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By James A. Luoma, Kerry L. Weber, and Denise A. Mayer

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Conversion Factors

International System of Units to Inch/Pound

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
micrometer (µm)	3.937×10^{-5}	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
nanometer (nm)	3.937×10^{-8}	inch (in.)
	Volume	
liter (L)	1.057	quart (qt)
milliliter (mL)	0.03382	ounce, fluid (fl. oz)
	Flow rate	
liter per minute (L/min)	0.2642	gallon per minute (gal/min)
milliliter per minute (mL/min)	0.0002642	gallon per minute (gal/min)
	Mass	
gram (g)	0.03527	ounce, avoirdupois (oz)
milligram (mg)	3.527×10^{-5}	ounce, avoirdupois (oz)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as °F = (1.8 × °C) + 32.

Conductivity is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C).

Concentrations of chemical constituents in water are given in milligrams per liter (mg/L).

Abbreviations

AI	active ingredient
$CaCO_3$	calcium carbonate
CL145A	strain of *Pseudomonas fluorescens*
DO	dissolved oxygen
L × W × H	length by width by height
LC_{50}	lethal concentration that causes 50 percent mortality in test organisms
SDP	spray-dried powder
TAN	total ammonia nitrogen
UMESC	Upper Midwest Environmental Sciences Center

Exposure-Related Effects of *Pseudomonas fluorescens*, Strain CL145A, on Coldwater, Coolwater, and Warmwater Fish

By James A. Luoma[1], Kerry L. Weber[1], and Denise A. Mayer[2]

Abstract

The exposure-related effects of a commercially prepared spray-dried powder (SDP) formulation of *Pseudomonas fluorescens*, strain CL145A, were evaluated on coldwater, coolwater, and warmwater fish endemic to the Great Lakes and Upper Mississippi River Basins. Nine species of young-of-the-year fish were exposed to SDP for 24 hours by using continuous-flow, serial-dilution exposure systems at temperatures of 12 degrees Celsius (°C; 2 species; *Oncorhynchus mykiss* [rainbow trout] and *Salvelinus fontinalis* [brook trout]), 17 °C (3 species; *Perca flavescens* [yellow perch], *Sander vitreus* [walleye], and *Acipenser fulvescens* [lake sturgeon]), or 22 °C (4 species; *Micropterus salmoides* [largemouth bass], *Micropterus dolomieu* [smallmouth bass], *Lepomis macrochirus* [bluegill sunfish], and *Ictalurus punctatus* [channel catfish]).

Treatments, which were nominal target concentrations of SDP (as active ingredient) of 50, 100, 200, and 300 milligrams per liter (mg/L), were continuously applied for 24 hours by the addition of a test article stock solution into the main water inflow of each exposure system's dilution box. The SDP-treated water was then serially diluted through a series of dilution cells before delivery to the test chambers. The exposure concentrations measured were 61.5 to 81.4 percent of the target concentration. After exposure, fish were monitored for 22 days to assess exposure-related latent effects.

Analyses of test animal condition factors and survival revealed that a 24-hour continuous dose of SDP affected all species. Calculated concentrations of SDP that would be lethal to 50 percent of the test animals (LC_{50}) for the coldwater species were 19.2 and 104.6 mg/L for rainbow and brook trout, respectively. The LC_{50}'s for the coolwater species were 185.4, 176.9 and 8.9 mg/L for yellow perch, walleye, and lake sturgeon, respectively. The LC_{50}'s for the warmwater species were 173.6, 139.4, and 63.1 for the largemouth bass, smallmouth bass, and channel catfish, respectively. A reliable LC_{50} for bluegill sunfish could not be calculated because mortality in the SDP-treated groups did not exceed 20 percent.

Further investigations to evaluate the SDP-exposure related effects on freshwater fish at the maximum approved open-water label concentration and exposure duration (100 mg/L for 8 hours) and using the expected lentic application technique (static application) are warranted. The variation in tolerance to *P. fluorescens*, strain CL145A, exposure observed in this study indicates that fish species community composition should be considered before SDP is applied in open-water environments.

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Introduction

North American freshwater mussels of the families Margaritiferidae and Unionidae comprise approximately 297 taxa; however, many of these species are imperiled or have become extinct in response to a variety of anthropogenic influences, including the introduction of invasive dreissenid mussels (*Dreissena polymorpha* [zebra mussel] and *Dreissena rostriformis bugensis* [quagga mussel]) (Williams and others, 1993; Burlakova and others, 2000; Strayer and others, 2004). The International Union for Conservation of Nature's Red List has 95 species of North American freshwater bivalves listed as vulnerable, endangered, or critically endangered and 29 listed as extinct (http://www.iucnredlist.org/, accessed March 31, 2015). Predictions for the future are not promising, with estimates of up to 127 unionid mussel species becoming extinct in the next 100 years—even without consideration of extirpations related to dreissenid mussels (Ricciardi and Rasmussen, 1999).

Because of their high reproductive capacity and a planktonic lifestage, dreissenid mussels rapidly disperse and inundate aquatic environments, as is evident by the identification of zebra mussels in 680 lakes and 27 states within the United States since their introduction in the mid-1980s (Birnbaum, 2011; Mackie, 1991; U.S. Geological Survey, 2014; Benson and others 2015). The detrimental influence that dreissenid mussels have on the condition and survival of native unionid mussels is well documented in the literature (Mackie, 1991; Schloesser and Kovalak, 1991; Nalepa, 1994; Baker and Hornbach, 1997; Strayer and Malcom, 2007; Nalepa and Schloesser, 2014).

A potential tool to mitigate the detrimental effects of dreissenids is a commercially formulated biopesticide containing a specific strain (CL145A) of the common soil bacterium *Pseudomonas fluorescens* (Molloy and others, 2013). The biopesticide, Zequanox®, is a spray-dried powder (SDP) formulation produced by Marrone Bio Innovations (Davis, California). Zequanox was registered by the U.S. Environmental Protection Agency (registration number 84059-15) for controlling dreissenid mussels in industrial water systems in 2012 and for open-water systems in 2014. The SDP formulation of *P. fluorescens* is currently under evaluation for use as a dreissenid mussel control tool to aid in native unionid mussel propagation and restoration programs. The evaluation process includes investigating SDP exposure-related effects on nontarget animals. Unionid mussel propagation requires the use of a variety of freshwater fish species as hosts for the parasitic life stage (glochidia) of unionid mussels. Typically, glochidia are flushed from gravid female mussels with water and allowed to adhere to host fish by placing the fish in a concentrated glochidia water bath. The host fish are then placed in containment cages within natural waterways to allow the mussels to excyst from the host fish and grow undisturbed for approximately 18 months. Application of a control tool, such as SDP, to manage dreissenid mussels adhering to these containment cages or adhering to native mussels could result in unintended SDP exposure to a variety of freshwater fish species. Therefore, it is prudent to evaluate exposure-related effects of SDP on nontarget fish that are either mussel hosts or endemic in potential SDP treatment areas. The objective of this study was to evaluate the exposure-related effects of the SDP formulation of *P. fluorescens*, strain CL145A, on the body condition (condition factor) and survival of coldwater, coolwater, and warmwater fish endemic to the Great Lakes and Upper Mississippi River Basins.

Materials and Methods

The protocol for this study is presented in appendix 1 (item 1). The methods and materials for this study are described in detail in the protocol and discussed within this report. Exceptions to the methods and materials in the protocol are identified in amendments (appendix 1, items 6–13), deviations

(appendix 2, items 1–36) and notes to file (appendix 1, items 2–5). No significant impacts resulted from the amendments or deviations.

Experimental Design

Laboratory trials were completed at the U.S. Geological Survey's Upper Midwest Environmental Sciences Center (UMESC) in La Crosse, Wisconsin, to assess the condition factor and survival of coldwater, coolwater, and warmwater fish following exposure to a SDP formulation of *P. fluorescens*, strain CL145A. Nine species of young-of-the-year fish (table 1) were exposed to SDP for 24 hours by using continuous-flow, serial-dilution exposure systems and then were monitored for 22 days. Test animals (n = 375 per species; 25 fish per test chamber) were randomly distributed to 1 of 15 test chambers (5 test chambers per exposure system × 3 exposure systems) in equal proportions (appendix 3, items 1–9) 18 to 21 hours prior to exposure. The experimental units for these trials were the individual test chambers; each of the three exposure systems had one experimental unit for each treatment group for a total of three experimental units per treatment group. Treatments were assigned to test chambers using a randomized block design (appendix 3, items 1–9). Test article stock solutions (30,000 milligrams per liter [mg/L] as active ingredient [A.I.]) were continuously administered into the main water inflows of each exposure system's dilution box, resulting in initial nominal SDP concentrations of 300 mg/L. The SDP-treated water was then subsequently diluted through a series of dilution cells. Effluents from dilution cells theoretically closest to target concentrations of 50, 100, 200, and 300 mg/L were used to supply SDP-treated water to the test chambers. Untreated water from each exposure system headbox was delivered through a separate dilution-box cell and supplied water to the untreated control test chamber. Exposures were 24 hours in duration, and surviving test animals from each test chamber were transferred to an observation chamber for 22 days of postexposure observation. At the conclusion of the postexposure observation period, all surviving test animals were euthanized, weighed, and measured (total length) for determination of condition factors.

Test Article

The test article was produced by Marrone Bio Innovations, Inc. (Davis, Calif.) and was a SDP formulation of *P. fluorescens* (strain CL145A) containing 50 percent active ingredient (weight-to-weight ratio *P. fluorescens*, strain CL145A). Test article concentrations are reported as active ingredient. Test article use was documented in test chemical logbooks (appendix 4, item 14). A zebra mussel bioassay was completed by the New York State Museum Field Research Laboratory (Cambridge, New York) to verify the biological activity for each lot of test article used in the study. Biological activity was confirmed as indicated by mean zebra mussel mortality ranging from 76.0 to 93.3 percent in the treated groups compared to 0.0 to 4.0 percent in the untreated groups (table 1; appendix 4, items 2–12).

Test Animals and Test Animal Handling

Young-of-the-year freshwater fish consisting of two coldwater species (*Oncorhynchus mykiss* [rainbow trout] and *Salvelinus fontinalis* [brook trout]), three coolwater species (*Perca flavescens* [yellow perch], *Sander vitreus* [walleye], and *Acipenser fulvescens* [lake sturgeon]), and four warmwater species (*Micropterus salmoides* [largemouth bass], *Micropterus dolomieu* [smallmouth bass], *Lepomis macrochirus* [bluegill sunfish], and *Ictalurus punctatus* [channel catfish]) endemic to the Great Lakes and Mississippi River Basins were used as the test animals. All test animals were obtained from the fish culture facility at the Upper Midwest Environmental Sciences Center and identified to

species as described in Eddy and Underhill (1978) by the center's fish culturist. The average test animal weight at the beginning of the study was 1–2 grams (g) except for lake sturgeon, which averaged 5.34 g (table 1). Test animal lot history, species verification, and maintenance records are presented in appendix 5 (items 3–15). Fish were acclimated and held at test temperature for at least 1 week and then transferred into the test system between 18 and 21 hours prior to exposure. Twenty-five test animals were distributed to each test chamber according to a predetermined randomization scheme in 3 distribution rounds of 5 or 10 fish per round (appendix 3, items 1–9).

Upon exposure termination, mortalities were recorded, and the dead fish were weighed and measured for total length. Up to five surviving test animals (depending on the number surviving; appendix 1, item 6) from each test chamber were euthanized, weighed, measured for total length, and preserved for histological examination. (Histological data are not included in this report.)

Table 1. Test animal, test article, and exposure date information for coldwater, coolwater, and warmwater fish exposed to Pseudomonas fluorescens, strain CL145A, for 24 hours in a continuous-flow, serial-dilution exposure system.

[SD, standard deviation; mm, millimeters; g, grams; RBT, rainbow trout, *Oncorhynchus mykiss*; BKT, brook trout, *Salvelinus fontinalis*; YEP, yellow perch, *Perca flavescens*; WAE, walleye, *Sander vitreus*; LMB, largemouth bass, *Micropterus salmoides*; SMB, smallmouth bass, *Micropterus dolomieu*; BLG, bluegill sunfish, *Lepomis macrochirus*; LST, lake sturgeon, *Acipenser fulvescens*; CCF, channel catfish, *Ictalurus punctatus*]

					Test article		
Scientific name	Common name	Code	Mean length[1] ± SD (mm)	Mean weight[1] ± SD (g)	Lot number	Biological activity (percent)	Exposure date
Oncorhynchus mykiss	Rainbow trout	RBT	48 ± 3	1.12 ± 0.27	TR 4669-3-(6)	90.7 ± 3.5	February 29, 2012
Salvelinus fontinalis	Brook trout	BKT	55 ± 3	1.33 ± 0.34	MBI-401 SDP TR4669-4-(5)	76.0 ± 8.0	May 2, 2012
Perca flavescens	Yellow perch	YEP	51 ± 3	1.18 ± 0.19	TR 4669-4-(6)	76.9 ± 6.0	March 7, 2012
Sander vitreus	Walleye	WAE	68 ± 5	1.94 ± 0.47	TR 4669-4-(7-8)	77.3 ± 4.8	March 21, 2012
Acipenser fulvescens	Lake sturgeon	LST	115 ± 11	5.34 ± 1.50	401P12154G-02	93.3 ± 8.3	August 1, 2012
Micropterus salmoides	Largemouth bass	LMB	47 ± 4	1.16 ± 0.38	TR4669-4-(5) 2nd shipment	77.5 ± 6.4	June 12, 2012
Micropterus dolomieu	Smallmouth bass	SMB	53 ± 3	1.68 ± 0.34	TR4669-4-(5) 3rd shipment	89.5 ± 2.2	June 20, 2012
Lepomis macrochirus	Bluegill sunfish	BLG	50 ± 5	1.92 ± 0.66	TR4669-3-(7)	93.3 ± 2.3	July 11, 2012
Ictalurus punctatus	Channel catfish	CCF	56 ± 4	1.63 ± 0.34	401P12154G-02 2nd shipment	82.7 ± 4.6	September 26, 2012

[1]Values measured on a representative sample of fish (n = 40) collected during the distribution of fish to the exposure chambers.

Pooled wet weights were obtained for the remaining test animals in each test chamber, and the weights were used to determine the initial feed ration. Fish from each test chamber were randomly transferred into an observation chamber for a 22-day observation period (appendix 3, items 1–9). Throughout the observation period, fish were offered the same diet used during the preexposure acclimation and holding period, which was a diet of commercially prepared dry feed, frozen adult brine shrimp, or frozen chironomid larvae. The feed ration was based on a percentage of the fish weight within each observation chamber, and the feed type and ration varied by species. Coldwater species (rainbow and brook trout) were fed 5 percent body weight per day of commercially prepared dry feed. The coolwater species, yellow perch and walleye, were fed 15 and 20 percent body weight per day of frozen adult brine shrimp, respectively, and the lake sturgeon were fed 20 percent body weight per day of frozen chironomid larvae. The warmwater species—largemouth bass, smallmouth bass, and bluegill sunfish—were fed 15, 15–20, and 15–18 percent body weight per day of frozen adult brine shrimp, respectively, and the channel catfish were fed 5 percent body weight per day of commercially prepared dry feed. Rations were adjusted daily to account for mortality and weekly to account for fish growth (appendix 6, items 1–13). Upon termination of the observation period, all fish were euthanized with tricaine methanesulfonate, weighed, and measured for total length.

Test System

The test system consisted of three independent continuous-flow, serial-dilution exposure systems, and each system consisted of a headbox, a dilution box, and a series of five glass aquarium test chambers (≈51 × 25 × 33 centimeters [cm] length by width by height [L × W × H] containing 15 liters [L] of exposure water; figs 1 and 2). To maintain consistent head pressure and resulting consistent water inflow to the dilution boxes, temperature-adjusted (12, 17 or 22 degrees Celsius [°C]) well water was maintained at a depth of ≈ 12 cm in the headboxes, which were mounted directly above the dilution boxes. Dilution boxes were mounted above the test chambers and delivered a concentration gradient of SDP-treated and untreated (control) water to the test chambers. Test article stock solutions were delivered into the main dilution box inflow by using a peristaltic pump (Masterflex® Digi-staltic drive, model 77310; Cole-Parmer, Vernon Hills, Illinois) fitted with Masterflex L/S 16 tubing. The SDP-treated water was then serially diluted approximately 19 percent through each of the next nine subsequent dilution cells with the addition of dilution water from the headbox. Except for the first dilution box cell (main inflow cell), water was removed from each dilution-box cell at the same rate as water addition from the headbox (265 ± 5 milliliters per minute [mL/min]). Effluent from five dilution-box cells supplied the appropriate test chambers with untreated or SDP-treated water (nominal concentrations of 0, 50, 100, 200 or 300 mg/L) according to a predetermined randomization scheme (appendix 3, items 1–9). Aeration was supplied to the test chambers during the 17 and 22 °C exposures; aeration was not supplied during the 12 °C exposures.

A flowthrough postexposure observation system was constructed and consisted of 4 sections containing 15 glass aquarium observation chambers (≈ 51 × 25 × 33 cm, L × W × H; 30 L of water) per section (fig. 3). Temperature-adjusted (12, 17 or 22 °C) well water was gravity fed to each observation chamber at approximately 0.5 liter per minute to achieve one tank-volume exchange per hour. Aeration was supplied to each chamber but was interrupted daily during feeding. Polyvinyl chloride pipe (6 pieces; ≈ 2.5 × 20.3 cm each, inner diameter × length) were placed in the smallmouth bass and bluegill sunfish observation chambers to reduce aggressive fish behavior.

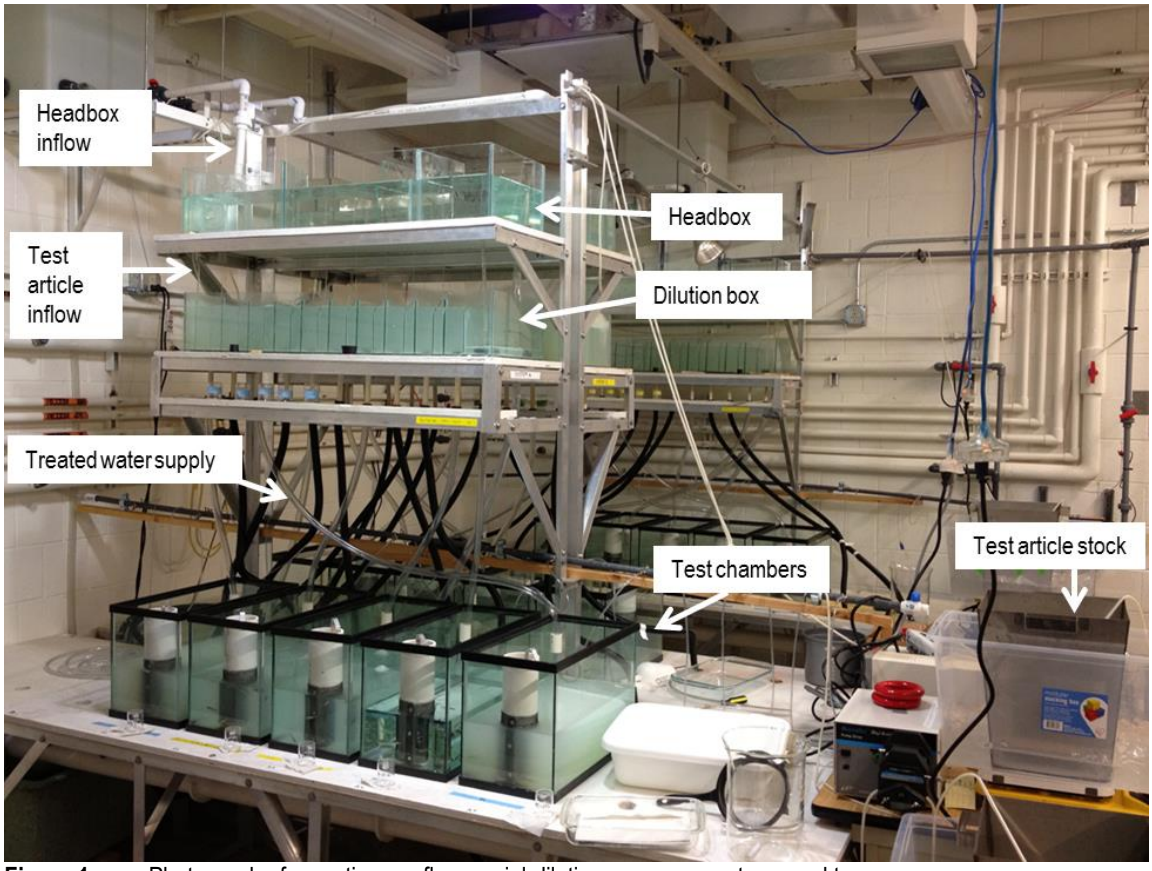

Figure 1. Photograph of a continuous-flow, serial-dilution exposure system used to expose coldwater, coolwater, and warmwater fish to *Pseudomonas fluorescens*, strain CL145A, for 24 hours.

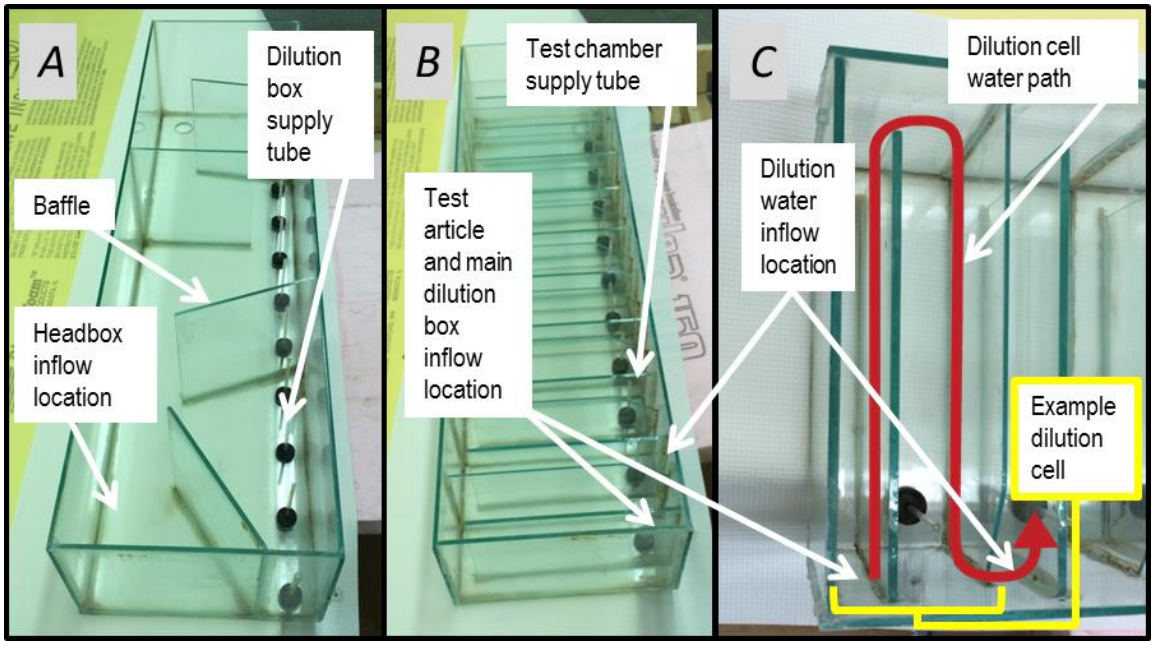

Figure 2. Photographs showing plan views of a headbox (*A*), dilution box (*B*), and a dilution-box cell (*C*) from a continuous-flow, serial-dilution exposure system used to expose coldwater, coolwater, and warmwater fish to *Pseudomonas fluorescens*, strain CL145A, for 24 hours.

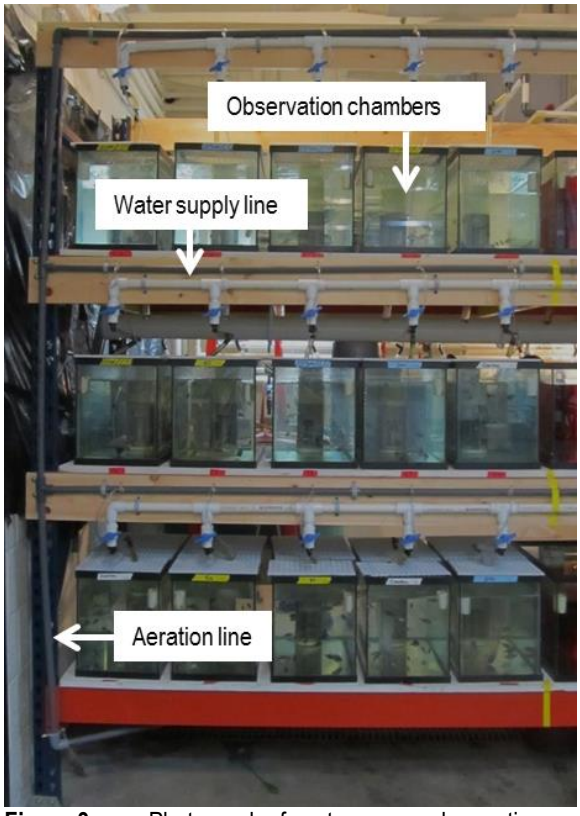

Figure 3. Photograph of postexposure observation system used to monitor fish for 22 days after a 24-hour exposure to *Pseudomonas fluorescens*, strain CL145A.

Test Article Preparation, Delivery and Verification

Two 12-L stock solutions containing 30,000 mg SDP/L (A.I.) were prepared for each test system during the course of the 24-hour exposure by mixing 720 g of SDP into 12 L of well water with a paint mixer attached to an electric drill. Stock solutions were prepared within 2 hours of use and maintained in an ice bath to reduce degradation. The stock solutions were continuously agitated during the exposure by using a stir plate with a magnetic stir bar or an overhead mixer. The stocks were delivered to the main water inflow of the dilution box by using a calibrated peristaltic pump to achieve nominal target concentrations of 300 mg/L in the first dilution-box cells. SDP-treated water was then subsequently diluted as previously described. Exposure concentrations were measured at 1, 3, 6, 12, 15, 18, and 24 hours except for the *S. vitreus* exposures, which were not measured at 15 hours. SDP concentrations were determined by comparing the absorbance of water samples collected from each test chamber to a zero-intercept linear regression created from a known mass of test article. A 2,000-mg/L A.I. test article stock solution was prepared by mixing 2.0 g of test article with well water in a 500-mL volumetric flask and then was used to create a series of test article dilutions from which a five-point, zero-intercept linear regression was made for determining exposure concentrations. The series of test article dilutions bracketed the expected SDP concentration, and a minimum of three absorbance measurements were recorded for each dilution and used to create the linear regression. All absorbance measurements were obtained by using a Beckman DU 800 spectrophotometer at a wavelength of 660 nanometers (appendix 8, item 1–18).

Water Chemistry

Prior to exposure, water hardness, alkalinity, and conductivity were measured in water samples collected from the headbox of each test system, and dissolved oxygen (DO), pH, and temperature were measured in each test chamber. During the exposure, DO, pH, and temperature were measured in each test chamber at 1, 6, 12, and 24 hours, and water hardness, alkalinity, and conductivity were measured at 3 hours. At the end of the exposure (24 hours), water samples were collected from each test chamber, filtered (0.45-micrometer polytetrafluoroethylene membrane), acidified to pH ≤ 2.5 with 10 percent sulfuric acid, and stored at ≈4 ºC until analyzed for total ammonia nitrogen (TAN) by means of the automated phenate method (Standard Method 4500G in American Public Health Association and others, 2012). Un-ionized ammonia concentrations were calculated by using the pH and temperature recorded at the time of sample collection with the formula identified by Emerson and others (1975). During the observation period, DO, pH, and temperature were measured daily, and water hardness, alkalinity, and conductivity were measured weekly in one representative treatment-group observation chamber.

Fish Condition Factor

Individual fish condition factors were calculated to assess potential sublethal SDP exposure-related effects. Individual fish weights and total lengths were measured at the termination of the observation period and used to calculate the individual fish condition factors as described in Piper and others (1982), according to equation 1:

$$Condition \text{ factor (K)} = \frac{W}{L^3} \quad (1)$$

where W is the fish weight in grams, and
L^3 is the cube of the fish length in millimeters.

Data Analysis

Analysis of water chemistry (DO, pH, temperature, alkalinity, water hardness, conductivity, and ammonia) and exposure concentration data analyses were limited to simple descriptive statistics calculated using SAS® software versions 9.3 or 9.4 (SAS, 2010) and Microsoft Office® Professional Plus 2010 Excel (Version 14.0.7145.5000 [32-bit]).

Statistical significance for all analyses was declared at $\alpha \leq 0.05$, and the three independent treatment group replicates (test chambers) were the experimental units in all analyses. Mean fish condition factors were calculated for each treatment-group replicate at the end of the observation period and analyzed using SAS software version 9.4. Condition factors for each treatment group were modeled using a mixed effects model with a random intercept. Normally distributed residuals were assumed for the model and, to allow for proper model convergence, the response was rescaled by using a multiplication factor of 100,000 (appendix 9, item 2). Condition factors of each treatment group were individually compared to the condition factors of the untreated control groups using unadjusted least squares means.

Mean fish survival at the end of the observation period was calculated for each treatment group replicate and analyzed using SAS software version 9.4. In accordance with Agresti (2007), a constant of 0.01 was added to the proportion of surviving test animals to allow for model convergence within SAS. The change in the proportion of surviving test animals in each treatment group at the conclusion of the

observation period was analyzed using a generalized linear mixed model with a Poisson distribution and a log link function. A scale parameter was included in the model by using the "random_residual_" statement (appendix 9, Item 5). Pairwise comparison tests were completed to compare each treatment group to the control group using unadjusted least squares means.

The lethal concentration of SDP to cause mortality in 50 percent of the test animals (LC_{50}) and corresponding 95 percent fiducial limits were calculated using SAS software version 9.3 (appendix 9, item 6). The LC_{50}'s were calculated using a probit regression analysis, which modeled the number of mortalities with the measured SDP concentration in the test chambers. To allow for the asymmetry in the mortality curve, the walleye and largemouth bass LC_{50}'s were calculated with a Gompertz distribution specified.

Results and Discussion

The preexposure water chemistry parameters are summarized in tables 2 and 3 and are presented in appendix 7 (items 1–18). The mean DO ranged from 7.72 to 9.95 mg/L; pH from 7.83 to 8.16; and temperature from 12.9 to 13.0 °C (rainbow and brook trout), 17.0 to 17.4 °C (yellow perch, walleye, and lake sturgeon), and 21.1 to 22.0 °C (largemouth bass, smallmouth bass, bluegill sunfish, and channel catfish). Water hardness ranged from 172 to 177 mg/L as calcium carbonate ($CaCO_3$), alkalinity from 124 to 130 mg/L as $CaCO_3$, and conductivity from 362 to 398 microsiemens per centimeter (µS/cm).

Water chemistry parameters measured during exposure are summarized in tables 2 and 3 and are presented in appendix 7 (items 1–18). The mean DO ranged from 7.02 to 9.78 mg/L; pH from 7.21 to 8.22; and temperature from 12.8 to 13.0 °C (rainbow and brook trout), 17.1 to 17.3 °C (yellow perch, walleye, and lake sturgeon), and 21.5 to 22.0 °C (largemouth bass, smallmouth bass, bluegill sunfish, and channel catfish). Water hardness ranged from 171 to 180 mg/L as $CaCO_3$, alkalinity from 123 to 138 mg/L as $CaCO_3$, and conductivity from 363 to 418 µS/cm. The maximum observed TAN was 0.33 mg/L, and the un-ionized ammonia remained below 0.01 mg/L in all treatment groups (presented in appendix 7, items 1–18). Both the TAN and the un-ionized ammonia were below the criteria identified for salmonid culture water (1.0 mg/L of total ammonia nitrogen and 0.02 mg/L of un-ionized ammonia) in Timmons and Ebeling (2007).

Water chemistry parameters measured during the postexposure observation period are summarized in tables 2 and 3 and are presented in appendix 7 (items 1–18). The mean DO ranged from 7.88 to 10.30 mg/L; pH from 7.64 to 8.46; temperature from 12.6 to 13.0 °C (rainbow and brook), 17.0 to 17.2 °C (yellow perch, walleye, and lake sturgeon), and 21.7 to 22.0 °C (largemouth bass, smallmouth bass, bluegill sunfish, and channel catfish). Water hardness ranged from 171 to 176 mg/L as $CaCO_3$; alkalinity from 125 to 131 mg/L as $CaCO_3$; and conductivity from 364 to 384 µS/cm.

Coefficients of determination (r^2) for the zero-intercept linear regressions used for determination of exposure concentrations exceeded 0.99 for all trials (appendix 8, items 10–18). Concentrations of SDP measured in the exposure chambers were consistently lower than expected, presumably from the settling of SDP that was observed in the dilution boxes. The mean percentage of target concentration in the test chambers for each species ranged from 61.5 to 81.4 percent (table 4). Mean SDP concentrations measured in each treatment group ranged from 30.3 to 40.3, 59.3 to 80.1, 123.5 to 166.9, and 192.5 to 244.4 mg/L for the 50-, 100-, 200-, and 300-mg/L treatment groups, respectively (table 4; appendix 8, items 10–18).

Condition factors for each species of fish at the termination of the postexposure observation period are shown in figs. 4–6 and presented in appendix 9 (item 2). All SDP-treated groups for the coldwater species tested (rainbow and brook trout) had significantly lower condition factors than the untreated control groups. For the three coolwater species tested (yellow perch, walleye, and lake

sturgeon), differences in condition factors were detected only in the two highest SDP-treated groups for yellow perch (138.2 and 205.6 mg/L). Although no statistical difference was detected when comparing the condition factors of lake sturgeon that survived exposure concentrations of 36.0 and 149.8 mg/L, the species is very sensitive to the SDP exposure, as indicated by the low survival in all SDP-treated groups (≤ 11.7 percent). Analyses of the warmwater species tested revealed that differences between the condition factors of fish in the SDP-treated groups and fish in the untreated control groups was dependent upon species. Bluegill sunfish had no detectable differences in condition factor when comparing the SDP-treated groups to the untreated control group. Differences in condition factors were detected in largemouth bass SDP-treated groups at concentrations ≥ 75.3 mg/L, and differences were detected in all smallmouth bass SDP-treated groups when compared to the untreated control groups. Although a statistical difference ($p = 0.04$) was detected when comparing channel catfish exposed to a SDP concentration of 59.3 mg/L to the untreated control group, the biological significance is indeterminate.

After 22 days of postexposure observation, mean survival in all control groups exceeded 98 percent. Survival of the two coldwater species, rainbow and brook trout, was impacted at SDP concentrations ≥ 32.8 and 80.1 mg/L, respectively; no rainbow trout survived SDP exposure concentrations ≥ 135.0 mg/L, and no brook trout survived a SDP exposure concentration of 244.4 mg/L. Differences in the survival of the coolwater species, yellow perch and walleye, were detected at SDP concentrations ≥ 138.2 and 149.3 mg/L, respectively, and mean survival was 37.6 and 28.3 percent in the highest SDP-treated groups (205.9 and 221.2 mg/L), respectively. Survival of the third coolwater species, lake sturgeon, was very low in all SDP-treated groups, with a mean survival of only 11.7 percent in the lowest SDP concentration tested (36.0 mg/L). In warmwater species, significant differences in the survival of largemouth bass in the SDP-treated groups were detected at SDP concentrations ≥ 159.9 mg/L (61.5 percent survival at 159.9 mg/L), and a significant difference in the survival of smallmouth bass was observed in the SDP-treated group that had the highest SDP exposure concentration (214.5 mg/L; 17.6 percent survival). Significant differences in the survival of bluegill sunfish were observed in both the 138.0- and 212.6-mg/L SDP-treated groups; however, mean survival was 80 percent in the highest SDP-treated group (212.6 mg/L). Survival of channel catfish was impacted at SDP concentrations ≥ 59.3 mg/L (49 percent survival at 59.3 mg/L), and no channel catfish survived the highest SDP concentration (192.5 mg/L).

The LC_{50}'s calculated for each species are presented in figures 4–6 and in appendix 9 (item 6). The calculated LC_{50}'s (95-percent fiducial limits) for the coldwater species rainbow and brook trout are 19.2 (1.6–30.9) and 104.6 (93.6–116.1) mg/L, respectively. The calculated LC_{50}'s (95-percent fiducial limits) for the coolwater species yellow perch, walleye, and lake sturgeon are 185.4 (159.1–228.8), 176.9 (154.8–207.6) and 8.9 (0.2–19.1) mg/L, respectively. For the warmwater species, the LC_{50}'s (95-percent fiducial limits) values for largemouth bass, smallmouth bass, and channel catfish are 173.6 (159.3–185.8), 139.4 (95.2–224.5), and 63.1 (56.8–69.9) mg/L, respectively. Calculation of a LC_{50} for the bluegill sunfish is unreliable because the mortality did not exceed 20 percent in any SDP-treated group.

Table 2. Mean (standard deviation) dissolved oxygen, pH range, and temperature by treatment group measured during the preexposure, exposure, and postexposure observation periods for tests in which coldwater, coolwater, and warmwater fish were exposed to *Pseudomonas fluorescens*, strain CL145A, for 24 hours in a continuous-flow, serial-dilution exposure system.

[mg/L, milligrams per liter; RBT, rainbow trout, *Oncorhynchus mykiss*; BKT, brook trout, *Salvelinus fontinalis*; YEP, yellow perch, *Perca flavescens*; WAE, walleye, *Sander vitreus*; LMB, largemouth bass, *Micropterus salmoides*; SMB, smallmouth bass, *Micropterus dolomieu*; BLG, bluegill sunfish, *Lepomis macrochirus*; LST, lake sturgeon, *Acipenser fulvescens*; CCF, channel catfish, *Ictalurus punctatus*; DO, dissolved oxygen; NC, sample not collected; Temp, temperature; °C, degrees Celsius]

Water quality parameter	Treatment group	RBT	BKT	YEP	WAE	LST	LMB	SMB	BLG	CCF
					Preexposure					
DO (mg/L)	Control	NC	9.95 (0.21)	8.93 (0.12)	8.22 (0.05)	8.99 (0.11)	7.91 (0.07)	8.11 (0.10)	7.77 (0.05)	7.78 (0.04)
	50 mg/L	NC	9.94 (0.12)	8.97 (0.10)	8.18 (0.15)	8.99 (0.11)	7.96 (0.04)	8.06 (0.05)	7.83 (0.11)	7.72 (0.05)
	100 mg/L	NC	9.90 (0.19)	8.99 (0.04)	8.01 (0.29)	8.84 (0.18)	7.94 (0.09)	7.96 (0.25)	7.83 (0.06)	7.81 (0.06)
	200 mg/L	NC	9.93 (0.24)	8.87 (0.17)	8.26 (0.04))	8.85 (0.26)	7.92 (0.11)	8.05 (0.05)	7.86 (0.02)	7.83 (0.10)
	300 mg/L	NC	9.92 (0.13)	8.96 (0.06)	8.36 (0.21)	8.99 (0.11)	7.95 (0.08)	8.14 (0.04)	7.83 (0.08)	7.88 (0.24)
pH range	Control	NC	7.94–8.03	7.83–7.96	7.89–7.97	8.05–8.10	7.97–8.02	8.03–8.05	8.05–8.09	8.02–8.09
	50 mg/L	NC	7.94–8.05	7.89–7.95	7.90–7.96	8.05–8.08	7.99–8.08	8.00–8.03	8.06–8.12	8.01–8.06
	100 mg/L	NC	7.95–8.00	7.90–7.94	7.87–7.96	7.99–8.05	7.97–8.06	7.97–8.02	8.05–8.12	8.05–8.07
	200 mg/L	NC	7.92–8.05	7.83–7.94	7.93–7.98	7.98–8.07	7.98–8.07	8.01–8.04	8.08–8.11	8.02–8.13
	300 mg/L	NC	7.96–7.98	7.87–7.91	7.96–7.99	8.06–8.10	8.00–8.06	8.01–8.03	8.05–8.10	7.98–8.16
Temp (°C)	Control	NC	13.0 (0.1)	17.0 (0.1)	17.4 (0.1)	17.0 (0.1)	21.3 (0.1)	22.0 (0.1)	21.9 (0.06)	21.5 (0.0)
	50 mg/L	NC	13.0 (0.2)	17.0 (0.1)	17.4 (0.1)	17.1 (0.1)	21.1 (0.1)	22.0 (0.1)	21.8 (0.0)	21.4 (0.1)
	100 mg/L	NC	12.9 (0.1)	17.0 (0.1)	17.3 (0.1)	17.1 (0.1)	21.2 (0.1)	21.9 (0.1)	21.8 (0.1)	21.4 (0.0)
	200 mg/L	NC	12.9 (0.1)	17.0 (0.1)	17.4 (0.1)	17.1 (0.1)	21.3 (0.1)	22.0 (0.2)	21.8 (0.1)	21.4 (0.1)
	300 mg/L	NC	12.9 (0.1)	17.0 (0.1)	17.4 (0.1)	17.1 (0.1)	21.3 (0.1)	22.0 (0.2)	21.9 (0.1)	21.4 (0.2)
					Exposure					
DO (mg/L)	Control	9.70 (0.13)	9.78 (0.13)	8.78 (0.25)	8.43 (0.16)	9.03 (0.14)	7.95 (0.10)	8.18 (0.10)	8.00 (0.07)	7.80 (0.15)
	50 mg/L	9.66 (0.14)	9.71 (0.14)	8.61 (0.32)	8.17 (0.14)	8.86 (0.21)	7.68 (0.45)	7.74 (0.47)	7.57 (0.41)	7.40 (0.31)
	100 mg/L	9.62 (0.13)	9.61 (0.17)	8.60 (0.35)	8.00 (0.24)	8.59 (0.26)	7.58 (0.57)	7.51 (0.70)	7.31 (0.63)	7.42 (0.39)
	200 mg/L	9.57	9.63	8.63	7.97	8.44	7.46	7.20	7.26	7.28

Water quality parameter	Treatment group	RBT	BKT	YEP	WAE	LST	LMB	SMB	BLG	CCF
		(0.20)	(0.20)	(0.34)	(0.26)	(0.21)	(0.66)	(1.11)	(0.77)	(0.59)
	300 mg/L	9.58 (0.20)	9.67 (0.17)	8.66 (0.28)	8.11 (0.27)	8.62 (0.21)	7.39 (0.57)	7.22 (0.86)	7.02 (0.87)	7.21 (0.73)
pH range	Control	7.81–8.00	7.72–7.96	7.74–7.89	7.80–7.99	7.96–8.19	7.89–8.19	7.96–8.15	8.09–8.22	7.87–8.17
	50 mg/L	7.78–7.93	7.64–7.91	7.68–7.84	7.71–7.93	7.95–8.12	7.71–8.12	7.72–8.12	7.83–8.11	7.79–8.05
	100 mg/L	7.72–7.87	7.58–7.81	7.59–7.80	7.65–7.91	7.83–8.04	7.61–8.09	7.55–8.08	7.67–8.07	7.72–8.03
	200 mg/L	7.75–7.66	7.47–7.73	7.54–7.73	7.54–7.82	7.74–7.89	7.42–7.99	7.21–8.07	7.54–8.02	7.53–7.98
	300 mg/L	7.54–7.68	7.43–7.68	7.44–7.68	7.49–7.76	7.69–7.92	7.36–7.92	7.26–7.95	7.29–7.96	7.45–7.89
Temp (°C)	Control	12.8 (0.1)	13.0 (0.1)	17.1 (0.1)	17.2 (0.1)	17.1 (0.1)	21.9 (0.1)	21.9 (0.1)	21.8 (0.1)	21.6 (0.1)
	50 mg/L	12.9 (0.1)	13.0 (0.1)	17.1 (0.1)	17.2 (0.1)	17.1 (0.1)	21.8 (0.1)	22.0 (0.1)	21.8 (0.1)	21.6 (0.1)
	100 mg/L	12.9 (0.1)	13.0 (0.1)	17.1 (0.1)	17.2 (0.1)	17.1 (0.1)	21.9 (0.1)	22.0 (0.1)	21.9 (0.1)	21.6 (0.1)
	200 mg/L	12.8 (0.1)	12.9 (0.1)	17.1 (0.1)	17.3 (0.1)	17.1 (0.1)	21.9 (0.1)	21.9 (0.2)	21.7 (0.1)	21.5 (0.1)
	300 mg/L	12.9 (0.1)	12.9 (0.1)	17.1 (0.1)	17.2 (0.1)	17.1 (0.1)	21.9 (0.1)	22.0 (0.1)	21.9 (0.0)	21.6 (0.1)
Postexposure observation										
DO (mg/L)	Control	10.13 (0.31)	10.09 (0.24)	9.11 (0.11)	9.17 (0.17)	8.39 (0.44)	8.14 (0.16)	8.05 (0.13)	8.18 (0.22)	7.88 (0.28)
	50 mg/L	10.23 (0.19)	10.11 (0.21)	9.10 (0.11)	9.21 (0.13)	8.89 (0.32)	8.15 (0.15)	8.07 (0.13)	8.10 (0.22)	7.98 (0.16)
	100 mg/L	10.27 (0.18)	10.08 (0.25)	9.12 (0.11)	9.18 (0.15)	8.93 (0.30)	8.17 (0.17)	8.03 (0.15)	8.15 (0.19)	8.07 (0.19)
	200 mg/L	10.27 (0.15)	10.16 (0.26)	9.16 (0.10)	9.24 (0.13)	8.92 (0.30)	8.22 (0.15)	8.07 (0.12)	8.12 (0.18)	8.14 (0.17)
	300 mg/L	10.30 (0.18)	10.18 (0.27)	9.14 (0.11)	9.29 (0.14)	9.15 (0.18)	8.24 (0.16)	8.16 (0.11)	8.19 (0.16)	8.18 (0.14)
pH range	Control	7.64–8.03	7.67–8.12	7.83–8.16	7.87–8.14	7.66–8.12	8.01–8.24	8.03–8.46	7.92–8.34	7.69–8.19
	50 mg/L	7.70–8.04	7.79–8.03	7.86–8.14	7.90–8.12	7.83–8.16	8.02–8.32	8.05–8.31	7.92–8.28	7.73–8.15
	100 mg/L	7.76–8.06	7.76–8.07	7.87–8.15	7.93–8.17	7.86–8.16	7.98–8.30	7.97–8.31	7.96–8.36	7.71–8.16
	200 mg/L	7.76–8.05	7.80–8.04	7.89–8.17	7.89–8.20	7.88–8.12	8.06–8.30	8.05–8.28	7.99–8.25	7.80–8.18
	300 mg/L	7.72–8.04	7.75–8.02	7.85–8.11	7.93–8.21	7.92–8.17	8.10–8.30	8.06–8.32	7.93–8.34	7.79–8.15
Temp (°C)	Control	12.8 (0.4)	12.9 (0.2)	17.0 (0.1)	17.0 (0.1)	17.1 (0.1)	21.9 (0.2)	21.9 (0.3)	21.8 (0.2)	21.9 (0.2)
	50 mg/L	12.9 (0.4)	12.9 (0.3)	17.0 (0.1)	17.0 (0.1)	17.2 (0.1)	22.0 (0.1)	22.0 (0.1)	21.9 (0.2)	21.9 (0.1)
	100 mg/L	12.8 (0.3)	13.0 (0.2)	17.0 (0.1)	17.0 (0.1)	17.2 (0.1)	21.9 (0.1)	21.9 (0.1)	21.8 (0.2)	21.9 (0.2)
	200 mg/L	12.7 (0.3)	12.9 (0.3)	17.0 (0.1)	17.0 (0.1)	17.2 (0.0)	21.9 (0.2)	21.9 (0.1)	21.8 (0.2)	21.8 (0.2)
	300 mg/L	12.6 (0.2)	12.9 (0.2)	17.0 (0.1)	17.0 (0.1)	17.1 (0.1)	21.9 (0.1)	21.9 (0.2)	21.9 (0.2)	21.7 (0.2)

Table 3. Mean (standard deviation) water alkalinity, hardness, and conductivity during the preexposure, exposure, and observation periods for tests in which coldwater, coolwater, and warmwater fish were exposed to *Pseudomonas fluorescens*, strain CL145A, for 24 hours in a continuous-flow, serial-dilution exposure system.
[RBT, rainbow trout, *Oncorhynchus mykiss*; BKT, brook trout, *Salvelinus fontinalis*; YEP, yellow perch, *Perca flavescens*; WAE, walleye, *Sander vitreus*; LMB, largemouth bass, *Micropterus salmoides*; SMB, smallmouth bass, *Micropterus dolomieu*; BLG, bluegill sunfish, *Lepomis macrochirus*; LST, lake sturgeon, *Acipenser fulvescens*; CCF, channel catfish, *Ictalurus punctatus*; mg/L, milligrams per liter; NA, not applicable; --, no data; alkalinity and hardness reported as mg/L of calcium carbonate; conductivity reported as µS/cm, microsiemens per centimeter at 25 degrees Celsius]

Water quality parameter	Treatment group	RBT	BKT	YEP	WAE	LST	LMB	SMB	BLG	CCF
Preexposure										
Alkalinity (mg/L)	NA	--	124 (2)	128 (1)	126 (2)	130 (1)	129 (1)	130 (1)	130 (2)	128 (1)
Hardness (mg/L)	NA	--	174 (2)	177 (1)	177 (1)	172 (2)	174 (2)	173 (1)	173 (1)	174 (0)
Conductivity (µs/cm)	NA	--	369 (3)	378 (4)	398 (4)	371 (2)	362 (0)	366 (3)	368 (2)	373 (2)
Exposure										
Alkalinity (mg/L)	Control	127 (3)	125 (1)	127 (1)	127 (1)	130 (1)	123 (1)	129 (1)	130 (1)	128 (2)
	50 mg/L	128 (2)	127 (1)	129 (0)	126 (1)	132 (0)	131 (1)	131 (2)	130 (0)	131 (1)
	100 mg/L	128 (2)	127 (1)	130 (2)	128 (1)	133 (1)	132 (1)	134 (4)	132 (1)	131 (1)
	200 mg/L	131 (1)	130 (0)	132 (1)	131 (1)	136 (2)	133 (2)	135 (1)	134 (1)	134 (2)
	300 mg/L	133 (2)	133 (0)	134 (2)	134 (2)	136 (1)	137 (2)	138 (2)	136 (1)	135 (2)
Hardness (mg/L)	Control	179 (1)	175 (1)	179 (1)	177 (1)	173 (1)	171 (2)	172 (2)	174 (2)	175 (1)
	50 mg/L	180 (2)	174 (2)	177 (3)	176 (0)	174 (2)	173 (3)	173 (1)	173 (1)	175 (1)
	100 mg/L	179 (3)	174 (0)	179 (1)	177 (1)	173 (2)	171 (1)	173 (1)	175 (3)	175 (1)
	200 mg/L	178 (2)	177 (4)	179 (1)	179 (1)	175 (1)	173 (1)	172 (0)	173 (1)	176 (2)
	300 mg/L	177 (2)	178 (4)	179 (3)	177 (1)	174 (2)	171 (1)	174 (0)	175 (1)	177 (1)
Conductivity (µs/cm)	Control	383 (16)	380 (5)	366 (17)	396 (6)	379 (9)	363 (5)	365 (5)	377 (5)	367 (8)
	50 mg/L	379 (26)	373 (2)	366 (19)	398 (6)	392 (4)	367 (2)	369 (3)	386 (3)	377 (2)
	100 mg/L	376 (19)	374 (10)	368 (26)	405 (7)	394 (3)	371 (5)	371 (1)	392 (2)	383 (3)
	200 mg/L	390	391	379	413	401	380	378	398	390

Water quality parameter	Treatment group	RBT	BKT	YEP	WAE	LST	LMB	SMB	BLG	CCF
		(25)	(2)	(9)	(9)	(6)	(6)	(2)	(3)	(3)
	300 mg/L	391 (6)	399 (8)	386 (7)	418 (1)	412 (8)	381 (10)	385 (5)	404 (9)	397 (1)
Postexposure observation										
Alkalinity (mg/L)	NA	125 (0)	127 (3)	125 (1)	125 (3)	128 (1)	131 (1)	130 (1)	127 (4)	128 (1)
Hardness (mg/L)	NA	172 (2)	174 (1)	172 (3)	175 (2)	176 (2)	174 (4)	171 (1)	171 (3)	173 (3)
Conductivity (µs/cm)	NA	384 (19)	368 (10)	384 (12)	371 (2)	371 (14)	364 (12)	367 (14)	369 (5)	377 (7)

Table 4. Mean (standard deviation) observed concentrations of *Pseudomonas fluorescens*, strain CL145A (in milligrams per liter of as active ingredient), during 24 hour exposures of coldwater, coolwater, and warmwater fish completed with continuous-flow, serial-dilution exposure systems.

[RBT, rainbow trout, *Oncorhynchus mykiss*; BKT, brook trout, *Salvelinus fontinalis*; YEP, yellow perch, *Perca flavescens*; WAE, walleye, *Sander vitreus*; LMB, largemouth bass, *Micropterus salmoides*; SMB, smallmouth bass, *Micropterus dolomieu*; BLG, bluegill sunfish, *Lepomis macrochirus*; LST, lake sturgeon, *Acipenser fulvescens*; CCF, channel catfish, *Ictalurus punctatus*; ND, not detectable-below detection limit; mg/L, milligrams per liter]

Treatment group	RBT	BKT	YEP	WAE	LST	LMB	SMB	BLG	CCF
Control	ND	ND	ND	ND	ND	ND	ND	ND	ND
50 mg/L	32.8 (6.4)	40.3 (5.8)	33.2 (8.1)	35.7 (7.7)	36.0 (6.4)	37.0 (5.9)	33.4 (5.7)	34.5 (5.7)	30.3 (6.2)
100 mg/L	65.5 (12.1)	80.1 (13.3)	66.0 (13.6)	70.9 (13.9)	73.4 (8.8)	75.3 (11.7)	66.6 (9.0)	67.9 (9.8)	59.3 (8.0)
200 mg/L	135.0 (13.6)	166.9 (9.2)	138.2 (22.5)	149.3 (16.0)	149.8 (16.0)	159.9 (12.1)	138.6 (15.9)	138.0 (11.5)	123.5 (6.3)
300 mg/L	198.4 (20.9)	244.4 (15.3)	205.9 (31.7)	221.2 (21.2)	223.2 (17.2)	242.2 (18.0)	214.5 (18.8)	212.6 (14.5)	192.5 (12.1)
Mean percent of target concentration	66.2 (0.8)	81.4 (1.3)	67.5 (1.4)	72.7 (1.6)	73.7 (1.1)	77.5 (2.9)	68.6 (2.0)	69.2 (1.1)	61.5 (1.8)

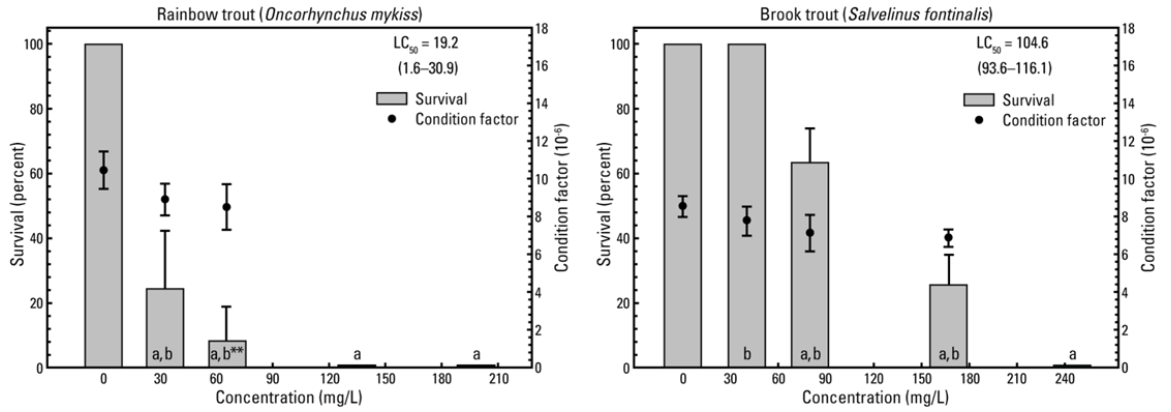

Figure 4. Comparison of mean percent survival, condition factor, and LC_{50} (95-percent fiducial limits) for coldwater fish (rainbow trout, *Oncorhynchus mykiss*; and brook trout, *Salvelinus fontinalis*) exposed to *Pseudomonas fluorescens*, strain CL145A, for 24 hours using continuous-flow, serial-dilution exposure systems. Survival and condition factor are ± 95-percent confidence intervals (denoted by capped vertical lines), and the LC_{50} 95-percent fiducial limits are in parentheses; letters (a, survival; b, condition factor) denote statistical difference compared to the untreated control group; ** indicates n ≤ 5. Abbreviations: mg/L, milligrams per liter; LC_{50}, lethal concentration for 50 percent of the test animals.

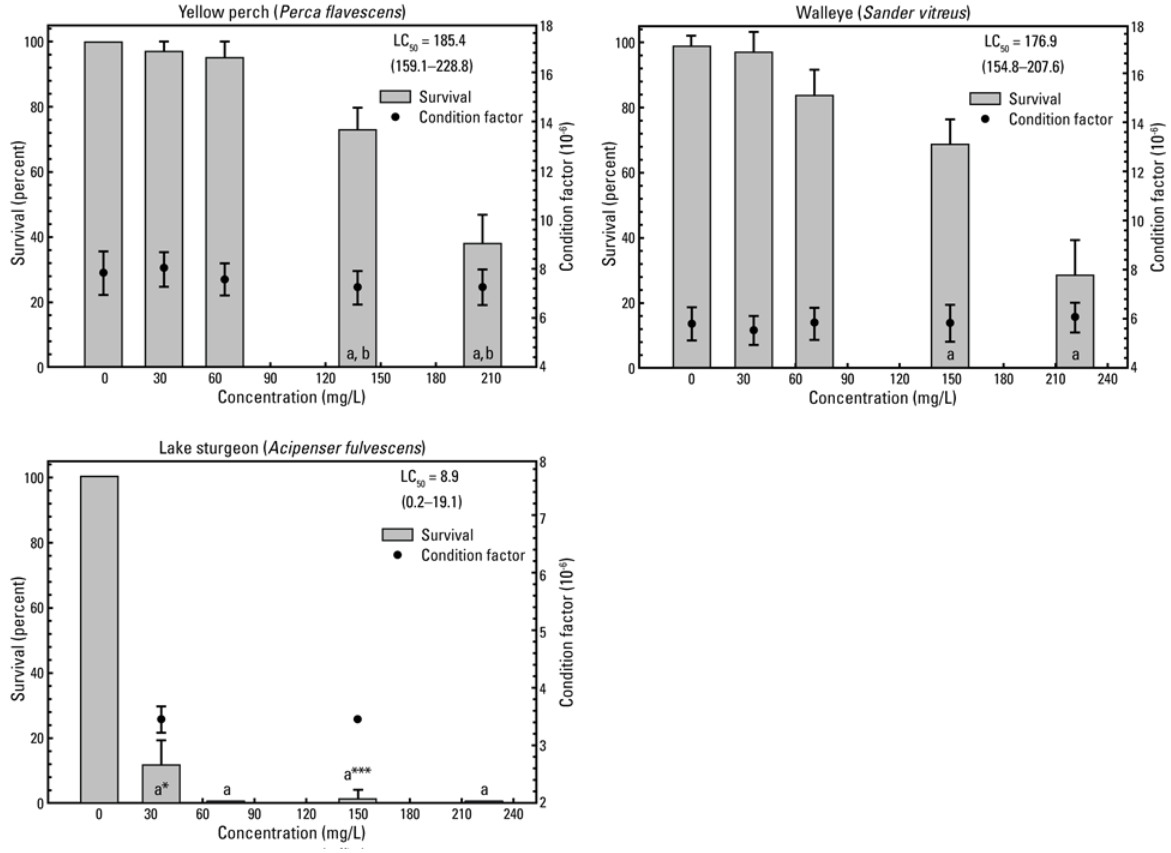

Figure 5. Comparison of mean percent survival, condition factor, and LC_{50} (95-percent fiducial limits) for coolwater fish (yellow perch, *Perca flavescens*; walleye, *Sander vitreus*; and lake sturgeon, *Acipenser fulvescens*) exposed to *Pseudomonas fluorescens,* strain CL145A for 24 hours using continuous-flow, serial-dilution exposure systems. Survival and condition factor are ± 95-percent confidence intervals (denoted by capped vertical lines), and the LC_{50} 95-percent fiducial limits are in parentheses; letters (a, survival; b, condition factor) denote statistical difference compared to the untreated control group; * indicates n ≤ 10, *** indicates n =1. Abbreviations: mg/L, milligrams per liter; LC_{50}, lethal concentration for 50 percent of the test animals.

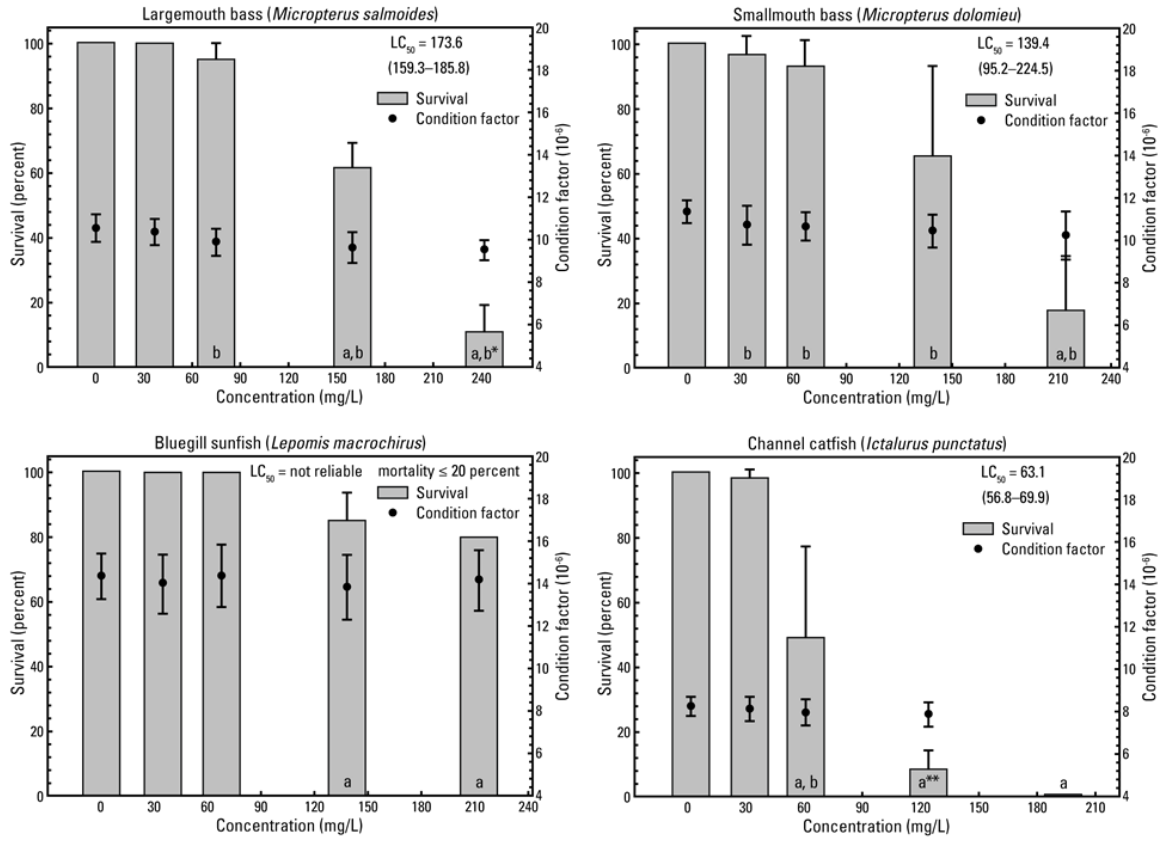

Figure 6. Comparison of mean percent survival, condition factor, and LC_{50} (95-percent fiducial limits) for warmwater fish (largemouth bass, *Micropterus salmoides*; smallmouth bass, *Micropterus dolomieu*; bluegill sunfish, *Lepomis macrochirus*; and channel catfish, *Ictalurus punctatus*) exposed to *Pseudomonas fluorescens*, strain CL145A for 24 hours using continuous flow, serial-dilution exposure systems. Survival and condition factor are ± 95-percent confidence intervals (denoted by capped vertical lines), and the LC_{50} 95-percent fiducial limits are in parentheses; letters (a, survival; b, condition factor) denote statistical difference compared to the untreated control group; * indicates n ≤ 10, ** indicates n ≤ 5. Abbreviations: mg/L, milligrams per liter; LC_{50}, lethal concentration for 50 percent of the test animals.

Conclusions

The measured concentrations of the formulated *Pseudomonas fluorescens* strain CL145A spray-dried powder (SDP) in the test chambers were considerably lower than the calculated theoretical target concentrations with measured SDP concentrations, ranging from 61.5 to 81.4 percent of target. Settling of the SDP was observed in the dilution boxes of exposure systems and presumably was the cause of the discrepancy between the theoretical and measured SDP concentrations. Although the absorbance measurements were recorded at 660 nanometers, which is in the absorbance spectrum for bacterial cells, it is unknown whether the discrepancy between the theoretical and measured SDP concentrations was caused from the settling of the *P. fluorescens* cells or from the settling of the inert ingredients. For this report, the discrepancy between the theoretical and measured SDP concentrations was assumed to be from uniform SDP settling; however, the accuracy of this assumption was not confirmed.

The condition factor analyses of the coldwater species *Oncorhynchus mykiss* (rainbow trout) and *Salvelinus fontinalis* (brook trout) detected significant impacts at the lowest concentrations tested (32.8 and 40.3 milligrams per liter [mg/L], respectively), and although the survival analyses detected a difference in survival of rainbow trout at 32.8 mg/L, no difference in brook trout survival was detected

at 40.3 mg/L of SDP. In coolwater species, both condition factor and survival analyses detected differences in the *Perca flavescens* (yellow perch) SDP-treated groups at concentrations ≥ 138 mg/L; however, in the *Sander vitreus* (walleye) and *Acipenser fulvescens* (lake sturgeon) tests, the condition factor analyses failed to detect differences, whereas the survival analyses detected differences at concentrations ≥ 149.3 and 36.0 mg/L, respectively. The differential detection sensitivity can be attributed to disproportionate survival of larger animals in the SDP-treated groups and (or) the low number of surviving animals in some of the SDP-treated groups. The condition factor and survival analyses were not equally sensitive in detecting differences between the SDP-treated and the untreated control groups of the warmwater species. The condition factor analyses detected differences in both *Micropterus salmoides* (largemouth bass) and *Micropterus dolomieu* (smallmouth bass) at lower concentrations than the survival analyses (75.3 versus 159.9 mg/L and 33.4 versus 214.5 mg/L, respectively). The survival analysis for *Lepomis macrochirus* (bluegill sunfish) detected differences in survival between the SDP-treated groups compared to the untreated control group at concentrations ≥ 138.0 mg/L, whereas the condition factor analysis did not detect difference between SDP-treated groups compared to the untreated controls. The condition factor and survival analyses both detected a difference between *Ictalurus punctatus* (channel catfish) in the 59.3-mg/L SDP-treated group and the untreated control groups, however, the condition analysis did not detect a difference between the 123.5-mg/L SDP-treated group compared to the untreated control group. Similar to the walleye and lake sturgeon tests, the differential detection sensitivity can be attributed to disproportionate survival of larger animals in the SDP-treated groups and (or) the low number of surviving animals in the SDP-treated groups. The LC_{50}'s varied by species, and three species (rainbow trout, lake sturgeon, and channel catfish) had LC_{50}'s below the current maximum approved concentration (100 mg/L, as active ingredient) that may be applied to open waters, indicating that 24 hours of exposure to continuously applied SDP may impact freshwater fish.

Combining the use of condition factor and survival analyses to detect SDP-exposure-related effects on fish was more sensitive than using either the condition factor or survival analysis alone. The 24-hour continuous SDP dose used in this study was three times the maximum approved exposure duration, and the observed settling in the dilution boxes may have contributed to the lower measured SDP concentrations; therefore, the results should be interpreted with caution. Development of an analytical detection method that utilizes a chemical signature of the active ingredient (*Pseudomonas fluorescens*, strain CL145A) may provide a more robust determination of active ingredient concentration than using absorbance or turbidity. Further investigations of the SDP-exposure related effects on freshwater fish at the maximum approved open-water label concentration and exposure duration (100 mg/L for 8 hours) using the expected lentic application technique (a single, static application) are warranted to determine how freshwater fish might be impacted if they are present during an application of SDP for dreissenid mussel control. The variation in tolerance to *P. fluorescens*, strain CL145A, exposure observed in this study indicates that fish species community composition should be considered before SDP is applied in open-water environments.

References Cited

Agresti, Alan, 2007, An introduction to categorical data analysis (2d ed.): Hoboken, N.J., John Wiley and Sons, 371 p.

American Public Health Association, American Water Works Association, and Water Environment Federation, 2012, Standard methods for examination of water and wastewater (22d ed.): Washington, D.C., American Public Health Association, 1,360 p.

Baker, S.M., and Hornbach, D.J., 1997, Acute physiological effects of zebra mussel (*Dreissena polymorpha*) infestation on two unionid mussels, *Actinonaias ligamentina* and *Amblema plicata:* Canadian Journal of Fisheries and Aquatic Sciences, v. 54, p. 512–519.

Benson, A.J., Raikow, D., Larson, J., Fusaro, A., and Bogdanoff, A.K., 2015, *Dreissena polymorpha* (fact sheet, revision date June 26, 2014): Gainesville, Fla., USGS Nonindigenous Aquatic Species Database, accessed February 25, 2015 at http://nas.er.usgs.gov/queries/factsheet.aspx?speciesid=5.

Birnbaum, Christina, 2011, NOBANIS—Invasive alien species fact sheet—*Dreissena polymorpha*: Online Database of the European Network on Invasive Alien Species, accessed February 13, 2014, at http://www.nobanis.org/files/factsheets/Dreissena_polymorpha.pdf.

Burlakova, L.E., Karatayev, A.Y., and Padilla, D.K., 2000, The impact of *Dreissena polymorpha* (PALLAS) invasion on unionid bivalves: International Review of Hydrobiology, v. 85, no. 5–6, p. 529–541.

Eddy, Samuel, and Underhill, J.C., 1978, How to know the freshwater fishes: Dubuque, Iowa, W.C. Brown Co., 215 p.

Emerson, K., Russo, R.C., Lund, R.E., and Thurston, R.V., 1975, Aqueous ammonia equilibrium calculations—Effect of pH and temperature: Journal of the Fisheries Research Board of Canada, v. 32, p. 2379–2383.

Mackie, G.L., 1991, Biology of the exotic zebra mussel, *Dreissena polymorpha*, in relation to native bivalves and its potential impact in Lake St. Clair: Hydrobiologia, v. 219, p. 251–268.

Molloy, D.P., Mayer, D.A., Gaylo, M.J., Morse, J.T., Presti, K.T., Sawyko, P.M., Karatayev, A.Y., Burlakova, L.E., Laruelle, F., Nishikawa, K.C., and Griffin, B.H., 2013, *Pseudomonas fluorescens* strain CL145A—A biopesticide for the control of zebra and quagga mussels (Bivalvia: Dreissenidae): Journal for Invertebrate Pathology, v. 113, p. 104–114.

Nalepa, T.F., 1994, Decline of native unionid bivalves in Lake St. Clair after infestation by the zebra mussel, *Dreissena polymorpha*: Canadian Journal of Fisheries and Aquatic Sciences, v. 51, p. 2227–2233.

Nalepa, T.F., and Schloesser D.W., eds., 2014, Response, management, and mitigation, *Part III of* Quagga and zebra mussels—Biology, impacts, and control (2d ed.): Boca Raton, Fla., CRC Press, Taylor & Francis Group, p. 116–284.

Piper, R.G., Mc Elwain, I.B., Orrne, L.E., McCraren, J.P., Fowler, L.G., and Leonard, J.R., 1982, Fish hatchery management: Washington, D.C., U.S. Department of the Interior, U.S. Fish & Wildlife Service, 517 p.

Ricciardi, Anthony, and Rasmussen, J.B., 1999, Extinction rates of North American freshwater fauna: Conservation Biology, v. 13, no. 5, p. 1220–1222.

SAS, 2010, Version 9.3: Cary, N.C., SAS Institute Inc.

Schloesser, D.W., and Kovalak, W.P., 1991, Infestation of unionids by *Dreissena polymorpha* in a power plant canal in Lake Erie: Journal of Shellfish Research, v. 10, no. 2, p. 355–359.

Strayer, D.L., Downing, J.A., Haag, W.R., King, T.L., Layzer, J.B., Newton, T.J., and Nichols, J.S., 2004, Changing perspectives on pearly mussels, North America's most imperiled animals: BioScience, v. 54, no. 5, p. 429–439.

Strayer, D.L., and Malcom, H.M., 2007, Effects of zebra mussels (*Dreissena polymorpha*) on native bivalves—The beginning of the end or the end of the beginning?: Journal of the North American Benthological Society, v. 26, no. 1, p. 111–122.

Timmons, M.B., and Ebeling, J.M., eds., 2007, Recirculating aquaculture: Ithaca, NY, Cayuga Aqua Ventures, Northeastern Regional Aquaculture Center publication No. 01–007, 975 p.

U.S. Geological Survey, 2014, Zebra and quagga mussel distribution in U.S. lakes: USGS Web page, accessed March 27, 2014, at http://fl.biology.usgs.gov/Nonindigenous_Species/Zebra_mussel_distribution/zebra_mussel_distribution.html.

Williams, J.D., Warren Jr., M.L., Cummings, K.S., Harris, J.L., and Neves, R.J., 1993, Conservation status of freshwater mussels of the United States and Canada: Fisheries, v. 18, no. 9, p. 6–22.

Appendix 1. Study Protocol, Amendments, and Datasheets

Item number	Item description	Number of pages	Report page number
1	Study Protocol: "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species."	23	21
2	Note to File #1 – Coding and labelling procedures for histological preparation of fish specimens	2	44
3	Note to File #2 – Details regarding randomizations procedure used to allocate RBT, YEP, WAE and BLG to test system.	1	46
4	Note to File #3 – Deviation preparation and signatures.	1	47
5	Note to File #4 – Clarification of water chemistry data collection for RBT, BKT, SMB, LST, and CCF during 22-d holding period.	2	48
6	Amendment #1 – Details sample collection, preservation and handling procedures for samples collected for histopathological analysis.	7	50
7	Amendment #2 – Reduces postexposure observation period for test animals from 30-d to 22-d.	3	57
8	Amendment #3 – Termination of BLG study, exposure termination criteria, use of aeration and correction of typographical errors in Amendments #1and #2.	7	60
9	Amendment #4 – Postexposure holding procedures and system and addition of refuge (e.g., PVC pipe) to reduce the effects of aggressive fish during the postexposure holding period.	5	67
10	Amendment # 5 – Eliminates the collection of water samples for ammonia analysis at 6 and 12-h.	2	72
11	Amendment #6 – Details use of aeration during the exposure period for 12 or 17 °C exposures.	2	74
12	Amendment # 7 – Eliminates FHM from list of test species.	2	76
13	Amendment #8 – Status change of study to non-GLP regulated study.	2	78
14	Study datasheets.	40	80

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Protocol Title: AEH-12-PSEUDO-03

Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species

Study Number: AEH-12-PSEUDO-03

Test Facilities and Study Sponsor
Upper Midwest Environmental Sciences Center (UMESC)
US Geological Survey
2630 Fanta Reed Rd.
La Crosse, Wisconsin 54603

Proposed Experimental Start Date: February 2012
Proposed Experimental Termination Date: December 2012

Protocol Approval
Reviewed by:

[redacted] 22 FEB 12
Mark P. Gaikowski, M.A. Date
Supervisory Biologist

[redacted] 2/22/12
Michael D. Jawson, Ph.D. Date
Center Director

Approved by:

[redacted] 2/22/12
James A. Luoma, B.A. Date
Study Director

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1. INTRODUCTION:

Native freshwater mussel populations of North America were historically considered the most diverse in the world with about 297 recognized taxa consisting of 281 species and 16 subspecies (Williams et al., 1993). Mussels are largely sedentary in nature, relying on movement of host fish during glochidial attachment as means of transport. They are thus particularly vulnerable to a variety of anthropogenic influences including habitat degradation and alteration, pollution and overharvest. A Nature Conservancy survey (Master 1990) found 55% of North America's mussels as extinct or imperiled compared to 7% of terrestrial species, even though terrestrial species traditionally receive far greater attention. Projections in 1999 (Ricciadi and Rasmussen, 1999) suggested that at least 127 imperiled mussel species will be lost in the next 100 years – a conservative extinction rate of 6.4% per decade given it did not take into account extirpations caused by invasive dreissenid mussels (zebra *Dreissena polymorpha* and quaqqa *D. bugensis* mussels).

Concerns for native mussels in the Southeast are potentially even greater given that only 25% of the 269 species historically present are reported as stable compared to the 13% presumed extinct and the 28, 14 and 18% listed, respectively, as endangered, threatened or of special concern. (Neves et al,1997)

Many unionid mussels in North America were imperiled prior to epizoic colonization by zebra and quaqqa mussels though the introduction of dreissenid mussels have dramatically heightened concerns for the continued survival of native mussels. Zebra mussels were reported to be responsible for the extirpation of unionids from waters in Europe as early as 1937 (Sebestyen, 1937). Severe declines in unionid abundance in Europe (Karatayev and Burlakova, 1995; Burlakova, 1998) and North America (Haag et al, 1993; Nalepa, 1994; Ricciardi et al., 1996) have since been well documented in the literature.

The 1973 Endangered Species Act (ESA) brought forth the need to recognize, protect and recover rare mussels in the United States. The United States Fish and Wildlife Service (USFWS) develops recovery plans for threatened and endangered species which utilize a range of tools to promote recovery of the species including restoring and acquiring critical habitat, removing introduced or invasive species and captive propagation and release into historic ranges.

As of 2004, mussel propagation work was being conducted in several different facilities in 7 states as well as in Ontario, Canada (Neves, 2004). The Genoa National Fish Hatchery (GNFH) in Wisconsin has been involved in mussel recovery since 2000,

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releasing tens of thousands of propagated subadult Higgins eye pearlymussel (*Lampsilis higginsii*) for recovery efforts. The GNFH produces subadult mussels using cage culture techniques. This technique involves placing glochidia laden host fish into submerged cages within natural water bodies such as the Mississippi and St. Croix Rivers. The fish are released from the cages after mussel excystment and the mussels are allowed to grow on the cage bottom for an additional 6-18 months before being harvested. Areas that were previously successful in rearing mussels using this technique have been abandoned due to the colonization and proliferation of zebra mussels.

Biologists at the New York State Museum (NYSM) Field Research Laboratory have been researching dreissenid mussel control techniques since 1991. They discovered that components of a strain of common bacterium isolated from soils (*Pseudomonas fluorescens* [*Pf*-CL145A]) are capable of causing mortality in zebra mussels. Marrone Bio Innovations (MBI; Davis, CA) is currently developing a spray dried formulation of this bacterium called MBI-401 SDP. A formulation of Pf-CL145A was recently registered with the USEPA for use within closed systems such as power generating plant cooling systems. The NYSM has partnered with the USFWS (Genoa NFH) and United States Geological Survey's (USGS) Upper Midwest Environmental Sciences Center (UMESC) to determine the suitability of this product for open water zebra mussel control applications including treatment of native mussel propagation cages or native mussel beds.

The waters on and around native mussel beds and the structures used to propagate them (e.g. mussel culture cages) may contain a diverse group of fish species that could be exposed to *Pseudomonas fluorescens* (*Pf*-CL145A) during open water treatments. The research to be completed according to this protocol will assess the potential effects of various concentrations of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten species of freshwater fish endemic to the Great Lakes and Upper Mississippi River basins.

2. PROTOCOL OBJECTIVE:

To assess the potential effects of various concentrations of MBI-401 SDP (*Pseudomonas fluorescens* [*Pf*-CL145A]) to ten species of freshwater fish endemic to the Great Lakes and Upper Mississippi River basins.

3. STUDY SCHEDULE:

3.1 Proposed initiation: February 2012

3.2 Schedule of events: A proposed schedule of events is provided in Table 1.

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3.3 Proposed completion date: December 2012

Table 1. Proposed Schedule of Events

Date	Activity
February 2012-June 2012	Fish exposures
July 2012-October 2012	Data analysis
December 2012	Final Report submission

4. STUDY DESIGN:

4.1 General Description:

Ten species (Table 2) of juvenile fish endemic in the Great Lakes and Mississippi River basins will be evaluated to identify potential effects from exposure to varying concentrations of MBI-401 SDP. Juvenile fish will be placed into a flow through test apparatus (FTTA), acclimated to FTTA conditions then exposed to MBI-401 SDP; surviving fish will be monitored post-exposure for delayed mortality or sublethal effects. Samples of surviving fish will be collected immediately post-exposure and at the termination of the post exposure observation period to assess potential pathological changes. Procedures to assess histological change will be added by protocol amendment if determined to be needed.

Table 2. Fish species to be used to identify potential effects following exposure to MBI-401 SDP (*Pseudomonas fluorescens* [*Pf*-CL145A]).

Common name	Scientific name	Test Temperature, °C (range)
Rainbow trout	*Oncorhynchus mykiss*	12 (10-14)
Coaster brook trout	*Salvelinus fontinalis*	12 (10-14)
Walleye	*Sander vitreum*	17 (15-19)
Yellow perch	*Perca flavescens*	17 (15-19)
Lake Sturgeon	*Acipenser fulvescens*	17 (15-19)
Largemouth bass	*Micropterus salmodies*	22 (20-24)
Smallmouth bass	*Micropterus dolomieu*	22 (20-24)
Bluegill sunfish	*Lepomis macrochirus*	22 (20-24)
Channel Catfish	*Ictalurus punctatus*	22 (20-24)
Fathead minnow	*Pimephales promelas*	22 (20-24)

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4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination. One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 30-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; ±2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 30-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination or disposed of by incineration.

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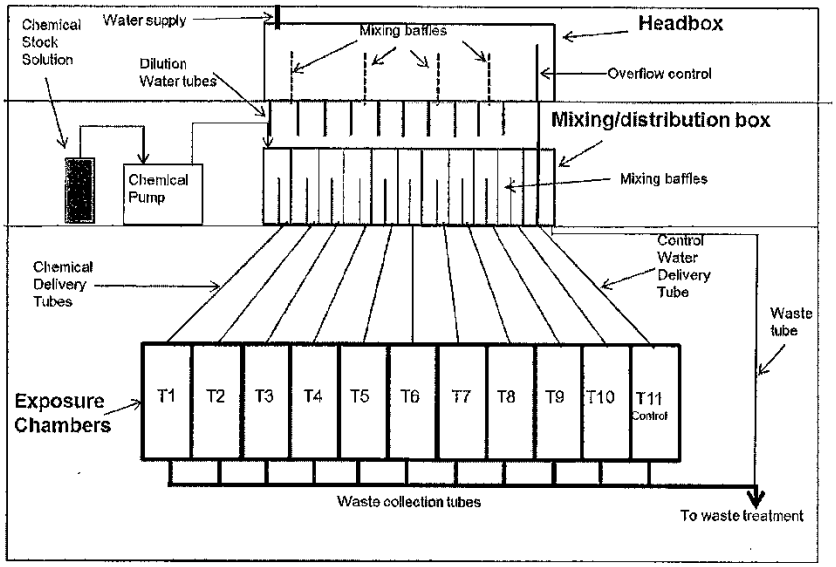
Figure 1. Schematic of flow through test apparatus (FTTA). Note, only 5 exposure chambers will be used corresponding to nominal concentrations of 300, 200, 100, 50 or 0 mg/L.



5. STUDY PROCEDURES

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

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5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution to exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.1.7 Feeding: Fish will be fed during the acclimation and post exposure periods by offering commercially-prepared dry feed, frozen live food, or live forage. The percentage body weight offered will be determined during the acclimation period, will vary between feed types and species, and will be documented in the study records. The feed rate will be adjusted weekly to account for fish growth. The exact procedures used will be documented in the study records. Feed offered will either be weighed or volumetrically measured for each holding chamber.

5.2 Water Chemistry

5.2.1 Dissolved oxygen: Dissolved oxygen will be measured and recorded daily in acclimation tanks. Dissolved oxygen will be measured and recorded at 6, 12 and 24 h in each exposure chamber during the exposure period. Dissolved oxygen will be measured and recorded daily in one concentration replicate holding chamber for each species during the post exposure observation period (UMESC SOP AEH 394 or equivalent).

5.2.2 Temperature: Temperature will be measured and recorded daily in acclimation tanks. Temperature will be measured and recorded at 6, 12 and 24 h in each exposure chamber during the exposure period. Temperature will be measured and recorded daily in one concentration replicate holding chamber for each species during the post exposure observation period.

5.2.3 pH: pH will be measured and recorded daily in acclimation tanks. pH will be measured and recorded at 6, 12 and 24 h in each exposure chamber during the exposure period. The pH will be measured and recorded daily in one concentration replicate holding chamber for each species during the post exposure observation period (UMESC SOP AEH 335 or equivalent).

5.2.4 Hardness: Hardness will be measured and recorded prior to test initiation and during the exposure period from all replicate exposure concentrations. Hardness will be measured weekly throughout the holding period on one

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representative holding chamber for each species (UMESC SOP AEH 712).

5.2.5 Alkalinity: Alkalinity will be measured and recorded prior to test initiation and during the exposure period from replicate exposure concentrations. Alkalinity will be measured weekly throughout the holding period on one representative holding chamber for each species (UMESC SOP AEH 706).

5.2.6 Conductivity: Conductivity will be measured and recorded prior to test initiation and during the exposure period from all replicate exposure concentrations. Conductivity will be measured weekly throughout the holding period on one representative holding chamber for each species (UMESC SOP AEH 188 or equivalent).

5.2.7 Ammonia: Samples for total ammonia-nitrogen will be collected at 6, 12 and 24 h during the exposure period for each exposure chamber. Analysis will be performed on the 24-h samples and may be performed on the 6 and 12-h samples. Unionized ammonia will be calculated from the total ammonia, pH and temperature of the samples. Ammonia samples will be filtered through a 0.45 micron syringe filter, acidified (~pH 2.5) with sulfuric acid and then stored at ~4°C until analyzed by the UMESC Long Term Resources Monitoring (LTRM) Water Quality Laboratory using the automated phenate method. The LTRM laboratory does not perform their analysis according to Good Laboratory Practice (GLP) regulation. Data Generated by LTRM will be annotated to state it does not comply with GLP regulations in the final report.

5.3 Disposal: All live fish at the end of the post-exposure period will be euthanized by MS-222 overdose (UMESC SOP GEN 132), weighed, measured and either preserved for histological examination or incinerated.

5.4 Study facilities:

5.4.1Test Facility

U.S. Geological Survey, Upper Midwest Environmental Sciences Center

2630 Fanta Reed Rd

La Crosse, Wisconsin 54603

5.4.1.1 Exposure system: The test system (Figure 1) is a flow through test apparatus which provides serially dilution of test solutions and it is comprised of a headbox, a mixing and distribution box and a series of 10 aquaria (50.8 x 25.4 x 33.02 cm). Each exposure chamber will receive a continuous supply of well water from the mixing/distribution box. Each

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chamber will be uniquely identified (eg: A1) to allow for identification of species, treatment type and replicate number. Coding procedures will be documented in the study records.

5.4.1.2 Aeration: Supplemental aeration will not be supplied during the MBI-401 SDP exposures unless the dissolved oxygen falls below 5 mg/L. Supplemental aeration supplied during the exposure period will be documented in the study records. Aeration will be supplied during the acclimation and post exposure observation periods.

5.4.1.3 Water supply: Temperature-adjusted well water will be supplied continuously to each chamber at ~1 tank-volume exchanges/h (~250 mL/min during exposure, ~ 500 mL/min during the post exposure observation period).

5.4.1.4 Lighting: Overhead lighting (~18 h light:6 h dark; 100-1000 lux) will be provided.

5.4.1.5 Exposure chamber dimensions: The exposure chambers are (~51 x 25 x 33 cm) glass aquaria. Each exposure chamber will contain ~15 L of water during the exposure period and ~30 L of water during the post-exposure observation period.

5.4.1.6 Water discharge: All water during the exposure period will be discharged through a particulate and carbon filter and then into the UMESC carbon adsorption system. Acclimation and post exposure period water will not be filtered prior to discharge.

5.4.1.7 Acclimation and holding chamber cleaning: During the acclimation period and throughout the post exposure observation period, each chamber or tank containing animals will be cleaned daily to remove uneaten feed and feces. Cleaning will be conducted by removal of the stand pipe and then brushing tank or by siphoning settled waste. No cleaning will be performed during the exposure period.

5.5 Observations:

5.5.1 Mortality: Fish without opercular movement or that do not respond to direct pressure to the caudal peduncle will be coded as a mortality and removed.

5.5.2 Feed consumption: Feed consumption during the post exposure period will be assessed by subjectively ranking consumption using the following categories (e.g.: 1 = 0-25% apparent consumption of the food offered; 2 = 26-50% apparent consumption of the food offered; 3 = 51-75% apparent consumption of the food offered; 4 = 75-100% apparent consumption of the food offered).

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5.5.3 Behavioral: Behavioral responses (i.e.: piping at the surface, loss of equilibrium, flashing, agitation, etc.) observed during the exposure or holding periods will be documented in the study records.

5.5.4 Fish weight/length: Initial fish weights will be measured upon transfer to the holding rack by placing all the fish to be transferred for each replicate in a tared bucket containing the same temperature well water (UMESC SOP AEH 606) and then weighing on a top loading balance. If the fish are to be sacrificed (i.e.: initial body weight, histological and terminal samples) the fish weight will be measured after overdose by MS-222 using a calibrated top loading balance. Fish length will be measured by placing the fish on a wetted measuring board and determining the total length (TL) to the nearest 0.1 cm (UMESC SOP AEH 605). If live fish are to be measured they may be sedated with a 50 mg/L MS-222 solution prior to handling.

5.6 Treatment administration:

5.6.1 Treatment: Each species of fish will be exposed to three replicates of either 0 (control) and approximately 50, 100, 200 or 300 mg/L MBI-401 SDP as a 24 h continuous exposure.

5.6.2 Route of administration: Exposures will be initiated by addition of a stock solution of MBI-401 SDP to the first cell of the mixing/distribution box of the FTTA. The test concentrations will include 0 (control), and approximately 50, 100, 200, or 300 mg/L of active MBI-401 SDP (the test material will be delivered to the FTTA first mixing box cell to achieve a high concentration of 300 mg/L; the diluter system then serially dilutes the initial dose and additional exposure chambers will be selected for use that supply as close to 50, 100 and 200 mg/L target dose as possible). The water volume in the exposure chambers will be maintained at approximately 15 L except that immediately after the addition of the test material is initiated the exposure chamber volume will be reduced by approximately 50% for ~30 minutes and then allowed to return to approximately 15 L with dosed water.

5.6.3 Concentration verification: Concentration will be determined spectrophotometrically. A standard curve will be prepared using a known mass of MBI-401 SDP. The absorbance of exposure solutions will be compared to the standard curve to determine the exposure concentration. Absorbance will be determined using a Beckman DU 800 UV/VIS spectrophotometer (UMESC SOP AEH 303).

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6. DATA ANALYSIS

6.1 Experimental unit: The experiment unit will be the exposure chamber.

6.2 Number of exposures and replicates: There will be a total of 5 treatment levels (control, and approximately 50, 100, 200 and 300 mg *Pf*-CL145A/L) for each FTTA. There will be a total of 3 independent FTTA (each with 5 treatment levels) which will serve as the replicates. Each species will be run concurrently in the 3 FTTA and they will have a single 24 h exposure and 30-d post exposure evaluation period.

6.3 Statistical methodology:

Survival data will be analyzed using a generalized linear mixed model (SAS PROC GLIMMIX). In every analysis, the exposure chamber will be treated as the experimental unit. The change in proportion of survivors will be analyzed using a generalized linear mixed model where the distribution is binomial and the link used is the logit function.

If a significant effect of treatment is identified then pairwise comparison tests will be completed to compare each treatment group to the control group using unadjusted least squares means.

6.4 Statistical significance: Statistical significance will be declared at $p < 0.05$.

6.5 Other data analyses: Body weight, body weight gain, and total fish length will be analyzed by ANOVA. Feed consumption will be modeled using mixed model ANOVA for repeated measures. Pairwise comparison tests will be used to compare each *Pf*-CL145A-treatment group to the control group using least squares means as appropriate (if an adjustment procedure is used to adjust the least-squares means that adjustment procedure will be identified in the final study report). Statistical methods for other study data collected will include calculation of means, standard deviations and coefficients of variation. The statistical procedures used will be described in detail in the final study report.

7. PERSONNEL

7.1 Study Director: James A. Luoma, B.A.

7.1.1 Address: Upper Midwest Environmental Sciences Center, US Geological Survey, 2630 Fanta Reed Rd., La Crosse, Wisconsin 54603

7.1.2 Contact: Tel: (608) 781-6391, Fax: (608) 783-6066; jluoma@usgs.gov

7.1.3 Training and experience: CV on file at UMESC.

7.2 Other personnel involved in study: Technical staff involved in the study will be identified in the study raw data to include study function. UMESC technical staff

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training and experience will be documented in CVs included in the study raw data.

8. DISPOSITION/STORAGE

8.1 Study Records: All data generated in the study at UMESC will be recorded in bound laboratory notebooks or kept in file folders (SOP No. GEN 008). All data sheets, file folders, laboratory notebooks and computer disks will be encoded with the study number when the data are generated and stored in secure files (SOP No. GEN 008). Raw data, laboratory notebooks and electronic files (including a CD-ROM containing the annotated SAS program used for the statistical analysis, the data files, SAS log and SAS output files) generated by UMESC and contract laboratory reports will be filed in the UMESC archives (SOP No. GEN 007) of the Upper Midwest Environmental Sciences Center, La Crosse Wisconsin, before the final report is signed by the Study Director. The final report will then be signed and archived.

9. GOOD LABORATORY PRACTICES

Data collection, storage and retrieval procedures for the study will be conducted in compliance with EPA regulations for Good Laboratory Practices (40 CFR, Part 160). The study protocol and progress of the study will be reviewed at the start of the study and periodically throughout the study by the Quality Assurance Unit (QAU). Transfer of samples outside of UMESC will be documented using a chain of custody form (SOP No. ECO 513.0 or equivalent) and the samples or the container holding multiple samples will be sealed with a chain of custody seal prior to release from UMESC custody. Histological samples will be labeled to include at a minimum the species, treatment dose and repetition number, sample time (i.e. immediate post exposure, 30-d post exposure, etc), date of collection, initial fixative type, initials/date of initial sample collector, fixative change date, secondary fixative type, and the initials/date of person conducting fixative change.

The Study Director has the responsibility of ensuring that all procedures used in conjunction with the study conform with Good Laboratory Practices.

10. AMENDMENT/DEVIATIONS TO THE PROTOCOL

10.1 Protocol amendments: A signed copy of the Study Protocol will be retained on-site. Proposed amendments to the protocol shall be brought to the attention of UMESC Management. When the Study Director and Management

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agree verbally, the study can proceed with the change. As soon as possible, the Study Director will then prepare a written protocol amendment that is signed by the Study Director, Branch Chief, UMESC Center Director, and UMESC-QA. The UMESC statistician or UMESC Animal Care and Use Chair may also sign as needed. The amendment then becomes an official part of the protocol.

10.2 Protocol deviations: All deviations from this approved protocol will be documented and reviewed by the Study Director. The Study Director will make a judgment on the impact of the deviations. The Study Director will notify Management, UMESC-QA, as soon as possible, in writing, of any deviations to the protocol, including their impact on the study.

11. INVESTIGATIONAL TEST ARTICLE

11.1 Test Substance(s): MBI-401 SDP, *Pseudomonas fluorescens* (*Pf*-CL145A)

11.1.1 Chemical name: *Pseudomonas fluorescens* (*Pf*-CL145A)

11.1.2 Trade name: MBI-401 FDP

11.1.3 Active ingredients: *Pseudomonas fluorescens* (*Pf*-CL145A) is the sole active ingredient, 50% active by weight.

11.1.4 Source: Marrone Bio Innovations (MBI); Davis, CA

11.1.5 Lot number: Multiple lots are expected to be used during the FTTA exposures. Lot number(s) will be included in the test chemical log books and lab notebook, and study files.

11.1.6 Expiration date: As determined by the manufacturer. An aliquot of each lot tested will be returned to the NYSM or MBI at the conclusion of exposures at UMESC for post-exposure zebra mussel bioassay tests (the standard testing protocol to assess *Pseudomonas fluorescens* [*Pf*-CL145A] formulation activity). Results of these confirmation bioassays will be used to validate the retention of activity of the MBI-401 SDP, *Pseudomonas fluorescens* (*Pf*-CL145A) and will be included in the study files when available.

11.1.7 Storage during study: test chemical will be stored refrigerated in a locked container within a restrictive entry laboratory. A subsample of the test chemical will be archived in the UMESC Chemical Archive (UMESC SOP GEN 011).

11.1.8 A NIOSH approved respirator will be used when preparing stock solutions to avoid inhalation. Protective eyewear, gloves and lab coats will be worn at all times when working with the test substance.

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12. ADVERSE EVENTS: Any adverse event will be recorded in the study logbook and the Study Director will be notified.

13. BIOSECURITY PROCEDURES

13.1 General Procedures: All personnel involved in the study will review the UMESC biosecurity (UMESC SOP APP 075) and project HACCP plans. Testing will be conducted in a laboratory with controlled access. All treated effluent water will be filtered prior to discharge from UMESC.

13.2 HACCP Plan: See Appendix 1 for the HACCP plan for this project.

14. STANDARD OPERATING PROCEDURES

A complete list of the standard operating procedures used in the study will be included in the study guide. The follow SOP's were cited in this protocol:

UMESC SOP GEN 007 – Archives Management for Regulated Studies
UMESC SOP GEN 008 – Maintenance of Data Recording of Raw Data for Regulated Studies
UMESC SOP GEN 132 – Care, Maintenance & Disposal of Aquatic Vertebrates
UMESC SOP APP 075 – Procedures to Minimize the Risk of Transfer of Pathogens and Invasive Species
UMESC SOP AEH 011 – Procedures for Labeling Chemicals and Specimens
UMESC SOP AEH 188 – Accumet Portable Waterproof Conductivity meter Model # AP75
UMESC SOP AEH 303 – Instrument Operating Procedure: Beckman spectrophotometer Model DU 800 Serial # 8003098
UMESC SOP AEH 335 – Beckman Portable pH/mV Meter, Model 250
UMESC SOP AEH 394 – YSI Handheld Dissolved Oxygen Meter, Model 55/12FT, Serials 94C17261 & 97F0837AG
UMESC SOP ECO 513.0 – Chain-of-custody procedures for environmental and experimental samples
UMESC SOP AEH 605 – Procedures for Anesthetizing Experimental Fish
UMESC SOP AEH 606 – Methods Used to Weigh, Measure and Mark Test Fish
UMESC SOP AEH 706 – Determination of Total Alkalinity by the Titrimetric (pH 4.5) Method
UMESC SOP AEH 712 – Determination of Total Hardness

15. REFERENCES.

40 CFR Part 160, Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); *Good Laboratory Practice Standards; Final Rule,* Environmental Protection Agency.

Burlakova, L.E., 1998. Ecology of *Dreissena polymorpha* (PALLAS) and its role in the structre and function of aquatic ecosystems. Candidate dissertation, Zoology Institute of the Academy of Science Republice Belarus, 168 p. (in Russian) in Burlakova L.E., A.Y. Karatayev and D. K. Padilla. 2000. The impact of Dreissena polymorpha (PALLAS) invasion on Unionid bivalves. Internat. Rev. hydrobiol. 85 (5-6):529-541.

Eddy, S. and J.C. Underhill. 1978. How to know the freshwater fishes. W.C. Brown Co., Dubuque, IA. 215 pp.

Haag, W.R., D.L. Berg, D.W. Garton, and J.L. Farris, 1993. Reduced survival and fitness in native bivalves in response to fouling by the introduced zebra mussel (Dreissena polymorpha) in western Lake Erie. Canadian Journal of Fisheries and Aquatic Sciences 50(1):13-19.

Karatayev, A.Y. and L.E. Burlakova, 1995. Present and future patterns in Dreissena population development in the Narochanskaya lakes system. Vestisi Akad. Navuk Belarusi. Ser. Biyol. Navuk 3: 95098 (in Belarussian) in Burlakova L.E., A.Y. Karatayev and D. K. Padilla. 2000. The impact of Dreissena polymorpha (PALLAS) invasion on Unionid bivalves. Internat. Rev. hydrobiol. 85 (5-6):529-541.
Master, L., 1990. The imperiled status of North American aquatic animals. Biodiversity Network News 3(3):5-8.

Napela, T.F., 1994. Decline of native unionid bivalves in Lake St. Clair after infestation by the zebra mussel, *Dreissena polymorpha*. Can. J. Fish. Aquat. Sci. 51:2227-2233.

Neves R. J., 2004. Propagation of endangered freshwater mussels in North America. Journal of Conchology, special publication 3:69-80.

Neves, R.J., A.E. Bogan, J.D. Williams, S.A. Ahlstedt, and P.W. Hartfield, 1997. Status of aquatic mollusks in the southeastern United States: a downward spiral of diversity. Pages 43-85 in G.W. Benz and D.E. Collins, editors. Aquatic fauna in peril: the southeastern perspective. Southeastern Aquatic Research Institute, Lenz Design and communications, Decatur, Georgia.

Ricciardi, A. F.G. Whoriskey, and J.B. Rasamussen, 1996. Impact of the *Dreissena* invasion on native unionid bivalves in the upper St. Lawerance River. Can. J. Fish. Aquat. Sci. 53:1434-1444.

Ricciardi A., and J.B. Rasmussen, 1999. Extinction rates of North American freshwater fauna. Conservation Biology. Vol. 13 (5):1220-1222.

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Sebestyn, O., 1937. Colonization of two new fauna-elements of Pontus-origin (*Dreissena polymorpha* Pall. And *Corophuim curvispinum* G.O. Sars forma devium Wundsch) in Lake Balaton, Verh. Int. Ver. Theor. Angew. Limnol. 8:169-182 in Burlakova L.E., A.Y. Karatayev and D. K. Padilla. 2000. The impact of Dreissena polymorpha (PALLAS) invasion on Unionid bivalves. Internat. Rev. hydrobiol. 85 (5-6):529-541.

Williams, J.D., M.L. Warren Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18(9):6-22.

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16. APPENDIX.

16.1 Appendix 1. HACCP PLAN for the study Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species

Step 1 – Activity Description

Facility: US Geological Survey-Upper Midwest Environmental Sciences Center	Site: Lower B, room 2
Site Coordinator: Jim Luoma	Activity: Determine the effects of various concentrations of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species present in the Great Lakes and Upper Mississippi River basins.
Site Manager: Mark Gaikowski	
Address: 2630 Fanta Reed Road La Crosse WI, 54601	
Phone: 608-781-6322	

Project Description
The objective of this study is to determine effects of various concentrations of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species present in the Great Lakes and Upper Mississippi River basins.

Step 2 – Potential Hazards: Species which may potentially be moved/introduced

Vertebrates: None
Invertebrates: Zebra mussel (*Dreissena polymorpha*)
Plants: Eurasian water milfoil *Myriophyllum spicatum*
Other biologicals (disease, pathogen, parasite): Largemouth Bass Virus Spring Viremia of Carp Virus Bluegill Virus Infectious Pancreatic Necrosis Virus Viral Hemorrhagic Septicemia Furunculosis *Aeromonas salmonicida* Enteric Redmouth Disease *Yersinia ruckeri* Bacterial Kidney Disease *Renibacterium salmoninarum* Other Assorted parasites/pathogens commonly found in the upper Mississippi River Basin
Other (construction materials): NA

Step 3 – Flow Diagram

Flow diagram outlining sequential tasks to complete activity/project

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Task 1	Fish are obtained from UMESC fish culture
↓	
Task 2	Fish are acclimate to test temperatures in a UMESC wet laboratory
↓	
Task 3	Fish are transferred to the exposure system
↓	
Task 4	Fish are transferred to post exposure holding systems.
↓	
Task 5	Fish are euthanized, enumerated, weighed and measured for growth observations

1 Tasks (from HACCP Step 3 - Flow Diagram)	2 Potential hazards identified in HACCP Step 2	3 Are any potential hazards probable? (yes/no)	4 Justify evaluation for column 3	5 What control measures can be applied to prevent undesirable results?	6 Is this task a critical control point? (yes/no)
Task 1 Fish are obtained from UMESC fish culture	Vertebrates	No	Fish are reared/held in clean well water and will be sorted to assure no unwanted vertebrates are present	N/A	no
	Invertebrates	no	Fish are reared/held in clean well water and will be sorted to assure no unwanted invertebrates are present	N/A	yes
	Plants	no	Fish are reared/held in clean well water and will be sorted to assure no unwanted plants are present	N/A	yes
	Others	yes	The potential transfer of fish diseases is possible.	UMESC and other state and federal hatcheries perform routine health inspections. Transport equipment will be disinfected. Equipment remains in the laboratory.	yes
Task 2 Fish are acclimate to test temperatures in a UMESC wet laboratory	Vertebrates	no	Risk eliminated prior to Task 1	N/A	no
	Invertebrates	no	Risk eliminated prior to Task 1	N/A	no
	Plants	no	Risk eliminated prior to Task 1	N/A	no
	Others	yes	The potential transfer of fish diseases is possible.	UMESC and other state and federal hatcheries perform routine health inspections. Transport equipment will be disinfected. Equipment remains in the laboratory.	yes

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Task 3 Fish are transferred to the exposure system	Vertebrates	No	Risk eliminated prior to Task 1Task 1	N/A	no
	Invertebrates	No	Risk eliminated prior to Task 1	N/A	no
	Plants	No	Risk eliminated prior to Task 1	N/A	no
	Others	yes	The potential transfer of fish diseases is possible.	UMESC and other state and federal hatcheries perform routine health inspections. Transport equipment will be disinfected. Equipment remains in the laboratory.	yes

Task 4 Fish are transferred to post exposure holding systems.	Vertebrates	No	Risk eliminated prior to Task 1	N/A	no
	Invertebrates	No	Risk eliminated prior to Task 1	N/A	no
	Plants	No	Risk eliminated prior to Task 1	N/A	no
	Others	yes	The potential transfer of fish diseases is possible.	UMESC and other state and federal hatcheries perform routine health inspections. Transport equipment will be disinfected. Equipment remains in the laboratory.	yes

Task 5 Fish are euthanized, enumerated, weighed and measured for growth observations	Vertebrates	No	Risk eliminated prior to Task 1	N/A	no
	Invertebrates	No	Risk eliminated prior to Task 1	N/A	no

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	Plants	No	Risk eliminated prior to Task 1	N/A	no
	Others	yes	The potential transfer of fish diseases is possible.	UMESC and other state and federal hatcheries perform routine health inspections. Transport equipment will be disinfected. Equipment remains in the laboratory.	yes

HACCP Plan Form
(all CCP's or "yes's" from column 6 of HACCP Step 4 -- Hazard Analysis Worksheet)

			Monitoring					
Critical Control Point (CCP)	**Significant Hazard(s)**	**Limits for each Control Measure**	**What**	**How**	**Frequency**	**Who**	**Evaluation & Corrective Action(s) (if needed)**	**Supporting Documentation (if any)**
Tasks 1, 2, 3, 4, 5 Other	Fish disease pathogen transfer	Pathogens must not be allow to establish in facility. Disease free fish must be used. Equipment must be disinfected.	Fish health observations and equipment disinfection	Monitor fish for signs of disease. Use established techniques for equipment disinfection.	Daily fish observations. Equipment disinfection after use	Lab technicians	Supervisor and staff are responsible for careful attention to detail and performing immediate corrective action.	Records in log books

Facility: Upper Midwest Environmental Sciences Center	**Activity:** Determine the effects of various concentrations of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species present in the Great Lakes and Upper Mississippi River basins.
Address: 2630 Fanta Reed Road, La Crosse, WI 54601	
Signature: HACCP Plan was followed.	**Date:**

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

AEH-12-PSEUDO-03

Date: April 19, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Note To File # 1 to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species."

This note is to document and clarify the coding procedures used to label the histology cassettes and tags for *Oncorhynchus mykiss* (dosed 29 February 2012), *Perca flavescens* (dosed7 March 2012) and *Sander vitreus* (dosed 28 March 2012) fish specimens and to document the labeling procedures for future exposures.

Amendment 1 to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species" details the sample collection, preservation and handling procedures for specimens collected for histopathological analysis. Section 5.1.8.3.2 provides examples of the unique identifiers to be used when labeling the histology cassettes or tags. Amendment 1 was not officially signed until March 19, 2012 by the UMESC Center Director and the Study Director. During the interim period, the histology cassettes and etchable tags for rainbow trout (RBT; dosed February 29, 2012) and yellow perch (YEP; dosed March 7 20120) were coded inconsistently. See Table 1 for the unique identifiers used to label the histology cassettes and tags. During the 22-day holding period for YEP and prior to the walleye (WAE) exposure (dosed on March 21, 2012), labeling procedure clarification was provided by the study director. See Table 2 for the unique identifiers used to label the histology tags for the WAE and the coding procedures to be used throughout the rest of the study for the labeling of histology cassettes and tags for remaining exposures.

Depending on animal size either a histology cassettes or an etchable tag attached through the lower jaw of the fish is used and labeled. Also, an A, B and C within a unique identifier refers to the diluter system while D, E, F and G refer to the holding rack quadrant. The letter M represents mortalities observed during either the 24-h dosing period or the 22-day observational holding period. The letter T represents those fish specimens collected at the termination of the 22-day observational holding period.

Specimens were collected as follows for each exposure: 10 specimens were collected just prior to distribution and then again after each of 3 distribution rounds (40 total); < 5 specimens (dependent on observed mortality, see amendment 1) were collected at the end of the 24-hour dosing period; and 5 specimens (if < 5 animals present in the chamber then all were collected) were collected at the termination of the 22-day observational holding period.

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cc: UMESC QAU

Table 1. Examples of the unique identifiers used to label the histology cassettes and tags prior to Amendment 1.

Sampling Period	RBT Labels	YEP Labels
Distribution	RBT-DIS#1-01[a]	YEP-DIS#1-01[a]
Exposure Termination (i.e., end of 24-h dosing period)	RBT-CONTROL-A-01[b]	YEP-CONTROL-A4-01[b]
Mortalities During Exposure	RBT-200-A-M1[c]	YEP-300-C4-M1[c]
Mortalities During 22-day Observational Period	RBT-200-E2-M1[d]	YEP-300-G6-M1[d]
Post-Exposure Termination (i.e., specimens collected on Day 22)	RBT-CONTROL-E13-T1[de]	YEP-CONTROL-G5-T1[de]

[a] There were four 10 fish specimens samples collected for histology during the distribution of animals to the exposure chambers. One sample was collected prior to distribution and the remaining 3 were collected after each of the 3 distribution rounds (Amendment 1 Section 5.1.8.2.1). Labels for the RBT and YEP histology specimens were consistent.
[b] Labels for the RBT specimens contained the diluter identity (i.e., A, B or C) while the labels for the YEP specimens contained the exposure tank identity (i.e., A1 through A5, B1 through B5, and C1 through C5). There were ≤ 5 (see Amendment 1) fish specimens from each treatment group replicate also collected at the end of the 24-h dosing period.
[c] Labels for the RBT mortalities at the end of the 24-h dosing period contained the diluter identity (i.e., A, B or C) while the labels for the YEP mortalities at the end of the 24-h dosing period also contained the exposure tank identity (i.e., A1 through A5, B1 through B5, and C1 through C5).
[d] Labels for the RBT and YEP mortalities during the 22-day holding period and specimens collected at the conclusion of the 22-day holding period were consistent.
[e] Five (or all remaining) specimens from each treatment group replicate were collected at the end of the 22-day holding period (Amendment 1 Section 5.1.8.2.2).

Table 2. Examples of the unique identifiers used to label the histology tags for the WAE and examples of the coding procedures to be used for all remaining exposures.

Sampling Period	WAE Labels[a]
Distribution	WAE-DIS#1-01
Exposure Termination (i.e., end of 24-h dosing period)	WAE-200-A-01
Mortalities During Exposure	WAE-200-A-M1
Mortalities During 22-day Observational Period	WAE-50-F1-M1
Post-Exposure Termination (i.e., specimens collected on Day 22)	WAE-200-F5-T1

[a] These unique identifiers are similar to those used to label the RBT specimens.

This note is to clearly document the coding procedures used for labeling the histology specimens. No adverse impacts to the study are anticipated as all the identification data needed were collected when required to uniquely identify the specimens collected for histopathology.

[redacted] 19 APR 12
Written by Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/20/12
Approved by Date
James A. Luoma, B.A.
Study Director, UMESC

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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: April 19, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Note To File # 2 to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species."

This note is to document and clarify the randomization outputs used to determine the treatment to exposure chamber within the diluter systems, distribution of fish to exposure chambers and exposure chamber transfer to the holding rack.

The study protocol to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species" briefly details the randomization procedures used to allocate treatment to the flow-through test apparatus (FTTA) and distribution of the test animals to exposure chambers. The randomization procedures were not discussed within the laboratory notebook for *Oncorhynchus mykiss* (RBT), *Perca flavescens* (YEP), *Sander vitreus* (WAE), and *Lepomis macrochirus* (BLG).

Using SAS (version 9.2), the Study Director performed randomization procedures prior to the distribution of each species to the exposure chambers. The randomization outputs included assignment of the treatment to the FTTA (i.e., concentration to the exposure chambers for each diluter system), distribution of the test animals to the exposure chambers, and the post-exposure transfer of test animals from the exposure chambers to the holding rack chambers. The outputs were used to setup the exposure and holding systems (i.e., place dosing lines to exposure chambers and to label the chambers for identification); randomly distribute test animals to exposure chambers; and to randomly assign exposure chamber treatment groups to a holding chamber. The randomization program files, log files and output files can be found in File Folders 16a (RBT), 18a (WAE), 19a (YEP) and 23a (BLG).

No adverse impacts to the study are anticipated as all the randomizations were completed, however the procedures were not clearly noted in the study log book.

[redacted] 19APR12
Written by Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/19/12
Approved by Date
James A. Luoma, B.A.
Study Director, UMESC

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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: May 6, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Note To File # 3 to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species."

This note clarifies the preparation and final approval order of Deviations 16 through 21 for study number AEH-12-PSEUDO-03.

Deviations 19, 20 and 21were approved on September 26 and 28, 2012, before the final approval signatures were obtained for deviations 16, 17 and 18 (approval signatures dated October 1, 2012). Deviations 16, 17, and 18 were noted and preparation initiated in chronological order (of discrepancy discovery), however, the final approval signatures were not obtained until after deviations 19, 20 and 21 were noted, drafted and approved.

No adverse impacts to the study are anticipated as deviations were written as required for all study discrepancies.

[redacted] 6 May 2013
Written by Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 5/6/13
Approved by Date
James A. Luoma, B.A.
Study Director, UMESC

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Item No. 12
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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: May 15, 2013

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Note To File #4 to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL 145A) to ten different freshwater fish species."

This note clarifies water chemistry data collection and summarization for the 22-d holding period of rainbow trout (*Oncorhynchus mykiss*), coaster brook trout (*Salvelinus fontinalis*), smallmouth bass (*Micropterus dolomieu*), lake sturgeon (*Acipenser fulvescens*), and channel catfish (*Ictalurus punctatus*) for study number AEH-12-PSEUDO-03.

During the post-exposure holding period, water quality parameters (i.e.: dissolved oxygen, pH, and temperature) were measured daily on 1of 3 replicate holding chambers for each treatment group (i.e.: one of chamber of each control, 50 mg/L, 100 mg/L, 200 mg/L, 300 mg/L treatment group). The parameters were measured on a rotational basis for each of the 3 replicates for each treatment group. For the aforementioned species, data collection continued in holding chambers after complete test animal mortality in the chamber. Chambers with complete test animal mortality were removed from the water chemistry data summaries on the date all the test animals succumbed. The species, chamber ID, treatment group and the date the water chemistry data was removed from the data (i.e.: the date of no surviving test animals) summaries are presented in Table 1.

Table 1. Species, chamber ID, treatment group and the date water chemistry parameters were removed from data summaries.

Species	Holding Chamber ID	Treatment Group (mg/L)	Removal Date[1]
Rainbow Trout	E2	300	March 18, 2012
	E4	200	March 19, 2012
	E7	200	March 20, 2012
	E8	300	March 13, 2012
	E12	100	March 19, 2012
	E14	300	March 15, 2012
	E15	200	March 20, 2012
Coaster Brook Trout	E12	300	May 21, 2012
	E14	300	May 21, 2012
Smallmouth Bass	D10[2]	200	June 21, 2012

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Table 1. (cont.) Species, chamber ID, treatment group and the date water chemistry parameters were removed from data summaries.

Lake Sturgeon	G1	100	August 21, 2012
	G3	300	August 9, 2012
	G7	100	August 19, 2012
	G9	300	August 8, 2012
	G11	100	August 17, 2012
	G12	200	August 11, 2012
	G14	300	August 5, 2012
	G15	200	August 10, 2012
Channel Catfish	E6	300	September 28, 2012
	E14	300	October 8, 2012
	E15	300	September 28, 2012

[1] – Date of no surviving test organisms remaining in holding chamber; water quality measurements taken on or after this date were removed from data summaries.
[2] – Exposure chamber A4 (holding chamber D10) was accidentally placed in MS-222 during transfer. The fish were euthanized and all water quality measurements taken from this holding chamber were removed from analysis. See Deviation #13 for further clarification.

No adverse impacts to the study are anticipated as water quality was monitored daily from chambers containing test organisms. Water quality measurements from holding chambers that did not contain test organisms were removed from data summaries to accurately reflect dissolved oxygen, pH and temperature in holding chambers with test animals.

[redacted] 15MAY2013

Written by
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 5/16/13

Approved by
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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wrong project #w 13MAR15

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: March 6, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 1- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on pages 2-7 of this amendment. Revised text is indicated **in bold**.

This amendment details the sample collection, preservation and handling procedures for samples collected for histopathological analysis.

Reviewed by:

[redacted] 06 Mar 12
Mark P. Gaikowski, M.A. Date
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

[redacted] 3/19/2012
Michael Jawson, Ph.D. Date
Center Director, UMESC

Approved by:

[redacted] 3/14/12
James A. Luoma, B.A. Date
Study Director, UMESC

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

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Current text:

4.1 General Description:

Ten species (Table 2) of juvenile fish endemic in the Great Lakes and Mississippi River basins will be evaluated to identify potential effects from exposure to varying concentrations of MBI-401 SDP. Juvenile fish will be placed into a flow through test apparatus (FTTA), acclimated to FTTA conditions then exposed to MBI-401 SDP; surviving fish will be monitored post-exposure for delayed mortality or sublethal effects. Samples of surviving fish will be collected immediately post-exposure and at the termination of the post exposure observation period to assess potential pathological changes. Procedures to assess histological change will be added by protocol amendment if determined to be needed.

4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination. One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 30-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; ±2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 30-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight

will be recorded for each test animal. Euthanized test animals will be preserved for histological examination or disposed of by incineration.

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution to exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.1.7 Feeding: Fish will be fed during the acclimation and post exposure periods by offering commercially-prepared dry feed, frozen live food, or live forage. The percentage body weight offered will be determined during the acclimation period, will vary between feed types and species, and will be documented in the study records. The feed rate will be adjusted weekly to account for fish growth. The exact procedures used will be documented in the study records. Feed offered will either be weighed or volumetrically measured for each holding chamber.

Revised Text **(In bold)**:

4.1 General Description:

Ten species (Table 2) of juvenile fish endemic in the Great Lakes and Mississippi River basins will be evaluated to identify potential effects from exposure to varying concentrations of MBI-401 SDP. Juvenile fish will be placed into a flow through test apparatus (FTTA), acclimated to FTTA conditions then exposed to MBI-401 SDP;

surviving fish will be monitored post-exposure for delayed mortality or sublethal effects. Samples of **up to 5** surviving fish will be collected immediately post-exposure and at the termination of the post exposure observation period **from each treatment replicate** to assess potential pathological changes.

4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination **(Protocol Section 5.1.8).** One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 30-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; $\pm$2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 30-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination **(Protocol section 5.1.8)** or disposed of by incineration.

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution to exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.1.7 Feeding: Fish will be fed during the acclimation and post exposure periods by offering commercially-prepared dry feed, frozen live food, or live forage. The percentage body weight offered will be determined during the acclimation period, will vary between feed types and species, and will be documented in the study records. The feed rate will be adjusted weekly to account for fish growth. The exact procedures used will be documented in the study records. Feed offered will either be weighed or volumetrically measured for each holding chamber.

5.1.8 Histopathological sampling: Fish samples will be collected for pathological examination. Samples of fish for pathological examination will be taken from fish that meet the following conditions:

5.1.8.1 Mortality: Dead or moribund fish will be removed from the acclimation tank, exposure and holding chambers daily. Dead or moribund fish removed during the acclimation period will not be subjected to histopathological examination.

Any dead or moribund fish observed during the exposure and post-exposure period will be preserved for potential histopathological observation. Fish with significant post-mortem decay (e.g. due to fungal or bacterial degradation) will be noted and the Study Pathologist

will determine whether post-mortem tissue decay is sufficient to preclude any histopathological examination.

5.1.8.2 Scheduled sampling: Scheduled histopathological samples include 40 fish during the distribution to exposure chambers and ≤ 5 fish from each treatment group replicate immediately post exposure and 30-d post exposure. Fish will be euthanized by MS-222 over dose as describe in UMESC SOP GEN 132.

5.1.8.2.1 Distribution to exposure chambers: 40 fish of each species will be collected for potential histopathological examination throughout the random distribution to the exposure chambers. Four 10 fish samples will be collected with the first sample collection prior to fish distribution and then after the completion of each distribution round.

5.1.8.2.2 Immediate post exposure: Immediate post exposure samples will be collected as the fish are removed from the exposure chambers by selecting the initial fish captured, and then spacing the remaining 4 samples evenly between the remaining number of surviving fish as they are transferred. The number of fish selected for immediate post exposure sampling will be reduced for mortalities as follows: 16-20 fish survive = 4 fish sampled, 11-15 fish survive = 3 fish sampled, < 10 fish survive = 0 fish sampled.

5.1.8.2.3 30-d post exposure: Five 30-d post exposure fish samples will be collected as the fish are removed from the holding chambers by selecting the initial fish captured and then spacing the remaining 4 samples evenly between the remaining number of surviving fish captured. If ≤ 5 fish survive, all the surviving fish will be sampled.

5.1.8.3 Histological sample identification and preservation

5.1.8.3.1 Sample preparation: Fish will be euthanized by MS-222 overdose (UMESC SOP 132). Individual fish weight and length will be recorded. The opercula will be excised and the body cavity opened with a small ventral incision.

5.1.8.3.2 Sample identification: Each fish sampled for potential histopathological examination will be either placed in an individual tissue cassette or individually tagged with a compression markable tag placed through the jaw or other suitable location. The cassette or tag will be uniquely marked to identify the species, treatment group, replicate number, sampling time and fish number (ie: RBT-300-2-24H-01, RBT-300-2-30D-01, etc). Initial distribution samples will be coded as to species, sampling time, and fish number (ie: RBT-DIS#1-01, RBT-DIS#2-10, etc).

5.1.8.3.3 Sample preservation: Histopathological samples will be preserved by placing the samples into Modified Davidson's solution for 24-48h, followed by a 70% ETOH rinse and a final indefinite 10% neutral buffered formalin storage solution. Separate containers will be used for discrete sampling times and treatment group. If space

permits [samples NTE 40% V/V (e.g. if the total volume of RBT taken immediately post exposure from the 300 mg/L group is ≤ 400 mL, then all the fish could be placed in a 1-L container filled with Modified Davidson's or 10% NBF)], all fish from one species, treatment group and sampling time (ie: RBT, all 300 mg/L replicates, immediate post exposure) will be placed into the same storage container. Initial distribution samples may be placed into a single storage container. All fish will retain unique identification as to treatment group, replicate, fish number, etc.

5.8.4 Tissue Trimming, Processing, Embedding, Microtomy, and Staining: These procedures will be performed at Experimental Pathology Laboratories, Inc. (EPL®) or an alternate laboratory experienced in fish pathology. Unless otherwise specified, procedures involving tissue processing, embedding, microtomy, and staining will be performed according to EPL (or alternate laboratory) SOP.

5.8.5 Pathology: The Study Pathologist will examine all histopathological samples and will interpret and report the findings. The Study Pathologist will not be blinded as to the treatment group. Initially, only samples from two representative species (one cold and one cool or one warm water species) and one time point (ie: immediate or 30-d post exposure) will be reviewed for pathological changes. Samples for other species and sampling times will be retained at UMESC for potential evaluation. Initial evaluation will be conducted on the control and high treatment group. If no changes are observed, then the lower treatment groups will not be evaluated.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: March 19, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 2- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on pages 2-7 of this amendment. Revised text is indicated **in bold**.

This amendment reduces the post exposure observation period for test animals from 30-d to 22-d. Reducing the exposure period will facilitate the availability of study equipment including holding chambers, acclimation tanks and associated temperature controlled water in a timely manner in addition to a more manageable daily work load. The proposed 22-d post-exposure observation period will provide sufficient observation time post dosing to achieve study objectives.

Reviewed by:

[redacted] 19 Mar 2012

Mark P. Gaikowski, M.A. — Date
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

[redacted] 3/19/2012

Michael Jawson, Ph.D. — Date
Center Director, UMESC

Approved by:

[redacted] 3/19/12

James A. Luoma, B.A. — Date
Study Director, UMESC

FF # 3 wrong item number KWW 19 Mar 13
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[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

Current text:

4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination (Protocol Section 5.1.8). One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 30-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; $\pm$2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 30-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination (Protocol section 5.1.8) or disposed of by incineration.

6.2 Number of exposures and replicates: There will be a total of 5 treatment levels (control, and approximately 50, 100, 200 and 300 mg *Pf*-CL145A/L) for each FTTA. There will be a total of 3 independent FTTA (each with 5 treatment levels) which will serve as the replicates. Each species will be run concurrently in the 3 FTTA and they will have a single 24 h exposure and 30-d post exposure evaluation period.

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Revised Text **(In bold)**:

4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination (Protocol Section 5.1.8). One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a **22-d** observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; ±2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At **22-d** post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination (Protocol section 5.1.8) or disposed of by incineration.

6.2 Number of exposures and replicates: There will be a total of 5 treatment levels (control, and approximately 50, 100, 200 and 300 mg *Pf*-CL145A/L) for each FTTA. There will be a total of 3 independent FTTA (each with 5 treatment levels) which will serve as the replicates. Each species will be run concurrently in the 3 FTTA and they will have a single 24 h exposure and **22-d** post exposure evaluation period.

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: April 9, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 3- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on pages 2-7 of this amendment. Revised text is indicated **in bold.**

This amendment details the 1) termination of data collection for Bluegill (*Lepomis macrochirus)* for the exposure initiated 02 April 2012, 2) exposure termination criteria, and 3) the use of aeration during the exposure period for all exposures conducted at 22°C.
This amendment further corrects typographical and omission errors in study Amendment #1 (dated March 6, 2012) and study Amendment #2 (dated March 19, 2012) in which study Amendment #1 omitted a number one (as shown in bold) in sections 5.**1**.8.4 (Tissue Trimming, Processing, Embedding, Microtomy, and Staining) and 5.**1**.8.5; (Pathology) and the use of etchable vs. compression markable tags in section 5.1.8.3.2. Study Amendment #2 did not change all of the 30-d post exposure time references to reflect amendment's intent to update all 30-d references to reflect the change to a 22-d post exposure holding period.

[redacted]

Reviewed by:

[redacted]

Mark P. Gaikowski, M.A.
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

18 Apr 12
Date

Michael Jawson, Ph.D.
Center Director, UMESC

4/16/2012
Date

[redacted]

Approved by:

James A. Luoma, B.A.
Study Director, UMESC

4/17/12
Date

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[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

The data collect for the Bluegill (*Lepomis macrochirus)* exposure initiated on 02 April 2012 was terminated at the end of the exposure period. The bluegill exposure was terminated due to problems encountered during test material delivery which resulted in concentrations ~ 50% of expected for an undeterminable period of time between the 6 and 12- h sampling. The concentrations returned to expected levels by the 15-h sampling time and the exposure and data collection continued through the 24-h exposure period. The data collection was terminated at the end of the exposure period and all test animals were euthanized and disposed of for incineration. 24-h ammonia samples were not collected for this exposure. The data collected during this exposure will be retained in the study records. Initial distribution BLG test animals collected for histopathological sampling will not be retained. A second exposure will be conducted for BLG and criteria listed for repeating exposures is detailed below. Additionally, dissolved oxygen levels at the 24-h post-exposure initiation sampling time revealed oxygen levels near or below the previously described action limit of 5.0 mg/L. Thus, this amendment details the use of supplemental aeration during all 22°C exposures.

Current text:

4.2 Experimental Design:

Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination (Protocol Section 5.1.8). One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 22-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in

addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; ±2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 22-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination (Protocol section 5.1.8) or disposed of by incineration.

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

5.1.8.2 Scheduled sampling: Scheduled histopathological samples include 40 fish during the distribution to exposure chambers and ≤ 5 fish from each treatment group replicate immediately post exposure and 30-d post exposure. Fish will be euthanized by MS-222 over dose as describe in UMESC SOP GEN 132.

5.1.8.2.1 Distribution to exposure chambers: 40 fish of each species will be collected for potential histopathological examination throughout the random distribution to the exposure chambers. Four 10 fish samples will be collected with the first sample collection prior to fish distribution and then after the completion of each distribution round.

5.1.8.2.2 Immediate post exposure: Immediate post exposure samples will be collected as the fish are removed from the exposure chambers by selecting the initial fish captured, and then spacing the remaining 4 samples evenly between the remaining number of surviving fish as they are transferred. The number of fish selected for immediate post exposure sampling will be reduced for mortalities as follows: 16-20 fish survive = 4 fish sampled, 11-15 fish survive = 3 fish sampled, < 10 fish survive = 0 fish sampled.

5.1.8.2.3 30-d post exposure: Five 30-d post exposure fish samples will be collected as the fish are removed from the holding chambers by selecting the initial fish captured and then spacing the remaining 4 samples evenly between the remaining number of surviving fish captured. If ≤ 5 fish survive, all the surviving fish will be sampled.

5.1.8.3 Histological sample identification and preservation

5.1.8.3.1 Sample preparation: Fish will be euthanized by MS-222 overdose (UMESC SOP 132). Individual fish weight and length will be recorded. The opercula will be excised and the body cavity opened with a small ventral incision.

5.1.8.3.2 Sample identification: Each fish sampled for potential histopathological examination will be either placed in an individual tissue cassette or individually tagged with a compression markable tag placed through the jaw or other suitable location. The cassette or tag will be uniquely marked to identify the species, treatment group, replicate

number, sampling time and fish number (ie: RBT-300-2-24H-01, RBT-300-2-30D-01, etc). Initial distribution samples will be coded as to species, sampling time, and fish number (ie: RBT-DIS#1-01, RBT-DIS#2-10, etc).
5.1.8.3.3 Sample preservation: Histopathological samples will be preserved by placing the samples into Modified Davidson's solution for 24-48h, followed by a 70% ETOH rinse and a final indefinite 10% neutral buffered formalin storage solution. Separate containers will be used for discrete sampling times and treatment group. If space permits [samples NTE 40% V/V (e.g. if the total volume of RBT taken immediately post exposure from the 300 mg/L group is ≤ 400 mL, then all the fish could be placed in a 1-L container filled with Modified Davidson's or 10% NBF)], all fish from one species, treatment group and sampling time (ie: RBT, all 300 mg/L replicates, immediate post exposure) will be placed into the same storage container. Initial distribution samples may be placed into a single storage container. All fish will retain unique identification as to treatment group, replicate, fish number, etc.

5.8.4 Tissue Trimming, Processing, Embedding, Microtomy, and Staining: These procedures will be performed at Experimental Pathology Laboratories, Inc. (EPL®) or an alternate laboratory experienced in fish pathology. Unless otherwise specified, procedures involving tissue processing, embedding, microtomy, and staining will be performed according to EPL (or alternate laboratory) SOP.
5.8.5 Pathology: The Study Pathologist will examine all histopathological samples and will interpret and report the findings. The Study Pathologist will not be blinded as to the treatment group. Initially, only samples from two representative species (one cold and one cool or one warm water species) and one time point (ie: immediate or 30-d post exposure) will be reviewed for pathological changes. Samples for other species and sampling times will be retained at UMESC for potential evaluation. Initial evaluation will be conducted on the control and high treatment group. If no changes are observed, then the lower treatment groups will not be evaluated.

5.4.1.2 Aeration: Supplemental aeration will not be supplied during the MBI-401 SDP exposures unless the dissolved oxygen falls below 5 mg/L. Supplemental aeration supplied during the exposure period will be documented in the study records. Aeration will be supplied during the acclimation and post exposure observation periods.

Revised Text **(In bold)**:

4.2 Experimental Design:
Each species of fish will be tested separately in the FTTA. Three separate replicate FTTA will be prepared to contain the exposure chambers. Treatment will be randomly allocated to the FTTA according to a randomized block design in which each block will contain one exposure chamber per concentration. Test fish will be

distributed to the exposure chambers according to a completely randomized distribution scheme. A single MBI-401 SDP exposure will be administered to each species in the FTTA, nominal concentrations selected will approximate 0, 50, 100, 200 and 300 mg/L.

After temperature acclimation, a group of five (1 group) or ten (2 groups) fish will be transferred into a randomly selected exposure chamber. The process will then be repeated until all exposure chambers designated for use (4 concentrations + 1 control per FFTA) receive three distributions for a total of 25 animals in each exposure chamber. Additionally, four groups of 10 fish of each species will be euthanized by an overdose of MS-222, measured to determine initial fish length and weight, and preserved for possible histological examination (Protocol Section 5.1.8). One group will be taken prior to initiation of distribution to the exposure chambers, the remaining 3 groups will be taken after each round of distribution is completed.

Exposures will be initiated at least 12 h after fish are placed in the exposure chambers. Each exposure will be a single 24 h continuous flow dose administered to a single species and then the exposure will be followed by a 22-d observation period. Exposures will be initiated by pumping MBI-401 SDP stock solution (concentration to be determined) to the incoming water supply in the mixing chamber of the diluter system (Figure 1). The actual concentrations of MBI-401 SDP will be dependent upon the dilution ratio of the FTTA, however, the exposure chambers that provide the closest concentrations to 50, 100, 200 and 300 mg/L will be used in addition to the control chamber. The exposure chambers will be held at the species designated test temperature (Table 2; ±2°C) and on an 18:6 h light/dark cycle for the exposure and post exposure period.

At 22-d post exposure, fish will be euthanized by an overdose of MS-222 according to the procedures established in UMESC SOP 132. Individual fish length and weight will be recorded for each test animal. Euthanized test animals will be preserved for histological examination (Protocol section 5.1.8) or disposed of by incineration.

Exposures that deviate substantially in concentration, exhibit unacceptable water quality or control mortality or other credible and documented deficiencies may be repeated at the discretion of the study director. All data collected up to the termination point will be retained in the study files. The cause of termination will be clearly documented in a note to file, deviation or other study records.

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

If exposures are repeated the number of fish used will increase by 415 per exposure.

5.1.8.2 Scheduled sampling: Scheduled histopathological samples include 40 fish during the distribution to exposure chambers and ≤ 5 fish from each treatment group replicate immediately post exposure and **22-d** post exposure. Fish will be euthanized by MS-222 over dose as describe in UMESC SOP GEN 132.

5.1.8.2.1 Distribution to exposure chambers: 40 fish of each species will be collected for potential histopathological examination throughout the random distribution to the exposure chambers. Four 10 fish samples will be collected with the first sample collection prior to fish distribution and then after the completion of each distribution round. **If the exposure is terminated, initial distribution histopathological samples will not be retained.**

5.1.8.2.2 Immediate post exposure: Immediate post exposure samples will be collected as the fish are removed from the exposure chambers by selecting the initial fish captured, and then spacing the remaining 4 samples evenly between the remaining number of surviving fish as they are transferred. The number of fish selected for immediate post exposure sampling will be reduced for mortalities as follows: 16-20 fish survive = 4 fish sampled, 11-15 fish survive = 3 fish sampled, < 10 fish survive = 0 fish sampled.

5.1.8.2.3 **22-d** post exposure: Five **22-d** post exposure fish samples will be collected as the fish are removed from the holding chambers by selecting the initial fish captured and then spacing the remaining 4 samples evenly between the remaining number of surviving fish captured. If ≤ 5 fish survive, all the surviving fish will be sampled.

5.1.8.3 Histological sample identification and preservation

5.1.8.3.1 Sample preparation: Fish will be euthanized by MS-222 overdose (UMESC SOP 132). Individual fish weight and length will be recorded. The opercula will be excised and the body cavity opened with a small ventral incision.

5.1.8.3.2 Sample identification: Each fish sampled for potential histopathological examination will be either placed in an individual tissue cassette or individually tagged with a compression markable **or etchable** tag placed through the jaw or other suitable location. The cassette or tag will be uniquely marked to identify the species, treatment group, replicate number, sampling time and fish number (ie: RBT-300-2-24H-01, RBT-300-2-**22D**-01, etc). Initial distribution samples will be coded as to species, sampling time, and fish number (ie: RBT-DIS#1-01, RBT-DIS#2-10, etc).

5.1.8.3.3 Sample preservation: Histopathological samples will be preserved by placing the samples into Modified Davidson's solution for 24-48h, followed by a 70% ETOH rinse and a final indefinite 10% neutral buffered formalin storage solution. Separate containers will be used for discrete sampling times and treatment group. If space permits [samples NTE 40% V/V (e.g. if the total volume of RBT taken immediately post exposure from the 300 mg/L group is ≤ 400 mL, then all the fish could be placed in a 1-L container filled with Modified Davidson's or 10% NBF)], all

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Pg 6 of 7

fish from one species, treatment group and sampling time (ie: RBT, all 300 mg/L replicates, immediate post exposure) will be placed into the same storage container. Initial distribution samples may be placed into a single storage container. All fish will retain unique identification as to treatment group, replicate, fish number, etc.

5.1.8.4 Tissue Trimming, Processing, Embedding, Microtomy, and Staining: These procedures will be performed at Experimental Pathology Laboratories, Inc. (EPL®) or an alternate laboratory experienced in fish pathology. Unless otherwise specified, procedures involving tissue processing, embedding, microtomy, and staining will be performed according to EPL (or alternate laboratory) SOP.

5.1.8.5 Pathology: The Study Pathologist will examine all histopathological samples and will interpret and report the findings. The Study Pathologist will not be blinded as to the treatment group. Initially, only samples from two representative species (one cold and one cool or one warm water species) and one time point (ie: immediate or **22-d** post exposure) will be reviewed for pathological changes. Samples for other species and sampling times will be retained at UMESC for potential evaluation. Initial evaluation will be conducted on the control and high treatment group. If no changes are observed, then the lower treatment groups will not be evaluated.

5.4.1.2 Aeration: **Supplemental aeration will not be supplied during the MBI-401 SDP exposures administered at 12 or 17°C unless the dissolved oxygen falls below 5 mg/L. Supplemental aeration supplied during the exposure period will be documented in the study records. Supplemental aeration will be supplied during all MBI-401 SDP exposures administered at 22°C.** Aeration will be supplied during the acclimation and post exposure observation periods.

ORIGINAL

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

AEH-12-PSEUDO-03

Date: July 5, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 4- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on pages 2-7 of this amendment. Revised text is indicated **in bold**.

This amendment details the 1) post exposure holding procedures and system and 2) includes the addition of refuge (e.g.: PVC pipe) to reduce the effects of aggressive fish during the post exposure holding period.

Reviewed by:

[redacted]

Mark P. Gaikowski, M.A.
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

7/5/12
Date

[redacted]

Michael Jawson, Ph.D.
Center Director, UMESC

7/17/2012
Date

[redacted]

Approved by:

James A. Luoma, B.A.
Study Director, UMESC

7/19/2012
Date

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

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Current text:

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

If exposures are repeated the number of fish used will increase by 415 per exposure.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution to exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.4 Study facilities:

5.4.1 Test Facility

U.S. Geological Survey, Upper Midwest Environmental Sciences Center

2630 Fanta Reed Rd

La Crosse, Wisconsin 54603

5.4.1.1 Exposure system: The test system (Figure 1) is a flow through test apparatus which provides serially dilution of test solutions and it is comprised of a headbox, a mixing and distribution box and a series of 10 aquaria (50.8 x 25.4 x 33.02 cm). Each exposure chamber will receive a continuous supply of well water from the mixing/distribution box. Each chamber will be uniquely identified (eg: A1) to allow for identification of

species, treatment type and replicate number. Coding procedures will be documented in the study records.

5.4.1.2 Aeration: Supplemental aeration will not be supplied during the MBI-401 SDP exposures unless the dissolved oxygen falls below 5 mg/L. Supplemental aeration supplied during the exposure period will be documented in the study records. Aeration will be supplied during the acclimation and post exposure observation periods.

5.4.1.3 Water supply: Temperature-adjusted well water will be supplied continuously to each chamber at ~1 tank-volume exchanges/h (~250 mL/min during exposure, ~ 500 mL/min during the post exposure observation period).

5.4.1.4 Lighting: Overhead lighting (~18 h light:6 h dark; 100-1000 lux) will be provided.

5.4.1.5 Exposure chamber dimensions: The exposure chambers are (~51 x 25 x 33 cm) glass aquaria. Each exposure chamber will contain ~15 L of water during the exposure period and ~30 L of water during the post-exposure observation period.

5.4.1.6 Water discharge: All water during the exposure period will be discharged through a particulate and carbon filter and then into the UMESC carbon adsorption system. Acclimation and post exposure period water will not be filtered prior to discharge.

5.4.1.7 Acclimation and holding chamber cleaning: During the acclimation period and throughout the post exposure observation period, each chamber or tank containing animals will be cleaned daily to remove uneaten feed and feces. Cleaning will be conducted by removal of the stand pipe and then brushing tank or by siphoning settled waste. No cleaning will be performed during the exposure period.

Revised Text **(In bold)**:

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

If exposures are repeated the number of fish used will increase by 415 per exposure.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution

5.1.6.1 Exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.1.6.2 Holding chambers: After the exposure period, the surviving fish not selected for histopathological sampling (section 5.1.8.2.2) will be placed into a bucket containing clean, tempered well water. A group wet weight will be determined for each replicate by pouring the fish into a pre-wetted net and then placing the fish into a tared vessel containing tempered well water. Immediately after weight determination, the fish will be placed into a randomly chosen holding chamber according to a predetermined randomization scheme for the post-exposure observation period.

5.4 Study facilities:

5.4.1 Test Facility

U.S. Geological Survey, Upper Midwest Environmental Sciences Center

2630 Fanta Reed Rd

La Crosse, Wisconsin 54603

5.4.1.1 Exposure system: The test system (Figure 1) is a flow through test apparatus which provides serially dilution of test solutions and it is comprised of a headbox, a mixing and distribution box and a series of 10 aquaria (50.8 x 25.4 x 33.02 cm). Each exposure chamber will receive a continuous supply of well water from the mixing/distribution box. Each chamber will be uniquely identified (eg: A1) to allow for identification of species, treatment type and replicate number. Coding procedures will be documented in the study records.

5.4.1.2 Aeration: Supplemental aeration will not be supplied during the MBI-401 SDP exposures unless the dissolved oxygen falls below 5 mg/L.

Supplemental aeration supplied during the exposure period will be documented in the study records. Aeration will be supplied during the acclimation and post exposure observation periods.

5.4.1.3 Water supply: Temperature-adjusted well water will be supplied continuously to each chamber at ~1 tank-volume exchanges/h (~250 mL/min during exposure, ~ 500 mL/min during the post exposure observation period).

5.4.1.4 Lighting: Overhead lighting (~18 h light:6 h dark; 100-1000 lux) will be provided.

5.4.1.5 Exposure chamber dimensions: The exposure chambers are (~51 x 25 x 33 cm) glass aquaria. Each exposure chamber will contain ~15 L of water during the exposure period and ~30 L of water during the post-exposure observation period.

5.4.1.6 Water discharge: All water during the exposure period will be discharged through a particulate and carbon filter and then into the UMESC carbon adsorption system. Acclimation and post exposure period water will not be filtered prior to discharge.

5.4.1.7 Acclimation and holding chamber cleaning: During the acclimation period and throughout the post exposure observation period, each chamber or tank containing animals will be cleaned daily to remove uneaten feed and feces. Cleaning will be conducted by removal of the stand pipe and then brushing tank or by siphoning settled waste. No cleaning will be performed during the exposure period.

5.4.1.8 Post exposure holding system: The system used for post exposure monitoring is a 2 sided three layered rack divided into four quadrants. Each of the four quadrants contain 15 holding chambers (~51 x 25 x 33 cm glass aquaria; ~30 L of water) identical to the exposure chambers. Each quadrant has 5 chambers on each level and all levels are supplied tempered well water from a single headbox.

5.4.1.8.1 Refuge material: To reduce the potential impacts of observed aggressive fish behavior, refuge material (e.g. sections of PVC pipe) may be placed in the post exposure holding chambers. The exact procedures used will be documented in the study records.

ORIGINAL

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

AEH-12-PSEUDO-03

Date: July 12, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 5- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on pages 2-7 of this amendment. Revised text is indicated **in bold**.

This amendment eliminates the collection of water samples for ammonia analysis at the 6-h and 12-h time points.

Reviewed by:

[redacted]
Mark P. Gaikowski, M.A.
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

16 Jul 2012
Date

[redacted]
Michael Jawson, Ph.D.
Center Director, UMESC

7/17/2012
Date

Approved by:

[redacted]
James A. Luoma, B.A.
Study Director, UMESC

7/19/2012
Date

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

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ORIGINAL

The protocol for study number AEH-12-PSUEDO-03 details the collection of water samples at 6, 12, and 24-h. The protocol further states that the analysis will be conducted on the 24-h samples and may be conducted on the 6 and 12-h samples. Analysis of the 24-h samples from 4 species of fish resulted in un-ionized ammonia concentrations of < 0.0050 mg/L, well below the level of concern. The results were discussed with management on July 11, 2012 and it was verbally approved to eliminate the collection of 6 and 12-h samples. The collection and analysis of the 24-h samples will continue as detailed in the protocol. The text is therefore revised as described below:

Current text:

5.2.7 Ammonia: Samples for total ammonia-nitrogen will be collected at 6, 12 and 24 h during the exposure period for each exposure chamber. Analysis will be performed on the 24-h samples and may be performed on the 6 and 12-h samples. Unionized ammonia will be calculated from the total ammonia, pH and temperature of the samples. Ammonia samples will be filtered through a 0.45 micron syringe filter, acidified (~pH 2.5) with sulfuric acid and then stored at ~4°C until analyzed by the UMESC Long Term Resources Monitoring (LTRM) Water Quality Laboratory using the automated phenate method. The LTRM laboratory does not perform their analysis according to Good Laboratory Practice (GLP) regulation. Data Generated by LTRM will be annotated to state it does not comply with GLP regulations in the final report.

Revised Text **(In bold)**:

5.2.7 Ammonia: **Samples will be collected at 24 h during the exposure period for each exposure chamber and analyzed for total ammonia-nitrogen. Unionized ammonia will be calculated from the total ammonia, pH and temperature of the samples.** Ammonia samples will be filtered through a 0.45 micron syringe filter, acidified (~pH 2.5) with sulfuric acid and then stored at ~4°C until analyzed by the UMESC Long Term Resources Monitoring (LTRM) Water Quality Laboratory using the automated phenate method. The LTRM laboratory does not perform their analysis according to Good Laboratory Practice (GLP) regulation. Data Generated by LTRM will be annotated to state it does not comply with GLP regulations in the final report.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

AEH-12-PSEUDO-03

Date: August 01, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 6- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on page 2 of this amendment. Revised text is indicated **in bold**.

This amendment details the use of aeration during the exposure period for exposures conducted at 12 or 17°C.

Reviewed by:

[redacted] 02 Aug 12

Mark P. Gaikowski, M.A. Date
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

[redacted] 8/6/12

Michael Jawson, Ph.D. Date
Center Director, UMESC

Approved by:

[redacted] 8/7/12

James A. Luoma, B.A. Date
Study Director, UMESC

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

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Prior to initiation of the lake sturgeon exposure to *Pseudomonas fluorescens* (*Pf*-CL145A) a recommendation by the study director to add supplemental aeration during the entire exposure period was agreed to by management. The recommendation was made due to the size of the test animals (~5 g each) and previous experience which has shown dissolved oxygen reduction during the exposure period.
Thus, this amendment details the use of supplemental aeration during the exposure period for exposures conducted at 12 or 17°C that are anticipated to otherwise have lower than desired dissolved oxygen levels (5 mg/L).

Current text:

5.4.1.2 Aeration: Supplemental aeration will not be supplied during the 12 or 17°C MBI-401 SDP exposures unless the dissolved oxygen falls below 5 mg/L. Supplemental aeration supplied during the exposure period will be documented in the study records. Supplemental aeration will be supplied during all 22°C MBI-401 SDP exposures. Aeration will be supplied during the acclimation and post exposure observation periods.

Revised Text **(In bold)**:

5.4.1.2 Aeration: **Supplemental aeration will be supplied during the 12 or 17°C MBI-401 SDP exposures if the dissolved oxygen falls below 5 mg/L or it will be supplied during the entire exposure if it is anticipated to fall below 5 mg/L (due to fish size, previous experience, etc) during the exposure period.** Supplemental aeration supplied during the exposure period will be documented in the study records. Supplemental aeration will be supplied during all 22°C MBI-401 SDP exposures. Aeration will be supplied during the acclimation and post exposure observation periods.

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: March 1, 2013

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 7- Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol, Study # AEH-12-PSEUDO-03 is proposed as detailed on page 2 of this amendment. Revised text is indicated **in bold**.

This amendment eliminates fathead minnow (*Pimephales promelas*) from the list of species to be tested under study number AEH-12-PSEUDO-03.

Reviewed by:

[redacted] 6/Mar/13

Mark P. Gaikowski, M.A.
Supervisory Biologist
Aquatic Ecosystem Health,
UMESC[1]

Date

[redacted] 3/6/2013

Michael Jawson, Ph.D.
Center Director, UMESC

Date

Approved by:

[redacted] 3/1/13

James A. Luoma, B.A.
Study Director, UMESC

Date

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

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This amendment eliminates fathead minnows (*Pimephales promelas*) from the list of species to be tested under study number AEH-12-PSEUDO-03. Fathead minnows will not be exposed due to the following reasons: 1) significant delays in test chemical availability from the manufacturer precluded timely completion 2) current test animal health precludes treatment initiation at this time and 3) the need to complete the final study report prevents further rescheduling of exposures.

No future attempts to complete fathead minnow exposure will be conducted for study number AEH-12-PSEUDO-03 and all other species exposures have been completed.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

Date: May 12, 2014
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Amendment 8 - Amendment to the study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Revision of Study Protocol (Study # AEH-12-PSEUDO-03) as detailed on page 2 of this amendment. Revised text is in **bold and underlined**, deleted text has a ~~strike-through~~.

This amendment documents the change of status of study number AEH-12-PSEUDO-03 titled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" from a Good Laboratory Practices (GLP) regulated study to a non-GLP regulated study. The data resulting from this study will not be used to support a product registration, therefore, a verbal decision with UMESC management was agreed to on April 22, 2014 to change the status of the study to non-regulated.

Reviewed by:

[redacted] 13th May 2014
Mark P. Gaikowski, M.A. Date
Supervisory Biologist
Aquatic Ecosystem Health, UMESC[1]

[redacted] 5/13/2014
Jane E. Rivera, B.A. Date
Acting Quality Assurance Officer, UMESC

[redacted] 05/14/2014
for Kevin D. Richards, Ph.D. Date
Acting Center Director, UMESC

Approved by:

[redacted] 15 May 2014
James A. Luoma, B.A. Date
Study Director, UMESC

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Pg 1 of 2

[1] UMESC: U.S. Geological Survey, Upper Midwest Environmental Sciences Center

Current text:

9. GOOD LABORATORY PRACTICES

Data collection, storage and retrieval procedures for the study will be conducted in compliance with EPA regulations for Good Laboratory Practices (40 CFR, Part 160). The study protocol and progress of the study will be reviewed at the start of the study and periodically throughout the study by the Quality Assurance Unit (QAU). Transfer of samples outside of UMESC will be documented using a chain of custody form (SOP No. ECO 513.0 or equivalent) and the samples or the container holding multiple samples will be sealed with a chain of custody seal prior to release from UMESC custody. Histological samples will be labeled to include at a minimum the species, treatment dose and repetition number, sample time (i.e. immediate post exposure, 30-d post exposure, etc), date of collection, initial fixative type, initials/date of initial sample collector, fixative change date, secondary fixative type, and the initials/date of person conducting fixative change.

The Study Director has the responsibility of ensuring that all procedures used in conjunction with the study conform with Good Laboratory Practices.

Revised text (<u>in bold and underlined</u>):

9. GOOD LABORATORY PRACTICES

Data collection, storage and retrieval procedures for the study will **<u>not</u>** be conducted in compliance with EPA regulations for Good Laboratory Practices (40 CFR, Part 160). The study protocol and progress of the study **<u>may</u>** ~~will~~ be reviewed at the start of the study and periodically throughout the study by the Quality Assurance Unit (QAU). Transfer of samples outside of UMESC will be documented using a chain of custody form (SOP No. ECO 513.0 or equivalent) and the samples or the container holding multiple samples will be sealed with a chain of custody seal prior to release from UMESC custody. Histological samples will be labeled to include at a minimum the species, treatment dose and repetition number, sample time (i.e. immediate post exposure, 30-d post exposure, etc), date of collection, initial fixative type, initials/date of initial sample collector, fixative change date, secondary fixative type, and the initials/date of person conducting fixative change.

The Study Director has the responsibility of ensuring that all procedures used in conjunction with the study conform **<u>to</u>** ~~with~~ Good **<u>Scientific</u>** ~~Laboratory~~ Practices

FF # 3
Item No. 60
Pg 2 of 2

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 1 - Daily Care - Acclimation

Fish Species: _____ Lot #: _____ Tank: _____ Room: _____

Month/Year: _____ Feed Type: _____ Lot #: _____

Instruments Used: _____ Feed Expiration Date: _____

Day of Month	Feed Time		Feed Amount (g)	Tank Cleaned	Number of Mortalities	Temp (°C)	Dissolved Oxygen (mg/L)	pH	Date & Initials	Comments
	AM	PM								
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										

Datasheet approved by [redacted] Date 2/24/12

24FEB2012/version1.0

FF # 28
Item No. 1
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Verified by: _____ Date: _____

Lab book/pgs: _____

Form 1a - Water Chemistry - Acclimation

Fish Species: _____ Lot Number: _____

Instruments Used: _____

Alkalinity, Hardness, and Conductivity Measurements

Room Number: _____ **Tank ID:** _____

	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)	Date	Initials
Rep 1				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Rep 2	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Rep 3	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			

① Alkalinity in mg/L $CaCO_3$ = (mL of 0.02N H_2SO_4 used) x (Multiplication Factor of 10)

② Hardness in mg/L $CaCO_3$ = (mL of 0.01 M Na_2EDTA titrant added to the sample) x (Multiplication Facotr of 20)

Datasheet approved by [redacted] Date 2-27-12

24FEB2012/Version 1.0

FF # 28
Item No. 2
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____ Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 1b - Water Quality - Pre-Exposure

Fish Species: _____ Lot Number: _____

Test Chemical: _____ Lot Number: _____

Instruments Used: _____

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	D.O. (mg/L)	Temp (°C)	Comments	Date	Initials

Datasheet approved by [redacted] Date 3/6/12.

6Mar12/version 1.0

FF # 38
Item No. 4
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____ Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 1b - Water Quality - Pre-Exposure

Fish Species: _____ Lot Number: _____

Test Chemical: _____ Lot Number: _____

Instruments Used: _____

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	D.O. (mg/L)	Temp (°C)	Comments	Date	Initials
A		0						
A		50						
A		100						
A		200						
A		300						
B		0						
B		50						
B		100						
B		200						
B		300						
C		0						
C		50						
C		100						
C		200						
C		300						

Datasheet approved by [redacted] Date 3-7-12

7Mar12/version 1.1

FF # 28
Item No. 4
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Verified by: _____ Date: _____

Lab book/pgs: _____

Form 1c - Water Chemistry - Pre-Exposure

Fish Species: _____ Lot Number: _____

Test Chemical: _____ Lot Number: _____

Instruments Used: _____

Alkalinity, Hardness, and Conductivity Measurements

	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)	Date	Initials
Diluter A				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Diluter B	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Diluter C	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			

① Alkalinity in mg/L $CaCO_3$ = (mL of 0.02N H_2SO_4 used) x (Multiplication Factor of 10)

② Hardness in mg/L $CaCO_3$ = (mL of 0.01 M Na_2EDTA titrant added to the sample) x (Multiplication Facotr of 20)

Datasheet approved by [redacted] Date 3/6/12

6MAR12/Version 1.0

FF # 28
Item No. 5
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Verified by: _____ Date: _____
Lab book/pgs: _____

Form 3 - Fish Length and Weight

Fish Species: _____ Balance Used: _____
Lot Number: _____ **Sampling Time (circle one)**
System: Acclimation tank _____ Distribution Exposure Termination
Diluter _____ Holding Rack Quadrant _____ Mortalities Post-exposure Termination

Tank or Chamber ID	Fish ID	Total Length (mm)	Wet Weight (g)	Comments	Date	Initials

Datasheet approved by [redacted] Date 2/24/12
24FEB12/version1.0

FF # 28
Item No. 6
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Verified by: _____ Date: _____
Lab book/pgs: _____

Form 3 - Fish Length and Weight

Fish Species: _____ Balance Used: _____
Lot Number: _____ **Sampling Time (circle one)**
System: Acclimation tank _____ Distribution Exposure Termination
Diluter _____ Holding Rack Quadrant ____ Mortalities Post-exposure Termination

Tank or Chamber ID	Fish ID	Total Length (mm)	Wet Weight (g)	Comments	Date	Initials Observed/ Recorded

Datasheet approved by [redacted] Date 3/1/12
01MAR12/version1.1

FF # 28
Item No. 7
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Verified by: _____ Date: _____
Lab book/pgs: _____

Form 3 - Fish Length and Weight

Fish Species: _____ Balance Used: _____
Lot Number: _____ **Sampling Time (circle one)**
System: Acclimation tank _____ Distribution Exposure Termination
Diluter _____ Holding Rack Quadrant _____ Mortalities Post-exposure Termination

Tank or Chamber ID	Fish ID	Total Length (mm)	Wet Weight (g)	Comments	Date	Initials Observed/ Recorded

Datasheet approved by [redacted] Date 3-1-12.
01MAR12/version1.1

FF # 28
Item No. 9
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 3 - Fish Length and Weight

Fish Species: _____
Lot Number: _____
System: Acclimation tank _____
Diluter _____ Holding Rack Quadrant _____

Balance Used: _____
Sampling Time (circle one)
Distribution Exposure Termination
Mortalities Post-exposure Termination

Tank or Chamber ID	Fish ID	Total Length (mm)	Wet Weight (g)	Comments	Date	Initials Observed/ Recorded

Datasheet approved by [redacted] Date 3-2-12.
02MAR12/version1.2

FF # 28
Item No. 9
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: ___ _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 3a - Pooled Fish Length and Weight

Fish Species: _____ Balance Used: _____
Lot Number: _____ **Sampling Time (circle one)**
System: Exposure Termination
Diluter_____ **Holding Rack Quadrant**_____ Post-exposure Termination

Chamber ID	Treatment Group	Number of fish	Wet Weight (g)	Mean Weight/ fish (g)	Comments	Date	Initials Observed/ Recorded

Datasheet approved by [redacted] Date 3-2-12
02MAR12/version1.0

FF # 28
Item No. 10
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____ Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 4 - Water Quality - Exposure Period

Fish Species: _____ Lot Number: _____

Test Chemical: _____ Lot Number: _____

Instruments Used: _____

Parameter (circle one): D.O. (mg/L) pH Temperature (°C)

Diluter ID	Chamber ID	Concentration (mg/L)	6 h Reading	Date	Initials	12 h Reading	Date	Initials	24 h Reading	Date	Initials

Datasheet approved by [redacted] Date 2/24/12.

24FEB12/version 1.0

FF # 28
Item No. 11
Pg 1 of 1

90

Study Number: AEH-12-PSEUDO-03
File Folder: _____ Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 4 - Water Quality - Exposure Period

Fish Species: _____ Lot Number: _____
Test Chemical: _____ Lot Number: _____
Instruments Used: _____

Parameter (circle one): D.O. (mg/L) pH Temperature (°C)

Diluter ID	Chamber ID	Concentration (mg/L)	1 h Reading	Date & Initials	6 h Reading	Date & Initials	12 h Reading	Date & Initials	24 h Reading	Date & Initials
A		0								
A		50								
A		100								
A		200								
A		300								
B		0								
B		50								
B		100								
B		200								
B		300								
C		0								
C		50								
C		100								
C		200								
C		300								

Datasheet approved by [redacted] Date 3-7-12
7MAR12/version 1.1

FF # 28
Item No. 12
Pg 1 of 1

Study Number AEH-12-PSEUDO-03 File Folder: _____ Reviewed by: _____ Date: _____
Lab book/pgs: _____ Verified by: _____ Date: _____

Form 5 - Exposure Period Conductivity and Hardness

Fish Species: _____ Lot Number: _____ Instruments: _____
Test Chemical: _____ Lot Number: _____ Sampling Time: _____

Diluter ID	Chamber ID	Concentration (mg/L)	Conductivity (µS/cm)	mL of 0.01 M EDTA	Multiplication Factor	Hardness① (mg/L $CaCO_3$)	Commments	Date	Initials
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				
					20				

①Hardness in mg/L $CaCO_3$ = (mL of 0.01 M Na_2EDTA titrant added to the sample) x (multiplication factor of 20)

Datasheet approved by [redacted] Date 2/24/12.
24FEB2012/version1.0

FF # 28
Item No. 17
Pg 1 of 1

Study Number AEH-12-PSEUDO-03 File Folder: _____ Reviewed by: _____ Date: _____
Lab book/pgs: _____ Verified by: _____ Date: _____

Form 5 - Exposure Period Conductivity and Hardness

Fish Species: _____ Lot Number: _____ Instruments: _____
Test Chemical: _____ Lot Number: _____ Sampling Time: _____

Diluter ID	Chamber ID	Concentration (mg/L)	Conductivity (µS/cm)	mL of 0.01 M EDTA	Multiplication Factor	Hardness① (mg/L $CaCO_3$)	Commments	Date	Initials
A		0			20				
		50			20				
		100			20				
		200			20				
		300			20				
B		0			20				
		50			20				
		100			20				
		200			20				
		300			20				
C		0			20				
		50			20				
		100			20				
		200			20				
		300			20				

①Hardness in mg/L $CaCO_3$ = (mL of 0.01 M Na_2EDTA titrant added to the sample) x (multiplication factor of 20)

Datasheet approved by [redacted] Date 3-7-12.
7MAR2012/version1.1

FF # 23
Item No. 14
Pg 1 of 1

Study Number AEH-12-PSEUDO-03 File Folder: _____ Reviewed by: _____ Date: _____
Lab book/pgs: _____ Verified by: _____ Date: _____

Form 6 - Exposure Period Alkalinity

Fish Species: _____ Lot Number: _____ Instruments: _____
Test Chemical: _____ Lot Number: _____ Sampling Time: _____

Diluter ID	Chamber ID	Concentration (mg/L)	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)	Commments	Date	Initials
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				
						10				

① Alkalinity in mg/L $CaCO_3$ = (mL 0.02N H_2SO_4 used) x (Multiplication Factor of 10)

Datasheet approved by [redacted] Date 2/24/12.
24FEB2012/version1.0

FF # 28
Item No. 15
Pg 1 of 1

Study Number AEH-12-PSEUDO-03 File Folder: _____ Reviewed by: _____ Date: _____
Lab book/pgs: _____ Verified by: _____ Date: _____

Form 6 - Exposure Period Alkalinity

Fish Species: _____ Lot Number: _____ Instruments: _____
Test Chemical: _____ Lot Number: _____ Sampling Time: _____

Diluter ID	Chamber ID	Concentration (mg/L)	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)	Commments	Date	Initials
A		0				10				
		50				10				
		100				10				
		200				10				
		300				10				
B		0				10				
		50				10				
		100				10				
		200				10				
		300				10				
C		0				10				
		50				10				
		100				10				
		200				10				
		300				10				

① Alkalinity in mg/L $CaCO_3$ = (mL 0.02N H_2SO_4 used) x (Multiplication Factor of 10)

Datasheet approved by [redacted] Date 3-7-12.
7MAR2012/version1.1

FF # 28
Item No. 14
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____ Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 7 - Ammonia Sample Collection - Exposure Period

Fish Species: _____ **Lot Number:** _____

Test Chemical: _____ **Lot Number:** _____ **Instruments Used:** _____

Diluter ID	Chamber ID	Concentration (mg/L)	6 hour			12 hour			24 hour			Comments
			pH	Temp (°C)	Date & Initials	pH	Temp (°C)	Date & Initials	pH	Temp (°C)	Date & Initials	

Note: Approximately 5 mL samples will be collected at 6, 12 and 24-hour from each exposure chamber. The samples will be filtered through a 0.45 µm syringe filter. 3 mL of the filtered sample will be acidified with 60 µL of 10% sulfuric acid, and stored at 4°C until analysis. Temperature and pH will be measured when the ammonia samples are collected.

Datasheet approved by [redacted] Date 2/24/12.

24FEB12/version1.0

FF # 25
Item No. 17
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: ______ Date: ______

File Folder: ______ Lab book/pgs: ______ Verified by: ______ Date: ______

Form 7 - Ammonia Sample Collection - Exposure Period

Fish Species: ______ Lot Number: ______

Test Chemical: ______ Lot Number: ______ Instruments Used: ______

Diluter ID	Chamber ID	Concentration (mg/L)	6 hour			12 hour			24 hour			Comments
			pH	Temp (°C)	Date & Initials	pH	Temp (°C)	Date & Initials	pH	Temp (°C)	Date & Initials	
A		0										
A		50										
A		100										
A		200										
A		300										
B		0										
B		50										
B		100										
B		200										
B		300										
C		0										
C		50										
C		100										
C		200										
C		300										

Note: Approximately 5 mL samples will be collected at 6, 12 and 24-hour from each exposure chamber. The samples will be filtered through a 0.45 μm syringe filter. 3 mL of the filtered sample will be acidified with 60 μL of 10% sulfuric acid, and stored at 4°C until analysis. Temperature and pH will be measured when the ammonia samples are collected.

Datasheet approved by [redacted] Date 3-7-12. 24FEB12/version1.0

Item No. 18

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Verified by: _____ Date: _____

Lab book/pgs: _____

Form 8 - Behavioral Observations

Fish Species: _____ **Lot Number:** _____

System: Diluter _____ **Exposure** or **Holding Period** (circle one)

Holding Rate Quadrant _____

Tank ID(s)	Treatment Group	Observation(s)	Date	Initials

Record tank ID number(s) and describe behavior(s) observed in the spaces provided.

Behavioral Abbreviations: F (flashing), P (piping at surface), E (loss of equilibrium)

Describe all observed behaviors (not limited to abbreviations), and number of fish exhibiting the behavior(s).

Datasheet approved by [redacted] Date 2/24/12.

24FEB12/version1.0

FF # 26
Item No. 19
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Verified by: _____ Date: _____

Lab book/pgs: _____

Form 8 - Behavioral Observations

Fish Species: _____ **Lot Number:** _____

System: Diluter _____ **Exposure** or **Holding Period** (circle one)

Holding Rack Quadrant _____ **Exposure Time:** _____

Tank ID(s)	Treatment Group	Observation(s)	Date	Initials

Record tank ID number(s) and describe behavior(s) observed in the spaces provided.

Behavioral Abbreviations: F (flashing), P (piping at surface), E (loss of equilibrium)

Describe all observed behaviors (not limited to abbreviations), and number of fish exhibiting the behavior(s).

Datasheet approved by [redacted] Date 7MAR12.

7MAR12/version1.1

FF # 28
Item No. 20
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: ______________ Lab book/pgs: ____________________

Reviewed by: ______________ Date: ____________
Verified by: ________________ Date: ____________

Form 9 - Daily Feed Chart

Fish Species: ________________________ Fish Lot #: ____________________ Holding Rack Quadrant: ________________
Feed Type/Size: ____________________ Feed Lot #: ____________________ Feed Expiration Date: ____________________

Week # ____		Daily Feed Amounts (g)															Initials
	Chamber #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Date	Treatment Group (mg/L)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																

Instructions: Multiply feed amount per fish (from Form 2) by number of fish per tank to calculate daily feed amounts. Re-calculate feed amounts weekly, AND whenever a mortality is observed. Feed amount per fish varies by tank and changes weekly.

Notes:

24FEB12/version1.0 Datasheet approved by [redacted] Date 2/24/12.

FF # 28
Item No. 21
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: ______________ Date: ____________

File Folder: ____________ Lab book/pgs: ____________________ Verified by: ________________ Date: ____________

Form 9 - Daily Feed Chart

Fish Species: ______________________ Fish Lot #: ________________________ Holding Rack Quadrant: __________________

Feed Type/Size: ____________________ Feed Lot #: ______________________ Feed Expiration Date: ________________________

Use feed Rate (g/fish) until: ____________________ Date\initials: ________________

Week # ______	Daily Feed Amounts (g)																
	Chamber #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Initials
	Treatment Group (mg/L)																
Date	Feed Rate (g/fish)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																
	Number of Fish																
	Feed Amount (g)																

Instructions: Multiply feed rate (g/fish) by number of fish per chamber to calculate daily feed amounts, weigh the amount of feed calculated and record the wieghed amount for each tank daily. Adjust feed rates weekly from Form 2 for each chamber.

Notes:

02MAR12/version1.1 Datasheet approved by [redacted] Date 3-2-12.

FF # 28
Item No. 22
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 10 - Daily Food Consumption Rating - Post Exposure

Fish Species: _____ Lot Number: _____

Month/Year: _____ Holding Rack Quadrant: _____

Date	Daily Food Consumption Rating																Initials
	Tank ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Treatment Group																

Instructions: Rank food consumption for each tank daily, ≥1 hour after feeding. (1 = 0-25%, 2 = 26-50%, 3 = 51-75%, and 4 = 76-100% of food offered that day).

Notes: _____

24FEB12/version1.0 Datasheet approved by [redacted] Date 2-27-12.

FF # 25
Item No. 23
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 10 - Daily Food Consumption Rating - Post Exposure

Fish Species: _____ Lot Number: _____
Month/Year: _____ Holding Rack Quadrant: _____

Date	Daily Food Consumption Rating															Initials Observed/ Recorded
	Tank ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Treatment Group																
																	/
																	/
																	/
																	/
																	/
																	/
																	/
																	/
																	/
																	/
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																	/
																	/
																	/
																	/
																	/

Instructions: Rank food consumption for each tank daily, ≥1 hour after feeding. (1 = 0-25%, 2 = 26-50%, 3 = 51-75%, and 4 = 76-100% of food offered that day).

Notes: _____

01MAR12/version1.1 Datasheet approved by [redacted] Date 3/1/12.

FF # 28
Item No. 24
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 10a - Daily Flow Rate - Post Exposure

Fish Species: _____ Lot Number: _____
Month/Year: _____ Holding Rack Quadrant: _____

Date	Daily Flow Rate																Comments	Initials
	Tank ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
	Treatment Group																	

Instructions: Observe the flow rate into each tank. If flows appear to be adequate, mark box with (**O**)K. If flows appear to be inadequate, adjust as necessary. Mark box with (**LA**) for low flow/adjusted or (**SA**) for stopped flow/adjusted. Measure the D.O. in tanks with inadequate flows and record in the comments or notes section.

Notes:

24FEB12/version1.0 Datasheet approved by [redacted] Date 2-27-12.

FF # 28
Item No. 25
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 10a - Daily Flow Rate - Post Exposure

Fish Species: _____ Lot Number: _____
Month/Year: _____ Holding Rack Quadrant: _____

Date	Daily Flow Rate																Comments	Initials Observed/ Recorded
	Tank ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
	Treatment Group																	
																		/
																		/
																		/
																		/
																		/
																		/
																		/
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																		/
																		/

Instructions: Observe the flow rate into each tank. If flows appear to be adequate, mark box with **O**)K. If flows appear to be inadequate, adjust as necessary. Mark box with **LA**) for low flow/adjusted or (**SA**) for stopped flow/adjusted. Measure the D.O. in tanks with inadequate flows and record in the comments or notes section.

Notes: _____

01MAR12/version1.1 Datasheet approved by [redacted] Date 3-1-12

FF # 26
Item No. 26
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 11 - Daily Mortality and Maintenance - Post Exposure

Fish Species: _____ Lot Number: _____
Month/Year: _____ Holding Rack Quadrant: _____

Date	Fed	Cleaned	Daily Mortalities															Initials
	Initial	Initial	Tank #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			Treatment Group																

Notes: _____

24FEB12/version1.0 Datasheet approved by [redacted] Date 2/24/12.

FF # 28
Item No. 27
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____
File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 11 - Daily Mortality and Maintenance - Post Exposure

Fish Species: _____ Lot Number: _____
Month/Year: _____ Holding Rack Quadrant: _____

Date	Fed	Cleaned	Daily Mortalities															Initials Observed/ Recorded
	Initial	Initial	Tank #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
			Treatment Group																
																			/
																			/
																			/
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Notes: _____

01MAR12/version1.1 Datasheet approved by [redacted] Date 3-1-12.

FF # 28
Item No. 28
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: ______________ Date: ____________
File Folder: ________ Lab book/pgs: ________ Verified by: ________________ Date: ____________

Form 11a - Exposure Mortality

Fish Species: ________________ Lot #: ________________________________
Exposure Date: _____________ Test Chemical: _________________ Lot #: __________

Time (h)	Dilutor ID	Mortalities						Comments	Date	Initials
		Tank #	1	2	3	4	5			
		Treatment Group								
Total Mortalities										

Notes: ____

5MAR12/version1.0
Datasheet approved by [redacted] Date 05 MAR 2012.

FF # 28
Item No. 29
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 12 - Water Quality - Post Exposure

Fish Species: _____ **Lot Number:** _____
Holding Rack Quadrant: _____ **Parameter (Circle one):** pH D.O. (mg/L)
Instruments Used: _____ Temperature (°C)

Month Day	Treatment Group										Date/Initials
	Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L		
	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											

Datasheet approved by [redacted] Date 2/24/12.
24FEB12/version1.0

FF # 28
Item No. 30
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 12 - Water Quality - Post Exposure

Fish Species: _____ **Lot Number:** _____
Holding Rack Quadrant: _____ **Parameter (Circle one):** pH D.O. (mg/L)
Instruments Used: _____ Temperature (°C)

Month Day	Treatment Group											
	Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L			Initials Observed/ Recorded
	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Date	
1												/
2												/
3												/
4												/
5												/
6												/
7												/
8												/
9												/
10												/
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26												/
27												/
28												/
29												/
30												/
31												/

Datasheet approved by [redacted] Date 7-1-12.
01MAR12/version1.1

FF # 28
Item No. 31
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Form 12 - Water Quality - Post Exposure

Fish Species: _____ **Lot Number:** _____
Holding Rack Quadrant: _____ **Parameter (Circle one):** pH D.O. (mg/L)
Instruments Used: _____ Temperature (°C)

Month Day	Treatment Group											
	Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L			Initials Observed/ Recorded
	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Chamber ID	Reading	Date	
1												/
2												/
3												/
4												/
5												/
6												/
7												/
8												/
9												/
10												/
11												/
12												/
13												/
14												/
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28												/
29												/
30												/
31												/

Datasheet approved by [redacted] Date 3-2-12.
02MAR12/version1.2

FF # 28
Item No. 32
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____

Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 13 - Weekly Flow Rates

Fish Species: _____ Lot #: _____ Holding Rack Quadrant: _____

Tank ID	Flow Rate (mL/min)	Adjusted Flow Rate (mL/min)	Comments	Date	Initials

Measure flow rates weekly on every active holding tank. If flow rates are outside range of 500 ± 50 mL per minute, adjust flow rates within range and record adjusted value.

Version 1.0/24FEB12 This datasheet was approved b[redacted] Date 2/24/12 .

FF # 26
Item No. 52
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03

File Folder: _____

Lab book/pgs: _____

Reviewed by: _____ Date: _____

Verified by: _____ Date: _____

Form 13 - Weekly Flow Rates

Fish Species: _____ Lot #: _____ Holding Rack Quadrant: _____

Tank ID	Flow Rate (mL/min)	Adjusted Flow Rate (mL/min)	Comments	Date	Initials
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Measure flow rates weekly on every active holding tank. If flow rates are outside range of 500 ± 50 mL per minute, adjust flow rates within range and record adjusted value.

Version 1.1/7MAR12 This datasheet was approved by [redacted] Date 3-7-12 .

FF # 23
Item No. 34
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Verified by: _____ Date: _____

Lab book/pgs: _____

Form 14 - Weekly Water Chemistry

Fish Species: _____ Lot Number: _____

Instruments Used: _____

Alkalinity, Hardness, and Conductivity Measurements

Holding Rack Quadrant: _____ **Holding Week Number:** _____

Chamber ID: _____

	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)	Date	Initials
Rep 1				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Rep 2	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			
Rep 3	Initial pH	Initial Temp (°C)	mL of 0.02 N H_2SO_4	Multiplication Factor	Alkalinity① (mg/L $CaCO_3$)		
				10			
			mL of 0.01 M EDTA	Multiplication Factor	Hardness② (mg/L CaCO3)		
				20			
				Conductivity (µS/cm)			

① Alkalinity in mg/L $CaCO_3$ = (mL of 0.02N H_2SO_4 used) x (Multiplication Factor of 10)

② Hardness in mg/L $CaCO_3$ = (mL of 0.01 M Na-EDTA titrant added to the sample) x (Multiplication Facotr of 20)

Datasheet approved by [redacted] Date 2/24/12

24FEB2012/Version 1.0

FF # 28
Item No. 35
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: _____ Date Rec'd _____ Exp. Date _____

Fish Species: _____

Instruments Used: _____

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials

Datasheet approved by [redacted] Date: 2-27-12

27FEB2012/version1.0

FF # 28
Item No. 36
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: _____ Date Rec'd _____ Exp. Date _____

Fish Species: _____

Instruments Used: _____

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials

Datasheet approved by [redacted] Date: 3/6/12

6MAR2012/version1.1

FF # 28
Item No. 37
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: _____

File Folder: _____ Lab book/pgs: _____ Verified by: _____ Date: _____

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: _____ Date Rec'd _____ Exp. Date _____

Fish Species: _____

Instruments Used: _____

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1				
Analytical #2				
Stock #1				
Stock #2				
Stock #3				
Stock #4				
Stock #5				
Stock #6				

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1						
Analytical #2						
Stock #1						
Stock #2						
Stock #3						
Stock #4						
Stock #5						
Stock #6						

Datasheet approved b[redacted] Date: 3-7-12

7MAR2012/version1.

FF # 28
Item No. 38
Pg 1 of 1

Study Number: AEH-12-PSEUDO-13
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Pipette Calibration

Pipette Brand: _____ **Tip Type:** _____
Model: _____ **Temperature:** _____
S/N: _____ **Water Density[1] (g/mL):** _____

Balance Used: _____ **Thermometer Used:** _____

Pipette Setting (µL)	Rep #	Water Mass (g)	Comments	Date	Initials
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

Mean Water Mass (g): _____

Standard Deviation: _____

Relative Standard Devaiation (Standard Deviation/Mean*100): _____

Pass or Fail (Pass = Relative Standard Deviation ≤ 1%): _____

Pipette Volume (Mean/Water Density[1]): _____

Note: Pipette calibration must be performed with delonized water left to adjust to ambient room temperautre for at least 24 hours prior to calibration.

[1] Water density (g/mL) at varying temperatures:
18°C = 0.9985976; 19°C = 0.9984073; 20°C = 0.9982063; 21°C = 0.9979948; 22°C = 0.9977730.

Datasheet approved by [redacted] Date: 23 Feb 12
23FEB2012/version1.0

FF # 28
Item No. 39
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: _____
Lab book/pgs: _____

Reviewed by: _____ Date: _____
Verified by: _____ Date: _____

Pipette Calibration

Pipette Brand: _____ **Tip Type:** _____
Model: _____ **Temperature:** _____
S/N: _____ **Water Density[1] (g/mL):** _____

Balance Used: _____ **Thermometer Used:** _____

Pipette Setting (µL)	Rep #	Water Mass (g)	Comments	Date	Initials
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

Mean Water Mass (g): _____

Standard Deviation: _____

Relative Standard Deviation (Standard Deviation/Mean*100): _____

Pass or Fail (Pass = Relative Standard Deviation ≤ 1%): _____

Pipette Volume (Mean/Water Density[1]): _____

Note: Pipette calibration must be performed with deionized water left to adjust to ambient room temperautre for at least 24 hours prior to calibration.

[1] Water density (g/mL) at varying temperatures:
18°C = 0.9985976; 19°C = 0.9984073; 20°C = 0.9982063; 21°C = 0.9979948; 22°C = 0.9977730.

Datasheet approved b[redacted] Date: 9/24/12
24SEP2012/version2.0

FF # 26
Item No. 40
Pg 1 of 1

Appendix 2. Deviations From the Study Protocol

Item number	Item description	Number of pages	Report page number
1	Deviation 1 – RBT: Chamber C2 contained 20 fish; Chamber C3 contained 30 fish. (See Deviation 24 for further clarification.)	1	122
2	Deviation 2 – RBT: Fish lengths measured incorrectly on measuring board.	2	123
3	Deviation 3 – RBT: No behavioral observations March 2 to March 4, 2012 and March 7, 2012.	1	125
4	Deviation 4 – RBT: Mortalities not subtracted from feed chart; Fish slightly over fed from March 3 to March 8, 2012.	1	126
5	Deviation 5 – RBT: Weekly water chemistry not monitored for Week 1.	1	127
6	Deviation 6 – RBT: Daily feed chart revised; resulted in fish being slightly underfed for 1 day.	1	128
7	Deviation 7 – RBT: Fish count off by one fish in Chamber E2; two (2) mortalities labeled M15; resulted in slight overfeeding. (See Deviation 32 for further clarification.)	1	129
8	Deviation 8 – RBT: Chamber E5 off by 2 fish; mortalities not accounted for on feed chart; slight overfeeding.	1	130
9	Deviation 9 – WAE: Chamber B3 contained 35 fish; Chamber B4 contained 15 fish.	1	131
10	Deviation 10 – WAE: Jumper found; One fish missing from F4 and F14. (See Deviation 25 for further clarification.)	1	132
11	Deviation 11 – WAE: No behavioral observations April 4, 2012.	1	133
12	Deviation 12 – BKT: No feed consumption ranking May 16, 2012.	1	134
13	Deviation 13 – SMB: Chamber A4 accidentally placed in MS-222 during transfer; fish euthanized.	1	135
14	Deviation 14 – SMB: A net was used to remove foam; a mortality was scooped out accidentally from either Chamber A4 or A5.	1	136
15	Deviation 15 – MISC: Refrigerator in Room 2 inadvertently unplugged.	1	137
16	Deviation 16 – BLG: Fish from Chamber B4 was accidentally dropped on the ground during transfer; fish not recovered.	1	138
17	Deviation 17 – SMB: One fish from Chamber D1 was missing and likely escaped. Only 19 of 20 fish were recovered.	1	139
18	Deviation 18 – SMB: Labeling error; cassettes/tags were labeled with quadrant “E” instead of correct quadrant “D”.	1	140
19	Deviation 19 – CCF: Diluter lines incorrectly routed; concentrations different from randomization.	1	141
20	Deviation 20 – CCF: Chamber C2 diluter line dislodged and dripping into Chamber C3.	1	142
21	Deviation 21 – CCF: Chamber B1 (E14) contained 15 fish; Chamber B5 (E4) contained 35 fish; Chamber B4 contained 26 fish.	1	143
22	Deviation 22 – CCF: Fish escape from Chamber E7; no length or weight taken.	1	144
23	Deviation 23 – MISC: Temperature recorders not labeled properly.	1	145
24	Deviation 24 – RBT: Correction to Deviation 1; Chamber C2 contained only 19 fish (not 20).	2	146

Item number	Item description	Number of pages	Report page number
25	Deviation 25 – WAE: Correction to Deviation 10; No jumper from Chamber F4 (all fish accounted); Chamber F14 did have jumper.	2	148
26	Deviation 26 – LMB: Incorrect reporting of 3 mortalities for Chamber E13; Mortalities actually from Chamber E11.	2	150
27	Deviation 27 – BKT: Accidental death of fish from Chamber E10; fish length and weight taken (but removed for analysis).	1	152
28	Deviation 28 – CCF: Incorrect number of fish transferred to Chamber E7; 19 fish transferred (not 20).	2	153
29	Deviation 29 – LMB: Incorrect number of fish transferred to Chamber C5; 24 fish transferred (not 25).	2	155
30	Deviation 30 – SMB: Accidental death of fish from Chamber D11; fish length and weight not taken.	1	157
31	Deviation 31 – WAE: Weekly water chemistry not monitored for Week 2.	1	158
32	Deviation 32 – RBT: Incorrect numbering and labeling of mort from March 9, 2012.	1	159
33	Deviation 33 – LMB: Only 19 fish transferred to Chamber E4 due to fish jumping out of net.	1	160
34	Deviation 34 – YEP: Accidental death of fish from Chamber A4; fish length and weight taken (but removed for analysis).	1	161
35	Deviation 35 – WAE: Mortality observations not recorded for April 12, 2012 for all holding chambers.	1	162
36	Deviation 36 – RBT, BKT, CCF, LST: Incorrect sequential numbering and labeling of mortalities.	2	163

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 1 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #1 – Section 5.1.6 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "a group of five or ten fish will be placed in a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated to receive a total of three distributions for a total of 25 fish per exposure chamber."

After the exposure period, during the transfer of RBT fish from the exposure chambers to holding chambers on March 1, 2012, it was discovered that two exposure chambers contained the incorrect quantity of fish. Exposure chamber C2 (50mg/L) contained 20 fish (15 were transferred to holding chamber and 5 taken for histology) while exposure chamber C3 (200 mg/L) contained 30 fish (25 were transferred to holding chamber and 5 taken for histology). This error would have occurred during the distribution of the fish to the exposure chambers on February 28, 2012. It is assumed that the 5 fish aliquot that should have been placed in exposure chamber C2 (50 mg/L) was inadvertently placed into exposure chamber C3 (200 mg/L).

As the flow rates were sufficient for the number of fish in the exposure chamber as indicated by acceptable water chemistry parameters (D.O. > 5.0 mg/L during exposure period) and sufficient number of test animals remained within the 50 mg/L treatment group (N=70) to obtain the desired study data, no adverse impacts to the study are anticipated as a result of this deviation.

[redacted] 4/12/12
Date

Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date

James A. Luoma, B.A.
Study Director, UMESC

FF # 3
Item No. 14
Pg 1 of 1

cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012

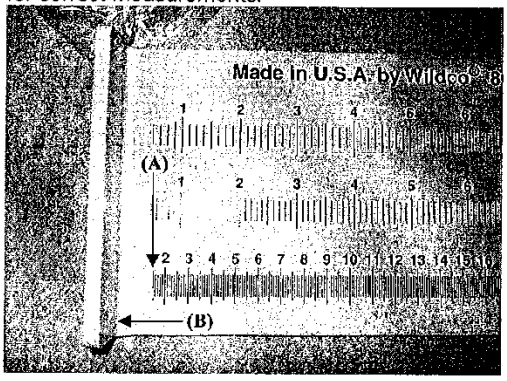
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation #2 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-145A) to ten different freshwater fish species."

Deviation #2 – Sections 5.5.4 (Fish weight/length) of the amended protocol for the study number AEH-12-PSEUDO-03 states that "fish length will be measured by placing the fish on a wetted measuring board and determining the total length (TL) to the nearest 0.1 cm (UMESC SOP AEH 605)."

On March 3 and 4, 2012, errors were made while measuring the lengths of rainbow trout (RBT) mortalities. The measure board used did not have graduations from 0 to 15 mm (Image 1). When measuring the RBT mortalities on March 3 and 4, 2012, the snouts of the RBT were incorrectly placed at the 15 mm mark and then measured. Twenty-two mortalities were incorrectly measured on March 3, 2012; Six mortalities were incorrectly measured on March 4, 2012. The fish that were measured incorrectly were 15 mm too long. A note was made on the datasheets to reflect the error (Form 3, dated March 3 and 4, 2012).

Image 1. Photograph of fish measuring board.
(A) indicates where the snouts of the fish were placed when the incorrect measurements were recorded.
(B) indicates the correct snout placement location for correct measurements.



FF # 3
Item No. 15
Pg 1 of 2

cc: UMESC QAU

Since the errors were made, discovered and noted for correction on Form 3 (dated March 3 and 4, 2012) there are no adverse impacts to the study.

[redacted]

4/12/2012
Date

Samuel M. Stafslien, B.S.
Bio Science Tech, UMESC

[redacted]

4/12/12
Date

James A. Luoma, B.A.
Study Director, UMESC

FF # 3
Item No. 15
Pg 2 of 2

Item No. ____
Pg ____ of ____

cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 3 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #3 – Sections 5.5.3 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "Behavioral responses (i.e.: piping at the surface, loss of equilibrium, flashing, agitation, etc.) observed during the exposure or holding periods will be documented in the study records."

From March 2 to March 4, 2012 and again on March 7, 2012, no behavioral observations were observed for the rainbow trout (RBT) holding chambers.

It is unclear as to why behavioral observations were not taken; however, any potential impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 12APR12
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 16
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 4 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #4 – Section 5.1.7 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" and the Memorandum entitled "Test animal feed rate calculation" dated February 24, 2012 state that "Fish will be fed during the acclimation and post exposure period by offering commercially-prepared dry feed, frozen live food, or live forage. The daily feed ration will be calculated based on the known weight of the fish transferred into each hold chamber and will be adjusted to compensate for mortalities."

On March 2, 2012 the rainbow trout (RBT) mortalities were removed and processed for histology at two discrete time points (in the morning at ~ 0800 and in the afternoon at ~1300). The number of mortalities from the second sampling time was not accounted for on the daily feeding chart. The following holding chambers were slightly overfed (≤ 0.12 g) from March 3 to 8, 2012 due to the mortalities not being taken into account: E2, E4, E8, E14, and E15 (see Table 1 for number of mortalities and incorrect feed amounts). The disparity in recorded mortalities on the daily feed chart and number of fish remaining in the tank was noticed on March 9, 2012 and rectified at that time.

Table 1.

Holding Chamber ID	E2	E4	E8	E14	E15
Treatment Group	300 mg/L	200 mg/L	300 mg/L	300 mg/L	200 mg/L
Number of Mortalities Not Transferred	2	1	1	2	2
Amount of Feed Over (g)	0.12	0.06	0.06	0.12	0.12

No adverse impacts are anticipated as a result of this deviation.

[redacted] 12 APR 12
Date

Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 5 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #5 – Sections 5.2.4, 5.2.5 and 5.2.6 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" state that hardness, alkalinity and conductivity "...will be measured weekly throughout the holding period on one representative holding chamber for each species."

Weekly water chemistry parameters (i.e.: hardness, alkalinity and conductivity) were not monitored for week 1 post-exposure on RBT fish holding chambers. The water chemistry parameters (i.e.: hardness, alkalinity and conductivity) were measured and recorded at 13 and 18 days post-exposure. The values deviated < 2 mg/L for hardness, < 1 mg/L for alkalinity, and < 16 µS for conductivity.

The water used during this study is UMESC well water which has minimal shifts in water quality, therefore no adverse impacts to the study are anticipated. In addition, critical observations of flow, temperature, pH and dissolved oxygen were observed daily.

[redacted] 12 APR 12
Date

Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 6 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #6 – Section 5.1.7 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "the feed rate will be adjusted weekly to account for fish growth".

During the Rainbow trout (RBT) holding period, the daily feed chart (Form 9 – Daily Feed Chart) was revised on March 2, 2012, after one day of use to include the daily per fish ration for each holding chamber. This form was designed with seven blank rows (one for each day of the week) for recording the amount of food fed each day. The revised form was placed into service on the second day of the week, however, this was not correctly noted and the form was used for an additional 7 days instead of the 6 days that it should have been used. A new form should have been filled out using the second weeks ration on March 8th. Instead, the fish were fed the first week ration on March 8th and not switched to the second week ration until March 9th (ie: the fish were underfed for 1-d).

The error was corrected on March 15, 2012 by leaving a blank space on the Week 2 Form 9 (Daily Feed Chart datasheet) to account for the revision in the datasheet. Week 3 feeding rates (March 15-21, 2012) were correct and started on a new datasheet.

All rainbow trout (RBT) test animals were treated identically. The feed rate change was ≤ 0.03 g/fish/day. Thus, the anticipated results of this deviation are negligible due to all tanks being treated similarly.

[redacted] 12APR12
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 19
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 7 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #7 – Section 5.1.7 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" and the Memorandum entitled "Test animal feed rate calculation" dated February 24, 2012 state that "Fish will be fed during the acclimation and post exposure period by offering commercially-prepared dry feed, frozen live food, or live forage. The daily feed ration will be calculated based on the known weight of the fish transferred into each holding chamber and will be adjusted to compensate for mortalities."

It was discovered on March 18, 2012 that no fish were left in the RBT holding chamber E2 (300 mg/L) creating a one fish discrepancy in the mortality sheet and feeding charts. It was determined from the fish lengths and weights datasheet (Form 3) that one mortality was removed and processed for histology from RBT holding chamber E2 on March 7, 2012 and on March 9, 2012. Both mortalities were identified as RBT-300-E2-M15. The mortality processed on March 9, 2012 was not recorded on the mortality sheet or accounted for on the feeding charts. Therefore, RBT holding chamber E2 (300 mg/L) was overfed by one fish ration from March 9, 2012 until the discovery of the empty holding chamber on March 18, 2012.

Minimal adverse impacts are anticipated as a result of this deviation as the fish were only slightly overfed (< 0.11 g/fish/day). The two mortalities labeled the same may be able to be separated by length (difference of 1 mm) data if histology is determined to be required.

[redacted] 12/Apr/12
Date
Kelly L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 8 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #8 – Section 5.1.7 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" and the Memorandum entitled "Test animal feed rate calculation" dated February 24, 2012 state that "Fish will be fed during the acclimation and post exposure period by offering commercially-prepared dry feed, frozen live food, or live forage. The daily feed ration will be calculated based on the known weight of the fish transferred into each hold chamber and will be adjusted to compensate for mortalities."

It was discovered on March 22, 2012 that there were only four rainbow trout (RBT) remaining in holding chamber E5 (100 mg/L treatment group) creating a discrepancy of 2 extra fish in the feeding chart. By examining the mortality datasheet, it was discovered that the two mortalities processed for histology on March 10, 2012 were not accounted for on the feeding chart. Therefore, holding chamber E5 was overfed (0.10 g) from March 20, 2012 to the end of the holding period on March 23, 2012.

No adverse impacts are anticipated as a result of this deviation as the fish were only slightly overfed (0.10 g/day). Any impacts to the study will be noted in the final report.

[redacted] 12 APR 12
Date
Kelly L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 9 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #9 – Section 5.1.6 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "a group of five or ten fish will be placed in a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated to receive a total of three distributions for a total of 25 fish per exposure chamber."

After the exposure period, during the transfer of walleye (WAE) from the exposure chambers to holding chambers on March 22, 2012, it was discovered that two exposure chambers contained the incorrect quantity of fish. Exposure chamber B3 (100 mg/L treatment group) contained 35 fish (30 were transferred to holding chamber and 5 taken for histology) while exposure chamber B4 (300 mg/L treatment group) contained 15 fish (10 were transferred to holding chamber and 5 taken for histology). This error would have occurred during the distribution of the fish to the exposure chambers on March 20, 2012. It is assumed that one of the 10 fish aliquot that should have been placed in exposure chamber B4 was inadvertently placed into exposure chamber B3.

As the flow rates were sufficient for the number of fish in the exposure chamber as indicated by acceptable water chemistry parameters (D.O. > 5.0 mg/L during exposure period) and sufficient number of test animals remained within the 300 mg/L treatment group (N=60) to obtain the desired study data, therefore, no adverse impacts to the study are anticipated as a result of this deviation. Any impacts to the study will be noted in the final report.

[redacted] 12 APR 12
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date
James A. Luoma, B.A.
Study Director, UMESC

FF # 3
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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 12, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 10 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #10 –On March 28, 2012, a walleye (WAE) was discovered on the floor by the floor trench. It was not anticipated that the WAE would jump out of the holding chambers.

All the fish in all the holding chambers were counted and compared against the expected number (number placed – mortalities removed). It was discovered that two holding chambers F4 (100 mg/L) and F14 (control) each had one less fish than expected. It is assumed that these fish jumped from the holding chambers and that one of the fish is the one discovered on the floor. The other fish could not be accounted for and likely escaped through the lab effluent system.

Sufficient numbers of test animals remained within the treatment groups to obtain the desired study data, therefore no adverse impacts to the study are anticipated as a result of this deviation. Special care was taken to cover each holding chamber after feeding and cleaning. Any impacts to the study will be noted in the final report.

[redacted] 12 APR 12
Date

Kerry E. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/12/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 13, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 11 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #11 – Sections 5.5.3 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "Behavioral responses (i.e.: piping at the surface, loss of equilibrium, flashing, agitation, etc.) observed during the exposure or holding periods will be documented in the study records."

On April 4, 2012, no behavioral observations were observed for the walleye (WAE) holding chambers. It is unclear as to why behavioral observations were not taken.

No adverse impacts are anticipated as a result of this deviation as the behavioral observations from April 3 and 5, 2012 indicate that the fish were health and active. However, any potential impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 4/13/12
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/13/12
Date
James A. Luoma, B.A.
Study Director, UMESC

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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: May 18, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 12 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #12 – Section 5.5.2 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" states that "Feed consumption during the post exposure period will be assessed by subjectively ranking consumption using the following categories (e.g.: 1 = 0-25% apparent consumption of the food offered; 2 = 26-50% apparent consumption of the food offered; 3 = 51-75% apparent consumption of the food offered; 4 = 75-100% apparent consumption of the food offered)."

On May 16, 2012, as an oversight, feed consumption rankings were not observed for the coaster brook trout (BKT) holding chambers.

No adverse impacts are anticipated as a result of this deviation as feed waste was observed in all tanks. Thus, it was apparent that the fish had eaten to satiation. Any potential impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 18MAY12
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 5-18-12
Date
James A. Luoma, B.A.
Study Director, UMESC

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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: June 22, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 13 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #13 – Transfer of SMB to holding chamber

On June 21, 2012 after the 24 hour exposure period, the fish from exposure chamber A4 (200 mg/L *Pf*-CL 145A) were being sampled for histology and pooled for transfer to the holding chambers when the fish for transfer were inadvertently placed into a bucket containing MS-222. We attempted to revive the fish, however, about half of the fish were lost during this transfer process. This 200 mg/L Pf-CL145A replicate was terminated as it is likely the fish mortalities were a result of the exposure to MS-222. The fish were removed from the tank, euthanized with MS-222 and disposed.

No adverse impacts are anticipated as a result of this deviation. There are still two replicates remaining for the 200 mg/L Pf-CL 145A group for data analysis. Any potential impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 6/22/12
Date
Theresa Schreier
UMESC

[redacted] 6/22/12
Date
James A. Luoma, B.A.
Study Director, UMESC

FF # 3
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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: June 25, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 14 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #14 – Removal of mortality during SMB exposure

On June 21, 2012 there was a buildup of a white foam substance resulting from the chemical treatment in both exposure chambers A4 (200 mg/L *Pf*-CL145A) and A5 (300 mg/L *Pf*-CL145A). To facilitate sampling, a net was used to remove the foam from the tanks. After foam removal, it was determined that a dead test fish was inadvertently removed from an exposure tank during the removal of the foam. Since both exposure chambers A4 and A5 had 24 fish remaining upon exposure termination, we could not determine which exposure tank the mortality was removed from; therefore, a note was made in the study records and the mortality was bagged and disposed of appropriately.

No adverse impacts are anticipated as a result of this deviation. There was still 24 test fish available in exposure tanks A4 and A5 for data analysis. Any potential impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 6/25/12
Date
Theresa Schreier
UMESC

[redacted] 6-25-12
Date
James A. Luoma, B.A.
Study Director, UMESC

FF # 3
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cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: June 28, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 15 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #15 – Refrigerator in Room 2 inadvertently unplugged

On June 25, 2012 the refrigerator in Room 2 (Whirlpool, serial number VS20151545) used for storage of test article for study number AEH-12-PSEUDO-03 was inadvertently unplugged when it was moved to retrieve an item that fell behind it. The problem was identified the morning of June 26, 2012 and the was power was immediately restored. The temperature recorder indicated that the temperature was ~ 5°C before the incident and then jumped to ~10°C within a couple hours and held that temperature until ~2 hours before discovery, when it increased to about 12°C. The manufacturer recommended storage temperature for the test article is 4°C. Two lots of chemical are potentially affected from this incident. Test chemical lot number TR 4669-4-(5) #3 shipment (received on June 14, 2012) and test chemical lot number TR 4669-3-(7) (received on June 21, 2012). Test chemical lot number TR 4669-4-(5) #3 shipment was previously used to expose smallmouth bass and post-exposure efficacy validation (mussel bio-assay by New York State Museum Field Research Laboratory[NYSM-FRL]) had not been completed. Test chemical lot number TR 4669-3-(7) has not been used for any exposures, however, the pre-exposure efficacy validation (mussel bio-assay by NYSM-FRL) previously conducted must be repeated to assure efficacy prior to use in exposures. An aliquot of each batch was returned to the NYSM-FRL on June 26, 2012 for the pre- and post-test efficacy validations.

No adverse impacts are anticipated as a result of this deviation. Test chemical lot number TR 4669-3-(7) will not be used unless it passes the second pre-test efficacy validation. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 6/28/12
Date
Theresa Schreier
UMESC

[redacted] 6/28/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: October 1, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 16 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #16 – Loss of test animal during BLG exposure period termination

During the BLG exposure period termination and transfer of test animals on July 12, 2012 one fish was accidently dropped on the ground during the transfer from diluter system B, chamber B4 (50 mg/L) to holding chamber E12. The missing fish was not recovered; presumably it escaped down a floor trench drain. As a result, only 19 BLG were transferred to holding chamber E12.

No adverse impacts are anticipated as a result of this deviation as there are still sufficient numbers for statistical analyses. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 01-OCT-12
Date
Todd Severson
UMESC

[redacted] 10/1/12
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: October 1, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 17 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #17 – One test animal unaccounted for during SMB post-exposure holding period termination

During the termination of the SMB post-exposure holding period on July 13, 2012, it was discovered that one fish from holding chamber D1 (100 mg/L treatment group) was missing. Only 19 fish of the 20 placed in the chamber were recovered. The disposition of the missing fish cannot be determined but was likely an undetected escape.

No adverse impacts are anticipated as a result of this deviation as there are still sufficient numbers to perform statistical analyses. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 01-OCT-12
Todd Severson Date
UMESC

[redacted] 10/1/12
James A. Luoma, B.A. Date
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 30
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: October 1, 2012
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 18 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #18 – Mislabeling of histology cassettes and tags during SMB post-exposure termination

On July 13, 2012 histology cassettes and tags used to label SMB post-exposure termination histopathology samples were mislabeled. The labels reflect that SMB were held in holding rack quadrant 'E' when they were actually held in holding rack quadrant 'D'. As an example, the labels were written as shown below:

'SMB-100-E1-T1' instead of the correct label 'SMB-100-D1-T1'.

Length and weight data form (Form 3) for SMB post-exposure termination was labeled correctly and accurately reflects that SMB were held in holding rack quadrant 'D'.

No adverse impacts are anticipated as a result of this deviation as this labeling mistake has been identified and documented. Additionally, all animals can be traced from their respective exposure group through their final disposition. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 01-OCT-12
Todd Severson Date
UMESC

[redacted] 10/1/12
James A. Luoma, B.A. Date
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 31
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: September 26, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 19 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #19 – Incorrect routing of the diluter test chemical delivery lines during the channel catfish exposure initiated September 26, 2012.

Approximated 30 minutes into dosing initiation on diluter system C for the channel catfish exposure on September 26, 2012 it was noticed that three of the exposure chambers were not receiving the correct test chemical dilution water from the diluter delivery box as determined by the randomization performed on September 24, 2012. The exposure chambers were selected for dosing in the following order: C1 = 300 mg/L; C2 = 100 mg/L; C3 = 200 mg/L; C4 = control and C5 = 50 mg/L. The exposure chambers delivery lines were incorrectly routed and therefore the exposure chamber received the following concentrations: C1 = 200 mg/L; C2 = 100 mg/L; C3 = Control; C4 = 30 mg/L and C5 = 50 mg/L.

The delivery lines and exposure chambers were left as found and all data sheets and the randomization sheet were noted to see this deviation for an explanation. No other deviations to the study plan were noted other than the change of the physical location of the exposure chambers receiving the dosages.

No adverse impacts are anticipated as a result of this deviation. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 9/26/12
James A. Luoma, B.A. Date
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 32
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: September 28, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 20 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #20 – Dripping of test chemical into control exposure chamber during channel catfish exposure due to delivery tube dislodgment.

At ~1230, during the 3 hour water quality data collection, it was noticed that the delivery tube to exposure chamber C2 (100 mg/L treatment) had become dislodged. The test water was dripping into exposure chamber C3 (control). The steps taken to rectify and document the situation are outlined below:

1) The delivery tube was immediately reattached to resume flow of test water into exposure chamber C2 (100 mg/L treatment) at ~1230.
2) Chamber C3 (control) was immediately drawn down to flush contaminated test water (~1230).
3) An initial spectrophotometric sample was taken from all exposure chambers and analyzed on the DU 800 spectrophotometer. The concentration of chamber C2 (100 mg/L treatment) was approximately 6 mg/L lower than anticipated while the concentration of chamber C3 (control) contained approximately 6 mg/L of test material.
4) A second sample was taken from the delivery tubes (~1250) to exposure chambers C2 (100 mg/L treatment) and C3 (control) to determine that the proper concentration was being delivered to the exposure chambers. Chamber C3 was flushed again at ~1250.
5) At ~1310 Chamber C3 (control) was drawn down for a third time and refilled with clean headbox dilution water. At that time another spectrophotometric sample were analyzed from exposure chambers C2 (100 mg/L treatment) and C3 (control). The concentration of chamber C3 (control) returned to 0 mg/L as verified by the spectrophotometer at 1313. The concentration of chamber C2 (100 mg/L treatment) also returned to expected concentration as verified by the absorbance values at 1313, 1340 and 1428 being within 2 mg/L of each other.

The exact time the delivery tube became dislodged is not known, however, due to activity within the laboratory it is anticipated that it was < 30 minutes and the situation was rectified immediately upon discovery. The control chamber was contaminated for less than 30 minutes after the problem was noticed. As such, no adverse impacts are anticipated as a result of this deviation. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 28 SEP 12
Date

Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 9/28/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: September 28, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 21 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #21 – Incorrect number of test organisms in exposure chambers during the channel catfish exposure initiated September 26, 2012.

Upon termination of the channel catfish exposure on September 27, 2012, it was discovered that errors had been made during the distribution of animals to the exposure chambers. Two errors were made, result in three exposures chambers not having the scheduled 25 test organisms. The errors are described below.

1) One of the distribution rounds of ten fish that should have been placed into exposure chamber B1 (300 mg/L) was accidently placed into exposure chamber B5 (control). This resulted in exposure chamber B1 having a total of 15 test organisms and exposure chamber B5 having 35 test organisms.
2) One extra fish was found in exposure chamber B4 from an apparent miscount during the distribution. This resulted in 26 test organisms in this exposure chamber.

All animals live test animals were retained and moved to the holding chamber selected for them according to the randomization scheme (exposure chamber B1 to holding chamber E14, exposure chamber B5 to holding chamber E3, exposure chamber B4 to holding chamber E4).

No adverse impacts are anticipated as a result of this deviation. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 9/28/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: October 1, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 22 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #22 – Escapement of CCF test animal from holding chamber

During the daily care and maintenance of the holding chambers for the CCF a test animal was found to have escaped from holding chamber E7 (100 mg/L) treatment group. The number of test animals was verified in the chamber compared to the number of test animals that were placed into the chamber, confirming that the escaped animal was from holding chamber E7.

The test animal was desiccated and therefore, length and weight measurements were not recorded for this animal and the test animal was disposed of for incineration. Datasheets and the lab notebook were annotated to document this escapement. Furthermore, the holding chambers were covered to prevent further escapement.

No adverse impacts are anticipated as a result of this deviation as there are sufficient numbers to perform statistical analyses. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 01OCT12
Date

Jeremy K. Wise, B.S.
Biological Science Technician II,
UMESC-IAP

[redacted] 10/1/12
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: October 17, 2012

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 23 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #23 – Deviations of temperature chart recorder records

During the Quality Assurance (QA) inspection of the study number AEH-12-PSEUDO-03 entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" deviations on the temperature chart recorder records were noted. The deviations were noted for the recorders records for the refrigerator/freezer united located in room 2 which is used for test article storage.

The deviations noted were for 1) improper documentation of initiation and termination dates as well as initials of the person making the change on the chart recorder records; 2) the absence of adhesive labels on the back of each chart record listing the archive file number, type of recorder, serial number and recorder location; and 3) poor organization of the chart recorder records.

The recommendations of the QA unit were followed and included: 1) the chronological organization of the chart records by recorder (i.e.: refrigerator or freezer); 2) assignment of specific personnel to the maintenance of the chart recorder records; and 3) the review of the records for conformance to SOP No. AEH 342.4 and 341.4, as appropriate.

Adhesive labels were placed on the back of each chart record listing the archive file number, type of recorder, serial number and recorder location. Upon review of the chart records, several were found to be missing dates and/or initials of the person removing the chart record, and many of the chart records were left in the recorder > 7 days, causing overlapping data marks. Most, if not all, of the removal dates can be reasonably assumed from the entry date of the following chart record and no spikes in temperature were noted on the chart records indicating normal operating parameters.

No adverse impacts are anticipated as a result of this deviation as no unusual temperature variations were noted and samples of the test article are sent back to the New York State Museum Field Research Laboratory (Cambridge, NY) for activity verification after the test article use in exposures.

[redacted] 17 Oct 2012
Date

James A. Lyoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 24 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #24 – Correction to the number of test animals reported as distributed to exposure chamber C2, during rainbow trout (*Oncorhynchus mykiss*) testing as documented in study Deviation #1

Study deviation #1 (dated April 12, 2012) identifies that during the distribution of rainbow trout (*O. mykiss*) to the exposure chambers on February 28 2012, an error was made and chamber C2 (50mg/L) received 20 test animals and chamber C3 (200 mg/L) received 30 test animals (both chambers should have received 25 test animals). It was assumed that the 5 test animal aliquot that should have been placed in exposure chamber C2 was inadvertently placed into exposure chamber C3.

This assumption is still correct, however, only 19 test animals can be documented as originating from chamber C2. It is further assumed that during the distribution that one of the two 10 test animal aliquots distributed to C2 only contained 9 test animals, not 10 test animals, as previously anticipated. Since only 19 test animals can be accounted for as originating from chamber C2 (as documented below), only 19 test animals will be used in the data analysis.

The disposition of test animals that can be documented as originating from exposure chamber C2 and followed through the post-exposure holding period in holding chamber E6 (the chamber the test animals were transferred into after the exposure period) are listed below. The running tally number is listed in **bold**.

1) At the termination of the exposure period, 4 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 16d). **N = 4**

2) Fifteen test animals were transferred from exposure chamber C2 to holding chamber E6 (documented on Form 3a – Pooled Fish Length and Weight, file folder 16d and on Form 9 – Daily Feed Chart, file folder 16c). **N = 19**

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3) Of the fifteen test animals transferred to holding chamber E6, 13 were recorded as mortalities throughout the 22-d post-exposure holding period (documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 16c). **N = 2**

4) Two test animals were collected from holding chamber E6 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure termination], file folder 16d). **N = 0**

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 3/25/13
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 25 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #25 – Correction to Study deviation #10, dated April 12, 2012.

Study deviation #10 (dated April 12, 2012) details that during the daily maintenance of walleye (*Sander vitreus*) during the holding period a test animal was found to have escaped from a holding chamber and was discover on the floor near the holding system. The number of test animals in each chamber were enumerated and it was determined (in error) that two test animals were missing, one from each of two exposure chambers, (F4 [100 mg/L] and F14 [control]).

Upon review of the study documents, it was found that exposure chamber F4 (100 mg/L) was not missing a test animal as indicated in study deviation #10 as all test animals placed in the exposure chamber can be accounted for by study documentation. As study deviation #10 correctly indicates, holding chamber F14 (control) was short one test animal and, therefore, it was the source of the test animal discovered on the floor and documented in deviation #10. Documentation, listed below for each exposure chamber (**running tally number in bold**), supports the conclusion that the test animal discovered by the floor trench came from exposure chamber F14 and that exposure chamber F4 was not missing any test animals.

Exposure chamber B3 (corresponding holding chamber F4):

1) Thirty-five test animals were placed into the exposure chamber B3 (documented as note on bottom of Form 3a – Pooled Fish Length and Weight, file folder 18d and study deviation # 9, dated April 12, 2012) **N = 35**
2) At the end of the exposure period, 5 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 18d). **N = 30**
3) Test animals transferred to holding chamber F4 (documented on Form 3a – Pooled Fish Length and Weight, file folder 18d and on Form 9 – Daily Feed Chart, file folder 18c). **N = 30**
4) Three mortalities were recorded throughout the 22-d post-exposure holding period in chamber F4 (Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 18c). **N = 27**
5) Twenty-seven test animals were collected from holding chamber F4 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure Termination], file folder 18d). **N = 0**

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Exposure chamber B5 (corresponding holding chamber F14):

1) Twenty-five test animals were placed into the exposure chamber B5 (documented on randomization as indicated by check-mark placed next to each exposure chamber as the test animals were placed, file folder 18a). **N = 25**
2) At the end of the exposure period, 5 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 18d). **N = 20**
3) Test animals transferred to post-exposure holding chamber F14 (documented on Form 3a – Pooled Fish Length and Weight, file folder 18d and on Form 9 – Daily Feed Chart, file folder 18c). **N = 20**
4) No mortalities were recorded throughout the 22-d post-exposure holding period in chamber F14 (Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 18c). **N = 20**
5) On March 29, 2012 (Day 7 of the 22-d post-exposure holding period) one test animal was found to have jumped from the holding chamber F14 (documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 18c and study deviation #10, dated April 12, 2012). **N = 19**
6) Nineteen test animals were collected from holding chamber F14 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure Termination], file folder 18d). **N = 0**

After review of the study records, it is concluded that an error was made on March 29, 2012 when the number of test animals in each post-exposure holding chamber were counted to determine the origin of the test animal discovered on the floor. Chamber F4 was miscounted and was not missing a test animal. Exposure chamber F14 (control) was determined to be the source of test animal.

Due to the inaccurate counting of holding chamber F4, the test animals were underfed by 0.35 to 0.64 g throughout the remainder of the holding period. No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 3/25/13
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 26 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #26 – Mortality recording error on Form 11 – Daily Mortality and Maintenance – Post Exposure, dated 13 June 2012.

On June 13, 2012, on Day 0 of the 22-d post-exposure holding period for largemouth bass (*Micropterus salmodies*), the mortalities were recorded incorrectly for holding chamber E11 (200 mg/L) and E13 (100 mg/L). Form 11 – Daily Mortality and Maintenance – Post Exposure, (file folder 21c) indicates that post-exposure holding chamber E11 had no mortalities while post-exposure holding chamber E13 had 3 mortalities. This information was determined to be transposed. Post-exposure holding chamber E11 had 3 mortalities and post-exposure holding chamber F13 had no mortalities for Day 0 (June 13, 2012). A correction will be made to the original data sheets that refer to this deviation.

Study record documentation listed below for each exposure chamber (**running tally number in bold**), supports the conclusion that holding chamber E11 had no mortalities and that exposure chamber E13 had 3 mortalities.

Exposure chamber A1 (corresponding holding chamber E11):

1) Twenty-five test animals were placed into the exposure chamber A1 (documented on randomization as indicated by check-mark placed next to each exposure chamber as the test animals were placed, file folder 21a). **N = 25**
2) Three test animals died during exposure (documented on Form 11a – Exposure Mortality, file folder 21c). **N = 22**
3) At the end of the exposure period, 5 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 21d). **N = 17**
4) Test animals transferred to post-exposure holding chamber E11 (documented on Form 3a – Pooled Fish Length and Weight, file folder 21d and on Form 9 – Daily Feed Chart, file folder 21c). **N = 17**
5) On June 13, 2012 (Day 0 of the 22-d post-exposure holding period), three test animals were incorrectly recorded as mortalities in holding chamber E13 (incorrectly documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 21c). These mortalities were correctly recorded as coming from holding chamber E11 on Form 3 (Fish Length and Weight [Mortalities], file folder 21d). **N = 14**
6) Fourteen test animals were collected form holding chamber E11 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure Termination], file folder 21d). **N = 0**

Exposure chamber B2 (corresponding holding chamber E13):

1) Twenty-five test animals were placed into the exposure chamber B2 (documented on randomization as indicated by check-mark placed next to each exposure chamber as the test animals were placed, file folder 21a). **N = 25**
2) No test animals died during exposure (documented on Form 11a – Exposure Mortality, file folder 21c). **N = 25**

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3) At the end of the exposure period, 5 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 21d). **N = 20**
4) Test animals transferred to post-exposure holding chamber E13 (documented on Form 3a – Pooled Fish Length and Weight, file folder 21d and on Form 9 – Daily Feed Chart, file folder 21c). **N = 20**
5) On June 13, 2012 (D0 of the 22-d post-exposure holding period), three test animals were incorrectly recorded as mortalities in holding chamber E13 (incorrectly documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 21c). These mortalities were correctly recorded as coming from holding chamber E11 on Form 3 (Fish Length and Weight [Mortalities], file folder 21d). **N = 20**
6) One mortality was recorded throughout the 22-d post-exposure holding period in holding chamber E13 (Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 21c and on Form 3 – Fish Length and Weight [Mortalities], file folder 21d). **N = 19**
7) Nineteen test animals were collected form holding chamber E13 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure Termination], file folder 21d). **N = 0**

The incorrect mortality counts also resulted in incorrect feed rates as feed was offered based on the weight of the fish in the tank. Holding chamber E11 was overfed by 0.41 to 0.57g per day from June 14 to July 4, 2012. Holding chamber E13 was underfed by 0.48 to 0.69g per day from June 14 to July 4, 2012. The feed ration was adjusted on June 20 and 27 and July 4, 2012 which accounts for the variation in the amount over and underfed.

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date
Kelly L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 3/25/13
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 27 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #27 – Accidental death of coaster brook trout (*Salvelinus fontinalis*) test animal during daily care and maintenance activities

On May 9, 2012, during the post-exposure holding period for the coaster brook trout (*S. fontinalis*) a test animal was accidently injured and subsequently died (as documented on Form 3 – Fish Length and Weight [Mortalities], file folder 17d and on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 17c). The test animal was injured during cleaning activities when it was accidently drawn into a siphon tube being used to clean debris and waste food from holding chamber. The test animal was from holding chamber E10 (200 mg/L treatment). While this test animal was a non-treatment related mortality it was retained for potential histological examination. This test animal will be removed from survival analysis for the post-exposure holding period.

No adverse impacts are anticipated as a result of this deviation as there are sufficient numbers for statistical analysis. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 3/25/13
Date

James A. Luoma, B.A.
Study Director,
UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 28 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #28 – Incorrect number of test animals transferred to post-exposure holding system documented on Form 3a – Pooled Weight for channel catfish (*Ictalurus punctatus*) exposure

On September 27, 2012, at the termination of the channel catfish (*I. punctatus*) exposure period, an incorrect number of test animals were documented as being transferred from exposure chamber B3 (100 mg/L treatment group) to post-exposure holding chamber E7. The "Pooled Fish Length Weight" datasheet (Form 3a, file folder 24d) indicates that 20 test animals were transferred from exposure chamber B3 to holding chamber E7 when 19 test animals were actually transferred. A note written, initialed and dated 9/27/12 on the feed chart (Form 2, file folder 7) states that 19 test animals were transferred from exposure chamber B3 to holding chamber E7, however a correction was not completed on Form 3a at that time. In addition, the "Daily Feed Chart" (Form 9, file folder 24c) also indicates that only 19 test animals were transferred to holding chamber E7.

Further study documentation, as listed below (**running tally number in bold**), supports the conclusion that the number of test animals transferred as documented on Form 3a (Pooled Fish Length and Weight, file folder 24d; N=20) was in error as all 25 test animals initially placed are accounted for in the study records.

1) Twenty-five test animals were placed into the exposure chamber B3 (documented on randomization as indicated by check-mark placed next to each exposure chamber as the test animals were placed, file folder 24a) **N = 25**
2) One test animal died during exposure (documented on Form 11a – Exposure Mortality, file folder 24c) **N = 24**
3) At the end of the exposure period 5 test animals were sampled and preserved for histological examination (documented on Form 3 – Fish Length and Weight [Exposure Termination], file folder 24d) **N= 19**
4) Test animals to holding chamber E7 (documented [in error as N=20] on Form 3a, Pooled Fish Length Weight data sheet, file folder 24d) **N=19**

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5) On September 29, 2012 (Day 2 of the 22 d post-exposure holding period) one test animal was found to have jumped from the holding chamber E7 (documented on Form 3 – Fish Length and Weight [Mortalities], file folder 24d and study deviation #22, dated October 1, 2012). **N=18**
6) Ten mortalities were recorded throughout the 22-d post-exposure holding period in chamber E7 (documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 24c and on Form 3 – Fish Length and Weight [Mortalities], file folder 24d). **N=8**
7) Eight test animals were collected from chamber E7 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight, file folder 24d). **N=0**

No adverse impacts are anticipated as a result of this deviation as the study records account for all 25 test animals placed in the exposure chamber. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date
Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 3/25/13
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 29 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #29 – Incorrect number of largemouth bass (*Micropterus salmoides*) placed into exposure chamber C5

It is assumed that an error was made during test animal distribution and that on June 12, 2012 only 24 fish were distributed to exposure chamber C5 (200 mg/L treatment group) for the largemouth bass (*M. salmoides*) exposure. A note written, initialed and dated June 13, 2012 on "Form 11a – Exposure Mortality" data sheet (file folder 21c) states: "Diluter C Tank C5 was short 1 fish upon termination. Six mortalities were removed, 14 fish were placed into the holding rack and 4 fish were sampled for histology". Only the test animals that can be definitively documented (N=24) as originating from exposure chamber C5 will be used in data analyses.

Study documentation, as listed below (**running tally number in bold**) supports the conclusion that 24 fish were initially placed into exposure chamber C5 (200 mg/L; corresponding holding chamber E2).

1) Six test animals died during exposure (documented on Form 11a – Exposure Mortality, file folder 21c and on Form 3 – Fish Length and Weight [Mortalities], file folder 21d). **N = 6**

2) At the end of the exposure period 4 test animals were sampled and preserved for histological examination (documented on Form 11a – Exposure Mortality, file folder 21c and on Form 3 – Fish Length and Weight [Post-exposure Termination], file folder 21d). **N=10**

3) Fourteen test animals were transferred from exposure chamber C5 to post-exposure holding chamber E2 (documented on Form 9 – Daily Feed Chart, file folder 21c and on Form 3a – Pooled Fish Length and Weight, file folder 21d). These 14 test animals can be accounted for throughout the 22-d holding period: 1) Two were recorded as mortalities (documented on Form 11 – Daily Mortality and Maintenance – Post-exposure, file folder 21c and on Form 3 – Fish Length

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and Weight [Mortalities], file folder 21d); 2) Twelve test animals were collected from holding chamber E2 at the termination of the post-exposure holding period (documented on Form 3 – Fish Length and Weight [Post-exposure termination], file folder 21d). **N=24**

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 3/25/13
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 30 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #30 – Accidental death of smallmouth bass (*Micropterus dolomieu*) test animal during daily care and maintenance activities

On July 2, 2012, during the post-exposure holding period for the smallmouth bass (*M. dolomieu*), a test animal was accidently injured and subsequently died (as documented on Form 11 – Daily Mortality and Maintenance – Post Exposure, file folder 22c). The test animal was injured during cleaning activities when it was accidently drawn into a siphon tube being used to clean debris and waste food from holding chamber. The test animal was from holding chamber D11 (100 mg/L treatment). Due to this test animal being a non-treatment related mortality, it was not retained for potential histological examination. This test animal will be removed from survival analysis for the post-exposure holding period.

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13
Date

Jeremy K. Wise
Biological Science Technician II
UMESC

[redacted] 3/15/13
Date

James A. Luoma, B.A.
Study Director,
UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 31 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #31 – Omission of hardness, alkalinity and conductivity measurements during the walleye (*Sander vitreus*) post-exposure holding period

Sections 5.2.4, 5.2.5 and 5.2.6 of study number AEH-12-PSEUDO-03 amended protocol entitled "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species" state that hardness, alkalinity and conductivity "...will be measured weekly throughout the holding period on one representative holding chamber for each species."

Weekly water chemistry parameters (hardness, alkalinity and conductivity) were not measured during week 2 of the walleye (*S. vitreus*) post-exposure holding period. The water chemistry parameters (i.e.: hardness, alkalinity and conductivity) were measured and recorded at 5 and 19 days post-exposure. The weekly averages deviated < 3 mg/L for hardness, < 4 mg/L for alkalinity, and < 3 µS for conductivity.

The water used during this study is UMESC well water which has minimal shifts in water chemistry; therefore, no adverse impacts to the study are anticipated. In addition observations of flow, temperature, pH and dissolved oxygen were conducted daily. Any impacts to the study will be noted in the final report.

[redacted] 25 MAR 13
Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 3/25/13
Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 44
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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 25, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 32 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #32 – Incorrect numbering and labeling of rainbow trout (*Oncorhynchus mykiss*) mortalities during 22-d holding period

On March 9, 2012, a mortality from post-exposure holding chamber E2 (300 mg/L treatment) was mislabeled as RBT-300-E2-15 on Form 3 (Fish Length and Weight [Mortalities], file folder 16d) when it should have been labeled RBT-300-E2-16 (ie: it was labeled as the 15th mortality removed, not the 16th, thus it resulted in two test animals being labeled RBT-300-E2-15). The first (and correct) test animal labeled as RBT-300-E2-15 was a mortality from March 7, 2012 (Form 3 – Fish Length and Weight [Mortalities], file folder 16d).

Subsequently, all mortalities from holding chamber E2 were incorrectly identified (ie: the end number that identifies the mortality number was 1 lower than the correct value) from March 9 throughout the rest of the 22-d holding period, which ended on March 23, 2012. The errors were easily identified and they were corrected on Form 3 (Fish Length and Weight [Mortalities], file folder 16d) to the proper sequential order.

The identification on the individual tissue cassettes that the effected mortalities were placed in for possible histological observation does not properly represent the post-exposure mortality number of the test animals as a result of this error. All of the test animals could easily be correctly identified except the animals that are both labeled RBT-300-E2-15 on the tissue cassettes.

No adverse impacts are anticipated as a result of this deviation. The labeling mistake has been identified and documented. If histology is performed on preserved mortality specimens this information will be made available. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 25MAR13 Date [redacted] 3/25/13 Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

James A. Luoma, B.A.
Study Director, UMESC

FF # 3
Item No. 45
Pg 1 of 1

cc: UMESC QAU

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 9, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 33 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #33 – Loss of test animal during largemouth bass (*Micropterus salmoides*) transfer from exposure chamber to holding chamber

During the transfer of largemouth bass (*M. salmoides*) from exposure chamber C2 (50 mg/L treatment group) to holding chamber E4 on June 13, 2012, one test organism was removed from the treatment group replicate as it jumped from the net. As a result, only 19 largemouth bass were transferred to holding chamber E4. A note was recorded on Form 3a – Pooled Fish Length and Weight (file folder 21d) on the day of occurrence explaining what happened and how it was resolved.

No adverse impacts are anticipated as a result of this deviation as there are still sufficient numbers for statistical analyses. Any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 9APR13
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/9/13
Date
James A. Luoma, B.A.
Study Director, UMESC

FF # 3
Item No. 46
Pg 1 of 2

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 9, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 34 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #34 – Accidental death of yellow perch (*Perca flavescens*) test animal during exposure chamber breakdown

On March 8, 2012, during the exposure termination breakdown for the yellow perch (*P. flavescens*), a test animal was inadvertently injured and subsequently died (as documented on Form 11a – Exposure Mortality, file folder 19c) during exposure chamber breakdown and test animal transfer to the holding chambers. It is assumed that the test organism was injured by the net while being removed. The test animal was from exposure chamber A4 (control treatment group). This test animal will be coded as a non-treatment related mortality on the data summary and it will be removed from all analyses for the post-exposure holding period.

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 9APR13
Date

Kerry L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 4/9/13
Date

James A. Luoma, B.A.
Study Director,
UMESC

cc: UMESC QAU

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United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 9, 2013
To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 35 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #35 – Mortality observations not recorded for walleye (*Sander vitreus*) holding chambers on April 12, 2012

Mortality observations for April 12, 2012 were not recorded for the walleye holding chambers. A correct entry should read zero mortalities for holding chambers F1 through F15 based on Form 9 – Daily Feed Chart (file folder 18C) and Form 3 – Fish Length and Weight – Mortalities (file folder 18D). Both of these forms indicate that there were no mortalities from April 12, 2012.

No adverse impacts are anticipated as a result of this deviation and any impacts to the study as a result of this deviation will be addressed in the final report.

[redacted] 9APR13
Date
Kerry L. Weber, M.S.
Principal Investigator, UMESC

[redacted] 4/9/13
Date
James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

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Item No. 48
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: April 15, 2013

To: The Record Study Number AEH-12-PSEUDO-03

Subject: Deviation 36 to study AEH-12-PSEUDO-03 "Effects of *Pseudomonas fluorescens* (*Pf*-CL145A) to ten different freshwater fish species"

Deviation #36 – Incorrect sequential numbering and labeling of mortalities during the 22-d holding period for rainbow trout (*Oncorhynchus mykiss*), coaster brook trout (*Salvelinus fontinalis*), channel catfish (*Ictalurus punctatus*), and lake sturgeon (*Acipenser fulvescens*).

Multiple errors were found on study Form 3 (Fish Length and Weight datasheet) in how the individual identification codes were assigned and recorded for the mortalities removed from the post exposure holding chambers. Specifically, the errors were made in the sequential numbering of mortalities removed from some holding chambers. Some of the test animal mortality identifications (i.e.: RBT-200-E15-M12) for specific holding chambers were inadvertently duplicated (the last alpha numeric code (i.e. -M12) identifies that the test animal was a mortality and the mortality number as it was removed from the holding chamber) and did not follow the sequential progression (i.e.: RBT-200-E15-M12, RBT-200-E15-M13, etc.). A previously identified sequential numbering error for *O. mykiss* was addressed in study Deviation #32, however, that information will be included in this deviation. A total of four (4) species and twelve (12) holding chambers are effected by these errors (Table 1).

Information including: 1) mortality date, 2) species, 3) holding chamber, 4) treatment group, 5) fish weight and 6) fish length were properly recorded on Form 3. Form 3 will be corrected to properly reflect the correct sequential numbering order. The codes recorded on the tissue cassettes or tags (i.e.: RBT-200-E15-M12) correctly identify the species, treatment group and holding chamber for the affected test animals. The codes do not correctly identify the mortality number (i.e.: -M12) for the identified effected test animals. The codes (including the mortality number) were recorded on tissue cassettes or tags to allow for identification of the test animal to the respective weight/length and other data collected on Form 3 in the event of histopathological examination. The effected test animals are still identifiable to treatment group and holding chamber, but they are not identifiable to the exact length or weight data and may not be identifiable to the date of death. No attempt will be made to correct the histology cassettes or tags for the affected test animals. The numbers of test animals that cannot be positively identified are shown in Table 1 in addition to affected sequentially numbered codes for each treatment replicate. Test animals that were numbered incorrectly after the error date(s) are identifiable according to the original sequentially numbered codes assigned on Form 3. These incorrectly number test animals were assigned a unique code and therefore they are identifiable. However, the sequential order number assigned was in error and should have been different (ie: code M-12 repeated, test animal mortality assigned M-13 should have been assigned M-14. This animal is still traceable from the original number assigned).

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The corrections that will be made on Form 3 will allow identification of the originally assigned numbers and, therefore, the weights and lengths on Form 3 can be identified for preserved test animals that were assigned a unique but incorrect sequential order number.

Impacts as a result of this deviation include the inability to identify the exact test animals affected by the sequential numbering errors to their respective length and weights and potentially to the date of death. However, due to rapid degradation of tissues observed in mortalities, it is unlikely that the mortality samples would be good specimens for histopathological examination.

Table 1. Dates of sequential numbering errors, impacted species, holding chambers, treatment groups, number of effected test animals and the sequentially numbered codes.

Species	Holding Chamber	Treatment group (mg/L)	Affected Mortality ID[1]	Number of Unidentifiable Test Animals[2]	Date of Sequential Numbering Error[3]
O. mykiss	E2	300	RBT-300-E2-M15[4]	2	March 9, 2012
	E7	200	RBT-200-E7-M17	2	March 12, 2012
	E15	200	RBT-200-E15-M12	6	March 12, 2012
			RBT-200-E15-M13		March 13, 2012
			RBT-200-E15-M14		March 13, 2012
S. fontinalis	E11	100	BKT-100-E11-M6	2	May 25, 2012
I. punctatus	E13	200	CCF-200-E13-M12	6	October 9, 2012
			CCF-200-E13-M13		October 9, 2012
			CCF-200-E13-M14		October 9, 2012
A. fulvescens	G1	100	LST-100-G1-M9	2	August 12, 2012
	G2	50	LST-50-G2-M5	2	August 15, 2012
	G3	300	LST-300-G3-M9	2	August 9, 2012
	G5	50	LST-50-G5-M13	2	August 17, 2012
	G6	50	LST-50-G6-M13	2	August 17, 2012
	G9	300	LST-300-G9-M12	2	August 4, 2012
	G15	200	LST-200-G15-M3	2	August 3, 2012

[1]–These IDs include all test animals mortalities that are not traceable to length and weight data on Form 3 due to sequential numbering errors (They were repeated in error).
[2]–This is the number of test animals from the holding chamber that that are not traceable to length and weight data on Form 3 due to sequential numbering errors.
[3]–This is the date that the sequential numbering error occurred on Form 3.
[4]–The sequential numbering error of these test animals from holding chamber E2 was the subject of Deviation #32.

[redacted] 15 APR 13 Date

Kelly L. Weber, M.S.
Principal Investigator,
UMESC

[redacted] 4/15/13 Date

James A. Luoma, B.A.
Study Director, UMESC

cc: UMESC QAU

FF # 3
Item No. 49
Pg 2 of 2

Appendix 3. Randomization Assignments

Item number	Item description	Number of pages	Report page number
1	SAS-generated random assignments – RBT	18	166
2	SAS-generated random assignments – BKT	15	184
3	SAS-generated random assignments – WAE	16	199
4	SAS-generated random assignments – YEP	17	215
5	SAS-generated random assignments – LST	15	232
6	SAS-generated random assignments – LMB	15	247
7	SAS-generated random assignments – SMB	14	262
8	SAS-generated random assignments – BLG	15	276
9	SAS-generated random assignments – CCF	16	291

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish 1
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks 2-22-12
Mussel species: Rainbow trout JA

Obs	block	tank	x	tankn	trt
1	1	1	0.02518	A1	control
2	1	2	0.21257	A2	50
3	1	5	0.46525	A5	100
4	1	3	0.51764	A3	200
5	1	4	0.75633	A4	300
6	2	2	0.24018	B2	control
7	2	5	0.53276	B5	50
8	2	1	0.61802	B1	100
9	2	3	0.84897	B3	200
10	2	4	0.90578	B4	300
11	3	4	0.14642	C4	control
12	3	2	0.48298	C2	50
13	3	1	0.57276	C1	100
14	3	3	0.77431	C3	200
15	3	5	0.93745	C5	300

Log Book/Pages Book 1/pg. 1+36 KLW 22MAR13
File Folder 16A
Initials KLW Date 28FEB12

PROOFED BY
Initials: KLW Date: 28FEB12
REVIEWED BY
Initials: JA Date: 3-29-12

Item No. 1

AEH 12 PSEUDO 03

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Analysis performed by J. Luoma SAS version 9.2 10:34 22FEB12

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```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 22 FEB 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Rainbow trout*/
data RBT;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data RBT2; set RBT;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=RBT2;
 by block x;
run;

data assign_trt_RBT; set RBT2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

PROOFED BY
Initials: KW Date: 28FEB12
REVIEWED BY
Initials: JL Date: 3-29-13

Log Book / Pages 1/1136 KW 22 MAR 13
File Folder 164
Initials KW Date 28FEB12

Item No. 1
AEH 12 PSEUDO 03

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```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_RBT;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Mussel speces: Rainbow trout';
run;
```

Log Book / Pages 1/136 KW 28FEB13
File Folder Lab
Initials KW Date 28FEB 2013

PROOFED BY
Initials KW Date: 28FEB 2013
REVIEWED BY
Initials [illegible] Date: 3-29-13

Item No. 1

AEH 12 PSEUDO 03

Pg 4 of 6

```
*  date created  : 22 FEB 2012 - JAL
*  Verified by:  _______  (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Rainbow trout*/
data RBT;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;

NOTE: The data set WORK.RBT has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


data RBT2; set RBT;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;

NOTE: There were 15 observations read from the data set WORK.RBT.
NOTE: The data set WORK.RBT2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


proc sort data=RBT2;
 by block x;
run;
```

Log Book / Pages 1/1+36
File Folder 16a
Initials KW Date 28FEB12

PROOFED BY
Initials: KW Date: 28FEB12
REVIEWED BY
Initials: JL Date: 2-29-12

Item No. 1

AER 12 PSEUDO 03

Pg 5 of 6

```
NOTE: There were 15 observations read from the data set WORK.RBT2.
NOTE: The data set WORK.RBT2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


     data assign_trt_RBT; set RBT2;
      if _n_ = 1 then trt = 'control';
       if _n_ = 2 then trt = '50';
        if _n_ = 3 then trt = '100';
         if _n_ = 4 then trt = '200';
      if _n_ = 5 then trt = '300';
       if _n_ = 6 then trt = 'control';
        if _n_ = 7 then trt = '50';
         if _n_ = 8 then trt = '100';
      if _n_ = 9 then trt = '200';
       if _n_ = 10 then trt = '300';
        if _n_ = 11 then trt = 'control';
         if _n_ = 12 then trt = '50';
       if _n_ = 13 then trt = '100';
        if _n_ = 14 then trt = '200';
         if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.RBT2.
NOTE: The data set WORK.ASSIGN_TRT_RBT has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


     proc print data= assign_trt_RBT;
     title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
     title2 h=1.5 'AEH-12-PSUEDO-03';
     title3 h=1 'Random assignment of treatment to experimental tanks';
     title4 h=1 'Mussel speces: Rainbow trout';
     run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_RBT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 1/11+36
File Folder 16a
Initials [illegible] Date 28FEB13

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Initials: [illegible] Date 28FEB13
REVIEWED BY
Initials: [illegible] Date: 3-29-13

FOLDER NO. 16a

Item No. 1

AEH 12 PSEUDO 03

Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish
Random assignment of Fish to test tanks 2-22-12 JM
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Obs	round	block	tank	x	tankn
1	1	1	5	0.07470	A5
2	1	3	1	0.15723	C1
3	1	1	4	0.23647	A4
4	1	1	2	0.25951	A2
5	1	3	5	0.33938	C5
6	1	1	1	0.47602	A1
7	1	3	4	0.50772	C4
8	1	2	4	0.65806	B4
9	1	2	3	0.67779	B3
10	1	2	1	0.70565	B1
11	1	2	2	0.73077	B2
12	1	1	3	0.73734	A3
13	1	3	3	0.85358	C3
14	1	3	2	0.93205	C2
15	1	2	5	0.93239	B5
16	2	1	1	0.01757	A1
17	2	1	3	0.01843	A3
18	2	2	3	0.08118	B3
19	2	2	5	0.09981	B5
20	2	3	4	0.10653	C4
21	2	2	2	0.19318	B2
22	2	3	3	0.23790	C3
23	2	3	1	0.28964	C1
24	2	1	2	0.34646	A2
25	2	2	1	0.36838	B1
26	2	1	4	0.42132	A4
27	2	3	5	0.65768	C5
28	2	1	5	0.77406	A5
29	2	3	2	0.85685	C2
30	2	2	4	0.98598	B4
31	3	2	2	0.19386	B2
32	3	3	3	0.21052	C3
33	3	2	1	0.35494	B1
34	3	1	4	0.36563	A4
35	3	1	3	0.37593	A3
36	3	3	2	0.41860	C2
37	3	1	2	0.42715	A2
38	3	3	4	0.46494	C4
39	3	1	5	0.63743	A5
40	3	2	3	0.71119	B3
41	3	2	5	0.71848	B5
42	3	3	1	0.76291	C1
43	3	1	1	0.78043	A1
44	3	3	5	0.80420	C5
45	3	2	4	0.94429	B4

Log Book / Pages Book 1 / pg 12 136 15 MAR 13
File Folder 16A
Initials KW Date 28-FEB-12

PROOFED BY
Initials KW Date 22MAR13
REVIEWED BY
Initials [illegible] Date 3-29-13

Item No. 2

AEH 12 PSEUDO 03

Pg 1 of 6

completed 1322 28FEB12 SMS

Analysis performed by J. Luoma SAS version 9.2 10:44 22FEB12

Log Book / Pages 111-2+36 25MAR13
File Folder 16A
Initials KW Date 28FEB12

PROOFED BY
Initials: KW Date: 28MAR13
REVIEWED BY
Initials: SC Date: 3-29-13

to 09

Item No. 2

AEB 12 PSEUDO 03
Pg 2 of 6

```
60   *  date created  : 22 Feb 2012 - JAL
61   *  Verified by:  _______ (Date:_______)                    page ____ of ____
62   *  Random allocation of fish to chamber.sas
63   ************************************************************************/
64   DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
65
66   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
67
68   options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
69
70   /*Random distribution of fish to experimental chambers*/
71   /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
72      round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
73
74   /*************************************************************************************************
74 ! **********/
75
76   /*fish species: Rainbow trout*/
77   data fish;
78    do round = 1 to 3 by 1;
79    do block = 1 to 3 by 1;
80     do tank = 1 to 5 by 1;
81      x = ranuni(-1);
82      output;
83     end;
84     end;
85    end;
86   run;
```

Log Book / Pages 1/1-2+36 28MAR13
File Folder 16A
Initials KW Date 26 FEB 13

PROOFED BY
Initials: KW Date: 28MAR13
REVIEWED
Initials: JL Date: 3-27-13

```
NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


87   data fishdist; set fish;
88   if block = 1 and tank = 1 then tankn = ' A1';
89     if block = 1 and tank = 2 then tankn = ' A2';
90      if block = 1 and tank = 3 then tankn = ' A3';
91       if block = 1 and tank = 4 then tankn = ' A4';
92        if block = 1 and tank = 5 then tankn = ' A5';
93    if block = 2 and tank = 1 then tankn = ' B1';
94     if block = 2 and tank = 2 then tankn = ' B2';
95      if block = 2 and tank = 3 then tankn = ' B3';
96       if block = 2 and tank = 4 then tankn = ' B4';
97        if block = 2 and tank = 5 then tankn = ' B5';
98   if block = 3 and tank = 1 then tankn = ' C1';
99     if block = 3 and tank = 2 then tankn = ' C2';
100     if block = 3 and tank = 3 then tankn = ' C3';
101      if block = 3 and tank = 4 then tankn = ' C4';
102       if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Item No. 2

AEH 12 PSEUDO 03

Pg 3 of 6

```
      real time              0.02 seconds
      cpu time               0.03 seconds


103
104
105  proc sort data= fishdist;
106   by round x;
107   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time              0.01 seconds
      cpu time               0.01 seconds


108  proc print data = fishdist;
109  title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
110  title2 h=1 'Random assignment of Fish to test tanks';
111  title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
112  run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time              0.00 seconds
      cpu time               0.00 seconds
```

Log Book / Pages 11-2+36 KW 20MAR13
File Folder 160
Initials KW Date 25 FEB13

PROOFED BY
Initials: KW Date: 21MAR13
REVIEWED BY
Initials: JL Date: 3-20-13

Item No. 2

AEH 12 PSEUDO 03

Pg 4 of 6

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 22 Feb 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*************************************************************************************************/

/*fish species: Rainbow trout*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of Fish to test tanks';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 1/1-2 +36 RMW 25FEB13
File Folder 160-
Initials RMW Date 25 FEB 13

PROOFED BY
Initials: RMW Date: 22FEB13
REVIEWED BY
Initials: JAL Date: 3-29-13

Item No. 2

AEH 12 PSEUDO 03
Pg 5 of 6

FOLDER NO. 16a

Item No. 2

AEH 12 PSEUDO 03

Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 2-22-12 JM 1

Move exposure chamber to sequentially numbered holding chamber

ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	2	5	0.01414	B5
2	1	3	5	0.02247	C5
3	1	2	2	0.07416	B2
4	1	2	3	0.12548	B3
5	1	2	1	0.19359	B1
6	1	3	2	0.31053	C2
7	1	3	3	0.32991	C3
8	1	2	4	0.34129	B4
9	1	3	1	0.35287	C1
10	1	1	2	0.35790	A2
11	1	1	1	0.56161	A1
12	1	1	5	0.61854	A5
13	1	3	4	0.66890	C4
14	1	1	4	0.82877	A4
15	1	1	3	0.98374	A3

Log Book / Pages Book 1 / pg 1, 5-6 + 36 KW 22MAR13
File Folder 16 A
Initials KLW Date 28 FEB 12

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: JM Date: 3-29-13

Item No. 3

AEH 12 PSEUDO 03

Pg 1 of 6

to

Analysis performed by J. Luoma SAS version 9.2 09:38 22FEB12

Log Book / Pages 1/56 +36
File Folder 16a
Initials PW Date 28 FEB 12

PROOFED BY
Initials PW Date 29MAR13
REVIEWED BY
Initials [illegible] Date 3-29-13

Item No. 3

AEH 12 PSEUDO 03

to 09

Pg 2 of 6

```
*  date created  : 22 Feb 2012 - JAL
*  Verified by: ______ (Date:______)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*******************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*******************************************************************************************
**********/

/*fish species: Rainbow trout*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

```
      real time           0.01 seconds
      cpu time            0.01 seconds



proc sort data= fishdist;
 by round x;
 run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
chamber 2, etc';
run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

Log Book / Pages 1/56 + 36 Kw 30MAR13
File Folder 16A 28FEB12
Initials Kw

PROOFED BY
Initials: Kw Date: 22MAR13
REVIEWED BY
Initials: Date: 3-29-13

Item No. 3

AEH 12 PSEUDO 03

Pg 4 of 6

___ to ___ pg

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 22 Feb 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*******************************************************************************************

/*fish species: Rainbow trout*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Log Book / Pages 1/5 H6 + 36 [illegible]
File Folder 16a
Initials [illegible] Date 28 FEB12

PROOFED BY
Initials [illegible] Date 22 MAR 13
REVIEWED BY
Initials [illegible] Date 3-29-13

Item No. 3

AEH 12 PSEUDO 03

Pg 5 of 6

FOLDER NO. 16a

Item No. 3

AEH 12 PSEUDO 03

Pg 6 of 6

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks
Fish speces: Brook trout

4/26/12
JA

PROOFED BY wrong date KWJ 22MAR13
Initials: KWJ Date 25APR13
REVIEWED BY
Initials: JA Date 4-3-13

Log Book / Pages 1/37
File Folder F7a
Initials HEM Date 22Mar13

Obs	block	tank	x	tankn	trt
1	1	4	0.09669	A4	control
2	1	2	0.13488	A2	50
3	1	3	0.18449	A3	100
4	1	5	0.25205	A5	200
5	1	1	0.25612	A1	300
6	2	5	0.10822	B5	control
7	2	3	0.31489	B3	50
8	2	2	0.46162	B2	100
9	2	4	0.77340	B4	200
10	2	1	0.98754	B1	300
11	3	1	0.01092	C1	control
12	3	5	0.08802	C5	50
13	3	2	0.09753	C2	100
14	3	4	0.32158	C4	200
15	3	3	0.66337	C3	300

Item No. 1
AEH 12 PSEUDO 03
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 07:21 26APR12

```
*  date created  : 26 APRIL 2012 - JAL
*  Verified by:  _______ (Date:_______)                page ____ of ____
*  Random allocation of treatment to tank.sas
******************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Brook trout*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.05 seconds
      cpu time            0.01 seconds


data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


proc sort data=fish2;
 by block x;
run;
```

PROOFED BY wrong date
Initials: Date:
REVIEWED BY
Initials: Date: 4-3-13

Log Book / Pages 1/37
File Folder 179
Initials Date

Item No. 1

AEH 12 PSEUDO 03

Pg 2 of 5

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds


44
45   data assign_trt_fish; set fish2;
46    if _n_ = 1 then trt = 'control';
47     if _n_ = 2 then trt = '50';
48      if _n_ = 3 then trt = '100';
49       if _n_ = 4 then trt = '200';
50    if _n_ = 5 then trt = '300';
51     if _n_ = 6 then trt = 'control';
52      if _n_ = 7 then trt = '50';
53       if _n_ = 8 then trt = '100';
54     if _n_ = 9 then trt = '200';
55     if _n_ = 10 then trt = '300';
56      if _n_ = 11 then trt = 'control';
57       if _n_ = 12 then trt = '50';
58     if _n_ = 13 then trt = '100';
59      if _n_ = 14 then trt = '200';
60       if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


61   proc print data= assign_trt_fish;
62   title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
63   title2 h=1.5 'AEH-12-PSUEDO-03';
64   title3 h=1 'Random assignment of treatment to experimental tanks';
65   title4 h=1 'Fish speces: Brook trout';
66   run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds
```

PROOFED BY
Initials: EW Date: 20MAR13
REVIEWED BY
Initials: JV Date: 4-3-13

Log Book / Pages 1/37
File Folder 17A
Initials HEM Date 27Mar13

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 5

10 9

```
/*************************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 26 APRIL 2012 - JAL JL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*************************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Brook trout*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

PROOFED BY
Initials: KMW Date: 22MAR13
REVIEWED BY
Initials: JAL Date: 4-3-13

Log Book / Pages 1/37
File Folder 17A
Initials HCM Date 22Mar13

Item No. 1

AEH 12 PSEUDO 03

Pg 4 of 5

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Brook trout';
run;
```

PROOFED BY
Initials: VW Date: 22Mar13
REVIEWED BY
Initials: JK Date: 4-3-13

Log Book / Pages 1/37
File Folder 174
Initials Hem Date 22Mar13

Item No. 1

AEH 12 PSEUDO 03

Pg 5 of 5

____ to ____ pg

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish
Random assignment of BKT to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

4/24/12 SA

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: SA Date: 4-3-13

Log Book / Pages 137, 138
File Folder 13A
Initials HEM Date 22Mar13

Obs	round	block	tank	x	tankn
1	1	2	2	0.02087	B2
2	1	2	3	0.06944	B3
3	1	2	1	0.19542	B1
4	1	3	5	0.27923	C5
5	1	1	2	0.31873	A2
6	1	1	1	0.33176	A1
7	1	2	5	0.41428	B5
8	1	2	4	0.50465	B4
9	1	1	3	0.53435	A3
10	1	3	1	0.60650	C1
11	1	3	2	0.68986	C2
12	1	3	3	0.69068	C3
13	1	1	4	0.74925	A4
14	1	3	4	0.75942	C4
15	1	1	5	0.99190	A5
16	2	3	1	0.01731	C1
17	2	3	2	0.08698	C2
18	2	3	3	0.17593	C3
19	2	2	1	0.21365	B1
20	2	3	5	0.29643	C5
21	2	1	3	0.38297	A3
22	2	2	5	0.39364	B5
23	2	1	4	0.39582	A4
24	2	1	2	0.45374	A2
25	2	3	4	0.48060	C4
26	2	2	2	0.60297	B2
27	2	1	5	0.61300	A5
28	2	2	3	0.65885	B3
29	2	1	1	0.68136	A1
30	2	2	4	0.83948	B4
31	3	3	1	0.02620	C1
32	3	1	5	0.14014	A5
33	3	2	5	0.17785	B5
34	3	2	3	0.33241	B3
35	3	2	1	0.33850	B1
36	3	1	2	0.34760	A2
37	3	3	3	0.38559	C3
38	3	2	2	0.44871	B2
39	3	3	2	0.45937	C2
40	3	1	1	0.49707	A1
41	3	1	3	0.65077	A3
42	3	3	4	0.67021	C4
43	3	1	4	0.67354	A4
44	3	2	4	0.73223	B4
45	3	3	5	0.86542	C5

15

start 1400
finish 1420
1MAY12 SAS

Item No. 2

AEH 12 PSEUDO 03

Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 07:12 26APR12

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 137, 38
File Folder 17A
Initials HEM Date 22MAR13

Item No. 2

AEH 12 PSEUDO 03

Pg 2 of 5

to pg

```
4     *  date created  : 26 APR 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of fish to chamber.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish to experimental chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
17
18    /*****************************************************************************************
18 !  **********/
19
20    /*fish species: Brooktrout*/
21    data fish;
22     do round = 1 to 3 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.27 seconds
      cpu time            0.10 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

PROOFED BY
Initials: YW Date: 22MAR13
REVIEWED BY
Initials: JL Date: 4-3-13

1/37,38
Log Book / Pages
File Folder 17A
Initials HEM Date 22MAR13

Item No. 2

AEH 12 PSEUDO 03

Pg 3 of 5

```
      real time           0.04 seconds
      cpu time            0.03 seconds


47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.06 seconds
      cpu time            0.06 seconds


52   proc print data= fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Random assignment of BKT to exposure chambers';
55   title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
56   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.13 seconds
      cpu time            0.10 seconds
```

PROOFED BY
Initials: KMW Date: 22MAR13
REVIEWED BY
Initials: SAV Date: 4-3-13

Log Book / Pages 137, 138
File Folder 17A
Initials HEM Date 22-Mar-13

NOT

to pg

Item No. 2

AEH 12 PSEUDO 03

Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 26 APR 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************/

/*fish species: Brooktrout*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of BKT to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

PROOFED BY
Initials: MW Date: 23MAR13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 137, 38
File Folder 17A
Initials HEM Date 27 Mar 13

Item No. 2

AEH 12 PSEUDO 03
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 4/26/12 SA 1
Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	3	1	0.07788	C1
2	1	1	3	0.12816	A3
3	1	2	3	0.16964	B3
4	1	3	3	0.22444	C3
5	1	3	5	0.25569	C5
6	1	2	2	0.25607	B2
7	1	2	5	0.27016	B5
8	1	2	4	0.40295	B4
9	1	1	2	0.45356	A2
10	1	1	5	0.47459	A5
11	1	3	2	0.49822	C2
12	1	1	1	0.63552	A1
13	1	1	4	0.74652	A4
14	1	2	1	0.89989	B1
15	1	3	4	0.99773	C4

1

PROOFED BY
Initials: KMO Date: 22MAR13
REVIEWED BY
Initials: SA Date: 4-3-13

Log Book / Pages 137, 39-40
File Folder 17A
Initials Item Date 22Mar13

to pg

Item No. 3
AEH 12 PSEUDO 03
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 07:37 26APR12

PROOFED BY
Initials: LW Date: 22MAR13
REVIEWED BY
Initials: SAL Date: 4-3-13

Log Book / Pages 1/37/12①, 39-40
File Folder 17-1
Initials HEM Date 22Mar13

① Wrote incorrect page number.
Correct page #'s are 37, 39-40.
HEM 22Mar13

Item No. 3

AEH 12 PSEUDO 03

Pg 2 of 5

to pg

```
4     *  date created  : 26 APRIL 2012 - JAL
5     *  Verified by:  _______ (Date:_______) JA✓                page ____ of ____
6     *  Random allocation of exposure chambers to holding chambers.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish from exposure chambers to holding chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18    /*****************************************************************************************
18 !  **********/
19
20    /*fish species: Brook trout*/
21    data fish;
22     do round = 1 to 1 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27     end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: JA Date: 4-3-13

Log Book / Pages 1/37, 39-40
File Folder F14
Initials Item Date 22 Mar 13

Item No. 3

AEH 12 PSEUDO D3

Pg 3 of 5

```
      real time           0.04 seconds
      cpu time            0.03 seconds


47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55   title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 ! chamber 2, etc';
56   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: JW Date: 4-3-13

Log Book / Pages 137, 39-40
File Folder 174
Initials HEM Date 22Mar13

Item No. 3

AEH 12 PSEUDO 03
Pg 4 of 5

to pg

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 26 APRIL 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Brook trout*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

PROOFED BY
Initials: KMW Date: 22MAR13
REVIEWED BY
Initials: SL Date: 4-3-13

Log Book / Pages 137, 39-40
File Folder 17A
Initials HEA Date 22Mar13

Item No. 3

AEH 12 PSEUDO 03
Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish 3/15/12 1
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks
Fish speces: Walleye

Obs	block	tank	x	tankn	trt
1	1	2	0.14847	A2	control
2	1	5	0.49168	A5	50
3	1	4	0.56943	A4	100
4	1	1	0.64746	A1	200
5	1	3	0.86889	A3	300
6	2	5	0.05924	B5	control
7	2	2	0.33086	B2	50
8	2	3	0.38057	B3	100
9	2	1	0.40017	B1	200
10	2	4	0.69564	B4	300
11	3	3	0.44328	C3	control
12	3	5	0.46722	C5	50
13	3	4	0.46759	C4	100
14	3	2	0.74384	C2	200
15	3	1	0.84366	C1	300

PROOFED BY wrong date. Date is 12FEB13 12FEB13 JKW
Initials: JKW Date: ~~13FEB13~~ 12FEB13
REVIEWED BY
Initials: JM Date: 4-3-13

Log Book / Pages 1136
File Folder 18a
Initials LHW Date 21MAR13

Item No. 1

AEH 12 PSEUDO 03
Pg 1 of 6

Analysis performed by J. Luoma SAS version 9.2 14:41 02MAR12

PROOFED BY
Initials: SKW Date: 12FEB13
REVIEWED BY
Initials: SAC Date: 4-3-13

Log Book / Pages 136
File Folder 18a
Initials LMW Date 21MAR13

Item No. 1

AEH 12 PSEUDO 03
Pg 2 of 6

to Pg

```
/*********************************************************************
*  Study Number : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 15 MARCH 2012 - JAL JL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: WALLEYE*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

PROOFED BY
Initials: JRW Date: 12FEB13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 1/36
File Folder 13a
Initials KW Date 21MAR13

Item No. 1

AEH 12 PSEUDO 03
Pg 3 of 6

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Walleye';
run;
```

PROOFED BY
Initials: JRW Date: ~~12FEB13~~ wrong date. Date 12FEB13 JRW 12FEB13
REVIEWED BY
Initials: SC Date: 4-3-13

Log Book / Pages 1/36
File Folder 15a
Initials KW Date 21MAR13

Item No. 1

AEH 12 PSEUDO 03
Pg 4 of 6

```
238  *  date created  : 15 MARCH 2012 - JAL
239  *  Verified by:  _______ (Date:_______)                    page ____ of ____
240  *  Random allocation of treatment to tank.sas
241  ************************************************************************/
242  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
243
244  FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
245
246  options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
247
248  /*Random assignment of treatment to experimental tanks*/
249  /*Fish speces: WALLEYE*/
250  data fish;
251   do block = 1 to 3 by 1;
252    do tank = 1 to 5 by 1;
253     x = ranuni(-1);
254     output;
255    end;
256   end;
257  run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


258  data fish2; set fish;
259   if block = 1 and tank = 1 then tankn = 'A1';
260    if block = 1 and tank = 2 then tankn = 'A2';
261     if block = 1 and tank = 3 then tankn = 'A3';
262      if block = 1 and tank = 4 then tankn = 'A4';
263       if block = 1 and tank = 5 then tankn = 'A5';
264   if block = 2 and tank = 1 then tankn = 'B1';
265    if block = 2 and tank = 2 then tankn = 'B2';
266     if block = 2 and tank = 3 then tankn = 'B3';
267      if block = 2 and tank = 4 then tankn = 'B4';
268       if block = 2 and tank = 5 then tankn = 'B5';
269   if block = 3 and tank = 1 then tankn = 'C1';
270    if block = 3 and tank = 2 then tankn = 'C2';
271     if block = 3 and tank = 3 then tankn = 'C3';
272      if block = 3 and tank = 4 then tankn = 'C4';
273       if block = 3 and tank = 5 then tankn = 'C5';
274       run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


275  proc sort data=fish2;
276   by block x;
277  run;
```

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: JL Date: 4-8-13

Log Book / Pages 136
File Folder 185
Initials KW Date 21MAR13

AEH 12 PSEUDO 03
Pg 5 of 6

Item No. 1

Pg ___ of ___

Illegible stamp. JKW 12FEB13

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

PROOFED BY
Initials: @ 12FEB13 Date: 12FEB13
REVIEWED BY
Initials: JK Date: 4-3-13
@ Wrote date in Initials are now Initial blanks. 12FEB13 JK

Log Book / Pages 136
File Folder 18a
Initials KW Date 21MAR13

```
278
279  data assign_trt_fish; set fish2;
280   if _n_ = 1 then trt = 'control';
281    if _n_ = 2 then trt = '50';
282     if _n_ = 3 then trt = '100';
283      if _n_ = 4 then trt = '200';
284   if _n_ = 5 then trt = '300';
285    if _n_ = 6 then trt = 'control';
286     if _n_ = 7 then trt = '50';
287      if _n_ = 8 then trt = '100';
288   if _n_ = 9 then trt = '200';
289    if _n_ = 10 then trt = '300';
290     if _n_ = 11 then trt = 'control';
291      if _n_ = 12 then trt = '50';
292    if _n_ = 13 then trt = '100';
293     if _n_ = 14 then trt = '200';
294      if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


295  proc print data= assign_trt_fish;
296  title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
297  title2 h=1.5 'AEH-12-PSUEDO-03';
298  title3 h=1 'Random assignment of treatment to experimental tanks';
299  title4 h=1 'Fish speces: Walleye';
300  run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds
```

Item No. 1

to

to

AEH 12 PSEUDO 03

Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 3/15/12 SA 1
Random assignment of WAE to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Obs	round	block	tank	x	tankn
1	1	1	4	0.08363	A4
2	1	2	5	0.11356	B5
3	1	3	1	0.16135	C1
4	1	2	4	0.22661	B4
5	1	2	3	0.22988	B3
6	1	1	2	0.29316	A2
7	1	1	5	0.30143	A5
8	1	3	3	0.32875	C3
9	1	2	2	0.47916	B2
10	1	3	5	0.58917	C5
11	1	3	4	0.60918	C4
12	1	1	3	0.65384	A3
13	1	1	1	0.85139	A1
14	1	3	2	0.89753	C2
15	1	2	1	0.93481	B1
16	2	2	3	0.08758	B3
17	2	3	5	0.11178	C5
18	2	3	1	0.24074	C1
19	2	2	5	0.27615	B5
20	2	2	4	0.34158	B4
21	2	2	1	0.36743	B1
22	2	1	3	0.41726	A3
23	2	3	2	0.46716	C2
24	2	1	5	0.47155	A5
25	2	2	2	0.48840	B2
26	2	3	4	0.50644	C4
27	2	1	1	0.57367	A1
28	2	1	4	0.61584	A4
29	2	3	3	0.69639	C3
30	2	1	2	0.81024	A2
31	3	3	2	0.00367	C2
32	3	1	5	0.11933	A5
33	3	2	5	0.26555	B5
34	3	3	3	0.36182	C3
35	3	3	1	0.37541	C1
36	3	2	3	0.42064	B3
37	3	3	4	0.44510	C4
38	3	1	4	0.47465	A4
39	3	2	4	0.51359	B4
40	3	1	2	0.57335	A2
41	3	1	1	0.63685	A1
42	3	2	1	0.70094	B1
43	3	2	2	0.72601	B2
44	3	3	5	0.76408	C5
45	3	1	3	0.96949	A3

PROOFED BY
Initials: KW Date: 12FEB13
REVIEWED BY
Initials: SAL Date: 4-3-13

Log Book / Pages 1/21 136
File Folder 18a
Initials KW Date 21MAR13

Item No. 2

AEH 12 PSEUDO 03

Pg 1 of 5

finished @ 1310 20MAR12 SMS

Analysis performed by J. Luoma SAS version 9.2 13:46 15MAR12

PROOFED BY
Initials: JDD Date: 12FEB13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 1/21+36
File Folder 186
Initials JLuoma Date 21MAR13

Item No. 2

AEB 12 PSEUDO D3
Pg 2 of 5

```
4     *  date created  : 15 MAR 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of fish to chamber.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish to experimental chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
17
18    /*************************************************************************************************
18 ! **********/
19
20    /*fish species: Walleye*/
21    data fish;
22     do round = 1 to 3 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.13 seconds
      cpu time            0.10 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

PROOFED BY
Initials: JKW Date: 2FEB13
REVIEWED BY
Initials: JAL Date: 4-3-13

Log Book / Pages 1/21+36
File Folder 18a
Initials CLW Date 2mar13

Item No. 2

AEB 12 PSEUDO D3

Pg 3 of 5

```
      real time           0.02 seconds
      cpu time            0.03 seconds


47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Random assignment of WAE to exposure chambers';
55   title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
56   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.20 seconds
      cpu time            0.07 seconds
```

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: [illegible] Date: 4-3-13

Log Book / Pages 1/2136
File Folder 18a
Initials KW Date 21MAR13

to pg

Item No. 2

AEH 12 PSEUDO D3

Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 15 MAR 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************/

/*fish species: Walleye*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of WAE to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 112136
File Folder 18a
Initials YLW Date 21MAR13

Item No. 2

AEH 12 PSEUDO 03
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 3/15/12 SM 1

Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	1	5	0.00556	A5
2	1	3	1	0.09222	C1
3	1	3	4	0.10923	C4
4	1	2	3	0.22952	B3
5	1	3	2	0.35358	C2
6	1	2	4	0.38559	B4
7	1	2	1	0.38705	B1
8	1	3	5	0.46249	C5
9	1	1	4	0.59335	A4
10	1	1	2	0.67659	A2
11	1	1	3	0.68550	A3
12	1	1	1	0.83000	A1
13	1	3	3	0.84631	C3
14	1	2	5	0.87603	B5
15	1	2	2	0.88542	B2

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: SM Date: 4-3-13

Log Book / Pages 1/24-36
File Folder 18e
Initials EHJ Date 21MAR13

to pg

Item No. 3

AEH 12 PSEUDO 03
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 13:53 15MAR12

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: SM Date: 4-3-13

Log Book/Pages 1/24136
File Folder 18a
Initials YLW Date 21MAR13

Item No. 3

AEH 12 PSEUDO 03
Pg 2 of 5

___ to ___ pg

```
4     *  date created  : 15 MARCH 2012 - JAL
5     *  Verified by:  _______ (Date:_______)  JA~                page ____ of ____
6     *  Random allocation of exposure chambers to holding chambers.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish from exposure chambers to holding chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18    /*****************************************************************************************
18 !  **********/
19
20    /*fish species: Walleye*/
21    data fish;
22     do round = 1 to 1 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: JL Date: 4-7-13

Log Book / Pages 124+36
File Folder 18~
Initials KW Date 21MAR13

Item No. 3

AEH 12 PSEUDO 03

Pg 3 of 5 not legible for Dommy13

```
      real time           0.03 seconds
      cpu time            0.01 seconds
```

PROOFED BY
Initials: JKW Date: 12FEB13
REVIEWED BY
Initials: SnL Date: 4-3-13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;
```

Log Book / Pages 1124+36
File Folder 15c-
Initials KW Date 21MAR13

```
NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55   title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 ! chamber 2, etc';
56   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```

Item No. 3

AEH 12 PSEUDO 03

Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 15 MARCH 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Walleye*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

PROOFED BY
Initials: JW Date: 13FEB13
REVIEWED BY
Initials: JL Date: 4-3-13

Log Book / Pages 1|24+36
File Folder 18a
Initials KW Date 21MAR13

Item No. 3

AEH 12 PSEUDO 03

Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03 JNL 7-2-12
Random assignment of treatment to experimental tanks
Fish speces: Yellow Perch

Obs	block	tank	x	tankn	trt
1	1	4	0.07075	A4	control
2	1	3	0.13678	A3	50
3	1	2	0.14234	A2	100
4	1	5	0.14400	A5	200
5	1	1	0.89583	A1	300
6	2	3	0.24950	B3	control
7	2	1	0.54476	B1	50
8	2	4	0.56135	B4	100
9	2	2	0.58463	B2	200
10	2	5	0.99953	B5	300
11	3	1	0.49466	C1	control
12	3	2	0.53306	C2	50
13	3	3	0.69864	C3	100
14	3	5	0.72045	C5	200
15	3	4	0.81174	C4	300

Log Book / Pages 1/7 p.36 wrong page KJW 22MAR13
File Folder 19a
Initials JKW Date 06FEB13

PROOFED BY
Initials: JKW Date: 06FEB13
REVIEWED BY
Initials: JNL Date: 4-3-13

___ to ___ pg

Item No. 1

AEH 12 PSEUDO 03
Pg 1 of 6

Analysis performed by J. Luoma SAS version 9.2 14:41 02MAR12

1/7 wrong page 2/3 [illegible] 22MAR13

Log Book / Pages 1/7
File Folder 19A
Initials KW Date 22MAR13

PROOFED BY
Initials: Pw Date: 02MAR13
REVIEWED BY
Initials: Jmc Date: 4-3-13

Item No. 1

AEH 12 PSEUDO 03

Pg 2 of 6

```
172  *  date created  : 02 MARCH 2012 - JAL
173  *  Verified by:  _______ (Date:_______)                    page ____ of ____
174  *  Random allocation of treatment to tank.sas
175  ************************************************************************/
176  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
177
178  FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
179
180  options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
181
182  /*Random assignment of treatment to experimental tanks*/
183  /*Fish speces: Yellow Perch*/
184  data YEP;
185   do block = 1 to 3 by 1;
186    do tank = 1 to 5 by 1;
187     x = ranuni(-1);
188     output;
189    end;
190   end;
191  run;

NOTE: The data set WORK.YEP has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


192  data YEP2; set YEP;
193   if block = 1 and tank = 1 then tankn = 'A1';
194    if block = 1 and tank = 2 then tankn = 'A2';
195     if block = 1 and tank = 3 then tankn = 'A3';
196      if block = 1 and tank = 4 then tankn = 'A4';
197       if block = 1 and tank = 5 then tankn = 'A5';
198   if block = 2 and tank = 1 then tankn = 'B1';
199    if block = 2 and tank = 2 then tankn = 'B2';
200     if block = 2 and tank = 3 then tankn = 'B3';
201      if block = 2 and tank = 4 then tankn = 'B4';
202       if block = 2 and tank = 5 then tankn = 'B5';
203   if block = 3 and tank = 1 then tankn = 'C1';
204    if block = 3 and tank = 2 then tankn = 'C2';
205     if block = 3 and tank = 3 then tankn = 'C3';
206      if block = 3 and tank = 4 then tankn = 'C4';
207       if block = 3 and tank = 5 then tankn = 'C5';
208       run;

NOTE: There were 15 observations read from the data set WORK.YEP.
NOTE: The data set WORK.YEP2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


209  proc sort data=YEP;
210   by block x;
211  run;
```

Log Book / Pages 1/2 Kw 22MAR13
File Folder 19A
Initials Kw Date 22MAR13

PROOFED BY
Initials Kw Date: 22MAR13
REVIEWED BY
Initials JAL Date 4-3-13

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 6

```
NOTE: There were 15 observations read from the data set WORK.YEP2.
NOTE: The data set WORK.YEP2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


212
213  data assign_trt_YEP; set YEP2;
214   if _n_ = 1 then trt = 'control';
215    if _n_ = 2 then trt = '50';
216     if _n_ = 3 then trt = '100';
217      if _n_ = 4 then trt = '200';
218   if _n_ = 5 then trt = '300';
219    if _n_ = 6 then trt = 'control';
220     if _n_ = 7 then trt = '50';
221      if _n_ = 8 then trt = '100';
222   if _n_ = 9 then trt = '200';
223    if _n_ = 10 then trt = '300';
224     if _n_ = 11 then trt = 'control';
225      if _n_ = 12 then trt = '50';
226    if _n_ = 13 then trt = '100';
227     if _n_ = 14 then trt = '200';
228      if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.YEP2.
NOTE: The data set WORK.ASSIGN_TRT_YEP has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds


229  proc print data= assign_trt_YEP;
230  title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
231  title2 h=1.5 'AEH-12-PSUEDO-03';
232  title3 h=1 'Random assignment of treatment to experimental tanks';
233  title4 h=1 'Fish speces: Yellow Perch';
234  run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_YEP.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 1/7 wrong page p. 36 PW 22MAR13
File Folder 19A
Initials PW Date 22MAR13

PROOFED BY
Initials KW Date: 22MAR13
REVIEWED BY
Initials: VM Date 4-2-13

Item No. 1

AEH 12 PSEUDO 03
Pg 4 of 10

to pg

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 02 MARCH 2012 - JAL
*  Verified by:  _______ (Date:_______)                  page ____ of ____
*  Random allocation of treatment to tank.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Yellow Perch*/
data YEP;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data YEP2; set YEP;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=YEP2;
 by block x;
run;

data assign_trt_YEP; set YEP2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

Log Book / Pages 1/2 wrong page p. 36 VW 22MAR13
File Folder 19A
Initials VW Date 22MAR-13

PROOFED BY
Initials VW Date 22MAR13
REVIEWED BY
Initials JL Date 4-3-13

Item No. 1

AEH 12 PSEUDO 03
Pg 5 of 6

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_YEP;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Yellow Perch';
run;
```

Log Book / Pages 1/2 p.36 KW 22MAR13 wrong page
File Folder 19A
Initials KW Date 22MAR13

PROOFED BY
Initials KW Date 22MAR13
REVIEWED BY
Initials JPL Date 4-3-13

to ___ pg

Item No. 1

AEH 12 PSEUDO 03
Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish Jm 3-2-12
Random assignment of Fish to test tanks
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Obs	round	block	tank	x	tankn
1	1	2	5	0.01312	B5
2	1	3	3	0.02811	C3
3	1	1	4	0.04108	A4
4	1	3	2	0.10439	C2
5	1	2	2	0.46095	B2
6	1	2	3	0.48078	B3
7	1	2	1	0.50993	B1
8	1	2	4	0.51939	B4
9	1	1	5	0.53453	A5
10	1	3	5	0.70732	C5
11	1	3	4	0.71369	C4
12	1	3	1	0.79777	C1
13	1	1	1	0.87149	A1
14	1	1	2	0.88723	A2
15	1	1	3	0.92453	A3
16	2	3	1	0.02186	C1
17	2	1	1	0.11803	A1
18	2	3	4	0.18495	C4
19	2	2	4	0.34131	B4
20	2	1	5	0.38510	A5
21	2	2	5	0.41300	B5
22	2	2	3	0.42179	B3
23	2	1	4	0.58975	A4
24	2	3	3	0.59272	C3
25	2	3	5	0.64854	C5
26	2	1	3	0.78876	A3
27	2	2	1	0.85463	B1
28	2	3	2	0.85614	C2
29	2	2	2	0.91120	B2
30	2	1	2	0.98884	A2
31	3	1	2	0.02867	A2
32	3	2	3	0.07333	B3
33	3	3	5	0.14919	C5
34	3	2	1	0.27234	B1
35	3	1	1	0.30260	A1
36	3	2	2	0.34316	B2
37	3	2	5	0.50581	B5
38	3	1	5	0.54694	A5
39	3	3	1	0.55274	C1
40	3	2	4	0.62301	B4
41	3	3	3	0.68774	C3
42	3	1	3	0.74103	A3
43	3	3	2	0.84134	C2
44	3	1	4	0.85103	A4
45	3	3	4	0.97773	C4

3 to 3 pg

Log Book / Pages 1/A wrong page p. 10+36 KW 23MAR13
File Folder 19a
Initials JKW Date 06FEB13

PROOFED BY
Initials: JKW Date: 06FEB13
REVIEWED BY
Initials: SAL Date: 4-3-13

Item No. 2

AEH 12 PSEUDO 03
Pg 1 of 6

Analysis performed by J. Luoma SAS version 9.2 14:41 02MAR12

Log Book / Pages 1/10+36
File Folder 19a
Initials KW Date 22MAR13

PROGRAM BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: JL Date: 4-3-13

Item No. 2

AEH 12 PSEUDO D3
Pg 2 of 6

10 09

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 02 March 2012 - JAL
*  Verified by:  _______ (Date:_______)                  page ____ of ____
*  Random allocation of fish to chamber.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************/

/*fish species: Yellow Perch*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of Fish to test tanks';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 1/10-136
File Folder 19A
Initials KW Date 22 MAR 13

PROOFED BY
Initials: KW Date: 22 MAR 13
REVIEWED BY
Initials: JL Date: 4-3-13

Item No. 2

AEH 12 PSEUDO 03

Pg 3 of 6

Item No. 2

AEH 12 PSEUDO D3

Pg 4 of 6

```
116  *  date created  : 02 March 2012 - JAL
117  *  Verified by:  _______ (Date:_______)                    page ____ of ____
118  *  Random allocation of fish to chamber.sas
119  ************************************************************************/
120  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
121
122  FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
123
124  options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
125
126  /*Random distribution of fish to experimental chambers*/
127  /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
128     round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
129
130  /*************************************************************************************************
130! **********/
131
132  /*fish species: Yellow Perch*/
133  data fish;
134   do round = 1 to 3 by 1;
135   do block = 1 to 3 by 1;
136    do tank = 1 to 5 by 1;
137     x = ranuni(-1);
138     output;
139    end;
140    end;
141   end;
142  run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


143  data fishdist; set fish;
144  if block = 1 and tank = 1 then tankn = ' A1';
145    if block = 1 and tank = 2 then tankn = ' A2';
146     if block = 1 and tank = 3 then tankn = ' A3';
147      if block = 1 and tank = 4 then tankn = ' A4';
148       if block = 1 and tank = 5 then tankn = ' A5';
149   if block = 2 and tank = 1 then tankn = ' B1';
150    if block = 2 and tank = 2 then tankn = ' B2';
151     if block = 2 and tank = 3 then tankn = ' B3';
152      if block = 2 and tank = 4 then tankn = ' B4';
153       if block = 2 and tank = 5 then tankn = ' B5';
154  if block = 3 and tank = 1 then tankn = ' C1';
155    if block = 3 and tank = 2 then tankn = ' C2';
156     if block = 3 and tank = 3 then tankn = ' C3';
157      if block = 3 and tank = 4 then tankn = ' C4';
158       if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 1/10136
File Folder 19A
Initials LW Date 22MAR13

PROOFED BY
Initials: LW Date: 22MAR13
REVIEWED BY
Initials: J.L Date: 4-3-13

Item No. 2

AEH 12 PSEUDO D3
Pg 5 of 6

```
      real time           0.02 seconds
      cpu time            0.01 seconds


159
160
161  proc sort data= fishdist;
162   by round x;
163   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


164  proc print data = fishdist;
165  title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
166  title2 h=1 'Random assignment of Fish to test tanks';
167  title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
168  run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 1/10 & 36
File Folder 19A
Initials KW Date 23MAR13

PROOFED BY
Initials KW Date 23MAR13
REVIEWED BY
Initials JC Date 4-3-13

Item No. 2
AEH 12 PSEUDO 03
Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish JnL 3-2-12
Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	1	3	0.00628	A3
2	1	2	4	0.09614	B4
3	1	3	5	0.10075	C5
4	1	3	1	0.16872	C1
5	1	2	3	0.17141	B3
6	1	1	1	0.23708	A1
7	1	2	5	0.29197	B5
8	1	1	4	0.37339	A4
9	1	1	2	0.51109	A2
10	1	1	5	0.61068	A5
11	1	3	2	0.65042	C2
12	1	2	2	0.65684	B2
13	1	3	4	0.71742	C4
14	1	2	1	0.79718	B1
15	1	3	3	0.86835	C3

Log Book / Pages 1/7 wrong page 137-36 new 20MAR13
File Folder 19a
Initials JKW Date 06FEB13

PROOFED BY
Initials: JKW Date: 06FEB13
REVIEWED BY
Initials: JnL Date: 4-3-13

Item No. 3

AEH 12 PSEUDO 03

Pg 1 of 5

___ to ___ 04

Analysis performed by J. Luoma SAS version 9.2 14:41 02MAR12

Log Book / Pages 1/13+36
File, Folder 19A
Initials KW 22MAR13

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: SC Date: 4-3-13

Item No. 2

AEH 12 PSEUDO D3

Pg 2 of 5

```
60   *  date created  : 02 MARCH 2012 - JAL
61   *  Verified by:  _______ (Date:_______)                    page ____ of ____
62   *  Random allocation of exposure chambers to holding chambers.sas
63   ***********************************************************************/
64   DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
65
66   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
67
68   options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
69
70   /*Random distribution of fish from exposure chambers to holding chambers*/
71   /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
72      round = 1, place one all fish from exposure chamber to the the holding chamber  */
73
74   /*************************************************************************************************
74 ! **********/
75
76   /*fish species: Yellow Perch*/
77   data fish;
78    do round = 1 to 1 by 1;
79    do block = 1 to 3 by 1;
80     do tank = 1 to 5 by 1;
81      x = ranuni(-1);
82      output;
83     end;
84     end;
85    end;
86   run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


87   data fishdist; set fish;
88   if block = 1 and tank = 1 then tankn = ' A1';
89     if block = 1 and tank = 2 then tankn = ' A2';
90      if block = 1 and tank = 3 then tankn = ' A3';
91       if block = 1 and tank = 4 then tankn = ' A4';
92        if block = 1 and tank = 5 then tankn = ' A5';
93    if block = 2 and tank = 1 then tankn = ' B1';
94     if block = 2 and tank = 2 then tankn = ' B2';
95      if block = 2 and tank = 3 then tankn = ' B3';
96       if block = 2 and tank = 4 then tankn = ' B4';
97        if block = 2 and tank = 5 then tankn = ' B5';
98   if block = 3 and tank = 1 then tankn = ' C1';
99     if block = 3 and tank = 2 then tankn = ' C2';
100     if block = 3 and tank = 3 then tankn = ' C3';
101      if block = 3 and tank = 4 then tankn = ' C4';
102       if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 1/13+36
File Folder 19A
Initials VW Date 22MAR13

PROOFED BY
Initials: VW Date: 22MAR13
REVIEWED BY
Initials: JL Date: 4-2-13

Item No. 3

AEH 12 PSEUDO D3

Pg 3 of 5

```
      real time           0.03 seconds
      cpu time            0.03 seconds


103
104
105  proc sort data= fishdist;
106   by round x;
107   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


108  proc print data = fishdist;
109  title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
110  title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
111  title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
111! chamber 2, etc';
112  run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

Log Book / Pages 1/13+36
File Folder 19A
Initials KW Date 22MAR13

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED
Initials: SM Date: 4-2-13

Item No. 3

AEH 12 PSEUDO 03

10 of 19

Pg 4 of 5

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 02 MARCH 2012 - JAL
*  Verified by:  _______ (Date:___ __)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Yellow Perch*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Log Book / Pages 1/13136
File Folder 11A
Initials KMW Date 22MAR13

PROOFED BY
Initials KMJ Date 22MAR-13
REVIEWED BY
Initials JC Date 4-3-13

Item No. 3

AEH 12 PSEUDO 03
Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks
Fish speces: Lake Sturgeon

7-6-12
SM

Log Book / Pages 2/14150
File Folder 20A 1
Initials SKW Date 14FEB13

PROOFED BY
Initials: SKW Date: 14FEB13
REVIEWED BY
Initials: SM Date: 4/4/13

Owrong pages. Should be
15724 FW
22MAR13

Obs	block	tank	x	tankn	trt
1	1	4	0.09310	A4	control
2	1	5	0.25798	A5	50
3	1	1	0.66112	A1	100
4	1	2	0.72865	A2	200
5	1	3	0.99270	A3	300
6	2	5	0.23720	B5	control
7	2	3	0.62617	B3	50
8	2	2	0.74796	B2	100
9	2	4	0.75520	B4	200
10	2	1	0.94113	B1	300
11	3	4	0.14843	C4	control
12	3	1	0.35255	C1	50
13	3	5	0.48804	C5	100
14	3	2	0.49012	C2	200
15	3	3	0.50544	C3	300

Item No. 1

Analysis performed by J. Luoma SAS version 9.2 13:14 06JUL12

AEH 12 PSEUDO 03
Pg 1 of 5

```
*. date created  : 06 July 2012 - JAL
*  Verified by: _______ (Date:_______)                          page ____ of ____
*  Random allocation of treatment to tank.sas
**********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Lake Sturgeon*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds


proc sort data=fish2;
 by block x;
run;
```

Log Book / Pages 2/1445 15+24 wrong pages
File Folder 20 A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: SAL Date: 4/4/13

Item No. 1

AEH 12 PSEUDO 03
Pg 2 of 5

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 2/14/15 15T24
File Folder 20A
Initials AKW Date 14FEB13

PROOFED BY
Initials: AKW Date: 14FEB13
REVIEWED BY
Initials: SH Date: 4/4/13

```

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Lake Sturgeon';
run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds
```

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 5

```
/*************************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 06 July 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*************************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Lake Sturgeon*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

Log Book / Pages 2/14-15 15-21 wrong pages
File Folder 20 A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: JAL Date: 4/4/13

Item No. 1

AEH 12 PSEUDO 03
Pg 14 of 75

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
    if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Lake Sturgeon';
run;
```

7-6-12 SM

Began writing File Folder # on wrong Line. JKW 14FEB13

Log book / Pages 204 - 2/14/13

File Folder 204

Initials JKW Date

PROOFED BY
Initials: JKW **Date:** 14FEB13
REVIEWED BY
Initials: SM **Date:** 4/4/13

① wrong pages. Should be 15-24 JKW 22MAR13

Item No. 1

AEH 12 PSEUDO 03

Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 7-6-12
Random assignment of LST to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

wrng pages KW 22MAR13 1

Log Book / Pages 2/1415 15, 24-25
File Folder 20A
Initials SKW Date 14FEB13

PROOFED BY
Initials: SKW Date: 14FEB13
REVIEWED BY
Initials: JPL Date: 4/4/13

Obs	round	block	tank	x	tankn
1	1	2	1	0.01852	B1
2	1	3	1	0.04747	C1
3	1	1	2	0.08394	A2
4	1	1	3	0.11125	A3
5	1	2	5	0.15198	B5
6	1	2	2	0.35866	B2
7	1	2	4	0.38833	B4
8	1	2	3	0.47825	B3
9	1	3	3	0.52772	C3
10	1	3	4	0.55631	C4
11	1	3	2	0.69868	C2
12	1	3	5	0.70309	C5
13	1	1	1	0.77332	A1
14	1	1	5	0.88665	A5
15	1	1	4	0.96743	A4
16	2	3	3	0.09630	C3
17	2	3	4	0.24418	C4
18	2	2	1	0.48589	B1
19	2	2	3	0.50641	B3
20	2	1	5	0.53963	A5
21	2	3	1	0.54750	C1
22	2	1	1	0.67068	A1
23	2	2	5	0.70046	B5
24	2	3	5	0.77328	C5
25	2	2	2	0.78406	B2
26	2	2	4	0.78669	B4
27	2	3	2	0.90840	C2
28	2	1	3	0.91138	A3
29	2	1	2	0.93461	A2
30	2	1	4	0.96199	A4
31	3	3	3	0.05098	C3
32	3	2	4	0.06274	B4
33	3	2	3	0.20070	B3
34	3	3	2	0.24158	C2
35	3	1	5	0.24590	A5
36	3	2	2	0.29339	B2
37	3	2	5	0.33506	B5
38	3	1	3	0.53046	A3
39	3	1	4	0.55030	A4
40	3	1	1	0.58691	A1
41	3	3	5	0.59052	C5
42	3	1	2	0.61377	A2
43	3	2	1	0.80864	B1
44	3	3	1	0.84423	C1
45	3	3	4	0.94933	C4

Animals distributed from PND-2 to dilutors A, B, and C

31JUL12
DGB

AEH 12 PSEUDO 03

Item No. 2 Pg 1a of 5a9

Analysis performed by J. Luoma SAS version 9.2 13:06 06JUL12

Log Book / Pages 2/14-15 15+24-25 Lunary pages plus 22 names
File Folder 20A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date 14FEB13
REVIEWED BY
Initials: SW Date: 4/4/13

Item No. 2

AEH 12 PSEUDO 03

Pg 2 of 5

```
*  date created  : 06 July2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/**********************************************************************************************
! **********/

/*fish species: Lake Sturgeon*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/14-15 15+24-25 wrong pages pre-dated
File Folder 204
Initials GKW Date 14FEB13

PROOFED BY
Initials: JKV Date: 14FEB13
REVIEWED BY
Initials: Date: 4/4/13

Item No. 2

AEH 12 PSEUDO 03

Pg 13 of 50

```
      real time           0.03 seconds
      cpu time            0.03 seconds
```

7-6-12 JM

Log Book / Pages 2/14-15 15+24-25 wrong pages JKW Amm 13.
File Folder 20 A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date : 14FEB13
REVIEWED BY
Initials: JM Date: 4/4/13

```


proc sort data= fishdist;
 by round x;
 run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of LST to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

Item No. 2

AEH 12 PSEUDO 03

Pg 4 **of** 5

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 06 July2012 - JAL
*  Verified by:  _______ (Date:_______)          page ____ of ____
*  Random allocation of fish to chamber.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*************************************************************************************************************

/*fish species: Lake Sturgeon*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of LST to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 2/14-15 wrong page 15+24-25
File Folder ZOA
Initials JKW Date 14FEB13

PROOFED BY Initials JKW Date 14FEB13
REVIEWED BY Initials JM Date 4/4/13

Item No. 2

AEH 12 PSEUDO 03

Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 7-6-12 JR 1

Move exposure chamber to sequentially numbered holding chamber

ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc.

Obs	round	block	tank	x	tankn
1	1	2	2	0.17323	B2
2	1	2	3	0.23325	B3
3	1	1	3	0.23881	A3
4	1	1	4	0.29854	A4
5	1	3	1	0.41913	C1
6	1	1	5	0.42632	A5
7	1	1	1	0.51067	A1
8	1	2	5	0.61769	B5
9	1	2	1	0.73543	B1
10	1	3	4	0.74312	C4
11	1	3	5	0.76970	C5
12	1	3	2	0.77694	C2
13	1	1	2	0.83802	A2
14	1	3	3	0.90169	C3
15	1	2	4	0.93018	B4

Log Book / Pages 2/~~1415~~ 15,24-127 wrong pages KWV 22MAR13

File Folder 20A

Initials JKV Date 14FEB13

PROOFED BY

Initials: JKW Date 14FEB13

REVIEWED BY

Initials: JR Date 4/4/13

Item No. 3

AEH 12 PSEUDO 03

Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 13:20 06JUL12

Log Book / Pages 2/1415 15,24,27
File Folder ZOA
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: Sn Date: 4/4/13

Item No. 3

AEH 12 PSEUDO 03
Pg 2 of 5

```
  * date created  : 06 July 2012 - JAL
  *  Verified by:  _______ (Date:_______)                          page ____ of ____
  *  Random allocation of exposure chambers to holding chambers.sas
  ****************************************************************************/
  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

  FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.

  options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

  /*Random distribution of fish from exposure chambers to holding chambers*/
  /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
     round = 1, place one all fish from exposure chamber to the the holding chamber  */

  /**************************************************************************************************
! **********/

  /*fish species: Lake Sturgeon*/
  data fish;
   do round = 1 to 1 by 1;
   do block = 1 to 3 by 1;
    do tank = 1 to 5 by 1;
     x = ranuni(-1);
     output;
    end;
    end;
   end;
  run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


  data fishdist; set fish;
  if block = 1 and tank = 1 then tankn = ' A1';
    if block = 1 and tank = 2 then tankn = ' A2';
     if block = 1 and tank = 3 then tankn = ' A3';
      if block = 1 and tank = 4 then tankn = ' A4';
       if block = 1 and tank = 5 then tankn = ' A5';
   if block = 2 and tank = 1 then tankn = ' B1';
    if block = 2 and tank = 2 then tankn = ' B2';
     if block = 2 and tank = 3 then tankn = ' B3';
      if block = 2 and tank = 4 then tankn = ' B4';
       if block = 2 and tank = 5 then tankn = ' B5';
  if block = 3 and tank = 1 then tankn = ' C1';
    if block = 3 and tank = 2 then tankn = ' C2';
     if block = 3 and tank = 3 then tankn = ' C3';
      if block = 3 and tank = 4 then tankn = ' C4';
       if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/14/15 15,24,29 (wrong pages 14FEB13)
File Folder 20 A
Initials JKV Date 14FEB13

PROOFED BY
Initials: JKV Date: 14FEB13
REVIEWED BY
Initials: JAL Date: 4/1/13

Item No. 3

AEH 12 PSEUDO 03 09

Pg 3 of 5

```
      real time           0.04 seconds
      cpu time            0.03 seconds



proc sort data= fishdist;
 by round x;
 run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03; Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
! chamber 2, etc';
run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```

7-6-12
JN

Log Book / Pages 2/14/15 wrong pages 15, 24+27
File Folder 20 A
Initials [illegible] Date 14FEB13
PROOFED BY
Initials: GKW Date 14FEB13
REVIEWED BY
Initials: JNL Date: 4/4/13

Item No. 3

AEH 12 PSEUDO 03
Pg 4 of 5
___ to ___ e9

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 06 July 2012 - JAL JL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************

/*fish species: Lake Sturgeon*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Log Book / Pages 20a
File Folder
Initials JKW Date

PROOFED BY
Initials JKW Date 14FEB13

REVIEWED BY
Initials SAL Date 2/4/13

Item No. 3

AEH 12 PSEUDO 03

Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks
Fish speces: Largemouth Bass

5-30-12
JL

Log Book / Pages 1/49
File Folder 21A
Initials JKW Date 21MAR13

PROOFED BY
Initials: KW Date: 21MAR13
REVIEWED BY
Initials: JL Date: 4/4/13

Obs	block	tank	x	tankn	trt
1	1	3	0.30278	A3	control
2	1	5	0.42274	A5	50
3	1	4	0.49822	A4	100
4	1	1	0.81293	A1	200
5	1	2	0.85904	A2	300
6	2	3	0.08459	B3	control
7	2	1	0.29739	B1	50
8	2	2	0.47833	B2	100
9	2	5	0.57869	B5	200
10	2	4	0.89800	B4	300
11	3	4	0.06160	C4	control
12	3	2	0.63050	C2	50
13	3	3	0.67193	C3	100
14	3	5	0.71443	C5	200
15	3	1	0.80742	C1	300

FF # 21A
Item No. 1
Pg 1 of 3

Analysis performed by J. Luoma SAS version 9.2 14:49 30MAY12

```
4    *  date created  : 30 May 2012 - JAL
5    *  Verified by:  _______ (Date:_______)                    page ____ of ____
6    *  Random allocation of treatment to tank.sas
7    ***************************************************************/
8    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12   options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
13
14   /*Random assignment of treatment to experimental tanks*/
15   /*Fish speces: Largemouth Bass*/
16   data fish;
17    do block = 1 to 3 by 1;
18     do tank = 1 to 5 by 1;
19      x = ranuni(-1);
20      output;
21     end;
22    end;
23   run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


24   data fish2; set fish;
25    if block = 1 and tank = 1 then tankn = 'A1';
26     if block = 1 and tank = 2 then tankn = 'A2';
27      if block = 1 and tank = 3 then tankn = 'A3';
28       if block = 1 and tank = 4 then tankn = 'A4';
29        if block = 1 and tank = 5 then tankn = 'A5';
30    if block = 2 and tank = 1 then tankn = 'B1';
31     if block = 2 and tank = 2 then tankn = 'B2';
32      if block = 2 and tank = 3 then tankn = 'B3';
33       if block = 2 and tank = 4 then tankn = 'B4';
34        if block = 2 and tank = 5 then tankn = 'B5';
35    if block = 3 and tank = 1 then tankn = 'C1';
36     if block = 3 and tank = 2 then tankn = 'C2';
37      if block = 3 and tank = 3 then tankn = 'C3';
38       if block = 3 and tank = 4 then tankn = 'C4';
39        if block = 3 and tank = 5 then tankn = 'C5';
40        run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


41   proc sort data=fish2;
42    by block x;
43   run;
```

Log Book / Pages 1/49
File Folder 21A
Initials JKW Date 21MAR13
PROOFED BY
Initials: KW Date 21MAR13
REVIEWED BY
Initials: JK Date 4-4-13

FF # 21A
Item No. 1
Pg 2 of 5

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

Log Book / Pages 1/49
File Folder 21A
Initials JKW Date 21MAR13

PROOFED BY
Initials: VMW Date: 21MAR13
REVIEWED BY
Initials: SL Date: 4.4.13

```
44
45   data assign_trt_fish; set fish2;
46    if _n_ = 1 then trt = 'control';
47     if _n_ = 2 then trt = '50';
48      if _n_ = 3 then trt = '100';
49       if _n_ = 4 then trt = '200';
50    if _n_ = 5 then trt = '300';
51     if _n_ = 6 then trt = 'control';
52      if _n_ = 7 then trt = '50';
53       if _n_ = 8 then trt = '100';
54    if _n_ = 9 then trt = '200';
55     if _n_ = 10 then trt = '300';
56      if _n_ = 11 then trt = 'control';
57       if _n_ = 12 then trt = '50';
58     if _n_ = 13 then trt = '100';
59      if _n_ = 14 then trt = '200';
60       if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


61   proc print data= assign_trt_fish;
62   title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
63   title2 h=1.5 'AEH-12-PSUEDO-03';
64   title3 h=1 'Random assignment of treatment to experimental tanks';
65   title4 h=1 'Fish speces: Largemouth Bass';
66   run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```

FF # 21A
Item No. 1
Pg 3 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03                    Log Book / Pages 1/49
*  Study Director: Jim Luoma                           File Folder 21A
*  date created  : 30 May 2012 - JAL JL                Initials JKW Date 2/19/13
*  Verified by:  _____ (Date:_____)          page ___ of ___   PROOFED BY
*  Random allocation of treatment to tank.sas          Initials: KW Date 2/19/13
*********************************************************************/   REVIEWED BY
                                                        Initials: EC Date: 4-4-13
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Largemouth Bass*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;                                                    da
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

FF # 21A
Item No. 1
Pg 4 of 5

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Largemouth Bass';
run;
```

5-30-12
JN

Log Book / Pages 1/49
File Folder 21A
Initials JKW Date 21MAR13

PROOFED
Initials: KW Date 21MAR13
REVIEWED BY
Initials: JN Date 4-4-13

FF # 21A
Item No. 1
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish
Random assignment of LMB to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

5-30-12
JA

Obs	round	block	tank	x	tankn
1	1	3	4	0.08531	C4
2	1	1	2	0.17470	A2
3	1	1	4	0.21760	A4
4	1	2	4	0.24416	B4
5	1	2	3	0.34703	B3
6	1	2	2	0.47295	B2
7	1	3	5	0.62464	C5
8	1	3	3	0.65448	C3
9	1	1	3	0.72712	A3
10	1	1	1	0.73548	A1
11	1	2	5	0.75445	B5
12	1	2	1	0.78301	B1
13	1	3	1	0.86266	C1
14	1	1	5	0.89212	A5
15	1	3	2	0.91425	C2
16	2	1	1	0.02671	A1
17	2	2	5	0.04149	B5
18	2	3	2	0.04615	C2
19	2	2	4	0.07772	B4
20	2	2	1	0.08749	B1
21	2	2	2	0.13918	B2
22	2	3	3	0.20404	C3
23	2	1	2	0.32241	A2
24	2	3	1	0.45937	C1
25	2	1	5	0.47560	A5
26	2	2	3	0.54750	B3
27	2	3	4	0.62214	C4
28	2	1	3	0.68513	A3
29	2	3	5	0.84005	C5
30	2	1	4	0.86780	A4
31	3	3	3	0.07861	C3
32	3	1	4	0.10820	A4
33	3	1	3	0.13575	A3
34	3	3	1	0.19406	C1
35	3	2	1	0.19984	B1
36	3	1	5	0.38382	A5
37	3	3	4	0.52745	C4
38	3	2	4	0.55918	B4
39	3	2	3	0.57923	B3
40	3	2	5	0.71562	B5
41	3	3	5	0.71720	C5
42	3	2	2	0.75456	B2
43	3	3	2	0.75517	C2
44	3	1	1	0.79892	A1
45	3	1	2	0.81562	A2

complete 1230
11JUN12 DGB

Log Book / Pages 1/49, 2/1
File Folder 21A
Initials JSW Date 21MAR13

PROOFED BY
Initials: MW Date: 21MAR13
REVIEWED BY
Initials: JW Date: 4-4-13

FF # 21A
Item No. 2
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 14:24 30MAY12

Log Book / Pages 1/49, 2/1
File Folder 21A
Initials JKW Date 21MAR13

PROOFED BY
Initials: KW Date 21MAR13
REVIEWED BY
Initials: SN Date: 4-4-13

FF # 21A
Item No. 2
Pg 2 of 5

```
4     *  date created  : 30 MAY 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of fish to chamber.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish to experimental chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
17
18    /*****************************************************************************************
18 !  **********/
19
20    /*fish species: Largemouth*/
21    data fish;
22     do round = 1 to 3 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.12 seconds
      cpu time            0.12 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 1/49, 2/1
File Folder 21A
Initials JKW Date 21MAR13

PROOFED BY
Initials KW Date 21MAR13
REVIEWED BY
Initials JL Date 4-4-13

FF # 21A
Item No. 2
Pg 3 of 5

```
      real time            0.03 seconds
      cpu time             0.01 seconds
```

Log Book / Pages 1/49, 2/1
File Folder 21A
Initials JKW Date 21MAR13
PROOFED BY
Initials KW Date 21MAR13
REVIEWED BY
Initials SL Date 4-4-13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time            0.03 seconds
      cpu time             0.03 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Random assignment of LMB to exposure chambers';
55   title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
56   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time            0.07 seconds
      cpu time             0.07 seconds
```

FF # 21A
Item No. 2
Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03                                  Log Book / Pages 144, 121
*  Study Director: Jim Luoma                                         File Folder ZIA
*  date created  : 30 MAY 2012 - JAL                                 Initials JKW Date 21MAR13
*  Verified by:  _____ (Date:_____)          page ___ of ___         PROOFED
*  Random allocation of fish to chamber.sas                          Initials LW Date 21MAR13
*********************************************************************/                REVIEWED BY
                                                                     Initials JL Date 4-4-13
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************/

/*fish species: Largemouth*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;                                          FF # 21A
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';         Item No. 2
title2 h=1 'Random assignment of LMB to exposure chambers';          Pg 5 of 5
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 5.30-12 JAC
Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	3	3	0.01386	C3
2	1	3	5	0.01830	C5
3	1	2	5	0.07891	B5
4	1	3	2	0.20669	C2
5	1	2	4	0.23224	B4
6	1	1	4	0.32873	A4
7	1	1	2	0.35555	A2
8	1	3	4	0.37859	C4
9	1	3	1	0.39115	C1
10	1	1	5	0.63287	A5
11	1	1	1	0.72780	A1
12	1	1	3	0.74112	A3
13	1	2	2	0.84001	B2
14	1	2	3	0.90831	B3
15	1	2	1	0.95414	B1

Log Book / Pages 1/49, 2/2-3
File Folder 21A
Initials JKW Date 21MAR13

PROOFED BY
Initials: KW Date: 21MAR13
REVIEWED BY
Initials: JAC Date: 4-4-13

FF # 21A
Item No. 3
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 14:54 30MAY12

Log Book / Pages 1/49, 2/2-3
File Folder 21A
Initials KW Date 21MAR13

PROOFED BY
Initials: KW Date: 21MAR13
REVIEWED BY
Initials: SGL Date: 4-4-13

FF # 21A
Item No. 3
Pg 2 of 5

```
4     *  date created  : 30 MAY 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of exposure chambers to holding chambers.sas
7     ***************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish from exposure chambers to holding chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18    /*************************************************************************************
18 !  **********/
19
20    /*fish species: Largemouth Bass*/
21    data fish;
22     do round = 1 to 1 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 1/49, 2/2-3
File Folder Z1A
Initials JKW Date 21MAR13

PROOFED BY
Initials: MW Date 21MAR13
REVIEWED by
Initials: JKL Date: 4-4-13

FF # 21A
Item No. 3
Pg 3 of 3

```
      real time             0.03 seconds
      cpu time              0.01 seconds
```

Log Book / Pages 1/49, 2/23
File Folder 21A
Initials SKD Date 21MAR13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;
```

PROOFED BY
Initials: KW Date 21MAR13
REVIEWED BY
Initials: SKD Date 4-4-13

```
NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time             0.01 seconds
      cpu time              0.01 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55   title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 ! chamber 2, etc';
56   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time             0.03 seconds
      cpu time              0.03 seconds
```

FF # 21A
Item No. 3
Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 30 MAY 2012 - JAL
*  Verified by:  _______ (Date:_______)                page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Largemouth Bass*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Log Book / Pages 1/49, 2/2-3
File Folder 21A
Initials JAW Date 2/11/13

PROOFED BY
Initials: PJW Date 2/11/13
REVIEWED
Initials: JAL Date 4-4-13

FF # 21A
Item No. 3
Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks
Fish speces: Smallmouth Bass

6/15/12
JAL

Log Book / Pages 2/4
File Folder 22A
Initials KW Date 19FEB13

PROOFED BY
Initials: KW Date: 19FEB13
REVIEWED BY
Initials: JAL Date: 4-24-13

Obs	block	tank	x	tankn	trt
1	1	2	0.11040	A2	control
2	1	3	0.21855	A3	50
3	1	1	0.28718	A1	100
4	1	4	0.75220	A4	200
5	1	5	0.79337	A5	300
6	2	1	0.49222	B1	control
7	2	5	0.50243	B5	50
8	2	3	0.53662	B3	100
9	2	2	0.57195	B2	200
10	2	4	0.58651	B4	300
11	3	1	0.09179	C1	control
12	3	3	0.09836	C3	50
13	3	2	0.22773	C2	100
14	3	5	0.31097	C5	200
15	3	4	0.69516	C4	300

Item No. 1

AEH 12 PSEUDO 03
Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 07:32 15JUN12

```
4     *  date created  : 15 June 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of treatment to tank.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
13
14    /*Random assignment of treatment to experimental tanks*/
15    /*Fish speces: Smallmouth Bass*/
16    data fish;
17     do block = 1 to 3 by 1;
18      do tank = 1 to 5 by 1;
19       x = ranuni(-1);
20       output;
21      end;
22     end;
23    run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


24    data fish2; set fish;
25     if block = 1 and tank = 1 then tankn = 'A1';
26      if block = 1 and tank = 2 then tankn = 'A2';
27       if block = 1 and tank = 3 then tankn = 'A3';
28        if block = 1 and tank = 4 then tankn = 'A4';
29         if block = 1 and tank = 5 then tankn = 'A5';
30     if block = 2 and tank = 1 then tankn = 'B1';
31      if block = 2 and tank = 2 then tankn = 'B2';
32       if block = 2 and tank = 3 then tankn = 'B3';
33        if block = 2 and tank = 4 then tankn = 'B4';
34         if block = 2 and tank = 5 then tankn = 'B5';
35     if block = 3 and tank = 1 then tankn = 'C1';
36      if block = 3 and tank = 2 then tankn = 'C2';
37       if block = 3 and tank = 3 then tankn = 'C3';
38        if block = 3 and tank = 4 then tankn = 'C4';
39         if block = 3 and tank = 5 then tankn = 'C5';
40         run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


41    proc sort data=fish2;
42     by block x;
43    run;
```

Log Book / Pages 2/4
File Folder 22A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: SAL Date: 4-Jun-13

Item No. 1

AEH 12 PSEUDO 03
Pg 2 of 5

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 2/4
File Folder 224
Initials JKW Date 19FEB13

```
44
45   data assign_trt_fish; set fish2;
46    if _n_ = 1 then trt = 'control';
47     if _n_ = 2 then trt = '50';
48      if _n_ = 3 then trt = '100';
49       if _n_ = 4 then trt = '200';
50    if _n_ = 5 then trt = '300';
51     if _n_ = 6 then trt = 'control';
52      if _n_ = 7 then trt = '50';
53       if _n_ = 8 then trt = '100';
54    if _n_ = 9 then trt = '200';
55     if _n_ = 10 then trt = '300';
56      if _n_ = 11 then trt = 'control';
57       if _n_ = 12 then trt = '50';
58     if _n_ = 13 then trt = '100';
59      if _n_ = 14 then trt = '200';
60       if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.03 seconds


61   proc print data= assign_trt_fish;
62   title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
63   title2 h=1.5 'AEH-12-PSUEDO-03';
64   title3 h=1 'Random assignment of treatment to experimental tanks';
65   title4 h=1 'Fish speces: Smallmouth Bass';
66   run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: SM Date: 4-4-13

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 15 June 2012 - JAL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Smallmouth Bass*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

Log Book / Pages 2/4
File Folder 22A
Initials SKW Date 19FEB13

PROOFED BY
Initials: SKW Date: 19FEB13
REVIEWED BY
Initials: JAL Date: 4-25-13

Item No. 1

AEH 12 PSEUDO 03
Pg 4 of 5

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
    if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Smallmouth Bass';
run;
```

6/15/12 SAL

Log Book / Pages 2/4
File Folder 22A
Initials JW Date 19FEB13

PROOFED BY
Initials: JW Date: 19FEB13
REVIEWED BY
Initials: SAL Date: 4-4-13

Item No. 1

AEH 12 PSEUDO 03
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 6/15/12 JA
Random assignment of SMB to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Log Book / Pages 2/4,6 1
File Folder 22A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: JA Date: 4-4-13

19JUN12 DOR

Obs	round	block	tank	x	tankn
1	1	3	1	0.00520	C1
2	1	1	5	0.00658	A5
3	1	3	4	0.02307	C4
4	1	2	3	0.10238	B3
5	1	1	3	0.12389	A3
6	1	1	2	0.25180	A2
7	1	2	2	0.26419	B2
8	1	2	1	0.30119	B1
9	1	3	5	0.42616	C5
10	1	2	4	0.49087	B4
11	1	1	1	0.49348	A1
12	1	3	2	0.61569	C2
13	1	1	4	0.64264	A4
14	1	2	5	0.76654	B5
15	1	3	3	0.77712	C3
16	2	2	1	0.03494	B1
17	2	3	4	0.10653	C4
18	2	3	3	0.15847	C3
19	2	2	5	0.16116	B5
20	2	1	5	0.21136	A5
21	2	3	5	0.22119	C5
22	2	3	1	0.30357	C1
23	2	1	3	0.56854	A3
24	2	3	2	0.59540	C2
25	2	1	4	0.62400	A4
26	2	2	4	0.63899	B4
27	2	1	1	0.68895	A1
28	2	1	2	0.85122	A2
29	2	2	3	0.90788	B3
30	2	2	2	0.94028	B2
31	3	1	4	0.02431	A4
32	3	1	2	0.02729	A2
33	3	1	5	0.04127	A5
34	3	3	2	0.11033	C2
35	3	1	1	0.11420	A1
36	3	1	3	0.15274	A3
37	3	3	1	0.16354	C1
38	3	2	3	0.22880	B3
39	3	2	2	0.23315	B2
40	3	2	1	0.27105	B1
41	3	2	5	0.37922	B5
42	3	3	4	0.59714	C4
43	3	2	4	0.74886	B4
44	3	3	3	0.86394	C3
45	3	3	5	0.88722	C5

Item No. 2

AEH 12 PSEUDO 03

Pg 1 of 5

Log Book / Pages 2/4, 6
File Folder 224
Initials JKW Date 14FEB13

Analysis performed by J. Luoma SAS version 9.2 07:08 15JUN12

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: SA Date: 4-4-13

Item No. 2

AEH 12 PSEUDO 03
Pg 2 of 5

```
4     *  date created  : 15 June 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of fish to chamber.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish to experimental chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
17
18    /*************************************************************************************************
18 !  **********/
19
20    /*fish species: smallmouth bass*/
21    data fish;
22     do round = 1 to 3 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.25 seconds
      cpu time            0.14 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/4, 6
File Folder 224
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JA Date: 4-4-13

Item No. 2

AEH 12 PSEUDO 03

Pg 3 of 5

```
      real time           0.03 seconds
      cpu time            0.01 seconds
```

6/15/12 SM

Log Book / Pages 2/4, 6
File Folder 22A
Initials KW Date 14FEB13

PROOFED BY
Initials: KW Date: 14FEB13
REVIEWED BY
Initials: SM Date: 4-4-13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.07 seconds
      cpu time            0.04 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Random assignment of SMB to exposure chambers';
55   title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
56   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.11 seconds
      cpu time            0.04 seconds
```

Item No. 2

AEH 12 PSEUDO 03

Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 15 June 2012 - JAL
*  Verified by:  _______ (Date:_______)                page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************/

/*fish species: smallmouth bass*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of SMB to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 2/4,6
File Folder 72A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: SA Date: 4-4-13

Item No. 2

AEH 12 PSEUDO 03
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 6/15/12 Jnc
Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	1	1	0.02689	A1
2	1	3	3	0.03668	C3
3	1	1	3	0.08426	A3
4	1	2	3	0.14049	B3
5	1	2	2	0.22696	B2
6	1	1	2	0.24090	A2
7	1	3	1	0.24642	C1
8	1	2	5	0.41182	B5
9	1	1	5	0.62305	A5
10	1	1	4	0.65615	A4
11	1	3	2	0.74986	C2
12	1	3	5	0.75595	C5
13	1	3	4	0.77849	C4
14	1	2	4	0.81147	B4
15	1	2	1	0.93738	B1

Log Book / Pages 2/4,8
File Folder 22A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: JH Date: 4-4-13

Item No. 3

AEH 12 PSEUDO 03
Pg 1 of 4

Log Book / Pages 2/4,8
File Folder 22A
Initials JKW Date 19FEB13

Analysis performed by J. Luoma SAS version 9.2 07:25 15JUN12

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: SAL Date: 4-4-13

Item No. 3

AEH 12 PSEUDO 03

Pg 2 of 4

```
4    * .date created  : 15 June 2012 - JAL
5    *  Verified by:  _______ (Date:_______)                    page ____ of ____
6    *  Random allocation of exposure chambers to holding chambers.sas
7    ***************************************************************/
8    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12   options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14   /*Random distribution of fish from exposure chambers to holding chambers*/
15   /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16      round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18   /*************************************************************************************
18 ! **********/
19
20   /*fish species: Smallmouth Bass*/
21   data fish;
22    do round = 1 to 1 by 1;
23    do block = 1 to 3 by 1;
24     do tank = 1 to 5 by 1;
25      x = ranuni(-1);
26      output;
27     end;
28     end;
29    end;
30   run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


31   data fishdist; set fish;
32   if block = 1 and tank = 1 then tankn = ' A1';
33     if block = 1 and tank = 2 then tankn = ' A2';
34      if block = 1 and tank = 3 then tankn = ' A3';
35       if block = 1 and tank = 4 then tankn = ' A4';
36        if block = 1 and tank = 5 then tankn = ' A5';
37    if block = 2 and tank = 1 then tankn = ' B1';
38     if block = 2 and tank = 2 then tankn = ' B2';
39      if block = 2 and tank = 3 then tankn = ' B3';
40       if block = 2 and tank = 4 then tankn = ' B4';
41        if block = 2 and tank = 5 then tankn = ' B5';
42   if block = 3 and tank = 1 then tankn = ' C1';
43     if block = 3 and tank = 2 then tankn = ' C2';
44      if block = 3 and tank = 3 then tankn = ' C3';
45       if block = 3 and tank = 4 then tankn = ' C4';
46        if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/4,8
File Folder 22A
Initials JKW Date 14FEB13

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: JL Date: 4-4-13

Item No. 3

AEH 12 PSEUDO 03

Pg 3 of 4

```
      real time             0.03 seconds
      cpu time              0.01 seconds
```

6/15/12 JW

Log Book / Pages 2/4,8
File Folder 224
Initials JW Date 14FEB13

```
47
48
49    proc sort data= fishdist;
50     by round x;
51     run;
```

PROOFED BY
Initials: JW Date: 14FEB13
REVIEWED BY
Initials: JW Date: 4-4-13

```
NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time             0.01 seconds
      cpu time              0.01 seconds


52    proc print data = fishdist;
53    title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54    title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55    title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 !  chamber 2, etc';
56    run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time             0.03 seconds
      cpu time              0.03 seconds
```

Item No. 3

AEH 12 PSEUDO 03

Pg 4 of 4

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks 7-9-12 JL
Fish speces: Bluegill

Log Book / Pages ~~2/16~~ 34 ① wrong page KW 22MAR13
File Folder 234
Initials SKW Date 19FEB13

PROOFED BY
Initials: SKW Date 19FEB13
REVIEWED BY
Initials: JL Date 4-9-13

① Original page number was correct. pg 16 KW 22MAR13

Obs	block	tank	x	tankn	trt
1	1	1	0.08400	A1	control
2	1	4	0.45723	A4	50
3	1	2	0.74437	A2	100
4	1	5	0.90750	A5	200
5	1	3	0.99194	A3	300
6	2	3	0.01716	B3	control
7	2	4	0.16239	B4	50
8	2	2	0.60973	B2	100
9	2	1	0.80537	B1	200
10	2	5	0.99224	B5	300
11	3	2	0.29383	C2	control
12	3	1	0.69211	C1	50
13	3	4	0.75232	C4	100
14	3	5	0.89411	C5	200
15	3	3	0.96831	C3	300

Item No. 1

Analysis performed by J. Luoma SAS version 9.2 09:09 09JUL12

```
4     *  date created  : 09 July 2012 - JAL  Jm
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of treatment to tank.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
13
14    /*Random assignment of treatment to experimental tanks*/
15    /*Fish speces: Bluegill*/
16    data fish;
17     do block = 1 to 3 by 1;
18      do tank = 1 to 5 by 1;
19       x = ranuni(-1);
20       output;
21      end;
22     end;
23    run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.11 seconds
      cpu time            0.12 seconds


24    data fish2; set fish;
25     if block = 1 and tank = 1 then tankn = 'A1';
26      if block = 1 and tank = 2 then tankn = 'A2';
27       if block = 1 and tank = 3 then tankn = 'A3';
28        if block = 1 and tank = 4 then tankn = 'A4';
29         if block = 1 and tank = 5 then tankn = 'A5';
30     if block = 2 and tank = 1 then tankn = 'B1';
31      if block = 2 and tank = 2 then tankn = 'B2';
32       if block = 2 and tank = 3 then tankn = 'B3';
33        if block = 2 and tank = 4 then tankn = 'B4';
34         if block = 2 and tank = 5 then tankn = 'B5';
35     if block = 3 and tank = 1 then tankn = 'C1';
36      if block = 3 and tank = 2 then tankn = 'C2';
37       if block = 3 and tank = 3 then tankn = 'C3';
38        if block = 3 and tank = 4 then tankn = 'C4';
39         if block = 3 and tank = 5 then tankn = 'C5';
40         run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


41    proc sort data=fish2;
42     by block x;
43    run;
```

Log Book / Pages 2/16
File Folder Z3A
Initials JKW Date 19FEB13
PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JM Date: 4-4-13

Item No. 1

AEH 12 PSEUDO 03
Pg 2 of 5 pg

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds
```

7-9-12 SK

Log Book / Pages 2/16
File Folder ZTA
Initials SKW Date 19FEB13

PROOFED BY
Initials: SKW Date: 19FEB13
REVIEWED BY
Initials: SAL Date: 4-4-13

```
44
45   data assign_trt_fish; set fish2;
46    if _n_ = 1 then trt = 'control';
47     if _n_ = 2 then trt = '50';
48      if _n_ = 3 then trt = '100';
49       if _n_ = 4 then trt = '200';
50    if _n_ = 5 then trt = '300';
51     if _n_ = 6 then trt = 'control';
52      if _n_ = 7 then trt = '50';
53       if _n_ = 8 then trt = '100';
54    if _n_ = 9 then trt = '200';
55     if _n_ = 10 then trt = '300';
56      if _n_ = 11 then trt = 'control';
57       if _n_ = 12 then trt = '50';
58     if _n_ = 13 then trt = '100';
59      if _n_ = 14 then trt = '200';
60       if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


61   proc print data= assign_trt_fish;
62   title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
63   title2 h=1.5 'AEH-12-PSUEDO-03';
64   title3 h=1 'Random assignment of treatment to experimental tanks';
65   title4 h=1 'Fish speces: Bluegill';
66   run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds
```

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma  JAL
*  date created  : 09 July 2012 - JAL
*  Verified by:  _____ (Date:_____)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Bluegill*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

Log Book / Pages 2/16
File Folder 23A
Initials JKW Date 4FEB13

PROOFED BY
Initials: JKW Date: 4FEB13
REVIEWED BY
Initials: SA Date: 4-4-13

Item No. 1

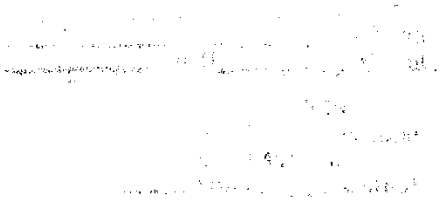
AEH 12 PSEUDO 03
Pg 104 of 93

```
    if _n_ = 12 then trt = '50';
   if _n_ = 13 then trt = '100';
    if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish speces: Bluegill';
run;
```

7-9-12 SW

Log Book / Pages 2/16
File Folder 23A
Initials SKW Date 19FEB13

PROOFED BY
Initials: SKW Date: 19FEB13
REVIEWED BY
Initials: SW Date: 4-4-13



Item No. 1

AEH 12 PSEUDO 03

Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish
Random assignment of BLG to exposure chambers 7-9-12 JAL
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Log Book / Pages 2/16
File Folder 23A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JAL Date: 4-4-13

Obs	round	block	tank	x	tankn
1	1	2	2	0.01585	B2
2	1	2	5	0.10965	B5
3	1	3	2	0.19424	C2
4	1	1	5	0.22611	A5
5	1	3	1	0.26120	C1
6	1	2	3	0.28169	B3
7	1	1	2	0.38861	A2
8	1	3	4	0.43734	C4
9	1	3	5	0.45675	C5
10	1	1	4	0.70525	A4
11	1	2	1	0.72251	B1
12	1	3	3	0.86392	C3
13	1	1	3	0.88189	A3
14	1	1	1	0.90390	A1
15	1	2	4	0.92790	B4
16	2	3	5	0.01164	C5
17	2	1	3	0.18102	A3
18	2	2	2	0.23772	B2
19	2	3	4	0.32743	C4
20	2	1	2	0.34889	A2
21	2	3	2	0.38590	C2
22	2	1	5	0.46443	A5
23	2	2	1	0.57851	B1
24	2	1	1	0.75155	A1
25	2	3	1	0.80908	C1
26	2	2	5	0.81871	B5
27	2	3	3	0.82793	C3
28	2	1	4	0.85671	A4
29	2	2	3	0.93914	B3
30	2	2	4	0.99114	B4
31	3	3	1	0.03237	C1
32	3	3	2	0.06539	C2
33	3	1	4	0.07503	A4
34	3	3	3	0.16561	C3
35	3	2	4	0.29361	B4
36	3	1	3	0.34671	A3
37	3	1	5	0.38633	A5
38	3	2	1	0.39926	B1
39	3	2	3	0.40963	B3
40	3	1	1	0.54264	A1
41	3	3	4	0.68921	C4
42	3	1	2	0.72852	A2
43	3	2	2	0.84339	B2
44	3	2	5	0.87403	B5
45	3	3	5	0.94114	C5

10JUL12 DLB

Item No. 2

AEH 12 PSEUDO 03

Pg 10 of 50

Analysis performed by J. Luoma SAS version 9.2 09:14 09JUL12

Log Book / Pages 2/16
File Folder 23A
Initials JCJ Date 11FEB13

PROOFED BY
Initials: SKW Date: 11FEB13
REVIEWED BY
Initials: SJL Date: 4-4-13

Item No. 2

AEH 12 PSEUDO 03

Pg 2 in of 54

```
4    *  date created  : 09 July 2012 - JAL
5    *  Verified by:  _______ (Date:_______)                    page ____ of ____
6    *  Random allocation of fish to chamber.sas
7    ************************************************************************/
8    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12   options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14   /*Random distribution of fish to experimental chambers*/
15   /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16      round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
17
18   /*************************************************************************************************
18 ! **********/
19
20   /*fish species: Bluegill*/
21   data fish;
22    do round = 1 to 3 by 1;
23    do block = 1 to 3 by 1;
24     do tank = 1 to 5 by 1;
25      x = ranuni(-1);
26      output;
27     end;
28     end;
29    end;
30   run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds


31   data fishdist; set fish;
32   if block = 1 and tank = 1 then tankn = ' A1';
33     if block = 1 and tank = 2 then tankn = ' A2';
34      if block = 1 and tank = 3 then tankn = ' A3';
35       if block = 1 and tank = 4 then tankn = ' A4';
36        if block = 1 and tank = 5 then tankn = ' A5';
37    if block = 2 and tank = 1 then tankn = ' B1';
38     if block = 2 and tank = 2 then tankn = ' B2';
39      if block = 2 and tank = 3 then tankn = ' B3';
40       if block = 2 and tank = 4 then tankn = ' B4';
41        if block = 2 and tank = 5 then tankn = ' B5';
42   if block = 3 and tank = 1 then tankn = ' C1';
43     if block = 3 and tank = 2 then tankn = ' C2';
44      if block = 3 and tank = 3 then tankn = ' C3';
45       if block = 3 and tank = 4 then tankn = ' C4';
46        if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/16
File Folder 23A
Initials JKW Date 11FEB13

PROOFED BY
Initials JKW Date 11FEB13
REVIEWED BY
Initials SAL Date 4-9-13

Item No. 2

AEH 12 PSEUDO 03
Pg 10 of 59

```
      real time             0.02 seconds
      cpu time              0.01 seconds
```

7-9-12 SM

Log Book / Pages 2 16
File Folder 23A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JL Date: 4-4-13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time             0.01 seconds
      cpu time              0.01 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Random assignment of BLG to exposure chambers';
55   title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
56   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time             0.03 seconds
      cpu time              0.03 seconds
```

Item No. 2

AEH 12 PSEUDO 03

Pg 4 to 5 of 5

```
/*****************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 09 July 2012 - JAL
*  Verified by:  _______ (Date:_______)          page ____ of ____
*  Random allocation of fish to chamber.sas
*****************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */

/*****************************************************************************************************

/*fish species: Bluegill*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of BLG to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 2/16
File Folder 23A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JAL Date: 4/4/13

Item No. 2

AEH 12 PSEUDO 03
Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 7-9-12 SA

Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	1	2	0.03889	A2
2	1	1	3	0.16551	A3
3	1	3	3	0.22978	C3
4	1	3	4	0.24175	C4
5	1	3	5	0.30634	C5
6	1	2	2	0.31189	B2
7	1	3	1	0.34814	C1
8	1	2	5	0.46232	B5
9	1	1	5	0.49893	A5
10	1	3	2	0.57337	C2
11	1	1	1	0.65012	A1
12	1	2	4	0.67118	B4
13	1	1	4	0.73473	A4
14	1	2	3	0.78221	B3
15	1	2	1	0.90332	B1

Log Book / Pages 2/16, 18
File Folder 23A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY 4-4-13
Initials: JAC Date:

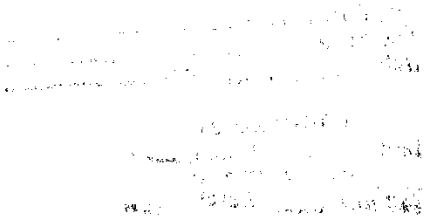
Item No. 31

AEH 12 PSEUDO 03
Pg 1 of 5 09

Log Book / Pages 2/16, 18
File Folder 23A
Initials JKW Date 14FEB13

Analysis performed by J. Luoma SAS version 9.2 09:23 09JUL12

PROOFED BY
Initials: JKW Date: 14FEB13
REVIEWED BY
Initials: JKW Date: 4-4-13



Item No. 3

AEH 12 PSEUDO 03

Pg 2 of 5 pgs

```
4    *  date created  : 09 July 2012 - JAL
5    *  Verified by:  _____ (Date: _____)                    page ____ of ____
6    *  Random allocation of exposure chambers to holding chambers.sas
7    ************************************************************************/
8    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10   FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12   options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14   /*Random distribution of fish from exposure chambers to holding chambers*/
15   /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16      round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18   /*************************************************************************************************
18 ! **********/
19
20   /*fish species: Bluegill*/
21   data fish;
22    do round = 1 to 1 by 1;
23    do block = 1 to 3 by 1;
24     do tank = 1 to 5 by 1;
25      x = ranuni(-1);
26      output;
27     end;
28     end;
29    end;
30   run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


31   data fishdist; set fish;
32   if block = 1 and tank = 1 then tankn = ' A1';
33     if block = 1 and tank = 2 then tankn = ' A2';
34      if block = 1 and tank = 3 then tankn = ' A3';
35       if block = 1 and tank = 4 then tankn = ' A4';
36        if block = 1 and tank = 5 then tankn = ' A5';
37    if block = 2 and tank = 1 then tankn = ' B1';
38     if block = 2 and tank = 2 then tankn = ' B2';
39      if block = 2 and tank = 3 then tankn = ' B3';
40       if block = 2 and tank = 4 then tankn = ' B4';
41        if block = 2 and tank = 5 then tankn = ' B5';
42   if block = 3 and tank = 1 then tankn = ' C1';
43     if block = 3 and tank = 2 then tankn = ' C2';
44      if block = 3 and tank = 3 then tankn = ' C3';
45       if block = 3 and tank = 4 then tankn = ' C4';
46        if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/16, 18
File Folder 23A
Initials JKW Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JL Date: 4-4-13

Item No. 3

AEH 12 PSEUDO 03
Pg 3 to of 5 pg

```
      real time           0.03 seconds
      cpu time            0.01 seconds
```

7-9-13 SM

Log Book / Pages 2/16, 18
File Folder 23A
Initials JKV Date 19FEB13

PROOFED BY
Initials: JKW Date: 19FEB13
REVIEWED BY
Initials: JL Date: 4-4-13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55   title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 ! chamber 2, etc';
56   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.04 seconds
      cpu time            0.04 seconds
```

Item No. 3

AEH 12 PSEUDO 03

Pg 4a of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03                                  Log Book / Pages 2/16, 18
*  Study Director: Jim Luoma                                         File Folder 23A
*  date created  : 09 July 2012 - JAL JL                             Initials JKL Date 19FEB13
*  Verified by:  _______ (Date:_______)                  page ____ of ____
*  Random allocation of exposure chambers to holding chambers.sas    PROOFED BY
*********************************************************************/  Initials JKL Date 19FEB13
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;              REVIEWED BY 4-4-13
                                                                      Initials JL Date

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Bluegill*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

                                                          Item No. 3

proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;                                AEH 12 PSEUDO 03
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Pg 5 of 5

Effects of Psuedomonas fluorescens (Pf-CL145A) to fish
AEH-12-PSUEDO-03
Random assignment of treatment to experimental tanks 9-24-12 SM
Fish species: Channel Catfish

Obs	block	tank	x	tankn	trt
1	1	4	0.05055	A4	control
2	1	2	0.29693	A2	50
3	1	5	0.81441	A5	100
4	1	3	0.88048	A3	200
5	1	1	0.88313	A1	300
6	2	5	0.00947	B5	control
7	2	4	0.27132	B4	50
8	2	3	0.29540	B3	100
9	2	2	0.53723	B2	200
10	2	1	0.57666	B1	300
11	3	4	0.01397	① ~~C4~~ C3	control
12	3	5	0.12636	C5	50
13	3	2	0.13289	C2	100
14	3	3	0.16506	① ~~C3~~ C1	200
15	3	1	0.36118	① ~~C1~~ C4	300

Leg Book / Pages 2/34
File Folder 24a
Initials SKW Date 21FEB13

PROOFED BY
Initials: SKW Date: 21FEB13
REVIEWED BY
Initials: SM Date: 4-5-13

① Delivery tubes incorrectly placed. See Deviation #19 for explanation. KW 26SEP13

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AEH 12 PSEUDO 03
Pg 1 of 6

to

Log Book/Pages 2/34
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JHU Date: 4-5-13

Analysis performed by J. Luoma SAS version 9.2 13:01 24SEP12

Item No. 1

AFM 12 PSEUDO 03

Pg 2 of 6

to

```
4     *  date created  : 24 Sept 2012 - JAL
5     *  Verified by:  _______ (Date:_______)                    page ____ of ____
6     *  Random allocation of treatment to tank.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 "Analysis performed by J. Luoma SAS version " &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;
13
14    /*Random assignment of treatment to experimental tanks*/
15    /*Fish species: Channel Catfish*/
16    data fish;
17     do block = 1 to 3 by 1;
18      do tank = 1 to 5 by 1;
19       x = ranuni(-1);
20       output;
21      end;
22     end;
23    run;

NOTE: The data set WORK.FISH has 15 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


24    data fish2; set fish;
25     if block = 1 and tank = 1 then tankn = 'A1';
26      if block = 1 and tank = 2 then tankn = 'A2';
27       if block = 1 and tank = 3 then tankn = 'A3';
28        if block = 1 and tank = 4 then tankn = 'A4';
29         if block = 1 and tank = 5 then tankn = 'A5';
30     if block = 2 and tank = 1 then tankn = 'B1';
31      if block = 2 and tank = 2 then tankn = 'B2';
32       if block = 2 and tank = 3 then tankn = 'B3';
33        if block = 2 and tank = 4 then tankn = 'B4';
34         if block = 2 and tank = 5 then tankn = 'B5';
35     if block = 3 and tank = 1 then tankn = 'C1';
36      if block = 3 and tank = 2 then tankn = 'C2';
37       if block = 3 and tank = 3 then tankn = 'C3';
38        if block = 3 and tank = 4 then tankn = 'C4';
39         if block = 3 and tank = 5 then tankn = 'C5';
40         run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


41    proc sort data=fish2;
42     by block x;
43    run;
```

Log Book / Pages 2/34
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JL Date: 4-5-13

Item No. 1

AEH 12 PSEUDO 03

Pg 3 of 6

```
NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 15 observations and 4 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds
```

Log Book / Pages 2/34
File Folder 240
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JL Date: 4-5-13

```
44
45   data assign_trt_fish; set fish2;
46    if _n_ = 1 then trt = 'control';
47     if _n_ = 2 then trt = '50';
48      if _n_ = 3 then trt = '100';
49       if _n_ = 4 then trt = '200';
50    if _n_ = 5 then trt = '300';
51     if _n_ = 6 then trt = 'control';
52      if _n_ = 7 then trt = '50';
53       if _n_ = 8 then trt = '100';
54    if _n_ = 9 then trt = '200';
55     if _n_ = 10 then trt = '300';
56      if _n_ = 11 then trt = 'control';
57       if _n_ = 12 then trt = '50';
58     if _n_ = 13 then trt = '100';
59      if _n_ = 14 then trt = '200';
60       if _n_ = 15 then trt = '300'; run;

NOTE: There were 15 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.ASSIGN_TRT_FISH has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


61   proc print data= assign_trt_fish;
62   title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
63   title2 h=1.5 'AEH-12-PSUEDO-03';
64   title3 h=1 'Random assignment of treatment to experimental tanks';
65   title4 h=1 'Fish species: Channel Catfish';
66   run;

NOTE: There were 15 observations read from the data set WORK.ASSIGN_TRT_FISH.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


NOTE: This SAS session is using a registry in WORK.  All changes will be lost at the end of this
      session.
```

Item No. 1

AEH 12 PSEUDO 03

Pg 4 of 6

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```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 24 Sept 2012 - JAL
*  Verified by:  _____ (Date:_____)                    page ____ of ____
*  Random allocation of treatment to tank.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1  Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options /*ls=85 ps=40 formdlim='-' */ pageno = 1 nocenter nodate nosource2;

/*Random assignment of treatment to experimental tanks*/
/*Fish speces: Channel Catfish*/
data fish;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
 end;
run;
data fish2; set fish;
 if block = 1 and tank = 1 then tankn = 'A1';
  if block = 1 and tank = 2 then tankn = 'A2';
   if block = 1 and tank = 3 then tankn = 'A3';
    if block = 1 and tank = 4 then tankn = 'A4';
     if block = 1 and tank = 5 then tankn = 'A5';
 if block = 2 and tank = 1 then tankn = 'B1';
  if block = 2 and tank = 2 then tankn = 'B2';
   if block = 2 and tank = 3 then tankn = 'B3';
    if block = 2 and tank = 4 then tankn = 'B4';
     if block = 2 and tank = 5 then tankn = 'B5';
 if block = 3 and tank = 1 then tankn = 'C1';
  if block = 3 and tank = 2 then tankn = 'C2';
   if block = 3 and tank = 3 then tankn = 'C3';
    if block = 3 and tank = 4 then tankn = 'C4';
     if block = 3 and tank = 5 then tankn = 'C5';
     run;
proc sort data=fish2;
 by block x;
run;

data assign_trt_fish; set fish2;
 if _n_ = 1 then trt = 'control';
  if _n_ = 2 then trt = '50';
   if _n_ = 3 then trt = '100';
    if _n_ = 4 then trt = '200';
 if _n_ = 5 then trt = '300';
  if _n_ = 6 then trt = 'control';
   if _n_ = 7 then trt = '50';
    if _n_ = 8 then trt = '100';
 if _n_ = 9 then trt = '200';
  if _n_ = 10 then trt = '300';
   if _n_ = 11 then trt = 'control';
```

Log Book / Pages 2/34
24a
JKW 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JPL Date: 4-5-13

Item No. 1

AEH 12 PSEUDO 03

Pg 5 of 6

```
    if _n_ = 12 then trt = '50';
  if _n_ = 13 then trt = '100';
   if _n_ = 14 then trt = '200';
    if _n_ = 15 then trt = '300'; run;
proc print data= assign_trt_fish;
title1 h=2 'Effects of Psuedomonas fluorescens (Pf-CL145A) to fish';
title2 h=1.5 'AEH-12-PSUEDO-03';
title3 h=1 'Random assignment of treatment to experimental tanks';
title4 h=1 'Fish species: Channel Catfish';
run;
```

Log Book / Pages 2/34
File Folder 240
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials JKW Date 4-5-13

Item No. 1

AEH 12 PSEUDO 03

Pg 6 of 6

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 9/24/12 Sn
Random assignment of CCF to exposure chambers
Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round

Log Book / Pages 2/34,35 1
File Folder Z4a
Initials JKW Date 21FEB13

PROOFED BY Initials: JKW Date: 21FEB13
REVIEWED BY Initials: Sn Date: 4-5-13

Obs	round	block	tank	x	tankn
1	1	2	1	0.13758	B1
2	1	3	1	0.29574	C1
3	1	2	2	0.30223	B2
4	1	1	1	0.37882	A1
5	1	3	5	0.51370	C5
6	1	3	3	0.58580	C3
7	1	2	4	0.63838	B4
8	1	1	3	0.65997	A3
9	1	1	4	0.66138	A4
10	1	1	2	0.66429	A2
11	1	2	3	0.71795	B3
12	1	2	5	0.74658	B5
13	1	3	2	0.75921	C2
14	1	3	4	0.81158	C4
15	1	1	5	0.81944	A5
16	2	2	4	0.03948	B4
17	2	1	5	0.05799	A5
18	2	3	3	0.12392	C3
19	2	1	3	0.15977	A3
20	2	1	2	0.39820	A2
21	2	3	2	0.47657	C2
22	2	3	5	0.65369	C5
23	2	3	1	0.68378	C1
24	2	2	5	0.71651	B5
25	2	2	3	0.76927	B3
26	2	2	2	0.78230	B2
27	2	1	4	0.82283	A4
28	2	1	1	0.82561	A1
29	2	3	4	0.82817	C4
30	2	2	1	0.85458	B1
31	3	3	2	0.05328	C2
32	3	2	3	0.13146	B3
33	3	1	4	0.19878	A4
34	3	1	1	0.20461	A1
35	3	3	4	0.22170	C4
36	3	2	2	0.26879	B2
37	3	3	5	0.30082	C5
38	3	3	3	0.56798	C3
39	3	1	3	0.65613	A3
40	3	1	2	0.66526	A2
41	3	2	4	0.72212	B4
42	3	3	1	0.72453	C1
43	3	2	5	0.74691	B5
44	3	2	1	0.91514	B1
45	3	1	5	0.97231	A5

to Pg

Item No. 2

AEH 12 PSEUDO 03

Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 12:47 24SEP12

Log Book / Pages 2/34,35
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: SDL Date: 4-5-13

Item No. 2

AEH 12 PSEUDO 03

Pg 2 of 5

to pg

```
60    *  date created  : 24 September 2012 - JAL
61    *  Verified by:  _____(Date:_____)                    page ____ of ____
62    *  Random allocation of fish to chamber.sas
63    ************************************************************************/
64    DM 'LOG; CLEAR; OUTPUT; CLEAR;'; * CLEAR LOG AND OUTPUT;
65
66    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
67
68    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
69
70    /*Random distribution of fish to experimental chambers*/
71    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
72       round = distribution rounds 1 to 3, place one aliquot of Fish per tank per round */
73
74    /*************************************************************************************************
74 !  **********/
75
76    /*fish species: Channel Catfish*/
77    data fish;
78     do round = 1 to 3 by 1;
79     do block = 1 to 3 by 1;
80      do tank = 1 to 5 by 1;
81       x = ranuni(-1);
82       output;
83      end;
84      end;
85     end;
86    run;

NOTE: The data set WORK.FISH has 45 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


87    data fishdist; set fish;
88    if block = 1 and tank = 1 then tankn = ' A1';
89      if block = 1 and tank = 2 then tankn = ' A2';
90       if block = 1 and tank = 3 then tankn = ' A3';
91        if block = 1 and tank = 4 then tankn = ' A4';
92         if block = 1 and tank = 5 then tankn = ' A5';
93     if block = 2 and tank = 1 then tankn = ' B1';
94      if block = 2 and tank = 2 then tankn = ' B2';
95       if block = 2 and tank = 3 then tankn = ' B3';
96        if block = 2 and tank = 4 then tankn = ' B4';
97         if block = 2 and tank = 5 then tankn = ' B5';
98    if block = 3 and tank = 1 then tankn = ' C1';
99      if block = 3 and tank = 2 then tankn = ' C2';
100      if block = 3 and tank = 3 then tankn = ' C3';
101       if block = 3 and tank = 4 then tankn = ' C4';
102        if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 45 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/34,35
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JAL Date: 4-5-13

Item No. 2

AEH 12 PSEUDO 03

Pg 3 of 5

```
      real time             0.01 seconds
      cpu time              0.01 seconds
```

Log Book / Pages 2/34,35
File Folder 299
Initials JKW Date 21FEB13
PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: SAL Date: 8-5-13

```
103
104
105  proc sort data= fishdist;
106   by round x;
107   run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 45 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time             0.00 seconds
      cpu time              0.00 seconds


108  proc print data = fishdist;
109  title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
110  title2 h=1 'Random assignment of CCF to exposure chambers';
111  title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
112  run;

NOTE: There were 45 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time             0.01 seconds
      cpu time              0.01 seconds


NOTE: This SAS session is using a registry in WORK.  All changes will be lost at the end of this
      session.
```

Item No. 2

AEH 12 PSEUDO 03

Pg 4 of 5

```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03
*  Study Director: Jim Luoma
*  date created  : 24 September 2012 - JAL JL
*  Verified by:  _______ (Date:_______)                    page ____ of ____
*  Random allocation of fish to chamber.sas
*********************************************************************/
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish to experimental chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = distribution rounds 1 to 3,. place one aliquot of Fish per tank per round */

/*****************************************************************************************************

/*fish species: Channel Catfish*/
data fish;
 do round = 1 to 3 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;


proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Random assignment of CCF to exposure chambers';
title3 h=1 'Round 1 and 2 = 10 fish/round, round 3 = 5 fish/round';
run;
```

Log Book / Pages 2/34, 35
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13

REVIEWED BY
Initials: JL Date: 4-5-13

Item No. 2

AEH 12 PSEUDO 03

Pg 5 of 5

AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish 9-24-12 Sa ~
Move exposure chamber to sequentially numbered holding chamber
ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2, etc

Obs	round	block	tank	x	tankn
1	1	3	1	0.02812	C1
2	1	1	2	0.13843	A2
3	1	2	5	0.17756	B5
4	1	2	4	0.31948	B4
5	1	3	2	0.56113	C2
6	1	3	4	0.63763	C4
7	1	2	3	0.63830	B3
8	1	1	4	0.72923	A4
9	1	1	5	0.77883	A5
10	1	3	3	0.82187	C3
11	1	3	5	0.83545	C5
12	1	2	2	0.86888	B2
13	1	1	3	0.90872	A3
14	1	2	1	0.95042	B1
15	1	1	1	0.97013	A1

Log Book / Pages 2/34,37
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: SA Date: 4-5-13

Item No. 3

AEH 12 PSEUDO 03

Pg 1 of 5

Analysis performed by J. Luoma SAS version 9.2 12:54 24SEP12

Log Book / Pages 2/34,37
File Folder 24a
Initials JKW Date 21FEB13

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: SAL Date: 4-5-13

Item No. 3

to

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```
4     *  date created  : 24 September 2012 - JAL
5     *  Verified by:  _____ (Date:_____)                    page ____ of ____
6     *  Random allocation of exposure chambers to holding chambers.sas
7     ************************************************************************/
8     DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
9
10    FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
11
12    options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;
13
14    /*Random distribution of fish from exposure chambers to holding chambers*/
15    /* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
16       round = 1, place one all fish from exposure chamber to the the holding chamber  */
17
18    /*************************************************************************************************
18 !  **********/
19
20    /*fish species: Channel Catfish*/
21    data fish;
22     do round = 1 to 1 by 1;
23     do block = 1 to 3 by 1;
24      do tank = 1 to 5 by 1;
25       x = ranuni(-1);
26       output;
27      end;
28      end;
29     end;
30    run;

NOTE: The data set WORK.FISH has 15 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds


31    data fishdist; set fish;
32    if block = 1 and tank = 1 then tankn = ' A1';
33      if block = 1 and tank = 2 then tankn = ' A2';
34       if block = 1 and tank = 3 then tankn = ' A3';
35        if block = 1 and tank = 4 then tankn = ' A4';
36         if block = 1 and tank = 5 then tankn = ' A5';
37     if block = 2 and tank = 1 then tankn = ' B1';
38      if block = 2 and tank = 2 then tankn = ' B2';
39       if block = 2 and tank = 3 then tankn = ' B3';
40        if block = 2 and tank = 4 then tankn = ' B4';
41         if block = 2 and tank = 5 then tankn = ' B5';
42    if block = 3 and tank = 1 then tankn = ' C1';
43      if block = 3 and tank = 2 then tankn = ' C2';
44       if block = 3 and tank = 3 then tankn = ' C3';
45        if block = 3 and tank = 4 then tankn = ' C4';
46         if block = 3 and tank = 5 then tankn = ' C5'; run;

NOTE: There were 15 observations read from the data set WORK.FISH.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: DATA statement used (Total process time):
```

Log Book / Pages 2/34,37
File Folder 249
Initials JAL Date 21FEB13

PROOFED BY
Initials: JAL Date: 21FEB13
REVIEWED BY
Initials: SAC Date: 4-5-13

Item No. 3

AEH 12 PSEUDO 03

Pg 3 of 5

```
      real time           0.02 seconds
      cpu time            0.03 seconds
```

Log Book / Page 2/34,37
File Folder 24a
Initials JKW Date 21FEB13

```
47
48
49   proc sort data= fishdist;
50    by round x;
51    run;
```

PROOFED BY
Initials: JKW Date: 21FEB13
REVIEWED BY
Initials: JMC Date: 4-5-13

```
NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: The data set WORK.FISHDIST has 15 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


52   proc print data = fishdist;
53   title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
54   title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
55   title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding
55 ! chamber 2, etc';
56   run;

NOTE: There were 15 observations read from the data set WORK.FISHDIST.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


NOTE: This SAS session is using a registry in WORK.  All changes will be lost at the end of this
      session.
```

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```
/*********************************************************************
*  Study Number  : AEH-12-PSUEDO-03                    Log Book / Pages 2/34, 37
*  Study Director: Jim Luoma                           File Folder 24A
*  date created  : 24 September 2012 - JAL JL          Initials JKW  Date 21FEB13
*  Verified by:  _______ (Date:_______)          page ____ of ____   PROOFED BY
*  Random allocation of exposure chambers to holding chambers.sas    Initials: JKW Date: 21FEB13
*********************************************************************/   REVIEWED BY
                                                                       Initials: JL Date: 4-5-13
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Analysis performed by J. Luoma SAS version ' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=58 formdlim='-'  pageno = 1 nocenter nodate nosource2;

/*Random distribution of fish from exposure chambers to holding chambers*/
/* tank 1 to 15 = tank A1 to A5 (1-5), tank B1 to B5 (6-10), tank C1 to C5 (11-15)
   round = 1, place one all fish from exposure chamber to the the holding chamber  */

/*****************************************************************************************************/

/*fish species: Channel Catfish*/
data fish;
 do round = 1 to 1 by 1;
 do block = 1 to 3 by 1;
  do tank = 1 to 5 by 1;
   x = ranuni(-1);
   output;
  end;
  end;
 end;
run;
data fishdist; set fish;
if block = 1 and tank = 1 then tankn = ' A1';
  if block = 1 and tank = 2 then tankn = ' A2';
   if block = 1 and tank = 3 then tankn = ' A3';
    if block = 1 and tank = 4 then tankn = ' A4';
     if block = 1 and tank = 5 then tankn = ' A5';
 if block = 2 and tank = 1 then tankn = ' B1';
  if block = 2 and tank = 2 then tankn = ' B2';
   if block = 2 and tank = 3 then tankn = ' B3';
    if block = 2 and tank = 4 then tankn = ' B4';
     if block = 2 and tank = 5 then tankn = ' B5';
if block = 3 and tank = 1 then tankn = ' C1';
  if block = 3 and tank = 2 then tankn = ' C2';
   if block = 3 and tank = 3 then tankn = ' C3';
    if block = 3 and tank = 4 then tankn = ' C4';
     if block = 3 and tank = 5 then tankn = ' C5'; run;

proc sort data= fishdist;
 by round x;
 run;
proc print data = fishdist;
title1 h=1 'AEH-12-PSUEDO-03: Effects of Pf-CL145A to Fish';
title2 h=1 'Move exposure chamber to sequentially numbered holding chamber';
title3 h=1 'ie: top listed exposure chamber to holding chamber 1, second listed to holding chamber 2,
run;
```

Item No. 3

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Appendix 4. Test Article Information

Item number	Item description	Number of pages	Report page number
1	Material Safety Data Sheet	2	308
2	MBI-401 SDP [lot # TR 4669-3-(6)] Test Article Information	4	310
3	MBI-401 SDP [lot # TR 4669-4-(6)] Test Article Information	4	314
4	MBI-401 SDP [lot # TR 4669-4-(7-8)] Test Article Information	4	318
5	MBI-401 SDP [lot # TR 4669-4-(7-8) 2nd shipment] Test Article Information	5	322
6	MBI-401 SDP [lot # TR 4669-4-(5)] Test Article Information	6	327
7	MBI-401 SDP [lot # TR 4669-4-(5) 2nd shipment] Test Article Information	6	333
8	MBI-401 SDP [lot # TR 4669-4-(5) 3rd shipment] Test Article Information	5	339
9	MBI-401 SDP [lot # TR 4669-3-(7)] Test Article Information	9	344
10	MBI-401 SDP [lot # 401P12154G-02] Test Article Information	9	353
11	MBI-401 SDP [lot # 401P12154G-02 2nd shipment] Test Article Information	5	362
12	MBI-401 SDP [lot # 401P120197C] Test Article Information	4	367
13	Form 15 – Test chemical dosing form	11	371
14	Certified copy of test chemical information from chemical log books	121	382

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Initials: HEM Date: 27Mar13

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Item No.
Pg 1 of 7

MBI-401 Spray Dried Powder, August 2010 — MATERIAL SAFETY DATA SHEET — AEH-12-PSEUDO-03 — Page 1 of 2

Product Name: MBI-401 SDP

Contact: Marrone Bio Innovations, 2121 Second Street, Suite B-107, Davis, CA 95618
Phone (Business hours): 530-750-2800
www.marronebioinnovations.com
For emergencies such as leaks or spills call CHEMTREC 24-hour toll-free hotline at 1.800.424.9300

Trade names/ Synonyms: MBI-401 SDP
EPA Registration Number: None, Experimental
PMRA Research Authorization #: 0030-RP-10
Primary Hazards: Inhalation

SECTION 1: MATERIAL IDENTIFICATION

INGREDIENT 1
Common Name: CL145A strain of *Pseudomonas fluorescens*
Chemical Name: Not applicable
Molecular Formula: Not applicable
CAS Number: Not applicable
Percent: 50%

OTHER INGREDIENTS: inert, non-reactive

SECTION 2: PHYSICAL DATA

Boiling Point: Not applicable
Melting Point: Not applicable
Bulk Density: 0.78 g/ml
Solubility in Water: Dispersible in water
Appearance: Powder
Color: Tan
Odor: Sweet, musty

SECTION 3: FIRE AND EXPLOSION DATA

Flash Point: Not flammable
Method: Not applicable
Extinguishing Media: Use extinguishing media appropriate for the surrounding fire

Special Fire Fighting Procedures: None
Unusual Fire and Explosion Hazards: None

SECTION 4: REACTIVITY

Stability: Material is non-reactive
Hazardous Polymerization: Does not occur
Incompatibility: None known
Hazardous Decomposition Products: None known
Conditions to avoid: None known

SECTION 5: HEALTH HAZARDS

Primary Route of Entry: Skin contact, Eye, Inhalation
Exposure Limit: Not established
Corrosive: Not corrosive
Inhalation: May be irritating to respiratory tract for some individuals. Avoid breathing dust.
Skin/ Eye Irritation: May be irritating to skin and eyes for some individuals.
Effects of Overexposure: If product comes in contact with eyes or skin, irritation may occur.
Toxicity: None of the components of this product are listed as carcinogenic by NTP, IARC, OSHA
Acute studies:
Acute Oral LD_{50} (Rat): >5,000 mg/kg (very low toxicity)
Acute Dermal LD_{50} (Rabbit) >2,000 mg/kg (non-irritating, mild or slight irritation)
Primary Dermal Irritation Slight Irritation, Class 4
Eye Irritation Minimal Irritation, Class 4
Inhalation: >2.25 g/ml, Class 4

SECTION 6: FIRST AID

Emergency First Aid Procedures:
If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center of doctor for treatment advice.
If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
If on skin: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.
If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

AEH-12-PSEUDO-03

Pg 1 of 2

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Initials: HGM Date: 27Mar13

AEH-12-PSEUDO-03

MATERIAL SAFETY DATA SHEET

MBI-401 Spray Dried Powder, August 2010

SECTION 7: SPILL, LEAK AND DISPOSAL PROCEDURES

Steps to be taken in case material is released or spilled:

Wear suitable protective clothing such as long-sleeved shirt, pants, waterproof gloves and shoes with socks. Carefully mop or sweep up spill and place in a closed container for disposal.

Waste disposal method: Dispose of in accordance with all applicable federal, state, and local environmental regulations.

For emergencies such as leaks or spills, call CHEMTREC 24-hour toll-free hotline at 1.800.424.9300.

SECTION 8: SPECIAL HANDLING

Respiratory: Use a NIOSH approved respirator with any N-95, P-95, R-95 or HE filter for biological products when mixing/loading the product.

Protective gloves: Wear gloves made of Latex or other impervious material.

Eye protection: Safety goggles or safety glasses with side shields recommended.

Other protective clothes: Clothing to prevent prolonged skin contact as needed such as long-sleeved shirt, long pants and shoes with socks.

SECTION 9: SPECIAL PRECAUTIONS

Precautions to be taken in handling and storing:

Use a NIOSH approved respirator with any N-95, P-95, R-95 or HE filter for biological products when mixing/loading the product.

Store in a dry area inaccessible to children. Store in original containers only. Keep container closed when not in use.

Empty container completely and dispose of in accordance with all applicable federal, state, and local environmental regulations.

Wash any contamination from skin or eyes immediately. Wash hands and exposed skin before eating, drinking, smoking after work or using the toilet.

SECTION 10: SHIPPING REGULATIONS

Proper shipping name:	None
DOT Label (s) Required:	None
Freight Classification:	Insecticides, Fungicides N.O.I., Other Than Poisons. NMFC 102120 Class 60

SARA Title III Hazard Classification:

Immediate (acute) Health:	None
Delayed (chronic) Health:	None
Fire:	None
Sudden Release of Pressure:	None
Reactivity:	None

National Fire Protection Association Rating:

Health:	None
Flammability:	None
Reactivity:	None

This document set forth is based on information that Marrone Bio Innovations, Inc. (MBI) believes to be accurate. No warranty, expressed or implied, is intended. The information is provided solely for your information and consideration and MBI assumes no legal responsibility for use or reliance thereon.

Marrone Bio Innovations™

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Item No. 1
Pg 2 of 2

Pg 2 of 2

Marrone™ Bio Innovations

AEH-12-PSEUDO-03

CERTIFICATE OF ANALYSIS

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-3-(6)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	26 January 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 13 February 2012

Tamara Nicholson, Quality Control Supervisor

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Item No. 2
Pg 1 of 1

Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

AEH-12-PSEUDO-03

edEx. US Airbill Express — FedEx Tracking Number: chemical 8687 2524 5962

From Please print and press hard.
Date 12 MAR 12 — Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber — Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD — Dept/Floor/Suite/Room
City LA CROSSE — State WI — ZIP 54603-1223
Your Internal Billing Reference (first 24 characters will appear on invoice) — OPTIONAL

To
Recipient's Name Denise Mayer — Phone (518) 677-8245
Company New York State Museum
Recipient's Address Field Research Laboratory (We cannot deliver to P.O. boxes or P.O. ZIP codes.) — Dept/Floor/Suite/Room
Address 51 Fish Hatchery Rd. (To request a package be held at a specific FedEx location, print FedEx address here.)
City Cambridge — State NY — ZIP 12816

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Initials: Hem Date: 27Mar13

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Form 0215 — Sender's Copy

4a Express Package Service — Packages up to 150 lbs.
- [ ] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. — * To most locations.

4b Express Freight Service — Packages over 150 lbs.
- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation. — ** To most locations.

5 Packaging
- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

* Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.
- [ ] SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- [ ] HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging. — [ ] Cargo Aircraft Only

7 Payment Bill to: — Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages — Total Weight — Total Declared Value†
$ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this AirBill you agree to the service conditions on the back of this AirBill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.
- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [x] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

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edEx. US Airbill Express — FedEx Tracking Number: containers 8687 2524 5837

From Please print and press hard.
Date 12 MAR 12 — Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber — Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD — Dept/Floor/Suite/Room
City LA CROSSE — State WI — ZIP 54603-1223
Your Internal Billing Reference (first 24 characters will appear on invoice) — OPTIONAL

To
Recipient's Name Denise Mayer — Phone (518) 677-8245
Company New York State Museum — FF# 9
Recipient's Address Field Research Laboratory (We cannot deliver to P.O. boxes or P.O. ZIP codes.) — Item No. 3 — Pg 1 of 1 — Dept/Floor/Suite/Room
Address 51 Fish Hatchery Rd. (To request a package be held at a specific FedEx location, print FedEx address here.)
City Cambridge — State NY — ZIP 12816

Pg 1 of 1 0396746560

Store your addresses at fedex.com
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MAR 11

Form 0215 — Sender's Copy

4a Express Package Service — Packages up to 150 lbs.
- [ ] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. — * To most locations.

4b Express Freight Service — Packages over 150 lbs.
- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation. — ** To most locations.

5 Packaging
- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

* Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.
- [ ] SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- [ ] HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging. — [ ] Cargo Aircraft Only

7 Payment Bill to: — Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages — Total Weight — Total Declared Value†
$ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this AirBill you agree to the service conditions on the back of this AirBill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.
- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [x] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 TR-4669-3-(6)
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/03/13
Date of start of test: 03/21/2012

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP-TR-4669-3-(6)
  - USGS Study #AEH-12-PSEUDO-03; RBT

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-3-(6) from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:
Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-3-(6) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):
As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 11-14-2011 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 65.65 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:
Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	12/09/2011	03/12/2012	03/20/2012

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Item No. 4
Pg 1 of 2

Experimental design:
For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):
3 – Untreated Control
3 – 200 ppm (a.i.) Cambridge CF Positive Control B (A, B, C) (produced on 11-14-2011)
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-3-(6) #1
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-3-(6) #2
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-3-(6) #3

Testing jar bioassay protocol:
On the day prior to treatment (03/20/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (03/21/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 29 days (30 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 13.18 ± 3.22 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.002 ± 0.001
Cambridge CF (Positive Control)	0.177 ± 0.002
MBI-401 SDP TR-4669-3-(6) #1	0.208 ± 0.003
MBI-401 SDP TR-4669-3-(6) #2	0.211 ± 0.005
MBI-401 SDP TR-4669-3-(6) #3	0.204 ± 0.007

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 30 days.

Treatment	Mean % mortality (±SD)	Combined Mean % Mortality (±SD)
Untreated Control	1.3 ± 2.3%	
Cambridge CF (Positive Control)	94.7 ± 6.1%	
MBI-401 SDP TR-4669-3-(6) #1	92.0 ± 6.9%	**90.7 ± 3.5%**
MBI-401 SDP TR-4669-3-(6) #2	86.7 ± 6.1%	
MBI-401 SDP TR-4669-3-(6) #3	93.3 ± 8.3%	

MBI-401 SDP TR-4669-3-(6) PASSED the post-test bioassay validation (91% mortality). Untreated control mortality was 1%.

FF # 9
Item No. 4
Pg 2 of 2

Pg 2 of 2

CERTIFIED COPY
Initials: HEM Date: 27Mar13

AEH-12-PSEUDO-03

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(6)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	08 February 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

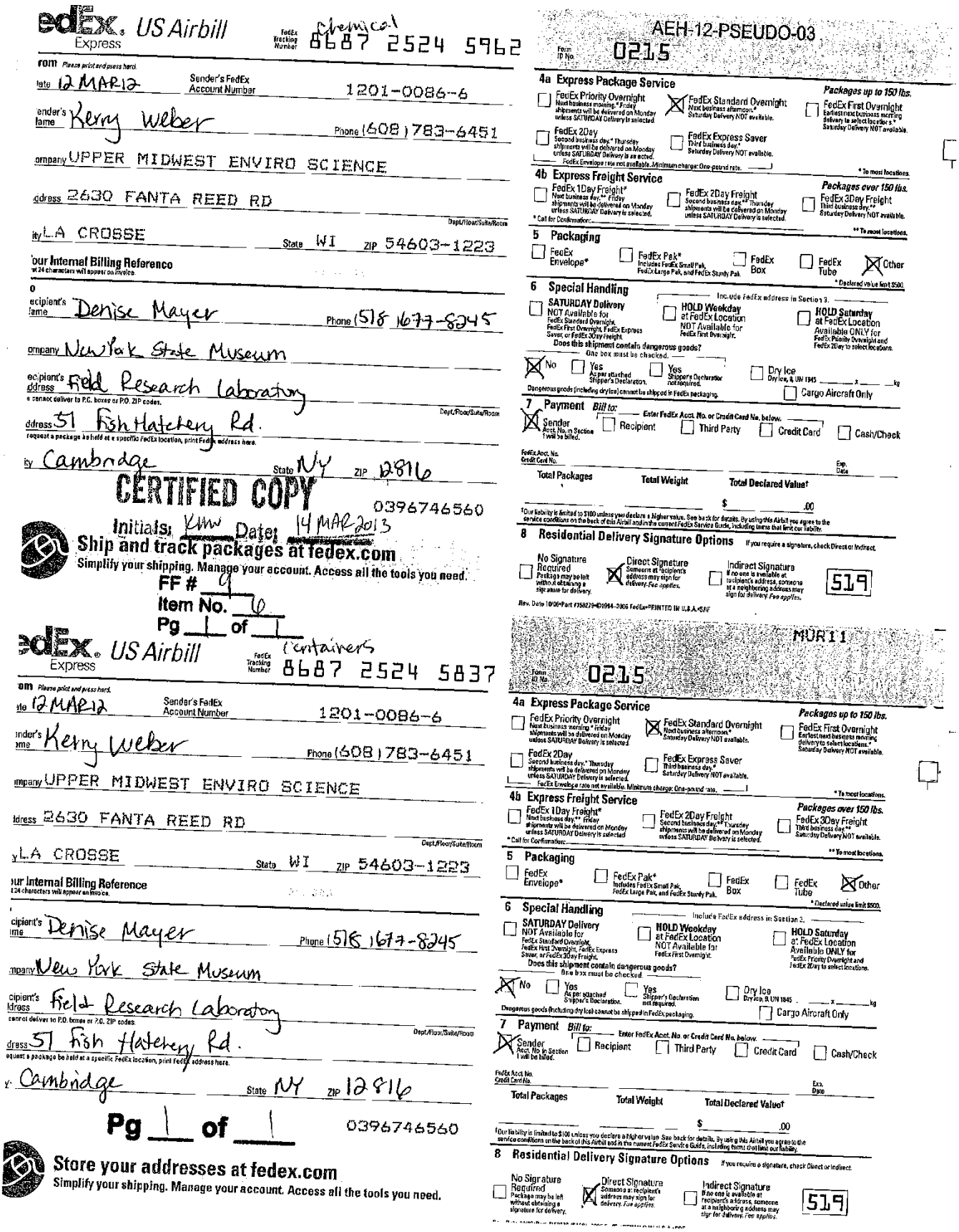
Quality Control: [redacted]
Tamara Nicholson, Quality Control Supervisor

Date: 13 February 2012

FF # 9
Item No. 5
Pg 1 of 1

Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800



FedEx Express US Airbill — FedEx Tracking Number 8687 2524 5962 (chemical)

AEH-12-PSEUDO-03

Form ID No. 0215

From
Date 12 MAR 12 — Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber — Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD — Dept/Floor/Suite/Room
City LA CROSSE — State WI — ZIP 54603-1223
Your Internal Billing Reference (first 24 characters will appear on invoice)

To
Recipient's Name Denise Mayer — Phone (518) 677-8245
Company New York State Museum
Recipient's Address Field Research Laboratory (cannot deliver to P.O. boxes or P.O. ZIP codes.) — Dept/Floor/Suite/Room
Address 57 Fish Hatchery Rd. (request a package be held at a specific FedEx location, print FedEx address here.)
City Cambridge — State NY — ZIP 12816

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Initials: KMW Date: 14 MAR 2013

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FF # 4
Item No. 6
Pg 1 of 2

4a Express Package Service (Packages up to 150 lbs.)
- FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [X] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. * To most locations.

4b Express Freight Service (Packages over 150 lbs.)
- FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation: ** To most locations.

5 Packaging
- FedEx Envelope*
- FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- FedEx Box
- FedEx Tube
- [X] Other — * Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.
- SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? (One box must be checked.)
- [X] No
- Yes — As per attached Shipper's Declaration.
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Dangerous goods (including dry ice) cannot be shipped in FedEx packaging. Cargo Aircraft Only

7 Payment Bill to: — Enter FedEx Acct. No. or Credit Card No. below.
- [X] Sender — Acct. No. in Section 1 will be billed.
- Recipient
- Third Party
- Credit Card
- Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages — Total Weight — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.
- No Signature Required — Package may be left without obtaining a signature for delivery.
- [X] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

519

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MUR11

Form ID No. 0215

4a Express Package Service (Packages up to 150 lbs.)
- FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [X] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. * To most locations.

4b Express Freight Service (Packages over 150 lbs.)
- FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation: ** To most locations.

5 Packaging
- FedEx Envelope*
- FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- FedEx Box
- FedEx Tube
- [X] Other — * Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.
- SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? (One box must be checked.)
- [X] No
- Yes — As per attached Shipper's Declaration.
- Yes — Shipper's Declaration not required.
- Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging. Cargo Aircraft Only

7 Payment Bill to: — Enter FedEx Acct. No. or Credit Card No. below.
- [X] Sender — Acct. No. in Section 1 will be billed.
- Recipient
- Third Party
- Credit Card
- Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages — Total Weight — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.
- No Signature Required — Package may be left without obtaining a signature for delivery.
- [X] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

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FedEx Express US Airbill — FedEx Tracking Number 8687 2524 5837 (containers)

From
Date 12 MAR 12 — Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber — Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD — Dept/Floor/Suite/Room
City LA CROSSE — State WI — ZIP 54603-1223
Your Internal Billing Reference (first 24 characters will appear on invoice)

To
Recipient's Name Denise Mayer — Phone (518) 677-8245
Company New York State Museum
Recipient's Address Field Research Laboratory (cannot deliver to P.O. boxes or P.O. ZIP codes.) — Dept/Floor/Suite/Room
Address 57 Fish Hatchery Rd. (request a package be held at a specific FedEx location, print FedEx address here.)
City Cambridge — State NY — ZIP 12816

Pg 2 of 2

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP TR-4669-4-(6)
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/03/13
Date of start of test: 03/21/2012

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(6)
  - USGS Study #AEH-12-PSEUDO-03; YEP

PURPOSE: Post-test product validation of MBI-401 SDP-TR-4669-4-(6) from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:
Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(6) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspenstion was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):
As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 11-14-2011 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 65.65 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:
Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	12/09/2011	03/12/2012	03/20/2012

Experimental design:
For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):
3 – Untreated Control
3 – 200 ppm (a.i.) Cambridge CF Positive Control B (A, B, C) (produced on 11-14-2011)
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(6) #1
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(6) #2
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(6) #3

Testing jar bioassay protocol:
On the day prior to treatment (03/20/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (03/21/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 29 days (30 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 13.18 ± 3.22 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.002 ± 0.001
Cambridge CF (Positive Control)	0.177 ± 0.002
MBI-401 SDP TR-4669-4-(6) #1	0.206 ± 0.004
MBI-401 SDP TR-4669-4-(6) #2	0.216 ± 0.004
MBI-401 SDP TR-4669-4-(6) #3	0.209 ± 0.010

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 30 days.

Treatment	Mean % mortality (±SD)	Combined Mean % Mortality (±SD)
Untreated Control	1.3 ± 2.3%	
Cambridge CF (Positive Control)	94.7 ± 6.1%	
MBI-401 SDP TR-4669-4-(6) #1	82.7 ± 16.7%	
MBI-401 SDP TR-4669-4-(6) #2	77.3 ± 8.3%	**76.9 ± 6.0%**
MBI-401 SDP TR-4669-4-(6) #3	70.7 ± 15.1%	

MBI-401 SDP TR-4669-4-(6) PASSED the post-test bioassay validation (77% mortality). Untreated control mortality was 1%.

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 7
Pg 2 of 2

Pg 2 of 2

Marrone™ Bio Innovations

AEH-12-PSEUDO-03

CERTIFICATE OF ANALYSIS

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(7-8)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	26 January 2012
Expiration Date:	1 year from date of manufacture

AEH-12-PSEUDO-03

I hereby certify that the above information is true and correct.

Quality Control: [redacted]
Tamara Nicholson, Quality Control Supervisor

Date: 13 February 2012

FF # 9
Item No. 8
Pg 1 of 1

Pg 1 of 1

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PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

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Initials: HEN Date: 27Mar13

FedEx Express US Airbill

FedEx Tracking Number 8687 2524 8983

Form I.D. No. 0215 — Sender's Copy — MUR11

1 From
Date 9 APR12 — Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber — Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD — Dept/Floor/Suite/Room
City LA CROSSE — State WI — ZIP 54603-1223

2 Your Internal Billing Reference — OPTIONAL

3 To
Recipient's Name Denise Mayer — Phone (518) 677-8245
Company New York State Museum
Recipient's Address Field Research Laboratory
We cannot deliver to P.O. boxes or P.O. ZIP codes. — Dept/Floor/Suite/Room
Address 51 Fish Hatchery Road
To request a package be held at a specific FedEx location, print FedEx address here.
City Cambridge — State NY — ZIP 12816

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4a Express Package Service — Packages up to 150 lbs.
- [ ] FedEx Priority Overnight
- [X] FedEx Standard Overnight
- [ ] FedEx First Overnight
- [ ] FedEx 2Day
- [ ] FedEx Express Saver

4b Express Freight Service — Packages over 150 lbs.
- [ ] FedEx 1Day Freight
- [ ] FedEx 2Day Freight
- [ ] FedEx 3Day Freight

5 Packaging
- [ ] FedEx Envelope
- [ ] FedEx Pak
- [ ] FedEx Box
- [ ] FedEx Tube
- [X] Other

6 Special Handling
- [ ] SATURDAY Delivery
- [ ] HOLD Weekday at FedEx Location
- [ ] HOLD Saturday at FedEx Location

Does this shipment contain dangerous goods?
- [X] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice
- [ ] Cargo Aircraft Only

7 Payment Bill to:
- [X] Sender
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

Total Packages	Total Weight	Total Declared Value
1		$ .00

8 Residential Delivery Signature Options
- [ ] No Signature Required
- [ ] Direct Signature
- [ ] Indirect Signature

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FF # 9
Item No. ~~8~~ 9 (wrong item number KWO 2Apr13)
Pg 1 of 1

NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-4-(7-8)
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/04/10
Date of start of test: 04/19/2012

..EH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(7-8)
    - USGS Study #AEH-12-PSEUDO-03; WAE

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-4-(7-8) from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(7-8) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 11-14-2011 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 65.65 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	12/09/2011	03/12/2012	04/18/2012

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 7 10 wrong item number HEM 27MAR13
Pg 1 of 2

Pg 1 of 2

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control
3 – 200 ppm (a.i.) Cambridge CF Positive Control B (A, B, C) (produced on 11-14-2011)
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(7-8) #1
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(7-8) #2
3 – 200 ppm (a.i.) (1, 2, 3) - MBI-401 SDP TR-4669-4-(7-8) #3

Testing jar bioassay protocol:

On the day prior to treatment (04/18/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (04/19/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 13 days (14 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 13.84 ± 2.47 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.003 ± 0.002
Cambridge CF (Positive Control)	0.183 ± 0.008
Cambridge CF (Positive Control) + 750 ppm KCl	0.180 ± 0.005
MBI-401 SDP 4669-4-(7-8) #1	0.207 ± 0.002
MBI-401 SDP 4669-4-(7-8) #2	0.205 ± 0.007
MBI-401 SDP 4669-4-(7-8) #3	0.207 ± 0.003

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 14 days.

Treatment	Mean % mortality (±SD)	Combined Mean % Mortality (±SD)
Untreated Control	1.3 ± 2.3%	
Cambridge CF (Positive Control)	88.0 ± 8.0%	
Cambridge CF (Positive Control) + 750 ppm KCl	50.7 ± 6.1%	
MBI-401 SDP 4669-4-(7-8) #1	72.0 ± 8.0%	**77.3 ± 4.8%**
MBI-401 SDP 4669-4-(7-8) #2	81.3 ± 10.1%	
MBI-401 SDP 4669-4-(7-8) #3	78.7 ± 6.1%	

MBI-401 SDP-4669-4-(7-8) PASSED the post-test bioassay validation (77% mortality). Untreated control mortality was 1%.

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 8 10 wrong item number HEM 20Mar13
Pg 2 of 2

Pg 2 of 2

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

PACKING LIST
DATE OF SHIPMENT - ~~2012/02/12~~ (1)

AEH-12-PSEUDO-03

FF # 9
Item No. 10 11
Pg 1 of 1

wrong item number given 20MAR13

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Pg 1 of 1

Shipping Method: UPS Next Day Air
Required by: 2012/03/13

Item Description:

MBI-401 SDP Lot # TR4669-4-(7-8) (2) in three containers (total weight 4.85 Kg):
#1 1.63 Kg
#2 1.59 Kg
#3 1.63 Kg

Shipped on ice. Store at 4°C, protected from light.

3/12/2013 [redacted]

(1) This is the incorrect date for this shipment. This shipment was received on 13MAR2012. Therefore it had to be shipped on 12 MAR 2012. See lab notebook #1 page 17 for more information. KW 22 MAR 2013.

(2) This is the second shipment for this particular lot. See lab notebook #1 page 17. KW 22MAR13

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(7-8)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	26 January 2012
Expiration Date:	1 year from date of manufacture.

I hereby certify that the above information is true and correct.

Quality Control: [redacted]
Tamara Nicholson, Quality Control Supervisor

Date: 13 February 2012

FF # 9 wrong item number Eric Summers
Item No. 12
Pg 1 of 1

Pg 1 of 1

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 1/13 (wrong item number, FW 30Mar13)
Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express US Airbill

FedEx Tracking Number 8687 2524 9410

Form ID No. 0215 MUR11

1 From Please print and press hard.
Date 23 APR12 Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber Phone (608)783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD Dept./Floor/Suite/Room
City LA CROSSE State WI ZIP 54603-1223

2 Your Internal Billing Reference First 24 characters will appear on invoice.

3 To
Recipient's Name Denise Mayer Phone (518)677-8245
Company New York State Museum
Recipient's Address Field Research Laboratory
We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room
Address 51 Fish Hatchery Rd.
To request a package be held at a specific FedEx location, print FedEx address here.
City Cambridge State NY ZIP 12816

0396746560

Find drop-off locations at fedex.com
Simplify your shipping. Manage your account. Access all the tools you need.

4a Express Package Service — *Packages up to 150 lbs.*
- [ ] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. *To most locations.

4b Express Freight Service — *Packages over 150 lbs.*
- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation. ** To most locations.

5 Packaging
- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

* Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.
- [ ] SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- [ ] HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging.

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. Exp. Date

Total Packages	Total Weight	Total Declared Value†
1		$ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options If you require a signature, check Direct or Indirect.
- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

519

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-4-(7-8) 2nd shipment
(USGS Study #AEH-12-PSEUDO-03 and AEH-11-PSEUDO-02)

Date product received from USGS: 2012/04/20 ①
Date of start of test: 05/01/2012

AEH-12-PSEUDO-03

① This is the incorrect receipt date. Should be 4/24/2012 as the product wasn't shipped until 4/23/12. HEM 4APR13

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(7-8) 2nd shipment
  - USGS Study #AEH-12-PSEUDO-03; BLG
  - USGS Study #AEH-11-PSEUDO-02; BLS

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-4-(7-8) 2nd shipment from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(7-8) 2nd shipment (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 11-14-2011 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 65.65 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	10/18/2011	04/23/2012	04/30/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control
3 – 200 ppm (a.i.) Cambridge CF Positive Control B (A, B, C) (produced on 11-14-2011)
3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(7-8) 2nd #1
3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(7-8) 2nd #2
3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(7-8) 2nd #3

Testing jar bioassay protocol:
On the day prior to treatment (04/30/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (05/01/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 37 days (38 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 12.77 ± 3.61 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.002 ± 0.0021
Cambridge CF (Positive Control)	0.177 ± 0.007
MBI-401 SDP TR-4669-4-(7-8) 2nd #1	0.203 ± 0.008
MBI-401 SDP TR-4669-4-(7-8) 2nd #2	0.199 ± 0.003
MBI-401 SDP TR-4669-4-(7-8) 2nd #3	0.195 ± 0.004

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 38 days (validation tests) and 21 days (KCl tests).

Treatment	Mean % mortality (±SD)	Combined Mean % Mortality (±SD)
Untreated Control	0.0 ± 0.0%	
Cambridge CF (Positive Control) (38 days)	92.0 ± 8.0%	
MBI-401 SDP TR-4669-4-(7-8) 2nd #1	72.0 ± 6.9%	**70.7 ± 2.3%**
MBI-401 SDP TR-4669-4-(7-8) 2nd #2	72.0 ± 4.0%	
MBI-401 SDP TR-4669-4-(7-8) 2nd #3	68.0 ± 10.6%	

MBI-401 SDP TR-4669-4-(7-8) 2nd shipment PASSED the post-test bioassay validation (71% mortality). Untreated control mortality was 0%.

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Initials: HEM Date: 2/7/13

FF # 9 Item No. 13 Pg 2 of 2 Pg 2 of 2

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

AEH-12-PSEUDO-03

PACKING LIST
DATE OF SHIPMENT - 2012/04/23

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/04/24

Item Description:

MBI-401 SDP Lot # TR-4669-4-(5) in one bag, bag #1 (total weight 5 Kg):

Shipped on ice. Store at 4°C, protected from light.

FF # 9
Item No. 15
Pg 1 of 1

Pg 1 of 1

AEH-12-PSEUDO-03

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(5)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	12 January 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

Quality Control: [redacted]
Tamara Nicholson, Quality Control Supervisor

Date: 12 March 2012

FF # 9
Item No. 10
Pg 1 of 1

Pg 1 of 1

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FF # 9
Item No. 17
Pg 1 of 1

AEH-12-PSEUDO-03

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express *NEW Package US Airbill*

FedEx Tracking Number 8006 5616 8206

Form ID No. 0215 — MUR1 — Sender's Copy

1 From *Please print and press hard.*

Date 21 MAY 2012 — Sender's FedEx Account Number 1201-0086-6

Sender's Name Kerry Weber — Phone (608) 783-6451

Company UPPER MIDWEST ENVIRO SCIENCE

Address 2630 FANTA REED RD — Dept./Floor/Suite/Room

City LA CROSSE — State WI — ZIP 54603-1223

2 Your Internal Billing Reference First 24 characters will appear on invoice.

3 To

Recipient's Name Denise Mayer — Phone (518) 677-8245

Company New York State Museum

Address Field Research Laboratory — Dept./Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address 51 Fish Hatchery Road

Use this line for the HOLD location address or for continuation of your shipping address.

☐ HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

☐ HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

City Cambridge — State NY — ZIP 12816

0450685150

The FedEx US Airbill has changed. See Section 4.
For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

4 Express Package Service *To most locations. NOTE: Service order has changed. Please select carefully.*

Packages up to 150 lbs. For packages over 150 lbs., use the new FedEx Express Freight US Airbill.

Next Business Day

☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☒ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

☐ NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.

☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☐ No Signature Required — Package may be left without obtaining a signature for delivery.

☐ Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.

☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods? One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box. ☐ Cargo Aircraft Only

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below.

☒ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages 1 — Total Weight ____ lbs. — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

611

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* The aliquots of test chemical shipped on this date (21 MAY 2012) were mishandled. A third aliquot was shipped on 23 May 2012. KW ~~21 MAY 2013~~ wrong date KW 21 MAR 2013

Pg 1 of 1

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 78
Pg 1 of 1

AEH-12-PSEUDO-03
Pg 1 of 1

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express NEW Package US Airbill

FedEx Tracking Number 8006 5616 8170

MUR1
Form I.D. No. 0215 Sender's Copy

1 From *Please print and press hard.*
Date 23 MAR 12 Sender's FedEx Account Number 1201-0086-6
Sender's Name Kerry Weber Phone (608) 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD Dept./Floor/Suite/Room
City LA CROSSE State WI ZIP 54603-1223

2 Your Internal Billing Reference
First 24 characters will appear on invoice.

3 To
Recipient's Name Denise Mayer Phone (518) 677-8245
Company New York State Museum
Address Field Research Laboratory
We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room
HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.
Address 51 Fish Hatchery Rd.
Use this line for the HOLD location address or for continuation of your shipping address.
HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.
City Cambridge State NY ZIP 12816

0450685150

The FedEx US Airbill has changed. See Section 4.
For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

4 Express Package Service *To most locations. **Packages up to 150 lbs.**
NOTE: Service order has changed. Please select carefully. *For packages over 150 lbs., use the new FedEx Express Freight US Airbill.*

Next Business Day
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days
- [ ] NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.
- [ ] FedEx Envelope*
- [ ] FedEx Pak*
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

6 Special Handling and Delivery Signature Options
- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. *Fee applies.*
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?
One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

7 Payment *Bill to:*
Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. Exp. Date

Total Packages 1 Total Weight ____ lbs. Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

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* Two previous aliquots shipped on 21 MAY 2012 were mishandled. The aliquot shipped on this date (23 MAY 2012) was used for post-test efficacy verification. HEM 21 MAR 2013.

NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-4-(5)
(USGS Study #AEH-12-PSEUDO-03 and AEH-11-PSEUDO-02)

Date product received from USGS: 2012/05/24
Date of start of test: 05/29/2012

AEH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(5)
  - USGS Study #AEH-12-PSEUDO-03; BKT
  - USGS Study #AEH-11-PSEUDO-02; PPB

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-4-(5) from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(5) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 11-14-2011 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 65.65 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Pg 1 of 2

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FF # 9
Item No. 19
Pg 1 of 2

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	10/18/2011 and 12/28/2011	04/23/2012, 05/17/2012, and 05/23/2012 (mixed randomly)	05/28/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 11-14-2011)

3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(5)

Testing jar bioassay protocol:

On the day prior to treatment (05/28/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (05/29/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 20 days (21 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 13.23 ± 3.30 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.008 ± 0.005
Cambridge CF (Positive Control)	0.203 ± 0.006
MBI-401 SDP TR-4669-4-(5) (Post-test validation)	0.264 ± 0.007

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 21 days.

Treatment	Mean % mortality (±SD)
Untreated Control	0.0 ± 0.0%
Cambridge CF (Positive Control)	85.3 ± 12.2%
MBI-401 SDP TR-4669-4-(5) (Post-test validation)	76.0 ± 8.0%

MBI-401 SDP TR-4669-4-(5) shipment PASSED the post-test bioassay validation (76% mortality). Untreated control mortality was 0%.

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Initials: HEM Date: 27May13

FF # 9
Item No. 19
Pg 2 of 2

Pg 2 of 2

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

AEH-12-PSEUDO-03

PACKING LIST
DATE OF SHIPMENT - 2012/06/04

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/06/05

Item Description:

MBI-401 SDP Lot # TR 4669-4-(5)[1] in three containers (total weight 5 Kg):
#1 1.7 Kg
#2 1.7 Kg
#3 1.7 Kg

Shipped on ice. Store at 4°C, protected from light.

FF # 9
Item No. 20
Pg 1 of 1

Pg 1 of 1

6/4/2012

[redacted]

[1] This is the second shipment for this particular lot. See lab notebook #1 page 50. KW 08APR13

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(5)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	12 January 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 12 March 2012

Tamara Nicholson, Quality Control Supervisor

FF # 9
Item No. 21
Pg 1 of 1

Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

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Initials: HBM Date: 27Mar13

FF # 9
Item No. 22
Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

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FedEx NEW Package Express US Airbill

FedEx Tracking Number 8006 5616 7688

1 From Please print and press hard.

Date 18 Nov 12 Sender's FedEx Account Number [redacted]1201-0086-6

Sender's Name Kerry Weber Phone (608) 783-6451

Company UPPER MIDWEST ENVIRO SCIENCE

Address 2630 FANTA REED RD

City LA CROSSE State WI ZIP 54603-1223

Dept/Floor/Suite/Room

2 Your Internal Billing Reference
First 24 characters will appear on invoice.

3 To Recipient's Name Denise Mayer Phone 518 677 8245

Company New York State Museum

Address Field Research Laboratory Dept/Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address 57 Fish Hatchery Rd

Use this line for the HOLD location address or for continuation of your shipping address.

City Cambridge State NY ZIP 12816

0450685150

4 Express Package Service *To most locations. NOTE: Service center has changed. Please select carefully.

Packages up to 150 lbs. For packages over 150 lbs., see the new FedEx Express Freight US Airbill.

Next Business Day

- FedEx First Overnight — Earliest next business morning delivery to select locations. Priority Alert upgrade available. Monday unless SATURDAY Delivery is selected.
- FedEx Priority Overnight — Next business morning.* Priority Alert upgrade available. Monday unless SATURDAY Delivery is selected.
- X FedEx Standard Overnight — Next business afternoon.* Saturday delivery NOT available.

2 or 3 Business Days

- NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

- FedEx Envelope*
- FedEx Pak*
- FedEx Box
- FedEx Tube
- X Other

6 Special Handling and Delivery Signature Options

- SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- No Signature Required — Package may be left without obtaining a signature for delivery.
- Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies. Not available for residential deliveries only.

Does this shipment contain dangerous goods? One box must be checked.

- X No
- Yes — Shipper's Declaration not required.
- Yes — Dangerous goods (including dry ice) as per attached Shipper's Declaration.
- Dry Ice — Dry Ice, 9, UN 1845 — X ____ kg
- Cargo Aircraft Only

7 Payment Bill to:

- X Sender — FedEx Acct. No. or Credit Card No. below
- Recipient
- Third Party
- Credit Card
- Cash/Check

Enter FedEx Acct. No. or Credit Card No. below

Total Packages 1 Total Weight ____ lbs Total Declared Value* $ ____.00

*Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

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611

The FedEx US Airbill has changed. See Section 4.
For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

* This shipment of test chemical was delayed during shipment. Not used for post-test activity verification. Fwd 21 MAR 2013

CERT.FIED COPY

m i is: HEM Date: 27Mar13

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Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

MUR1

FedEx NEWPackage Express US Airbill

FedEx Tracking Number 8006 5616 7655

1 From Please print and press hard.

Date 19 JUNE 2012 Sender's FedEx Account Number 1201-0086-6

Sender's Name Kerry Weber Phone 608 783-6451

Company UPPER MIDWEST ENVIRO SCIENCE

Address 2630 FANTA REED RD

City LA CROSSE State WI ZIP 54603-1223

2 Your Internal Billing Reference

3 To Recipient's Name Denise Mayer Phone 518 677-8245

Company New York State Museum

Address Field Research Laboratory

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address 51 Fish Hatchery Road

Use this line for the HOLD location address or for continuation of your shipping address.

City Cambridge State NY ZIP 12816

0450685150

4 Express Package Service

Packages up to 150 lbs. For packages over 150 lbs., see the new FedEx Express Freight US Airbill.

Next Business Day

- FedEx First Overnight — Earliest next business morning delivery to select locations. Next business morning delivery to most locations. Monday unless SATURDAY Delivery is selected.
- FedEx Priority Overnight — Next business morning. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected. X
- FedEx Standard Overnight — Next business afternoon. Saturday Delivery NOT available.

2 or 3 Business Days

- NEW FedEx 2Day A.M. — Second business morning. Saturday Delivery NOT available.
- FedEx 2Day — Second business afternoon. Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- FedEx Express Saver — Third business day. Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

- FedEx Envelope*
- FedEx Pak*
- FedEx Box
- FedEx Tube
- X Other

6 Special Handling and Delivery Signature Options

- SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- No Signature Required — Package may be left without obtaining a signature for delivery.
- Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies for residential deliveries only.

Does this shipment contain dangerous goods?

One box must be checked.

X No — Yes, Shipper's Declaration not required — Dry Ice, Dry Ice, 9, UN 1845 — x ____ kg

Yes, Shipper's Declaration required — Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

7 Payment Bill to:

X Sender — Enter FedEx Acct. No. or Credit Card No. below. — Recipient — Third Party — Credit Card — Cash/Check

FedEx Acct. No. / Credit Card No. / Exp. Date

Total Packages 1 Total Weight ____ lbs. Total Declared Value* $ ____.00

*Your liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

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111

The FedEx US Airbill has changed. See Section 4 for shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

* This is second shipment for lot # TR 4669-4-(5) #2 shipment. First lot was delayed during shipment. KW 21MAR 2013

NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-4-(5) 2nd shipment
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/06/20
Date of start of test: 06/20/2012

AEH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(5) 2nd shipment
  - USGS Study #AEH-12-PSEUDO-03; LMB

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-4-(5) 2nd shipment from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(5) 2nd shipment (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 06/18/2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.15 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

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Initials: HEM Date: 27Mar13

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Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	10/18/2011	05/31/2012	06/19/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 06/18/2012)

3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(5) 2nd shipment

Testing jar bioassay protocol:

On the day prior to treatment (06/19/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml acrated hard water and allowed to attach overnight. The next morning (06/20/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 12 days (13 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 12.79 ± 2.36 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.005 ± 0.003
Cambridge CF (Positive Control) (06/18/2012)	0.194 ± 0.009
MBI-401 SDP TR-4669-4-(5) 2nd shipment Post-test validation	0.264 ± 0.006

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 13 days.

Treatment	Mean % mortality (±SD)
Untreated Control	1.3 ± 2.3%
Cambridge CF (Positive Control) (06/18/2012)	85.4 ± 8.5%
MBI-401 SDP TR-4669-4-(5) 2nd shipment Post-test validation	77.5 ± 6.4%

MBI-401 SDP TR-4669-4-(5) 2nd shipment PASSED the post-test bioassay validation (78% mortality). Untreated control mortality was 1%.

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

PACKING LIST
DATE OF SHIPMENT - 2012/06/13

~~AEH-12-PSEUDO-03~~

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/06/14

Item Description:

MBI-401 SDP Lot # TR4669-4-(5) #3 in three containers (total weight 5 Kg):
#1 1.7 Kg
#2 1.7 Kg
#3 1.7 Kg

Shipped on ice. Store at 4°C, protected from light.

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Item No. 35
Pg 1 of 1

Pg 1 of 1

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-4-(5)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	12 January 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 12 March 2012

Tamara Nicholson, Quality Control Supervisor

FF # 9
Item No. 26
Pg 1 of 1

Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

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Initials: HEM Date: 27Mar13

FF # 9
Item No. 27
Pg 1 of 1

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FedEx Express NEW Package US Airbill FedEx Tracking Number 8006 5616 7390

Form ID No. 0215 Recipient's Copy

1 From This portion can be removed for Recipient's records.

Date 6/26/12 FedEx Tracking Number 800656167390

Sender's Name Therese Schreier Phone 608 783-6451

Company [illegible]

Address [illegible]

City [illegible] State [illegible] ZIP 54603-1223 Dept./Floor/Suite/Room

2 Your Internal Billing Reference Dm22B

3 To
Recipient's Name Denise Mayer Phone 518 677-8245

Company New York State Museum Field Research Lab

Address 51 Fish Hatchery Rd — We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room

HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Address — Use this line for the HOLD location address or for continuation of your shipping address.

City Cambridge State NY ZIP 12816

0450605150

8006 5616 7390

4 Express Package Service *To most locations. Packages up to 150 lbs.
NOTE: Service order has changed. Please select carefully.

Next Business Day
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days
- [ ] NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.
- [ ] FedEx Envelope*
- [ ] FedEx Pak*
- [ ] FedEx Box

6 Special Handling and Delivery Signature Options
- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- [x] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ___ x ___ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

[redacted]

Total Packages 1 Total Weight ___ lbs. [redacted] Credit Card Auth.

Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-4-(5) 3rd shipment
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/06/27
Date of start of test: 06/27/2012

AEH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-4-(5) 3rd shipment
  - USGS Study #AEH-12-PSEUDO-03; SMB

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-4-(5) 3rd shipment from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-4-(5) 3rd shipment (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 06/18/2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.15 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Pg 1 of 2

Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	06/06/2012	06/06/2012	06/26/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 06/18/2012)

3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-4-(5) 3rd shipment

Testing jar bioassay protocol:

On the day prior to treatment (06/26/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (06/27/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 13 days (14 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 14.54 ± 2.53 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.004 ± 0.001
Cambridge CF (Positive Control) (06/18/2012)	0.147 ± 0.016
MBI-401 SDP TR-4669-4-(5) 3rd shipment Post-test validation	0.154 ± 0.007

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 13 days.

Treatment	Mean % mortality (±SD)
Untreated Control	2.7 ± 4.6%
Cambridge CF (Positive Control) (06/18/2012)	96.0 ± 4.0%
MBI-401 SDP TR-4669-4-(5) 3rd shipment Post-test validation	89.5 ± 2.2%

MBI-401 SDP TR-4669-4-(5) 3rd shipment PASSED the post-test bioassay validation (90% mortality). Untreated control mortality was 3%.

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Initials: HEM Date: 27 Mar 13

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Item No. 28
Pg 2 of 2

Pg 2 of 2

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

AEH-12-PSEUDO-03

PACKING LIST
DATE OF SHIPMENT - 2012/06/20

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/06/21

Item Description:

MBI-401 SDP Lot # TR 4669-3-(7) in three containers of approximately 1.7 Kg each (total weight 5 Kg):
#1 1.7 Kg
#2 1.7 Kg
#3 1.7 Kg

Shipped on ice. Store at 4°C, protected from light.

3/20/2012 (1)
DAM

FF # 9
Item No. 29 **Pg 1 of 1**
Pg 1 of 1

(1) The date written by DAM is incorrect. This lot of MBI-401 SDP was shipped on 20 JUN 2012 and therefore should have been dated 6/20/2012 by DAM. This typographical error is confirmed by the chemical logbook, which states that this lot was received on 21 JUN 2012. KMW 26MAR13

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	TR 4669-3-(7)
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	11 January 2012
Expiration Date:	1 year from date of manufacture

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 01 June 2012

Tamara Nicholson, Quality Control Supervisor

FF # 9
Item No. 30
Pg 1 of 1

Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

AEH-12-PSEUDO-03

CERTIFIED COPY
Initials: HEM Date: 27Mar13

FF # 9
Item No. 31
Pg 1 of 1

Pg 1 of 1

FedEx Express — NEW Package US Airbill — FedEx Tracking Number 8006 5616 7390

From This portion can be removed for Recipient's records.
Date 6/26/12 FedEx Tracking Number 800656167390
Sender's Name Theresa Schreier Phone 608 783-6451
Company UPPER MIDWEST ENVIRO SCIENCE
Address 2630 FANTA REED RD
Dept/Floor/Suite/Room
City LA CROSSE State WI ZIP 54603-1223

Your Internal Billing Reference DMR2B

To Recipient's Name Denise Mayer Phone 518 677-8245
Company New York State Museum
Field Research Lab
Address 51 Fish Hatchery Rd
We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept/Floor/Suite/Room
HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.
HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.
Address — Use this line for the HOLD location address or for continuation of your shipping address.
City Cambridge State NY ZIP 12816

0450685150

8006 5616 7390

Form ID No. 0215 — Recipient's Copy

4 Express Package Service *To most locations. Packages up to 150 lbs.
NOTE: Service order has changed. Please select carefully.

Next Business Day
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days
- [ ] NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.
- [ ] FedEx Envelope*
- [ ] FedEx Pak*
- [ ] FedEx Box

6 Special Handling and Delivery Signature Options
- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- [x] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

7 Payment Bill to:
Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

[redacted]

Total Packages 1 Total Weight ____ lbs. [redacted] Credit Card Auth.

*Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

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NYSM Pre-Treatment Product Validation Assay

MBI-401 SDP TR-4669-3-(7)

(USGS Study #AEH-12-PSEUDO-03) AEH-12-PSEUDO-03

Date product received from MBI: 2012/06/20 (Test 1)
Date of start of test: 06/20/2012 (Test 1)
Date product received from USGS: 2012/06/27 (Test 2 - Recheck)
Date of start of recheck test: 06/27/2012 (Test 2 - Recheck)

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is received from Marrone Bio Innovations (MBI) it is bioassayed against zebra mussels to validate product efficacy; i.e., pre-test validation. A sample of product lot MBI-401 SDP TR-4669-3-(7) was shipped back to the NYSM Field Research Laboratory (Cambridge, NY) to be rechecked in the pre-test validation assay due to a refrigeration failure at USGS (La Crosse, WI). This pre-test validation report contains results from both the initial pre-test (Test 1) and the recheck (Test 2) to confirm product efficacy.

- MBI-401 SDP TR-4669-3-(7)
  - USGS Study #AEH-12-PSEUDO-03; BLG

PURPOSE: Pre-test product validation of MBI-401 SDP TR-4669-3-(7).

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Product efficacy was rechecked in this test after a refrigeration failure at USGS resulted in the storage temperature rising to 12°C. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-2-(7) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 6-18-2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.155 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:
Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

Mussel collection and handling:

Test	Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
#1	Zebra mussels	Hedges Lake (Washington County)	10/18/2011	05/31/2012	06/19/2012
#2			06/06/2012	06/06/2012	06/26/2012

Experimental design: For validation of efficacy the following treatments were set up:
Zebra mussels (25 mussels/jar):
3 – Untreated Control
3 – 200 ppm (a.i.) Cambridge CF Positive Control B (A, B, C) (produced on 6-18-2012)
3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-3-(7)

Testing jar bioassay protocol:
On the day prior to treatment (06/19/2012 and 06/26/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (06/20/2012 and 06/27/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\,nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 12 or 13 days (13 or 14 days total, tests 1 and 2, respectively). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 12.79 ± 2.36 mm (Test 1); 14.54 ± 2.53 mm (Test 2).

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\,nm}$)	
	Test 1	Test 2
Untreated Control	0.005 ± 0.003	0.004 ± 0.001
Cambridge CF (Positive Control)	0.194 ± 0.009	0.147 ± 0.016
MBI-401 SDP TR-4669-3-(7)	0.295 ± 0.001	0.228 ± 0.001

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 13 days (Test 1) and 14 days (Test 2).

Treatment	Mean % mortality (±SD)
TEST #1	
Untreated Control	1.3 ± 2.3%
Cambridge CF (Positive Control)	85.4 ± 8.5%
MBI-401 SDP TR-4669-3-(7)	84.0± 10.6%
TEST #2	
Untreated Control	2.7 ± 4.6%
Cambridge CF (Positive Control)	96.0 ± 4.0%
MBI-401 SDP TR-4669-3-(7)	86.4± 8.4%

MBI-401 SDP TR-4669-3-(7) PASSED both of the pre-test bioassay validations (84% and 86%mortality, Tests 1 and 2, respectively). Untreated control mortality was 1% and 3% (Tests 1 and 2, respectively).

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Initials: HEM Date: 27Mar-13

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AEH-12-PSEUDO-03

Pg 1 of 1

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express *NEW Package* US Airbill

FedEx Tracking Number 8006 5616 6957

Form ID No. 0215 — MUR1 — Sender's Copy

1 From *Please print and press hard.*

Date 7/12/12 — Sender's FedEx Account Number 1201-0086-6

Sender's Name Theresa Schreier — Phone (608) 783-6451

Company UPPER MIDWEST ENVIRO SCIENCE

Address 2680 FANTA REED RD — Dept/Floor/Suite/Room

City LA CROSSE — State WI — ZIP 54603-1223

2 Your Internal Billing Reference First 24 characters will appear on invoice. DMR2B

3 To

Recipient's Name Denise Mayer — Phone (518) 677 8245

Company New York State Museum - Field Research Laboratory

Address 51 Fish Hatchery Rd — Dept/Floor/Suite/Room
We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address
Use this line for the HOLD location address or for continuation of your shipping address.

City Cambridge — State NY — ZIP 12816

☐ HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

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0450685150

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4 Express Package Service *To most locations. NOTE: Service order has changed. Please select carefully.*

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☒ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

☐ NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.

☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☒ No Signature Required — Package may be left without obtaining a signature for delivery.

☐ Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.

☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods? One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below.

☒ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

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Total Packages 1 — Total Weight ____ lbs. — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

611

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP MBI-401 SDP TR-4669-3-(7)
(USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/07/13
Date of start of test: 07/18/2012

AEH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP TR-4669-3-(7)
  - USGS Study #AEH-12-PSEUDO-03; BLG

PURPOSE: Post-test product validation of MBI-401 SDP TR-4669-3-(7) from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP TR-4669-3-(7) (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 06/18/2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.15 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

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Initials: HEM Date: 27Mar13

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Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	06/06/2012	06/06/2012	07/17/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 06/18/2012)

3 – 200 ppm (a.i.) - MBI-401 SDP TR-4669-3-(7)

Testing jar bioassay protocol:

On the day prior to treatment (07/17/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (07/18/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 8 days (9 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 14.01 ± 4.07 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.006 ± 0.002
Cambridge CF (Positive Control) (06/18/2012)	0.194 ± 0.018
MBI-401 SDP TR-4669-3-(7) Post-test validation	0.317 ± 0.002

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 9 days.

Treatment	Mean % mortality (±SD)
Untreated Control	2.7 ± 4.6%
Cambridge CF (Positive Control) (06/18/2012)	78.7 ± 9.2%
MBI-401 SDP TR-4669-3-(7) Post-test validation	93.3 ± 2.3%

MBI-401 SDP TR-4669-3-(7) PASSED the post-test bioassay validation (93% mortality). Untreated control mortality was 3%.

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

AEH-12-PSEUDO-03

PACKING LIST
DATE OF SHIPMENT - 2012/07/25

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/07/26

Item Description:

MBI-401 SDP Lot # 401P12154G-02 in three containers of approximately 1.7 Kg each (total weight 5 Kg):

#1 1.7 Kg
#2 1.7 Kg
#3 1.7 Kg

This product was from bag #1 of this lot #. Packaged by D. Mayer. Shipped on ice. Store at 4°C, protected from light.

[redacted]

7/25/12

Manufactured: 06-06-2012
Expiration date 06-06-2013

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Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	401P12154G-02
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	06 June 2012
Expiration Date:	06 June 2013

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 09 July 2012

Tamara Nicholson, Quality Control Supervisor

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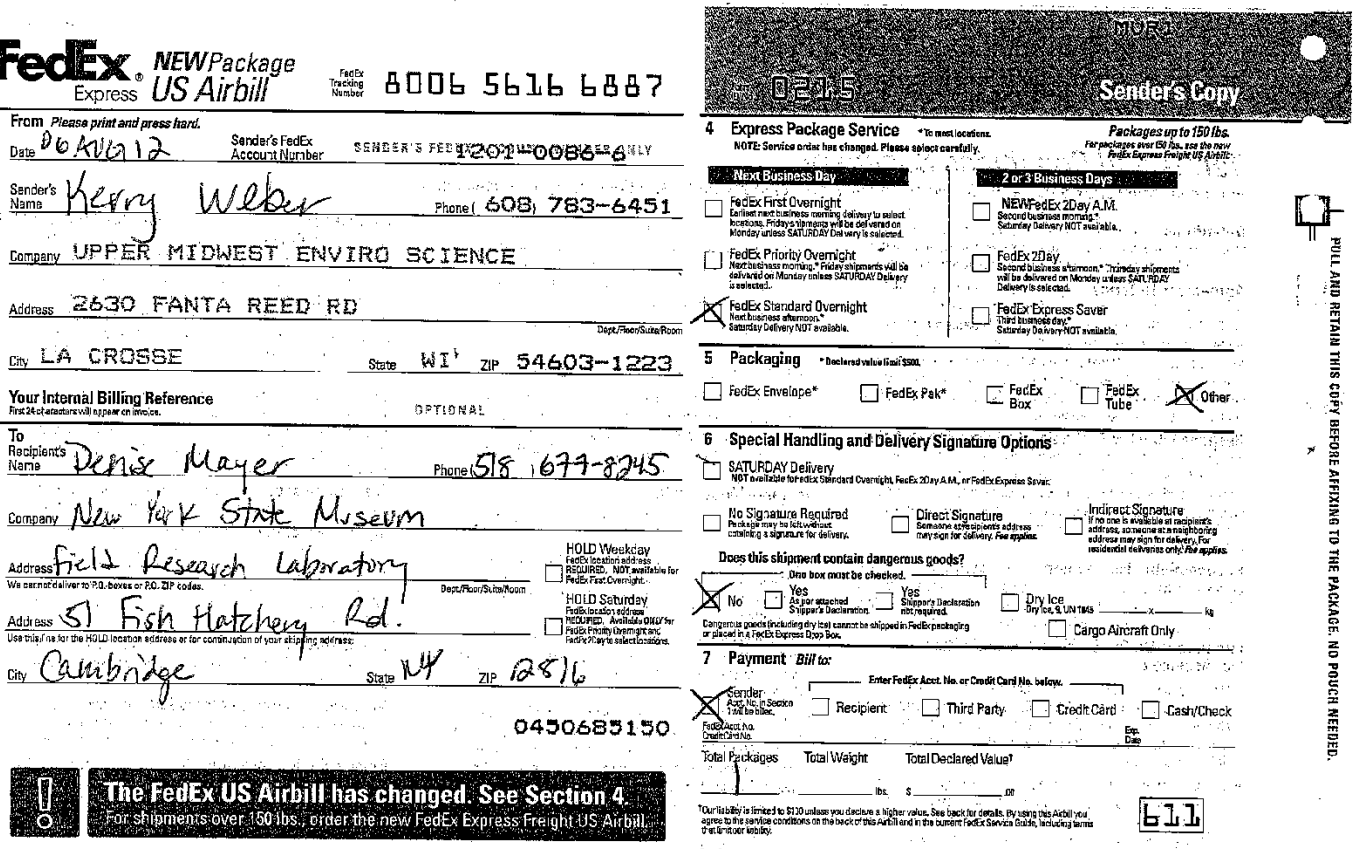
2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800



FedEx Express NEW Package US Airbill

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1 From Please print and press hard.

Date 06 Aug 12 Sender's FedEx Account Number SENDER'S FEDEX 1201-0086-6 ONLY

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Company UPPER MIDWEST ENVIRO SCIENCE

Address 2630 FANTA REED RD

Dept./Floor/Suite/Room

City LA CROSSE State WI ZIP 54603-1223

2 Your Internal Billing Reference
First 24 characters will appear on invoice. OPTIONAL

3 To

Recipient's Name Denise Mayer Phone (518) 677-8345

Company New York State Museum

Address Field Research Laboratory
We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room

Address 51 Fish Hatchery Rd.
Use this line for the HOLD location address or for continuation of your shipping address.

City Cambridge State NY ZIP 12816

HOLD Weekday
FedEx location address REQUIRED. NOT available for FedEx First Overnight.

HOLD Saturday
FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

0450685150

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For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

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4 Express Package Service * To most locations.
NOTE: Service order has changed. Please select carefully.
Packages up to 150 lbs.
For packages over 150 lbs., see the new FedEx Express Freight US Airbill.

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- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations. Friday's shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [X] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

- [ ] NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

- [ ] FedEx Envelope*
- [ ] FedEx Pak*
- [ ] FedEx Box
- [ ] FedEx Tube
- [X] Other

6 Special Handling and Delivery Signature Options

- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods? One box must be checked.

- [X] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

- [ ] Cargo Aircraft Only

7 Payment Bill to:

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AEH-12-PSEUDO-03

Pg 1 of 1

NYSM Post-Treatment Product Validation Assay

MBI-401 SDP 401P12154G-02 (USGS Study #AEH-12-PSEUDO-03)

Date product received from USGS: 2012/08/07
Date of start of test: 08/07/2012

AEH-12-PSEUDO-03

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP 401P12154G-02
  - USGS Study #AEH-12-PSEUDO-03; LST

- **PURPOSE:** Post-test product validation of MBI-401 SDP 401P12154G-02 from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP 401P12154G-02 (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water stirring for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at -80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 06/18/2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.15 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

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Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	06/06/2012	06/06/2012	08/06/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 06/18/2012)

3 – 200 ppm (a.i.) - MBI-401 SDP 401P12154G-02

Testing jar bioassay protocol:

On the day prior to treatment (08/06/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (08/07/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 13 days (14 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 14.46 ± 3.87mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.009 ± 0.003
Cambridge CF (Positive Control)	0.203± 0.004
MBI-401 SDP 401P12154G-02 Post-test validation	0.278 ± 0.002

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 14 days.

Treatment	Mean % mortality (±SD)
Untreated Control	4.0 ± 4.0%
Cambridge CF (Positive Control)	93.3 ± 6.1%
MBI-401 SDP 401P12154G-02 Post-test validation	93.3 ± 8.3%

MBI-401 SDP 401P12154G-02 PASSED the post-test bioassay validation (93% mortality). Untreated control mortality was 4%.

THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

AEH-12-PSEUDO-03

PACKING LIST
DATE OF SHIPMENT - 2012/09/18

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/09/19

Item Description:

MBI-401 SDP Lot # 401P12154G-02 (1) in three containers of approximately 1.7 Kg each (total weight 5 Kg):

#1 1.7 Kg
#2 1.7 Kg
#3 1.7 Kg

This product was from bag #2 of this lot #. Packaged by K. Presti and D. Mayer. Shipped on ice. Store at 4°C, protected from light.

Manufactured: 06-06-2012
Expiration date 06-06-2013

[redacted]

FF # 9
Item No. 39
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(1) This is the second shipment for this particular lot. See lab notebook # 2 page 34. KMW 05MAR13

Marrone™ Bio Innovations

CERTIFICATE OF ANALYSIS

AEH-12-PSEUDO-03

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	401P12154G-02
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	06 June 2012
Expiration Date:	06 June 2013

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 09 July 2012

Tamara Nicholson, Quality Control Supervisor

FF # 9
Item No. 40
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Pg 1 of 1

2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

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Initials: HEM Date: 27Mar13

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AEH-12-PSEUDO-03

Pg 1 of 1

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express *NEW Package* US Airbill

FedEx Tracking Number 8008 0133 0045

MUR4

Form I.D. No. 0215 — Sender's Copy

1 From *Please print and press hard.*

Date 02 OCT 2012 — Sender's FedEx Account Number: 1201-0085-6

Sender's Name: Kerry Weber — Phone (608) 783-6451

Company: UPPER MIDWEST ENVIRO SCIENCE

Address: 2630 FANTA REED RD — Dept./Floor/Suite/Room

City: LA CROSSE — State: WI — ZIP: 54603-1223

2 Your Internal Billing Reference — First 24 characters will appear on invoice. — OPTIONAL

3 To

Recipient's Name: Denise Mayer — Phone (518) 677-8245

Company: New York State Museum

Address: Field Research Laboratory — Dept./Floor/Suite/Room
We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address: 51 Fish Hatchery Rd.
Use this line for the HOLD location address or for continuation of your shipping address.

City: Cambridge — State: NY — ZIP: 12816

☐ HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

☐ HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

0453538510

The FedEx US Airbill has changed. See Section 4.
For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

4 Express Package Service *To most locations.*
NOTE: Service order has changed. Please select carefully.

Packages up to 150 lbs. For packages over 150 lbs., use the new FedEx Express Freight US Airbill.

Next Business Day

- ☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☒ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☐ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

- ☐ NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- ☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☐ No Signature Required — Package may be left without obtaining a signature for delivery.
☐ Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods?
One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box. ☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below.

☒ Sender Acct. No. in Section 1 will be billed. ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages: 1 — Total Weight: ____ lbs. — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

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NYSM Post-Treatment Product Validation Assay

MBI-401 SDP 401P12154G-02 2nd Shipment (USGS Study #AEH-12-PSEUDO-03)

AEH-12-PSEUDO-03
AEH-12-PSEUDO

Date product received from USGS: 2012/10/03
Date of start of test: 2012/10/16

BACKGROUND: As standard protocol for the USEPA project, each time a batch of Zequanox product is used in a test a UMESC, a portion of the product is bioassayed by the NYSM to validate toxicity post-treatment.

- MBI-401 SDP 401P12154G-02 2nd shipment
  - USGS Study #AEH-12-PSEUDO-03; CCF

PURPOSE: Post-test product validation of MBI-401 SDP 401P12154G-02 2nd shipment from USGS-UMESC.

MATERIALS AND METHODS:

Preparation of product for testing:

Product was shipped under cold conditions and held in the laboratory refrigerator at 4°C until use. Within 30 min of treatment application, prepare each at treatment stock of each MBI-401 formulated product:

MBI-401 SDP 401P12154G-02 2nd Shipment (SDP – 50% active ingredient): 3 g of the powder from each sample was added slowly to a beaker with dilution water with stirring on a stir plate for even suspension and then the total volume was adjusted to 30 ml with dilution water. The suspension was transferred to a 50 ml centrifuge and stored in refrigerator until ready to use. The suspension, when evenly dispersed was 100 mg product/ml or 50 mg a.i./ml. For 200 ppm a.i. treatments in testing jars, 2 ml were added to each testing jar (500 ml).

Cambridge CF (Standard for Positive Controls):

As an efficacy standard, we used *Pf*-CL145A killed CF that was maintained at -80°C (Cambridge CF). Since its production in 2005, this material has been valuable as a reference standard. The Cambridge CF was produced in 2005 (2005-0027) in 100-L batches 10, 11 and 12 and E-beamed to kill the cells. The solution, at 110 mg/ml dry weight, is stored in 1 cm thick sheets in the Cambridge ultrafreezer at - 80°C. A section of the sheet was broken off and weighed to determine volume (ca. 1 g = 1 ml).

For this bioassay, a positive control suspension was produced on 06/18/2012 from the frozen blocks described above and dispensed into multiple 50-ml centrifuge tubes for single-use treatment of bioassays. The dry weight of the material was 68.15 mg/ml; therefore 1.5 ml was added to each testing jar to treat at 200 ppm.

Mussel collections:

Mussels were scraped from substrates (rocks) in the field and placed in plastic bins. Bins containing mussels were set in a cooler with towels and frozen ice packs to maintain temperature to be transported back to the laboratory in Cambridge. In the laboratory, mussels were placed in pint-sized canning jars, covered with mesh, and placed in aquaria containing unchlorinated tap water with circulation (1 Whisper filter) and aeration at ambient laboratory temperature (ca. 20°C).

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Initials: MEM Date: 27 Mar 13

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Mussel collection and handling:

Species	Collection site	Collection date	Date in lab (20°C)	Picked for test
Zebra mussels	Hedges Lake (Washington County)	07/26/2012	07/26/2012	10/15/2012

Experimental design: For validation of efficacy the following treatments were set up:

Zebra mussels (25 mussels/jar):

3 – Untreated Control

3 – 200 ppm (a.i.) Cambridge CF Positive Control (produced on 06/18/2012)

3 – 200 ppm (a.i.) - MBI-401 SDP 401P12154G-02 2nd Shipment

Testing jar bioassay protocol:

On the day prior to treatment (10/15/2012) mussels were carefully examined and 25 mussels placed into each testing jar containing ca. 100 ml aerated hard water and allowed to attach overnight. The next morning (10/16/2012), unattached mussels were removed and replaced with attached mussels from an extra glass Petri dish. Water was replaced with 500 ml fresh aerated hard water.

After at least one hour, the treatment was applied. The optical density of each jar was measured in duplicate ($A_{660\ nm}$ Genesys Spectrophotometer).

After 24 hr of treatment, mussel mortality was checked and mussels were transferred to square plastic dishes with fresh aerated hard water. Mortality was checked and recorded each day with water replacements, for an additional 9 days (10 days total). On the final day of mortality checks, 20 mussels were measured from the untreated controls using a caliper.

Results:

Mussel length: Zebra mussels 17.67 ± 3.15 mm.

Optical density of treatments:

Treatment	Mean (±SD) OD ($A_{660\ nm}$)
Untreated Control	0.004 ± 0.001
Cambridge CF (Positive Control)	0.166 ± 0.009
MBI-401 SDP 401P12154G-02 2nd Shipment Post-test validation	0.248 ± 0.014

Zebra mussel mortality: Mussels were treated in triplicate testing jars (500 ml) at 20°C for 24 hr and mortality was recorded for a total of 10 days.

Treatment	Mean % mortality (±SD)
Untreated Control	0.0 ± 0.0%
Cambridge CF (Positive Control)	65.3 ± 9.2%
MBI-401 SDP 401P12154G-02 2nd Shipment Post-test validation	82.7 ± 4.6%

MBI-401 SDP 401P12154G-02 2nd Shipment PASSED the post-test bioassay validation (83% mortality). Untreated control mortality was 0%.

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Initials: HEM Date: 7/16/13

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THE STATE EDUCATION DEPARTMENT / OFFICE OF CULTURAL EDUCATION

New York State Museum Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
Tel. 518-677-8245
Fax 518-677-5236
E-mail: dmayer@mail.nysed.gov

PACKING LIST
DATE OF SHIPMENT - 2012/11/19

AEH-12-PSEUDO-03

CERTIFIED COPY
Initials: KW Date: 05APR13

Ship from:
Denise Mayer
New York State Museum
Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816

Ship To:
Jim Luoma
USGS UMESC
2630 Fanta Reed Road
La Crosse, WI 54603

Shipping Method: UPS Next Day Air
Required by: 2012/11/20

Item Description:

MBI-401 SDP Lot # 401P120197C in two zip-lock bags of approximately 2.5 Kg each (total weight 5 Kg):
Bag #1 2.5 Kg
Bag #2 2.5 Kg

Packaged by D. Mayer.
Shipped on ice. Store at 4°C, protected from light.

Manufactured: 09-27-2012
Expiration date 09-27-2013

[redacted]

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Marrone™ Bio Innovations

AEH-12-PSEUDO-03

CERTIFICATE OF ANALYSIS

CERTIFIED COPY
Initials: KW Date: 05APR13

Name of Product:	MBI-401 SDP
Active Ingredient:	100% *Pseudomonas fluorescens* strain CL145A cells and spent fermentation media
Percent Active Ingredient:	50% by weight
Viable Cfu/g:	0 cfu/g *Pseudomonas fluorescens* strain CL145A
Lot Number:	401P120917C
Mussel Bioassay:	Pass
Appearance:	Tan powder
Storage Conditions:	4 °C, protected from light
Date of Manufacture:	27 September 2012
Expiration Date:	27 September 2013

I hereby certify that the above information is true and correct.

Quality Control: [redacted] Date: 07 November 2012

Tamara Nicholson, Quality Control Supervisor

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2121 Second Street, Suite B-107 • Davis, CA 95618 • Phone: 530-750-2800

BISON CONNECT

Weber, Kerry <klweber@usgs.gov>

401P120917C

1 message

[redacted] AEH-12-PSEUDO-03

Mon, Apr 8, 2013 at 1:26 PM
KLW

Jim,

We ran 2 pre-test validation bioassays with the SDP lot 401P120917C (Bag 1 and Bag 2). Here are the results from each test - Mean (+/-SD) % mortality of 3 reps per test:

Test 1 (27 day observations):
Untreated Control 0% (0%)
Positive Control 88% (7%)
SDP Bag 1 61% (6%)
SDP Bag 2 63% (10%)

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Initials: KLW Date: 10APR13

Test 2 (14 day observations):
Untreated Control 0% (0%)
Positive Control 79% (2%)
SDP Bag 1 32% (14%)
SDP Bag 2 37% (8%)

The material's efficacy fell well below our acceptable QC level of 70% for non-target trials. Correspondence with folks at MBI indicated that they were having similar issues with this material as well as other lot batches produced around the same time. Therefore, material was unavailable to conduct fish trial studies in December or January.

Please let me know if you need more info re. this product lot.

Denise

Denise A. Mayer, Ph.D.
Director and Senior Research Scientist
New York State Museum - Field Research Laboratory
51 Fish Hatchery Road
Cambridge, NY 12816
518.677.8245
518.677.5236 fax
518.744.8668 mobile
dmayer@mail.nysed.gov

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AEH-12-PSEUDO-03

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Initials: Kw Date: 08 APR 13

PULL AND RETAIN THIS COPY BEFORE AFFIXING TO THE PACKAGE. NO POUCH NEEDED.

FedEx Express — *NEW Package US Airbill*

FedEx Tracking Number 8008 0133 0983

MUR4 — 0215 — Sender's Copy

1 From *Please print and press hard.*

Date 8 JAN 2013 — Sender's FedEx Account Number 1201-0086-8

Sender's Name Kerry Weber — Phone (608) 783-6451

Company UPPER MIDWEST ENVIRO SCIENCE

Address 2630 FANTA REED RD — Dept./Floor/Suite/Room

City LA CROSSE — State WI — ZIP 54603-1223

2 Your Internal Billing Reference First 24 characters will appear on invoice. — OPTIONAL

3 To

Recipient's Name Bridget Gruber — Phone ( )

Company Marrone Bio Innovations

Address — We cannot deliver to P.O. boxes or P.O. ZIP codes. — Dept./Floor/Suite/Room

HOLD Weekday — FedEx location address REQUIRED. NOT available for FedEx First Overnight.

Address 2121 Second Street, Suite B-107 — Use this line for the HOLD location address or for continuation of your shipping address.

HOLD Saturday — FedEx location address REQUIRED. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

City Davis — State CA — ZIP 95618

0453538510

The FedEx US Airbill has changed. See Section 4. For shipments over 150 lbs., order the new FedEx Express Freight US Airbill.

4 Express Package Service *To most locations. — **Packages up to 150 lbs.** For packages over 150 lbs., use the new FedEx Express Freight US Airbill.

NOTE: Service order has changed. Please select carefully.

Next Business Day:
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days:
- [ ] NEW FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging *Declared value limit $500.
- [ ] FedEx Envelope*
- [ ] FedEx Pak*
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

6 Special Handling and Delivery Signature Options
- [ ] SATURDAY Delivery — NOT available for FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.
- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. Fee applies.

Does this shipment contain dangerous goods? One box must be checked.
- [x] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

7 Payment *Bill to:* — Enter FedEx Acct. No. or Credit Card No. below.
- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. — Exp. Date

Total Packages 1 — Total Weight ____ lbs. — Total Declared Value† $ ____ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

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Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 1/1, 2, 3, 4

Reviewed by: JRW Date: 06FEB13
Verified by: JM Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: TR 4669-3-(6) Date Rec'd 23FEB12 Exp. Date 26JAN13

Fish Species: RBT

Instruments Used: BAL 4, BAL 5, WTS 2, 3, 5, 4

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.04341g		29FEB12	KLW
Analytical #2	2.06166g			
Stock #1	720.09g			
Stock #2	720.07g			
Stock #3	720.04g			
Analytical #3	2.01661g			
Stock #4	720.11g			
Stock #5	720.47g			
Stock #6	720.17g		29FEB12	KLW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1 (2)	520	0815	Analytical Stock for RBT	0h	29FEB12	KLW
Stock #1	12000	0952	Dilutor A for RBT	0h		
Stock #2	12000	1030	Dilutor B for RBT	0h		
Stock #3	12000	1105	Dilutor C for RBT	0h	29FEB12	KLW
Stock #4	~~12000~~ 12000	2015	Replacement of Dilutor A	12h	29FEB12	KLW
Stock #5	12000	2045	Replacement of Dilutor B	12h	29FEB12	KLW
Stock #6	12000	2115	Replacement of Dilutor C	12h	29FEB12	KLW

(1) RE. KLW 29 FEB12 (2) Analytical Stock #1 was spilled during Stock preparation and discarded. Analytical stock #2 was used to make standard curve #1 ad RBT dosing initiation. Analytical Stock #3 was used to make Standard curve #2 during RBT 12-h [redacted] book #1 pages 2-5. KW 29MAR2013

Datasheet approved by [redacted] Date: 2-27-12

27FEB2012/version1.0

Item No. 1

AEH 12 PSEUDO 03

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 1/4-6

Reviewed by: JKW Date: 06FEB13
Verified by: JAL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: TR 4669-4-(6) Date Rec'd 1MAR12 Exp. Date 08 FEB12

Fish Species: YEP

Instruments Used: BAL4, WTS 13046, 99-12354, 02-35173-8 Added info on WS on 6FEB13 KW
BAL5, WTS 13046 added info on WTS on 6FEB13 KW wrote wrong date KW 6FEB13

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.13402	Not used weights are not correct	6MAR12	KW
Analytical #2	2.18676	Should be 2.00g KMAR12 JAL	6MAR12	KW
Stock #1	720.17	Wrong day JAL 3-7-12	6MAR12	KW
Stock #2	720.03		6MAR12	KW
Stock #3	720.77		6MAR12	KW
Stock #4	720.37		6MAR12	KW
Stock #5	720.13		6MAR12	KW
Stock #6	720.28		6MAR12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Stock #1	12000	~~0835~~ ①	~~Dotter~~ ② A for YEP	0 h 0900	7MAR12	KW
Stock #2	12000	0910	Dilutor B YEP	initial	7MAR12	JAL
Stock #3	12000	0940	Dilutor C YEP	initial	7MAR12	KW
Stock #4	12000	1945	Dilutor A YEP	12-h renewal	7MAR12	KW
Stock #5	12000	2015	Dilutor B YEP	12-h renewal	7MAR12	KW
Stock #6	12000	2045	Dilutor C YEP	12-h renewal	7MAR12	KW

Datasheet approved [redacted] Date: 3/6/12
6MAR2012/version1

Item No. 2

AEH 12 PSEUDO 03
Pg 1 of 2

① wrote wrong time. 0835 KW 7MAR12
② sp. Dilutor. KW 7MAR12

Study Number: AEH-12-PSEUDO-03 File Folder: QA Lab book/pgs: 1/11-12

Reviewed by: JKW Date: 06FEB13
Verified by: JM Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A
Test Chemical Lot #: TR 4669-416 Date Rec'd 1MAR12 Exp. Date 08FEB12
Fish Species: YEP
Instruments Used: BAL 4, BAL 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #3	2.00291g		7MAR12	JM
Analytical #4	2.00052g		7MAR12	JM

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #3	500	0900	standards	N/A	7MAR12	JM
Analytical #4	500	2300	standards curve #2	N/A	7MAR12	JM

Datasheet approved by [redacted] Date: 2-27-12
27FEB2012/version1.0

Item 2

AEH 12 PSEUDO 03
Pg 2 of 2

Study Number: AEH-12-PSEUDO-03 Reviewed by: JKW Date: 06FEB13
File Folder: 9A Lab book/pgs: 1/10, 21, 22, 23 Verified by: JAL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: HR4669-4-(7-8) Date Rec'd 6MAR12 Exp. Date 26JAN13

Fish Species: WAE

Instruments Used: BAL 4 and BAL 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical Stock #1	2.00092g		20MAR12	KW
Analytical Stock #2	2.00068g		↑	↑
Analytical Stock #3	2.00021g			
Analytical Stock #4	2.00057			
Stock #1	720.06g			
Stock #2	720.05g			
Stock #3	720.09g			
Stock #4	720.07g			
Stock #5	720.03g		↓	↓
Stock #6	720.10g		20MAR12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical Stocks 1-3	500	0815	standard curve	NA ①	3/21/12	JAL
Stock #1	12000	0815	Dilutor A for WAE	Initial	21MAR12	KW
Stock #2	12000	0855	Dilutor B for WAE	Initial	21MAR12	KW
Stock #3	12000	0920	Dilutor C for WAE	Initial	21MAR12	KW
Stock #4	12000	1915	Dilutor A for WAE	12 hour	21MAR12	TS
Stock #5	12000	1945	Dilutor B for WAE	12 hour	21MAR12	TS
Stock #6	12000	2015	Dilutor C for WAE	12 hour	21MAR12	TS
Analytical Stock #4	500	2130	Standard check	12-24 hour	21MAR12	KW

① The standard curve #1 which used dilutions of analytical stocks 1, 2 #3 was not used due to high deviation. Dilutions were remade from analytical stocks #1 and it was used to create standard curve #1 which will be used for the duration of the exposure. 3-21-12 JAL

Datasheet approved by [redacted] Date: 3/6/12

6MAR2012/version1.1

Item No. 3

AEH 12 PSEUDO 03

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 1/17, 31, 32

Reviewed by: SKW Date: 07FEB13
Verified by: JL Date: 3/26/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A
Test Chemical Lot #: TR4669-4-(7-8) Shipment #2 Date Rec'd 13MAR12 Exp. Date 26JAN13
Fish Species: BLG
Instruments Used: BAL 3 and BAL 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical Stock #1	2.00073		2APR12	KLW
Analytical Stock #2	2.00044		2APR12	KLW
Stock #1	720.00		2APR12	KLW
Stock #2	720.01		2APR12	KLW
Stock #3	720.02		2APR12	KLW
Stock #4	720.01		2APR12	KLW
Stock #5	720.03		2APR12	KLW
Stock #6	720.03		2APR12	KLW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Stock #1	12000	0740	Dilutor A for BLG	Initial	3APR12	KLW
Stock #2	12000	0815	Dilutor B for BLG	Initial	3APR12	KLW
Stock #3	12000	0840	Dilutor C for BLG	Initial	3APR12	KLW
Analytical Stock #1	500	0800	for Std. curve	Initial	3APR12	KLW
Stock #4	12000	1815	Dilutor A for BLG	12 h renew	3APR12	KLW
Stock #5	12000	1845	Dilutor B for BLG	12 h renew	3APR12	KLW
Stock #6	12000	1915	Dilutor C for BLG	12 h renew	3APR12	KLW
Analytical Stock #2	500	2000	Std curve check	12h	3APR12	KLW

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 4

AEH 12 PSEUDO 03
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A   Lab book/pgs: 1/38

Reviewed by: SKW   Date: 06FEB13
Verified by: JM   Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A

Test Chemical Lot #: MB1401 SDP TR4169-4-(5) Date Rec'd 24APR12 Exp. Date 12 JAN13
Fish Species: BKT
Instruments Used: BAL4, BAL5, BAL7

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical Stock #1	2.00102 g	None	1MAY12	KW
Analytical Stock #2	2.00029 g	↑	↑	↑
Stock #1	720.00 g			
Stock #2	720.09 g			
Stock #3	720.00 g			
Stock #4	720.00 g			
Stock #5	719.99 g	↓	↓	↓
Stock #6	720.06 g	None	1MAY12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical Stock #1	500	0755	(Standard curve) Analytical stock	Initial	2MAY12	KW
Stock #1	12,000	~~0800~~ 0800	Dilutor A for BKT	Initial	2MAY12	KW
Stock #2	12,000	0830	Dilutor B for BKT	Initial	2MAY12	KW
Stock #3	12,000	0900	Dilutor C for BKT	Initial	2MAY12	KW
Stock #4	12,000	1850	Dilutor A for BKT	12 h	2MAY12	KW
Stock #5	12,000	1920	Dilutor B for BKT	12 h	2MAY12	KW
Stock #6	12,000	1950	Dilutor C for BKT	12h	2MAY12	KW
Analytical Stock #2	500	2000	Standard curve check	12h	2MAY12	KW

OVL. 0800. KW 2MAY12 KW

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 5

AEH 12 PSEUDO 03
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Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 2/1

Reviewed by: KW Date: 12JUN12
Verified by: JaL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A
Test Chemical Lot #: TP4669-4-(5)#2 Date Rec'd 5JUN10 KW Exp. Date 12 JAN 2013
Fish Species: LMB
Instruments Used: BAL 3+5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.00062	NONE	11JUN12	KW
Analytical #2	2.00050	↑	↑	↑
Stock #1	720.06			
Stock #2	720.05			
stock #3	720.01			
Stock #4	720.05			
Stock #5	720.05	↓	↓	↓
Stock #6	720.01	NONE	11JUN12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Stock #1	12000	0755	Dilutor A for LMB	0815	12JUN12	KW
Stock #2	12000	0820	Dilutor B for LMB	0845	12JUN12	KW
Stock #3	12000	0850	Dilutor C for LMB	0915	12JUN12	KW
Analytical #1	500	0830	Analytical curve #1	Initial	12JUN12	KW
Stock #4	12000	1910	Dilutor A LMB ①	2015	6/12/12	JaL
Stock #5	12000	1925	Dilutor B LMB ①	2045	6/12/12	JaL
Stock #6	12000	1945	Dilutor C LMB ①	2115	6/12/12	JaL
Analytical #2	500	2100	standard curve check	N/A	6/12/12	JaL

① Used for 12 hour renewal KW 12JUN12

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 6

AEH 12 PSEUDO 03
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: TH Lab book/pgs: 2/6-7

Reviewed by: JKW Date: 06FEB13
Verified by: JV Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A
Test Chemical Lot #: TR4669-4-65) #3 Date Rec'd 14 JUN 12 Exp. Date 12JUN13
Fish Species: SMB
Instruments Used: BAL 3 and 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.00019 g		19JUN12	KW
Analytical #2	2.00010g		↓	↑
Stock #1	720.05			
Stock #2	720.07			
Stock #3	720.02			
Stock #4	720.00			
Stock #5	720.00		↓	↓
Stock #6	720.00		19JUN12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1	500	0800	Standard curve	Initial	20JUN12	KW
Stock #1	12000	0800	Dilutor A for SMB	Initial 0815	20JUN12	KW
Stock #2	12000	0822	Dilutor B for SMB	Initial 0845	20JUN12	KW
Stock #3	12000	0845	Dilutor C for SMB	Initial 0915	20JUN12	KW
Stock #4	12000	1821	Dilutor A for SMB ①	12h 2015	20JUN12	TJS
Stock #5	12000	1845	Dilutor B for SMB	12h 2045	20JUN12	TJS
Stock #6	12000	1915	Dilutor C for SMB	12h 2115	20JUN12	TJS
Analytical #2	500	2000	Standard Set #2	12h	20JUN12	TJS

①Wrote wrong time. TJS 20JUN12.

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 7

AEH 12 PSEUDO 03
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 2/17-18

Reviewed by: JKW Date: 06FEB13
Verified by: JAL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluorescens* strain 145A
Test Chemical Lot #: TR 4669-3-(7) Date Rec'd 21 Jun 12 Exp. Date 11 Jun 13
Fish Species: BLG
Instruments Used: BAL 3 and BAL 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	~~2.0000~~ 2.00013 g balance changed	TMS 7/10/12	7/10/12	TMS
Analytical #2	2.00004 g		7/10/12	TMS
Stock #1	720.05	Container 1 of 3	7/10/12	TMS
Stock #2	720.03	Container 1 of 3	7/10/12	TMS
Stock #3	720.00	Container 2 of 3	7/10/12	TMS
Stock #4	720.04	Container 2 of 3	7/10/12	TMS
Stock #5	720.05	Container 3 of 3	7/10/12	TMS
Stock #6	720.04	Container 3 of 3	7/10/12	TMS

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1	500	0800	Standard Curve	Initial	11JUL12	KW
Stock #1	12000	0815	Dilutor A for BLG	↑	↑	↑
Stock #2	12000	0840	Dilutor B for BLG	↓	↓	↓
Stock #3	12000	0910	Dilutor C for BLG	Initial	11JUL12	KW
Analytical #2	500	2005	Standard set #2	12h	11JUL12	TMS
Stock #4	12000	1950	12h stock Dilutor A BLG	↑	↑	JAL
Stock #5	12000	2015	12h stock Dilutor B BLG	↓	↓	JAL
Stock #6	12000	2630	12h stock Dilutor C BLG	12h	11JUL12	JAL

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 8

AEH 12 PSEUDO 03
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 2/23-26

Reviewed by: JKW Date: 06FEB13
Verified by: JWL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluroescens* strain 145A
Test Chemical Lot #: 40|P121544-02 Date Rec'd 26JUL12 Exp. Date 6JUN13
Fish Species: LST
Instruments Used: BAL 3, ~~BAL 7~~ ~~BAL 5~~ wrong balance. KW 31JUL12

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.00020	container 1 of 3	31JUL12	KW
Analytical #2	2.00041	container 1 of 3	↑	↑
Stock #1	720.49	From container 1 of 3		
Stock #2	720.04	container 1 of 3		
Stock #3	720.08	container 2 of 3		
Stock #4	720.06	container 2 of 3		
Stock #5	720.03	container 3 of 3	↓	↓
Stock #6	720.15	container 3 of 3	31JUL12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1	500	0740	Standard curve.	Initial	~~31JUL12~~ ①	KW
Stock #1	12000	~~0840~~	Dilutor A for LST	Initial	~~31JUL12~~ ②	KW
Stock #2	12000	0810	Dilutor B for LST	Initial	~~31JUL12~~ ②	KW
Stock #3	12000	0840	Dilutor C for LST	Initial	~~31JUL12~~ ②	KW
Stock #4	12000	1830	Dilutor A for LST	12h	01AUG12	KW
Stock #5	12000	1900	Dilutor B for LST	12h	01AUG12	KW
Stock #6	12000	1930	Dilutor C for LST	12h	01AUG12	KW
Analytical #2	500	~~2050~~ 0850 ③	12h Standard check	12h	01AUG12	TFS

③ wrote in correct time. 2050 is correct. TFS 01AUG12.

① wrong time. Should be 0740 KW 31JUL12
② wrong date. Should be 01AUG12. KW 01AUG12

Datasheet approved by [redacted] Date: 3/6/12
6MAR2012/version1.1

Item No. 9

AEH 12 PSEUDO 03

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: 9A Lab book/pgs: 2/35

Reviewed by: JKW Date: 06FEB13
Verified by: JWL Date: 3/29/13

Form 15 - Test Chemical Stock Preparation Data Form

Test Chemical: *Pseudomonas fluorescens* strain 145A
Test Chemical Lot #: 401P01549-02 (2nd Shipment) Date Rec'd 19SEP12 Exp. Date 6JUN13
Fish Species: CCF
Instruments Used: BAL 3 and BAL 5

Chemical Weighing:

Sample ID	Sample Weight	Comments	Date	Initials
Analytical #1	2.00003g		24SEP12	KW
Analytical #2	2.00065g			
Stock #1	720.05g			
Stock #2	720.06g			
Stock #3	720.05g			
Stock #4	720.05			
Stock #5	720.08			
Stock #6	720.03		24SEP12	KW

NOTE: Chemical samples to be stored refrigerated until used for stock preparation.

Stock Preparation:

Sample ID	Dilution Volume (mL)	Dilution Time	Use (i.e., Dilutor A, B or C for RBT)	Exposure Time	Date	Initials
Analytical #1	500	0800	Standard curve #1	—	26SEP12	KW
Stock #1	12000	0811	Dilutor A for CCF	Initial	26SEP12	KW
Stock #2	12000	0835	Dilutor B for CCF	Initial	26SEP12	KW
Stock #3	12000	0905	Dilutor C for CCF	Initial	26SEP12	KW
Analytical #2	500	1940	Standard set #2	N/A	9/26/12	JWL
Stock #4	12000	1936	Dilutor A for CCF	12h renewal	26SEP12	JKW
Stock #5	12000	2000	Dilutor B for CCF	12h renewal	26SEP12	KW
Stock #6	12000	2030	Dilutor C for CCF	12h renewal	26SEP12	KW

Datasheet approved by [redacted] Date: 3/6/13
6MAR2012/version1.1

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AEH 12 PSUEDO 03

File Folder 12

Item No. 1

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR-4669-3-(6)

CONTAINER: 1 OF 3

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: TMS Date: 9/12/12
REVIEWED BY
Initials: JM Date: 9/14/12

FF # 12
Item No. 1
Pg 1 of 4

Pg 1 of 4

AEH 12 PSUED0 03

PROOFED BY
Initials: HBM Date: 09Apr13
REVIEWED BY
Initials: JL Date: 4/11/13

CERTIFIED COPY
Initials: ML Date: 9/13/12

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	23 Feb12

"This Use and Maintenance Log Book has been inspected [redacted] GEN 009.

Inspected and sealed on 29 February 2012 by [redacted]."
Date

Pg 2 of 4

PROOFED BY
Initials: HEM Date: 9 April 13
REVIEWED BY
Initials: JC Date: 9/11/13

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Rm. 2

Date Received 23 FEB 12 Date Opened 28 FEB 12 KW Expiration Date 26 JAN 13
(5 years unless otherwise stated)

Test Chemical Lot Number TR-4669-3-(6) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg①

Initial Mass (with cover on) of Test Chemical and Container 1777.80g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

①This is container 1 of 3. Amount of test chemical is approximately ⅓ of the ~5kg shipment of product. KW 23FEB12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RF-III-42 KW 5MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 23FEB12

CERTIFIED COPY
Initials: mr Date: 9/13/12

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR-4669-3-(6)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 1777.79	* 5.66763	* 1772.07	AEH-12-PSEUDO-03	*Archived Sample	28 FEB 12	KLW
1772.10	2.06161	1770.02	AEH-12-PSEUDO-03	~~Analytical #1~~ ①	29 FEB 12	KLW
1770.02	2.04341	1767.97	AEH-12-PSEUDO-03	~~Analytical #2~~ ②	29 FEB 12	KLW
1767.97	720.09	1047.63	AEH-12-PSEUDO-03	Stock #1	29 FEB 12	KLW
1047.63	720.07	327.23	AEH-12-PSEUDO-03	Stock #2	29 FEB 12	KLW
327.23	2.01661	325.18	AEH-12-PSEUDO-03	Analytical #3	29 FEB 12	KLW
325.16	220.61	104.54	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared baggie, original container with residue weighed, all returned to NYSM.	12 MAR 12	KLW
			Chemical and container returned to NYSM. Log closed for archiving. KLW 12 MAR 12			

*The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 01: ① wrong sample ID. Should be Analytical 1
The initial mass is also entered on Form GEN 012.a. ② wrong sample ID, Should be Analytical 2

A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CERTIFIED COPY Initials: [signature] Date: 9/13/12

PROOFED BY Initials: [signature] Date: 10/9/13

REVIEWED BY Initials: [signature] Date: 4/11/13

AEH 12 PSUEDO 03
File Folder 2

Item No. 1

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AEH 12 PSUEDO 03

File Folder 12

Item No. 2

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR-4669-3-(6)

CONTAINER: 2 OF 3

CERTIFIED COPY
Initials: JHS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JHS Date: 4-11-13

FF # 12
Item No. 2
Pg 1 of 4

Pg 1 of 4

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	28 FEB 12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on 29 February 2012 by [redacted] Quality Assurance Unit."

Date

PROOFED BY
Initials: HEM **Date:** 09Apr13
REVIEWED BY
Initials: [illegible] **Date:** 4-11-13

Pg 2 **of** 4

CERTIFIED COPY
Initials: TMS Date: 9/13/12

AEH 12 PSUEDO 03

ORIGINAL

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A

Source of Test Chemical (Manufacturer) Marine Bio Innovations

Storage Location Refrigerator in Rm 2

Date Received 23 FEB12 Date Opened 28 FEB12 KW Expiration Date 26 JAN13
(5 years unless otherwise stated)

Test Chemical Lot Number TR-4669-3-(6) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg @

Initial Mass (with cover on) of Test Chemical and Container 1690.67g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

@This is container 2 of 3. Amount of test chemical is approximately 1/3 of the ~5kg shipment of product KW 23FEB12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location Rf-III-62 Sample archived is from container 1 of 3. KW 5MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 23 FEB12

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

CERTIFIED COPY
Initials: MS Date: 9/13/12

Pg 3 of 4

ORIGINAL

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR-4669-3-(6)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample was * archived * from Container			1 of 3. See that	*Archived Sample chemical logbook for information. KLW 29FEB12		28 FEB12
1690.63	720.04	970.54	AEH-12-PSEUDO-03	Stock #3	29FEB12	KLW
970.54	720.11	248.65	AEH-12-PSEUDO-03	Stock #4 Some test chemical spilled when transferring	29FEB12	KLW
248.56	143.90	104.66	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared baggie & original container with residue weighed; all returned to NISM	12MAR12	KLW
			chemical and container returned to NISM.			
			Log closed for archiving. KLW 12MAR12			

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

PROOFED BY Initials: HEM Date: 01/14/13
REVIEWED BY Initials: [illegible] Date: 4/11/13

CERTIFIED COPY
Initials: DMS Date: 9/13/12

Item No. 2

AEH 12 PSUED0 03
File Folder 12

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AEH 12 PSUEDO 03

File Folder 12

Item No. 3

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR-4669-3-(6)

CONTAINER: 3 OF 3

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SC Date: 4/11/13
CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 1 of 4

FF # 12
Item No. 3
Pg 1 of 4

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry L. Weber	[redacted]	KLW	29 FEB12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on 29 February 2012 by [redacted]."

Date Quality Assurance Unit

PROOFED BY
Initials: HEM Date: 9Apr13
REVIEWED BY
Initials: SAL Date: 4-11-13

Pg 2 of 4

CERTIFIED COPY
Initials: MS Date: 9/13/12

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) PF-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marine BioInnovations

Storage Location Refrigerator in Rm. 2

Date Received 23 FEB 12 Date Opened 23 FEB 12 KW Expiration Date 26 JAN 13
(5 years unless otherwise stated)

TR-4669-3-(6)

Test Chemical Lot Number ~~TP-4669~~ RC KW 23 FEB 12 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg①

Initial Mass (with cover on) of Test Chemical and Container 1647.43g

Characterization of Test Chemical: Color TAN
Physical State: liquid _ solid X
Solid Form: powder X crystal _ pellet _

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No _

Additional Comments about the Test Chemical:

① This container is 3 of 3. Amount of test chemical is approximately 1/3 of the ~5kg shipment of product. KW 23FEB12

Sample Placed in Archives: Yes X No _ (Entries should also be made on Form GEN 012.b)

Archive Location PF-III-62 Sample archived is from Container 1 of 3. KW 5MAR12 Material Safety Data Sheet Available: Yes X No _

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 23 FEB 12

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SAL Date: 4-9-13

CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 3 of 4

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR-4669-3-(6)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
1 Sample was archived from Container 1 of 3. See that chemical log book for information. KW	*	*		*Archived Sample	~~KW 29 FEB12~~ 28 FEB 12	
1647.49	720.47	926.89	AEH-12-PSEUDO-03	~~Stock #5~~	29 FEB 12	KW
926.89	720.17	206.52	AEH-12-PSEUDO-03	Stock #6	29 FEB12	KW
206.51	102.10	104.39	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared bagger. Original container with residue weighed, all returned to NYSM	12MAR12	KW
			Chemical and container returned to NYSM. Log closed for archiving. KW 12MAR12			

PROOFED BY
Initials: HEH Date: 09Apr13
REVIEWED BY
Initials: SD Date: 4-11-13

CERTIFIED COPY
Initials: TMS Date: 9/13/12

Pg 4 of 4

Item No. 3

AEH 12 PSUEDO 03
File Folder 12

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.

1 = The initial mass is also entered on Form GEN 012.a.

A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).

B. The test chemical removed from the container will be placed into a tared vessel.

C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

AEH 12 PSUEDO 03
File Folder 12

Item No. 4

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(6)

PROOFED BY
Initials: JLen Date: 09Apr13
REVIEWED BY
Initials: SA Date: 4-11-13

Container 1 of 3

CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 1 of 4

FF # 12
Item No. 4
Pg 1 of 4

AEH 12 PSUED0 03

PROOFED BY
Initials: KEM Date: 09Apr13
REVIEWED BY
Initials: SA Date: 4-11-13

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry L Weber	[redacted]	KLW	1MAR12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on 06 March 2012 by [redacted]"

Date — Quality Assurance Unit

CERTIFIED COPY
Initials: DMS Date: 9/13/12 Pg 2 of 4

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) ~~Pf-CL145A~~ ① RF KW 1MAR12 MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A, Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location ~~Refrig~~ SP KW 1MAR12 Refrigerator in Room 2

Date Received 1 MAR 12 Date Opened 1 MAR 12 Expiration Date 05 FEB 2013
(5 years unless otherwise stated)

Test Chemical Lot Number TR 4669-4-16 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg①

Initial Mass (with cover on) of Test Chemical and Container 1611.22g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is container 1 of 3. Amount of test chemical is approximately 1/3 of the ~5kg shipment of product.

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RF III-G5 KW 13MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 1 MAR 12

② wrote wrong chemical name. KW 6MAR12

CERTIFIED COPY
Initials: JMS Date: 9/13/12

PROOFED BY
Initials: MEM Date: 09Apr13
REVIEWED BY
Initials: JM Date: 4-11-13

Pg 3 of 4

CERTIFIED COPY
Initials: HEM Date: 28Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED
Initials: SR Date: 4-11-13

AEH-12-PSEUDO-03

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG **Pg** 4 **of** 4

Test Chemical: MBI-401SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR 4669-4-(6)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 1611.22	* 4.92	* 1606.24	AEH-12-PSEUDO-03	*Archived Sample	1MAR12	KW
1606.24	~~2.14~~ 2.13403 ①	1604.05	AEH-12-PSEUDO-03	Analytical #1 Stock for YEP	6MAR12	KW
1604.05	2.18676	1601.84	AEH-12-PSEUDO-03	Analytical #2 stock for YEP	6MAR12	KW
1601.84	720.17	593.37	AEH-12-PSEUDO-03	Stock #1 for YEP	6MAR12	KW
593.37	720.03	161.41	AEH-12-PSEUDO-03	Stock #2 for YEP	6MAR12	KW
161.53	57.05	104.36	AEH-12-PSEUDO-03	Aliquot for NYSM analysis and all remaining chemical except residue left in container all returned to NYSM	12MAR12	KW
			Remaining chemical	and container returned to NYSM Log closed. KW 12MAR12		

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

① Balance changed. KW 6MAR12

Item No. 4

FOLDER NO. 12

AEH 12 PSUEDO 03

File Folder 12

CHEMICAL LOG BOOK

Item No. 5

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(6)

Container 2 of 3

PROOFED BY
Initials: HEM Date: 04/4/13
REVIEWED BY
Initials: JAC Date: 4-11-13

CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 1 of 4

FF # 12
Item No. 5
Pg 1 of 4

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L Weber		Klw	1MAR12

"This Use and Maintenance Log Book has been inspected [redacted] GEN 009.

Inspected and sealed on 06 Mar 2012 by [redacted]."
Date Quality Assurance Un

CERTIFIED COPY
Initials: jms Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09/..-13
REVIEWED BY
Initials: JHe Date: 4-11-13

Pg 2 of 4

AEH 12 PSUEDO 03

ORIGINAL

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 1 MAR 12 Date Opened 6 MAR 12 KW Expiration Date 05 FEB 2013
(5 years unless otherwise stated)

Test Chemical Lot Number ~~TR-4664-3-(6)~~ ② KW 12MAR12 TR-4664-4-(6) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg ①

Initial Mass (with cover on) of Test Chemical and Container 1598.00g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is Container 2 of 3. Amount of product is approximately 1/3 of the ~5kg shipment of product.

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)
Archive Location RF III-G5 Sample placed in archive is from container 1 of 3. KW 12MAR12
Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 1 MAR 12

② Wrote wrong lot # KW 6 MAR 12

CERTIFIED COPY
Initials: DMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13

REVIEWED BY
Initials: JAC Date: 4-11-13

CERTIFIED COPY
Initials: HEM Date: 28Mar13

AEH-12-PSEUDO-03

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG **Pg 4 of 4**

Test Chemical: MSI-4015DP	Manufacturer: Marine Bio Innovations	Lot or Batch #: TR4669-4-(6)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
1 Sample was archived from Container lot 3. See that				*Archived Sample chemical logbook for information.	6 MAR 12	KW
1597.97	720.77	~~581.330~~	AEH-12-PSEUDO-03	Stock # 3 for YEP spilled ~1.40g while weighing out stock	6MAR12	KW
874.32	720.37	153.92	AEH-12-PSEUDO-03	Stock #4 for YEP	6MAR12	KW
153.95	~~48.~~ 49.19 ①	104.61	AEH-12-PSEUDO-03	① Balance changed. Remaining test chemical weighed into tared baggie. Original container with residue weighed, all returned to NYSM.	12MAR12	KW
			Chemical and container returned to NYSM. Log closed for archiving. KW 12MAR12			

Item No. 5

FOLDER NO. 12

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

① Wrong weight. Should be 874.32g KW 6MAR12

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: KW Date: 4-11-13

AEH 12 PSUEDO 03

File Folder 12

CHEMICAL LOG BOOK

Item No. 6

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(6)

Container 3 of 3

PROOFED BY
Initials: Hem Date: 09Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

CERTIFIED COPY
Initials: JML Date: 7/13/12

Pg 1 of 4

FF # 12
Item No. 6
Pg 1 of 4

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JTL Date: 4-11-13

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	1MAR12
James A. Luome		JAL	7MAR12

"This Use and Maintenance Log Book has been inspected [redacted] EN 009.

Inspected and sealed on 06 March 2012 by [redacted]"
Date
Quality Assurance Unit

CERTIFIED COPY
Initials: TMS Date: 9/13/12

Pg 2 of 4

ORIGINAL

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 1MAR12 Date Opened 6MAR12 KW Expiration Date ~~08 FEB12~~ 08 FEB13 (2) RE. KW 1MAR12
(5 years unless otherwise stated)

Test Chemical Lot Number TR-4669-4-(6) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg(1)

Initial Mass (with cover on) of Test Chemical and Container 1763.04g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

(1) This is container 3 of 3. Amount of product is ~1/3 of the ~~25kg~~ ~5kg shipment of product. KW 1MAR12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location PFTI-65 (sample placed in archive is from container 1 of 3. KW 12MAR12) Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 1MAR12

(2) Wrote wrong year. KW 6MAR12

CERTIFIED COPY
Initials: JMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13

REVIEWED BY
Initials: JMS Date: 4/11/13

PROOFED BY
Initials: HEM Date: 11Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

CERTIFIED COPY
Initials: HEM Date: 11Apr13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Pg 4 of 4

Test Chemical: MBI-401 SDP			Manufacturer: Marine Bio Innovations		Lot or Batch #: TR4669-4-(6)	
A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
L Sample was archived from container 1 of 3. See				*Archived Sample that chemical log book for information		6MAR12 KW
1762.99	720.13	1042.79	AEH-12-PSEUDO-03	AEH-12-PSEUDO-03 Stock #5 for YEP	6MAR12	KW
1042.79	720.28	322.47	AEH-12-PSEUDO-03	Stock #6 for YEP	6MAR12	KW
322.53	2.00291	320.47	AEH-12-PSEUDO-03	Analytical stock #3	7MAR12	SA
320.47	2.00052	318.46	AEH-12-PSEUDO-03	Analytical stock #4	7MAR12	SA
318.46	213.03	105.36	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared bottle of original container with residue weighed, all returned to NYSM.	12 MAR 12	KW
				chemical and container returned to NYSM. Log closed for archiving. KW 12MAR12		

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
L = The initial mass is also entered on Form GEN 012.a.
A = The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B = The test chemical removed from the container will be placed into a tared vessel.
C = After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

Item No. 6

FOLDER NO. 12

401

AEH 12 PSUEDO 03

File Folder 12

Item No. 7

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(7-8)

Container 1 of 3

CERTIFIED COPY
Initials: JMS Date: 1/13/12

PREPARED BY
Initials: Hem Date: 04Apr13
REVIEWED BY
Initials: SH Date: 4-11-13

Pg 1 of 4

FF # 12
Item No. 7
Pg 1 of 4

AEH 12 PSUED0 03

PROOFED BY
Initials: HEM Date 09Apr13
REVIEWED B.
Initials: JN Date: 4-11-13

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. weber		KLW	6MAR12

"This Use and Maintenance Log Book has been inspected [redacted] GEN 009.

Inspected and sealed on 06 March 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 2 of 4

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDI

Circle one: Test Article Control Article

Trade Name of Test Chemical (Synonyms) PF-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 6MAR12 Date Opened 6MAR12 KW Expiration Date 26 JAN 13
(5 years unless otherwise stated)

Test Chemical Lot Number TR 4669-4-(7-8) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6 kg@

Initial Mass (with cover on) of Test Chemical and Container 1687.09g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

This is container lot 3. Amount of test chemical is ~1/3 of ~5 kg shipment.

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RFII-46 KW13MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 6MAR12

CERTIFIED COPY
Initials: JMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JC Date: 4-11-13

Pg 3 of 4

ORIGINAL

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marine Bio Innovations | Lot or Batch #: TR4669-4-(7-8)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 1687.07	* 5.23	* 1681.84	AEH-12-PSEUDO-03	*Archived Sample	6MAR12	KWW
1682.04	2.00049	1680.13	AEH-12-PSEUDO-03	Analytical Stock prep for standard curve	19MAR12	KWW
1679.98	2.00092	1678.02	AEH-12-PSEUDO-03	Analytical stock #1 for WAE	20MAR12	KWW
1678.03	2.00068	1676.01	AEH-12-PSEUDO-03	Analytical Stock #2 for WAE	20MAR12	KWW
1676.01	720.06 g	663.84	AEH-12-PSEUDO-03	Stock #1 for WAE	20MAR12	KWW
663.84	720.05	235.23	AEH-12-PSEUDO-03	Stock #2 for WAE	20MAR12	KWW
235.15	130.39	104.69	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared baggie. Original container with residue weighed. All returned to NYSM.	9APR12	KWW
				Chemical and container returned to NYSM. Log closed for archiving. KWW APR12		

1 = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
= The initial mass is also entered on Form GEN 012.a.

A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

Initials: REVIEWED BY Date: 9 Apr 13
Initials: PROOFED BY Date: 4-11-13

Pg 4 of 7 Initials: Pms Date: 9/13/12

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Item No. 4

AEH-12-PSEUDO-03

405

AEH 12 PSUEDO 03

File Folder 12

CHEMICAL LOG BOOK

Item No. 8

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(7-8)

Container 2 of 3

PROOFED BY
Initials: HEM Date: 09Apr-13
REVIEWED BY
Initials: JM Date: 4-11-13

CERTIFIED COPY
Initials: JMS Date: 9/13/12

Pg 1 of 4

FF # 12
Item No. 8
Pg 1 of 4

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: J[illegible] Date: 4-11-13

AEH 12 PSUED0 03

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber	[redacted]	KLW	6MAR12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on 06 March 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: PMS Date: 9/13/12

Pg 2 of 4

AEH 12 PSUEDO 03

ORIGINAL

SOP No. GEN 012.3
Page 5 of 7

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MB1-49 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-6145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 6 MAR 12 Date Opened 19 MAR 12 KW Expiration Date 26 JAN 13
(5 years unless otherwise stated)

Test Chemical Lot Number TR4669-4-(75) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6 kg①

Initial Mass (with cover on) of Test Chemical and Container ~~1656.56g~~ 1686.10g

Characterization of Test Chemical: Color TAN
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

①This is container 2 of 3. Amount of test chemical is ~1/3 of ~5 kg Shipment

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RF III-G6 Sample placed in archive from container 1 of 3 KW 6MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 6 MAR 12

①Forgot to take parafilm off on first weight. KW 6MAR12

PROOFED BY
Initials: HEM Date: 01 Apr 13
REVIEWED:
Initials: JAL Date: 4-11-13

CERTIFIED COPY
Initials: DAS Date: 9/13/12

Pg 3 of 4

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP
Manufacturer: Marrone Bio Innovations
Lot or Batch #: TR 4669-4-(7-8)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*Sample was archived from container 1 of 3. See that				*Archived Sample test chemical logbook for information.	6MAR12	KLW
1686.53	2.00082	1684.55	AEH-12-PSEUDO-03	Analytical stock for standard curve	19MAR12	KLW
1684.31	2.00021	1682.21	AEH-12-PSEUDO-03	Analytical stock # 3 for WAE	20MAR12	KLW
1682.21	720.09	961.81	AEH-12-PSEUDO-03	Stock #3 for WAE	20MAR12	KLW
961.81	720.07	241.43	AEH-12-PSEUDO-03	Stock #4 for WAE	20MAR12	KLW
241.31	136.18	105.04	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared bottle. Original container with residue weighed, all returned to NYSM.	9APR12	KLW
			Chemical and container returned to NYSM. Log closed for archiving KLW 9APR12			

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

PROOFED BY Initials: HEM Date: 01Apr13
REVIEWED BY Initials: JL Date: 4-11-13

CERTIFIED COPY Initials: DMS Date: 9/13/12

Pg 4 of 4

AEH 12 PSUEDO 03
File Folder 12
Item No. 8

AEH 12 PSUEDO D3

File Folder - 12

CHEMICAL LOG BOOK

Item No. 9

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(7-8)

Container 3 of 3

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JM Date: 4-11-13

CERTIFIED COPY
Initials: DMS Date: 9/13/12

Pg 1 of 4

FF # 12
Item No. 9
Pg 1 of 4

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JTC Date: 4-11-13

SIGNATURE PAGE

CERTIFIED COPY
Initials: JMS Date: 9/13/12

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L Weber		KLW	06MAR12

"This Use and Maintenance Log Book has been inspected [redacted]EN 009.

Inspected and sealed on 06 March 2012 by [redacted]"
DATE Quality Assurance Unit

Pg 2 **of** 4

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MB1-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) RF-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 6MAR12 Date Opened 19MAR12 KW Expiration Date 26JAN13
(5 years unless otherwise stated)

Test Chemical Lot Number TR 4469-4-(7-8) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.6kg①

Initial Mass (with cover on) of Test Chemical and Container 16963g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is container 3 of 3. Amount of test chemical is ~1/3 of 15kg shipment.

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RF III-66 sample placed in archive from container 1 of 3. KW 13MAR12 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 6MAR12

CERTIFIED COPY
Initials: TMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13

REVIEWED BY
Initials: SM Date: 4-11-13

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP			Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4669-4-(7-8)		
A	B	C	D	E	F	G
Initial mass of test chemical & container with cap/ lid on (g)	Amount removed (g)	Mass of test chemical & container after removal, with cap/lid on (g)	Study Number	Purpose and Other Comments	Date	Initials
*1 Sample	* was archived	* from container	1 of 3 See that test	*Archived Sample chemical log book for information	6MAR12	KW
1692.023	2.00006	1690.04	AEH-12-PSEUDO-03	① Balance changed. Analytical stock for standard curve	19MAR12	KW
~~1690.04~~ ② 1689.91	2.00057	1687.83	AEH-12-PSEUDO-03	② Began to write wrong weight Analytical Stock #4 for WAE	20MAR12	KW
1687.83	~~967.55~~ 720.03 ③	967.55	AEH-12-PSEUDO-03	③ Began to record wrong weight Stock # 5 for WAE	20MAR12	KW
967.55	720.10	247.22	AEH-12-PSEUDO-03	Stock # 6 for WAE	20MAR12	KW
247.11	142.10	104.93	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared baggie. Original container with residue weighed. All returned to NYSM	9APR12	KW
			Chemical and	Container returned to NYSM. Log closed for archiving. KW 9APR12		

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

SCOOPED BY
Initials: HEM Date: 01Apr13

REVIEWED BY
Initials: JSC Date: 4-11-13

Pg 4 of 4

AEH-12-PSUEDO-03
File Folder 12

CERTIFIED COPY
Initials: PMS Date: 9/13/12

Item No. 9

AEH 12 PSUEDO 03
File Folder 12

Item No. 10

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR4669-4-(7-8)

Container 1 of 3

(Shipment #2 KW 13MAR12)
CERTIFIED COPY
Initials: TMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr-13
REVIEWED BY
Initials: SA Date: 4-11-13

Pg 1 of 4

FF # 12
Item No. 10
Pg 1 of 4

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SN Date: 4-11-13

AEH 12 PSUED0 03

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Todd J. Severson		TJS	13MAR12
Kerry L. Weber		KLW	13MAR12

"This Use and Maintenance Log Book has been inspected [redacted] SOP GEN 009.

Inspected and sealed on March 28 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: TMS Date: 9/13/12

Pg 2 of 4

ORIGINAL

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SAP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 13MAR12 Date Opened 13MAR12 TJS Expiration Date 26 JAN 13
(5 years unless otherwise stated)

Test Chemical Lot Number ① IR 4669-4-(7-8) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.63 kg

Initial Mass (with cover on) of Test Chemical and Container 1714.38g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is the second shipment of this lot. KW 13MAR12
② This archive sample is from container 1 of 3 of shipment received on 6MAR12. KW 13MAR12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ③ PS-III-5-6 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 13MAR12

CERTIFIED COPY
Initials: TJS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13

REVIEWED BY
Initials: TJS Date: 4-11-13

Pg 3 of 4

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP			Manufacturer: Marrone Bio Innovations		Lot or Batch #: TR 4669-4-(7-5)	
A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from	* container 1 of	* 3 of shipment		*Archived Sample #1 (received 6MAR12) KW 13	MAR12	
1714.35	2.00073	1712.32	AEH-12-PSEUDO-03	Analytical Stock #1 for BLG	2APR12	KW
1712.32	2.00044	1710.31	AEH-12-PSEUDO-03	Analytical Stock #2 for BLG	2APR12	KW
1710.31	720.00	990.23	AEH-12-PSEUDO-03	Stock #1 for BLG	2APR12	KW
990.23	720.01	270.15	AEH-12-PSEUDO-03	Stock #2 for BLG	2APR12	KW
270.27	10.00034	260.04	AEH-11-PSEUDO-02	Dactive Stock for BLS	16APR12	KW
260.04	10.00418	249.99	AEH-11-PSEUDO-02	Active Stock for BLS	16APR12	KW
250.08	145.00	104.97	AEH-11-PSEUDO-02 AEH-12-PSEUDO-03	Remaining test chemical [illegible] container with residue weighed. All returned to NYSM.	19APR12	KW
			Chemical and container returned to NYSM	for archiving. KW 19APR12		

Initials: HEM Date: 01A-13 (CHECKED BY)

REVIEWED BY
Initials: JN Date: 9-11-13

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

AEH.12.PSUEDO.03
File Folder 12
CERTIFIED COPY
Initials: JMS Date: 9/13/12

Item No. 10

ORIGINAL

Pg 4 of 4

AEH 12 PSUEDO 03

File Folder 12

Item No. 11

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR4669-4-(7-8)

Container 2 of 3

(Shipment #2 KW 13MAR12)

CERTIFIED COPY
Initials: TMS Date: 9/13/12

PROOFED BY
Initials: HEM Date: 09Apr13

REVIEWED BY
Initials: SM Date: 4-11-13

Pg 1 of 4

FF # 12
Item No. 11
Pg 1 of 4

AEH 12 PSUEDO 03

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13 SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Todd J. Severson	[redacted]	TJS	13MAR12
Kerry L. Weber		KLW	13MAR12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on March 28, 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: TMS Date: 9/13/12

PROOFED BY Initials: HEM Date: 09Apr13
REVIEWED BY Initials: JHC Date: 4-11-13

ORIGINAL

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 13MAR12 Date Opened 13MAR12 TJS Expiration Date 26 JAN 13 (5 years unless otherwise stated)

Test Chemical Lot Number ①TR 4669-4-(7-8) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.59 kg

Initial Mass (with cover on) of Test Chemical and Container 1708.43g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

①This is the second shipment of this lot. KMW 13MAR12
②This archive sample is from container 1 of 3 of first shipment received on 6 MAR 12. KMW 13MAR12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ②Pf-III-G-6 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 13MAR12

CERTIFIED COPY
Initials: TMS Date: 9/13/12

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR 4669-4-(7-8)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
[1] Sample archived from *	* container	* 1 of 3 of shipment		*Archived Sample #1 (received 6MAR12) KW 13MAR12		
1708.35	720.02	988.30	AEH-12-PSEUDO-03	Stock #3 for BLG	2APR12	KW
988.30	720.01	268.05	AEH-12-PSEUDO-03	Stock #4 for BLG	2APR12	KW
~~268.120~~	163.16	104.79	AEH-12-PSEUDO-03	Remaining test chemical weighed into tared weigh... Original container with residue weighed. All returned to NYSM. (1) Changed to 268.05 [illegible] 19APR12	19APR12	KW
			Chemical	and container returned to NYSM		
				Log closed for archiving. KW	19APR12	

PROOFED BY
Initials: [illegible] Date: 3/4/13
REVIEWED BY
Initials: [illegible] Date: 4/1/13

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CERTIFIED COPY
Initials: pms Date: 9/13/12

Pg 4 of 4

AEH-12-PSUEDO-03
File Folder 12

Item No. 11

ORIGINAL

SOP No. GEN 012.3
Page 7 of 7

AEH 12 PSUEDO 03

File Folder 12

Item No. 12

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR4669-4-(7-8)

Container 3 of 3

(Second Shipment KW 13MAR12)

CERTIFIED COPY
Initials: JMS Date: 2/13/12

PROOFED BY
Initials: Hem Date: 09Apr13

REVIEWED BY
Initials: SDL Date: 4-11-13

Pg 1 of 4

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SM Date: 4-11-13

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Todd J. Severson		TJS	13MAR12
Kerry L. Weber		KLW	13MAR12

"This Use and Maintenance Log Book has been inspected [redacted] SOP GEN 009.

Inspected and sealed on March 28, 2012 by [redacted]."

Date

CERTIFIED COPY
Initials: TMS Date: 9/13/12

Pg 2 of 4

CERTIFIED COPY
Initials: HEM Date: 11Apr13

ORIGINAL

PROOFED BY
Initials: HEM Date: 11Apr13
REVIEWED BY
Initials: JDL Date: 4-11-13

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

AEH-12-PSEUDO-03

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145Aj; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 13MAR12 Date Opened 13MAR12 TDS Expiration Date 26 JAN 13
(5 years unless otherwise stated)

Test Chemical Lot Number ① TR 4669-4-(7-8) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.63 kg

Initial Mass (with cover on) of Test Chemical and Container 1724.58g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is the second shipment of this lot. RLW 13MAR12
② This archive sample is from container 1 of 3 of first shipment received on 6MAR12. RLW 13MAR12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location Rf-②D-4-6 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 13MAR12

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: TR 4669-4-(7-8)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from	* container	* 1 of 3 of shipment #		*Archived Sample 1 (received 6 MAR 12) KW 13 MAR 12		
1724.49	720.03	1004.47	AEH-12-PSEUD003	Stock #5 for BLG	2 APR 12	KW
1004.47	720.03	284.32	AEH-12-PSEUD003	Stock #6 for BLG	2 APR 12	KW
284.34	179.27	104.97	AEH-12-PSEUD003	Remaining test chemical weighed into tared baggie. Original container with residue weighed. All returned to NYSM	19 APR 12	KW
			Chemical and	container returned to NYSM		
				Log closed for archiving. KW 19 APR 12		

PROOFED BY Initials: HEM Date: 1 Apr 13
REVIEWED BY Initials: SJL Date: 4-11-13

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CERTIFIED COPY
Initials: mS Date: 9/13/12

Pg 4 of 4

AEH 12 PSUED0 03
File Folder 12
Item No. 12

ORIGINAL

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5)

Container 1

FF # 12
Item No. 13
Pg 1 of 5

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

PROOFED BY
Initials: HEM Date: 09 Apr-13
REVIEWED BY
Initials: SM Date: 4-11-13

Pg 1 of 5

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JN Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg** 2 **of** 5

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	24Apr12
Theresa M. Schreier		TMS	5/25/12

"This Use and Maintenance Log Book has been inspected [redacted] EN 009.

Inspected and sealed on 01 May 2012 by [redacted]"
Date Quality Assurance Unit

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

PROOFED BY
Initials: HEM Date: 25April3
REVIEWED BY
Initials: JLC Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.2a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 5

Test Material (Chemical Name) MBI-401 SDP

Trade Name of Chemical (Synonyms) Pf-CL145A

Source of Chemical (Manufacturer) Monroe Bio Innovations

Storage Location Locked refrigerator in Room 2

Date Received 24APR12 Date Opened 1MAY12 Expiration Date 12JAN13
(5 years unless otherwise stated)

Test Chemical Lot Number TR4669-4-(5) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) 5kg

Initial Weight (with cover on) of Test Chemical and Container 5028.3g

Characterization of Test Chemical: Color tan
Physical State: liquid ☐ solid ☒
Solid Form: powder ☒ crystal ☐ pellet ☐

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes ☒ No ☐

Additional Comments About Test Chemical:

Sample Placed in Archives: Yes ☒ No ☐ (Entries should also be made on Form GEN 012.2b)

Archive # Pf III-67 FWD 1MAY12 Material Safety Data Sheet Available: Yes ☒ No ☐

Signature of person (Study Director or designated representative) initiating Test Chemical Use Log and date:

Signature [redacted] Date 24APR12

CERTIFIED COPY
Initials: HEM Date: 2SMar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012 2b
Page 1 of 1

TEST CHEMICAL USE LOG

Pg 4 of 5

Test Chemical: MBI-401 SDP Manufacturer: Marrone Bio Innovations Lot #: TR 4669-4-(5)

A Initial weight of chemical & container (with cap/lid on)(g)	B Amount removed (g)	C Weight of chemical & container (g) after removal (with cap/lid on)	D Study # and Purpose	E Comments	F Date/Initials
*! 5025.3	6.6618	5018.8①	*Archived Sample	AEH-12-PSEUDO-03 and AEH-11-PSEUDO-02	1MAY12 KW
5018.8①	2.00182	5019.2①	AEH-12-PSEUDO-03	AEH-12-PSEUDO-03 BKT Analytical Stock #1	
5019.2①	2.00029	5019.2①		AEH-12-PSEUDO-03 BKT Analytical Stock #2	
5019.2①	720.00	4294.8		AEH-12-PSEUDO-03 BKT Stock #1	
4294.8	720.09	3573.6		AEH-12-PSEUDO-03 BKT Stock #2	
3573.6	720.00	2854.4		AEH-12-PSEUDO-03 BKT Stock #3	
2854.4	720.00	2133.6		AEH-12-PSEUDO-03 BKT Stock #4	
2133.6	719.99	1413.6		AEH-12-PSEUDO-03 BKT Stock #5	
1413.6	720.06	693.1	AEH-12-PSEUDO-03	AEH-12-PSEUDO-03 BKT Stock #6	1MAY12 KW
① Due to the large amount of product in container and the small amount removed for the analytical standards the balance (BAL7) was unable to detect the difference in weight in the container with the product. After consulting with QAM and a chemist it was determined to proceed and acknowledge the weight discrepancies. The analytical aliquots were weighed directly on an analytical balance (BAL5; model LPA225D; S/N 26450930), there is no concern regarding aliquot weights. KW 1MAY12					
692.69 (693.1)	695.0009	687.17	AEH-11-PSEUDO-02	AEH-11-PSEUDO-02 PPB Active Stock	15MAY12 KW

②weighed wrong amount of test chemical. Aliquot will not be used to dose PPB. KW 15MAY12 (③This aliquot was shipped back to NYSM for verification. KW 21MAY12

* = The first entry should be the chemical placed in the Chemical Archives. Follow GEN 011.
! = The initial weight is also entered on Form GEN 012.2a.

A. The weight of the chemical and its container shall be measured by weighing it on a balance that has been verified to be accurate (SOP GEN 013).
B. The chemical removed from the test chemical container will be weighed into a tared vessel.
C. After the chemical has been removed from the test chemical container, r[illegible]eigh the container and its contents (including the cap or

CERTIFIED COPY

Initials: HEM Date: 09Apr13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JC Date: 4-11-13

ORIGINAL

SOP No. GEN 012.2
Page 6 of 6

AEH-12-PSEUDO-03

Form GEN 012.2b
Page 1 of 1

TEST CHEMICAL USE LOG

Pg 5 of 5

Test Chemical: MBI-401SDP Manufacturer: Marrone Bio Innovations Lot #: TR4669-4-(5)

A Initial weight of chemical & container (with cap/lid on)(g)	B Amount removed (g)	C Weight of chemical & container (g) after removal (with cap/lid on)	D Study # and Purpose	E Comments	F Date/Initials
687.17	(4) 5.00091	682.25	AEH-11-PSEUDO-02	Deactive stock for PPB Juvenile mussels	15MAY12 KW
682.41	10.00058	671.95	AEH-11-PSEUDO-02	(2) Deactive Stock for PPB Juvenile Mussels	15MAY12 KW
671.95	10.00012	661.75	AEH-11-PSEUDO-02	(3) Active Stock for PPB Juvenile mussels	15MAY12 KW
662.23	10.00144	651.74	AEH-11-PSEUDO-02	Active Stock for PPB Juvenile Mussels	16MAY12 KW
652.07	6.04074	645.76	AEH-11-PSEUDO-02 AEH-12-PSEUDO-03	Aliquot to NYSM for verification (3rd Aliquot)	23MAY12 KW
645.92	20.00739	625.50	AEH-11-PSEUDO-02	2 aliquots removed HD Stock 10.00374 g, Active stock 10.00365 g small amount spilled.	JMS 5/25/12
625.67	7.75	617.56	AEH-11-PSEUDO-02	Aliquot to NYSM for verification.	4JUN12 KW

Weighed wrong amount of test chemical. Aliquot will not be used to dose PPB. 15MAY12 KW

* The first entry should be the chemical placed in the Chemical Archives. Follow GEN 011.

* The initial weight is also entered on Form GEN 012.2a.

(2) This stock was spilled while making. Discarded. KW 16MAY12

(3) This stock was used to make the deactive stock while a new aliquot was weighed to make the active stock. KW 16MAY12

. The weight of the chemical and its container shall be measured by weighing it on a balance that has been verified to be accurate (SOP GEN 013).

3. The chemical removed from the test chemical container will be weighed into [illegible] ed vessel. After the chemi[illegible] as been removed from the test chemical container, [illegible] e container and its contents (including the cap or [illegible]

(4) This aliquot was shipped back to NYSM for verification. KW 21MAY12

FOLDER NO. 12

Item No. 13

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5) #2©

Bottle 1 of 3

FF # 12
Item No. 14
Pg 1 of 4

©This is the second shipment of this lot. First shipment received on 24APR12.
HW
5JUN12

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SAL Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg** 2 **of** 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L Weber		KLW	5JUN12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 6 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

PROOFED BY
Initials: HEM Date: 01 Apr 13
REVIEWED BY
Initials: JHL Date: 4-11-13

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MB1-49SPP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Rf-CL145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 5 JUN 12 Date Opened 11 JUN 12 KW Expiration Date 12 JAN 2013
(5 years unless otherwise stated)

Test Chemical Lot Number ① TR4669-4-15) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~21.7 kg

Initial Mass (with cover on) of Test Chemical and Container 1686.23g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is the second shipment of this lot. KW 5 JUN 12
② This archive sample is from container 1 of 1 from shipment #1 (received 24 APR 12) KW 5 JUN 12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ② RFII-G7 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signatu [redacted] Date 5 JUN 12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

COPIED BY
Initials: HEM Date: 04Apr13
REVIEWED BY
Initials: JFL Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MB1-401SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4669-4-(5)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from	* container lot 1	of shipment #1		*Archived Sample received 24APR12. KMW 5JUN12		
1686.50	2.00062	1684.28	AEH-12-PSEUDO-03	Analytical Stock #1 for LMB	11JUN12	KMW
1684.28	2.00050	1682.15	AEH-12-PSEUDO-03	Analytical Stock #2 for LMB	↑	↑
1682.15	720.06	960.70	AEH-12-PSEUDO-03	Stock #1 for LMB	↓	↓
960.70	720.05	239.67	AEH-12-PSEUDO-03	Stock #2 for LMB	11JUN12	KMW
239.86	7.71	232.13	AEH-12-PSEUDO-03	aliquot to NYSM for verification	14JUN12	KMW
232.03	6.46	225.55	AEH-12-PSEUDO-03	aliquot to NYSM for verification	19JUN12	KMW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test						
article will be made for this study 3APR13 KMW						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

FOLDER NO. 12
Item No. 14

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

*LOT NUMBER: TR 4669-4-(5) #2*①

Bottle 2 of 3

①This is the second shipment of this lot. First shipment received on 24 APR 13. Inv 53UN12

FF # 12
Item No. 15
Pg 1 of 4

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Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SHL Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg** 2 **of** 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	5 Jun 12

"This Use and Maintenance Log Book has been inspected [redacted] GEN 009.

Inspected and sealed on June 6 2012 by [redacted]."

Date

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JM Date: 4-11-13

EH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MB1-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A; Zequenox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 5JUN12 Date Opened 11JUN12 KW Expiration Date 12 JAN 2013
(5 years unless otherwise stated)

Test Chemical Lot Number (1) IR4669-4-15) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7 kg

Initial Mass (with cover on) of Test Chemical and Container 16896g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
(1) This is the second shipment of this lot. KW 5JUN12
(2) This archive sample is from container 1 of shipment received on 24 APR12 KW 5JUN12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location (2) Pf III - 67 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signatu[redacted] Date 5JUN12

CERTIFIED COPY
Initials: HEM Date: 04Apr13
PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JR Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4669-4-(5)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from	* container 1 of	1 of Shipment #1		*Archived Sample (received 24APR12). KW 5JUN12		
1690.03	720.01	968.42	AEH-12-PSEUDO03	Stock #3 for LMB	10JUN12	KW
968.42	720.05	247.65	AEH-12-PSEUDO03	Stock #4 for LMB	11JUN12	KW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3APR13						

Item No. 45

FOLDER NO. 12-

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5) #2①

Bottle 3 of 3

① This is the second shipment of this lot. First shipment received 24 APR 12. KMO 5JUN12

FF # 12
Item No. 16
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13.

PROOFED BY
Initials: HEM Date: 04Apr13
REVIEWED BY
Initials: JGL Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 01Apr13
REVIEWED
Initials: JL Date: 4-11-13

AEH-12-PSEUDO-03

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	5Jun12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 6, 2012 by [redacted]."

CERTIFIED COPY
Initials: HEM Date: 25MAR13

ORIGINAL

PROOFED BY
Initials: HEM Date: 09APR13
REVIEWED BY
Initials: SR Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) PF-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Rm 2

Date Received 5 JUN12 Date Opened 11 JUN12 KW Expiration Date 12 JAN 2013
(5 years unless otherwise stated)

Test Chemical Lot Number ① TR 4669-4-(5) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7 kg

Initial Mass (with cover on) of Test Chemical and Container 1687.2 g

Characterization of Test Chemical: Color TAN
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
①This is the second shipment of this lot. KW 5JUN12
②This archive sample is from container 1 of shipment received on 24APR12. KW 5JUN12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ② RFIII-67 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 5 JUN12

CERTIFIED COPY
Initials: HEM Date: 04Apr13
PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JD Date: 9-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marone Bo Innovations	Lot or Batch #: TR 4669-4(5)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from container 1 of 1 of	*	*	Shipment #1 (Received on 24APR12) KW 5JUN12	*Archived Sample		
1687.18	720.05	966.51	AEH-12-PSEUDO-03	Stock #5 for LMB	11JUN12	pw
966.51	720.01	245.76	AEH-12-PSEUDO-03	stock #6 for LMB	11JUN12	KW
The use of this test article for study number			AEH-12-PSEUDO-03	has been completed and no other withdrawals of test article		
will be made for this study. KW 3APR13						

FOLDER NO. 12
Item No. 16

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CHEMICAL LOG BOOK

MBI-401 SDP

~~AEH-12-PSEUDO-03~~

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5) #3①

Container 1 of 3

① This is the third shipment of this lot. The first shipment was received on 24APR12; the second shipment was received on 5JUN12.
KMD
14JUN12

FF # 12
Item No. 17
Pg 1 of 4

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PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SJM Date: 4-11-13

Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	14JUN12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 15, 2012 by [redacted]
Date Quality Assurance Unit

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

ORIGINAL

PROOFED BY
Initials: HEM Date: 04 Apr 13
REVIEWED BY
Initials: SA Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 14 JUN 12 Date Opened 19 JUN 12 KW Expiration Date 12 JAN 2013
(5 years unless otherwise stated)

Test Chemical Lot Number ① JR4669-4-(5) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7 kg

Initial Mass (with cover on) of Test Chemical and Container 1683.57 g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is the third shipment of this lot. KW (wrong date) 14 JUN 12
⑤ This archive sample is from container 1 of 1 from shipment #1 (received 24 APR 12). KW 14 JUN 12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ⑤ RF III-67 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 14 JUN 12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 09Apr-13
REVIEWED BY
Initials: JG Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4669-4-15)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from	* container 1 of 1 of Shipment			*Archived Sample #1 (received 24MAR.12) KW 14JUN12		
1683.07	2.00019	1681.10	AEH-12-PSEUDO-03	Analytical #1 for SMB	19JUN12	KW
1681.10	2.00010	1678.97	AEH-12-PSEUDO-03	Analytical #2 for SMB	19JUN12	KW
1678.97	720.05	958.20	AEH-12-PSEUDO-03	Stock #1 for SMB	19JUN12	KW
958.20	720.07	236.99	AEH-12-PSEUDO-03	Stock #2 for SMB	19JUN12	KW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3APR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

FOLDER NO. 12
Item No. 17

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5) #3①

Container 2 of 3

① This the third shipment of this lot. The first shipment was received on 24APR-12; the second shipment was received on 5JUN12. & on 14JUN12

FF # 12
Item No. 18
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: Hem Date: 09Apr13
REVIEWED BY
Initials: JD Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: Jn Date: 4-11-13

AEH-12-PSEUDO-03

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry L. Weber		KLW	14Jun12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 15 2012 (Date) by [redacted] Quality Assurance Unit."

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

P. COPY
Initials: HEM Date: 25Mar13
REVIEWED BY
[redacted] Date 4/1/13

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) pf-CL 145A; Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 14JUN12 Date Opened 19JUN12 KMW Expiration Date 12JUN2013
(5 years unless otherwise stated)

Test Chemical Lot Number ⑥ TR4669-4-15 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1819.74g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

⑥ This is third shipment of this lot. KMW 14JUN12

⑤ This archive sample is from container 1 of 1 from shipment #1 (received 24APR12) KMW 14JUN12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ⑤ PFTF-6-7 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 14JUN12

CERTIFIED COPY
Initials: HEM Date: 04Apr13
PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: [illegible] Date: 9-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: JR 4669-4-(5)

A	B	C	D	E	F	G
Initial mass of test chemical & container with cap/ lid on (g)	Amount removed (g)	Mass of test chemical & container after removal, with cap/lid on (g)	Study Number	Purpose and Other Comments	Date	Initials
*1 Sample archived from container	*	*	lot 1 of Shipment	*Archived Sample #1 (received 24APR12)	KW 14JUN13	
1819.31	720.02	1098.12	AEH-12-PSEUDO-03	Stock #3 for SMB	19JUN12	KW
1098.12	720.00	377.25	AEH-12-PSEUDO-03	Stock #4 for SMB	19JUN12	KW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article for this study will be made. KW 3APR13						

FOLDER NO. 12
Item No. 18

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-4-(5) #3(1)

Container 3 of 3

(1) This is the third shipment of this lot. The First shipment was received on 24APR12; the second shipment was received on 5JUN12.
HW
14JUN12

FF # 12
Item No. 19
Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: SAL Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JR Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE

Pg 2 of 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry L. Weber	[redacted]	KLW	15 Jun 12
Theresa Schreier		TMS	15 Jun 12

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 15 2012 by [redacted]."
Date Quality Assurance Unit

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

PROOFED BY
Initials: HEM Date: 04Apr13
REVIEWED BY
Initials: JH Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-4015DP

Circle one: Test Article Control Article

Trade Name of Test Chemical (Synonyms) PF-CL-1415A; Tequarmx

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 14JUN12 Date Opened 19JUN12 KLW Expiration Date 12JUN2013
(5 years unless otherwise stated)

Test Chemical Lot Number (1) TR4669-415 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1761.76g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

(1) This is the third shipment of this lot. KLW 14JUN12

(2) The archive sample is from container 1 of 1 of shipment #1 (received 24APR12). KLW 14JUN12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location (3) RF III-67 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signatur [redacted] Date 14JUN12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

ORIGINAL

PROOFED BY
Initials: HEM Date: 09Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Pg 4 of 4

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4669-4-(5)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Sample archived from container 1 of 1 of shipment #1 (received 24APR12) KW 14JUN12				*Archived Sample		
1761.66	720.00	1041.12	AEH-12-PSEUDO-03	Stock #5 for SMB	19JUN12	KW
1041.12	720.00	320.60	AEH-12-PSEUDO-03	Stock #6 for SMB	19JUN12	KW
320.36	4.99	315.31	AEH-12-PSEUDO-03	sample shipped to NYSM for activity test	25Jun12	TMS
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3APR13						

FOLDER NO. 12

Item No. 19

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-3-(7)

Container 1 of 3

FF # 12
Item No. 20
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY:
Initials: JA Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

PROOFED BY
Initials: HEM Date: 10 April 3
REVIEWED BY
Initials: SL Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE Pg 2 of 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry Weber	[redacted]	KW	25Mar13
Theresa Schreier		TMS	25Mar13

"This Use and Maintenance Log Book has been inspected and found to be in compliance with SOP GEN 009.

Inspected and sealed on June 26, 2012 by [redacted]
Date Quality Assurance Unit

CERTIFIED COPY
Initials: HEM Date: 25Mar13
PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: Jw Date: 04-11-13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MB1-401SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CC1145A, Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 21JUN12 Date Opened 25 Jun 12 1st Expiration Date 11JUN13
(5 years unless otherwise stated)

Test Chemical Lot Number TR4669-3-(7) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1570.19g

Characterization of Test Chemical: Color TAN
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RTP GS Material Safety Data Sheet Available: Yes X No __
TR 6/26/12

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 21JUN12

CERTIFIED COPY

Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13

REVIEWED BY
Initials: JAL Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical:	Manufacturer:	Lot or Batch #:
MSI-49 SPP	Mamac Bio Innovations	TR 4669-3-(7)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 1569.75	* 3.05	* 1566.64	AEH-12-PSEUDO-03	*Archived Sample	6/25/12	TMS
1566.72	5.07	1561.70	AEH-12-PSEUDO-03	Sample shipped to NYSM for activity verification	6/26/12	TMS
1561.74	4.00017	1557.68	AEH-12-PSEUDO-03	analytical #1 2.00013g for BLE exposure analytical #2 2.00004g	7/10/12	TMS
1557.68	1440.08	116.20	AEH-12-PSEUDO-03	Stock #1 720.05 g for BLE exposure Stock #2 720.03 g	7/10/12	TMS
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3APR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

FOLDER NO. 12
Item No. 20

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-3-(7)

Container 2 of 3

FF # 12
Item No. 21
Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr-13
REVIEWED BY
Initials: SA Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: KW Date: 5APR13

AEH-12-PSEUDO-03

Pg 2 of 4

PROOFED BY Initials: HEM Date 10Apr13
REVIEWED BY Initials: JLL Date: 4-11-13

SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry Weber	[redacted]	KWW	2APR13
Therese Schreier		TMS	7/10/13

"This Use and Maintenance Log Book has been inspected [redacted] 009.

Inspected and sealed on April 3, 2013 b[redacted]
Date Quality Assurance Unit

* Received the logbook on 4/3/13 for review. It appears it was inadvertently omitted when the chemical was received. JLL

CERTIFIED COPY
Initials: KWW Date: 5APR13

PROOFED BY
Initials: HEM Date: 16April3

REVIEWED BY
Initials: [redacted] Date: 4-11-13

ORIGINAL

AEH-12-PSEUDO-03

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) MB1-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL 145A; Sequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 21JUN12 Date Opened 7/10/12 TMS Expiration Date 11JAN13
(5 years unless otherwise stated)

Test Chemical Lot Number TR4669-3-(7) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1722.68g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

Archive sample taken from container # 1 of 3. TMS 7/10/12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)
Sample archived is from container 1 of 3. KWW 5APR13

Archive Location RF-III 68 Material Safety Data Sheet Available: Yes X No __
Sample was archived by Author on 6/26/12 KWW 5APR13

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 21JUN12

Pg 3 of 4

CERTIFIED COPY

Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13

REVIEWED BY
Initials: JTA Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: TR 4609-3-(7)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive	* sample	*taken from	container 1 of 3.	*Archived Sample	7/10/12	TMS
1722.88	1440.04g	280.34	AEH-12-PSEUDO-03	Stock #3 720.00g for Stock #4 720.04g BLG exposure	7/10/12	TMS
280.21	5.00g	275.19	AEH-12-PSEUDO-03	sample sent to NYSM for activity verification	7/12/12	TMS
275.40	15.00g ① ~~10.00g~~	259.32	AEH-12-PSEUDO-04	Test bottom injection device ①wrote wrong value. TMS 24AUG12	24AUG12	TMS
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for the study. TMS 3APR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

Item No. 21

FOLDER NO. 12

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: TR 4669-3-(7)

Container 3 of 3

FF # 12
Item No. 12
Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JH Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 10Apr13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

AEH-12-PSEUDO-03. SIGNATURE PAGE Pg 2 of 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry Weber	[redacted]	KW	2/13/2012
Theresa Schreier		TMS	7/16/12

"This Use and Maintenance Log Book has been inspect[redacted]N 009.

Inspected and sealed on *April 3, 2013
Date

[redacted]
Quality Assurance Unit

*Received for review and Sealed on 04/03/13. It appears this log was inadvertently omitted from review when the chemical arrived.

①Corrected date 4/10/13 [redacted]

CERTIFIED COPY
Initials: KW Date: 5APR13

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PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JC Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Test Chemical (Chemical Name) Pf-CL 145A / MBI-401SDr

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Tequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Refrigerator in Room 2

Date Received 21JUN12 Date Opened 7/10/12 TMS Expiration Date 11JAN2013
(5 years unless otherwise stated)

Test Chemical Lot Number TP4669-3-(7) Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1686.58g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

Archive sample taken from container #1 of 3. TMS 7/10/12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)
Sample archived is from container 1 of 3. KW 5APR13

Archive Location RFIG8 Material Safety Data Sheet Available: Yes X No __
KW 5APR13 Sample was archived by Q4h on 6/26/12 KW 5APR13

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 21JUN12

Pg 3 of 4

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JS Date: 4-11-13

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP
Manufacturer: Marrone Bio Innovations
Lot or Batch #: TR 4069-3-(7)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive	* sample taken	* from	container #1 &	*Archived Sample 3.	7/10/12	TMS
~~1686~~ 1686.69 transposed TMS 7/10/12	1440.09 g	245.56	AEH-12-PSEUDO-03	Stock #5 720.05 g Stock #6 720.04 g For BLG exposure	7/10/12	TMS
The use of test article for	study number	AEH-12-PSEUDO-03	has been completed and no	other withdrawals of test article		
will be made	for this study. KLW 3APR13					

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

Item No. 22

FOLDER NO. 12

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, CA

Lot Number: 401P12154G-02

Shipment #1
Raw Material

FF # 12
Item No. 13
Pg 1 of 4

Container: 1 of 3

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

Pg 1 of 4

PROOFED BY
Initials: HEM Date 10Apr13
REVIEWED BY
Initials: Jm Date 4-11-13

CERTIFIED COPY
Initials: HEM Date: 25Mar13

AEH-12-PSEUDO-03 SIGNATURE PAGE Pg 2 of 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Theresa Schreier	[redacted]	Tms	7/26/12
Kerry L. Weber	[redacted]	Klw	3Dec12
	[redacted]		

"This Test Chemical Log Book has been inspected and found to be in compliance with SOP GEN 009 and 012.

Inspected and sealed on 6/27 2012 (Date) by [redacted] Quality Assurance Unit."

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JM Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A, Zeguanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Rm 2, Refrigerator

Date Received 7/26/12 TMS Date Opened 7/26/12 TMS Expiration Date 6/6/13
(5 years unless otherwise stated)

Test Chemical Lot Number ② 401P12154G-02 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) 1.7 Kg ①
wrote in wrong space TMS 7/26/12

Initial Mass (with cover on) of Test Chemical and Container X 1660.52g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is container 1 of 3. Total available test chemical is 5 Kg including containers 2 and 3. TMS 7/26/12
② This is the first shipment of this lot. KW 19SEP12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location RF III 69 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 7/26/12

CERTIFIED COPY
Initials: HEM Date: 04April3
PROOFED BY
Initials: HEM Date: 10April3
REVIEWED BY
Initials: SMc Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1
Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SOP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: 401P1215466-02 Container 1 of 3

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 1660.52	* 2.93	* 1657.63	AEH-12-PSEUDO-03	*Archived Sample	7/26/12	
1657.42	720.49	936.55	AEH-12-PSEUDO-03	Stock #1 for LST	31 JUL 12	
936.55	720.04	215.39	AEH-12-PSEUDO-03	Stock #2 for LST	31 JUL 12	
215.39	6.92	208.43	AEH-12-PSEUDO-03	verification sample for NYSM	31 JUL 12	
208.39	2.00020	206.23	AEH-12-PSEUDO-03	Analytical #1 for LST	31 JUL 12	
206.23	2.00041	204.10	AEH-12-PSEUDO-03	Analytical #2 for LST	31 JUL 12	
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3 APR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
: = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the t[illegible]hemical has been removed from the container, determine the m[illegible] f the container and its contents (with cap/lid on).

ORIGINAL

FOLDER NO. 12
Item No. 23

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, CA

Lot Number: 401P12154G-02

Shipment #1
Kiwi NSEP12

FF # 12
Item No. 24
Pg 1 of 4

Container: 2 of 3

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: Snc Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Theresa Schreier	[redacted]	TMS	7/26/12
Kerry Weber		Kw	31JUL12

"This Test Chemical Log Book has been inspected and found to be in compliance with SOP GEN 009 and 012.

Inspected and sealed

on 2/07 2013 by [redacted]it ________."
Date

CERTIFIED COPY ORIGINAL

Initials: HEM Date: 25Mar13

SOP No. GEN 012.3
Page 5 of 7

AEH-12-PSEUDO-03 Form GEN 012.3a
Page 1 of 1

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: [redacted] Date: 4-11-13

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SOP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) PF-CL145A, Zequanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Rm 2, Refrigerator

Date Received 7/26/12 Date Opened 31JUL13 KW Expiration Date 6/6/13
(5 years unless otherwise stated)

Test Chemical Lot Number (3) 401P12154A-02 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) 1.7Kg ①

Initial Mass (with cover on) of Test Chemical and Container 1653.08 g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is container 2 of 3. Total available test chemical is 5 Kg including containers 1 and 3. 7/26/12
② An archive sample was removed from container 1 of 3 of the same chemical lot. JMS 7/26/12
③ This is first shipment of this lot KW 19SEP12

(2) Sample Placed in Archives: Yes __ No X (Entries should also be made on Form GEN 012.b)

Archive Location NA Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 7/26/12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROCFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JH Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: 401P12154G-02 container 2 of 3

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive	* sample was removed	* from container 1 of 3 of the same lot.		*Archived Sample	7/26/12	TMS
1652.76	720.08	932.35	AEH-12-PSEUDO-03	Stock #3 for LST	31JUL12	KW
932.35	720.06	211.26	AEH-12-PSEUDO-03	Stock #4 for LST	31JUL12	KW
The use of test article for study number			AEH-12-PSEUDO-03	has been completed and no other withdrawals of test article		
will be made for this study. KW 31MAR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate.(SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the t... chemical has been removed from the container, determine the m... the container and its contents (with cap/lid on).

FOLDER NO. 12
Item No. 21

474

ORIGINAL

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, CA

Lot Number: 401P12154G-02

Shipment #1
Lot 1951P12

FF # 12
Item No. 25
Pg 1 of 4

Container: 3 of 3

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Initials: HEM Date: 25Nov13

PROOFED BY
Initials: HEM Date: 10Apr-13
REVIEWED BY
Initials: JC Date: 4-11-13

Pg 1 of 4

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Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Therese Schreier	[redacted]	TMS	7/26/12
Kerry L. Weber		KLW	3Jan13

"This Test Chemical Log Book has been inspected and found to be in compliance with SOP GEN 009 and 012.

Inspected and sealed on Jul 27, 2012 (Date) by [redacted] Quality Assurance Unit."

CERTIFIED COPY ORIGINAL

Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: VD Date: 4-11-13

AEH-12-PSEUDO-03 Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A, Zeguanox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Rm 2, Refrigerator

Date Received 7/26/12 Date Opened 31JUL12 KW Expiration Date 6/6/13
(5 years unless otherwise stated)

Test Chemical Lot Number ③401912154C-02 Purity of Chemical 50% ①

Amount of Test Chemical Available or Received (if known) 1.7Kg

Initial Mass (with cover on) of Test Chemical and Container 1767.65g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is container 3 of 3. Total available test chemical is 5Kg including containers 1 and 2. TMS 7/26/12
② An archive sample was removed from container 1 of 3 of the same chemical lot. TMS 7/26/12
③ This is the first shipment of this lot. KW 19SEP12

Sample Placed in Archives: Yes __ No X (Entries should also be made on Form GEN 012.b)

Archive Location NA Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 7/26/12

CERTIFIED COPY

Init's Is: HEM Date: 04Apr13

PROOFED BY

Initials: HEM Date: 10Apr13

REVIEWED BY

Initials: JU Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401-SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: 401P12154C-02 container 3 of 3

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments Duplicate entry. "03" KW 3APR13	F Date	G Initials
*1 Archive	* sample was	removed from container 1 of 3 g		*Archived Sample the same chemical lot	7/26/12	TMS
1767.42	720.03	1046.59	AEH-12-PSEUDO-03	Stock #5 for LST	31JUL12	KW
1046.59	720.15	325.85	AEH-12-PSEUDO-03	Stock #6 for LST	31JUL12	KW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article						
will be made for this study. KW 3APR13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.

1 = The initial mass is also entered on Form GEN 012.a.

A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).

B. The test chemical removed from the container will be placed into a tared vessel.

C. After the t[illegible]hemical has been removed from the container, determine the m[illegible] the container and its contents (with cap/lid on).

FOLDER NO. 12

Item No. 25

478

ORIGINAL

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

LOT NUMBER: 401P12154G-02

Shipment #2 (Bag #2)
MW 195CP2

Container 1 of 3

FF # 12
Item No. 20
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JAL Date: 9-17-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
Kerry L. Weber	[redacted]	Klw	11 Sep 12

"This Use and Maintenance Log Book has been inspected [redacted] with SOP GEN 009.

Inspected and sealed on ① 7/17/2012 by [redacted] ."
Date [redacted]t

① [illegible] [redacted]
7/17/2012

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL
AEH-12-PSEUDO-03

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: SM Date: 4-11-13

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) FF-LL145A; Tegumex

Source of Test Chemical (Manufacturer) Marine Bio Innovations

Storage Location Rm 2 Refrigerator

Date Received 19 SEP 12 KW Date Opened 24 SEP 12 KW Expiration Date 6 JUN 13
(5 years unless otherwise stated)

Test Chemical Lot Number ① 401P121546-03 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7kg

Initial Mass (with cover on) of Test Chemical and Container 1736.92g

Characterization of Test Chemical: Color TAN
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:
① This is the second shipment of this lot. KW 19SEP12
② This archive sample is from Container 1 of 3 from shipment #1. KW 19SEP12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ② RF III G9 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 19 SEP 12

CERTIFIED COPY

Initials: HEM Date: 25Apr-13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JH Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: 401P121546-02 (2nd Shipment)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive sample	* is from container 1 of 3 from	* shipment #1 (Received 26 JUL 12)		*Archived Sample	19SEP12	KW
1736.87	720.05	1016.31	AEH-12-PSEUD003	Stock #1 for CCF	24SEP12	KW
1016.31	720.06	296.06	↑	Stock #2 for CCF	↑	↑
296.06	2.00003	294.02	↓	Analytical #1 for CCF	↓	↓
294.02	2.00065	291.99	AEH-12-PSEUD003	Analytical #2 for CCF	24SEP12	KW
292.13	7.13	284.92	AEH-12-PSEUD003	Aliquot to NYSM for verification	02OCT12	KW
285.05	80.00	204.83	AEH-12-ZEA-01	LC/MR Range finding Stock #1	25OCT12	KW
The use of this	test article for	study number	AEH-12-PSEUD003	has been completed and no other withdrawals of test		
article will be	made for this	study. KW 3APR13				

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

FOLDER NO. 12

Item No. 20

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

AEH-12-PSEUDO-03

LOT NUMBER: 401P12154G-02

Shipment #2
(Bag #2)
RW 19 SEP 13

Container 2 of 3

FF # 12
Item No. 27
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JAL Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: [illegible] Date: [illegible]

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
Kerry C. Weber		KW	13Sep12

"This Use and Maintenance Log Book has been inspected [redacted] GEN 009.

Inspected and sealed on 9/19/2012 by [redacted]."
Date

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

COPIED BY
Initials: HEM Date: 26Mar13
REVIEWED BY
Initials: [redacted] Date: 4-11-13

AEH-12-PSEUDO-03 Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MB1-401 SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) PF-CL145A; Tegumenox

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location R-M 2 Refrigerator

Date Received 19 SEP 12 KW Date Opened 24 SEP 12 KW Expiration Date 6-IV-N13
(5 years unless otherwise stated)

Test Chemical Lot Number ① 401P121546-02 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.7 kg

Initial Mass (with cover on) of Test Chemical and Container 17-20,47

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

① This is the second shipment of this lot KW 19SEP12
② This archive sample is from container 1 of 3 from shipment #1. KW 19SEP12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location ③ RF III 69 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signatu[redacted] Date 19 SEP 12

CERTIFIED COPY
Initials: HEM Date: 04Apr13
PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JTC Date: 4-11-13

ORIGINAL

SOP No. GEN 012.3
Page 6 of 7

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Pg 4 of 4

Test Chemical: MBI-401 SDP			Manufacturer: Marrone Bio Innovations		Lot or Batch #: 401P121546-02 (2nd Shipment)	
A	B	C	D	E	F	G
Initial mass of test chemical & container with cap/ lid on (g)	Amount removed (g)	Mass of test chemical & container after removal, with cap/lid on (g)	Study Number	Purpose and Other Comments	Date	Initials
*1 Archive sample	* is from container 1 of 3 from	* shipment #1 (received 26 JUL 12)		*Archived Sample	19SEP12	KW
1720.42	720.05	1000.10	AEH-12-PSEUDO-03	Stock #13 for CCF	24SEP12	KW
1000.10	720.05	279.67	AEH-12-PSEUDO-03	Stock #4 for CCF	24SEP12	KW
279.89	80.01	199.64	AEH-12-ZEQ-01	LCCMR Range Finding Stock #2	25OCT12	KW
199.64	4.00	195.54	↑	LCCMR Range Finding Stock #3	↑	↑
195.54	4.01	191.49	↓	LCCMR Range Finding Stock #4	↓	↓
191.49	8.00283	183.42	AEH-12-ZEQ-01	LCCMR Range ~~Finding~~ Finding KW 25OCT12 Analytical #1 ~~2.000~~ KW 25OCT12 2.00072g Analytical #2 2.00056g Analytical #3 2.00080g Analytical #4 2.00081g	25OCT12	KW
The use of this test article	for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals					
of test article will be made	for this study. KW 3APR13					

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

FOLDER NO. 12

Item No. 27

CHEMICAL LOG BOOK

MBI-401 SDP

Marrone Bio Innovations
Davis, California

AEH-12-PSEUDO-03

LOT NUMBER: 401P12154G-02

Shipment #2 (bag #2) for MSEP12

Container 3 of 3

FF # 12
Item No. 28
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

AEH-12-PSEUDO-03 **SIGNATURE PAGE** **Pg** 2 **of** 4

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]URE	INITIALS	DATE
Kerry L[illegible]	[redacted]	KL	[illegible]

"This Use and Maintenance Log Book has been inspected [redacted]OP GEN 009.
Inspected and sealed on 7/17/2012 by [redacted]."
Date

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

AEH-12-PSEUDO-03 Form GEN 012.3a
Page 1 of 1

PROOFED BY
Initials: HEM Date: 10 Apr 13
REVIEWED BY
Initials: SAL Date: 4-11-13

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) PF-CL145A; Tequamex

Source of Test Chemical (Manufacturer) Marine Bio Innovations

Storage Location Rm 2 Refrigerator

Date Received 19SEP12 KW Date Opened 24SEP12 KW Expiration Date 6JUN13
(5 years unless otherwise stated)

Test Chemical Lot Number (6) 401P121546-02 Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~1.71g

Initial Mass (with cover on) of Test Chemical and Container 1749.84g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

(1) This is the second shipment of this lot. KW 19SEP12

(2) This archive sample is from container 1 of 3 from shipment #1. KW 19SEP12

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location (3) RFTH69 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 19SEP12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: SM Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

TEST CHEMICAL USE LOG

Test Chemical: MBI-401SDP | Manufacturer: Marrone Bio Innovations | Lot or Batch #: 401P121546-02 (2nd Shipment)

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive sample is from container 1 of 3 from shipment #1 (Received 26 JUL 12)	*	*		*Archived Sample	19SEP12	KW
1749.80	720.08	1028.22	AEH-12-PSEUDO-03	Stock #5 for CCF	24SEP12	KW
1028.22	720.03	307.62	AEH-12-PSEUDO-03	Stock #6 for CCF	24SEP12	KW
307.68	80.08	227.37	AEH-12-ZEA-01 (2)	Stock #3 for range finding	5NOV12	KW
The use of test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. KW 3DEC13						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

(2) write over "12" KW 24SEP12
(3) write over "ZEA" KW 5NOV12

Item No. 28

FOLDER NO. 12

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

Lot Number: 401P120917C

Container 1of 2

FF # 12
Item No. 79
Pg 1 of 4

CERTIFIED COPY
Initials: HEM Date: 25 Mar 13

PROOFED BY
Initials: HEM Date: 10Apr-13
REVIEWED BY
Initials: JA Date: 4-11-13

Pg 1 of 4

CERTIFIED COPY
Initials: HEm Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JLL Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	[redacted]	INITIALS	DATE
James L. [illegible]	[redacted]	JLL	[illegible]
Kerry L. Weber	[redacted]	KLW	8JAN13
	[redacted]		

"This Test Chemical Log Book has been inspected and found to be in compliance with SOP GEN 009 and 012.

[redacted]

on November 30, 2012 by [redacted]."
Date

CERTIFIED COPY
Initials: HBM Date: 25Mar13

REVIEWED BY
Initials: HBM Date: 10Apr13
REVIEWED BY
Initials: [illegible] Date: 4-11-13

ORIGINAL

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401 SOP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) Pf-CL145A

Source of Test Chemical (Manufacturer) Marone Bio Innovations

Storage Location Lock refrigerator Room 2

Date Received 20 NOV 12 Date Opened 20 NOV 12 Expiration Date 27 Sept 13
(5 years unless otherwise stated)

Test Chemical Lot Number 401P120917C Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~ 2.5 kg

Initial Mass (with cover on) of Test Chemical and Container 2513.3 g

Characterization of Test Chemical: Color tan
Physical State: liquid __ solid X
Solid Form: powder __ crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical:

Container 1 of 2

Sample Placed in Archives: Yes X No __ (Entries should also be made on Form GEN 012.b)

Archive Location Refrig 1 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 20 NOV 12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JP Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP	Manufacturer: Marrone Bio Innovations	Lot or Batch #: 401P120917C

A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 2513.3 ②	* 509601 ③	* 2508.3 ②	AEH-12-PSEUDO-03 ~~AEH-PSEUDO-03~~	*Archived Sample First use 20NOV12JA	20 NOV 12	JA
2508.2	None removed. Batch did not meet	AEH-12 PSEUDO-03 established QC verification standards. Shipped back to manufacturer			08 JAN13	KW
The use of this test article for study number AEH-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. 3APR13 KW						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

② weighed on Sartorius balance model LC 3900P S/N 30303922 20NOV12JA
③ weighed on Sartorius balance model BZ000 S/N 2090 3620 20NOV12JA

FOLDER NO. 12
Item No. 20

CHEMICAL LOG BOOK

MBI-401 SDP

AEH-12-PSEUDO-03

Marrone Bio Innovations
Davis, California

Lot Number: 401P120917C

FF # 12
Item No. 30
Pg 1 of 4

Container ~~1~~ 2 of 2

Wrong Container I.D. typed when log was made. See correction 20Mar13 JA

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

Pg 1 of 1

CERTIFIED COPY
Initials: HEM Date: 25Mar13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JD Date: 4-11-13

AEH-12-PSEUDO-03 SIGNATURE PAGE **Pg 2 of 4**

All personnel making an entry in this log must fill out the form below in accordance with SOP GEN 009.

PRINTED NAME	SIGNATURE	INITIALS	DATE
JAMES A. Luoma	[redacted]	JAL	20Nov12
Kerry L Weber		KLW	8Jan13

"This Test Chemical Log Book has been inspected and found to be in compliance with SOP GEN 009 and 012.

on November 21, 2012 by [redacted] ."
Date

CERTIFIED COPY
Initials: HEM Date: 25Mar13

ORIGINAL

SOP No. GEN 012.3
Page 5 of 7

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JnL Date: 4-11-13

AEH-12-PSEUDO-03

Form GEN 012.3a
Page 1 of 1

TEST CHEMICAL DATA FORM

Pg 3 of 4

Test Chemical (Chemical Name) MBI-401-SDP

Circle one: (Test Article) Control Article

Trade Name of Test Chemical (Synonyms) pf-CL145A

Source of Test Chemical (Manufacturer) Marrone Bio Innovations

Storage Location Locked refrigerator room 2

Date Received 20 NOV 12 Date Opened _____ Expiration Date 27 Sept 13
(5 years unless otherwise stated)

Test Chemical Lot Number 401P120917C Purity of Chemical 50%

Amount of Test Chemical Available or Received (if known) ~2.5 kg

Initial Mass (with cover on) of Test Chemical and Container 2511.5 g

Characterization of Test Chemical: Color Tan
Physical State: liquid __ solid X
Solid Form: powder X crystal __ pellet __

Chemical Abstract Service Number N/A

Manufacturer Certificate of Analysis Yes X No __

Additional Comments about the Test Chemical: Container 2 of 2
① archive sample was from container #1 20 NOV 12 JM

Sample Placed in Archives: Yes X (1) No __ (Entries should also be made on Form GEN 012.b)

Archive Location R 111 G11 Material Safety Data Sheet Available: Yes X No __

Signature of Study Director or designee initiating Test Chemical Use Log and date:

Signature [redacted] Date 20 NOV 12

CERTIFIED COPY
Initials: HEM Date: 04Apr13

PROOFED BY
Initials: HEM Date: 10Apr13
REVIEWED BY
Initials: JA Date: 4-11-13

ORIGINAL

Form GEN 012.3b
Page 1 of 1

Pg 4 of 4

TEST CHEMICAL USE LOG

Test Chemical: MBI-401 SDP			Manufacturer: Marrone Bio Innovations		Lot or Batch #: 401P12 0917C	
A Initial mass of test chemical & container with cap/ lid on (g)	B Amount removed (g)	C Mass of test chemical & container after removal, with cap/lid on (g)	D Study Number	E Purpose and Other Comments	F Date	G Initials
*1 Archive sample was collected from container 1 of 2 and placed in archive location RF III G11 20Mar12 JA				*Archived Sample		
2511.2	* None removed. Batch did not meet established QC verification standards. Shipped back to manufacturer		MBI-12-PSEUDO-03		08 JAN 13	KW
The use of this test article for study number MBI-12-PSEUDO-03 has been completed and no other withdrawals of test article will be made for this study. 3APR13 KW						

* = The first entry should be the test chemical sample placed in the Chemical Archives. Follow GEN 011.
1 = The initial mass is also entered on Form GEN 012.a.
A. The mass of the test chemical and its container will be determined using a balance that has been verified to be accurate (SOP GEN 013).
B. The test chemical removed from the container will be placed into a tared vessel.
C. After the test chemical has been removed from the container, determine the mass of the container and its contents (with cap/lid on).

Item No. 30

FOLDER NO. 12

Appendix 5. Test Animal Information

Item number	Item description	Number of pages	Report page number
1	Test System Description (text and table from protocol)	2	500
2	Approval for Housing and Care of Test Animals During Experiments	1	502
3	RBT (lot # 116000) Species Information	13	503
4	YEP (lot # 113000) Species Information	10	516
5	LST (lot # 112700) Species Information	4	526
6	WAE (lot # 112100) Species Information	10	530
7	BLG (lot #114500) Species Information	6	540
8	BKT (lot # 120300) Species Information	7	546
9	LMB (lot # 114000) Species Information	11	553
10	SMB (lot # 112400) Species Information	10	564
11	BLG (lot # 114100) Species Information	4	574
12	CCF (lot # 114100) Species Information	4	578
13	BLG (lot # 114500) Species Information	8	582
14	LST (lot # 122300) Species Information	10	590
15	CCF (lot # 123000) Species Information	10	600

Study Number: AEH-12-PSEUDO-03

Lab book/pages: 11-12 Reviewed: JKW Date: 07FEB13
File Folder: 8 Verified: SM Date: 4-5-13

Test System Description (text and table from protocol):

5.1 Test Animals

5.1.1 Description:

5.1.1.1 Age – <1 yr.

5.1.1.2 Sex – Test animals will be used without regard to sex.

5.1.1.3 Species – See Table 2

5.1.2 Number of animals: Approximately 415 fish ([25 per replicate x 3 replicates x 5 concentrations]) + 40 initial size verification samples) of each species. This design uses the fewest number of fish possible, consistent with the objective of the study and contemporary scientific standards.

5.1.3 Source of animals: Fish will be obtained from the UMESC fish culture facility or other state or federal fish hatcheries and identified according to Eddy and Underhill (1978) by the UMESC fish culturist prior to entrance into the study. The fish source will be described in the study data management system.

5.1.4 Inclusion criterion: Fish will only be used only if their mortality is less than 0.2% per day for 3 consecutive days (UMESC SOP GEN 132)

5.1.5 Acclimation: Fish will be acclimated to test temperature (Table 2) at a rate not to exceed 3°C/day (SOP No. GEN 132) and then held at test temperature for a minimum of one week prior to transfer to the FTTA.

5.1.6 Distribution to exposure chambers: After the acclimation period, a group of five or ten fish will be placed into a bucket with water and transferred into a randomly chosen exposure chamber according to a predetermined randomization scheme. The process will then be repeated until all exposure chambers designated for use receive a total of three distributions for a total of 25 fish per exposure chamber.

5.1.7 Feeding: Fish will be fed during the acclimation and post exposure periods by offering commercially-prepared dry feed, frozen live food, or live forage. The percentage body weight offered will be determined during the acclimation period, will vary between feed types and species, and will be documented in the study records. The feed rate will be adjusted weekly to account for fish growth. The exact procedures used will be documented in the study records. Feed

offered will either be weighed or volumetrically measured for each holding chamber.

Table 2. Fish species to be used to identify potential effects following exposure to MBI-401 SDP (*Pseudomonas fluorescens* [*Pf*-CL145A]).

Common name	Scientific name	Test Temperature, °C (range)
Rainbow trout	*Oncorhynchus mykiss*	12 (10-14)
Coaster brook trout	*Salvelinus fontinalis*	12 (10-14)
Walleye	*Sander vitreum*	17 (15-19)
Yellow perch	*Perca flavescens*	17 (15-19)
Lake Sturgeon	*Acipenser fulvescens*	17 (15-19)
Largemouth bass	*Micropterus salmodies*	22 (20-24)
Smallmouth bass	*Micropterus dolomieu*	22 (20-24)
Bluegill sunfish	*Lepomis macrochirus*	22 (20-24)
Channel Catfish	*Ictalurus punctatus*	22 (20-24)
Fathead minnow	*Pimephales promelas*	22 (20-24)

Approved by [redacted] Date: 2-28-12

FF # 8
Item No. 1
Pg 2 of 2

Pg 2 of 2

APPROVAL FOR HOUSING AND CARE OF TEST ANIMALS DURING EXPERIMENTS

This protocol has been examined by the Animal Care and Use Committee for consistency with the Animal Welfare Act (7 U.S.C. 2131 et. seq.) and with rules governing the use of test animals at the Upper Midwest environmental Sciences Center, La Crosse.

We, the undersigned, find this protocol to be acceptable as it is represented.

Log Book / Pages 11-2
File Folder 8
Initials JW Date 07FEB2013

Protocol Number: AEH-12-PSEUDO-03

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SH Date: 4-5-13

Principal Investigator: [redacted]

Study Director: James A. Lazorchak

Protocol Title: Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

[redacted]
Signature, Title

1-4-12
Date

[redacted]

2-22-12
Date

[redacted]

2-27-12
Date

[redacted]

2/28/12
Date

* File the original signed copy of this form in the study file for each study and the Chair, Animal Care and Use Committee gets a copy.

FF # 8
Item No. 2
Pg 1 of 1

Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 116000 as rainbow trout (*Oncorhynchus mykiss*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 3
Pg 1 of 1

Pg 1 of 1

ORIGINAL

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Log Book / Pages 1/1
File Folder 8
Initials TJS Date 23APR12

Study Director: Jim Lnoma

Source Tank: I-3 (RBT moved to I-3 on 2-23-12 from tank R-6) mortality for R-6 0-0-0 over three days JKW 24FEB12

Animal Lot Number: 116000

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SAL Date: 4:35PM

Species: RBT

3-Day Mortality: 0-0-0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 2/24/12
Signature, Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 14
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 24 FEB12

Species: RBT

Lot number: 116000

Number transferred: 500

Log Book / Pages 1/1
File Folder 8
Initials TJS Date 23APR12

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: JM Date: 4-5-12

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Fish Culture tank I-3

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): RND-2 Room 2

Purpose of Transfer (be specific): Test organisms to be used to test non-target effects of PF-CL-145A as part of study AEH-12-PSEUDO-03.
0.77 g/fish as per Center Fish Culturist sample count.

[redacted] 24FEB12

transferring animals — Date of transfer

FF # 8
Item No. 5
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2-28-12

Log Book / Pages 1/2
File Folder 8
Initials DS Date 23APR12

Species: RBT

Lot number: 116000

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SW Date: 4-5-13

Number transferred: 125 ①

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Room 2 RNO2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Dilutor A Room 2

Purpose of Transfer (be specific): Distribution to Exposure tanks.
① 25 fish transferred to each of 5 exposure chambers
in 3 random rounds

[redacted] 2-28-12

[redacted]erson transferring animals — Date of transfer

FF # 8
Item No. 6
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2-28-12

Log Book / Pages 1/2
File Folder 8
Initials DS Date 23APR12

Species: RBT

Lot number: 116000

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SM Date: 4-5-13

Number transferred: 125

AEH-12-PSEUDO-03

Source study number (if not applicable: N/A): _____

Source tank number (include room number): Room 2 RND 2

AEH-12-PSEUDO-03

Destination study number (if not applicable: N/A): _____

Destination tank number (include room number): Diluter B Room 2

Purpose of Transfer (be specific): Distribution to exposure chambers

① 25 fish transferred to each of 5 exposure chambers in 3 randomized rounds

[redacted] f person transferring animals

2-28-12
Date of transfer

FF # 8
Item No. 7
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2-28-12

Log Book / Pages 1/2
File Folder 8
Initials DS Date 23APR12

Species: RBT

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SAC Date: 4-5-13

Lot number: 116000

Number transferred: 1250

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Room 2 RNO-2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Dilution C Room 2

Purpose of Transfer (be specific): Distribution to Exposure chambers
① 25 fish transferred to each of 5 exposure chambers
in 3 randomized rounds

[redacted] 2-28-12

[redacted] of person transferring animals

Date of transfer

FF # 8
Item No. 8
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2-28-12

Log Book / Pages 1/2
File Folder 8
Initials DS Date 23APR12

Species: RBT

Lot number: 116000

PROOFED BY
Initials: DS Date: 23APR12

Number transferred: 40

REVIEWED BY
Initials: SM Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology Sample containers

Purpose of Transfer (be specific): Samples for initial histopathology. Four groups of 10 fish euthanized with 200 mg/L MS-222 and processed for Histology sampling.

[redacted]
re of person
ring animals

2-28-12
Date of transfer

FF # 8 using item number from 30MAY13
Item No. 8 9
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2-29-12

Log Book / Pages 114
File Folder 8
Initials DS Date 23APR12

Species: RBT

Lot number: 116000

PROOFED BY
Initials: DS Date: 23APR12

Number transferred: ~85

REVIEWED BY
Initials: SAE Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Room 2 RW02

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Freezer upper B core

Purpose of Transfer (be specific): Excess fish, euthanized with 200mg/L MS-222, bagged & frozen for disposal

[redacted] person
animals

2-29-12
Date of transfer

FF # 8
Item No. 10
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/5-6
File Folder 8
Initials TDS Date 23APR12

Date of transfer: 1MAR12

Species: RBT

Lot number: 116000

Number transferred: 125

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED BY
Initials: JM Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): BANK A Rm 2

Destination study number (if not applicable: N/A): Same as source, 2014

Destination tank number (include room number): 20 ea to E11, E22, E24, E15, E10; and 25 were euthanized

Purpose of Transfer (be specific): 100 to recovery tanks, 25 for histopathology samples

[redacted]
Signature of person transferring animals

1MAR12
Date of transfer

FF # 8
Item No. 11
Pg 1 of 1

① wrong #'s, read the 1 as a 2 1MAR12 SHS

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 1MAR12

Log Book / Pages 1/5-6
File Folder 8
Initials TDS Date 23APR12

Species: RBT

Lot number: 116000

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED BY
Initials: SH Date: 4-5-13

Number transferred: 125

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): BANK B, RM 2

Destination study number (if not applicable: N/A): same as source

Destination tank number (include room number): 20 ea to E5, E3, E4, E8, E1; 25 euthanized

Purpose of Transfer (be specific): 100 to recovery tanks, 25 to histopathology sampling

[redacted]

Signature of person transferring animals

1 MAR 12

Date of transfer

FF # 8
Item No. 12
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 15-6
File Folder 8
Initials DS Date 23APR12

Date of transfer: 1MAR12

Species: RBT

Lot number: 1160000

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SAC Date: 4-5-12

Number transferred: 124

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): BANK C, RM 2

Destination study number (if not applicable: N/A): same as above

Destination tank number (include room number): 20 ea to E9, E13, E2, 15 to E6, 25 to E7, 19 were euthanized (includes 1 mortality from CS 1MAR12)

Purpose of Transfer (be specific): 100 to recovery / observation tank and 19 were for histopathology samples

[redacted]
Signature of person transferring animals

1MAR12
Date of transfer

FF # 8
Item No. 13
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

AEH-12-PSEUDO-03

SOP No. GEN 133.7
Page 8 of 10

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 23 MAR 2012

Log Book / Pages 1/25-26
File Folder 8
Initials KLW Date 21MAR13

Species: RBT

Lot number: 116000

PROOFED BY
Initials: JKW Date: 22MAR13
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Number transferred: 30

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To storage for histology

Purpose of Transfer (be specific): RBT exposure 22-d holding period termination. Up to 5 RBT were removed at random from each tank for preservation. These fish will be used for histopathology. Tanks ① E1, ① E5, ① E6 and ① E9 contained ≤5 fish so all were taken for histology. All RBT were euthanized according to SOP GEN 132.7 (overdose of MS-222).

[redacted] 23 MAR 2012; signed ② 21MAR 2013

[redacted] transferring animals

Date of transfer

FF # 8
Item No. 14
Pg 1 of 1

① Tank E1 = 3 fish preserved
Tank E5 = 4 fish preserved
Tank E6 = 2 fish preserved
Tank E9 = 1 fish preserved
KLW
21MAR13

Pg 1 of 1

② This sheet was filled out as clarification. It was not filled out on transfer date due to an oversight. Information was obtained from Form 3 - Fish Length and Weight (Post-exposure Termination), file folder 16D. KLW 21MAR13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 125-26
File Folder 8
Initials KW Date 21MAR13

Date of transfer: 23 MAR 2012

Species: RBT

Lot number: 116000

Number transferred: 49

PROOFED BY
Initials: KW Date: 22MAR13
REVIEWED BY
Initials: [redacted] Date: 4-5-13

Source study number (if not applicable: N/A): AFH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): 49 RBT were remainder of fish not used for histological sampling from 22-d holding period termination. All RBT were euthanized according to SOP No. GEN 132.7, an overdose of MS-222.

[redacted]
rson
mals

23MAR 2012; signed ① 21MAR 2013
Date of transfer

① This sheet was filled out on 21MAR 2013 for clarification. Information was obtained from Form 3- Fish Length and Weight (Post-Exposure Termination), file folder 16D. KW 21MAR2013

FF # 8
Item No. 15
Pg 1 of 1

Pg 1 of 1

AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 113000 as yellow perch (*Perca flavescens*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 16
Pg 1 of 1

Pg 1 of 1

ORIGINAL

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: Jim Luoma

Log Book / Pages 1/1
File Folder 8
Initials DS Date 23APR12

Source Tank: I-5

Animal Lot Number: 113000

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: JDL Date: 4-5-13

Species: YEP

3-Day Mortality: 0 - 0 - 0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 2/24/12
e Date
Wrong Date 2/24/12 SDA

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 17
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 24FEB12

Species: YEP

Lot number: 113000

Number transferred: 500

Log Book / Pages 1/1
File Folder 8
Initials DS Date 23APR12

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SNL Date: 4-5-13

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): I-5 (room 21)

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): RND-1 (room 12)

Purpose of Transfer (be specific): Test the effects of Pseudomonas fluorescens (PF-CL145A) on YEP.

[redacted]

Signature of person transferring animals

24FEB12

Date of transfer

FF # 8
Item No. 18
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 6MAR12

Log Book / Pages 1/10
File Folder 8
Initials DS Date 23MAR12

Species: YEP

Lot number: 113000

PROOFED BY
Initials: DS Date: 23MAR12
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Number transferred: ~~315~~ 415 (2)

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Rm (1) 12 ~~2~~, Tank RND-1

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Rm 2 25ea in A1→A5, B1→B5, C1→C5, 40 euthanized

Purpose of Transfer (be specific): For test exposures, and euthanized for pre-exposure histopathology

(2) The correct total # of test ~~animals~~ (spelling error 4-5-13 JM) animals is 415. 125 to each of 3 dilutes (=375) + 40 for histology = 415 4-5-13 JM

[redacted]
Signature of person transferring animals

6MAR12
Date of transfer

(1) Wrong room # 6MAR12 SHS

FF # 8
Item No. 19
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/11
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 7MAR12

Species: YEP

Lot number: 113000

Number transferred: 113 (1)

PROOFED BY
Initials: TJS Date 23APR12
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-1, Room 12

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): Tank N/A, to freezer for incineration

Purpose of Transfer (be specific): 113 (1) YEP not used in stocking / distribution to test tanks/exposure chambers. These remaining YEP were euthanized according to SOP No. GEN 132.7

(1) Either the remaining fish were hand counted and more than 500 were originally transferred or this # should be ~~75~~ 85 fish. 4-5-13 [illegible]
incorrect # written 4-5-13 [illegible]

[redacted]
Signature of person transferring animals

7MAR12
Date of transfer

FF # 8
Item No. 20
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1 / 13
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 8MAR12

Species: YEP

Lot number: 113000

Number transferred: 89 + 36 = 125

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SJ Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Rm 2 - BANK A, TANKS 1→5

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): 89 to holding rack tanks; 36 to histo, including morts

Purpose of Transfer (be specific): 89 in holding rack tanks for post-exposure observation; morts and euthanized fish (36) for possible histopathology analysis

[redacted]

Signature of person transferring animals

8MAR12

Date of transfer

FF # 8
Item No. 21
Pg 1 of 1

AEH 12 PSEUDO 03

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/13
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 8MAR12

Species: YEP

Lot number: 113000

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SM Date: 4/5/13

Number transferred: 83 + 42 = 125

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Rm 2 - Bank B, Tanks 1-5

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): 83 to holding rack tanks; 42 to histo, including morts

Purpose of Transfer (be specific): 83 in holding tanks for observation; morts and euthanized fish (42) for histopathology analysis

[redacted]

Signature of person transferring animals

8MAR12

Date of transfer

FF # 8
Item No. 22
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/13
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 8MAR12

Species: YEP

Lot number: 113000

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SAL Date: 4-5-13

Number transferred: 88 + 37 = 125

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Rm 2, BANK C, Tanks 1-25

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): Rm 2; holding rack tanks (88) and 37 for histopath analysis

Purpose of Transfer (be specific): 88 in holding rack tanks for post-exposure observation; 37 morts and euthanized fish for histopathology analysis

[redacted]

Signature of person transferring animals

8MAR12

Date of transfer

FF # 8
Item No. 23
Pg 1 of 1

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 30 MAR 2012

Log Book / Pages 1/27
File Folder 8
Initials KW Date 21MAR13

Species: YEP

PROOFED BY
Initials: KW Date: 22MAR13

Lot number: 113000

REVIEWED BY
Initials: [illegible] Date: 4-5-13

Number transferred: 75

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks G1-G15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To storage for histology

Purpose of Transfer (be specific): YEP 22-d holding period termination. 5 YEP were removed at random from each tank for preservation. These fish will be used for histopathology. All YEP were euthanized according to SOP GEN 132.7, overdose of MS-222.

[redacted]
of person
g animals

23 30MAR12; signed ① 21MAR13
wrong date
Date of transfer
KW 21MAR13

① This transfer sheet was filled out on 21MAR13 for clarification. Information was obtained from from 3-fish length and weight (Post-exposure Termination), file folder 19d. KW 21MAR13

FF # 8
Item No. 24
Pg 1 of 1

FF # 8
Item No. 24
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ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1129
File Folder 8
Initials KW Date 21MAR13

Date of transfer: 30 MAR 2013

Species: YEP

Lot number: 113000

Number transferred: 168

PROOFED BY
Initials: KW Date: 21MAR13
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks G1-G15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): 168 YEP were remainder of fish not used for histological sampling from 22-d holding pond termination. All YEP were euthanized according to SOP GEN 132-7, an overdose of MS-222.

[redacted] of person transferring animals

30MAR2013 signed ① 21MAR2013
Date of transfer

① This sheet was filled out on 21MAR 2013 for clarification. Information was obtained from Form 3 - Fish Length and Weight (Post Exposure), file folder 19D. KW 21MAR13

FF # 8
Item No. 25
Pg 1 of 1

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AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 112700 as lake sturgeon (*Acipenser fulvescens*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]
Steven D. Redman

FF # 8
Item No. 26
Pg 1 of 1

Pg 1 of 1

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Log Book / Pages 1/7
File Folder 8
Initials DS Date 23APR12

Study Director: James Luoma

Source Tank: I-7 Fish Culture (transferred from 16-ACC-1)

Animal Lot Number: 112700

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SM Date: 4-5-12

Species: LST

3-Day Mortality: 1-0-0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 3/2/12
Signature, Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 27
Pg 1 of 1

AEH 12 PSEUDO 03
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ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 2 MAR12

Log Book / Pages 1/7
File Folder 8
Initials DS Date 23APR12

Species: LST

Lot number: 112700

PROOFED BY
Initials: DS Date: 23APR12

Number transferred: 512

REVIEWED BY
Initials: SnL Date: 4-5-13

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): I-7 Fish Culture

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): RND-2 ROOM 2

Purpose of Transfer (be specific): Test organisms to be used to test non-target effects of PF-CL-145A as part of study AEH-12-PSEUDO-03
3.2 g/fish as per Center Fish Culturist sample count.

[redacted]

2 MAR12
Date of transfer

FF # 8
Item No. 28
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/11
File Folder 8
Initials JTS Date 23APR12

Date of transfer: 7MAR 12

Species: LST

Lot number: 112700

PROOFED BY
Initials: JTS Date: 23APR12
REVIEWED BY
Initials: JM Date: 4-5-13

Number transferred: 507 ①

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-2, Room 2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): Tank N/A, to Freezer for incineration

Purpose of Transfer (be specific): 507 LST were determined to be unfit for use in study and were euthanized according to SOP no. GEN 132.7

① 512 fish initially - 4 mortz during acclimatin = 508 fish
- euthanized 4-5-13 JM

[redacted]

7MAR12
Date of transfer

FF # 8
Item No. 29
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AEH 12 PSEUDO 03
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AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: March 19, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 112100 as walleye (*Sander vitreum*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 30
Pg 1 of 1

Pg 1 of 1

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: Jim Lawn

Log Book / Pages 1/14
File Folder 8
Initials DS Date 23APR12

Source Tank: R33

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: JHL Date: 4-5-13

Animal Lot Number: 112100

Species: WAE @ 2.47g/each

3-Day Mortality: 0 - 0 - 1

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 3/9/12
Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 31
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AEH 12 PSEUDO 03
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SOP No. GEN 133.6
Page 7 of 9

Form GEN 133.6c
Page 1 of 1

RECORD OF VERTEBRATE TRANSFER

Upper Midwest Environmental Sciences Center-La Crosse, WI

Date of Transfer: 3/9/12

Species: WAE

Lot Number: 112100

Number Transferred: 500

Source Study Number (if not applicable: N/A): AEH-12-PSEUDO-03

Source Tank Number (include room number): R33 Room 21

Destination Study Number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination Tank Number (include room number): RNO1 - Room 12

Purpose of Transfer (be specific): Acclimation to 17°C for PLCL145A exposures

[redacted]rson
[redacted]mals

3/9/12
Date of Transfer

Log Book / Pages 1/14
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED BY
Initials: MC Date: 4-5-13

FF # 8
Item No. 32
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1121
File Folder 8
Initials KW Date 23APR13

Date of transfer: 20MAR12 (1)

Species: WAE

Lot number: ~~112200~~ 112100 wrote wrong LOT # 21MAR12 SMS

PROOFED BY
Initials: DS Date: 23APR13
REVIEWED BY
Initials: SM Date: 4-5-13

Number transferred: 415

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Rm 12, RND-1

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Rm 2; 25 fish ea to Tanks A1→A5, B1→B5, C1→C5 and 40 euthanized for preservation

Purpose of Transfer (be specific): Fish in Tanks A1→A5, B1→B5, C1→C5 will be exposed to 0 mg, 50 mg, 100 mg, 200 mg or 300 mg/L pseudomonas. Euthanized fish will serve as controls for histopathology evaluation if needed.

(1) Year was left off the date 4-5-13 SMS

[redacted]

Signature of person transferring animals

20MAR12

Date of transfer

FF # 8
Item No. 33
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1 / 22
File Folder 8
Initials DS Date 23APR12

Date of transfer: 21MAR12

Species: WAE

Lot number: 112100

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: SL Date: 4-5-13

Number transferred: 78 Correct # should be 81 4-5-13 SL

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RMD-1, Room 12

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A

Purpose of Transfer (be specific): Euthanized WAE with MS-222 overdose, they will be stored in freezer until incineration can occur. 500 transferred into tank RMD-1 Room 12 3/9/12, 4 animals died during acclimation, 375 distributed to dilutors and 40 sampled for histology 4-5-13 SL

[redacted]
transferring animals

21MAR12
Date of transfer

FF # 8
Item No. 31
Pg 1 of 1

AEH 12 PSEUDO 03
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ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/24-25
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 22MAR12

Species: WAE

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SJC Date: 4-5-12

Lot number: 112100

Number transferred: 125 (24 to histo; 7 mortalities, 94 to tanks)

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): A1, A2, A3, A4, A5 - Rm 2

Destination study number (if not applicable: N/A): same

Destination tank number (include room number): Rm 2; A1→F12; A2→F10; A3→F11; A4→F9; A5→F1

Purpose of Transfer (be specific): Fish transferred to tanks are for 3 week observation; 24 euthanized for possible histopathology analysis

[redacted]

Signature of person transferring animals

22MAR12

Date of transfer

FF # 8
Item No. 35
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/24-25
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date: 23APR12

REVIEWED
Initials: JM Date: 4-5-12

23APR12 Correct date. TDS 23APR12

Date of transfer: 22 MAR12

Species: WAE

Lot number: 112100

Number transferred: 125 (5 mortalities; 97 to tanks; 23 euthanized)

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): B1, B2, B3, B4, B5

Destination study number (if not applicable: N/A): same

Destination tank number (include room number): Rm 2; B2→F13; B3→F4; B4→F6; B5→F14

Purpose of Transfer (be specific): Fish transferred to tanks are for 3 week observation; 23 euthanized for possible histopathology analysis.

[redacted]
Signature of person transferring animals

22 MAR12
Date of transfer

FF # 8
Item No. 36
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1 / 24-25
File Folder 8
Initials TJS Date 23APR12

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: SC Date: 4-5-12

Date of transfer: 22MAR12

Species: WAE

Lot number: 112100

Number transferred: 125 (5 morts, 95 to tanks, 25 euthanized)

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Rm 2 (C1, C2, C3, C4, C5)

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): Rm 2; C1→F2; C2→F5; C3→F13; C4→F3; C5→F8

Purpose of Transfer (be specific): Fish transferred to holding tanks for 3 week observation; euthanized fish are for possible histopathology analysis

[redacted]

Signature of person transferring animals

22 MAR 12

Date of transfer

FF # 8
Item No. 37
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 13 APR 2012

Species: WAE

Lot number: 112100

Number transferred: 72

Log Book / Pages 1/36
File Folder 8
Initials DS Date 23APR12

PROOFED BY
Initials: DS Date: 23APR 12
REVIEWED BY
Initials: SK Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks F1 - F15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To storage for histology

Purpose of Transfer (be specific): WAE Exposure holding period termination, 5 WAE removed at random from each tank for preservation. These fish will be used in histological examinations. Tank F6 contained ~~four~~ illegible 13APRIL JRK 2 fish, yielding only 2 fish for histology. All WAE were euthanized according to SOP No. GEN 132.7, an overdose of MS-222.

[redacted]

13APR2012
Date of transfer

FF # 8
Item No. 38
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 13APR2017

Species: WAE

Lot number: 112100

Number transferred: 160

Log Book / Pages 1/36
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date 23APR12
REVIEWED
Initials: SM Date: 4-5-13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks F1-F15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): 160 WAE were remainder of fish not used for histological sampling from Exposure Holding period termination. All WAE were euthanized according to SOP No. GEN 132.7, an overdose of MS-222.

[redacted]
transferring animals

13APR2017
Date of transfer

FF # 8
Item No. 39
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: May 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the BLG in lot number 114500 as Bluegill (*Lepomis macrochirus*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]
Steven D. Redman

FF # 8
Item No. 40
Pg 1 of 1

Pg 1 of 1

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: Jim Luoma

Source Tank: R22 room 21

Animal Lot Number: 114500

Species: BLG

3-Day Mortality: 0 - 0 - 0

wrong line. TDS 23APR12

Log Book / Pages 8 1/26
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED BY
Initials: SRL Date: 4-5-13

Approval (Member, Animal Care and Use Committee):

[redacted] Fish Biologist 3/22/12
ure, Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
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Pg 1 of 1

AEH 12 PSEUDO 03
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ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 3/22/12

Species: BLG

Lot number: 114500

Number transferred: 500

Log Book / Pages 124-25
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED:
Initials: SA Date: 4-5-13

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): R22 Room 21

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): RND-1 Room 12

Purpose of Transfer (be specific): pf-CL145A testing acclimation

Sample Count 58.03g = 45 fish = 1.29g each

[redacted]
re of person
ring animals

3/22/12
Date of transfer

FF # 8
Item No. 42
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

SOP No. GEN 133.7
Page 8 of 10

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Wrong line. TJS 23APR12

Log Book / Pages 8 / 131
File Folder 8
Initials TJS Date 23APR12

Date of transfer: 2APR12

Species: BLG

Lot number: 114500

PROOFED BY
Initials: TJS Date: 23APR12
REVIEWED BY
Initials: JAL Date: 4-5-13

Number transferred: 415

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Rm 12

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Rm 2 - A1→A5; B1→B5; C1→C5

Purpose of Transfer (be specific): 40 fish were euthanized for possible histopathology analysis; 375 were transferred to exposure tanks (25 per tank, 5 tanks per bank, 3 banks) to be exposed to pseudomonas bacteria on 3APR12.

[redacted]

Signature of person transferring animals

2APR12

Date of transfer

FF # 8
Item No. 43
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/31
File Folder 8
Initials DS Date 23APR12

Date of transfer: 3APR2012

Species: BLG

Lot number: 114500

PROOFED BY
Initials: DS Date: 23APR12
REVIEWED BY
Initials: STH Date: 4-5-13

Number transferred: ~~75~~ Correct # should be 85 4-5-13 STH

Source study number (if not applicable: N/A): AEH-12-PSEUDO-02

Source tank number (include room number): RND-2 in Room 12

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): BLG euthanized according to SOP No. GEN 132.7 as all fish required for study were previously distributed. This remainder was not needed and was euthanized.

[redacted]

3APR2012
Date of transfer

FF # 8
Item No. 44
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Wrong line. TDS 23APR12

Log Book / Pages ~~8~~ 133
File Folder 8
Initials TDS Date 23APR12

PROOFED BY
Initials: TDS Date: 23APR12
REVIEWED BY
Initials: SMC Date: 4-5-13

Date of transfer: 4APR2012

Species: BL6

Lot number: 114500

Number transferred: 375

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): A 1-5, B 1-5, C 1-5 in R2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A to freezer for incineration

Purpose of Transfer (be specific): Study director determined errors in chemical delivery, thereby terminating exposure without holding test organisms for post exposure holding. All organisms were euthanized according to SOP No. GEN 132.7.

[redacted]
transferring animals

4APR2012
Date of transfer

FF # 8
Item No. 45
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

AEH-12-PSEUDO-03

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: May 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the BKT in lot number 120300 as Brook trout (*Salvelinus fontinalis*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 46
Pg 1 of 1

Pg 1 of 1

ORIGINAL

SOP No. GEN 132.7
Page 10 of 15

Form GEN 132.7a
Page 1 of 1

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: SKW Date: 4-8-13

Log Book / Pages 1/37-38
File Folder 8
Initials SKW Date 07FEB13

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: James Lhomme

Source Tank: R14

Animal Lot Number: 120300

Species: BKT

3-Day Mortality: 0-0-0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 5/1/12
Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
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AEH 12 PSEUDO 03
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AEH-12-PSEUDO-03

SOP No. GEN 133.7
Page 8 of 10

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 137-38
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 5/1/12

Species: BLCT

Lot number: 120300

Number transferred: 375

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): R14 Room 24 (Fish culture)

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Dilutor exposure chambers Room 2

Purpose of Transfer (be specific):

Place in exposure chambers. Temperature for exposure is the same as temperature in fish culture so the fish were not placed in an acclimation tank

[redacted] on transferring animals

5/1/12
Date of transfer

FF # 8
Item No. 48
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: SKW Date 07FEB13
REVIEWED BY
Initials: SAL Date: 4-5-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 137-38
File Folder 8
Initials SKW Date 07FEB13

Date of transfer: 5/1/12

Species: BKT

Lot number: 120300

Number transferred: 40

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): RM Room 21 (Fish culture)

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A

Purpose of Transfer (be specific): For initial Histology samples for distribution.

[redacted] ture of person
erring animals

5/1/12
Date of transfer

FF # 8
Item No. 49
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/39-40
File Folder 8
Initials KWJ Date 21MAR13

Date of transfer: 3MAY 2012

Species: BKT

PROOFED BY
Initials: JP Date 4-9-13

Lot number: 1203000

REVIEWED BY
Initials: JRV Date: 21MAR13

Number transferred: 375 (75 to histo; 300 to tanks)

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Exposure chambers A1-A5, B1-B5 and C1-C5

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): Rm 2; Tanks E1-E15

Purpose of Transfer (be specific): Fish transferred to holding rack tanks for 22-d holding period; 75 (5 from each exposure chamber) were euthanized for possible histopathology according to SOP GEN 132.7, an overdose of MS-222.

[redacted] person transferring animals

3MAY2012; signed 21MAR2013 Date of transfer

This sheet was filled out on 21MAR 2013 for clarification. Information was obtained from form 3a - Pooled fish Length and Weight and form 3 - Fish Length and Weight (Exposure Termination), file folder 17d. KW 21MAR2013

FF # 8
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Pg 1 of 1

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JC Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 148-49
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 25 MAY12

Species: BKT

Lot number: 120300

Number transferred: 58

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): Preserved for histology

Purpose of Transfer (be specific): 5 fish from each tank (1), with exception of 3 fish from tank E8, were preserved for later histological examination upon termination of ~~21 day~~ 22 day holding period is actual length of holding period. JKW 21MAR13 holding period. All fish were euthanized according to SOP GEN 132.7 with an overdose of MS-222

(1) All of the 300 mg/L Treatment group tanks (E4, E12, E14) had no fish remaining so no fish were sampled from these tanks. 4-8-13 JC

[redacted] 25MAY12

Date of transfer

FF # 8
Item No. 51
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JA Date: 4813

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/48-49
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 25MAY12

Species: BKT

Lot number: 120300

Number transferred: 115

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): 115 fish were remaining fish from each tank after 5 were selected for histological preservation. Remaining fish were euthanized according to SOP GEN 132.7 and placed in freezer for incineration after being ~~tabbed~~ and double bagged.

Spelling error. Word is labeled JKW 07FEB13

[redacted]

25MAY12
Date of transfer

FF # 8
Item No. 52
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: SA Date: 7-8-13

Log Book / Pages 149
File Folder 8
Initials SKW Date 07FEB13

MEMORANDUM

Date: June 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 114000 as Largemouth Bass (*Micropterus salmodies*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 6
Item No. 53
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: SA Date: 4-5-13

Log Book / Pages 1/49
File Folder 8
Initials SKW Date 07FEB13

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: LuoMA

Source Tank: R 12

Animal Lot Number: 114000

Species: LmB

3-Day Mortality: 0 - 0 - 1

Approval (Member, Animal Care and Use Committee):

[redacted] 5/30/12
Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 54
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JM Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 149
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 01JUN12

Species: LMB

Lot number: 114000

Number transferred: 535

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): R12 in Fish Culture

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): RND-2 in Room 2

Purpose of Transfer (be specific): LMB to be dosed with PP CL 145A on a later date as documented in study protocol for AEH-12-PSEUDO-03

[redacted]

01JUN2012
Date of transfer

FF # 8
Item No. 55
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: JA Date: 7 Feb 13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 150, 211
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 11JUN12

Species: LMB

Lot number: 114000

Number transferred: 375

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-2 in Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Tanks 1-5 in systems A, B, C

Purpose of Transfer (be specific): Test non-target effects of Mf CL 145A as per AEH-12-PSEUDO-03 protocol.

[redacted]

11JUN12
Date of transfer

FF # 8
Item No. 56
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SC Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/50, 2/1
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 11JUN12

Species: LMB

Lot number: 114000

Number transferred: 40

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-2, Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology

Purpose of Transfer (be specific): Upon distribution to AEH-12-PSEUDO-03 test diluter system four rounds of ten fish each were preserved for histological examination after being sacrificed with concentrated MS-222.

[redacted]

11JUN12
Date of transfer

FF # 8
Item No. 57
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JK Date: 4-8-13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/1-2
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 12JUN12

Species: LMB

Lot number: 114000

Number transferred: 115 Correct # should be 120 ① 119 4-8-13 Jan

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RNO-2 in Room 2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To Freezer for incineration

Purpose of Transfer (be specific): Test organisms kept to replace any potential mortalities from unforseen circumstances of fish placed in diluter systems A, B, and C on 11JUN12.

① 535 transferred to RNO-2 room 2 on 01Jun12, 1 fish died during acclimation, 375 to diluter system, 40 sampled for histology 4-8-13 Jan

[redacted]

12JUN12
Date of transfer

FF # 8
Item No. 58
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 6 FEB 13
REVIEWED BY
Initials: JK Date: 4.8.13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/2-3
File Folder 8
Initials JKW Date 6 FEB 13

Date of transfer: 6/13/12

Species: LMB

Lot number: 114000

Number transferred: 79

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Pilot Tanks A1, A2, A4, B4, B5, C1 + C5

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Fixative container

Purpose of Transfer (be specific): Mortalities removed at the termination of Exposure period the mortalities were processed for Histology

[redacted]
on
als

6/13/12
Date of transfer

FF # 8
Item No. 59
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SM Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/2-3
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 6/13/12

Species: LMB

Lot number: 114000

Number transferred: 57

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Diluters A, B & C Tanks 1-5

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology Containers

Purpose of Transfer (be specific): Animals sampled for histology at 24h After exposure, infection

[redacted]

Not legible date is 6/13/12
4-8-13
JAC

Date of transfer

FF # 8
Item No. 60
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JKW Date: 4/8/13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 212-3.
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 13JUN12

Species: LMB

Lot number: 114000

Number transferred: 237 + 10 ①

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Diluter System A, B, C tanks 1-5

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): E1-E15 in Room 2

Purpose of Transfer (be specific): After being exposed to Rf-CL 145A For 24 hr period according to AEH-12-PSEUDO-03 protocol, fish were transferred to designated, randomized holding tank where they will be maintained for 21 days.

① one fish from Diluter tank C2 (50mg/L) was dropped on the counter and not transfered to hold chamber EC4 6/13/12 Jw

[redacted] 13JUN12

Date of transfer

FF # 8
Item No. 61
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07-FEB13
REVIEWED BY
Initials: SA Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/14
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 5 JUL 12

Species: LMB

Lot number: 114000

Number transferred: 68

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15 Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A Preserved for histological examination

Purpose of Transfer (be specific): Holding period of ~~21 days~~ ① has ended as JKW 21MAR13 per study protocol. Upon termination of holding period 6 fish from each tank are preserved for later histological examination, with the exception of tanks with less than 5 fish total. In these tanks all fish are preserved for later histological examination

① Actual length of holding period is 22 days

[redacted]
transferring animals

5 JUL 12
Date of transfer

FF # 8
Item No. 62
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: Sm Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/14
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 5 JUL 12

Species: LMB

Lot number: 114000

Number transferred: 154

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E15 Room 2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A to freezer for incineration

Purpose of Transfer (be specific): Fish not preserved for histological examination were weighed and measured and placed in Freezer for incineration.

[redacted]

5JUL12
Date of transfer

FF # 8
Item No. 63
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

PROOFED BY
Initials: SKW Date: 06FEB13
REVIEWED BY
Initials: SDR Date: 6-5-13

Log Book / Pages 1/50, 2/1
File Folder 8
Initials SKW Date 07FEB13

MEMORANDUM

Date: June 11, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 112400 as Smallmouth bass (*Micropterus dolomieu*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 64
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JM Date: 4-8-13

VERTEBRATE USE APPROVAL

Log Book / Pages 1/49
File Folder 8
Initials JKW Date 07FEB13

Protocol Number: AEH-12-PSEUDO-03

Study Director: JAMES A. LUOMA

Source Tank: R-15

Animal Lot Number: 112400

Species: SMB

3-Day Mortality: 0-0-0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist — 6/8/12
ature, Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 65
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

PROOFED BY
Initials: JKW Date: 06FEB13
REVIEWED BY
Initials: JAC Date: 6-8-13

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 1/49
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 8JUN12

Species: SMB

Lot number: 112400

Number transferred: 540

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): R15 in Fish culture R21

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): MY-2 Room 11

Purpose of Transfer (be specific): SMB to be used in trials regarding non-target effects of PF CL-145A in AEH-12-PSEUDO-03.

[redacted] 8JUN12

transferring animals — Date of transfer

FF # 8
Item No. 66
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

PROOFED BY Initials: SKW Date: 07FEB13
REVIEWED BY Initials: SKW Date: 4-8-13
ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 216
File Folder 8
Initials SKW Date 07FEB13

Date of transfer: 19JUN12

Species: SMB

Lot number: 112400

Number transferred: 375

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tank MY-2, Room 11

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Systems A, B, C tanks 1-5

Purpose of Transfer (be specific): Fish to be used in non-target testing of PF CL 145A as per AEH-12-PSEUDO-03 protocol. 25 fish stocked to each tank in three diluter systems

[redacted]
transferring animals

19JUN12
Date of transfer

FF # 8
Item No. 67
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JAC Date: 7-8-13
ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 19JUN12

Log Book / Pages 216
File Folder 8
Initials 07FEB13 Date JKW

Species: SMB

Lot number: 112400

Number transferred: 40

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tank MY-2, room 11

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A; preserved

Purpose of Transfer (be specific): During distribution of 375 test organisms to dilutor systems A, B, C; four subsets of test organisms will be sacrificed using concentrated MS-222 and preserved for later histological examination. (Each subset totalling 10 fish)

[redacted]
transferring animals

19JUN12
Date of transfer

FF # 8
Item No. 68
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JK Date: 4/9/13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/6-7
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 20JUN12

Species: SMB

Lot number: 112400

Number transferred: 105 correct # should be 125 4-8-13 JKW

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tank MY-2, Room 11

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A to freezer for incineration

Purpose of Transfer (be specific): Test organisms transferred to dilutor systems A, B, C on 19JUN12 used for AEH-12-PSEUDO-03. Remaining fish were retained as potential replacements for any test organisms moribund prior to test initiation. These remaining fish sacrificed after test initiation

[redacted]

20JUN12
Date of transfer

FF # 8
Item No. 69
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

SOP No. GEN 133.7
Page 8 of 10

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

AEH-12-PSEUDO-03
FF # 8

Upper Midwest Environmental Sciences Center, La Crosse, WI

Item No. 30
Pg 1 of 1

Log Book / Pages 2/8
File Folder 8
Initials KW Date 21MAR13
Initials: JC Date 4-8-13 PROOFED BY
REVIEWED BY Initials: TW Date: 22MAR13
Proofed reviewed switched 4-8-13 JC

Date of transfer: 21 JUN 2012

Species: SMB

Lot number: 112400

Number transferred: 373 (61 to histology; 56 mortalities; 256 to holding chambers)

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Exposure chambers A1-A5, B1-B5, C1-C5

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): Rm 2; Tanks D1-D6 ③; histology containers; ~~freezer~~ ①

Purpose of Transfer (be specific): Fish transferred to holding chambers for 22-d holding period. 61 fish were euthanized for possible histopathology. 56 mortalities from exposure were also processed for histopathology. Histopathology samples were euthanized according to SOP GEN 132.7, an overdose of MS-222.

[redacted] transferring animals

21 JUN 2012; Signed ② 21 MAR 2013
Date of transfer

① Freezer was not a location for mortalities, transfers or histology samples. Written in error. KW 21MAR13.

② This sheet was filled out on 21 MAR 2013 for clarification. Information was obtained from form 3a - Pooled Fish Length and Weight and form 3 - Fish Length and Weight (Exposure Termination - histology and mortality), file folder 22d. KW 21MAR13

③ Should be Tanks D1-D15. KW 21MAR13

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 21 JUN 2012

Species: SMB

Lot number: 112400

Number transferred: 18

Log Book / Pages 218
File Folder 8
Initials KW Date 21MAR13

Pooled/removed switched 4-8-13 SW

PROOFED BY
Initials: SW Date: 4-8-13
REVIEWED BY
Initials: JW Date: 22MAR13

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Rm 2; A4

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): freezer

Purpose of Transfer (be specific): fish in this tank were inadvertently placed in MS-222 instead of a transfer bucket. Fish could not be revived. Placed into freezer for incineration. See Deviation #13 for more information.

[redacted]
erson
imals

21 JUN 2012; signed ① 21 MAR 2013
Date of transfer

① This sheet was filled out on 21MAR 2013 for clarification. Information was obtained from form 3A-Pooled fish Length and Weight and Deviation #13. KW 21MAR13

AEH-12-PSEUDO-03

FF # 8
Item No. 11
Pg 1 of 1

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 13 JUL 2012

Log Book / Pages 2/19-20
File Folder 8
Initials KW Date 21MAR13

Species: SMB

Lot number: 112400

Proofed/reviewed switched 4-8-13 JAL

PROOFED BY
Initials: JAL Date: 4-8-13

REVIEWED BY
Initials: JKW Date: 22MAR13

Number transferred: 64

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Holding chambers D1-D15

Destination study number (if not applicable: N/A): Same

Destination tank number (include room number): To storage for histology

Purpose of Transfer (be specific): Remaining fish that survived 22-d holding period were euthanized according to SOP GEN 132.7, an overdose of MS-222. 5 SMB were removed at random from each tank for preservation. These fish will be used for histopathology. Tank D9 had only 3 fish preserved. Tank D14 had only 1 fish preserved. Tank D10 had no remaining fish.

[redacted]son
[redacted]nals

13 JUL 2012; Signed 21 MAR 13 ①
Date of transfer

① This sheet was filled out on 21MAR13 for clarification. Information was obtained from Form 3 - Fish Length and Weight (Post-exposure Termination), file folder 22D. KW 21MAR13

FF # 8
Item No. 72
Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 21M-20
File Folder 8
Initials KW Date 21MAR13

Date of transfer: 13 JUL 2012

Species: SMB

Lot number: 112400

Number transferred: 147

Proofed/reviewed switched → 4-8-13 KW

PROOFED BY
Initials: KW Date: 4-8-13
REVIEWED BY
Initials: KW Date: 22MAR13

Source study number (if not applicable: N/A): AEH-D-PSEUDO-03

Source tank number (include room number): Holding chambers D1-D15 (Rm 2)

Destination study number (if not applicable: N/A): same

Destination tank number (include room number): TO freezer for incineration

Purpose of Transfer (be specific): 147 SMB were remainder of fish not used for histological sampling from 22-d holding period termination. All SMB were euthanized according to SOP GEN 132.7, an overdose of MS-222.

[redacted] person transferring animals

13 JUL 2012; signed ① 21MAR2013
Date of transfer

① This sheet was filled out on 21MAR 2013 for clarification. Information was obtained from Form 3 - Fish Length and Weight (Post-exposure Termination), file folder 22d. KW 21MAR13

FF # 8
Item No. 73
Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

CERTIFIED COPY
Initials: KW Date: 14MAR13

Date: May 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the BLG in lot number 114500 as Bluegill (*Lepomis macrochirus*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 74
Pg 1 of 1

AEH-12-PSEUDO-03
Pg 1 of 1

ORIGINAL

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

PROOFED BY
Initials: KW Date: 05APR13
REVIEWED BY
Initials: JL Date: 4-8-13

Study Director: James A Luma

Source Tank: R-22

Log Book / Page: 214
File Folder: 8
Initials: KW Date: 05APR13

Animal Lot Number: 114500

Species: BLG

3-Day Mortality: 2 - 0 - 2

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 6/15/12
Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 75
Pg 1 of 1

AEH-12-PSEUDO-03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1 PROOFED BY
Initials: GKW Date 19FEB13
REVIEWED BY
Initials: JRC Date 4/5/13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/4
File Folder 8
Initials GKW Date 07FEB13

Date of transfer: 15 JUNE 2012

Species: Bluegill

Lot number: 114500

Number transferred: 520

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Fish culture Tank R22

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Room 2; RND-2 tank

Purpose of Transfer (be specific): Fish to be used in testing of Pf-CL145A test chemical as per AEH-12-PSEUDO-03 protocol.

[redacted]

15 JUN 12
Date of transfer

FF # 8
Item No. 76
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Date of transfer: 17 JUN 2012

Log Book / Pages 215
File Folder 8
Initials KW Date 21MAR13

Species: BLG

Lot number: 14500

PROOFED BY
Initials KW Date 21MAR13
REVIEWED BY
Initials [illegible] Date 4-4-13

Number transferred: 490

Source study number (if not applicable: N/A): AEH-12-PSAUDO-03

Source tank number (include room number): Rm 2; RND-2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freeze for incineration

Purpose of Transfer (be specific): 490 BLG were determined to be unfit for use in study due to high number of mortalities. Fish were euthanized according to SOP GEN 132.7, an over dose of MS-222.

[redacted]
transferring animals

17 JUN 2012; signed (1) 21MAR 2013
Date of transfer

(1) This sheet was filled out on 21MAR 2013 for clarification. Information was written in logbook # 2, page 5. KW 21MAR 2013

FF # 8
Item No. 77
Pg 1 of 1

Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

PROOFED BY (1) wrong date JKW 07FEB13
Initials: JKW Date: 13FEB 07FEB13
REVIEWED BY
Initials: SR Date: 4-5-13

Log Book / Pages 2/5-6
File Folder 8
Initials JKW Date 07 FEB 13

MEMORANDUM

Date: June 18, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 114100 as Channel Catfish (*Ictalurus punctatus*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]
Steven D. Redman

FF # 8
Item No. 78
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

VERTEBRATE USE APPROVAL

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: JK- Date: 4-8-13

Protocol Number: AEH-12-PSEUDO-03

Log Book / Pages 215
File Folder 8
Initials JKW Date 07FEB13

Study Director: Todd J. Stevenson for JAL

Source Tank: ~~R32~~ R34 Wrong tank number, R34 is correct. TJS 14FEB2013.

Animal Lot Number: 114100

Species: CCF

3-Day Mortality: 0 - 0 - 0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist 6/17/12
Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 79
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SM Date: 4-Feb-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 215
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 17 JUN 12

Species: CCF

Lot number: 114100

Number transferred: 500

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Room 21 ; R34

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Room 2; RND-2

Purpose of Transfer (be specific): CCF to be used in testing of Pf-CL145A as per AEH-12-PSEUDO-03 Protocol.

[redacted]

Signature of person transferring animals

17 JUN 12

Date of transfer

FF # 8
Item No. 80
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JAL Date: 7 FEB 13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/10
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 25JUN12

Species: CCF

Lot number: 114100

Number transferred: ~~496~~ 495 ①

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-2, Room 2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): To freezer for incineration

Purpose of Transfer (be specific): Study director decision not to use CCF in AEH-12-PSEUDO-03 due to size concerns and low dissolved oxygen levels in test chambers. (< 6 ppm for SMB during treatment, while fish 50% smaller)

① 5 mortalities during acclimation from 500 transferred into RMD-2 Room 2 on 17JUN12 4-8-13 JAL

[redacted]
transferring animals

25JUN12
Date of transfer

FF # 8
Item No. 81
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: May 1, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

CERTIFIED COPY
Initials: KLW Date: 14MAR2013

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the BLG in lot number 114500 as Bluegill (*Lepomis macrochirus*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 82
Pg 1 of 1

AEH-12-PSEUDO-03
Pg 1 of 1

VERTEBRATE USE APPROVAL

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: [illegible] Date: 4-8-13

Log Book / Pages 2/16-17
File Folder 8
Initials SKW Date 07FEB13

Protocol Number: AEH-12-PSEUDO-03

Study Director: LuomA

Source Tank: 21A-1

Animal Lot Number: 114500

Species: BLG

3-Day Mortality: 0 - 0 - 0

Approval (Member, Animal Care and Use Committee):

[redacted] Fishery Biologist Title 7/10/12 Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 83
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JN Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/16-17
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 10JUL12

Species: BL6

Lot number: 114500

Number transferred: 375

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Tank 21A-1, Fish Culture

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Systems A,B,C 1-5 Room 2

Purpose of Transfer (be specific): BL6 to be used as test organisms as part of AEH-12-PSEUDO-03, non-target effects of Pf-CL 145A .25 distributed to systems A,B,C tanks 1-5 for a total of 375

[redacted]
transferring animals

10JUL12
Date of transfer

FF # 8
Item No. 84
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JK Date: 7-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/16-17
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 10JUL12

Species: BL6

Lot number: 114800

Number transferred: 40

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): 21A-1

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A preserved for histological examination

Purpose of Transfer (be specific): Ten fish preserved for histological examination prior to initiation of distribution to test systems A, B, C, ID also preserved after each round of distribution, three total rounds, meaning 40 total are preserved

[redacted]
transferring animals

10JUL12
Date of transfer

FF # 8
Item No. 85
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SR Date: 2/8/13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/18-19
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 12 Jul 12

Species: BLG

Lot number: 114500

Number transferred: 75

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Dilution A, B, C (Tanks 1-5)

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology cassettes

Purpose of Transfer (be specific): 5 fish from each exposure tank was sampled for histology after the 24 hr exposure.

[redacted]
Signature of person transferring animals

7/12/12
Date of transfer

FF # 8
Item No. 84
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JV Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/18-19
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 12 JUL 12

Species: BG

Lot number: 114500

Number transferred: ~~AEH-12-PSEUDO-03~~ 297 (+ 1 Ash ①)
Wrote in wrong space TMS 7/12/12

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Diluter System A, B, C (Tanks 1-5)

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): E1-E15, Room 2

Purpose of Transfer (be specific): After exposure to PF-CC 145A for 24 hr according to study protocol, fish were transferred to designated randomized holding tank. Fish will be maintained for 21 days.

① One fish was lost during the transfer to obtain the group weight from Tank B4 - therefore not included in transfer to E12. TMS 7/12/12

[redacted]
Signature of person transferring animals

7/12/12
Date of transfer

FF # 8
Item No. 81
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JK Date: 4-8-13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/27-28
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 03AUG12

Species: BLG

Lot number: 114500

Number transferred: 75

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Holding tanks E1-E15, Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A; preserved for histological examination

Purpose of Transfer (be specific): BLG holding period termination.
5 BLG preserved for later histological examination
from holding tanks E1-E15, a total of 75 fish.

[redacted]
transferring animals

03AUG12
Date of transfer

FF # 8
Item No. 88
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SR Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 127-28
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 03AUG12

Species: BL6

Lot number: 114500

Number transferred: 203

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Holding tanks E1-E16, R2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A; to freezer for incineration

Purpose of Transfer (be specific): BL6 not selected for histological preservation were euthanized according to SOP GEN 132.7, a total of 203 from tanks E1-E15.

[redacted] 03AUG12

Date of transfer

FF # 8
Item No. 51
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

PROOFED BY
Initials: SKW Date: 07FEB13
REVIEWED BY
Initials: JAL Date: 4-8-13

Log Book / Pages 2/15
File Folder 8
Initials KW Date 7 MAR 2013

MEMORANDUM

Date: July 6, 2012

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 122300 as lake sturgeon (*Acipenser fulvescens*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]
Steven D. Redman

FF # 8
Item No. 90
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

Form GEN 132.7a
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JR Date: 4-8-13

Log Book / Pages 2/14-15
File Folder 8
Initials JKW Date 07FEB13

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSEUDO-03

Study Director: James A. Luoma

Source Tank: RND-1

Animal lot Number: 122300

Species: LST

3-Day Mortality: 3-0-0

Approval (Member, Animal Care and Use Committee):

[redacted] Fisheries Biologist 7/6/12
Title Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 91
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of

PROOFED BY
Initials: JKW Date: 5 FEB 13
REVIEWED BY
Initials: [illegible] Date: 6-5-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/14-15
File Folder 8
Initials JKW Date 5 FEB 13

Date of transfer: 06 JUL 12

Species: LST

Lot number: 122300

Number transferred: 500

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): Room 21, RND-1

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Room 2, RND-2

Purpose of Transfer (be specific): LST to be used in testing of PF-CL145A as per AEH-12-PSEUDO-03 protocol.

[redacted]
Signature of person transferring animals

06 JUL 12
Date of transfer

FF # 8
Item No. 92
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JM Date: 4-5-13

ORIGINAL

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/24-25
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 7/31/12

Species: LST

Lot number: 122300

Number transferred: 375

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RND-2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Dilutors A, B, & Room 2

Purpose of Transfer (be specific): For PF-CL 145A exposure on 8/1/12
Distribute in 3 randomized rounds from randomizations
completed on 7/16/12 - 7/31/12 JM

[redacted] person transferring animals

7/31/12 Date of transfer

FF # 8
Item No. 93
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JK Date: 7-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/24-25
File Folder 6
Initials JKW Date 07FEB13

Date of transfer: 7/31/12

Species: LST

Lot number: 122300

Number transferred: 40

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RVD-2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A

Purpose of Transfer (be specific): initial Histology samples

[redacted]
transferring animals

7/31/12
Date of transfer

FF # 8
Item No. 94
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JKW Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/25-26
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 01AUG12

Species: LST

Lot number: 122300

Number transferred: 78

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): RNO-2, Room 2

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A to freezer for incineration

Purpose of Transfer (be specific): Fish were remainder of lot not used in AEH-12-PSEUDO-03 PF-CL 145A exposure. Euthanized according to SOP GEN 132.7, transferred to freezer for incineration

[redacted] 01AUG12
transferring animals — Date of transfer

FF # 8
Item No. 95
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SM Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/26-27
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 8/2/12

Species: LST

Lot number: 122300

Number transferred: 65 66 wrote incorrect number of samples 8/2/12 JK

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Dilters A, B, C

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology samples

Purpose of Transfer (be specific): Animals (≤5) from each dilution exposure chamber were euthanized and processed for Histology at the termination of the exposure period.

[redacted] son
nals

8/2/12
Date of transfer

FF # 8
Item No. 96
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SAL Date: 7 FEB 13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/26-27
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 8/2/12

Species: LST

Lot number: 122300

Number transferred: 265 +44

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Dilutors A, B&C

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Holding rack quadrant 6

Purpose of Transfer (be specific): Animals transferred from exposure chambers to the holding rack for post exposure observation. 44 mortalities removed from the exposure chambers at the termination of the exposure period and processed for Histology.

[redacted]erson
imals

8/2/12
Date of transfer

FF # 8
Item No. 97
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JA Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/34
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 24AUG12

Species: LST

Lot number: 122300

Number transferred: 23

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03
① Illegible entry. Tank # is 66. JKW 07FEB13

Source tank number (include room number): Tanks 62, 64, 65, ~~66~~, 68, 610, 613

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A preserved for histological examination

Purpose of Transfer (be specific): All fish from tanks 62, 65, 66, 613 preserved for later histological examination. 5 fish from tanks 64, 68, 610 were preserved for later histological examination.

[redacted]

24AUG12
Date of transfer

FF # 8
Item No. 98
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 02FEB13
REVIEWED BY
Initials: SAV Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/34
File Folder 8
Initials JKW Date 02FEB13

Date of transfer: 24AUG12

Species: LST

Lot number: 122300

Number transferred: 45

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks 64, 68, 610

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A to freezer for incineration

Purpose of Transfer (be specific): 5 LST from each tank preserved for later histological examination. Remaining 15 from each tank were euthanized according to SOP GEN 132.7 and placed in freezer for incineration.

[redacted]

24AUG12
Date of transfer

FF # 8
Item No 99
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Biological Resources Division
Upper Midwest Environmental Sciences Center
2630 Fanta Reed Road
La Crosse, Wisconsin 54603

MEMORANDUM

Date: February 13, 2013

To: James A. Luoma
Research Fisheries Biologist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

From: Steven D. Redman
Fish Culturist
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin

Subject: Fish species verification for study number AEH-12-PSEUDO-03

I verified the fish in lot number 123000 used for study number AEH-12-PSEUDO-03 as Channel Catfish (*Ictalurus punctatus*) using a standard taxonomic text (Eddy and Underhill, 1978; How to Know Freshwater Fishes).

[redacted]

Steven D. Redman

FF # 8
Item No. 100
Pg 1 of 1

AEH-12-PSEUDO-03
Pg 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JKW Date: 4-7-13

Log Book / Pages 2/35
File Folder 8
Initials JKW Date 07FEB13

VERTEBRATE USE APPROVAL

Protocol Number: AEH-12-PSUEDO-03

Study Director: LuomA

Source Tank: 16ACC-1

Animal Lot Number: 123000

Species: CCF

3-Day Mortality: 0 - 0 - 0

Approval (Member, Animal Care and Use Committee):

[redacted] 9/27/12
Date

* Note: This form must be filed with the data of the study number the vertebrates are assigned.

Vertebrate Use Approval forms are valid for a maximum of one month or when mortality exceeds the minimum acceptable level for three consecutive days.

FF # 8
Item No. 19
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SJC Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/35
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 25SEP12

Species: CCF

Lot number: 123000

Number transferred: 375

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): 16-ACC-1 Room 21B JKW 26SEP12

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Systems A, B, C tanks 1-5 (Room 2)

Purpose of Transfer (be specific): CCF to be used to test non-target effects of Pf-CL145A as part of AEH-12-PSEUDO-03. 25 CCF transferred to each tank in Systems A, B, C tanks 1-5.

[redacted] 25SEP12

transferring animals — Date of transfer

FF # 8
Item No. 102
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SAL Date: 9-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/35
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 9/25/12

Species: CCF

Lot number: 123000

Number transferred: 3

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): 16ACC-1

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): N/A - Extra fish

Purpose of Transfer (be specific): There was 3 additional fish beyond the required 4/15 needed for the study. The additional fish were discarded after MS-222 overdose. The animals were placed in the UMESC freezer for incineration. The transfer log in the UMESC fish holding was noted to update the actual # of animals removed from the tank.

[redacted]
transferring animals

9/25/12, signed 9/27/12
Date of transfer

FF # 8
Item No. 103
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JR Date: 7-7-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/35
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 25SEP12

Species: CCF

Lot number: 123000

Number transferred: 40

Source study number (if not applicable: N/A): N/A

Source tank number (include room number): 16-ACC-1 JKW 26SEP12

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): ~~Systems A,B,C tanks 1-5 (Room 2)~~ ① These 40 CCF were preserved for later histological examination, rather than transfer to another set of tanks. JKW 07FEB13

Purpose of Transfer (be specific): CCF preserved for later histological examination. 10 preserved prior to each round of distribution and upon completion.

[redacted] 25SEP12

Date of transfer

FF # 8
Item No. 164
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SC Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/36-37
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 9/27/12

Species: CCF

Lot number: 123000

Number transferred: 61

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Dilution A, B, & C Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Fixative Containers

Purpose of Transfer (be specific): Mortalities during exposure period. Animals were processed for possible Histology sampling

[redacted]

9/27/12
Date of transfer

FF # 8
Item No. 105
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: NW Date: 07FEB13
REVIEWED BY
Initials: SJL Date: 7-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/36-37
File Folder 8
Initials NW Date 07FEB13

Date of transfer: 9/22/12

Species: CCF

Lot number: 123000

Number transferred: 60

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Dilutions A, B & C control - 2 no tanks Room 2

Destination study number (if not applicable: N/A): AEH-12-PSEUDO-03

Destination tank number (include room number): Histology Fathead containers

Purpose of Transfer (be specific): 5 fish from each dilution replicate (except for 300 mg/L, which had high mortality) were sampled for possible histology examination upon animal transfer to the holding racks.

[redacted] person
animals

9/22/12
Date of transfer

FF # 8
Item No. 10v
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: [illegible] Date: 4-5-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/36-37
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 9/27/12

Species: CCP

Lot number: 123000

Number transferred: 255

Source study number (if not applicable: N/A): AEH-12-PSEH00-03

Source tank number (include room number): Dilutes A, B, C Room #2 Tanks 1-5 9/27/12 JKW

Destination study number (if not applicable: N/A): AEH-12-PSEH00-03

Destination tank number (include room number): Holding Rack Quadrant E 1-15

Purpose of Transfer (be specific): Post exposure observation period

*This note is to provide clarification. 255 fish were transferred to holding chambers for 22-d holding period. KW 21 MAR 2013

[redacted] person
animals

9/27/12
Date of transfer

FF # 8
Item No. 107
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: SJL Date: 4-5-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/44
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 19OCT12

Species: CCF

Lot number: 123000

Number transferred: 50

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1 - E13

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A

Purpose of Transfer (be specific): Histology Samples preserved.

*This note is to clarify: up to 5 CCF were removed at random from each tank for preservation at 22-d holding period termination. This fish will potentially be used for histopathology. Tanks E6, E14 and E15 had no fish remaining; Tanks E12 and E13 each had 1 fish preserved. Tank E1 had 3 fish preserved. Remaining tanks had 5 fish preserved. JKW 21MAR2013

[redacted]

19OCT12
Date of transfer

FF # 8
Item No. 108
Pg 1 of 1

AEH 12 PSEUDO 03
Pg 1 of 1

ORIGINAL

Form GEN 133.7c
Page 1 of 1

PROOFED BY
Initials: JKW Date: 07FEB13
REVIEWED BY
Initials: JA Date: 4-8-13

Record of Vertebrate Transfer

Upper Midwest Environmental Sciences Center, La Crosse, WI

Log Book / Pages 2/44
File Folder 8
Initials JKW Date 07FEB13

Date of transfer: 19OCT12

Species: CCF

Lot number: 123000

Number transferred: 114

Source study number (if not applicable: N/A): AEH-12-PSEUDO-03

Source tank number (include room number): Tanks E1-E13

Destination study number (if not applicable: N/A): N/A

Destination tank number (include room number): N/A

Purpose of Transfer (be specific): Termination Samples. Weighed and measured. To be incinerated.

[redacted]son
[redacted]nals

19OCT12 KW
Date of transfer

FF # 8
Item No. 109
Pg 1 of 1

AEH 12 PSEUDO 03

Pg 1 of 1

Appendix 6. Test Animal Feed Information

Item number	Item description	Number of pages	Report page number
1	Form 2 – Acclimation Feed Rate Charts	11	611
2	Form 2 – RBT Holding Period Feed Rate Chart	15	622
3	Form 2 – YEP Holding Period Feed Rate Chart	15	637
4	Form 2 – WAE Holding Period Feed Rate Chart	15	652
5	Form 2 – Revised WAE Holding Period Feed Rate Chart	15	667
6	Form 2 – BKT Holding Period Feed Rate Chart	15	682
7	Form 2 – LMB Holding Period Feed Rate Chart	15	697
8	Form 2 – SMB Holding Period Feed Rate Chart	15	712
9	Form 2 – Revised SMB Holding Period Feed Rate Chart	14	727
10	Form 2 – BLG Holding Period Feed Rate Chart	15	741
11	Form 2 – Revised BLG Holding Period Feed Rate Chart	15	756
12	Form 2 – LST Holding Period Feed Rate Chart	15	771
13	Form 2 – CCF Holding Period Feed Rate Chart	15	786

Study Number: AEH-12-PSEUDO-03
File Folder Act 0 Lab book/pgs 1, 1

Reviewed by: DS Date: 23APR12
Verified by: SA Date 4-27-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Acclimation
Holding Tank/Chamber: Room 3 RND-2
Treatment Group: N/A
Species: RBT Lot: 116000

Date Created/Initials: 2/24/12 JnL
Date Revised/initia [redacted]
Approved for use: [redacted] 2/24/12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.08							
21	Number of fish	500							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							
27									

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	540.00	1.08	27.00	562.50	1.13	1.84	4.66
34	2	562.50	1.13	28.13	585.94	1.17	1.86	4.73
35	3	585.94	1.17	29.30	610.35	1.22	1.89	4.79
36	4	610.35	1.22	30.52	635.78	1.27	1.91	4.86
37	5	635.78	1.27	31.79	662.27	1.32	1.94	4.93
38	6	662.27	1.32	33.11	689.87	1.38	1.97	4.99
39	7	689.87	1.38	34.49	718.61	1.44	1.99	5.06
40								
41	Daily group ration (g)		30.62		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	718.61	1.44	35.93	748.56	1.50	2.02	5.13
45	9	748.56	1.50	37.43	779.75	1.56	2.05	5.20
46	10	779.75	1.56	38.99	812.23	1.62	2.08	5.27
47	11	812.23	1.62	40.61	846.08	1.69	2.10	5.34
48	12	846.08	1.69	42.30	881.33	1.76	2.13	5.42
49	13	881.33	1.76	44.07	918.05	1.84	2.16	5.49
50	14	918.05	1.84	45.90	956.31	1.91	2.19	5.57
51								
52	Daily group ration (g)		40.75		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	956.31	1.91	47.82	996.15	1.99	2.22	5.64
56	16	996.15	1.99	49.81	1037.66	2.08	2.25	5.72
57	17	1037.66	2.08	51.88	1080.89	2.16	2.28	5.80
58	18	1080.89	2.16	54.04	1125.93	2.25	2.31	5.88
59	19	1125.93	2.25	56.30	1172.84	2.35	2.35	5.96
60	20	1172.84	2.35	58.64	1221.71	2.44	2.38	6.04
62	21	1221.71	2.44	61.09	1272.62	2.55	2.41	6.12
62								
63	Daily group ration (g)		54.22		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	1272.62	2.55	63.63	1325.64	2.65	2.44	6.21
67	23	1325.64	2.65	66.28	1380.88	2.76	2.48	6.29
68	24	1380.88	2.76	69.04	1438.41	2.88	2.51	6.38
69	25	1438.41	2.88	71.92	1498.35	3.00	2.55	6.47
70	26	1498.35	3.00	74.92	1560.78	3.12	2.58	6.56
71	27	1560.78	3.12	78.04	1625.81	3.25	2.62	6.65
72	28	1625.81	3.25	81.29	1693.55	3.39	2.65	6.74
73								
74	Daily group ration (g)		72.16		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	1693.55	3.39	84.68	1764.12	3.53	2.69	6.83
78	30	1764.12	3.53	88.21	1837.62	3.68	2.73	6.92
79	31	1837.62	3.68	91.88	1914.19	3.83	2.76	7.02
80								
81	Daily group ration (g)		88.25		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① Incorrect File Folder.
Should be File Folder 7. KW 11APR12

FF # 7
Item No. 1
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs ___/___

Reviewed by: TJS Date: 23APR12
Verified by: ___ Date ___

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.,pgs 406-457.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: Reduction Tank
Holding Tank/Chamber: Room 12 RMD-I
Treatment Group: NTH
Species: YEP Lot: 113000

Date Created/Initials: 2/24/12 JSm
Date Revised/init: [redacted]
Approved for use: [redacted] 2/24/12 Date

Row	Column: c	d	e	f	g	h	I	j

INPUT SECTION

Initial fish size (g)	0.77
Number of fish	500
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$76/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	385.00	0.77	57.75	390.78	0.78	1.79	4.55
2	390.78	0.78	58.62	396.64	0.79	1.80	4.57
3	396.64	0.79	59.50	402.59	0.81	1.81	4.59
4	402.59	0.81	60.39	408.62	0.82	1.82	4.62
5	408.62	0.82	61.29	414.75	0.83	1.83	4.64
6	414.75	0.83	62.21	420.98	0.84	1.84	4.66
7	420.98	0.84	63.15	427.29	0.85	1.84	4.68

Daily group ration (g): 60.41 ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g): 0.12 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

8	427.29	0.85	64.09	433.70	0.87	1.85	4.71
9	433.70	0.87	65.05	440.21	0.88	1.86	4.73
10	440.21	0.88	66.03	446.81	0.89	1.87	4.75
11	446.81	0.89	67.02	453.51	0.91	1.88	4.78
12	453.51	0.91	68.03	460.31	0.92	1.89	4.80
13	460.31	0.92	69.05	467.22	0.93	1.90	4.83
14	467.22	0.93	70.08	474.23	0.95	1.91	4.85

Daily group ration (g): 67.05 ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g): 0.13 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

15	474.23	0.95	71.13	481.34	0.96	1.92	4.87
16	481.34	0.96	72.20	488.56	0.98	1.93	4.90
17	488.56	0.98	73.28	495.89	0.99	1.94	4.92
18	495.89	0.99	74.38	503.33	1.01	1.95	4.95
19	503.33	1.01	75.50	510.88	1.02	1.96	4.97
20	510.88	1.02	76.63	518.54	1.04	1.97	5.00
21	518.54	1.04	77.78	526.32	1.05	1.98	5.02

Daily group ration (g): 74.42 ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g): 0.15 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

22	526.32	1.05	78.95	534.21	1.07	1.99	5.05
23	534.21	1.07	80.13	542.23	1.08	2.00	5.07
24	542.23	1.08	81.33	550.36	1.10	2.01	5.10
25	550.36	1.10	82.55	558.61	1.12	2.02	5.12
26	558.61	1.12	83.79	566.99	1.13	2.03	5.15
27	566.99	1.13	85.05	575.50	1.15	2.04	5.17
28	575.50	1.15	86.32	584.13	1.17	2.05	5.20

Daily group ration (g): 82.59 ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g): 0.17 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

29	584.13	1.17	87.62	592.89	1.19	2.06	5.23
30	592.89	1.19	88.93	601.79	1.20	2.07	5.25
31	601.79	1.20	90.27	610.81	1.22	2.08	5.28

Daily group ration (g): 88.94 ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g): 0.18 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

FF # 7
Item No. 2
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder: 7 Lab book/pgs: 1 / 7 Verified by: [redacted] Date: [redacted]

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982 Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: Acclimation
Holding Tank/Chamber: RNO-2
Treatment Group: N/A
Species: L-ST Lot: 112700

Date Created/Initials: 3-2-12 /JC
Date Revised/Initials: [redacted]
Approved for use: [redacted] 3/2/12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	3.2
Number of fish	512
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	12

WorkSheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	1638.40	3.20	196.61	1802.24	3.52	3.38	8.60
2	1802.24	3.52	216.27	1982.46	3.87	3.49	8.87
3	1982.46	3.87	237.90	2180.71	4.26	3.61	9.16
4	2180.71	4.26	261.69	2398.78	4.69	3.72	9.46
5	2398.78	4.69	287.85	2638.66	5.15	3.84	9.76
6	2638.66	5.15	316.64	2902.53	5.67	3.97	10.08
7	2902.53	5.67	348.30	3152.78	6.24	4.10	10.40
Daily group ration (g)		266.46	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.52	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	3192.78	6.24	383.13	3512.06	6.86	4.23	10.74
9	3512.06	6.86	421.45	3863.26	7.55	4.36	11.08
10	3863.26	7.55	463.59	4249.59	8.30	4.50	11.44
11	4249.59	8.30	509.95	4674.55	9.13	4.65	11.81
12	4674.55	9.13	560.95	5142.00	10.04	4.80	12.19
13	5142.00	10.04	617.04	5656.20	11.05	4.96	12.59
14	5656.20	11.05	678.74	6221.82	12.15	5.12	12.99
Daily group ration (g)		519.26	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		1.01	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	6221.82	12.15	746.62	6844.00	13.37	5.28	13.41
16	6844.00	13.37	821.28	7528.40	14.70	5.45	13.84
17	7528.40	14.70	903.41	8281.24	16.17	5.63	14.29
18	8281.24	16.17	993.75	9109.37	17.79	5.81	14.75
19	9109.37	17.79	1093.12	10020.31	19.57	6.00	15.23
20	10020.31	19.57	1202.44	11022.34	21.53	6.19	15.72
21	11022.34	21.53	1322.68	12124.57	23.68	6.39	16.23
Daily group ration (g)		1011.90	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		1.98	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	12124.57	23.68	1454.95	13337.03	26.05	6.60	16.75
23	13337.03	26.05	1600.44	14670.73	28.65	6.81	17.29
24	14670.73	28.65	1760.49	16137.80	31.52	7.03	17.85
25	16137.80	31.52	1936.54	17751.58	34.67	7.25	18.43
26	17751.58	34.67	2130.19	19526.74	38.14	7.49	19.02
27	19526.74	38.14	2343.21	21479.41	41.95	7.73	19.64
28	21479.41	41.95	2577.53	23627.36	46.15	7.98	20.27
Daily group ration (g)		1971.91	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		3.85	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	23627.36	46.15	2835.28	25990.09	50.76	8.24	20.92
30	25990.09	50.76	3118.81	28589.10	55.84	8.50	21.60
31	28589.10	55.84	3430.69	31448.01	61.42	8.78	22.30
Daily group ration (g)		3128.26	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		6.11	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 3
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 28 FEB 2013
File Folder 7 Lab book/pgs 1 / H-15 Verified by: JA Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Acclimation
Holding Tank/Chamber: RND-1
Treatment Group: N/A
Species: WAE Lot: 112100

Date Created/Initials: 3/9/12 JA
Date Revised/Init [redacted]
Approved for use [redacted] 3/9/12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	2.47							
21	Number of fish	500							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	15							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual nitial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	1235.00	2.47	185.25	1253.53	2.51	2.64	6.71
2	1253.53	2.51	188.03	1272.33	2.54	2.65	6.74
3	1272.33	2.54	190.85	1291.41	2.58	2.67	6.77
4	1291.41	2.58	193.71	1310.78	2.62	2.68	6.81
5	1310.78	2.62	196.62	1330.45	2.66	2.69	6.84
6	1330.45	2.66	199.57	1350.40	2.70	2.71	6.87
7	1350.40	2.70	202.56	1370.66	2.74	2.72	6.91
Daily group ration (g)		193.80	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.39	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	1370.66	2.74	205.60	1391.22	2.78	2.73	6.94
9	1391.22	2.78	208.68	1412.09	2.82	2.75	6.98
10	1412.09	2.82	211.81	1433.27	2.87	2.76	7.01
11	1433.27	2.87	214.99	1454.77	2.91	2.77	7.05
12	1454.77	2.91	218.22	1476.59	2.95	2.79	7.08
13	1476.59	2.95	221.49	1498.74	3.00	2.80	7.12
14	1498.74	3.00	224.81	1521.22	3.04	2.82	7.15
Daily group ration (g)		215.09	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	1521.22	3.04	228.18	1544.04	3.09	2.83	7.19
16	1544.04	3.09	231.61	1567.20	3.13	2.84	7.22
17	1567.20	3.13	235.08	1590.71	3.18	2.86	7.26
18	1590.71	3.18	238.61	1614.57	3.23	2.87	7.30
19	1614.57	3.23	242.18	1638.78	3.28	2.89	7.33
20	1638.78	3.28	245.82	1663.37	3.33	2.90	7.37
21	1663.37	3.33	249.50	1688.32	3.38	2.92	7.41
Daily group ration (g)		238.71	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.48	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	1688.32	3.38	253.25	1713.64	3.43	2.93	7.44
23	1713.64	3.43	257.05	1739.35	3.48	2.94	7.48
24	1739.35	3.48	260.90	1765.44	3.53	2.96	7.52
25	1765.44	3.53	264.82	1791.92	3.58	2.97	7.55
26	1791.92	3.58	268.79	1818.80	3.64	2.99	7.59
27	1818.80	3.64	272.82	1846.08	3.69	3.00	7.63
28	1846.08	3.69	276.91	1873.77	3.75	3.02	7.67
Daily group ration (g)		264.93	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.53	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	1873.77	3.75	281.07	1901.88	3.80	3.03	7.71
30	1901.88	3.80	285.28	1930.40	3.86	3.05	7.74
31	1930.40	3.86	289.56	1959.36	3.92	3.06	7.78
Daily group ration (g)		285.30	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.57	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 4
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 | Reviewed by: TVS | Date: 23APR12
File Folder: F | Lab book/pgs: 1, 25 | Verified by: [redacted] | Date: 4-25-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: Acclimation
Holding Tank/Chamber: RND-1, Room12
Treatment Group: N/A
Species: BLG **Lot**: 114500

Date Created/Initials: 3-22-12/ JW
Date Revised/in: [redacted]
Approved for us: [redacted] 3/22/12 Date

INPUT SECTION

Initial fish size (g)	1.29
Number of fish	500
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((((E33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	645.00	1.29	96.75	654.68	1.31	1.86	4.72
2	654.68	1.31	98.20	664.50	1.33	1.87	4.74
3	664.50	1.33	99.67	674.46	1.35	1.88	4.77
4	674.46	1.35	101.17	684.58	1.37	1.89	4.79
5	684.58	1.37	102.69	694.85	1.39	1.89	4.81
6	694.85	1.39	104.23	705.27	1.41	1.90	4.84
7	705.27	1.41	105.79	715.85	1.43	1.91	4.86
Daily group ration (g)		101.21		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	715.85	1.43	107.38	726.59	1.45	1.92	4.88
9	726.59	1.45	108.99	737.49	1.47	1.93	4.91
10	737.49	1.47	110.62	748.55	1.50	1.94	4.93
11	748.55	1.50	112.28	759.78	1.52	1.95	4.96
12	759.78	1.52	113.97	771.17	1.54	1.96	4.98
13	771.17	1.54	115.68	782.74	1.57	1.97	5.01
14	782.74	1.57	117.41	794.48	1.59	1.98	5.03
Daily group ration (g)		112.33		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	794.48	1.59	119.17	806.40	1.61	1.99	5.06
16	806.40	1.61	120.96	818.50	1.64	2.00	5.08
17	818.50	1.64	122.77	830.77	1.66	2.01	5.11
18	830.77	1.66	124.62	843.23	1.69	2.02	5.13
19	843.23	1.69	126.49	855.88	1.71	2.03	5.16
20	855.88	1.71	128.38	868.72	1.74	2.04	5.18
21	868.72	1.74	130.31	881.75	1.76	2.05	5.21
Daily group ration (g)		124.67		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	881.75	1.76	132.26	894.98	1.79	2.06	5.24
23	894.98	1.79	134.25	908.40	1.82	2.07	5.26
24	908.40	1.82	136.26	922.03	1.84	2.08	5.29
25	922.03	1.84	138.30	935.86	1.87	2.09	5.31
26	935.86	1.87	140.38	949.90	1.90	2.10	5.34
27	949.90	1.90	142.48	964.15	1.93	2.11	5.37
28	964.15	1.93	144.62	978.61	1.96	2.12	5.39
Daily group ration (g)		138.37		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	978.61	1.96	146.79	993.29	1.99	2.13	5.42
30	993.29	1.99	148.99	1008.19	2.02	2.15	5.45
31	1008.19	2.02	151.23	1023.31	2.05	2.16	5.48
Daily group ration (g)		149.00		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 5
Pg 1 of 1

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Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 1, 49

Reviewed by: KW Date: 19MAR2013
Verified by: SL Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Acclimation
Holding Tank/Chamber: RND-2
Treatment Group: N/A/
Species: LMB **Lot:** 114000

Date Created/Initials: 6/01/2012 JAL JW
Date Revised/ [redacted]
Approved for [redacted] 6/01/2012
Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.48							
21	Number of fish	500							
22	Condition Factor (C)	0.00045							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	15							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33:(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	740.00	1.48	111.00	751.10	1.50	1.94	4.94	
2	751.10	1.50	112.67	762.37	1.52	1.95	4.96	
3	762.37	1.52	114.35	773.80	1.55	1.96	4.99	
4	773.80	1.55	116.07	785.41	1.57	1.97	5.01	
5	785.41	1.57	117.81	797.19	1.59	1.98	5.04	
6	797.19	1.59	119.58	809.15	1.62	1.99	5.06	
7	809.15	1.62	121.37	821.29	1.64	2.00	5.09	
Daily group ration (g)		116.12	←OUTPUT - GROUP FEED RATE (g) for week 1					
Daily per fish ration (g)		0.23	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1					
8	821.29	1.64	123.19	833.60	1.67	2.01	5.11	
9	833.60	1.67	125.04	846.11	1.69	2.02	5.14	
10	846.11	1.69	126.92	858.80	1.72	2.03	5.16	
11	858.80	1.72	128.82	871.68	1.74	2.04	5.19	
12	871.68	1.74	130.75	884.76	1.77	2.05	5.22	
13	884.76	1.77	132.71	898.03	1.80	2.06	5.24	
14	898.03	1.80	134.70	911.50	1.82	2.07	5.27	
Daily group ration (g)		128.88	←OUTPUT - GROUP FEED RATE (g) for week 2					
Daily per fish ration (g)		0.26	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2					
15	911.50	1.82	136.72	925.17	1.85	2.08	5.29	
16	925.17	1.85	138.78	939.05	1.88	2.09	5.32	
17	939.05	1.88	140.86	953.14	1.91	2.11	5.35	
18	953.14	1.91	142.97	967.43	1.93	2.12	5.37	
19	967.43	1.93	145.11	981.94	1.96	2.13	5.40	
20	981.94	1.96	147.29	996.67	1.99	2.14	5.43	
21	996.67	1.99	149.50	1011.62	2.02	2.15	5.45	
Daily group ration (g)		143.03	←OUTPUT - GROUP FEED RATE (g) for week 3					
Daily per fish ration (g)		0.29	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3					
22	1011.62	2.02	151.74	1026.80	2.05	2.16	5.48	
23	1026.80	2.05	154.02	1042.20	2.08	2.17	5.51	
24	1042.20	2.08	156.33	1057.83	2.12	2.18	5.54	
25	1057.83	2.12	158.67	1073.70	2.15	2.19	5.56	
26	1073.70	2.15	161.05	1089.81	2.18	2.20	5.59	
27	1089.81	2.18	163.47	1106.15	2.21	2.21	5.62	
28	1106.15	2.21	165.92	1122.74	2.25	2.22	5.65	
Daily group ration (g)		158.75	←OUTPUT - GROUP FEED RATE (g) for week 4					
Daily per fish ration (g)		0.32	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4					
29	1122.74	2.25	168.41	1139.59	2.28	2.23	5.68	
30	1139.59	2.28	170.94	1156.68	2.31	2.25	5.70	
31	1156.68	2.31	173.50	1174.03	2.35	2.26	5.73	
Daily group ration (g)		170.95	←OUTPUT - GROUP FEED RATE (g) for week 5					
Daily per fish ration (g)		0.34	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5					

① Revised 5 JUN 2013. Do not use. KW 5 JUN 2012

① wrote wrong year. Should be 2012. KW 5 JUN 2012

FF # 7
Item No. 6
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-L2-PSEUDO-03 Reviewed by: KW Date: 9MAR13
File Folder 7 Lab book/pgs 1 / 50 Verified by: SAT Date 6-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equa 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management,
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Acclimation Date Created/Initials: 6/01/2012 JAL 50
Holding Tank/Chamber: RND-2 Date Revised/Initials: KW 5Jun13
Treatment Group: N/A/ Approved for use: DMS 6/01/2012
Species: LMB Lot: 114000 Study Director Date

Row	Column: c	d	e	f	g	h	I	J
19	**INPUT SECTION**							
20	Initial fish size (g)		1.48					
21	Number of fish		500					
22	Condition Factor (C)		0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR		10					
26	% B.W./d		20					
27								

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Init al fish weight (g) = D33/$DF21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish w: (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Fina Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	740.00	1.48	148.00	754.80	1.51	1.95	4.95
34	2	754.80	1.51	150.96	769.90	1.54	1.96	4.98
35	3	769.90	1.54	153.98	785.29	1.57	1.97	5.01
36	4	785.29	1.57	157.06	801.00	1.60	1.99	5.05
37	5	801.00	1.60	160.20	817.02	1.63	2.00	5.08
38	6	817.02	1.63	163.40	833.36	1.67	2.01	5.11
39	7	833.36	1.67	166.67	850.03	1.70	2.03	5.15
40								
41	Daily group ration (g)		157.18		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	850.03	1.70	170.01	867.03	1.73	2.04	5.18
45	9	867.03	1.73	173.41	884.37	1.77	2.05	5.22
46	10	884.37	1.77	176.87	902.06	1.80	2.07	5.25
47	11	902.06	1.80	180.41	920.10	1.84	2.08	5.28
48	12	920.10	1.84	184.02	938.50	1.88	2.09	5.32
49	13	938.50	1.88	187.70	957.27	1.91	2.11	5.36
50	14	957.27	1.91	191.45	976.41	1.95	2.12	5.39
51								
52	Daily group ration (g)		180.55		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	976.41	1.95	195.28	995.94	1.99	2.14	5.43
56	16	995.94	1.99	199.19	1015.86	2.03	2.15	5.46
57	17	1015.86	2.03	203.17	1036.18	2.07	2.16	5.50
58	18	1036.18	2.07	207.24	1056.90	2.11	2.18	5.53
59	19	1056.90	2.11	211.38	1078.04	2.16	2.19	5.57
60	20	1078.04	2.16	215.61	1099.60	2.20	2.21	5.61
61	21	1099.60	2.20	219.92	1121.59	2.24	2.22	5.65
62								
63	Daily group ration (g)		207.40		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	1121.59	2.24	224.32	1144.02	2.29	2.24	5.68
67	23	1144.02	2.29	228.80	1166.91	2.33	2.25	5.72
68	24	1166.91	2.33	233.38	1190.24	2.38	2.27	5.76
69	25	1190.24	2.38	238.05	1214.05	2.43	2.28	5.80
70	26	1214.05	2.43	242.81	1238.33	2.48	2.30	5.83
71	27	1238.33	2.48	247.67	1263.10	2.53	2.31	5.87
72	28	1263.10	2.53	252.62	1288.35	2.58	2.33	5.91
73								
74	Daily group ration (g)		238.24		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	1288.36	2.58	257.67	1314.13	2.63	2.34	5.95
78	30	1314.13	2.63	262.83	1340.41	2.68	2.36	5.99
79	31	1340.41	2.68	268.08	1367.22	2.73	2.37	6.03
80								
81	Daily group ration (g)		262.86		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 7
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 1 / 50

Reviewed by: KW Date: 19Mar13
Verified by: [illegible] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Acclimation__________
Holding Tank/Chamber:__________
Treatment Group:____N/A/____________
Species:_SMB__________Lot: _112400______

Date Created/Initials: KW 8JUN12
Date Revised/In[redacted]/8/12
Date

Row	Column: c	d	e	f
19	**INPUT SECTION**			
20	Initial fish size (g)		2.4	
21	Number of fish		500	
22	Condition Factor (C)		0.00045	
23	(C = 0.00015 - 0.00050 in 0.00005 increments)			
24				
25	FCR	10		
26	% B.W./d	15		

Worksheet Formulas

- Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
- Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
- Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
- Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
- Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
- Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
- Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	1200.00	2.40	180.00	1218.00	2.44	2.28	5.80
34	2	1218.00	2.44	182.70	1236.27	2.47	2.30	5.83
35	3	1236.27	2.47	185.44	1254.81	2.51	2.31	5.86
36	4	1254.81	2.51	188.22	1273.64	2.55	2.32	5.89
37	5	1273.64	2.55	191.05	1292.74	2.59	2.33	5.92
38	6	1292.74	2.59	193.91	1312.13	2.62	2.34	5.95
39	7	1312.13	2.62	196.82	1331.81	2.66	2.35	5.98
40								
41	Daily group ration (g)		188.31	←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.38	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43								
44	8	1331.81	2.66	199.77	1351.79	2.70	2.37	6.01
45	9	1351.79	2.70	202.77	1372.07	2.74	2.38	6.04
46	10	1372.07	2.74	205.81	1392.65	2.79	2.39	6.07
47	11	1392.65	2.79	208.90	1413.54	2.83	2.40	6.10
48	12	1413.54	2.83	212.03	1434.74	2.87	2.41	6.13
49	13	1434.74	2.87	215.21	1456.26	2.91	2.42	6.16
50	14	1456.26	2.91	218.44	1478.11	2.96	2.44	6.19
51								
52	Daily group ration (g)		208.99	←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.42	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54								
55	15	1478.11	2.96	221.72	1500.28	3.00	2.45	6.22
56	16	1500.28	3.00	225.04	1522.78	3.05	2.46	6.25
57	17	1522.78	3.05	228.42	1545.62	3.09	2.47	6.28
58	18	1545.62	3.09	231.84	1568.81	3.14	2.49	6.31
59	19	1568.81	3.14	235.32	1592.34	3.18	2.50	6.35
60	20	1592.34	3.18	238.85	1616.23	3.23	2.51	6.38
61	21	1616.23	3.23	242.43	1640.47	3.28	2.52	6.41
62								
63	Daily group ration (g)		231.95	←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.46	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65								
66	22	1640.47	3.28	246.07	1665.08	3.33	2.54	6.44
67	23	1665.08	3.33	249.76	1690.05	3.38	2.55	6.47
68	24	1690.05	3.38	253.51	1715.40	3.43	2.56	6.50
69	25	1715.40	3.43	257.31	1741.13	3.48	2.57	6.54
70	26	1741.13	3.48	261.17	1767.25	3.53	2.59	6.57
71	27	1767.25	3.53	265.09	1793.76	3.59	2.60	6.60
72	28	1793.76	3.59	269.06	1820.67	3.64	2.61	6.63
73								
74	Daily group ration (g)		257.42	←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.51	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76								
77	29	1820.67	3.64	273.10	1847.98	3.70	2.63	6.67
78	30	1847.98	3.70	277.20	1875.70	3.75	2.64	6.70
79	31	1875.70	3.75	281.35	1903.83	3.81	2.65	6.73
80								
81	Daily group ration (g)		277.22	←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.55	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 8
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03
File Folder: ~~F3~~ (1) Lab book/pgs 2 / 4
Reviewed by: JKW Date: 2/FEB13
Verified by: SA Date 4-5-13

(1) Wrong File Folder. File Folder Should be File folder 7. SKW 21MAR13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Acclimation
Holding Tank/Chamber: RND-2
Treatment Group: N/A
Species: BLG **Lot:** 114500

Date Created/Initials: 6-15-12 JW
Date Revised/in [redacted]
Approved for us [redacted] 6-15-12 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.4
Number of fish	500
Condition Factor (C)	0.00045

(C = 0.00015 - 0.00050 in 0.00005 increments)

FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)*0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Fina Length (inches)	Fish Final Length (cm)
1	700.00	1.40	105.00	710.50	1.42	1.91	4.85
2	710.50	1.42	106.58	721.16	1.44	1.92	4.87
3	721.16	1.44	108.17	731.97	1.46	1.93	4.90
4	731.97	1.46	109.80	742.95	1.48	1.94	4.92
5	742.95	1.49	111.44	754.10	1.51	1.95	4.95
6	754.10	1.51	113.11	765.41	1.53	1.96	4.97
7	765.41	1.53	114.81	776.89	1.55	1.97	5.00

Daily group ration (g) **109.84** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.22** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

8	776.89	1.55	116.53	788.54	1.58	1.98	5.02
9	788.54	1.58	118.28	800.37	1.60	1.99	5.04
10	800.37	1.60	120.06	812.38	1.62	2.00	5.07
11	812.38	1.62	121.86	824.56	1.65	2.01	5.10
12	824.56	1.65	123.68	836.93	1.67	2.02	5.12
13	836.93	1.67	125.54	849.49	1.70	2.03	5.15
14	849.49	1.70	127.42	862.23	1.72	2.04	5.17

Daily group ration (g) **121.91** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.24** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

15	862.23	1.72	129.33	875.16	1.75	2.05	5.20
16	875.16	1.75	131.27	888.29	1.78	2.06	5.22
17	888.29	1.78	133.24	901.61	1.80	2.07	5.25
18	901.61	1.80	135.24	915.14	1.83	2.08	5.28
19	915.14	1.83	137.27	928.87	1.86	2.09	5.30
20	928.87	1.86	139.33	942.80	1.89	2.10	5.33
21	942.80	1.89	141.42	956.94	1.91	2.11	5.35

Daily group ration (g) **135.30** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.27** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

22	956.94	1.91	143.54	971.29	1.94	2.12	5.38
23	971.29	1.94	145.69	985.86	1.97	2.13	5.41
24	985.86	1.97	147.88	1000.65	2.00	2.14	5.43
25	1000.65	2.00	150.10	1015.66	2.03	2.15	5.46
26	1015.66	2.03	152.35	1030.90	2.06	2.16	5.49
27	1030.90	2.06	154.63	1046.36	2.09	2.17	5.52
28	1046.36	2.09	156.95	1062.06	2.12	2.18	5.54

Daily group ration (g) **150.16** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.30** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

29	1062.06	2.12	159.31	1077.99	2.16	2.19	5.57
30	1077.99	2.16	161.70	1094.16	2.19	2.20	5.60
31	1094.16	2.19	164.12	1110.57	2.22	2.22	5.63

Daily group ration (g) **161.71** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.32** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

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AEH 12 PSEUDO 03
Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: KJW Date: 19MAR2013
File Folder 7 Lab book/pgs 2 / 5 Verified by: [redacted] Date 4-7-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Room 2
Holding Tank/Chamber: RND-2
Treatment Group: Acclimation Tank
Species: CCF **Lot:** 114100

Date Created/Initials: 17JUN12 TJS
Date Revised/Initi [redacted] 6/7/12
Approved for use: Date

INPUT SECTION	
Initial fish size (g)	9.7
Number of fish	500
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	2
% B.W./d	3

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Fina Length (inches)	Fish Final Length (cm)	
1	4850.00	9.70	145.50	4922.75	9.85	4.17	10.58	
2	4922.75	9.85	147.68	4996.59	9.99	4.19	10.63	
3	4996.59	9.99	149.90	5071.54	10.14	4.21	10.69	
4	5071.54	10.14	152.15	5147.61	10.30	4.23	10.74	
5	5147.61	10.30	154.43	5224.83	10.45	4.25	10.79	
6	5224.83	10.45	156.74	5303.20	10.61	4.27	10.85	
7	5303.20	10.61	159.10	5382.75	10.77	4.29	10.90	
Daily group ration (g)		152.21		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	5382.75	10.77	161.48	5463.49	10.93	4.31	10.95	
9	5463.49	10.93	163.90	5545.44	11.09	4.33	11.01	
10	5545.44	11.09	166.36	5628.62	11.26	4.36	11.06	
11	5628.62	11.26	168.86	5713.05	11.43	4.38	11.12	
12	5713.05	11.43	171.39	5798.75	11.60	4.40	11.17	
13	5798.75	11.60	173.96	5885.73	11.77	4.42	11.23	
14	5885.73	11.77	176.57	5974.02	11.95	4.44	11.29	
Daily group ration (g)		168.93		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	5974.02	11.95	179.22	6063.63	12.13	4.47	11.34	
16	6063.63	12.13	181.91	6154.58	12.31	4.49	11.40	
17	6154.58	12.31	184.64	6246.90	12.49	4.51	11.46	
18	6246.90	12.49	187.41	6340.60	12.68	4.53	11.51	
19	6340.60	12.68	190.22	6435.71	12.87	4.55	11.57	
20	6435.71	12.87	193.07	6532.25	13.06	4.58	11.63	
21	6532.25	13.06	195.97	6630.23	13.26	4.60	11.68	
Daily group ration (g)		187.49		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	6630.23	13.26	198.91	6729.68	13.46	4.62	11.74	
23	6729.68	13.46	201.89	6830.63	13.66	4.65	11.80	
24	6830.63	13.66	204.92	6933.09	13.87	4.67	11.86	
25	6933.09	13.87	207.99	7037.08	14.07	4.69	11.92	
26	7037.08	14.07	211.11	7142.64	14.29	4.72	11.98	
27	7142.64	14.29	214.28	7249.78	14.50	4.74	12.04	
28	7249.78	14.50	217.49	7358.53	14.72	4.76	12.10	
Daily group ration (g)		208.08		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	7358.53	14.72	220.76	7468.91	14.94	4.79	12.16	
30	7468.91	14.94	224.07	7580.94	15.16	4.81	12.22	
31	7580.94	15.16	227.43	7694.65	15.39	4.83	12.28	
Daily group ration (g)		224.08		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 10
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Study Number: AEH-12-PSEUDO-03 2, 15 Reviewed by: KW Date: MAR 2013
File Folder 7 Lab book/pgs Verified by: Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Acclimation
Holding Tank/Chamber: RND-2
Treatment Group: N/A
Species: LST **Lot:** 122300

Date Created/Initials: 7-6-12 JH
Date Revised/ini [redacted]
Approved for us [redacted] 7-6-12
Date

INPUT SECTION	
Initial fish size (g)	2.31
Number of fish	500
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	7
% B.W./d	25

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	1155.00	2.31	288.75	1196.25	2.39	2.98	7.56
2	1196.25	2.39	299.06	1238.97	2.48	3.01	7.65
3	1238.97	2.48	309.74	1283.22	2.57	3.05	7.74
4	1283.22	2.57	320.81	1329.05	2.66	3.08	7.83
5	1329.05	2.66	332.26	1376.52	2.75	3.12	7.92
6	1376.52	2.75	344.13	1425.68	2.85	3.15	8.01
7	1425.68	2.85	356.42	1476.60	2.95	3.19	8.11
Daily group ration (g)			321.60	←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)			0.64	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	1476.60	2.95	369.15	1529.33	3.06	3.23	8.20
9	1529.33	3.06	382.33	1583.95	3.17	3.27	8.30
10	1583.95	3.17	395.99	1640.52	3.28	3.31	8.40
11	1640.52	3.28	410.13	1699.11	3.40	3.34	8.50
12	1699.11	3.40	424.78	1759.79	3.52	3.38	8.60
13	1759.79	3.52	439.95	1822.64	3.65	3.42	8.70
14	1822.64	3.65	455.66	1887.74	3.78	3.46	8.80
Daily group ration (g)			411.14	←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)			0.82	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	1887.74	3.78	471.93	1955.16	3.91	3.51	8.90
16	1955.16	3.91	488.79	2024.58	4.05	3.55	9.01
17	2024.98	4.05	506.25	2097.30	4.19	3.59	9.11
18	2097.30	4.19	524.33	2172.21	4.34	3.63	9.22
19	2172.21	4.34	543.03	2249.79	4.50	3.67	9.33
20	2249.79	4.50	562.45	2330.14	4.66	3.72	9.44
21	2330.14	4.66	582.53	2413.36	4.83	3.76	9.55
Daily group ration (g)			525.62	←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)			1.05	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	2413.36	4.83	603.34	2499.55	5.00	3.80	9.66
23	2499.55	5.00	624.89	2588.82	5.18	3.85	9.78
24	2588.82	5.18	647.20	2681.27	5.36	3.89	9.89
25	2681.27	5.36	670.32	2777.03	5.55	3.94	10.01
26	2777.03	5.55	694.26	2876.21	5.75	3.99	10.13
27	2876.21	5.75	719.05	2978.94	5.96	4.03	10.24
28	2978.94	5.96	744.73	3085.33	6.17	4.08	10.37
Daily group ration (g)			671.97	←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)			1.34	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	3085.33	6.17	771.33	3195.52	6.39	4.13	10.49
30	3195.52	6.39	798.88	3309.64	6.62	4.18	10.61
31	3309.64	6.62	827.41	3427.84	6.86	4.23	10.74
Daily group ration (g)			799.21	←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)			1.60	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 11
Pg 1 of 1

Pg 1 of 1

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 2/24/12
File Folder 7 Lab book/pgs 1, 6-24 Verified by: JK Date 4-5-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in P per et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Hatmark Section E
Holding Tank/Chamber: E1
Treatment Group: 50
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 JK
Date Revised/in [redacted]
Approved for us [redacted] 3-1-12
Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	1.0695						
21	Number of fish	20						
22	Condition Factor (C)	0.0004						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR	1.2						
26	% B.W./d	5						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333535 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	21.39	1.07	1.07	22.28	1.11	1.83	4.65
2	22.28	1.11	1.11	23.21	1.16	1.86	4.71
3	23.21	1.16	1.16	24.18	1.21	1.88	4.78
4	24.18	1.21	1.21	25.18	1.26	1.91	4.84
5	25.18	1.26	1.26	26.23	1.31	1.93	4.91
6	26.23	1.31	1.31	27.33	1.37	1.96	4.98
7	27.33	1.37	1.37	28.47	1.42	1.99	5.05
Daily group ration (g)		1.21		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	28.47	1.42	1.42	29.65	1.48	2.01	5.11
9	29.65	1.48	1.48	30.89	1.54	2.04	5.18
10	30.89	1.54	1.54	32.17	1.61	2.07	5.26
11	32.17	1.61	1.61	33.51	1.68	2.10	5.33
12	33.51	1.68	1.68	34.91	1.75	2.13	5.40
13	34.91	1.75	1.75	36.37	1.82	2.16	5.47
14	36.37	1.82	1.82	37.88	1.89	2.18	5.55
Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	37.88	1.89	1.89	39.46	1.97	2.21	5.63
16	39.46	1.97	1.97	41.10	2.06	2.25	5.70
17	41.10	2.06	2.06	42.82	2.14	2.28	5.78
18	42.82	2.14	2.14	44.60	2.23	2.31	5.86
19	44.60	2.23	2.23	46.46	2.32	2.34	5.94
20	46.46	2.32	2.32	48.39	2.42	2.37	6.02
21	48.39	2.42	2.42	50.41	2.52	2.40	6.10
Daily group ration (g)		2.15		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	50.41	2.52	2.52	52.51	2.63	2.44	6.19
23	52.51	2.63	2.63	54.70	2.73	2.47	6.27
24	54.70	2.73	2.73	56.98	2.85	2.50	6.36
25	56.98	2.85	2.85	59.35	2.97	2.54	6.45
26	59.35	2.97	2.97	61.82	3.09	2.57	6.53
27	61.82	3.09	3.09	64.40	3.22	2.61	6.62
28	64.40	3.22	3.22	67.08	3.35	2.64	6.71
Daily group ration (g)		2.86		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	67.08	3.35	3.35	69.88	3.49	2.68	6.81
30	69.88	3.49	3.49	72.79	3.64	2.72	6.90
31	72.79	3.64	3.64	75.82	3.79	2.75	6.99
Daily group ration (g)		3.50		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 12
Pg 1 of 16

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 6-24

Reviewed by: TDS Date: 23APR12
Verified by: SL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (e: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Recirculation Section 5
Holding Tank/Chamber: E 2
Treatment Group: 300
Species: RBT Lot: 360

Date Created/Initials: 7-1-12 JM
Date Revised/Init [redacted]
Approved for use: [redacted] 7-1-12 Date

Row	Column:	c	d	e	f	g	h	i

INPUT SECTION

Initial fish size (g)	1.108
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * F21 (initial fish size determined from measured weights)
Average Individua. Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (nuenerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	22.16	1.11	1.11	23.08	1.15	1.85	4.70
2	23.08	1.15	1.15	24.05	1.20	1.88	4.77
3	24.05	1.20	1.20	25.05	1.25	1.90	4.83
4	25.05	1.25	1.25	26.09	1.30	1.93	4.90
5	26.09	1.30	1.30	27.18	1.36	1.96	4.97
6	27.18	1.36	1.36	28.31	1.42	1.98	5.04
7	28.31	1.42	1.42	29.49	1.47	2.01	5.11
Daily group ration (g)		1.26		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	29.49	1.47	1.47	30.72	1.54	2.04	5.18
9	30.72	1.54	1.54	32.00	1.60	2.07	5.25
10	32.00	1.60	1.60	33.33	1.67	2.09	5.32
11	33.33	1.67	1.67	34.72	1.74	2.12	5.39
12	34.72	1.74	1.74	36.17	1.81	2.15	5.46
13	36.17	1.81	1.81	37.67	1.88	2.18	5.54
14	37.67	1.88	1.88	39.24	1.96	2.21	5.62
Daily group ration (g)		1.67		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	39.24	1.96	1.96	40.88	2.04	2.24	5.69
16	40.88	2.04	2.04	42.58	2.13	2.27	5.77
17	42.58	2.13	2.13	44.36	2.22	2.30	5.85
18	44.36	2.22	2.22	46.20	2.31	2.38	5.93
19	46.20	2.31	2.31	48.13	2.41	2.37	6.01
20	48.13	2.41	2.41	50.14	2.51	2.40	6.09
21	50.14	2.51	2.51	52.22	2.61	2.43	6.18
Daily group ration (g)		2.23		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	52.22	2.61	2.61	54.40	2.72	2.47	6.26
23	54.40	2.72	2.72	56.67	2.83	2.50	6.35
24	56.67	2.83	2.83	59.03	2.95	2.53	6.43
25	59.03	2.95	2.95	61.49	3.07	2.57	6.52
26	61.49	3.07	3.07	64.05	3.20	2.60	6.61
27	64.05	3.20	3.20	66.72	3.34	2.64	6.70
28	66.72	3.34	3.34	69.50	3.47	2.67	6.79
Daily group ration (g)		2.96		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	69.50	3.47	3.47	72.39	3.62	2.71	6.89
30	72.39	3.62	3.62	75.41	3.77	2.75	6.98
31	75.41	3.77	3.77	78.55	3.93	2.79	7.08
Daily group ration (g)		3.62		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 12
Pg 2 of 15

Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DRS Date: 23APR12
File Folder 7 Lab book/pgs. 1 / 6-24 Verified by: [illegible] Date 4-25-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack Section E
Holding Tank/Chamber: E3
Treatment Group: Control
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 SA~
Date Revised/initi [redacted]
Approved for use: [redacted] 3-1-12 Date

Row	Column:	a	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	0.9595							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33:F33*(1/$D$25))) (Columns D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	19.19	0.96	0.96	19.99	1.00	1.77	4.48
2	19.99	1.00	1.00	20.82	1.04	1.79	4.55
3	20.82	1.04	1.04	21.69	1.08	1.81	4.61
4	21.69	1.08	1.08	22.59	1.13	1.84	4.67
5	22.59	1.13	1.13	23.54	1.18	1.86	4.74
6	23.54	1.18	1.18	24.52	1.23	1.89	4.80
7	24.52	1.23	1.23	25.54	1.28	1.92	4.87
Daily group ration (g)		1.09		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.05		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	25.54	1.28	1.28	26.60	1.33	1.94	4.93
9	26.60	1.33	1.33	27.71	1.39	1.97	5.00
10	27.71	1.39	1.39	28.86	1.44	2.00	5.07
11	28.86	1.44	1.44	30.07	1.50	2.02	5.14
12	30.07	1.50	1.50	31.32	1.57	2.05	5.21
13	31.32	1.57	1.57	32.62	1.63	2.08	5.28
14	32.62	1.63	1.63	33.98	1.70	2.11	5.35
Daily group ration (g)		1.45		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	33.98	1.70	1.70	35.40	1.77	2.14	5.43
16	35.40	1.77	1.77	36.88	1.84	2.17	5.50
17	36.88	1.84	1.84	38.41	1.92	2.20	5.58
18	38.41	1.92	1.92	40.01	2.00	2.23	5.65
19	40.01	2.00	2.00	41.68	2.08	2.26	5.73
20	41.68	2.08	2.08	43.42	2.17	2.29	5.81
21	43.42	2.17	2.17	45.23	2.26	2.32	5.89
Daily group ration (g)		1.93		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	45.23	2.26	2.26	47.11	2.36	2.35	5.97
23	47.11	2.36	2.36	49.07	2.45	2.38	6.05
24	49.07	2.45	2.45	51.12	2.56	2.41	6.13
25	51.12	2.56	2.56	53.25	2.66	2.45	6.22
26	53.25	2.66	2.66	55.47	2.77	2.48	6.30
27	55.47	2.77	2.77	57.78	2.89	2.51	6.39
28	57.78	2.89	2.89	60.18	3.01	2.55	6.48
Daily group ration (g)		2.56		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	60.18	3.01	3.01	62.69	3.13	2.58	6.56
30	62.69	3.13	3.13	65.30	3.27	2.62	6.65
31	65.30	3.27	3.27	68.02	3.40	2.66	6.75
Daily group ration (g)		3.14		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 12
Pg 2 of 15

Pg 3 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 6-24 Verified by: [illegible] Date: 6-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. a 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Recirculating
Holding Tank/Chamber: E4
Treatment Group: 200
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 SW
Date Revised/ini [redacted]
Approved for use [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.0205							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$25/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	20.41	1.02	1.02	21.26	1.06	1.89	4.58
2	21.26	1.06	1.06	22.15	1.11	1.83	4.64
3	22.15	1.11	1.11	23.07	1.15	1.85	4.70
4	23.07	1.15	1.15	24.03	1.20	1.88	4.77
5	24.03	1.20	1.20	25.03	1.25	1.90	4.83
6	25.03	1.25	1.25	26.07	1.30	1.93	4.90
7	26.07	1.30	1.30	27.16	1.36	1.96	4.97
Daily group ration (g)		1.16		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	27.16	1.36	1.36	28.29	1.41	1.98	5.04
9	28.29	1.41	1.41	29.47	1.47	2.01	5.10
10	29.47	1.47	1.47	30.70	1.53	2.04	5.17
11	30.70	1.53	1.53	31.98	1.60	2.06	5.24
12	31.98	1.60	1.60	33.31	1.67	2.09	5.32
13	33.31	1.67	1.67	34.70	1.73	2.12	5.39
14	34.70	1.73	1.73	36.14	1.81	2.15	5.46
Daily group ration (g)		1.54		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	36.14	1.81	1.81	37.65	1.88	2.18	5.54
16	37.65	1.88	1.88	39.22	1.96	2.21	5.61
17	39.22	1.96	1.96	40.85	2.04	2.24	5.69
18	40.85	2.04	2.04	42.56	2.13	2.27	5.77
19	42.56	2.13	2.13	44.33	2.22	2.30	5.85
20	44.33	2.22	2.22	46.18	2.31	2.33	5.93
21	46.18	2.31	2.31	48.10	2.41	2.37	6.01
Daily group ration (g)		2.05		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	48.10	2.41	2.41	50.10	2.51	2.40	6.09
23	50.10	2.51	2.51	52.19	2.61	2.43	6.18
24	52.19	2.61	2.61	54.37	2.72	2.46	6.26
25	54.37	2.72	2.72	56.63	2.83	2.50	6.35
26	56.63	2.83	2.83	58.99	2.95	2.53	6.43
27	58.99	2.95	2.95	61.45	3.07	2.57	6.52
28	61.45	3.07	3.07	64.01	3.20	2.60	6.61
Daily group ration (g)		2.73		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	64.01	3.20	3.20	66.68	3.33	2.64	6.70
30	66.68	3.33	3.33	69.46	3.47	2.67	6.78
31	69.46	3.47	3.47	72.35	3.62	2.71	6.88
Daily group ration (g)		3.34		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 12
Pg 4 of 15

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TAS Date: 23APR12
File Folder 7 Lab book/pgs 1.6-24 Verified by: SAL Date 4-25-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406 467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Reside Section E
Holding Tank/Chamber: E5
Treatment Group: 100
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 SA
Date Revised/init [redacted]
Approved for use [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	0.9925							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	19.85	0.99	0.99	20.68	1.03	1.79	4.54
2	20.68	1.03	1.03	21.54	1.08	1.81	4.60
3	21.54	1.08	1.08	22.44	1.12	1.83	4.66
4	22.44	1.12	1.12	23.37	1.17	1.86	4.72
5	23.37	1.17	1.17	24.34	1.22	1.89	4.79
6	24.34	1.22	1.22	25.36	1.27	1.91	4.85
7	25.36	1.27	1.27	26.42	1.32	1.94	4.92
Daily group ration (g)		1.13		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	26.42	1.32	1.32	27.52	1.38	1.96	4.99
9	27.52	1.38	1.38	28.66	1.43	1.99	5.06
10	28.66	1.43	1.43	29.86	1.49	2.02	5.13
11	29.86	1.49	1.49	31.10	1.56	2.05	5.20
12	31.10	1.56	1.56	32.40	1.62	2.07	5.27
13	32.40	1.62	1.62	33.75	1.69	2.10	5.34
14	33.75	1.69	1.69	35.15	1.76	2.13	5.41
Daily group ration (g)		1.50		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	35.15	1.76	1.76	36.62	1.83	2.16	5.49
16	36.62	1.83	1.83	38.14	1.91	2.19	5.56
17	38.14	1.91	1.91	39.73	1.99	2.22	5.64
18	39.73	1.99	1.99	41.39	2.07	2.25	5.72
19	41.39	2.07	2.07	43.11	2.16	2.28	5.79
20	43.11	2.16	2.16	44.91	2.25	2.31	5.87
21	44.91	2.25	2.25	46.78	2.34	2.34	5.95
Daily group ration (g)		1.99		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	46.78	2.34	2.34	48.73	2.44	2.38	6.04
23	48.73	2.44	2.44	50.76	2.54	2.41	6.12
24	50.76	2.54	2.54	52.88	2.64	2.44	6.20
25	52.88	2.64	2.64	55.08	2.75	2.48	6.29
26	55.08	2.75	2.75	57.37	2.87	2.51	6.37
27	57.37	2.87	2.87	59.76	2.99	2.54	6.46
28	59.76	2.99	2.99	62.25	3.11	2.58	6.55
Daily group ration (g)		2.65		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	62.25	3.11	3.11	64.85	3.24	2.61	6.64
30	64.85	3.24	3.24	67.55	3.38	2.65	6.73
31	67.55	3.38	3.38	70.36	3.52	2.69	6.82
Daily group ration (g)		3.24		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 6-24

Reviewed by: DS Date: 2/3/12
Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. a. 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack Section E
Holding Tank/Chamber: E6
Treatment Group: 50
Species: RBT Lot: 116-00

Date Created/Initials: 3-1-12 JM
Date Revised/ini [redacted]
Approved for use [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.0373
Number of fish	15
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	15.56	1.04	0.78	16.21	1.08	1.81	4.60
2	16.21	1.08	0.81	16.88	1.13	1.84	4.67
3	16.88	1.13	0.84	17.59	1.17	1.86	4.73
4	17.59	1.17	0.88	18.32	1.22	1.89	4.79
5	18.32	1.22	0.92	19.08	1.27	1.91	4.86
6	19.08	1.27	0.95	19.88	1.33	1.94	4.93
7	19.88	1.33	0.99	20.71	1.38	1.97	4.99
Daily group ration (g)			0.88	←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)			0.06	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	20.71	1.38	1.04	21.57	1.44	1.99	5.06
9	21.57	1.44	1.08	22.47	1.50	2.02	5.13
10	22.47	1.50	1.12	23.40	1.56	2.05	5.20
11	23.40	1.56	1.17	24.38	1.63	2.08	5.27
12	24.38	1.63	1.22	25.39	1.69	2.10	5.35
13	25.39	1.69	1.27	26.45	1.76	2.13	5.42
14	26.45	1.76	1.32	27.55	1.84	2.16	5.49
Daily group ration (g)			1.17	←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)			0.08	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	27.55	1.84	1.38	28.70	1.91	2.19	5.57
16	28.70	1.91	1.44	29.90	1.99	2.22	5.64
17	29.90	1.99	1.49	31.14	2.08	2.25	5.72
18	31.14	2.08	1.56	32.44	2.16	2.28	5.80
19	32.44	2.16	1.62	33.79	2.25	2.31	5.88
20	33.79	2.25	1.69	35.20	2.35	2.35	5.96
21	35.20	2.35	1.76	36.67	2.44	2.38	6.04
Daily group ration (g)			1.56	←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)			0.10	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	36.67	2.44	1.83	38.20	2.55	2.41	6.13
23	38.20	2.55	1.91	39.79	2.65	2.44	6.21
24	39.79	2.65	1.99	41.45	2.76	2.48	6.29
25	41.45	2.76	2.07	43.17	2.88	2.51	6.38
26	43.17	2.88	2.16	44.97	3.00	2.55	6.47
27	44.97	3.00	2.25	46.85	3.12	2.58	6.56
28	46.85	3.12	2.34	48.80	3.25	2.62	6.65
Daily group ration (g)			2.08	←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)			0.14	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	48.80	3.25	2.44	50.83	3.39	2.65	6.74
30	50.83	3.39	2.54	52.95	3.53	2.69	6.83
31	52.95	3.53	2.65	55.16	3.68	2.73	6.92
Daily group ration (g)			2.54	←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)			0.17	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 12
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Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23MAR12
File Folder 7 Lab book/pgs 1 / 6-24 Verified by: JM Date 4-5-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor: C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack Section E
Holding Tank/Chamber: E7
Treatment Group: Zoo
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 JM
Date Revised/in [redacted]
Approved for us [redacted] 3-1-12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	~~1.288~~ 1.285
Number of fish	25
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

(1) (2)

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.20	1.29	1.61	33.54	1.34	1.95	4.95
2	33.54	1.34	1.68	34.94	1.40	1.97	5.01
3	34.94	1.40	1.75	36.40	1.46	2.00	5.08
4	36.40	1.46	1.82	37.91	1.52	2.03	5.15
5	37.91	1.52	1.90	39.49	1.58	2.06	5.22
6	39.49	1.58	1.97	41.14	1.65	2.08	5.30
7	41.14	1.65	2.06	42.85	1.71	2.11	5.37
Daily group ration (g)		~~1.85~~	1.82	← OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07	(2)	← OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	42.85	1.71	2.14	44.64	1.79	2.14	5.44
9	44.64	1.79	2.23	46.50	1.86	2.17	5.52
10	46.50	1.86	2.32	48.43	1.94	2.20	5.59
11	48.43	1.94	2.42	50.45	2.02	2.23	5.67
12	50.45	2.02	2.52	52.55	2.10	2.26	5.75
13	52.55	2.10	2.63	54.74	2.19	2.29	5.82
14	54.74	2.19	2.74	57.02	2.28	2.32	5.90
Daily group ration (g)		~~2.43~~	2.42	← OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.10	(2)	← OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	57.02	2.28	2.85	59.40	2.38	2.36	5.99
16	59.40	2.38	2.97	61.88	2.48	2.39	6.07
17	61.88	2.48	3.09	64.45	2.58	2.42	6.15
18	64.45	2.58	3.22	67.14	2.69	2.45	6.23
19	67.14	2.69	3.36	69.94	2.80	2.49	6.32
20	69.94	2.80	3.50	72.85	2.91	2.52	6.41
21	72.85	2.91	3.64	75.89	3.04	2.56	6.49
Daily group ration (g)		3.23		← OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.13		← OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	75.89	3.04	3.79	79.05	3.16	2.59	6.58
23	79.05	3.16	3.95	82.34	3.29	2.63	6.67
24	82.34	3.29	4.12	85.77	3.43	2.66	6.76
25	85.77	3.43	4.29	89.35	3.57	2.70	6.86
26	89.35	3.57	4.47	93.07	3.72	2.74	6.95
27	93.07	3.72	4.65	96.95	3.88	2.77	7.05
28	96.95	3.88	4.85	100.99	4.04	2.81	7.14
Daily group ration (g)		~~4.30~~	4.29	← OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.17	(2)	← OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	100.99	4.04	5.05	105.19	4.21	2.85	7.24
30	105.19	4.21	5.26	109.58	4.38	2.89	7.34
31	109.58	4.38	5.48	114.14	4.57	2.93	7.44
Daily group ration (g)		~~5.26~~	5.25	← OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.21	(2)	← OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) Incorrect fish mass was used to calculated feed rate Correct (3) rate should be 1.285 g/fish 3-2-12 JM
(3) should say mean weight 3-2-12 JM

(2) corrected values for group weights listed when they changed. Weight to feed/fish and week 3 group feed rate did not change 3-2-12 JM

(4) Note 1 is incorrect. Value for calculated feed rate should be 0.1288g/fish as mean weight. Daily ration does not change. MM 23MAR13

FF # 7
Item No. 12
Pg 7 of 15

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TTS Date: 23APR12
File Folder 7 Lab book/pgs 1, 6-24 Verified by: [redacted] Date 4-25-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Recirc section E
Holding Tank/Chamber: E 8
Treatment Group: 300
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12
Date Revised/initia
Approved for use: [redacted] 3-1-12 Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	1.087						
21	Number of fish	20						
22	Condition Factor (C)	0.0004						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR	1.2						
26	% B.W./d	5						
27								

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	21.74	1.09	1.09	22.65	1.13	1.84	4.67
2	22.65	1.13	1.13	23.59	1.18	1.87	4.74
3	23.59	1.18	1.18	24.57	1.23	1.89	4.80
4	24.57	1.23	1.23	25.60	1.28	1.92	4.87
5	25.60	1.28	1.28	26.66	1.33	1.94	4.94
6	26.66	1.33	1.33	27.77	1.39	1.97	5.00
7	27.77	1.39	1.39	28.93	1.45	2.00	5.07
Daily group ration (g)		1.23		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	28.98	1.45	1.45	30.14	1.51	2.02	5.14
9	30.14	1.51	1.51	31.39	1.57	2.05	5.21
10	31.39	1.57	1.57	32.70	1.63	2.08	5.28
11	32.70	1.63	1.63	34.06	1.70	2.11	5.36
12	34.06	1.70	1.70	35.48	1.77	2.14	5.43
13	35.48	1.77	1.77	36.96	1.85	2.17	5.50
14	36.96	1.85	1.85	38.50	1.93	2.20	5.58
Daily group ration (g)		1.64		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	38.50	1.93	1.93	40.10	2.01	2.23	5.66
16	40.10	2.01	2.01	41.78	2.09	2.26	5.73
17	41.78	2.09	2.09	43.52	2.18	2.29	5.81
18	43.52	2.18	2.18	45.33	2.27	2.32	5.89
19	45.33	2.27	2.27	47.22	2.36	2.35	5.97
20	47.22	2.36	2.36	49.19	2.46	2.38	6.05
21	49.19	2.46	2.46	51.23	2.56	2.42	6.14
Daily group ration (g)		2.18		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.23	2.56	2.56	53.37	2.67	2.45	6.22
23	53.37	2.67	2.67	55.59	2.78	2.48	6.31
24	55.59	2.78	2.78	57.91	2.90	2.52	6.39
25	57.91	2.90	2.90	60.32	3.02	2.55	6.48
26	60.32	3.02	3.02	62.84	3.14	2.59	6.57
27	62.84	3.14	3.14	65.45	3.27	2.62	6.66
28	65.45	3.27	3.27	68.18	3.41	2.66	6.75
Daily group ration (g)		2.91		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	68.18	3.41	3.41	71.02	3.55	2.69	6.84
30	71.02	3.55	3.55	73.98	3.70	2.73	6.94
31	73.98	3.70	3.70	77.06	3.85	2.77	7.03
Daily group ration (g)		3.55		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 12
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Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR 12
File Folder: 7 Lab book/pgs: 1 / 6-24 Verified by: JW Date: 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: Reed Section E
Holding Tank/Chamber: E9
Treatment Group: 100
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 JW
Date Revised/in: [redacted]
Approved for us: [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	I	J
19		**INPUT SECTION**							
20		Initial fish size (g)	1.0265						
21		Number of fish	20						
22		Condition Factor (C)	0.0004						
23		(C = 0.00015 - 0.00050 in 0.00005 increments)							
24									
25		FCR	1.2						
26		% B.W./d	5						

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	20.53	1.03	1.03	21.39	1.07	1.81	4.59
2	21.39	1.07	1.07	22.28	1.11	1.83	4.65
3	22.28	1.11	1.11	23.20	1.16	1.86	4.71
4	23.20	1.16	1.16	24.17	1.21	1.88	4.78
5	24.17	1.21	1.21	25.18	1.26	1.91	4.84
6	25.18	1.26	1.26	26.23	1.31	1.93	4.91
7	26.23	1.31	1.31	27.32	1.37	1.96	4.98
Daily group ration (g)		1.16		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	27.32	1.37	1.37	28.46	1.42	1.99	5.04
9	28.46	1.42	1.42	29.64	1.48	2.01	5.11
10	29.64	1.48	1.48	30.88	1.54	2.04	5.18
11	30.88	1.54	1.54	32.17	1.61	2.07	5.26
12	32.17	1.61	1.61	33.51	1.68	2.10	5.33
13	33.51	1.68	1.68	34.90	1.75	2.13	5.40
14	34.90	1.75	1.75	36.36	1.82	2.16	5.47
Daily group ration (g)		1.55		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	36.36	1.82	1.82	37.87	1.89	2.18	5.55
16	37.87	1.89	1.89	39.45	1.97	2.21	5.63
17	39.45	1.97	1.97	41.09	2.05	2.24	5.70
18	41.09	2.05	2.05	42.81	2.14	2.28	5.78
19	42.81	2.14	2.14	44.59	2.23	2.31	5.86
20	44.59	2.23	2.23	46.45	2.32	2.34	5.94
21	46.45	2.32	2.32	48.38	2.42	2.37	6.02
Daily group ration (g)		2.06		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	48.38	2.42	2.42	50.40	2.52	2.40	6.10
23	50.40	2.52	2.52	52.50	2.62	2.44	6.19
24	52.50	2.62	2.62	54.69	2.73	2.47	6.27
25	54.69	2.73	2.73	56.97	2.85	2.50	6.36
26	56.97	2.85	2.85	59.34	2.97	2.54	6.45
27	59.34	2.97	2.97	61.81	3.09	2.57	6.53
28	61.81	3.09	3.09	64.39	3.22	2.61	6.62
Daily group ration (g)		2.74		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	64.39	3.22	3.22	67.07	3.35	2.64	6.71
30	67.07	3.35	3.35	69.86	3.49	2.68	6.81
31	69.86	3.49	3.49	72.77	3.64	2.72	6.90
Daily group ration (g)		3.36		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 6-24

Reviewed by: TJS Date: 23APR12
Verified by: JSL Date 4-23-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (i.e. FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Recirc Section E
Holding Tank/Chamber: E10
Treatment Group: 50
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 JSL
Date Revised/In [redacted]
Approved for us [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.067							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individua Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+F33*(1/$D$25)) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	21.34	1.07	1.07	22.23	1.11	1.83	4.65
34	2	22.23	1.11	1.11	23.16	1.16	1.85	4.71
35	3	23.16	1.16	1.16	24.12	1.21	1.88	4.77
36	4	24.12	1.21	1.21	25.13	1.26	1.91	4.84
37	5	25.13	1.26	1.26	26.17	1.31	1.93	4.91
38	6	26.17	1.31	1.31	27.26	1.36	1.96	4.97
39	7	27.26	1.36	1.36	28.40	1.42	1.98	5.04
40								
41	Daily group ration (g)		1.21		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	28.40	1.42	1.42	29.58	1.48	2.01	5.11
45	9	29.58	1.48	1.48	30.81	1.54	2.04	5.18
46	10	30.81	1.54	1.54	32.10	1.60	2.07	5.25
47	11	32.10	1.60	1.60	33.44	1.67	2.10	5.32
48	12	33.44	1.67	1.67	34.83	1.74	2.12	5.40
49	13	34.83	1.74	1.74	36.28	1.81	2.15	5.47
50	14	36.28	1.81	1.81	37.79	1.89	2.18	5.55
51								
52	Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	37.79	1.89	1.89	39.37	1.97	2.21	5.62
56	16	39.37	1.97	1.97	41.01	2.05	2.24	5.70
57	17	41.01	2.05	2.05	42.72	2.14	2.27	5.78
58	18	42.72	2.14	2.14	44.50	2.22	2.31	5.86
59	19	44.50	2.22	2.22	46.35	2.32	2.34	5.94
60	20	46.35	2.32	2.32	48.28	2.41	2.37	6.02
61	21	48.28	2.41	2.41	50.29	2.51	2.40	6.10
62								
63	Daily group ration (g)		2.14		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	50.29	2.51	2.51	52.39	2.62	2.43	6.18
67	23	52.39	2.62	2.62	54.57	2.73	2.47	6.27
68	24	54.57	2.73	2.73	56.84	2.84	2.50	6.35
69	25	56.84	2.84	2.84	59.21	2.96	2.54	6.44
70	26	59.21	2.96	2.96	61.68	3.08	2.57	6.53
71	27	61.68	3.08	3.08	64.25	3.21	2.61	6.62
72	28	64.25	3.21	3.21	66.93	3.35	2.64	6.71
73								
74	Daily group ration (g)		2.85		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	66.93	3.35	3.35	69.72	3.49	2.68	6.80
78	30	69.72	3.49	3.49	72.62	3.63	2.71	6.89
79	31	72.62	3.63	3.63	75.65	3.78	2.75	6.99
80								
81	Daily group ration (g)		3.49		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 12
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Study Number: AEH-12-PSEUDO-03 Reviewed by: TRJ Date: 23APR12
File Folder 7 Lab book/pgs 1, 6-24 Verified by: JA Date 4-25-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: Rack Section E
Holding Tank/Chamber: E11
Treatment Group: Control
Species: RAT Lot: 116000

Date Created/Initials: 3-1-12 JA
Date Revised/in [redacted]
Approved for us [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	0.9365							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 to 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	18.73	0.94	0.94	19.51	0.98	1.75	4.45	
34	2	19.51	0.98	0.98	20.32	1.02	1.78	4.51	
35	3	20.32	1.02	1.02	21.17	1.06	1.80	4.57	
36	4	21.17	1.06	1.06	22.05	1.10	1.82	4.63	
37	5	22.05	1.10	1.10	22.97	1.15	1.85	4.70	
38	6	22.97	1.15	1.15	23.93	1.20	1.87	4.76	
39	7	23.93	1.20	1.20	24.93	1.25	1.90	4.83	
40									
41	Daily group ration (g)		1.06		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.05		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	24.93	1.25	1.25	25.96	1.30	1.93	4.89	
45	9	25.96	1.30	1.30	27.05	1.35	1.95	4.96	
46	10	27.05	1.35	1.35	28.17	1.41	1.98	5.03	
47	11	28.17	1.41	1.41	29.35	1.47	2.01	5.10	
48	12	29.35	1.47	1.47	30.57	1.53	2.03	5.17	
49	13	30.57	1.53	1.53	31.84	1.59	2.06	5.24	
50	14	31.84	1.59	1.59	33.17	1.66	2.09	5.31	
51									
52	Daily group ration (g)		1.41		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	33.17	1.66	1.66	34.55	1.73	2.12	5.38	
56	16	34.55	1.73	1.73	35.99	1.80	2.15	5.46	
57	17	35.99	1.80	1.80	37.49	1.87	2.18	5.53	
58	18	37.49	1.87	1.87	39.05	1.95	2.21	5.61	
59	19	39.05	1.95	1.95	40.68	2.03	2.24	5.68	
60	20	40.68	2.03	2.03	42.38	2.12	2.27	5.76	
61	21	42.38	2.12	2.12	44.14	2.21	2.30	5.84	
62									
63	Daily group ration (g)		1.88		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	44.14	2.21	2.21	45.98	2.30	2.33	5.92	
67	23	45.98	2.30	2.30	47.90	2.39	2.36	6.00	
68	24	47.90	2.39	2.39	49.89	2.49	2.39	6.08	
69	25	49.89	2.49	2.49	51.97	2.60	2.43	6.17	
70	26	51.97	2.60	2.60	54.14	2.71	2.46	6.25	
71	27	54.14	2.71	2.71	56.39	2.82	2.49	6.34	
72	28	56.39	2.82	2.82	58.74	2.94	2.53	6.42	
73									
74	Daily group ration (g)		2.50		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	58.74	2.94	2.94	61.19	3.06	2.56	6.51	
78	30	61.19	3.06	3.06	63.74	3.19	2.60	6.60	
79	31	63.74	3.19	3.19	66.39	3.32	2.63	6.69	
80									
81	Daily group ration (g)		3.06		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 12
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Study Number: AEH-12-PSEUDO-03 Reviewed by: TJ-S Date: 23APR12
File Folder 7 Lab book/pgs 1 / 6-24 Verified by: SM Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individua feed rate.
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack Section-E
Holding Tank/Chamber: E12
Treatment Group: 100
Species: RGT Lot: 116000

Date Created/Initials: 3-1-12 JL
Date Revised/ini[redacted]
Approved for us[redacted] 3-1-12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.006
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$L$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	20.12	1.01	1.01	20.96	1.05	1.79	4.56
2	20.96	1.05	1.05	21.83	1.09	1.82	4.62
3	21.83	1.09	1.09	22.74	1.14	1.84	4.68
4	22.74	1.14	1.14	23.69	1.18	1.87	4.75
5	23.69	1.18	1.18	24.68	1.23	1.89	4.81
6	24.68	1.23	1.23	25.70	1.29	1.92	4.88
7	25.70	1.29	1.29	26.77	1.34	1.95	4.94
Daily group ration (g)		1.14		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	26.77	1.34	1.34	27.89	1.39	1.97	5.01
9	27.89	1.39	1.39	29.05	1.45	2.00	5.08
10	29.05	1.45	1.45	30.26	1.51	2.03	5.15
11	30.26	1.51	1.51	31.52	1.58	2.06	5.22
12	31.52	1.58	1.58	32.84	1.64	2.08	5.29
13	32.84	1.64	1.64	34.21	1.71	2.11	5.36
14	34.21	1.71	1.71	35.63	1.78	2.14	5.44
Daily group ration (g)		1.52		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	35.63	1.78	1.78	37.12	1.86	2.17	5.51
16	37.12	1.86	1.86	38.66	1.93	2.20	5.59
17	38.66	1.93	1.93	40.27	2.01	2.23	5.66
18	40.27	2.01	2.01	41.95	2.10	2.26	5.74
19	41.95	2.10	2.10	43.70	2.18	2.29	5.82
20	43.70	2.18	2.18	45.52	2.28	2.32	5.90
21	45.52	2.28	2.28	47.42	2.37	2.35	5.98
Daily group ration (g)		2.02		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	47.42	2.37	2.37	49.39	2.47	2.39	6.06
23	49.39	2.47	2.47	51.45	2.57	2.42	6.15
24	51.45	2.57	2.57	53.59	2.68	2.45	6.23
25	53.59	2.68	2.68	55.83	2.79	2.49	6.32
26	55.83	2.79	2.79	58.15	2.91	2.52	6.40
27	58.15	2.91	2.91	60.58	3.03	2.55	6.49
28	60.58	3.03	3.03	63.10	3.16	2.59	6.58
Daily group ration (g)		2.69		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	63.10	3.16	3.16	65.73	3.29	2.63	6.67
30	65.73	3.29	3.29	68.47	3.42	2.66	6.76
31	68.47	3.42	3.42	71.32	3.57	2.70	6.85
Daily group ration (g)		3.29		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder 7 Lab book/pgs 1 16-24 Verified by: [redacted] Date 4-2-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack Section E
Holding Tank/Chamber: E 1 3
Treatment Group: Control
Species: RBT Lot: 116030

Date Created/Initials: 3-1-12
Date Revised/initia [redacted]
Approved for use: [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19		**INPUT SECTION**							
20		Initial fish size (g)	1.104						
21		Number of fish	20						
22		Condition Factor (C)	0.0004						
23		[C = 0.00015 - 0.00050 in 0.00005 increments)							
24									
25		FCR	1.2						
26		% B.W./d	5						

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (Inches) =((H33/454)/$F$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	22.08	1.10	1.10	23.00	1.15	1.85	4.70
2	23.00	1.15	1.15	23.96	1.20	1.88	4.76
3	23.96	1.20	1.20	24.96	1.25	1.90	4.83
4	24.96	1.25	1.25	26.00	1.30	1.93	4.90
5	26.00	1.30	1.30	27.08	1.35	1.95	4.96
6	27.08	1.35	1.35	28.21	1.41	1.98	5.03
7	28.21	1.41	1.41	29.38	1.47	2.01	5.10
Daily group ration (g)		1.25		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	29.38	1.47	1.47	30.61	1.53	2.03	5.17
9	30.61	1.53	1.53	31.88	1.59	2.06	5.24
10	31.88	1.59	1.59	33.21	1.66	2.09	5.31
11	33.21	1.66	1.66	34.60	1.73	2.12	5.38
12	34.60	1.73	1.73	36.04	1.80	2.15	5.46
13	36.04	1.80	1.80	37.54	1.88	2.18	5.53
14	37.54	1.88	1.88	39.10	1.96	2.21	5.61
Daily group ration (g)		1.67		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	39.10	1.96	1.96	40.73	2.04	2.24	5.69
16	40.73	2.04	2.04	42.43	2.12	2.27	5.76
17	42.43	2.12	2.12	44.20	2.21	2.30	5.84
18	44.20	2.21	2.21	46.04	2.30	2.33	5.92
19	46.04	2.30	2.30	47.96	2.40	2.36	6.00
20	47.96	2.40	2.40	49.95	2.50	2.40	6.09
21	49.95	2.50	2.50	52.04	2.60	2.43	6.17
Daily group ration (g)		2.22		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	52.04	2.60	2.60	54.20	2.71	2.46	6.25
23	54.20	2.71	2.71	56.46	2.82	2.50	6.34
24	56.46	2.82	2.82	58.82	2.94	2.53	6.43
25	58.82	2.94	2.94	61.27	3.06	2.56	6.51
26	61.27	3.06	3.06	63.82	3.19	2.60	6.60
27	63.82	3.19	3.19	66.48	3.32	2.64	6.69
28	66.48	3.32	3.32	69.25	3.46	2.67	6.79
Daily group ration (g)		2.95		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	69.25	3.46	3.46	72.13	3.61	2.71	6.88
30	72.13	3.61	3.61	75.14	3.76	2.75	6.97
31	75.14	3.76	3.76	78.27	3.91	2.78	7.07
Daily group ration (g)		3.61		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TD-S Date: 23APR12
File Folder 7 Lab book/pgs 1 / 6-24 Verified by: [redacted] Date 4-27-17

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack section E
Holding Tank/Chamber: E 14
Treatment Group: 300
Species: RBT Lot: 116000

Date Created/Initials: 3-1-12 JA
Date Revised/[redacted]
Approved for [redacted] 3-1-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.068							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	[C = 0.00015 - 0.00050 in 0.00005 increments]								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+F33*(1/$D$25)) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333S36 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	21.36	1.07	1.07	22.25	1.11	1.83	4.65
2	22.25	1.11	1.11	23.18	1.16	1.85	4.71
3	23.18	1.16	1.16	24.14	1.21	1.88	4.78
4	24.14	1.21	1.21	25.15	1.26	1.91	4.84
5	25.15	1.26	1.26	26.20	1.31	1.93	4.91
6	26.20	1.31	1.31	27.29	1.36	1.96	4.97
7	27.29	1.36	1.36	28.43	1.42	1.99	5.04
Daily group ration (g)		1.21		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	28.43	1.42	1.42	29.61	1.48	2.01	5.11
9	29.61	1.48	1.48	30.84	1.54	2.04	5.18
10	30.84	1.54	1.54	32.13	1.61	2.07	5.25
11	32.13	1.61	1.61	33.47	1.67	2.10	5.33
12	33.47	1.67	1.67	34.86	1.74	2.13	5.40
13	34.86	1.74	1.74	36.31	1.82	2.15	5.47
14	36.31	1.82	1.82	37.83	1.89	2.18	5.55
Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	37.83	1.89	1.89	39.40	1.97	2.21	5.62
16	39.40	1.97	1.97	41.05	2.05	2.24	5.70
17	41.05	2.05	2.05	42.76	2.14	2.27	5.78
18	42.76	2.14	2.14	44.54	2.23	2.31	5.86
19	44.54	2.23	2.23	46.39	2.32	2.34	5.94
20	46.39	2.32	2.32	48.33	2.42	2.37	6.02
21	48.33	2.42	2.42	50.34	2.52	2.40	6.10
Daily group ration (g)		2.14		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	50.34	2.52	2.52	52.44	2.62	2.43	6.18
23	52.44	2.62	2.62	54.62	2.73	2.47	6.27
24	54.62	2.73	2.73	56.90	2.84	2.50	6.36
25	56.90	2.84	2.84	59.27	2.96	2.54	6.44
26	59.27	2.96	2.96	61.74	3.09	2.57	6.53
27	61.74	3.09	3.09	64.31	3.22	2.61	6.62
28	64.31	3.22	3.22	66.99	3.35	2.64	6.71
Daily group ration (g)		2.85		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	66.99	3.35	3.35	69.78	3.49	2.68	6.80
30	69.78	3.49	3.49	72.69	3.63	2.72	6.90
31	72.69	3.63	3.63	75.72	3.79	2.75	6.99
Daily group ration (g)		3.49		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 6-24

Reviewed by: TAS Date: 23APR12
Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System Rack section E
Holding Tank/Chamber: E15
Treatment Group: 200
Species: RBT Lot: 1160 06

Date Created/Initials: 3-1-12 SM
Date Revised/ini [redacted]
Approved for use [redacted] 3-1-12 Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	1.0675						
21	Number of fish	20						
22	Condition Factor (C)	0.0004						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR	1.2						
26	% B.W./d	5						

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$O$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	21.35	1.07	1.07	22.24	1.11	1.83	4.65
2	22.24	1.11	1.11	23.17	1.16	1.85	4.71
3	23.17	1.16	1.16	24.13	1.21	1.88	4.78
4	24.13	1.21	1.21	25.14	1.26	1.91	4.84
5	25.14	1.26	1.26	26.18	1.31	1.93	4.91
6	26.18	1.31	1.31	27.28	1.36	1.96	4.97
7	27.28	1.36	1.36	28.41	1.42	1.99	5.04
Daily group ration (g)		1.21	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.06	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	28.41	1.42	1.42	29.60	1.48	2.01	5.11
9	29.60	1.48	1.48	30.83	1.54	2.04	5.18
10	30.83	1.54	1.54	32.11	1.61	2.07	5.25
11	32.11	1.61	1.61	33.45	1.67	2.10	5.32
12	33.45	1.67	1.67	34.85	1.74	2.12	5.40
13	34.85	1.74	1.74	36.30	1.81	2.15	5.47
14	36.30	1.81	1.81	37.81	1.89	2.18	5.55
Daily group ration (g)		1.61	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.08	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	37.81	1.89	1.89	39.38	1.97	2.21	5.62
16	39.38	1.97	1.97	41.03	2.05	2.24	5.70
17	41.03	2.05	2.05	42.74	2.14	2.27	5.78
18	42.74	2.14	2.14	44.52	2.23	2.31	5.86
19	44.52	2.23	2.23	46.37	2.32	2.34	5.94
20	46.37	2.32	2.32	48.30	2.42	2.37	6.02
21	48.30	2.42	2.42	50.32	2.52	2.40	6.10
Daily group ration (g)		2.14	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.11	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	50.32	2.52	2.52	52.41	2.62	2.43	6.18
23	52.41	2.62	2.62	54.60	2.73	2.47	6.27
24	54.60	2.73	2.73	56.87	2.84	2.50	6.35
25	56.87	2.84	2.84	59.24	2.96	2.54	6.44
26	59.24	2.96	2.96	61.71	3.09	2.57	6.53
27	61.71	3.09	3.09	64.28	3.21	2.61	6.62
28	64.28	3.21	3.21	66.96	3.35	2.64	6.71
Daily group ration (g)		2.85	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.14	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	66.96	3.35	3.35	69.75	3.49	2.68	6.80
30	69.75	3.49	3.49	72.65	3.63	2.71	6.90
31	72.65	3.63	3.63	75.68	3.78	2.75	6.99
Daily group ration (g)		3.49	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.17	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TBS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: [redacted] Date 4-25-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: G
Holding Tank/Chamber: G1
Treatment Group: 50 mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / TBS
Date Revised/Initials:
Approved for use: [redacted] Study Director 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.15					
21	Number of fish			19					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas
Group Total Initial Fish Weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial Fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	21.85	1.15	3.28	22.18	1.17	2.05	5.20	
34	2	22.18	1.17	3.33	22.51	1.18	2.06	5.22	
35	3	22.51	1.18	3.38	22.85	1.20	2.07	5.25	
36	4	22.85	1.20	3.43	23.19	1.22	2.08	5.28	
37	5	23.19	1.22	3.48	23.54	1.24	2.09	5.30	
38	6	23.54	1.24	3.53	23.89	1.26	2.10	5.33	
39	7	23.89	1.26	3.58	24.25	1.28	2.11	5.36	
40									
41	Daily group ration (g)		3.43		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	24.25	1.28	3.64	24.61	1.30	2.12	5.38	
45	9	24.61	1.30	3.69	24.98	1.31	2.13	5.41	
46	10	24.98	1.31	3.75	25.36	1.33	2.14	5.44	
47	11	25.36	1.33	3.80	25.74	1.35	2.15	5.46	
48	12	25.74	1.35	3.86	26.12	1.37	2.16	5.49	
49	13	26.12	1.37	3.92	26.52	1.40	2.17	5.52	
50	14	26.52	1.40	3.98	26.91	1.42	2.18	5.54	
51									
52	Daily group ration (g)		3.81		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	26.91	1.42	4.04	27.32	1.44	2.19	5.57	
56	16	27.32	1.44	4.10	27.73	1.46	2.20	5.60	
57	17	27.73	1.46	4.16	28.14	1.48	2.22	5.63	
58	18	28.14	1.48	4.22	28.57	1.50	2.23	5.66	
59	19	28.57	1.50	4.28	28.99	1.53	2.24	5.68	
60	20	28.99	1.53	4.35	29.43	1.55	2.25	5.71	
61	21	29.43	1.55	4.41	29.87	1.57	2.26	5.74	
62									
63	Daily group ration (g)		4.22		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	29.87	1.57	4.48	30.32	1.60	2.27	5.77	
67	23	30.32	1.60	4.55	30.77	1.62	2.28	5.80	
68	24	30.77	1.62	4.62	31.23	1.64	2.29	5.83	
69	25	31.23	1.64	4.69	31.70	1.67	2.31	5.86	
70	26	31.70	1.67	4.76	32.18	1.69	2.32	5.88	
71	27	32.18	1.69	4.83	32.66	1.72	2.33	5.91	
72	28	32.66	1.72	4.90	33.15	1.74	2.34	5.94	
73									
74	Daily group ration (g)		4.69		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	33.15	1.74	4.97	33.65	1.77	2.35	5.97	
78	30	33.65	1.77	5.05	34.15	1.80	2.36	6.00	
79	31	34.15	1.80	5.12	34.67	1.82	2.37	6.03	
80									
81	Daily group ration (g)		5.05		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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AEH-12-PSEUDO-03
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: [illegible] Date 4-8-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food convers on rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System C
Holding Tank/Chamber: 62
Treatment Group: 100mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 /TDS
Date Revised/I [redacted]
Approved for U [redacted] 08MAR12
Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**					Worksheet Formulas		
20	Initial fish size (g)	1.1				Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish	19				Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condit on Factor (C)	0.0003				Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)					Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24						Individual Final Fish wt (g) =G33/$C$21 (numerator value adjusts by row)		
25	FCR	10				Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d	15				Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27								

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	20.90	1.10	3.14	21.21	1.12	2.02	5.12	
34	2	21.21	1.12	3.18	21.53	1.13	2.03	5.15	
35	3	21.53	1.13	3.23	21.85	1.15	2.04	5.17	
36	4	21.85	1.15	3.28	22.18	1.17	2.05	5.20	
37	5	22.18	1.17	3.33	22.52	1.19	2.06	5.22	
38	6	22.52	1.19	3.38	22.85	1.20	2.07	5.25	
39	7	22.85	1.20	3.43	23.20	1.22	2.08	5.28	
40									
41	Daily group ration (g)		3.28		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	23.20	1.22	3.48	23.54	1.24	2.09	5.30	
45	9	23.54	1.24	3.53	23.90	1.26	2.10	5.33	
46	10	23.90	1.26	3.58	24.26	1.28	2.11	5.36	
47	11	24.26	1.28	3.64	24.62	1.30	2.12	5.38	
48	12	24.62	1.30	3.69	24.99	1.32	2.13	5.41	
49	13	24.99	1.32	3.75	25.36	1.33	2.14	5.44	
50	14	25.36	1.33	3.80	25.74	1.35	2.15	5.46	
51									
52	Daily group ration (g)		3.64		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	25.74	1.35	3.86	26.13	1.38	2.16	5.49	
56	16	26.13	1.38	3.92	26.52	1.40	2.17	5.52	
57	17	26.52	1.40	3.98	26.92	1.42	2.18	5.54	
58	18	26.92	1.42	4.04	27.32	1.44	2.19	5.57	
59	19	27.32	1.44	4.10	27.73	1.46	2.20	5.60	
60	20	27.73	1.46	4.16	28.15	1.48	2.22	5.63	
61	21	28.15	1.48	4.22	28.57	1.50	2.23	5.66	
62									
63	Daily group ration (g)		4.04		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	28.57	1.50	4.29	29.00	1.53	2.24	5.68	
67	23	29.00	1.53	4.35	29.44	1.55	2.25	5.71	
68	24	29.44	1.55	4.42	29.88	1.57	2.26	5.74	
69	25	29.88	1.57	4.48	30.32	1.60	2.27	5.77	
70	26	30.32	1.60	4.55	30.78	1.62	2.28	5.80	
71	27	30.78	1.62	4.62	31.24	1.64	2.29	5.83	
72	28	31.24	1.64	4.69	31.71	1.67	2.31	5.86	
73									
74	Daily group ration (g)		4.48		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	31.71	1.67	4.76	32.19	1.69	2.32	5.88	
78	30	32.19	1.69	4.83	32.67	1.72	2.33	5.91	
79	31	32.67	1.72	4.90	33.16	1.75	2.34	5.94	
80									
81	Daily group ration (g)		4.83		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 , 13-29

Reviewed by: TDS Date: 23APR12
Verified by: SA Date: 4-25-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System 6
Holding Tank/Chamber: 63
Treatment Group: 200mg/L
Species: YEP Lot: 113006

Date Created/Initials: 08MAR12/TDS
Date Revised/Ini [redacted] 08MAR12
Approved for us Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.15					
21	Number of fish			16					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00035 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas
Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((((G33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	18.40	1.15	2.76	18.68	1.17	2.05	5.20	
34	2	18.68	1.17	2.80	18.96	1.18	2.06	5.22	
35	3	18.96	1.18	2.84	19.24	1.20	2.07	5.25	
36	4	19.24	1.20	2.89	19.53	1.22	2.08	5.28	
37	5	19.53	1.22	2.93	19.82	1.24	2.09	5.30	
38	6	19.82	1.24	2.97	20.12	1.26	2.10	5.33	
39	7	20.12	1.26	3.02	20.42	1.28	2.11	5.36	
40									
41	Daily group ration (g)		2.89						←OUTPUT - GROUP FEED RATE (g) for week 1
42	Daily per fish ration (g)		0.18						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
43									
44	8	20.42	1.28	3.06	20.73	1.30	2.12	5.38	
45	9	20.73	1.30	3.11	21.04	1.31	2.13	5.41	
46	10	21.04	1.31	3.16	21.35	1.33	2.14	5.44	
47	11	21.35	1.33	3.20	21.67	1.35	2.15	5.46	
48	12	21.67	1.35	3.25	22.00	1.37	2.16	5.49	
49	13	22.00	1.37	3.30	22.33	1.40	2.17	5.52	
50	14	22.33	1.40	3.35	22.66	1.42	2.18	5.54	
51									
52	Daily group ration (g)		3.20						←OUTPUT - GROUP FEED RATE (g) for week 2
53	Daily per fish ration (g)		0.20						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
54									
55	15	22.66	1.42	3.40	23.00	1.44	2.19	5.57	
56	16	23.00	1.44	3.45	23.35	1.46	2.20	5.60	
57	17	23.35	1.46	3.50	23.70	1.48	2.22	5.63	
58	18	23.70	1.48	3.55	24.06	1.50	2.23	5.66	
59	19	24.06	1.50	3.61	24.42	1.53	2.24	5.68	
60	20	24.42	1.53	3.66	24.78	1.55	2.25	5.71	
61	21	24.78	1.55	3.72	25.15	1.57	2.26	5.74	
62									
63	Daily group ration (g)		3.56						←OUTPUT - GROUP FEED RATE (g) for week 3
64	Daily per fish ration (g)		0.22						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
65									
66	22	25.15	1.57	3.77	25.53	1.60	2.27	5.77	
67	23	25.53	1.60	3.83	25.91	1.62	2.28	5.80	
68	24	25.91	1.62	3.89	26.30	1.64	2.29	5.83	
69	25	26.30	1.64	3.95	26.70	1.67	2.31	5.86	
70	26	26.70	1.67	4.00	27.10	1.69	2.32	5.88	
71	27	27.10	1.69	4.06	27.50	1.72	2.33	5.91	
72	28	27.50	1.72	4.13	27.92	1.74	2.34	5.94	
73									
74	Daily group ration (g)		3.95						←OUTPUT - GROUP FEED RATE (g) for week 4
75	Daily per fish ration (g)		0.25						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
76									
77	29	27.92	1.74	4.19	28.34	1.77	2.35	5.97	
78	30	28.34	1.77	4.25	28.76	1.80	2.36	6.00	
79	31	28.76	1.80	4.31	29.19	1.82	2.37	6.03	
80									
81	Daily group ration (g)		4.25						←OUTPUT - GROUP FEED RATE (g) for week 5
82	Daily per fish ration (g)		0.27						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

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Item No. 13
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Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23APR12
File Folder 7 Lab book/pgs 1, 13-29 Verified by: [redacted] Date 4-5-17

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: 64
Treatment Group: Control
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12/TDS
Date Revised/Initials:
Approved for use: [redacted] 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		0.98						
21	Number of fish		20						
22	Condition Factor (C)		0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		15						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individua Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I+33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	19.60	0.98	2.94	19.80	0.99	1.94	4.93	
34	2	19.80	0.99	2.98	20.19	1.01	1.95	4.95	
35	3	20.19	1.01	3.03	20.50	1.02	1.96	4.98	
36	4	20.50	1.02	3.07	20.80	1.04	1.97	5.00	
37	5	20.80	1.04	3.12	21.11	1.06	1.98	5.03	
38	6	21.11	1.06	3.17	21.43	1.07	1.99	5.05	
39	7	21.43	1.07	3.21	21.75	1.09	2.00	5.08	
40									
41	Daily group ration (g)		3.08		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	21.75	1.09	3.26	22.08	1.10	2.01	5.10	
45	9	22.08	1.10	3.31	22.41	1.12	2.02	5.13	
46	10	22.41	1.12	3.36	22.75	1.14	2.03	5.15	
47	11	22.75	1.14	3.41	23.09	1.15	2.04	5.18	
48	12	23.09	1.15	3.46	23.43	1.17	2.05	5.20	
49	13	23.43	1.17	3.52	23.79	1.19	2.06	5.23	
50	14	23.79	1.19	3.57	24.14	1.21	2.07	5.26	
51									
52	Daily group ration (g)		3.41		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	24.14	1.21	3.62	24.50	1.23	2.08	5.28	
56	16	24.50	1.23	3.68	24.87	1.24	2.09	5.31	
57	17	24.87	1.24	3.73	25.25	1.26	2.10	5.34	
58	18	25.25	1.26	3.79	25.62	1.28	2.11	5.36	
59	19	25.62	1.28	3.84	26.01	1.30	2.12	5.39	
60	20	26.01	1.30	3.90	26.40	1.32	2.13	5.42	
61	21	26.40	1.32	3.96	26.79	1.34	2.14	5.44	
62									
63	Daily group ration (g)		3.79		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	26.79	1.34	4.02	27.20	1.36	2.15	5.47	
67	23	27.20	1.36	4.08	27.60	1.38	2.16	5.50	
68	24	27.60	1.38	4.14	28.02	1.40	2.17	5.52	
69	25	28.02	1.40	4.20	28.44	1.42	2.19	5.55	
70	26	28.44	1.42	4.27	28.87	1.44	2.20	5.58	
71	27	28.87	1.44	4.33	29.30	1.46	2.21	5.61	
72	28	29.30	1.46	4.39	29.74	1.49	2.22	5.63	
73									
74	Daily group ration (g)		4.20		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	29.74	1.49	4.46	30.18	1.51	2.23	5.66	
78	30	30.18	1.51	4.53	30.64	1.53	2.24	5.69	
79	31	30.64	1.53	4.60	31.10	1.55	2.25	5.72	
80									
81	Daily group ration (g)		4.53		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: [redacted] Date 4-25-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Inter or Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System 6
Holding Tank/Chamber: G-5
Treatment Group: Control
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / TDS
Date Revised/in [redacted] 08MAR12
Approved for us [redacted] Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initia fish size (g)			1.24			Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish			20			Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)			0.0003			Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR			10			Fish Final Length (nches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)		
26	% B.W./d			15			Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
28									
29									
30									
31									
32									
33	1	24.80	1.24	3.72	25.17	1.26	2.10	5.33	
34	2	25.17	1.26	3.78	25.55	1.28	2.11	5.36	
35	3	25.55	1.28	3.83	25.93	1.30	2.12	5.38	
36	4	25.93	1.30	3.89	26.32	1.32	2.13	5.41	
37	5	26.32	1.32	3.95	26.72	1.34	2.14	5.44	
38	6	26.72	1.34	4.01	27.12	1.36	2.15	5.46	
39	7	27.12	1.36	4.07	27.52	1.38	2.16	5.49	
40									
41	Daily group ration (g)		3.89		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	27.52	1.38	4.13	27.94	1.40	2.17	5.52	
45	9	27.94	1.40	4.19	28.36	1.42	2.18	5.55	
46	10	28.36	1.42	4.25	28.78	1.44	2.19	5.57	
47	11	28.78	1.44	4.32	29.21	1.46	2.21	5.60	
48	12	29.21	1.46	4.38	29.65	1.48	2.22	5.63	
49	13	29.65	1.48	4.45	30.10	1.50	2.23	5.66	
50	14	30.10	1.50	4.51	30.55	1.53	2.24	5.69	
51									
52	Daily group ration (g)		4.32		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	30.55	1.53	4.58	31.01	1.55	2.25	5.71	
56	16	31.01	1.55	4.65	31.47	1.57	2.26	5.74	
57	17	31.47	1.57	4.72	31.94	1.60	2.27	5.77	
58	18	31.94	1.60	4.79	32.42	1.62	2.28	5.80	
59	19	32.42	1.62	4.86	32.91	1.65	2.29	5.83	
60	20	32.91	1.65	4.94	33.40	1.67	2.31	5.86	
61	21	33.40	1.67	5.01	33.90	1.70	2.32	5.89	
62									
63	Daily group ration (g)		4.79		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	33.90	1.70	5.09	34.41	1.72	2.33	5.92	
67	23	34.41	1.72	5.16	34.93	1.75	2.34	5.95	
68	24	34.93	1.75	5.24	35.45	1.77	2.35	5.97	
69	25	35.45	1.77	5.32	35.98	1.80	2.36	6.00	
70	26	35.98	1.80	5.40	36.52	1.83	2.38	6.03	
71	27	36.52	1.83	5.48	37.07	1.85	2.39	6.06	
72	28	37.07	1.85	5.56	37.63	1.88	2.40	6.09	
73									
74	Daily group ration (g)		5.32		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	37.63	1.88	5.64	38.19	1.91	2.41	6.12	
78	30	38.19	1.91	5.73	38.76	1.94	2.42	6.16	
79	31	38.76	1.94	5.81	39.35	1.97	2.44	6.19	
80									
81	Daily group ration (g)		5.73		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 13-29

Reviewed by: TAS Date: 23APR12
Verified by: [redacted] Date 4-8-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food convers on rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: G6
Treatment Group: 300 mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12/TAS
Date Revised/I[redacted]
Approved for u[redacted] 08MAR12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.1
Number of fish	15
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	16.50	1.10	2.48	16.75	1.12	2.02	5.12	
2	16.75	1.12	2.51	17.00	1.13	2.03	5.15	
3	17.00	1.13	2.55	17.25	1.15	2.04	5.17	
4	17.25	1.15	2.59	17.51	1.17	2.05	5.20	
5	17.51	1.17	2.63	17.78	1.19	2.06	5.22	
6	17.78	1.19	2.67	18.04	1.20	2.07	5.25	
7	18.04	1.20	2.71	18.31	1.22	2.08	5.28	
Daily group ration (g)		2.59		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	18.31	1.22	2.75	18.59	1.24	2.09	5.30	
9	18.59	1.24	2.79	18.87	1.26	2.10	5.33	
10	18.87	1.26	2.83	19.15	1.28	2.11	5.36	
11	19.15	1.28	2.87	19.44	1.30	2.12	5.38	
12	19.44	1.30	2.92	19.73	1.32	2.13	5.41	
13	19.73	1.32	2.96	20.02	1.33	2.14	5.44	
14	20.02	1.33	3.00	20.32	1.35	2.15	5.46	
Daily group ration (g)		2.87		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	20.32	1.35	3.05	20.63	1.38	2.16	5.49	
16	20.63	1.38	3.09	20.94	1.40	2.17	5.52	
17	20.94	1.40	3.14	21.25	1.42	2.18	5.54	
18	21.25	1.42	3.19	21.57	1.44	2.19	5.57	
19	21.57	1.44	3.24	21.89	1.46	2.20	5.60	
20	21.89	1.46	3.28	22.22	1.48	2.22	5.63	
21	22.22	1.48	3.33	22.56	1.50	2.23	5.66	
Daily group ration (g)		3.19		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	22.56	1.50	3.38	22.89	1.53	2.24	5.68	
23	22.89	1.53	3.43	23.24	1.55	2.25	5.71	
24	23.24	1.55	3.49	23.59	1.57	2.26	5.74	
25	23.59	1.57	3.54	23.94	1.60	2.27	5.77	
26	23.94	1.60	3.59	24.30	1.62	2.28	5.80	
27	24.30	1.62	3.64	24.66	1.64	2.29	5.83	
28	24.66	1.64	3.70	25.03	1.67	2.31	5.86	
Daily group ration (g)		3.54		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	25.03	1.67	3.76	25.41	1.69	2.32	5.88	
30	25.41	1.69	3.81	25.79	1.72	2.33	5.91	
31	25.79	1.72	3.87	26.18	1.75	2.34	5.94	
Daily group ration (g)		3.81		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Full study number not legible ~~AEH-12-PSEUDO-0~~
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Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs 1 / 13-29

Reviewed by: TPS Date: 23APR12
Verified by: [redacted] Date: 4-25-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: 6
Holding Tank/Chamber: 67
Treatment Group: 300mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / TPS
Date Revised/Initials: [redacted]
Approved for use: [redacted] 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.18					
21	Number of fish			10					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00003 increments)								
24									
25	FCR		10						
26	% B.W./d		15						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = 33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	11.80	1.18	1.77	11.98	1.20	2.06	5.24	
34	2	11.98	1.20	1.80	12.16	1.22	2.07	5.27	
35	3	12.16	1.22	1.82	12.34	1.23	2.08	5.30	
36	4	12.34	1.23	1.85	12.52	1.25	2.10	5.32	
37	5	12.52	1.25	1.88	12.71	1.27	2.11	5.35	
38	6	12.71	1.27	1.91	12.90	1.29	2.12	5.37	
39	7	12.90	1.29	1.94	13.10	1.31	2.13	5.40	
40									
41	Daily group ration (g)		1.85		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	13.10	1.31	1.96	13.28	1.33	2.14	5.43	
45	9	13.29	1.33	1.99	13.48	1.35	2.15	5.46	
46	10	13.49	1.35	2.02	13.68	1.37	2.16	5.48	
47	11	13.69	1.37	2.05	13.90	1.39	2.17	5.51	
48	12	13.90	1.39	2.08	14.11	1.41	2.18	5.54	
49	13	14.11	1.41	2.12	14.32	1.43	2.19	5.56	
50	14	14.32	1.43	2.15	14.53	1.45	2.20	5.59	
51									
52	Daily group ration (g)		2.06		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	14.53	1.45	2.18	14.75	1.48	2.21	5.62	
56	16	14.75	1.48	2.21	14.97	1.50	2.22	5.65	
57	17	14.97	1.50	2.25	15.20	1.52	2.23	5.68	
58	18	15.20	1.52	2.28	15.43	1.54	2.25	5.70	
59	19	15.43	1.54	2.31	15.66	1.57	2.26	5.73	
60	20	15.66	1.57	2.35	15.89	1.59	2.27	5.76	
61	21	15.89	1.59	2.38	16.13	1.61	2.28	5.79	
62									
63	Daily group ration (g)		2.28		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	16.13	1.61	2.42	16.37	1.64	2.29	5.82	
67	23	16.37	1.64	2.46	16.62	1.66	2.30	5.85	
68	24	16.62	1.66	2.49	16.87	1.69	2.31	5.88	
69	25	16.87	1.69	2.53	17.12	1.71	2.33	5.91	
70	26	17.12	1.71	2.57	17.38	1.74	2.34	5.94	
71	27	17.38	1.74	2.61	17.64	1.76	2.35	5.96	
72	28	17.64	1.76	2.65	17.90	1.79	2.36	5.99	
73									
74	Daily group ration (g)		2.53		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	17.90	1.79	2.69	18.17	1.82	2.37	6.02	
78	30	18.17	1.82	2.73	18.44	1.84	2.38	6.05	
79	31	18.44	1.84	2.77	18.72	1.87	2.40	6.08	
80									
81	Daily group ration (g)		2.73		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 13-29

Reviewed by: TJS Date: 23MAR12
Verified by: SA Date 4-8-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food convers on rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C - If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: G8
Treatment Group: Control
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12/TJS
Date Revised/ [redacted]
Approved for [redacted] 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initial fish size (g)			1.05			Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish			19			Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)			0.0003			Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR			10			Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d			15			Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
28									
29									
30									
31									
32									
33	1	19.95	1.05	2.99	20.25	1.07	1.99	5.04	
34	2	20.25	1.07	3.04	20.55	1.08	2.00	5.07	
35	3	20.55	1.08	3.08	20.86	1.10	2.01	5.09	
36	4	20.86	1.10	3.13	21.17	1.11	2.02	5.12	
37	5	21.17	1.11	3.18	21.49	1.13	2.03	5.14	
38	6	21.49	1.13	3.22	21.81	1.15	2.04	5.17	
39	7	21.81	1.15	3.27	22.14	1.17	2.05	5.20	
40									
41	Daily group ration (g)			3.13			←OUTPUT - GROUP FEED RATE (g) for week 1		
42	Daily per fish ration (g)			0.16			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1		
43									
44	8	22.14	1.17	3.32	22.47	1.18	2.06	5.22	
45	9	22.47	1.18	3.37	22.81	1.20	2.07	5.25	
46	10	22.81	1.20	3.42	23.15	1.22	2.08	5.27	
47	11	23.15	1.22	3.47	23.50	1.24	2.09	5.30	
48	12	23.50	1.24	3.53	23.85	1.26	2.10	5.33	
49	13	23.85	1.26	3.58	24.21	1.27	2.11	5.35	
50	14	24.21	1.27	3.63	24.57	1.29	2.12	5.38	
51									
52	Daily group ration (g)			3.47			←OUTPUT - GROUP FEED RATE (g) for week 2		
53	Daily per fish ration (g)			0.18			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2		
54									
55	15	24.57	1.29	3.69	24.94	1.31	2.13	5.41	
56	16	24.94	1.31	3.74	25.32	1.33	2.14	5.43	
57	17	25.32	1.33	3.80	25.70	1.35	2.15	5.46	
58	18	25.70	1.35	3.85	26.08	1.37	2.16	5.49	
59	19	26.08	1.37	3.91	26.47	1.39	2.17	5.51	
60	20	26.47	1.39	3.97	26.87	1.41	2.18	5.54	
61	21	26.87	1.41	4.03	27.27	1.44	2.19	5.57	
62									
63	Daily group ration (g)			3.86			←OUTPUT - GROUP FEED RATE (g) for week 3		
64	Daily per fish ration (g)			0.20			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3		
65									
66	22	27.27	1.44	4.09	27.68	1.46	2.20	5.60	
67	23	27.68	1.46	4.15	28.10	1.48	2.21	5.62	
68	24	28.10	1.48	4.21	28.52	1.50	2.23	5.65	
69	25	28.52	1.50	4.28	28.95	1.52	2.24	5.68	
70	26	28.95	1.52	4.34	29.38	1.55	2.25	5.71	
71	27	29.38	1.55	4.41	29.82	1.57	2.26	5.74	
72	28	29.82	1.57	4.47	30.27	1.59	2.27	5.77	
73									
74	Daily group ration (g)			4.28			←OUTPUT - GROUP FEED RATE (g) for week 4		
75	Daily per fish ration (g)			0.23			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4		
76									
77	29	30.27	1.59	4.54	30.72	1.62	2.28	5.79	
78	30	30.72	1.62	4.61	31.18	1.64	2.29	5.82	
79	31	31.18	1.64	4.68	31.65	1.67	2.30	5.85	
80									
81	Daily group ration (g)			4.61			←OUTPUT - GROUP FEED RATE (g) for week 5		
82	Daily per fish ration (g)			0.24			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5		

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: SR Date 09-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: 69
Treatment Group: 100mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 /TJS
Date Revised/ini [redacted]
Approved for use [redacted] 08MAR12
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initial fish size (g)			1.11			Group Total initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish			20			Average individua Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)			0.0003			Daily group Feed Ration (g) = D33*(D2G/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)		
25	FCR			10			Fish Final Length (inches) =((H33/434)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d			15			Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
28									
29									
30									
31									
32	Day	(g)	(g)	(g)	(g)	(g)	(inches)	(cm)	
33	1	22.20	1.11	3.33	22.53	1.13	2.02	5.14	
34	2	22.53	1.13	3.38	22.87	1.14	2.03	5.16	
35	3	22.87	1.14	3.43	23.21	1.16	2.04	5.19	
36	4	23.21	1.16	3.48	23.56	1.18	2.05	5.21	
37	5	23.56	1.18	3.53	23.92	1.20	2.06	5.24	
38	6	23.92	1.20	3.59	24.27	1.21	2.07	5.27	
39	7	24.27	1.21	3.64	24.64	1.23	2.08	5.29	
40									
41	Daily group ration (g)		3.48		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	24.64	1.23	3.70	25.01	1.25	2.09	5.32	
45	9	25.01	1.25	3.75	25.38	1.27	2.10	5.34	
46	10	25.38	1.27	3.81	25.76	1.29	2.11	5.37	
47	11	25.76	1.29	3.86	26.15	1.31	2.13	5.40	
48	12	26.15	1.31	3.92	26.54	1.33	2.14	5.43	
49	13	26.54	1.33	3.98	26.94	1.35	2.15	5.45	
50	14	26.94	1.35	4.04	27.34	1.37	2.16	5.48	
51									
52	Daily group ration (g)		3.87		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	27.34	1.37	4.10	27.76	1.39	2.17	5.51	
56	16	27.76	1.39	4.16	28.17	1.41	2.18	5.53	
57	17	28.17	1.41	4.23	28.59	1.43	2.19	5.56	
58	18	28.59	1.43	4.29	29.02	1.45	2.20	5.59	
59	19	29.02	1.45	4.35	29.46	1.47	2.21	5.62	
60	20	29.46	1.47	4.42	29.90	1.50	2.22	5.64	
61	21	29.90	1.50	4.49	30.35	1.52	2.23	5.67	
62									
63	Daily group ration (g)		4.29		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	30.35	1.52	4.55	30.80	1.54	2.24	5.70	
67	23	30.80	1.54	4.62	31.27	1.56	2.26	5.73	
68	24	31.27	1.56	4.69	31.73	1.59	2.27	5.76	
69	25	31.73	1.59	4.76	32.21	1.61	2.28	5.79	
70	26	32.21	1.61	4.83	32.69	1.63	2.29	5.82	
71	27	32.69	1.63	4.90	33.18	1.66	2.30	5.84	
72	28	33.18	1.66	4.98	33.68	1.68	2.31	5.87	
73									
74	Daily group ration (g)		4.76		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	33.68	1.68	5.05	34.19	1.71	2.32	5.90	
78	30	34.19	1.71	5.13	34.70	1.74	2.34	5.93	
79	31	34.70	1.74	5.21	35.22	1.76	2.35	5.96	
80									
81	Daily group ration (g)		5.13		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23MAR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food convers on rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Began writing 610 in wrong spot. DS 08MAR12

Holding System GT G
Holding Tank/Chamber: G10
Treatment Group: 200 mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / DS
Date Revised/ [redacted]
Approved for [redacted] 08MAR12 Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**					Worksheet Formulas		
20	Initial fish size (g)		1.13			Group Total initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}		
21	Number of fish		16			Average Individual initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}		
22	Condition Factor (C)		0.0003			Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)					Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}		
24						Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}		
25	FCR		10			Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}		
26	% B.W./d		15			Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}		
27								
28								
29			Group Total Initial	Average Individual Initial	Daily Group Feed	Total Final	Individual Final	Fish Final	Fish Final
30									
31									
32	Day		Fish wt (g)	Fish wt (g)	Ration (g)	Fish wt (g)	Fish wt (g)	Length (inches)	Length (cm)
33	1		18.08	1.13	2.71	18.35	1.15	2.03	5.17
34	2		18.35	1.15	2.75	18.63	1.16	2.04	5.19
35	3		18.63	1.16	2.79	18.91	1.18	2.05	5.22
36	4		18.91	1.18	2.84	19.19	1.20	2.07	5.25
37	5		19.19	1.20	2.88	19.48	1.22	2.08	5.27
38	6		19.48	1.22	2.92	19.77	1.24	2.09	5.30
39	7		19.77	1.24	2.97	20.07	1.25	2.10	5.32
40									
41	Daily group ration (g)			2.84		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)			0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43									
44	8		20.07	1.25	3.01	20.37	1.27	2.11	5.35
45	9		20.37	1.27	3.06	20.67	1.29	2.12	5.38
46	10		20.67	1.29	3.10	20.98	1.31	2.13	5.40
47	11		20.98	1.31	3.15	21.30	1.33	2.14	5.43
48	12		21.30	1.33	3.19	21.62	1.35	2.15	5.46
49	13		21.62	1.35	3.24	21.94	1.37	2.16	5.48
50	14		21.94	1.37	3.29	22.27	1.39	2.17	5.51
51									
52	Daily group ration (g)			3.15		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)			0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54									
55	15		22.27	1.39	3.34	22.60	1.41	2.18	5.54
56	16		22.60	1.41	3.39	22.94	1.43	2.19	5.57
57	17		22.94	1.43	3.44	23.29	1.46	2.20	5.59
58	18		23.29	1.46	3.49	23.64	1.48	2.21	5.62
59	19		23.64	1.48	3.55	23.99	1.50	2.22	5.65
60	20		23.99	1.50	3.60	24.35	1.52	2.24	5.68
61	21		24.35	1.52	3.65	24.72	1.54	2.25	5.71
62									
63	Daily group ration (g)			3.49		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)			0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65									
66	22		24.72	1.54	3.71	25.09	1.57	2.26	5.74
67	23		25.09	1.57	3.76	25.46	1.59	2.27	5.76
68	24		25.46	1.59	3.82	25.85	1.62	2.28	5.79
69	25		25.85	1.62	3.88	26.23	1.64	2.29	5.82
70	26		26.23	1.64	3.93	26.63	1.66	2.30	5.85
71	27		26.63	1.66	3.99	27.03	1.69	2.31	5.88
72	28		27.03	1.69	4.05	27.43	1.71	2.33	5.91
73									
74	Daily group ration (g)			3.88		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)			0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76									
77	29		27.43	1.71	4.11	27.84	1.74	2.34	5.94
78	30		27.84	1.74	4.18	28.26	1.77	2.35	5.97
79	31		28.26	1.77	4.24	28.68	1.79	2.36	6.00
80									
81	Daily group ration (g)			4.18		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)			0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 13-29

Reviewed by: TJS Date: 23APR12
Verified by: [redacted] Date: 4-25-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/wt graph charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System 6
Holding Tank/Chamber: 611
Treatment Group: 50 mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / TJS
Date Revised/
Approved for [redacted] 08MAR12
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.05					
21	Number of fish			20					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D39/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (nches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	21.00	1.05	3.15	21.32	1.07	1.99	5.04	
2	21.32	1.07	3.20	21.63	1.08	2.00	5.07	
3	21.63	1.08	3.25	21.96	1.10	2.01	5.09	
4	21.96	1.10	3.29	22.29	1.11	2.02	5.12	
5	22.29	1.11	3.34	22.62	1.13	2.03	5.14	
6	22.62	1.13	3.39	22.96	1.15	2.04	5.17	
7	22.96	1.15	3.44	23.31	1.17	2.05	5.20	
Daily group ration (g)		3.30		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	23.31	1.17	3.50	23.66	1.18	2.06	5.22	
9	23.66	1.18	3.55	24.01	1.20	2.07	5.25	
10	24.01	1.20	3.60	24.37	1.22	2.08	5.27	
11	24.37	1.22	3.66	24.74	1.24	2.09	5.30	
12	24.74	1.24	3.71	25.11	1.26	2.10	5.33	
13	25.11	1.26	3.77	25.48	1.27	2.11	5.35	
14	25.48	1.27	3.82	25.87	1.29	2.12	5.38	
Daily group ration (g)		3.66		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	25.87	1.29	3.88	26.25	1.31	2.13	5.41	
16	26.25	1.31	3.94	26.65	1.33	2.14	5.43	
17	26.65	1.33	4.00	27.05	1.35	2.15	5.46	
18	27.05	1.35	4.06	27.45	1.37	2.16	5.49	
19	27.45	1.37	4.12	27.87	1.39	2.17	5.51	
20	27.87	1.39	4.18	28.28	1.41	2.18	5.54	
21	28.28	1.41	4.24	28.71	1.44	2.19	5.57	
Daily group ration (g)		4.06		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	28.71	1.44	4.31	29.14	1.46	2.20	5.60	
23	29.14	1.46	4.37	29.58	1.48	2.21	5.62	
24	29.58	1.48	4.44	30.02	1.50	2.23	5.65	
25	30.02	1.50	4.50	30.47	1.52	2.24	5.68	
26	30.47	1.52	4.57	30.93	1.55	2.25	5.71	
27	30.93	1.55	4.64	31.39	1.57	2.26	5.74	
28	31.39	1.57	4.71	31.86	1.59	2.27	5.77	
Daily group ration (g)		4.50		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	31.86	1.59	4.78	32.34	1.62	2.28	5.79	
30	32.34	1.62	4.85	32.82	1.64	2.29	5.82	
31	32.82	1.64	4.92	33.32	1.67	2.30	5.85	
Daily group ration (g)		4.85		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: JDS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 13-29 Verified by: SC Date 4-24-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
if not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: G12
Treatment Group: 200mg/L
Species: YET Lot: 113000

Date Created/Initials: 08MAR12/JDS
Date Revised
Approved for [redacted] 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.13					
21	Number of fish			15					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333333 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	16.95	1.13	2.54	17.20	1.15	2.03	5.17	
34	2	17.20	1.15	2.58	17.46	1.16	2.04	5.19	
35	3	17.46	1.16	2.62	17.72	1.18	2.05	5.22	
36	4	17.72	1.18	2.66	17.99	1.20	2.07	5.25	
37	5	17.99	1.20	2.70	18.26	1.22	2.08	5.27	
38	6	18.26	1.22	2.74	18.53	1.24	2.09	5.30	
39	7	18.53	1.24	2.78	18.81	1.25	2.10	5.32	
40									
41	Daily group ration (g)		2.66						←OUTPUT - GROUP FEED RATE (g) for week 1
42	Daily per fish ration (g)		0.18						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
43									
44	8	16.81	1.25	2.82	19.09	1.27	2.11	5.36	
45	9	19.09	1.27	2.86	19.38	1.29	2.12	5.38	
46	10	19.38	1.29	2.91	19.67	1.31	2.13	5.40	
47	11	19.67	1.31	2.95	19.97	1.33	2.14	5.43	
48	12	19.97	1.33	2.99	20.27	1.35	2.15	5.46	
49	13	20.27	1.35	3.04	20.57	1.37	2.16	5.48	
50	14	20.57	1.37	3.09	20.88	1.39	2.17	5.51	
51									
52	Daily group ration (g)		2.95						←OUTPUT - GROUP FEED RATE (g) for week 2
53	Daily per fish ration (g)		0.20						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
54									
55	15	20.88	1.39	3.13	21.19	1.41	2.18	5.54	
56	16	21.19	1.41	3.18	21.51	1.43	2.19	5.57	
57	17	21.51	1.43	3.23	21.83	1.46	2.20	5.59	
58	18	21.83	1.46	3.27	22.16	1.48	2.21	5.62	
59	19	22.16	1.48	3.32	22.49	1.50	2.22	5.65	
60	20	22.49	1.50	3.37	22.83	1.52	2.24	5.68	
61	21	22.83	1.52	3.42	23.17	1.54	2.25	5.71	
62									
63	Daily group ration (g)		3.28						←OUTPUT - GROUP FEED RATE (g) for week 3
64	Daily per fish ration (g)		0.22						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
65									
66	22	23.17	1.54	3.48	23.52	1.57	2.26	5.74	
67	23	23.52	1.57	3.53	23.87	1.59	2.27	5.76	
68	24	23.87	1.59	3.58	24.23	1.62	2.28	5.79	
69	25	24.23	1.62	3.63	24.59	1.64	2.29	5.82	
70	26	24.59	1.64	3.69	24.96	1.66	2.30	5.85	
71	27	24.96	1.66	3.74	25.34	1.69	2.31	5.88	
72	28	25.34	1.69	3.80	25.72	1.71	2.33	5.91	
73									
74	Daily group ration (g)		3.64						←OUTPUT - GROUP FEED RATE (g) for week 4
75	Daily per fish ration (g)		0.24						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
76									
77	29	25.72	1.71	3.86	26.10	1.74	2.34	5.94	
78	30	26.10	1.74	3.92	26.49	1.77	2.35	5.97	
79	31	26.49	1.77	3.97	26.89	1.79	2.36	6.00	
80									
81	Daily group ration (g)		3.92						←OUTPUT - GROUP FEED RATE (g) for week 5
82	Daily per fish ration (g)		0.26						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

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Item No. 13
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Study Number: AEH-12-PSEUDO-03 | Reviewed by: TLS | Date: 23APR12
File Folder: 7 | Lab book/pgs: 1, 13-29 | Verified by: SS | Date: 4-27-12

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: G
Holding Tank/Chamber: 613
Treatment Group: 300 mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12 / DS
Date Revised/In: [redacted]
Approved for us: [redacted] 08MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.05					
21	Number of fish			12					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	12.60	1.05	1.89	12.79	1.07	1.99	5.04
2	12.79	1.07	1.92	12.98	1.08	2.00	5.07
3	12.98	1.08	1.95	13.18	1.10	2.01	5.09
4	13.18	1.10	1.98	13.37	1.11	2.02	5.12
5	13.37	1.11	2.01	13.57	1.13	2.03	5.14
6	13.57	1.13	2.04	13.78	1.15	2.04	5.17
7	13.78	1.15	2.07	13.98	1.17	2.05	5.20
Daily group ration (g)		1.98		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	13.98	1.17	2.10	14.19	1.18	2.06	5.22
9	14.19	1.18	2.13	14.41	1.20	2.07	5.25
10	14.41	1.20	2.16	14.62	1.22	2.08	5.27
11	14.62	1.22	2.19	14.84	1.24	2.09	5.30
12	14.84	1.24	2.23	15.06	1.26	2.10	5.33
13	15.06	1.26	2.26	15.29	1.27	2.11	5.35
14	15.29	1.27	2.29	15.52	1.29	2.12	5.38
Daily group ration (g)		2.19		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	15.52	1.29	2.33	15.75	1.31	2.13	5.41
16	15.75	1.31	2.36	15.98	1.33	2.14	5.43
17	15.99	1.33	2.40	16.23	1.35	2.15	5.46
18	16.23	1.35	2.43	16.47	1.37	2.16	5.49
19	16.47	1.37	2.47	16.72	1.39	2.17	5.51
20	16.72	1.39	2.51	16.97	1.41	2.18	5.54
21	16.97	1.41	2.55	17.22	1.44	2.19	5.57
Daily group ration (g)		2.44		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	17.22	1.44	2.58	17.48	1.46	2.20	5.60
23	17.48	1.46	2.62	17.75	1.48	2.21	5.62
24	17.75	1.48	2.66	18.01	1.50	2.23	5.65
25	18.01	1.50	2.70	18.28	1.52	2.24	5.68
26	18.28	1.52	2.74	18.56	1.55	2.25	5.71
27	18.56	1.55	2.78	18.83	1.57	2.26	5.74
28	18.83	1.57	2.83	19.12	1.59	2.27	5.77
Daily group ration (g)		2.70		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	19.12	1.59	2.87	19.40	1.62	2.28	5.79
30	19.40	1.62	2.91	19.69	1.64	2.29	5.82
31	19.69	1.64	2.95	19.99	1.67	2.30	5.85
Daily group ration (g)		2.91		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23MAR12
File Folder 7 Lab book/pgs 1, 13-29 Verified by: [redacted] Date 4-5-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406 467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System G
Holding Tank/Chamber: G14
Treatment Group: 50mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12/TDS
Date Revised/Initials:
Approved for use: [redacted] 8MAR12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initial fish size (g)		1.07				Group Total Initial Fish Weight (g) = E20 * E21 (Initial fish size determined from measured weights)		
21	Number of fish		19				Average Individual Initial Fish Weight (g) = D33/$D$21 (numerator value adjusts by row)		
22	Condition Factor (C)		0.0003				Daily group Feed Ration (g) = D38*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish Wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish Wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR		10				Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d		15				Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	20.33	1.07	3.05	20.63	1.09	2.00	5.07	
34	2	20.63	1.09	3.10	20.94	1.10	2.01	5.10	
35	3	20.94	1.10	3.14	21.26	1.12	2.02	5.13	
36	4	21.26	1.12	3.19	21.58	1.14	2.03	5.15	
37	5	21.58	1.14	3.24	21.90	1.15	2.04	5.18	
38	6	21.90	1.15	3.29	22.23	1.17	2.05	5.20	
39	7	22.23	1.17	3.33	22.56	1.19	2.06	5.23	
40									
41	Daily group ration (g)		3.19		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	22.56	1.19	3.38	22.90	1.21	2.07	5.25	
45	9	22.90	1.21	3.44	23.25	1.22	2.08	5.28	
46	10	23.25	1.22	3.49	23.59	1.24	2.09	5.31	
47	11	23.59	1.24	3.54	23.95	1.26	2.10	5.33	
48	12	23.95	1.26	3.59	24.31	1.28	2.11	5.36	
49	13	24.31	1.28	3.65	24.67	1.30	2.12	5.39	
50	14	24.67	1.30	3.70	25.04	1.32	2.13	5.41	
51									
52	Daily group ration (g)		3.54		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	25.04	1.32	3.76	25.42	1.34	2.14	5.44	
56	16	25.42	1.34	3.81	25.80	1.36	2.15	5.47	
57	17	25.80	1.36	3.87	26.19	1.38	2.16	5.49	
58	18	26.19	1.38	3.93	26.58	1.40	2.17	5.52	
59	19	26.58	1.40	3.99	26.98	1.42	2.18	5.55	
60	20	26.98	1.42	4.05	27.38	1.44	2.20	5.58	
61	21	27.38	1.44	4.11	27.79	1.46	2.21	5.60	
62									
63	Daily group ration (g)		3.93		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	27.79	1.46	4.17	28.21	1.48	2.22	5.63	
67	23	28.21	1.48	4.23	28.63	1.51	2.23	5.66	
68	24	28.63	1.51	4.29	29.06	1.53	2.24	5.69	
69	25	29.06	1.53	4.36	29.50	1.55	2.25	5.72	
70	26	29.50	1.55	4.42	29.94	1.58	2.26	5.74	
71	27	29.94	1.58	4.49	30.39	1.60	2.27	5.77	
72	28	30.39	1.60	4.56	30.85	1.62	2.28	5.80	
73									
74	Daily group ration (g)		4.36		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	30.85	1.62	4.63	31.31	1.65	2.30	5.83	
78	30	31.31	1.65	4.70	31.78	1.67	2.31	5.86	
79	31	31.78	1.67	4.77	32.25	1.70	2.32	5.89	
80									
81	Daily group ration (g)		4.70		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs 1, 13-29

Reviewed by: TLS Date: 23APR12
Verified by: SR Date: 4-5-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Inter or Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: G
Holding Tank/Chamber: G15
Treatment Group: 100mg/L
Species: YEP Lot: 113000

Date Created/Initials: 08MAR12/TLS
Date Revised/Initials:
Approved for u [redacted] 08MAR12
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.08					
21	Number of fish			20					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					
27									

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	21.60	1.08	3.24	21.92	1.10	2.00	5.09	
34	2	21.82	1.10	3.29	22.25	1.11	2.01	5.12	
35	3	22.25	1.11	3.34	22.59	1.13	2.02	5.14	
36	4	22.59	1.13	3.39	22.93	1.15	2.03	5.17	
37	5	22.93	1.15	3.44	23.27	1.16	2.04	5.19	
38	6	23.27	1.16	3.49	23.62	1.18	2.05	5.22	
39	7	23.62	1.18	3.54	23.97	1.20	2.06	5.24	
40									
41	Daily group ration (g)		3.39		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	23.97	1.20	3.60	24.33	1.22	2.07	5.27	
45	9	24.33	1.22	3.65	24.70	1.23	2.09	5.30	
46	10	24.70	1.23	3.70	25.07	1.25	2.10	5.32	
47	11	25.07	1.25	3.76	25.44	1.27	2.11	5.35	
48	12	25.44	1.27	3.82	25.83	1.29	2.12	5.38	
49	13	25.83	1.29	3.87	26.21	1.31	2.13	5.40	
50	14	26.21	1.31	3.93	26.61	1.33	2.14	5.43	
51									
52	Daily group ration (g)		3.76		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	26.61	1.33	3.99	27.01	1.35	2.15	5.46	
56	16	27.01	1.35	4.05	27.41	1.37	2.16	5.48	
57	17	27.41	1.37	4.11	27.82	1.39	2.17	5.51	
58	18	27.82	1.39	4.17	28.24	1.41	2.18	5.54	
59	19	28.24	1.41	4.24	28.66	1.43	2.19	5.57	
60	20	28.66	1.43	4.30	29.09	1.45	2.20	5.59	
61	21	29.09	1.45	4.36	29.53	1.48	2.21	5.62	
62									
63	Daily group ration (g)		4.18		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	29.53	1.48	4.43	29.97	1.50	2.22	5.65	
67	23	29.97	1.50	4.50	30.42	1.52	2.24	5.68	
68	24	30.42	1.52	4.56	30.88	1.54	2.25	5.71	
69	25	30.88	1.54	4.63	31.34	1.57	2.26	5.73	
70	26	31.34	1.57	4.70	31.81	1.59	2.27	5.76	
71	27	31.81	1.59	4.77	32.29	1.61	2.28	5.79	
72	28	32.29	1.61	4.84	32.77	1.64	2.29	5.82	
73									
74	Daily group ration (g)		4.69		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	32.77	1.64	4.92	33.26	1.66	2.30	5.85	
78	30	33.26	1.66	4.99	33.76	1.69	2.31	5.88	
79	31	33.76	1.69	5.06	34.27	1.71	2.33	5.91	
80									
81	Daily group ration (g)		4.99		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 13
Pg 15 of 15
AEH-12-PSEUDO-03

Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder: 7 Lab book/pgs 1, 24-31 Verified by: SM Date 4-25-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C – If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F1
Treatment Group: 50 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 3-22-12/ JM
Date Revised/in [redacted]
Approved for us [redacted] 3-22-12 Date

INPUT SECTION

Initial fish size (g)	~~1.86~~ ①
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial Fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($ D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.34	1.86	5.30	35.87	1.89	2.40	6.10
2	35.87	1.89	5.38	36.41	1.92	2.41	6.13
3	36.41	1.92	5.46	36.95	1.94	2.43	6.16
4	36.95	1.94	5.54	37.51	1.97	2.44	6.19
5	37.51	1.97	5.63	38.07	2.00	2.45	6.22
6	38.07	2.00	5.71	38.64	2.03	2.46	6.25
7	38.64	2.03	5.80	39.22	2.06	2.47	6.29
Daily group ration (g)		5.55	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.29	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	39.22	2.06	5.88	39.81	2.10	2.49	6.32
9	39.81	2.10	5.97	40.41	2.13	2.50	6.35
10	40.41	2.13	6.06	41.01	2.16	2.51	6.38
11	41.01	2.16	6.15	41.63	2.19	2.52	6.41
12	41.63	2.19	6.24	42.25	2.22	2.54	6.44
13	42.25	2.22	6.34	42.89	2.26	2.55	6.48
14	42.89	2.26	6.43	43.53	2.29	2.56	6.51
Daily group ration (g)		6.15	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.32	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	43.53	2.29	6.53	44.18	2.33	2.57	6.54
16	44.18	2.33	6.63	44.85	2.36	2.59	6.57
17	44.85	2.36	6.73	45.52	2.40	2.60	6.61
18	45.52	2.40	6.83	46.20	2.43	2.61	6.64
19	46.20	2.43	6.93	46.89	2.47	2.63	6.67
20	46.89	2.47	7.03	47.60	2.51	2.64	6.70
21	47.60	2.51	7.14	48.31	2.54	2.65	6.74
Daily group ration (g)		6.83	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.36	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	48.31	2.54	7.25	49.04	2.58	2.67	6.77
23	49.04	2.58	7.36	49.77	2.62	2.68	6.81
24	49.77	2.62	7.47	50.52	2.66	2.69	6.84
25	50.52	2.66	7.58	51.28	2.70	2.71	6.87
26	51.28	2.70	7.69	52.05	2.74	2.72	6.91
27	52.05	2.74	7.81	52.83	2.78	2.73	6.94
28	52.83	2.78	7.92	53.62	2.82	2.75	6.98
Daily group ration (g)		7.58	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.40	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	53.62	2.82	8.04	54.42	2.86	2.76	7.01
30	54.42	2.86	8.16	55.24	2.91	2.77	7.05
31	55.24	2.91	8.29	56.07	2.95	2.79	7.08
Daily group ration (g)		8.16	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Revised 4-3-12
Do not use
JM 4/3/12

① Incorrect value. Initial fish size should be 1.87g/fish. Daily ration per fish does not change. KW 22MAR13

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23APR12
File Folder: 7 Lab book/pgs: 1, 24-31 Verified by: [redacted] Date: 4-3-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F2
Treatment Group: 300 MG/L
Species: WAE Lot: 112100
Date Created/Initials: 3-22-12/ JN
Date Revised/ [redacted]
Approved for [redacted] or 3/22/12 Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	1.96						
21	Number of fish	16						
22	Condition Factor (C)	0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR	10						
26	%B.W./d	15						
27								

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	31.36	1.96	4.70	31.83	1.99	2.44	6.21
34	2	31.83	1.99	4.77	32.31	2.02	2.45	6.24
35	3	32.31	2.02	4.85	32.79	2.05	2.47	6.27
36	4	32.79	2.05	4.92	33.28	2.08	2.48	6.30
37	5	33.28	2.08	4.99	33.78	2.11	2.49	6.33
38	6	33.78	2.11	5.07	34.29	2.14	2.51	6.36
39	7	34.29	2.14	5.14	34.80	2.18	2.52	6.40
40								
41	Daily group ration (g)		4.92		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	34.80	2.18	5.22	35.33	2.21	2.53	6.43
45	9	35.33	2.21	5.30	35.86	2.24	2.54	6.46
46	10	35.86	2.24	5.38	36.39	2.27	2.56	6.49
47	11	36.39	2.27	5.46	36.94	2.31	2.57	6.52
48	12	36.94	2.31	5.54	37.49	2.34	2.58	6.56
49	13	37.49	2.34	5.62	38.06	2.38	2.59	6.59
50	14	38.06	2.38	5.71	38.63	2.41	2.61	6.62
51								
52	Daily group ration (g)		5.46		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	38.63	2.41	5.79	39.21	2.45	2.62	6.66
56	16	39.21	2.45	5.88	39.80	2.49	2.63	6.69
57	17	39.80	2.49	5.97	40.39	2.52	2.65	6.72
58	18	40.39	2.52	6.06	41.00	2.56	2.66	6.76
59	19	41.00	2.56	6.15	41.61	2.60	2.67	6.79
60	20	41.61	2.60	6.24	42.24	2.64	2.69	6.82
61	21	42.24	2.64	6.34	42.87	2.68	2.70	6.86
62								
63	Daily group ration (g)		6.06		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	42.87	2.68	6.43	43.51	2.72	2.71	6.89
67	23	43.51	2.72	6.53	44.17	2.76	2.73	6.93
68	24	44.17	2.76	6.63	44.83	2.80	2.74	6.96
69	25	44.83	2.80	6.72	45.50	2.84	2.75	6.99
70	26	45.50	2.84	6.83	46.18	2.89	2.77	7.03
71	27	46.18	2.89	6.93	46.88	2.93	2.78	7.06
72	28	46.88	2.93	7.03	47.58	2.97	2.79	7.10
73								
74	Daily group ration (g)		6.73		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	47.58	2.97	7.14	48.29	3.02	2.81	7.13
78	30	48.29	3.02	7.24	49.02	3.06	2.82	7.17
79	31	49.02	3.06	7.35	49.75	3.11	2.84	7.21
80								
81	Daily group ration (g)		7.24		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-3-12 JN

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 29-31

Reviewed by: TJS Date: 23Apr12
Verified by: Sn Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR – Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d – Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467. If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System_______F_______________ **Date Created/Initials:_3-22-12/ Jn**
Holding Tank/Chamber:___F3___________ **Date Revised/initials:**
Treatment Group:__100 MG/L_______________ **Approved for us[redacted]r** 3/22/12 **Date**
Species:_WAE___________Lot: _112100___________

Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	1.98
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

	Day	Group Total Initial Fish wt (g)	Average Individual Initia Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
	1	39.60	1.98	5.94	40.19	2.01	2.45	6.23
	2	40.19	2.01	6.03	40.80	2.04	2.46	6.26
	3	40.80	2.04	6.12	41.41	2.07	2.48	6.29
	4	41.41	2.07	6.21	42.03	2.10	2.49	6.32
	5	42.03	2.10	6.30	42.66	2.13	2.50	6.35
	6	42.66	2.13	6.40	43.30	2.17	2.51	6.39
	7	43.30	2.17	6.50	43.95	2.20	2.53	6.42
Daily group ration (g)			6.21	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)			0.31	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
	8	43.95	2.20	6.59	44.61	2.23	2.54	6.45
	9	44.61	2.23	6.69	45.28	2.26	2.55	6.48
	10	45.28	2.26	6.79	45.96	2.30	2.56	6.51
	11	45.96	2.30	6.89	46.65	2.33	2.58	6.55
	12	46.65	2.33	7.00	47.35	2.37	2.59	6.58
	13	47.35	2.37	7.10	48.06	2.40	2.60	6.61
	14	48.06	2.40	7.21	48.78	2.44	2.62	6.65
Daily group ration (g)			6.90	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)			0.34	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
	15	48.78	2.44	7.32	49.51	2.48	2.63	6.68
	16	49.51	2.48	7.43	50.25	2.51	2.64	6.71
	17	50.25	2.51	7.54	51.01	2.55	2.66	6.74
	18	51.01	2.55	7.65	51.77	2.59	2.67	6.78
	19	51.77	2.59	7.77	52.55	2.63	2.68	6.81
	20	52.55	2.63	7.88	53.34	2.67	2.70	6.85
	21	53.34	2.67	8.00	54.14	2.71	2.71	6.88
Daily group ration (g)			7.65	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)			0.38	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
	22	54.14	2.71	8.12	54.95	2.75	2.72	6.91
	23	54.95	2.75	8.24	55.77	2.79	2.74	6.95
	24	55.77	2.79	8.37	56.61	2.83	2.75	6.98
	25	56.61	2.83	8.49	57.46	2.87	2.76	7.02
	26	57.46	2.87	8.62	58.32	2.92	2.78	7.05
	27	58.32	2.92	8.75	59.19	2.96	2.79	7.09
	28	59.19	2.96	8.88	60.08	3.00	2.80	7.12
Daily group ration (g)			8.50	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)			0.42	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
	29	60.08	3.00	9.01	60.98	3.05	2.82	7.16
	30	60.98	3.05	9.15	61.90	3.09	2.83	7.19
	31	61.90	3.09	9.28	62.83	3.14	2.85	7.23
Daily group ration (g)			9.15	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)			0.46	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Revised 4-3-12
Do not use
4-3-12
JN

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 3 of 13

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23MAR12
File Folder 7 Lab book/pgs 1 / 29-31 Verified by: JM Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management,
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 3-22-12/ JM
Holding Tank/Chamber: F4 Date Revised/Initi[redacted]
Treatment Group: 100 MG/L Approved for use: [redacted] r 3/22/12 Date
Species: WAE Lot: 112100

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2 ①
Number of fish	30
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	60.00	2.00	9.00	60.90	2.03	2.46	6.25
2	60.90	2.03	9.14	61.81	2.06	2.47	6.28
3	61.81	2.06	9.27	62.74	2.09	2.49	6.31
4	62.74	2.09	9.41	63.68	2.12	2.50	6.34
5	63.68	2.12	9.55	64.64	2.15	2.51	6.38
6	64.64	2.15	9.70	65.61	2.19	2.52	6.41
7	65.61	2.19	9.84	66.59	2.22	2.54	6.44
Daily group ration (g)		9.42		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	66.59	2.22	9.99	67.59	2.25	2.55	6.47
9	67.59	2.25	10.14	68.60	2.29	2.56	6.50
10	68.60	2.29	10.29	69.63	2.32	2.57	6.54
11	69.63	2.32	10.44	70.68	2.36	2.59	6.57
12	70.68	2.36	10.60	71.74	2.39	2.60	6.60
13	71.74	2.39	10.76	72.81	2.43	2.61	6.63
14	72.81	2.43	10.92	73.91	2.46	2.62	6.67
Daily group ration (g)		10.45		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	73.91	2.46	11.09	75.01	2.50	2.64	6.70
16	75.01	2.50	11.25	76.14	2.54	2.65	6.73
17	76.14	2.54	11.42	77.28	2.58	2.66	6.77
18	77.28	2.58	11.59	78.44	2.61	2.68	6.80
19	78.44	2.61	11.77	79.62	2.65	2.69	6.83
20	79.62	2.65	11.94	80.81	2.69	2.70	6.87
21	80.81	2.69	12.12	82.02	2.73	2.72	6.90
Daily group ration (g)		11.60		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	82.02	2.73	12.30	83.25	2.78	2.73	6.94
23	83.25	2.78	12.49	84.50	2.82	2.74	6.97
24	84.50	2.82	12.68	85.77	2.86	2.76	7.01
25	85.77	2.86	12.87	87.06	2.90	2.77	7.04
26	87.06	2.90	13.06	88.36	2.95	2.79	7.08
27	88.36	2.95	13.25	89.69	2.99	2.80	7.11
28	89.69	2.99	13.45	91.03	3.03	2.81	7.15
Daily group ration (g)		12.87		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	91.03	3.03	13.65	92.40	3.08	2.83	7.18
30	92.40	3.08	13.86	93.78	3.13	2.84	7.22
31	93.78	3.13	14.07	95.19	3.17	2.86	7.25
Daily group ration (g)		13.86		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① Incorrect initial fish size. Should be 1.99g/fish. Daily feed ration per fish does not change. KW 22MAR13

Revised 4-3-12
DO not use
JM 4-3-12

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 4 of 19

Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23APR12
File Folder 7 Lab book/pgs 1, 24-31 Verified by: SM Date 4-3-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F **Date Created/Initials:** 3-22-12/ SM
Holding Tank/Chamber: F5 **Date Revised/initials:**
Treatment Group: 200 MG/L **Approved for use:** [redacted] 3/22/12 Date
Species: WAE **Lot:** 112100

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.88
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.72	1.88	5.36	36.26	1.91	2.41	6.12
2	36.26	1.91	5.44	36.80	1.94	2.42	6.15
3	36.80	1.94	5.52	37.35	1.97	2.43	6.18
4	37.35	1.97	5.60	37.91	2.00	2.45	6.22
5	37.91	2.00	5.69	38.48	2.03	2.46	6.25
6	38.48	2.03	5.77	39.06	2.06	2.47	6.28
7	39.06	2.06	5.86	39.64	2.09	2.48	6.31
Daily group ration (g)		5.61		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	39.64	2.09	5.95	40.24	2.12	2.50	6.34
9	40.24	2.12	6.04	40.84	2.15	2.51	6.37
10	40.84	2.15	6.13	41.45	2.18	2.52	6.40
11	41.45	2.18	6.22	42.08	2.21	2.53	6.43
12	42.08	2.21	6.31	42.71	2.25	2.55	6.47
13	42.71	2.25	6.41	43.35	2.28	2.56	6.50
14	43.35	2.28	6.50	44.00	2.32	2.57	6.53
Daily group ration (g)		6.22		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	44.00	2.32	6.60	44.66	2.35	2.58	6.56
16	44.66	2.35	6.70	45.33	2.39	2.60	6.60
17	45.33	2.39	6.80	46.01	2.42	2.61	6.63
18	46.01	2.42	6.90	46.70	2.46	2.62	6.66
19	46.70	2.46	7.00	47.40	2.49	2.64	6.70
20	47.40	2.49	7.11	48.11	2.53	2.65	6.73
21	48.11	2.53	7.22	48.83	2.57	2.66	6.76
Daily group ration (g)		6.90		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	48.83	2.57	7.32	49.56	2.61	2.68	6.80
23	49.56	2.61	7.43	50.31	2.65	2.69	6.83
24	50.31	2.65	7.55	51.06	2.69	2.70	6.86
25	51.06	2.69	7.66	51.83	2.73	2.72	6.90
26	51.83	2.73	7.77	52.61	2.77	2.73	6.93
27	52.61	2.77	7.89	53.39	2.81	2.74	6.97
28	53.39	2.81	8.01	54.20	2.85	2.76	7.00
Daily group ration (g)		7.66		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	54.20	2.85	8.13	55.01	2.90	2.77	7.04
30	55.01	2.90	8.25	55.83	2.94	2.78	7.07
31	55.83	2.94	8.37	56.67	2.98	2.80	7.11
Daily group ration (g)		8.25		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-3-12
SM

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 24-31

Reviewed by: TDS Date: 23APR12
Verified by: JW Date 24-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F6
Treatment Group: 300 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 3-22-12/ JW
Date Revised/ini [redacted]
Approved for use [redacted] 3/22/12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2.1
Number of fish	8
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333836 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	16.80	2.10	2.52	17.05	2.13	2.50	6.35
2	17.05	2.13	2.56	17.31	2.16	2.51	6.38
3	17.31	2.16	2.60	17.57	2.20	2.53	6.42
4	17.57	2.20	2.64	17.83	2.23	2.54	6.45
5	17.83	2.23	2.67	18.10	2.26	2.55	6.48
6	18.10	2.26	2.71	18.37	2.30	2.56	6.51
7	18.37	2.30	2.76	18.65	2.33	2.58	6.55
Daily group ration (g)			2.64	←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)			0.33	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	18.65	2.33	2.80	18.93	2.37	2.59	6.58
9	18.93	2.37	2.84	19.21	2.40	2.60	6.61
10	19.21	2.40	2.88	19.50	2.44	2.62	6.64
11	19.50	2.44	2.92	19.79	2.47	2.63	6.68
12	19.79	2.47	2.97	20.09	2.51	2.64	6.71
13	20.09	2.51	3.01	20.39	2.55	2.65	6.74
14	20.39	2.55	3.06	20.69	2.59	2.67	6.78
Daily group ration (g)			2.93	←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)			0.37	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	20.69	2.59	3.10	21.00	2.63	2.68	6.81
16	21.00	2.63	3.15	21.32	2.66	2.69	6.84
17	21.32	2.66	3.20	21.64	2.70	2.71	6.88
18	21.64	2.70	3.25	21.96	2.75	2.72	6.91
19	21.96	2.75	3.29	22.29	2.79	2.74	6.95
20	22.29	2.79	3.34	22.63	2.83	2.75	6.98
21	22.63	2.83	3.39	22.97	2.87	2.76	7.02
Daily group ration (g)			3.25	←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)			0.41	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	22.97	2.87	3.44	23.31	2.91	2.78	7.05
23	23.31	2.91	3.50	23.66	2.96	2.79	7.09
24	23.66	2.96	3.55	24.02	3.00	2.80	7.12
25	24.02	3.00	3.60	24.38	3.05	2.82	7.16
26	24.38	3.05	3.66	24.74	3.09	2.83	7.19
27	24.74	3.09	3.71	25.11	3.14	2.85	7.23
28	25.11	3.14	3.77	25.49	3.19	2.86	7.26
Daily group ration (g)			3.60	←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)			0.45	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	25.49	3.19	3.82	25.87	3.23	2.87	7.30
30	25.87	3.23	3.88	26.26	3.28	2.89	7.34
31	26.26	3.28	3.94	26.65	3.33	2.90	7.37
Daily group ration (g)			3.88	←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)			0.49	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① Incorrect initial fish size. Should be 2.07g/fish. Daily feed ration should be 0.32g/fish. KW 23MAR13

Revised 4-3-12
Do not use
4-3-12
JW

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 6 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TDS Date: 23APR12
File Folder 7 Lab book/pgs 1 ; 24-31 Verified by: JH Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 3-22-12/ JH
Holding Tank/Chamber: F7 Date Revised/Ini [redacted]
Treatment Group: 200 MG/L Approved for us [redacted] 3/22/12 Date
Species: WAE Lot: 112100

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.84
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	34.96	1.84	5.24	35.48	1.87	2.39	6.08
2	35.48	1.87	5.32	36.02	1.90	2.41	6.11
3	36.02	1.90	5.40	36.56	1.92	2.42	6.14
4	36.56	1.92	5.48	37.11	1.95	2.43	6.17
5	37.11	1.95	5.57	37.66	1.98	2.44	6.20
6	37.66	1.98	5.65	38.23	2.01	2.45	6.23
7	38.23	2.01	5.73	38.80	2.04	2.47	6.26
Daily group ration (g)		5.49		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	38.80	2.04	5.82	39.38	2.07	2.48	6.29
9	39.38	2.07	5.91	39.97	2.10	2.49	6.33
10	39.97	2.10	6.00	40.57	2.14	2.50	6.36
11	40.57	2.14	6.09	41.18	2.17	2.52	6.39
12	41.18	2.17	6.18	41.80	2.20	2.53	6.42
13	41.80	2.20	6.27	42.43	2.23	2.54	6.45
14	42.43	2.23	6.36	43.06	2.27	2.55	6.48
Daily group ration (g)		6.09		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	43.06	2.27	6.46	43.71	2.30	2.57	6.52
16	43.71	2.30	6.56	44.36	2.33	2.58	6.55
17	44.36	2.33	6.65	45.03	2.37	2.59	6.58
18	45.03	2.37	6.75	45.70	2.41	2.60	6.61
19	45.70	2.41	6.86	46.39	2.44	2.62	6.65
20	46.39	2.44	6.96	47.09	2.48	2.63	6.68
21	47.09	2.48	7.06	47.79	2.52	2.64	6.71
Daily group ration (g)		6.76		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	47.79	2.52	7.17	48.51	2.55	2.66	6.75
23	48.51	2.55	7.28	49.24	2.59	2.67	6.78
24	49.24	2.59	7.39	49.98	2.63	2.68	6.81
25	49.98	2.63	7.50	50.73	2.67	2.70	6.85
26	50.73	2.67	7.61	51.49	2.71	2.71	6.88
27	51.49	2.71	7.72	52.26	2.75	2.72	6.92
28	52.26	2.75	7.84	53.04	2.79	2.74	6.95
Daily group ration (g)		7.50		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	53.04	2.79	7.96	53.84	2.83	2.75	6.99
30	53.84	2.83	8.08	54.65	2.88	2.76	7.02
31	54.65	2.88	8.20	55.46	2.92	2.78	7.06
Daily group ration (g)		8.08		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-3-12
JH

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TPS Date: 2/24/12
File Folder: 7 Lab book/pgs: 1 / 24-31 Verified by: SM Date: 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F8
Treatment Group: 50 MG/L
Species: WAE Lot: 112100
Date Created/Initial: 2-22-12 KAL
Date Revised/Initial: [redacted]
Approved for use: [redacted] 3/22/12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			2.1 (1)					
21	Number of fish			20					
22	Condition Factor (C)			0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$E$22)^0.333339536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	42.00	2.10	6.30	42.63	2.13	2.50	6.35
34	2	42.63	2.13	6.39	43.27	2.16	2.51	6.38
35	3	43.27	2.16	6.49	43.92	2.20	2.53	6.42
36	4	43.92	2.20	6.59	44.58	2.23	2.54	6.45
37	5	44.58	2.23	6.69	45.25	2.26	2.55	6.48
38	6	45.25	2.26	6.79	45.92	2.30	2.56	6.51
39	7	45.92	2.30	6.89	46.61	2.33	2.58	6.55
40								
41	Daily group ration (g)		6.59		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	46.61	2.33	6.99	47.31	2.37	2.59	6.58
45	9	47.31	2.37	7.10	48.02	2.40	2.60	6.61
46	10	48.02	2.40	7.20	48.74	2.44	2.62	6.64
47	11	48.74	2.44	7.31	49.47	2.47	2.63	6.68
48	12	49.47	2.47	7.42	50.22	2.51	2.64	6.71
49	13	50.22	2.51	7.53	50.97	2.55	2.65	6.74
50	14	50.97	2.55	7.65	51.73	2.59	2.67	6.78
51								
52	Daily group ration (g)		7.31		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	51.73	2.59	7.76	52.51	2.63	2.68	6.81
56	16	52.51	2.63	7.88	53.30	2.66	2.69	6.84
57	17	53.30	2.66	7.99	54.10	2.70	2.71	6.88
58	18	54.10	2.70	8.11	54.91	2.75	2.72	6.91
59	19	54.91	2.75	8.24	55.73	2.79	2.74	6.95
60	20	55.73	2.79	8.36	56.57	2.83	2.75	6.98
61	21	56.57	2.83	8.49	57.42	2.87	2.76	7.02
62								
63	Daily group ration (g)		8.12		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	57.42	2.87	8.61	58.28	2.91	2.78	7.05
67	23	58.28	2.91	8.74	59.15	2.96	2.79	7.09
68	24	59.15	2.96	8.87	60.04	3.00	2.80	7.12
69	25	60.04	3.00	9.01	60.94	3.05	2.82	7.16
70	26	60.94	3.05	9.14	61.85	3.09	2.83	7.19
71	27	61.85	3.09	9.28	62.78	3.14	2.85	7.23
72	28	62.78	3.14	9.42	63.72	3.19	2.86	7.26
73								
74	Daily group ration (g)		9.01		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	63.72	3.19	9.56	64.68	3.23	2.87	7.30
78	30	64.68	3.23	9.70	65.65	3.28	2.89	7.34
79	31	65.65	3.28	9.85	66.63	3.33	2.90	7.37
80								
81	Daily group ration (g)		9.70		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) Incorrect Initial fish size. Should be 2.09 g/fish. Daily feed ration does not change. KLW 22MAR13

Revised 4-3-12 Do not use 4-3-12 JM

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TPS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 24-31 Verified by: SM Date 4-3-12

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C – if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 3-22-12/ SM
Holding Tank/Chamber: F9 Date Revised/Ini [redacted]
Treatment Group: 100 MG/L Approved for use [redacted] 3/22/12 Date
Species: WAE Lot: 112100

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.87
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) – E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) – D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	37.40	1.87	5.61	37.96	1.90	2.41	6.11
2	37.96	1.90	5.69	38.53	1.93	2.42	6.14
3	38.53	1.93	5.78	39.11	1.96	2.43	6.17
4	39.11	1.96	5.87	39.69	1.98	2.44	6.20
5	39.69	1.98	5.95	40.29	2.01	2.45	6.23
6	40.29	2.01	6.04	40.89	2.04	2.47	6.27
7	40.89	2.04	6.13	41.51	2.08	2.48	6.30
Daily group ration (g)		5.87		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	41.51	2.08	6.23	42.13	2.11	2.49	6.33
9	42.13	2.11	6.32	42.76	2.14	2.50	6.36
10	42.76	2.14	6.41	43.40	2.17	2.52	6.39
11	43.40	2.17	6.51	44.06	2.20	2.53	6.42
12	44.06	2.20	6.61	44.72	2.24	2.54	6.46
13	44.72	2.24	6.71	45.39	2.27	2.55	6.49
14	45.39	2.27	6.81	46.07	2.30	2.57	6.52
Daily group ration (g)		6.51		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	46.07	2.30	6.91	46.76	2.34	2.58	6.55
16	46.76	2.34	7.01	47.46	2.37	2.59	6.58
17	47.46	2.37	7.12	48.17	2.41	2.61	6.62
18	48.17	2.41	7.23	48.89	2.44	2.62	6.65
19	48.89	2.44	7.33	49.63	2.48	2.63	6.68
20	49.63	2.48	7.44	50.37	2.52	2.64	6.72
21	50.37	2.52	7.56	51.15	2.56	2.65	6.75
Daily group ration (g)		7.23		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.13	2.56	7.67	51.89	2.59	2.67	6.78
23	51.89	2.59	7.78	52.67	2.63	2.68	6.82
24	52.67	2.63	7.90	53.46	2.67	2.70	6.85
25	53.46	2.67	8.02	54.27	2.71	2.71	6.89
26	54.27	2.71	8.14	55.08	2.75	2.72	6.92
27	55.08	2.75	8.26	55.91	2.80	2.74	6.95
28	55.91	2.80	8.39	56.74	2.84	2.75	6.99
Daily group ration (g)		8.02		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	56.74	2.84	8.51	57.60	2.88	2.77	7.02
30	57.60	2.88	8.64	58.46	2.92	2.78	7.06
31	58.46	2.92	8.77	59.34	2.97	2.79	7.09
Daily group ration (g)		8.64		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Dsml use
4-3-12
SM

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 1 / 24-31

Reviewed by: TRS Date: 23APR12
Verified by: SM Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F10
Treatment Group: CONTROL
Species: WAE Lot: 112100

Date Created/Initials: 3-22-12/ SM
Date Revised/i[redacted]
Approved for u[redacted] 3/22/12 Date

Row	Column:	c	d	e	f	g	h	i	j
19		**INPUT SECTION**							
20		Initial fish size (g)	1.88						
21		Number of fish	20						
22		Condition Factor (C)	0.0003						
23		(C = 0.00015 - 0.00050 in 0.00005 increments)							
24									
25		FCR	10						
26		% B.W./d	15						

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$DS25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	37.60	1.88	5.64	38.16	1.91	2.41	6.12
2	38.16	1.91	5.72	38.74	1.94	2.42	6.15
3	38.74	1.94	5.81	39.32	1.97	2.43	6.18
4	39.32	1.97	5.90	39.91	2.00	2.45	6.22
5	39.91	2.00	5.99	40.51	2.03	2.46	6.25
6	40.51	2.03	6.08	41.11	2.06	2.47	6.28
7	41.11	2.06	6.17	41.73	2.09	2.48	6.31
Daily group ration (g)		5.90	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.30	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	41.73	2.09	6.26	42.36	2.12	2.50	6.34
9	42.36	2.12	6.35	42.99	2.15	2.51	6.37
10	42.99	2.15	6.45	43.64	2.18	2.52	6.40
11	43.64	2.18	6.55	44.29	2.21	2.53	6.43
12	44.29	2.21	6.64	44.96	2.25	2.55	6.47
13	44.96	2.25	6.74	45.63	2.28	2.56	6.50
14	45.63	2.28	6.84	46.31	2.32	2.57	6.53
Daily group ration (g)		6.55	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.33	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	46.31	2.32	6.95	47.01	2.35	2.58	6.56
16	47.01	2.35	7.05	47.71	2.39	2.60	6.60
17	47.71	2.39	7.16	48.43	2.42	2.61	6.63
18	48.43	2.42	7.26	49.16	2.46	2.62	6.66
19	49.16	2.46	7.37	49.89	2.49	2.64	6.70
20	49.89	2.49	7.48	50.64	2.53	2.65	6.73
21	50.64	2.53	7.60	51.40	2.57	2.66	6.76
Daily group ration (g)		7.27	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.36	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	51.40	2.57	7.71	52.17	2.61	2.68	6.80
23	52.17	2.61	7.83	52.95	2.65	2.69	6.83
24	52.95	2.65	7.94	53.75	2.69	2.70	6.86
25	53.75	2.69	8.06	54.55	2.73	2.72	6.90
26	54.56	2.73	8.18	55.37	2.77	2.73	6.93
27	55.37	2.77	8.31	56.20	2.81	2.74	6.97
28	56.20	2.81	8.43	57.05	2.85	2.76	7.00
Daily group ration (g)		8.07	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.40	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	57.05	2.85	8.56	57.90	2.90	2.77	7.04
30	57.90	2.90	8.69	58.77	2.94	2.78	7.07
31	58.77	2.94	8.82	59.65	2.98	2.80	7.11
Daily group ration (g)		8.69	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Revised 4-3-12
Do not use
4-3-12
SM

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 24-31

Reviewed by: TTS Date: 23APR12
Verified by: JS Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per Individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F11
Treatment Group: 300 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 3-22-12/ JS
Date Revised/initi [redacted]
Approved for use: [redacted] r 3-22-12 Date

Row	Column:	e	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.06
Number of fish	16
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	31.36	1.96	4.70	31.83	1.99	2.44	6.21
2	31.83	1.99	4.77	32.31	2.02	2.46	6.24
3	32.31	2.02	4.85	32.79	2.05	2.47	6.27
4	32.79	2.05	4.92	33.28	2.08	2.48	6.30
5	33.28	2.08	4.99	33.78	2.11	2.49	6.33
6	33.78	2.11	5.07	34.29	2.14	2.51	6.36
7	34.29	2.14	5.14	34.80	2.18	2.52	6.40
Daily group ration (g)		4.92		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	34.80	2.18	5.22	35.33	2.21	2.53	6.43
9	35.33	2.21	5.30	35.86	2.24	2.54	6.46
10	35.86	2.24	5.38	36.39	2.27	2.56	6.49
11	36.39	2.27	5.46	36.94	2.31	2.57	6.52
12	36.94	2.31	5.54	37.49	2.34	2.58	6.56
13	37.49	2.34	5.62	38.06	2.38	2.59	6.59
14	38.06	2.38	5.71	38.63	2.41	2.61	6.62
Daily group ration (g)		5.46		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	38.63	2.41	5.79	39.21	2.45	2.62	6.66
16	39.21	2.45	5.88	39.80	2.49	2.63	6.69
17	39.80	2.49	5.97	40.39	2.52	2.65	6.72
18	40.39	2.52	6.06	41.00	2.56	2.66	6.76
19	41.00	2.56	6.15	41.61	2.60	2.67	6.79
20	41.61	2.60	6.24	42.24	2.64	2.69	6.82
21	42.24	2.64	6.34	42.87	2.68	2.70	6.86
Daily group ration (g)		6.06		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	42.87	2.68	6.43	43.51	2.72	2.71	6.89
23	43.51	2.72	6.53	44.17	2.76	2.73	6.93
24	44.17	2.76	6.63	44.83	2.80	2.74	6.96
25	44.83	2.80	6.72	45.50	2.84	2.75	6.99
26	45.50	2.84	6.83	46.18	2.89	2.77	7.03
27	46.18	2.89	6.93	46.88	2.93	2.78	7.06
28	46.88	2.93	7.03	47.58	2.97	2.79	7.10
Daily group ration (g)		6.73		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	47.58	2.97	7.14	48.29	3.02	2.81	7.13
30	48.29	3.02	7.24	49.02	3.06	2.82	7.17
31	49.02	3.06	7.35	49.75	3.11	2.84	7.21
Daily group ration (g)		7.24		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-4 wrong data
4-3-12
JS
4-3-12
JS

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs 1, 24-31

Reviewed by: TTS Date: 2/19/12
Verified by: SAL Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie. FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained.
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F12
Treatment Group: 200 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 3-22-12/ JA
Date Revised/in [redacted]
Approved for us [redacted] 3-22-12 Date

INPUT SECTION	
Initial fish size (g)	1.93
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	36.67	1.93	5.50	37.22	1.96	2.43	6.18
2	37.22	1.96	5.58	37.78	1.99	2.44	6.21
3	37.78	1.99	5.67	38.35	2.02	2.46	6.24
4	38.35	2.02	5.75	38.92	2.05	2.47	6.27
5	38.92	2.05	5.84	39.50	2.08	2.48	6.30
6	39.50	2.08	5.93	40.10	2.11	2.49	6.33
7	40.10	2.11	6.01	40.70	2.14	2.51	6.36
Daily group ration (g)		5.75		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	40.70	2.14	6.10	41.31	2.17	2.52	6.40
9	41.31	2.17	6.20	41.93	2.21	2.53	6.43
10	41.93	2.21	6.29	42.56	2.24	2.54	6.46
11	42.56	2.24	6.38	43.20	2.27	2.56	6.49
12	43.20	2.27	6.48	43.84	2.31	2.57	6.52
13	43.84	2.31	6.58	44.50	2.34	2.58	6.56
14	44.50	2.34	6.68	45.17	2.38	2.59	6.59
Daily group ration (g)		6.39		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	45.17	2.38	6.78	45.85	2.41	2.61	6.62
16	45.85	2.41	6.88	46.53	2.45	2.62	6.65
17	46.53	2.45	6.98	47.23	2.49	2.63	6.69
18	47.23	2.49	7.08	47.94	2.52	2.65	6.72
19	47.94	2.52	7.19	48.66	2.56	2.66	6.75
20	48.66	2.56	7.30	49.39	2.60	2.67	6.79
21	49.39	2.60	7.41	50.13	2.64	2.69	6.82
Daily group ration (g)		7.09		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	50.13	2.64	7.52	50.88	2.68	2.70	6.86
23	50.88	2.68	7.63	51.65	2.72	2.71	6.89
24	51.65	2.72	7.75	52.42	2.76	2.73	6.92
25	52.42	2.76	7.86	53.21	2.80	2.74	6.96
26	53.21	2.80	7.98	54.00	2.84	2.75	6.99
27	54.00	2.84	8.10	54.81	2.88	2.77	7.03
28	54.81	2.88	8.22	55.64	2.93	2.78	7.06
Daily group ration (g)		7.87		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	55.64	2.93	8.35	56.47	2.97	2.79	7.10
30	56.47	2.97	8.47	57.32	3.02	2.81	7.13
31	57.32	3.02	8.60	58.18	3.06	2.82	7.17
Daily group ration (g)		8.47		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-3-12
JA

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TFS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 24-31 Verified by: JM Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 3-22-12/ TA
Holding Tank/Chamber: F13 Date Revised/ini [redacted]
Treatment Group: CONTROL Approved for us [redacted] 3/22/12 Date
Species: WAE Lot: 112100

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.75						
21	Number of fish		20						
22	Condition Factor (C)		0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		15						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DC21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$L$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total (Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	35.00	1.75	5.25	35.53	1.78	2.35	5.98	
2	35.53	1.78	5.33	36.06	1.80	2.37	6.01	
3	36.06	1.80	5.41	36.60	1.83	2.38	6.04	
4	36.60	1.83	5.49	37.15	1.86	2.39	6.07	
5	37.15	1.86	5.57	37.70	1.89	2.40	6.10	
6	37.70	1.89	5.66	38.27	1.91	2.41	6.13	
7	38.27	1.91	5.74	38.84	1.94	2.42	6.16	
Daily group ration (g)			5.49			←OUTPUT - GROUP FEED RATE (g) for week 1		
Daily per fish ration (g)			0.27			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1		
8	38.84	1.94	5.83	39.43	1.97	2.44	6.19	
9	39.43	1.97	5.91	40.02	2.00	2.45	6.22	
10	40.02	2.00	6.00	40.62	2.03	2.46	6.25	
11	40.62	2.03	6.09	41.23	2.06	2.47	6.28	
12	41.23	2.06	6.18	41.85	2.09	2.49	6.31	
13	41.85	2.09	6.28	42.47	2.12	2.50	6.35	
14	42.47	2.12	6.37	43.11	2.16	2.51	6.38	
Daily group ration (g)			6.10			←OUTPUT - GROUP FEED RATE (g) for week 2		
Daily per fish ration (g)			0.30			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2		
15	43.11	2.16	6.47	43.76	2.19	2.52	6.41	
16	43.76	2.19	6.56	44.41	2.22	2.54	6.44	
17	44.41	2.22	6.66	45.08	2.25	2.55	6.47	
18	45.08	2.25	6.76	45.76	2.29	2.56	6.51	
19	45.76	2.29	6.86	46.44	2.32	2.57	6.54	
20	46.44	2.32	6.97	47.14	2.36	2.59	6.57	
21	47.14	2.36	7.07	47.85	2.39	2.60	6.60	
Daily group ration (g)			6.77			←OUTPUT - GROUP FEED RATE (g) for week 3		
Daily per fish ration (g)			0.34			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3		
22	47.85	2.39	7.18	48.56	2.43	2.61	6.64	
23	48.56	2.43	7.28	49.29	2.46	2.63	6.67	
24	49.29	2.46	7.39	50.03	2.50	2.64	6.70	
25	50.03	2.50	7.50	50.78	2.54	2.65	6.74	
26	50.78	2.54	7.62	51.54	2.58	2.66	6.77	
27	51.54	2.58	7.73	52.32	2.62	2.68	6.80	
28	52.32	2.62	7.85	53.10	2.66	2.69	6.84	
Daily group ration (g)			7.51			←OUTPUT - GROUP FEED RATE (g) for week 4		
Daily per fish ration (g)			0.38			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4		
29	53.10	2.66	7.97	53.90	2.69	2.70	6.87	
30	53.90	2.69	8.08	54.71	2.74	2.72	6.90	
31	54.71	2.74	8.21	55.53	2.78	2.73	6.94	
Daily group ration (g)			8.09			←OUTPUT - GROUP FEED RATE (g) for week 5		
Daily per fish ration (g)			0.40			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5		

Revised 4-3-12
Do not use
4-3-12
JM

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TFS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 24-31 Verified by: JJ Date 4-5-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 3-22-12/ JJ
Holding Tank/Chamber: F14 Date Revised/ [redacted]
Treatment Group: CONTROL Approved for [redacted] 3-22-12
Species: WAE Lot: 112100 [redacted]ector Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.87							
21	Number of fish	20							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	15							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust ay row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$F$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
1	37.40	1.87	5.61	37.96	1.90	2.41	6.11
2	37.96	1.90	5.69	38.53	1.93	2.42	6.14
3	38.53	1.93	5.78	39.11	1.96	2.43	6.17
4	39.11	1.96	5.87	39.69	1.98	2.44	6.20
5	39.69	1.98	5.95	40.29	2.01	2.45	6.23
6	40.29	2.01	6.04	40.89	2.04	2.47	6.27
7	40.89	2.04	6.13	41.51	2.08	2.48	6.30
Daily group ration (g)		5.87		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	41.51	2.08	6.23	42.13	2.11	2.49	6.33
9	42.13	2.11	6.32	42.76	2.14	2.50	6.36
10	42.76	2.14	6.41	43.40	2.17	2.52	6.39
11	43.40	2.17	6.51	44.06	2.20	2.53	6.42
12	44.06	2.20	6.61	44.72	2.24	2.54	6.46
13	44.72	2.24	6.71	45.39	2.27	2.55	6.49
14	45.39	2.27	6.81	46.07	2.30	2.57	6.52
Daily group ration (g)		6.51		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	46.07	2.30	6.91	46.76	2.34	2.58	6.55
16	46.76	2.34	7.01	47.46	2.37	2.59	6.58
17	47.46	2.37	7.12	48.17	2.41	2.61	6.62
18	48.17	2.41	7.23	48.88	2.44	2.62	6.65
19	48.89	2.44	7.33	49.63	2.48	2.63	6.68
20	49.63	2.48	7.44	50.37	2.52	2.64	6.72
21	50.37	2.52	7.56	51.13	2.56	2.66	6.75
Daily group ration (g)		7.23		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.13	2.56	7.67	51.89	2.59	2.67	6.78
23	51.89	2.59	7.78	52.67	2.63	2.68	6.82
24	52.67	2.63	7.90	53.46	2.67	2.70	6.85
25	53.46	2.67	8.02	54.27	2.71	2.71	6.89
26	54.27	2.71	8.14	55.08	2.75	2.72	6.92
27	55.08	2.75	8.26	55.91	2.80	2.74	6.95
28	55.91	2.80	8.39	56.74	2.84	2.75	6.99
Daily group ration (g)		8.02		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	56.74	2.84	8.51	57.60	2.88	2.77	7.02
30	57.60	2.88	8.64	58.46	2.92	2.78	7.06
31	58.46	2.92	8.77	59.34	2.97	2.79	7.09
Daily group ration (g)		8.64		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Revised 4-3-12
Do not use
4-3-12
JJ

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 24-31

Reviewed by: TJS Date: 23APR12
Verified by: JM Date ~~3-4-5~~ wrong incorrect date date is 4-8-13 4-8-13 JM

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System______F____________
Holding Tank/Chamber:__F15__________
Treatment Group:__50 MG/L______________
Species:_WAE__________Lot: _112100_________

Date Created/Initials:_3-22-12/ JM
Date Revised/initi[redacted]
Approved for use:[redacted] 3-22-12
Date

Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	1.64
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.80	1.64	4.92	33.29	1.66	2.30	5.85
2	33.29	1.66	4.99	33.79	1.69	2.31	5.88
3	33.79	1.69	5.07	34.30	1.71	2.33	5.91
4	34.30	1.71	5.14	34.81	1.74	2.34	5.94
5	34.81	1.74	5.22	35.33	1.77	2.35	5.97
6	35.33	1.77	5.30	35.86	1.79	2.36	6.00
7	35.86	1.79	5.38	36.40	1.82	2.37	6.03

Daily group ration (g) **5.15** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.26** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
8	36.40	1.82	5.46	36.95	1.85	2.38	6.06
9	36.95	1.85	5.54	37.50	1.88	2.40	6.09
10	37.50	1.88	5.63	38.07	1.90	2.41	6.12
11	38.07	1.90	5.71	38.64	1.93	2.42	6.15
12	38.64	1.93	5.80	39.22	1.96	2.43	6.18
13	39.22	1.96	5.88	39.80	1.99	2.44	6.21
14	39.80	1.99	5.97	40.40	2.02	2.46	6.24

Daily group ration (g) **5.71** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.29** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Revised 4-3-12
Do not use
4-3-12
JM

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
15	40.40	2.02	6.06	41.01	2.05	2.47	6.27
16	41.01	2.05	6.15	41.62	2.08	2.48	6.30
17	41.62	2.08	6.24	42.25	2.11	2.49	6.33
18	42.25	2.11	6.34	42.88	2.14	2.51	6.37
19	42.88	2.14	6.43	43.52	2.18	2.52	6.40
20	43.52	2.18	6.53	44.18	2.21	2.53	6.43
21	44.18	2.21	6.63	44.84	2.24	2.54	6.46

Daily group ration (g) **6.34** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.32** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
22	44.84	2.24	6.73	45.51	2.28	2.56	6.49
23	45.51	2.28	6.83	46.19	2.31	2.57	6.53
24	46.19	2.31	6.93	46.89	2.34	2.58	6.56
25	46.89	2.34	7.03	47.59	2.38	2.59	6.59
26	47.59	2.38	7.14	48.30	2.42	2.61	6.62
27	48.30	2.42	7.25	49.03	2.45	2.62	6.66
28	49.03	2.45	7.35	49.76	2.49	2.63	6.69

Daily group ration (g) **7.04** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.35** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
29	49.76	2.49	7.46	50.51	2.53	2.65	6.72
30	50.51	2.53	7.58	51.27	2.56	2.66	6.76
31	51.27	2.56	7.69	52.04	2.60	2.67	6.79

Daily group ration (g) **7.58** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.38** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

AEH-12-PSEUDO-03

FF # 7
Item No. 14
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TMS Date: 23APR12
File Folder 7 Lab book/pgs 1, 31-36 Verified by: TMS Date 4-3-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 TM
Holding Tank/Chamber: F1 Date Revised/Initials: 4-3-2012 TM
Treatment Group: 50 MG/L Approved for use: [redacted] 4-3-2012
Species: WAE Lot: 112100 tor Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.86 (1)							
21	Number of fish	18							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00950 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	20							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	33.48	1.86	6.70	34.15	1.90	2.41	6.11
2	34.15	1.90	6.83	34.83	1.94	2.42	6.15
3	34.83	1.94	6.97	35.53	1.97	2.44	6.19
4	35.53	1.97	7.11	36.24	2.01	2.45	6.23
5	36.24	2.01	7.25	36.96	2.05	2.47	6.27
6	36.96	2.05	7.39	37.70	2.09	2.49	6.32
7	37.70	2.09	7.54	38.46	2.14	2.50	6.36
Daily group ration (g)		7.11	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.40	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	38.46	2.14	7.69	39.23	2.18	2.52	6.40
9	39.23	2.18	7.85	40.01	2.22	2.54	6.44
10	40.01	2.22	8.00	40.81	2.27	2.55	6.49
11	40.81	2.27	8.16	41.63	2.31	2.57	6.53
12	41.63	2.31	8.33	42.46	2.36	2.59	6.57
13	42.46	2.36	8.49	43.31	2.41	2.60	6.62
14	43.31	2.41	8.66	44.18	2.45	2.62	6.66
Daily group ration (g)		8.17	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.45	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	44.18	2.45	8.84	45.06	2.50	2.64	6.70
16	45.06	2.50	9.01	45.96	2.55	2.66	6.75
17	45.96	2.55	9.19	46.88	2.60	2.67	6.79
18	46.88	2.60	9.38	47.82	2.66	2.69	6.84
19	47.82	2.66	9.56	48.77	2.71	2.71	6.88
20	48.77	2.71	9.75	49.75	2.76	2.73	6.93
21	49.75	2.76	9.95	50.74	2.82	2.75	6.97
Daily group ration (g)		9.38	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.52	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	50.74	2.82	10.15	51.76	2.88	2.76	7.02
23	51.76	2.88	10.35	52.79	2.93	2.78	7.07
24	52.79	2.93	10.56	53.85	2.99	2.80	7.11
25	53.85	2.99	10.77	54.93	3.05	2.82	7.16
26	54.93	3.05	10.99	56.03	3.11	2.84	7.21
27	56.03	3.11	11.21	57.15	3.17	2.86	7.26
28	57.15	3.17	11.43	58.29	3.24	2.88	7.30
Daily group ration (g)		10.78	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.60	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	58.29	3.24	11.66	59.46	3.30	2.89	7.35
30	59.46	3.30	11.89	60.64	3.37	2.91	7.40
31	60.64	3.37	12.13	61.86	3.44	2.93	7.45
Daily group ration (g)		11.89	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.66	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

(1) Incorrect value. Initial fish size should be 1.87g/fish. Daily feed ration per fish does not change. 12MAR13

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DRS Date: 23APR12
File Folder: 7 Lab book/pgs 1 / 31-36 Verified by: SAC Date: 4-3-12

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained.
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406 467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F2
Treatment Group: 300 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JD
Date Revised/in [redacted] JD
Approved for us [redacted] 4-3-2012
[redacted]or Date

Row	Column:	c	d	e	f	g	h	i	j
19		**INPUT SECTION**							
20		Initial fish size (g)	1.96						
21		Number of fish	6						
22		Condition Factor (C)	0.0003						
23		(C = 0.00015 - 0.00050 in 0.00005 increments)							
24									
25		FCR	10						
26		% B.W./d	20						
27									

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	11.76	1.96	2.35	12.00	2.00	2.45	6.22	
34	2	12.00	2.00	2.40	12.24	2.04	2.46	6.26	
35	3	12.24	2.04	2.45	12.48	2.08	2.48	6.30	
36	4	12.48	2.08	2.50	12.73	2.12	2.50	6.34	
37	5	12.73	2.12	2.55	12.98	2.16	2.51	6.39	
38	6	12.98	2.16	2.60	13.24	2.21	2.53	6.43	
39	7	13.24	2.21	2.65	13.51	2.25	2.55	6.47	
40									
41	Daily group ration (g)		**2.50**		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		**0.42**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	13.51	2.25	2.70	13.78	2.30	2.56	6.51	
45	9	13.78	2.30	2.76	14.05	2.34	2.58	6.56	
46	10	14.05	2.34	2.81	14.34	2.39	2.60	6.60	
47	11	14.34	2.39	2.87	14.62	2.44	2.62	6.64	
48	12	14.62	2.44	2.92	14.91	2.49	2.63	6.69	
49	13	14.91	2.49	2.98	15.21	2.54	2.65	6.73	
50	14	15.21	2.54	3.04	15.52	2.59	2.67	6.78	
51									
52	Daily group ration (g)		**2.87**		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		**0.48**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	15.52	2.59	3.10	15.83	2.64	2.69	6.82	
56	16	15.83	2.64	3.17	16.14	2.69	2.70	6.87	
57	17	16.14	2.69	3.23	16.47	2.74	2.72	6.91	
58	18	16.47	2.74	3.29	16.80	2.80	2.74	6.96	
59	19	16.80	2.80	3.36	17.13	2.86	2.76	7.00	
60	20	17.13	2.86	3.43	17.47	2.91	2.78	7.05	
61	21	17.47	2.91	3.49	17.82	2.97	2.79	7.10	
62									
63	Daily group ration (g)		**3.30**		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		**0.55**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	17.82	2.97	3.56	18.18	3.03	2.81	7.14	
67	23	18.18	3.03	3.64	18.54	3.09	2.83	7.19	
68	24	18.54	3.09	3.71	18.92	3.15	2.85	7.24	
69	25	18.92	3.15	3.78	19.29	3.22	2.87	7.29	
70	26	19.29	3.22	3.86	19.68	3.28	2.89	7.33	
71	27	19.68	3.28	3.94	20.07	3.35	2.91	7.38	
72	28	20.07	3.35	4.01	20.47	3.41	2.93	7.43	
73									
74	Daily group ration (g)		**3.79**		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		**0.63**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	20.47	3.41	4.09	20.88	3.48	2.95	7.48	
78	30	20.88	3.48	4.18	21.30	3.55	2.97	7.53	
79	31	21.30	3.55	4.26	21.73	3.62	2.98	7.58	
80									
81	Daily group ration (g)		**4.18**		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		**0.70**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TTS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JLL
Holding Tank/Chamber: F3 Date Revised/in [redacted]
Treatment Group: 100 MG/L Approved for us [redacted] 4-3-2012
Species: WAE Lot: 112100 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.98
Number of fish	17
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	33.66	1.98	6.73	34.33	2.02	2.46	6.24
2	34.33	2.02	6.87	35.02	2.06	2.47	6.28
3	35.02	2.06	7.00	35.72	2.10	2.49	6.32
4	35.72	2.10	7.14	36.43	2.14	2.51	6.36
5	36.43	2.14	7.29	37.16	2.19	2.52	6.41
6	37.16	2.19	7.43	37.91	2.23	2.54	6.45
7	37.91	2.23	7.58	38.66	2.27	2.56	6.49
Daily group ration (g)		7.15		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	38.66	2.27	7.73	39.44	2.32	2.57	6.54
9	39.44	2.32	7.89	40.23	2.37	2.59	6.58
10	40.23	2.37	8.05	41.03	2.41	2.61	6.62
11	41.03	2.41	8.21	41.85	2.46	2.62	6.67
12	41.85	2.46	8.37	42.69	2.51	2.64	6.71
13	42.69	2.51	8.54	43.54	2.56	2.66	6.75
14	43.54	2.56	8.71	44.41	2.61	2.68	6.80
Daily group ration (g)		8.21		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	44.41	2.61	8.88	45.30	2.66	2.69	6.84
16	45.30	2.66	9.06	46.21	2.72	2.71	6.89
17	46.21	2.72	9.24	47.13	2.77	2.73	6.94
18	47.13	2.77	9.43	48.07	2.83	2.75	6.98
19	48.07	2.83	9.61	49.04	2.88	2.77	7.03
20	49.04	2.88	9.81	50.02	2.94	2.79	7.07
21	50.02	2.94	10.00	51.02	3.00	2.80	7.12
Daily group ration (g)		9.43		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.02	3.00	10.20	52.04	3.06	2.82	7.17
23	52.04	3.06	10.41	53.08	3.12	2.84	7.22
24	53.08	3.12	10.62	54.14	3.18	2.86	7.26
25	54.14	3.18	10.83	55.22	3.25	2.88	7.31
26	55.22	3.25	11.04	56.33	3.31	2.90	7.36
27	56.33	3.31	11.27	57.45	3.38	2.92	7.41
28	57.45	3.38	11.49	58.60	3.45	2.94	7.46
Daily group ration (g)		10.84		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.64		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	58.60	3.45	11.72	59.77	3.52	2.96	7.51
30	59.77	3.52	11.95	60.97	3.59	2.98	7.56
31	60.97	3.59	12.19	62.19	3.66	2.99	7.61
Daily group ration (g)		11.96		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.70		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 31-36

Reviewed by: TDS Date: 22MAR12
Verified by: Sa Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F4
Treatment Group: 100 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JV
Date Revised/in [redacted] JV
Approved for us [redacted] ctor 4-3-2012
Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		2.00						
21	Number of fish		27						
22	Condition Factor (C)		0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	%B.W./d		20						
27									

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33 -(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$C$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	54.00	2.00	10.80	55.08	2.04	2.47	6.26	
34	2	55.08	2.04	11.02	56.18	2.08	2.48	6.30	
35	3	56.18	2.08	11.24	57.31	2.12	2.50	6.34	
36	4	57.31	2.12	11.46	58.45	2.16	2.51	6.39	
37	5	58.45	2.16	11.69	59.62	2.21	2.53	6.43	
38	6	59.62	2.21	11.92	60.81	2.25	2.55	6.47	
39	7	60.81	2.25	12.16	62.03	2.30	2.56	6.51	
40									
41	Daily group ration (g)		11.47		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	62.03	2.30	12.41	63.27	2.34	2.58	6.56	
45	9	63.27	2.34	12.65	64.53	2.39	2.60	6.60	
46	10	64.53	2.39	12.91	65.83	2.44	2.62	6.64	
47	11	65.83	2.44	13.17	67.14	2.49	2.63	6.69	
48	12	67.14	2.49	13.43	68.49	2.54	2.65	6.73	
49	13	68.49	2.54	13.70	69.85	2.59	2.67	6.78	
50	14	69.85	2.59	13.97	71.25	2.64	2.69	6.82	
51									
52	Daily group ration (g)		13.18		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	71.25	2.64	14.25	72.68	2.69	2.70	6.87	
56	16	72.68	2.69	14.54	74.13	2.75	2.72	6.91	
57	17	74.13	2.75	14.83	75.63	2.80	2.74	6.96	
58	18	75.61	2.80	15.12	77.13	2.86	2.76	7.00	
59	19	77.13	2.86	15.43	78.67	2.91	2.78	7.05	
60	20	78.67	2.91	15.73	80.24	2.97	2.79	7.10	
61	21	80.24	2.97	16.05	81.85	3.03	2.81	7.14	
62									
63	Daily group ration (g)		15.13		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	81.85	3.03	16.37	83.48	3.09	2.83	7.19	
67	23	83.48	3.09	16.70	85.15	3.15	2.85	7.24	
68	24	85.15	3.15	17.03	86.86	3.22	2.87	7.29	
69	25	86.86	3.22	17.37	88.59	3.28	2.89	7.34	
70	26	88.59	3.28	17.72	90.36	3.35	2.91	7.38	
71	27	90.36	3.35	18.07	92.17	3.41	2.93	7.43	
72	28	92.17	3.41	18.43	94.02	3.48	2.95	7.48	
73									
74	Daily group ration (g)		17.38		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.64		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	94.02	3.48	18.80	95.90	3.55	2.97	7.53	
78	30	95.90	3.55	19.18	97.81	3.62	2.99	7.58	
79	31	97.81	3.62	19.56	99.77	3.70	3.00	7.63	
80									
81	Daily group ration (g)		19.18		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.71		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

① Incorrect initial fish size. Should be 1.99 g/fish. Daily feed ration per fish does not change. KW 22MAR13

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TLS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: [redacted] Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F5
Treatment Group: 200 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JM
Date Revised/ [redacted] JM
Approved for [redacted] 4-3-2012
Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.88
Number of fish	13
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/954)/$E$22)^0.333333333 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	24.44	1.88	4.89	24.93	1.92	2.41	6.13
2	24.93	1.92	4.99	25.43	1.96	2.43	6.17
3	25.43	1.96	5.09	25.94	2.00	2.45	6.21
4	25.94	2.00	5.19	26.45	2.03	2.46	6.26
5	26.45	2.03	5.29	26.98	2.08	2.48	6.30
6	26.98	2.08	5.40	27.52	2.12	2.50	6.34
7	27.52	2.12	5.50	28.07	2.16	2.51	6.38
Daily group ration (g)		5.19	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.40	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	28.07	2.16	5.61	28.64	2.20	2.53	6.42
9	28.64	2.20	5.73	29.21	2.25	2.55	6.47
10	29.21	2.25	5.84	29.79	2.29	2.56	6.51
11	29.79	2.29	5.96	30.39	2.34	2.58	6.55
12	30.39	2.34	6.08	31.00	2.38	2.60	6.60
13	31.00	2.38	6.20	31.62	2.43	2.61	6.64
14	31.62	2.43	6.32	32.25	2.48	2.63	6.68
Daily group ration (g)		5.96	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.46	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	32.25	2.48	6.45	32.89	2.53	2.65	6.73
16	32.89	2.53	6.58	33.55	2.58	2.67	6.77
17	33.55	2.58	6.71	34.22	2.63	2.68	6.82
18	34.22	2.63	6.84	34.91	2.69	2.70	6.86
19	34.91	2.69	6.98	35.60	2.74	2.72	6.91
20	35.60	2.74	7.12	36.32	2.79	2.74	6.95
21	36.32	2.79	7.26	37.04	2.85	2.76	7.00
Daily group ration (g)		6.85	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.53	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	37.04	2.85	7.41	37.78	2.91	2.77	7.05
23	37.78	2.91	7.56	38.54	2.96	2.79	7.09
24	38.54	2.96	7.71	39.31	3.02	2.81	7.14
25	39.31	3.02	7.86	40.10	3.08	2.83	7.19
26	40.10	3.08	8.02	40.90	3.15	2.85	7.23
27	40.90	3.15	8.18	41.72	3.21	2.87	7.28
28	41.72	3.21	8.34	42.55	3.27	2.89	7.33
Daily group ration (g)		7.87	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.61	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	42.55	3.27	8.51	43.40	3.34	2.90	7.38
30	43.40	3.34	8.68	44.27	3.41	2.92	7.43
31	44.27	3.41	8.85	45.16	3.47	2.94	7.48
Daily group ration (g)		8.68	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.67	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 31-36

Reviewed by: TDS Date: 23MAR12
Verified by: [redacted] Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F6
Treatment Group: 300 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JW
Date Revised/initials [redacted]
Approved for use: [redacted] 4-3-2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION (1)

Initial fish size (g)	~~2.1~~
Number of fish	2
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Co umn D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	4.20	2.10	0.84	4.28	2.14	2.51	6.36
2	4.28	2.14	0.86	4.37	2.18	2.52	6.41
3	4.37	2.18	0.87	4.46	2.23	2.54	6.45
4	4.46	2.23	0.89	4.55	2.27	2.56	6.49
5	4.55	2.27	0.91	4.64	2.32	2.57	6.53
6	4.64	2.32	0.93	4.73	2.36	2.59	6.58
7	4.73	2.36	0.95	4.82	2.41	2.61	6.62
Daily group ration (g)		0.89		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		~~0.45~~ (1)		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	4.82	2.41	0.96	4.92	2.46	2.62	6.66
9	4.92	2.46	0.98	5.02	2.51	2.64	6.71
10	5.02	2.51	1.00	5.12	2.56	2.66	6.75
11	5.12	2.56	1.02	5.22	2.61	2.68	6.80
12	5.22	2.61	1.04	5.33	2.66	2.69	6.84
13	5.33	2.66	1.07	5.43	2.72	2.71	6.89
14	5.43	2.72	1.09	5.54	2.77	2.73	6.93
Daily group ration (g)		1.02		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	5.54	2.77	1.11	5.65	2.83	2.75	6.98
16	5.65	2.83	1.13	5.77	2.88	2.77	7.03
17	5.77	2.88	1.15	5.88	2.94	2.78	7.07
18	5.88	2.94	1.18	6.00	3.00	2.80	7.12
19	6.00	3.00	1.20	6.12	3.06	2.82	7.17
20	6.12	3.06	1.22	6.24	3.12	2.84	7.21
21	6.24	3.12	1.25	6.37	3.18	2.86	7.26
Daily group ration (g)		1.18		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	6.37	3.18	1.27	6.49	3.25	2.88	7.31
23	6.49	3.25	1.30	6.62	3.31	2.90	7.36
24	6.62	3.31	1.32	6.76	3.38	2.92	7.41
25	6.76	3.38	1.35	6.89	3.45	2.94	7.46
26	6.89	3.45	1.38	7.03	3.51	2.95	7.51
27	7.03	3.51	1.41	7.17	3.58	2.97	7.56
28	7.17	3.58	1.43	7.31	3.66	2.99	7.61
Daily group ration (g)		1.35		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.68		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	7.31	3.66	1.46	7.46	3.73	3.01	7.66
30	7.46	3.73	1.49	7.61	3.80	3.03	7.71
31	7.61	3.80	1.52	7.76	3.88	3.05	7.76
Daily group ration (g)		1.49		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.75		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) Incorrect Initial fish size. Should be 2.07g/fish. Daily feed ration should be 0.44g/fish. JW 22MAR13

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 6 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 31-36

Reviewed by: TDS Date: 23APR12
Verified by: Sav Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F
Holding Tank/Chamber: F7
Treatment Group: 200 MG/L
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JV
Date Revised/Initials: JV
Approved for use: [redacted] 4-3-2012
ector Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.84
Number of fish	15
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	27.60	1.84	5.52	28.15	1.88	2.40	6.09
2	28.15	1.88	5.63	28.72	1.91	2.41	6.13
3	28.72	1.91	5.74	29.29	1.95	2.43	6.17
4	29.29	1.95	5.86	29.88	1.99	2.45	6.21
5	29.88	1.99	5.98	30.47	2.03	2.46	6.25
6	30.47	2.03	6.09	31.08	2.07	2.48	6.29
7	31.08	2.07	6.22	31.70	2.11	2.49	6.34
Daily group ration (g)		5.86		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	31.70	2.11	6.34	32.34	2.16	2.51	6.38
9	32.34	2.16	6.47	32.98	2.20	2.53	6.42
10	32.98	2.20	6.60	33.64	2.24	2.54	6.46
11	33.64	2.24	6.73	34.32	2.29	2.56	6.51
12	34.32	2.29	6.86	35.00	2.33	2.58	6.55
13	35.00	2.33	7.00	35.70	2.38	2.60	6.59
14	35.70	2.38	7.14	36.42	2.43	2.61	6.64
Daily group ration (g)		6.73		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	36.42	2.43	7.28	37.15	2.48	2.63	6.68
16	37.15	2.48	7.43	37.89	2.53	2.65	6.72
17	37.89	2.53	7.58	38.65	2.58	2.66	6.77
18	38.65	2.58	7.73	39.42	2.63	2.68	6.81
19	39.42	2.63	7.88	40.21	2.68	2.70	6.86
20	40.21	2.68	8.04	41.01	2.73	2.72	6.90
21	41.01	2.73	8.20	41.83	2.79	2.74	6.95
Daily group ration (g)		7.74		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	41.83	2.79	8.37	42.67	2.84	2.75	6.99
23	42.67	2.84	8.53	43.52	2.90	2.77	7.04
24	43.52	2.90	8.70	44.39	2.96	2.79	7.09
25	44.39	2.96	8.88	45.28	3.02	2.81	7.13
26	45.28	3.02	9.06	46.19	3.08	2.83	7.18
27	46.19	3.08	9.24	47.11	3.14	2.85	7.23
28	47.11	3.14	9.42	48.05	3.20	2.87	7.28
Daily group ration (g)		8.89		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	48.05	3.20	9.61	49.01	3.27	2.88	7.33
30	49.01	3.27	9.80	49.99	3.33	2.90	7.37
31	49.99	3.33	10.00	50.99	3.40	2.92	7.42
Daily group ration (g)		9.80		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.65		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: TJS Date: 23APR12
File Folder 7 Lab book/pgs 1, 31-36 Verified by: JAL Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
if not specified in Piper et al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JAL
Holding Tank/Chamber: F8 Date Revised/initia[redacted]
Treatment Group: 50 MG/L Approved for use: [redacted] 4-3-2012
Species: WAE Lot: 112100 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION (1)

Initial fish size (g)	2.1
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	42.00	2.10	8.40	42.84	2.14	2.51	6.36
2	42.84	2.14	8.57	43.70	2.18	2.52	6.41
3	43.70	2.18	8.74	44.57	2.23	2.54	6.45
4	44.57	2.23	8.91	45.46	2.27	2.56	6.49
5	45.46	2.27	9.09	46.37	2.32	2.57	6.53
6	46.37	2.32	9.27	47.30	2.36	2.59	6.58
7	47.30	2.36	9.46	48.24	2.41	2.61	6.62
Daily group ration (g)		8.92		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	48.24	2.41	9.65	49.21	2.46	2.62	6.65
9	49.21	2.46	9.84	50.19	2.51	2.64	6.71
10	50.19	2.51	10.04	51.20	2.56	2.66	6.75
11	51.20	2.56	10.24	52.22	2.61	2.68	6.80
12	52.22	2.61	10.44	53.27	2.66	2.69	6.84
13	53.27	2.66	10.65	54.33	2.72	2.71	6.89
14	54.33	2.72	10.87	55.42	2.77	2.73	6.93
Daily group ration (g)		10.25		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	55.42	2.77	11.08	56.53	2.83	2.75	6.98
16	56.53	2.83	11.31	57.66	2.88	2.77	7.03
17	57.66	2.88	11.53	58.81	2.94	2.78	7.07
18	58.81	2.94	11.76	59.99	3.00	2.80	7.12
19	59.99	3.00	12.00	61.19	3.06	2.82	7.17
20	61.19	3.06	12.24	62.41	3.12	2.84	7.21
21	62.41	3.12	12.48	63.66	3.18	2.86	7.26
Daily group ration (g)		11.77		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	63.66	3.18	12.73	64.93	3.25	2.88	7.31
23	64.93	3.25	12.99	66.23	3.31	2.90	7.36
24	66.23	3.31	13.25	67.55	3.38	2.92	7.41
25	67.55	3.38	13.51	68.91	3.45	2.94	7.46
26	68.91	3.45	13.78	70.28	3.51	2.95	7.51
27	70.28	3.51	14.06	71.69	3.58	2.97	7.56
28	71.69	3.58	14.34	73.12	3.66	2.99	7.61
Daily group ration (g)		13.52		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.68		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	73.12	3.66	14.62	74.59	3.73	3.01	7.66
30	74.59	3.73	14.92	76.08	3.80	3.03	7.71
31	76.08	3.80	15.22	77.60	3.88	3.05	7.76
Daily group ration (g)		14.92		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.75		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) Incorrect Initial fish size. Should be 2.09 g/fish. Daily feed ration does not change. Rev 23MAR13

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: JDS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: JM Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JM
Holding Tank/Chamber: F9 Date Revised/[redacted] JM
Treatment Group: 100 MG/L Approved for [redacted] 4-3-2012
Species: WAE Lot: 112100 or Date

Row	Column:	c	d	e	f	g	h	i	j
19	INPUT SECTION								
20	Initial fish size (g)		1.87						
21	Number of fish		16						
22	Condition Factor (C)		0.0003						
23	[C = 0.00015 - 0.00050 in 0.00005 increments]								
24									
25	FCR		10						
26	% B.W./d		20						

Worksheet Formulas
Group Total initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333336 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	29.92	1.87	5.98	30.52	1.91	2.41	6.12	
2	30.52	1.91	6.10	31.13	1.95	2.43	6.16	
3	31.13	1.95	6.23	31.75	1.98	2.44	6.20	
4	31.75	1.98	6.35	32.39	2.02	2.46	6.24	
5	32.39	2.02	6.48	33.03	2.06	2.47	6.29	
6	33.03	2.06	6.61	33.69	2.11	2.49	6.33	
7	33.69	2.11	6.74	34.37	2.15	2.51	6.37	
Daily group ration (g)		6.36		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	34.37	2.15	6.87	35.06	2.19	2.52	6.41	
9	35.06	2.19	7.01	35.76	2.23	2.54	6.45	
10	35.76	2.23	7.15	36.47	2.28	2.56	6.50	
11	36.47	2.28	7.29	37.20	2.33	2.57	6.54	
12	37.20	2.33	7.44	37.95	2.37	2.59	6.58	
13	37.95	2.37	7.59	38.70	2.42	2.61	6.63	
14	38.70	2.42	7.74	39.48	2.47	2.63	6.67	
Daily group ration (g)		7.30		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	39.48	2.47	7.90	40.27	2.52	2.64	6.72	
16	40.27	2.52	8.05	41.07	2.57	2.66	6.76	
17	41.07	2.57	8.21	41.90	2.62	2.68	6.80	
18	41.90	2.62	8.38	42.73	2.67	2.70	6.85	
19	42.73	2.67	8.55	43.59	2.72	2.71	6.89	
20	43.59	2.72	8.72	44.46	2.78	2.73	6.94	
21	44.46	2.78	8.89	45.35	2.83	2.75	6.99	
Daily group ration (g)		8.39		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	45.35	2.83	9.07	46.26	2.89	2.77	7.03	
23	46.26	2.89	9.25	47.18	2.95	2.79	7.08	
24	47.18	2.95	9.44	48.12	3.01	2.81	7.13	
25	48.12	3.01	9.62	49.09	3.07	2.82	7.17	
26	49.09	3.07	9.82	50.07	3.13	2.84	7.22	
27	50.07	3.13	10.01	51.07	3.19	2.86	7.27	
28	51.07	3.19	10.21	52.09	3.26	2.88	7.32	
Daily group ration (g)		9.63		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.60		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	52.09	3.26	10.42	53.13	3.32	2.90	7.37	
30	53.13	3.32	10.63	54.20	3.39	2.92	7.41	
31	54.20	3.39	10.84	55.28	3.45	2.94	7.46	
Daily group ration (g)		10.63		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.66		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 1 / 31-36

Reviewed by: JS Date: 23APR12
Verified by: JW Date: 4-30-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: F
Holding Tank/Chamber: F10
Treatment Group: CONTROL
Species: WAE Lot: 112100

Date Created/Initials: 4-3-2012 JW
Date Revised/initi [redacted] JW
Approved for use: [redacted] ctor 4-3-2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.88
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individua Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((F33/454)/$F$22)^0.333333535 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	37.60	1.88	7.52	38.35	1.92	2.41	6.13
2	38.35	1.92	7.67	39.12	1.96	2.43	6.17
3	39.12	1.96	7.82	39.90	2.00	2.45	6.21
4	39.90	2.00	7.98	40.70	2.03	2.46	6.26
5	40.70	2.03	8.14	41.51	2.08	2.48	6.30
6	41.51	2.08	8.30	42.34	2.12	2.50	6.34
7	42.34	2.12	8.47	43.19	2.16	2.51	6.38
Daily group ration (g)		7.99		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	43.19	2.16	8.64	44.05	2.20	2.53	6.42
9	44.05	2.20	8.81	44.94	2.25	2.55	6.47
10	44.94	2.25	8.99	45.83	2.29	2.56	6.51
11	45.83	2.29	9.17	46.75	2.34	2.58	6.55
12	46.75	2.34	9.35	47.69	2.38	2.60	6.60
13	47.69	2.38	9.54	48.64	2.43	2.61	6.64
14	48.64	2.43	9.73	49.61	2.48	2.63	6.68
Daily group ration (g)		9.17		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	49.61	2.48	9.92	50.60	2.53	2.65	6.73
16	50.60	2.53	10.12	51.62	2.58	2.67	6.77
17	51.62	2.58	10.32	52.65	2.63	2.68	6.82
18	52.65	2.63	10.53	53.70	2.69	2.70	6.86
19	53.70	2.69	10.74	54.78	2.74	2.72	6.91
20	54.78	2.74	10.96	55.87	2.79	2.74	6.95
21	55.87	2.79	11.17	56.99	2.85	2.76	7.00
Daily group ration (g)		10.54		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	56.99	2.85	11.40	58.13	2.91	2.77	7.05
23	58.13	2.91	11.63	59.29	2.96	2.79	7.09
24	59.29	2.96	11.86	60.48	3.02	2.81	7.14
25	60.48	3.02	12.10	61.69	3.08	2.83	7.19
26	61.69	3.08	12.34	62.92	3.15	2.85	7.23
27	62.92	3.15	12.58	64.18	3.21	2.87	7.28
28	64.18	3.21	12.84	65.46	3.27	2.89	7.33
Daily group ration (g)		12.10		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.61		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	65.46	3.27	13.09	66.77	3.34	2.90	7.38
30	66.77	3.34	13.35	68.11	3.41	2.92	7.43
31	68.11	3.41	13.62	69.47	3.47	2.94	7.48
Daily group ration (g)		13.36		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.67		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: JA Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JA
Holding Tank/Chamber: F11 Date Revised/ini[redacted] JA
Treatment Group: 300 MG/L Approved for use[redacted] 4-3-2012
Species: WAE Lot: 112100 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.96						
21	Number of fish		8						
22	Condition Factor (C)		0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		20						

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial Fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$25/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	15.68	1.96	3.14	15.99	2.00	2.45	6.22
2	15.99	2.00	3.20	16.31	2.04	2.46	6.26
3	16.31	2.04	3.26	16.64	2.08	2.48	6.30
4	16.64	2.08	3.33	16.97	2.12	2.50	6.34
5	16.97	2.12	3.39	17.31	2.16	2.51	6.39
6	17.31	2.16	3.46	17.66	2.21	2.53	6.43
7	17.66	2.21	3.53	18.01	2.25	2.55	6.47
Daily group ration (g)		3.33		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	18.01	2.25	3.60	18.37	2.30	2.56	6.51
9	18.37	2.30	3.67	18.74	2.34	2.58	6.56
10	18.74	2.34	3.75	19.11	2.39	2.60	6.60
11	19.11	2.39	3.82	19.50	2.44	2.62	6.64
12	19.50	2.44	3.90	19.89	2.49	2.63	6.69
13	19.89	2.49	3.98	20.28	2.54	2.65	6.73
14	20.28	2.54	4.06	20.69	2.59	2.67	6.78
Daily group ration (g)		3.83		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	20.69	2.59	4.14	21.10	2.64	2.69	6.82
16	21.10	2.64	4.22	21.53	2.69	2.70	6.87
17	21.53	2.69	4.31	21.96	2.74	2.72	6.91
18	21.96	2.74	4.39	22.39	2.80	2.74	6.96
19	22.39	2.80	4.48	22.84	2.86	2.76	7.00
20	22.84	2.86	4.57	23.30	2.91	2.78	7.05
21	23.30	2.91	4.66	23.77	2.97	2.79	7.10
Daily group ration (g)		4.39		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	23.77	2.97	4.75	24.24	3.03	2.81	7.14
23	24.24	3.03	4.85	24.73	3.09	2.83	7.19
24	24.73	3.09	4.95	25.22	3.15	2.85	7.24
25	25.22	3.15	5.04	25.72	3.22	2.87	7.29
26	25.72	3.22	5.14	26.24	3.28	2.89	7.33
27	26.24	3.28	5.25	26.76	3.35	2.91	7.38
28	26.76	3.35	5.35	27.30	3.41	2.93	7.43
Daily group ration (g)		5.05		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.63		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	27.30	3.41	5.46	27.85	3.48	2.95	7.48
30	27.85	3.48	5.57	28.40	3.55	2.97	7.53
31	28.40	3.55	5.68	28.97	3.62	2.98	7.58
Daily group ration (g)		5.57		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.70		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: SM Date 4-30-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JD
Holding Tank/Chamber: F12 Date Revised/initia
Treatment Group: 200 MG/L Approved for use: [redacted] 4-3-2012
Species: WAE Lot: 112100 Date

Row	Column: c	d	e	f	g	h	j

INPUT SECTION

Initial fish size (g)	1.93
Number of fish	14
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individua Initial F sh weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feec Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator va ue adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initia Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	27.02	1.93	5.40	27.56	1.97	2.44	6.19
2	27.56	1.97	5.51	28.11	2.01	2.45	6.23
3	28.11	2.01	5.62	28.67	2.05	2.47	6.27
4	28.67	2.05	5.73	29.25	2.09	2.48	6.31
5	29.25	2.09	5.85	29.83	2.13	2.50	6.35
6	29.83	2.13	5.97	30.43	2.17	2.52	6.39
7	30.43	2.17	6.09	31.04	2.22	2.53	6.44
Daily group ration (g)		5.74		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	31.04	2.22	6.21	31.66	2.26	2.55	6.48
9	31.66	2.26	6.33	32.29	2.31	2.57	6.52
10	32.29	2.31	6.46	32.94	2.35	2.59	6.57
11	32.94	2.35	6.59	33.60	2.40	2.60	6.61
12	33.60	2.40	6.72	34.27	2.45	2.62	6.65
13	34.27	2.45	6.85	34.95	2.50	2.64	6.70
14	34.95	2.50	6.99	35.65	2.55	2.65	6.74
Daily group ration (g)		6.59		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	35.65	2.55	7.13	36.37	2.60	2.67	6.79
16	36.37	2.60	7.27	37.09	2.65	2.69	6.83
17	37.09	2.65	7.42	37.83	2.70	2.71	6.88
18	37.83	2.70	7.57	38.59	2.76	2.73	6.92
19	38.59	2.76	7.72	39.36	2.81	2.74	6.97
20	39.36	2.81	7.87	40.15	2.87	2.76	7.01
21	40.15	2.87	8.03	40.95	2.93	2.78	7.06
Daily group ration (g)		7.57		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.54		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	40.95	2.93	8.19	41.77	2.98	2.80	7.11
23	41.77	2.98	8.35	42.61	3.04	2.82	7.15
24	42.61	3.04	8.52	43.46	3.10	2.84	7.20
25	43.46	3.10	8.69	44.33	3.17	2.85	7.25
26	44.33	3.17	8.87	45.22	3.23	2.87	7.30
27	45.22	3.23	9.04	46.12	3.29	2.89	7.35
28	46.12	3.29	9.22	47.04	3.36	2.91	7.39
Daily group ration (g)		8.70		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.62		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	47.04	3.36	9.41	47.98	3.43	2.93	7.44
30	47.98	3.43	9.60	48.94	3.50	2.95	7.49
31	48.94	3.50	9.79	49.92	3.57	2.97	7.54
Daily group ration (g)		9.60		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.69		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: SNL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie; FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System F **Date Created/Initials:** 4-3-2012 JAL
Holding Tank/Chamber: F13 **Date Revised/initials:** 4-3-2012 JAL
Treatment Group: Control **Approved for use:** [redacted] 4-3-2012
Species: WAE **Lot:** 112100 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.75
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$25/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)^$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.00	1.75	7.00	35.70	1.79	2.36	5.99
2	35.70	1.79	7.14	36.41	1.82	2.37	6.03
3	36.41	1.82	7.28	37.14	1.86	2.39	6.07
4	37.14	1.86	7.43	37.89	1.89	2.40	6.11
5	37.89	1.89	7.58	38.64	1.93	2.42	6.15
6	38.64	1.93	7.73	39.42	1.97	2.44	6.19
7	39.42	1.97	7.88	40.20	2.01	2.45	6.23
Daily group ration (g)		7.43	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.37	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	40.20	2.01	8.04	41.01	2.05	2.47	6.27
9	41.01	2.05	8.20	41.83	2.09	2.49	6.31
10	41.83	2.09	8.37	42.66	2.13	2.50	6.36
11	42.66	2.13	8.53	43.52	2.18	2.52	6.40
12	43.52	2.18	8.70	44.39	2.22	2.54	6.44
13	44.39	2.22	8.88	45.28	2.26	2.55	6.48
14	45.28	2.26	9.06	46.18	2.31	2.57	6.53
Daily group ration (g)		8.54	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	46.18	2.31	9.24	47.11	2.36	2.59	6.57
16	47.11	2.36	9.42	48.05	2.40	2.60	6.61
17	48.05	2.40	9.61	49.01	2.45	2.62	6.66
18	49.01	2.45	9.80	49.99	2.50	2.64	6.70
19	49.99	2.50	10.00	50.99	2.55	2.66	6.74
20	50.99	2.55	10.20	52.01	2.60	2.67	6.79
21	52.01	2.60	10.40	53.05	2.65	2.69	6.83
Daily group ration (g)		9.81	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.49	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	53.05	2.65	10.61	54.11	2.71	2.71	6.88
23	54.11	2.71	10.82	55.19	2.76	2.73	6.92
24	55.19	2.76	11.04	56.30	2.81	2.74	6.97
25	56.30	2.81	11.26	57.42	2.87	2.76	7.02
26	57.42	2.87	11.48	58.57	2.93	2.78	7.06
27	58.57	2.93	11.71	59.74	2.99	2.80	7.11
28	59.74	2.99	11.95	60.94	3.05	2.82	7.16
Daily group ration (g)		11.27	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.56	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	60.94	3.05	12.19	62.15	3.11	2.84	7.20
30	62.15	3.11	12.43	63.40	3.17	2.86	7.25
31	63.40	3.17	12.68	64.67	3.23	2.87	7.30
Daily group ration (g)		12.43	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.62	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs / / 31-36

Reviewed by: TJ-S Date: 23APR12
Verified by: JR Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System ___F___
Holding Tank/Chamber: ___F14___
Treatment Group: ___Control___
Species: ___WAE___ **Lot:** __112100___

Date Created/Initials: ___4-3-2012___ JA
Date Revised/ini[redacted]
Approved for us[redacted] __4-3-2012__
Date

Row Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	1.87
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.53	1.87	7.11	36.24	1.91	2.41	6.12
2	36.24	1.91	7.25	36.97	1.95	2.43	6.16
3	36.97	1.95	7.39	37.70	1.98	2.44	6.20
4	37.70	1.98	7.54	38.46	2.02	2.46	6.24
5	38.46	2.02	7.69	39.23	2.06	2.47	6.29
6	39.23	2.06	7.85	40.01	2.11	2.49	6.33
7	40.01	2.11	8.00	40.81	2.15	2.51	6.37

Daily group ration (g) **7.55** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.40** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

8	40.81	2.15	8.16	41.63	2.19	2.52	6.41
9	41.63	2.19	8.33	42.46	2.23	2.54	6.45
10	42.46	2.23	8.49	43.31	2.28	2.56	6.50
11	43.31	2.28	8.66	44.18	2.33	2.57	6.54
12	44.18	2.33	8.84	45.06	2.37	2.59	6.58
13	45.06	2.37	9.01	45.96	2.42	2.61	6.63
14	45.96	2.42	9.19	46.88	2.47	2.63	6.67

Daily group ration (g) **8.67** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.46** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

15	46.88	2.47	9.38	47.82	2.52	2.64	6.72
16	47.82	2.52	9.56	48.78	2.57	2.66	6.76
17	48.78	2.57	9.76	49.75	2.62	2.68	6.80
18	49.75	2.62	9.95	50.75	2.67	2.70	6.85
19	50.75	2.67	10.15	51.76	2.72	2.71	6.89
20	51.76	2.72	10.35	52.80	2.78	2.73	6.94
21	52.80	2.78	10.56	53.85	2.83	2.75	6.99

Daily group ration (g) **9.96** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.52** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

22	53.85	2.83	10.77	54.93	2.89	2.77	7.03
23	54.93	2.89	10.99	56.03	2.95	2.79	7.08
24	56.03	2.95	11.21	57.15	3.01	2.81	7.13
25	57.15	3.01	11.43	58.29	3.07	2.82	7.17
26	58.29	3.07	11.66	59.46	3.13	2.84	7.22
27	59.46	3.13	11.89	60.65	3.19	2.86	7.27
28	60.65	3.19	12.13	61.86	3.26	2.88	7.32

Daily group ration (g) **11.44** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.60** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

29	61.86	3.26	12.37	63.10	3.32	2.90	7.37
30	63.10	3.32	12.62	64.36	3.39	2.92	7.41
31	64.36	3.39	12.87	65.64	3.45	2.94	7.46

Daily group ration (g) **12.62** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.66** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DJS Date: 23APR12
File Folder 7 Lab book/pgs 1 / 31-36 Verified by: SA Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et al, use value that approximates body condition for the species. Enter value as a decima

Holding System F Date Created/Initials: 4-3-2012 JJ
Holding Tank/Chamber: F15 Date Revised/i[redacted]
Treatment Group: 50 mg/L Approved for u[redacted] 4-3-2012
Species: WAE Lot: 112100 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.64							
21	Number of fish	20							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	20							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.80	1.64	6.56	33.46	1.67	2.31	5.86
2	33.46	1.67	6.69	34.13	1.71	2.32	5.90
3	34.13	1.71	6.83	34.81	1.74	2.34	5.94
4	34.81	1.74	6.96	35.50	1.78	2.35	5.98
5	35.50	1.78	7.10	36.21	1.81	2.37	6.02
6	36.21	1.81	7.24	36.94	1.85	2.38	6.06
7	36.94	1.85	7.39	37.68	1.88	2.40	6.10
Daily group ration (g)		6.97		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	37.68	1.88	7.54	38.43	1.92	2.42	6.14
9	38.43	1.92	7.69	39.20	1.96	2.43	6.18
10	39.20	1.96	7.84	39.98	2.00	2.45	6.22
11	39.98	2.00	8.00	40.78	2.04	2.46	6.26
12	40.78	2.04	8.16	41.60	2.08	2.48	6.30
13	41.60	2.08	8.32	42.43	2.12	2.50	6.34
14	42.43	2.12	8.49	43.28	2.16	2.51	6.39
Daily group ration (g)		8.00		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	43.28	2.16	8.66	44.14	2.21	2.53	6.43
16	44.14	2.21	8.83	45.03	2.25	2.55	6.47
17	45.03	2.25	9.01	45.93	2.30	2.56	6.51
18	45.93	2.30	9.19	46.85	2.34	2.58	6.56
19	46.85	2.34	9.37	47.78	2.39	2.60	6.60
20	47.78	2.39	9.56	48.74	2.44	2.62	6.64
21	48.74	2.44	9.75	49.71	2.49	2.63	6.69
Daily group ration (g)		9.19		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	49.71	2.49	9.94	50.71	2.54	2.65	6.73
23	50.71	2.54	10.14	51.72	2.59	2.67	6.78
24	51.72	2.59	10.34	52.76	2.64	2.69	6.82
25	52.76	2.64	10.55	53.81	2.69	2.70	6.87
26	53.81	2.69	10.76	54.89	2.74	2.72	6.91
27	54.89	2.74	10.98	55.99	2.80	2.74	6.96
28	55.99	2.80	11.20	57.11	2.86	2.76	7.00
Daily group ration (g)		10.56		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	57.11	2.86	11.42	58.25	2.91	2.78	7.05
30	58.25	2.91	11.65	59.41	2.97	2.79	7.10
31	59.41	2.97	11.88	60.60	3.03	2.81	7.14
Daily group ration (g)		11.65		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 15
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 9MAR2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: JWL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 DS
Holding Tank/Chamber: E1 (from diluter C1) **Date Revised/initials:**
Treatment Group: Control **Approved for us** [redacted] D3MAY12
Species: BKT **Lot:** 120300 Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	INPUT SECTION						Worksheet Formulas		
20	Initial fish size (g)	1.4165					Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish	20					Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)	0.0004					Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR	1.2					Fish Final Length (inches) ={(H33/454)/$E$22}^0.333333536 (Column H value adjusts by row)		
26	% B.W./d	5					Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
28									
29									
30									
31									
32	Day	(g)	(g)	(g)	(g)	(g)	(inches)	(cm)	
33	1	28.33	1.42	1.42	29.51	1.48	2.01	5.11	
34	2	29.51	1.48	1.48	30.74	1.54	2.04	5.18	
35	3	30.74	1.54	1.54	32.02	1.60	2.07	5.25	
36	4	32.02	1.60	1.60	33.36	1.67	2.09	5.32	
37	5	33.36	1.67	1.67	34.74	1.74	2.12	5.39	
38	6	34.74	1.74	1.74	36.19	1.81	2.15	5.47	
39	7	36.19	1.81	1.81	37.70	1.89	2.18	5.54	
40									
41	Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	37.70	1.89	1.89	39.27	1.96	2.21	5.62	
45	9	39.27	1.96	1.96	40.91	2.05	2.24	5.69	
46	10	40.91	2.05	2.05	42.61	2.13	2.27	5.77	
47	11	42.61	2.13	2.13	44.39	2.22	2.30	5.85	
48	12	44.39	2.22	2.22	46.24	2.31	2.33	5.93	
49	13	46.24	2.31	2.31	48.16	2.41	2.37	6.01	
50	14	48.16	2.41	2.41	50.17	2.51	2.40	6.09	
51									
52	Daily group ration (g)		2.14		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	50.17	2.51	2.51	52.26	2.61	2.43	6.18	
56	16	52.26	2.61	2.61	54.44	2.72	2.47	6.26	
57	17	54.44	2.72	2.72	56.71	2.84	2.50	6.35	
58	18	56.71	2.84	2.84	59.07	2.95	2.53	6.44	
59	19	59.07	2.95	2.95	61.53	3.08	2.57	6.52	
60	20	61.53	3.08	3.08	64.09	3.20	2.60	6.61	
61	21	64.09	3.20	3.20	66.77	3.34	2.64	6.70	
62									
63	Daily group ration (g)		2.84		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	66.77	3.34	3.34	69.55	3.48	2.68	6.80	
67	23	69.55	3.48	3.48	72.44	3.62	2.71	6.89	
68	24	72.44	3.62	3.62	75.46	3.77	2.75	6.98	
69	25	75.46	3.77	3.77	78.61	3.93	2.79	7.08	
70	26	78.61	3.93	3.93	81.88	4.09	2.82	7.18	
71	27	81.88	4.09	4.09	85.29	4.26	2.86	7.27	
72	28	85.29	4.26	4.26	88.85	4.44	2.90	7.37	
73									
74	Daily group ration (g)		3.79		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	88.85	4.44	4.44	92.55	4.63	2.94	7.47	
78	30	92.55	4.63	4.63	96.41	4.82	2.98	7.58	
79	31	96.41	4.82	4.82	100.42	5.02	3.02	7.68	
80									
81	Daily group ration (g)		4.63		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: RW Date: 19MAR2013
File Folder 7 Lab book/pgs 1 / 40-48 Verified by: JR Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982 Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 TS
Holding Tank/Chamber: E2 (from diluter A3) **Date Revised/Initials:**
Treatment Group: 100 mg/L **Approved for use** [redacted] 03MAY12
Species: BKT **Lot:** 120300 Study Director Date

Row	Column:	c	d	e	f	g	h	I	J
19	**INPUT SECTION**								
20	Initial fish size (g)	1.42							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)
Fish Final Length (inches) ={(H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	28.40	1.42	1.42	29.58	1.48	2.01	5.11	
34	2	29.58	1.48	1.48	30.82	1.54	2.04	5.18	
35	3	30.82	1.54	1.54	32.10	1.60	2.07	5.25	
36	4	32.10	1.60	1.60	33.44	1.67	2.10	5.32	
37	5	33.44	1.67	1.67	34.83	1.74	2.12	5.40	
38	6	34.83	1.74	1.74	36.28	1.81	2.15	5.47	
39	7	36.28	1.81	1.81	37.78	1.89	2.18	5.55	
40									
41	Daily group ration (g)		1.61						←OUTPUT - GROUP FEED RATE (g) for week 1
42	Daily per fish ration (g)		0.08						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
43									
44	8	37.79	1.89	1.89	39.37	1.97	2.21	5.62	
45	9	39.37	1.97	1.97	41.01	2.05	2.24	5.70	
46	10	41.01	2.05	2.05	42.72	2.14	2.27	5.78	
47	11	42.72	2.14	2.14	44.50	2.22	2.31	5.86	
48	12	44.50	2.22	2.22	46.35	2.32	2.34	5.94	
49	13	46.35	2.32	2.32	48.28	2.41	2.37	6.02	
50	14	48.28	2.41	2.41	50.29	2.51	2.40	6.10	
51									
52	Daily group ration (g)		2.14						←OUTPUT - GROUP FEED RATE (g) for week 2
53	Daily per fish ration (g)		0.11						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
54									
55	15	50.29	2.51	2.51	52.39	2.62	2.43	6.18	
56	16	52.39	2.62	2.62	54.57	2.73	2.47	6.27	
57	17	54.57	2.73	2.73	56.85	2.84	2.50	6.35	
58	18	56.85	2.84	2.84	59.22	2.96	2.54	6.44	
59	19	59.22	2.96	2.96	61.68	3.08	2.57	6.53	
60	20	61.68	3.08	3.08	64.25	3.21	2.61	6.62	
61	21	64.25	3.21	3.21	66.93	3.35	2.64	6.71	
62									
63	Daily group ration (g)		2.85						←OUTPUT - GROUP FEED RATE (g) for week 3
64	Daily per fish ration (g)		0.14						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
65									
66	22	66.93	3.35	3.35	69.72	3.49	2.68	6.80	
67	23	69.72	3.49	3.49	72.62	3.63	2.71	6.89	
68	24	72.62	3.63	3.63	75.65	3.78	2.75	6.99	
69	25	75.65	3.78	3.78	78.80	3.94	2.79	7.08	
70	26	78.80	3.94	3.94	82.09	4.10	2.83	7.18	
71	27	82.09	4.10	4.10	85.51	4.28	2.87	7.28	
72	28	85.51	4.28	4.28	89.07	4.45	2.91	7.38	
73									
74	Daily group ration (g)		3.80						←OUTPUT - GROUP FEED RATE (g) for week 4
75	Daily per fish ration (g)		0.19						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
76									
77	29	89.07	4.45	4.45	92.78	4.64	2.95	7.48	
78	30	92.78	4.64	4.64	96.65	4.83	2.99	7.58	
79	31	96.65	4.83	4.83	100.67	5.03	3.03	7.69	
80									
81	Daily group ration (g)		4.64						←OUTPUT - GROUP FEED RATE (g) for week 5
82	Daily per fish ration (g)		0.23						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 1 , 40-48

Reviewed by: KAW Date: 19 MAR 2013
Verified by: [illegible] Date: 4-xx-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E3 (from diluter B3)
Treatment Group: 50 mg/L
Species: BKT **Lot:** 120300

Date Created/Initials: 5/3/12 DS
Date Revised/Init: [redacted]
Approved for use [redacted] 03MAY12 Date

INPUT SECTION	
Initial fish size (g)	1.2445
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Fina Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) ={(H33/454)/$E$22}^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator vakre adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	24.89	1.24	1.24	25.93	1.30	1.93	4.89
2	25.93	1.30	1.30	27.01	1.35	1.95	4.96
3	27.01	1.35	1.35	28.13	1.41	1.98	5.03
4	28.13	1.41	1.41	29.30	1.47	2.01	5.09
5	29.30	1.47	1.47	30.53	1.53	2.03	5.16
6	30.53	1.53	1.53	31.80	1.59	2.06	5.24
7	31.80	1.59	1.59	33.12	1.66	2.09	5.31
Daily group ration (g)		1.41		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	33.12	1.66	1.66	34.50	1.73	2.12	5.38
9	34.50	1.73	1.73	35.94	1.80	2.15	5.45
10	35.94	1.80	1.80	37.44	1.87	2.18	5.53
11	37.44	1.87	1.87	39.00	1.95	2.21	5.60
12	39.00	1.95	1.95	40.62	2.03	2.24	5.68
13	40.62	2.03	2.03	42.32	2.12	2.27	5.76
14	42.32	2.12	2.12	44.08	2.20	2.30	5.84
Daily group ration (g)		1.88		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	44.08	2.20	2.20	45.92	2.30	2.33	5.92
16	45.92	2.30	2.30	47.83	2.39	2.36	6.00
17	47.83	2.39	2.39	49.82	2.49	2.39	6.08
18	49.82	2.49	2.49	51.90	2.59	2.43	6.16
19	51.90	2.59	2.59	54.06	2.70	2.46	6.25
20	54.06	2.70	2.70	56.31	2.82	2.49	6.33
21	56.31	2.82	2.82	58.66	2.93	2.53	6.42
Daily group ration (g)		2.50		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.12		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	58.66	2.93	2.93	61.10	3.06	2.56	6.51
23	61.10	3.06	3.06	63.65	3.18	2.60	6.60
24	63.65	3.18	3.18	66.30	3.32	2.63	6.69
25	66.30	3.32	3.32	69.06	3.45	2.67	6.78
26	69.06	3.45	3.45	71.94	3.60	2.71	6.87
27	71.94	3.60	3.60	74.94	3.75	2.74	6.97
28	74.94	3.75	3.75	78.06	3.90	2.78	7.06
Daily group ration (g)		3.33		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	78.06	3.90	3.90	81.31	4.07	2.82	7.16
30	81.31	4.07	4.07	84.70	4.24	2.86	7.26
31	84.70	4.24	4.24	88.23	4.41	2.90	7.36
Daily group ration (g)		4.07		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 11MAR2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: JW Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in P per et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Date Created/Initials: 5/3/12 DS
Holding Tank/Chamber: E4 (from diluter C3) Date Revised/ini [redacted]
Treatment Group: 300 mg/L Approved for us [redacted] 1MAY12
Species: BKT Lot: 120300 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.384							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+,F33*(1/$D$25)) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	27.68	1.38	1.36	28.85	1.44	1.99	5.07
2	28.83	1.44	1.44	30.05	1.50	2.02	5.14
3	30.03	1.50	1.50	31.29	1.56	2.05	5.21
4	31.29	1.56	1.56	32.59	1.63	2.08	5.28
5	32.59	1.63	1.63	33.95	1.70	2.11	5.35
6	33.95	1.70	1.70	35.36	1.77	2.14	5.42
7	35.36	1.77	1.77	36.84	1.84	2.16	5.50
Daily group ration (g)		1.57		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.84	1.84	1.84	38.37	1.92	2.19	5.57
9	38.37	1.92	1.92	39.97	2.00	2.22	5.65
10	39.97	2.00	2.00	41.63	2.08	2.25	5.73
11	41.63	2.08	2.08	43.37	2.17	2.29	5.81
12	43.37	2.17	2.17	45.18	2.26	2.32	5.89
13	45.18	2.26	2.26	47.06	2.35	2.35	5.97
14	47.06	2.35	2.35	49.02	2.45	2.38	6.05
Daily group ration (g)		2.09		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	49.02	2.45	2.45	51.06	2.55	2.41	6.13
16	51.06	2.55	2.55	53.19	2.66	2.45	6.21
17	53.19	2.66	2.66	55.41	2.77	2.48	6.30
18	55.41	2.77	2.77	57.71	2.89	2.51	6.39
19	57.71	2.89	2.89	60.12	3.01	2.55	6.47
20	60.12	3.01	3.01	62.62	3.13	2.58	6.56
21	62.62	3.13	3.13	65.23	3.26	2.62	6.65
Daily group ration (g)		2.78		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	65.23	3.26	3.26	67.95	3.40	2.65	6.74
23	67.95	3.40	3.40	70.78	3.54	2.69	6.84
24	70.78	3.54	3.54	73.73	3.69	2.73	6.93
25	73.73	3.69	3.69	76.80	3.84	2.77	7.02
26	76.80	3.84	3.84	80.00	4.00	2.80	7.12
27	80.00	4.00	4.00	83.34	4.17	2.84	7.22
28	83.34	4.17	4.17	86.81	4.34	2.88	7.32
Daily group ration (g)		3.70		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	86.81	4.34	4.34	90.43	4.52	2.92	7.42
30	90.43	4.52	4.52	94.20	4.71	2.96	7.52
31	94.20	4.71	4.71	98.12	4.91	3.00	7.62
Daily group ration (g)		4.52		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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FF # 7
Item No. 16
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KWW Date: 9MAR2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration (g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Date Created/Initials: 5/3/12 DS
Holding Tank/Chamber: E5 (from diluter C5) Date Revised/Initi [redacted]
Treatment Group: 50 mg/L Approved for use: [redacted] 03MAY12
Species: BKT Lot: 120300 Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initial fish size (g)			1.292			Group Total Initial fish weight (g) = E20 * E21 (Initia fish size determined from measured weights)		
21	Number of fish			20			Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)			0.0004			Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	[C = 0.00015 - 0.00050 in 0.00005 increments]						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR			1.2			Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d			5			Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									
28			Group Total Initial	Average Individual Initial	Daily Group Feed	Total Final	Individual Final	Fish Final	Fish Final
29									
30									
31									
32		Day	Fish wt (g)	Fish wt (g)	Ration (g)	Fish wt (g)	Fish wt (g)	Length (inches)	Length (cm)
33		1	25.84	1.29	1.29	26.92	1.35	1.95	4.95
34		2	26.92	1.35	1.35	28.04	1.40	1.98	5.02
35		3	28.04	1.40	1.40	29.21	1.46	2.00	5.09
36		4	29.21	1.46	1.46	30.42	1.52	2.03	5.16
37		5	30.42	1.52	1.52	31.69	1.58	2.06	5.23
38		6	31.69	1.58	1.58	33.01	1.65	2.09	5.30
39		7	33.01	1.65	1.65	34.39	1.72	2.12	5.37
40									
41	Daily group ration (g)			1.47		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)			0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43									
44		8	34.39	1.72	1.72	35.81	1.79	2.14	5.45
45		9	35.82	1.79	1.79	37.31	1.87	2.17	5.52
46		10	37.31	1.87	1.87	38.87	1.94	2.20	5.60
47		11	38.87	1.94	1.94	40.49	2.02	2.23	5.67
48		12	40.49	2.02	2.02	42.17	2.11	2.26	5.75
49		13	42.17	2.11	2.11	43.98	2.20	2.33	5.83
50		14	43.93	2.20	2.20	45.76	2.29	2.33	5.91
51									
52	Daily group ration (g)			1.95		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)			0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54									
55		15	45.76	2.29	2.29	47.67	2.38	2.36	5.99
56		16	47.67	2.38	2.38	49.65	2.48	2.39	6.07
57		17	49.65	2.48	2.48	51.72	2.59	2.42	6.16
58		18	51.72	2.59	2.59	53.88	2.69	2.46	6.24
59		19	53.88	2.69	2.69	56.12	2.81	2.49	6.33
60		20	56.12	2.81	2.81	58.46	2.92	2.52	6.41
61		21	58.46	2.92	2.92	60.90	3.04	2.56	6.50
62									
63	Daily group ration (g)			2.59		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)			0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65									
66		22	60.90	3.04	3.04	63.43	3.17	2.59	6.59
67		23	63.43	3.17	3.17	66.08	3.30	2.63	6.68
68		24	66.08	3.30	3.30	68.83	3.44	2.67	6.77
69		25	68.83	3.44	3.44	71.70	3.58	2.70	6.86
70		26	71.70	3.58	3.58	74.69	3.73	2.74	6.96
71		27	74.69	3.73	3.73	77.80	3.89	2.78	7.05
72		28	77.80	3.89	3.89	81.04	4.05	2.82	7.15
73									
74	Daily group ration (g)			3.45		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)			0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76									
77		29	81.04	4.05	4.05	84.42	4.22	2.85	7.25
78		30	84.42	4.22	4.22	87.93	4.40	2.89	7.36
79		31	87.93	4.40	4.40	91.60	4.58	2.93	7.45
80									
81	Daily group ration (g)			4.22		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)			0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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FF # 7
Item No. 16
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Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: JM Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food convers on rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
if not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 TJS
Holding Tank/Chamber: E6 (from diluter B2) **Date Revised/ini** [redacted]
Treatment Group: 100 mg/L **Approved for use** [redacted] 03MAY12 Date
Species: BKT **Lot:** 120300

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.484					
21	Number of fish			20					
22	Condition Factor (C)			0.0004					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			1.2					
26	% B.W./d			5					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	29.68	1.48	1.48	30.92	1.55	2.04	5.19	
34	2	30.92	1.55	1.55	32.20	1.61	2.07	5.26	
35	3	32.20	1.61	1.61	33.55	1.68	2.10	5.33	
36	4	33.55	1.68	1.68	34.94	1.75	2.13	5.40	
37	5	34.94	1.75	1.75	36.40	1.82	2.16	5.48	
38	6	36.40	1.82	1.82	37.92	1.90	2.19	5.55	
39	7	37.92	1.90	1.90	39.50	1.97	2.22	5.63	
40									
41	Daily group ration (g)		1.68		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	39.50	1.97	1.97	41.14	2.06	2.25	5.70	
45	9	41.14	2.06	2.06	42.86	2.14	2.28	5.78	
46	10	42.86	2.14	2.14	44.64	2.23	2.31	5.86	
47	11	44.64	2.23	2.23	46.50	2.33	2.34	5.94	
48	12	46.50	2.33	2.33	48.44	2.42	2.37	6.02	
49	13	48.44	2.42	2.42	50.46	2.52	2.40	6.11	
50	14	50.46	2.52	2.52	52.56	2.63	2.44	6.19	
51									
52	Daily group ration (g)		2.24		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	52.56	2.63	2.63	54.75	2.74	2.47	6.27	
56	16	54.75	2.74	2.74	57.03	2.85	2.50	6.36	
57	17	57.03	2.85	2.85	59.41	2.97	2.54	6.45	
58	18	59.41	2.97	2.97	61.88	3.09	2.57	6.54	
59	19	61.88	3.09	3.09	64.46	3.22	2.61	6.63	
60	20	64.46	3.22	3.22	67.15	3.36	2.64	6.72	
61	21	67.15	3.36	3.36	69.95	3.50	2.68	6.81	
62									
63	Daily group ration (g)		2.98		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	69.95	3.50	3.50	72.86	3.64	2.72	6.90	
67	23	72.86	3.64	3.64	75.90	3.79	2.75	7.00	
68	24	75.90	3.79	3.79	79.06	3.95	2.79	7.09	
69	25	79.06	3.95	3.95	82.35	4.12	2.83	7.19	
70	26	82.35	4.12	4.12	85.79	4.29	2.87	7.29	
71	27	85.79	4.29	4.29	89.36	4.47	2.91	7.39	
72	28	89.36	4.47	4.47	93.08	4.65	2.95	7.49	
73									
74	Daily group ration (g)		3.97		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	93.08	4.65	4.65	96.96	4.85	2.99	7.59	
78	30	96.96	4.85	4.85	101.00	5.05	3.03	7.70	
79	31	101.00	5.05	5.05	105.21	5.26	3.07	7.80	
80									
81	Daily group ration (g)		4.85		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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FF # 7
Item No. 16
Pg 6 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 1 ; 40-48 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack **Date Created/Initials:** 5/3/12 TJS
Holding Tank/Chamber: E7 (from diluter B5) **Date Revised/Initials:**
Treatment Group: CONTROL **Approved for use** [redacted] 03MAY12
Species: BKT **Lot:** 120300 **Study Director** **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.3485							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							
27									

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) = ((H33/434)/$E$22)^0.333333333 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	26.97	1.35	1.35	28.05	1.40	1.98	5.02	
34	2	28.09	1.40	1.40	29.26	1.46	2.00	5.09	
35	3	29.26	1.46	1.46	30.48	1.52	2.03	5.16	
36	4	30.48	1.52	1.52	31.75	1.59	2.06	5.23	
37	5	31.75	1.59	1.59	33.08	1.65	2.09	5.30	
38	6	33.08	1.65	1.65	34.46	1.72	2.12	5.38	
39	7	34.46	1.72	1.72	35.89	1.79	2.15	5.45	
40									
41	Daily group ration (g)		1.53		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	35.89	1.79	1.79	37.39	1.87	2.18	5.53	
45	9	37.39	1.87	1.87	38.94	1.95	2.21	5.60	
46	10	38.94	1.95	1.95	40.57	2.03	2.24	5.68	
47	11	40.57	2.03	2.03	42.26	2.11	2.27	5.76	
48	12	42.26	2.11	2.11	44.02	2.20	2.30	5.83	
49	13	44.02	2.20	2.20	45.85	2.29	2.33	5.91	
50	14	45.85	2.29	2.29	47.76	2.39	2.36	6.00	
51									
52	Daily group ration (g)		2.04		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	47.76	2.39	2.39	49.75	2.49	2.39	6.08	
56	16	49.75	2.49	2.49	51.83	2.59	2.43	6.16	
57	17	51.83	2.59	2.59	53.98	2.70	2.46	6.25	
58	18	53.98	2.70	2.70	56.23	2.81	2.49	6.33	
59	19	56.23	2.81	2.81	58.58	2.93	2.53	6.42	
60	20	58.58	2.93	2.93	61.02	3.05	2.56	6.51	
61	21	61.02	3.05	3.05	63.56	3.18	2.60	6.59	
62									
63	Daily group ration (g)		2.71		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	63.56	3.18	3.18	66.21	3.31	2.63	6.68	
67	23	66.21	3.31	3.31	68.97	3.45	2.67	6.78	
68	24	68.97	3.45	3.45	71.84	3.59	2.70	6.87	
69	25	71.84	3.59	3.59	74.83	3.74	2.74	6.96	
70	26	74.83	3.74	3.74	77.95	3.90	2.78	7.06	
71	27	77.95	3.90	3.90	81.20	4.06	2.82	7.16	
72	28	81.20	4.06	4.06	84.58	4.23	2.86	7.25	
73									
74	Daily group ration (g)		3.60		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	84.58	4.23	4.23	88.11	4.41	2.89	7.35	
78	30	88.11	4.41	4.41	91.78	4.59	2.93	7.45	
79	31	91.78	4.59	4.59	95.60	4.78	2.97	7.55	
80									
81	Daily group ration (g)		4.41		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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FF # 7
Item No. 1e
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1 / 40-48

Reviewed by: [redacted] Date: APR 2013
Verified by: JP Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Inter or Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 PS
Holding Tank/Chamber: E8 (from diluter B4) **Date Revised/Initials:**
Treatment Group: 200 mg/L **Approved for use:** [redacted] 03MAY12
Species: BKT **Lot:** 120300 **Study Director** **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.261					
21	Number of fish			20					
22	Condition Factor (C)			0.0004					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			1.2					
26	% B.W./d			5					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.338333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	25.22	1.26	1.26	26.27	1.31	1.93	4.91	
34	2	26.27	1.31	1.31	27.37	1.37	1.96	4.98	
35	3	27.37	1.37	1.37	28.51	1.43	1.99	5.05	
36	4	28.51	1.43	1.43	29.69	1.48	2.01	5.12	
37	5	29.69	1.48	1.48	30.93	1.55	2.04	5.19	
38	6	30.93	1.55	1.55	32.22	1.61	2.07	5.26	
39	7	32.22	1.61	1.61	33.56	1.68	2.10	5.33	
40									
41	Daily group ration (g)		1.43		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	33.56	1.68	1.68	34.96	1.75	2.13	5.40	
45	9	34.96	1.75	1.75	36.42	1.82	2.16	5.48	
46	10	36.42	1.82	1.82	37.93	1.90	2.19	5.55	
47	11	37.93	1.90	1.90	39.51	1.98	2.22	5.63	
48	12	39.51	1.98	1.98	41.16	2.06	2.25	5.71	
49	13	41.16	2.06	2.06	42.88	2.14	2.28	5.78	
50	14	42.88	2.14	2.14	44.66	2.23	2.31	5.86	
51									
52	Daily group ration (g)		1.90		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	44.66	2.23	2.23	46.52	2.33	2.34	5.94	
56	16	46.52	2.33	2.33	48.46	2.42	2.37	6.02	
57	17	48.46	2.42	2.42	50.48	2.52	2.40	6.11	
58	18	50.48	2.52	2.52	52.59	2.63	2.44	6.19	
59	19	52.59	2.63	2.63	54.78	2.74	2.47	6.28	
60	20	54.78	2.74	2.74	57.06	2.85	2.50	6.36	
61	21	57.06	2.85	2.85	59.44	2.97	2.54	6.45	
62									
63	Daily group ration (g)		2.53		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	59.44	2.97	2.97	61.91	3.10	2.57	6.54	
67	23	61.91	3.10	3.10	64.49	3.22	2.61	6.63	
68	24	64.49	3.22	3.22	67.18	3.36	2.64	6.72	
69	25	67.18	3.36	3.36	69.98	3.50	2.68	6.81	
70	26	69.98	3.50	3.50	72.89	3.64	2.72	6.90	
71	27	72.89	3.64	3.64	75.93	3.80	2.75	7.00	
72	28	75.93	3.80	3.80	79.10	3.95	2.79	7.09	
73									
74	Daily group ration (g)		3.37		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	79.10	3.95	3.95	82.39	4.12	2.83	7.19	
78	30	82.39	4.12	4.12	85.82	4.29	2.87	7.29	
79	31	85.82	4.29	4.29	89.40	4.47	2.91	7.39	
80									
81	Daily group ration (g)		4.12		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 9MAR2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 TJS
Holding Tank/Chamber: E9 (from diluter A2) **Date Revised/Initials:**
Treatment Group: 50 mg/L **Approved for use** [redacted] 03MAY12
Species: BKT **Lot:** 120300 Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.2915							
21	Number of fish	20							
22	Condition Factor (C)	0.0004							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	1.2							
26	% B.W./d	5							

Worksheet Formulas
Group Total initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	25.83	1.29	1.29	26.91	1.35	1.95	4.95
34	2	26.91	1.35	1.35	28.03	1.40	1.98	5.02
35	3	28.03	1.40	1.40	29.20	1.46	2.00	5.09
36	4	29.20	1.46	1.46	30.41	1.52	2.03	5.16
37	5	30.41	1.52	1.52	31.68	1.58	2.06	5.23
38	6	31.68	1.58	1.58	33.00	1.65	2.09	5.30
39	7	33.00	1.65	1.65	34.37	1.72	2.12	5.37
40								
41	Daily group ration (g)		1.46		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	34.37	1.72	1.72	35.81	1.79	2.14	5.45
45	9	35.81	1.79	1.79	37.30	1.86	2.17	5.52
46	10	37.30	1.86	1.86	38.85	1.94	2.20	5.60
47	11	38.85	1.94	1.94	40.47	2.02	2.23	5.67
48	12	40.47	2.02	2.02	42.16	2.11	2.26	5.75
49	13	42.16	2.11	2.11	43.91	2.20	2.30	5.83
50	14	43.91	2.20	2.20	45.74	2.29	2.33	5.91
51								
52	Daily group ration (g)		1.95		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	45.74	2.29	2.29	47.65	2.38	2.36	5.99
56	16	47.65	2.38	2.38	49.63	2.48	2.39	6.07
57	17	49.63	2.48	2.48	51.70	2.59	2.42	6.16
58	18	51.70	2.59	2.59	53.86	2.69	2.46	6.24
59	19	53.86	2.69	2.69	56.10	2.81	2.49	6.33
60	20	56.10	2.81	2.81	58.44	2.92	2.52	6.41
61	21	58.44	2.92	2.92	60.87	3.04	2.56	6.50
62								
63	Daily group ration (g)		2.59		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	60.87	3.04	3.04	63.41	3.17	2.59	6.59
67	23	63.41	3.17	3.17	66.05	3.30	2.63	6.68
68	24	66.05	3.30	3.30	68.80	3.44	2.67	6.77
69	25	68.80	3.44	3.44	71.67	3.58	2.70	6.86
70	26	71.67	3.58	3.58	74.66	3.73	2.74	6.96
71	27	74.66	3.73	3.73	77.77	3.89	2.78	7.05
72	28	77.77	3.89	3.89	81.01	4.05	2.81	7.15
73								
74	Daily group ration (g)		3.45		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	81.01	4.05	4.05	84.38	4.22	2.85	7.25
78	30	84.38	4.22	4.22	87.90	4.39	2.89	7.35
79	31	87.90	4.39	4.39	91.56	4.58	2.93	7.45
80								
81	Daily group ration (g)		4.22		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 40-48

Reviewed by: KMW Date: 19MAR 2013
Verified by: JM Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 DS
Holding Tank/Chamber: E10 (from diluter A5) **Date Revised/in** [redacted]
Treatment Group: 200 mg/L **Approved for us** [redacted] 03 MAY 12
Species: BKT **Lot:** 120300 **Study Director** **Date**

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.3835
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas

Group Total initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+F33*(1/$D$25)) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	27.67	1.38	1.38	28.82	1.44	1.99	5.07	
2	28.82	1.44	1.44	30.02	1.50	2.02	5.14	
3	30.02	1.50	1.50	31.27	1.56	2.05	5.21	
4	31.27	1.56	1.56	32.58	1.63	2.08	5.28	
5	32.58	1.63	1.63	33.94	1.70	2.11	5.35	
6	33.94	1.70	1.70	35.35	1.77	2.14	5.42	
7	35.35	1.77	1.77	36.82	1.84	2.15	5.50	
Daily group ration (g)		1.57		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	36.82	1.84	1.84	38.36	1.92	2.19	5.57	
9	38.36	1.92	1.92	39.95	2.00	2.22	5.65	
10	39.95	2.00	2.00	41.62	2.08	2.25	5.73	
11	41.62	2.08	2.08	43.35	2.17	2.29	5.80	
12	43.35	2.17	2.17	45.16	2.26	2.32	5.88	
13	45.16	2.26	2.26	47.04	2.35	2.35	5.97	
14	47.04	2.35	2.35	49.00	2.45	2.38	6.05	
Daily group ration (g)		2.09		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	49.00	2.45	2.45	51.04	2.55	2.41	6.13	
16	51.04	2.55	2.55	53.17	2.66	2.45	6.21	
17	53.17	2.66	2.66	55.39	2.77	2.48	6.30	
18	55.39	2.77	2.77	57.69	2.88	2.51	6.39	
19	57.69	2.88	2.88	60.10	3.00	2.55	6.47	
20	60.10	3.00	3.00	62.60	3.13	2.58	6.56	
21	62.60	3.13	3.13	65.21	3.26	2.62	6.65	
Daily group ration (g)		2.78		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	65.21	3.26	3.26	67.93	3.40	2.65	6.74	
23	67.93	3.40	3.40	70.76	3.54	2.69	6.83	
24	70.76	3.54	3.54	73.71	3.69	2.73	6.93	
25	73.71	3.69	3.69	76.78	3.84	2.76	7.02	
26	76.78	3.84	3.84	79.98	4.00	2.80	7.12	
27	79.98	4.00	4.00	83.31	4.17	2.84	7.22	
28	83.31	4.17	4.17	86.78	4.34	2.88	7.32	
Daily group ration (g)		3.70		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	86.78	4.34	4.34	90.39	4.52	2.97	7.47	
30	90.39	4.52	4.52	94.16	4.71	2.96	7.52	
31	94.16	4.71	4.71	98.08	4.90	3.00	7.62	
Daily group ration (g)		4.52		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 1 / 40-48

Reviewed by: KW Date: 19MAR2013
Verified by: SA Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E11 (from diluter C2)
Treatment Group: 100 mg/L
Species: BKT **Lot:** 120300

Date Created/Initials: 5/3/12 TS
Date Revised/Initials: [redacted]
Approved for use [redacted] 03MAY12 Date

INPUT SECTION	
Initial fish size (g)	1.347
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	26.94	1.35	1.35	28.06	1.40	1.98	5.02	
2	28.06	1.40	1.40	29.23	1.46	2.00	5.09	
3	29.23	1.46	1.46	30.45	1.52	2.03	5.16	
4	30.45	1.52	1.52	31.72	1.59	2.06	5.23	
5	31.72	1.59	1.59	33.04	1.65	2.09	5.30	
6	33.04	1.65	1.65	34.42	1.72	2.12	5.37	
7	34.42	1.72	1.72	35.85	1.79	2.15	5.45	
Daily group ration (g)		1.53						←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g)		0.08						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
8	35.85	1.79	1.79	37.34	1.87	2.17	5.52	
9	37.34	1.87	1.87	38.90	1.95	2.20	5.60	
10	38.90	1.95	1.95	40.52	2.03	2.23	5.68	
11	40.52	2.03	2.03	42.21	2.11	2.27	5.75	
12	42.21	2.11	2.11	43.97	2.20	2.30	5.83	
13	43.97	2.20	2.20	45.80	2.29	2.33	5.91	
14	45.80	2.29	2.29	47.71	2.39	2.36	5.99	
Daily group ration (g)		2.03						←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g)		0.10						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
15	47.71	2.39	2.39	49.70	2.48	2.39	6.08	
16	49.70	2.48	2.48	51.77	2.59	2.42	6.16	
17	51.77	2.59	2.59	53.92	2.70	2.46	6.24	
18	53.92	2.70	2.70	56.17	2.81	2.49	6.33	
19	56.17	2.81	2.81	58.51	2.93	2.53	6.42	
20	58.51	2.93	2.93	60.95	3.05	2.56	6.50	
21	60.95	3.05	3.05	63.49	3.17	2.60	6.59	
Daily group ration (g)		2.71						←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g)		0.14						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
22	63.49	3.17	3.17	66.13	3.31	2.63	6.68	
23	66.13	3.31	3.31	68.89	3.44	2.67	6.77	
24	68.89	3.44	3.44	71.76	3.59	2.70	6.87	
25	71.76	3.59	3.59	74.75	3.74	2.74	6.96	
26	74.75	3.74	3.74	77.87	3.89	2.78	7.06	
27	77.87	3.89	3.89	81.11	4.06	2.82	7.15	
28	81.11	4.06	4.06	84.49	4.22	2.85	7.25	
Daily group ration (g)		3.60						←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g)		0.18						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
29	84.49	4.22	4.22	88.01	4.40	2.89	7.35	
30	88.01	4.40	4.40	91.68	4.58	2.93	7.45	
31	91.68	4.58	4.58	95.50	4.77	2.97	7.55	
Daily group ration (g)		4.40						←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g)		0.22						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

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FF # 7
Item No. 16
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR 2013
File Folder 7 Lab book/pgs 1, 40-48 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Date Created/Initials: 5/3/12 TJS
Holding Tank/Chamber: E12 (from diluter A1) Date Revised/initials:
Treatment Group: CONTROL Approved for use [redacted] 03MAY12
Species: BKT Lot: 120300 Study Director Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.3485
Number of fish	20
Condition Factor (C)	0.0004
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	1.2
% B.W./d	5

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = 33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Tota Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	26.97	1.35	1.35	28.09	1.40	1.98	5.02
2	28.09	1.40	1.40	29.26	1.46	2.00	5.09
3	29.26	1.46	1.46	30.48	1.52	2.03	5.16
4	30.48	1.52	1.52	31.75	1.59	2.06	5.23
5	31.75	1.59	1.59	33.08	1.65	2.09	5.30
6	33.08	1.65	1.65	34.46	1.72	2.12	5.38
7	34.46	1.72	1.72	35.89	1.79	2.15	5.45

Daily group ration (g) 1.53 ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) 0.08 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

8	35.89	1.79	1.79	37.39	1.87	2.16	5.53
9	37.39	1.87	1.87	38.94	1.95	2.21	5.60
10	38.94	1.95	1.95	40.57	2.03	2.24	5.68
11	40.57	2.03	2.03	42.26	2.11	2.27	5.76
12	42.26	2.11	2.11	44.02	2.20	2.30	5.83
13	44.02	2.20	2.20	45.85	2.29	2.33	5.91
14	45.85	2.29	2.29	47.76	2.39	2.36	6.00

Daily group ration (g) 2.04 ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) 0.10 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

15	47.76	2.39	2.39	49.75	2.49	2.39	6.08
16	49.75	2.49	2.49	51.83	2.59	2.43	6.16
17	51.83	2.59	2.59	53.98	2.70	2.46	6.25
18	53.98	2.70	2.70	56.23	2.81	2.49	6.33
19	56.23	2.81	2.81	58.58	2.93	2.53	6.42
20	58.58	2.93	2.93	61.02	3.05	2.56	6.51
21	61.02	3.05	3.05	63.56	3.18	2.60	6.59

Daily group ration (g) 2.71 ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) 0.14 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

22	63.56	3.18	3.18	66.21	3.31	2.63	6.68
23	66.21	3.31	3.31	68.97	3.45	2.67	6.78
24	68.97	3.45	3.45	71.84	3.59	2.70	6.87
25	71.84	3.59	3.59	74.83	3.74	2.74	6.96
26	74.83	3.74	3.74	77.95	3.90	2.78	7.06
27	77.95	3.90	3.90	81.20	4.06	2.82	7.16
28	81.20	4.06	4.06	84.58	4.23	2.86	7.25

Daily group ration (g) 3.60 ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) 0.18 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

29	84.58	4.23	4.23	88.11	4.41	2.89	7.35
30	88.11	4.41	4.41	91.78	4.59	2.93	7.45
31	91.78	4.59	4.59	95.60	4.78	2.97	7.56

Daily group ration (g) 4.41 ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) 0.22 ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 1, 40-48

Reviewed by: KMW Date: 9MAR2013
Verified by: SM Date: 11-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack
Holding Tank/Chamber: E13 (from diluter A4)
Treatment Group: CONTROL
Species: BKT **Lot:** 120300

Date Created/Initials: 5/3/12 DS
Date Revised/Init
Approved for use [redacted] 03May12
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.3135					
21	Number of fish			20					
22	Condition Factor (C)			0.0004					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			1.2					
26	% B.W./d			5					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	26.27	1.31	1.31	27.36	1.37	1.96	4.98	
34	2	27.36	1.37	1.37	28.50	1.43	1.99	5.05	
35	3	28.50	1.43	1.43	29.69	1.48	2.01	5.12	
36	4	29.69	1.48	1.48	30.93	1.55	2.04	5.19	
37	5	30.93	1.55	1.55	32.22	1.61	2.07	5.26	
38	6	32.22	1.61	1.61	33.56	1.68	2.10	5.33	
39	7	33.56	1.68	1.68	34.96	1.75	2.13	5.40	
40									
41	Daily group ration (g)		1.49		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	34.96	1.75	1.75	36.42	1.82	2.16	5.48	
45	9	36.42	1.82	1.82	37.93	1.90	2.19	5.55	
46	10	37.93	1.90	1.90	39.51	1.98	2.22	5.63	
47	11	39.51	1.98	1.98	41.16	2.06	2.25	5.71	
48	12	41.16	2.06	2.06	42.88	2.14	2.28	5.78	
49	13	42.88	2.14	2.14	44.66	2.23	2.31	5.86	
50	14	44.66	2.23	2.23	46.52	2.33	2.34	5.94	
51									
52	Daily group ration (g)		1.98		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	46.52	2.33	2.33	48.46	2.42	2.37	6.02	
56	16	48.46	2.42	2.42	50.48	2.52	2.40	6.11	
57	17	50.48	2.52	2.52	52.58	2.63	2.44	6.19	
58	18	52.58	2.63	2.63	54.77	2.74	2.47	6.28	
59	19	54.77	2.74	2.74	57.06	2.85	2.50	6.36	
60	20	57.06	2.85	2.85	59.43	2.97	2.54	6.45	
61	21	59.43	2.97	2.97	61.91	3.10	2.57	6.54	
62									
63	Daily group ration (g)		2.64		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.13		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	61.91	3.10	3.10	64.49	3.22	2.61	6.63	
67	23	64.49	3.22	3.22	67.18	3.36	2.64	6.72	
68	24	67.18	3.36	3.36	69.98	3.50	2.68	6.81	
69	25	69.98	3.50	3.50	72.89	3.64	2.72	6.90	
70	26	72.89	3.64	3.64	75.93	3.80	2.75	7.00	
71	27	75.93	3.80	3.80	79.09	3.95	2.79	7.09	
72	28	79.09	3.95	3.95	82.39	4.12	2.83	7.19	
73									
74	Daily group ration (g)		3.51		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	82.39	4.12	4.12	85.82	4.29	2.87	7.29	
78	30	85.82	4.29	4.29	89.40	4.47	2.91	7.39	
79	31	89.40	4.47	4.47	93.12	4.66	2.95	7.49	
80									
81	Daily group ration (g)		4.29		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 13 of 13

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 1, 40-48

Reviewed by: KMW Date: 9 MAR 2013
Verified by: TJS Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack **Date Created/Initials:** 5/3/12 TJS
Holding Tank/Chamber: E14 (from diluter B1) **Date Revised/in** [redacted]
Treatment Group: 300 mg/L **Approved for us** [redacted] 03MAY12
Species: BKT **Lot:** 120300 Study Director Date

Raw	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.365					
21	Number of fish			20					
22	Condition Factor (C)			0.0004					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			1.2					
26	% B.W./d			5					

WorkSheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individua. Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual nitial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	27.30	1.37	1.37	28.44	1.42	1.99	5.04	
2	28.44	1.42	1.42	29.62	1.48	2.01	5.11	
3	29.62	1.48	1.48	30.86	1.54	2.04	5.18	
4	30.86	1.54	1.54	32.14	1.61	2.07	5.25	
5	32.14	1.61	1.61	33.48	1.67	2.10	5.33	
6	33.48	1.67	1.67	34.88	1.74	2.13	5.40	
7	34.88	1.74	1.74	36.33	1.82	2.15	5.47	
Daily group ration (g)		1.55		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	36.33	1.82	1.82	37.84	1.89	2.18	5.55	
9	37.84	1.89	1.89	39.42	1.97	2.21	5.62	
10	39.42	1.97	1.97	41.06	2.05	2.24	5.70	
11	41.06	2.05	2.05	42.77	2.14	2.28	5.78	
12	42.77	2.14	2.14	44.56	2.23	2.31	5.86	
13	44.56	2.23	2.23	46.41	2.32	2.34	5.94	
14	46.41	2.32	2.32	48.35	2.42	2.37	6.02	
Daily group ration (g)		2.06		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	48.35	2.42	2.42	50.36	2.52	2.40	6.10	
16	50.36	2.52	2.52	52.46	2.62	2.44	6.19	
17	52.46	2.62	2.62	54.65	2.73	2.47	6.27	
18	54.65	2.73	2.73	56.92	2.85	2.50	6.36	
19	56.92	2.85	2.85	59.29	2.96	2.54	6.44	
20	59.29	2.95	2.96	61.76	3.09	2.57	6.53	
21	61.76	3.09	3.09	64.34	3.22	2.61	6.62	
Daily group ration (g)		2.74		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	64.34	3.22	3.22	67.02	3.35	2.64	6.71	
23	67.02	3.35	3.35	69.81	3.49	2.68	6.80	
24	69.81	3.49	3.49	72.72	3.64	2.72	6.90	
25	72.72	3.64	3.64	75.75	3.79	2.75	6.99	
26	75.75	3.79	3.79	78.91	3.95	2.79	7.09	
27	78.91	3.95	3.95	82.19	4.11	2.83	7.18	
28	82.19	4.11	4.11	85.62	4.28	2.87	7.28	
Daily group ration (g)		3.65		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	85.62	4.28	4.28	89.19	4.46	2.91	7.38	
30	89.19	4.46	4.46	92.90	4.65	2.95	7.48	
31	92.90	4.65	4.65	96.77	4.84	2.99	7.59	
Daily group ration (g)		4.46		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 1 / 40-48 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack **Date Created/Initials:** 5/3/12 TJS
Holding Tank/Chamber: E15 (from diluter C4) **Date Revised/init:** [redacted]
Treatment Group: 200 mg/L **Approved for use:** [redacted] 03/19/12
Species: BKT **Lot:** 120300 **Study Director** **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.56					
21	Number of fish			20					
22	Condition Factor (C)			0.0004					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			1.2					
26	% B.W./d			5					

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$E21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) ={(H33/454)/$E$22}^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	31.20	1.56	1.56	32.50	1.63	2.08	5.27
2	32.50	1.63	1.63	33.85	1.69	2.10	5.35
3	33.85	1.69	1.69	35.26	1.76	2.13	5.42
4	35.26	1.76	1.76	36.73	1.84	2.16	5.49
5	36.73	1.84	1.84	38.26	1.91	2.19	5.57
6	38.26	1.91	1.91	39.86	1.99	2.22	5.64
7	39.86	1.99	1.99	41.52	2.08	2.25	5.72
Daily group ration (g)		1.77		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	41.52	2.08	2.08	43.25	2.16	2.28	5.80
9	43.25	2.16	2.16	45.05	2.25	2.31	5.88
10	45.05	2.25	2.25	46.93	2.35	2.35	5.96
11	46.93	2.35	2.35	48.86	2.44	2.38	6.04
12	48.88	2.44	2.44	50.92	2.55	2.41	6.12
13	50.92	2.55	2.55	53.04	2.65	2.44	6.21
14	53.04	2.65	2.65	55.25	2.76	2.48	6.29
Daily group ration (g)		2.35		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.12		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	55.25	2.76	2.76	57.56	2.88	2.51	6.38
16	57.56	2.88	2.88	59.95	3.00	2.55	6.47
17	59.95	3.00	3.00	62.45	3.12	2.58	6.56
18	62.45	3.12	3.12	65.05	3.25	2.62	6.65
19	65.05	3.25	3.25	67.76	3.39	2.65	6.74
20	67.76	3.39	3.39	70.59	3.53	2.69	6.83
21	70.59	3.53	3.53	73.53	3.68	2.73	6.92
Daily group ration (g)		3.13		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	73.53	3.68	3.68	76.59	3.83	2.76	7.02
23	76.59	3.83	3.83	79.78	3.99	2.80	7.11
24	79.78	3.99	3.99	83.11	4.16	2.84	7.21
25	83.11	4.16	4.16	86.57	4.33	2.88	7.31
26	86.57	4.33	4.33	90.18	4.51	2.92	7.41
27	90.18	4.51	4.51	93.94	4.70	2.96	7.51
28	93.94	4.70	4.70	97.85	4.89	3.00	7.61
Daily group ration (g)		4.17		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	97.85	4.89	4.89	101.93	5.10	3.04	7.72
30	101.93	5.10	5.10	106.17	5.31	3.08	7.82
31	106.17	5.31	5.31	110.60	5.53	3.12	7.93
Daily group ration (g)		5.10		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

AEH-12-PSEUDO-03

FF # 7
Item No. 16
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: RW Date: 4/4/2013
File Folder 7 Lab book/pgs 2, 3-13 Verified by: JTL Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System__E_____ **Date Created/Initials:**__6/13/2012 JAL
Holding Tank/Chamber:__E1_____ **Date Revised/Init**[redacted]
Treatment Group:____100 mg/L_____ **Approved for use**[redacted] __6/13/2012__
Species:_LMB_____**Lot:** _114000_____ [redacted]**y Director** Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.12
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33:(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	22.40	1.12	3.36	22.74	1.14	1.77	4.50	
2	22.74	1.14	3.41	23.08	1.15	1.78	4.52	
3	23.08	1.15	3.46	23.42	1.17	1.79	4.55	
4	23.42	1.17	3.51	23.77	1.19	1.80	4.57	
5	23.77	1.19	3.57	24.13	1.21	1.81	4.59	
6	24.13	1.21	3.62	24.49	1.22	1.82	4.61	
7	24.49	1.22	3.67	24.86	1.24	1.83	4.64	
Daily group ration (g)		3.52		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	24.86	1.24	3.73	25.23	1.26	1.83	4.66	
9	25.23	1.26	3.79	25.61	1.28	1.84	4.68	
10	25.61	1.28	3.84	26.00	1.30	1.85	4.71	
11	26.00	1.30	3.90	26.39	1.32	1.86	4.73	
12	26.39	1.32	3.96	26.78	1.34	1.87	4.75	
13	26.78	1.34	4.02	27.18	1.36	1.88	4.78	
14	27.18	1.36	4.08	27.59	1.38	1.89	4.80	
Daily group ration (g)		3.90		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	27.59	1.38	4.14	28.01	1.40	1.90	4.82	
16	28.01	1.40	4.20	28.43	1.42	1.91	4.85	
17	28.43	1.42	4.26	28.85	1.44	1.92	4.87	
18	28.85	1.44	4.33	29.28	1.46	1.93	4.90	
19	29.28	1.46	4.39	29.72	1.49	1.94	4.92	
20	29.72	1.49	4.46	30.17	1.51	1.95	4.95	
21	30.17	1.51	4.53	30.62	1.53	1.96	4.97	
Daily group ration (g)		4.33		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	30.62	1.53	4.59	31.08	1.55	1.97	5.00	
23	31.08	1.55	4.66	31.55	1.58	1.98	5.02	
24	31.55	1.58	4.73	32.02	1.60	1.99	5.05	
25	32.02	1.60	4.80	32.50	1.63	2.00	5.07	
26	32.50	1.63	4.88	32.99	1.65	2.01	5.10	
27	32.99	1.65	4.95	33.48	1.67	2.02	5.12	
28	33.48	1.67	5.02	33.99	1.70	2.03	5.15	
Daily group ration (g)		4.81		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	33.99	1.70	5.10	34.50	1.72	2.04	5.17	
30	34.50	1.72	5.17	35.01	1.75	2.05	5.20	
31	35.01	1.75	5.25	35.54	1.78	2.06	5.22	
Daily group ration (g)		5.17		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 2, 3-13 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs Verified by: Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E2
Treatment Group: 200 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/initials:
Approved for use [redacted] ector 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	I	J

INPUT SECTION

Initial fish size (g)	1.44
Number of fish	14
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
%B W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	20.16	1.44	3.02	20.46	1.46	1.93	4.89	
2	20.46	1.46	3.07	20.77	1.48	1.94	4.92	
3	20.77	1.48	3.12	21.08	1.51	1.95	4.94	
4	21.08	1.51	3.16	21.40	1.53	1.96	4.97	
5	21.40	1.53	3.21	21.72	1.55	1.97	4.99	
6	21.72	1.55	3.26	22.04	1.57	1.98	5.02	
7	22.04	1.57	3.31	22.37	1.60	1.99	5.04	
Daily group ration (g)		3.16		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	22.37	1.60	3.36	22.71	1.62	1.99	5.07	
9	22.71	1.62	3.41	23.05	1.65	2.00	5.09	
10	23.05	1.65	3.46	23.40	1.67	2.01	5.12	
11	23.40	1.67	3.51	23.75	1.70	2.02	5.14	
12	23.75	1.70	3.56	24.10	1.72	2.03	5.17	
13	24.10	1.72	3.62	24.47	1.75	2.05	5.19	
14	24.47	1.75	3.67	24.83	1.77	2.06	5.22	
Daily group ration (g)		3.51		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	24.83	1.77	3.72	25.20	1.80	2.07	5.25	
16	25.20	1.80	3.78	25.58	1.83	2.08	5.27	
17	25.58	1.83	3.84	25.97	1.85	2.09	5.30	
18	25.97	1.85	3.89	26.36	1.88	2.10	5.33	
19	26.36	1.88	3.95	26.75	1.91	2.11	5.35	
20	26.75	1.91	4.01	27.15	1.94	2.12	5.38	
21	27.15	1.94	4.07	27.56	1.97	2.13	5.40	
Daily group ration (g)		3.90		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	27.56	1.97	4.13	27.97	2.00	2.14	5.43	
23	27.97	2.00	4.20	28.39	2.03	2.15	5.46	
24	28.39	2.03	4.26	28.82	2.06	2.16	5.49	
25	28.82	2.06	4.32	29.25	2.09	2.17	5.51	
26	29.25	2.09	4.39	29.69	2.12	2.18	5.54	
27	29.69	2.12	4.45	30.14	2.15	2.19	5.57	
28	30.14	2.15	4.52	30.59	2.18	2.20	5.60	
Daily group ration (g)		4.32		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	30.59	2.18	4.59	31.05	2.22	2.21	5.62	
30	31.05	2.22	4.66	31.51	2.25	2.23	5.65	
31	31.51	2.25	4.73	31.98	2.28	2.24	5.68	
Daily group ration (g)		4.66		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 3-13 Verified by: JAL Date: 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained.
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E3
Treatment Group: 200 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/I: [redacted]
Approved for u: [redacted] ctor 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.35
Number of fish	12
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
%B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	16.20	1.35	2.43	16.44	1.37	1.89	4.79
2	16.44	1.37	2.47	16.69	1.39	1.90	4.81
3	16.69	1.39	2.50	16.94	1.41	1.90	4.84
4	16.94	1.41	2.54	17.19	1.43	1.91	4.86
5	17.19	1.43	2.58	17.45	1.45	1.92	4.89
6	17.45	1.45	2.62	17.71	1.48	1.93	4.91
7	17.71	1.48	2.66	17.98	1.50	1.94	4.93
Daily group ration (g)		2.54	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.21	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	17.98	1.50	2.70	18.25	1.52	1.95	4.96
9	18.25	1.52	2.74	18.52	1.54	1.96	4.98
10	18.52	1.54	2.78	18.80	1.57	1.97	5.01
11	18.80	1.57	2.82	19.08	1.59	1.98	5.03
12	19.08	1.59	2.86	19.37	1.61	1.99	5.06
13	19.37	1.61	2.91	19.66	1.64	2.00	5.08
14	19.66	1.64	2.95	19.95	1.66	2.01	5.11
Daily group ration (g)		2.82	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.24	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	19.95	1.66	2.99	20.25	1.69	2.02	5.13
16	20.25	1.69	3.04	20.56	1.71	2.03	5.16
17	20.56	1.71	3.08	20.87	1.74	2.04	5.19
18	20.87	1.74	3.13	21.18	1.76	2.05	5.21
19	21.18	1.76	3.18	21.50	1.79	2.06	5.24
20	21.50	1.79	3.22	21.82	1.82	2.07	5.26
21	21.82	1.82	3.27	22.15	1.85	2.08	5.29
Daily group ration (g)		3.13	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.26	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	22.15	1.85	3.32	22.48	1.87	2.09	5.32
23	22.48	1.87	3.37	22.82	1.90	2.10	5.34
24	22.82	1.90	3.42	23.16	1.93	2.11	5.37
25	23.16	1.93	3.47	23.51	1.96	2.12	5.40
26	23.51	1.96	3.53	23.86	1.99	2.13	5.42
27	23.86	1.99	3.58	24.22	2.02	2.15	5.45
28	24.22	2.02	3.63	24.58	2.05	2.16	5.48
Daily group ration (g)		3.48	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.29	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	24.58	2.05	3.69	24.95	2.08	2.17	5.50
30	24.95	2.08	3.74	25.32	2.11	2.18	5.53
31	25.32	2.11	3.80	25.70	2.14	2.19	5.56
Daily group ration (g)		3.74	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.31	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder: 7 Lab book/pgs: 2, 3-13 Verified by: JAL Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E4
Treatment Group: 50 mg/L
Species: LMB **Lot:** 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/Init: [redacted]
Approved for use: [redacted] rector 6/13/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.21
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
%B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	22.99	1.21	3.45	23.33	1.23	1.82	4.62	
2	23.33	1.23	3.50	23.68	1.25	1.83	4.64	
3	23.68	1.25	3.55	24.04	1.27	1.84	4.66	
4	24.04	1.27	3.61	24.40	1.28	1.85	4.69	
5	24.40	1.28	3.66	24.77	1.30	1.85	4.71	
6	24.77	1.30	3.72	25.14	1.32	1.86	4.73	
7	25.14	1.32	3.77	25.52	1.34	1.87	4.76	
Daily group ration (g)		3.61		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	25.52	1.34	3.83	25.90	1.36	1.88	4.78	
9	25.90	1.36	3.88	26.29	1.38	1.89	4.81	
10	26.29	1.38	3.94	26.68	1.40	1.90	4.83	
11	26.68	1.40	4.00	27.08	1.43	1.91	4.85	
12	27.08	1.43	4.06	27.49	1.45	1.92	4.88	
13	27.49	1.45	4.12	27.90	1.47	1.93	4.90	
14	27.90	1.47	4.18	28.32	1.49	1.94	4.93	
Daily group ration (g)		4.00		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	28.32	1.49	4.25	28.74	1.51	1.95	4.95	
16	28.74	1.51	4.31	29.17	1.54	1.96	4.98	
17	29.17	1.54	4.38	29.61	1.56	1.97	5.00	
18	29.61	1.56	4.44	30.06	1.58	1.98	5.02	
19	30.06	1.58	4.51	30.51	1.61	1.99	5.05	
20	30.51	1.61	4.58	30.96	1.63	2.00	5.08	
21	30.96	1.63	4.64	31.43	1.65	2.01	5.10	
Daily group ration (g)		4.44		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	31.43	1.65	4.71	31.90	1.68	2.02	5.13	
23	31.90	1.68	4.79	32.38	1.70	2.03	5.15	
24	32.38	1.70	4.86	32.86	1.73	2.04	5.18	
25	32.86	1.73	4.93	33.36	1.76	2.05	5.20	
26	33.36	1.76	5.00	33.86	1.78	2.06	5.23	
27	33.86	1.78	5.08	34.37	1.81	2.07	5.25	
28	34.37	1.81	5.15	34.88	1.84	2.08	5.28	
Daily group ration (g)		4.93		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	34.88	1.84	5.23	35.40	1.86	2.09	5.31	
30	35.40	1.86	5.31	35.94	1.89	2.10	5.33	
31	35.94	1.89	5.39	36.47	1.92	2.11	5.36	
Daily group ration (g)		5.31		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [redacted] Date: 11MAR2013
File Folder 7 Lab book/pgs 2, 3-13 Verified by: [redacted] Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management. Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System E
Holding Tank/Chamber: E5
Treatment Group: 300 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/In [redacted]
Approved for us [redacted] cor 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.17
Number of fish	5
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
%B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	5.85	1.17	0.88	5.94	1.19	1.80	4.57
2	5.94	1.19	0.89	6.03	1.21	1.81	4.59
3	6.03	1.21	0.90	6.12	1.22	1.82	4.61
4	6.12	1.22	0.92	6.21	1.24	1.82	4.64
5	6.21	1.24	0.93	6.30	1.26	1.83	4.66
6	6.30	1.26	0.95	6.40	1.28	1.84	4.68
7	6.40	1.28	0.96	6.49	1.30	1.85	4.71
Daily group ration (g)		0.92	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.18	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	6.49	1.30	0.97	6.59	1.32	1.86	4.73
9	6.59	1.32	0.99	6.69	1.34	1.87	4.75
10	6.69	1.34	1.00	6.79	1.36	1.88	4.78
11	6.79	1.36	1.02	6.89	1.38	1.89	4.80
12	6.89	1.38	1.03	6.99	1.40	1.90	4.82
13	6.99	1.40	1.05	7.10	1.42	1.91	4.85
14	7.10	1.42	1.06	7.21	1.44	1.92	4.87
Daily group ration (g)		1.02	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.20	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	7.21	1.44	1.08	7.31	1.46	1.93	4.90
16	7.31	1.46	1.10	7.42	1.48	1.94	4.92
17	7.42	1.48	1.11	7.53	1.51	1.95	4.94
18	7.53	1.51	1.13	7.65	1.53	1.96	4.97
19	7.65	1.53	1.15	7.76	1.55	1.97	4.99
20	7.76	1.55	1.16	7.88	1.58	1.98	5.02
21	7.88	1.58	1.18	8.00	1.60	1.99	5.04
Daily group ration (g)		1.13	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.23	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	8.00	1.60	1.20	8.12	1.62	2.00	5.07
23	8.12	1.62	1.22	8.24	1.65	2.01	5.09
24	8.24	1.65	1.24	8.36	1.67	2.02	5.12
25	8.36	1.67	1.25	8.49	1.70	2.03	5.14
26	8.49	1.70	1.27	8.62	1.72	2.04	5.17
27	8.62	1.72	1.29	8.74	1.75	2.05	5.20
28	8.74	1.75	1.31	8.88	1.78	2.06	5.22
Daily group ration (g)		1.25	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.25	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	8.88	1.78	1.33	9.01	1.80	2.07	5.25
30	9.01	1.80	1.35	9.14	1.83	2.08	5.27
31	9.14	1.83	1.37	9.28	1.86	2.09	5.30
Daily group ration (g)		1.35	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.27	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 17
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 11 MAR 2013
File Folder: 7 Lab book/pgs: 2 1.3-13 Verified by: [illegible] Date: 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E6
Treatment Group: 100 mg/L
Species: LMB **Lot:** 114000
Date Created/Initials: 6/13/2012 JAL
Date Revised/init [redacted]
Approved for use [redacted] 6/13/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.19
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =([33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	22.61	1.19	3.39	22.95	1.21	1.81	4.59
2	22.95	1.21	3.44	23.29	1.23	1.82	4.62
3	23.29	1.23	3.49	23.64	1.24	1.83	4.64
4	23.64	1.24	3.55	24.00	1.26	1.84	4.66
5	24.00	1.26	3.60	24.36	1.28	1.84	4.68
6	24.36	1.28	3.65	24.72	1.30	1.85	4.71
7	24.72	1.30	3.71	25.09	1.32	1.86	4.73
Daily group ration (g)		3.55	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.19	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	25.09	1.32	3.76	25.47	1.34	1.87	4.76
9	25.47	1.34	3.82	25.85	1.36	1.88	4.78
10	25.85	1.36	3.88	26.24	1.38	1.89	4.80
11	26.24	1.38	3.94	26.63	1.40	1.90	4.83
12	26.63	1.40	4.00	27.03	1.42	1.91	4.85
13	27.03	1.42	4.05	27.44	1.44	1.92	4.87
14	27.44	1.44	4.12	27.85	1.47	1.93	4.90
Daily group ration (g)		3.94	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.21	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	27.85	1.47	4.18	28.27	1.49	1.94	4.92
16	28.27	1.49	4.24	28.69	1.51	1.95	4.95
17	28.69	1.51	4.30	29.12	1.53	1.96	4.97
18	29.12	1.53	4.37	29.56	1.56	1.97	5.00
19	29.56	1.56	4.43	30.00	1.58	1.98	5.02
20	30.00	1.58	4.50	30.45	1.60	1.99	5.05
21	30.45	1.60	4.57	30.91	1.63	2.00	5.07
Daily group ration (g)		4.37	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.23	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	30.91	1.63	4.64	31.37	1.65	2.01	5.10
23	31.37	1.65	4.71	31.84	1.68	2.02	5.12
24	31.84	1.68	4.78	32.32	1.70	2.03	5.15
25	32.32	1.70	4.85	32.81	1.73	2.04	5.17
26	32.81	1.73	4.92	33.30	1.75	2.05	5.20
27	33.30	1.75	4.99	33.80	1.78	2.06	5.23
28	33.80	1.78	5.07	34.30	1.81	2.07	5.25
Daily group ration (g)		4.85	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.26	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	34.30	1.81	5.15	34.82	1.83	2.08	5.28
30	34.82	1.83	5.22	35.34	1.86	2.09	5.30
31	35.34	1.85	5.30	35.87	1.89	2.10	5.33
Daily group ration (g)		5.22	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.27	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 13-13 Verified by: [illegible] Date: 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E7
Treatment Group: 300 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/Initials:
Approved for us [redacted] Study Director 6/13/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.22
Number of fish	9
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish site determined from measured weights}
Average Individual Initial fish weight (g) = D33/$D$21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	10.98	1.22	1.65	11.14	1.24	1.82	4.63	
2	11.14	1.24	1.67	11.31	1.26	1.83	4.65	
3	11.31	1.26	1.70	11.48	1.28	1.84	4.68	
4	11.48	1.28	1.72	11.65	1.29	1.85	4.70	
5	11.65	1.29	1.75	11.83	1.31	1.86	4.72	
6	11.83	1.31	1.77	12.01	1.33	1.87	4.75	
7	12.01	1.33	1.80	12.19	1.35	1.88	4.77	
Daily group ration (g)		1.72		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	12.19	1.35	1.83	12.37	1.37	1.89	4.79	
9	12.37	1.37	1.86	12.55	1.39	1.90	4.82	
10	12.55	1.39	1.88	12.74	1.42	1.91	4.84	
11	12.74	1.42	1.91	12.93	1.44	1.92	4.87	
12	12.93	1.44	1.94	13.13	1.46	1.93	4.89	
13	13.13	1.46	1.97	13.32	1.48	1.94	4.92	
14	13.32	1.48	2.00	13.52	1.50	1.94	4.94	
Daily group ration (g)		1.91		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	13.52	1.50	2.03	13.73	1.53	1.95	4.96	
16	13.73	1.53	2.06	13.93	1.55	1.96	4.99	
17	13.93	1.55	2.09	14.14	1.57	1.97	5.01	
18	14.14	1.57	2.12	14.35	1.59	1.98	5.04	
19	14.35	1.59	2.15	14.57	1.62	1.99	5.06	
20	14.57	1.62	2.19	14.79	1.64	2.00	5.09	
21	14.79	1.64	2.22	15.01	1.67	2.01	5.11	
Daily group ration (g)		2.12		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	15.01	1.67	2.25	15.24	1.69	2.02	5.14	
23	15.24	1.69	2.29	15.46	1.72	2.03	5.17	
24	15.46	1.72	2.32	15.70	1.74	2.04	5.19	
25	15.70	1.74	2.35	15.93	1.77	2.05	5.22	
26	15.93	1.77	2.39	16.17	1.80	2.06	5.24	
27	16.17	1.80	2.43	16.41	1.82	2.07	5.27	
28	16.41	1.82	2.46	16.66	1.85	2.08	5.30	
Daily group ration (g)		2.36		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	16.66	1.85	2.50	16.91	1.88	2.10	5.32	
30	16.91	1.88	2.54	17.16	1.91	2.11	5.35	
31	17.16	1.91	2.57	17.42	1.94	2.12	5.37	
Daily group ration (g)		2.54		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: MAR 2013
File Folder 7 Lab book/pgs 2, 3-13 Verified by: SC Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E8
Treatment Group: control
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/Ini
Approved for use [redacted] irector 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.14
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F35*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	22.80	1.14	3.42	23.14	1.16	1.78	4.53	
2	23.14	1.16	3.47	23.49	1.17	1.79	4.55	
3	23.49	1.17	3.52	23.84	1.19	1.80	4.57	
4	23.84	1.19	3.58	24.20	1.21	1.81	4.60	
5	24.20	1.21	3.63	24.56	1.23	1.82	4.62	
6	24.56	1.23	3.68	24.93	1.25	1.83	4.64	
7	24.93	1.25	3.74	25.30	1.27	1.84	4.66	
Daily group ration (g)		3.58		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	25.30	1.27	3.80	25.68	1.28	1.85	4.69	
9	25.68	1.28	3.85	26.07	1.30	1.85	4.71	
10	26.07	1.30	3.91	26.46	1.32	1.86	4.73	
11	26.46	1.32	3.97	26.86	1.34	1.87	4.76	
12	26.86	1.34	4.03	27.26	1.36	1.88	4.78	
13	27.26	1.36	4.09	27.67	1.38	1.89	4.81	
14	27.67	1.38	4.15	28.08	1.40	1.90	4.83	
Daily group ration (g)		3.97		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	28.08	1.40	4.21	28.51	1.43	1.91	4.85	
16	28.51	1.43	4.28	28.93	1.45	1.92	4.88	
17	28.93	1.45	4.34	29.37	1.47	1.93	4.90	
18	29.37	1.47	4.41	29.81	1.49	1.94	4.93	
19	29.81	1.49	4.47	30.25	1.51	1.95	4.95	
20	30.25	1.51	4.54	30.71	1.54	1.96	4.98	
21	30.71	1.54	4.61	31.17	1.56	1.97	5.00	
Daily group ration (g)		4.41		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	31.17	1.56	4.68	31.64	1.58	1.98	5.02	
23	31.64	1.58	4.75	32.11	1.61	1.99	5.05	
24	32.11	1.61	4.82	32.59	1.63	2.00	5.08	
25	32.59	1.63	4.89	33.08	1.65	2.01	5.10	
26	33.08	1.65	4.96	33.58	1.68	2.02	5.13	
27	33.58	1.68	5.04	34.08	1.70	2.03	5.15	
28	34.08	1.70	5.11	34.59	1.73	2.04	5.18	
Daily group ration (g)		4.89		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	34.59	1.73	5.19	35.11	1.76	2.05	5.20	
30	35.11	1.76	5.27	35.64	1.78	2.06	5.23	
31	35.64	1.78	5.35	36.17	1.81	2.07	5.25	
Daily group ration (g)		5.27		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 2,3-13 Reviewed by: MW Date: 19 MAR 2013
File Folder 7 Lab book/pgs Verified by: SA Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E9
Treatment Group: 300 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/ini
Approved for use [redacted] ctor 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.57
Number of fish	2
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust ay row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	3.14	1.57	0.47	3.19	1.59	1.98	5.04
2	3.19	1.59	0.48	3.23	1.62	1.99	5.06
3	3.23	1.62	0.49	3.28	1.64	2.00	5.09
4	3.28	1.64	0.49	3.33	1.67	2.01	5.11
5	3.33	1.67	0.50	3.38	1.69	2.02	5.14
6	3.38	1.69	0.51	3.43	1.72	2.03	5.16
7	3.43	1.72	0.52	3.48	1.74	2.04	5.19
Daily group ration (g)		0.49		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	3.48	1.74	0.52	3.54	1.77	2.05	5.22
9	3.54	1.77	0.53	3.59	1.80	2.06	5.24
10	3.59	1.80	0.54	3.64	1.82	2.07	5.27
11	3.64	1.82	0.55	3.70	1.85	2.08	5.29
12	3.70	1.85	0.55	3.75	1.88	2.09	5.32
13	3.75	1.88	0.56	3.81	1.91	2.10	5.35
14	3.81	1.91	0.57	3.87	1.93	2.12	5.37
Daily group ration (g)		0.55		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	3.87	1.93	0.58	3.93	1.96	2.13	5.40
16	3.93	1.96	0.59	3.98	1.99	2.14	5.43
17	3.98	1.99	0.60	4.04	2.02	2.15	5.45
18	4.04	2.02	0.61	4.11	2.05	2.16	5.48
19	4.11	2.05	0.62	4.17	2.08	2.17	5.51
20	4.17	2.08	0.62	4.23	2.11	2.18	5.54
21	4.23	2.11	0.63	4.29	2.15	2.19	5.56
Daily group ration (g)		0.61		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	4.29	2.15	0.64	4.36	2.18	2.20	5.59
23	4.36	2.18	0.65	4.42	2.21	2.21	5.62
24	4.42	2.21	0.66	4.49	2.24	2.22	5.65
25	4.49	2.24	0.67	4.56	2.28	2.23	5.67
26	4.56	2.28	0.68	4.62	2.31	2.25	5.70
27	4.62	2.31	0.69	4.69	2.35	2.26	5.73
28	4.69	2.35	0.70	4.76	2.38	2.27	5.76
Daily group ration (g)		0.67		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	4.76	2.38	0.71	4.84	2.42	2.28	5.79
30	4.84	2.42	0.73	4.91	2.45	2.29	5.82
31	4.91	2.45	0.74	4.98	2.49	2.30	5.85
Daily group ration (g)		0.73		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 17
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: DW Date: 14MAR2013
File Folder: 7 Lab book/pgs 2, 3-13 Verified by: JAL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E10
Treatment Group: 50 mg/L
Species: LMB **Lot:** 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/in [redacted]
Approved for us [redacted] Director 6/13/2012 Date

INPUT SECTION	
Initial fish size (g)	1.2
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$25/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjusts by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	24.00	1.20	3.60	24.36	1.22	1.81	4.61
2	24.36	1.22	3.65	24.73	1.24	1.82	4.63
3	24.73	1.24	3.71	25.10	1.25	1.83	4.65
4	25.10	1.25	3.76	25.47	1.27	1.84	4.67
5	25.47	1.27	3.82	25.85	1.29	1.85	4.70
6	25.85	1.29	3.88	26.24	1.31	1.86	4.72
7	26.24	1.31	3.94	26.64	1.33	1.87	4.74
Daily group ration (g)		3.77		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	26.64	1.33	4.00	27.04	1.35	1.88	4.77
9	27.04	1.35	4.06	27.44	1.37	1.89	4.79
10	27.44	1.37	4.12	27.85	1.39	1.90	4.82
11	27.85	1.39	4.18	28.27	1.41	1.91	4.84
12	28.27	1.41	4.24	28.69	1.43	1.91	4.86
13	28.69	1.43	4.30	29.13	1.46	1.92	4.89
14	29.13	1.46	4.37	29.56	1.48	1.93	4.91
Daily group ration (g)		4.18		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	29.56	1.48	4.43	30.01	1.50	1.94	4.94
16	30.01	1.50	4.50	30.46	1.52	1.95	4.96
17	30.46	1.52	4.57	30.91	1.55	1.96	4.99
18	30.91	1.55	4.64	31.38	1.57	1.97	5.01
19	31.38	1.57	4.71	31.85	1.59	1.98	5.04
20	31.85	1.59	4.78	32.32	1.62	1.99	5.06
21	32.32	1.62	4.85	32.81	1.64	2.00	5.09
Daily group ration (g)		4.64		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	32.81	1.64	4.92	33.30	1.67	2.01	5.11
23	33.30	1.67	5.00	33.80	1.69	2.02	5.14
24	33.80	1.69	5.07	34.31	1.72	2.03	5.16
25	34.31	1.72	5.15	34.82	1.74	2.04	5.19
26	34.82	1.74	5.22	35.35	1.77	2.05	5.21
27	35.35	1.77	5.30	35.88	1.79	2.06	5.24
28	35.88	1.79	5.38	36.41	1.82	2.07	5.27
Daily group ration (g)		5.15		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	36.41	1.82	5.46	36.96	1.85	2.08	5.29
30	36.96	1.85	5.54	37.51	1.88	2.09	5.32
31	37.51	1.88	5.63	38.08	1.90	2.10	5.35
Daily group ration (g)		5.54		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 17
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Study Number: AEH-12-PSEUDO-03 Reviewed by: MW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 3-13 Verified by: JAL Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (e: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System__E__ **Date Created/Initials:**__6/13/2012 JAL__
Holding Tank/Chamber:__E11__ **Date Revised/ini**[redacted]
Treatment Group:____200 mg/L____ **Approved for us**[redacted] __6/13/2012__
Species:_LMB_____**Lot:** _114000_____ [redacted] **Director** **Date**

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	0.89
Number of fish	17
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial Fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	15.13	0.89	2.27	15.36	0.90	1.64	4.17	
2	15.36	0.90	2.30	15.59	0.92	1.65	4.19	
3	15.59	0.92	2.34	15.82	0.93	1.66	4.21	
4	15.82	0.93	2.37	16.06	0.94	1.67	4.23	
5	16.06	0.94	2.41	16.30	0.96	1.67	4.25	
6	16.30	0.96	2.44	16.54	0.97	1.68	4.27	
7	16.54	0.97	2.48	16.79	0.99	1.69	4.29	
Daily group ration (g)		2.37		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.14		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	16.79	0.99	2.52	17.04	1.00	1.70	4.32	
9	17.04	1.00	2.56	17.30	1.02	1.71	4.34	
10	17.30	1.02	2.59	17.56	1.03	1.72	4.36	
11	17.56	1.03	2.63	17.82	1.05	1.72	4.38	
12	17.82	1.05	2.67	18.09	1.06	1.73	4.40	
13	18.09	1.06	2.71	18.36	1.08	1.74	4.42	
14	18.36	1.08	2.75	18.64	1.10	1.75	4.45	
Daily group ration (g)		2.64		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	18.64	1.10	2.80	18.92	1.11	1.76	4.47	
16	18.92	1.11	2.84	19.20	1.13	1.77	4.49	
17	19.20	1.13	2.88	19.49	1.15	1.78	4.51	
18	19.49	1.15	2.92	19.78	1.16	1.79	4.54	
19	19.78	1.16	2.97	20.08	1.18	1.79	4.56	
20	20.08	1.18	3.01	20.38	1.20	1.80	4.58	
21	20.38	1.20	3.06	20.68	1.22	1.81	4.60	
Daily group ration (g)		2.92		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	20.68	1.22	3.10	20.99	1.23	1.82	4.63	
23	20.99	1.23	3.15	21.31	1.25	1.83	4.65	
24	21.31	1.25	3.20	21.63	1.27	1.84	4.67	
25	21.63	1.27	3.24	21.95	1.29	1.85	4.70	
26	21.95	1.29	3.29	22.28	1.31	1.86	4.72	
27	22.28	1.31	3.34	22.62	1.33	1.87	4.74	
28	22.62	1.33	3.39	22.96	1.35	1.88	4.77	
Daily group ration (g)		3.25		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	22.96	1.35	3.44	23.30	1.37	1.89	4.79	
30	23.30	1.37	3.49	23.65	1.39	1.90	4.81	
31	23.65	1.39	3.55	24.00	1.41	1.90	4.84	
Daily group ration (g)		3.50		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03 2.13.13 Reviewed by: YW Date: 19MAR2013
File Folder 7 Lab book/pgs Verified by: Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System: E
Holding Tank/Chamber: E12
Treatment Group: control
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/init
Approved for use [redacted] irector 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.1
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$OE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	22.00	1.10	3.30	22.33	1.12	1.76	4.47	
2	22.33	1.12	3.35	22.66	1.13	1.77	4.50	
3	22.66	1.13	3.40	23.00	1.15	1.78	4.52	
4	23.00	1.15	3.45	23.35	1.17	1.79	4.54	
5	23.35	1.17	3.50	23.70	1.19	1.80	4.56	
6	23.70	1.18	3.56	24.06	1.20	1.81	4.59	
7	24.06	1.20	3.61	24.42	1.22	1.81	4.61	
Daily group ration (g)		3.45		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	24.42	1.22	3.66	24.78	1.24	1.82	4.63	
9	24.78	1.24	3.72	25.15	1.26	1.83	4.66	
10	25.15	1.26	3.77	25.53	1.28	1.84	4.68	
11	25.53	1.28	3.83	25.91	1.30	1.85	4.70	
12	25.91	1.30	3.89	26.30	1.32	1.86	4.73	
13	26.30	1.32	3.95	26.70	1.33	1.87	4.75	
14	26.70	1.33	4.00	27.10	1.35	1.88	4.77	
Daily group ration (g)		3.83		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	27.10	1.35	4.06	27.51	1.38	1.89	4.80	
16	27.51	1.38	4.13	27.92	1.40	1.90	4.82	
17	27.92	1.40	4.19	28.34	1.42	1.91	4.84	
18	28.34	1.42	4.25	28.76	1.44	1.92	4.87	
19	28.76	1.44	4.31	29.19	1.46	1.93	4.89	
20	29.19	1.46	4.38	29.63	1.48	1.94	4.92	
21	29.63	1.48	4.44	30.08	1.50	1.95	4.94	
Daily group ration (g)		4.25		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	30.08	1.50	4.51	30.53	1.53	1.95	4.97	
23	30.53	1.53	4.58	30.98	1.55	1.96	4.99	
24	30.98	1.55	4.65	31.45	1.57	1.97	5.01	
25	31.45	1.57	4.72	31.92	1.60	1.98	5.04	
26	31.92	1.60	4.79	32.40	1.62	1.99	5.07	
27	32.40	1.62	4.86	32.89	1.64	2.00	5.09	
28	32.89	1.64	4.93	33.38	1.67	2.01	5.12	
Daily group ration (g)		4.72		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	33.38	1.67	5.01	33.88	1.69	2.02	5.14	
30	33.88	1.69	5.08	34.39	1.72	2.03	5.17	
31	34.39	1.72	5.16	34.90	1.75	2.04	5.19	
Daily group ration (g)		5.08		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 17
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Study Number: AEH-12-PSELIDD-03 Reviewed by: KW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 3-13 Verified by: JM Date: 4-8-13

Form 2 - Fish growth and Feed Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter va ue as a decima

Holding System: E
Holding Tank/Chamber: E13
Treatment Group: 100 mg/L
Species: LMB Lot: 114000

Date Created/Initials: 6/13/2012 JAL
Date Revised/
Approved for [redacted] ctor 6/13/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.05
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$22 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish Wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	21.00	1.05	3.15	21.32--	1.07	1.73	4.41	
2	21.32	1.07	3.20	21.63	1.08	1.74	4.43	
3	21.63	1.08	3.25	21.96	1.10	1.75	4.45	
4	21.96	1.10	3.29	22.29	1.11	1.76	4.47	
5	22.29	1.11	3.34	22.62	1.13	1.77	4.49	
6	22.62	1.13	3.39	22.96	1.15	1.78	4.52	
7	22.96	1.15	3.44	23.31	1.17	1.79	4.54	
Daily group ration (g)		3.30		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.16		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	23.31	1.17	3.50	23.66	1.18	1.80	4.56	
9	23.66	1.18	3.55	24.01	1.20	1.80	4.58	
10	24.01	1.20	3.60	24.37	1.22	1.81	4.61	
11	24.37	1.22	3.66	24.74	1.24	1.82	4.63	
12	24.74	1.24	3.71	25.11	1.26	1.83	4.65	
13	25.11	1.25	3.77	25.48	1.27	1.84	4.68	
14	25.48	1.27	3.82	25.87	1.29	1.85	4.70	
Daily group ration (g)		3.66		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.18		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	25.87	1.29	3.88	26.25	1.31	1.86	4.72	
16	26.25	1.31	3.94	26.65	1.33	1.87	4.75	
17	26.65	1.33	4.00	27.05	1.35	1.88	4.77	
18	27.05	1.35	4.06	27.45	1.37	1.89	4.79	
19	27.45	1.37	4.12	27.87	1.39	1.90	4.82	
20	27.87	1.39	4.18	28.28	1.41	1.91	4.84	
21	28.28	1.41	4.24	28.71	1.44	1.92	4.86	
Daily group ration (g)		4.06		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.20		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	28.71	1.44	4.31	29.14	1.46	1.92	4.89	
23	29.14	1.46	4.37	29.58	1.48	1.93	4.91	
24	29.58	1.48	4.44	30.02	1.50	1.94	4.94	
25	30.02	1.50	4.50	30.47	1.52	1.95	4.96	
26	30.47	1.52	4.57	30.93	1.55	1.96	4.99	
27	30.93	1.55	4.64	31.39	1.57	1.97	5.01	
28	31.39	1.57	4.71	31.86	1.59	1.98	5.04	
Daily group ration (g)		4.50		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.23		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	31.86	1.59	4.78	32.34	1.62	1.99	5.06	
30	32.34	1.62	4.85	32.82	1.64	2.00	5.09	
31	32.82	1.64	4.92	33.32	1.67	2.01	5.11	
Daily group ration (g)		4.85		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder 1 Lab book/pgs 2, 3-13 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (i.e: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that aproximates body condition for the species. Enter value as a decima

Holding System__E__ **Date Created/Initials:**__6/13/2012 JAL__
Holding Tank/Chamber:__E14__ **Date Revised/init**[redacted]
Treatment Group:____control____ **Approved for use**[redacted] __6/13/2012__
Species:_LMB_____**Lot:** _114000_____ Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.1
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00950 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average individual initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	22.00	1.10	3.30	22.33	1.12	1.76	4.47	
2	22.33	1.12	3.35	22.66	1.13	1.77	4.50	
3	22.66	1.13	3.40	23.00	1.15	1.78	4.52	
4	23.00	1.15	3.45	23.35	1.17	1.79	4.54	
5	23.35	1.17	3.50	23.70	1.19	1.80	4.56	
6	23.70	1.19	3.56	24.06	1.20	1.81	4.59	
7	24.06	1.20	3.61	24.42	1.22	1.81	4.61	
Daily group ration (g)		3.45		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	24.42	1.22	3.66	24.78	1.24	1.82	4.63	
9	24.78	1.24	3.72	25.15	1.26	1.83	4.66	
10	25.15	1.26	3.77	25.53	1.28	1.84	4.68	
11	25.53	1.28	3.83	25.91	1.30	1.85	4.70	
12	25.91	1.30	3.89	26.30	1.32	1.86	4.73	
13	26.30	1.32	3.95	26.70	1.33	1.87	4.75	
14	26.70	1.33	4.00	27.10	1.35	1.88	4.77	
Daily group ration (g)		3.83		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	27.10	1.35	4.06	27.51	1.38	1.89	4.80	
16	27.51	1.38	4.13	27.92	1.40	1.90	4.82	
17	27.92	1.40	4.19	28.34	1.42	1.91	4.84	
18	28.34	1.42	4.25	28.76	1.44	1.92	4.87	
19	28.76	1.44	4.31	29.19	1.46	1.93	4.89	
20	29.19	1.46	4.38	29.63	1.48	1.94	4.92	
21	29.63	1.48	4.44	30.08	1.50	1.95	4.94	
Daily group ration (g)		4.25		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	30.08	1.50	4.51	30.53	1.53	1.95	4.97	
23	30.53	1.53	4.58	30.98	1.55	1.96	4.99	
24	30.98	1.55	4.65	31.45	1.57	1.97	5.01	
25	31.45	1.57	4.72	31.92	1.60	1.98	5.04	
26	31.92	1.60	4.79	32.40	1.62	1.99	5.07	
27	32.40	1.62	4.86	32.89	1.64	2.00	5.09	
28	32.89	1.64	4.93	33.38	1.67	2.01	5.12	
Daily group ration (g)		4.72		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	33.38	1.67	5.01	33.88	1.69	2.02	5.14	
30	33.88	1.69	5.08	34.39	1.72	2.03	5.17	
31	34.39	1.72	5.16	34.90	1.75	2.04	5.19	
Daily group ration (g)		5.08		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [redacted] Date: 19 MAR 2013
File Folder: 7 Lab book/pgs 2, 3-13 Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decima

Holding System__E_____ **Date Created/Initials:**__6/13/2012 JAL__
Holding Tank/Chamber:__E15_____ **Date Revised/Initials:** [redacted]
Treatment Group:____50 mg/L_____ **Approved for use** [redacted] __6/13/2012__
Species:_LMB_____**Lot:** _114000_____ [redacted]rector Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.1							
21	Number of fish	20							
22	Condition Factor (C)	0.00045							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	15							

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	22.00	1.10	3.30	22.33	1.12	1.76	4.47	
34	2	22.33	1.12	3.35	22.66	1.13	1.77	4.50	
35	3	22.66	1.13	3.40	23.00	1.15	1.78	4.52	
36	4	23.00	1.15	3.45	23.35	1.17	1.79	4.54	
37	5	23.35	1.17	3.50	23.70	1.19	1.80	4.56	
38	6	23.70	1.19	3.56	24.06	1.20	1.81	4.59	
39	7	24.06	1.20	3.61	24.42	1.22	1.82	4.61	
40									
41	Daily group ration (g)		3.45		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	24.42	1.22	3.66	24.78	1.24	1.82	4.63	
45	9	24.78	1.24	3.72	25.15	1.26	1.83	4.66	
46	10	25.15	1.26	3.77	25.53	1.28	1.84	4.68	
47	11	25.53	1.28	3.83	25.91	1.30	1.85	4.70	
48	12	25.91	1.30	3.89	26.30	1.32	1.86	4.73	
49	13	26.30	1.32	3.95	26.70	1.33	1.87	4.75	
50	14	26.70	1.33	4.00	27.10	1.35	1.88	4.77	
51									
52	Daily group ration (g)		3.83		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	27.10	1.35	4.06	27.51	1.38	1.89	4.80	
56	16	27.51	1.38	4.13	27.92	1.40	1.90	4.82	
57	17	27.92	1.40	4.19	28.34	1.42	1.91	4.84	
58	18	28.34	1.42	4.25	28.76	1.44	1.92	4.87	
59	19	28.76	1.44	4.31	29.19	1.46	1.93	4.89	
60	20	29.19	1.46	4.38	29.63	1.48	1.94	4.92	
61	21	29.63	1.48	4.44	30.08	1.50	1.95	4.94	
62									
63	Daily group ration (g)		4.25		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	30.08	1.50	4.51	30.53	1.53	1.95	4.97	
67	23	30.53	1.53	4.58	30.98	1.55	1.96	4.99	
68	24	30.98	1.55	4.65	31.45	1.57	1.97	5.01	
69	25	31.45	1.57	4.72	31.92	1.60	1.98	5.04	
70	26	31.92	1.60	4.79	32.40	1.62	1.99	5.07	
71	27	32.40	1.62	4.86	32.89	1.64	2.00	5.09	
72	28	32.89	1.64	4.93	33.38	1.67	2.01	5.12	
73									
74	Daily group ration (g)		4.72		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	33.38	1.67	5.01	33.88	1.69	2.02	5.14	
78	30	33.88	1.69	5.08	34.39	1.72	2.03	5.17	
79	31	34.39	1.72	5.16	34.90	1.75	2.04	5.19	
80									
81	Daily group ration (g)		5.08		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 17
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 2 / 8-12

Reviewed by: KLW Date: 19 MAR 2013
Verified by: JR Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__D__________
Holding Tank/Chamber:__D1______
Treatment Group:____100 mg/L____________
Species:_SMB__________Lot: _112400______

Date Created/Initials:__6/21/2012 KLW KLW______
Date Revised/Initials: [redacted]
Approved for use [redacted]ector __6/21/2012__ Date

Row Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	1.41
Number of fish	20
Condition Factor (C)	0.00045
[C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	28.20	1.41	4.23	28.62	1.43	1.91	4.86
2	28.62	1.43	4.29	29.05	1.45	1.92	4.88
3	29.05	1.45	4.36	29.49	1.47	1.93	4.91
4	29.49	1.47	4.42	29.93	1.50	1.94	4.93
5	29.93	1.50	4.49	30.38	1.52	1.95	4.96
6	30.38	1.52	4.56	30.84	1.54	1.96	4.98
7	30.84	1.54	4.63	31.30	1.56	1.97	5.01

Daily group ration (g) **4.43** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.22** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
8	31.30	1.56	4.69	31.77	1.59	1.98	5.03
9	31.77	1.59	4.77	32.24	1.61	1.99	5.06
10	32.24	1.61	4.84	32.73	1.64	2.00	5.08
11	32.73	1.64	4.91	33.22	1.66	2.01	5.11
12	33.22	1.66	4.98	33.72	1.69	2.02	5.13
13	33.72	1.69	5.06	34.22	1.71	2.03	5.16
14	34.22	1.71	5.13	34.74	1.74	2.04	5.18

Daily group ration (g) **4.91** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.25** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
15	34.74	1.74	5.21	35.26	1.76	2.05	5.21
16	35.26	1.76	5.29	35.79	1.79	2.06	5.24
17	35.79	1.79	5.37	36.32	1.82	2.07	5.26
18	36.32	1.82	5.45	36.87	1.84	2.08	5.29
19	36.87	1.84	5.53	37.42	1.87	2.09	5.31
20	37.42	1.87	5.61	37.98	1.90	2.10	5.34
21	37.98	1.90	5.70	38.55	1.93	2.11	5.37

Daily group ration (g) **5.45** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.27** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
22	38.55	1.93	5.78	39.13	1.96	2.12	5.39
23	39.13	1.96	5.87	39.72	1.99	2.13	5.42
24	39.72	1.99	5.96	40.31	2.02	2.14	5.45
25	40.31	2.02	6.05	40.92	2.05	2.16	5.47
26	40.92	2.05	6.14	41.53	2.08	2.17	5.50
27	41.53	2.08	6.23	42.15	2.11	2.18	5.53
28	42.15	2.11	6.32	42.79	2.14	2.19	5.56

Daily group ration (g) **6.05** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.30** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
29	42.79	2.14	6.42	43.43	2.17	2.20	5.58
30	43.43	2.17	6.51	44.08	2.20	2.21	5.61
31	44.08	2.20	6.61	44.74	2.24	2.22	5.64

Daily group ration (g) **6.51** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.33** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

Feed rate increased and sheets revised 7/2/12 and these forms no longer used after that date.
[redacted] 3/19/13

FF # 7
Item No. 18
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder: 7 Lab book/pgs: 2, 8-12 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D2
Treatment Group: 50 mg/L
Species: SMB Lot: 112400

Date Created/I[redacted]2 KLW KW
Date Revised/I[redacted]
Approved for u[redacted] 6/21/2012
Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.59					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas

Group Total initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (nches) ={(H33/454)/$E$22}^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual nitia Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	31.80	1.59	4.77	32.28	1.61	1.99	5.06
34	2	32.28	1.61	4.84	32.76	1.64	2.00	5.08
35	3	32.76	1.64	4.91	33.25	1.66	2.01	5.11
36	4	33.25	1.66	4.99	33.75	1.69	2.02	5.13
37	5	33.75	1.69	5.06	34.26	1.71	2.03	5.16
38	6	34.26	1.71	5.14	34.77	1.74	2.04	5.19
39	7	34.77	1.74	5.22	35.29	1.76	2.05	5.21
40								
41	Daily group ration (g)		4.99		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish rat on (g)		0.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	35.29	1.76	5.29	35.82	1.79	2.06	5.24
45	9	35.82	1.79	5.37	36.36	1.82	2.07	5.26
46	10	36.36	1.82	5.45	36.91	1.85	2.08	5.29
47	11	36.91	1.85	5.54	37.46	1.87	2.09	5.32
48	12	37.46	1.87	5.62	38.02	1.90	2.10	5.34
49	13	38.02	1.90	5.70	38.59	1.93	2.11	5.37
50	14	38.59	1.93	5.79	39.17	1.96	2.12	5.40
51								
52	Daily group ration (g)		5.54		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	39.17	1.96	5.88	39.76	1.99	2.13	5.42
56	16	39.76	1.99	5.96	40.35	2.02	2.15	5.45
57	17	40.35	2.02	6.05	40.96	2.05	2.16	5.48
58	18	40.96	2.05	6.14	41.57	2.08	2.17	5.50
59	19	41.57	2.08	6.24	42.20	2.11	2.18	5.53
60	20	42.20	2.11	6.33	42.83	2.14	2.19	5.56
61	21	42.83	2.14	6.42	43.47	2.17	2.20	5.59
62								
63	Daily group ration (g)		6.15		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	43.47	2.17	6.52	44.12	2.21	2.21	5.61
67	23	44.12	2.21	6.62	44.79	2.24	2.22	5.64
68	24	44.79	2.24	6.72	45.46	2.27	2.23	5.67
69	25	45.46	2.27	6.82	46.14	2.31	2.24	5.70
70	26	46.14	2.31	6.92	46.83	2.34	2.25	5.73
71	27	46.83	2.34	7.02	47.53	2.38	2.27	5.76
72	28	47.53	2.38	7.13	48.25	2.41	2.28	5.78
73								
74	Daily group ration (g)		6.82		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	48.25	2.41	7.24	48.97	2.45	2.29	5.81
78	30	48.97	2.45	7.35	49.71	2.49	2.30	5.84
79	31	49.71	2.49	7.46	50.45	2.52	2.31	5.87
80								
81	Daily group ration (g)		7.35		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and sheets revised reprinted and [redacted] in use on 7/2/13.
[redacted] 7/19/13

FF # 7
Item No. 18
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder: 4 Lab book/pgs: 2, 8-12 Verified by: JSC Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D3
Treatment Group: 50 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/in [redacted]
Approved for us [redacted] Director 6/21/2012 Date

INPUT SECTION	
Initial fish size (g)	1.53
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33:(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	30.60	1.53	4.59	31.06	1.55	1.97	4.99	
2	31.06	1.55	4.66	31.52	1.58	1.98	5.02	
3	31.52	1.58	4.73	32.00	1.60	1.99	5.04	
4	32.00	1.60	4.80	32.48	1.62	2.00	5.07	
5	32.48	1.62	4.87	32.96	1.65	2.01	5.09	
6	32.96	1.65	4.94	33.46	1.67	2.02	5.12	
7	33.46	1.67	5.02	33.96	1.70	2.03	5.15	
Daily group ration (g)		4.80		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	33.96	1.70	5.09	34.47	1.72	2.04	5.17	
9	34.47	1.72	5.17	34.99	1.75	2.05	5.20	
10	34.99	1.75	5.25	35.51	1.78	2.06	5.22	
11	35.51	1.78	5.33	36.05	1.80	2.07	5.25	
12	36.05	1.80	5.41	36.59	1.83	2.08	5.27	
13	36.59	1.83	5.49	37.13	1.86	2.09	5.30	
14	37.13	1.86	5.57	37.69	1.88	2.10	5.33	
Daily group ration (g)		5.33		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	37.69	1.88	5.65	38.26	1.91	2.11	5.35	
16	38.26	1.91	5.74	38.83	1.94	2.12	5.38	
17	38.83	1.94	5.82	39.41	1.97	2.13	5.41	
18	39.41	1.97	5.91	40.00	2.00	2.14	5.43	
19	40.00	2.00	6.00	40.60	2.03	2.15	5.46	
20	40.60	2.03	6.09	41.21	2.06	2.16	5.49	
21	41.21	2.06	6.18	41.83	2.09	2.17	5.52	
Daily group ration (g)		5.91		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	41.83	2.09	6.27	42.46	2.12	2.18	5.54	
23	42.46	2.12	6.37	43.10	2.15	2.19	5.57	
24	43.10	2.15	6.46	43.74	2.19	2.20	5.60	
25	43.74	2.19	6.56	44.40	2.22	2.21	5.63	
26	44.40	2.22	6.66	45.06	2.25	2.23	5.65	
27	45.06	2.25	6.76	45.74	2.29	2.24	5.68	
28	45.74	2.29	6.86	46.43	2.32	2.25	5.71	
Daily group ration (g)		6.56		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	46.43	2.32	6.96	47.12	2.36	2.26	5.74	
30	47.12	2.36	7.07	47.83	2.39	2.27	5.77	
31	47.83	2.39	7.17	48.55	2.43	2.28	5.80	
Daily group ration (g)		7.07		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/13.
[redacted] /19/13

FF # 7
Item No. 18
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder: 7 Lab book/pgs: 2, 8-12 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D4
Treatment Group: 100 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/[redacted]
Approved for [redacted] Study Director 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.63
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333333 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	32.60	1.63	4.89	33.09	1.65	2.01	5.10	
2	33.09	1.65	4.96	33.59	1.68	2.02	5.13	
3	33.59	1.68	5.04	34.09	1.70	2.03	5.15	
4	34.09	1.70	5.11	34.60	1.73	2.04	5.18	
5	34.60	1.73	5.19	35.12	1.76	2.05	5.20	
6	35.12	1.76	5.27	35.65	1.78	2.06	5.23	
7	35.65	1.78	5.35	36.18	1.81	2.07	5.25	
Daily group ration (g)		5.12		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	36.18	1.81	5.43	36.72	1.84	2.08	5.28	
9	36.72	1.84	5.51	37.27	1.86	2.09	5.31	
10	37.27	1.86	5.59	37.83	1.89	2.10	5.33	
11	37.83	1.89	5.68	38.40	1.92	2.11	5.36	
12	38.40	1.92	5.76	38.98	1.95	2.12	5.39	
13	38.98	1.95	5.85	39.56	1.98	2.13	5.41	
14	39.56	1.98	5.93	40.16	2.01	2.14	5.44	
Daily group ration (g)		5.68		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	40.16	2.01	6.07	40.76	2.04	2.15	5.47	
16	40.76	2.04	6.11	41.37	2.07	2.16	5.49	
17	41.37	2.07	6.21	41.99	2.10	2.17	5.52	
18	41.99	2.10	6.30	42.62	2.13	2.18	5.55	
19	42.62	2.13	6.39	43.26	2.16	2.20	5.58	
20	43.26	2.16	6.48	43.91	2.20	2.21	5.61	
21	43.91	2.20	6.59	44.57	2.23	2.22	5.63	
Daily group ration (g)		6.30		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	44.57	2.23	6.68	45.23	2.26	2.23	5.66	
23	45.23	2.26	6.79	45.91	2.30	2.24	5.69	
24	45.91	2.30	6.89	46.60	2.33	2.25	5.72	
25	46.60	2.33	6.99	47.30	2.37	2.26	5.75	
26	47.30	2.37	7.10	48.01	2.40	2.27	5.77	
27	48.01	2.40	7.20	48.73	2.44	2.28	5.80	
28	48.73	2.44	7.31	49.46	2.47	2.30	5.83	
Daily group ration (g)		6.99		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	49.46	2.47	7.42	50.20	2.51	2.31	5.86	
30	50.20	2.51	7.53	50.96	2.55	2.32	5.89	
31	50.96	2.55	7.64	51.72	2.59	2.33	5.92	
Daily group ration (g)		7.53		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/12
[redacted] 3/14/13

FF # 7
Item No. 18
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 4/19/2013
File Folder: 1 Lab book/pgs 2, 8-12 Verified by: SM Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Inter or Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D5
Treatment Group: 200 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/ [redacted]
Approved for [redacted] Director 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.64
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = D3*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.80	1.64	4.92	33.29	1.66	2.01	5.11
2	33.29	1.66	4.99	33.79	1.68	2.02	5.14
3	33.79	1.69	5.07	34.30	1.71	2.03	5.16
4	34.30	1.71	5.14	34.81	1.74	2.04	5.19
5	34.81	1.74	5.22	35.33	1.77	2.05	5.21
6	35.33	1.77	5.30	35.86	1.79	2.06	5.24
7	35.86	1.79	5.38	36.40	1.82	2.07	5.27
Daily group ration (g)		5.15		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.40	1.82	5.46	36.95	1.85	2.08	5.29
9	36.95	1.85	5.54	37.50	1.88	2.09	5.32
10	37.50	1.88	5.63	38.07	1.90	2.10	5.34
11	38.07	1.90	5.71	38.64	1.93	2.11	5.37
12	38.64	1.93	5.80	39.22	1.96	2.13	5.40
13	39.22	1.96	5.88	39.80	1.99	2.14	5.42
14	39.80	1.99	5.97	40.40	2.02	2.15	5.45
Daily group ration (g)		5.71		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	40.40	2.02	6.06	41.01	2.05	2.16	5.48
16	41.01	2.05	6.15	41.62	2.08	2.17	5.51
17	41.62	2.08	6.24	42.25	2.11	2.18	5.53
18	42.25	2.11	6.34	42.86	2.14	2.19	5.56
19	42.88	2.14	6.43	43.52	2.18	2.20	5.59
20	43.52	2.18	6.53	44.18	2.21	2.21	5.62
21	44.18	2.21	6.63	44.84	2.24	2.22	5.64
Daily group ration (g)		6.34		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	44.84	2.24	6.73	45.51	2.28	2.23	5.67
23	45.51	2.28	6.83	46.19	2.31	2.24	5.70
24	46.19	2.31	6.93	46.89	2.34	2.26	5.73
25	46.89	2.34	7.03	47.59	2.38	2.27	5.76
26	47.59	2.38	7.14	48.30	2.42	2.28	5.79
27	48.30	2.42	7.25	49.03	2.45	2.29	5.82
28	49.03	2.45	7.35	49.76	2.49	2.30	5.84
Daily group ration (g)		7.04		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	49.76	2.49	7.46	50.51	2.53	2.31	5.87
30	50.51	2.53	7.58	51.27	2.56	2.32	5.90
31	51.27	2.56	7.69	52.04	2.60	2.34	5.93
Daily group ration (g)		7.58		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/13 12 wrong year 3/19/13 SM [redacted] /19/13

FF # 7
Item No. 18
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 Mar 2013
File Folder 7 Lab book/pgs 2, 812 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D6
Treatment Group: 0 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/ [redacted]
Approved for [redacted] 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.53
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$23 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333535 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	30.60	1.53	4.59	31.06	1.55	1.97	4.99
2	31.06	1.55	4.66	31.52	1.58	1.98	5.02
3	31.52	1.58	4.73	32.00	1.60	1.99	5.04
4	32.00	1.60	4.80	32.48	1.62	2.00	5.07
5	32.48	1.62	4.87	32.96	1.65	2.01	5.09
6	32.96	1.65	4.94	33.46	1.67	2.02	5.12
7	33.46	1.67	5.02	33.96	1.70	2.03	5.15
Daily group ration (g)		4.80		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	33.96	1.70	5.09	34.47	1.72	2.04	5.17
9	34.47	1.72	5.17	34.99	1.75	2.05	5.20
10	34.99	1.75	5.25	35.51	1.78	2.06	5.22
11	35.51	1.78	5.33	36.05	1.80	2.07	5.25
12	36.05	1.80	5.41	36.59	1.83	2.08	5.27
13	36.59	1.83	5.49	37.13	1.86	2.09	5.30
14	37.13	1.86	5.57	37.69	1.88	2.10	5.33
Daily group ration (g)		5.33		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	37.69	1.88	5.65	38.26	1.91	2.11	5.35
16	38.26	1.91	5.74	38.83	1.94	2.12	5.38
17	38.83	1.94	5.82	39.41	1.97	2.13	5.41
18	39.41	1.97	5.91	40.00	2.00	2.14	5.43
19	40.00	2.00	6.00	40.60	2.03	2.15	5.46
20	40.60	2.03	6.09	41.21	2.06	2.16	5.49
21	41.21	2.06	6.18	41.83	2.09	2.17	5.52
Daily group ration (g)		5.91		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	41.83	2.09	6.27	42.46	2.12	2.18	5.54
23	42.46	2.12	6.37	43.10	2.15	2.19	5.57
24	43.10	2.15	6.46	43.74	2.19	2.20	5.60
25	43.74	2.19	6.56	44.40	2.22	2.21	5.63
26	44.40	2.22	6.66	45.06	2.25	2.23	5.65
27	45.06	2.25	6.76	45.74	2.29	2.24	5.68
28	45.74	2.29	6.86	46.43	2.32	2.25	5.71
Daily group ration (g)		6.56		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	46.43	2.32	6.96	47.12	2.36	2.26	5.74
30	47.12	2.36	7.07	47.83	2.39	2.27	5.77
31	47.83	2.39	7.17	48.55	2.43	2.28	5.80
Daily group ration (g)		7.07		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/12.
[redacted] 4/19/13

FF # 7
Item No. 18
Pg 6 of 15

Study Number: AE-I-12-PSEUDO-03 File Folder 7 Lab book/pgs 2 , 8-12

Reviewed by: KW Date: 19MAR2013
Verified by: ___ Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__D__________ | **Date Created/Initials:__6/21/2012 KLW** KW
Holding Tank/Chamber:__D7______ | **Date Revised/**[redacted]
Treatment Group:____0 mg/L__________ | **Approved for** [redacted] **_6/21/2012__ Date**
Species:_SMB__________Lot: _112400______

Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	1.57
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (Inches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
1	31.40	1.57	4.71	31.87	1.59	1.98	5.04
2	31.87	1.59	4.78	32.35	1.62	1.99	5.06
3	32.35	1.62	4.85	32.83	1.64	2.00	5.09
4	32.83	1.64	4.93	33.33	1.67	2.01	5.11
5	33.33	1.67	5.00	33.83	1.69	2.02	5.14
6	33.83	1.69	5.07	34.33	1.72	2.03	5.16
7	34.33	1.72	5.15	34.85	1.74	2.04	5.19

Daily group ration (g) **4.93** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.25** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
8	34.85	1.74	5.23	35.37	1.77	2.05	5.22
9	35.37	1.77	5.31	35.90	1.80	2.06	5.24
10	35.90	1.80	5.39	36.44	1.82	2.07	5.27
11	36.44	1.82	5.47	36.99	1.85	2.08	5.29
12	36.99	1.85	5.55	37.54	1.88	2.09	5.32
13	37.54	1.88	5.63	38.11	1.91	2.10	5.35
14	38.11	1.91	5.72	38.68	1.93	2.12	5.37

Daily group ration (g) **5.47** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.27** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
15	38.68	1.93	5.80	39.26	1.96	2.13	5.40
16	39.26	1.96	5.89	39.85	1.99	2.14	5.43
17	39.85	1.99	5.98	40.44	2.02	2.15	5.45
18	40.44	2.02	6.07	41.05	2.05	2.16	5.48
19	41.05	2.05	6.16	41.67	2.08	2.17	5.51
20	41.67	2.08	6.25	42.29	2.11	2.18	5.54
21	42.29	2.11	6.34	42.93	2.15	2.19	5.56

Daily group ration (g) **6.07** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.30** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
22	42.93	2.15	6.44	43.57	2.18	2.20	5.59
23	43.57	2.18	6.54	44.22	2.21	2.21	5.62
24	44.22	2.21	6.63	44.89	2.24	2.22	5.65
25	44.89	2.24	6.73	45.56	2.28	2.23	5.67
26	45.56	2.28	6.83	46.24	2.31	2.25	5.70
27	46.24	2.31	6.94	46.94	2.35	2.26	5.73
28	46.94	2.35	7.04	47.64	2.38	2.27	5.76

Daily group ration (g) **6.74** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.34** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (Inches)	Fish Final Length (cm)
29	47.64	2.38	7.15	48.36	2.42	2.28	5.79
30	48.36	2.42	7.25	49.08	2.45	2.29	5.82
31	49.08	2.45	7.36	49.82	2.49	2.30	5.85

Daily group ration (g) **7.25** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.36** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

Feed rates increased and sheets revised, reprinted and ~~Placed~~ placed into use on 7/2/12.
illegible 3/15/13
[redacted] /19/13

FF # 7
Item No. 18
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 4 MAR 2013
File Folder: 4 Lab book/pgs: 2, 8-12 Verified by: JC Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Serv ce Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D8
Treatment Group: 50 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/Ini [redacted]
Approved for use [redacted] rector 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish s ze (g)	1.54
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00035 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individua Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($O$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$O$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initia Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	30.80	1.54	4.62	31.26	1.56	1.97	5.01	
2	31.26	1.56	4.69	31.73	1.59	1.98	5.03	
3	31.73	1.59	4.76	32.21	1.61	1.99	5.05	
4	32.21	1.61	4.83	32.69	1.63	2.00	5.08	
5	32.69	1.63	4.90	33.18	1.66	2.01	5.11	
6	33.18	1.66	4.98	33.68	1.68	2.02	5.13	
7	33.68	1.68	5.05	34.18	1.71	2.03	5.16	
Daily group ration (g)		4.83		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	34.18	1.71	5.13	34.70	1.73	2.04	5.18	
9	34.70	1.73	5.20	35.22	1.76	2.05	5.21	
10	35.22	1.76	5.28	35.74	1.79	2.06	5.23	
11	35.74	1.79	5.36	36.28	1.81	2.07	5.26	
12	36.28	1.81	5.44	36.63	1.84	2.08	5.29	
13	36.83	1.84	5.52	37.38	1.87	2.09	5.31	
14	37.38	1.87	5.61	37.94	1.90	2.10	5.34	
Daily group ration (g)		5.36		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	37.94	1.90	5.69	38.51	1.93	2.11	5.37	
16	38.51	1.93	5.78	39.08	1.95	2.12	5.39	
17	39.08	1.95	5.86	39.67	1.98	2.13	5.42	
18	39.67	1.98	5.95	40.27	2.01	2.14	5.45	
19	40.27	2.01	6.04	40.87	2.04	2.15	5.47	
20	40.87	2.04	6.13	41.48	2.07	2.17	5.50	
21	41.48	2.07	6.22	42.11	2.11	2.18	5.53	
Daily group ration (g)		5.95		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	42.11	2.11	6.32	42.74	2.14	2.19	5.55	
23	42.74	2.14	6.41	43.38	2.17	2.20	5.58	
24	43.38	2.17	6.51	44.03	2.20	2.21	5.61	
25	44.03	2.20	6.60	44.69	2.23	2.22	5.64	
26	44.69	2.23	6.70	45.36	2.27	2.23	5.67	
27	45.36	2.27	6.80	46.04	2.30	2.24	5.69	
28	46.04	2.30	6.91	46.73	2.34	2.25	5.72	
Daily group ration (g)		6.61		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	46.73	2.34	7.01	47.43	2.37	2.26	5.75	
30	47.43	2.37	7.11	48.14	2.41	2.28	5.78	
31	48.14	2.41	7.22	48.87	2.44	2.29	5.81	
Daily group ration (g)		7.12		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/12.
[redacted] 3/18/13

FC # 7
Item No. 18
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19 MAR 2013
File Folder: 7 Lab book/pgs: 2, 8-12 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D9
Treatment Group: 300 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/Ini [redacted]
Approved for use [redacted] ector 6/21/2012
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.86
Number of fish	9
Condition Factor (C)	0.03045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Columns D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	16.74	1.86	2.51	16.99	1.89	2.10	5.33
2	16.99	1.89	2.55	17.25	1.92	2.11	5.36
3	17.25	1.92	2.59	17.50	1.94	2.12	5.38
4	17.50	1.94	2.63	17.77	1.97	2.13	5.41
5	17.77	1.97	2.67	18.03	2.00	2.14	5.44
6	18.03	2.00	2.71	18.30	2.03	2.15	5.46
7	18.30	2.03	2.75	18.58	2.06	2.16	5.49
Daily group ration (g)		2.63		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	18.58	2.06	2.79	18.86	2.10	2.17	5.52
9	18.86	2.10	2.83	19.14	2.13	2.18	5.55
10	19.14	2.13	2.87	19.43	2.16	2.19	5.57
11	19.43	2.16	2.91	19.72	2.19	2.21	5.60
12	19.72	2.19	2.96	20.01	2.22	2.22	5.63
13	20.01	2.22	3.00	20.31	2.26	2.23	5.66
14	20.31	2.26	3.05	20.62	2.29	2.24	5.69
Daily group ration (g)		2.92		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	20.62	2.29	3.09	20.93	2.33	2.25	5.71
16	20.93	2.33	3.14	21.24	2.36	2.26	5.74
17	21.24	2.36	3.19	21.56	2.40	2.27	5.77
18	21.56	2.40	3.23	21.88	2.43	2.28	5.80
19	21.88	2.43	3.28	22.21	2.47	2.29	5.83
20	22.21	2.47	3.33	22.55	2.51	2.31	5.86
21	22.55	2.51	3.38	22.88	2.54	2.32	5.89
Daily group ration (g)		3.24		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	22.88	2.54	3.43	23.23	2.58	2.33	5.92
23	23.23	2.58	3.48	23.58	2.62	2.34	5.95
24	23.58	2.62	3.54	23.93	2.66	2.35	5.97
25	23.93	2.66	3.59	24.29	2.70	2.36	6.00
26	24.29	2.70	3.64	24.65	2.74	2.38	6.03
27	24.65	2.74	3.70	25.02	2.78	2.39	6.06
28	25.02	2.78	3.75	25.40	2.82	2.40	6.09
Daily group ration (g)		3.59		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	25.40	2.82	3.81	25.78	2.86	2.41	6.12
30	25.78	2.86	3.87	26.17	2.91	2.42	6.16
31	26.17	2.91	3.92	26.56	2.95	2.44	6.19
Daily group ration (g)		3.87		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets revised, reprinted and placed into service on 7/12/12 [redacted] 3/19/13

FF # 7
Item No. 18
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19MAR2013
File Folder 7 Lab book/pgs 2 / 8-12 Verified by: JDL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D10
Treatment Group: 200 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Init [redacted]
Approved for use [redacted] y Director 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.64
Number of fish	18
Condition Factor (C)	0.00645
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ratio (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	29.52	1.64	4.43	29.96	1.66	2.01	5.11
2	29.96	1.66	4.49	30.41	1.69	2.02	5.14
3	30.41	1.69	4.56	30.87	1.71	2.03	5.16
4	30.87	1.71	4.63	31.33	1.74	2.04	5.19
5	31.33	1.74	4.70	31.80	1.77	2.05	5.21
6	31.80	1.77	4.77	32.28	1.79	2.06	5.24
7	32.28	1.79	4.84	32.76	1.82	2.07	5.27
Daily group ration (g)		4.63		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	32.76	1.82	4.91	33.25	1.85	2.08	5.29
9	33.25	1.85	4.99	33.75	1.88	2.09	5.32
10	33.75	1.88	5.06	34.26	1.90	2.10	5.34
11	34.26	1.90	5.14	34.77	1.93	2.11	5.37
12	34.77	1.93	5.22	35.29	1.96	2.13	5.40
13	35.29	1.96	5.29	35.82	1.99	2.14	5.42
14	35.82	1.99	5.37	36.36	2.02	2.15	5.45
Daily group ration (g)		5.14		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	36.36	2.02	5.45	36.91	2.05	2.16	5.48
16	36.91	2.05	5.54	37.46	2.08	2.17	5.51
17	37.46	2.08	5.62	38.02	2.11	2.18	5.53
18	38.02	2.11	5.70	38.59	2.14	2.19	5.56
19	38.59	2.14	5.79	39.17	2.18	2.20	5.59
20	39.17	2.18	5.88	39.76	2.21	2.21	5.62
21	39.76	2.21	5.96	40.36	2.24	2.22	5.64
Daily group ration (g)		5.71		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	40.36	2.24	6.05	40.96	2.28	2.23	5.67
23	40.96	2.28	6.14	41.58	2.31	2.24	5.70
24	41.58	2.31	6.24	42.20	2.34	2.26	5.73
25	42.20	2.34	6.33	42.83	2.38	2.27	5.76
26	42.83	2.38	6.42	43.47	2.42	2.28	5.79
27	43.47	2.42	6.52	44.13	2.45	2.29	5.82
28	44.13	2.45	6.62	44.79	2.49	2.30	5.84
Daily group ration (g)		6.33		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	44.79	2.49	6.72	45.46	2.53	2.31	5.87
30	45.46	2.53	6.82	46.14	2.56	2.32	5.90
31	46.14	2.56	6.92	46.83	2.60	2.34	5.93
Daily group ration (g)		6.82		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets reprinted and placed into service on 7/2/12

[redacted] 3/19/13

FF # 7
Item No. 18
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 8-12 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie; FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D11
Treatment Group: 100 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/In: [redacted]
Approved for u: [redacted] Director 6/21/2012 Date

INPUT SECTION	
Initial fish size (g)	1.63
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * $21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	32.60	1.63	4.89	33.09	1.65	2.01	5.10	
2	33.09	1.65	4.96	33.59	1.68	2.02	5.13	
3	33.59	1.68	5.04	34.09	1.70	2.03	5.15	
4	34.09	1.70	5.11	34.60	1.73	2.04	5.18	
5	34.60	1.73	5.19	35.12	1.76	2.05	5.20	
6	35.12	1.76	5.27	35.65	1.78	2.06	5.23	
7	35.65	1.78	5.35	36.18	1.81	2.07	5.25	
Daily group ration (g)		5.12		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	36.18	1.81	5.43	36.72	1.84	2.08	5.28	
9	36.72	1.84	5.51	37.27	1.86	2.09	5.31	
10	37.27	1.86	5.59	37.83	1.89	2.10	5.33	
11	37.83	1.89	5.68	38.40	1.92	2.12	5.36	
12	38.40	1.92	5.76	38.98	1.95	2.12	5.39	
13	38.98	1.95	5.85	39.56	1.98	2.13	5.41	
14	39.56	1.98	5.93	40.16	2.01	2.14	5.44	
Daily group ration (g)		5.68		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	40.16	2.01	6.02	40.76	2.04	2.15	5.47	
16	40.76	2.04	6.11	41.37	2.07	2.16	5.49	
17	41.37	2.07	6.21	41.99	2.10	2.17	5.52	
18	41.99	2.10	6.30	42.62	2.13	2.18	5.55	
19	42.62	2.13	6.39	43.26	2.16	2.20	5.58	
20	43.26	2.16	6.49	43.91	2.20	2.21	5.61	
21	43.91	2.20	6.59	44.57	2.23	2.22	5.63	
Daily group ration (g)		6.30		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	44.57	2.23	6.68	45.23	2.26	2.23	5.66	
23	45.23	2.26	6.79	45.91	2.30	2.24	5.69	
24	45.91	2.30	6.89	46.60	2.33	2.25	5.72	
25	46.60	2.33	6.99	47.30	2.37	2.26	5.75	
26	47.30	2.37	7.10	48.01	2.40	2.27	5.77	
27	48.01	2.40	7.20	48.73	2.44	2.28	5.80	
28	48.73	2.44	7.31	49.46	2.47	2.30	5.83	
Daily group ration (g)		6.99		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	49.46	2.47	7.42	50.20	2.51	2.31	5.86	
30	50.20	2.51	7.53	50.96	2.55	2.32	5.89	
31	50.96	2.55	7.64	51.72	2.59	2.33	5.92	
Daily group ration (g)		7.53		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rates increased and sheets reprinted and placed into use on 7/2/12

[redacted] 3/19/13

FF # 7
Item No. 18
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 11/14/2013
File Folder: 4 Lab book/pgs: 2, 8-12 Verified by: [redacted] Date: 11-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982 Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D12
Treatment Group: 200 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Initials: [redacted]
Approved for use: [redacted] Director 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.81						
21	Number of fish		10						
22	Condition Factor (C)		0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		15						

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*($/$D$25))) (Column D and F values adjust by row)
Individual Fina Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	18.10	1.81	2.72	18.37	1.84	2.08	5.28	
34	2	18.37	1.84	2.76	18.65	1.86	2.09	5.31	
35	3	18.65	1.86	2.80	18.93	1.89	2.10	5.33	
36	4	18.93	1.89	2.84	19.21	1.92	2.11	5.36	
37	5	19.21	1.92	2.88	19.50	1.95	2.12	5.39	
38	6	19.50	1.95	2.92	19.78	1.98	2.13	5.41	
39	7	19.79	1.98	2.97	20.09	2.01	2.14	5.44	
40									
41	Daily group ration (g)		2.84		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	20.09	2.01	3.01	20.39	2.04	2.15	5.47	
45	9	20.39	2.04	3.06	20.70	2.07	2.16	5.50	
46	10	20.70	2.07	3.10	21.01	2.10	2.17	5.52	
47	11	21.01	2.10	3.15	21.32	2.13	2.19	5.55	
48	12	21.32	2.13	3.20	21.64	2.16	2.20	5.58	
49	13	21.64	2.16	3.25	21.97	2.20	2.21	5.61	
50	14	21.97	2.20	3.29	22.29	2.23	2.22	5.63	
51									
52	Daily group ration (g)		3.15		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	22.29	2.23	3.34	22.63	2.26	2.23	5.66	
56	16	22.63	2.26	3.39	22.97	2.30	2.24	5.69	
57	17	22.97	2.30	3.45	23.31	2.33	2.25	5.72	
58	18	23.31	2.33	3.50	23.66	2.37	2.26	5.75	
59	19	23.66	2.37	3.55	24.02	2.40	2.27	5.78	
60	20	24.02	2.40	3.60	24.38	2.44	2.29	5.80	
61	21	24.38	2.44	3.66	24.74	2.47	2.30	5.83	
62									
63	Daily group ration (g)		3.50		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	24.74	2.47	3.71	25.11	2.51	2.31	5.86	
67	23	25.11	2.51	3.77	25.49	2.55	2.32	5.89	
68	24	25.49	2.55	3.82	25.87	2.59	2.33	5.92	
69	25	25.87	2.59	3.88	26.26	2.63	2.34	5.95	
70	26	26.26	2.63	3.94	26.66	2.67	2.35	5.98	
71	27	26.66	2.67	4.00	27.06	2.71	2.37	6.01	
72	28	27.06	2.71	4.06	27.46	2.75	2.38	6.04	
73									
74	Daily group ration (g)		3.88		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	27.46	2.75	4.12	27.87	2.79	2.39	6.07	
78	30	27.87	2.79	4.18	28.29	2.83	2.40	6.10	
79	31	28.29	2.83	4.24	28.72	2.87	2.41	6.13	
80									
81	Daily group ration (g)		4.18		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rates increased and sheets reprinted and placed into use on 7/2/12
[redacted] 3/19/13

FF # 7
Item No. 18
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19MAR2013
File Folder 4 Lab book/pgs 2/8-12 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D13
Treatment Group: 300 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/i [redacted]
Approved for u [redacted] rector 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.55
Number of fish	12
Condit on Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	18.60	1.55	2.79	18.88	1.57	1.97	5.02
2	18.88	1.57	2.83	19.16	1.60	1.98	5.04
3	19.16	1.60	2.87	19.45	1.62	1.99	5.07
4	19.45	1.62	2.92	19.74	1.65	2.00	5.09
5	19.74	1.65	2.96	20.04	1.67	2.01	5.12
6	20.04	1.67	3.01	20.34	1.69	2.02	5.14
7	20.34	1.69	3.05	20.64	1.72	2.03	5.17
Daily group ration (g)		2.92		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.24		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	20.64	1.72	3.10	20.95	1.75	2.04	5.19
9	20.95	1.75	3.14	21.27	1.77	2.05	5.22
10	21.27	1.77	3.19	21.59	1.80	2.06	5.24
11	21.59	1.80	3.24	21.91	1.83	2.08	5.27
12	21.91	1.83	3.29	22.24	1.85	2.09	5.30
13	22.24	1.85	3.34	22.57	1.88	2.10	5.32
14	22.57	1.88	3.39	22.91	1.91	2.11	5.35
Daily group ration (g)		3.24		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	22.91	1.91	3.44	23.25	1.94	2.12	5.38
16	23.25	1.94	3.49	23.60	1.97	2.13	5.40
17	23.60	1.97	3.54	23.96	2.00	2.14	5.43
18	23.96	2.00	3.59	24.32	2.03	2.15	5.46
19	24.32	2.03	3.65	24.68	2.06	2.16	5.48
20	24.68	2.06	3.70	25.05	2.09	2.17	5.51
21	25.05	2.09	3.76	25.43	2.12	2.18	5.54
Daily group ration (g)		3.60		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	25.43	2.12	3.81	25.81	2.15	2.19	5.57
23	25.81	2.15	3.87	26.20	2.18	2.20	5.59
24	26.20	2.18	3.93	26.59	2.22	2.21	5.62
25	26.59	2.22	3.99	26.99	2.25	2.22	5.65
26	26.99	2.25	4.05	27.39	2.28	2.24	5.68
27	27.39	2.28	4.11	27.80	2.32	2.25	5.71
28	27.80	2.32	4.17	28.22	2.35	2.26	5.74
Daily group ration (g)		3.99		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	28.22	2.35	4.23	28.64	2.39	2.27	5.76
30	28.64	2.39	4.30	29.07	2.42	2.28	5.79
31	29.07	2.42	4.36	29.51	2.46	2.29	5.82
Daily group ration (g)		4.30		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets reprinted and placed into use on 7/2/12 [redacted] 3/19/13

FF # 7
Item No. 18
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03 File Folder: 7 Lab book/pgs: 2, 8-12

Reviewed by: KLW Date: 19 MAR 2013
Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration (g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D14
Treatment Group: 300 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/In: [redacted]
Approved for us[redacted]tor 6/21/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						**Worksheet Formulas**		
20	Initial fish size (g)	1.72					Group Total Initial fish weight (g) = E20 * E21 [initial fish size determined from measured weights]		
21	Number of fish	7					Average Individual Initial fish weight (g) = D33/$DE21 [numerator value adjusts by row]		
22	Condition Factor (C)	0.00045					Daily group Feed Ration (g) = D33*($D$26/100) [numerator value adjusts by row]		
23	(C = 0.00015 - 0.00050 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))] [Column D and F values adjust by row]		
24							Individual Final Fish wt (g) =G33/$E$21 [numerator value adjusts by row]		
25	FCR	10					Fish Final Length (inches) =((H33/4.4)/$L$22]^0.333333336 [Column H value adjusts by row]		
26	% B.W./d	15					Fish Final Length (cm) = I33*2.54 [numerator value adjusts by row]		
27									
28									
29				Group Total Initial	Average Individua Initial	Daily Group Feed	Total Final	Individual Final	Fish Final	Fish Final
30										
31				Fish wt	Fish wt	Ration	Fish wt	Fish wt	Length	Length
32		Day		(g)	(g)	(g)	(g)	(g)	(inches)	(cm)
33		1		12.04	1.72	1.81	12.22	1.75	2.04	5.19
34		2		12.22	1.75	1.83	12.40	1.77	2.05	5.22
35		3		12.40	1.77	1.86	12.59	1.80	2.06	5.24
36		4		12.59	1.80	1.89	12.78	1.83	2.08	5.27
37		5		12.78	1.83	1.92	12.97	1.85	2.09	5.30
38		6		12.97	1.85	1.95	13.17	1.88	2.10	5.32
39		7		13.17	1.88	1.97	13.36	1.91	2.11	5.35
40										
41	Daily group ration (g)				1.89		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)				0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43										
44		8		13.36	1.91	2.00	13.56	1.94	2.12	5.38
45		9		13.56	1.94	2.03	13.77	1.97	2.13	5.40
46		10		13.77	1.97	2.06	13.97	2.00	2.14	5.43
47		11		13.97	2.00	2.10	14.18	2.03	2.15	5.46
48		12		14.18	2.03	2.13	14.40	2.06	2.16	5.48
49		13		14.40	2.06	2.16	14.61	2.09	2.17	5.51
50		14		14.61	2.09	2.19	14.83	2.12	2.18	5.54
51										
52	Daily group ration (g)				2.10		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)				0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54										
55		15		14.83	2.12	2.22	15.05	2.15	2.19	5.57
56		16		15.05	2.15	2.26	15.28	2.18	2.20	5.59
57		17		15.28	2.18	2.29	15.51	2.22	2.21	5.62
58		18		15.51	2.22	2.33	15.74	2.25	2.22	5.65
59		19		15.74	2.25	2.36	15.98	2.28	2.24	5.68
60		20		15.98	2.28	2.40	16.22	2.32	2.25	5.71
61		21		16.22	2.32	2.43	16.46	2.35	2.26	5.73
62										
63	Daily group ration (g)				2.33		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)				0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65										
66		22		16.46	2.35	2.47	16.71	2.39	2.27	5.76
67		23		16.71	2.39	2.51	16.96	2.42	2.28	5.79
68		24		16.96	2.42	2.54	17.21	2.46	2.29	5.82
69		25		17.21	2.46	2.58	17.47	2.50	2.30	5.85
70		26		17.47	2.50	2.62	17.73	2.53	2.31	5.88
71		27		17.73	2.53	2.66	18.00	2.57	2.33	5.91
72		28		18.00	2.57	2.70	18.27	2.61	2.34	5.94
73										
74	Daily group ration (g)				2.58		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)				0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76										
77		29		18.27	2.61	2.74	18.54	2.65	2.35	5.97
78		30		18.54	2.65	2.78	18.82	2.69	2.36	6.00
79		31		18.82	2.69	2.82	19.10	2.73	2.37	6.03
80										
81	Daily group ration (g)				2.78		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)				0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheet reprinted after revision and placed into use on 7/2/12.
[redacted] 3/19/13

FF # 7
Item No. 18
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR 2013
File Folder 7 Lab book/pgs 2, 8-12 Verified by: JM Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406 467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D15
Treatment Group: 0 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/Init [redacted]
Approved for use [redacted] rector 6/21/2012 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.7
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333336 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	34.00	1.79	5.10	34.51	1.73	2.04	5.17
2	34.51	1.73	5.18	35.03	1.75	2.05	5.20
3	35.03	1.75	5.25	35.55	1.78	2.06	5.22
4	35.55	1.78	5.33	36.09	1.80	2.07	5.25
5	36.09	1.80	5.41	36.63	1.83	2.08	5.28
6	36.63	1.83	5.49	37.18	1.86	2.09	5.30
7	37.18	1.86	5.58	37.73	1.89	2.10	5.33
Daily group ration (g)		5.34		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.27		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	37.73	1.89	5.66	38.30	1.92	2.11	5.36
9	38.30	1.92	5.75	38.88	1.94	2.12	5.38
10	38.88	1.94	5.83	39.46	1.97	2.13	5.41
11	39.46	1.97	5.92	40.05	2.00	2.14	5.44
12	40.05	2.00	6.01	40.65	2.03	2.15	5.46
13	40.65	2.03	6.10	41.26	2.06	2.16	5.49
14	41.26	2.06	6.19	41.88	2.09	2.17	5.52
Daily group ration (g)		5.92		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.88	2.09	6.28	42.51	2.13	2.18	5.54
16	42.51	2.13	6.38	43.15	2.16	2.19	5.57
17	43.15	2.16	6.47	43.79	2.19	2.20	5.60
18	43.79	2.19	6.57	44.45	2.22	2.22	5.63
19	44.45	2.22	6.67	45.12	2.26	2.23	5.66
20	45.12	2.26	6.77	45.79	2.29	2.24	5.68
21	45.79	2.29	6.87	46.48	2.32	2.25	5.71
Daily group ration (g)		6.57		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	46.48	2.32	6.97	47.18	2.36	2.26	5.74
23	47.18	2.36	7.08	47.88	2.39	2.27	5.77
24	47.88	2.39	7.18	48.60	2.43	2.28	5.80
25	48.60	2.43	7.29	49.33	2.47	2.29	5.83
26	49.33	2.47	7.40	50.07	2.50	2.31	5.86
27	50.07	2.50	7.51	50.82	2.54	2.32	5.89
28	50.82	2.54	7.62	51.59	2.58	2.33	5.91
Daily group ration (g)		7.29		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	51.59	2.58	7.74	52.36	2.62	2.34	5.94
30	52.36	2.62	7.85	53.14	2.66	2.35	5.97
31	53.14	2.66	7.97	53.94	2.70	2.36	6.00
Daily group ration (g)		7.85		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and sheets revised, reprinted and placed into use on 7/2/12 [redacted] 3/19/13

FF # 7
Item No. 18
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 2/13-19
File Folder ~~8~~ Lab book/pgs 2 / 13-19
wrong File Folder. Should be 7. KLW 28FEB2013

Reviewed by: KLW Date: 19MAR2013
Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 405-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__D__________ **Date Created/Init**[redacted]**2 KLW** KLW
Holding Tank/Chamber:__D1______ **Date Revised/init**[redacted]
Treatment Group:____100 mg/L___________ **Approved for use**[redacted] **__7/2/2012__**
Species:_SMB__________Lot: _112400_____ [redacted]**irector** **Date**

Row Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	1.41
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	28.20	1.41	5.64	28.76	1.44	1.92	4.87
2	28.76	1.44	5.75	29.34	1.47	1.93	4.90
3	29.34	1.47	5.87	29.93	1.50	1.94	4.93
4	29.93	1.50	5.99	30.52	1.53	1.95	4.97
5	30.52	1.53	6.10	31.14	1.56	1.97	5.00
6	31.14	1.56	6.23	31.76	1.59	1.98	5.03
7	31.76	1.59	6.35	32.39	1.62	1.99	5.06

Daily group ration (g) **5.99** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.30** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
8	32.39	1.62	6.48	33.04	1.65	2.01	5.10
9	33.04	1.65	6.61	33.70	1.69	2.02	5.13
10	33.70	1.69	6.74	34.38	1.72	2.03	5.17
11	34.38	1.72	6.88	35.06	1.75	2.05	5.20
12	35.06	1.75	7.01	35.76	1.79	2.06	5.23
13	35.76	1.79	7.15	36.48	1.82	2.07	5.27
14	36.48	1.82	7.30	37.21	1.86	2.09	5.30

Daily group ration (g) **6.88** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.34** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
15	37.21	1.86	7.44	37.95	1.90	2.10	5.34
16	37.95	1.90	7.59	38.71	1.94	2.12	5.37
17	38.71	1.94	7.74	39.49	1.97	2.13	5.41
18	39.49	1.97	7.90	40.28	2.01	2.14	5.45
19	40.28	2.01	8.06	41.08	2.05	2.16	5.48
20	41.08	2.05	8.22	41.90	2.10	2.17	5.52
21	41.90	2.10	8.38	42.74	2.14	2.19	5.56

Daily group ration (g) **7.90** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.40** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
22	42.74	2.14	8.55	43.60	2.18	2.20	5.59
23	43.60	2.18	8.72	44.47	2.22	2.22	5.63
24	44.47	2.22	8.89	45.36	2.27	2.23	5.67
25	45.36	2.27	9.07	46.27	2.31	2.25	5.70
26	46.27	2.31	9.25	47.19	2.36	2.26	5.74
27	47.19	2.36	9.44	48.13	2.41	2.28	5.78
28	48.13	2.41	9.63	49.10	2.45	2.29	5.82

Daily group ration (g) **9.08** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.45** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
29	49.10	2.45	9.82	50.08	2.50	2.31	5.86
30	50.08	2.50	10.02	51.08	2.55	2.32	5.90
31	51.08	2.55	10.22	52.10	2.61	2.34	5.93

Daily group ration (g) **10.02** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.50** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

(1) Due to there being no fish left in holding chamber D10, the feed chart was not revised. Therefore, there are only 14 pages. KLW 24MAR2013

FF # 7
Item No. 19
Pg 1 of ~~15~~ 14 (1)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D2
Treatment Group: 50 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/Init [redacted]
Approved for use [redacted] rector 7/2/2012 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.59
Number of fish	20
Condition Factor (C)	0.00045

(C = 0.00015 - 0.00050 in 0.00005 increments)

FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(J/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	31.80	1.59	6.36	32.44	1.62	1.98	5.07
2	32.44	1.62	6.49	33.08	1.65	2.01	5.10
3	33.08	1.65	6.62	33.75	1.69	2.02	5.13
4	33.75	1.69	6.75	34.42	1.72	2.03	5.17
5	34.42	1.72	6.88	35.11	1.76	2.05	5.20
6	35.11	1.76	7.02	35.81	1.79	2.06	5.24
7	35.81	1.79	7.16	36.53	1.83	2.08	5.27
Daily group ration (g)		6.75		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.53	1.83	7.31	37.26	1.86	2.09	5.31
9	37.26	1.86	7.45	38.00	1.90	2.10	5.34
10	38.00	1.90	7.60	38.76	1.94	2.12	5.38
11	38.76	1.94	7.75	39.54	1.98	2.13	5.41
12	39.54	1.98	7.91	40.33	2.02	2.15	5.45
13	40.33	2.02	8.07	41.14	2.06	2.16	5.48
14	41.14	2.06	8.23	41.96	2.10	2.17	5.52
Daily group ration (g)		7.76		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.96	2.10	8.39	42.80	2.14	2.19	5.56
16	42.80	2.14	8.56	43.65	2.18	2.20	5.59
17	43.65	2.18	8.73	44.53	2.23	2.22	5.63
18	44.53	2.23	8.91	45.42	2.27	2.23	5.67
19	45.42	2.27	9.08	46.33	2.32	2.25	5.71
20	46.33	2.32	9.27	47.25	2.36	2.26	5.74
21	47.25	2.36	9.45	48.20	2.41	2.28	5.78
Daily group ration (g)		8.91		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	48.20	2.41	9.64	49.16	2.46	2.29	5.82
23	49.16	2.46	9.83	50.15	2.51	2.31	5.86
24	50.15	2.51	10.03	51.15	2.56	2.32	5.90
25	51.15	2.56	10.23	52.17	2.61	2.34	5.94
26	52.17	2.61	10.43	53.21	2.66	2.35	5.98
27	53.21	2.66	10.64	54.28	2.71	2.37	6.02
28	54.28	2.71	10.86	55.36	2.77	2.38	6.06
Daily group ration (g)		10.24		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	55.36	2.77	11.07	56.47	2.82	2.40	6.10
30	56.47	2.82	11.29	57.60	2.88	2.42	6.14
31	57.60	2.88	11.52	58.75	2.94	2.43	6.18
Daily group ration (g)		11.30		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) See page 1 for explanation of change date of page numbers. KW 24MAR13

FF # 7
Item No. 19
Pg 2 of 15 (1)

Study Number: AEH-12-PSEUDO-09
File Folder: 7 Lab book/pgs: 2, 13-19

Reviewed by: KW Date: 14MAR2013
Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 405-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D3
Treatment Group: 50 mg/L
Species: SMB **Lot**: 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/in: [redacted]
Approved for us: [redacted] 7/2/2012
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.59						
21	Number of fish		19						
22	Condition Factor (C)		0.00045						
23	[C = 0.00015 - 0.00050 in 0.00005 increments]								
24									
25	FCR		10						
26	% B.W./d		20						

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Fina Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	29.07	1.53	5.81	29.65	1.56	1.97	5.00
2	29.65	1.56	5.93	30.24	1.59	1.98	5.04
3	30.24	1.59	6.05	30.85	1.62	2.00	5.07
4	30.85	1.62	6.17	31.47	1.66	2.01	5.10
5	31.47	1.66	6.29	32.10	1.69	2.02	5.14
6	32.10	1.69	6.42	32.74	1.72	2.04	5.17
7	32.74	1.72	6.55	33.39	1.76	2.05	5.20
Daily group ration (g)		6.17		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	33.39	1.76	6.68	34.06	1.79	2.06	5.24
9	34.06	1.79	6.81	34.74	1.83	2.08	5.27
10	34.74	1.83	6.95	35.44	1.87	2.09	5.31
11	35.44	1.87	7.09	36.14	1.90	2.10	5.34
12	36.14	1.90	7.23	36.87	1.94	2.12	5.38
13	36.87	1.94	7.37	37.61	1.98	2.13	5.41
14	37.61	1.98	7.52	38.36	2.02	2.15	5.45
Daily group ration (g)		7.09		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	38.36	2.02	7.67	39.12	2.06	2.16	5.49
16	39.12	2.06	7.82	39.91	2.10	2.17	5.52
17	39.91	2.10	7.98	40.71	2.14	2.19	5.56
18	40.71	2.14	8.14	41.52	2.19	2.20	5.60
19	41.52	2.19	8.30	42.35	2.23	2.22	5.63
20	42.35	2.23	8.47	43.20	2.27	2.23	5.67
21	43.20	2.27	8.64	44.06	2.32	2.25	5.71
Daily group ration (g)		8.15		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	44.06	2.32	8.81	44.94	2.37	2.26	5.75
23	44.94	2.37	8.99	45.84	2.41	2.28	5.78
24	45.84	2.41	9.17	46.76	2.46	2.29	5.82
25	46.76	2.46	9.35	47.69	2.51	2.31	5.86
26	47.69	2.51	9.54	48.65	2.56	2.32	5.90
27	48.65	2.56	9.73	49.62	2.61	2.34	5.94
28	49.62	2.61	9.92	50.61	2.66	2.35	5.98
Daily group ration (g)		9.36		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	50.61	2.66	10.12	51.62	2.72	2.37	6.02
30	51.62	2.72	10.32	52.66	2.77	2.38	6.06
31	52.66	2.77	10.53	53.71	2.83	2.40	6.10
Daily group ration (g)		10.33		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.54		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① See page 1 for explanation of page change. KW 29MAR13

FF # 7
Item No. 19
Pg 3 of 3&4①

Study Number: AEH-12-PSEUDO-03 Reviewed by: YW Date: 19 MAR 2013
File Folder: 7 Lab book/pgs: 2, 13-19 Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D4
Treatment Group: 100 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW YW
Date Revised/in [illegible]
Approved for us [redacted] rector 7/2/2012 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.69
Number of fish	20
Condition Factor (C)	0.00045

(C = 0.00015 - 0.00050 in 0.00005 increments)

FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights;
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.60	1.63	6.52	33.25	1.66	2.01	5.11
2	33.25	1.66	6.65	33.92	1.70	2.02	5.14
3	33.92	1.70	6.78	34.60	1.73	2.04	5.18
4	34.60	1.73	6.92	35.29	1.76	2.05	5.21
5	35.29	1.76	7.06	35.99	1.80	2.07	5.25
6	35.99	1.80	7.20	36.71	1.84	2.08	5.28
7	36.71	1.84	7.34	37.45	1.87	2.09	5.32
Daily group ration (g)		6.92		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	37.45	1.87	7.49	38.20	1.91	2.11	5.35
9	38.20	1.91	7.64	38.96	1.95	2.12	5.38
10	38.96	1.95	7.79	39.74	1.99	2.13	5.42
11	39.74	1.99	7.95	40.53	2.03	2.15	5.46
12	40.53	2.03	8.11	41.34	2.07	2.16	5.49
13	41.34	2.07	8.27	42.17	2.11	2.18	5.53
14	42.17	2.11	8.43	43.02	2.15	2.19	5.57
Daily group ration (g)		7.95		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	43.02	2.15	8.60	43.88	2.19	2.21	5.60
16	43.88	2.19	8.78	44.75	2.24	2.22	5.64
17	44.75	2.24	8.95	45.65	2.28	2.24	5.68
18	45.65	2.28	9.13	46.56	2.33	2.25	5.72
19	46.56	2.33	9.31	47.49	2.37	2.27	5.75
20	47.49	2.37	9.50	48.44	2.42	2.28	5.79
21	48.44	2.42	9.69	49.41	2.47	2.30	5.83
Daily group ration (g)		9.14		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	49.41	2.47	9.88	50.40	2.52	2.31	5.87
23	50.40	2.52	10.08	51.41	2.57	2.33	5.91
24	51.41	2.57	10.28	52.44	2.62	2.34	5.95
25	52.44	2.62	10.49	53.49	2.67	2.36	5.99
26	53.48	2.67	10.70	54.55	2.73	2.37	6.03
27	54.55	2.73	10.91	55.64	2.78	2.39	6.07
28	55.64	2.78	11.13	56.76	2.84	2.40	6.11
Daily group ration (g)		10.50		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	56.76	2.84	11.35	57.89	2.89	2.42	6.15
30	57.89	2.89	11.58	59.05	2.95	2.44	6.19
31	59.05	2.95	11.81	60.23	3.01	2.45	6.23
Daily group ration (g)		11.58		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) See page 1 for explanation of page change. YW 20MAR13

FF # 7
Item No. 19
Pg 4 of 13 (1)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D5
Treatment Group: 200 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW KW
Date Revised/Initials:
Approved for use [redacted] 7/2/2012
Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.64
Number of fish	18
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	29.52	1.64	5.90	30.11	1.67	2.02	5.12
2	30.11	1.67	6.02	30.71	1.71	2.03	5.15
3	30.71	1.71	6.14	31.33	1.74	2.04	5.19
4	31.33	1.74	6.27	31.95	1.78	2.06	5.22
5	31.95	1.78	6.39	32.59	1.81	2.07	5.26
6	32.59	1.81	6.52	33.24	1.85	2.08	5.29
7	33.24	1.85	6.65	33.91	1.88	2.10	5.33
Daily group ration (g)		6.27		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	33.91	1.88	6.78	34.59	1.92	2.11	5.36
9	34.59	1.92	6.92	35.28	1.96	2.12	5.40
10	35.28	1.96	7.06	35.98	2.00	2.14	5.43
11	35.98	2.00	7.20	36.70	2.04	2.15	5.47
12	36.70	2.04	7.34	37.44	2.08	2.17	5.51
13	37.44	2.08	7.49	38.19	2.12	2.18	5.54
14	38.19	2.12	7.64	38.95	2.16	2.20	5.58
Daily group ration (g)		7.20		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	38.95	2.16	7.79	39.73	2.21	2.21	5.62
16	39.73	2.21	7.95	40.52	2.25	2.23	5.65
17	40.52	2.25	8.10	41.34	2.30	2.24	5.69
18	41.34	2.30	8.27	42.16	2.34	2.25	5.73
19	42.16	2.34	8.43	43.01	2.39	2.27	5.77
20	43.01	2.39	8.60	43.87	2.44	2.28	5.80
21	43.87	2.44	8.77	44.74	2.49	2.30	5.84
Daily group ration (g)		8.27		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	44.74	2.49	8.95	45.64	2.54	2.32	5.88
23	45.64	2.54	9.13	46.55	2.59	2.33	5.92
24	46.55	2.59	9.31	47.48	2.64	2.35	5.96
25	47.48	2.64	9.50	48.43	2.69	2.36	6.00
26	48.43	2.69	9.69	49.40	2.74	2.38	6.04
27	49.40	2.74	9.88	50.39	2.80	2.39	6.08
28	50.39	2.80	10.08	51.40	2.86	2.41	6.12
Daily group ration (g)		9.50		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	51.40	2.86	10.28	52.42	2.91	2.42	6.16
30	52.42	2.91	10.48	53.47	2.97	2.44	6.20
31	53.47	2.97	10.69	54.54	3.03	2.46	6.24
Daily group ration (g)		10.49		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① See page 1 for explanation of page change. KW 19MAR13

FF # 7
Item No. 19
Pg 5 of 35 ①

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 2 , 13-19

Reviewed by: KMW Date: 19 MAR 2013
Verified by: [initials] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__D__________
Holding Tank/Chamber:__D6______
Treatment Group:____0 mg/L___________
Species:_SMB__________Lot: _112400_____

Date Created/Initials: 6/21/2012 KLW KMW
Date Revised/Initi[redacted]
Approved for use:[redacted] **_7/2/2012_**
Date

Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	1.53
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (Inches) =((H33/454)/$E$22)^0 333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	30.60	1.53	6.12	31.21	1.56	1.97	5.00
2	31.21	1.56	6.24	31.84	1.59	1.98	5.04
3	31.84	1.59	6.37	32.47	1.62	2.00	5.07
4	32.47	1.62	6.49	33.12	1.66	2.01	5.10
5	33.12	1.66	6.62	33.78	1.69	2.02	5.14
6	33.78	1.69	6.76	34.46	1.72	2.04	5.17
7	34.46	1.72	6.89	35.15	1.76	2.05	5.20

Daily group ration (g) **6.50** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.32** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
8	35.15	1.76	7.03	35.85	1.79	2.06	5.24
9	35.85	1.79	7.17	36.57	1.83	2.08	5.27
10	36.57	1.83	7.31	37.30	1.87	2.09	5.31
11	37.30	1.87	7.46	38.05	1.90	2.10	5.34
12	38.05	1.90	7.61	38.81	1.94	2.12	5.38
13	38.81	1.94	7.76	39.58	1.98	2.13	5.41
14	39.58	1.98	7.92	40.38	2.02	2.15	5.45

Daily group ration (g) **7.47** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.37** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
15	40.38	2.02	8.08	41.18	2.06	2.16	5.49
16	41.18	2.06	8.24	42.01	2.10	2.17	5.52
17	42.01	2.10	8.40	42.85	2.14	2.19	5.56
18	42.85	2.14	8.57	43.70	2.19	2.20	5.60
19	43.70	2.19	8.74	44.58	2.23	2.22	5.63
20	44.58	2.23	8.92	45.47	2.27	2.23	5.67
21	45.47	2.27	9.09	46.38	2.32	2.25	5.71

Daily group ration (g) **8.58** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.43** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
22	46.38	2.32	9.28	47.31	2.37	2.26	5.75
23	47.31	2.37	9.46	48.25	2.41	2.28	5.78
24	48.25	2.41	9.65	49.22	2.46	2.29	5.82
25	49.22	2.46	9.84	50.20	2.51	2.31	5.86
26	50.20	2.51	10.04	51.21	2.56	2.32	5.90
27	51.21	2.56	10.24	52.23	2.61	2.34	5.94
28	52.23	2.61	10.45	53.28	2.66	2.35	5.98

Daily group ration (g) **9.85** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.49** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
29	53.28	2.66	10.65	54.34	2.72	2.37	6.02
30	54.34	2.72	10.87	55.43	2.77	2.38	6.06
31	55.43	2.77	11.09	56.54	2.83	2.40	6.10

Daily group ration (g) **10.87** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.54** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

(1) See page 1 for explanation of page change. KMW 29MAR13

FF # 7
Item No. 19
Pg 6 of 574 (1)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: [redacted] Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D7
Treatment Group: 0 mg/L
Species: SMB Lot: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Ini [redacted]
Approved for use [redacted] irector 7/2/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.57							
21	Number of fish	20							
22	Condition Factor (C)	0.00045							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	20							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	31.40	1.57	6.28	32.03	1.60	1.99	5.05
2	32.03	1.60	6.41	32.67	1.63	2.00	5.08
3	32.67	1.63	6.53	33.32	1.67	2.01	5.11
4	33.32	1.67	6.66	33.99	1.70	2.03	5.15
5	33.99	1.70	6.80	34.67	1.73	2.04	5.18
6	34.67	1.73	6.93	35.36	1.77	2.05	5.21
7	35.36	1.77	7.07	36.07	1.80	2.07	5.25
Daily group ration (g)		6.67		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.07	1.80	7.21	36.79	1.84	2.08	5.28
9	36.79	1.84	7.36	37.53	1.88	2.09	5.32
10	37.53	1.88	7.51	38.28	1.91	2.11	5.35
11	38.28	1.91	7.66	39.04	1.95	2.12	5.39
12	39.04	1.95	7.81	39.82	1.99	2.14	5.43
13	39.82	1.99	7.96	40.62	2.03	2.15	5.46
14	40.62	2.03	8.12	41.43	2.07	2.16	5.50
Daily group ration (g)		7.66		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.43	2.07	8.29	42.26	2.11	2.18	5.53
16	42.26	2.11	8.45	43.11	2.16	2.19	5.57
17	43.11	2.16	8.62	43.97	2.20	2.21	5.61
18	43.97	2.20	8.79	44.85	2.24	2.22	5.64
19	44.85	2.24	8.97	45.74	2.29	2.24	5.68
20	45.74	2.29	9.15	46.66	2.33	2.25	5.72
21	46.66	2.33	9.33	47.59	2.38	2.27	5.76
Daily group ration (g)		8.80		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	47.59	2.38	9.52	48.54	2.43	2.28	5.80
23	48.54	2.43	9.71	49.51	2.48	2.30	5.83
24	49.51	2.48	9.90	50.50	2.53	2.31	5.87
25	50.50	2.53	10.10	51.52	2.58	2.33	5.91
26	51.52	2.58	10.30	52.55	2.63	2.34	5.95
27	52.55	2.63	10.51	53.60	2.68	2.36	5.99
28	53.60	2.68	10.72	54.67	2.73	2.37	6.03
Daily group ration (g)		10.11		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	54.67	2.73	10.93	55.76	2.79	2.39	6.07
30	55.76	2.79	11.15	56.88	2.84	2.41	6.11
31	56.88	2.84	11.38	58.01	2.90	2.42	6.15
Daily group ration (g)		11.15		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① See page 1 for explanation of page change. KLW 20MAR13

FF # 7
Item No. 19
Pg 7 of 35 ①

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 18MAR2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual food rate.
Condition Factor C = if available, value obtained from Length /weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D8
Treatment Group: 50 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Init [redacted]
Approved for use [redacted] **irector** 7/2/2012 **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.54							
21	Number of fish	20							
22	Condition Factor (C)	0.00045							
23	(C = 0.00015 - 0.00050 in 0.00005 Increments)								
24									
25	FCR	10							
26	% B.W./d	20							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	30.80	1.54	6.16	31.42	1.57	1.97	5.01
2	31.42	1.57	6.28	32.04	1.60	1.99	5.05
3	32.04	1.60	6.41	32.69	1.63	2.00	5.08
4	32.69	1.63	6.54	33.34	1.67	2.01	5.11
5	33.34	1.67	6.67	34.01	1.70	2.03	5.15
6	34.01	1.70	6.80	34.69	1.73	2.04	5.18
7	34.69	1.73	6.94	35.38	1.77	2.05	5.22
Daily group ration (g)		6.54		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	35.38	1.77	7.08	36.09	1.80	2.07	5.25
9	36.09	1.80	7.22	36.81	1.84	2.08	5.29
10	36.81	1.84	7.36	37.55	1.88	2.09	5.32
11	37.55	1.88	7.51	38.30	1.91	2.11	5.36
12	38.30	1.91	7.66	39.06	1.95	2.12	5.39
13	39.06	1.95	7.81	39.84	1.99	2.14	5.43
14	39.84	1.99	7.97	40.64	2.03	2.15	5.46
Daily group ration (g)		7.51		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	40.64	2.03	8.13	41.45	2.07	2.16	5.50
16	41.45	2.07	8.29	42.28	2.11	2.18	5.54
17	42.28	2.11	8.46	43.13	2.16	2.19	5.57
18	43.13	2.16	8.63	43.99	2.20	2.21	5.61
19	43.99	2.20	8.80	44.87	2.24	2.22	5.65
20	44.87	2.24	8.97	45.77	2.29	2.24	5.68
21	45.77	2.29	9.15	46.68	2.33	2.25	5.72
Daily group ration (g)		8.63		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	46.68	2.33	9.34	47.62	2.38	2.27	5.76
23	47.62	2.38	9.52	48.57	2.43	2.28	5.80
24	48.57	2.43	9.71	49.54	2.48	2.30	5.84
25	49.54	2.48	9.91	50.53	2.53	2.31	5.87
26	50.53	2.53	10.11	51.54	2.58	2.33	5.91
27	51.54	2.58	10.31	52.57	2.63	2.34	5.95
28	52.57	2.63	10.51	53.62	2.68	2.36	5.99
Daily group ration (g)		9.92		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	53.62	2.68	10.72	54.70	2.73	2.37	6.03
30	54.70	2.73	10.94	55.79	2.79	2.39	6.07
31	55.79	2.79	11.16	56.91	2.85	2.41	6.11
Daily group ration (g)		10.94		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) See page 1 for explanation of page change. KLW 29MAR13

FF # 7
Item No. 19
Pg 8 of 15 1/2 (1)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 4MAR2013
File Folder: 1 Lab book/pgs: 2, 13-19 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D9
Treatment Group: 300 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Init [redacted]
Approved for use [redacted] rector 7/2/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.86							
21	Number of fish	4							
22	Condition Factor (C)	0.00045							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	20							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	7.44	1.86	1.49	7.59	1.90	2.10	5.34
2	7.59	1.90	1.52	7.74	1.94	2.12	5.37
3	7.74	1.94	1.55	7.90	1.97	2.13	5.41
4	7.90	1.97	1.58	8.05	2.01	2.14	5.45
5	8.05	2.01	1.61	8.21	2.05	2.16	5.48
6	8.21	2.05	1.64	8.38	2.09	2.17	5.52
7	8.38	2.09	1.68	8.55	2.14	2.19	5.55
Daily group ration (g)		1.58		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	8.55	2.14	1.71	8.72	2.18	2.20	5.59
9	8.72	2.18	1.74	8.89	2.22	2.22	5.63
10	8.89	2.22	1.78	9.07	2.27	2.23	5.67
11	9.07	2.27	1.81	9.25	2.31	2.25	5.70
12	9.25	2.31	1.85	9.44	2.36	2.26	5.74
13	9.44	2.36	1.89	9.62	2.41	2.28	5.78
14	9.62	2.41	1.92	9.82	2.45	2.29	5.82
Daily group ration (g)		1.82		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	9.82	2.45	1.96	10.01	2.50	2.31	5.86
16	10.01	2.50	2.00	10.21	2.55	2.32	5.89
17	10.21	2.55	2.04	10.42	2.60	2.34	5.93
18	10.42	2.60	2.08	10.63	2.66	2.35	5.97
19	10.63	2.66	2.13	10.84	2.71	2.37	6.01
20	10.84	2.71	2.17	11.06	2.76	2.38	6.05
21	11.06	2.76	2.21	11.28	2.82	2.40	6.09
Daily group ration (g)		2.09		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	11.28	2.82	2.26	11.50	2.88	2.41	6.13
23	11.50	2.88	2.30	11.73	2.93	2.43	6.17
24	11.73	2.93	2.35	11.97	2.99	2.45	6.21
25	11.97	2.99	2.39	12.21	3.05	2.46	6.26
26	12.21	3.05	2.44	12.45	3.11	2.48	6.30
27	12.45	3.11	2.49	12.70	3.17	2.50	6.34
28	12.70	3.17	2.54	12.95	3.24	2.52	6.38
Daily group ration (g)		2.40		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.60		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	12.95	3.24	2.59	13.21	3.30	2.53	6.42
30	13.21	3.30	2.64	13.48	3.37	2.55	6.47
31	13.48	3.37	2.70	13.75	3.44	2.56	6.51
Daily group ration (g)		2.64		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.66		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(D See page 1 for explanation of page change. KLW 2MAR13

FF # 7
Item No. 19
Pg 9 of 15 (D)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 11/14/2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: SA Date 11-4-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D11
Treatment Group: 100 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Initi [redacted]
Approved for use: [redacted] 7/2/2012
Study Director Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.63
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	30.97	1.63	6.19	31.59	1.66	2.01	5.11
2	31.59	1.66	6.32	32.22	1.70	2.02	5.14
3	32.22	1.70	6.44	32.87	1.73	2.04	5.18
4	32.87	1.73	6.57	33.52	1.76	2.05	5.21
5	33.52	1.76	6.70	34.19	1.80	2.07	5.25
6	34.19	1.80	6.84	34.88	1.84	2.08	5.28
7	34.88	1.84	6.98	35.57	1.87	2.09	5.32
Daily group ration (g)		6.58		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	35.57	1.87	7.11	36.29	1.91	2.11	5.35
9	36.29	1.91	7.26	37.01	1.95	2.12	5.39
10	37.01	1.95	7.40	37.75	1.99	2.13	5.42
11	37.75	1.99	7.55	38.51	2.03	2.15	5.46
12	38.51	2.03	7.70	39.28	2.07	2.16	5.49
13	39.28	2.07	7.86	40.06	2.11	2.18	5.53
14	40.06	2.11	8.01	40.86	2.15	2.19	5.57
Daily group ration (g)		7.56		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	40.86	2.15	8.17	41.68	2.19	2.21	5.60
16	41.68	2.19	8.34	42.52	2.24	2.22	5.64
17	42.52	2.24	8.50	43.37	2.28	2.24	5.68
18	43.37	2.28	8.67	44.23	2.33	2.25	5.72
19	44.23	2.33	8.85	45.12	2.37	2.27	5.75
20	45.12	2.37	9.02	46.02	2.42	2.28	5.79
21	46.02	2.42	9.20	46.94	2.47	2.30	5.83
Daily group ration (g)		8.68		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	46.94	2.47	9.39	47.88	2.52	2.31	5.87
23	47.88	2.52	9.58	48.84	2.57	2.33	5.91
24	48.84	2.57	9.77	49.81	2.62	2.34	5.95
25	49.81	2.62	9.96	50.81	2.67	2.36	5.99
26	50.81	2.67	10.16	51.83	2.73	2.37	6.03
27	51.83	2.73	10.37	52.86	2.78	2.39	6.07
28	52.86	2.78	10.57	53.92	2.84	2.40	6.11
Daily group ration (g)		9.97		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	53.92	2.84	10.78	55.00	2.89	2.42	6.15
30	55.00	2.89	11.00	56.10	2.95	2.44	6.19
31	56.10	2.95	11.22	57.22	3.01	2.45	6.23
Daily group ration (g)		11.00		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) See page 1 for explanation of page change. KLW 29MAR13

FF # 7
Item No. 19
Pg 10 of 15/4(1)

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 4MAR2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: SA Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and %B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D12
Treatment Group: 200 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Initia [redacted]
Approved for use: [redacted] 7/2/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.81						
21	Number of fish		10						
22	Condition Factor (C)		0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		20						
27									

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33>(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	18.10	1.81	3.62	18.46	1.85	2.08	5.29
34	2	18.46	1.85	3.69	18.83	1.88	2.10	5.33
35	3	18.83	1.88	3.77	19.21	1.92	2.11	5.36
36	4	19.21	1.92	3.84	19.59	1.96	2.12	5.40
37	5	19.59	1.96	3.92	19.98	2.00	2.14	5.43
38	6	19.98	2.00	4.00	20.38	2.04	2.15	5.47
39	7	20.38	2.04	4.08	20.79	2.08	2.17	5.50
40								
41	Daily group ration (g)		3.84		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	20.79	2.08	4.16	21.21	2.12	2.18	5.54
45	9	21.21	2.12	4.24	21.63	2.16	2.20	5.58
46	10	21.63	2.16	4.33	22.06	2.21	2.21	5.61
47	11	22.06	2.21	4.41	22.51	2.25	2.23	5.65
48	12	22.51	2.25	4.50	22.96	2.30	2.24	5.69
49	13	22.96	2.30	4.59	23.41	2.34	2.25	5.73
50	14	23.41	2.34	4.68	23.88	2.39	2.27	5.76
51								
52	Daily group ration (g)		4.42		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	23.88	2.39	4.78	24.36	2.44	2.28	5.80
56	16	24.36	2.44	4.87	24.85	2.48	2.30	5.84
57	17	24.85	2.48	4.97	25.34	2.53	2.31	5.88
58	18	25.34	2.53	5.07	25.85	2.59	2.33	5.92
59	19	25.85	2.59	5.17	26.37	2.64	2.35	5.96
60	20	26.37	2.64	5.27	26.90	2.69	2.36	6.00
61	21	26.90	2.69	5.38	27.43	2.74	2.38	6.04
62								
63	Daily group ration (g)		5.07		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	27.43	2.74	5.49	27.98	2.80	2.39	6.08
67	23	27.98	2.80	5.60	28.54	2.85	2.41	6.12
68	24	28.54	2.85	5.71	29.11	2.91	2.42	6.16
69	25	29.11	2.91	5.82	29.69	2.97	2.44	6.20
70	26	29.69	2.97	5.94	30.29	3.03	2.46	6.24
71	27	30.29	3.03	6.06	30.88	3.09	2.47	6.28
72	28	30.89	3.09	6.18	31.51	3.15	2.49	6.32
73								
74	Daily group ration (g)		5.89		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	31.51	3.15	6.30	32.14	3.21	2.51	6.36
78	30	32.14	3.21	6.43	32.79	3.28	2.52	6.41
79	31	32.79	3.28	6.56	33.44	3.34	2.54	6.45
80								
81	Daily group ration (g)		6.43		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.64		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① See page 1 for explanation of page change. KLW 2/14-02-13

FF # 7
Item No. 19
Pg 11 of ~~15~~ 14 ①

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 14MAR2013
File Folder: 7 Lab book/pgs: 2, 13-19 Verified by: SAC Date: 4-6-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D13
Treatment Group: 300 mg/L
Species: SMB **Lot**: 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Init: [redacted]
Approved for use: [redacted] 7/2/2012
Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.55
Number of fish	8
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	12.40	1.55	2.48	12.65	1.58	1.98	5.02
2	12.65	1.58	2.53	12.90	1.61	1.99	5.06
3	12.90	1.61	2.58	13.16	1.64	2.00	5.09
4	13.16	1.64	2.63	13.42	1.68	2.02	5.12
5	13.42	1.68	2.68	13.69	1.71	2.03	5.16
6	13.69	1.71	2.74	13.96	1.75	2.04	5.19
7	13.96	1.75	2.79	14.24	1.78	2.06	5.23
Daily group ration (g)		2.63		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	14.24	1.78	2.85	14.53	1.82	2.07	5.26
9	14.53	1.82	2.91	14.82	1.85	2.09	5.30
10	14.82	1.85	2.96	15.12	1.89	2.10	5.33
11	15.12	1.89	3.02	15.42	1.93	2.11	5.37
12	15.42	1.93	3.08	15.73	1.97	2.13	5.40
13	15.73	1.97	3.15	16.04	2.01	2.14	5.44
14	16.04	2.01	3.21	16.36	2.05	2.16	5.47
Daily group ration (g)		3.03		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	16.36	2.05	3.27	16.69	2.09	2.17	5.51
16	16.69	2.09	3.34	17.02	2.13	2.18	5.55
17	17.02	2.13	3.40	17.36	2.17	2.20	5.58
18	17.36	2.17	3.47	17.71	2.21	2.21	5.62
19	17.71	2.21	3.54	18.06	2.26	2.23	5.66
20	18.06	2.26	3.61	18.43	2.30	2.24	5.70
21	18.43	2.30	3.69	18.79	2.35	2.26	5.73
Daily group ration (g)		3.48		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	18.79	2.35	3.76	19.17	2.40	2.27	5.77
23	19.17	2.40	3.83	19.55	2.44	2.29	5.81
24	19.55	2.44	3.91	19.94	2.49	2.30	5.85
25	19.94	2.49	3.99	20.34	2.54	2.32	5.89
26	20.34	2.54	4.07	20.75	2.59	2.33	5.93
27	20.75	2.59	4.15	21.17	2.65	2.35	5.95
28	21.17	2.65	4.23	21.59	2.70	2.36	6.00
Daily group ration (g)		3.99		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	21.59	2.70	4.32	22.02	2.75	2.38	6.04
30	22.02	2.75	4.40	22.46	2.81	2.40	6.08
31	22.46	2.81	4.49	22.91	2.86	2.41	6.12
Daily group ration (g)		4.40		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 19
Pg 12 of 14

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 2, 13-19

Reviewed by: KLW Date: 19 MAR 2013
Verified by: [redacted] Date: 4-5-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: D
Holding Tank/Chamber: D14
Treatment Group: 300 mg/L
Species: SMB **Lot:** 112400

Date Created/Initials: 6/21/2012 KLW
Date Revised/Init: [redacted]
Approved for use: [redacted] tor 7/2/2012 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.72
Number of fish	2
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	3.44	1.72	0.69	3.51	1.75	2.05	5.20
2	3.51	1.75	0.70	3.58	1.79	2.06	5.24
3	3.58	1.79	0.72	3.65	1.83	2.08	5.27
4	3.65	1.83	0.73	3.72	1.86	2.09	5.31
5	3.72	1.86	0.74	3.80	1.90	2.10	5.34
6	3.80	1.90	0.76	3.87	1.94	2.12	5.38
7	3.87	1.94	0.77	3.95	1.98	2.13	5.41
Daily group ration (g)		0.73		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	3.95	1.98	0.79	4.03	2.02	2.14	5.45
9	4.03	2.02	0.81	4.11	2.06	2.16	5.48
10	4.11	2.06	0.82	4.19	2.10	2.17	5.52
11	4.19	2.10	0.84	4.28	2.14	2.19	5.56
12	4.28	2.14	0.86	4.36	2.18	2.20	5.59
13	4.36	2.18	0.87	4.45	2.23	2.22	5.63
14	4.45	2.23	0.89	4.54	2.27	2.23	5.67
Daily group ration (g)		0.84		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	4.54	2.27	0.91	4.63	2.31	2.25	5.70
16	4.63	2.31	0.93	4.72	2.36	2.26	5.74
17	4.72	2.36	0.94	4.82	2.41	2.28	5.78
18	4.82	2.41	0.96	4.91	2.46	2.29	5.82
19	4.91	2.46	0.98	5.01	2.51	2.31	5.86
20	5.01	2.51	1.00	5.11	2.56	2.32	5.90
21	5.11	2.56	1.02	5.21	2.61	2.34	5.94
Daily group ration (g)		0.96		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	5.21	2.61	1.04	5.32	2.66	2.35	5.97
23	5.32	2.66	1.06	5.42	2.71	2.37	6.01
24	5.42	2.71	1.08	5.53	2.77	2.38	6.05
25	5.53	2.77	1.11	5.64	2.82	2.40	6.09
26	5.64	2.82	1.13	5.76	2.88	2.42	6.13
27	5.76	2.88	1.15	5.87	2.94	2.43	6.18
28	5.87	2.94	1.17	5.99	2.99	2.45	6.22
Daily group ration (g)		1.11		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	5.99	2.99	1.20	6.11	3.05	2.46	6.26
30	6.11	3.05	1.22	6.23	3.12	2.48	6.30
31	6.23	3.12	1.25	6.36	3.18	2.50	6.34
Daily group ration (g)		1.22		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.61		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 19
Pg 13 of 14

Study Number: AEH-12-PSEUDO-03 Reviewed by: VW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 13-19 Verified by: [illegible] Date [illegible]

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed week y average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System D
Holding Tank/Chamber: D15
Treatment Group: 0 mg/L
Species: SMB Lot: 112400

Date Created/[illegible] VW
Date Revised/[illegible]
Approved for [illegible] or 7/2/2012 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.7							
21	Number of fish	20							
22	Condition Factor (C)	0.00945							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	20							
27									

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($O$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	34.00	1.70	6.80	34.68	1.73	2.04	5.18
2	34.68	1.73	6.94	35.37	1.77	2.05	5.22
3	35.37	1.77	7.07	36.08	1.80	2.07	5.25
4	36.08	1.80	7.22	36.80	1.84	2.08	5.28
5	36.80	1.84	7.36	37.54	1.88	2.09	5.32
6	37.54	1.88	7.51	38.29	1.91	2.11	5.36
7	38.29	1.91	7.66	39.06	1.95	2.12	5.39
Daily group ration (g)		7.22		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	39.06	1.95	7.81	39.84	1.99	2.14	5.43
9	39.84	1.99	7.97	40.63	2.03	2.15	5.46
10	40.63	2.03	8.13	41.45	2.07	2.16	5.50
11	41.45	2.07	8.29	42.27	2.11	2.18	5.53
12	42.27	2.11	8.45	43.12	2.16	2.19	5.57
13	43.12	2.16	8.62	43.98	2.20	2.21	5.61
14	43.98	2.20	8.80	44.86	2.24	2.22	5.65
Daily group ration (g)		8.30		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	44.86	2.24	8.97	45.76	2.29	2.24	5.68
16	45.76	2.29	9.15	46.67	2.33	2.25	5.72
17	46.67	2.33	9.33	47.61	2.38	2.27	5.76
18	47.61	2.38	9.52	48.56	2.43	2.28	5.80
19	48.56	2.43	9.71	49.53	2.48	2.30	5.83
20	49.53	2.48	9.91	50.52	2.53	2.31	5.87
21	50.52	2.53	10.10	51.53	2.58	2.33	5.91
Daily group ration (g)		9.53		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.53	2.58	10.31	52.56	2.63	2.34	5.95
23	52.56	2.63	10.51	53.61	2.68	2.36	5.99
24	53.61	2.68	10.72	54.69	2.73	2.37	6.03
25	54.69	2.73	10.94	55.78	2.79	2.39	6.07
26	55.78	2.79	11.16	56.90	2.84	2.41	6.11
27	56.90	2.84	11.38	58.03	2.90	2.42	6.15
28	58.03	2.90	11.61	59.19	2.96	2.44	6.19
Daily group ration (g)		10.95		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	59.19	2.96	11.84	60.38	3.02	2.45	6.23
30	60.38	3.02	12.08	61.59	3.08	2.47	6.27
31	61.59	3.08	12.32	62.82	3.14	2.49	6.32
Daily group ration (g)		12.08		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.60		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Form No. 19
Page 14 of 14

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 1/14/13
File Folder: 7 Lab book/pgs: 2, 19-22 Verified by: JW Date: 1-8-13
Should be p. 22. KW 2/8/13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:** 7-12-12 JW
Holding Tank/Chamber:___E-1 (from A2)_____ **Date Revised/initial:** [redacted]
Treatment Group:____100_____ **Approved for use:** [redacted] 7/12/12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial Fish size (g)	1.69						
21	Number of fish	20						
22	Condition Factor (C)	0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 Increments)							
24								
25	FCR	10						
26	% B.W./d	15						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = i33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	32.60	1.63	4.89	33.09	1.65	2.01	5.10
34	2	33.09	1.65	4.96	33.59	1.68	2.02	5.13
35	3	33.59	1.68	5.04	34.09	1.70	2.03	5.15
36	4	34.09	1.70	5.11	34.60	1.73	2.04	5.18
37	5	34.60	1.73	5.19	35.12	1.76	2.05	5.20
38	6	35.12	1.76	5.27	35.65	1.78	2.06	5.23
39	7	35.65	1.78	5.35	36.18	1.81	2.07	5.25
40								
41	Daily group ration (g)		5.12		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	36.18	1.81	5.43	36.72	1.84	2.08	5.28
45	9	36.72	1.84	5.51	37.27	1.86	2.09	5.31
46	10	37.27	1.86	5.59	37.83	1.89	2.10	5.33
47	11	37.83	1.89	5.68	38.40	1.92	2.11	5.36
48	12	38.40	1.92	5.76	38.98	1.95	2.12	5.39
49	13	38.98	1.95	5.85	39.56	1.98	2.13	5.41
50	14	39.56	1.98	5.93	40.16	2.01	2.14	5.44
51								
52	Daily group ration (g)		5.68		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	40.16	2.01	6.02	40.76	2.04	2.15	5.47
56	16	40.76	2.04	6.11	41.37	2.07	2.16	5.49
57	17	41.37	2.07	6.21	41.98	2.10	2.17	5.52
58	18	41.98	2.10	6.30	42.62	2.13	2.18	5.55
59	19	42.62	2.13	6.39	43.26	2.16	2.20	5.58
60	20	43.26	2.16	6.49	43.91	2.20	2.21	5.61
61	21	43.91	2.20	6.59	44.57	2.23	2.22	5.63
62								
63	Daily group ration (g)		6.30		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	44.57	2.23	6.68	45.22	2.26	2.23	5.66
67	23	45.23	2.26	6.79	45.91	2.30	2.24	5.69
68	24	45.91	2.30	6.89	46.60	2.33	2.25	5.72
69	25	46.60	2.33	6.99	47.30	2.37	2.26	5.75
70	26	47.30	2.37	7.10	48.01	2.40	2.27	5.77
71	27	48.01	2.40	7.20	48.73	2.44	2.28	5.80
72	28	48.73	2.44	7.31	49.46	2.47	2.30	5.83
73								
74	Daily group ration (g)		6.99		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	49.46	2.47	7.42	50.20	2.51	2.31	5.86
78	30	50.20	2.51	7.53	50.96	2.55	2.32	5.89
79	31	50.96	2.55	7.64	51.72	2.59	2.33	5.92
80								
81	Daily group ration (g)		7.53		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased on 7/20/12 these rates are no longer to be used
7/20/12
JW

FF # 7
Item No. 20
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: VMW Date: 19MAR13
File Folder 7 Lab book/pgs 2 / ~~19-27~~ Should be p. 22 VW 28FEB13 Verified by: JN Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials: 7-12-12 JN**
Holding Tank/Chamber:___E-2 (from A3)_____ **Date Revised/Initial** [redacted]
Treatment Group:____300__________ **Approved for use:_** 7/12/12
Species:_BLG__________Lot: _114500_____ **Date**

Row Column: c d e f g h i j

Row	INPUT SECTION	
19	**INPUT SECTION**	
20	Initial fish size (g)	1.72
21	Number of fish	20
22	Condition Factor (C)	0.00045
23	(C = 0.00015 - 0.00050 in 0.00005 increments)	
24		
25	FCR	10
26	% B.W./d	15

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	34.40	1.72	5.16	34.92	1.75	2.04	5.19
34	2	34.92	1.75	5.24	35.44	1.77	2.05	5.22
35	3	35.44	1.77	5.32	35.97	1.80	2.06	5.24
36	4	35.97	1.80	5.40	36.51	1.83	2.08	5.27
37	5	36.51	1.83	5.48	37.06	1.85	2.09	5.30
38	6	37.06	1.85	5.56	37.61	1.88	2.10	5.32
39	7	37.61	1.88	5.64	38.18	1.91	2.11	5.35
40								
41	Daily group ration (g)		**5.40**		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		**0.27**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	38.18	1.91	5.73	38.75	1.94	2.12	5.38
45	9	38.75	1.94	5.81	39.33	1.97	2.13	5.40
46	10	39.33	1.97	5.90	39.92	2.00	2.14	5.43
47	11	39.92	2.00	5.99	40.52	2.03	2.15	5.46
48	12	40.52	2.03	6.08	41.13	2.06	2.16	5.48
49	13	41.13	2.06	6.17	41.75	2.09	2.17	5.51
50	14	41.75	2.09	6.26	42.37	2.12	2.18	5.54
51								
52	Daily group ration (g)		**5.99**		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		**0.30**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	42.37	2.12	6.36	43.01	2.15	2.19	5.57
56	16	43.01	2.15	6.45	43.65	2.18	2.20	5.59
57	17	43.65	2.18	6.55	44.31	2.22	2.21	5.62
58	18	44.31	2.22	6.65	44.97	2.25	2.22	5.65
59	19	44.97	2.25	6.75	45.65	2.28	2.24	5.68
50	20	45.65	2.28	6.85	46.33	2.32	2.25	5.71
61	21	46.33	2.32	6.95	47.03	2.35	2.26	5.73
62								
63	Daily group ration (g)		**6.65**		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		**0.33**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	47.03	2.35	7.05	47.73	2.39	2.27	5.76
67	23	47.73	2.39	7.16	48.45	2.42	2.28	5.79
68	24	48.45	2.42	7.27	49.17	2.46	2.29	5.82
69	25	49.17	2.46	7.38	49.91	2.50	2.30	5.85
70	26	49.91	2.50	7.49	50.66	2.53	2.31	5.88
71	27	50.66	2.53	7.60	51.42	2.57	2.33	5.91
72	28	51.42	2.57	7.71	52.19	2.61	2.34	5.94
73								
74	Daily group ration (g)		**7.38**		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		**0.37**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	52.19	2.61	7.83	52.98	2.65	2.35	5.97
78	30	52.98	2.65	7.95	53.77	2.69	2.36	6.00
79	31	53.77	2.69	8.07	54.58	2.73	2.37	6.03
80								
81	Daily group ration (g)		**7.95**		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		**0.40**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased 7/20/12
This Form no longer to be used
7/20/12
JN

FF # 7
Item No. 20
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR13
File Folder 7 Lab book/pgs 2, 19-27 Verified by: JM Date 4-8-13
Sharib & p. 22. KW 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length-/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, Use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 JM
Holding Tank/Chamber: E-3 (from C3) **Date Revised/initi** [redacted]
Treatment Group: 300 **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 **Date**

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.76
Number of fish	19
Condition Factor (C)	0.00945
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial Fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D39/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D38*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D38+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G38/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	33.44	1.76	5.02	33.94	1.79	2.06	5.23
2	33.94	1.79	5.09	34.45	1.81	2.07	5.26
3	34.45	1.81	5.17	34.97	1.84	2.08	5.29
4	34.97	1.84	5.25	35.49	1.87	2.09	5.31
5	35.49	1.87	5.32	36.02	1.90	2.10	5.34
6	36.02	1.90	5.40	36.56	1.92	2.11	5.36
7	36.56	1.92	5.48	37.11	1.95	2.12	5.38
Daily group ration (g)		5.25		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	37.11	1.95	5.57	37.67	1.98	2.13	5.42
9	37.67	1.98	5.65	38.23	2.01	2.14	5.44
10	38.23	2.01	5.74	38.81	2.04	2.15	5.47
11	38.81	2.04	5.82	39.39	2.07	2.16	5.50
12	39.39	2.07	5.91	39.98	2.10	2.18	5.53
13	39.98	2.10	6.00	40.58	2.14	2.19	5.55
14	40.58	2.14	6.09	41.19	2.17	2.20	5.58
Daily group ration (g)		5.82		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.19	2.17	6.18	41.81	2.20	2.21	5.61
16	41.81	2.20	6.27	42.43	2.23	2.22	5.64
17	42.43	2.23	6.37	43.07	2.27	2.23	5.67
18	43.07	2.27	6.46	43.72	2.30	2.24	5.69
19	43.72	2.30	6.56	44.37	2.34	2.25	5.72
20	44.37	2.34	6.66	45.04	2.37	2.26	5.75
21	45.04	2.37	6.76	45.71	2.41	2.28	5.78
Daily group ration (g)		6.46		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	45.71	2.41	6.86	46.40	2.44	2.29	5.81
23	46.40	2.44	6.96	47.10	2.48	2.30	5.84
24	47.10	2.48	7.06	47.80	2.52	2.31	5.87
25	47.80	2.52	7.17	48.52	2.55	2.32	5.89
26	48.52	2.55	7.28	49.25	2.59	2.33	5.92
27	49.25	2.59	7.39	49.99	2.63	2.34	5.95
28	49.99	2.63	7.50	50.74	2.67	2.36	5.98
Daily group ration (g)		7.17		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	50.74	2.67	7.61	51.50	2.71	2.37	6.01
30	51.50	2.71	7.72	52.27	2.75	2.38	6.04
31	52.27	2.75	7.84	53.05	2.79	2.39	6.07
Daily group ration (g)		7.73		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and Form revised this Form no longer to be used
7/20/12
JM

FF # 7
Item No. 20
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 8/MAR13
File Folder 7 Lab book/pgs 2, 19-27 Verified by: JN Date 4-8-13
Should be p. 22. KW 3/8/13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length-/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 JN
Holding Tank/Chamber: E-4 (from C4) **Date Revised/Initials:**
Treatment Group: 100 **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.86						
21	Number of fish		20						
22	Condition Factor (C)		0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		15						

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($U$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	37.20	1.86	5.58	37.76	1.89	2.10	5.33
2	37.76	1.89	5.66	38.32	1.92	2.11	5.36
3	38.32	1.92	5.75	38.90	1.94	2.12	5.38
4	38.90	1.94	5.83	39.48	1.97	2.13	5.41
5	39.48	1.97	5.92	40.07	2.00	2.14	5.44
6	40.07	2.00	6.01	40.68	2.03	2.15	5.46
7	40.68	2.03	6.10	41.29	2.06	2.16	5.49
Daily group ration (g)			5.84	←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)			0.29	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	41.29	2.06	6.19	41.91	2.10	2.17	5.52
9	41.91	2.10	6.29	42.53	2.13	2.18	5.55
10	42.53	2.13	6.38	43.17	2.16	2.19	5.57
11	43.17	2.16	6.48	43.82	2.19	2.21	5.60
12	43.82	2.19	6.57	44.48	2.22	2.22	5.63
13	44.48	2.22	6.67	45.14	2.26	2.23	5.66
14	45.14	2.26	6.77	45.82	2.29	2.24	5.69
Daily group ration (g)			6.48	←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)			0.32	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	45.82	2.29	6.87	46.51	2.33	2.25	5.71
16	46.51	2.33	6.98	47.21	2.36	2.26	5.74
17	47.21	2.36	7.08	47.91	2.40	2.27	5.77
18	47.91	2.40	7.19	48.63	2.43	2.28	5.80
19	48.63	2.43	7.29	49.36	2.47	2.29	5.83
20	49.36	2.47	7.40	50.10	2.51	2.31	5.86
21	50.10	2.51	7.52	50.85	2.54	2.32	5.89
Daily group ration (g)			7.19	←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)			0.36	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	50.85	2.54	7.63	51.62	2.58	2.33	5.92
23	51.62	2.58	7.74	52.39	2.62	2.34	5.95
24	52.39	2.62	7.86	53.18	2.66	2.35	5.97
25	53.18	2.66	7.98	53.98	2.70	2.36	6.00
26	53.98	2.70	8.10	54.78	2.74	2.38	6.03
27	54.78	2.74	8.22	55.61	2.78	2.39	6.06
28	55.61	2.78	8.34	56.44	2.82	2.40	6.09
Daily group ration (g)			7.98	←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)			0.40	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	56.44	2.82	8.47	57.29	2.86	2.41	6.12
30	57.29	2.86	8.59	58.15	2.91	2.42	6.15
31	58.15	2.91	8.72	59.02	2.95	2.44	6.19
Daily group ration (g)			8.59	←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)			0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rates increased and form revised this Form no longer to be used 7/20/12 JN

FF # 7
Item No. 20
Pg 4 of 18

Study Number: AEH-12-PSEUDO-03 Reviewed by: JAW Date: 19MAR13
File Folder 7 Lab book/pgs 2, 19-27 Verified by: JAW Date 4-5-13
Should be p.22 Kim 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and %B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration (g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406 467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 JAW
Holding Tank/Chamber: E-5 (from C5) **Date Revised/Initials:**
Treatment Group: 200 **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.91
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	38.20	1.91	5.73	38.77	1.94	2.12	5.38
2	38.77	1.94	5.82	39.35	1.97	2.13	5.40
3	39.35	1.97	5.90	39.94	2.00	2.14	5.43
4	39.94	2.00	5.99	40.54	2.03	2.15	5.46
5	40.54	2.03	6.08	41.15	2.06	2.16	5.49
6	41.15	2.06	6.17	41.77	2.09	2.17	5.51
7	41.77	2.09	6.27	42.40	2.12	2.18	5.54
Daily group ration (g)		5.99		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	42.40	2.12	6.36	43.03	2.15	2.19	5.57
9	43.03	2.15	6.45	43.68	2.18	2.20	5.60
10	43.68	2.18	6.55	44.33	2.22	2.21	5.62
11	44.33	2.22	6.65	45.00	2.25	2.22	5.65
12	45.00	2.25	6.75	45.67	2.28	2.24	5.68
13	45.67	2.28	6.85	46.36	2.32	2.25	5.71
14	46.36	2.32	6.95	47.05	2.35	2.26	5.74
Daily group ration (g)		6.65		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	47.05	2.35	7.06	47.76	2.39	2.27	5.76
16	47.76	2.39	7.16	48.48	2.42	2.28	5.79
17	48.48	2.42	7.27	49.20	2.46	2.29	5.82
18	49.20	2.46	7.38	49.94	2.50	2.30	5.85
19	49.94	2.50	7.49	50.69	2.53	2.31	5.88
20	50.69	2.53	7.60	51.45	2.57	2.33	5.91
21	51.45	2.57	7.72	52.22	2.61	2.34	5.94
Daily group ration (g)		7.38		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	52.22	2.61	7.83	53.00	2.65	2.35	5.97
23	53.00	2.65	7.95	53.80	2.69	2.36	6.00
24	53.80	2.69	8.07	54.61	2.73	2.37	6.03
25	54.61	2.73	8.19	55.43	2.77	2.38	6.06
26	55.43	2.77	8.31	56.26	2.81	2.40	6.09
27	56.26	2.81	8.44	57.10	2.86	2.41	6.12
28	57.10	2.86	8.57	57.96	2.90	2.42	6.15
Daily group ration (g)		8.19		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	57.96	2.90	8.69	58.83	2.94	2.43	6.18
30	58.83	2.94	8.82	59.71	2.99	2.44	6.21
31	59.71	2.99	8.96	60.61	3.03	2.46	6.24
Daily group ration (g)		8.82		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and Form revised. This Form no longer to be used. spelling error 7/20/12 JAW

7/20/12
JAW

FF # 7
Item No. 20
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR13
File Folder: 7 Lab book/pgs 2, 19-27 Verified by: JR Date: 4-8-13
Should be p. 20. KW 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__ JR
Holding Tank/Chamber:___E-6 (from B2)____ **Date Revised/Initials:**
Treatment Group:____100_____ **Approved for use** [redacted] 7/12/12
Species:_BLG_____**Lot:** _114500_____ **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.84							
21	Number of fish	20							
22	Condition Factor (C)	0.00045							
23	(C = 0.00035 - 0.00050 in 0.00005 increments)								
24									
25	FCR	10							
26	% B.W./d	15							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	36.80	1.84	5.52	37.35	1.87	2.09	5.31
2	37.35	1.87	5.60	37.91	1.90	2.10	5.34
3	37.91	1.90	5.69	38.48	1.92	2.11	5.36
4	38.48	1.92	5.77	39.06	1.95	2.12	5.39
5	39.06	1.95	5.86	39.64	1.98	2.13	5.42
6	39.64	1.98	5.95	40.24	2.01	2.14	5.44
7	40.24	2.01	6.04	40.84	2.04	2.15	5.47
Daily group ration (g)		5.77		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	40.84	2.04	6.13	41.45	2.07	2.16	5.50
9	41.45	2.07	6.22	42.08	2.10	2.18	5.53
10	42.08	2.10	6.31	42.71	2.14	2.19	5.55
11	42.71	2.14	6.41	43.35	2.17	2.20	5.58
12	43.35	2.17	6.50	44.00	2.20	2.21	5.61
13	44.00	2.20	6.60	44.66	2.23	2.22	5.64
14	44.66	2.23	6.70	45.33	2.27	2.23	5.66
Daily group ration (g)		6.41		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	45.33	2.27	6.80	46.01	2.30	2.24	5.69
16	46.01	2.30	6.90	46.70	2.33	2.25	5.72
17	46.70	2.33	7.00	47.40	2.37	2.26	5.75
18	47.40	2.37	7.11	48.11	2.41	2.27	5.78
19	48.11	2.41	7.22	48.83	2.44	2.29	5.81
20	48.83	2.44	7.32	49.56	2.48	2.30	5.84
21	49.56	2.48	7.43	50.31	2.52	2.31	5.87
Daily group ration (g)		7.11		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	50.31	2.52	7.55	51.06	2.55	2.32	5.89
23	51.06	2.55	7.66	51.83	2.59	2.33	5.92
24	51.83	2.59	7.77	52.61	2.63	2.34	5.95
25	52.61	2.63	7.89	53.39	2.67	2.36	5.98
26	53.39	2.67	8.01	54.20	2.71	2.37	6.01
27	54.20	2.71	8.13	55.01	2.75	2.38	6.04
28	55.01	2.75	8.25	55.83	2.79	2.39	6.07
Daily group ration (g)		7.89		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	55.83	2.79	8.38	56.67	2.83	2.40	6.10
30	56.67	2.83	8.50	57.52	2.88	2.41	6.13
31	57.52	2.88	8.63	58.38	2.92	2.43	6.16
Daily group ration (g)		8.50		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and Form revised. this form no longer to be used.
7/20/12
JR

FF # 7
Item No. 20
Pg 6 of 15

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 2 , 19-27 Should be p. 22. KMW 28FE13

Reviewed by: KMW Date: 19MAR13
Verified by: JSu Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials: 7-12-12** JTu
Holding Tank/Chamber:___E-7 (from C1)_____ **Date Revised/i**[redacted]
Treatment Group:____50_____________ **Approved for u**[redacted]/12/12
Species:_BLG___________Lot: _114500______ **Date**

Row Column: c d e f g h i j

Row	INPUT SECTION	
19		
20	Initial fish size (g)	1.6
21	Number of fish	20
22	Condition Factor (C)	0.00045
23	(C = 0.00015 - 0.00050 in 0.00005 increments)	
24		
25	FCR	10
26	% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
27								
28–32								
33	1	32.00	1.60	4.80	32.48	1.62	2.00	5.07
34	2	32.48	1.62	4.87	32.97	1.65	2.01	5.09
35	3	32.97	1.65	4.95	33.46	1.67	2.02	5.12
36	4	33.46	1.67	5.02	33.96	1.70	2.03	5.15
37	5	33.96	1.70	5.09	34.47	1.72	2.04	5.17
38	6	34.47	1.72	5.17	34.99	1.75	2.05	5.20
39	7	34.99	1.75	5.25	35.52	1.78	2.06	5.22
40								
41	Daily group ration (g)		**5.02**	←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		**0.25**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43								
44	8	35.52	1.78	5.33	36.05	1.80	2.07	5.25
45	9	36.05	1.80	5.41	36.59	1.83	2.08	5.27
46	10	36.59	1.83	5.49	37.14	1.86	2.09	5.30
47	11	37.14	1.86	5.57	37.69	1.88	2.10	5.33
48	12	37.69	1.88	5.65	38.26	1.91	2.11	5.35
49	13	38.26	1.91	5.74	38.83	1.94	2.12	5.38
50	14	38.83	1.94	5.83	39.42	1.97	2.13	5.41
51								
52	Daily group ration (g)		**5.57**	←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		**0.28**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54								
55	15	39.42	1.97	5.91	40.01	2.00	2.14	5.43
56	16	40.01	2.00	6.00	40.61	2.03	2.15	5.46
57	17	40.61	2.03	6.09	41.22	2.06	2.16	5.49
58	18	41.22	2.06	6.18	41.83	2.09	2.17	5.52
59	19	41.83	2.09	6.28	42.46	2.12	2.18	5.54
50	20	42.46	2.12	6.37	43.10	2.15	2.19	5.57
61	21	43.10	2.15	6.46	43.75	2.19	2.20	5.60
62								
63	Daily group ration (g)		**6.19**	←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		**0.31**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65								
66	22	43.75	2.19	6.56	44.40	2.22	2.21	5.63
67	23	44.40	2.22	6.66	45.07	2.25	2.23	5.65
68	24	45.07	2.25	6.76	45.74	2.29	2.24	5.68
69	25	45.74	2.29	6.86	46.43	2.32	2.25	5.71
70	26	46.43	2.32	6.96	47.13	2.36	2.26	5.74
71	27	47.13	2.36	7.07	47.83	2.39	2.27	5.77
72	28	47.83	2.39	7.18	48.55	2.43	2.28	5.80
73								
74	Daily group ration (g)		**6.86**	←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		**0.34**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76								
77	29	48.55	2.43	7.28	49.28	2.46	2.29	5.82
78	30	49.28	2.46	7.39	50.02	2.50	2.30	5.85
79	31	50.02	2.50	7.50	50.77	2.54	2.32	5.88
80								
81	Daily group ration (g)		**7.39**	←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		**0.37**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rate increased and form revised. This form no longer to be used.
7/20/12
JTu

FF # 7
Item No. 20
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 28FEB13
File Folder: 1 Lab book/pgs: 2, 19-27 Verified by: JAC Date: 4-4-13
Should be p.22. KW 28FEB13

Form 2 - Fish Growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multipiying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:** 7-12-12 JAC
Holding Tank/Chamber:___E-8 (from BS)_____ **Date Revised/Initial** [redacted] 7/12/12
Treatment Group:____300_____ **Approved for use:** [redacted] Date
Species: BLG_____ **Lot:** 114500_____

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	38.00	2.00	5.70	38.57	2.03	2.15	5.46
2	38.57	2.03	5.79	39.15	2.06	2.16	5.48
3	39.15	2.06	5.87	39.74	2.09	2.17	5.52
4	39.74	2.09	5.96	40.33	2.12	2.18	5.54
5	40.33	2.12	6.05	40.94	2.15	2.19	5.57
6	40.94	2.15	6.14	41.55	2.19	2.20	5.60
7	41.55	2.19	6.23	42.17	2.22	2.21	5.63
Daily group ration (g)		5.96	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.31	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	42.17	2.22	6.33	42.81	2.25	2.23	5.65
9	42.81	2.25	6.42	43.45	2.29	2.24	5.68
10	43.45	2.29	6.52	44.10	2.32	2.25	5.71
11	44.10	2.32	6.62	44.76	2.36	2.26	5.74
12	44.76	2.36	6.71	45.43	2.39	2.27	5.77
13	45.43	2.39	6.82	46.11	2.43	2.28	5.80
14	46.11	2.43	6.92	46.81	2.46	2.29	5.82
Daily group ration (g)		6.62	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.35	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	46.81	2.46	7.02	47.51	2.50	2.30	5.85
16	47.51	2.50	7.13	48.22	2.54	2.32	5.88
17	48.22	2.54	7.23	48.94	2.58	2.33	5.91
18	48.94	2.58	7.34	49.68	2.61	2.34	5.94
19	49.68	2.61	7.45	50.42	2.65	2.35	5.97
20	50.42	2.65	7.56	51.18	2.69	2.36	6.00
21	51.18	2.69	7.68	51.95	2.73	2.37	6.03
Daily group ration (g)		7.34	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.39	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	51.95	2.73	7.79	52.73	2.78	2.39	6.06
23	52.73	2.76	7.91	53.52	2.82	2.40	6.09
24	53.52	2.82	8.03	54.32	2.86	2.41	6.12
25	54.32	2.86	8.15	55.14	2.90	2.42	6.15
26	55.14	2.90	8.27	55.96	2.95	2.43	6.18
27	55.96	2.95	8.39	56.80	2.99	2.45	6.21
28	56.80	2.99	8.52	57.65	3.03	2.46	6.24
Daily group ration (g)		8.15	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.43	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	57.65	3.03	8.65	58.52	3.08	2.47	6.27
30	58.52	3.08	8.78	59.40	3.13	2.48	6.31
31	59.40	3.13	8.91	60.29	3.17	2.49	6.34
Daily group ration (g)		8.78	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.46	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rate increased and Form revised. This form no longer to be used 7/20/12 JAC

FF # 7
Item No. 20
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR13
File Folder 7 Lab book/pgs 2, 19-27 Verified by: JM Date 4-8-13
Should be p.20. KW 28Feb13

Form 2 - Fish Growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 JM
Holding Tank/Chamber: E-9 (from A5) **Date Revised/Initials:** [redacted]
Treatment Group: 200 **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 **Date**

Row	Column:	c	d	a	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	40.00	2.00	6.00	40.60	2.03	2.15	5.46
2	40.60	2.03	6.09	41.21	2.06	2.16	5.49
3	41.21	2.06	6.18	41.83	2.09	2.17	5.52
4	41.83	2.09	6.27	42.45	2.12	2.18	5.54
5	42.45	2.12	6.37	43.09	2.15	2.19	5.57
6	43.09	2.15	6.46	43.74	2.19	2.20	5.60
7	43.74	2.19	6.56	44.39	2.22	2.21	5.63
Daily group ration (g)		6.28		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	44.39	2.22	6.66	45.06	2.25	2.23	5.65
9	45.06	2.25	6.76	45.74	2.29	2.24	5.68
10	45.74	2.29	6.86	46.42	2.32	2.25	5.71
11	46.42	2.32	6.96	47.12	2.36	2.26	5.74
12	47.12	2.36	7.07	47.82	2.39	2.27	5.77
13	47.82	2.39	7.17	48.54	2.43	2.28	5.80
14	48.54	2.43	7.28	49.27	2.46	2.29	5.82
Daily group ration (g)		6.97		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	49.27	2.46	7.39	50.01	2.50	2.30	5.85
16	50.01	2.50	7.50	50.76	2.54	2.32	5.88
17	50.76	2.54	7.61	51.52	2.58	2.33	5.91
18	51.52	2.58	7.73	52.29	2.61	2.34	5.94
19	52.29	2.61	7.84	53.08	2.65	2.35	5.97
20	53.08	2.65	7.96	53.87	2.69	2.36	6.00
21	53.87	2.69	8.08	54.68	2.73	2.37	6.03
Daily group ration (g)		7.73		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	54.68	2.73	8.20	55.50	2.78	2.39	6.06
23	55.50	2.78	8.33	56.34	2.82	2.40	6.09
24	56.34	2.82	8.45	57.18	2.86	2.41	6.12
25	57.18	2.86	8.58	58.04	2.90	2.42	6.15
26	58.04	2.90	8.71	58.91	2.95	2.43	6.18
27	58.91	2.95	8.84	59.79	2.99	2.45	6.21
28	59.79	2.99	8.97	60.69	3.03	2.46	6.24
Daily group ration (g)		8.58		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	60.69	3.03	9.10	61.60	3.08	2.47	6.27
30	61.60	3.08	9.24	62.52	3.13	2.48	6.31
31	62.52	3.13	9.38	63.46	3.17	2.49	6.34
Daily group ration (g)		9.24		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and Form revised. This form no longer to be used.
7/20/12
JM

FF # 7
Item No. 20
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KLW Date: 19MAR13
File Folder F Lab book/pgs 2, 19-27 Verified by: JAL Date 4-8-13
Should be p. 22 KLW 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. a 1982. Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:** 7-12-12 JAL
Holding Tank/Chamber:___E-10 (from C2)_____ **Date Revised/Initials:** [redacted] 7/12/12
Treatment Group:____CONTROL_____ **Approved for use:** [redacted] Date
Species:_BLG_____ **Lot:** _114500_____

Row	Column:	c	d	e	f	g	h	I	J
19	**INPUT SECTION**								
20	Initial fish size (g)		1.81						
21	Number of fish		20						
22	Condition Factor (C)		0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		15						
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33-(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333333 {Column H value adjusts by row}
Fish final Length (cm) = I33*2.54 {numerator value adjusts by row}

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	36.20	1.81	5.43	36.74	1.84	2.08	5.28
34	2	36.74	1.84	5.51	37.29	1.86	2.09	5.31
35	3	37.29	1.86	5.59	37.85	1.89	2.10	5.33
36	4	37.85	1.89	5.68	38.42	1.92	2.11	5.36
37	5	38.42	1.92	5.76	39.00	1.95	2.12	5.39
38	6	39.00	1.95	5.85	39.58	1.98	2.13	5.41
39	7	39.58	1.98	5.94	40.18	2.01	2.14	5.44
40								
41	Daily group ration (g)		5.68		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.28		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	40.18	2.01	6.03	40.78	2.04	2.15	5.47
45	9	40.78	2.04	6.12	41.39	2.07	2.16	5.50
46	10	41.39	2.07	6.21	42.01	2.10	2.17	5.52
47	11	42.01	2.10	6.30	42.64	2.13	2.19	5.55
48	12	42.64	2.13	6.40	43.28	2.16	2.20	5.58
49	13	43.28	2.16	6.49	43.93	2.20	2.21	5.61
50	14	43.93	2.20	6.59	44.59	2.23	2.22	5.63
51								
52	Daily group ration (g)		6.30		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	44.59	2.23	6.69	45.26	2.26	2.23	5.66
56	16	45.26	2.26	6.79	45.94	2.30	2.24	5.69
57	17	45.94	2.30	6.89	46.63	2.33	2.25	5.72
58	18	46.63	2.33	6.99	47.33	2.37	2.26	5.75
59	19	47.33	2.37	7.10	48.04	2.40	2.27	5.78
60	20	48.04	2.40	7.21	48.76	2.44	2.29	5.80
61	21	48.76	2.44	7.31	49.49	2.47	2.30	5.83
62								
63	Daily group ration (g)		7.00		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	49.49	2.47	7.42	50.23	2.51	2.31	5.86
67	23	50.23	2.51	7.53	50.98	2.55	2.32	5.89
68	24	50.98	2.55	7.65	51.75	2.59	2.33	5.92
69	25	51.75	2.59	7.76	52.52	2.63	2.34	5.95
70	26	52.52	2.63	7.88	53.31	2.67	2.35	5.98
71	27	53.31	2.67	8.00	54.11	2.71	2.37	6.01
72	28	54.11	2.71	8.12	54.92	2.75	2.38	6.04
73								
74	Daily group ration (g)		7.77		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	54.92	2.75	8.24	55.75	2.79	2.39	6.07
78	30	55.75	2.79	8.36	56.58	2.83	2.40	6.10
79	31	56.58	2.83	8.49	57.43	2.87	2.41	6.13
80								
81	Daily group ration (g)		8.36		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and form revised. This form no longer to be used.
7/20/12
JAL

FF # 7
Item No. 20
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: PLW Date: 10 MAR 13
File Folder: 7 Lab book/pgs 2, 19-27 Verified by: JM Date 4-8-13
Should be p. 22. PLW 28 FEB 13

Form 2 - Fish Growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 JM
Holding Tank/Chamber: E-11 (from A1) **Date Revised/Initials:**
Treatment Group: CONTROL **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 **Date**

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.76					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			15					

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.20	1.76	5.28	35.73	1.79	2.06	5.23
2	35.73	1.79	5.36	36.26	1.81	2.07	5.26
3	36.26	1.81	5.44	36.81	1.84	2.08	5.29
4	36.81	1.84	5.52	37.36	1.87	2.09	5.31
5	37.36	1.87	5.60	37.92	1.90	2.10	5.34
6	37.92	1.90	5.69	38.49	1.92	2.11	5.36
7	38.49	1.92	5.77	39.07	1.95	2.12	5.39
Daily group ration (g)			**5.52**			←OUTPUT - GROUP FEED RATE (g) for week 1	
Daily per fish ration (g)			**0.28**			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1	
8	39.07	1.95	5.86	39.65	1.98	2.13	5.42
9	39.65	1.98	5.95	40.25	2.01	2.14	5.44
10	40.25	2.01	6.04	40.85	2.04	2.15	5.47
11	40.85	2.04	6.13	41.46	2.07	2.16	5.50
12	41.46	2.07	6.22	42.09	2.10	2.18	5.53
13	42.09	2.10	6.31	42.72	2.14	2.19	5.55
14	42.72	2.14	6.41	43.36	2.17	2.20	5.58
Daily group ration (g)			**6.13**			←OUTPUT - GROUP FEED RATE (g) for week 2	
Daily per fish ration (g)			**0.31**			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2	
15	43.36	2.17	6.50	44.01	2.20	2.21	5.61
16	44.01	2.20	6.60	44.67	2.23	2.22	5.64
17	44.67	2.23	6.70	45.34	2.27	2.23	5.67
18	45.34	2.27	6.80	46.02	2.30	2.24	5.69
19	46.02	2.30	6.90	46.71	2.34	2.25	5.72
20	46.71	2.34	7.01	47.41	2.37	2.26	5.75
21	47.41	2.37	7.11	48.12	2.41	2.28	5.78
Daily group ration (g)			**6.80**			←OUTPUT - GROUP FEED RATE (g) for week 3	
Daily per fish ration (g)			**0.34**			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3	
22	48.12	2.41	7.22	48.84	2.44	2.29	5.81
23	48.84	2.44	7.33	49.57	2.48	2.30	5.84
24	49.57	2.48	7.44	50.32	2.52	2.31	5.87
25	50.32	2.52	7.55	51.07	2.55	2.32	5.89
26	51.07	2.55	7.66	51.84	2.59	2.33	5.92
27	51.84	2.59	7.78	52.62	2.63	2.34	5.95
28	52.62	2.63	7.89	53.41	2.67	2.36	5.98
Daily group ration (g)			**7.55**			←OUTPUT - GROUP FEED RATE (g) for week 4	
Daily per fish ration (g)			**0.38**			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4	
29	53.41	2.67	8.01	54.21	2.71	2.37	6.01
30	54.21	2.71	8.13	55.02	2.75	2.38	6.04
31	55.02	2.75	8.25	55.85	2.79	2.39	6.07
Daily group ration (g)			**8.13**			←OUTPUT - GROUP FEED RATE (g) for week 5	
Daily per fish ration (g)			**0.41**			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5	

Feed rate increased and Forms revised. This form no longer to be used.
7/20/12
JM

FF # 7
Item No. 20
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 12MAR13
File Folder 7 Lab book/pgs 2, 19-24 Verified by: SN Date 4-7-13
Should be p. 22. KW 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates bocy condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 TM
Holding Tank/Chamber: E-12 (from B4) **Date Revised/Initials:** [redacted]
Treatment Group: 50 **Approved for use:** [redacted] 7/12/12
Species: BLG **Lot:** 114500 [redacted]tor Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2.04
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) = G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	38.76	2.04	5.81	39.34	2.07	2.16	5.50
2	39.34	2.07	5.90	39.93	2.10	2.17	5.52
3	39.93	2.10	5.99	40.53	2.13	2.19	5.55
4	40.53	2.13	6.08	41.14	2.17	2.20	5.58
5	41.14	2.17	6.17	41.76	2.20	2.21	5.61
6	41.76	2.20	6.26	42.38	2.23	2.22	5.63
7	42.38	2.23	6.36	43.02	2.26	2.23	5.66
Daily group ration (g)		6.08		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	43.02	2.26	6.45	43.66	2.30	2.24	5.69
9	43.66	2.30	6.55	44.32	2.33	2.25	5.72
10	44.32	2.33	6.65	44.98	2.37	2.26	5.75
11	44.98	2.37	6.75	45.66	2.40	2.27	5.78
12	45.66	2.40	6.85	46.34	2.44	2.29	5.81
13	46.34	2.44	6.95	47.04	2.48	2.30	5.83
14	47.04	2.48	7.06	47.74	2.51	2.31	5.86
Daily group ration (g)		6.75		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	47.74	2.51	7.16	48.46	2.55	2.32	5.89
16	48.46	2.55	7.27	49.19	2.59	2.33	5.92
17	49.19	2.59	7.38	49.92	2.63	2.34	5.95
18	49.92	2.63	7.49	50.67	2.67	2.35	5.98
19	50.67	2.67	7.60	51.43	2.71	2.37	6.01
20	51.43	2.71	7.71	52.20	2.75	2.38	6.04
21	52.20	2.75	7.83	52.99	2.79	2.39	6.07
Daily group ration (g)		7.49		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	52.99	2.79	7.95	53.78	2.83	2.40	6.10
23	53.78	2.83	8.07	54.59	2.87	2.41	6.13
24	54.59	2.87	8.19	55.41	2.92	2.43	6.16
25	55.41	2.92	8.31	56.24	2.96	2.44	6.19
26	56.24	2.96	8.44	57.08	3.00	2.45	6.22
27	57.08	3.00	8.56	57.94	3.05	2.46	6.25
28	57.94	3.05	8.69	58.81	3.10	2.47	6.28
Daily group ration (g)		8.31		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	58.81	3.10	8.82	59.69	3.14	2.49	6.32
30	59.69	3.14	8.95	60.58	3.19	2.50	6.35
31	60.58	3.19	9.09	61.49	3.24	2.51	6.38
Daily group ration (g)		8.95		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and Form revised. This form no longer to be used
7/20/12
SN

FF # 7
Item No. 20
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 7/19/12
File Folder: 7 Lab book/pgs 2, 19-27 Verified by: JN Date: 4-8-13
Should be p. 22. KW 08FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:** 7-12-12 TM
Holding Tank/Chamber:___E-13 (from A4)_____ **Date Revised/Initia** [redacted]
Treatment Group:____50_____ **Approved for use:** [redacted] 7/12/12
Species: BLG_____ **Lot:** 114500_____ Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	1.87						
21	Number of fish	20						
22	Condition Factor (C)	0.00045						
23	[C = 0.00015 - 0.00050 in 0.00005 increments]							
24								
25	FCR	10						
26	% B.W./d	15						
27								

Worksheet Formulas
Group Total Initial fish weight (g) = E29 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	37.40	1.87	5.61	37.96	1.90	2.10	5.34
34	2	37.96	1.90	5.69	38.53	1.93	2.11	5.37
35	3	38.53	1.93	5.78	39.11	1.96	2.12	5.39
36	4	39.11	1.96	5.87	39.69	1.98	2.13	5.42
37	5	39.69	1.98	5.95	40.29	2.01	2.14	5.45
38	6	40.29	2.01	6.04	40.89	2.04	2.16	5.47
39	7	40.89	2.04	6.13	41.51	2.08	2.17	5.50
40								
41	Daily group ration (g)		5.87		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	41.51	2.08	6.23	42.13	2.11	2.18	5.53
45	9	42.13	2.11	6.32	42.76	2.14	2.19	5.56
46	10	42.76	2.14	6.41	43.40	2.17	2.20	5.58
47	11	43.40	2.17	6.51	44.06	2.20	2.21	5.61
48	12	44.06	2.20	6.61	44.72	2.24	2.22	5.64
49	13	44.72	2.24	6.71	45.39	2.27	2.23	5.67
50	14	45.39	2.27	6.81	46.07	2.30	2.24	5.70
51								
52	Daily group ration (g)		6.51		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	46.07	2.30	6.91	46.76	2.34	2.25	5.72
56	16	46.76	2.34	7.01	47.46	2.37	2.26	5.75
57	17	47.46	2.37	7.12	48.17	2.41	2.28	5.78
58	18	48.17	2.41	7.23	48.89	2.44	2.29	5.81
59	19	48.89	2.44	7.33	49.63	2.48	2.30	5.84
60	20	49.63	2.48	7.44	50.37	2.52	2.31	5.87
61	21	50.37	2.52	7.56	51.13	2.56	2.32	5.90
62								
63	Daily group ration (g)		7.23		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	51.13	2.56	7.67	51.89	2.59	2.33	5.93
67	23	51.89	2.59	7.78	52.67	2.63	2.34	5.96
68	24	52.67	2.63	7.90	53.46	2.67	2.36	5.99
69	25	53.46	2.67	8.02	54.27	2.71	2.37	6.02
70	26	54.27	2.71	8.14	55.08	2.75	2.38	6.05
71	27	55.08	2.75	8.26	55.91	2.80	2.39	6.08
72	28	55.91	2.80	8.39	56.74	2.84	2.40	6.11
73								
74	Daily group ration (g)		8.02		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	56.74	2.84	8.51	57.60	2.88	2.42	6.14
78	30	57.60	2.88	8.64	58.46	2.92	2.43	6.17
79	31	58.46	2.92	8.77	59.34	2.97	2.44	6.20
80								
81	Daily group ration (g)		8.64		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased and form revised. This form no longer to be used.
7/20/12
JNL

FF # 7
Item No. 20
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR13
File Folder 7 Lab book/pgs 2 / 19-27 Verified by: JO Date 4-8-13
Should be p.22. KW 28FEB13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials: 7-12-12** TR
Holding Tank/Chamber:___E-14 (from B3)_____ **Date Revised/initials:** [redacted]
Treatment Group:____CONTROL____________ **Approved for use:** [redacted] 7/12/12
Species:_BLG__________Lot: _114500______ **Date**

Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	1.97
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	39.40	1.97	5.91	39.99	2.00	2.14	5.43
2	39.99	2.00	6.00	40.59	2.03	2.15	5.46
3	40.59	2.03	6.09	41.20	2.06	2.16	5.49
4	41.20	2.06	6.18	41.82	2.09	2.17	5.51
5	41.82	2.09	6.27	42.44	2.12	2.18	5.54
6	42.44	2.12	6.37	43.08	2.15	2.19	5.57
7	43.08	2.15	6.46	43.73	2.19	2.20	5.60
Daily group ration (g)		**6.18**	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		**0.31**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	43.73	2.19	6.56	44.38	2.22	2.21	5.63
9	44.38	2.22	6.66	45.05	2.25	2.23	5.65
10	45.05	2.25	6.76	45.73	2.29	2.24	5.68
11	45.73	2.29	6.86	46.41	2.32	2.25	5.71
12	46.41	2.32	6.96	47.11	2.36	2.26	5.74
13	47.11	2.36	7.07	47.81	2.39	2.27	5.77
14	47.81	2.39	7.17	48.53	2.43	2.28	5.80
Daily group ration (g)		**6.86**	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		**0.34**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	48.53	2.43	7.28	49.26	2.46	2.29	5.82
16	49.26	2.46	7.39	50.00	2.50	2.30	5.85
17	50.00	2.50	7.50	50.75	2.54	2.32	5.88
18	50.75	2.54	7.61	51.51	2.58	2.33	5.91
19	51.51	2.58	7.73	52.28	2.61	2.34	5.94
20	52.28	2.61	7.84	53.07	2.65	2.35	5.97
21	53.07	2.65	7.96	53.86	2.69	2.36	6.00
Daily group ration (g)		**7.62**	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		**0.38**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	53.86	2.69	8.08	54.67	2.73	2.37	6.03
23	54.67	2.73	8.20	55.49	2.77	2.39	6.06
24	55.49	2.77	8.32	56.32	2.82	2.40	6.09
25	56.32	2.82	8.45	57.17	2.86	2.41	6.12
26	57.17	2.86	8.58	58.02	2.90	2.42	6.15
27	58.02	2.90	8.70	58.90	2.94	2.43	6.18
28	58.90	2.94	8.83	59.78	2.99	2.45	6.21
Daily group ration (g)		**8.45**	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		**0.42**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	59.78	2.99	8.97	60.68	3.03	2.46	6.24
30	60.68	3.03	9.10	61.59	3.08	2.47	6.27
31	61.59	3.08	9.24	62.51	3.13	2.48	6.31
Daily group ration (g)		**9.10**	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		**0.46**	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

Feed rate increased and form revised. This form no longer to be used. 7/20/12 JRL

FF # 7
Item No. 20
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 13
File Folder 7 Lab book/pgs 2, 19-22 Verified by: SM Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in P per et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12 SM
Holding Tank/Chamber: E-15 (from B1) **Date Revised/In** [redacted]
Treatment Group: 200 **Approved for us** [redacted] 7/17/12 Date
Species: BLG **Lot:** 114500

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2.04
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	15

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	40.80	2.04	6.12	41.41	2.07	2.16	5.50
2	41.41	2.07	6.21	42.03	2.10	2.17	5.52
3	42.03	2.10	6.30	42.66	2.13	2.19	5.55
4	42.66	2.13	6.40	43.30	2.17	2.20	5.58
5	43.30	2.17	6.50	43.95	2.20	2.21	5.61
6	43.95	2.20	6.59	44.61	2.23	2.22	5.63
7	44.61	2.23	5.69	45.28	2.26	2.23	5.66
Daily group ration (g)		6.40		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.32		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	45.28	2.26	6.79	45.96	2.30	2.24	5.69
9	45.96	2.30	6.89	46.65	2.33	2.25	5.72
10	46.65	2.33	7.00	47.35	2.37	2.26	5.75
11	47.35	2.37	7.10	48.06	2.40	2.27	5.78
12	48.06	2.40	7.21	48.78	2.44	2.29	5.81
13	48.78	2.44	7.32	49.51	2.48	2.30	5.83
14	49.51	2.48	7.43	50.26	2.51	2.31	5.86
Daily group ration (g)		7.11		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	50.26	2.51	7.54	51.01	2.55	2.32	5.89
16	51.01	2.55	7.65	51.77	2.59	2.33	5.92
17	51.77	2.59	7.77	52.55	2.63	2.34	5.95
18	52.55	2.63	7.88	53.34	2.67	2.35	5.98
19	53.34	2.67	8.00	54.14	2.71	2.37	6.01
20	54.14	2.71	8.12	54.95	2.75	2.38	6.04
21	54.95	2.75	8.24	55.78	2.79	2.39	6.07
Daily group ration (g)		7.89		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	55.78	2.79	8.37	56.61	2.83	2.40	6.10
23	56.61	2.83	8.49	57.46	2.87	2.41	6.13
24	57.46	2.87	8.62	58.32	2.92	2.43	6.16
25	58.32	2.92	8.75	59.20	2.96	2.44	6.19
26	59.20	2.96	8.88	60.09	3.00	2.45	6.22
27	60.09	3.00	9.01	60.99	3.05	2.46	6.25
28	60.99	3.05	9.15	61.90	3.10	2.47	6.28
Daily group ration (g)		8.75		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	61.90	3.10	9.28	62.83	3.14	2.49	6.32
30	62.83	3.14	9.42	63.77	3.19	2.50	6.35
31	63.77	3.19	9.57	64.73	3.24	2.51	6.38
Daily group ration (g)		9.43		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

Feed rate increased, and form revised. This form no longer to be used.
7/20/12
SM

FF # 7
Item No. 20
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: MAR2013
File Folder 7 Lab book/pgs 2 122-27 Verified by: Date 4/8/13
Copy of #. Should be 27 KW 28 FEB2013

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12
Holding Tank/Chamber: E-1 (from A2) **Date Revised/in** [redacted]
Treatment Group: 100 **Approved for us** [redacted] 7-20-12
Species: BLG **Lot:** 114500 [redacted]ctor Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.63
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$F$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.60	1.63	5.87	33.19	1.66	2.01	5.11
2	33.19	1.66	5.97	33.78	1.69	2.02	5.14
3	33.78	1.69	6.08	34.39	1.72	2.03	5.17
4	34.39	1.72	6.19	35.01	1.75	2.05	5.20
5	35.01	1.75	6.30	35.64	1.78	2.06	5.23
6	35.64	1.78	6.42	36.28	1.81	2.07	5.26
7	36.28	1.81	6.53	36.94	1.85	2.08	5.29
Daily group ration (g)		6.19		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.31		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.94	1.85	6.65	37.60	1.88	2.10	5.32
9	37.60	1.88	6.77	38.28	1.91	2.11	5.35
10	38.28	1.91	6.89	38.97	1.95	2.12	5.39
11	38.97	1.95	7.01	39.67	1.98	2.13	5.42
12	39.67	1.98	7.14	40.38	2.02	2.15	5.45
13	40.38	2.02	7.27	41.11	2.06	2.16	5.48
14	41.11	2.06	7.40	41.85	2.09	2.17	5.52
Daily group ration (g)		7.02		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.85	2.09	7.53	42.60	2.13	2.18	5.55
16	42.60	2.13	7.67	43.37	2.17	2.20	5.58
17	43.37	2.17	7.81	44.15	2.21	2.21	5.62
18	44.15	2.21	7.95	44.94	2.25	2.22	5.65
19	44.94	2.25	8.09	45.75	2.29	2.24	5.68
20	45.75	2.29	8.24	46.58	2.33	2.25	5.72
21	46.58	2.33	8.38	47.42	2.37	2.26	5.75
Daily group ration (g)		7.95		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	47.42	2.37	8.53	48.27	2.41	2.28	5.78
23	48.27	2.41	8.69	49.14	2.46	2.29	5.82
24	49.14	2.46	8.84	50.02	2.50	2.30	5.85
25	50.02	2.50	9.00	50.92	2.55	2.32	5.89
26	50.92	2.55	9.17	51.84	2.59	2.33	5.92
27	51.84	2.59	9.33	52.77	2.64	2.35	5.96
28	52.77	2.64	9.50	53.72	2.69	2.36	5.99
Daily group ration (g)		9.01		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	53.72	2.69	9.67	54.69	2.73	2.37	6.03
30	54.69	2.73	9.84	55.67	2.78	2.39	6.07
31	55.67	2.78	10.02	56.68	2.83	2.40	6.10
Daily group ration (g)		9.85		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. J1
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: [redacted] Date 4-8-13
wrong page #. Should be p. 27, KW 28 FEB 2013

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain [ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained]
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly averaga through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-2 (from A3)____ **Date Revised/initials:** [redacted]
Treatment Group:____300_____ **Approved for use:** [redacted] 7-20-12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column:	c	d	e	f	g	h	I	J
19	**INPUT SECTION**								
20	Initial fish size (g)		1.72						
21	Number of fish		20						
22	Condition Factor (C)		0.00045						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		10						
26	% B.W./d		18						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$UE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	34.40	1.72	6.19	35.02	1.75	2.05	5.20	
34	2	35.02	1.75	6.30	35.65	1.78	2.06	5.23	
35	3	35.65	1.78	6.42	36.29	1.81	2.07	5.26	
36	4	36.29	1.81	6.53	36.94	1.85	2.08	5.29	
37	5	36.94	1.85	6.65	37.61	1.88	2.10	5.32	
38	6	37.61	1.88	6.77	38.29	1.91	2.11	5.35	
39	7	38.29	1.91	6.89	38.98	1.95	2.12	5.39	
40									
41	Daily group ration (g)		6.54		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	38.98	1.95	7.02	39.68	1.98	2.13	5.42	
45	9	39.68	1.98	7.14	40.39	2.02	2.15	5.45	
46	10	40.39	2.02	7.27	41.12	2.06	2.16	5.48	
47	11	41.12	2.06	7.40	41.86	2.09	2.17	5.52	
48	12	41.86	2.09	7.53	42.61	2.13	2.18	5.55	
49	13	42.61	2.13	7.67	43.38	2.17	2.20	5.58	
50	14	43.38	2.17	7.81	44.16	2.21	2.21	5.62	
51									
52	Daily group ration (g)		7.41		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	44.16	2.21	7.95	44.95	2.25	2.22	5.65	
56	16	44.95	2.25	8.09	45.76	2.29	2.24	5.68	
57	17	45.76	2.29	8.24	46.59	2.33	2.25	5.72	
58	18	46.59	2.33	8.38	47.43	2.37	2.26	5.75	
59	19	47.43	2.37	8.54	48.28	2.41	2.28	5.79	
60	20	48.28	2.41	8.69	49.15	2.46	2.29	5.82	
61	21	49.15	2.46	8.85	50.03	2.50	2.30	5.85	
62									
63	Daily group ration (g)		8.39		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	50.03	2.50	9.01	50.93	2.55	2.32	5.89	
67	23	50.93	2.55	9.17	51.85	2.59	2.33	5.92	
68	24	51.85	2.59	9.33	52.78	2.64	2.35	5.96	
69	25	52.78	2.64	9.50	53.73	2.69	2.36	6.00	
70	26	53.73	2.69	9.67	54.70	2.74	2.37	6.03	
71	27	54.70	2.74	9.85	55.68	2.78	2.39	6.07	
72	28	55.68	2.78	10.02	56.69	2.83	2.40	6.10	
73									
74	Daily group ration (g)		9.51		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	56.69	2.83	10.20	57.71	2.89	2.42	6.14	
78	30	57.73	2.89	10.39	58.75	2.94	2.43	6.18	
79	31	58.75	2.94	10.57	59.81	2.99	2.45	6.21	
80									
81	Daily group ration (g)		10.39		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 21
Pg 2 of 15

Study Number: AEH-12-P5EUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-3 (from C3)_____ **Date Revised/Init** [redacted]
Treatment Group:___300_____ **Approved for use** [redacted] 7-20-12 Date
Species:_BLG_____ **Lot:** _114500_____

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.76					
21	Number of fish			19					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initial Fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
30	1	33.44	1.76	6.02	34.04	1.79	2.06	5.24	
34	2	34.04	1.79	6.13	34.65	1.82	2.07	5.27	
35	3	34.65	1.82	6.24	35.28	1.86	2.09	5.30	
36	4	35.28	1.86	6.35	35.91	1.89	2.10	5.33	
37	5	35.91	1.89	6.46	36.56	1.92	2.11	5.36	
38	6	36.56	1.92	6.58	37.22	1.96	2.12	5.40	
39	7	37.22	1.96	6.70	37.89	1.99	2.14	5.43	
40									
41	Daily group ration (g)		6.35		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	37.89	1.99	6.82	38.57	2.03	2.15	5.46	
45	9	38.57	2.03	6.94	39.26	2.07	2.16	5.49	
46	10	39.26	2.07	7.07	39.97	2.10	2.18	5.53	
47	11	39.97	2.10	7.19	40.69	2.14	2.19	5.56	
48	12	40.69	2.14	7.32	41.42	2.18	2.20	5.59	
49	13	41.42	2.18	7.46	42.17	2.22	2.21	5.63	
50	14	42.17	2.22	7.59	42.93	2.26	2.23	5.66	
51									
52	Daily group ration (g)		7.20		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	42.93	2.26	7.73	43.70	2.30	2.24	5.69	
56	16	43.70	2.30	7.87	44.49	2.34	2.25	5.73	
57	17	44.49	2.34	8.01	45.29	2.38	2.27	5.76	
58	18	45.29	2.38	8.15	46.10	2.43	2.28	5.80	
59	19	46.10	2.43	8.30	46.93	2.47	2.30	5.83	
60	20	46.93	2.47	8.45	47.78	2.51	2.31	5.86	
61	21	47.78	2.51	8.60	48.64	2.56	2.32	5.90	
62									
63	Daily group ration (g)		8.16		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	48.64	2.56	8.75	49.51	2.61	2.34	5.93	
67	23	49.51	2.61	8.91	50.40	2.65	2.35	5.97	
68	24	50.40	2.65	9.07	51.31	2.70	2.36	6.01	
69	25	51.31	2.70	9.24	52.23	2.75	2.38	6.04	
70	26	52.23	2.75	9.40	53.18	2.80	2.39	6.08	
71	27	53.18	2.80	9.57	54.13	2.85	2.41	6.11	
72	28	54.13	2.85	9.74	55.11	2.90	2.42	6.15	
73									
74	Daily group ration (g)		9.24		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	55.11	2.90	9.92	56.10	2.95	2.44	6.19	
78	30	56.10	2.95	10.10	57.11	3.01	2.45	6.22	
79	31	57.11	3.01	10.28	58.14	3.06	2.46	6.26	
80									
81	Daily group ration (g)		10.10		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: [redacted] Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12
Holding Tank/Chamber: E-4 (from C4) **Date Revised/in** [redacted]
Treatment Group: 100 **Approved for us** [redacted] 7-20-12
Species: BLG **Lot:** 114500 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.86					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	37.20	1.86	6.70	37.87	1.89	2.10	5.34	
2	37.87	1.89	6.82	38.55	1.93	2.11	5.37	
3	38.55	1.93	6.94	39.25	1.96	2.13	5.40	
4	39.25	1.96	7.06	39.95	2.00	2.14	5.43	
5	39.95	2.00	7.19	40.67	2.03	2.15	5.46	
6	40.67	2.03	7.32	41.40	2.07	2.16	5.50	
7	41.40	2.07	7.45	42.15	2.11	2.18	5.53	
Daily group ration (g)		7.07		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	42.15	2.11	7.59	42.91	2.15	2.19	5.56	
9	42.91	2.15	7.72	43.68	2.18	2.20	5.60	
10	43.68	2.18	7.86	44.47	2.22	2.22	5.63	
11	44.47	2.22	8.00	45.27	2.26	2.23	5.66	
12	45.27	2.26	8.15	46.08	2.30	2.24	5.70	
13	46.08	2.30	8.29	46.91	2.35	2.26	5.73	
14	46.91	2.35	8.44	47.75	2.39	2.27	5.76	
Daily group ration (g)		8.81		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	47.75	2.39	8.60	48.61	2.43	2.28	5.80	
16	48.61	2.43	8.75	49.49	2.47	2.30	5.83	
17	49.49	2.47	8.91	50.38	2.52	2.31	5.87	
18	50.38	2.52	9.07	51.29	2.56	2.32	5.90	
19	51.29	2.56	9.23	52.21	2.61	2.34	5.94	
20	52.21	2.61	9.40	53.15	2.66	2.35	5.97	
21	53.15	2.66	9.57	54.11	2.71	2.37	6.01	
Daily group ration (g)		9.07		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	54.11	2.71	9.74	55.08	2.75	2.38	6.05	
23	55.08	2.75	9.91	56.07	2.80	2.39	6.08	
24	56.07	2.80	10.09	57.08	2.85	2.41	6.12	
25	57.08	2.85	10.27	58.11	2.91	2.42	6.15	
26	58.11	2.91	10.46	59.15	2.96	2.44	6.19	
27	59.15	2.96	10.65	60.22	3.01	2.45	6.23	
28	60.22	3.01	10.84	61.30	3.07	2.47	6.26	
Daily group ration (g)		10.28		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	61.30	3.07	11.03	62.41	3.12	2.48	6.30	
30	62.41	3.12	11.23	63.53	3.18	2.50	6.34	
31	63.53	3.18	11.44	64.67	3.23	2.51	6.38	
Daily group ration (g)		11.23		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: 4/4/2013
File Folder 7 Lab book/pgs 2 / 22-27 Verified by: _____ Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-5 (from C5)_____ **Date Revised/Initials:** 7-20-12 [redacted]
Treatment Group:____200_____ **Approved for use** [redacted] 7-20-12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.91					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00035 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(H33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = J33*2.54 (numerator value adjusts by row)

Row		Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33		1	38.20	1.91	6.88	38.89	1.94	2.12	5.38	
34		2	38.89	1.94	7.00	39.59	1.98	2.13	5.41	
35		3	39.59	1.98	7.13	40.30	2.02	2.14	5.45	
36		4	40.30	2.02	7.25	41.03	2.05	2.16	5.48	
37		5	41.03	2.05	7.38	41.76	2.09	2.17	5.51	
38		6	41.76	2.09	7.52	42.52	2.13	2.18	5.55	
39		7	42.52	2.13	7.65	43.28	2.16	2.20	5.58	
40										
41	Daily group ration (g)			7.26		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)			0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43										
44		8	43.28	2.16	7.79	44.06	2.20	2.21	5.61	
45		9	44.06	2.20	7.93	44.85	2.24	2.22	5.65	
46		10	44.85	2.24	8.07	45.66	2.28	2.24	5.68	
47		11	45.66	2.28	8.22	46.48	2.32	2.25	5.71	
48		12	46.48	2.32	8.37	47.32	2.37	2.26	5.75	
49		13	47.32	2.37	8.52	48.17	2.41	2.28	5.78	
50		14	48.17	2.41	8.67	49.04	2.45	2.29	5.82	
51										
52	Daily group ration (g)			8.22		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)			0.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54										
55		15	49.04	2.45	8.83	49.92	2.50	2.30	5.85	
56		16	49.92	2.50	8.99	50.82	2.54	2.32	5.88	
57		17	50.82	2.54	9.15	51.73	2.59	2.33	5.92	
58		18	51.73	2.59	9.31	52.67	2.63	2.34	5.96	
59		19	52.67	2.63	9.48	53.61	2.68	2.36	5.99	
60		20	53.61	2.68	9.65	54.58	2.73	2.37	6.03	
61		21	54.58	2.73	9.82	55.56	2.78	2.39	6.06	
62										
63	Daily group ration (g)			9.32		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)			0.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65										
66		22	55.56	2.78	10.00	56.56	2.83	2.40	6.10	
67		23	56.56	2.83	10.18	57.58	2.88	2.42	6.14	
68		24	57.58	2.88	10.36	58.62	2.93	2.43	6.17	
69		25	58.62	2.93	10.55	59.67	2.98	2.44	6.21	
70		26	59.67	2.98	10.74	60.74	3.04	2.46	6.25	
71		27	60.74	3.04	10.93	61.84	3.09	2.47	6.28	
72		28	61.84	3.09	11.13	62.95	3.15	2.49	6.32	
73										
74	Daily group ration (g)			10.56		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)			0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76										
77		29	62.95	3.15	11.33	64.08	3.20	2.50	6.36	
78		30	64.08	3.20	11.54	65.24	3.26	2.52	6.40	
79		31	65.24	3.26	11.74	66.41	3.32	2.53	6.43	
80										
81	Daily group ration (g)			11.54		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)			0.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Study Number: AEH-12-PSEUDO-03 Reviewed by: MW Date: 19 MAR 2013
File Folder 7 Lab book/pgs 2 / 22-27 Verified by: SAL Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-6 (from B2)_____ **Date Revised/Initia**[redacted]
Treatment Group:____100_____ **Approved for use:**[redacted] 7-20-12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.84
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (init al fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	36.80	1.84	6.62	37.46	1.87	2.09	5.32
2	37.46	1.87	6.74	38.14	1.91	2.11	5.35
3	38.14	1.91	6.86	38.82	1.94	2.12	5.38
4	38.82	1.94	6.99	39.52	1.98	2.13	5.41
5	39.52	1.98	7.11	40.23	2.01	2.14	5.44
6	40.23	2.01	7.24	40.96	2.05	2.16	5.48
7	40.96	2.05	7.37	41.69	2.08	2.17	5.51
Daily group ration (g)		6.99		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.35		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	41.69	2.08	7.51	42.45	2.12	2.18	5.54
9	42.45	2.12	7.64	43.21	2.16	2.19	5.58
10	43.21	2.16	7.78	43.99	2.20	2.21	5.61
11	43.99	2.20	7.92	44.78	2.24	2.22	5.64
12	44.78	2.24	8.06	45.58	2.28	2.23	5.68
13	45.58	2.28	8.21	46.41	2.32	2.25	5.71
14	46.41	2.32	8.35	47.24	2.36	2.26	5.74
Daily group ration (g)		7.92		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	47.24	2.36	8.50	48.09	2.40	2.27	5.78
16	48.09	2.40	8.66	48.96	2.45	2.29	5.81
17	48.96	2.45	8.81	49.84	2.49	2.30	5.85
18	49.84	2.49	8.97	50.74	2.54	2.32	5.88
19	50.74	2.54	9.13	51.65	2.58	2.33	5.92
20	51.65	2.58	9.30	52.58	2.63	2.34	5.95
21	52.58	2.63	9.46	53.52	2.68	2.36	5.99
Daily group ration (g)		8.98		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.45		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	53.52	2.68	9.63	54.49	2.72	2.37	6.02
23	54.49	2.72	9.81	55.47	2.77	2.39	6.06
24	55.47	2.77	9.98	56.47	2.82	2.40	6.10
25	56.47	2.82	10.16	57.48	2.87	2.41	6.13
26	57.48	2.87	10.35	58.52	2.93	2.43	6.17
27	58.52	2.93	10.53	59.57	2.98	2.44	6.21
28	59.57	2.98	10.72	60.64	3.03	2.46	6.24
Daily group ration (g)		10.17		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	60.64	3.03	10.92	61.74	3.09	2.47	6.28
30	61.74	3.09	11.11	62.85	3.14	2.49	6.32
31	62.85	3.14	11.31	63.98	3.20	2.50	6.35
Daily group ration (g)		11.11		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder 7 Lab book/pgs 2 / 22-27 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal)

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12
Holding Tank/Chamber: E-7 (from C1) **Date Revised/Initials:** 7-20-12 [illegible]
Treatment Group: 50 **Approved for use:** [redacted] 7-20-12 Date
Species: BLG **Lot:** 114500

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.6
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$U$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	32.00	1.60	5.76	32.58	1.63	2.00	5.07
2	32.58	1.63	5.86	33.16	1.66	2.01	5.10
3	33.16	1.66	5.97	33.76	1.69	2.02	5.13
4	33.76	1.69	6.08	34.37	1.72	2.03	5.17
5	34.37	1.72	6.19	34.99	1.75	2.05	5.20
6	34.99	1.75	6.30	35.62	1.78	2.06	5.23
7	35.62	1.78	6.41	36.26	1.81	2.07	5.26
Daily group ration (g)		6.08		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	36.26	1.81	6.53	36.91	1.85	2.08	5.29
9	36.91	1.85	6.64	37.57	1.88	2.10	5.32
10	37.57	1.88	6.76	38.25	1.91	2.11	5.35
11	38.25	1.91	6.88	38.94	1.95	2.12	5.39
12	38.94	1.95	7.01	39.64	1.98	2.13	5.42
13	39.64	1.98	7.14	40.35	2.02	2.15	5.45
14	40.35	2.02	7.26	41.08	2.05	2.16	5.48
Daily group ration (g)		6.89		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	41.08	2.05	7.39	41.82	2.09	2.17	5.51
16	41.82	2.09	7.53	42.57	2.13	2.18	5.55
17	42.57	2.13	7.66	43.34	2.17	2.20	5.58
18	43.34	2.17	7.80	44.12	2.21	2.21	5.61
19	44.12	2.21	7.94	44.91	2.25	2.22	5.65
20	44.91	2.25	8.08	45.72	2.29	2.24	5.68
21	45.72	2.29	8.23	46.54	2.33	2.25	5.72
Daily group ration (g)		7.81		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	46.54	2.33	8.38	47.38	2.37	2.26	5.75
23	47.38	2.37	8.53	48.23	2.41	2.28	5.78
24	48.23	2.41	8.68	49.10	2.46	2.29	5.82
25	49.10	2.46	8.84	49.99	2.50	2.30	5.85
26	49.99	2.50	9.00	50.89	2.54	2.32	5.89
27	50.89	2.54	9.16	51.80	2.59	2.33	5.92
28	51.80	2.59	9.32	52.73	2.64	2.35	5.96
Daily group ration (g)		8.84		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	52.73	2.64	9.49	53.68	2.68	2.36	5.99
30	53.68	2.68	9.66	54.65	2.73	2.37	6.03
31	54.65	2.73	9.84	55.63	2.78	2.39	6.07
Daily group ration (g)		9.66		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 8
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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12
Holding Tank/Chamber: E-8 (from B5) **Date Revised/Initials:** 7-20-12 [illegible]
Treatment Group: 300 **Approved for us** [redacted] 7-20-12 Date
Species: BLG **Lot:** 114500

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2
Number of fish	19
Condition Factor (C)	0.00045
[C = 0.00015 - 0.00050 in 0.00005 increments]	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	38.00	2.00	6.84	38.68	2.04	2.15	5.47	
2	38.68	2.04	6.96	39.38	2.07	2.16	5.50	
3	39.38	2.07	7.09	40.09	2.11	2.18	5.53	
4	40.09	2.11	7.22	40.81	2.15	2.19	5.56	
5	40.81	2.15	7.35	41.55	2.19	2.20	5.60	
6	41.55	2.19	7.48	42.29	2.23	2.22	5.63	
7	42.29	2.23	7.61	43.05	2.27	2.23	5.66	
Daily group ration (g)		7.22		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	43.05	2.27	7.75	43.83	2.31	2.24	5.70	
9	43.83	2.31	7.89	44.62	2.35	2.26	5.73	
10	44.62	2.35	8.03	45.42	2.39	2.27	5.77	
11	45.42	2.39	8.18	46.24	2.43	2.28	5.80	
12	46.24	2.43	8.32	47.07	2.48	2.30	5.84	
13	47.07	2.48	8.47	47.92	2.52	2.31	5.87	
14	47.92	2.52	8.63	48.78	2.57	2.32	5.91	
Daily group ration (g)		8.18		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	48.78	2.57	8.78	49.66	2.61	2.34	5.94	
16	49.66	2.61	8.94	50.55	2.66	2.35	5.98	
17	50.55	2.66	9.10	51.46	2.71	2.37	6.01	
18	51.46	2.71	9.26	52.39	2.76	2.38	6.05	
19	52.39	2.76	9.43	53.33	2.81	2.40	6.08	
20	53.33	2.81	9.60	54.29	2.86	2.41	6.12	
21	54.29	2.86	9.77	55.27	2.91	2.42	6.16	
Daily group ration (g)		9.27		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	55.27	2.91	9.95	56.26	2.96	2.44	6.19	
23	56.26	2.96	10.13	57.28	3.01	2.45	6.23	
24	57.28	3.01	10.31	58.31	3.07	2.47	6.27	
25	58.31	3.07	10.50	59.36	3.12	2.48	6.30	
26	59.36	3.12	10.68	60.43	3.18	2.50	6.34	
27	60.43	3.18	10.88	61.51	3.24	2.51	6.38	
28	61.51	3.24	11.07	62.62	3.30	2.53	6.42	
Daily group ration (g)		10.50		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	62.62	3.30	11.27	63.75	3.36	2.54	6.46	
30	63.75	3.36	11.47	64.90	3.42	2.56	6.49	
31	64.90	3.42	11.68	66.05	3.48	2.57	6.53	
Daily group ration (g)		11.48		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.60		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 21
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Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: JH Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C – if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-9 (from A5)_____ **Date Revised/Initials:** [redacted] A
Treatment Group:____200_____ **Approved for use:** [redacted] 7-20-12
Species:_BLG_____ **Lot:** _114500_____ [redacted]or Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	2
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+F33*(1/$D$25)) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	40.00	2.00	7.20	40.72	2.04	2.15	5.47
2	40.72	2.04	7.33	41.45	2.07	2.16	5.50
3	41.45	2.07	7.46	42.20	2.11	2.18	5.53
4	42.20	2.11	7.60	42.96	2.15	2.19	5.56
5	42.96	2.15	7.73	43.73	2.19	2.20	5.60
6	43.73	2.19	7.87	44.52	2.23	2.22	5.63
7	44.52	2.23	8.01	45.32	2.27	2.23	5.66
Daily group ration (g)		7.60		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	45.32	2.27	8.16	46.14	2.31	2.24	5.70
9	46.14	2.31	8.30	46.97	2.35	2.26	5.73
10	46.97	2.35	8.45	47.81	2.39	2.27	5.77
11	47.81	2.39	8.61	48.67	2.43	2.28	5.80
12	48.67	2.43	8.76	49.55	2.48	2.30	5.84
13	49.55	2.48	8.92	50.44	2.52	2.31	5.87
14	50.44	2.52	9.08	51.35	2.57	2.32	5.91
Daily group ration (g)		8.61		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	51.35	2.57	9.24	52.27	2.61	2.34	5.94
16	52.27	2.61	9.41	53.21	2.66	2.35	5.98
17	53.21	2.66	9.58	54.17	2.71	2.37	6.01
18	54.17	2.71	9.75	55.15	2.76	2.38	6.05
19	55.15	2.76	9.93	56.14	2.81	2.40	6.08
20	56.14	2.81	10.11	57.15	2.86	2.41	6.12
21	57.15	2.86	10.29	58.18	2.91	2.42	6.16
Daily group ration (g)		9.76		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	58.18	2.91	10.47	59.23	2.96	2.44	6.19
23	59.23	2.96	10.66	60.29	3.01	2.45	6.23
24	60.29	3.01	10.85	61.38	3.07	2.47	6.27
25	61.38	3.07	11.05	62.48	3.12	2.48	6.30
26	62.48	3.12	11.25	63.61	3.18	2.50	6.34
27	63.61	3.18	11.45	64.75	3.24	2.51	6.38
28	64.75	3.24	11.66	65.92	3.30	2.53	6.42
Daily group ration (g)		11.05		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	65.92	3.30	11.87	67.10	3.36	2.54	6.46
30	67.10	3.36	12.08	68.31	3.42	2.56	6.49
31	68.31	3.42	12.30	69.54	3.48	2.57	6.53
Daily group ration (g)		12.08		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.60		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 18 MAR 2013
File Folder 7 Lab book/pgs 2 / 22-27 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-10 (from C2)_____ **Date Revised/Initials:** [redacted]
Treatment Group:____CONTROL_____ **Approved for use** [redacted] 7-20-12
Species:_BLG_____**Lot:** _114500_____ or Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.81					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H va ue adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	36.20	1.81	6.52	36.85	1.84	2.08	5.29	
34	2	36.85	1.84	6.63	37.51	1.88	2.09	5.32	
35	3	37.51	1.88	6.75	38.19	1.91	2.11	5.35	
36	4	38.19	1.91	6.87	38.88	1.94	2.12	5.38	
37	5	38.88	1.94	7.00	39.58	1.98	2.13	5.41	
38	6	39.58	1.98	7.12	40.29	2.01	2.14	5.45	
39	7	40.29	2.01	7.25	41.02	2.05	2.16	5.48	
40									
41	Daily group ration (g)		6.88		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	41.02	2.05	7.38	41.75	2.09	2.17	5.51	
45	9	41.75	2.09	7.52	42.50	2.13	2.18	5.54	
46	10	42.50	2.13	7.65	43.27	2.16	2.20	5.58	
47	11	43.27	2.16	7.79	44.05	2.20	2.21	5.61	
48	12	44.05	2.20	7.93	44.84	2.24	2.22	5.64	
49	13	44.84	2.24	8.07	45.65	2.28	2.24	5.68	
50	14	45.65	2.28	8.22	46.47	2.32	2.25	5.71	
51									
52	Daily group ration (g)		7.79		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	46.47	2.32	8.36	47.31	2.37	2.26	5.75	
56	16	47.31	2.37	8.52	48.16	2.41	2.28	5.78	
57	17	48.16	2.41	8.67	49.03	2.45	2.29	5.81	
58	18	49.03	2.45	8.82	49.91	2.50	2.30	5.85	
59	19	49.91	2.50	8.98	50.81	2.54	2.32	5.88	
60	20	50.81	2.54	9.15	51.72	2.59	2.33	5.92	
61	21	51.72	2.59	9.31	52.65	2.63	2.34	5.95	
62									
63	Daily group ration (g)		8.83		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	52.65	2.63	9.48	53.60	2.68	2.36	5.99	
67	23	53.60	2.68	9.65	54.56	2.73	2.37	6.03	
68	24	54.56	2.73	9.82	55.55	2.78	2.39	6.06	
69	25	55.55	2.78	10.00	56.55	2.83	2.40	6.10	
70	26	56.55	2.83	10.18	57.56	2.88	2.42	6.13	
71	27	57.56	2.88	10.36	58.60	2.93	2.43	6.17	
72	28	58.60	2.93	10.55	59.65	2.98	2.44	6.21	
73									
74	Daily group ration (g)		10.00		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	59.65	2.98	10.74	60.73	3.04	2.46	6.25	
78	30	60.73	3.04	10.93	61.82	3.09	2.47	6.28	
79	31	61.82	3.09	11.13	62.93	3.15	2.49	6.32	
80									
81	Daily group ration (g)		10.93		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.55		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 21
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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder 7 Lab book/pgs 2 122-27 Verified by: [illegible] Date 4-4-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:** 7-12-12
Holding Tank/Chamber:___E-11 (from A1)_____ **Date Revised/Initia** [redacted]
Treatment Group:____CONTROL_____ **Approved for use:** [redacted] 7-2-12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.76
Number of fish	20
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	35.20	1.76	6.34	35.83	1.79	2.06	5.24
2	35.83	1.79	6.45	36.48	1.82	2.07	5.27
3	36.48	1.82	6.57	37.14	1.86	2.09	5.30
4	37.14	1.86	6.68	37.80	1.89	2.10	5.33
5	37.80	1.89	6.80	38.48	1.92	2.11	5.36
6	38.48	1.92	6.93	39.18	1.96	2.12	5.40
7	39.18	1.96	7.05	39.88	1.99	2.14	5.43
Daily group ration (g)		6.69		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.33		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	39.88	1.99	7.18	40.60	2.03	2.15	5.46
9	40.60	2.03	7.31	41.33	2.07	2.16	5.49
10	41.33	2.07	7.44	42.07	2.10	2.18	5.53
11	42.07	2.10	7.57	42.83	2.14	2.19	5.56
12	42.83	2.14	7.71	43.60	2.18	2.20	5.59
13	43.60	2.18	7.85	44.39	2.22	2.21	5.63
14	44.39	2.22	7.99	45.19	2.26	2.23	5.66
Daily group ration (g)		7.58		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.38		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	45.19	2.26	8.13	46.00	2.30	2.24	5.69
16	46.00	2.30	8.28	46.83	2.34	2.25	5.73
17	46.83	2.34	8.43	47.67	2.38	2.27	5.76
18	47.67	2.38	8.58	48.53	2.43	2.28	5.80
19	48.53	2.43	8.74	49.40	2.47	2.30	5.83
20	49.40	2.47	8.89	50.29	2.51	2.31	5.86
21	50.29	2.51	9.05	51.20	2.56	2.32	5.90
Daily group ration (g)		8.59		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.43		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	51.20	2.56	9.22	52.12	2.61	2.34	5.93
23	52.12	2.61	9.38	53.06	2.65	2.35	5.97
24	53.06	2.65	9.55	54.01	2.70	2.36	6.01
25	54.01	2.70	9.72	54.98	2.75	2.38	6.04
26	54.98	2.75	9.90	55.97	2.80	2.39	6.08
27	55.97	2.80	10.08	56.98	2.85	2.41	6.11
28	56.98	2.85	10.26	58.01	2.90	2.42	6.15
Daily group ration (g)		9.73		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.49		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	58.01	2.90	10.44	59.05	2.95	2.44	6.19
30	59.05	2.95	10.63	60.11	3.01	2.45	6.22
31	60.11	3.01	10.82	61.20	3.06	2.46	6.26
Daily group ration (g)		10.63		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.53		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 21
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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2 , 22-27

Reviewed by: KAW Date: 19APR2013
Verified by: [illegible] Date 6-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__
Holding Tank/Chamber:___E-12 (from B4)_____
Treatment Group:____50____________
Species:_BLG____________Lot: _114500______

Date Created/Initi[redacted]
Date Revised/Initi[redacted]
Approved for use:[redacted] 7-20-12
[redacted]**or** **Date**

Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	2.04
Number of fish	19
Condition Factor (C)	0.00045
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	10
% B.W./d	18

Worksheet Formules

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	38.76	2.04	6.98	39.46	2.08	2.17	5.50
2	39.46	2.08	7.10	40.17	2.11	2.18	5.54
3	40.17	2.11	7.23	40.89	2.15	2.19	5.57
4	40.89	2.15	7.36	41.63	2.19	2.21	5.60
5	41.63	2.19	7.49	42.38	2.23	2.22	5.63
6	42.38	2.23	7.63	43.14	2.27	2.23	5.67
7	43.14	2.27	7.77	43.92	2.31	2.24	5.70
Daily group ration (g)		7.37	←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.39	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	43.92	2.31	7.90	44.71	2.35	2.26	5.74
9	44.71	2.35	8.05	45.51	2.40	2.27	5.77
10	45.51	2.40	8.19	46.33	2.44	2.29	5.80
11	46.33	2.44	8.34	47.16	2.48	2.30	5.84
12	47.16	2.48	8.49	48.01	2.53	2.31	5.87
13	48.01	2.53	8.64	48.88	2.57	2.33	5.91
14	48.88	2.57	8.80	49.76	2.62	2.34	5.94
Daily group ration (g)		8.34	←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.44	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	49.76	2.62	8.96	50.65	2.67	2.35	5.98
16	50.65	2.67	9.12	51.56	2.71	2.37	6.02
17	51.56	2.71	9.28	52.49	2.76	2.38	6.05
18	52.49	2.76	9.45	53.44	2.81	2.40	6.09
19	53.44	2.81	9.62	54.40	2.86	2.41	6.12
20	54.40	2.86	9.79	55.38	2.91	2.43	6.16
21	55.38	2.91	9.97	56.38	2.97	2.44	6.20
Daily group ration (g)		9.45	←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.50	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	56.38	2.97	10.15	57.39	3.02	2.45	6.23
23	57.39	3.02	10.33	58.42	3.07	2.47	6.27
24	58.42	3.07	10.52	59.47	3.13	2.48	6.31
25	59.47	3.13	10.71	60.54	3.19	2.50	6.35
26	60.54	3.19	10.90	61.63	3.24	2.51	6.38
27	61.63	3.24	11.09	62.74	3.30	2.53	6.42
28	62.74	3.30	11.29	63.87	3.36	2.54	6.46
Daily group ration (g)		10.71	←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.56	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	63.87	3.36	11.50	65.02	3.42	2.56	6.50
30	65.02	3.42	11.70	66.19	3.48	2.57	6.54
31	66.19	3.48	11.91	67.39	3.55	2.59	6.58
Daily group ration (g)		11.71	←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.62	←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 21
Pg 12 of 15

Study Number: AEH-12-PSEUDO-09 Reviewed by: KWW Date: MMAR2013
File Folder: 1 Lab book/pgs 2, 22-27 Verified by: JJ~ Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-13 (from A4)____ **Date Revised/Initi**[redacted]
Treatment Group:____50____ **Approved for use:**[redacted] 7-20-12 Date
Species:_BLG_____**Lot:** _114500_____

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.87					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initia fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$U$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g)=G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	37.40	1.87	6.73	38.07	1.90	2.10	5.34	
34	2	38.07	1.90	6.85	38.76	1.94	2.12	5.38	
35	3	38.76	1.94	6.98	39.46	1.97	2.13	5.41	
36	4	39.46	1.97	7.10	40.17	2.01	2.14	5.44	
37	5	40.17	2.01	7.23	40.89	2.04	2.15	5.47	
38	6	40.89	2.04	7.36	41.63	2.08	2.17	5.51	
39	7	41.63	2.08	7.49	42.37	2.12	2.18	5.54	
40									
41	Daily group ration (g)		7.11		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	42.37	2.12	7.63	43.14	2.16	2.19	5.57	
45	9	43.14	2.16	7.76	43.91	2.20	2.21	5.61	
46	10	43.91	2.20	7.90	44.70	2.24	2.22	5.64	
47	11	44.70	2.24	8.05	45.51	2.28	2.23	5.67	
48	12	45.51	2.28	8.19	46.33	2.32	2.25	5.71	
49	13	46.33	2.32	8.34	47.16	2.36	2.26	5.74	
50	14	47.16	2.36	8.49	48.01	2.40	2.27	5.77	
51									
52	Daily group ration (g)		8.05		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.40		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	48.01	2.40	8.64	48.88	2.44	2.29	5.81	
56	16	48.88	2.44	8.80	49.75	2.49	2.30	5.84	
57	17	49.75	2.49	8.96	50.65	2.53	2.31	5.88	
58	18	50.65	2.53	9.12	51.56	2.58	2.33	5.91	
59	19	51.56	2.58	9.28	52.49	2.62	2.34	5.95	
60	20	52.49	2.62	9.45	53.44	2.67	2.36	5.98	
61	21	53.44	2.67	9.62	54.40	2.72	2.37	6.02	
62									
63	Daily group ration (g)		9.12		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	54.40	2.72	9.79	55.38	2.77	2.38	6.06	
67	23	55.38	2.77	9.97	56.37	2.82	2.40	6.09	
68	24	56.37	2.82	10.15	57.39	2.87	2.41	6.13	
69	25	57.39	2.87	10.33	58.42	2.92	2.43	6.16	
70	26	58.42	2.92	10.52	59.47	2.97	2.44	6.20	
71	27	59.47	2.97	10.70	60.54	3.03	2.46	6.24	
72	28	60.54	3.03	10.90	61.63	3.08	2.47	6.28	
73									
74	Daily group ration (g)		10.34		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.52		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	61.63	3.08	11.09	62.74	3.14	2.49	6.31	
78	30	62.74	3.14	11.29	63.87	3.19	2.50	6.35	
79	31	63.87	3.19	11.50	65.02	3.25	2.52	6.39	
80									
81	Daily group ration (g)		11.29		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 21
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Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 10MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System Holding Rack Quadrant E **Date Created/Initials:** 7-12-12
Holding Tank/Chamber: E-14 (from B3) **Date Revised/Initials:** 7-20-12 [redacted]
Treatment Group: CONTROL **Approved for use:** [redacted] 7-20-12
Species: BLG **Lot:** 114500 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			1.97					
21	Number of fish			20					
22	Condition Factor (C)			0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			10					
26	% B.W./d			18					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333333 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	39.40	1.97	7.09	40.11	2.01	2.14	5.44
34	2	40.11	2.01	7.22	40.83	2.04	2.15	5.47
35	3	40.83	2.04	7.35	41.57	2.08	2.17	5.50
36	4	41.57	2.08	7.48	42.31	2.12	2.18	5.54
37	5	42.31	2.12	7.62	43.08	2.15	2.19	5.57
38	6	43.08	2.15	7.75	43.85	2.19	2.21	5.60
39	7	43.85	2.19	7.89	44.64	2.23	2.22	5.64
40								
41	Daily group ration (g)		7.49		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.37		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	44.64	2.23	8.04	45.44	2.27	2.23	5.67
45	9	45.44	2.27	8.18	46.26	2.31	2.25	5.70
46	10	46.26	2.31	8.33	47.09	2.35	2.26	5.74
47	11	47.09	2.35	8.48	47.94	2.40	2.27	5.77
48	12	47.94	2.40	8.63	48.81	2.44	2.29	5.81
49	13	48.81	2.44	8.79	49.68	2.48	2.30	5.84
50	14	49.68	2.48	8.94	50.58	2.53	2.31	5.88
51								
52	Daily group ration (g)		8.48		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		0.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	50.58	2.53	9.10	51.49	2.57	2.33	5.91
56	16	51.49	2.57	9.27	52.42	2.62	2.34	5.95
57	17	52.42	2.62	9.43	53.36	2.67	2.35	5.98
58	18	53.36	2.67	9.60	54.32	2.72	2.37	6.02
59	19	54.32	2.72	9.78	55.30	2.76	2.38	6.05
60	20	55.30	2.76	9.95	56.28	2.81	2.40	6.09
61	21	56.29	2.81	10.13	57.31	2.87	2.41	6.13
62								
63	Daily group ration (g)		9.61		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		0.48		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	57.31	2.87	10.32	58.34	2.92	2.43	6.16
67	23	58.34	2.92	10.50	59.39	2.97	2.44	6.20
68	24	59.39	2.97	10.69	60.46	3.02	2.45	6.24
69	25	60.46	3.02	10.88	61.54	3.08	2.47	6.27
70	26	61.54	3.08	11.08	62.65	3.13	2.48	6.31
71	27	62.65	3.13	11.28	63.78	3.19	2.50	6.35
72	28	63.78	3.19	11.48	64.93	3.25	2.51	6.39
73								
74	Daily group ration (g)		10.89		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		0.54		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	64.93	3.25	11.69	66.10	3.30	2.53	6.42
78	30	66.10	3.30	11.90	67.29	3.36	2.54	6.46
79	31	67.29	3.36	12.11	68.50	3.42	2.56	6.50
80								
81	Daily group ration (g)		11.90		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		0.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 21
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 22-27 Verified by: JAC Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System__Holding Rack Quadrant E__ **Date Created/Initials:**__7-12-12__
Holding Tank/Chamber:___E-15 (from B1)____ **Date Revised/Init**[redacted]
Treatment Group:____200_____ **Approved for use**[redacted] 7-20-12
Species:_BLG_____**Lot:** _114500_____ Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)		2.04					
21	Number of fish		20					
22	Condition Factor (C)		0.00045					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR		10					
26	% B.W./d		18					
27								

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333636 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	40.80	2.04	7.34	41.53	2.08	2.17	5.50	
34	2	41.53	2.08	7.48	42.28	2.11	2.18	5.54	
35	3	42.28	2.11	7.61	43.04	2.15	2.19	5.57	
36	4	43.04	2.15	7.75	43.82	2.19	2.21	5.60	
37	5	43.82	2.19	7.89	44.61	2.23	2.22	5.63	
38	6	44.61	2.23	8.03	45.41	2.27	2.23	5.67	
39	7	45.41	2.27	8.17	46.23	2.31	2.24	5.70	
40									
41	Daily group ration (g)		7.75		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	46.23	2.31	8.32	47.06	2.35	2.26	5.74	
45	9	47.06	2.35	8.47	47.91	2.40	2.27	5.77	
46	10	47.91	2.40	8.62	48.77	2.44	2.29	5.80	
47	11	48.77	2.44	8.78	49.65	2.48	2.30	5.84	
48	12	49.65	2.48	8.94	50.54	2.53	2.31	5.87	
49	13	50.54	2.53	9.10	51.45	2.57	2.33	5.91	
50	14	51.45	2.57	9.26	52.38	2.62	2.34	5.94	
51									
52	Daily group ration (g)		8.78		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.44		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	52.38	2.62	9.43	53.32	2.67	2.35	5.98	
56	16	53.32	2.67	9.60	54.28	2.71	2.37	6.02	
57	17	54.28	2.71	9.77	55.26	2.76	2.38	6.05	
58	18	55.26	2.76	9.95	56.25	2.81	2.40	6.09	
59	19	56.25	2.81	10.12	57.26	2.86	2.41	6.12	
60	20	57.26	2.86	10.31	58.29	2.91	2.43	6.16	
61	21	58.29	2.91	10.49	59.34	2.97	2.44	6.20	
62									
63	Daily group ration (g)		9.95		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	59.34	2.97	10.68	60.41	3.02	2.46	6.23	
67	23	60.41	3.02	10.87	61.50	3.07	2.47	6.27	
68	24	61.50	3.07	11.07	62.60	3.13	2.48	6.31	
69	25	62.60	3.13	11.27	63.73	3.19	2.50	6.35	
70	26	63.73	3.19	11.47	64.88	3.24	2.51	6.38	
71	27	64.88	3.24	11.68	66.05	3.30	2.53	6.42	
72	28	66.05	3.30	11.89	67.24	3.36	2.54	6.46	
73									
74	Daily group ration (g)		11.28		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	67.24	3.36	12.10	68.45	3.42	2.56	6.50	
78	30	68.45	3.42	12.32	69.68	3.48	2.57	6.54	
79	31	69.68	3.48	12.54	70.93	3.55	2.59	6.58	
80									
81	Daily group ration (g)		12.32		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.62		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 21
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: KW Date: 19MAR2013
Verified by: JAV Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C – If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G1 (from B2)
Treatment Group: 100 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JAV
Date Revised/Initials:
Approved for us [redacted] 8-2-12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initia fish size (g)	4.15
Number of fish	20
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($O$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$O$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$E$22)^0.333333S36 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	83.00	4.15	16.60	84.84	4.24	3.60	9.15
2	84.84	4.24	16.97	86.73	4.34	3.63	9.22
3	86.73	4.34	17.35	88.66	4.43	3.65	9.28
4	88.66	4.43	17.73	90.63	4.53	3.68	9.35
5	90.63	4.53	18.13	92.64	4.63	3.71	9.42
6	92.64	4.63	18.53	94.70	4.74	3.74	9.49
7	94.70	4.74	18.94	96.80	4.84	3.76	9.56
Daily group ration (g)		17.75		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.89		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	96.80	4.84	19.36	98.96	4.95	3.79	9.63
9	98.96	4.95	19.79	101.15	5.06	3.82	9.70
10	101.15	5.06	20.23	103.40	5.17	3.85	9.77
11	103.40	5.17	20.68	105.70	5.29	3.88	9.84
12	105.70	5.29	21.14	108.05	5.40	3.90	9.92
13	108.05	5.40	21.61	110.45	5.52	3.93	9.98
14	110.45	5.52	22.09	112.90	5.65	3.96	10.06
Daily group ration (g)		20.70		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.04		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	112.90	5.65	22.58	115.41	5.77	3.99	10.14
16	115.41	5.77	23.08	117.98	5.90	4.02	10.21
17	117.98	5.90	23.60	120.60	6.03	4.05	10.29
18	120.60	6.03	24.12	123.28	6.16	4.08	10.36
19	123.28	6.16	24.66	126.02	6.30	4.11	10.44
20	126.02	6.30	25.20	128.82	6.44	4.14	10.51
21	128.82	6.44	25.76	131.68	6.58	4.17	10.59
Daily group ration (g)		24.14		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	131.68	6.58	26.34	134.61	6.73	4.20	10.67
23	134.61	6.73	26.92	137.60	6.88	4.23	10.75
24	137.60	6.88	27.52	140.66	7.03	4.26	10.83
25	140.66	7.03	28.13	143.78	7.19	4.29	10.91
26	143.78	7.19	28.76	146.98	7.35	4.33	10.99
27	146.98	7.35	29.40	150.25	7.51	4.36	11.07
28	150.25	7.51	30.05	153.58	7.68	4.39	11.16
Daily group ration (g)		28.16		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	153.58	7.68	30.72	157.00	7.85	4.42	11.23
30	157.00	7.85	31.40	160.48	8.02	4.45	11.31
31	160.48	8.02	32.10	164.05	8.20	4.48	11.40
Daily group ration (g)		31.40		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.57		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: RW Date: 19MAR2013
Verified by: JA Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and %B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G2 (from B3)
Treatment Group: 50 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JA
Date Revised/I [redacted]
Approved for u [redacted] 8-2-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			4.15					
21	Number of fish			20					
22	Condition Factor (C)			0.0002					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			9					
26	% B.W./d			20					

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$I$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	83.00	4.15	16.60	84.84	4.24	3.60	9.15
2	84.84	4.24	16.97	86.78	4.34	3.63	9.22
3	86.78	4.34	17.35	88.66	4.43	3.65	9.28
4	88.66	4.43	17.73	90.63	4.53	3.68	9.35
5	90.63	4.53	18.13	92.64	4.63	3.71	9.42
6	92.64	4.63	18.53	94.70	4.74	3.74	9.49
7	94.70	4.74	18.94	96.80	4.84	3.76	9.56
Daily group ration (g)		**17.75**		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		**0.89**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	96.80	4.84	19.36	98.96	4.95	3.79	9.63
9	98.96	4.95	19.79	101.15	5.06	3.82	9.70
10	101.15	5.06	20.23	103.40	5.17	3.85	9.77
11	103.40	5.17	20.68	105.70	5.29	3.88	9.84
12	105.70	5.29	21.14	108.05	5.40	3.90	9.92
13	108.05	5.40	21.61	110.45	5.52	3.93	9.99
14	110.45	5.52	22.09	112.90	5.65	3.96	10.06
Daily group ration (g)		**20.70**		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		**1.04**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	112.80	5.65	22.58	115.41	5.77	3.99	10.14
16	115.41	5.77	23.08	117.98	5.90	4.02	10.21
17	117.98	5.90	23.60	120.60	6.03	4.05	10.29
18	120.60	6.03	24.12	123.28	6.16	4.08	10.36
19	123.28	6.16	24.66	126.02	6.30	4.11	10.44
20	126.02	6.30	25.20	128.82	6.44	4.14	10.51
21	128.82	6.44	25.76	131.68	6.58	4.17	10.59
Daily group ration (g)		**24.14**		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		**1.21**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	131.68	6.58	26.34	134.61	6.73	4.20	10.67
23	134.61	6.73	26.92	137.60	6.88	4.23	10.75
24	137.60	6.88	27.52	140.66	7.03	4.26	10.83
25	140.66	7.03	28.13	143.78	7.19	4.29	10.91
26	143.78	7.19	28.76	146.98	7.35	4.33	10.99
27	146.98	7.35	29.40	150.25	7.51	4.36	11.07
28	150.25	7.51	30.05	153.58	7.68	4.39	11.15
Daily group ration (g)		**28.16**		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		**1.41**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	153.58	7.68	30.72	157.00	7.85	4.42	11.23
30	157.00	7.85	31.40	160.49	8.02	4.45	11.31
31	160.49	8.02	32.10	164.05	8.20	4.48	11.40
Daily group ration (g)		**31.40**		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		**1.57**		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: KW Date: 11 MAR 2013
Verified by: JD Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d – Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G3 (from A3)
Treatment Group: 300 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JA
Date Revised/[redacted]
Approved for [redacted] 8-2-12
[redacted]tor Date

Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	5.06
Number of fish	10
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	50.60	5.06	10.12	51.72	5.17	3.85	9.77
2	51.72	5.17	10.34	52.87	5.29	3.88	9.85
3	52.87	5.29	10.57	54.05	5.40	3.90	9.92
4	54.05	5.40	10.81	55.25	5.52	3.93	9.99
5	55.25	5.52	11.05	56.48	5.65	3.96	10.06
6	56.48	5.65	11.30	57.73	5.77	3.99	10.14
7	57.73	5.77	11.55	59.02	5.90	4.02	10.21
Daily group ration (g)		10.82		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		1.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	59.02	5.90	11.80	60.33	6.03	4.05	10.29
9	60.33	6.03	12.07	61.67	6.17	4.08	10.36
10	61.67	6.17	12.33	63.04	6.30	4.11	10.44
11	63.04	6.30	12.61	64.44	6.44	4.14	10.52
12	64.44	6.44	12.89	65.87	6.59	4.17	10.59
13	65.87	6.59	13.17	67.33	6.73	4.20	10.67
14	67.33	6.73	13.47	68.83	6.88	4.23	10.75
Daily group ration (g)		12.62		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	68.83	6.88	13.77	70.36	7.04	4.26	10.83
16	70.36	7.04	14.07	71.92	7.19	4.29	10.91
17	71.92	7.19	14.38	73.52	7.35	4.33	10.99
18	73.52	7.35	14.70	75.16	7.52	4.36	11.07
19	75.16	7.52	15.03	76.83	7.68	4.39	11.15
20	76.83	7.68	15.37	78.53	7.85	4.42	11.23
21	78.53	7.85	15.71	80.28	8.03	4.45	11.32
Daily group ration (g)		14.72		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	80.28	8.03	16.06	82.06	8.21	4.49	11.40
23	82.06	8.21	16.41	83.89	8.39	4.52	11.48
24	83.89	8.39	16.78	85.75	8.58	4.55	11.57
25	85.75	8.58	17.15	87.66	8.77	4.59	11.65
26	87.66	8.77	17.53	89.60	8.96	4.62	11.74
27	89.60	8.96	17.92	91.60	9.16	4.66	11.82
28	91.60	9.16	18.32	93.63	9.36	4.69	11.91
Daily group ration (g)		17.17		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.72		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	93.63	9.36	18.73	95.71	9.57	4.72	12.00
30	95.71	9.57	19.14	97.84	9.78	4.76	12.09
31	97.84	9.78	19.57	100.01	10.00	4.79	12.18
Daily group ration (g)		19.15		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.91		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 3 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2 , 27-33

Reviewed by: KW Date: 4 MAR 2013
Verified by: JA Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 405-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G4 (from A4)
Treatment Group: control
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JA
Date Revised/[redacted]
Approved for [redacted] 8-2-12
Date

Column: c d e f g h i j

INPUT SECTION	
Initial fish size (g)	4.2
Number of fish	20
Condition Factor (C)	0.0002
(C= 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	84.00	4.20	16.80	85.87	4.29	3.62	9.18
2	85.87	4.29	17.17	87.77	4.39	3.64	9.25
3	87.77	4.39	17.55	89.73	4.49	3.67	9.32
4	89.73	4.49	17.95	91.72	4.59	3.70	9.39
5	91.72	4.59	18.34	93.76	4.69	3.72	9.46
6	93.76	4.69	18.75	95.84	4.79	3.75	9.53
7	95.84	4.79	19.17	97.97	4.90	3.78	9.60

Daily group ration (g) **17.96** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.90** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

8	97.97	4.90	19.59	100.15	5.01	3.81	9.67
9	100.15	5.01	20.03	102.37	5.12	3.83	9.74
10	102.37	5.12	20.47	104.65	5.23	3.86	9.81
11	104.65	5.23	20.93	106.97	5.35	3.89	9.88
12	106.97	5.35	21.39	109.35	5.47	3.92	9.96
13	109.35	5.47	21.87	111.78	5.59	3.95	10.03
14	111.78	5.59	22.36	114.27	5.71	3.98	10.10

Daily group ration (g) **20.95** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **1.05** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

25	114.27	5.71	22.85	116.80	5.84	4.01	10.18
16	116.80	5.84	23.36	119.40	5.97	4.04	10.25
17	119.40	5.97	23.88	122.05	6.10	4.07	10.33
18	122.05	6.10	24.41	124.77	6.24	4.10	10.40
19	124.77	6.24	24.95	127.54	6.38	4.13	10.48
20	127.54	6.38	25.51	130.37	6.52	4.16	10.56
21	130.37	6.52	26.07	133.27	6.66	4.19	10.63

Daily group ration (g) **24.43** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **1.22** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

22	133.27	6.66	26.65	136.23	6.81	4.22	10.71
23	136.23	6.81	27.25	139.26	6.96	4.25	10.79
24	139.26	6.96	27.85	142.35	7.12	4.28	10.87
25	142.35	7.12	28.47	145.52	7.28	4.31	10.95
26	145.52	7.28	29.10	148.75	7.44	4.34	11.03
27	148.75	7.44	29.75	152.06	7.60	4.37	11.11
28	152.06	7.60	30.41	155.43	7.77	4.41	11.19

Daily group ration (g) **28.50** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **1.42** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

29	155.43	7.77	31.09	158.89	7.94	4.44	11.28
30	158.89	7.94	31.78	162.42	8.12	4.47	11.36
31	162.42	8.12	32.48	166.03	8.30	4.50	11.44

Daily group ration (g) **31.78** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **1.59** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

FF # 7
Item No. 22
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: [illegible] Date: 14MAR2013
Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G5 (from C1)
Treatment Group: 50 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JRL
Date Revised/ [redacted]
Approved for [redacted] 8-2-12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	4.42
Number of fish	20
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$CE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	88.40	4.42	17.68	90.86	4.57	3.68	9.34
2	90.36	4.52	18.07	92.37	4.62	3.71	9.41
3	92.37	4.62	18.47	94.43	4.72	3.73	9.48
4	94.43	4.72	18.89	96.52	4.83	3.76	9.55
5	96.52	4.83	19.30	98.67	4.93	3.79	9.62
6	98.67	4.93	19.73	100.86	5.04	3.82	9.69
7	100.86	5.04	20.17	103.10	5.16	3.84	9.76
Daily group ration (g)		18.90		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.95		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	103.10	5.16	20.62	105.39	5.27	3.87	9.83
9	105.39	5.27	21.08	107.74	5.39	3.90	9.91
10	107.74	5.39	21.55	110.13	5.51	3.93	9.98
11	110.13	5.51	22.03	112.58	5.63	3.96	10.05
12	112.58	5.63	22.52	115.08	5.75	3.99	10.13
13	115.08	5.75	23.02	117.64	5.88	4.02	10.20
14	117.64	5.88	23.53	120.25	6.01	4.05	10.28
Daily group ration (g)		22.05		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	120.25	6.01	24.05	122.92	6.15	4.08	10.35
16	122.92	6.15	24.58	125.65	6.28	4.11	10.43
17	125.65	6.28	25.13	128.45	6.42	4.14	10.50
18	128.45	6.42	25.69	131.30	6.57	4.17	10.58
19	131.30	6.57	26.26	134.22	6.71	4.20	10.66
20	134.22	6.71	26.84	137.20	6.86	4.23	10.74
21	137.20	6.86	27.44	140.25	7.01	4.26	10.82
Daily group ration (g)		25.71		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	140.25	7.01	28.05	143.37	7.17	4.29	10.90
23	143.37	7.17	28.67	146.55	7.33	4.32	10.98
24	146.55	7.33	29.31	149.81	7.49	4.35	11.06
25	149.81	7.49	29.96	153.14	7.66	4.39	11.14
26	153.14	7.66	30.63	156.54	7.83	4.42	11.22
27	156.54	7.83	31.31	160.02	8.00	4.45	11.30
28	160.02	8.00	32.00	163.58	8.18	4.48	11.39
Daily group ration (g)		29.99		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	163.58	8.18	32.72	167.21	8.36	4.52	11.47
30	167.21	8.36	33.44	170.93	8.55	4.55	11.55
31	170.93	8.55	34.19	174.73	8.74	4.58	11.64
Daily group ration (g)		33.45		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.67		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 2, 27-33

Reviewed by: [illegible] Date: 14 MAR 2013
Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G6 (from A5)
Treatment Group: 50 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JW
Date Revised/I [redacted]
Approved for u [redacted] 8-2-12
Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)	4.32						
21	Number of fish	20						
22	Condition Factor (C)	0.0002						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR	9						
26	% B.W./d	20						

Worksheet Formulas
Group Total Initia fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($O$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$O$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((h33/454)/$E$22)^0.333333536 (Column h value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
33	1	86.40	4.32	17.28	88.32	4.42	3.65	9.27
34	2	88.32	4.42	17.66	90.28	4.51	3.68	9.34
35	3	90.28	4.51	18.06	92.29	4.61	3.70	9.41
36	4	92.29	4.61	18.46	94.34	4.72	3.73	9.48
37	5	94.34	4.72	18.87	96.44	4.82	3.76	9.55
38	6	96.44	4.82	19.29	98.58	4.93	3.79	9.62
39	7	98.58	4.93	19.72	100.77	5.04	3.81	9.69
40								
41	Daily group ration (g)		18.48		←OUTPUT - GROUP FEED RATE (g) for week 1			
42	Daily per fish ration (g)		0.92		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
43								
44	8	100.77	5.04	20.15	103.01	5.15	3.84	9.76
45	9	103.01	5.15	20.60	105.30	5.26	3.87	9.83
46	10	105.30	5.26	21.06	107.64	5.38	3.90	9.90
47	11	107.64	5.38	21.53	110.03	5.50	3.93	9.98
48	12	110.03	5.50	22.01	112.48	5.62	3.96	10.05
49	13	112.48	5.62	22.50	114.97	5.75	3.99	10.12
50	14	114.97	5.75	22.99	117.53	5.88	4.01	10.20
51								
52	Daily group ration (g)		21.55		←OUTPUT - GROUP FEED RATE (g) for week 2			
53	Daily per fish ration (g)		1.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
54								
55	15	117.53	5.88	23.51	120.14	6.01	4.04	10.27
56	16	120.14	6.01	24.03	122.81	6.14	4.07	10.35
57	17	122.81	6.14	24.56	125.54	6.28	4.10	10.42
58	18	125.54	6.28	25.11	128.33	6.42	4.13	10.50
59	19	128.33	6.42	25.67	131.18	6.56	4.16	10.58
60	20	131.18	6.56	26.24	134.10	6.70	4.20	10.66
61	21	134.10	6.70	26.82	137.08	6.85	4.23	10.73
62								
63	Daily group ration (g)		25.13		←OUTPUT - GROUP FEED RATE (g) for week 3			
64	Daily per fish ration (g)		1.26		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
65								
66	22	137.08	6.85	27.42	140.12	7.01	4.26	10.81
67	23	140.12	7.01	28.02	143.24	7.16	4.29	10.89
68	24	143.24	7.16	28.65	146.42	7.32	4.32	10.97
69	25	146.42	7.32	29.28	149.67	7.48	4.35	11.05
70	26	149.67	7.48	29.93	153.00	7.65	4.38	11.14
71	27	153.00	7.65	30.60	156.40	7.82	4.42	11.22
72	28	156.40	7.82	31.28	159.88	7.99	4.45	11.30
73								
74	Daily group ration (g)		29.31		←OUTPUT - GROUP FEED RATE (g) for week 4			
75	Daily per fish ration (g)		1.47		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
76								
77	29	159.88	7.99	31.98	163.43	8.17	4.48	11.38
78	30	163.43	8.17	32.69	167.06	8.35	4.51	11.47
79	31	167.06	8.35	33.41	170.77	8.54	4.55	11.55
80								
81	Daily group ration (g)		32.69		←OUTPUT - GROUP FEED RATE (g) for week 5			
82	Daily per fish ration (g)		1.63		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 6 of 15

Study Number: AEH-22-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder: 1 Lab book/pgs: 2, 27-33 Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 486-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G7 (from A1)
Treatment Group: 100 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 Jan
Date Revised/i [redacted]
Approved for u [redacted] 8-2-12 Date

Row	Column:	b	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	4.2
Number of fish	20
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Fina Length (cm)
1	84.00	4.20	16.80	85.87	4.29	3.62	9.18
2	85.87	4.29	17.17	87.77	4.39	3.64	9.25
3	87.77	4.39	17.55	89.73	4.49	3.67	9.32
4	89.73	4.49	17.95	91.72	4.59	3.70	9.39
5	91.72	4.59	18.34	93.76	4.69	3.72	9.46
6	93.76	4.69	18.75	95.84	4.79	3.75	9.53
7	95.84	4.79	19.17	97.97	4.90	3.78	9.60
Daily group ration (g)		17.96		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.90		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	97.97	4.90	19.59	100.15	5.01	3.81	9.67
9	100.15	5.01	20.03	102.37	5.12	3.83	9.74
10	102.37	5.12	20.47	104.65	5.23	3.86	9.81
11	104.65	5.23	20.93	106.97	5.35	3.89	9.88
12	106.97	5.35	21.39	109.35	5.47	3.92	9.96
13	109.35	5.47	21.87	111.78	5.59	3.95	10.03
14	111.78	5.59	22.36	114.27	5.71	3.98	10.10
Daily group ration (g)		20.95		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.05		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	114.27	5.71	22.85	116.80	5.84	4.01	10.18
16	116.80	5.84	23.36	119.40	5.97	4.04	10.25
17	119.40	5.97	23.88	122.05	6.10	4.07	10.33
18	122.05	6.10	24.41	124.77	6.24	4.10	10.40
19	124.77	6.24	24.95	127.54	6.38	4.13	10.48
20	127.54	6.38	25.51	130.37	6.52	4.16	10.56
21	130.37	6.52	26.07	133.27	6.66	4.19	10.63
Daily group ration (g)		24.43		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.22		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	133.27	6.66	26.65	136.23	6.81	4.22	10.71
23	136.23	6.81	27.25	139.26	6.96	4.25	10.79
24	139.26	6.96	27.85	142.35	7.12	4.28	10.87
25	142.35	7.12	28.47	145.52	7.28	4.31	10.95
26	145.52	7.28	29.10	148.75	7.44	4.34	11.03
27	148.75	7.44	29.75	152.06	7.60	4.37	11.11
28	152.06	7.60	30.41	155.43	7.77	4.41	11.19
Daily group ration (g)		28.50		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.42		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	155.43	7.77	31.09	158.89	7.94	4.44	11.28
30	158.89	7.94	31.78	162.42	8.12	4.47	11.36
31	162.42	8.12	32.48	166.03	8.30	4.50	11.44
Daily group ration (g)		31.78		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 22
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Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 2, 27-33

Reviewed by: JW Date: 19MAR2013
Verified by: Date: 4-5-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G8 (from B5)
Treatment Group: control
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JaL
Date Revised/Ini [redacted]
Approved for use [redacted] 8-2-12
Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			4.79					
21	Number of fish			20					
22	Condition Factor (C)			0.0002					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			9					
26	% B.W./d			20					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$L$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$F$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	95.80	4.79	19.16	97.93	4.90	3.78	9.60
2	97.93	4.90	19.59	100.11	5.01	3.81	9.67
3	100.11	5.01	20.02	102.33	5.12	3.83	9.74
4	102.33	5.12	20.47	104.60	5.23	3.86	9.81
5	104.60	5.23	20.92	106.93	5.35	3.89	9.88
6	106.93	5.35	21.39	109.30	5.47	3.92	9.95
7	109.30	5.47	21.86	111.73	5.59	3.95	10.03
Daily group ration (g)		20.49		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		1.02		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	111.73	5.59	22.35	114.22	5.71	3.98	10.10
9	114.22	5.71	22.84	116.75	5.84	4.01	10.18
10	116.75	5.84	23.35	119.35	5.97	4.04	10.25
11	119.35	5.97	23.87	122.00	6.10	4.07	10.33
12	122.00	6.10	24.40	124.71	6.24	4.10	10.40
13	124.71	6.24	24.94	127.48	6.37	4.13	10.48
14	127.48	6.37	25.50	130.32	6.52	4.16	10.56
Daily group ration (g)		23.89		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.19		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	130.32	6.52	26.06	133.21	6.66	4.19	10.63
16	133.21	6.66	26.64	136.17	6.81	4.22	10.71
17	136.17	6.81	27.23	139.20	6.96	4.25	10.79
18	139.20	6.96	27.84	142.29	7.11	4.28	10.87
19	142.29	7.11	28.46	145.45	7.27	4.31	10.95
20	145.45	7.27	29.09	148.69	7.43	4.34	11.03
21	148.69	7.43	29.74	151.99	7.60	4.37	11.11
Daily group ration (g)		27.87		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.39		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	151.99	7.60	30.40	155.37	7.77	4.41	11.19
23	155.37	7.77	31.07	158.82	7.94	4.44	11.27
24	158.82	7.94	31.76	162.35	8.12	4.47	11.36
25	162.35	8.12	32.47	165.96	8.30	4.50	11.44
26	165.96	8.30	33.19	169.65	8.48	4.54	11.53
27	169.65	8.48	33.93	173.42	8.67	4.57	11.61
28	173.42	8.67	34.68	177.27	8.86	4.60	11.70
Daily group ration (g)		32.50		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.63		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	177.27	8.86	35.45	181.21	9.06	4.64	11.78
30	181.21	9.06	36.24	185.24	9.26	4.67	11.87
31	185.24	9.26	37.05	189.35	9.47	4.71	11.96
Daily group ration (g)		36.25		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.81		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 22
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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: [illegible] Date: 19MAR'13
Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G9 (from B1)
Treatment Group: 300 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JW
Date Revised/In[illegible]
Approved for u[illegible] [redacted] 8-2-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**						Worksheet Formulas		
20	Initial fish size (g)			4.5			Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)		
21	Number of fish			15			Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)		
22	Condition Factor (C)			0.0092			Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)		
23	(C = 0.00915 - 0.00950 in 0.00005 increments)						Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)		
24							Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)		
25	FCR			9			Fish Final Length (inches) =(H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)		
26	% B.W./d			20			Fish Fina Length (cm) = I33*2.54 (numerator value adjusts by row)		
27									

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
28									
29									
30									
31									
32									
33	1	67.50	4.50	13.50	69.00	4.60	3.70	9.40	
34	2	69.00	4.60	13.80	70.53	4.70	3.73	9.47	
35	3	70.53	4.70	14.11	72.10	4.81	3.75	9.54	
36	4	72.10	4.81	14.42	73.70	4.91	3.78	9.61	
37	5	73.70	4.91	14.74	75.34	5.02	3.81	9.68	
38	6	75.34	5.02	15.07	77.02	5.13	3.84	9.75	
39	7	77.02	5.13	15.40	78.73	5.25	3.87	9.82	
40									
41	Daily group ration (g)			14.43			←OUTPUT - GROUP FEED RATE (g) for week 1		
42	Daily per fish ration (g)			0.96			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1		
43									
44	8	78.73	5.25	15.75	80.48	5.37	3.89	9.89	
45	9	80.48	5.37	16.10	82.26	5.48	3.92	9.97	
46	10	82.26	5.48	16.45	84.09	5.61	3.95	10.04	
47	11	84.09	5.61	16.82	85.96	5.73	3.98	10.11	
48	12	85.96	5.73	17.19	87.87	5.86	4.01	10.19	
49	13	87.87	5.86	17.57	89.82	5.99	4.04	10.26	
50	14	89.82	5.99	17.96	91.82	6.12	4.07	10.34	
51									
52	Daily group ration (g)			16.83			←OUTPUT - GROUP FEED RATE (g) for week 2		
53	Daily per fish ration (g)			1.12			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2		
54									
55	15	91.82	6.12	18.36	93.86	6.26	4.10	10.41	
56	16	93.86	6.26	18.77	95.95	6.40	4.13	10.49	
57	17	95.95	6.40	19.19	98.08	6.54	4.16	10.57	
58	18	98.08	6.54	19.62	100.25	6.68	4.19	10.65	
59	19	100.26	6.68	20.05	102.49	6.83	4.22	10.72	
60	20	102.49	6.83	20.50	104.76	6.98	4.25	10.80	
61	21	104.76	6.98	20.95	107.09	7.14	4.28	10.88	
62									
63	Daily group ration (g)			19.63			←OUTPUT - GROUP FEED RATE (g) for week 3		
64	Daily per fish ration (g)			1.31			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3		
65									
66	22	107.09	7.14	21.42	109.47	7.30	4.32	10.96	
67	23	109.47	7.30	21.89	111.90	7.46	4.35	11.04	
68	24	111.90	7.46	22.38	114.39	7.63	4.38	11.12	
69	25	114.39	7.63	22.88	116.93	7.80	4.41	11.21	
70	26	116.93	7.80	23.39	119.53	7.97	4.44	11.29	
71	27	119.53	7.97	23.91	122.19	8.15	4.48	11.37	
72	28	122.19	8.15	24.44	124.98	8.33	4.51	11.45	
73									
74	Daily group ration (g)			22.90			←OUTPUT - GROUP FEED RATE (g) for week 4		
75	Daily per fish ration (g)			1.53			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4		
76									
77	29	124.98	8.33	24.98	127.68	8.51	4.54	11.54	
78	30	127.68	8.51	25.54	130.52	8.70	4.58	11.62	
79	31	130.52	8.70	26.10	133.42	8.89	4.61	11.71	
80									
81	Daily group ration (g)			25.54			←OUTPUT - GROUP FEED RATE (g) for week 5		
82	Daily per fish ration (g)			1.70			←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5		

FF # 7
Item No. 22
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: [illegible]
File Folder 7 Lab book/pgs 2127-33 Verified by: [illegible] Date 4-3-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management, United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 466-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G10 (from C4)
Treatment Group: control
Species: LST **Lot:** 122300

Date Created/[redacted]
Date Revised/
Approved for [redacted] 8-2-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	4.61							
21	Number of fish	20							
22	Condition Factor (C)	0.0002							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	9							
26	%B.W./d	20							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((I33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	92.20	4.61	18.44	94.25	4.71	3.73	9.47
2	94.25	4.71	18.85	96.34	4.82	3.76	9.54
3	96.34	4.82	19.27	98.48	4.92	3.79	9.61
4	98.48	4.92	19.70	100.67	5.03	3.81	9.68
5	100.67	5.03	20.13	102.91	5.15	3.84	9.76
6	102.91	5.15	20.58	105.20	5.26	3.87	9.83
7	105.20	5.26	21.04	107.53	5.38	3.90	9.90
Daily group ration (g)		19.72		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.99		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	107.53	5.38	21.51	109.92	5.50	3.93	9.97
9	109.92	5.50	21.98	112.37	5.62	3.96	10.05
10	112.37	5.62	22.47	114.86	5.74	3.98	10.12
11	114.86	5.74	22.97	117.42	5.87	4.01	10.19
12	117.42	5.87	23.48	120.03	6.00	4.04	10.27
13	120.03	6.00	24.01	122.69	6.13	4.07	10.35
14	122.69	6.13	24.54	125.42	6.27	4.10	10.42
Daily group ration (g)		23.00		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.15		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	125.42	6.27	25.08	128.21	6.41	4.13	10.50
16	128.21	6.41	25.64	131.06	6.55	4.16	10.58
17	131.06	6.55	26.21	133.97	6.70	4.19	10.65
18	133.97	6.70	26.79	136.95	6.85	4.22	10.73
19	136.95	6.85	27.39	139.99	7.00	4.26	10.81
20	139.99	7.00	28.00	143.10	7.15	4.29	10.89
21	143.10	7.15	28.62	146.28	7.31	4.32	10.97
Daily group ration (g)		26.82		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.34		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	146.28	7.31	29.26	149.53	7.48	4.35	11.05
23	149.53	7.48	29.91	152.85	7.64	4.38	11.13
24	152.85	7.64	30.57	156.25	7.81	4.41	11.21
25	156.25	7.81	31.25	159.72	7.99	4.45	11.30
26	159.72	7.99	31.94	163.27	8.16	4.48	11.38
27	163.27	8.16	32.65	166.90	8.34	4.51	11.46
28	166.90	8.34	33.38	170.61	8.53	4.55	11.55
Daily group ration (g)		31.28		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.56		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	170.61	8.53	34.12	174.40	8.72	4.58	11.63
30	174.40	8.72	34.88	178.28	8.91	4.61	11.72
31	178.28	8.91	35.66	182.24	9.11	4.65	11.80
Daily group ration (g)		34.89		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.74		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
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Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: KW Date: 19 MAR 2013
Verified by: SA Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in Input section
FCR = Food conversion rate expressed as units fed per unit gain (ie; FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Wash'ngton, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G11 (from C5)
Treatment Group: 100 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JaL
Date Revised/initi [redacted]
Approved for use: [redacted] 8-2-12
Date

Row	Column:	a	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		4.29						
21	Number of fish		20						
22	Condition Factor (C)		0.0002						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		9						
26	% B.W./d		20						

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^C.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator va ue adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	85.80	4.29	17.16	87.71	4.39	3.64	9.25	
34	2	87.71	4.39	17.54	89.66	4.48	3.67	9.32	
35	3	89.66	4.48	17.93	91.65	4.58	3.70	9.39	
36	4	91.65	4.58	18.33	93.68	4.68	3.72	9.46	
37	5	93.68	4.68	18.74	95.77	4.79	3.75	9.53	
38	6	95.77	4.79	19.15	97.89	4.89	3.78	9.60	
39	7	97.89	4.89	19.58	100.07	5.00	3.81	9.67	
40									
41	Daily group ration (g)		18.35		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.92		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	100.07	5.00	20.01	102.29	5.11	3.82	9.74	
45	9	102.29	5.11	20.46	104.57	5.23	3.86	9.81	
46	10	104.57	5.23	20.91	106.89	5.34	3.89	9.88	
47	11	106.89	5.34	21.38	109.27	5.46	3.92	9.95	
48	12	109.27	5.46	21.85	111.69	5.58	3.95	10.03	
49	13	111.69	5.58	22.34	114.18	5.71	3.98	10.10	
50	14	114.18	5.71	22.84	116.71	5.84	4.01	10.17	
51									
52	Daily group ration (g)		21.40		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		1.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	116.71	5.84	23.34	119.31	5.97	4.04	10.25	
56	16	119.31	5.97	23.86	121.96	6.10	4.06	10.32	
57	17	121.96	6.10	24.39	124.67	6.23	4.09	10.40	
58	18	124.67	6.23	24.93	127.44	6.37	4.12	10.48	
59	19	127.44	6.37	25.49	130.27	6.51	4.16	10.55	
60	20	130.27	6.51	26.05	133.17	6.66	4.19	10.63	
61	21	133.17	6.66	26.63	136.13	6.81	4.22	10.71	
62									
63	Daily group ration (g)		24.96		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		1.25		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	136.13	6.81	27.23	139.15	6.96	4.25	10.79	
67	23	139.15	6.96	27.83	142.24	7.11	4.28	10.87	
68	24	142.24	7.11	28.45	145.40	7.27	4.31	10.95	
69	25	145.40	7.27	29.08	148.63	7.43	4.34	11.03	
70	26	148.63	7.43	29.73	151.94	7.60	4.37	11.11	
71	27	151.94	7.60	30.39	155.31	7.77	4.41	11.19	
72	28	155.31	7.77	31.06	158.77	7.94	4.44	11.27	
73									
74	Daily group ration (g)		29.12		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		1.46		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	158.77	7.94	31.75	162.29	8.11	4.47	11.36	
78	30	162.29	8.11	32.46	165.90	8.30	4.50	11.44	
79	31	165.90	8.30	33.18	169.59	8.48	4.54	11.52	
80									
81	Daily group ration (g)		32.46		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		1.62		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 22
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2 27-33

Reviewed by: RW Date: MAR2013
Verified by: SM Date 4-9-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equa 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G12 (from C2)
Treatment Group: 200 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 SM
Date Revised/I [redacted]
Approved for u [redacted] 8-2-12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION	
Initial fish size (g)	4.42
Number of fish	18
Condition Factor (C)	0.0002
{ C = 0.00015 - 0.00050 in 0.00005 increments}	
FCR	9
% B.W./d	20

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+[F33*(1/$D$25)]) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) ={(H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	79.56	4.42	15.91	81.33	4.52	3.68	9.34	
2	81.33	4.52	16.27	83.14	4.62	3.71	9.41	
3	83.14	4.62	16.63	84.98	4.72	3.73	9.48	
4	84.98	4.72	17.00	86.87	4.83	3.76	9.55	
5	86.87	4.83	17.37	88.80	4.93	3.79	9.62	
6	88.80	4.93	17.76	90.78	5.04	3.82	9.69	
7	90.78	5.04	18.16	92.79	5.16	3.84	9.76	
Daily group ration (g)		17.01		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.95		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	92.79	5.16	18.56	94.85	5.27	3.87	9.83	
9	94.85	5.27	18.97	96.96	5.39	3.90	9.91	
10	96.96	5.39	19.39	99.12	5.51	3.93	9.98	
11	99.12	5.51	19.82	101.32	5.63	3.96	10.05	
12	101.32	5.63	20.26	103.57	5.75	3.99	10.13	
13	103.57	5.75	20.71	105.87	5.88	4.02	10.20	
14	105.87	5.88	21.17	108.23	6.01	4.05	10.28	
Daily group ration (g)		19.84		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		1.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	108.23	6.01	21.65	110.63	6.15	4.08	10.35	
16	110.63	6.15	22.13	113.09	6.28	4.11	10.43	
17	113.09	6.28	22.62	115.60	6.42	4.14	10.50	
18	115.60	6.42	23.12	118.17	6.57	4.17	10.58	
19	118.17	6.57	23.63	120.80	6.71	4.20	10.66	
20	120.80	6.71	24.16	123.48	6.86	4.23	10.74	
21	123.48	6.86	24.70	126.23	7.01	4.26	10.82	
Daily group ration (g)		23.14		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		1.29		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	126.23	7.01	25.25	129.03	7.17	4.29	10.90	
23	129.03	7.17	25.81	131.90	7.33	4.32	10.98	
24	131.90	7.33	26.38	134.83	7.49	4.35	11.06	
25	134.83	7.49	26.97	137.82	7.66	4.39	11.14	
26	137.82	7.66	27.56	140.89	7.83	4.42	11.22	
27	140.89	7.83	28.18	144.02	8.00	4.45	11.30	
28	144.02	8.00	28.80	147.22	8.18	4.48	11.39	
Daily group ration (g)		26.99		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		1.50		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	147.22	8.18	29.44	150.49	8.36	4.52	11.47	
30	150.49	8.36	30.10	153.83	8.55	4.55	11.55	
31	153.83	8.55	30.77	157.25	8.74	4.58	11.64	
Daily group ration (g)		30.10		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		1.67		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 22
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KWW Date: 9 MAR 2013
File Folder: 7 Lab book/pgs: 2, 27-33 Verified by: JL Date: 4-9-13

Form 2 - Fish growth and Food Calculator

Enter initial fish size (g), number of fish, FCR, and %B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G13 (from A2)
Treatment Group: 200 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JL
Date Revised/i [redacted]
Approved for u [redacted] 8-2-12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	4.17
Number of fish	16
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
%B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches)=((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	66.72	4.17	13.34	68.20	4.26	3.61	9.16
2	68.20	4.26	13.64	69.72	4.36	3.63	9.23
3	69.72	4.36	13.94	71.27	4.45	3.66	9.30
4	71.27	4.45	14.25	72.85	4.55	3.69	9.37
5	72.85	4.55	14.57	74.47	4.65	3.71	9.44
6	74.47	4.65	14.89	76.13	4.76	3.74	9.50
7	76.13	4.76	15.23	77.82	4.86	3.77	9.57
Daily group ration (g)		14.27		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.89		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	77.82	4.86	15.56	79.55	4.97	3.80	9.65
9	79.55	4.97	15.91	81.31	5.08	3.83	9.72
10	81.31	5.08	16.26	83.12	5.20	3.85	9.79
11	83.12	5.20	16.62	84.97	5.31	3.88	9.86
12	84.97	5.31	16.99	86.86	5.43	3.91	9.93
13	86.86	5.43	17.37	88.79	5.55	3.94	10.00
14	88.79	5.55	17.76	90.76	5.67	3.97	10.08
Daily group ration (g)		16.64		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.04		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	90.76	5.67	18.15	92.78	5.80	4.00	10.15
16	92.78	5.80	18.56	94.84	5.93	4.03	10.23
17	94.84	5.93	18.97	96.95	6.06	4.06	10.30
18	96.95	6.06	19.39	99.10	6.19	4.09	10.38
19	99.10	6.19	19.82	101.30	6.33	4.12	10.45
20	101.30	6.33	20.26	103.55	6.47	4.15	10.53
21	103.55	6.47	20.71	105.85	6.62	4.18	10.61
Daily group ration (g)		19.41		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.21		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	105.85	6.62	21.17	108.21	6.76	4.21	10.69
23	108.21	6.76	21.64	110.61	6.91	4.24	10.77
24	110.61	6.91	22.12	113.07	7.07	4.27	10.84
25	113.07	7.07	22.61	115.58	7.22	4.30	10.92
26	115.58	7.22	23.12	118.15	7.38	4.33	11.00
27	118.15	7.38	23.63	120.78	7.55	4.36	11.09
28	120.78	7.55	24.16	123.46	7.72	4.40	11.17
Daily group ration (g)		22.64		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.41		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	123.46	7.72	24.69	126.20	7.89	4.43	11.25
30	126.20	7.89	25.24	129.01	8.06	4.46	11.33
31	129.01	8.06	25.80	131.87	8.24	4.49	11.42
Daily group ration (g)		25.24		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.58		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

EF # 7
Item No. 22
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19 MAR 2013
File Folder 7 Lab book/pgs 2,27-33 Verified by: JR Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G14 (from C3)
Treatment Group: 300 mg/L
Species: LST **Lot:** 122300
Date Created/Initials: 8-2-12 JR
Date Revise [redacted]
Approved fo [redacted] 8-2-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)			4.68					
21	Number of fish			10					
22	Condition Factor (C)			0.0002					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR			9					
26	% B.W./d			20					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initia fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	46.80	4.68	9.36	47.84	4.78	3.75	9.52	
34	2	47.84	4.78	9.57	48.90	4.89	3.78	9.59	
35	3	48.90	4.89	9.78	49.99	5.00	3.80	9.66	
36	4	49.99	5.00	10.00	51.10	5.11	3.83	9.73	
37	5	51.10	5.11	10.22	52.24	5.22	3.86	9.81	
38	6	52.24	5.22	10.45	53.40	5.34	3.89	9.88	
39	7	53.40	5.34	10.68	54.58	5.46	3.92	9.95	
40									
41	Daily group ration (g)		10.01		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		1.00		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	54.58	5.46	10.92	55.80	5.58	3.95	10.02	
45	9	55.80	5.58	11.16	57.04	5.70	3.98	10.10	
46	10	57.04	5.70	11.41	58.30	5.83	4.00	10.17	
47	11	58.30	5.83	11.66	59.60	5.96	4.03	10.25	
48	12	59.60	5.96	11.92	60.92	6.09	4.06	10.32	
49	13	60.92	6.09	12.18	62.28	6.23	4.09	10.40	
50	14	62.28	6.23	12.46	63.66	6.37	4.12	10.47	
51									
52	Daily group ration (g)		11.67		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		1.17		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	63.66	6.37	12.73	65.08	6.51	4.15	10.55	
56	16	65.08	6.51	13.02	66.52	6.65	4.18	10.63	
57	17	66.52	6.65	13.30	68.00	6.80	4.22	10.71	
58	18	68.00	6.80	13.60	69.51	6.95	4.25	10.79	
59	19	69.51	6.95	13.90	71.06	7.11	4.28	10.86	
60	20	71.06	7.11	14.21	72.64	7.26	4.31	10.94	
61	21	72.64	7.26	14.53	74.25	7.43	4.34	11.02	
62									
63	Daily group ration (g)		13.61		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		1.36		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	74.25	7.43	14.85	75.90	7.59	4.37	11.11	
67	23	75.90	7.59	15.18	77.59	7.76	4.40	11.19	
68	24	77.59	7.76	15.52	79.31	7.93	4.44	11.27	
69	25	79.31	7.93	15.86	81.07	8.11	4.47	11.35	
70	26	81.07	8.11	16.21	82.88	8.29	4.50	11.44	
71	27	82.88	8.29	16.58	84.72	8.47	4.54	11.52	
72	28	84.72	8.47	16.94	86.60	8.66	4.57	11.60	
73									
74	Daily group ration (g)		15.88		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		1.59		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	86.60	8.66	17.32	88.52	8.85	4.60	11.69	
78	30	88.52	8.85	17.70	90.49	9.05	4.64	11.78	
79	31	90.49	9.05	18.10	92.50	9.25	4.67	11.86	
80									
81	Daily group ration (g)		17.71		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		1.77		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 22
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 27-33

Reviewed by: [illegible] Date: 12MAR2013
Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: G15 (from B4)
Treatment Group: 200 mg/L
Species: LST **Lot:** 122300

Date Created/Initials: 8-2-12 JM
Date Revised/Initials:
Approved for use: [redacted] 8-2-12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	4.46
Number of fish	16
Condition Factor (C)	0.0002
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	9
% B.W./d	20

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Fina Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	71.36	4.46	14.27	72.95	4.56	3.69	9.37
2	72.95	4.56	14.59	74.57	4.66	3.72	9.44
3	74.57	4.66	14.91	76.22	4.76	3.74	9.51
4	76.22	4.76	15.24	77.92	4.87	3.77	9.58
5	77.92	4.87	15.58	79.65	4.98	3.80	9.65
6	79.65	4.98	15.93	81.42	5.09	3.83	9.72
7	81.42	5.09	16.28	83.23	5.20	3.85	9.79
Daily group ration (g)		15.26		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.95		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	83.23	5.20	16.65	85.08	5.32	3.88	9.86
9	85.08	5.32	17.02	86.97	5.44	3.91	9.94
10	86.97	5.44	17.39	88.90	5.56	3.94	10.01
11	88.90	5.56	17.78	90.88	5.68	3.97	10.08
12	90.88	5.68	18.18	92.90	5.81	4.00	10.16
13	92.90	5.81	18.58	94.96	5.94	4.03	10.23
14	94.96	5.94	18.99	97.07	6.07	4.06	10.31
Daily group ration (g)		17.80		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		1.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	97.07	6.07	19.41	99.23	6.20	4.09	10.38
16	99.23	6.20	19.85	101.43	6.34	4.12	10.46
17	101.43	6.34	20.29	103.69	6.48	4.15	10.54
18	103.69	6.48	20.74	105.99	6.62	4.18	10.61
19	105.99	6.62	21.20	108.35	6.77	4.21	10.69
20	108.35	6.77	21.67	110.75	6.92	4.24	10.77
21	110.75	6.92	22.15	113.22	7.08	4.27	10.85
Daily group ration (g)		20.76		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		1.30		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	113.22	7.08	22.64	115.73	7.23	4.30	10.93
23	115.73	7.23	23.15	118.30	7.39	4.33	11.01
24	118.30	7.39	23.66	120.93	7.56	4.37	11.09
25	120.93	7.56	24.19	123.62	7.73	4.40	11.17
26	123.62	7.73	24.72	126.37	7.90	4.43	11.25
27	126.37	7.90	25.27	129.17	8.07	4.46	11.34
28	129.17	8.07	25.83	132.05	8.25	4.50	11.42
Daily group ration (g)		24.21		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		1.51		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	132.05	8.25	26.41	134.98	8.44	4.53	11.50
30	134.98	8.44	27.00	137.98	8.62	4.56	11.59
31	137.98	8.62	27.60	141.05	8.82	4.60	11.67
Daily group ration (g)		27.00		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		1.69		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 22
Pg 15 of 15

Study Number: AEH-12-PSEUDO-03 File Folder 7 Lab book/pgs 2 / 87-44

Reviewed by: [illegible] Date: 19 MAR 2013
Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E1 (from C1)
Treatment Group: 200 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 JHL
Date Revised/in [redacted]
Approved for us [redacted] 9-27-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)		1.56						
21	Number of fish		20						
22	Condition Factor (C)		0.0003						
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR		5						
26	% B.W./d		5						

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$D$21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	31.20	1.56	1.56	31.51	1.58	2.26	5.74
2	31.51	1.58	1.58	31.83	1.59	2.27	5.76
3	31.83	1.59	1.59	32.15	1.61	2.28	5.78
4	32.15	1.61	1.61	32.47	1.62	2.29	5.80
5	32.47	1.62	1.62	32.79	1.64	2.29	5.82
6	32.79	1.64	1.64	33.12	1.66	2.30	5.84
7	33.12	1.66	1.66	33.45	1.67	2.31	5.86
Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	33.45	1.67	1.67	33.79	1.69	2.31	5.88
9	33.79	1.69	1.69	34.12	1.71	2.32	5.90
10	34.12	1.71	1.71	34.46	1.72	2.33	5.92
11	34.46	1.72	1.72	34.81	1.74	2.34	5.94
12	34.81	1.74	1.74	35.16	1.76	2.35	5.96
13	35.16	1.76	1.76	35.51	1.78	2.35	5.98
14	35.51	1.78	1.78	35.86	1.79	2.36	6.00
Daily group ration (g)		1.72		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	35.86	1.79	1.79	36.22	1.81	2.37	6.02
16	36.22	1.81	1.81	36.58	1.83	2.38	6.04
17	36.58	1.83	1.83	36.95	1.85	2.38	6.06
18	36.95	1.85	1.85	37.32	1.87	2.39	6.08
19	37.32	1.87	1.87	37.69	1.88	2.40	6.10
20	37.69	1.88	1.88	38.07	1.90	2.41	6.12
21	38.07	1.90	1.90	38.45	1.92	2.42	6.14
Daily group ration (g)		1.85		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	38.45	1.92	1.92	38.84	1.94	2.42	6.16
23	38.84	1.94	1.94	39.22	1.96	2.43	6.18
24	39.22	1.96	1.96	39.62	1.98	2.44	6.20
25	39.62	1.98	1.98	40.01	2.00	2.45	6.22
26	40.01	2.00	2.00	40.41	2.02	2.46	6.24
27	40.41	2.02	2.02	40.82	2.04	2.47	6.26
28	40.82	2.04	2.04	41.22	2.06	2.47	6.28
Daily group ration (g)		1.98		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	41.22	2.06	2.06	41.64	2.08	2.48	6.30
30	41.64	2.08	2.08	42.05	2.10	2.49	6.32
31	42.05	2.10	2.10	42.47	2.12	2.50	6.35
Daily group ration (g)		2.08		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 23
Pg 1 of 15

Study Number: AEH-12-PSEUDO-03 File Folder: 7 Lab book/pgs: 2, 37-44

Reviewed by: [illegible] Date: 10 MAR 2013

Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section

FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)

%B.W./d = Percentage of body weight to be fed daily throughout the period

Feed weekly average through the week

Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.

Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.

If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack

Holding Tank/Chamber: E2 (from A2)

Treatment Group: 50 mg/L

Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 JS

Date Revised/I [redacted]

Approved for u [redacted] 9-27-12 Date

Row	Column	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.56
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00005 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)

Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)

Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)

Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)

Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)

Fish Final Length (inches) =((H33/454)/$F$22)^0.333333586 (Column H value adjusts by row)

Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	31.20	1.56	1.56	31.51	1.58	2.26	5.74	
2	31.51	1.58	1.58	31.83	1.59	2.27	5.76	
3	31.83	1.59	1.59	32.15	1.61	2.28	5.78	
4	32.15	1.61	1.61	32.47	1.62	2.28	5.80	
5	32.47	1.62	1.62	32.79	1.64	2.29	5.82	
6	32.79	1.64	1.64	33.12	1.66	2.30	5.84	
7	33.12	1.66	1.66	33.45	1.67	2.31	5.86	
Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	33.45	1.67	1.67	33.79	1.69	2.31	5.88	
9	33.79	1.69	1.69	34.12	1.71	2.32	5.90	
10	34.12	1.71	1.71	34.46	1.72	2.33	5.92	
11	34.46	1.72	1.72	34.81	1.74	2.34	5.94	
12	34.81	1.74	1.74	35.16	1.76	2.35	5.96	
13	35.16	1.76	1.76	35.51	1.78	2.35	5.98	
14	35.51	1.78	1.78	35.86	1.79	2.36	6.00	
Daily group ration (g)		1.72		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	35.86	1.79	1.79	36.22	1.81	2.37	6.02	
16	36.22	1.81	1.81	36.58	1.83	2.38	6.04	
17	36.58	1.83	1.83	36.95	1.85	2.38	6.06	
18	36.95	1.85	1.85	37.32	1.87	2.39	6.08	
19	37.32	1.87	1.87	37.69	1.88	2.40	6.10	
20	37.69	1.88	1.88	38.07	1.90	2.41	6.12	
21	38.07	1.90	1.90	38.45	1.92	2.42	6.14	
Daily group ration (g)		1.85		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	38.45	1.92	1.92	38.84	1.94	2.42	6.16	
23	38.84	1.94	1.94	39.22	1.96	2.43	6.18	
24	39.22	1.96	1.96	39.62	1.98	2.44	6.20	
25	39.62	1.98	1.98	40.01	2.00	2.45	6.22	
26	40.01	2.00	2.00	40.41	2.02	2.46	6.24	
27	40.41	2.02	2.02	40.82	2.04	2.47	6.26	
28	40.82	2.04	2.04	41.22	2.06	2.47	6.28	
Daily group ration (g)		1.98		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	41.22	2.06	2.06	41.64	2.08	2.48	6.30	
30	41.64	2.08	2.08	42.05	2.10	2.49	6.32	
31	42.05	2.10	2.10	42.47	2.12	2.50	6.35	
Daily group ration (g)		2.08		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 23
Pg 2 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: _____ Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 37-44 Verified by: _____ Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individua feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E3 (from B5)
Treatment Group: CONTROL
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 [redacted]
Date Revised/I
Approved for U _9-27-12_ Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.42
Number of fish	30
Condition Factor [C]	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = C20 * E21 (Initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	42.60	1.42	2.13	43.08	1.43	2.19	5.57
2	43.03	1.43	2.15	43.46	1.45	2.20	5.59
3	43.46	1.45	2.17	43.89	1.46	2.21	5.60
4	43.89	1.46	2.19	44.33	1.48	2.21	5.62
5	44.33	1.48	2.22	44.77	1.49	2.22	5.64
6	44.77	1.49	2.24	45.22	1.51	2.23	5.66
7	45.22	1.51	2.26	45.67	1.52	2.24	5.68
Daily group ration (g)		2.19		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	45.67	1.52	2.28	46.13	1.54	2.24	5.70
9	46.13	1.54	2.31	46.59	1.55	2.25	5.72
10	46.59	1.55	2.33	47.06	1.57	2.26	5.74
11	47.06	1.57	2.35	47.53	1.58	2.27	5.76
12	47.53	1.58	2.38	48.00	1.60	2.27	5.77
13	48.00	1.60	2.40	48.48	1.62	2.28	5.79
14	48.48	1.62	2.42	48.97	1.63	2.29	5.81
Daily group ration (g)		2.35		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	48.97	1.63	2.45	49.46	1.65	2.30	5.83
16	49.46	1.65	2.47	49.95	1.67	2.30	5.85
17	49.95	1.67	2.50	50.45	1.68	2.31	5.87
18	50.45	1.68	2.52	50.96	1.70	2.32	5.89
19	50.96	1.70	2.55	51.47	1.72	2.33	5.91
20	51.47	1.72	2.57	51.98	1.73	2.33	5.93
21	51.98	1.73	2.60	52.50	1.75	2.34	5.95
Daily group ration (g)		2.52		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	52.50	1.75	2.62	53.02	1.77	2.35	5.97
23	53.02	1.77	2.65	53.56	1.79	2.36	5.99
24	53.56	1.79	2.68	54.09	1.80	2.37	6.01
25	54.09	1.80	2.70	54.63	1.82	2.37	6.03
26	54.63	1.82	2.73	55.18	1.84	2.38	6.05
27	55.18	1.84	2.76	55.73	1.86	2.39	6.07
28	55.73	1.86	2.79	56.29	1.88	2.40	6.09
Daily group ration (g)		2.71		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	56.29	1.88	2.81	56.85	1.89	2.41	6.11
30	56.85	1.89	2.84	57.42	1.91	2.41	6.13
31	57.42	1.91	2.87	57.99	1.93	2.42	6.15
Daily group ration (g)		2.84		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Item No. 23
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Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder: 7 Lab book/pgs: 2, 37-44 Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E4 (from B4)
Treatment Group: 50mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 JM
Date Revised/I[redacted]
Approved for u[redacted] 9-27-12 Date

Row	Column: c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.41
Number of fish	20 (19) (2)
Condition Factor (C)	00003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	28.20	1.41	1.41	28.48	1.42	2.19	5.55
2	28.48	1.42	1.42	28.77	1.44	2.19	5.57
3	28.77	1.44	1.44	29.05	1.45	2.20	5.59
4	29.05	1.45	1.45	29.35	1.47	2.21	5.61
5	29.35	1.47	1.47	29.64	1.48	2.22	5.63
6	29.64	1.48	1.48	29.93	1.50	2.22	5.65
7	29.93	1.50	1.50	30.23	1.51	2.23	5.67
Daily group ration (g)		1.45		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	30.23	1.51	1.51	30.54	1.53	2.24	5.68
9	30.54	1.53	1.53	30.84	1.54	2.25	5.70
10	30.84	1.54	1.54	31.15	1.56	2.25	5.72
11	31.15	1.56	1.56	31.46	1.57	2.26	5.74
12	31.46	1.57	1.57	31.78	1.59	2.27	5.76
13	31.78	1.59	1.59	32.09	1.60	2.28	5.78
14	32.09	1.60	1.60	32.42	1.62	2.28	5.80
Daily group ration (g)		1.56		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	32.42	1.62	1.62	32.74	1.64	2.29	5.82
16	32.74	1.64	1.64	33.07	1.65	2.30	5.84
17	33.07	1.65	1.65	33.40	1.67	2.31	5.86
18	33.40	1.67	1.67	33.73	1.69	2.31	5.88
19	33.73	1.69	1.69	34.07	1.70	2.32	5.90
20	34.07	1.70	1.70	34.41	1.72	2.33	5.92
21	34.41	1.72	1.72	34.75	1.74	2.34	5.94
Daily group ration (g)		1.67		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	34.75	1.74	1.74	35.10	1.76	2.34	5.95
23	35.10	1.76	1.76	35.45	1.77	2.35	5.97
24	35.45	1.77	1.77	35.81	1.79	2.36	5.99
25	35.81	1.79	1.79	36.16	1.81	2.37	6.01
26	36.16	1.81	1.81	36.53	1.83	2.38	6.03
27	36.53	1.83	1.83	36.89	1.84	2.38	6.05
28	36.89	1.84	1.84	37.26	1.86	2.39	6.07
Daily group ration (g)		1.79		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	37.26	1.86	1.86	37.63	1.88	2.40	6.09
30	37.63	1.88	1.88	38.01	1.90	2.41	6.11
31	38.01	1.90	1.90	38.39	1.92	2.42	6.14
Daily group ration (g)		1.88		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

(1) Enter number of fish - 19 fish

(2) Twenty (20) is the correct number of fish transferred
9-27-12 JM

FF # 7
Item No. 23
Pg 4 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 37-44

Reviewed by: KW Date: MAR 2013
Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management. Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E5 (from C2)
Treatment Group: 100 mg/L
Species: CCF **Lot:** 123000

Date Created/In [redacted]
Date Revised/Ini
Approved for us [redacted] 9-27-12
Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.39							
21	Number of fish	20							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	5							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D35/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	27.80	1.39	1.39	28.08	1.40	2.18	5.53	
2	28.08	1.40	1.40	28.36	1.42	2.18	5.55	
3	28.36	1.42	1.42	28.64	1.43	2.19	5.56	
4	28.64	1.43	1.43	28.93	1.45	2.20	5.58	
5	28.93	1.45	1.45	29.22	1.46	2.21	5.60	
6	29.22	1.46	1.46	29.51	1.48	2.21	5.62	
7	29.51	1.48	1.48	29.81	1.49	2.22	5.64	
Daily group ration (g)		1.43		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	29.81	1.49	1.49	30.10	1.51	2.23	5.66	
9	30.10	1.51	1.51	30.40	1.52	2.23	5.68	
10	30.40	1.52	1.52	30.71	1.54	2.24	5.70	
11	30.71	1.54	1.54	31.02	1.55	2.25	5.71	
12	31.02	1.55	1.55	31.33	1.57	2.26	5.73	
13	31.33	1.57	1.57	31.64	1.58	2.26	5.75	
14	31.64	1.58	1.58	31.96	1.60	2.27	5.77	
Daily group ration (g)		1.54		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	31.96	1.60	1.60	32.27	1.61	2.28	5.79	
16	32.27	1.61	1.61	32.60	1.63	2.29	5.81	
17	32.60	1.63	1.63	32.92	1.65	2.29	5.83	
18	32.92	1.65	1.65	33.25	1.66	2.30	5.85	
19	33.25	1.66	1.66	33.59	1.68	2.31	5.87	
20	33.59	1.68	1.68	33.92	1.70	2.32	5.89	
21	33.92	1.70	1.70	34.26	1.71	2.33	5.91	
Daily group ration (g)		1.65		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	34.26	1.71	1.71	34.60	1.73	2.33	5.93	
23	34.60	1.73	1.73	34.95	1.75	2.34	5.95	
24	34.95	1.75	1.75	35.30	1.76	2.35	5.97	
25	35.30	1.76	1.76	35.65	1.78	2.36	5.99	
26	35.65	1.78	1.78	36.01	1.80	2.36	6.01	
27	36.01	1.80	1.80	36.37	1.82	2.37	6.03	
28	36.37	1.82	1.82	36.73	1.84	2.38	6.05	
Daily group ration (g)		1.77		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	36.73	1.84	1.84	37.10	1.85	2.39	6.07	
30	37.10	1.85	1.85	37.47	1.87	2.40	6.09	
31	37.47	1.87	1.87	37.84	1.89	2.40	6.11	
Daily group ration (g)		1.86		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 23
Pg 5 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 37-44

Reviewed by: [redacted] Date: 19 MAR 2013
Verified by: [redacted] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E6 (from C4)
Treatment Group: 300 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 [redacted]
Date Revised/Initi [redacted]
Approved for use: [redacted] 9-27-12 Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.49							
21	Number of fish	2							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	5							
26	% B.W./d	5							
27									

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(O33+(F33*(3/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333596 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	2.98	1.49	0.15	3.01	1.50	2.23	5.66
2	3.01	1.50	0.15	3.04	1.52	2.23	5.68
3	3.04	1.52	0.15	3.07	1.54	2.24	5.69
4	3.07	1.54	0.15	3.10	1.55	2.25	5.71
5	3.10	1.55	0.16	3.13	1.57	2.26	5.73
6	3.13	1.57	0.16	3.16	1.58	2.26	5.75
7	3.16	1.58	0.16	3.19	1.60	2.27	5.77
Daily group ration (g)		0.15		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	3.19	1.60	0.16	3.23	1.61	2.28	5.79
9	3.23	1.61	0.16	3.26	1.63	2.29	5.81
10	3.26	1.63	0.16	3.29	1.65	2.29	5.83
11	3.29	1.65	0.16	3.32	1.66	2.30	5.85
12	3.32	1.66	0.17	3.36	1.68	2.31	5.87
13	3.36	1.68	0.17	3.39	1.70	2.32	5.89
14	3.39	1.70	0.17	3.43	1.71	2.33	5.91
Daily group ration (g)		0.16		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	3.43	1.71	0.17	3.46	1.73	2.33	5.93
16	3.46	1.73	0.17	3.49	1.75	2.34	5.95
17	3.49	1.75	0.17	3.53	1.76	2.35	5.97
18	3.53	1.76	0.18	3.56	1.78	2.36	5.99
19	3.56	1.78	0.18	3.60	1.80	2.36	6.01
20	3.60	1.80	0.18	3.64	1.82	2.37	6.03
21	3.64	1.82	0.18	3.67	1.84	2.38	6.05
Daily group ration (g)		0.18		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	3.67	1.84	0.18	3.71	1.85	2.39	6.07
23	3.71	1.85	0.19	3.75	1.87	2.40	6.09
24	3.75	1.87	0.19	3.78	1.89	2.40	6.11
25	3.78	1.89	0.19	3.82	1.91	2.41	6.13
26	3.82	1.91	0.19	3.86	1.93	2.42	6.15
27	3.86	1.93	0.19	3.90	1.95	2.43	6.17
28	3.90	1.95	0.19	3.94	1.97	2.44	6.19
Daily group ration (g)		0.19		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	3.94	1.97	0.20	3.98	1.99	2.44	6.21
30	3.98	1.99	0.20	4.02	2.01	2.45	6.23
31	4.02	2.01	0.20	4.06	2.03	2.46	6.25
Daily group ration (g)		0.20		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 23
Pg 6 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: VW Date: PMAR2013
File Folder 7 Lab book/pgs 2, 37-44 Verified by: SAC Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E7 (from B3)
Treatment Group: 100 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 JA
Date Revised/I [redacted]
Approved for u [redacted] 9-27-12
[redacted]cor Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION ②

Initial fish size (g)	1.38 (2)
Number of fish	20 (19)
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$F$21 (numerator va ue adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	27.60	1.38	1.38	27.88	1.39	2.17	5.51
2	27.88	1.39	1.39	28.15	1.41	2.18	5.53
3	28.15	1.41	1.41	28.44	1.42	2.19	5.55
4	28.44	1.42	1.42	28.72	1.44	2.19	5.57
5	28.72	1.44	1.44	29.01	1.45	2.20	5.59
6	29.01	1.45	1.45	29.30	1.46	2.21	5.61
7	29.30	1.46	1.46	29.59	1.48	2.21	5.63
Daily group ration (g)		1.42		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	29.59	1.48	1.48	29.89	1.49	2.22	5.64
9	29.89	1.49	1.49	30.19	1.51	2.23	5.66
10	30.19	1.51	1.51	30.49	1.52	2.24	5.68
11	30.49	1.52	1.52	30.79	1.54	2.24	5.70
12	30.79	1.54	1.54	31.10	1.56	2.25	5.72
13	31.10	1.56	1.56	31.41	1.57	2.26	5.74
14	31.41	1.57	1.57	31.73	1.59	2.27	5.76
Daily group ration (g)		1.52		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	31.73	1.59	1.59	32.04	1.60	2.27	5.78
16	32.04	1.60	1.60	32.36	1.62	2.28	5.80
17	32.36	1.62	1.62	32.69	1.63	2.29	5.82
18	32.69	1.63	1.63	33.01	1.65	2.30	5.83
19	33.01	1.65	1.65	33.34	1.67	2.30	5.85
20	33.34	1.67	1.67	33.68	1.68	2.31	5.87
21	33.68	1.68	1.68	34.01	1.70	2.32	5.89
Daily group ration (g)		1.63		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	34.01	1.70	1.70	34.35	1.72	2.33	5.91
23	34.35	1.72	1.72	34.70	1.73	2.34	5.93
24	34.70	1.73	1.73	35.04	1.75	2.34	5.95
25	35.04	1.75	1.75	35.40	1.77	2.35	5.97
26	35.40	1.77	1.77	35.75	1.79	2.36	5.99
27	35.75	1.79	1.79	36.11	1.81	2.37	6.01
28	36.11	1.81	1.81	36.47	1.82	2.37	6.03
Daily group ration (g)		1.75		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	36.47	1.82	1.82	36.83	1.84	2.38	6.05
30	36.83	1.84	1.84	37.20	1.86	2.39	6.07
31	37.20	1.86	1.86	37.57	1.88	2.40	6.09
Daily group ration (g)		1.84		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

① incorrect # of fish. only 19 fish were transferred to the holding rack. 9/27/12 JA

② Incorrect initial fish size. Mean weight is 1.45g/fish. See Form 3a (File folder 24) and Deviation # 28. Daily ration per fish does not change. JAW 2/5/2013

FF # 7
Item No. 23
Pg 7 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2 / 37-44

Reviewed by: KAW Date: 19MAR2013
Verified by: JH Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack____________
Holding Tank/Chamber: E8 (from A4)_______
Treatment Group: control____________
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 JO
Date Revised/Initials: [redacted]
Approved for u[redacted] 9-27-12
Date

Row Column: c d e f g h i j

INPUT SECTION

Initial fish size (g)	1.51
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	30.20	1.51	1.51	30.50	1.53	2.24	5.68
2	30.50	1.53	1.53	30.81	1.54	2.24	5.70
3	30.81	1.54	1.54	31.12	1.56	2.25	5.72
4	31.12	1.56	1.56	31.43	1.57	2.26	5.74
5	31.43	1.57	1.57	31.74	1.59	2.27	5.76
6	31.74	1.59	1.59	32.06	1.60	2.27	5.78
7	32.06	1.60	1.60	32.38	1.62	2.28	5.80

Daily group ration (g) **1.56** ←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g) **0.08** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
8	32.38	1.62	1.62	32.70	1.64	2.29	5.82
9	32.70	1.64	1.64	33.03	1.65	2.30	5.84
10	33.03	1.65	1.65	33.36	1.67	2.31	5.85
11	33.36	1.67	1.67	33.69	1.68	2.31	5.87
12	33.69	1.68	1.68	34.03	1.70	2.32	5.89
13	34.03	1.70	1.70	34.37	1.72	2.33	5.91
14	34.37	1.72	1.72	34.71	1.74	2.34	5.93

Daily group ration (g) **1.67** ←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g) **0.08** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
15	34.71	1.74	1.74	35.06	1.75	2.34	5.95
16	35.06	1.75	1.75	35.41	1.77	2.35	5.97
17	35.41	1.77	1.77	35.77	1.79	2.36	5.99
18	35.77	1.79	1.79	36.12	1.81	2.37	6.01
19	36.12	1.81	1.81	36.48	1.82	2.37	6.03
20	36.48	1.82	1.82	36.85	1.84	2.38	6.05
21	36.85	1.84	1.84	37.22	1.86	2.39	6.07

Daily group ration (g) **1.79** ←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g) **0.09** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
22	37.22	1.86	1.86	37.59	1.88	2.40	6.09
23	37.59	1.88	1.88	37.97	1.90	2.41	6.11
24	37.97	1.90	1.90	38.35	1.92	2.41	6.13
25	38.35	1.92	1.92	38.73	1.94	2.42	6.15
26	38.73	1.94	1.94	39.12	1.96	2.43	6.17
27	39.12	1.96	1.96	39.51	1.98	2.44	6.19
28	39.51	1.98	1.98	39.90	2.00	2.45	6.21

Daily group ration (g) **1.92** ←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g) **0.10** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
29	39.90	2.00	2.00	40.30	2.02	2.45	6.24
30	40.30	2.02	2.02	40.71	2.04	2.46	6.26
31	40.71	2.04	2.04	41.11	2.06	2.47	6.28

Daily group ration (g) **2.02** ←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g) **0.10** ←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

FF # 7
Item No. 23
Pg 8 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs 2, 37-44

Reviewed by: KW Date: 19MAR2013
Verified by: [redacted] Date 4-9-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management. Piper et. al 1982. Fish Hatchery Management. United States Department of the Interior Fish and Wildlife Service Washington, D.C.,pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E9 (from A5)
Treatment Group: 100 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 TA
Date Revised/in [redacted]
Approved for us [redacted] 9-27-12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.45
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {Initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33-((F33*(3/$D$25)) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$23 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.338333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	27.55	1.45	1.38	27.88	1.46	2.21	5.61	
2	27.83	1.46	1.39	28.10	1.48	2.21	5.62	
3	28.10	1.48	1.41	28.38	1.49	2.22	5.64	
4	28.38	1.49	1.42	28.67	1.51	2.23	5.66	
5	28.67	1.51	1.43	28.96	1.52	2.24	5.68	
6	28.96	1.52	1.45	29.24	1.54	2.24	5.70	
7	29.24	1.54	1.46	29.54	1.55	2.25	5.72	
Daily group ration (g)		1.42						←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g)		0.07						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
8	29.54	1.55	1.48	29.83	1.57	2.26	5.74	
9	29.83	1.57	1.49	30.13	1.59	2.27	5.76	
10	30.13	1.59	1.51	30.43	1.60	2.27	5.78	
11	30.43	1.60	1.52	30.74	1.62	2.28	5.80	
12	30.74	1.62	1.54	31.04	1.63	2.29	5.81	
13	31.04	1.63	1.55	31.35	1.65	2.30	5.83	
14	31.35	1.65	1.57	31.67	1.67	2.30	5.85	
Daily group ration (g)		1.52						←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g)		0.08						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
15	31.67	1.67	1.58	31.98	1.68	2.31	5.87	
16	31.98	1.68	1.60	32.30	1.70	2.32	5.89	
17	32.30	1.70	1.62	32.63	1.72	2.33	5.91	
18	32.63	1.72	1.63	32.95	1.73	2.34	5.93	
19	32.95	1.73	1.65	33.28	1.75	2.34	5.95	
20	33.28	1.75	1.66	33.62	1.77	2.35	5.97	
21	33.62	1.77	1.68	33.95	1.79	2.36	5.99	
Daily group ration (g)		1.63						←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g)		0.09						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
22	33.95	1.79	1.70	34.29	1.80	2.37	6.01	
23	34.29	1.80	1.71	34.63	1.82	2.37	6.03	
24	34.63	1.82	1.73	34.98	1.84	2.38	6.05	
25	34.98	1.84	1.75	35.33	1.86	2.39	6.07	
26	35.33	1.86	1.77	35.68	1.88	2.40	6.09	
27	35.68	1.88	1.78	36.04	1.90	2.41	6.11	
28	36.04	1.90	1.80	36.40	1.92	2.41	6.13	
Daily group ration (g)		1.75						←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g)		0.09						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
29	36.40	1.92	1.82	36.77	1.94	2.42	6.15	
30	36.77	1.94	1.84	37.13	1.95	2.43	6.17	
31	37.13	1.95	1.86	37.50	1.97	2.44	6.19	
Daily group ration (g)		1.84						←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g)		0.10						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

FF # 7
Item No. 23
Pg 9 of 15

Study Number: AEH-12-PSEUDO-03 File Folder: 7 Lab book/pgs: 2, 37-44

Reviewed by: KW Date: 19MAR2013
Verified by: [redacted] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie. FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from length/weight charts from Fish Hatchery Management, Piper et. al 1982, Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E10 (from C3)
Treatment Group: control
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 [redacted]
Date Revised/in: [redacted]
Approved for us: [redacted] 9-27-12
Date

Row	Column:	c	d	e	f	g	h	i	j
19	**INPUT SECTION**								
20	Initial fish size (g)	1.4							
21	Number of fish	20							
22	Condition Factor (C)	0.0003							
23	(C = 0.00015 - 0.00050 in 0.00005 increments)								
24									
25	FCR	5							
26	% B.W./d	5							

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =(H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	28.00	1.40	1.40	28.28	1.41	2.18	5.54
2	28.28	1.41	1.41	28.56	1.43	2.19	5.56
3	28.56	1.43	1.43	28.85	1.44	2.20	5.58
4	28.85	1.44	1.44	29.14	1.46	2.20	5.60
5	29.14	1.46	1.46	29.43	1.47	2.21	5.62
6	29.43	1.47	1.47	29.72	1.49	2.22	5.63
7	29.72	1.49	1.48	30.02	1.50	2.23	5.65
Daily group ration (g)		1.44		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	30.02	1.50	1.50	30.32	1.52	2.23	5.67
9	30.32	1.52	1.52	30.62	1.53	2.24	5.69
10	30.62	1.53	1.53	30.93	1.55	2.25	5.71
11	30.93	1.55	1.55	31.24	1.56	2.26	5.73
12	31.24	1.56	1.56	31.55	1.58	2.26	5.75
13	31.55	1.58	1.58	31.87	1.59	2.27	5.77
14	31.87	1.59	1.59	32.19	1.61	2.28	5.79
Daily group ration (g)		1.55		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	32.19	1.61	1.61	32.51	1.63	2.29	5.80
16	32.51	1.63	1.63	32.83	1.64	2.29	5.82
17	32.83	1.64	1.64	33.16	1.66	2.30	5.84
18	33.16	1.66	1.66	33.49	1.67	2.31	5.86
19	33.49	1.67	1.67	33.83	1.69	2.32	5.88
20	33.83	1.69	1.69	34.17	1.71	2.32	5.90
21	34.17	1.71	1.71	34.51	1.73	2.33	5.92
Daily group ration (g)		1.66		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	34.51	1.73	1.73	34.85	1.74	2.34	5.94
23	34.85	1.74	1.74	35.20	1.76	2.35	5.96
24	35.20	1.76	1.76	35.55	1.78	2.35	5.98
25	35.55	1.78	1.78	35.91	1.80	2.36	6.00
26	35.91	1.80	1.80	36.27	1.81	2.37	6.02
27	36.27	1.81	1.81	36.63	1.83	2.38	6.04
28	36.63	1.83	1.83	37.00	1.85	2.39	6.06
Daily group ration (g)		1.78		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	37.00	1.85	1.85	37.37	1.87	2.39	6.08
30	37.37	1.87	1.87	37.74	1.89	2.40	6.10
31	37.74	1.89	1.89	38.12	1.91	2.41	6.12
Daily group ration (g)		1.87		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 23
Pg 10 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 19MAR2013
File Folder 7 Lab book/pgs 2, 37-44 Verified by: [illegible] Date 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E11 (from C5)
Treatment Group: 50 mg/L
Species: CCF **Lot:** 123000

Date Created/In [redacted]
Date Revised/In
Approved for us [redacted] 9-27-12 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.43
Number of fish	20
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))] (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$F$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	28.60	1.43	1.43	28.89	1.44	2.20	5.58	
2	28.89	1.44	1.44	29.17	1.46	2.20	5.60	
3	29.17	1.46	1.46	29.47	1.47	2.21	5.62	
4	29.47	1.47	1.47	29.76	1.49	2.22	5.64	
5	29.76	1.49	1.49	30.06	1.50	2.23	5.65	
6	30.06	1.50	1.50	30.36	1.52	2.23	5.67	
7	30.36	1.52	1.52	30.66	1.53	2.24	5.69	
Daily group ration (g)		1.47						←OUTPUT - GROUP FEED RATE (g) for week 1
Daily per fish ration (g)		0.07						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1
8	30.66	1.53	1.53	30.97	1.55	2.25	5.71	
9	30.97	1.55	1.55	31.28	1.56	2.26	5.73	
10	31.28	1.56	1.56	31.59	1.58	2.26	5.75	
11	31.59	1.58	1.58	31.91	1.60	2.27	5.77	
12	31.91	1.60	1.60	32.23	1.61	2.28	5.79	
13	32.23	1.61	1.61	32.55	1.63	2.29	5.81	
14	32.55	1.63	1.63	32.87	1.64	2.29	5.83	
Daily group ration (g)		1.58						←OUTPUT - GROUP FEED RATE (g) for week 2
Daily per fish ration (g)		0.08						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2
15	32.87	1.64	1.64	33.20	1.66	2.30	5.85	
16	33.20	1.66	1.66	33.54	1.68	2.31	5.86	
17	33.54	1.68	1.68	33.87	1.69	2.32	5.88	
18	33.87	1.69	1.69	34.21	1.71	2.32	5.90	
19	34.21	1.71	1.71	34.55	1.73	2.33	5.92	
20	34.55	1.73	1.73	34.90	1.74	2.34	5.94	
21	34.90	1.74	1.74	35.25	1.76	2.35	5.96	
Daily group ration (g)		1.69						←OUTPUT - GROUP FEED RATE (g) for week 3
Daily per fish ration (g)		0.08						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3
22	35.25	1.76	1.76	35.60	1.78	2.36	5.98	
23	35.60	1.78	1.78	35.95	1.80	2.36	6.00	
24	35.95	1.80	1.80	36.31	1.82	2.37	6.02	
25	36.31	1.82	1.82	36.68	1.83	2.38	6.04	
26	36.68	1.83	1.83	37.04	1.85	2.39	6.06	
27	37.04	1.85	1.85	37.41	1.87	2.39	6.08	
28	37.41	1.87	1.87	37.79	1.89	2.40	6.10	
Daily group ration (g)		1.82						←OUTPUT - GROUP FEED RATE (g) for week 4
Daily per fish ration (g)		0.09						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4
29	37.79	1.89	1.89	38.17	1.91	2.41	6.12	
30	38.17	1.91	1.91	38.55	1.93	2.42	6.14	
31	38.55	1.93	1.93	38.93	1.95	2.43	6.16	
Daily group ration (g)		1.91						←OUTPUT - GROUP FEED RATE (g) for week 5
Daily per fish ration (g)		0.10						←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5

FF # 7
Item No. 23
Pg 11 of 15

Study Number: AEH-12-PSEUDO-03
File Folder: 7 Lab book/pgs: 2, 37-44

Reviewed by: MW Date: MAR 2013
Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equa. 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individua feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C. pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E12 (from B2)
Treatment Group: 200 mg/L
Species: CCF **Lot:** 123000

Date Created/In: [redacted]
Date Revised/in:
Approved for us: [redacted] 9-27-12 Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.43
Number of fish	19
Condition Factor (C)	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 (initial fish size determined from measured weights)
Average Individual Initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$26/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator value adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	27.17	1.43	1.36	27.44	1.44	2.20	5.58
2	27.44	1.44	1.37	27.72	1.46	2.20	5.60
3	27.72	1.46	1.39	27.99	1.47	2.21	5.62
4	27.99	1.47	1.40	28.27	1.49	2.22	5.64
5	28.27	1.49	1.41	28.56	1.50	2.23	5.65
6	28.56	1.50	1.43	28.84	1.52	2.23	5.67
7	28.84	1.52	1.44	29.13	1.53	2.24	5.69
Daily group ration (g)		1.40		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	29.13	1.53	1.46	29.42	1.55	2.25	5.71
9	29.42	1.55	1.47	29.72	1.56	2.26	5.73
10	29.72	1.56	1.49	30.01	1.58	2.26	5.75
11	30.01	1.58	1.50	30.31	1.60	2.27	5.77
12	30.31	1.60	1.52	30.62	1.61	2.28	5.79
13	30.62	1.61	1.53	30.92	1.63	2.29	5.81
14	30.92	1.63	1.55	31.23	1.64	2.29	5.83
Daily group ration (g)		1.50		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	31.23	1.64	1.56	31.54	1.66	2.30	5.85
16	31.54	1.66	1.58	31.86	1.68	2.31	5.86
17	31.86	1.68	1.59	32.18	1.69	2.32	5.88
18	32.18	1.69	1.61	32.50	1.71	2.32	5.90
19	32.50	1.71	1.62	32.82	1.73	2.33	5.92
20	32.82	1.73	1.64	33.15	1.74	2.34	5.94
21	33.15	1.74	1.66	33.48	1.76	2.35	5.96
Daily group ration (g)		1.61		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	33.48	1.76	1.67	33.82	1.78	2.36	5.98
23	33.82	1.78	1.69	34.16	1.80	2.36	6.00
24	34.16	1.80	1.71	34.50	1.82	2.37	6.02
25	34.50	1.82	1.72	34.84	1.83	2.38	6.04
26	34.84	1.83	1.74	35.19	1.85	2.39	6.06
27	35.19	1.85	1.76	35.54	1.87	2.39	6.08
28	35.54	1.87	1.78	35.90	1.89	2.40	6.10
Daily group ration (g)		1.73		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	35.90	1.89	1.79	36.26	1.91	2.41	6.12
30	36.26	1.91	1.81	36.62	1.93	2.42	6.14
31	36.62	1.93	1.83	36.99	1.95	2.43	6.16
Daily group ration (g)		1.81		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

FF # 7
Item No. 23
Pg 12 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: KW Date: 4/MAR/2013
File Folder: 7 Lab book/pgs: 2, 37-44 Verified by: Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/Weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E13 (from A3)
Treatment Group: 200 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 [redacted]
Date Revised/In [redacted]
Approved for us [redacted] 9-27-12
Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)		1.48					
21	Number of fish		20					
22	Condition Factor (C)		0.0003					
23	[C = 0.00015 - 0.00090 in 0.00005 increments]							
24								
25	FCR		5					
26	% B W./d		5					

Worksheet Formulas
Group Total initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333586 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Row	Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
33	1	29.60	1.48	1.48	29.90	1.49	2.22	5.64	
34	2	29.90	1.49	1.49	30.19	1.51	2.23	5.66	
35	3	30.19	1.51	1.51	30.50	1.52	2.24	5.68	
36	4	30.50	1.52	1.52	30.80	1.54	2.24	5.70	
37	5	30.80	1.54	1.54	31.11	1.56	2.25	5.72	
38	6	31.11	1.56	1.56	31.42	1.57	2.26	5.74	
39	7	31.42	1.57	1.57	31.74	1.59	2.27	5.76	
40									
41	Daily group ration (g)		1.53		←OUTPUT - GROUP FEED RATE (g) for week 1				
42	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
43									
44	8	31.74	1.59	1.59	32.05	1.60	2.27	5.78	
45	9	32.05	1.60	1.60	32.37	1.62	2.28	5.80	
46	10	32.37	1.62	1.62	32.70	1.63	2.29	5.82	
47	11	32.70	1.63	1.63	33.02	1.65	2.30	5.84	
48	12	33.02	1.65	1.65	33.35	1.67	2.30	5.85	
49	13	33.35	1.67	1.67	33.69	1.68	2.31	5.87	
50	14	33.69	1.68	1.68	34.02	1.70	2.32	5.89	
51									
52	Daily group ration (g)		1.64		←OUTPUT - GROUP FEED RATE (g) for week 2				
53	Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
54									
55	15	34.02	1.70	1.70	34.36	1.72	2.33	5.91	
56	16	34.36	1.72	1.72	34.71	1.74	2.34	5.93	
57	17	34.71	1.74	1.74	35.06	1.75	2.34	5.95	
58	18	35.06	1.75	1.75	35.41	1.77	2.35	5.97	
59	19	35.41	1.77	1.77	35.76	1.79	2.36	5.99	
60	20	35.76	1.79	1.79	36.12	1.81	2.37	6.01	
61	21	36.12	1.81	1.81	36.48	1.82	2.37	6.03	
62									
63	Daily group ration (g)		1.75		←OUTPUT - GROUP FEED RATE (g) for week 3				
64	Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
65									
66	22	36.48	1.82	1.82	36.84	1.84	2.38	6.05	
67	23	36.84	1.84	1.84	37.21	1.86	2.39	6.07	
68	24	37.21	1.86	1.86	37.58	1.88	2.40	6.09	
69	25	37.58	1.88	1.88	37.96	1.90	2.41	6.11	
70	26	37.96	1.90	1.90	38.34	1.92	2.41	6.13	
71	27	38.34	1.92	1.92	38.72	1.94	2.42	6.15	
72	28	38.72	1.94	1.94	39.11	1.96	2.43	6.17	
73									
74	Daily group ration (g)		1.88		←OUTPUT - GROUP FEED RATE (g) for week 4				
75	Daily per fish ration (g)		0.09		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
76									
77	29	39.11	1.96	1.96	39.50	1.98	2.44	6.19	
78	30	39.50	1.98	1.98	39.90	1.99	2.45	6.21	
79	31	39.90	1.99	1.99	40.30	2.01	2.46	6.24	
80									
81	Daily group ration (g)		1.98		←OUTPUT - GROUP FEED RATE (g) for week 5				
82	Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

FF # 7
Item No. 23
Pg 13 of 15

Study Number: AEH-12-PSEUDO-03
File Folder 7 Lab book/pgs 2, 37-44

Reviewed by: KMW Date: 19MAR2013
Verified by: [redacted] Date 4-5-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual , adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = if available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E14 (from B1)
Treatment Group: 300 mg/L
Species: CCF **Lot:** 123000

Date Created/Initi[redacted]
Date Revised/ini[redacted]
Approved for use[redacted] 9-27-12
[redacted]or Date

Row	Column: c	d	e	f	g	h	i	j
19	**INPUT SECTION**							
20	Initial fish size (g)		1.85					
21	Number of fish		4					
22	Condition Factor (C)		0.0003					
23	(C = 0.00015 - 0.00050 in 0.00005 increments)							
24								
25	FCR		5					
26	% B.W./d		5					

Worksheet Formulas
Group Total Initial fish weight (g) = E20 * E21 (Initial fish size determined from measured weights)
Average Individual initial fish weight (g) = D33/$DE21 (numerator value adjusts by row)
Daily group Feed Ration (g) = D33*($D$25/100) (numerator value adjusts by row)
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) (Column D and F values adjust by row)
Individual Final Fish wt (g) =G33/$E$21 (numerator va ue adjusts by row)
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333586 (Column H value adjusts by row)
Fish Final Length (cm) = I33*2.54 (numerator value adjusts by row)

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)	
1	7.40	1.85	0.37	7.47	1.87	2.39	6.08	
2	7.47	1.87	0.37	7.55	1.89	2.40	6.10	
3	7.55	1.89	0.38	7.62	1.91	2.41	6.12	
4	7.62	1.91	0.38	7.70	1.93	2.42	6.14	
5	7.70	1.93	0.38	7.78	1.94	2.43	6.16	
6	7.78	1.94	0.39	7.86	1.96	2.43	6.18	
7	7.86	1.96	0.39	7.93	1.98	2.44	6.20	
Daily group ration (g)		0.38		←OUTPUT - GROUP FEED RATE (g) for week 1				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1				
8	7.93	1.98	0.40	8.01	2.00	2.45	6.22	
9	8.01	2.00	0.40	8.09	2.02	2.46	6.24	
10	8.09	2.02	0.40	8.17	2.04	2.47	6.26	
11	8.17	2.04	0.41	8.26	2.06	2.47	6.29	
12	8.26	2.06	0.41	8.34	2.08	2.48	6.31	
13	8.34	2.08	0.42	8.42	2.11	2.49	6.33	
14	8.42	2.11	0.42	8.51	2.13	2.50	6.35	
Daily group ration (g)		0.41		←OUTPUT - GROUP FEED RATE (g) for week 2				
Daily per fish ration (g)		0.10		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2				
15	8.51	2.13	0.43	8.59	2.15	2.51	6.37	
16	8.59	2.15	0.43	8.68	2.17	2.52	6.39	
17	8.68	2.17	0.43	8.76	2.19	2.52	6.41	
18	8.76	2.19	0.44	8.85	2.21	2.53	6.43	
19	8.85	2.21	0.44	8.94	2.24	2.54	6.45	
20	8.94	2.24	0.45	9.03	2.26	2.55	6.48	
21	9.03	2.26	0.45	9.12	2.28	2.55	6.50	
Daily group ration (g)		0.44		←OUTPUT - GROUP FEED RATE (g) for week 3				
Daily per fish ration (g)		0.11		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3				
22	9.12	2.28	0.46	9.21	2.30	2.57	6.52	
23	9.21	2.30	0.46	9.30	2.33	2.58	6.54	
24	9.30	2.33	0.47	9.40	2.35	2.58	6.56	
25	9.40	2.35	0.47	9.49	2.37	2.59	6.58	
26	9.49	2.37	0.47	9.58	2.40	2.60	6.61	
27	9.58	2.40	0.48	9.68	2.42	2.61	6.63	
28	9.68	2.42	0.48	9.78	2.44	2.62	6.65	
Daily group ration (g)		0.47		←OUTPUT - GROUP FEED RATE (g) for week 4				
Daily per fish ration (g)		0.12		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4				
29	9.78	2.44	0.49	9.88	2.47	2.63	6.67	
30	9.88	2.47	0.49	9.97	2.49	2.64	6.69	
31	9.97	2.49	0.50	10.07	2.52	2.64	6.72	
Daily group ration (g)		0.49		←OUTPUT - GROUP FEED RATE (g) for week 5				
Daily per fish ration (g)		0.12		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5				

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Item No. 23
Pg 14 of 15

Study Number: AEH-12-PSEUDO-03 Reviewed by: [illegible] Date: 19MAR2013
File Folder: 4 Lab book/pgs 2, 37-44 Verified by: [illegible] Date: 4-8-13

Form 2 - Fish growth and Food Calculator

Enter Initial Fish Size (g), number of fish, FCR, and % B.W./d in input section
FCR = Food conversion rate expressed as units fed per unit gain (ie: FCR of 1.5 would equal 1.5 grams fed for every 1.0 grams gained)
%B.W./d = Percentage of body weight to be fed daily throughout the period
Feed weekly average through the week
Daily ration(g) to feed per week is shown in boxes for group and per individual, adjust for mortalities by multiplying # of surviving fish by the individual feed rate.
Condition Factor C = If available, value obtained from Length/weight charts from Fish Hatchery Management, Piper et. al 1982. Fish Hatchery Management.
United States Department of the Interior Fish and Wildlife Service Washington, D.C.pgs 406-467.
If not specified in Piper et. al, use value that approximates body condition for the species. Enter value as a decimal

Holding System: Holding Rack
Holding Tank/Chamber: E15 (from A1)
Treatment Group: 300 mg/L
Species: CCF **Lot:** 123000

Date Created/Initials: 9-27-12 [illegible]
Date Revised/Init [redacted]
Approved for use [redacted] 9-27-12
Date

Row	Column:	c	d	e	f	g	h	i	j

INPUT SECTION

Initial fish size (g)	1.23
Number of fish	2
Condition Factor [C]	0.0003
(C = 0.00015 - 0.00050 in 0.00005 increments)	
FCR	5
% B.W./d	5

Worksheet Formulas

Group Total Initial fish weight (g) = E20 * E21 {initial fish size determined from measured weights}
Average Individual Initial fish weight (g) = D33/$DE21 {numerator value adjusts by row}
Daily group Feed Ration (g) = D33*($D$26/100) {numerator value adjusts by row}
Total Final Fish wt (g) = SUM(D33+(F33*(1/$D$25))) {Column D and F values adjust by row}
Individual Final Fish wt (g) =G33/$E$21 {numerator value adjusts by row}
Fish Final Length (inches) =((H33/454)/$E$22)^0.333333536 {Column H value adjusts by row}
Fish Final Length (cm) = I33*2.54 {numerator value adjusts by row}

Day	Group Total Initial Fish wt (g)	Average Individual Initial Fish wt (g)	Daily Group Feed Ration (g)	Total Final Fish wt (g)	Individual Final Fish wt (g)	Fish Final Length (inches)	Fish Final Length (cm)
1	2.46	1.23	0.12	2.48	1.24	2.09	5.31
2	2.48	1.24	0.12	2.51	1.25	2.10	5.32
3	2.51	1.25	0.13	2.53	1.27	2.10	5.34
4	2.53	1.27	0.13	2.56	1.28	2.11	5.36
5	2.56	1.28	0.13	2.59	1.29	2.12	5.38
6	2.59	1.29	0.13	2.61	1.31	2.13	5.40
7	2.61	1.31	0.13	2.64	1.32	2.13	5.41
Daily group ration (g)		0.13		←OUTPUT - GROUP FEED RATE (g) for week 1			
Daily per fish ration (g)		0.06		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 1			
8	2.64	1.32	0.13	2.66	1.33	2.14	5.43
9	2.66	1.33	0.13	2.69	1.35	2.15	5.45
10	2.69	1.35	0.13	2.72	1.36	2.15	5.47
11	2.72	1.36	0.14	2.74	1.37	2.16	5.49
12	2.74	1.37	0.14	2.77	1.39	2.17	5.50
13	2.77	1.39	0.14	2.80	1.40	2.17	5.52
14	2.80	1.40	0.14	2.83	1.41	2.18	5.54
Daily group ration (g)		0.14		←OUTPUT - GROUP FEED RATE (g) for week 2			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 2			
15	2.83	1.41	0.14	2.86	1.43	2.19	5.56
16	2.86	1.43	0.14	2.88	1.44	2.20	5.58
17	2.88	1.44	0.14	2.91	1.46	2.20	5.60
18	2.91	1.46	0.15	2.94	1.47	2.21	5.61
19	2.94	1.47	0.15	2.97	1.49	2.22	5.63
20	2.97	1.49	0.15	3.00	1.50	2.23	5.65
21	3.00	1.50	0.15	3.03	1.52	2.23	5.67
Daily group ration (g)		0.15		←OUTPUT - GROUP FEED RATE (g) for week 3			
Daily per fish ration (g)		0.07		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 3			
22	3.03	1.52	0.15	3.06	1.53	2.24	5.69
23	3.06	1.53	0.15	3.09	1.55	2.25	5.71
24	3.09	1.55	0.15	3.12	1.56	2.26	5.73
25	3.12	1.56	0.16	3.15	1.58	2.26	5.75
26	3.15	1.58	0.16	3.19	1.59	2.27	5.77
27	3.19	1.59	0.16	3.22	1.61	2.28	5.78
28	3.22	1.61	0.16	3.25	1.63	2 29	5.80
Daily group ration (g)		0.16		←OUTPUT - GROUP FEED RATE (g) for week 4			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 4			
29	3.25	1.63	0.16	3.28	1.64	2.29	5.82
30	3.28	1.64	0.16	3.32	1.66	2.30	5.84
31	3.32	1.66	0.17	3.35	1.67	2.31	5.86
Daily group ration (g)		0.16		←OUTPUT - GROUP FEED RATE (g) for week 5			
Daily per fish ration (g)		0.08		←OUTPUT - INDIVIDUAL FEED RATE (g) for week 5			

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Appendix 7. Water Quality

Item number	Item description	Number of pages	Report page number
1	Exposure Period Water Chemistry Data Summary for SAS	17	802
2	Total Ammonia Nitrogen Summary for SAS	4	819
3	SAS output for Water Chemistry Analysis	36	823
4	SAS program for Water Chemistry Analysis	2	859
5	SAS log for Water Chemistry Analysis	4	861
6	SAS output for Ammonia Analysis	9	865
7	SAS program for Ammonia Analysis	1	874
8	SAS log for Ammonia Analysis	2	875
9	Water Chemistry – *Oncorhynchus mykiss*: Data Summary	12	877
10	Water Chemistry – *Salvelinus fontinalis*: Data Summary	12	889
11	Water Chemistry – *Sander vitreus*: Data Summary	12	901
12	Water Chemistry – *Perca flavescens*: Data Summary	12	913
13	Water Chemistry – *Acipenser fulvescens*: Data Summary	12	925
14	Water Chemistry – *Micropterus salmoides*: Data Summary	12	937
15	Water Chemistry – *Micropterus dolomieu*: Data Summary	12	949
16	Water Chemistry – *Lepomis macrochirus*: Data Summary	12	961
17	Water Chemistry – *Ictalurus punctatus*: Data Summary	12	973
18	Report of Analysis – Total Ammonia Nitrogen Results	7	985

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Data Source: File Folders: 16B, 17B, 18B, 19B, 20B, 21B, 22B, 23B, 24B	Created.....	10-Feb-14	KLW
Water Quality Forms: 1b, 1c, 4, 5, 6	Revised.....	11-Feb-15	KLW
	Reviewed...	11FEB15	
	Certified...	2/11/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Water Chem for SAS.xlsx]Exposure Water Chem			

Exposure Period Water Chemistry

Species, Dosing, and Assessment Information

Scientific Name	Common Name	Abbreviation	Test Article Lot Number	Exposure Date
Oncorhynchus mykiss	Rainbow Trout	RBT	TR 4669-3-(6)	29-Feb-12
Perca flavescens	Yellow Perch	YEP	TR 4669-4-(6)	7-Mar-12
Sander vitreus	Walleye	WAE	TR 4669-4-(7-8)	21-Mar-12
Salvelinus fontinalis	Coaster Brook Trout	BKT	MBI-401 SDP TR4669-4-(5)	02-May012
Micropterus salmoides	Largemouth Bass	LMB	TR4669-4-(5) 2nd shipment	12-Jun-12
Micropterus dolomieu	Smallmouth Bass	SMB	TR4669-4-(5) 3rd shipment	20-Jun-12
Lepomis macrochirus	Bluegill sunfish	BLG	TR4669-3-(7)	11-Jul-12
Acipenser fulvescens	Lake Sturgeon	LST	401P12154G-02	1-Aug-12
Ictalarus punctatus	Channel Catfish	CCF	401P12154G-02 2nd shipment	26-Spe-12

Data codes used within SAS

sps = Young of year fish species (see 3 letter abbreviation codes above)

time = Sample time

- 0 = Pre-exposure
- 1 = 1 hr post-dosing intitation
- 3 = 3 hr post-dosing intitation
- 6 = 6 hr post-dosing intitation
- 12 = 12 hr post-dosing intitation
- 24 = 24 hr post-dosing intitation

id = Test chamber ID

- i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)

conc = Concentration (mg/L)

- 0 = Control (no product added)
- 50 = 50 mg/L
- 100 = 100 mg/L
- 200 = 200 mg/L
- 300 = 300 mg/L

do = Dissolved oxygen (in mg/L)

pH = pH

temp = Temperature (in ° C)

cond = Conductivity (in µS/cm temperature compensated to 25°C)

hard = Water hardness (in mg/L of $CaCO_3$)

alk = Alkalinity (in mg/L of CaCO3)

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Data Explanation

Water chemistry data analyses were limited to simple descriptive statistics (Proc Means) using SAS Version 9.4.

Data Anomalies and Deviations

1) Pre-exposure water chemistry was not measured for RBT. It was decided after the RBT exposure that these data needed to be collected.

sps	time	id	conc	do	ph	temp	cond	hard	alk
YEP	0	A4	0	8.96	7.91	16.9	383	176	128
YEP	0	A3	50	9.03	7.94	17.0	.	.	.
YEP	0	A2	100	8.97	7.90	17.0	.	.	.
YEP	0	A5	200	8.96	7.91	17.0	.	.	.
YEP	0	A1	300	9.01	7.91	17.0	.	.	.
YEP	0	B3	0	9.04	7.96	16.9	376	176	128
YEP	0	B1	50	9.03	7.95	16.9	.	.	.
YEP	0	B4	100	9.04	7.94	16.9	.	.	.
YEP	0	B2	200	8.98	7.94	16.9	.	.	.
YEP	0	B5	300	8.97	7.89	16.9	.	.	.
YEP	0	C1	0	8.80	7.83	17.1	376	178	129
YEP	0	C2	50	8.85	7.89	17.1	.	.	.
YEP	0	C3	100	8.96	7.90	17.1	.	.	.
YEP	0	C5	200	8.67	7.83	17.1	.	.	.
YEP	0	C4	300	8.90	7.87	17.1	.	.	.
YEP	1	A4	0	8.90	7.75	17.0	.	.	.
YEP	1	A3	50	8.79	7.69	17.0	.	.	.
YEP	1	A2	100	8.76	7.67	17.0	.	.	.
YEP	1	A5	200	8.80	7.61	17.1	.	.	.
YEP	1	A1	300	8.75	7.56	17.1	.	.	.
YEP	1	B3	0	8.85	7.74	17.1	.	.	.
YEP	1	B1	50	8.82	7.70	17.2	.	.	.
YEP	1	B4	100	8.80	7.69	17.1	.	.	.
YEP	1	B2	200	8.76	7.67	17.1	.	.	.
YEP	1	B5	300	8.77	7.63	17.1	.	.	.
YEP	1	C1	0	8.82	7.78	17.2	.	.	.
YEP	1	C2	50	8.68	7.84	17.2	.	.	.
YEP	1	C3	100	8.73	7.80	17.3	.	.	.
YEP	1	C5	200	8.68	7.72	17.3	.	.	.
YEP	1	C4	300	8.76	7.68	17.2	.	.	.
YEP	3	A4	0	.	.	.	384	180	127
YEP	3	A3	50	.	.	.	387	176	129
YEP	3	A2	100	.	.	.	396	180	130
YEP	3	A5	200	.	.	.	388	180	133
YEP	3	A1	300	.	.	.	390	178	132
YEP	3	B3	0	.	.	.	361	180	128
YEP	3	B1	50	.	.	.	349	180	129
YEP	3	B4	100	.	.	.	364	178	131
YEP	3	B2	200	.	.	.	371	178	132
YEP	3	B5	300	.	.	.	378	176	135
YEP	3	C1	0	.	.	.	352	178	127
YEP	3	C2	50	.	.	.	362	174	129
YEP	3	C3	100	.	.	.	345	178	128
YEP	3	C5	200	.	.	.	379	180	132
YEP	3	C4	300	.	.	.	390	182	134
YEP	6	A4	0	8.83	7.82	17.2	.	.	.
YEP	6	A3	50	8.65	7.71	17.1	.	.	.
YEP	6	A2	100	8.67	7.65	17.1	.	.	.
YEP	6	A5	200	8.70	7.54	17.2	.	.	.
YEP	6	A1	300	8.65	7.46	17.2	.	.	.
YEP	6	B3	0	8.87	7.82	17.1	.	.	.

YEP	6	B1	50	8.76	7.73	17.2	.	.	.
YEP	6	B4	100	8.78	7.66	17.1	.	.	.
YEP	6	B2	200	8.73	7.56	17.1	.	.	.
YEP	6	B5	300	8.81	7.49	17.1	.	.	.
YEP	6	C1	0	8.88	7.86	17.3	.	.	.
YEP	6	C2	50	8.70	7.77	17.3	.	.	.
YEP	6	C3	100	8.79	7.73	17.3	.	.	.
YEP	6	C5	200	8.93	7.65	17.3	.	.	.
YEP	6	C4	300	8.82	7.54	17.2	.	.	.
YEP	12	A4	0	9.02	7.82	17.0	.	.	.
YEP	12	A3	50	8.93	7.73	17.1	.	.	.
YEP	12	A2	100	8.88	7.68	16.9	.	.	.
YEP	12	A5	200	8.95	7.59	16.9	.	.	.
YEP	12	A1	300	8.98	7.52	16.9	.	.	.
YEP	12	B3	0	9.04	7.79	17.0	.	.	.
YEP	12	B1	50	8.90	7.73	17.0	.	.	.
YEP	12	B4	100	8.91	7.65	17.0	.	.	.
YEP	12	B2	200	8.80	7.57	17.0	.	.	.
YEP	12	B5	300	8.91	7.50	17.1	.	.	.
YEP	12	C1	0	9.01	7.89	17.2	.	.	.
YEP	12	C2	50	8.77	7.80	17.2	.	.	.
YEP	12	C3	100	8.81	7.74	17.1	.	.	.
YEP	12	C5	200	8.95	7.67	17.2	.	.	.
YEP	12	C4	300	8.85	7.54	17.2	.	.	.
YEP	24	A4	0	8.37	7.82	17.1	.	.	.
YEP	24	A3	50	8.12	7.73	17.0	.	.	.
YEP	24	A2	100	8.07	7.66	17.0	.	.	.
YEP	24	A5	200	8.09	7.56	17.1	.	.	.
YEP	24	A1	300	8.21	7.47	17.0	.	.	.
YEP	24	B3	0	8.35	7.83	16.9	.	.	.
YEP	24	B1	50	8.02	7.68	17.0	.	.	.
YEP	24	B4	100	7.94	7.59	16.8	.	.	.
YEP	24	B2	200	8.11	7.59	16.9	.	.	.
YEP	24	B5	300	8.23	7.44	16.9	.	.	.
YEP	24	C1	0	8.43	7.87	17.2	.	.	.
YEP	24	C2	50	8.17	7.76	17.2	.	.	.
YEP	24	C3	100	8.11	7.69	17.1	.	.	.
YEP	24	C5	200	8.05	7.57	17.2	.	.	.
YEP	24	C4	300	8.20	7.49	17.2	.	.	.
BKT	0	A4	0	10.10	7.96	12.9	365	174	122
BKT	0	A2	50	9.95	7.94	12.9	.	.	.
BKT	0	A3	100	10.11	8.00	12.9	.	.	.
BKT	0	A5	200	10.07	7.92	12.9	.	.	.
BKT	0	A1	300	10.02	7.98	12.9	.	.	.
BKT	0	B5	0	10.04	8.03	12.9	371	172	125
BKT	0	B3	50	10.05	8.05	12.9	.	.	.
BKT	0	B2	100	9.77	7.95	12.9	.	.	.
BKT	0	B4	200	10.07	8.05	12.8	.	.	.
BKT	0	B1	300	9.97	7.96	12.9	.	.	.
BKT	0	C1	0	9.71	7.94	13.1	371	176	125
BKT	0	C5	50	9.81	8.02	13.2	.	.	.
BKT	0	C2	100	9.81	8.00	13.0	.	.	.

BKT	0	C4	200	9.66	7.96	13.0	.	.	.
BKT	0	C3	300	9.78	7.98	13.0	.	.	.
BKT	1	A4	0	9.77	7.75	13.0	.	.	.
BKT	1	A2	50	9.66	7.72	13.0	.	.	.
BKT	1	A3	100	9.74	7.72	12.9	.	.	.
BKT	1	A5	200	9.78	7.63	12.9	.	.	.
BKT	1	A1	300	9.77	7.62	12.9	.	.	.
BKT	1	B5	0	9.80	7.84	12.9	.	.	.
BKT	1	B3	50	9.72	7.82	12.9	.	.	.
BKT	1	B2	100	9.68	7.78	12.9	.	.	.
BKT	1	B4	200	9.73	7.72	12.8	.	.	.
BKT	1	B1	300	9.69	7.66	12.9	.	.	.
BKT	1	C1	0	9.56	7.86	13.1	.	.	.
BKT	1	C5	50	9.59	7.87	13.1	.	.	.
BKT	1	C2	100	9.47	7.80	13.0	.	.	.
BKT	1	C4	200	9.46	7.73	12.9	.	.	.
BKT	1	C3	300	9.60	7.68	12.8	.	.	.
BKT	3	A4	0	.	.	.	378	174	125
BKT	3	A2	50	.	.	.	372	172	126
BKT	3	A3	100	.	.	.	363	174	128
BKT	3	A5	200	.	.	.	390	182	130
BKT	3	A1	300	.	.	.	408	182	133
BKT	3	B5	0	.	.	.	386	176	124
BKT	3	B3	50	.	.	.	373	174	127
BKT	3	B2	100	.	.	.	382	174	127
BKT	3	B4	200	.	.	.	393	174	130
BKT	3	B1	300	.	.	.	392	174	133
BKT	3	C1	0	.	.	.	377	174	125
BKT	3	C5	50	.	.	.	375	176	127
BKT	3	C2	100	.	.	.	378	174	126
BKT	3	C4	200	.	.	.	390	176	130
BKT	3	C3	300	.	.	.	398	178	133
BKT	6	A4	0	9.93	7.77	12.9	.	.	.
BKT	6	A2	50	9.88	7.75	13.0	.	.	.
BKT	6	A3	100	9.81	7.73	12.9	.	.	.
BKT	6	A5	200	9.93	7.64	12.8	.	.	.
BKT	6	A1	300	9.84	7.61	12.9	.	.	.
BKT	6	B5	0	9.89	7.92	12.9	.	.	.
BKT	6	B3	50	9.80	7.85	12.9	.	.	.
BKT	6	B2	100	9.75	7.78	12.9	.	.	.
BKT	6	B4	200	9.71	7.66	12.9	.	.	.
BKT	6	B1	300	9.75	7.59	12.9	.	.	.
BKT	6	C1	0	9.82	7.94	13.0	.	.	.
BKT	6	C5	50	9.79	7.90	13.0	.	.	.
BKT	6	C2	100	9.62	7.81	13.0	.	.	.
BKT	6	C4	200	9.51	7.68	13.0	.	.	.
BKT	6	C3	300	9.68	7.63	13.0	.	.	.
BKT	12	A4	0	9.93	7.85	13.0	.	.	.
BKT	12	A2	50	9.84	7.77	13.0	.	.	.
BKT	12	A3	100	9.76	7.70	13.0	.	.	.
BKT	12	A5	200	9.86	7.60	13.0	.	.	.
BKT	12	A1	300	9.86	7.57	13.0	.	.	.

BKT	12	B5	0	9.92	7.93	13.0	.	.	.
BKT	12	B3	50	9.83	7.86	13.0	.	.	.
BKT	12	B2	100	9.74	7.79	13.0	.	.	.
BKT	12	B4	200	9.78	7.67	13.0	.	.	.
BKT	12	B1	300	9.80	7.59	13.0	.	.	.
BKT	12	C1	0	9.82	7.96	13.2	.	.	.
BKT	12	C5	50	9.81	7.91	13.1	.	.	.
BKT	12	C2	100	9.60	7.81	13.2	.	.	.
BKT	12	C4	200	9.55	7.68	13.1	.	.	.
BKT	12	C3	300	9.79	7.64	13.0	.	.	.
BKT	24	A4	0	9.62	7.72	12.8	.	.	.
BKT	24	A2	50	9.43	7.64	12.8	.	.	.
BKT	24	A3	100	9.33	7.58	12.8	.	.	.
BKT	24	A5	200	9.43	7.47	12.8	.	.	.
BKT	24	A1	300	9.45	7.43	12.8	.	.	.
BKT	24	B5	0	9.70	7.82	12.9	.	.	.
BKT	24	B3	50	9.55	7.73	12.8	.	.	.
BKT	24	B2	100	9.52	7.65	12.8	.	.	.
BKT	24	B4	200	9.55	7.53	12.7	.	.	.
BKT	24	B1	300	9.48	7.43	12.8	.	.	.
BKT	24	C1	0	9.63	7.86	13.0	.	.	.
BKT	24	C5	50	9.58	7.79	13.0	.	.	.
BKT	24	C2	100	9.33	7.69	13.0	.	.	.
BKT	24	C4	200	9.25	7.54	12.9	.	.	.
BKT	24	C3	300	9.34	7.48	12.8	.	.	.
CCF	0	A4	0	7.76	8.03	21.5	374	174	127
CCF	0	A2	50	7.77	8.03	21.5	.	.	.
CCF	0	A5	100	7.84	8.05	21.4	.	.	.
CCF	0	A3	200	7.74	8.02	21.5	.	.	.
CCF	0	A1	300	7.61	7.98	21.6	.	.	.
CCF	0	B5	0	7.76	8.02	21.5	371	174	129
CCF	0	B4	50	7.68	8.01	21.4	.	.	.
CCF	0	B3	100	7.86	8.07	21.4	.	.	.
CCF	0	B2	200	7.81	8.04	21.4	.	.	.
CCF	0	B1	300	8.04	8.08	21.4	.	.	.
CCF	0	C3	0	7.83	8.09	21.5	373	174	129
CCF	0	C5	50	7.72	8.06	21.4	.	.	.
CCF	0	C2	100	7.74	8.06	21.4	.	.	.
CCF	0	C1	200	7.94	8.13	21.3	.	.	.
CCF	0	C4	300	7.99	8.16	21.2	.	.	.
CCF	1	A4	0	7.57	8.01	21.6	.	.	.
CCF	1	A2	50	7.67	7.99	21.6	.	.	.
CCF	1	A5	100	7.67	7.96	21.4	.	.	.
CCF	1	A3	200	7.65	7.88	21.6	.	.	.
CCF	1	A1	300	7.38	7.78	21.6	.	.	.
CCF	1	B5	0	7.53	7.90	21.6	.	.	.
CCF	1	B4	50	7.47	7.87	21.5	.	.	.
CCF	1	B3	100	7.64	7.88	21.6	.	.	.
CCF	1	B2	200	7.53	7.78	21.6	.	.	.
CCF	1	B1	300	7.88	7.79	21.6	.	.	.
CCF	1	C3	0	7.81	8.12	21.5	.	.	.
CCF	1	C5	50	7.58	8.00	21.5	.	.	.

CCF	1	C2	100	7.60	7.98	21.6	.	.	.
CCF	1	C1	200	7.70	7.98	21.4	.	.	.
CCF	1	C4	300	7.69	7.89	21.7	.	.	.
CCF	3	A4	0	.	.	.	369	174	126
CCF	3	A2	50	.	.	.	377	174	130
CCF	3	A5	100	.	.	.	380	174	130
CCF	3	A3	200	.	.	.	392	174	132
CCF	3	A1	300	.	.	.	396	176	133
CCF	3	B5	0	.	.	.	373	176	128
CCF	3	B4	50	.	.	.	378	176	131
CCF	3	B3	100	.	.	.	385	176	132
CCF	3	B2	200	.	.	.	387	176	135
CCF	3	B1	300	.	.	.	398	176	136
CCF	3	C3	0	.	.	.	358	174	129
CCF	3	C5	50	.	.	.	375	176	131
CCF	3	C2	100	.	.	.	384	176	132
CCF	3	C1	200	.	.	.	390	178	136
CCF	3	C4	300	.	.	.	396	178	136
CCF	6	A4	0	7.78	7.87	21.6	.	.	.
CCF	6	A2	50	7.64	7.90	21.6	.	.	.
CCF	6	A5	100	7.68	7.89	21.6	.	.	.
CCF	6	A3	200	7.70	7.83	21.5	.	.	.
CCF	6	A1	300	7.38	7.72	21.4	.	.	.
CCF	6	B5	0	7.75	8.09	21.6	.	.	.
CCF	6	B4	50	7.41	8.00	21.6	.	.	.
CCF	6	B3	100	7.66	7.97	21.6	.	.	.
CCF	6	B2	200	7.49	7.88	21.6	.	.	.
CCF	6	B1	300	7.89	7.85	21.6	.	.	.
CCF	6	C3	0	7.94	8.17	21.5	.	.	.
CCF	6	C5	50	7.75	8.05	21.5	.	.	.
CCF	6	C2	100	7.83	8.03	21.6	.	.	.
CCF	6	C1	200	7.74	7.98	21.5	.	.	.
CCF	6	C4	300	7.80	7.87	21.7	.	.	.
CCF	12	A4	0	7.80	8.10	21.7	.	.	.
CCF	12	A2	50	7.44	7.98	21.6	.	.	.
CCF	12	A5	100	7.31	7.90	21.6	.	.	.
CCF	12	A3	200	7.38	7.84	21.6	.	.	.
CCF	12	A1	300	6.93	7.68	21.7	.	.	.
CCF	12	B5	0	7.77	8.09	21.6	.	.	.
CCF	12	B4	50	7.21	7.92	21.6	.	.	.
CCF	12	B3	100	7.60	7.92	21.6	.	.	.
CCF	12	B2	200	7.36	7.80	21.6	.	.	.
CCF	12	B1	300	7.75	7.81	21.6	.	.	.
CCF	12	C3	0	7.92	8.16	21.5	.	.	.
CCF	12	C5	50	7.67	8.01	21.6	.	.	.
CCF	12	C2	100	7.66	7.98	21.5	.	.	.
CCF	12	C1	200	7.71	7.93	21.6	.	.	.
CCF	12	C4	300	7.52	7.79	21.6	.	.	.
CCF	24	A4	0	7.90	8.00	21.5	.	.	.
CCF	24	A2	50	7.17	7.83	21.6	.	.	.
CCF	24	A5	100	6.75	7.72	21.4	.	.	.
CCF	24	A3	200	6.57	7.61	21.6	.	.	.

CCF	24	A1	300	6.19	7.45	21.6	.	.	.
CCF	24	B5	0	7.81	8.05	21.6	.	.	.
CCF	24	B4	50	6.65	7.79	21.5	.	.	.
CCF	24	B3	100	6.81	7.74	21.6	.	.	.
CCF	24	B2	200	5.99	7.53	21.6	.	.	.
CCF	24	B1	300	6.41	7.51	21.6	.	.	.
CCF	24	C3	0	8.07	8.15	21.5	.	.	.
CCF	24	C5	50	7.17	7.87	21.5	.	.	.
CCF	24	C2	100	6.83	7.78	21.5	.	.	.
CCF	24	C1	200	6.50	7.65	21.2	.	.	.
CCF	24	C4	300	5.75	7.45	21.6	.	.	.
LST	0	A4	0	9.06	8.08	17.1	371	172	129
LST	0	A5	50	9.07	8.08	17.1	.	.	.
LST	0	A1	100	8.93	8.04	17.1	.	.	.
LST	0	A2	200	9.03	8.07	17.0	.	.	.
LST	0	A3	300	9.07	8.10	17.0	.	.	.
LST	0	B5	0	9.05	8.10	16.9	373	170	130
LST	0	B3	50	9.03	8.08	17.0	.	.	.
LST	0	B2	100	8.96	8.05	17.0	.	.	.
LST	0	B4	200	8.96	8.07	17.0	.	.	.
LST	0	B1	300	9.04	8.07	17.0	.	.	.
LST	0	C4	0	8.87	8.05	17.1	370	174	131
LST	0	C1	50	8.87	8.05	17.2	.	.	.
LST	0	C5	100	8.63	7.99	17.2	.	.	.
LST	0	C2	200	8.55	7.98	17.2	.	.	.
LST	0	C3	300	8.86	8.06	17.2	.	.	.
LST	1	A4	0	9.09	7.96	17.1	.	.	.
LST	1	A5	50	9.05	7.96	17.0	.	.	.
LST	1	A1	100	8.65	7.86	17.1	.	.	.
LST	1	A2	200	8.61	7.83	17.1	.	.	.
LST	1	A3	300	8.60	7.77	17.1	.	.	.
LST	1	B5	0	9.09	8.12	17.0	.	.	.
LST	1	B3	50	8.98	8.05	17.0	.	.	.
LST	1	B2	100	8.89	7.99	17.0	.	.	.
LST	1	B4	200	8.58	7.87	17.0	.	.	.
LST	1	B1	300	8.81	7.88	17.0	.	.	.
LST	1	C4	0	8.75	8.06	17.2	.	.	.
LST	1	C1	50	8.62	8.00	17.3	.	.	.
LST	1	C5	100	8.28	7.91	17.2	.	.	.
LST	1	C2	200	8.17	7.88	17.2	.	.	.
LST	1	C3	300	8.54	7.87	17.2	.	.	.
LST	3	A4	0	.	.	.	373	174	129
LST	3	A5	50	.	.	.	393	176	132
LST	3	A1	100	.	.	.	397	174	132
LST	3	A2	200	.	.	.	408	176	135
LST	3	A3	300	.	.	.	418	174	136
LST	3	B5	0	.	.	.	374	172	130
LST	3	B3	50	.	.	.	388	174	132
LST	3	B2	100	.	.	.	392	174	133
LST	3	B4	200	.	.	.	396	174	135
LST	3	B1	300	.	.	.	403	176	136
LST	3	C4	0	.	.	.	389	174	130

LST	3	C1	50	.	.	.	396	172	132
LST	3	C5	100	.	.	.	394	170	133
LST	3	C2	200	.	.	.	398	174	139
LST	3	C3	300	.	.	.	415	172	137
LST	6	A4	0	9.07	8.18	16.9	.	.	.
LST	6	A5	50	9.05	8.11	17.0	.	.	.
LST	6	A1	100	8.76	7.94	17.1	.	.	.
LST	6	A2	200	8.56	7.85	17.1	.	.	.
LST	6	A3	300	8.70	7.83	17.1	.	.	.
LST	6	B5	0	9.09	8.19	17.0	.	.	.
LST	6	B3	50	9.01	8.12	17.0	.	.	.
LST	6	B2	100	8.96	8.04	17.0	.	.	.
LST	6	B4	200	8.73	7.89	17.0	.	.	.
LST	6	B1	300	8.94	7.92	17.0	.	.	.
LST	6	C4	0	8.87	8.14	17.2	.	.	.
LST	6	C1	50	8.63	8.02	17.3	.	.	.
LST	6	C5	100	8.42	7.91	17.2	.	.	.
LST	6	C2	200	8.50	7.89	17.3	.	.	.
LST	6	C3	300	8.55	7.82	17.2	.	.	.
LST	12	A4	0	9.12	8.13	17.0	.	.	.
LST	12	A5	50	9.04	8.06	17.0	.	.	.
LST	12	A1	100	8.71	7.88	17.1	.	.	.
LST	12	A2	200	8.47	7.76	17.1	.	.	.
LST	12	A3	300	8.61	7.76	17.0	.	.	.
LST	12	B5	0	9.05	8.18	17.0	.	.	.
LST	12	B3	50	8.99	8.09	17.1	.	.	.
LST	12	B2	100	8.84	7.99	17.1	.	.	.
LST	12	B4	200	8.51	7.82	17.1	.	.	.
LST	12	B1	300	8.87	7.86	17.1	.	.	.
LST	12	C4	0	8.87	8.15	17.2	.	.	.
LST	12	C1	50	8.63	8.01	17.3	.	.	.
LST	12	C5	100	8.29	7.89	17.2	.	.	.
LST	12	C2	200	8.28	7.85	17.3	.	.	.
LST	12	C3	300	8.38	7.78	17.2	.	.	.
LST	24	A4	0	9.23	8.16	16.9	.	.	.
LST	24	A5	50	8.94	8.04	17.0	.	.	.
LST	24	A1	100	8.48	7.85	17.0	.	.	.
LST	24	A2	200	8.42	7.74	17.0	.	.	.
LST	24	A3	300	8.59	7.73	17.0	.	.	.
LST	24	B5	0	9.18	8.18	17.1	.	.	.
LST	24	B3	50	8.91	8.06	17.0	.	.	.
LST	24	B2	100	8.63	7.93	17.1	.	.	.
LST	24	B4	200	8.48	7.77	17.1	.	.	.
LST	24	B1	300	8.62	7.79	17.1	.	.	.
LST	24	C4	0	8.97	8.16	17.2	.	.	.
LST	24	C1	50	8.45	7.95	17.2	.	.	.
LST	24	C5	100	8.14	7.83	17.2	.	.	.
LST	24	C2	200	7.98	7.77	17.3	.	.	.
LST	24	C3	300	8.17	7.69	17.2	.	.	.
WAE	0	A2	0	8.23	7.89	17.3	403	178	124
WAE	0	A5	50	8.21	7.90	17.4	.	.	.
WAE	0	A4	100	8.27	7.93	17.3	.	.	.

WAE	0	A1	200	8.28	7.93	17.3	.	.	.
WAE	0	A3	300	8.22	7.96	17.3	.	.	.
WAE	0	B5	0	8.26	7.96	17.4	395	178	127
WAE	0	B2	50	8.32	7.96	17.3	.	.	.
WAE	0	B3	100	7.70	7.87	17.3	.	.	.
WAE	0	B1	200	8.28	7.95	17.4	.	.	.
WAE	0	B4	300	8.60	7.99	17.3	.	.	.
WAE	0	C3	0	8.17	7.97	17.5	397	176	128
WAE	0	C5	50	8.02	7.96	17.5	.	.	.
WAE	0	C4	100	8.06	7.96	17.4	.	.	.
WAE	0	C2	200	8.21	7.98	17.4	.	.	.
WAE	0	C1	300	8.25	7.98	17.5	.	.	.
WAE	1	A2	0	8.25	7.86	17.2	.	.	.
WAE	1	A5	50	8.09	7.82	17.2	.	.	.
WAE	1	A4	100	8.02	7.78	17.2	.	.	.
WAE	1	A1	200	7.80	7.68	17.2	.	.	.
WAE	1	A3	300	7.81	7.64	17.2	.	.	.
WAE	1	B5	0	8.09	7.90	17.2	.	.	.
WAE	1	B2	50	8.11	7.84	17.2	.	.	.
WAE	1	B3	100	7.47	7.74	17.2	.	.	.
WAE	1	B1	200	7.79	7.70	17.2	.	.	.
WAE	1	B4	300	8.27	7.76	17.2	.	.	.
WAE	1	C3	0	8.18	7.97	17.3	.	.	.
WAE	1	C5	50	7.92	7.93	17.3	.	.	.
WAE	1	C4	100	7.97	7.91	17.4	.	.	.
WAE	1	C2	200	8.03	7.82	17.3	.	.	.
WAE	1	C1	300	8.00	7.75	17.3	.	.	.
WAE	3	A2	0	.	.	.	403	178	127
WAE	3	A5	50	.	.	.	395	176	127
WAE	3	A4	100	.	.	.	406	176	128
WAE	3	A1	200	.	.	.	419	178	132
WAE	3	A3	300	.	.	.	417	178	135
WAE	3	B5	0	.	.	.	393	176	127
WAE	3	B2	50	.	.	.	405	176	125
WAE	3	B3	100	.	.	.	398	178	127
WAE	3	B1	200	.	.	.	402	180	131
WAE	3	B4	300	.	.	.	418	176	135
WAE	3	C3	0	.	.	.	393	178	126
WAE	3	C5	50	.	.	.	395	176	126
WAE	3	C4	100	.	.	.	412	176	128
WAE	3	C2	200	.	.	.	417	178	130
WAE	3	C1	300	.	.	.	419	176	131
WAE	6	A2	0	8.45	7.83	17.2	.	.	.
WAE	6	A5	50	8.31	7.77	17.2	.	.	.
WAE	6	A4	100	8.28	7.71	17.2	.	.	.
WAE	6	A1	200	8.07	7.59	17.2	.	.	.
WAE	6	A3	300	8.11	7.54	17.2	.	.	.
WAE	6	B5	0	8.50	7.93	17.1	.	.	.
WAE	6	B2	50	8.35	7.80	17.1	.	.	.
WAE	6	B3	100	8.04	7.69	17.0	.	.	.
WAE	6	B1	200	8.32	7.61	17.1	.	.	.
WAE	6	B4	300	8.55	7.54	17.0	.	.	.

WAE	6	C3	0	8.45	7.95	17.3	.	.	.
WAE	6	C5	50	8.19	7.84	17.4	.	.	.
WAE	6	C4	100	8.19	7.78	17.3	.	.	.
WAE	6	C2	200	8.24	7.66	17.3	.	.	.
WAE	6	C1	300	8.10	7.58	17.3	.	.	.
WAE	12	A2	0	8.52	7.80	17.1	.	.	.
WAE	12	A5	50	8.36	7.71	17.0	.	.	.
WAE	12	A4	100	8.25	7.65	17.1	.	.	.
WAE	12	A1	200	8.22	7.54	17.1	.	.	.
WAE	12	A3	300	8.17	7.49	17.1	.	.	.
WAE	12	B5	0	8.51	7.90	17.1	.	.	.
WAE	12	B2	50	8.33	7.82	17.2	.	.	.
WAE	12	B3	100	7.95	7.71	17.1	.	.	.
WAE	12	B1	200	8.19	7.64	17.2	.	.	.
WAE	12	B4	300	8.41	7.55	17.2	.	.	.
WAE	12	C3	0	8.57	7.99	17.4	.	.	.
WAE	12	C5	50	8.17	7.85	17.4	.	.	.
WAE	12	C4	100	8.18	7.79	17.4	.	.	.
WAE	12	C2	200	8.09	7.68	17.4	.	.	.
WAE	12	C1	300	8.16	7.59	17.4	.	.	.
WAE	24	A2	0	8.56	7.89	17.3	.	.	.
WAE	24	A5	50	8.16	7.77	17.2	.	.	.
WAE	24	A4	100	8.04	7.72	17.3	.	.	.
WAE	24	A1	200	7.79	7.63	17.3	.	.	.
WAE	24	A3	300	8.03	7.61	17.3	.	.	.
WAE	24	B5	0	8.51	7.89	17.1	.	.	.
WAE	24	B2	50	8.09	7.76	17.1	.	.	.
WAE	24	B3	100	7.65	7.65	17.1	.	.	.
WAE	24	B1	200	7.59	7.57	17.3	.	.	.
WAE	24	B4	300	8.15	7.50	17.0	.	.	.
WAE	24	C3	0	8.58	7.91	17.3	.	.	.
WAE	24	C5	50	7.99	7.78	17.4	.	.	.
WAE	24	C4	100	7.95	7.72	17.4	.	.	.
WAE	24	C2	200	7.54	7.59	17.4	.	.	.
WAE	24	C1	300	7.52	7.52	17.5	.	.	.
SMB	0	A2	0	8.22	8.05	22.0	364	172	130
SMB	0	A3	50	8.02	8.01	22.0	.	.	.
SMB	0	A1	100	8.18	8.02	21.9	.	.	.
SMB	0	A4	200	8.05	8.02	22.0	.	.	.
SMB	0	A5	300	8.18	8.03	21.9	.	.	.
SMB	0	B1	0	8.04	8.04	21.9	369	174	130
SMB	0	B5	50	8.11	8.03	21.9	.	.	.
SMB	0	B3	100	7.69	7.97	21.9	.	.	.
SMB	0	B2	200	8.09	8.04	21.9	.	.	.
SMB	0	B4	300	8.13	8.03	21.9	.	.	.
SMB	0	C1	0	8.06	8.03	22.1	366	172	131
SMB	0	C3	50	8.06	8.00	22.0	.	.	.
SMB	0	C2	100	8.02	8.01	22.0	.	.	.
SMB	0	C5	200	8.00	8.01	22.2	.	.	.
SMB	0	C4	300	8.10	8.01	22.2	.	.	.
SMB	1	A2	0	8.18	8.11	22.0	.	.	.
SMB	1	A3	50	8.15	8.10	22.1	.	.	.

SMB	1	A1	100	8.14	8.04	22.0	.	.	.
SMB	1	A4	200	8.13	7.99	22.0	.	.	.
SMB	1	A5	300	8.18	7.95	21.9	.	.	.
SMB	1	B1	0	8.21	8.15	21.9	.	.	.
SMB	1	B5	50	8.14	8.12	22.0	.	.	.
SMB	1	B3	100	8.18	8.08	22.0	.	.	.
SMB	1	B2	200	8.14	7.95	22.0	.	.	.
SMB	1	B4	300	8.05	7.88	22.1	.	.	.
SMB	1	C1	0	8.14	8.14	22.2	.	.	.
SMB	1	C3	50	8.02	8.09	22.1	.	.	.
SMB	1	C2	100	7.97	8.05	22.0	.	.	.
SMB	1	C5	200	8.30	8.07	21.9	.	.	.
SMB	1	C4	300	8.17	7.95	22.0	.	.	.
SMB	3	A2	0	.	.	.	369	174	129
SMB	3	A3	50	.	.	.	370	174	133
SMB	3	A1	100	.	.	.	371	174	139
SMB	3	A4	200	.	.	.	376	172	136
SMB	3	A5	300	.	.	.	384	174	140
SMB	3	B1	0	.	.	.	366	170	129
SMB	3	B5	50	.	.	.	371	174	130
SMB	3	B3	100	.	.	.	372	172	131
SMB	3	B2	200	.	.	.	379	172	135
SMB	3	B4	300	.	.	.	380	174	138
SMB	3	C1	0	.	.	.	360	172	128
SMB	3	C3	50	.	.	.	366	172	131
SMB	3	C2	100	.	.	.	370	172	133
SMB	3	C5	200	.	.	.	380	172	135
SMB	3	C4	300	.	.	.	390	174	137
SMB	6	A2	0	8.22	8.08	21.9	.	.	.
SMB	6	A3	50	8.09	7.97	22.0	.	.	.
SMB	6	A1	100	8.00	7.91	22.0	.	.	.
SMB	6	A4	200	7.89	7.80	22.0	.	.	.
SMB	6	A5	300	7.73	7.68	21.9	.	.	.
SMB	6	B1	0	8.28	8.14	21.8	.	.	.
SMB	6	B5	50	8.05	8.01	22.0	.	.	.
SMB	6	B3	100	7.94	7.88	21.9	.	.	.
SMB	6	B2	200	7.90	7.82	21.9	.	.	.
SMB	6	B4	300	7.77	7.73	21.9	.	.	.
SMB	6	C1	0	8.17	8.14	22.0	.	.	.
SMB	6	C3	50	7.86	7.99	22.0	.	.	.
SMB	6	C2	100	7.81	7.95	21.9	.	.	.
SMB	6	C5	200	7.29	7.74	21.8	.	.	.
SMB	6	C4	300	7.78	7.71	22.0	.	.	.
SMB	12	A2	0	8.28	8.08	21.9	.	.	.
SMB	12	A3	50	8.00	7.94	22.0	.	.	.
SMB	12	A1	100	7.80	7.88	21.9	.	.	.
SMB	12	A4	200	7.35	7.73	21.9	.	.	.
SMB	12	A5	300	7.21	7.62	21.8	.	.	.
SMB	12	B1	0	8.28	8.08	21.9	.	.	.
SMB	12	B5	50	7.88	7.91	22.0	.	.	.
SMB	12	B3	100	7.65	7.83	22.0	.	.	.
SMB	12	B2	200	7.31	7.71	22.0	.	.	.

SMB	12	B4	300	7.07	7.62	22.1	.	.	.
SMB	12	C1	0	8.27	8.14	22.0	.	.	.
SMB	12	C3	50	7.64	7.93	22.0	.	.	.
SMB	12	C2	100	7.43	7.88	22.0	.	.	.
SMB	12	C5	200	7.36	7.60	21.7	.	.	.
SMB	12	C4	300	6.09	7.69	22.1	.	.	.
SMB	24	A2	0	8.04	7.96	21.9	.	.	.
SMB	24	A3	50	7.10	7.72	22.0	.	.	.
SMB	24	A1	100	6.62	7.58	22.0	.	.	.
SMB	24	A4	200	6.01	7.37	22.0	.	.	.
SMB	24	A5	300	6.17	7.32	21.9	.	.	.
SMB	24	B1	0	8.07	8.03	21.8	.	.	.
SMB	24	B5	50	7.22	7.78	21.9	.	.	.
SMB	24	B3	100	6.35	7.55	21.9	.	.	.
SMB	24	B2	200	6.11	7.39	21.9	.	.	.
SMB	24	B4	300	5.82	7.26	22.0	.	.	.
SMB	24	C1	0	8.01	8.07	22.0	.	.	.
SMB	24	C3	50	6.74	7.72	22.0	.	.	.
SMB	24	C2	100	6.26	7.61	21.9	.	.	.
SMB	24	C5	200	4.57	7.21	21.4	.	.	.
SMB	24	C4	300	6.61	7.44	21.9	.	.	.
RBT	1	A1	0	9.51	7.81	12.9	.	.	.
RBT	1	A2	50	9.42	7.79	12.8	.	.	.
RBT	1	A5	100	9.37	7.75	12.9	.	.	.
RBT	1	A3	200	9.20	7.66	12.8	.	.	.
RBT	1	A4	300	9.24	7.59	12.8	.	.	.
RBT	1	B2	0	9.69	7.94	12.7	.	.	.
RBT	1	B5	50	9.52	7.88	12.8	.	.	.
RBT	1	B1	100	9.54	7.83	12.7	.	.	.
RBT	1	B3	200	9.41	7.75	12.7	.	.	.
RBT	1	B4	300	9.27	7.67	12.8	.	.	.
RBT	1	C4	0	9.47	7.94	12.9	.	.	.
RBT	1	C2	50	9.68	7.93	12.9	.	.	.
RBT	1	C1	100	9.44	7.87	12.9	.	.	.
RBT	1	C3	200	9.25	7.73	12.9	.	.	.
RBT	1	C5	300	9.38	7.68	13.0	.	.	.
RBT	3	A1	0	.	.	.	398	180	131
RBT	3	A2	50	.	.	.	409	182	129
RBT	3	A5	100	.	.	.	357	178	127
RBT	3	A3	200	.	.	.	375	176	131
RBT	3	A4	300	.	.	.	386	176	134
RBT	3	B2	0	.	.	.	366	180	125
RBT	3	B5	50	.	.	.	368	180	126
RBT	3	B1	100	.	.	.	395	176	130
RBT	3	B3	200	.	.	.	419	180	131
RBT	3	B4	300	.	.	.	398	180	131
RBT	3	C4	0	.	.	.	386	178	125
RBT	3	C2	50	.	.	.	360	178	128
RBT	3	C1	100	.	.	.	377	182	128
RBT	3	C3	200	.	.	.	376	178	132
RBT	3	C5	300	.	.	.	389	176	135
RBT	6	A1	0	9.57	7.85	12.8	.	.	.

RBT	6	A2	50	9.51	7.78	12.7	.	.	.
RBT	6	A5	100	9.50	7.72	12.9	.	.	.
RBT	6	A3	200	9.47	7.62	12.7	.	.	.
RBT	6	A4	300	9.56	7.54	12.8	.	.	.
RBT	6	B2	0	9.71	7.91	12.7	.	.	.
RBT	6	B5	50	9.56	7.81	12.8	.	.	.
RBT	6	B1	100	9.64	7.76	12.6	.	.	.
RBT	6	B3	200	9.61	7.65	12.8	.	.	.
RBT	6	B4	300	9.45	7.55	12.8	.	.	.
RBT	6	C4	0	9.72	7.94	12.9	.	.	.
RBT	6	C2	50	9.76	7.89	13.0	.	.	.
RBT	6	C1	100	9.63	7.82	13.0	.	.	.
RBT	6	C3	200	9.56	7.67	12.9	.	.	.
RBT	6	C5	300	9.71	7.61	13.0	.	.	.
RBT	12	A1	0	9.71	7.92	12.9	.	.	.
RBT	12	A2	50	9.64	7.84	12.7	.	.	.
RBT	12	A5	100	9.64	7.78	12.9	.	.	.
RBT	12	A3	200	9.68	7.67	12.8	.	.	.
RBT	12	A4	300	9.71	7.58	12.8	.	.	.
RBT	12	B2	0	9.88	7.96	12.7	.	.	.
RBT	12	B5	50	9.68	7.85	12.9	.	.	.
RBT	12	B1	100	9.77	7.80	12.9	.	.	.
RBT	12	B3	200	9.81	7.67	12.8	.	.	.
RBT	12	B4	300	9.66	7.59	12.9	.	.	.
RBT	12	C4	0	9.82	7.97	12.9	.	.	.
RBT	12	C2	50	9.90	7.91	12.9	.	.	.
RBT	12	C1	100	9.76	7.84	13.0	.	.	.
RBT	12	C3	200	9.66	7.69	12.8	.	.	.
RBT	12	C5	300	9.88	7.63	13.1	.	.	.
RBT	24	A1	0	9.72	7.93	12.9	.	.	.
RBT	24	A2	50	9.65	7.84	12.8	.	.	.
RBT	24	A5	100	9.67	7.76	12.9	.	.	.
RBT	24	A3	200	9.63	7.65	12.7	.	.	.
RBT	24	A4	300	9.62	7.56	12.7	.	.	.
RBT	24	B2	0	9.88	7.95	12.7	.	.	.
RBT	24	B5	50	9.73	7.85	12.8	.	.	.
RBT	24	B1	100	9.70	7.79	12.9	.	.	.
RBT	24	B3	200	9.81	7.69	12.7	.	.	.
RBT	24	B4	300	9.64	7.59	12.9	.	.	.
RBT	24	C4	0	9.72	8.00	12.9	.	.	.
RBT	24	C2	50	9.83	7.93	13.1	.	.	.
RBT	24	C1	100	9.76	7.87	13.1	.	.	.
RBT	24	C3	200	9.73	7.70	13.1	.	.	.
RBT	24	C5	300	9.79	7.64	13.1	.	.	.
BLG	0	A1	0	7.75	8.07	21.9	370	174	129
BLG	0	A4	50	7.78	8.07	21.8	.	.	.
BLG	0	A2	100	7.78	8.07	21.8	.	.	.
BLG	0	A5	200	7.88	8.11	21.8	.	.	.
BLG	0	A3	300	7.78	8.05	21.9	.	.	.
BLG	0	B3	0	7.73	8.05	21.9	367	172	132
BLG	0	B4	50	7.75	8.06	21.8	.	.	.
BLG	0	B2	100	7.83	8.05	21.7	.	.	.

BLG	0	B1	200	7.81	8.08	21.7	.	.	.
BLG	0	B5	300	7.80	8.09	21.8	.	.	.
BLG	0	C2	0	7.83	8.09	21.8	368	174	130
BLG	0	C1	50	7.96	8.12	21.8	.	.	.
BLG	0	C4	100	7.89	8.12	21.9	.	.	.
BLG	0	C5	200	7.89	8.11	21.8	.	.	.
BLG	0	C3	300	7.92	8.10	21.9	.	.	.
BLG	1	A1	0	7.95	8.11	21.8	.	.	.
BLG	1	A4	50	7.95	8.06	21.8	.	.	.
BLG	1	A2	100	7.90	8.03	21.9	.	.	.
BLG	1	A5	200	7.98	7.98	21.6	.	.	.
BLG	1	A3	300	7.78	7.83	21.9	.	.	.
BLG	1	B3	0	7.96	8.14	21.8	.	.	.
BLG	1	B4	50	7.81	8.06	21.9	.	.	.
BLG	1	B2	100	7.73	7.98	21.9	.	.	.
BLG	1	B1	200	7.79	7.96	21.8	.	.	.
BLG	1	B5	300	7.77	7.90	21.9	.	.	.
BLG	1	C2	0	7.96	8.16	21.8	.	.	.
BLG	1	C1	50	7.92	8.11	21.8	.	.	.
BLG	1	C4	100	7.88	8.07	21.9	.	.	.
BLG	1	C5	200	7.84	8.02	21.7	.	.	.
BLG	1	C3	300	7.86	7.96	21.9	.	.	.
BLG	3	A1	0	.	.	.	376	172	130
BLG	3	A4	50	.	.	.	384	174	130
BLG	3	A2	100	.	.	.	390	172	131
BLG	3	A5	200	.	.	.	395	172	133
BLG	3	A3	300	.	.	.	397	174	135
BLG	3	B3	0	.	.	.	383	176	130
BLG	3	B4	50	.	.	.	390	174	130
BLG	3	B2	100	.	.	.	394	178	133
BLG	3	B1	200	.	.	.	397	174	134
BLG	3	B5	300	.	.	.	402	176	136
BLG	3	C2	0	.	.	.	373	174	131
BLG	3	C1	50	.	.	.	384	172	130
BLG	3	C4	100	.	.	.	393	174	133
BLG	3	C5	200	.	.	.	401	172	134
BLG	3	C3	300	.	.	.	414	174	136
BLG	6	A1	0	7.98	8.18	21.8	.	.	.
BLG	6	A4	50	7.77	8.07	21.8	.	.	.
BLG	6	A2	100	7.81	8.03	21.9	.	.	.
BLG	6	A5	200	7.78	7.96	21.6	.	.	.
BLG	6	A3	300	7.56	7.80	21.9	.	.	.
BLG	6	B3	0	7.99	8.18	21.8	.	.	.
BLG	6	B4	50	7.85	8.08	21.7	.	.	.
BLG	6	B2	100	7.63	7.95	21.7	.	.	.
BLG	6	B1	200	7.80	7.93	21.7	.	.	.
BLG	6	B5	300	7.56	7.81	21.8	.	.	.
BLG	6	C2	0	8.00	8.19	21.7	.	.	.
BLG	6	C1	50	7.87	8.08	21.8	.	.	.
BLG	6	C4	100	7.73	8.00	21.8	.	.	.
BLG	6	C5	200	7.73	7.94	21.5	.	.	.
BLG	6	C3	300	7.63	7.85	21.8	.	.	.

BLG	12	A1	0	7.98	8.09	21.7	.	.	.
BLG	12	A4	50	7.64	7.95	21.7	.	.	.
BLG	12	A2	100	7.67	7.93	21.8	.	.	.
BLG	12	A5	200	7.49	7.81	21.7	.	.	.
BLG	12	A3	300	7.08	7.64	21.8	.	.	.
BLG	12	B3	0	7.92	8.14	21.8	.	.	.
BLG	12	B4	50	7.63	8.01	21.8	.	.	.
BLG	12	B2	100	7.10	7.83	21.8	.	.	.
BLG	12	B1	200	7.32	7.82	21.8	.	.	.
BLG	12	B5	300	6.99	7.64	21.9	.	.	.
BLG	12	C2	0	7.95	8.18	21.8	.	.	.
BLG	12	C1	50	7.59	7.99	21.9	.	.	.
BLG	12	C4	100	7.20	7.88	21.9	.	.	.
BLG	12	C5	200	7.11	7.82	21.7	.	.	.
BLG	12	C3	300	6.92	7.70	21.9	.	.	.
BLG	24	A1	0	8.10	8.17	21.8	.	.	.
BLG	24	A4	50	6.94	7.84	21.9	.	.	.
BLG	24	A2	100	6.73	7.78	21.8	.	.	.
BLG	24	A5	200	6.58	7.63	21.8	.	.	.
BLG	24	A3	300	5.94	7.40	21.9	.	.	.
BLG	24	B3	0	8.11	8.19	21.9	.	.	.
BLG	24	B4	50	6.98	7.86	21.9	.	.	.
BLG	24	B2	100	6.18	7.67	21.9	.	.	.
BLG	24	B1	200	5.86	7.54	21.8	.	.	.
BLG	24	B5	300	5.52	7.29	21.9	.	.	.
BLG	24	C2	0	8.14	8.22	21.8	.	.	.
BLG	24	C1	50	6.83	7.83	21.9	.	.	.
BLG	24	C4	100	6.21	7.69	21.9	.	.	.
BLG	24	C5	200	5.80	7.55	21.6	.	.	.
BLG	24	C3	300	5.58	7.37	21.9	.	.	.
LMB	0	A3	0	7.98	7.97	21.2	362	174	129
LMB	0	A5	50	7.99	8.00	21.1	.	.	.
LMB	0	A4	100	8.04	8.05	21.1	.	.	.
LMB	0	A1	200	8.03	8.07	21.2	.	.	.
LMB	0	A2	300	8.02	8.06	21.3	.	.	.
LMB	0	B3	0	7.85	8.00	21.3	362	172	128
LMB	0	B1	50	7.91	7.99	21.1	.	.	.
LMB	0	B2	100	7.88	7.97	21.3	.	.	.
LMB	0	B5	200	7.92	7.98	21.3	.	.	.
LMB	0	B4	300	7.95	8.02	21.3	.	.	.
LMB	0	C4	0	7.89	8.02	21.3	362	176	130
LMB	0	C2	50	7.98	8.08	21.2	.	.	.
LMB	0	C3	100	7.90	8.06	21.3	.	.	.
LMB	0	C5	200	7.81	8.01	21.4	.	.	.
LMB	0	C1	300	7.87	8.00	21.4	.	.	.
LMB	1	A3	0	8.01	8.04	21.9	.	.	.
LMB	1	A5	50	8.07	8.02	21.8	.	.	.
LMB	1	A4	100	8.09	8.02	21.9	.	.	.
LMB	1	A1	200	7.89	7.88	22.0	.	.	.
LMB	1	A2	300	8.02	7.91	22.0	.	.	.
LMB	1	B3	0	7.83	8.01	22.0	.	.	.
LMB	1	B1	50	7.91	7.98	21.8	.	.	.

LMB	1	B2	100	7.82	7.90	21.9	.	.	.
LMB	1	B5	200	7.89	7.87	21.9	.	.	.
LMB	1	B4	300	7.85	7.81	22.0	.	.	.
LMB	1	C4	0	7.78	8.01	22.0	.	.	.
LMB	1	C2	50	7.81	8.01	22.0	.	.	.
LMB	1	C3	100	7.86	7.97	22.0	.	.	.
LMB	1	C5	200	7.70	7.84	21.9	.	.	.
LMB	1	C1	300	7.64	7.79	22.0	.	.	.
LMB	3	A3	0	.	.	.	364	170	128
LMB	3	A5	50	.	.	.	367	176	132
LMB	3	A4	100	.	.	.	367	172	132
LMB	3	A1	200	.	.	.	382	172	131
LMB	3	A2	300	.	.	.	387	172	136
LMB	3	B3	0	.	.	.	358	170	129
LMB	3	B1	50	.	.	.	366	174	131
LMB	3	B2	100	.	.	.	376	170	133
LMB	3	B5	200	.	.	.	373	172	135
LMB	3	B4	300	.	.	.	369	170	139
LMB	3	C4	0	.	.	.	367	174	130
LMB	3	C2	50	.	.	.	369	170	131
LMB	3	C3	100	.	.	.	370	172	132
LMB	3	C5	200	.	.	.	385	174	134
LMB	3	C1	300	.	.	.	387	172	136
LMB	6	A3	0	8.12	8.19	21.9	.	.	.
LMB	6	A5	50	8.13	8.12	21.7	.	.	.
LMB	6	A4	100	8.13	8.09	21.9	.	.	.
LMB	6	A1	200	8.12	7.99	22.0	.	.	.
LMB	6	A2	300	8.00	7.92	22.0	.	.	.
LMB	6	B3	0	7.99	8.04	21.9	.	.	.
LMB	6	B1	50	8.00	7.97	21.7	.	.	.
LMB	6	B2	100	7.88	7.87	21.8	.	.	.
LMB	6	B5	200	7.88	7.77	21.8	.	.	.
LMB	6	B4	300	7.87	7.72	21.8	.	.	.
LMB	6	C4	0	7.93	8.03	22.0	.	.	.
LMB	6	C2	50	7.88	7.96	21.8	.	.	.
LMB	6	C3	100	7.97	7.95	21.8	.	.	.
LMB	6	C5	200	7.81	7.77	21.7	.	.	.
LMB	6	C1	300	7.50	7.64	21.9	.	.	.
LMB	12	A3	0	8.01	8.01	21.9	.	.	.
LMB	12	A5	50	7.95	7.93	21.8	.	.	.
LMB	12	A4	100	7.93	7.89	21.9	.	.	.
LMB	12	A1	200	7.93	7.80	22.0	.	.	.
LMB	12	A2	300	7.74	7.73	22.0	.	.	.
LMB	12	B3	0	7.98	8.05	21.9	.	.	.
LMB	12	B1	50	7.74	7.92	21.7	.	.	.
LMB	12	B2	100	7.57	7.80	21.9	.	.	.
LMB	12	B5	200	7.47	7.70	21.9	.	.	.
LMB	12	B4	300	7.37	7.65	21.9	.	.	.
LMB	12	C4	0	7.95	8.07	21.9	.	.	.
LMB	12	C2	50	7.62	7.93	21.7	.	.	.
LMB	12	C3	100	7.68	7.91	21.8	.	.	.
LMB	12	C5	200	7.38	7.73	21.7	.	.	.

LMB	12	C1	300	7.01	7.59	21.8	.	.	.
LMB	24	A3	0	8.06	7.89	22.0	.	.	.
LMB	24	A5	50	7.47	7.76	21.8	.	.	.
LMB	24	A4	100	6.75	7.62	22.0	.	.	.
LMB	24	A1	200	6.88	7.57	22.0	.	.	.
LMB	24	A2	300	6.75	7.43	22.0	.	.	.
LMB	24	B3	0	7.84	7.97	21.9	.	.	.
LMB	24	B1	50	6.79	7.7[illegible]	21.8	.	.	.
LMB	24	B2	100	6.70	7.61	21.9	.	.	.
LMB	24	B5	200	6.49	7.45	21.9	.	.	.
LMB	24	B4	300	6.46	7.39	21.9	.	.	.
LMB	24	C4	0	7.88	7.99	22.0	.	.	.
LMB	24	C2	50	6.83	7.73	21.9	.	.	.
LMB	24	C3	100	6.59	7.66	21.8	.	.	.
LMB	24	C5	200	6.02	7.42	21.7	.	.	.
LMB	24	C1	300	6.52	7.36	22.0	.	.	.

FF # 26
Item No. 2
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initia s
Data Source: TAN Data Source: LTRMP Report (File Folder 15)	Created.....	10-Feb-15	KLW
pH and Temperature Data Source: Form 7 (File Folder 16B-24B)	Rev sed.....	11-Feb-15	KLW
	Rev ewed...	11FEB15	
	Certified...	2/11/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Water Chem for SAS.xlsx]Ammonia

Total Ammonia Nitrogen

Species, Dosing, and Assessment Information

Scientific Name	Common Name	Abbreviation	Test Article Lot Number	Exposure Date
Oncorhynchus mykiss	Rainbow Trout	RBT	TR 4669-3-(6)	29-Feb-12
Perca flavescens	Yellow Perch	YEP	TR 4669-4-(6)	7-Mar-12
Sander vitreus	Walleye	WAE	TR 4669-4-(7-8)	21-Mar-12
Salvelinus fontinalis	Coaster Brook Trout	BKT	MBI-4C1 SDP TR4669-4-(5)	02-May012
Micropterus salmoides	Largemouth Bass	LMB	TR4669-4-(5) 2nd shipment	12-Jun-12
Micropterus dolomieu	Smallmouth Bass	SMB	TR4669-4-(5) 3rd shipment	20-Jun-12
Lepomis macrochirus	Bluegill sunfish	BLG	TR4669-3-(7)	11-Jul-12
Acipenser fulvescens	Lake Sturgeon	LST	401P12154G-02	1-Aug-12
Ictalarus punctatus	Channel Catfish	CCF	401P12154G-02 2nd shipment	26-Spe-12

Data codes used within SAS

sps = Young of year fish species (see 3 letter abbreviation codes above)

conc = Concentration (mg/L)

0 = Control (no product added)

50 = 50 mg/L active ingredient

100 = 100 mg/L active ingredient

200 = 200 mg/L active ingredient

300 = 300 mg/L active ingredient

id = Test chamber ID

i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)

pH = pH

temp = Temperature (in ° C)

tan = Total ammonia nitrogen (in mg NH_3-N/L)

Data Explanation

Water chemistry data analyses were limited to simple descriptive statistics (Proc Means) using SAS Version 9.4.

Data Anomalies and Deviations

NONE

FF # 26
Item No. 3
Pg 1 of 4

sps	conc	id	ph	temp	tan
RBT	0	A	7.93	12.9	0.087
RBT	0	B	7.95	12.7	0.072
RBT	0	C	8.00	12.9	0.068
RBT	50	A	7.84	12.8	0.096
RBT	50	B	7.85	12.8	0.098
RBT	50	C	7.93	13.1	0.095
RBT	100	A	7.76	12.9	0.130
RBT	100	B	7.79	12.9	0.142
RBT	100	C	7.87	13.1	0.124
RBT	200	A	7.65	12.7	0.180
RBT	200	B	7.69	12.7	0.204
RBT	200	C	7.70	13.1	0.189
RBT	300	A	7.56	12.7	0.228
RBT	300	B	7.59	12.9	0.256
RBT	300	C	7.64	13.1	0.455
YEP	0	A	7.82	17.1	0.082
YEP	0	B	7.83	16.9	0.090
YEP	0	C	7.87	17.2	0.074
YEP	50	A	7.73	17.0	0.112
YEP	50	B	7.68	17.0	0.132
YEP	50	C	7.76	17.2	0.099
YEP	100	A	7.66	17.0	0.142
YEP	100	B	7.59	16.8	0.150
YEP	100	C	7.69	17.1	0.152
YEP	200	A	7.56	17.1	0.194
YEP	200	B	7.59	16.9	0.194
YEP	200	C	7.57	17.2	0.192
YEP	300	A	7.47	17.0	0.259
YEP	300	B	7.44	16.9	0.237
YEP	300	C	7.49	17.2	0.234
WAE	0	A	7.89	17.3	0.090
WAE	0	B	7.89	17.1	0.058
WAE	0	C	7.91	17.3	0.066
WAE	50	A	7.77	17.2	0.107
WAE	50	B	7.76	17.1	0.079
WAE	50	C	7.78	17.4	0.113
WAE	100	A	7.72	17.3	0.168
WAE	100	B	7.65	17.1	0.147
WAE	100	C	7.72	17.4	0.134
WAE	200	A	7.63	17.3	0.217
WAE	200	B	7.57	17.3	0.211
WAE	200	C	7.59	17.4	0.226
WAE	300	A	7.61	17.3	0.300
WAE	300	B	7.50	17.0	0.253
WAE	300	C	7.52	17.5	0.281
BKT	0	A	7.72	12.8	0.132

AEH-12-PSEUDO-03

BKT	0	B	7.82	12.9	0.121
BKT	0	C	7.86	13.0	0.122
BKT	50	A	7.64	12.8	0.143
BKT	50	B	7.73	12.8	0.135
BKT	50	C	7.79	13.0	0.133
BKT	100	A	7.58	12.8	0.153
BKT	100	B	7.65	12.8	0.159
BKT	100	C	7.69	13.0	0.147
BKT	200	A	7.47	12.8	0.180
BKT	200	B	7.53	12.7	0.181
BKT	200	C	7.54	12.9	0.184
BKT	300	A	7.43	12.8	0.207
BKT	300	B	7.43	12.8	0.216
BKT	300	C	7.48	12.8	0.207
LMB	0	A	7.89	22.0	0.096
LMB	0	B	7.97	21.9	0.069
LMB	0	C	7.99	22.0	0.068
LMB	50	A	7.76	21.8	0.107
LMB	50	B	7.71	21.8	0.098
LMB	50	C	7.73	21.9	0.110
LMB	100	A	7.62	22.0	0.144
LMB	100	B	7.61	21.9	0.115
LMB	100	C	7.66	21.8	0.122
LMB	200	A	7.57	22.0	0.158
LMB	200	B	7.45	21.9	0.177
LMB	200	C	7.42	21.7	0.165
LMB	300	A	7.43	22.0	0.223
LMB	300	B	7.39	21.9	0.224
LMB	300	C	7.36	22.0	0.196
SMB	0	A	7.96	21.9	0.069
SMB	0	B	8.03	21.8	0.096
SMB	0	C	8.07	22.0	0.054
SMB	50	A	7.72	22.0	0.131
SMB	50	B	7.78	21.9	0.113
SMB	50	C	7.72	22.0	0.133
SMB	100	A	7.58	22.0	0.147
SMB	100	B	7.55	21.9	0.159
SMB	100	C	7.61	21.9	0.166
SMB	200	A	7.37	22.0	0.185
SMB	200	B	7.39	21.9	0.207
SMB	200	C	7.21	21.4	0.256
SMB	300	A	7.32	21.9	0.197
SMB	300	B	7.26	22.0	0.196
SMB	300	C	7.44	21.9	0.223
BLG	0	A	8.17	21.8	0.080
BLG	0	B	8.19	21.9	0.052
BLG	0	C	8.22	21.8	0.087

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BLG	50	A	7.84	21.9	0.116
BLG	50	B	7.86	21.9	0.127
BLG	50	C	7.83	21.9	0.152
BLG	100	A	7.78	21.8	0.090
BLG	100	B	7.67	21.9	0.163
BLG	100	C	7.69	21.9	0.156
BLG	200	A	7.63	21.8	0.217
BLG	200	B	7.54	21.8	0.118
BLG	200	C	7.55	21.6	0.299
BLG	300	A	7.40	21.9	0.227
BLG	300	B	7.29	21.9	0.225
BLG	300	C	7.37	21.9	0.251
LST	0	A	8.16	16.9	0.108
LST	0	B	8.18	17.1	0.096
LST	0	C	8.16	17.2	0.090
LST	50	A	8.04	17.0	0.116
LST	50	B	8.06	17.0	0.116
LST	50	C	7.95	17.2	0.112
LST	100	A	7.85	17.0	0.138
LST	100	B	7.93	17.1	0.148
LST	100	C	7.83	17.2	0.137
LST	200	A	7.74	17.0	0.166
LST	200	B	7.77	17.1	0.172
LST	200	C	7.77	17.3	0.194
LST	300	A	7.73	17.0	0.205
LST	300	B	7.79	17.1	0.193
LST	300	C	7.69	17.2	0.229
CCF	0	A	8.00	21.5	0.153
CCF	0	B	8.05	21.6	0.143
CCF	0	C	8.15	21.5	0.147
CCF	50	A	7.83	21.6	0.165
CCF	50	B	7.79	21.5	0.186
CCF	50	C	7.87	21.5	0.184
CCF	100	A	7.72	21.4	0.239
CCF	100	B	7.74	21.6	0.269
CCF	100	C	7.78	21.5	0.249
CCF	200	A	7.61	21.6	0.289
CCF	200	B	7.53	21.6	0.234
CCF	200	C	7.65	21.2	0.453
CCF	300	A	7.45	21.6	0.325
CCF	300	B	7.51	21.6	0.264
CCF	300	C	7.45	21.6	0.357

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Item No. 3
Pg 4 of 4

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Statistical analysis of pre-exposure and exposure period water chemistry
SAS v. 9.4 Analysis Completion Date: 12FEB2015 Analysis prepared by: KLW

KW 12FEB15

AEH-12-PSEUDO-03

Obs	aps	time	id	conc	do	temp	ph	hard	alk	cond
1	BKT	0	A4	0	10.10	12.9	7.96	174	122	365
2	BKT	0	B5	0	10.04	12.9	8.03	172	125	371
3	BKT	0	C1	0	9.71	13.1	7.94	176	125	371
4	BKT	0	A2	50	9.95	12.9	7.94	.	.	.
5	BKT	0	B3	50	10.05	12.9	8.05	.	.	.
6	BKT	0	C5	50	9.81	13.2	8.02	.	.	.
7	BKT	0	A3	100	10.11	12.9	8.00	.	.	.
8	BKT	0	B2	100	9.77	12.9	7.95	.	.	.
9	BKT	0	C2	100	9.81	13.0	8.00	.	.	.
10	BKT	0	A5	200	10.07	12.9	7.92	.	.	.
11	BKT	0	B4	200	10.07	12.8	8.05	.	.	.
12	BKT	0	C4	200	9.66	13.0	7.96	.	.	.
13	BKT	0	A1	300	10.02	12.9	7.98	.	.	.
14	BKT	0	B1	300	9.97	12.9	7.96	.	.	.
15	BKT	0	C3	300	9.78	13.0	7.98	.	.	.
16	BKT	1	A4	0	9.77	13.0	7.75	.	.	.
17	BKT	1	B5	0	9.80	12.9	7.84	.	.	.
18	BKT	1	C1	0	9.56	13.1	7.86	.	.	.
19	BKT	1	A2	50	9.66	13.0	7.72	.	.	.
20	BKT	1	B3	50	9.72	12.9	7.82	.	.	.
21	BKT	1	C5	50	9.59	13.1	7.87	.	.	.
22	BKT	1	A3	100	9.74	12.9	7.72	.	.	.
23	BKT	1	B2	100	9.68	12.9	7.78	.	.	.
24	BKT	1	C2	100	9.47	13.0	7.80	.	.	.
25	BKT	1	A5	200	9.78	12.9	7.63	.	.	.
26	BKT	1	B4	200	9.73	12.8	7.72	.	.	.
27	BKT	1	C4	200	9.46	12.9	7.73	.	.	.
28	BKT	1	A1	300	9.77	12.9	7.62	.	.	.
29	BKT	1	B1	300	9.69	12.9	7.66	.	.	.
30	BKT	1	C3	300	9.60	12.8	7.68	.	.	.
31	BKT	3	A4	0	.	.	.	174	125	378

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32	BKT	3	B5	0	.	.	.	176	124	386
33	BKT	3	C1	0	.	.	.	174	125	377
34	BKT	3	A2	50	.	.	.	172	126	372
35	BKT	3	B3	50	.	.	.	174	127	373
36	BKT	3	C5	50	.	.	.	176	127	375
37	BKT	3	A3	100	.	.	.	174	128	363
38	BKT	3	B2	100	.	.	.	174	127	382
39	BKT	3	C2	100	.	.	.	174	126	378
40	BKT	3	A5	200	.	.	.	182	130	390
41	BKT	3	B4	200	.	.	.	174	130	393
42	BKT	3	C4	200	.	.	.	176	130	390
43	BKT	3	A1	300	.	.	.	182	133	408
44	BKT	3	B1	300	.	.	.	174	133	392
45	BKT	3	C3	300	.	.	.	178	133	398
46	BKT	6	A4	0	9.93	12.9	7.77	.	.	.
47	BKT	6	B5	0	9.89	12.9	7.92	.	.	.
48	BKT	6	C1	0	9.82	13.0	7.94	.	.	.
49	BKT	6	A2	50	9.88	13.0	7.75	.	.	.
50	BKT	6	B3	50	9.80	12.9	7.85	.	.	.
51	BKT	6	C5	50	9.79	13.0	7.90	.	.	.
52	BKT	6	A3	100	9.81	12.9	7.73	.	.	.
53	BKT	6	B2	100	9.75	12.9	7.78	.	.	.
54	BKT	6	C2	100	9.62	13.0	7.81	.	.	.
55	BKT	6	A5	200	9.93	12.8	7.64	.	.	.
56	BKT	6	B4	200	9.71	12.9	7.66	.	.	.
57	BKT	6	C4	200	9.51	13.0	7.68	.	.	.
58	BKT	6	A1	300	9.84	12.9	7.61	.	.	.
59	BKT	6	B1	300	9.75	12.9	7.59	.	.	.
60	BKT	6	C3	300	9.68	13.0	7.63	.	.	.
61	BKT	12	A4	0	9.93	13.0	7.85	.	.	.
62	BKT	12	B5	0	9.92	13.0	7.93	.	.	.
63	BKT	12	C1	0	9.82	13.2	7.96	.	.	.
64	BKT	12	A2	50	9.84	13.0	7.77	.	.	.
65	BKT	12	B3	50	9.83	13.0	7.86	.	.	.
66	BKT	12	C5	50	9.81	13.1	7.91	.	.	.

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	BKT	12	A3	100	9.76	13.0	7.70	.	.	.
68	BKT	12	B2	100	9.74	13.0	7.79	.	.	.
69	BKT	12	C2	100	9.60	13.2	7.81	.	.	.
70	BKT	12	A5	200	9.86	13.0	7.60	.	.	.
71	BKT	12	B4	200	9.78	13.0	7.67	.	.	.
72	BKT	12	C4	200	9.55	13.1	7.68	.	.	.
73	BKT	12	A1	300	9.86	13.0	7.57	.	.	.
74	BKT	12	B1	300	9.80	13.0	7.59	.	.	.
75	BKT	12	C3	300	9.79	13.0	7.64	.	.	.
76	BKT	24	A4	0	9.62	12.8	7.72	.	.	.
77	BKT	24	B5	0	9.70	12.9	7.82	.	.	.
78	BKT	24	C1	0	9.63	13.0	7.86	.	.	.
79	BKT	24	A2	50	9.43	12.8	7.64	.	.	.
80	BKT	24	B3	50	9.55	12.8	7.73	.	.	.
81	BKT	24	C5	50	9.58	13.0	7.79	.	.	.
82	BKT	24	A3	100	9.33	12.8	7.58	.	.	.
83	BKT	24	B2	100	9.52	12.8	7.65	.	.	.
84	BKT	24	C2	100	9.33	13.0	7.69	.	.	.
85	BKT	24	A5	200	9.43	12.8	7.47	.	.	.
86	BKT	24	B4	200	9.55	12.7	7.53	.	.	.
87	BKT	24	C4	200	9.25	12.9	7.54	.	.	.
88	BKT	24	A1	300	9.45	12.8	7.43	.	.	.
89	BKT	24	B1	300	9.48	12.8	7.43	.	.	.
90	BKT	24	C3	300	9.34	12.8	7.48	.	.	.
91	BLG	0	A1	0	7.75	21.9	8.07	174	129	370
92	BLG	0	B3	0	7.73	21.9	8.05	172	132	367
93	BLG	0	C2	0	7.83	21.8	8.09	174	130	368
94	BLG	0	A4	50	7.78	21.8	8.07	.	.	.
95	BLG	0	B4	50	7.75	21.8	8.06	.	.	.
96	BLG	0	C1	50	7.96	21.8	8.12	.	.	.
97	BLG	0	A2	100	7.78	21.8	8.07	.	.	.
98	BLG	0	B2	100	7.83	21.7	8.05	.	.	.
99	BLG	0	C4	100	7.89	21.9	8.12	.	.	.
100	BLG	0	A5	200	7.88	21.8	8.11	.	.	.
101	BLG	0	B1	200	7.81	21.7	8.08	.	.	.

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	BLG	0	C5	200	7.89	21.8	8.11	.	.	.
103	BLG	0	A3	300	7.78	21.9	8.05	.	.	.
104	BLG	0	B5	300	7.80	21.8	8.09	.	.	.
105	BLG	0	C3	300	7.92	21.9	8.10	.	.	.
106	BLG	1	A1	0	7.95	21.8	8.11	.	.	.
107	BLG	1	B3	0	7.96	21.8	8.14	.	.	.
108	BLG	1	C2	0	7.96	21.8	8.16	.	.	.
109	BLG	1	A4	50	7.95	21.8	8.06	.	.	.
110	BLG	1	B4	50	7.81	21.9	8.06	.	.	.
111	BLG	1	C1	50	7.92	21.8	8.11	.	.	.
112	BLG	1	A2	100	7.90	21.9	8.03	.	.	.
113	BLG	1	B2	100	7.73	21.9	7.98	.	.	.
114	BLG	1	C4	100	7.88	21.9	8.07	.	.	.
115	BLG	1	A5	200	7.98	21.8	7.98	.	.	.
116	BLG	1	B1	200	7.79	21.8	7.96	.	.	.
117	BLG	1	C5	200	7.84	21.7	8.02	.	.	.
118	BLG	1	A3	300	7.78	21.9	7.83	.	.	.
119	BLG	1	B5	300	7.77	21.9	7.90	.	.	.
120	BLG	1	C3	300	7.86	21.9	7.96	.	.	.
121	BLG	3	A1	0	.	.	.	172	130	376
122	BLG	3	B3	0	.	.	.	176	130	383
123	BLG	3	C2	0	.	.	.	174	131	373
124	BLG	3	A4	50	.	.	.	174	130	384
125	BLG	3	B4	50	.	.	.	174	130	390
126	BLG	3	C1	50	.	.	.	172	130	384
127	BLG	3	A2	100	.	.	.	172	131	390
128	BLG	3	B2	100	.	.	.	178	133	394
129	BLG	3	C4	100	.	.	.	174	133	393
130	BLG	3	A5	200	.	.	.	172	133	395
131	BLG	3	B1	200	.	.	.	174	134	397
132	BLG	3	C5	200	.	.	.	172	134	401
133	BLG	3	A3	300	.	.	.	174	135	397
134	BLG	3	B5	300	.	.	.	176	136	402
135	BLG	3	C3	300	.	.	.	174	136	414
136	BLG	6	A1	0	7.98	21.8	8.18	.	.	.

AEH-12-PSEUDO-03

	BLG	6	B3	0	7.99	21.8	8.18	.	.	.
138	BLG	6	C2	0	8.00	21.7	8.19	.	.	.
139	BLG	6	A4	50	7.77	21.8	8.07	.	.	.
140	BLG	6	B4	50	7.85	21.7	8.08	.	.	.
141	BLG	6	C1	50	7.87	21.8	8.08	.	.	.
142	BLG	6	A2	100	7.81	21.9	8.03	.	.	.
143	BLG	6	B2	100	7.63	21.7	7.95	.	.	.
144	BLG	6	C4	100	7.73	21.8	8.00	.	.	.
145	BLG	6	A5	200	7.78	21.6	7.96	.	.	.
146	BLG	6	B1	200	7.80	21.7	7.93	.	.	.
147	BLG	6	C5	200	7.73	21.5	7.94	.	.	.
148	BLG	6	A3	300	7.56	21.9	7.80	.	.	.
149	BLG	6	B5	300	7.56	21.8	7.81	.	.	.
150	BLG	6	C3	300	7.63	21.8	7.85	.	.	.
151	BLG	12	A1	0	7.98	21.7	8.09	.	.	.
152	BLG	12	B3	0	7.92	21.8	8.14	.	.	.
153	BLG	12	C2	0	7.95	21.8	8.18	.	.	.
154	BLG	12	A4	50	7.64	21.7	7.95	.	.	.
155	BLG	12	B4	50	7.63	21.8	8.01	.	.	.
156	BLG	12	C1	50	7.59	21.9	7.99	.	.	.
157	BLG	12	A2	100	7.67	21.8	7.93	.	.	.
158	BLG	12	B2	100	7.10	21.8	7.83	.	.	.
159	BLG	12	C4	100	7.20	21.9	7.88	.	.	.
160	BLG	12	A5	200	7.49	21.7	7.81	.	.	.
161	BLG	12	B1	200	7.32	21.8	7.82	.	.	.
162	BLG	12	C5	200	7.11	21.7	7.82	.	.	.
163	BLG	12	A3	300	7.08	21.8	7.84	.	.	.
164	BLG	12	B5	300	6.99	21.9	7.84	.	.	.
165	BLG	12	C3	300	6.92	21.9	7.70	.	.	.
166	BLG	24	A1	0	8.10	21.8	8.17	.	.	.
167	BLG	24	B3	0	8.11	21.9	8.19	.	.	.
168	BLG	24	C2	0	8.14	21.8	8.22	.	.	.
169	BLG	24	A4	50	6.94	21.9	7.84	.	.	.
170	BLG	24	B4	50	6.98	21.9	7.86	.	.	.
171	BLG	24	C1	50	6.83	21.9	7.83	.	.	.

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	BLG	24	A2	100	6.73	21.8	7.78	.	.	.
173	BLG	24	B2	100	6.18	21.9	7.87	.	.	.
174	BLG	24	C4	100	6.21	21.9	7.89	.	.	.
175	BLG	24	A5	200	6.58	21.8	7.63	.	.	.
176	BLG	24	B1	200	5.86	21.8	7.54	.	.	.
177	BLG	24	C5	200	5.80	21.6	7.55	.	.	.
178	BLG	24	A3	300	5.94	21.9	7.40	.	.	.
179	BLG	24	B5	300	5.52	21.9	7.29	.	.	.
180	BLG	24	C3	300	5.58	21.9	7.37	.	.	.
181	CCF	0	A4	0	7.76	21.5	8.03	174	127	374
182	CCF	0	B5	0	7.76	21.5	8.02	174	129	371
183	CCF	0	C3	0	7.83	21.5	8.09	174	129	373
184	CCF	0	A2	50	7.77	21.5	8.03	.	.	.
185	CCF	0	B4	50	7.68	21.4	8.01	.	.	.
186	CCF	0	C5	50	7.72	21.4	8.06	.	.	.
187	CCF	0	A5	100	7.84	21.4	8.05	.	.	.
188	CCF	0	B3	100	7.86	21.4	8.07	.	.	.
189	CCF	0	C2	100	7.74	21.4	8.06	.	.	.
190	CCF	0	A3	200	7.74	21.5	8.02	.	.	.
191	CCF	0	B2	200	7.81	21.4	8.04	.	.	.
192	CCF	0	C1	200	7.94	21.3	8.13	.	.	.
193	CCF	0	A1	300	7.61	21.6	7.98	.	.	.
194	CCF	0	B1	300	8.04	21.4	8.08	.	.	.
195	CCF	0	C4	300	7.99	21.2	8.16	.	.	.
196	CCF	1	A4	0	7.57	21.6	8.01	.	.	.
197	CCF	1	B5	0	7.53	21.6	7.90	.	.	.
198	CCF	1	C3	0	7.81	21.5	8.12	.	.	.
199	CCF	1	A2	50	7.67	21.6	7.99	.	.	.
200	CCF	1	B4	50	7.47	21.5	7.87	.	.	.
201	CCF	1	C5	50	7.58	21.5	8.00	.	.	.
202	CCF	1	A5	100	7.67	21.4	7.96	.	.	.
203	CCF	1	B3	100	7.64	21.6	7.88	.	.	.
204	CCF	1	C2	100	7.60	21.6	7.98	.	.	.
205	CCF	1	A3	200	7.65	21.6	7.88	.	.	.
206	CCF	1	B2	200	7.53	21.6	7.78	.	.	.

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	CCF	1	C1	200	7.70	21.4	7.98	.	.	.
208	CCF	1	A1	300	7.38	21.6	7.78	.	.	.
209	CCF	1	B1	300	7.88	21.6	7.79	.	.	.
210	CCF	1	C4	300	7.69	21.7	7.89	.	.	.
211	CCF	3	A4	0	.	.	.	174	126	369
212	CCF	3	B5	0	.	.	.	176	128	373
213	CCF	3	C3	0	.	.	.	174	129	368
214	CCF	3	A2	50	.	.	.	174	130	377
215	CCF	3	B4	50	.	.	.	176	131	378
216	CCF	3	C5	50	.	.	.	176	131	375
217	CCF	3	A5	100	.	.	.	174	130	380
218	CCF	3	B3	100	.	.	.	176	132	385
219	CCF	3	C2	100	.	.	.	176	132	384
220	CCF	3	A3	200	.	.	.	174	132	392
221	CCF	3	B2	200	.	.	.	176	135	387
222	CCF	3	C1	200	.	.	.	178	136	390
223	CCF	3	A1	300	.	.	.	176	133	396
224	CCF	3	B1	300	.	.	.	176	136	398
225	CCF	3	C4	300	.	.	.	178	136	396
226	CCF	6	A4	0	7.78	21.6	7.87	.	.	.
227	CCF	6	B5	0	7.75	21.6	8.09	.	.	.
228	CCF	6	C3	0	7.94	21.5	8.17	.	.	.
229	CCF	6	A2	50	7.64	21.6	7.90	.	.	.
230	CCF	6	B4	50	7.41	21.6	8.00	.	.	.
231	CCF	6	C5	50	7.75	21.5	8.05	.	.	.
232	CCF	6	A5	100	7.68	21.6	7.89	.	.	.
233	CCF	6	B3	100	7.66	21.6	7.97	.	.	.
234	CCF	6	C2	100	7.83	21.6	8.03	.	.	.
235	CCF	6	A3	200	7.70	21.5	7.83	.	.	.
236	CCF	6	B2	200	7.49	21.6	7.88	.	.	.
237	CCF	6	C1	200	7.74	21.5	7.98	.	.	.
238	CCF	6	A1	300	7.38	21.4	7.72	.	.	.
239	CCF	6	B1	300	7.89	21.6	7.85	.	.	.
240	CCF	6	C4	300	7.80	21.7	7.87	.	.	.
241	CCF	12	A4	0	7.80	21.7	8.10	.	.	.

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	CCF	12	B5	0	7.77	21.6	8.09	.	.	.
243	CCF	12	C3	0	7.92	21.5	8.16	.	.	.
244	CCF	12	A2	50	7.44	21.6	7.98	.	.	.
245	CCF	12	B4	50	7.21	21.6	7.92	.	.	.
246	CCF	12	C5	50	7.67	21.6	8.01	.	.	.
247	CCF	12	A5	100	7.31	21.6	7.90	.	.	.
248	CCF	12	B3	100	7.60	21.6	7.92	.	.	.
249	CCF	12	C2	100	7.66	21.5	7.98	.	.	.
250	CCF	12	A3	200	7.38	21.6	7.84	.	.	.
251	CCF	12	B2	200	7.36	21.6	7.80	.	.	.
252	CCF	12	C1	200	7.71	21.6	7.93	.	.	.
253	CCF	12	A1	300	6.93	21.7	7.68	.	.	.
254	CCF	12	B1	300	7.75	21.6	7.81	.	.	.
255	CCF	12	C4	300	7.52	21.6	7.79	.	.	.
256	CCF	24	A4	0	7.90	21.5	8.00	.	.	.
257	CCF	24	B5	0	7.81	21.6	8.05	.	.	.
258	CCF	24	C3	0	8.07	21.5	8.15	.	.	.
259	CCF	24	A2	50	7.17	21.6	7.83	.	.	.
260	CCF	24	B4	50	6.65	21.5	7.79	.	.	.
261	CCF	24	C5	50	7.17	21.5	7.87	.	.	.
262	CCF	24	A5	100	6.75	21.4	7.72	.	.	.
263	CCF	24	B3	100	6.81	21.6	7.74	.	.	.
264	CCF	24	C2	100	6.83	21.5	7.78	.	.	.
265	CCF	24	A3	200	6.57	21.6	7.61	.	.	.
266	CCF	24	B2	200	5.99	21.6	7.53	.	.	.
267	CCF	24	C1	200	6.50	21.2	7.65	.	.	.
268	CCF	24	A1	300	6.19	21.6	7.45	.	.	.
269	CCF	24	B1	300	6.41	21.6	7.51	.	.	.
270	CCF	24	C4	300	5.75	21.6	7.45	.	.	.
271	LMB	0	A3	0	7.98	21.2	7.97	174	129	362
272	LMB	0	B3	0	7.85	21.3	8.00	172	128	362
273	LMB	0	C4	0	7.89	21.3	8.02	176	130	362
274	LMB	0	A5	50	7.99	21.1	8.00	.	.	.
275	LMB	0	B1	50	7.91	21.1	7.99	.	.	.
276	LMB	0	C2	50	7.98	21.2	8.08	.	.	.

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	LMB	0	A4	100	8.04	21.1	8.05	.	.	.
278	LMB	0	B2	100	7.88	21.3	7.97	.	.	.
279	LMB	0	C3	100	7.90	21.3	8.06	.	.	.
280	LMB	0	A1	200	8.03	21.2	8.07	.	.	.
281	LMB	0	B5	200	7.92	21.3	7.98	.	.	.
282	LMB	0	C5	200	7.81	21.4	8.01	.	.	.
283	LMB	0	A2	300	8.02	21.3	8.06	.	.	.
284	LMB	0	B4	300	7.95	21.3	8.02	.	.	.
285	LMB	0	C1	300	7.87	21.4	8.00	.	.	.
286	LMB	1	A3	0	8.01	21.9	8.04	.	.	.
287	LMB	1	B3	0	7.83	22.0	8.01	.	.	.
288	LMB	1	C4	0	7.78	22.0	8.01	.	.	.
289	LMB	1	A5	50	8.07	21.8	8.02	.	.	.
290	LMB	1	B1	50	7.91	21.8	7.98	.	.	.
291	LMB	1	C2	50	7.81	22.0	8.01	.	.	.
292	LMB	1	A4	100	8.09	21.9	8.02	.	.	.
293	LMB	1	B2	100	7.82	21.9	7.90	.	.	.
294	LMB	1	C3	100	7.86	22.0	7.97	.	.	.
295	LMB	1	A1	200	7.89	22.0	7.88	.	.	.
296	LMB	1	B5	200	7.89	21.9	7.87	.	.	.
297	LMB	1	C5	200	7.70	21.9	7.84	.	.	.
298	LMB	1	A2	300	8.02	22.0	7.91	.	.	.
299	LMB	1	B4	300	7.85	22.0	7.81	.	.	.
300	LMB	1	C1	300	7.64	22.0	7.79	.	.	.
301	LMB	3	A3	0	.	.	.	170	128	364
302	LMB	3	B3	0	.	.	.	170	129	358
303	LMB	3	C4	0	.	.	.	174	130	367
304	LMB	3	A5	50	.	.	.	176	132	367
305	LMB	3	B1	50	.	.	.	174	131	366
306	LMB	3	C2	50	.	.	.	170	131	369
307	LMB	3	A4	100	.	.	.	172	132	367
308	LMB	3	B2	100	.	.	.	170	133	376
309	LMB	3	C3	100	.	.	.	172	132	370
310	LMB	3	A1	200	.	.	.	172	131	382
311	LMB	3	B5	200	.	.	.	172	135	373

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	LMB	3	C5	200	.	.	.	174	134	385
313	LMB	3	A2	300	.	.	.	172	136	387
314	LMB	3	B4	300	.	.	.	170	139	369
315	LMB	3	C1	300	.	.	.	172	136	387
316	LMB	6	A3	0	8.12	21.9	8.19	.	.	.
317	LMB	6	B3	0	7.99	21.9	8.04	.	.	.
318	LMB	6	C4	0	7.93	22.0	8.03	.	.	.
319	LMB	6	A5	50	8.13	21.7	8.12	.	.	.
320	LMB	6	B1	50	8.00	21.7	7.97	.	.	.
321	LMB	6	C2	50	7.88	21.8	7.96	.	.	.
322	LMB	6	A4	100	8.13	21.9	8.09	.	.	.
323	LMB	6	B2	100	7.88	21.8	7.87	.	.	.
324	LMB	6	C3	100	7.97	21.8	7.95	.	.	.
325	LMB	6	A1	200	8.12	22.0	7.99	.	.	.
326	LMB	6	B5	200	7.88	21.8	7.77	.	.	.
327	LMB	6	C5	200	7.81	21.7	7.77	.	.	.
328	LMB	6	A2	300	8.00	22.0	7.92	.	.	.
329	LMB	6	B4	300	7.87	21.8	7.72	.	.	.
330	LMB	6	C1	300	7.50	21.9	7.64	.	.	.
331	LMB	12	A3	0	8.01	21.9	8.01	.	.	.
332	LMB	12	B3	0	7.98	21.9	8.05	.	.	.
333	LMB	12	C4	0	7.95	21.9	8.07	.	.	.
334	LMB	12	A5	50	7.95	21.8	7.93	.	.	.
335	LMB	12	B1	50	7.74	21.7	7.92	.	.	.
336	LMB	12	C2	50	7.62	21.7	7.93	.	.	.
337	LMB	12	A4	100	7.93	21.9	7.89	.	.	.
338	LMB	12	B2	100	7.57	21.9	7.80	.	.	.
339	LMB	12	C3	100	7.68	21.8	7.91	.	.	.
340	LMB	12	A1	200	7.93	22.0	7.80	.	.	.
341	LMB	12	B5	200	7.47	21.9	7.70	.	.	.
342	LMB	12	C5	200	7.38	21.7	7.73	.	.	.
343	LMB	12	A2	300	7.74	22.0	7.73	.	.	.
344	LMB	12	B4	300	7.37	21.9	7.65	.	.	.
345	LMB	12	C1	300	7.01	21.8	7.59	.	.	.
346	LMB	24	A3	0	8.06	22.0	7.89	.	.	.

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	LMB	24	B3	0	7.84	21.9	7.97	.	.	.
348	LMB	24	C4	0	7.88	22.0	7.99	.	.	.
349	LMB	24	A5	50	7.47	21.8	7.76	.	.	.
350	LMB	24	B1	50	6.79	21.8	7.71	.	.	.
351	LMB	24	C2	50	6.83	21.9	7.73	.	.	.
352	LMB	24	A4	100	6.75	22.0	7.62	.	.	.
353	LMB	24	B2	100	6.70	21.9	7.61	.	.	.
354	LMB	24	C3	100	6.59	21.8	7.66	.	.	.
355	LMB	24	A1	200	6.88	22.0	7.57	.	.	.
356	LMB	24	B5	200	6.49	21.9	7.45	.	.	.
357	LMB	24	C5	200	6.02	21.7	7.42	.	.	.
358	LMB	24	A2	300	6.75	22.0	7.43	.	.	.
359	LMB	24	B4	300	6.46	21.9	7.39	.	.	.
360	LMB	24	C1	300	6.52	22.0	7.36	.	.	.
361	LST	0	A4	0	9.06	17.1	8.08	172	129	371
362	LST	0	B5	0	9.05	16.9	8.10	170	130	373
363	LST	0	C4	0	8.87	17.1	8.05	174	131	370
364	LST	0	A5	50	9.07	17.1	8.08	.	.	.
365	LST	0	B3	50	9.03	17.0	8.08	.	.	.
366	LST	0	C1	50	8.87	17.2	8.05	.	.	.
367	LST	0	A1	100	8.93	17.1	8.04	.	.	.
368	LST	0	B2	100	8.96	17.0	8.05	.	.	.
369	LST	0	C5	100	8.53	17.2	7.99	.	.	.
370	LST	0	A2	200	9.03	17.0	8.07	.	.	.
371	LST	0	B4	200	8.96	17.0	8.07	.	.	.
372	LST	0	C2	200	8.55	17.2	7.98	.	.	.
373	LST	0	A3	300	9.07	17.0	8.10	.	.	.
374	LST	0	B1	300	9.04	17.0	8.07	.	.	.
375	LST	0	C3	300	8.86	17.2	8.06	.	.	.
376	LST	1	A4	0	9.09	17.1	7.96	.	.	.
377	LST	1	B5	0	9.09	17.0	8.12	.	.	.
378	LST	1	C4	0	8.75	17.2	8.06	.	.	.
379	LST	1	A5	50	9.05	17.0	7.96	.	.	.
380	LST	1	B3	50	8.98	17.0	8.05	.	.	.
381	LST	1	C1	50	8.62	17.3	8.00	.	.	.

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	LST	1	A1	100	8.65	17.1	7.86	.	.	.
383	LST	1	B2	100	8.89	17.0	7.99	.	.	.
384	LST	1	C5	100	8.28	17.2	7.91	.	.	.
385	LST	1	A2	200	8.61	17.1	7.83	.	.	.
386	LST	1	B4	200	8.58	17.0	7.87	.	.	.
387	LST	1	C2	200	8.17	17.2	7.88	.	.	.
388	LST	1	A3	300	8.60	17.1	7.77	.	.	.
389	LST	1	B1	300	8.81	17.0	7.88	.	.	.
390	LST	1	C3	300	8.54	17.2	7.87	.	.	.
391	LST	3	A4	0	.	.	.	174	129	373
392	LST	3	B5	0	.	.	.	172	130	374
393	LST	3	C4	0	.	.	.	174	130	389
394	LST	3	A5	50	.	.	.	176	132	393
395	LST	3	B3	50	.	.	.	174	132	388
396	LST	3	C1	50	.	.	.	172	132	396
397	LST	3	A1	100	.	.	.	174	132	397
398	LST	3	B2	100	.	.	.	174	133	392
399	LST	3	C5	100	.	.	.	170	133	394
400	LST	3	A2	200	.	.	.	176	135	408
401	LST	3	B4	200	.	.	.	174	135	396
402	LST	3	C2	200	.	.	.	174	139	398
403	LST	3	A3	300	.	.	.	174	136	418
404	LST	3	B1	300	.	.	.	176	136	403
405	LST	3	C3	300	.	.	.	172	137	415
406	LST	6	A4	0	9.07	16.9	8.18	.	.	.
407	LST	6	B5	0	9.09	17.0	8.19	.	.	.
408	LST	6	C4	0	8.87	17.2	8.14	.	.	.
409	LST	6	A5	50	9.05	17.0	8.11	.	.	.
410	LST	6	B3	50	9.01	17.0	8.12	.	.	.
411	LST	6	C1	50	8.63	17.3	8.02	.	.	.
412	LST	6	A1	100	8.76	17.1	7.94	.	.	.
413	LST	6	B2	100	8.96	17.0	8.04	.	.	.
414	LST	6	C5	100	8.42	17.2	7.91	.	.	.
415	LST	6	A2	200	8.56	17.1	7.85	.	.	.
416	LST	6	B4	200	8.73	17.0	7.89	.	.	.

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	LST	6	C2	200	8.50	17.3	7.89	.	.	.
418	LST	6	A3	300	8.70	17.1	7.83	.	.	.
419	LST	6	B1	300	8.94	17.0	7.92	.	.	.
420	LST	6	C3	300	8.55	17.2	7.82	.	.	.
421	LST	12	A4	0	9.12	17.0	8.13	.	.	.
422	LST	12	B5	0	9.05	17.0	8.18	.	.	.
423	LST	12	C4	0	8.87	17.2	8.15	.	.	.
424	LST	12	A5	50	9.04	17.0	8.06	.	.	.
425	LST	12	B3	50	8.99	17.1	8.09	.	.	.
426	LST	12	C1	50	8.63	17.3	8.01	.	.	.
427	LST	12	A1	100	8.71	17.1	7.88	.	.	.
428	LST	12	B2	100	8.84	17.1	7.99	.	.	.
429	LST	12	C5	100	8.29	17.2	7.89	.	.	.
430	LST	12	A2	200	8.47	17.1	7.76	.	.	.
431	LST	12	B4	200	8.51	17.1	7.82	.	.	.
432	LST	12	C2	200	8.28	17.3	7.85	.	.	.
433	LST	12	A3	300	8.61	17.0	7.76	.	.	.
434	LST	12	B1	300	8.87	17.1	7.86	.	.	.
435	LST	12	C3	300	8.38	17.2	7.78	.	.	.
436	LST	24	A4	0	9.23	16.9	8.16	.	.	.
437	LST	24	B5	0	9.18	17.1	8.18	.	.	.
438	LST	24	C4	0	8.97	17.2	8.16	.	.	.
439	LST	24	A5	50	8.94	17.0	8.04	.	.	.
440	LST	24	B3	50	8.91	17.0	8.06	.	.	.
441	LST	24	C1	50	8.45	17.2	7.95	.	.	.
442	LST	24	A1	100	8.48	17.0	7.85	.	.	.
443	LST	24	B2	100	8.63	17.1	7.93	.	.	.
444	LST	24	C5	100	8.14	17.2	7.83	.	.	.
445	LST	24	A2	200	8.42	17.0	7.74	.	.	.
446	LST	24	B4	200	8.48	17.1	7.77	.	.	.
447	LST	24	C2	200	7.98	17.3	7.77	.	.	.
448	LST	24	A3	300	8.59	17.0	7.73	.	.	.
449	LST	24	B1	300	8.62	17.1	7.79	.	.	.
450	LST	24	C3	300	8.17	17.2	7.69	.	.	.
451	RBT	1	A1	0	9.51	12.9	7.81	.	.	.

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	RBT	1	B2	0	9.69	12.7	7.94	.	.	.
453	RBT	1	C4	0	9.47	12.9	7.94	.	.	.
454	RBT	1	A2	50	9.42	12.8	7.79	.	.	.
455	RBT	1	B5	50	9.52	12.8	7.88	.	.	.
456	RBT	1	C2	50	9.68	12.9	7.93	.	.	.
457	RBT	1	A5	100	9.37	12.9	7.75	.	.	.
458	RBT	1	B1	100	9.54	12.7	7.83	.	.	.
459	RBT	1	C1	100	9.44	12.9	7.87	.	.	.
460	RBT	1	A3	200	9.20	12.8	7.66	.	.	.
461	RBT	1	B3	200	9.41	12.7	7.75	.	.	.
462	RBT	1	C3	200	9.25	12.9	7.73	.	.	.
463	RBT	1	A4	300	9.24	12.8	7.59	.	.	.
464	RBT	1	B4	300	9.27	12.8	7.67	.	.	.
465	RBT	1	C5	300	9.38	13.0	7.68	.	.	.
466	RBT	3	A1	0	.	.	.	180	131	398
467	RBT	3	B2	0	.	.	.	180	125	366
468	RBT	3	C4	0	.	.	.	178	125	386
469	RBT	3	A2	50	.	.	.	182	129	409
470	RBT	3	B5	50	.	.	.	180	126	368
471	RBT	3	C2	50	.	.	.	178	128	360
472	RBT	3	A5	100	.	.	.	178	127	357
473	RBT	3	B1	100	.	.	.	176	130	395
474	RBT	3	C1	100	.	.	.	182	128	377
475	RBT	3	A3	200	.	.	.	176	131	375
476	RBT	3	B3	200	.	.	.	180	131	419
477	RBT	3	C3	200	.	.	.	178	132	376
478	RBT	3	A4	300	.	.	.	176	134	386
479	RBT	3	B4	300	.	.	.	180	131	398
480	RBT	3	C5	300	.	.	.	176	135	389
481	RBT	6	A1	0	9.57	12.8	7.85	.	.	.
482	RBT	6	B2	0	9.71	12.7	7.91	.	.	.
483	RBT	6	C4	0	9.72	12.9	7.94	.	.	.
484	RBT	6	A2	50	9.51	12.7	7.78	.	.	.
485	RBT	6	B5	50	9.56	12.8	7.81	.	.	.
486	RBT	6	C2	50	9.76	13.0	7.89	.	.	.

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	RBT	6	A5	100	9.50	12.9	7.72	.	.	.
488	RBT	6	B1	100	9.64	12.6	7.76	.	.	.
489	RBT	6	C1	100	9.63	13.0	7.82	.	.	.
490	RBT	6	A3	200	9.47	12.7	7.62	.	.	.
491	RBT	6	B3	200	9.61	12.8	7.65	.	.	.
492	RBT	6	C3	200	9.56	12.9	7.67	.	.	.
493	RBT	6	A4	300	9.56	12.8	7.54	.	.	.
494	RBT	6	B4	300	9.45	12.8	7.55	.	.	.
495	RBT	6	C5	300	9.71	13.0	7.61	.	.	.
496	RBT	12	A1	0	9.71	12.9	7.92	.	.	.
497	RBT	12	B2	0	9.88	12.7	7.96	.	.	.
498	RBT	12	C4	0	9.82	12.9	7.97	.	.	.
499	RBT	12	A2	50	9.64	12.7	7.84	.	.	.
500	RBT	12	B5	50	9.68	12.9	7.85	.	.	.
501	RBT	12	C2	50	9.90	12.9	7.91	.	.	.
502	RBT	12	A5	100	9.64	12.9	7.78	.	.	.
503	RBT	12	B1	100	9.77	12.9	7.80	.	.	.
504	RBT	12	C1	100	9.76	13.0	7.84	.	.	.
505	RBT	12	A3	200	9.68	12.8	7.67	.	.	.
506	RBT	12	B3	200	9.81	12.8	7.67	.	.	.
507	RBT	12	C3	200	9.68	12.8	7.69	.	.	.
508	RBT	12	A4	300	9.71	12.8	7.58	.	.	.
509	RBT	12	B4	300	9.66	12.9	7.59	.	.	.
510	RBT	12	C5	300	9.88	13.1	7.63	.	.	.
511	RBT	24	A1	0	9.72	12.9	7.93	.	.	.
512	RBT	24	B2	0	9.88	12.7	7.95	.	.	.
513	RBT	24	C4	0	9.72	12.9	8.00	.	.	.
514	RBT	24	A2	50	9.65	12.8	7.84	.	.	.
515	RBT	24	B5	50	9.73	12.8	7.85	.	.	.
516	RBT	24	C2	50	9.83	13.1	7.93	.	.	.
517	RBT	24	A5	100	9.67	12.9	7.76	.	.	.
518	RBT	24	B1	100	9.70	12.9	7.79	.	.	.
519	RBT	24	C1	100	9.76	13.1	7.87	.	.	.
520	RBT	24	A3	200	9.63	12.7	7.65	.	.	.
521	RBT	24	B3	200	9.81	12.7	7.69	.	.	.

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	RBT	24	C3	200	9.73	13.1	7.70	.	.	.
523	RBT	24	A4	300	9.62	12.7	7.56	.	.	.
524	RBT	24	B4	300	9.64	12.9	7.59	.	.	.
525	RBT	24	C5	300	9.79	13.1	7.64	.	.	.
526	SMB	0	A2	0	8.22	22.0	8.05	172	130	364
527	SMB	0	B1	0	8.04	21.9	8.04	174	130	369
528	SMB	0	C1	0	8.06	22.1	8.03	172	131	366
529	SMB	0	A3	50	8.02	22.0	8.01	.	.	.
530	SMB	0	B5	50	8.11	21.9	8.03	.	.	.
531	SMB	0	C3	50	8.06	22.0	8.00	.	.	.
532	SMB	0	A1	100	8.18	21.9	8.02	.	.	.
533	SMB	0	B3	100	7.69	21.9	7.97	.	.	.
534	SMB	0	C2	100	8.02	22.0	8.01	.	.	.
535	SMB	0	A4	200	8.05	22.0	8.02	.	.	.
536	SMB	0	B2	200	8.09	21.9	8.04	.	.	.
537	SMB	0	C5	200	8.00	22.2	8.01	.	.	.
538	SMB	0	A5	300	8.18	21.9	8.03	.	.	.
539	SMB	0	B4	300	8.13	21.9	8.03	.	.	.
540	SMB	0	C4	300	8.10	22.2	8.01	.	.	.
541	SMB	1	A2	0	8.18	22.0	8.11	.	.	.
542	SMB	1	B1	0	8.21	21.9	8.15	.	.	.
543	SMB	1	C1	0	8.14	22.2	8.14	.	.	.
544	SMB	1	A3	50	8.15	22.1	8.10	.	.	.
545	SMB	1	B5	50	8.14	22.0	8.12	.	.	.
546	SMB	1	C3	50	8.02	22.1	8.09	.	.	.
547	SMB	1	A1	100	8.14	22.0	8.04	.	.	.
548	SMB	1	B3	100	8.18	22.0	8.08	.	.	.
549	SMB	1	C2	100	7.97	22.0	8.05	.	.	.
550	SMB	1	A4	200	8.13	22.0	7.99	.	.	.
551	SMB	1	B2	200	8.14	22.0	7.95	.	.	.
552	SMB	1	C5	200	8.30	21.9	8.07	.	.	.
553	SMB	1	A5	300	8.18	21.9	7.95	.	.	.
554	SMB	1	B4	300	8.05	22.1	7.88	.	.	.
555	SMB	1	C4	300	8.17	22.0	7.95	.	.	.
556	SMB	3	A2	0	.	.	.	174	129	369

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	SMB	3	B1	0	.	.	.	170	129	366
558	SMB	3	C1	0	.	.	.	172	128	360
559	SMB	3	A3	50	.	.	.	174	133	370
560	SMB	3	B5	50	.	.	.	174	130	371
561	SMB	3	C3	50	.	.	.	172	131	366
562	SMB	3	A1	100	.	.	.	174	139	371
563	SMB	3	B3	100	.	.	.	172	131	372
564	SMB	3	C2	100	.	.	.	172	133	370
565	SMB	3	A4	200	.	.	.	172	136	376
566	SMB	3	B2	200	.	.	.	172	135	379
567	SMB	3	C5	200	.	.	.	172	135	380
568	SMB	3	A5	300	.	.	.	174	140	384
569	SMB	3	B4	300	.	.	.	174	138	380
570	SMB	3	C4	300	.	.	.	174	137	390
571	SMB	6	A2	0	8.22	21.9	8.08	.	.	.
572	SMB	6	B1	0	8.28	21.8	8.14	.	.	.
573	SMB	6	C1	0	8.17	22.0	8.14	.	.	.
574	SMB	6	A3	50	8.09	22.0	7.97	.	.	.
575	SMB	6	B5	50	8.05	22.0	8.01	.	.	.
576	SMB	6	C3	50	7.86	22.0	7.99	.	.	.
577	SMB	6	A1	100	8.00	22.0	7.91	.	.	.
578	SMB	6	B3	100	7.94	21.9	7.88	.	.	.
579	SMB	6	C2	100	7.81	21.9	7.95	.	.	.
580	SMB	6	A4	200	7.89	22.0	7.80	.	.	.
581	SMB	6	B2	200	7.90	21.9	7.82	.	.	.
582	SMB	6	C5	200	7.29	21.8	7.74	.	.	.
583	SMB	6	A5	300	7.73	21.9	7.68	.	.	.
584	SMB	6	B4	300	7.77	21.9	7.73	.	.	.
585	SMB	6	C4	300	7.78	22.0	7.71	.	.	.
586	SMB	12	A2	0	8.28	21.9	8.08	.	.	.
587	SMB	12	B1	0	8.28	21.9	8.08	.	.	.
588	SMB	12	C1	0	8.27	22.0	8.14	.	.	.
589	SMB	12	A3	50	8.00	22.0	7.94	.	.	.
590	SMB	12	B5	50	7.88	22.0	7.91	.	.	.
591	SMB	12	C3	50	7.64	22.0	7.93	.	.	.

	SMB	12	A1	100	7.80	21.9	7.88	.	.	.
593	SMB	12	B3	100	7.65	22.0	7.83	.	.	.
594	SMB	12	C2	100	7.43	22.0	7.88	.	.	.
595	SMB	12	A4	200	7.35	21.9	7.73	.	.	.
596	SMB	12	B2	200	7.31	22.0	7.71	.	.	.
597	SMB	12	C5	200	7.36	21.7	7.60	.	.	.
598	SMB	12	A5	300	7.21	21.8	7.62	.	.	.
599	SMB	12	B4	300	7.07	22.1	7.62	.	.	.
600	SMB	12	C4	300	6.09	22.1	7.69	.	.	.
601	SMB	24	A2	0	8.04	21.9	7.96	.	.	.
602	SMB	24	B1	0	8.07	21.8	8.03	.	.	.
603	SMB	24	C1	0	8.01	22.0	8.07	.	.	.
604	SMB	24	A3	50	7.10	22.0	7.72	.	.	.
605	SMB	24	B5	50	7.22	21.9	7.78	.	.	.
606	SMB	24	C3	50	6.74	22.0	7.72	.	.	.
607	SMB	24	A1	100	6.62	22.0	7.58	.	.	.
608	SMB	24	B3	100	6.35	21.9	7.55	.	.	.
609	SMB	24	C2	100	6.26	21.9	7.61	.	.	.
610	SMB	24	A4	200	6.01	22.0	7.37	.	.	.
611	SMB	24	B2	200	6.11	21.9	7.39	.	.	.
612	SMB	24	C5	200	4.57	21.4	7.21	.	.	.
613	SMB	24	A5	300	6.17	21.9	7.32	.	.	.
614	SMB	24	B4	300	5.82	22.0	7.26	.	.	.
615	SMB	24	C4	300	6.61	21.9	7.44	.	.	.
616	WAE	0	A2	0	8.23	17.3	7.89	178	124	403
617	WAE	0	B5	0	8.26	17.4	7.96	178	127	395
618	WAE	0	C3	0	8.17	17.5	7.97	176	128	397
619	WAE	0	A5	50	8.21	17.4	7.90	.	.	.
620	WAE	0	B2	50	8.32	17.3	7.96	.	.	.
621	WAE	0	C5	50	8.02	17.5	7.96	.	.	.
622	WAE	0	A4	100	8.27	17.3	7.93	.	.	.
623	WAE	0	B3	100	7.70	17.3	7.87	.	.	.
624	WAE	0	C4	100	8.06	17.4	7.96	.	.	.
625	WAE	0	A1	200	8.28	17.3	7.93	.	.	.
626	WAE	0	B1	200	8.28	17.4	7.95	.	.	.

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	WAE	0	C2	200	8.21	17.4	7.96	.	.	.
628	WAE	0	A3	300	8.22	17.3	7.96	.	.	.
629	WAE	0	B4	300	8.60	17.3	7.99	.	.	.
630	WAE	0	C1	300	8.25	17.5	7.98	.	.	.
631	WAE	1	A2	0	8.25	17.2	7.86	.	.	.
632	WAE	1	B5	0	8.09	17.2	7.90	.	.	.
633	WAE	1	C3	0	8.18	17.3	7.97	.	.	.
634	WAE	1	A5	50	8.09	17.2	7.82	.	.	.
635	WAE	1	B2	50	8.11	17.2	7.84	.	.	.
636	WAE	1	C5	50	7.92	17.3	7.93	.	.	.
637	WAE	1	A4	100	8.02	17.2	7.78	.	.	.
638	WAE	1	B3	100	7.47	17.2	7.74	.	.	.
639	WAE	1	C4	100	7.97	17.4	7.91	.	.	.
640	WAE	1	A1	200	7.80	17.2	7.68	.	.	.
641	WAE	1	B1	200	7.79	17.2	7.70	.	.	.
642	WAE	1	C2	200	8.03	17.3	7.82	.	.	.
643	WAE	1	A3	300	7.81	17.2	7.64	.	.	.
644	WAE	1	B4	300	8.27	17.2	7.76	.	.	.
645	WAE	1	C1	300	8.00	17.3	7.75	.	.	.
646	WAE	3	A2	0	.	.	.	178	127	403
647	WAE	3	B5	0	.	.	.	176	127	393
648	WAE	3	C3	0	.	.	.	178	126	393
649	WAE	3	A5	50	.	.	.	176	127	395
650	WAE	3	B2	50	.	.	.	176	125	405
651	WAE	3	C5	50	.	.	.	176	126	395
652	WAE	3	A4	100	.	.	.	176	128	406
653	WAE	3	B3	100	.	.	.	178	127	398
654	WAE	3	C4	100	.	.	.	176	128	412
655	WAE	3	A1	200	.	.	.	178	132	419
656	WAE	3	B1	200	.	.	.	180	131	402
657	WAE	3	C2	200	.	.	.	178	130	417
658	WAE	3	A3	300	.	.	.	178	135	417
659	WAE	3	B4	300	.	.	.	176	135	418
660	WAE	3	C1	300	.	.	.	176	131	419
661	WAE	6	A2	0	8.45	17.2	7.83	.	.	.

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	WAE	6	B5	0	8.50	17.1	7.93	.	.	.
663	WAE	6	C3	0	8.45	17.3	7.95	.	.	.
664	WAE	6	A5	50	8.31	17.2	7.77	.	.	.
665	WAE	6	B2	50	8.35	17.1	7.80	.	.	.
666	WAE	6	C5	50	8.19	17.4	7.84	.	.	.
667	WAE	6	A4	100	8.28	17.2	7.71	.	.	.
668	WAE	6	B3	100	8.04	17.0	7.69	.	.	.
669	WAE	6	C4	100	8.19	17.3	7.78	.	.	.
670	WAE	6	A1	200	8.07	17.2	7.59	.	.	.
671	WAE	6	B1	200	8.32	17.1	7.61	.	.	.
672	WAE	6	C2	200	8.24	17.3	7.66	.	.	.
673	WAE	6	A3	300	8.11	17.2	7.54	.	.	.
674	WAE	6	B4	300	8.55	17.0	7.54	.	.	.
675	WAE	6	C1	300	8.10	17.3	7.58	.	.	.
676	WAE	12	A2	0	8.52	17.1	7.80	.	.	.
677	WAE	12	B5	0	8.51	17.1	7.90	.	.	.
678	WAE	12	C3	0	8.57	17.4	7.99	.	.	.
679	WAE	12	A5	50	8.36	17.0	7.71	.	.	.
680	WAE	12	B2	50	8.33	17.2	7.82	.	.	.
681	WAE	12	C5	50	8.17	17.4	7.85	.	.	.
682	WAE	12	A4	100	8.25	17.1	7.65	.	.	.
683	WAE	12	B3	100	7.95	17.1	7.71	.	.	.
684	WAE	12	C4	100	8.18	17.4	7.79	.	.	.
685	WAE	12	A1	200	8.22	17.1	7.54	.	.	.
686	WAE	12	B1	200	8.19	17.2	7.64	.	.	.
687	WAE	12	C2	200	8.09	17.4	7.68	.	.	.
688	WAE	12	A3	300	8.17	17.1	7.49	.	.	.
689	WAE	12	B4	300	8.41	17.2	7.55	.	.	.
690	WAE	12	C1	300	8.16	17.4	7.59	.	.	.
691	WAE	24	A2	0	8.56	17.3	7.89	.	.	.
692	WAE	24	B5	0	8.51	17.1	7.89	.	.	.
693	WAE	24	C3	0	8.58	17.3	7.91	.	.	.
694	WAE	24	A5	50	8.16	17.2	7.77	.	.	.
695	WAE	24	B2	50	8.09	17.1	7.76	.	.	.
696	WAE	24	C5	50	7.99	17.4	7.78	.	.	.

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	WAE	24	A4	100	8.04	17.3	7.72	.	.	.
698	WAE	24	B3	100	7.65	17.1	7.65	.	.	.
699	WAE	24	C4	100	7.95	17.4	7.72	.	.	.
700	WAE	24	A1	200	7.79	17.3	7.63	.	.	.
701	WAE	24	B1	200	7.59	17.3	7.57	.	.	.
702	WAE	24	C2	200	7.54	17.4	7.59	.	.	.
703	WAE	24	A3	300	8.03	17.3	7.61	.	.	.
704	WAE	24	B4	300	8.15	17.0	7.50	.	.	.
705	WAE	24	C1	300	7.52	17.5	7.52	.	.	.
706	YEP	0	A4	0	8.96	16.9	7.91	176	128	383
707	YEP	0	B3	0	9.04	16.9	7.96	176	128	376
708	YEP	0	C1	0	8.80	17.1	7.83	178	129	376
709	YEP	0	A3	50	9.03	17.0	7.94	.	.	.
710	YEP	0	B1	50	9.03	16.9	7.95	.	.	.
711	YEP	0	C2	50	8.85	17.1	7.89	.	.	.
712	YEP	0	A2	100	8.97	17.0	7.90	.	.	.
713	YEP	0	B4	100	9.04	16.9	7.94	.	.	.
714	YEP	0	C3	100	8.96	17.1	7.90	.	.	.
715	YEP	0	A5	200	8.98	17.0	7.91	.	.	.
716	YEP	0	B2	200	8.98	16.9	7.94	.	.	.
717	YEP	0	C5	200	8.67	17.1	7.83	.	.	.
718	YEP	0	A1	300	9.01	17.0	7.91	.	.	.
719	YEP	0	B5	300	8.97	16.9	7.89	.	.	.
720	YEP	0	C4	300	8.90	17.1	7.87	.	.	.
721	YEP	1	A4	0	8.90	17.0	7.75	.	.	.
722	YEP	1	B3	0	8.85	17.1	7.74	.	.	.
723	YEP	1	C1	0	8.82	17.2	7.78	.	.	.
724	YEP	1	A3	50	8.79	17.0	7.69	.	.	.
725	YEP	1	B1	50	8.82	17.2	7.70	.	.	.
726	YEP	1	C2	50	8.68	17.2	7.84	.	.	.
727	YEP	1	A2	100	8.76	17.0	7.67	.	.	.
728	YEP	1	B4	100	8.80	17.1	7.69	.	.	.
729	YEP	1	C3	100	8.73	17.3	7.80	.	.	.
730	YEP	1	A5	200	8.80	17.1	7.61	.	.	.
731	YEP	1	B2	200	8.76	17.1	7.67	.	.	.

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	YEP	1	C5	200	8.68	17.3	7.72	.	.	.
733	YEP	1	A1	300	8.75	17.1	7.56	.	.	.
734	YEP	1	B5	300	8.77	17.1	7.63	.	.	.
735	YEP	1	C4	300	8.76	17.2	7.68	.	.	.
736	YEP	3	A4	0	.	.	.	180	127	384
737	YEP	3	B3	0	.	.	.	180	128	361
738	YEP	3	C1	0	.	.	.	178	127	352
739	YEP	3	A3	50	.	.	.	176	129	387
740	YEP	3	B1	50	.	.	.	180	129	349
741	YEP	3	C2	50	.	.	.	174	129	362
742	YEP	3	A2	100	.	.	.	180	130	396
743	YEP	3	B4	100	.	.	.	178	131	364
744	YEP	3	C3	100	.	.	.	178	128	345
745	YEP	3	A5	200	.	.	.	180	133	388
746	YEP	3	B2	200	.	.	.	178	132	371
747	YEP	3	C5	200	.	.	.	180	132	379
748	YEP	3	A1	300	.	.	.	178	132	390
749	YEP	3	B5	300	.	.	.	176	135	378
750	YEP	3	C4	300	.	.	.	182	134	390
751	YEP	6	A4	0	8.83	17.2	7.82	.	.	.
752	YEP	6	B3	0	8.87	17.1	7.82	.	.	.
753	YEP	6	C1	0	8.88	17.3	7.86	.	.	.
754	YEP	6	A3	50	8.65	17.1	7.71	.	.	.
755	YEP	6	B1	50	8.76	17.2	7.73	.	.	.
756	YEP	6	C2	50	8.70	17.3	7.77	.	.	.
757	YEP	6	A2	100	8.67	17.1	7.65	.	.	.
758	YEP	6	B4	100	8.78	17.1	7.66	.	.	.
759	YEP	6	C3	100	8.79	17.3	7.73	.	.	.
760	YEP	6	A5	200	8.70	17.2	7.54	.	.	.
761	YEP	6	B2	200	8.73	17.1	7.56	.	.	.
762	YEP	6	C5	200	8.93	17.3	7.65	.	.	.
763	YEP	6	A1	300	8.65	17.2	7.46	.	.	.
764	YEP	6	B5	300	8.81	17.1	7.49	.	.	.
765	YEP	6	C4	300	8.82	17.2	7.54	.	.	.
766	YEP	12	A4	0	9.02	17.0	7.82	.	.	.

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	YEP	12	B3	0	9.04	17.0	7.79	.	.	.
768	YEP	12	C1	0	9.01	17.2	7.89	.	.	.
769	YEP	12	A3	50	8.93	17.1	7.73	.	.	.
770	YEP	12	B1	50	8.90	17.0	7.73	.	.	.
771	YEP	12	C2	50	8.77	17.2	7.80	.	.	.
772	YEP	12	A2	100	8.88	16.9	7.68	.	.	.
773	YEP	12	B4	100	8.91	17.0	7.65	.	.	.
774	YEP	12	C3	100	8.81	17.1	7.74	.	.	.
775	YEP	12	A5	200	8.95	16.9	7.59	.	.	.
776	YEP	12	B2	200	8.80	17.0	7.57	.	.	.
777	YEP	12	C5	200	8.95	17.2	7.67	.	.	.
778	YEP	12	A1	300	8.98	16.9	7.52	.	.	.
779	YEP	12	B5	300	8.91	17.1	7.60	.	.	.
780	YEP	12	C4	300	8.85	17.2	7.54	.	.	.
781	YEP	24	A4	0	8.37	17.1	7.82	.	.	.
782	YEP	24	B3	0	8.35	16.9	7.83	.	.	.
783	YEP	24	C1	0	8.43	17.2	7.87	.	.	.
784	YEP	24	A3	50	8.12	17.0	7.73	.	.	.
785	YEP	24	B1	50	8.02	17.0	7.68	.	.	.
786	YEP	24	C2	50	8.17	17.2	7.76	.	.	.
787	YEP	24	A2	100	8.07	17.0	7.66	.	.	.
788	YEP	24	B4	100	7.94	16.8	7.59	.	.	.
789	YEP	24	C3	100	8.11	17.1	7.69	.	.	.
790	YEP	24	A5	200	8.09	17.1	7.56	.	.	.
791	YEP	24	B2	200	8.11	16.9	7.59	.	.	.
792	YEP	24	C5	200	8.05	17.2	7.57	.	.	.
793	YEP	24	A1	300	8.21	17.0	7.47	.	.	.
794	YEP	24	B5	300	8.23	16.9	7.44	.	.	.
795	YEP	24	C4	300	8.20	17.2	7.49	.	.	.

Performed by K. Weber SAS version 9.4 07:56 12FEB15

KW
12FEB15

Pre-exposure Period Water Chemistry Means by Species and Treatment Group

The MEANS Procedure

sps=BKT

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	9.9500	0.2100	9.7100	10.1000	9.4283	10.4717
		ph	7.9767	0.0473	7.9400	8.0300	7.8593	8.0941
		temp	12.9667	0.1155	12.9000	13.1000	12.6798	13.2535
		cond	369.0	3.4641	365.0	371.0	360.4	377.6
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	124.0	1.7321	122.0	125.0	119.7	128.3
50	3	do	9.9367	0.1206	9.8100	10.0500	9.6372	10.2361
		ph	8.0033	0.0569	7.9400	8.0500	7.8621	8.1446
		temp	13.0000	0.1732	12.9000	13.2000	12.5697	13.4303
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	9.8967	0.1858	9.7700	10.1100	9.4350	10.3583
		ph	7.9833	0.0289	7.9500	8.0000	7.9116	8.0550
		temp	12.9333	0.0577	12.9000	13.0000	12.7899	13.0768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	9.9333	0.2367	9.8600	10.0700	9.3453	10.5214
		ph	7.9767	0.0666	7.9200	8.0500	7.8113	8.1421
		temp	12.9000	0.1000	12.8000	13.0000	12.6516	13.1484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	9.9233	0.1266	9.7800	10.0200	9.6088	10.2379
		ph	7.9733	0.0115	7.9600	7.9800	7.9446	8.0020
		temp	12.9333	0.0577	12.9000	13.0000	12.7899	13.0768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=BLG

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	7.7700	0.0529	7.7300	7.8300	7.6386	7.9014
		ph	8.0700	0.0200	8.0500	8.0900	8.0203	8.1197
		temp	21.8667	0.0577	21.8000	21.9000	21.7232	22.0101
		cond	368.3	1.5275	367.0	370.0	364.5	372.1
		hard	173.3	1.1547	172.0	174.0	170.5	176.2
		alk	130.3	1.5275	129.0	132.0	126.5	134.1

50	3	do	7.8300	0.1136	7.7500	7.9600	7.5479	8.1121
		ph	8.0833	0.0321	8.0600	8.1200	8.0035	8.1632
		temp	21.8000	0	21.8000	21.8000	.	.
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	7.8333	0.0551	7.7800	7.8900	7.6965	7.9701
		ph	8.0800	0.0361	8.0500	8.1200	7.9904	8.1696
		temp	21.8000	0.1000	21.7000	21.9000	21.5516	22.0484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	7.8600	0.0436	7.8100	7.8900	7.7517	7.9683
		ph	8.1000	0.0173	8.0800	8.1100	8.0570	8.1430
		temp	21.7667	0.0577	21.7000	21.8000	21.6232	21.9101
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	7.8333	0.0757	7.7800	7.9200	7.6452	8.0214
		ph	8.0800	0.0265	8.0500	8.1000	8.0143	8.1457
		temp	21.8667	0.0577	21.8000	21.9000	21.7232	22.0101
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=CCF

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	7.7833	0.0404	7.7600	7.8300	7.6829	7.8837
		ph	8.0467	0.0379	8.0200	8.0900	7.9526	8.1407
		temp	21.5000	0	21.5000	21.5000	.	.
		cond	372.7	1.5275	371.0	374.0	368.9	376.5
		hard	174.0	0	174.0	174.0	.	.
		alk	128.3	1.1547	127.0	129.0	125.5	131.2
50	3	do	7.7233	0.0451	7.6800	7.7700	7.6113	7.8353
		ph	8.0333	0.0252	8.0100	8.0600	7.9708	8.0958
		temp	21.4333	0.0577	21.4000	21.5000	21.2899	21.5768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	7.8133	0.0643	7.7400	7.8600	7.6536	7.9730
		ph	8.0600	0.0100	8.0500	8.0700	8.0352	8.0848
		temp	21.4000	0	21.4000	21.4000	.	.
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	7.8300	0.1015	7.7400	7.9400	7.5779	8.0821
		ph	8.0633	0.0586	8.0200	8.1300	7.9178	8.2089

		temp	21.4000	0.1000	21.3000	21.5000	21.1516	21.6484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	7.8800	0.2352	7.6100	8.0400	7.2958	8.4642
		ph	8.0733	0.0902	7.9800	8.1600	7.8493	8.2974
		temp	21.4000	0.2000	21.2000	21.6000	20.9032	21.8968
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=LMB

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	7.9067	0.0666	7.8500	7.9800	7.7413	8.0721
		ph	7.9967	0.0252	7.9700	8.0200	7.9342	8.0592
		temp	21.2667	0.0577	21.2000	21.3000	21.1232	21.4101
		cond	362.0	0	362.0	362.0	.	
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	129.0	1.0000	128.0	130.0	126.5	131.5
50	3	do	7.9600	0.0436	7.9100	7.9900	7.8517	8.0683
		ph	8.0233	0.0493	7.9900	8.0800	7.9008	8.1459
		temp	21.1333	0.0577	21.1000	21.2000	20.9899	21.2768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	7.9400	0.0872	7.8800	8.0400	7.7234	8.1566
		ph	8.0267	0.0493	7.9700	8.0600	7.9041	8.1492
		temp	21.2333	0.1155	21.1000	21.3000	20.9465	21.5202
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	7.9200	0.1100	7.8100	8.0300	7.6467	8.1933
		ph	8.0200	0.0458	7.9800	8.0700	7.9062	8.1338
		temp	21.3000	0.1000	21.2000	21.4000	21.0516	21.5484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	7.9467	0.0751	7.8700	8.0200	7.7602	8.1331
		ph	8.0267	0.0306	8.0000	8.0600	7.9508	8.1026
		temp	21.3333	0.0577	21.3000	21.4000	21.1899	21.4768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=LST

						Lower 95%	Upper 95%

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conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	CL for Mean	CL for Mean
0	3	do	8.9933	0.1069	8.8700	9.0600	8.7277	9.2590
		ph	8.0767	0.0252	8.0500	8.1000	8.0142	8.1392
		temp	17.0333	0.1155	16.9000	17.1000	16.7465	17.3202
		cond	371.3	1.5275	370.0	373.0	367.5	375.1
		hard	172.0	2.0000	170.0	174.0	167.0	177.0
		alk	130.0	1.0000	129.0	131.0	127.5	132.5
50	3	do	8.9900	0.1058	8.8700	9.0700	8.7271	9.2529
		ph	8.0700	0.0173	8.0500	8.0800	8.0270	8.1130
		temp	17.1000	0.1000	17.0000	17.2000	16.8516	17.3484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	8.8400	0.1825	8.6300	8.9600	8.3867	9.2933
		ph	8.0267	0.0321	7.9900	8.0500	7.9468	8.1065
		temp	17.1000	0.1000	17.0000	17.2000	16.8516	17.3484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	8.8467	0.2593	8.5500	9.0300	8.2025	9.4908
		ph	8.0400	0.0520	7.9800	8.0700	7.9109	8.1691
		temp	17.0667	0.1155	17.0000	17.2000	16.7798	17.3535
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	8.9900	0.1136	8.8600	9.0700	8.7079	9.2721
		ph	8.0767	0.0208	8.0600	8.1000	8.0250	8.1284
		temp	17.0667	0.1155	17.0000	17.2000	16.7798	17.3535
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=SMB

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	8.1067	0.0987	8.0400	8.2200	7.8616	8.3517
		ph	8.0400	0.0100	8.0300	8.0500	8.0152	8.0648
		temp	22.0000	0.1000	21.9000	22.1000	21.7516	22.2484
		cond	366.3	2.5166	364.0	369.0	360.1	372.6
		hard	172.7	1.1547	172.0	174.0	169.8	175.5
		alk	130.3	0.5774	130.0	131.0	128.9	131.8
50	3	do	8.0633	0.0451	8.0200	8.1100	7.9513	8.1753
		ph	8.0133	0.0153	8.0000	8.0300	7.9754	8.0513
		temp	21.9667	0.0577	21.9000	22.0000	21.8232	22.1101
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
		do	7.9633	0.2499	7.6900	8.1800	7.3426	8.5840

100	3	ph	8.0000	0.0265	7.9700	8.0200	7.9343	8.0657
		temp	21.9333	0.0577	21.9000	22.0000	21.7899	22.0768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	8.0467	0.0451	8.0000	8.0900	7.9347	8.1587
		ph	8.0233	0.0153	8.0100	8.0400	7.9854	8.0613
		temp	22.0333	0.1528	21.9000	22.2000	21.6539	22.4128
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	8.1367	0.0404	8.1000	8.1800	8.0363	8.2371
		ph	8.0233	0.0115	8.0100	8.0300	7.9946	8.0520
		temp	22.0000	0.1732	21.9000	22.2000	21.5697	22.4303
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=WAE

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	8.2200	0.0458	8.1700	8.2600	8.1062	8.3338
		ph	7.9400	0.0436	7.8900	7.9700	7.8317	8.0483
		temp	17.4000	0.1000	17.3000	17.5000	17.1516	17.6484
		cond	398.3	4.1633	395.0	403.0	388.0	408.7
		hard	177.3	1.1547	176.0	178.0	174.5	180.2
		alk	126.3	2.0817	124.0	128.0	121.2	131.5
50	3	do	8.1833	0.1518	8.0200	8.3200	7.8063	8.5603
		ph	7.9400	0.0346	7.9000	7.9600	7.8539	8.0261
		temp	17.4000	0.1000	17.3000	17.5000	17.1516	17.6484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	8.0100	0.2883	7.7000	8.2700	7.2939	8.7261
		ph	7.9200	0.0458	7.8700	7.9600	7.8062	8.0338
		temp	17.3333	0.0577	17.3000	17.4000	17.1899	17.4768
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	8.2567	0.0404	8.2100	8.2800	8.1563	8.3571
		ph	7.9533	0.0252	7.9300	7.9800	7.8908	8.0158
		temp	17.3667	0.0577	17.3000	17.4000	17.2232	17.5101
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	8.3567	0.2113	8.2200	8.6000	7.8319	8.8815
		ph	7.9767	0.0153	7.9600	7.9900	7.9387	8.0146
		temp	17.3667	0.1155	17.3000	17.5000	17.0798	17.6535

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		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

sps=YEP

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	do	8.9333	0.1222	8.8000	9.0400	8.6298	9.2369
		ph	7.9000	0.0656	7.8300	7.9600	7.7371	8.0629
		temp	16.9667	0.1155	16.9000	17.1000	16.6798	17.2535
		cond	378.3	4.0415	376.0	383.0	368.3	388.4
		hard	176.7	1.1547	176.0	178.0	173.8	179.5
		alk	128.3	0.5774	128.0	129.0	126.9	129.8
50	3	do	8.9700	0.1039	8.8500	9.0300	8.7118	9.2282
		ph	7.9267	0.0321	7.8900	7.9500	7.8468	8.0065
		temp	17.0000	0.1000	16.9000	17.1000	16.7516	17.2484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
100	3	do	8.9900	0.0436	8.9600	9.0400	8.8817	9.0983
		ph	7.9133	0.0231	7.9000	7.9400	7.8560	7.9707
		temp	17.0000	0.1000	16.9000	17.1000	16.7516	17.2484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
200	3	do	8.8700	0.1735	8.6700	8.9800	8.4390	9.3010
		ph	7.8933	0.0569	7.8300	7.9400	7.7521	8.0346
		temp	17.0000	0.1000	16.9000	17.1000	16.7516	17.2484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.
300	3	do	8.9600	0.0557	8.9000	9.0100	8.8217	9.0983
		ph	7.8900	0.0200	7.8700	7.9100	7.8403	7.9397
		temp	17.0000	0.1000	16.9000	17.1000	16.7516	17.2484
		cond	.	.	.	.	.	.
		hard	.	.	.	.	.	.
		alk	.	.	.	.	.	.

Performed by K. Weber SAS version 9.4 07:56 12FEB15

KW 12FEB15

Exposure Period Water Chemistry Means by Species and Treatment Group

The MEANS Procedure

sps=BKT

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	9.7825	0.1291	9.5600	9.9300	9.7005	9.8645
		ph	7.8517	0.0774	7.7200	7.9600	7.8025	7.9009
		temp	12.9750	0.1055	12.8000	13.2000	12.9080	13.0420
		cond	380.3	4.9329	377.0	386.0	368.1	392.6
		hard	174.7	1.1547	174.0	176.0	171.8	177.5
		alk	124.7	0.5774	124.0	125.0	123.2	126.1
50	15	do	9.7067	0.1422	9.4300	9.8800	9.6163	9.7970
		ph	7.8008	0.0820	7.6400	7.9100	7.7488	7.8529
		temp	12.9667	0.0985	12.8000	13.1000	12.9041	13.0292
		cond	373.3	1.5275	372.0	375.0	369.5	377.1
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	126.7	0.5774	126.0	127.0	125.2	128.1
100	15	do	9.6125	0.1666	9.3300	9.8100	9.5066	9.7184
		ph	7.7367	0.0722	7.5800	7.8100	7.6908	7.7825
		temp	12.9500	0.1087	12.8000	13.2000	12.8809	13.0191
		cond	374.3	10.0167	363.0	382.0	349.5	399.2
		hard	174.0	0	174.0	174.0	.	.
		alk	127.0	1.0000	126.0	128.0	124.5	129.5
200	15	do	9.6283	0.2011	9.2500	9.9300	9.5006	9.7561
		ph	7.6292	0.0799	7.4700	7.7300	7.5784	7.6800
		temp	12.9000	0.1128	12.7000	13.1000	12.8283	12.9717
		cond	391.0	1.7321	390.0	393.0	386.7	395.3
		hard	177.3	4.1633	174.0	182.0	167.0	187.7
		alk	130.0	0	130.0	130.0	.	.
300	15	do	9.6708	0.1683	9.3400	9.8600	9.5639	9.7778
		ph	7.5775	0.0854	7.4300	7.6800	7.5232	7.6318
		temp	12.9000	0.0853	12.8000	13.0000	12.8458	12.9542
		cond	399.3	8.0829	392.0	408.0	379.3	419.4
		hard	178.0	4.0000	174.0	182.0	168.1	187.9
		alk	133.0	0	133.0	133.0	.	.

sps=BLG

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	8.0033	0.0720	7.9200	8.1400	7.9576	8.0491
		ph	8.1625	0.0367	8.0900	8.2200	8.1392	8.1858
		temp	21.7917	0.0515	21.7000	21.9000	21.7589	21.8244
		cond	377.3	5.1316	373.0	383.0	364.6	390.1
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	130.3	0.5774	130.0	131.0	128.9	131.8

50	15	do	7.5650	0.4083	6.8300	7.9500	7.3056	7.8244
		ph	7.9950	0.1016	7.8300	8.1100	7.9305	8.0595
		temp	21.8250	0.0764	21.7000	21.9000	21.7771	21.8729
		cond	386.0	3.4641	384.0	390.0	377.4	394.6
		hard	173.3	1.1547	172.0	174.0	170.5	176.2
		alk	130.0	0	130.0	130.0	.	.
100	15	do	7.3142	0.6316	6.1800	7.9000	6.9129	7.7154
		ph	7.9033	0.1345	7.6700	8.0700	7.8179	7.9888
		temp	21.8500	0.0674	21.7000	21.9000	21.8072	21.8928
		cond	392.3	2.0817	390.0	394.0	387.2	397.5
		hard	174.7	3.0551	172.0	178.0	167.1	182.3
		alk	132.3	1.1547	131.0	133.0	129.5	135.2
200	15	do	7.2567	0.7717	5.8000	7.9800	6.7663	7.7470
		ph	7.8300	0.1699	7.5400	8.0200	7.7220	7.9380
		temp	21.6917	0.0996	21.5000	21.8000	21.6284	21.7550
		cond	397.7	3.0551	395.0	401.0	390.1	405.3
		hard	172.7	1.1547	172.0	174.0	169.8	175.5
		alk	133.7	0.5774	133.0	134.0	132.2	135.1
300	15	do	7.0158	0.8689	5.5200	7.8600	6.4637	7.5679
		ph	7.6825	0.2215	7.2900	7.9600	7.5418	7.8232
		temp	21.8750	0.0452	21.8000	21.9000	21.8463	21.9037
		cond	404.3	8.7369	397.0	414.0	382.6	426.0
		hard	174.7	1.1547	174.0	176.0	171.8	177.5
		alk	135.7	0.5774	135.0	136.0	134.2	137.1

sps=CCF

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	7.8042	0.1497	7.5300	8.0700	7.7091	7.8993
		ph	8.0592	0.0977	7.8700	8.1700	7.9971	8.1213
		temp	21.5667	0.0651	21.5000	21.7000	21.5253	21.6081
		cond	366.7	7.7675	358.0	373.0	347.4	386.0
		hard	174.7	1.1547	174.0	176.0	171.8	177.5
		alk	127.7	1.5275	126.0	129.0	123.9	131.5
50	15	do	7.4025	0.3118	6.6500	7.7500	7.2044	7.6006
		ph	7.9342	0.0822	7.7900	8.0500	7.8820	7.9864
		temp	21.5583	0.0515	21.5000	21.6000	21.5256	21.5911
		cond	376.7	1.5275	375.0	378.0	372.9	380.5
		hard	175.3	1.1547	174.0	176.0	172.5	178.2
		alk	130.7	0.5774	130.0	131.0	129.2	132.1
100	15	do	7.4200	0.3940	6.7500	7.8300	7.1696	7.6704
		ph	7.8958	0.1006	7.7200	8.0300	7.8319	7.9597
		temp	21.5500	0.0798	21.4000	21.6000	21.4993	21.6007
		cond	383.0	2.6458	380.0	385.0	376.4	389.6
		hard	175.3	1.1547	174.0	176.0	172.5	178.2
		alk	131.3	1.1547	130.0	132.0	128.5	134.2
200	15	do	7.2767	0.5866	5.9900	7.7400	6.9039	7.6494
		ph	7.8075	0.1440	7.5300	7.9800	7.7160	7.8990

		temp	21.5333	0.1231	21.2000	21.6000	21.4551	21.6115
		cond	389.7	2.5166	387.0	392.0	383.4	395.9
		hard	176.0	2.0000	174.0	178.0	171.0	181.0
		alk	134.3	2.0817	132.0	136.0	129.2	139.5
300	15	do	7.2142	0.7277	5.7500	7.8900	6.7518	7.6765
		ph	7.7158	0.1599	7.4500	7.8900	7.6143	7.8174
		temp	21.6083	0.0793	21.4000	21.7000	21.5580	21.6587
		cond	396.7	1.1547	396.0	398.0	393.8	399.5
		hard	176.7	1.1547	176.0	178.0	173.8	179.5
		alk	135.0	1.7321	133.0	136.0	130.7	139.3

sps=LMB

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	7.9483	0.1006	7.7800	8.1200	7.8844	8.0123
		ph	8.0250	0.0697	7.8900	8.1900	7.9807	8.0693
		temp	21.9417	0.0515	21.9000	22.0000	21.9089	21.9744
		cond	363.0	4.5826	358.0	367.0	351.6	374.4
		hard	171.3	2.3094	170.0	174.0	165.6	177.1
		alk	129.0	1.0000	128.0	130.0	126.5	131.5
50	15	do	7.6833	0.4478	6.7900	8.1300	7.3988	7.9678
		ph	7.9200	0.1250	7.7100	8.1200	7.8406	7.9994
		temp	21.7917	0.0900	21.7000	22.0000	21.7345	21.8489
		cond	367.3	1.5275	366.0	369.0	363.5	371.1
		hard	173.3	3.0551	170.0	176.0	165.7	180.9
		alk	131.3	0.5774	131.0	132.0	129.9	132.8
100	15	do	7.5808	0.5654	6.5900	8.1300	7.2216	7.9401
		ph	7.8575	0.1559	7.6100	8.0900	7.7584	7.9566
		temp	21.8833	0.0718	21.8000	22.0000	21.8377	21.9289
		cond	371.0	4.5826	367.0	376.0	359.6	382.4
		hard	171.3	1.1547	170.0	172.0	168.5	174.2
		alk	132.3	0.5774	132.0	133.0	130.9	133.8
200	15	do	7.4550	0.6564	6.0200	8.1200	7.0379	7.8721
		ph	7.7325	0.1734	7.4200	7.9900	7.6223	7.8427
		temp	21.8750	0.1215	21.7000	22.0000	21.7878	21.9622
		cond	380.0	6.2450	373.0	385.0	364.5	395.5
		hard	172.7	1.1547	172.0	174.0	169.8	175.5
		alk	133.3	2.0817	131.0	135.0	128.2	138.5
300	15	do	7.3942	0.5708	6.4600	8.0200	7.0315	7.7568
		ph	7.6617	0.1905	7.3600	7.9200	7.5406	7.7827
		temp	21.9417	0.0793	21.8000	22.0000	21.8913	21.9920
		cond	381.0	10.3923	369.0	387.0	355.2	406.8
		hard	171.3	1.1547	170.0	172.0	168.5	174.2
		alk	137.0	1.7321	136.0	139.0	132.7	141.3

sps=LST

							Lower 95%	Upper 95%

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conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	CL for Mean	CL for Mean
0	15	co	9.0317	0.1403	8.7500	9.2300	8.9425	9.1208
		ph	8.1342	0.0654	7.9600	8.1900	8.0926	8.1757
		temp	17.0667	0.1155	16.9000	17.2000	16.9933	17.1400
		cond	378.7	8.9629	373.0	389.0	356.4	400.9
		hard	173.3	1.1547	172.0	174.0	170.5	176.2
		alk	129.7	0.5774	129.0	130.0	128.2	131.1
50	15	do	8.8583	0.2129	8.4500	9.0500	8.7230	8.9936
		ph	8.0392	0.0540	7.9500	8.1200	8.0048	8.0735
		temp	17.1000	0.1348	17.0000	17.3000	17.0143	17.1857
		cond	392.3	4.0415	388.0	396.0	382.3	402.4
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	132.0	0	132.0	132.0	.	.
100	15	do	8.5875	0.2641	8.1400	8.9600	8.4197	8.7553
		ph	7.9183	0.0632	7.8300	8.0400	7.8782	7.9585
		temp	17.1083	0.0793	17.0000	17.2000	17.0580	17.1587
		cond	394.3	2.5166	392.0	397.0	388.1	400.6
		hard	172.7	2.3094	170.0	174.0	166.9	178.4
		alk	132.7	0.5774	132.0	133.0	131.2	134.1
200	15	do	8.4408	0.2064	7.9800	8.7300	8.3097	8.5720
		ph	7.8267	0.0542	7.7400	7.8900	7.7923	7.8611
		temp	17.1333	0.1155	17.0000	17.3000	17.0600	17.2067
		cond	400.7	6.4291	396.0	408.0	384.7	416.6
		hard	174.7	1.1547	174.0	176.0	171.8	177.5
		alk	136.3	2.3094	135.0	139.0	130.6	142.1
300	15	do	8.6150	0.2089	8.1700	8.9400	8.4823	8.7477
		ph	7.8083	0.0673	7.6900	7.9200	7.7656	7.8511
		temp	17.1000	0.0853	17.0000	17.2000	17.0458	17.1542
		cond	412.0	7.9373	403.0	418.0	392.3	431.7
		hard	174.0	2.0000	172.0	176.0	169.0	179.0
		alk	136.3	0.5774	136.0	137.0	134.9	137.8

sps=RBT

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	9.7000	0.1302	9.4700	9.8800	9.6172	9.7828
		ph	7.9267	0.0516	7.8100	8.0000	7.8939	7.9594
		temp	12.8250	0.0965	12.7000	12.9000	12.7637	12.8863
		cond	383.3	16.1658	366.0	398.0	343.2	423.5
		hard	179.3	1.1547	178.0	180.0	176.6	182.2
		alk	127.0	3.4641	125.0	131.0	118.4	135.6
50	15	do	9.6567	0.1389	9.4200	9.9000	9.5684	9.7449
		ph	7.8583	0.0508	7.7800	7.9300	7.8261	7.8906
		temp	12.8500	0.1168	12.7000	13.1000	12.7758	12.9242
		cond	379.0	26.2869	360.0	409.0	313.7	444.3
		hard	180.0	2.0000	178.0	182.0	175.0	185.0
		alk	127.7	1.5275	126.0	129.0	123.9	131.5
		do	9.6163	0.1304	9.3700	9.7700	9.5355	9.7012

100	15	ph	7.7992	0.0480	7.7200	7.8700	7.7687	7.8296
		temp	12.8917	0.1311	12.6000	13.1000	12.8083	12.9750
		cond	376.3	19.0088	357.0	395.0	329.1	423.6
		hard	178.7	3.0551	176.0	182.0	171.1	186.3
		alk	128.3	1.5275	127.0	130.0	124.5	132.1
200	15	do	9.5683	0.2003	9.2000	9.8100	9.4411	9.6956
		ph	7.6792	0.0358	7.6200	7.7500	7.6564	7.7019
		temp	12.8083	0.1165	12.7000	13.1000	12.7343	12.8823
		cond	390.0	25.1197	375.0	419.0	327.6	452.4
		hard	176.0	2.0000	176.0	180.0	173.0	183.0
		alk	131.3	0.5774	131.0	132.0	129.9	132.8
300	15	do	9.5758	0.2019	9.2400	9.8800	9.4476	9.7041
		ph	7.6025	0.0449	7.5400	7.6800	7.5739	7.6311
		temp	12.8917	0.1311	12.7000	13.1000	12.8083	12.9750
		cond	391.0	6.2450	386.0	398.0	375.5	406.5
		hard	177.3	2.3094	176.0	180.0	171.6	183.1
		alk	133.3	2.0817	131.0	135.0	128.2	138.5

sps=SMB

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	8.1792	0.0967	8.0100	8.2800	8.1177	8.2406
		ph	8.0933	0.0565	7.9600	8.1500	8.0575	8.1292
		temp	21.9417	0.1084	21.8000	22.2000	21.8728	22.0105
		cond	365.0	4.5826	360.0	369.0	353.0	376.4
		hard	172.0	2.0000	170.0	174.0	167.0	177.0
		alk	128.7	0.5774	128.0	129.0	127.2	130.1
50	15	do	7.7408	0.4687	6.7400	8.1500	7.4430	8.0386
		ph	7.9400	0.1389	7.7200	8.1200	7.8518	8.0282
		temp	22.0083	0.0515	21.9000	22.1000	21.9756	22.0411
		cond	369.0	2.6458	366.0	371.0	362.4	375.6
		hard	173.3	1.1547	172.0	174.0	170.5	176.2
		alk	131.3	1.5275	130.0	133.0	127.5	135.1
100	15	do	7.5125	0.6995	6.2600	8.1800	7.0680	7.9570
		ph	7.8533	0.1824	7.5500	8.0800	7.7374	7.9692
		temp	21.9583	0.0515	21.9000	22.0000	21.9256	21.9911
		cond	371.0	1.0000	370.0	372.0	368.5	373.5
		hard	172.7	1.1547	172.0	174.0	169.8	175.5
		alk	134.3	4.1633	131.0	139.0	124.0	144.7
200	15	do	7.1967	1.1084	4.5700	8.3000	6.4924	7.9009
		ph	7.6983	0.2638	7.2100	8.0700	7.5307	7.8660
		temp	21.8750	0.1765	21.4000	22.0000	21.7629	21.9871
		cond	378.3	2.0817	376.0	380.0	373.2	383.5
		hard	172.0	0	172.0	172.0	.	.
		alk	135.3	0.5774	135.0	136.0	133.9	136.8
300	15	do	7.2208	0.8593	5.8200	8.1800	6.6748	7.7668
		ph	7.6542	0.2240	7.2600	7.9500	7.5118	7.7965
		temp	21.9667	0.0985	21.8000	22.1000	21.9041	22.0292

		cond	384.7	5.0332	380.0	390.0	372.2	397.2
		hard	174.0	0	174.0	174.0	.	.
		alk	138.3	1.5275	137.0	140.0	134.6	142.1

sps=WAE

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	8.4308	0.1641	8.0900	8.5800	8.3266	8.5351
		ph	7.9017	0.0549	7.8000	7.9900	7.8668	7.9366
		temp	17.2167	0.1030	17.1000	17.4000	17.1512	17.2821
		cond	396.3	5.7735	393.0	403.0	382.0	410.7
		hard	177.3	1.1547	176.0	178.0	174.5	180.2
		alk	126.7	0.5774	126.0	127.0	125.2	128.1
50	15	do	8.1725	0.1432	7.9200	8.3600	8.0815	8.2635
		ph	7.8075	0.0561	7.7100	7.9300	7.7719	7.8431
		temp	17.2250	0.1288	17.0000	17.4000	17.1432	17.3068
		cond	398.3	5.7735	395.0	405.0	384.0	412.7
		hard	176.0	0	176.0	176.0	.	.
		alk	126.0	1.0000	125.0	127.0	123.5	128.5
100	15	do	7.9992	0.2378	7.4700	8.2800	7.8480	8.1503
		ph	7.7375	0.0712	7.6500	7.9100	7.6922	7.7828
		temp	17.2250	0.1357	17.0000	17.4000	17.1388	17.3112
		cond	405.3	7.0238	398.0	412.0	387.9	422.8
		hard	176.7	1.1547	176.0	178.0	173.8	179.5
		alk	127.7	0.5774	127.0	128.0	126.2	129.1
200	15	do	7.9725	0.2624	7.5400	8.3200	7.8058	8.1392
		ph	7.6425	0.0741	7.5400	7.8200	7.5954	7.6896
		temp	17.2500	0.1000	17.1000	17.4000	17.1865	17.3135
		cond	412.7	9.2916	402.0	419.0	389.6	435.7
		hard	178.7	1.1547	178.0	180.0	175.8	181.5
		alk	131.0	1.0000	130.0	132.0	128.5	133.5
300	15	do	8.1067	0.2652	7.5200	8.5500	7.9382	8.2751
		ph	7.5692	0.0890	7.4900	7.7600	7.5326	7.6457
		temp	17.2250	0.1485	17.0000	17.5000	17.1307	17.3193
		cond	418.0	1.0000	417.0	419.0	416.5	420.5
		hard	176.7	1.1547	176.0	178.0	173.8	179.5
		alk	133.7	2.3094	131.0	135.0	127.9	139.4

sps=YEP

conc	N Obs	Variable	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	15	do	8.7808	0.2614	8.3500	9.0400	8.6211	8.9406
		ph	7.8158	0.0454	7.7400	7.8900	7.7870	7.8447
		temp	17.1083	0.1165	16.9000	17.3000	17.0343	17.1823
		cond	365.7	16.5025	352.0	384.0	324.7	406.7
		hard	179.3	1.1547	178.0	180.0	176.5	182.2
		alk	127.3	0.5774	127.0	128.0	125.9	128.8

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50	15	do	8.6092	0.3173	8.0200	8.9300	8.4076	8.8108
		ph	7.7392	0.0466	7.6800	7.8400	7.7096	7.7688
		temp	17.1250	0.1055	17.0000	17.3000	17.0580	17.1920
		cond	366.0	19.3132	349.0	387.0	318.0	414.0
		hard	176.7	3.0551	174.0	180.0	169.1	184.3
		alk	129.0	0	129.0	129.0	.	.
100	15	do	8.6042	0.3478	7.9400	8.9100	8.3832	8.8252
		ph	7.6842	0.0533	7.5900	7.8000	7.6503	7.7181
		temp	17.0667	0.1435	16.8000	17.3000	16.9755	17.1579
		cond	368.3	25.7747	345.0	396.0	304.3	432.4
		hard	178.7	1.1547	178.0	180.0	175.8	181.6
		alk	129.7	1.5275	128.0	131.0	125.9	133.5
200	15	do	8.6292	0.3418	8.0500	8.9500	8.4120	8.8464
		ph	7.6083	0.0562	7.5400	7.7200	7.5726	7.6441
		temp	17.1167	0.1337	16.9000	17.3000	17.0317	17.2016
		cond	379.3	8.5049	371.0	388.0	358.2	400.5
		hard	179.3	1.1547	178.0	180.0	176.5	182.2
		alk	132.3	0.5774	132.0	133.0	130.9	133.8
300	15	do	8.6617	0.2826	8.2000	8.9800	8.4821	8.8412
		ph	7.5267	0.0702	7.4400	7.6800	7.4820	7.5713
		temp	17.1000	0.1128	16.9000	17.2000	17.0283	17.1717
		cond	386.0	6.9282	378.0	390.0	368.8	403.2
		hard	178.7	3.0551	176.0	182.0	171.1	186.3
		alk	133.7	1.5275	132.0	135.0	129.9	137.5

Performed by K. Weber SAS version 9.4 07:56 12FEB15

KW 12FEB15

FF # 29
Item No. 1
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```
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by K. Weber SAS version' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species';
title2 h=2 'Statistical analysis of pre-exposure and exposure period water chemistry';
title3 h=2 'SAS v. 9.4 Analysis Completion Date: 12FEB2015 Analysis prepared by: KLW';
/*************************************************************
* SAS ver 9.4       Analysis prepared by:  KLW   12FEB15    *
* Analysis completion date:  12FEB2015                      *
*************************************************************/

/*****************************************************************************************************
* Variable Names:
* sps = three letter code for fish species
*           RBT = Rainbow trout (Oncorhynchus mykiss)
*           YEP = Yellow perch (Perca flavescens)
*           WAE = Walleye (Sander vitreus)
*           BKT = Coaster brook trout (Salvelinus fontinalis)
*           LMB = Largemouth bass (Micropterus salmoides)
*           SMB = Smallmouth bass (Micropterus dolomieu)
*           BLG = Bluegill sunfish (Lepomis macrochirus)
*           LST = Lake sturgeon (Acipenser fulvescens)
*           CCF = Channel catfish (Ictalarus punctatus)
* time = water sampling time
*           0 = Pre-exposure
*           1 = 1 hour post-dosing initiation
*           3 = 3 hour post-dosing initiation
*           6 = 6 hour post-dosing initiation
*           12 = 12 hour post-dosing initiation
*           24 = 24 hour post-dosing initiation
* id = exposure chamber ID
*            i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)
* conc = concentration (in mg/L)
*           0 = control (0 mg/L)
*           50 = 50 mg/L
*           100 = 100 mg/L
*           200 = 200 mg/L
*           300 = 300 mg/L
* do = dissolved oxygen (mg/L)
* pH = pH
* temp = temperautre (C)
* cond = conductivity (uS/cm2) temperature compensate to 25C
* hard = hardness (mg/L CaCO3)
* alk = alkalinity (mg/L CaCO3)
*****************************************************************************************************/

data exp_water_chem; set PSEUDO03.exp_water_chem;
    disso = do + 0;
        drop do;
        rename disso = do;
    tempy = temp + 0;
        drop temp;
        rename tempy = temp;
```

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FF # 29
Item No. 2
Pg 1 of 2

```
    pHval = pH + 0;
        drop pH;
        rename pHval = ph;
    hardy = hard + 0;
        drop hard;
        rename hardy = hard;
    alky = alk + 0;
        drop alk;
        rename alky = alk;
    condy = cond + 0;
        drop cond;
        rename condy = cond;


proc sort data=exp_water_chem; by sps time conc id; run;
proc print data=exp_water_chem; run;

data pre_exp; set exp_water_chem;
    If time ne 0 then delete;
    run;

data exp; set exp_water_chem;
    If time <1 then delete;
    run;

title1 h=2 'Pre-exposure Period Water Chemistry Means by Species and Treatment Group';
proc means data = pre_exp mean std min max clm fw=8;
by sps;
class conc;
var do pH temp cond hard alk;
run;

title1 h=2 'Exposure Period Water Chemistry Means by Species and Treatment Group';
proc means data = exp mean std min max clm fw=8;
by sps;
class conc;
var do ph temp cond hard alk;
run;
```

PW
12/26/15

FF # 21
Item No. 2
Pg 2 of 2

```
1    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
2
3    FOOTNOTE1 'Performed by K. Weber SAS version' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
4
5    options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
6
7    title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish
7  ! species';
8    title2 h=2 'Statistical analysis of pre-exposure and exposure period water chemistry';
9    title3 h=2 'SAS v. 9.4 Analysis Completion Date: 12FEB2015 Analysis prepared by: KLW';
10   /*************************************************************
11   * SAS ver 9.4       Analysis prepared by:  KLW  12FEB15     *
12   * Analysis completion date:  12FEB2015                      *
13   *************************************************************/
14
15   /*************************************************************************************************
15 ! *************
16   * Variable Names:
16 !             *
17   * sps = three letter code for fish species
17 !             *
18   *           RBT = Rainbow trout (Oncorhynchus mykiss)
18 !             *
19   *           YEP = Yellow perch (Perca flavescens)
19 !             *
20   *           WAE = Walleye (Sander vitreus)
20 !             *
21   *           BKT = Coaster brook trout (Salvelinus fontinalis)
21 !             *
22   *           LMB = Largemouth bass (Micropterus salmoides)
22 !             *
23   *           SMB = Smallmouth bass (Micropterus dolomieu)
23 !             *
24   *           BLG = Bluegill sunfish (Lepomis macrochirus)
24 !             *
25   *           LST = Lake sturgeon (Acipenser fulvescens)
25 !             *
26   *           CCF = Channel catfish (Ictalarus punctatus)
26 !             *
27   * time = water sampling time
27 !             *
28   *           0 = Pre-exposure
28 !             *
29   *           1 = 1 hour post-dosing initiation
29 !             *
30   *           3 = 3 hour post-dosing initiation
30 !             *
31   *           6 = 6 hour post-dosing initiation
31 !             *
32   *           12 = 12 hour post-dosing initiation
32 !             *
33   *           24 = 24 hour post-dosing initiation
33 !             *
34   * id = exposure chamber ID
34 !             *
```

FF # 29
Item No. 3
Pg 1 of 4

```
35   *            i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)
35 !              *
36   * conc = concentration (in mg/L)
36 !              *
37   *            0 = control (0 mg/L)
37 !              *
38   *            50 = 50 mg/L
38 !              *
39   *            100 = 100 mg/L
39 !              *
40   *            200 = 200 mg/L
40 !              *
41   *            300 = 300 mg/L
41 !              *
42   * do = dissolved oxygen (mg/L)
42 !              *
43   * pH = pH
43 !              *
44   * temp = temperautre (C)
44 !              *
45   * cond = conductivity (uS/cm2) temperature compensate to 25C
45 !              *
46   * hard = hardness (mg/L CaCO3)
46 !              *
47   * alk = alkalinity (mg/L CaCO3)
47 !              *
48   ************************************************************************************************
48 ! ************/

49
50   data exp_water_chem; set PSEUDO03.exp_water_chem;
51       disso = do + 0;
52           drop do;
53           rename disso = do;
54       tempy = temp + 0;
55           drop temp;
56           rename tempy = temp;
57       pHval = pH + 0;
58           drop pH;
59           rename pHval = ph;
60       hardy = hard + 0;
61           drop hard;
62           rename hardy = hard;
63       alky = alk + 0;
64           drop alk;
65           rename alky = alk;
66       condy = cond + 0;
67           drop cond;
68           rename condy = cond;
69
70
```

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```
NOTE: Character values have been converted to numeric values at the places given by:
      (Line):(Column).
      60:13   63:12   66:13
NOTE: Missing values were generated as a result of performing an operation on missing values.
      Each place is given by: (Number of times) at (Line):(Column).
```

```
      135 at 51:16   135 at 54:18   135 at 57:16   636 at 60:18   636 at 63:16   636 at 66:18
NOTE: There were 795 observations read from the data set PSEUD003.EXP_WATER_CHEM.
NOTE: The data set WORK.EXP_WATER_CHEM has 795 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.06 seconds
      cpu time            0.03 seconds


71    proc sort data=exp_water_chem; by sps time conc id; run;

NOTE: There were 795 observations read from the data set WORK.EXP_WATER_CHEM.
NOTE: The data set WORK.EXP_WATER_CHEM has 795 observations and 10 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds


72    proc print data=exp_water_chem; run;
NOTE: Writing HTML Body file: sashtml.htm

NOTE: There were 795 observations read from the data set WORK.EXP_WATER_CHEM.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           2.28 seconds
      cpu time            0.89 seconds


73
74    data pre_exp; set exp_water_chem;
75        If time ne 0 then delete;
76        run;

NOTE: There were 795 observations read from the data set WORK.EXP_WATER_CHEM.
NOTE: The data set WORK.PRE_EXP has 120 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


77
78    data exp; set exp_water_chem;
79        If time <1 then delete;
80        run;

NOTE: There were 795 observations read from the data set WORK.EXP_WATER_CHEM.
NOTE: The data set WORK.EXP has 675 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
81
82    title1 h=2 'Pre-exposure Period Water Chemistry Means by Species and Treatment Group';
83    proc means data = pre_exp mean std min max clm fw=8;
84    by sps;
85    class conc;
86    var do pH temp cond hard alk;
```

```
87   run;

NOTE: There were 120 observations read from the data set WORK.PRE_EXP.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.23 seconds
      cpu time            0.15 seconds


88
89   title1 h=2 'Exposure Period Water Chemistry Means by Species and Treatment Group';
90   proc means data = exp mean std min max clm fw=8;
91   by sps;
92   class conc;
93   var do ph temp cond hard alk;
94   run;

NOTE: There were 675 observations read from the data set WORK.EXP.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.17 seconds
      cpu time            0.17 seconds
```

JCW
12FEB15

FF # 29
Item No. 3
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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Statistical analysis of ammonia levels (TAN and un-ionized)
SAS v. 9.4 Analysis Completion Date: 11FEB2015 Analysis prepared by: KLW

KW 11FEB2015

Obs	sps	conc	id	ph	temp	tan	un_ion
1	BKT	0	A	7.72	12.8	0.132	.001584796
2	BKT	0	B	7.82	12.9	0.121	.001837057
3	BKT	0	C	7.86	13.0	0.122	.002043336
4	BKT	50	A	7.64	12.8	0.143	.001430914
5	BKT	50	B	7.73	12.8	0.135	.001658104
6	BKT	50	C	7.79	13.0	0.133	.001900710
7	BKT	100	A	7.58	12.8	0.153	.001335150
8	BKT	100	B	7.65	12.8	0.159	.001627697
9	BKT	100	C	7.69	13.0	0.147	.001673632
10	BKT	200	A	7.47	12.8	0.180	.001221687
11	BKT	200	B	7.53	12.7	0.181	.001398353
12	BKT	200	C	7.54	12.9	0.184	.001476725
13	BKT	300	A	7.43	12.8	0.207	.001282086
14	BKT	300	B	7.43	12.8	0.216	.001337829
15	BKT	300	C	7.48	12.8	0.207	.001437438
16	BLG	0	A	8.17	21.8	0.080	.005021036
17	BLG	0	B	8.19	21.9	0.052	.003430470
18	BLG	0	C	8.22	21.8	0.087	.006080081
19	BLG	50	A	7.84	21.9	0.116	.003547789
20	BLG	50	B	7.86	21.9	0.127	.004061421
21	BLG	50	C	7.83	21.9	0.152	.004546172
22	BLG	100	A	7.78	21.8	0.090	.002390052
23	BLG	100	B	7.67	21.9	0.163	.003404171
24	BLG	100	C	7.69	21.9	0.156	.003408169
25	BLG	200	A	7.63	21.8	0.217	.004111554
26	BLG	200	B	7.54	21.8	0.118	.001823775
27	BLG	200	C	7.55	21.6	0.299	.004660413
28	BLG	300	A	7.40	21.9	0.227	.002570805
29	BLG	300	B	7.29	21.9	0.225	.001983023
30	BLG	300	C	7.37	21.9	0.251	.002654883
31	CCF	0	A	8.00	21.5	0.153	.006490803

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Item No. 4
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32	CCF	0	B	8.05	21.6	0.143	.006818675
33	CCF	0	C	8.15	21.5	0.147	.008657437
34	CCF	50	A	7.83	21.6	0.165	.004832266
35	CCF	50	B	7.79	21.5	0.186	.004945862
36	CCF	50	C	7.87	21.5	0.184	.005850628
37	CCF	100	A	7.72	21.4	0.239	.005392327
38	CCF	100	B	7.74	21.6	0.269	.006438820
39	CCF	100	C	7.78	21.5	0.249	.006474278
40	CCF	200	A	7.61	21.6	0.289	.005159996
41	CCF	200	B	7.53	21.6	0.234	.003485571
42	CCF	200	C	7.65	21.2	0.453	.008605237
43	CCF	300	A	7.45	21.6	0.325	.004036743
44	CCF	300	B	7.51	21.6	0.264	.003757969
45	CCF	300	C	7.45	21.6	0.357	.004434207
46	LMB	0	A	7.89	22.0	0.096	.003305061
47	LMB	0	B	7.97	21.9	0.069	.002816685
48	LMB	0	C	7.99	22.0	0.068	.002921211
49	LMB	50	A	7.76	21.8	0.107	.002716864
50	LMB	50	B	7.71	21.8	0.098	.002223879
51	LMB	50	C	7.73	21.9	0.110	.002629509
52	LMB	100	A	7.62	22.0	0.144	.002705508
53	LMB	100	B	7.61	21.9	0.115	.002097459
54	LMB	100	C	7.66	21.8	0.122	.002473535
55	LMB	200	A	7.57	22.0	0.158	.002551134
56	LMB	200	B	7.45	21.9	0.177	.002246036
57	LMB	200	C	7.42	21.7	0.165	.001927949
58	LMB	300	A	7.43	22.0	0.223	.002723279
59	LMB	300	B	7.39	21.9	0.224	.002479723
60	LMB	300	C	7.36	22.0	0.196	.002040956
61	LST	0	A	8.16	16.9	0.108	.004716072
62	LST	0	B	8.18	17.1	0.096	.004443449
63	LST	0	C	8.16	17.2	0.090	.004015055
64	LST	50	A	8.04	17.0	0.116	.003911570
65	LST	50	B	8.06	17.0	0.116	.004089418
66	LST	50	C	7.95	17.2	0.112	.003134437

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	LST	100	A	7.85	17.0	0.138	.003040834
68	LST	100	B	7.93	17.1	0.148	.003931886
69	LST	100	C	7.83	17.2	0.137	.002928238
70	LST	200	A	7.74	17.0	0.166	.002853437
71	LST	200	B	7.77	17.1	0.172	.003187394
72	LST	200	C	7.77	17.3	0.194	.003648063
73	LST	300	A	7.73	17.0	0.205	.003444959
74	LST	300	B	7.79	17.1	0.193	.003741842
75	LST	300	C	7.69	17.2	0.229	.003566866
76	RBT	0	A	7.93	12.9	0.087	.001694182
77	RBT	0	B	7.95	12.7	0.072	.001444891
78	RBT	0	C	8.00	12.9	0.068	.001550505
79	RBT	50	A	7.84	12.8	0.096	.001513612
80	RBT	50	B	7.85	12.8	0.098	.001580556
81	RBT	50	C	7.93	13.1	0.095	.001878016
82	RBT	100	A	7.76	12.9	0.130	.001722393
83	RBT	100	B	7.79	12.9	0.142	.002014030
84	RBT	100	C	7.87	13.1	0.124	.002140458
85	RBT	200	A	7.65	12.7	0.180	.001828708
86	RBT	200	B	7.69	12.7	0.204	.002270264
87	RBT	200	C	7.70	13.1	0.189	.002218104
88	RBT	300	A	7.56	12.7	0.228	.001886398
89	RBT	300	B	7.59	12.9	0.256	.002303015
90	RBT	300	C	7.64	13.1	0.455	.004657895
91	SMB	0	A	7.96	21.9	0.069	.002755130
92	SMB	0	B	8.03	21.8	0.096	.004441723
93	SMB	0	C	8.07	22.0	0.054	.002764971
94	SMB	50	A	7.72	22.0	0.131	.003083543
95	SMB	50	B	7.78	21.9	0.113	.003022008
96	SMB	50	C	7.72	22.0	0.133	.003130620
97	SMB	100	A	7.58	22.0	0.147	.002523028
98	SMB	100	B	7.55	21.9	0.159	.002531722
99	SMB	100	C	7.61	21.9	0.166	.003027637
100	SMB	200	A	7.37	22.0	0.185	.001970806
101	SMB	200	B	7.39	21.9	0.207	.002291530

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	SMB	200	C	7.21	21.4	0.256	.001813185
103	SMB	300	A	7.32	21.9	0.197	.001859250
104	SMB	300	B	7.26	22.0	0.196	.001624668
105	SMB	300	C	7.44	21.9	0.223	.002766138
106	WAE	0	A	7.89	17.3	0.090	.002217746
107	WAE	0	B	7.89	17.1	0.058	.001408580
108	WAE	0	C	7.91	17.3	0.066	.001701019
109	WAE	50	A	7.77	17.2	0.107	.001997418
110	WAE	50	B	7.76	17.1	0.079	.001431257
111	WAE	50	C	7.78	17.4	0.113	.002189375
112	WAE	100	A	7.72	17.3	0.168	.002821363
113	WAE	100	B	7.65	17.1	0.147	.002075735
114	WAE	100	C	7.72	17.4	0.134	.002266907
115	WAE	200	A	7.63	17.3	0.217	.002971506
116	WAE	200	B	7.57	17.3	0.211	.002520968
117	WAE	200	C	7.59	17.4	0.226	.002846703
118	WAE	300	A	7.61	17.3	0.300	.003925589
119	WAE	300	B	7.50	17.0	0.253	.002520936
120	WAE	300	C	7.52	17.5	0.281	.003040547
121	YEP	0	A	7.82	17.1	0.082	.001701141
122	YEP	0	B	7.83	16.9	0.090	.001881969
123	YEP	0	C	7.87	17.2	0.074	.001730704
124	YEP	50	A	7.73	17.0	0.112	.001882124
125	YEP	50	B	7.68	17.0	0.132	.001980608
126	YEP	50	C	7.76	17.2	0.099	.001806779
127	YEP	100	A	7.66	17.0	0.142	.002036134
128	YEP	100	B	7.59	16.8	0.150	.001807708
129	YEP	100	C	7.69	17.1	0.152	.002350211
130	YEP	200	A	7.56	17.1	0.194	.002232573
131	YEP	200	B	7.59	16.9	0.194	.002355291
132	YEP	200	C	7.57	17.2	0.192	.002277135
133	YEP	300	A	7.47	17.0	0.259	.002410072
134	YEP	300	B	7.44	16.9	0.237	.002044249
135	YEP	300	C	7.49	17.2	0.234	.002312974

Performed by K. Weber SAS version 9.4 08:47 11FEB15 KW 11FEB2015 AEH-12-PSEUDO-05

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Statistical analysis of ammonia levels (TAN and un-ionized)
SAS v. 9.4 Analysis Completion Date: 11FEB2015 Analysis prepared by: KLW

The MEANS Procedure

sps=BKT

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.1250	0.00608	0.1210	0.1320	0.1099	0.1401
		un_ion		0.00182	0.000230	0.00158	0.00204	0.00125	0.00239
50	3	tan	tan	0.1370	0.00529	0.1330	0.1430	0.1239	0.1501
		un_ion		0.00166	0.000235	0.00143	0.00190	0.00108	0.00225
100	3	tan	tan	0.1530	0.00600	0.1470	0.1590	0.1381	0.1679
		un_ion		0.00155	0.000184	0.00134	0.00167	0.00109	0.00200
200	3	tan	tan	0.1817	0.00208	0.1800	0.1840	0.1766	0.1868
		un_ion		0.00137	0.000131	0.00122	0.00148	0.00104	0.00169
300	3	tan	tan	0.2100	0.00520	0.2070	0.2160	0.1971	0.2229
		un_ion		0.00135	0.000079	0.00128	0.00144	0.00116	0.00155

sps=BLG

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.0730	0.0185	0.0520	0.0870	0.0270	0.1190
		un_ion		0.00484	0.00133	0.00343	0.00608	0.00153	0.00816
50	3	tan	tan	0.1317	0.0184	0.1160	0.1520	0.0858	0.1775
		un_ion		0.00405	0.000499	0.00355	0.00456	0.00281	0.00529
100	3	tan	tan	0.1363	0.0403	0.0900	0.1630	0.0363	0.2364
		un_ion		0.00307	0.000587	0.00239	0.00341	0.00161	0.00452
200	3	tan	tan	0.2113	0.0906	0.1180	0.2990	-0.0138	0.4365
		un_ion		0.00353	0.00150	0.00182	0.00466	-0.00021	0.00727
300	3	tan	tan	0.2343	0.0145	0.2250	0.2510	0.1984	0.2703
		un_ion		0.00240	0.000366	0.00198	0.00265	0.00149	0.00331

sps=CCF

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.1477	0.00503	0.1430	0.1530	0.1352	0.1602
		un_ion		0.00732	0.00117	0.00649	0.00866	0.00442	0.0102
50	3	tan	tan	0.1783	0.0116	0.1650	0.1860	0.1495	0.2071
		un_ion		0.00521	0.000558	0.00483	0.00585	0.00382	0.00660
		tan	tan	0.2523	0.0153	0.2390	0.2690	0.2144	0.2903

100	3	un_ion		0.00610	0.000615	0.00539	0.00647	0.00457	0.00763
200	3	tan	tan	0.3253	0.1139	0.2340	0.4530	0.0423	0.6084
		un_ion		0.00575	0.00261	0.00349	0.00861	-0.00073	0.0122
300	3	tan	tan	0.3153	0.0472	0.2640	0.3570	0.1980	0.4327
		un_ion		0.00406	0.000340	0.00376	0.00443	0.00323	0.00492

sps=LMB

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.0777	0.0159	0.0680	0.0960	0.0382	0.1171
		un_ion		0.00301	0.000257	0.00282	0.00331	0.00238	0.00365
50	3	tan	tan	0.1050	0.00624	0.0980	0.1100	0.0895	0.1205
		un_ion		0.00252	0.000263	0.00222	0.00272	0.00187	0.00318
100	3	tan	tan	0.1270	0.0151	0.1150	0.1440	0.0894	0.1646
		un_ion		0.00243	0.000307	0.00210	0.00271	0.00166	0.00319
200	3	tan	tan	0.1687	0.00961	0.1580	0.1770	0.1428	0.1905
		un_ion		0.00228	0.000362	0.00193	0.00265	0.00137	0.00318
300	3	tan	tan	0.2143	0.0159	0.1960	0.2240	0.1749	0.2538
		un_ion		0.00241	0.000346	0.00204	0.00272	0.00156	0.00327

sps=LST

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.0980	0.00917	0.0900	0.1080	0.0752	0.1208
		un_ion		0.00439	0.000353	0.00402	0.00472	0.00351	0.00527
50	3	tan	tan	0.1147	0.00231	0.1120	0.1160	0.1089	0.1204
		un_ion		0.00371	0.000508	0.00313	0.00409	0.00245	0.00497
100	3	tan	tan	0.1410	0.00608	0.1370	0.1480	0.1259	0.1561
		un_ion		0.00330	0.000550	0.00293	0.00393	0.00193	0.00467
200	3	tan	tan	0.1773	0.0147	0.1660	0.1940	0.1407	0.2140
		un_ion		0.00323	0.000399	0.00285	0.00365	0.00224	0.00422
300	3	tan	tan	0.2090	0.0183	0.1930	0.2290	0.1635	0.2545
		un_ion		0.00358	0.000149	0.00344	0.00374	0.00321	0.00396

sps=RBT

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan	tan	0.0757	0.0100	0.0680	0.0870	0.0508	0.1005
		un_ion		0.00156	0.000125	0.00144	0.00169	0.00125	0.00187
50	3	tan	tan	0.0963	0.00153	0.0950	0.0980	0.0925	0.1001
		un_ion		0.00166	0.000194	0.00151	0.00188	0.00118	0.00214

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100	3	tan un_ion	tan	0.1320 0.00196	0.00917 0.000214	0.1240 0.00172	0.1420 0.00214	0.1092 0.00143	0.1548 0.00249
200	3	tan un_ion	tan	0.1910 0.00211	0.0121 0.000241	0.1800 0.00183	0.2040 0.00227	0.1609 0.00151	0.2211 0.00271
300	3	tan un_ion	tan	0.3130 0.00295	0.1238 0.00149	0.2280 0.00189	0.4550 0.00466	0.00554 -0.00076	0.6205 0.00666

sps=SMB

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan un_ion	tan	0.0730 0.00332	0.0213 0.000971	0.0540 0.00276	0.0960 0.00444	0.0201 0.000909	0.1259 0.00573
50	3	tan un_ion	tan	0.1257 0.00308	0.0110 0.000054	0.1130 0.00302	0.1330 0.00313	0.0983 0.00294	0.1530 0.00321
100	3	tan un_ion	tan	0.1573 0.00269	0.00961 0.000289	0.1470 0.00252	0.1660 0.00303	0.1335 0.00198	0.1812 0.00341
200	3	tan un_ion	tan	0.2160 0.00203	0.0363 0.000244	0.1850 0.00181	0.2560 0.00229	0.1257 0.00142	0.3063 0.00263
300	3	tan un_ion	tan	0.2053 0.00208	0.0153 0.000603	0.1960 0.00162	0.2230 0.00277	0.1673 0.000586	0.2434 0.00358

sps=WAE

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan un_ion	tan	0.0713 0.00178	0.0187 0.000410	0.0580 0.00141	0.0900 0.00222	0.0300 0.000758	0.1127 0.00279
50	3	tan un_ion	tan	0.0997 0.00187	0.0181 0.000394	0.0790 0.00143	0.1130 0.00219	0.0546 0.000894	0.1447 0.00285
100	3	tan un_ion	tan	0.1497 0.00239	0.0172 0.000387	0.1340 0.00208	0.1680 0.00282	0.1070 0.00143	0.1923 0.00335
200	3	tan un_ion	tan	0.2180 0.00278	0.00755 0.000233	0.2110 0.00252	0.2260 0.00297	0.1992 0.00220	0.2368 0.00336
300	3	tan un_ion	tan	0.2780 0.00316	0.0236 0.000710	0.2530 0.00252	0.3000 0.00393	0.2193 0.00140	0.3367 0.00493

sps=YEP

conc	N Obs	Variable	Label	Mean	Std Dev	Minimum	Maximum	Lower 95% CL for Mean	Upper 95% CL for Mean
0	3	tan un_ion	tan	0.0820 0.00177	0.00800 0.000097	0.0740 0.00170	0.0900 0.00188	0.0621 0.00153	0.1019 0.00201
50	3	tan	tan	0.1143	0.0166	0.0990	0.1320	0.0730	0.1556

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		un_ion		0.00189	0.000087	0.00181	0.00198	0.00167	0.00211
100	3	tan	tan	0.1480	0.00529	0.1420	0.1520	0.1349	0.1611
		un_ion		0.00206	0.000272	0.00181	0.00235	0.00139	0.00274
200	3	tan	tan	0.1933	0.00115	0.1920	0.1940	0.1905	0.1962
		un_ion		0.00229	0.000062	0.00223	0.00236	0.00213	0.00244
300	3	tan	tan	0.2433	0.0137	0.2340	0.2590	0.2094	0.2772
		un_ion		0.00226	0.000190	0.00204	0.00241	0.00179	0.00273

Performed by K. Weber SAS version 9.4 08:17 11FEB15

KW 11FEB2015

FF # 29
Item No. 4
Pg 9 of 9

```
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by K. Weber SAS version' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species';
title2 h=2 'Statistical analysis of ammonia levels (TAN and un-ionized)';
title3 h=2 'SAS v. 9.4 Analysis Completion Date: 11FEB2015 Analysis prepared by: KLW';
/*************************************************************
* SAS ver 9.4       Analysis prepared by:  KLW
* Analysis completion date:  11FEB2015                       *
*************************************************************/
/*************************************************************************************************
* Variable Names:
* sps = three letter code for fish species
*           RBT = Rainbow trout (Oncorhynchus mykiss)
*           YEP = Yellow perch (Perca flavescens)
*           WAE = Walleye (Sander vitreus)
*           BKT = Coaster brook trout (Salvelinus fontinalis)
*           LMB = Largemouth bass (Micropterus salmoides)
*           SMB = Smallmouth bass (Micropterus dolomieu)
*           BLG = Bluegill sunfish (Lepomis macrochirus)
*           LST = Lake sturgeon (Acipenser fulvescens)
*           CCF = Channel catfish (Ictalarus punctatus)
* conc = concentration (in mg/L)
*           0 = control (0 mg/L)
*           50 = 50 mg/L
*           100 = 100 mg/L
*           200 = 200 mg/L
*           300 = 300 mg/L
* id = exposure chamber ID
*            i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)
* pH = pH
* temp = temperautre (C)
* tan = total ammonia nitrogen levels
*************************************************************************************************/

data ammonia; set Pseudo03.ammonia;
un_ion = (1/(10**(0.09018+(2729.92/(273.2+temp))-pH)+1))*tan;
run;
proc sort data=ammonia; by sps conc id; run;
proc print data=ammonia; run;

proc means data = ammonia mean std min max clm fw=8;
by sps;
class conc;
var tan un_ion;
run;
```

PER-12-PSEUDO-03

FF # 29
Item No. 5
Pg 1 of 1

```
1    DM  LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
2
3    FOOTNOTE1 'Performed by K. Weber SAS version' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
4
5    options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
6
7    title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish
7  ! species';
8    title2 h=2 'Statistical analysis of ammonia levels (TAN and un-ionized)';
9    title3 h=2 'SAS v. 9.4 Analysis Completion Date: 11FEB2015 Analysis prepared by: KLW';
10   /*************************************************************
11   * SAS ver 9.4       Analysis prepared by:  KLW                *
12   * Analysis completion date:  11FEB2015                       *
13   *************************************************************/
14   /*****************************************************************************************
14 ! *************
15   * Variable Names:
15 !             *
16   * sps = three letter code for fish species
16 !             *
17   *           RBT = Rainbow trout (Oncorhynchus mykiss)
17 !             *
18   *           YEP = Yellow perch (Perca flavescens)
18 !             *
19   *           WAE = Walleye (Sander vitreus)
19 !             *
20   *           BKT = Coaster brook trout (Salvelinus fontinalis)
20 !             *
21   *           LMB = Largemouth bass (Micropterus salmoides)
21 !             *
22   *           SMB = Smallmouth bass (Micropterus dolomieu)
22 !             *
23   *           BLG = Bluegill sunfish (Lepomis macrochirus)
23 !             *
24   *           LST = Lake sturgeon (Acipenser fulvescens)
24 !             *
25   *           CCF = Channel catfish (Ictalarus punctatus)
25 !             *
26   * conc = concentration (in mg/L)
26 !             *
27   *           0 = control (0 mg/L)
27 !             *
28   *           50 = 50 mg/L
28 !             *
29   *           100 = 100 mg/L
29 !             *
30   *           200 = 200 mg/L
30 !             *
31   *           300 = 300 mg/L
31 !             *
32   * id = exposure chamber ID
32 !             *
33   *            i.e., A2 = Diluter System (A, B, or C) and Position in Diluter System (1-5)
33 !             *
34   * pH = pH
```

AEH-12-PSEUDO-03

FF # 29
Item No. 6
Pg 1 of 2

```
34 |            *
35   * temp = temperautre (C)
35 |            *
36   * tan = total ammonia nitrogen levels
36 |            *
37   ****************************************************************************************
37 | ************/
38
39   data ammonia; set Pseudo03.ammonia;
40   un_ion = (1/(10**(0.09018+(2729.92/(273.2+temp))-pH)+1))*tan;
41   run;

NOTE: There were 135 observations read from the data set PSEUDO03.AMMONIA.
NOTE: The data set WORK.AMMONIA has 135 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.06 seconds
      cpu time            0.03 seconds


42   proc sort data=ammonia; by sps conc id; run;

NOTE: There were 135 observations read from the data set WORK.AMMONIA.
NOTE: The data set WORK.AMMONIA has 135 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


43   proc print data=ammonia; run;
NOTE: Writing HTML Body file: sashtml.htm

NOTE: There were 135 observations read from the data set WORK.AMMONIA.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           2.54 seconds
      cpu time            0.60 seconds


44
45   proc means data = ammonia mean std min max clm fw=8;
46   by sps;
47   class conc;
48   var tan un_ion;
49   run;

NOTE: There were 135 observations read from the data set WORK.AMMONIA.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.20 seconds
      cpu time            0.15 seconds
```

KW
11FB2015

FF # 29
Item No. 6
Pg 2 of 2

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #: (pages: 1-26)	Created.....	1-May-13	KLW
Data Source: File Folder: 16B	Revised.....	10 MAY 13	KLW
Forms: 1b, 1c	Reviewed...	10/MAY13	KLW
	Certified...	5/14/13	JRL
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chemistry]RBT PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Oncorhynchus mykiss*

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 11E000
Test Chemical: *Pseudomonas fluorescens Pf*- CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Data Explanation:

Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system..

Data anomalies and deviations

1) Pre-exposure water chemistry was not measured for RBT. It was decided after the RBT exposure that these data needed to be collected.

FOLDER NO. 16B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-76)
Data Source: File Folder: 16R
Forms: 1b, 1c

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens* Pf- CL 145A (SDP) Lot #: TR 4669-3 (6)
Exposure Date: 2/29/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
A	A1	0	N/A	N/A	N/A
	A2	50	N/A	N/A	N/A
	A5	100	N/A	N/A	N/A
	A3	200	N/A	N/A	N/A
	A4	300	N/A	N/A	N/A
B	B2	0	N/A	N/A	N/A
	B5	50	N/A	N/A	N/A
	B1	100	N/A	N/A	N/A
	B3	200	N/A	N/A	N/A
	B4	300	N/A	N/A	N/A
C	C4	0	N/A	N/A	N/A
	C2	50	N/A	N/A	N/A
	C1	100	N/A	N/A	N/A
	C3	200	N/A	N/A	N/A
	C5	300	N/A	N/A	N/A
		Mean	N/A	N/A	N/A
		(SD)	N/A	N/A	N/A
		Minimum	N/A	N/A	N/A
		Maximum	N/A	N/A	N/A

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	N/A	N/A	N/A
B	N/A	N/A	N/A
C	N/A	N/A	N/A
Mean	N/A	N/A	N/A
(SD)	N/A	N/A	N/A
Minimum	N/A	N/A	N/A
Maximum	N/A	N/A	N/A

Item Number 1
Page 2 of 2

FOLDER NO. 16B

CREATED BY:
INITIALS: KW
DATE: 1 MAY 2013

PROOFED BY
Initials: KW Date: 10/MAY/13
REVIEWED BY
Initials: JM Date: 5/14/13

Item No. 1

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 1-26)	Created.....	1-May-13	KLW
Data Source: File Folder: 168	Revised.....	10 MAY 13	KLW
Forms: 4, 5, 6	Reviewed...	10 MAY 13	KLW
	Certified...	5/14/13	JM

File Name: J:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT Exposure Water Chem.

Exposure Period Water Chemistry - *Oncorhynchus mykiss*

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-C.. 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 0h.

Data anomalies and deviations
NONE

FOLDER NO. 168

Item Number 2
Page 1 of 2

Study Number: ACH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-26)
Data Source: File Folder: 168
Forms: 4, 5, 6

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf-* CL 14SA (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A1	0	9.51	7.81	12.9	9.57	7.85	12.8	9.71	7.92	12.9	9.72	7.93	12.9	398	180	131
	A2	50	9.42	7.79	12.8	9.51	7.78	12.7	9.64	7.84	12.7	9.65	7.84	12.8	409	182	129
	A5	100	9.37	7.75	12.9	9.50	7.72	12.5	9.64	7.78	12.9	9.67	7.76	12.9	357	178	127
	A3	200	9.20	7.66	12.8	9.47	7.62	12.7	9.68	7.67	12.8	9.63	7.65	12.7	375	176	131
	A4	300	9.24	7.59	12.8	9.56	7.54	12.8	9.71	7.58	12.8	9.62	7.56	12.7	386	176	134
B	B2	0	9.69	7.94	12.7	9.71	7.91	12.7	9.88	7.96	12.7	9.88	7.95	12.7	366	180	175
	B5	50	9.52	7.88	12.8	9.56	7.81	12.8	9.68	7.85	12.9	9.73	7.85	12.8	368	180	126
	B1	100	9.54	7.83	12.7	9.64	7.76	12.6	9.77	7.80	12.9	9.70	7.79	12.9	395	176	130
	B3	200	9.41	7.75	12.7	9.61	7.65	12.8	9.81	7.67	12.8	9.81	7.69	12.7	419	180	131
	B4	300	9.27	7.67	12.8	9.45	7.55	12.8	9.66	7.59	12.9	9.64	7.59	12.9	398	180	131
C	C4	0	9.47	7.94	12.9	9.72	7.94	12.9	9.82	7.97	12.9	9.72	8.00	12.9	386	178	125
	C2	50	9.68	7.93	12.9	9.76	7.89	13.0	9.90	7.91	12.9	9.83	7.93	13.1	360	178	128
	C1	100	9.44	7.87	12.9	9.63	7.82	13.0	9.76	7.84	13.0	9.76	7.87	13.1	377	182	128
	C3	200	9.25	7.73	12.9	9.56	7.67	12.9	9.66	7.69	12.8	9.73	7.70	13.1	376	178	132
	C5	300	9.38	7.68	13.0	9.71	7.61	13.0	9.88	7.63	13.1	9.79	7.64	13.1	389	176	135
Mean			9.43	N/A	12.8	9.60	N/A	12.8	9.75	N/A	12.9	9.73	N/A	12.9	384	179	130
(SD)			(0.14)	N/A	(0.1)	(0.09)	N/A	(0.1)	(0.09)	N/A	(0.1)	(0.07)	N/A	(0.1)	(17)	(2)	(3)
Minimum			9.20	7.59	12.7	9.45	7.54	12.6	9.64	7.58	12.7	9.62	7.56	12.7	357	176	125
Maximum			9.69	7.94	13.0	9.76	7.94	13.0	9.90	7.97	13.1	9.88	8.00	13.1	419	182	135

Item Number 2
Page 2 of 2

CREATED BY:
INITIALS: KW
DATE: 1 MAY 2013

FOLDER NO. 16B

Item No. 2

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED BY
Initials: JA Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 3-5)	Created.....	7-May-13	KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8MAY13	
pH and Temperature Data Source: Form 7 (File Folder 16B)	Reviewed...	8MAY13	
	Certified.....	5/9/13	

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]RBT Ammonia Data

24 h Post-dosing Initiation Ammonia

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 16B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #1 (page 3-5)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 168)

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(6)

Exposure Date: 7/29/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/l)[2]	Mean NH_3 (mg/L)	Std Dev
RBT	0	A	7.93	12.9	0.087	0.0194	0.001688	0.001557	0.000102
		B	7.95	12.7	0.072	0.0200	0.001439		
		C	8.00	12.9	0.068	0.0227	0.001545		
	50	A	7.84	12.8	0.096	0.0157	0.001508	0.001651	0.000158
		B	7.85	12.8	0.098	0.0161	0.001575		
		C	7.93	13.1	0.095	0.0197	0.001871		
	100	A	7.76	12.9	0.130	0.0132	0.001716	0.001952	0.000174
		B	7.79	12.9	0.142	0.0141	0.002006		
		C	7.87	13.1	0.124	0.0172	0.002132		
	200	A	7.65	12.7	0.180	0.0101	0.001822	0.002098	0.000196
		B	7.69	12.7	0.204	0.0111	0.002262		
		C	7.70	13.1	0.189	0.0117	0.002210		
	300	A	7.56	12.7	0.228	0.0082	0.001879	0.002938	0.001216
		B	7.59	12.9	0.256	0.0090	0.002294		
		C	7.64	13.1	0.455	0.0102	0.004640		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_C)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #1 (page 3-5)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 163)

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4659-3-(6)

Exposure Date: 2/25/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
RBT	0	A	7.93	12.9	0.087	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	7.95	12.7	0.072	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	8.00	12.9	0.068	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.84	12.8	0.096	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.85	12.8	0.098	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.93	13.1	0.095	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.76	12.9	0.130	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.79	12.9	0.142	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.87	13.1	0.124	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.65	12.7	0.180	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.69	12.7	0.204	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.70	13.1	0.189	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.56	12.7	0.228	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.59	12.9	0.256	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.64	13.1	0.455	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018 + \left(\frac{2729.92}{(273.15+T_c)}\right)\right) - pH}\right] + 1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

883

FOLDER NO. 16B

Item No. 3

Pg 3 of 3

CREATED BY:

INITIALS: KW

DATE: 7MAY13

PROOFED BY

Initials: KW Date: 8MAY13

REVIEWED F

Initials: JH Date: 5/9/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 1-26)	Created.....	1-May-13	KLW
Data Source: File Folder: 16B, 16C	Revised.....	10/4/13	KLW
Forms: 9, 12, 14	Reviewed...	10/4/13	KLW
	Certified...	5/14/13	JS
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Oncorhynchus mykiss*

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Data Explanation:

Form 12 (File Folder 16B) Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT Temp. Holding Period by Day

Form 14 (File Folder 16B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT Weekly Water Chem.

Form 9 (File Folder 16C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations.

Data Anomalies and Deviations

1) Deviation #5 - Weekly water chemistry not monitored for Week 1

2) Week 3 weekly water chemistry was monitored on March 19, 2012 on holding chamber E8. This chamber no longer contained test organisms (starting March 13, 2012). Therefore, the alkalinity, hardness and conductivity represent the incoming water chemistry of all holding chambers.

Holding Chamber ID	Treatment Group (mg/L)	Date Empty[1]
E2	300	18-Mar-12
E4	200	19-Mar-12
E7	200	20-Mar-12
E8	300	13-Mar-12
E12	100	19-Mar-12
E14	300	15-Mar-12
E15	200	20-Mar-12

[1] No surviving test organisms present

FOI DFR NO. 16B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-76)
Data Source: File Folder: 16B
Forms: 12

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
03/01/12	D0	E11	10.38	E10	10.30	E12	10.38	E15	10.23	E14	10.27
03/02/12	D1	E3	10.52	E1	10.31	E5	10.36	E4	10.41	E8	10.41
03/03/12	D2	E13	10.38	E6	10.36	E9	10.37	E7	10.33	E2	10.35
03/04/12	D3	E11	10.05	E10	10.35	E12	10.45	E15	10.37	E14	10.42
03/05/12	D4	E3	10.12	E1	10.13	E5	10.20	E4	10.31	E8	10.30
03/06/12	D5	E13	10.41	E6	10.27	E9	10.37	E7	10.46	E2	10.46
03/07/12	D6	E11	10.56	E10	10.60	E12	10.58	E15	10.51	E14	10.60
03/08/12	D7	E3	9.94	E1	9.89	E5	9.85	E4	9.93	E8	9.96
03/09/12	D8	E13	10.48	E6	10.48	E9	10.46	E7	10.41	E2	10.38
03/10/12	D9	E11	10.41	E10	10.49	E12	10.45	E15	10.37	E14	10.51
03/11/12	D10	E3	9.95	E1	10.00	E5	10.13	E4	10.13	E8	10.12
03/12/12	D11	E13	10.17	E6	10.24	E9	10.21	E7	10.22	E2	10.18
03/13/12	D12	E11	10.20	E10	10.10	E12	10.18	E15	10.17	E14	10.26
03/14/12	D13	E3	10.11	E1	10.15	E5	10.17	E4	10.27	E8	-
03/15/12	D14	E13	10.02	E6	10.27	E9	10.21	E7	10.19	E2	10.00
03/16/12	D15	E11	9.97	E10	9.99	E12	10.11	E15	10.01	E14	-
03/17/12	D16	E3	10.16	E1	10.17	E5	10.21	E4	10.27	E8	-
03/18/12	D17	E13	10.28	E6	10.28	E9	10.23	E7	10.42	E2	-
03/19/12	D18	E11	9.73	E10	10.04	E12	-	E15	10.20	E14	-
03/20/12	D19	E3	9.99	E1	10.48	E5	10.40	E4	-	E8	-
03/21/12	D20	E13	9.08	E6	9.83	E9	9.92	E7	-	E2	-
03/22/12	D21	E11	10.22	E10	10.29	E12	-	E15	-	E14	-
03/23/12	D22	E3	9.93	E1	10.21	E5	10.35	E4	-	E8	-
Mean			10.13		10.23		10.27		10.27		10.30
(SD)			(0.31)		(0.19)		(0.18)		(0.15)		(0.18)
Minimum			9.08		9.83		9.85		9.93		9.96
Maximum			10.56		10.60		10.58		10.51		10.60
Grand Mean			10.24								
(SD)			(0.06)								

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-76)
Data Source: File Folder: 16B
Forms: 12

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 110000
Test Chemical: *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
03/01/12	D0	E11	8.02	E10	8.03	E12	8.06	E15	8.04	E14	8.04
03/02/12	D1	E3	8.01	E1	8.02	E5	8.02	E4	8.05	E8	8.03
03/03/12	D2	E13	8.00	E6	8.01	E9	8.03	E7	8.00	E2	8.01
03/04/12	D3	E11	8.02	E10	8.02	E12	8.03	E15	8.00	E14	8.02
03/05/12	D4	E3	7.82	E1	7.88	E5	7.89	E4	7.91	E8	7.91
03/06/12	D5	E13	7.93	E6	7.91	E9	7.94	E7	7.94	E2	7.95
03/07/12	D6	E11	8.03	E10	8.04	E12	8.02	E15	7.97	E14	7.99
03/08/12	D7	E3	7.95	E1	7.75	E5	7.79	E4	7.85	E8	7.83
03/09/12	D8	E13	7.93	E6	7.97	E9	7.95	E7	7.95	E2	7.96
03/10/12	D9	E11	7.89	E10	7.95	E12	7.91	E15	7.86	E14	7.92
03/11/12	D10	E3	7.76	E1	7.83	E5	7.87	E4	7.85	E8	7.90
03/12/12	D11	E13	7.73	E6	7.79	E9	7.76	E7	7.75	E2	7.72
03/13/12	D12	E11	7.95	E10	7.93	E12	7.99	E15	7.96	E14	8.01
03/14/12	D13	E3	7.78	E1	7.85	E5	7.88	E4	7.92	E8	-
03/15/12	D14	E13	7.79	E6	7.91	E9	7.87	E7	7.83	E2	7.84
03/16/12	D15	E11	7.91	E10	7.89	E12	7.93	E15	7.92	E14	-
03/17/12	D16	E3	7.83	E1	7.87	E5	7.89	E4	7.94	E8	-
03/18/12	D17	E13	7.88	E6	7.86	E9	7.97	E7	7.93	E2	-
03/19/12	D18	E11	7.64	E10	7.70	E12	-	E15	7.79	E14	-
03/20/12	D19	E3	7.64	E1	7.81	E5	7.80	E4	-	E8	-
03/21/12	D20	E13	7.84	E6	7.88	E9	7.89	E7	-	E2	-
03/22/12	D21	E11	7.81	E10	7.81	E12	-	E15	-	E14	-
03/23/12	D22	E3	7.85	E1	7.92	E5	7.90	E4	-	E8	-
Minimum			7.64		7.70		7.76		7.76		7.72
Maximum			8.03		8.04		8.06		8.05		8.04

22-d Minimum (all treatment groups)	7.64
22-d Maximum (all treatment groups)	8.06

Item Number 4
Page 2 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-26)
Data Source: File Folder: 158
Forms: 12

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 RBT Water Chem.xlsx]RBT Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
03/01/12	D0	E11	12.8	E10	12.9	E12	12.8	E15	12.9	E14	12.8
03/02/12	D1	E3	12.8	E1	13.1	E5	12.9	E4	12.9	E8	12.7
03/03/12	D2	E13	12.5	E6	12.7	E9	12.5	E7	12.3	E2	12.6
03/04/12	D3	E11	12.7	E10	12.6	E12	12.5	E15	12.5	E14	12.5
03/05/12	D4	E3	12.7	E1	12.9	E5	12.7	E4	12.7	E8	12.6
03/06/12	D5	E13	12.6	E6	12.8	E9	12.6	E7	12.4	E2	12.7
03/07/12	D6	E11	13.0	E10	12.9	E12	12.8	E15	12.9	E14	12.8
03/08/12	D7	E3	12.4	E1	12.5	E5	12.5	E4	12.3	E8	12.3
03/09/12	D8	E13	12.1	E6	12.3	E9	12.0	E7	12.1	E2	12.0
03/10/12	D9	E11	12.4	E10	12.3	E12	12.3	E15	12.4	E14	12.2
03/11/12	D10	E3	12.7	E1	12.9	E5	12.7	E4	12.6	E8	12.6
03/12/12	D11	E13	12.8	E6	13.0	E9	12.7	E7	12.8	E2	12.7
03/13/12	D12	E11	12.7	E10	12.6	E12	12.5	E15	12.6	E14	12.6
03/14/12	D13	E3	12.7	E1	12.9	E5	12.8	E4	12.7	E8	-
03/15/12	D14	E13	12.7	E6	12.9	E9	12.7	E7	12.6	E2	12.7
03/16/12	D15	E11	12.8	E10	12.6	E12	12.6	E15	12.7	E14	-
03/17/12	D16	E3	13.2	E1	13.5	E5	13.4	E4	13.2	E8	-
03/18/12	D17	E13	13.0	E6	13.3	E9	13.0	E7	13.0	E2	-
03/19/12	D18	E11	13.5	E10	13.3	E12	-	E15	13.4	E14	-
03/20/12	D19	E3	13.3	E1	13.5	E5	13.2	E4	-	E8	-
03/21/12	D20	E13	13.2	E6	13.3	E9	13.2	E7	-	E2	-
03/22/12	D21	E11	13.4	E10	13.3	E12	-	E15	-	E14	-
03/23/12	D22	E3	13.5	E1	13.6	E5	13.5	E4	-	E8	-
Mean			12.8		12.9		12.8		12.7		12.6
(SD)			(0.4)		(0.4)		(0.3)		(0.3)		(0.2)
Minimum			12.1		12.3		12.0		12.1		12.0
Maximum			13.5		13.6		13.5		13.4		12.8
Grand Mean			12.8								
(SD)			(0.1)								

Item Number 4
Page 4 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-26)
Data Source: File Folder: 16B
Forms: 14

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH 12 PSEUDO 03 RBT Water Chem.xlsx]RBT Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	NA	Rep 1	NA	N/A	N/A	N/A
		Rep 2		N/A	N/A	N/A
		Rep 3		N/A	N/A	N/A
			Mean	N/A	N/A	N/A
			(SD)	N/A	N/A	N/A
2	03/14/12	Rep 1	E10	125	173	373
		Rep 2		125	174	370
		Rep 3		125	174	368
			Mean	125	174	370
			(SD)	(0)	(1)	(3)
3	03/19/12	Rep 1	E8	125	172	402
		Rep 2		126	170	395
		Rep 3		125	170	396
			Mean	125	171	398
			(SD)	1	1	4
			Grand Mean	125	172	384
			(SD)	(0)	(2)	(19)

FOLDER NO. 16B

Item Number 4
Page 5 of 5

CREATED BY:
INITIALS: fmw
DATE: 10 MAY 2013

PROOFED BY
Initials: fmw Date: 10 MAY 13
REVIEWED BY:
Initials: SC Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages 38-49)	Created.....	1-May-13	KLW
Data Source: File Folder: 17B	Revised.....	[illegible]	[illegible]
Forms: 1b, 3c	Reviewed...	[illegible]	[illegible]
	Cert fied...	5/14/13	[illegible]

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT PreExposure Water Chem.

Pre-Exposure Water Chemistry - *Salvelinus fontinalis*

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP); Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 17B

Item Number 1
Page 1 of 3

Study Number: AEH-12-PSEUDO-03
Lab Notebook, pages: 1, 38-49
Data Source: Forms 1b, 1c
File Folder: 17B

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP); Lot #: TR 4689-4-(5)
Exposure Date: 5/2/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT PreExposure Water Chem.

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
	A4	0	7.96	10.10	12.9
	A2	50	7.94	9.95	12.9
A	A3	100	8.00	10.11	12.9
	A5	200	7.92	10.07	12.9
	A1	300	7.98	10.02	12.9
	B5	0	8.03	10.04	12.9
	B3	50	8.05	10.05	12.9
B	B2	100	7.95	9.77	12.9
	B4	200	8.05	10.07	12.8
	B1	300	7.96	9.97	12.9
	C1	0	7.94	9.71	13.1
	C5	50	8.02	9.81	13.2
C	C2	100	8.00	9.81	13.0
	C4	200	7.96	9.66	13.0
	C3	300	7.98	9.78	13.0
		Mean	N/A	9.93	12.9
		(SD)	N/A	(0.15)	(0.10)
		Minimum	7.92	9.66	12.8
		Maximum	8.05	10.11	13.2

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	122	174	365
B	125	172	371
C	125	176	371
Mean	124	174	369
(SD)	(1)	(2)	(3)
Minimum	122	172	365
Maximum	125	176	371

Item Number 1
Page 2 of 2

FOLDER NO. 17B

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 14MAY13
REVIEWED BY
Initials: JM Date: 5/14/13

Study Number: AEH-12-PSEUDO-03		Action	Date	Initials
Lab Notebook #1 (pages 38-49)		Created.....	1-May-13	KLW
Data Source: File Folder: 17B		Revised.....	14MAY13	KLW
Forms: 4, 5, 6		Reviewed...	14MAY13	KLW
		Certified..	5/14/13	JS
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT Exposure Water Chem.				

Exposure Period Water Chemistry - *Salvelinus fontinalis*

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP); Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 17B

Item Number 2
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 178
Forms: 4, 5, 6

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP); Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A4	0	9.77	7.75	13.0	9.93	7.77	12.9	9.93	7.85	13.0	9.62	7.72	12.8	378	174	125
	A2	50	9.66	7.72	13.0	9.88	7.75	13.0	9.84	7.77	13.0	9.43	7.64	12.8	372	172	126
	A3	100	9.74	7.72	12.9	9.81	7.73	12.9	9.76	7.70	13.0	9.33	7.58	12.8	363	174	128
	A5	200	9.78	7.63	12.9	9.93	7.64	12.8	9.86	7.60	13.0	9.43	7.47	12.8	390	182	130
	A1	300	9.77	7.62	12.9	9.84	7.61	12.9	9.86	7.57	13.0	9.45	7.43	12.8	408	182	133
B	B5	0	9.80	7.84	12.9	9.89	7.92	12.9	9.92	7.93	13.0	9.70	7.82	12.9	386	176	174
	B3	50	9.72	7.82	12.9	9.80	7.85	12.9	9.83	7.86	13.0	9.55	7.73	12.8	373	174	127
	B2	100	9.68	7.78	12.9	9.75	7.78	12.9	9.74	7.79	13.0	9.52	7.65	12.8	382	174	127
	B4	200	9.73	7.72	12.8	9.71	7.66	12.9	9.78	7.67	13.0	9.55	7.53	12.7	393	174	130
	B1	300	9.69	7.66	12.9	9.75	7.59	12.9	9.80	7.59	13.0	9.48	7.43	12.8	392	174	133
C	C1	0	9.56	7.86	13.1	9.82	7.94	13.0	9.82	7.96	13.2	9.63	7.86	13.0	377	174	125
	C5	50	9.59	7.87	13.1	9.79	7.90	13.0	9.81	7.91	13.1	9.58	7.79	13.0	375	176	127
	C2	100	9.47	7.80	13.0	9.62	7.81	13.0	9.60	7.81	13.2	9.33	7.69	13.0	378	174	126
	C4	200	9.46	7.73	12.9	9.51	7.68	13.0	9.55	7.68	13.1	9.25	7.54	12.9	390	176	130
	C3	300	9.60	7.68	12.8	9.68	7.63	13.0	9.79	7.64	13.0	9.34	7.48	12.8	398	178	133
	Mean		9.67	N/A	12.9	9.78	N/A	12.9	9.79	N/A	13.0	9.48	N/A	12.8	384	176	128
	(SD)		(0.11)	N/A	(0.1)	(0.11)	N/A	(0.1)	(0.10)	N/A	(0.1)	(0.13)	N/A	(0.1)	(11)	(3)	(3)
	Minimum		9.46	7.62	12.8	9.51	7.59	12.8	9.55	7.57	13.0	9.25	7.43	12.7	363	172	124
	Maximum		9.80	7.87	13.1	9.93	7.94	13.0	9.93	7.96	13.2	9.70	7.86	13.0	408	182	133

Item Number 9
Page 2 of 2

FOLDER NO. 178

CREATED BY:
INITIALS: KW
DATE: 14MAY13

PROOFED BY
Initials: KW Date: 14MAY13
REVIEWED BY
Initials: JM Date: 5/14/13

Study Number: AEH-12-PSEUDO-03 Lab Notebook #1 (page 38-39) TAN Data Source: LTRMP Report (File Folder 15) pH and Temperature Data Source: Form 7 (File Folder 17B)	Action	Date	Initials
	Created.....	7-May-13	KLW
	Revised.....	8MAY13	KLW
	Reviewed...	8MAY13	KLW
	Certified.....	5/9/13	JH
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]BKT Ammonia Data			

24 h Post-dosing Initiation Ammonia

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 17B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #1 (page 38-39)

TAN Data Source: ITRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 17B)

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5)

Exposure Date: 5/2/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
BKT	0	A	7.72	12.8	0.132	0.0120	0.001579	0.001815	0.000187
		B	7.82	12.9	0.121	0.0151	0.001830		
		C	7.86	13.0	0.122	0.0167	0.002036		
	50	A	7.64	12.8	0.143	0.0100	0.001425	0.001657	0.000191
		B	7.73	12.8	0.135	0.0122	0.001652		
		C	7.79	13.0	0.133	0.0142	0.001894		
	100	A	7.58	12.8	0.153	0.0087	0.001330	0.001540	0.000149
		B	7.65	12.8	0.159	0.0102	0.001622		
		C	7.69	13.0	0.147	0.0113	0.001667		
	200	A	7.47	12.8	0.180	0.0068	0.001217	0.001360	0.000106
		B	7.53	12.7	0.181	0.0077	0.001393		
		C	7.54	12.9	0.184	0.0080	0.001471		
	300	A	7.43	12.8	0.207	0.0062	0.001277	0.001347	0.000064
		B	7.43	12.8	0.216	0.0062	0.001333		
		C	7.48	12.8	0.207	0.0069	0.001432		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f - \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 38-99)
TAN Data Source: LTRMP Report (File Folder 15)
pH and Temperature Data Source: Form 7 (File Folder 17B)

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120800
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
BKT	0	A	7.72	12.8	0.132	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	7.82	12.9	0.121	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	7.86	13.0	0.122	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.64	12.8	0.143	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.73	12.8	0.135	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.79	13.0	0.133	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.58	12.8	0.153	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.65	12.8	0.159	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.69	13.0	0.147	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.47	12.8	0.180	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.53	12.7	0.181	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.54	12.9	0.184	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.43	12.8	0.207	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.43	12.8	0.216	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.48	12.8	0.207	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018 + \left(\frac{2729.92}{(273.15+T_c)}\right)\right) - pH}\right] + 1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

FOLDER NO. 17B

Item No. 3

Pg 3 of 3

CREATED BY:
INITIALS: KW
DATE: 7MAY13

PROOFED BY
Initials: KW Date: 8MAY13
REVIEWED BY:
Initials: JA Date: 5/9/13

Study Number: AEH 12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages 36-49)	Created.....	1-May-13	KLW
Data Source: File Folder: 17B, 17C	Revised.....	14MAY13	KLW
Forms: 9, 12, 14	Reviewed...	14MAY13	KLW
	Certified...	5/14/13	JJL
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Salvelinus fontinalis*

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP); Lot #: TR 4669-4-(5)
Exposure Date: 5/3/2012

Data Explanation:

Form 12 (File Folder 17B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AE-I-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT DO Holding Period by Day

pH File Name:
I:\AE-I-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT pH Holding Period by Day

Temperature File Name:
I:\AE-I-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT Temp. Holding Period by Day

Form 14 (File Folder 17B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AE-I-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT Weekly Water Chem.

Form 9 (File Folder 17C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations.

Data Anomalies and Deviations

Holding Chamber ID	Treatment Group (mg/L)	Date Empty[1]
E12	300	21-May-12
E14	300	21-May-12

[1] No surviving test organisms present

FOLDER NO. 17B

Item Number 4
Page 1 of 5

Study Number: AEH-12 PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17B
Forms: 12

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SOP); Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
05/03/12	D0	E13	9.98	E9	10.18	E2	9.97	E10	9.95	E12	10.13
05/04/12	D1	E7	10.12	E3	10.07	E6	10.04	E8	9.94	E14	10.18
05/05/12	D2	E1	9.82	E5	9.85	E11	9.91	E15	10.03	E4	9.80
05/06/12	D3	E13	10.50	E9	10.29	E2	10.08	E10	10.21	E12	10.32
05/07/12	D4	E7	10.14	E3	10.10	E6	10.23	E8	9.96	E14	10.31
05/08/12	D5	E1	9.90	E5	10.10	E11	10.11	E15	10.20	E4	10.07
05/09/12	D6	E13	10.29	E9	10.10	E2	9.85	E10	9.96	E12	10.02
05/10/12	D7	E7	9.67	E3	9.73	E6	9.66	E8	9.77	E14	9.73
05/11/12	D8	E1	9.93	E5	10.15	E11	10.11	E15	10.28	E4	10.10
05/12/12	D9	E13	10.08	E9	9.94	E2	9.68	E10	9.81	E12	9.85
05/13/12	D10	E7	9.93	E3	9.91	E6	9.99	E8	10.23	E14	10.27
05/14/12	D11	F1	9.77	E5	10.02	E11	9.94	E15	10.04	E4	10.00
05/15/12	D12	E13	10.02	E9	10.01	E2	9.74	E10	9.89	E12	10.24
05/16/12	D13	E7	10.50	E3	10.38	E6	10.51	E8	10.64	E14	10.68
05/17/12	D14	E1	10.14	E5	10.44	E11	10.46	E15	10.61	E4	10.51
05/18/12	D15	E13	10.49	E9	10.48	E2	10.24	E10	10.25	E12	10.55
05/19/12	D16	E7	10.47	E3	10.16	E6	10.24	E8	10.47	E14	10.42
05/20/12	D17	E1	10.09	E5	10.35	E11	10.71	E15	10.62	E4	10.49
05/21/12	D18	E13	10.35	E9	10.36	E2	10.09	E10	10.23	E12	-
05/22/12	D19	E7	10.12	E3	10.17	E6	10.27	E8	10.51	E14	-
05/23/12	D20	E1	9.80	E5	9.67	E11	10.04	E15	9.95	E4	9.76
05/24/12	D21	E13	10.04	E9	10.16	E2	9.97	E10	9.99	E12	-
05/25/12	D22	E7	9.96	E3	10.02	E6	10.11	E8	10.21	E14	-
Mean			10.09		10.11		10.08		10.16		10.18
(SD)			(0.24)		(0.21)		(0.25)		(0.26)		(0.27)
Minimum			9.67		9.67		9.66		9.77		9.73
Maximum			10.50		10.48		10.71		10.64		10.68
Grand Mean			10.13								
(SD)			(0.04)								

Item Number 4
Page 2 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17B
Forms: 12

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP); Lot #: TR 4669-4-[5]
Exposure Date: 5/2/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
05/03/12	D0	E13	7.78	E9	7.84	E2	7.80	E10	7.80	E12	7.84
05/04/12	D1	E7	7.90	E3	7.90	E6	7.90	E8	7.90	E14	7.98
05/05/12	D2	E1	7.86	E5	7.95	E11	7.95	E15	8.00	E4	7.91
05/06/12	D3	E13	7.93	E9	7.89	E2	7.86	E10	7.92	E12	7.94
05/07/12	D4	E7	7.79	E3	7.80	E6	7.85	E8	7.82	E14	7.88
05/08/12	D5	E1	7.86	E5	7.95	E11	7.94	E15	7.98	E4	7.91
05/09/12	D6	E13	8.06	E9	8.03	E2	7.96	E10	8.00	E12	8.00
05/10/12	D7	E7	7.82	E3	7.85	E6	7.84	E8	7.88	E14	7.86
05/11/12	D8	E1	7.87	E5	7.95	E11	7.94	E15	7.99	E4	7.90
05/12/12	D9	E13	7.97	E9	7.96	E2	7.87	E10	7.94	E12	7.94
05/13/12	D10	E7	7.73	E3	7.80	E6	7.84	E8	7.99	E14	7.97
05/14/12	D11	E1	7.93	E5	8.00	E11	7.95	E15	7.97	E4	7.98
05/15/12	D12	E13	8.12	E9	8.03	E2	7.95	E10	8.00	E12	8.02
05/16/12	D13	E7	7.79	E3	7.81	E6	7.92	E8	8.00	E14	8.02
05/17/12	D14	E1	7.82	E5	7.84	E11	7.80	E15	7.84	E4	7.89
05/18/12	D15	E13	7.82	E9	7.90	E2	7.76	E10	7.89	E12	7.87
05/19/12	D16	E7	7.87	E3	7.93	E6	7.98	E8	8.02	E14	8.02
05/20/12	D17	E1	7.67	E5	7.81	E11	8.07	E15	7.90	E4	7.75
05/21/12	D18	E13	7.85	E9	7.92	E2	7.79	E10	7.91	E12	-
05/22/12	D19	E7	7.76	E3	7.79	E6	7.89	E8	7.96	E14	-
05/23/12	D20	E1	7.93	E5	7.89	E11	8.01	E15	7.95	E4	7.89
05/24/12	D21	E13	7.88	E9	7.93	E2	7.82	E10	7.86	E12	-
05/25/12	D22	E7	7.93	E3	7.94	E6	7.96	E8	8.04	E14	-
Minimum			7.67		7.79		7.76		7.80		7.75
Maximum			8.12		8.03		8.07		8.04		8.02

22-d Minimum (all treatment groups)	7.67
22-d Maximum (all treatment groups)	8.12

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17B
Forms: 12

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP); Lot #: TR 4659-4-(5)
Exposure Date: 5/2/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
05/03/12	D0	E13	12.7	E9	12.7	E2	12.8	E10	12.8	E12	12.8
05/04/12	D1	E7	12.6	E3	12.6	E6	12.7	E8	12.6	E14	12.5
05/05/12	D2	E1	12.8	E5	12.7	E11	12.6	E15	12.6	E4	12.7
05/06/12	D3	E13	12.7	E9	12.6	E2	12.8	E10	12.8	E12	12.6
05/07/12	D4	E7	12.7	E3	12.8	E6	12.9	E8	12.7	E14	12.7
05/08/12	D5	E1	12.7	E5	12.7	E11	12.7	E15	12.7	E4	12.6
05/09/12	D6	E13	13.0	E9	12.9	E2	13.0	E10	13.0	E12	12.9
05/10/12	D7	E7	13.0	E3	13.1	E6	13.2	E8	13.0	E14	13.0
05/11/12	D8	E1	13.7	E5	13.7	E11	13.1	E15	13.1	E4	13.1
05/12/12	D9	E13	13.0	E9	13.0	E2	13.0	E10	13.1	E12	12.9
05/13/12	D10	E7	12.8	E3	13.0	E6	13.0	E8	12.9	E14	12.7
05/14/12	D11	E1	13.1	E5	13.2	E11	12.9	E15	12.8	E4	13.0
05/15/12	D12	E13	13.1	E9	13.1	E2	13.1	E10	13.2	E12	13.1
05/16/12	D13	E7	12.7	E3	12.8	E6	13.0	E8	12.7	E14	12.8
05/17/12	D14	E1	12.8	E5	12.7	E11	13.0	E15	12.7	E4	12.6
05/18/12	D15	E13	13.1	E9	13.3	E2	13.1	E10	13.9	E12	13.1
05/19/12	D16	E7	13.4	E3	13.6	E6	13.5	E8	13.4	E14	13.5
05/20/12	D17	E1	13.1	E5	13.5	E11	13.4	E15	13.2	E4	13.1
05/21/12	D18	E13	12.8	E9	12.8	E2	12.7	E10	13.3	E12	-
05/22/12	D19	E7	12.8	E3	13.0	E6	13.2	E8	12.8	E14	
05/23/12	D20	E1	12.8	E5	12.9	E11	12.8	E15	12.8	E4	12.7
05/24/12	D21	E13	12.9	E9	12.8	E2	12.8	E10	12.9	E12	-
05/25/12	D22	E7	12.7	E3	12.8	E6	12.9	E8	12.6	E14	-
Mean			12.9		12.9		13.0		12.9		12.9
(SD)			(0.2)		(0.3)		(0.2)		(0.3)		(0.2)
Minimum			12.6		12.6		12.6		12.6		12.5
Maximum			13.4		13.6		13.5		13.9		13.5
Grand Mean			12.9								
(SD)			(0.0)								

Item Number 4
Page 4 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 178
Forms: 14

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP); Lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BKT Water Chem.xlsx]BKT Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	05/07/12	Rep 1	E7	121	174	374
		Rep 2		126	176	372
		Rep 3		125	174	372
			Mean	124	175	373
			(SD)	(3)	(1)	(1)
2	05/16/12	Rep 1	E7	128	176	361
		Rep 2		129	174	360
		Rep 3		129	174	347
			Mean	129	175	356
			(SD)	(1)	(1)	(8)
3	05/22/12	Rep 1	E3	128	174	382
		Rep 2		129	172	370
		Rep 3		127	172	371
			Mean	128	173	374
			(SD)	(1)	(1)	(7)
			Grand Mean	127	174	368
			(SD)	(3)	(1)	(10)

Item Number 4
Page 5 of 5

FOLDER NO. 178

CREATED BY:
INITIALS: KW
DATE: 14MAY13

PROOFED BY
Initials: KW Date: 14MAY13
REVIEWED BY
Initials: JA Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 14-37)	Created.....	1-May-13	KLW
Data Source: File Folder: 18B	Revised.....	9/MAY/13	KLW
Forms: 1b, 1c	Reviewed..	10/MAY/13	KLW
	Certified...	5/14/13	JA
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Sander vitreus*

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens* Pf- CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 9/21/2012

Data Explanation:

Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 18B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 14-37)
Data Source: File Folder: 188
Forms: 1b, 1c

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*- CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
A	A2	0	7.89	8.23	17.3
	A5	50	7.90	8.21	17.4
	A4	100	7.93	8.27	17.3
	A1	200	7.93	8.28	17.3
	A3	300	7.96	8.22	17.3
B	B5	0	7.96	8.26	17.4
	B2	50	7.96	8.32	17.3
	B3	100	7.87	7.70	17.3
	B1	200	7.95	8.28	17.4
	B4	300	7.99	8.50	17.3
C	C3	0	7.97	8.17	17.5
	C5	50	7.96	8.02	17.5
	C4	100	7.96	8.06	17.4
	C2	200	7.98	8.21	17.4
	C1	300	7.98	8.25	17.5
		Mean	N/A	8.21	17.37
		(SD)	N/A	(0.18)	(0.08)
		Minimum	7.87	7.70	17.30
		Maximum	7.99	8.50	17.50

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	124	178	403
B	127	178	395
C	128	176	397
Mean	126	177	398
(SD)	(2)	(1)	(3)
Minimum	124	176	395
Maximum	128	178	403

Item Number 1
Page 2 of 2

FOLDER NO. 183

CREATED BY,
INITIALS: KW
DATE: 10MAY13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED
Initials: JM Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 14-37)	Created.....	1-May-13	KLW
Data Source: File Folder: 18B	Revised.....	6/MAY/13	KLW
Forms: 4, 5, 6	Reviewed ..	10/MAY/13	KLW
	Certified..	5/14/13	JA
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE Exposure Water Chem.			

Exposure Period Water Chemistry - *Sander vitreus*

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 18B

Item Number 2
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 14-37)
Data Source: File Folder: 188
Forms: 4, 5, 6

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*- CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A2	0	8.25	7.86	17.2	8.45	7.83	17.2	8.52	7.80	17.1	8.56	7.89	17.3	403	178	127
	A5	50	8.09	7.82	17.2	8.31	7.77	17.2	8.36	7.71	17.0	8.16	7.77	17.2	395	176	127
	A4	100	8.02	7.78	17.2	8.28	7.71	17.2	8.25	7.65	17.1	8.04	7.72	17.3	406	176	128
	A1	200	7.80	7.68	17.2	8.07	7.59	17.2	8.22	7.54	17.1	7.79	7.63	17.3	419	178	132
	A3	300	7.81	7.64	17.2	8.11	7.54	17.2	8.17	7.49	17.1	8.03	7.61	17.3	417	178	135
B	B5	0	8.09	7.90	17.2	8.50	7.93	17.1	8.51	7.90	17.1	8.51	7.89	17.1	393	176	127
	B2	50	8.11	7.84	17.2	8.35	7.80	17.1	8.33	7.82	17.2	8.09	7.76	17.1	405	176	125
	B3	100	7.47	7.74	17.2	8.04	7.69	17.0	7.95	7.71	17.1	7.65	7.65	17.1	398	178	127
	B1	200	7.79	7.70	17.2	8.32	7.61	17.1	8.19	7.64	17.2	7.59	7.57	17.3	402	180	131
	B4	300	8.27	7.76	17.2	8.55	7.54	17.0	8.41	7.55	17.2	8.15	7.50	17.0	418	176	135
C	C3	0	8.18	7.97	17.3	8.45	7.95	17.3	8.57	7.99	17.4	8.58	7.91	17.3	393	178	126
	C5	50	7.92	7.93	17.3	8.19	7.84	17.4	8.17	7.85	17.4	7.99	7.78	17.4	395	176	126
	C4	100	7.97	7.91	17.4	8.19	7.78	17.3	8.18	7.79	17.4	7.95	7.72	17.4	412	176	128
	C2	200	8.03	7.82	17.3	8.24	7.66	17.3	8.09	7.68	17.4	7.54	7.59	17.4	417	178	130
	C1	300	8.00	7.75	17.3	8.10	7.58	17.3	8.16	7.59	17.4	7.52	7.52	17.5	419	176	131
Mean			7.99	N/A	17.2	8.28	N/A	17.2	8.27	N/A	17.2	8.01	N/A	17.3	406	177	129
(SD)			(0.20)	N/A	(0.1)	(0.16)	N/A	(0.1)	(0.17)	N/A	(0.1)	(0.34)	N/A	(0.1)	(10)	(1)	(3)
Minimum			7.47	7.64	17.2	8.04	7.54	17.0	7.95	7.49	17.0	7.52	7.50	17.0	393	176	125
Maximum			8.27	7.97	17.4	8.55	7.95	17.4	8.57	7.99	17.4	8.58	7.91	17.5	419	180	135

Item Number 2
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FOLDER NO. 188

CREATED BY:
INITIALS: KW
DATE: 1 MAY 13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED BY
Initials: JW Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 23-24)	Created.....	7-May-13	KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8 MAY 13	
pH and Temperature Data Source: Form 7 (File Folder 18B)	Reviewed...	8 MAY 13	
	Certified.....	5/9/13	

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]WAE Ammonia Data

24 h Post-dosing Initiation Ammonia

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 18B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #1 (page 23-24)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 188)

Species: Walleye (*Sander vitreus*) Lot number: 112100

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)

Exposure Date: 3/21/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3 N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
WAE	0	A	7.89	17.3	0.090	0.0246	0.002210	0.001769	0.000333
		B	7.89	17.1	0.058	0.0242	0.001403		
		C	7.91	17.3	0.066	0.0257	0.001695		
	50	A	7.77	17.2	0.107	0.0186	0.001990	0.001866	0.000321
		B	7.76	17.1	0.079	0.0181	0.001426		
		C	7.78	17.4	0.113	0.0193	0.002181		
	100	A	7.72	17.3	0.168	0.0167	0.002811	0.002379	0.000315
		B	7.65	17.1	0.147	0.0141	0.002068		
		C	7.72	17.4	0.134	0.0169	0.002259		
	200	A	7.63	17.3	0.217	0.0136	0.002961	0.002770	0.000189
		B	7.57	17.3	0.211	0.0119	0.002512		
		C	7.59	17.4	0.226	0.0125	0.002836		
	300	A	7.61	17.3	0.300	0.0130	0.003911	0.003151	0.000578
		B	7.50	17.0	0.253	0.0099	0.002512		
		C	7.52	17.5	0.281	0.0108	0.003029		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

906

	A	B	C	D	E	F	G	H	I	J
1	Study Number: AEH-12-PSEUDO-03							Species: Walleye (*Sander vitreus*) Lot number: 112100		
2	Lab Notebook #3 (page 23-24)							Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP)		Chemical lot #: TR 4669-4-(7-8)
3	TAN Data Source: LTRMP Report (File Folder 15)							Exposure Date: 3/21/2012		
4	pH and Temperature Data Source: Form 7 (File Folder 18B)									
5										
6										
7							**24 h Post-dosing Initiation Ammonia**			
8										
9										
10	Species	Treatment Group	Diluter	pH	Temperature	TAN	Un-Ionized	NH_3	Mean NH_3	Std Dev
11		(mg/L)			(°C)	as NH_3-N (mg/L)	Fraction[1]	(mg/L)[2]	(mg/L)	
12	WAE	0	A	7.89	17.3	0.090	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
13			B	7.89	17.1	0.058	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
14			C	7.91	17.3	0.066	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
15		50	A	7.77	17.2	0.107	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
16			B	7.76	17.1	0.079	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
17			C	7.78	17.4	0.113	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
18		100	A	7.72	17.3	0.168	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
19			B	7.65	17.1	0.147	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
20			C	7.72	17.4	0.134	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
21		200	A	7.63	17.3	0.217	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
22			B	7.57	17.3	0.211	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
23			C	7.59	17.4	0.226	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
24		300	A	7.61	17.3	0.300	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
25			B	7.50	17.0	0.253	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
26			C	7.52	17.5	0.281	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		
27										

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

907

FOLDER NO. 18B

Item No. 5

Pg 3 of 3

CREATED BY:

INITIALS: kw

DATE: 7MAY13

PROOFED BY

Initials: kw Date: 8MAY13

REVIEWED BY

Initials: JZ Date: 5/9/13

Study Number: AEH-12-PSEUDO-09	Action	Date	Initials
Lab Notebook #1 (pages: 14-37)	Created.....	1-May-13	KLW
Data Source: File Folder: 18B, 18C	Revised.....	9 MAY 13	KLW
Forms: 9, 12, 14	Reviewed..	10 MAY 13	KLW
	Certified..	5/14/13	JM
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Sander vitreus*

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*- CL 145A (SDP) lot #: IH 4669-4-(7-8)
Exposure Date: 3/21/2013

Data Explanation

Form 12 (File Folder 18B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE Temp. Holding Period by Day

Form 14 (File Folder 18B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE Weekly Water Chem.

Form 9 (File Folder 19C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations. All holding chambers for *Sander vitreus* contained at least 1 test organism throughout the 22-d holding period. Therefore, no water quality measurements were removed from analysis.

Data Anomalies and Deviations

1) Deviation #31 - Weekly water chemistry not monitored for Week 2

FOLDER NO. 18B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 14-37)
Data Source: File Folder: 188
Forms: 12

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemica : *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
03/22/12	D0	F10	9.29	F1	9.25	F9	9.25	F12	9.16	F11	9.27
03/23/12	D1	F14	8.97	F15	9.20	F4	9.20	F7	9.14	F6	9.50
03/24/12	D2	F13	9.16	F8	9.23	F3	8.99	F5	9.15	F2	9.22
03/25/12	D3	F10	8.93	F1	9.08	F9	9.14	F12	9.06	F11	8.97
03/26/12	D4	F14	9.24	F15	9.13	F4	8.98	F7	9.05	F6	9.21
03/27/12	D5	F13	9.07	F8	8.96	F3	8.96	F5	9.14	F2	9.16
03/28/12	D6	F10	8.97	F1	9.10	F9	9.19	F12	8.96	F11	9.08
03/29/12	D7	F14	9.25	F15	9.14	F4	9.24	F7	9.20	F6	9.33
03/30/12	D8	F13	9.10	F8	9.10	F3	9.20	F5	9.18	F2	9.22
03/31/12	D9	F10	9.33	F1	9.38	F9	9.49	F12	9.36	F11	9.45
04/01/12	D10	F14	9.47	F15	9.48	F4	9.39	F7	9.48	F6	9.53
04/02/12	D11	F13	9.33	F8	9.22	F3	9.33	F5	9.41	F2	9.40
04/03/12	D12	F10	9.11	F1	9.30	F9	9.26	F12	9.28	F11	9.25
04/04/12	D13	F14	9.34	F15	9.34	F4	9.30	F7	9.35	F6	9.40
04/05/12	D14	F13	9.23	F8	9.10	F3	9.21	F5	9.31	F2	9.33
04/06/12	D15	F10	9.04	F1	9.26	F9	9.20	F12	9.27	F11	9.22
04/07/12	D16	F14	9.23	F15	9.25	F4	9.01	F7	9.35	F6	9.23
04/08/12	D17	F13	9.06	F8	8.93	F3	9.02	F5	9.14	F2	9.18
04/09/12	D18	F10	8.75	F1	9.18	F9	9.00	F12	9.20	F11	9.13
04/10/12	D19	F14	9.37	F15	9.38	F4	9.12	F7	9.38	F6	9.48
04/11/12	D20	F13	9.35	F8	9.23	F3	9.42	F5	9.39	F2	9.42
04/12/12	D21	F10	9.02	F1	9.25	F9	9.25	F12	9.26	F11	9.23
04/13/12	D22	F14	9.26	F15	9.27	F4	9.05	F7	9.30	F6	9.36
Mean			9.17		9.21		9.18		9.24		9.29
(SD)			(0.17)		(0.13)		(0.15)		(0.13)		(0.14)
Minimum			8.75		8.93		8.96		8.96		8.97
Maximum			9.47		9.48		9.49		9.48		9.53
Grand Mean			9.22								
(SD)			(0.04)								

Item Number 4
Page 2 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 14-37)
Data Source: File Folder: 188
Forms: 12

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf-* CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
03/22/12	D0	F10	8.14	F1	8.11	F9	8.10	F12	8.04	F11	8.12
03/23/12	D1	F14	7.94	F15	8.01	F4	8.03	F7	7.99	F6	8.10
03/24/12	D2	F13	8.07	F8	8.08	F3	8.05	F5	8.07	F2	8.10
03/25/12	D3	F10	8.03	F1	8.08	F9	8.17	F12	7.98	F11	8.05
03/26/12	D4	F14	8.02	F15	7.97	F4	7.96	F7	7.97	F6	8.01
03/27/12	D5	F13	8.09	F8	8.06	F3	8.06	F5	8.11	F2	8.12
03/28/12	D6	F10	8.02	F1	8.05	F9	8.08	F12	8.01	F11	8.03
03/29/12	D7	F14	7.94	F15	7.92	F4	7.97	F7	7.89	F6	7.93
03/30/12	D8	F13	8.02	F8	8.02	F3	8.05	F5	8.02	F2	8.03
03/31/12	D9	F10	7.99	F1	8.01	F9	8.10	F12	7.99	F11	8.00
04/01/12	D10	F14	8.00	F15	8.06	F4	8.03	F7	8.03	F6	8.00
04/02/12	D11	F13	7.96	F8	7.90	F3	7.97	F5	8.03	F2	8.00
04/03/12	D12	F10	7.93	F1	8.08	F9	8.06	F12	8.05	F11	8.03
04/04/12	D13	F14	7.94	F15	7.95	F4	7.97	F7	7.97	F6	7.96
04/05/12	D14	F13	7.98	F8	7.94	F3	8.01	F5	8.05	F2	8.05
04/06/12	D15	F10	7.90	F1	8.04	F9	8.03	F12	8.03	F11	8.00
04/07/12	D16	F14	8.09	F15	8.12	F4	8.03	F7	8.09	F6	8.11
04/08/12	D17	F13	7.98	F8	7.95	F3	7.99	F5	8.02	F2	8.05
04/09/12	D18	F10	7.89	F1	8.02	F9	8.00	F12	8.05	F11	8.03
04/10/12	D19	F14	8.05	F15	8.11	F4	8.02	F7	8.10	F6	8.17
04/11/12	D20	F13	8.14	F8	8.11	F3	8.17	F5	8.20	F2	8.21
04/12/12	D21	F10	7.97	F1	8.09	F9	8.10	F12	8.10	F11	8.05
04/13/12	D22	F14	7.87	F15	7.90	F4	7.93	F7	7.99	F6	8.05
Minimum			7.87		7.90		7.93		7.89		7.93
Maximum			8.14		8.12		8.17		8.20		8.21

22-d Minimum (all treatment groups)	7.87
22-d Maximum (all treatment groups)	8.21

Item Number 4
Page 5 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #: (pages: 14-37)
Data Source: File Folder: 188
Forms: 12

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*- CL 145A (SDP) Lot #: TR 4669-4 (7-8)
Exposure Date: 3/21/2012

File Name: :\AEH-12 PSEUDO 03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
03/22/12	D0	F10	17.1	F1	17.1	F9	17.0	F12	16.9	F11	17.0
03/23/12	D1	F14	16.9	F15	16.9	F4	17.0	F7	16.9	F6	16.9
03/24/12	D2	F13	17.1	F8	17.1	F3	17.1	F5	17.1	F2	17.0
03/25/12	D3	F10	17.0	F1	17.0	F9	16.9	F12	16.9	F11	17.0
03/26/12	D4	F14	16.8	F15	16.9	F4	16.9	F7	16.9	F6	16.9
03/27/12	D5	F13	16.9	F8	17.0	F3	17.0	F5	16.9	F2	17.0
03/28/12	D6	F10	17.0	F1	17.0	F9	16.9	F12	16.9	F11	16.9
03/29/12	D7	F14	17.0	F15	17.0	F4	16.9	F7	16.9	F6	17.0
03/30/12	D8	F13	17.0	F8	17.0	F3	17.1	F5	17.1	F2	17.1
03/31/12	D9	F10	17.2	F1	17.1	F9	17.1	F12	17.1	F11	17.1
04/01/12	D10	F14	17.1	F15	17.1	F4	17.0	F7	17.0	F6	17.1
04/02/12	D11	F13	17.0	F8	17.0	F3	17.0	F5	16.9	F2	17.0
04/03/12	D12	F10	17.0	F1	17.0	F9	17.0	F12	16.9	F11	17.0
04/04/12	D13	F14	17.1	F15	17.1	F4	17.1	F7	17.1	F6	17.2
04/05/12	D14	F13	17.0	F8	17.0	F3	17.1	F5	17.0	F2	17.0
04/06/12	D15	F10	17.1	F1	17.0	F9	17.0	F12	17.0	F11	17.0
04/07/12	D16	F14	17.0	F15	17.1	F4	17.0	F7	17.0	F6	17.0
04/08/12	D17	F13	17.0	F8	17.0	F3	17.0	F5	17.0	F2	17.0
04/09/12	D18	F10	17.0	F1	17.0	F9	17.0	F12	16.9	F11	17.1
04/10/12	D19	F14	16.9	F15	17.0	F4	17.0	F7	17.0	F6	17.0
04/11/12	D20	F13	16.9	F8	16.9	F3	16.9	F5	17.0	F2	16.9
04/12/12	D21	F10	17.1	F1	17.0	F9	17.0	F12	17.0	F11	17.1
04/13/12	D22	F14	16.9	F15	17.0	F4	16.9	F7	16.9	F6	16.9
Mean			17.0		17.0		17.0		17.0		17.0
(SD)			(0.1)		(0.1)		(0.1)		(0.1)		(0.1)
Minimum			16.8		16.9		16.9		16.9		16.9
Maximum			17.2		17.1		17.1		17.1		17.2
Grand Mean			17.0								
(SD)			(0.0)								

Item Number 4
Page 4 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 14-37)
Data Source: File Folder: 18B
Forms: 14

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 WAE Water Chem.xlsx]WAE Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	03/27/12	Rep 1	F9	126	176	374
		Rep 2		127	176	371
		Rep 3		128	176	371
			Mean	127	176	372
			(SD)	(1)	(0)	(2)
2	N/A	Rep 1	N/A	N/A	N/A	N/A
		Rep 2		N/A	N/A	N/A
		Rep 3		N/A	N/A	N/A
			Mean	N/A	N/A	N/A
			(SD)	N/A	N/A	N/A
3	04/10/13	Rep 1	F3	119	172	368
		Rep 2		125	174	373
		Rep 3		125	174	367
			Mean	123	173	369
			(SD)	(3)	(1)	(3)
			Grand Mean	125	175	371
			(SD)	(3)	(2)	(2)

FOLDER NO. 18B

Item Number 4
Page 5 of 5

CREATED BY:
INITIALS: KW
DATE: 4/4/13

PROOFED BY
Initials: KW Date: 4/4/13
REVIEWED BY
Initials: JM Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 1-30)	Created.....	1-May-13	KLW
Data Source: File Folder: 19B	Revised.....		
Forms: 1b, 1c	Reviewed...		
	Certified...		

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEJDO-03 YEP Water Chem.xlsx]YEP PreExposure Water Chem.

Pre-Exposure Water Chemistry - *Perca flavescens*

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 5/7/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 19B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 198
Forms: 1b, 1c

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Lot #: TR 4669-A-(6)
Exposure Date: 3/7/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
	A4	0	7.91	8.96	16.9
	A3	50	7.94	9.03	17.0
A	A2	100	7.90	8.97	17.0
	A5	200	7.91	8.96	17.0
	A1	300	7.91	9.01	17.0
	B3	0	7.96	9.04	16.9
	B1	50	7.95	9.03	16.9
B	B4	100	7.94	9.04	16.9
	B2	200	7.94	8.98	16.9
	B5	300	7.89	8.97	16.9
	C1	0	7.83	8.80	17.1
	C2	50	7.89	8.85	17.1
C	C3	100	7.90	8.96	17.1
	C5	200	7.83	8.67	17.1
	C4	300	7.87	8.90	17.1
		Mean	N/A	8.94	17.0
		(SD)	N/A	(0.10)	(0.1)
		Minimum	7.83	8.67	16.9
		Maximum	7.96	9.04	17.1

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	128	176	383
B	128	176	376
C	129	178	376
Mean	128	177	378
(SD)	(0)	(1)	(3)
Minimum	128	176	376
Maximum	129	178	383

Item Number 1
Page 2 of 2

FOLDER NO. 198

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED BY
Initials: JA Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 1-30)	Created.....	1-May-13	KLW
Data Source: File Folder: 19B	Revised.....	9MAY13	KLW
Forms: 4, 5, 6	Reviewed...	10MAY13	KLW
	Certified...	5/14/13	JAL
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP Exposure Water Chem.			

Exposure Period Water Chemistry - *Perca flavescens*

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens* Pf -CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 3/7/2013

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 19B

Item Number 2
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 198
Forms: 4, 5, 6

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A4	0	8.90	7.75	17.0	8.83	7.82	17.2	9.02	7.82	17.0	8.37	7.82	17.1	384	180	127
	A3	50	8.79	7.69	17.0	8.65	7.71	17.1	8.93	7.73	17.1	8.12	7.73	17.0	387	176	129
	A2	100	8.75	7.67	17.0	8.67	7.65	17.1	8.88	7.68	16.9	8.07	7.66	17.0	396	180	130
	A5	200	8.80	7.61	17.1	8.70	7.54	17.2	8.95	7.59	16.9	8.09	7.56	17.1	388	180	133
	A1	300	8.75	7.56	17.1	8.65	7.46	17.2	8.98	7.52	16.9	8.21	7.47	17.0	390	178	132
B	B3	0	8.85	7.74	17.1	8.87	7.82	17.1	9.04	7.79	17.0	8.35	7.83	16.9	361	180	128
	B1	50	8.82	7.70	17.2	8.76	7.73	17.2	8.90	7.73	17.0	8.02	7.68	17.0	349	180	129
	B4	100	8.80	7.69	17.1	8.78	7.66	17.1	8.91	7.65	17.0	7.94	7.59	16.8	364	178	131
	B2	200	8.76	7.67	17.1	8.73	7.56	17.1	8.80	7.57	17.0	8.11	7.59	16.9	371	178	132
	B5	300	8.77	7.63	17.1	8.81	7.49	17.1	8.91	7.50	17.1	8.23	7.44	16.9	378	176	135
C	C1	0	8.82	7.78	17.2	8.88	7.86	17.3	9.01	7.89	17.2	8.43	7.87	17.2	352	178	127
	C2	50	8.68	7.84	17.2	8.70	7.77	17.3	8.77	7.80	17.2	8.17	7.76	17.2	362	174	129
	C3	100	8.73	7.80	17.3	8.79	7.73	17.3	8.81	7.74	17.1	8.11	7.69	17.1	345	178	128
	C5	200	8.68	7.72	17.3	8.93	7.65	17.3	8.95	7.67	17.2	8.05	7.57	17.2	379	180	132
	C4	300	8.76	7.68	17.2	8.82	7.54	17.2	8.85	7.54	17.2	8.20	7.49	17.2	390	182	134
Mean			8.78	N/A	17.1	8.77	N/A	17.2	8.91	N/A	17.1	8.16	N/A	17.0	373	179	130
(SD)			(0.06)	N/A	(0.1)	(0.08)	N/A	(0.1)	(0.08)	N/A	(0.1)	(0.13)	N/A	(0.1)	(16)	(2)	(2)
Minimum			8.68	7.56	17.0	8.65	7.46	17.1	8.77	7.50	16.9	7.94	7.44	16.8	345	174	127
Maximum			8.90	7.84	17.3	8.93	7.86	17.3	9.04	7.89	17.2	8.43	7.87	17.2	396	182	135

Item Number 2
Page 2 of 2

FOLDER NO. 198

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 1MAY13
REVIEWED BY
Initials: JW Date: 5/4/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 12-13)	Created.....	7-May-13	KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8MAY13	
pH and Temperature Data Source: Form 7 (File Folder 19B)	Reviewed...	8MAY13	
	Certified.....	5/9/13	

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]YEP Ammonia Data

24 h Post-dosing Initiation Ammonia

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 19B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #1 (page 12-13)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 198)

Species: Yellow Perch (*Perco flavescens*) Lot number: 113000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)

Exposure Date: 3/7/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
YEP	0	A	7.82	17.1	0.082	0.0207	0.001695	0.001765	0.000079
		B	7.83	16.9	0.090	0.0208	0.001875		
		C	7.87	17.2	0.074	0.0233	0.001724		
	50	A	7.73	17.0	0.112	0.0167	0.001875	0.001883	0.000071
		B	7.68	17.0	0.132	0.0149	0.001973		
		C	7.76	17.2	0.099	0.0182	0.001800		
	100	A	7.66	17.0	0.142	0.0143	0.002029	0.002057	0.000222
		B	7.59	16.8	0.150	0.0120	0.001801		
		C	7.69	17.1	0.152	0.0154	0.002342		
	200	A	7.56	17.1	0.194	0.0115	0.002224	0.002280	0.000051
		B	7.59	16.9	0.194	0.0121	0.002347		
		C	7.57	17.2	0.192	0.0118	0.002269		
	300	A	7.47	17.0	0.259	0.0093	0.002401	0.002247	0.000154
		B	7.44	16.9	0.237	0.0086	0.002037		
		C	7.49	17.2	0.234	0.0098	0.002304		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}^{-1}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 12-13)
TAN Data Source: LTRMP Report (File Folder 15)
pH and Temperature Data Source: Form 7 (File Folder 19B)

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4659-4-(6)
Exposure Date: 3/7/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
YEP	0	A	7.82	17.1	0.082	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	7.83	16.9	0.090	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	7.87	17.2	0.074	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.73	17.0	0.112	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.68	17.0	0.132	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.75	17.2	0.099	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.66	17.0	0.142	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.59	16.8	0.150	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.69	17.1	0.152	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.56	17.1	0.194	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.59	16.9	0.194	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.57	17.2	0.192	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.47	17.0	0.259	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.44	16.9	0.237	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.49	17.2	0.234	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_c = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

FOLDER NO. 19B

Item No. 3

Pg 3 of 3

CREATED BY:
INITIALS: KW
DATE: 7MAY13

PROOFED BY
Initials: KW Date: 8MAY13
REVIEWED BY
Initials: [illegible] Date: 5/9/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 1-30)	Created.....	1-May-13	KLW
Data Source: File Folder: 19B, 19C	Revised.....	9 MAY 13	PW
Forms: 9, 12, 14	Reviewed...	10 MAY 13	KLW
	Certified...	5/14/13	SAV
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Perca flavescens*

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens* Pf -CL 145A (SDP) Lot #: TR 4569-4-(6)
Exposure Date: 3/7/2012

Data Explanation:

Form 12 (File Folder 19B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP Temp. Holding Period by Day

Form 14 (File Folder 19B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP Weekly Water Chem.

Form 9 (File Folder 19C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations. All holding chambers for *Perca flavescens* contained at least 1 test organism throughout the 22-d holding period. Therefore, no water quality measurements were removed from analysis.

Data Anomalies and Deviations
None

FOLDER NO. 19B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 15B
Forms: 12

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens PJ-CL 145A* (SDP) Lot #: TR 4669-4-16
Exposure Date: 3/7/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
03/08/12	D0	G8	8.84	G1	8.88	G9	8.90	G10	8.89	G6	8.83
03/09/12	D1	G5	9.26	G14	9.26	G2	9.28	G12	9.19	G7	9.12
03/10/12	D2	G4	9.29	G11	9.12	G15	9.25	G3	9.31	G13	9.38
03/11/12	D3	G8	9.06	G1	9.12	G9	9.15	G10	9.18	G6	9.10
03/12/12	D4	G5	9.08	G14	9.04	G2	9.11	G12	9.16	G7	9.14
03/13/12	D5	G4	9.14	G11	8.99	G15	9.06	G3	9.19	G13	9.22
03/14/12	D6	G8	9.11	G1	9.16	G9	9.19	G10	9.20	G6	9.13
03/15/12	D7	G5	9.05	G14	8.98	G2	9.09	G12	9.07	G7	9.07
03/16/12	D8	G4	8.93	G11	8.89	G15	8.94	G3	9.06	G13	9.05
03/17/12	D9	G8	8.97	G1	9.06	G9	8.87	G10	8.97	G6	8.97
03/18/12	D10	G5	9.09	G14	9.05	G2	9.15	G12	8.99	G7	9.05
03/19/12	D11	G4	9.12	G11	8.98	G15	9.08	G3	9.21	G13	9.15
03/20/12	D12	G8	9.14	G1	9.28	G9	9.19	G10	9.30	G6	9.22
03/21/12	D13	G5	9.05	G14	9.05	G2	9.15	G12	9.12	G7	9.13
03/22/12	D14	G4	9 22	G11	9.17	G15	9.14	G3	9.28	G13	9.24
03/23/12	D15	G8	9 10	G1	9.28	G9	9.11	G10	9.19	G6	9.25
03/24/12	D16	G5	9 25	G14	9.16	G2	9.27	G12	9.27	G7	9.26
03/25/12	D17	G4	9 09	G11	9.02	G15	9.03	G3	9.17	G13	9.10
03/26/12	D18	G8	9 14	G1	9.20	G9	9.11	G10	9.12	G6	9.13
03/27/12	D19	G5	9 12	G14	9.13	G2	9.24	G12	9.15	G7	9.17
03/28/12	D20	G4	9 10	G11	9.01	G15	9.00	G3	9.25	G13	9.10
03/29/12	D21	G8	9 27	G1	9.24	G9	9.24	G10	9.26	G6	9.15
03/30/12	D22	G5	9 16	G14	9.17	G2	9.25	G12	9.16	G7	9.31
Mean			9 11		9.10		9.12		9.16		9.14
(SD)			(0 11)		(0.11)		(0.11)		(0.10)		(0.11)
Minimum			8 84		8.88		8.87		8.89		8.83
Maximum			9 29		9.28		9.28		9.31		9.38
Grand Mean			9 13								
(SD)			(0 02)								

Item Number 4
Page 8 of 15

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 19B
Forms: 12

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
03/08/12	D0	G8	7.83	G1	7.86	G9	7.89	G10	7.89	G6	7.85
03/09/12	D1	G5	8.08	G14	8.05	G2	8.09	G12	8.10	G7	7.95
03/10/12	D2	G4	8.16	G11	7.98	G15	8.02	G3	8.10	G13	8.09
03/11/12	D3	G8	8.07	G1	8.11	G9	8.11	G10	8.11	G6	8.04
03/12/12	D4	G5	8.01	G14	7.96	G2	8.00	G12	8.04	G7	7.98
03/13/12	D5	G4	8.02	G11	7.93	G15	8.00	G3	8.06	G13	8.05
03/14/12	D6	G8	8.10	G1	8.14	G9	8.15	G10	8.15	G6	8.11
03/15/12	D7	G5	7.99	G14	7.96	G2	8.00	G12	7.99	G7	8.00
03/16/12	D8	G4	8.06	G11	8.02	G15	8.02	G3	8.08	G13	8.07
03/17/12	D9	G8	8.01	G1	8.08	G9	7.97	G10	8.02	G6	7.99
03/18/12	D10	G5	8.05	G14	8.01	G2	8.06	G12	7.96	G7	7.98
03/19/12	D11	G4	8.06	G11	7.98	G15	8.02	G3	8.12	G13	8.01
03/20/12	D12	G8	7.94	G1	8.03	G9	7.97	G10	7.91	G6	7.96
03/21/12	D13	G5	8.04	G14	8.04	G2	8.09	G12	8.07	G7	8.06
03/22/12	D14	G4	8.00	G11	8.00	G15	7.98	G3	8.05	G13	7.98
03/23/12	D15	G8	7.98	G1	8.04	G9	7.97	G10	8.01	G6	8.01
03/24/12	D16	G5	8.09	G14	8.08	G2	8.12	G12	8.12	G7	8.10
03/25/12	D17	G4	8.06	G11	8.08	G15	8.06	G3	8.17	G13	8.09
03/26/12	D18	G8	8.01	G1	8.07	G9	7.99	G10	8.01	G6	8.01
03/27/12	D19	G5	7.97	G14	8.00	G2	8.08	G12	8.05	G7	8.02
03/28/12	D20	G4	7.99	G11	7.97	G15	7.95	G3	8.06	G13	7.97
03/29/12	D21	G8	7.92	G1	7.94	G9	7.87	G10	7.90	G6	7.89
03/30/12	D22	G5	8.02	G14	7.99	G2	8.08	G12	7.98	G7	8.10
	Minimum		7.83		7.86		7.87		7.89		7.85
	Maximum		8.16		8.14		8.15		8.17		8.11

22-d Minimum (all treatment groups)	7.83
22-d Maximum (all treatment groups)	8.17

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 19B
Forms: 12

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-D. 145A (SDP) Lot #: TR 4560-4-(6)
Exposure Date: 3/7/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
03/08/12	D0	G8	17.0	G1	17.0	G9	17.0	G10	17.0	G6	17.1
03/09/12	D1	G5	17.0	G14	16.8	G2	16.8	G12	16.8	G7	16.8
03/10/12	D2	G4	16.9	G11	17.0	G15	16.9	G3	16.9	G13	16.8
03/11/12	D3	G8	16.9	G1	16.9	G9	16.9	G10	16.8	G6	17.0
03/12/12	D4	G5	16.9	G14	16.9	G2	16.9	G12	16.9	G7	16.9
03/13/12	D5	G4	16.9	G11	17.0	G15	16.9	G3	16.9	G13	16.9
03/14/12	D6	G8	17.0	G1	17.0	G9	16.9	G10	16.9	G6	17.0
03/15/12	D7	G5	17.0	G14	17.0	G2	17.0	G12	16.9	G7	17.0
03/16/12	D8	G4	17.0	G11	17.1	G15	17.0	G3	17.0	G13	17.0
03/17/12	D9	G8	17.1	G1	17.4	G9	17.2	G10	17.1	G6	17.2
03/18/12	D10	G5	17.2	G14	17.1	G2	17.1	G12	17.1	G7	17.1
03/19/12	D11	G4	17.2	G11	17.3	G15	17.1	G3	17.3	G13	17.1
03/20/12	D12	G8	17.1	G1	17.2	G9	17.1	G10	17.1	G6	17.2
03/21/12	D13	G5	17.1	G14	17.0	G2	17.0	G12	17.0	G7	17.0
03/22/12	D14	G4	17.2	G11	17.2	G15	17.1	G3	17.2	G13	17.1
03/23/12	D15	G8	17.1	G1	17.1	G9	17.0	G10	16.9	G6	17.1
03/24/12	D16	G5	17.1	G14	17.1	G2	17.1	G12	17.1	G7	17.1
03/25/12	D17	G4	17.1	G11	17.1	G15	17.0	G3	17.0	G13	16.9
03/26/12	D18	G8	16.9	G1	16.9	G9	16.9	G10	17.0	G6	17.0
03/27/12	D19	G5	16.9	G14	16.9	G2	16.9	G12	16.9	G7	16.9
03/28/12	D20	G4	16.9	G11	17.0	G15	17.0	G3	16.9	G13	16.9
03/29/12	D21	G8	16.9	G1	17.0	G9	17.0	G10	17.0	G6	17.1
03/30/12	D22	G5	17.0	G14	17.0	G2	16.9	G12	17.0	G7	17.0
Mean			17.0		17.0		17.0		17.0		17.0
(SD)			(0.1)		(0.1)		(0.1)		(0.1)		(0.1)
Minimum			16.9		16.8		16.8		16.8		16.8
Maximum			17.2		17.4		17.2		17.3		17.2
Grand Mean			17.0								
(SD)			(0.0)								

Item Number 4
Page 4 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 1-30)
Data Source: File Folder: 19B
Forms: 14

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 YEP Water Chem.xlsx]YEP Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	03/14/12	Rep 1	G11	126	172	388
		Rep 2		125	172	381
		Rep 3		125	172	384
			Mean	125	172	384
			(SD)	(1)	(0)	(4)
2	03/19/12	Rep 1	G7	124	170	394
		Rep 2		125	170	392
		Rep 3		125	170	402
			Mean	125	170	396
			(SD)	(1)	(0)	(5)
3	03/27/12	Rep 1	G3	125	174	372
		Rep 2		127	176	372
		Rep 3		127	176	374
			Mean	126	175	373
			(SD)	1	1	1
			Grand Mean	125	172	384
			(SD)	(1)	(3)	(12)

FOLDER NO. 19B

Item Number 4
Page 5 of 5

CREATED BY.
INITIALS: KW
DATE: 10MAY13

PHOTOCOPIED BY
Initials: KW Date: 10MAY13
REVIEWED BY:
Initials: JH Date: 5/7/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages: 24-34)	Created.....	1-May-13	KLW
Data Source: File Folder: 20B	Revised	9/11/13	KLW
Forms: 1b, 1c	Reviewed...	10/11/13	KLW
	Certified...	5/14/13	JHC
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Acipenser fulvescens*

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 20B

Item Number 1
Page 1 of 2

Study Number: AER-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder. 208
Forms: 1b, 1c

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
	A4	0	8.08	9.05	17.1
	A5	50	8.08	9.07	17.1
A	A1	100	8.04	8.93	17.1
	A2	200	8.07	9.03	17.0
	A3	300	8.10	9.07	17.0
	B5	0	8.10	9.05	16.9
	B3	50	8.08	9.03	17.0
B	B2	100	8.05	8.96	17.0
	B4	200	8.07	8.96	17.0
	B1	300	8.07	9.04	17.0
	C4	0	8.05	8.87	17.1
	C1	50	8.05	8.87	17.2
C	C5	100	7.99	8.63	17.2
	C2	200	7.98	8.55	17.2
	C3	300	8.06	8.86	17.2
		Mean	N/A	8.93	17.1
		[SD]	N/A	[0.15]	[0.1]
		Minimum	7.98	8.55	16.9
		Maximum	8.10	9.07	17.2

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	129	172	371
B	130	170	373
C	131	174	370
Mean	130	172	371
[SD]	(1)	(2)	(1)
Minimum	129	170	370
Maximum	131	174	373

Item Number 1
Page 2 of 2

FOI DER NO. 208

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: LoMAY13 Date: 1oMAY13
REVIEWED BY
Initials: JH Date: 5/14/13

Study Number: AEH-12-PSEUDO-09	Action	Date	Initials
Lab Notebook #2 (pages: 24-34)	Created.....	1-May-13	KLW
Data Source: File Folder: 20B	Revised.....	9MAY13	KLW
Forms: 4, 5, 6	Reviewed...	10MAY13	KLW
	Cert Tied...	5/14/13	JA
File Name: I:\AEH-12-PSEUDO-09\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-09 LST Water Chem.xlsx]LST Exposure Water Chem..			

Exposure Period Water Chemistry - *Acipenser fulvescens*

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P121S4G-02
Exposure Date: 8/1/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 0h.

Data anomalies and deviations
NONE

FOLDER NO. 20B

Item Number 2
Page 1 of 2

Study Number: ACH-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder: 208
Forms: 4, 5, 6

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A4	0	9.09	7.96	17.1	9.07	8.18	16.9	9.12	8.13	17.0	9.23	8.16	16.9	373	174	129
	A5	50	9.05	7.96	17.0	9.05	8.11	17.0	9.04	8.06	17.0	8.94	8.04	17.0	393	176	132
	A1	100	8.65	7.86	17.1	8.76	7.94	17.1	8.71	7.88	17.1	8.48	7.85	17.0	397	174	132
	A2	200	8.61	7.83	17.1	8.56	7.85	17.1	8.47	7.76	17.1	8.42	7.74	17.0	408	176	135
	A3	300	8.60	7.77	17.1	8.70	7.83	17.1	8.61	7.76	17.0	8.59	7.73	17.0	418	174	136
B	B5	0	9.09	8.12	17.0	9.09	8.19	17.0	9.05	8.18	17.0	9.18	8.18	17.1	374	172	130
	B3	50	8.98	8.05	17.0	9.01	8.12	17.0	8.99	8.09	17.1	8.91	8.06	17.0	388	174	132
	B2	100	8.89	7.99	17.0	8.96	8.04	17.0	8.84	7.99	17.1	8.63	7.93	17.1	392	174	133
	B4	200	8.58	7.87	17.0	8.73	7.89	17.0	8.51	7.82	17.1	8.48	7.77	17.1	396	174	135
	B1	300	8.81	7.88	17.0	8.94	7.92	17.0	8.87	7.86	17.1	8.62	7.79	17.1	403	176	136
C	C4	0	8.75	8.06	17.2	8.87	8.14	17.2	8.87	8.15	17.2	8.97	8.16	17.2	389	174	130
	C1	50	8.62	8.00	17.3	8.63	8.02	17.3	8.63	8.01	17.3	8.45	7.95	17.2	396	172	132
	C5	100	8.28	7.91	17.2	8.42	7.91	17.2	8.29	7.89	17.2	8.14	7.83	17.2	394	170	133
	C2	200	8.17	7.88	17.2	8.50	7.89	17.3	8.28	7.85	17.3	7.98	7.77	17.3	398	174	139
	C3	300	8.54	7.87	17.2	8.55	7.82	17.2	8.38	7.78	17.2	8.17	7.69	17.2	415	172	137
Mean			8.71	N/A	17.1	8.79	N/A	17.1	8.71	N/A	17.1	8.61	N/A	17.1	396	174	133
(SD)			(0.27)	N/A	(0.1)	(0.22)	N/A	(0.1)	(0.27)	N/A	(0.1)	(0.36)	N/A	(0.1)	(12)	(2)	(3)
Minimum			8.17	7.77	17.0	8.42	7.82	16.9	8.28	7.76	17.0	7.98	7.69	16.9	373	170	129
Maximum			9.09	8.12	17.3	9.09	8.19	17.3	9.12	8.18	17.3	9.23	8.18	17.3	418	176	139

Item Number 2
Page 2 of 2

FORM NO. 208

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 1MAY13
REVIEWED
Initials: JL Date: 5/14/13

Study Number: AEH-12-PSEUDO-03 Lab Notebook #2 (page 27) TAN Data Source: LTRMP Report (File Folder 15) pH and Temperature Data Source: Form 7 (File Folder 208)	Action	Date	Initials
	Created.....	7-May-13	KLW KLW
	Revised.....	8MAY13	KLW
	Reviewed...	8 MAY 13	KLW
	Certified.....	5/9/13	JM
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]LST Ammonia Data			

24 h Post-dosing Initiation Ammonia

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
NONE

FOLDER NO. 208

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 27)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 20B)

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02

Exposure Date: 8/1/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
LST	0	A	8.16	16.9	0.108	0.0435	0.004699	0.004376	0.000287
		B	8.18	17.1	0.096	0.0461	0.004428		
		C	8.16	17.2	0.090	0.0445	0.004001		
	50	A	8.04	17.0	0.116	0.0336	0.003897	0.003698	0.000413
		B	8.06	17.0	0.116	0.0351	0.004075		
		C	7.95	17.2	0.112	0.0279	0.003123		
	100	A	7.85	17.0	0.138	0.0220	0.003030	0.003288	0.000447
		B	7.93	17.1	0.148	0.0265	0.003918		
		C	7.83	17.2	0.137	0.0213	0.002918		
	200	A	7.74	17.0	0.166	0.0171	0.002843	0.003218	0.000325
		B	7.77	17.1	0.172	0.0185	0.003176		
		C	7.77	17.3	0.194	0.0187	0.003635		
	300	A	7.73	17.0	0.205	0.0167	0.003432	0.003571	0.000121
		B	7.79	17.1	0.193	0.0193	0.003728		
		C	7.69	17.2	0.229	0.0155	0.003554		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

	A	B	C	D	E	F	G	H	I	J
1	Study Number: AEH-12-PSEUDO-03							Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300		
2	Lab Notebook #2 (page 27)							Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P121546-02		
3	TAN Data Source: LTRMP Report (File Folder 15)							Exposure Date: 8/1/2012		
4	pH and Temperature Data Source: Form 7 (File Folder 208)									
5										
6										
7						**24 h Post-dosing Initiation Ammonia**				
8										
9										
10	Species	Treatment Group	Diluter	pH	Temperature	TAN	Un-ionized	NH_3	Mean NH_3	Std Dev
11		(mg/L)			(°C)	as NH_3-N (mg/L)	Fraction[1]	(mg/L)[2]	(mg/L)	
12	LST	0	A	8.16	16.9	0.108	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
13			B	8.18	17.1	0.096	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
14			C	8.16	17.2	0.090	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
15		50	A	8.04	17.0	0.116	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
16			B	8.06	17.0	0.116	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
17			C	7.95	17.2	0.112	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
18		100	A	7.85	17.0	0.138	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
19			B	7.93	17.1	0.148	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
20			C	7.83	17.2	0.137	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
21		200	A	7.74	17.0	0.166	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
22			B	7.77	17.1	0.172	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
23			C	7.77	17.3	0.194	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
24		300	A	7.73	17.0	0.205	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
25			B	7.79	17.1	0.193	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
26			C	7.69	17.2	0.229	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		
27										

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018 + \left(\frac{2729.92}{(273.15+T_c)}\right)\right) - pH}\right] + 1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages: 24-34)	Created.....	1-May-13	KLW
Data Source: File Folder: 208, 20C	Revised.....	9/11/2013	KLW
Forms: 9, 12, 14	Reviewed.....	9/11/2013	KLW
	Certified...	9/11/13	
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - Acipenser fulvescens

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Lot #: 401P.2154G.02
Exposure Date: 8/1/2012

Data Explanation:

Form 12 (File Folder 208): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST Temp. Holding Period by Day

Form 14 (File Folder 208): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST Weekly Water Chem.

Form 9 (File Folder 20C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations.

Data Anomalies and Deviations

Holding Chamber ID	Treatment Group (mg/L)	Date Empty[1]
G1	100	21-Aug-12
G3	300	9-Aug-12
G7	100	19-Aug-12
G9	300	8-Aug-12
G11	100	17-Aug-12
G12	200	11-Aug-12
G14	300	5-Aug-12
G15	200	10-Aug-12

[1] No surviving test organisms present

FOLDER NO. 20B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder: 20B
Forms: 12

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group: Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
08/02/12	D0	G4	8.48	G6	8.32	G7	8.62	G13	8.86	G3	9.14
08/03/12	D1	G8	8.85	G2	8.99	G1	9.05	G15	9.13	G9	9.27
08/04/12	D2	G10	8.90	G5	9.05	G11	8.89	G12	8.95	G14	9.27
08/05/12	D3	G4	8.04	G6	8.29	G7	8.27	G13	8.49	G3	9.02
08/06/12	D4	G8	8.75	G2	9.10	G1	9.15	G15	9.26	G9	9.37
08/07/12	D5	G10	8.88	G5	9.11	G11	8.95	G12	9.04	G14	-
08/08/12	D6	G4	8.25	G6	8.61	G7	8.66	G13	8.74	G3	8.83
08/09/12	D7	G8	8.85	G2	9.44	G1	9.49	G15	9.57	G9	-
08/10/12	D8	G10	7.95	G5	8.87	G11	8.89	G12	9.03	G14	-
08/11/12	D9	G4	8.46	G6	8.96	G7	9.02	G13	9.11	G3	-
08/12/12	D10	G8	8.22	G2	9.04	G1	9.20	G15	-	G9	-
08/13/12	D11	G10	8.38	G5	8.60	G11	8.57	G12	-	G14	-
08/14/12	D12	G4	8.38	G6	9.02	G7	9.07	G13	8.88	G3	-
08/15/12	D13	G8	8.51	G2	8.62	G1	8.77	G15	-	G9	-
08/16/12	D14	G10	9.16	G5	9.43	G11	9.47	G12	-	G14	-
08/17/12	D15	G4	7.88	G6	8.75	G7	8.75	G13	8.55	G3	-
08/18/12	D16	G8	7.25	G2	8.80	G1	9.04	G15	-	G9	-
08/19/12	D17	G10	8.65	G5	9.09	G11	-	G12	-	G14	-
08/20/12	D18	G4	8.02	G6	8.71	G7	-	G13	8.45	G3	-
08/21/12	D19	G8	8.01	G2	8.67	G1	-	G15	-	G9	-
08/22/12	D20	G10	7.79	G5	8.53	G11	-	G12	-	G14	-
08/23/12	D21	G4	8.48	G6	9.01	G7	-	G13	8.87	G3	-
08/24/12	D22	G8	8.76	G2	9.48	G1	-	G15	-	G9	-
Mean			8.39		8.89		8.93		8.92		9.15
(SD)			(0.44)		(0.32)		(0.30)		(0.30)		(0.18)
Minimum			7.25		8.29		8.27		8.45		8.83
Maximum			9.16		9.48		9.49		9.57		9.37
Grand Mean			8.86								
(SD)			(0.25)								

Item Number 4
Page 2 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder: 20B
Forms: 12

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
08/02/12	D0	G4	7.85	G6	7.83	G7	7.87	G13	7.89	G3	7.92
08/03/12	D1	G8	8.02	G2	8.07	G1	8.10	G15	8.08	G9	8.17
08/04/12	D2	G10	8.00	G5	8.08	G11	7.98	G12	7.98	G14	8.11
08/05/12	D3	G4	7.82	G6	7.85	G7	7.86	G13	7.88	G3	7.95
08/06/12	D4	G8	7.92	G2	8.06	G1	8.10	G15	8.07	G9	8.16
08/07/12	D5	G10	7.90	G5	7.97	G11	7.92	G12	7.92	G14	-
08/08/12	D6	G4	7.83	G6	8.00	G7	8.01	G13	8.08	G3	8.10
08/09/12	D7	G8	7.66	G2	7.86	G1	7.96	G15	7.94	G9	-
08/10/12	D8	G10	7.80	G5	7.95	G11	7.90	G12	7.92	G14	-
08/11/12	D9	G4	7.88	G6	8.07	G7	8.06	G13	8.12	G3	-
08/12/12	D10	G8	7.85	G2	8.08	G1	8.14	G15	-	G9	-
08/13/12	D11	G10	8.09	G5	8.12	G11	8.04	G12	-	G14	-
08/14/12	D12	G4	7.96	G6	8.13	G7	8.09	G13	7.98	G3	-
08/15/12	D13	G8	8.12	G2	8.08	G1	8.16	G15	-	G9	-
08/16/12	D14	G10	8.05	G5	8.08	G11	8.03	G12	-	G14	-
08/17/12	D15	G4	7.89	G6	8.12	G7	8.08	G13	7.96	G3	-
08/18/12	D16	G8	7.71	G2	7.94	G1	7.95	G15	-	G9	-
08/19/12	D17	G10	8.03	G5	8.07	G11	-	G12	-	G14	-
08/20/12	D18	G4	7.84	G6	8.11	G7	-	G13	7.97	G3	-
08/21/12	D19	G8	7.95	G2	8.13	G1	-	G15	-	G9	-
08/22/12	D20	G10	7.96	G5	8.09	G11	-	G12	-	G14	-
08/23/12	D21	G4	7.95	G6	8.11	G7	-	G13	8.01	G3	-
08/24/12	D22	G8	7.92	G2	8.16	G1	-	G15	-	G9	-
Minimum			7.66		7.83		7.86		7.88		7.92
Maximum			8.12		8.16		8.16		8.12		8.17

22-d Minimum (all treatment groups)	7.66
22-d Maximum (all treatment groups)	8.17

Item Number 4
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder: 208
Forms: 12

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Lot #: 401P12154G-02
Exposure Date 8/1/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
08/02/12	D0	G4	17.7	G6	17.3	G7	17.3	G13	17.2	G3	17.2
08/03/12	D1	G8	17.2	G2	17.1	G1	17.2	G15	17.2	G9	17.1
08/04/12	D2	G10	17.2	G5	17.1	G11	17.2	G12	17.1	G14	17.1
08/05/12	D3	G4	17.2	G6	17.3	G7	17.2	G13	17.2	G3	17.1
08/06/12	D4	G8	17.2	G2	17.2	G1	17.3	G15	17.2	G9	17.2
08/07/12	D5	G10	17.1	G5	17.1	G11	17.2	G12	17.1	G14	-
08/08/12	D6	G4	17.0	G6	17.2	G7	17.1	G13	17.1	G3	17.0
08/09/12	D7	G8	17.1	G2	17.0	G1	17.1	G15	17.1	G9	-
08/10/12	D8	G10	17.3	G5	17.3	G11	17.3	G12	17.2	G14	-
08/11/12	D9	G4	17.1	G6	17.2	G7	17.1	G13	17.1	G3	-
08/12/12	D10	G8	17.2	G2	17.1	G1	17.2	G15	-	G9	-
08/13/12	D11	G10	17.1	G5	17.1	G11	17.3	G12	-	G14	-
08/14/12	D12	G4	17.1	G6	17.2	G7	17.2	G13	17.2	G3	-
08/15/12	D13	G8	17.1	G2	17.1	G1	17.1	G15	-	G9	-
08/16/12	D14	G10	17.3	G5	17.3	G11	17.3	G12	-	G14	-
08/17/12	D15	G4	17.1	G6	17.2	G7	17.2	G13	17.2	G3	-
08/18/12	D16	G8	17.2	G2	17.1	G1	17.2	G15	-	G9	-
08/19/12	D17	G10	17.1	G5	17.2	G11		G12		G14	-
08/20/12	D18	G4	17.1	G6	17.2	G7	-	G13	17.2	G3	-
08/21/12	D19	G8	17.1	G2	17.0	G1	-	G15	-	G9	-
08/22/12	D20	G10	17.2	G5	17.1	G11	-	G12	-	G14	-
08/23/12	D21	G4	17.1	G6	17.2	G7	-	G13	17.2	G3	-
08/24/12	D22	G8	17.1	G2	17.1	G1	-	G15	-	G9	-
Mean			17.1		17.2		17.2		17.2		17.1
(SD)			(0.1)		(0.1)		(0.1)		(0.0)		(0.1)
Minimum			17.0		17.0		17.1		17.1		17.0
Maximum			17.3		17.3		17.3		17.2		17.2
Grand Mean			17.2								
(SD)			(0.0)								

Item Number 4
Page 4 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages: 24-34)
Data Source: File Folder: 208
Forms: 14

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02
Exposure Date: 8/1/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LST Water Chem.xlsx]LST Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	08/06/12	Rep 1	G8	126	172	365
		Rep 2		128	174	372
		Rep 3		130	174	371
			Mean	128	173	369
			(SD)	(2)	(1)	(4)
2	08/13/12	Rep 1	G13	127	176	346
		Rep 2		128	174	362
		Rep 3		129	176	366
			Mean	128	175	358
			(SD)	(1)	(1)	(11)
3	08/20/12	Rep 1	G6	128	176	385
		Rep 2		126	178	385
		Rep 3		127	180	387
			Mean	127	178	386
			(SD)	(1)	(2)	(1)
			Grand Mean	128	176	371
			(SD)	(1)	(2)	(14)

FOLDER NO. 208

Item Number 4
Page 5 of 5

CREATED BY:
INITIALS: KW
DATE: 13MAY13

PROOFED BY
Initials: KW Date: 13MAY13
REVIEWED
Initials: JL Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)	Created.....	1-May-13	KLW
Data Source: File Folder: 21B	Revised.....	9 MAY 13	
Forms: 1b, 1c	Reviewed...	20 MAY 13	
	Certified...	5/24/13	
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Micropterus salmoides*

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOI DLR NO. 21B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 218
Forms: 1b, 1c

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
	A3	0	7.97	7.98	21.2
	A5	50	8.00	7.99	21.1
A	A4	100	8.05	8.04	21.1
	A1	200	8.07	8.03	21.2
	A2	300	8.06	8.02	21.3
	B3	0	8.00	7.85	21.3
	B1	50	7.99	7.91	21.1
B	B2	100	7.97	7.88	21.3
	B5	200	7.98	7.92	21.3
	B4	300	8.02	7.95	21.3
	C4	0	8.02	7.89	21.3
	C2	50	8.08	7.98	21.2
C	C3	100	8.06	7.90	21.3
	C5	200	8.01	7.81	21.4
	C1	300	8.00	7.87	21.4
		Mean	N/A	7.93	21.3
		(SD)	N/A	(0.07)	(0.1)
		Minimum	7.97	7.81	21.1
		Maximum	8.08	8.04	21.4

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	129	174	362
B	128	172	362
C	130	176	362
Mean	129	174	362
(SD)	(1)	(2)	(0)
Minimum	128	172	362
Maximum	130	176	362

Item Number 1
Page 2 of 2

FOLDER NO. 218

CREATED BY:
INITIALS: KMW
DATE: 1 MAY 2013

PROOFED BY
Initials: KMW Date: 10 MAY 13
REVIEWE
Initials: JH Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)	Created.....	1-May-13	KLW
Data Source: File Folder: 21B	Revised.....	3/MAY/13	KLW
Forms: 4, 5, 6	Reviewed...	10/MAY/13	KLW
	Certified...	5/14/13	JAC
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LVB Water Chem.xlsx]LMB Exposure Water Chem.			

Exposure Period Water Chemistry - *Micropterus salmoides*

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 21B

Item Number 2
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 218
Forms: 4, 5, 6

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A3	0	8.01	8.04	21.9	8.12	8.19	21.9	8.01	8.01	21.9	8.05	7.89	22.0	364	170	128
	A5	50	8.07	8.02	21.8	8.13	8.12	21.7	7.95	7.93	21.8	7.47	7.76	21.8	367	176	132
	A4	100	8.09	8.02	21.9	8.13	8.09	21.9	7.93	7.89	21.9	6.75	7.62	22.0	367	172	132
	A1	200	7.89	7.88	22.0	8.12	7.99	22.0	7.93	7.80	22.0	6.88	7.57	22.0	382	172	131
	A2	300	8.02	7.91	22.0	8.00	7.92	22.0	7.74	7.73	22.0	6.75	7.43	22.0	387	172	136
B	B3	0	7.83	8.01	22.0	7.99	8.04	21.9	7.98	8.05	21.9	7.84	7.97	21.9	358	170	129
	B1	50	7.91	7.98	21.8	8.00	7.97	21.7	7.74	7.92	21.7	6.79	7.71	21.8	366	174	131
	B2	100	7.82	7.90	21.9	7.88	7.87	21.8	7.57	7.80	21.9	6.70	7.61	21.9	376	170	133
	B5	200	7.89	7.87	21.9	7.88	7.77	21.8	7.47	7.70	21.9	6.49	7.45	21.9	373	172	135
	B4	300	7.85	7.81	22.0	7.87	7.77	21.8	7.37	7.65	21.9	6.46	7.39	21.9	369	170	139
C	C4	0	7.78	8.01	22.0	7.93	8.03	22.0	7.95	8.07	21.9	7.88	7.99	22.0	367	174	130
	C2	50	7.81	8.01	22.0	7.88	7.96	21.8	7.62	7.93	21.7	6.83	7.73	21.9	369	170	131
	C3	100	7.86	7.97	22.0	7.97	7.95	21.8	7.68	7.91	21.8	6.59	7.66	21.8	370	172	132
	C5	200	7.70	7.84	21.9	7.81	7.77	21.7	7.38	7.73	21.7	6.02	7.42	21.7	385	174	134
	C1	300	7.64	7.79	22.0	7.50	7.64	21.9	7.01	7.59	21.8	6.52	7.36	22.0	387	172	136
Mean			7.88	N/A	21.9	7.95	N/A	21.8	7.69	N/A	21.9	6.94	N/A	21.9	372	172	133
(SD)			(0.12)	N/A	(0.1)	(0.16)	N/A	(0.1)	(0.28)	N/A	(0.1)	(0.58)	N/A	(0.1)	(9)	(2)	(3)
Minimum			7.64	7.79	21.8	7.50	7.64	21.7	7.01	7.59	21.7	6.02	7.36	21.7	358	170	128
Maximum			8.09	8.04	22.0	8.13	8.19	22.0	8.01	8.07	22.0	8.06	7.99	22.0	387	176	139

Item Number 9
Page 2 of 2

FOLDER NO. 218

CREATED BY:
INITIALS: KW
DATE: 1 MAY 13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED
Initials: JAL : 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (page 1-2)	Created.....	7-May-13	KLW KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8MAY13	KLW
pH and Temperature Data Source: Form 7 (File Folder 21B)	Reviewed...	8MAY13	KLW
	Certified.....	5/9/13	JA
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]LMB Ammonia Data			

24 h Post-dosing Initiation Ammonia

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 21B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 1-2)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 21B)

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2

Exposure Date: 6/12/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
LMB	0	A	7.89	22.0	0.096	0.0343	0.003294	0.003004	0.000209
		B	7.97	21.9	0.069	0.0407	0.002807		
		C	7.99	22.0	0.068	0.0428	0.002911		
	50	A	7.76	21.8	0.107	0.0253	0.002707	0.002515	0.000214
		B	7.71	21.8	0.098	0.0226	0.002216		
		C	7.73	21.9	0.110	0.0238	0.002620		
	100	A	7.62	22.0	0.144	0.0187	0.002696	0.002417	0.000250
		B	7.61	21.9	0.115	0.0182	0.002090		
		C	7.66	21.8	0.122	0.0202	0.002465		
	200	A	7.57	22.0	0.158	0.0167	0.002642	0.002267	0.000295
		B	7.45	21.9	0.177	0.0126	0.002238		
		C	7.42	21.7	0.165	0.0116	0.001921		
	300	A	7.43	22.0	0.223	0.0122	0.002714	0.002406	0.000281
		B	7.39	21.9	0.224	0.0110	0.002471		
		C	7.36	22.0	0.196	0.0104	0.002034		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15+T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (page 1-2)
TAN Data Source: LTRMP Report (File Folder 15)
pH and Temperature Data Source: Form 7 (File Folder 21B)

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4569-4-(5) #2
Exposure Date: 6/12/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
LMB	0	A	7.89	22.0	0.096	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	7.97	21.9	0.059	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	7.99	22.0	0.068	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.76	21.8	0.107	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.71	21.8	0.098	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.73	21.9	0.110	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.62	22.0	0.144	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.61	21.9	0.115	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.66	21.8	0.122	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.57	22.0	0.158	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.45	21.9	0.177	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.42	21.7	0.165	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.43	22.0	0.223	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.39	21.9	0.224	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.36	22.0	0.196	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018 + \left(\frac{2729.92}{(273.15+T_c)}\right)\right) - pH}\right] + 1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

FOLDER NO. 21B

Item No. 3

CREATED BY:
INITIALS: KW
DATE: 7MAY13

PROOFED BY
Initials: KW Date: 8MAY13
REVIEWED
Initials: JAL Date: 5/9/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)	Created.....	1-May-13	KLW
Data Source: File Folder: 21B, 21C	Revised.....	5/14/13	KLW
Forms: 9, 12, 14	Reviewed...	5/14/13	
	Certified...	5/14/13	
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Micropterus salmoides*

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDF) Lot #: TR 4669-4-(S) #2
Exposure Date: 6/12/2012

Data Explanation:
Form 12 (File Folder 21B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB Temp. Holding Period by Day

Form 14 (File Folder 21B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB Weekly Water Chem.

Form 9 (File Folder 21C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations. All holding chambers for *Micropterus salmoides* contained at least 1 test organism throughout the 22-d holding period. Therefore, no water quality measurements were removed from analysis.

Data Anomalies and Deviations
NONE

FOLDER NO. 21B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 218
Forms: 12

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
06/13/12	D0	E12	8.37	E10	8.31	E6	8.26	E11	8.38	E7	8.46
06/14/12	D1	E14	8.05	E15	8.13	E13	8.08	E3	8.15	E5	8.14
06/15/12	D2	E8	8.55	E4	8.51	E1	8.60	E2	8.60	E9	8.58
06/16/12	D3	E12	8.17	E10	8.11	E6	8.15	E11	8.24	E7	8.21
06/17/12	D4	E14	8.18	E15	8.17	E13	8.12	E3	8.22	E5	8.32
06/18/12	D5	E8	8.22	E4	8.20	E1	8.28	E2	8.31	E9	8.32
06/19/12	D6	E12	7.86	E10	7.92	E6	7.82	E11	7.98	E7	7.95
06/20/12	D7	E14	8.36	E15	8.54	E13	8.46	E3	8.47	E5	8.57
06/21/12	D8	E8	8.07	E4	8.06	E1	8.10	E2	8.23	E9	8.19
06/22/12	D9	E12	8.24	E10	8.20	E6	8.31	E11	8.32	E7	8.23
06/23/12	D10	E14	7.95	E15	8.03	E13	8.02	E3	8.02	E5	7.97
06/24/12	D11	E8	8.12	E4	8.08	E1	8.11	E2	8.12	E9	8.19
06/25/12	D12	E12	8.28	E10	8.20	E6	8.29	E11	8.36	E7	8.25
06/26/12	D13	E14	8.29	E15	8.35	E13	8.39	E3	8.36	E5	8.41
06/27/12	D14	E8	7.97	E4	8.08	E1	7.98	E2	8.07	E9	8.10
06/28/12	D15	E12	8.14	E10	8.14	E6	8.16	E11	8.25	E7	8.15
06/29/12	D16	E14	8.03	E15	8.13	E13	8.17	E3	8.15	E5	8.25
06/30/12	D17	E8	8.08	E4	7.95	E1	8.01	E2	8.10	E9	8.12
07/01/12	D18	E12	8.00	E10	7.99	E6	8.00	E11	8.10	E7	8.09
07/02/12	D19	E14	7.97	E15	8.03	E13	8.02	E3	8.05	E5	8.11
07/03/12	D20	E8	8.19	E4	8.09	E1	8.29	E2	8.27	E9	8.31
07/04/12	D21	E12	8.12	E10	8.07	E6	8.12	E11	8.22	E7	8.21
07/05/12	D22	E14	8.00	E15	8.22	E13	8.19	E3	8.19	E5	8.28
Mean			8.14		8.15		8.17		8.22		8.24
(SD)			(0.16)		(0.15)		(0.17)		(0.15)		(0.16)
Minimum			7.86		7.92		7.82		7.98		7.95
Maximum			8.55		8.54		8.60		8.60		8.58
Grand Mean			8.18								
(SD)			(0.04)								

Item Number 4
Page 8 of 13

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 21B
Forms: 12

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
06/13/12	D0	E12	8.07	E10	8.02	E6	7.98	E11	8.06	E7	8.10
06/14/12	D1	E14	8.06	E15	8.16	E13	8.16	E3	8.23	E5	8.19
06/15/12	D2	E8	8.16	E4	8.09	E1	8.13	E2	8.18	E9	8.16
06/16/12	D3	E12	8.18	E10	8.17	E6	8.12	E11	8.22	E7	8.18
06/17/12	D4	E14	8.16	E15	8.16	E13	8.20	E3	8.24	E5	8.20
06/18/12	D5	E8	8.24	E4	8.20	E1	8.25	F2	8.29	E9	8.30
06/19/12	D6	E12	8.08	E10	8.11	E6	8.10	E11	8.12	E7	8.11
06/20/12	D7	E14	8.14	E15	8.27	E13	8.25	E3	8.21	E5	8.25
06/21/12	D8	E8	8.10	E4	8.07	F1	8.06	E2	8.17	E9	8.14
06/22/12	D9	E12	8.20	E10	8.22	E6	8.27	E11	8.26	E7	8.16
06/23/12	D10	E14	8.17	E15	8.22	E13	8.21	E3	8.20	E5	8.13
06/24/12	D11	E8	8.19	E4	8.16	E1	8.14	E2	8.19	E9	8.22
06/25/12	D12	E12	8.21	E10	8.24	E6	8.30	E11	8.28	E7	8.18
06/26/12	D13	E14	8.16	E15	8.22	E13	8.26	E3	8.26	E5	8.24
06/27/12	D14	E8	8.19	E4	8.24	E1	8.08	E2	8.21	E9	8.25
06/28/12	D15	E12	8.01	E10	8.15	E6	8.14	E11	8.19	E7	8.12
06/29/12	D16	E14	8.06	E15	8.17	E13	8.23	E3	8.16	E5	8.26
06/30/12	D17	E8	8.22	E4	8.18	E1	8.14	E2	8.21	E9	8.23
07/01/12	D18	E12	8.12	E10	8.14	E6	8.11	E11	8.16	E7	8.14
07/02/12	D19	E14	8.03	E15	8.14	E13	8.17	E3	8.14	E5	8.24
07/03/12	D20	E8	8.22	E4	8.10	E1	8.24	E2	8.23	E9	8.28
07/04/12	D21	E12	8.18	E10	8.18	F6	8.19	E11	8.30	E7	8.27
07/05/12	D22	E14	8.21	E15	8.32	E13	8.26	E3	8.28	E5	8.30
	Minimum		8.01		8.02		7.98		8.06		8.10
	Maximum		8.24		8.32		8.30		8.30		8.30

22-d Minimum (all treatment groups)	7.98
22-d Maximum (all treatment groups)	8.32

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 21B
Forms: 12

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 124000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (50P) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

File Name: E:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
06/13/12	D0	E12	21.5	E10	21.6	E6	21.6	E11	21.5	E7	21.6
06/14/12	D1	E14	21.9	E15	21.8	E13	22.0	E3	21.8	E5	21.9
06/15/12	D2	E8	21.8	E4	22.1	E1	21.7	E2	21.9	E9	21.9
06/16/12	D3	E12	21.7	E10	22.0	E6	21.9	E11	21.8	E7	21.9
06/17/12	D4	E14	21.9	E15	21.7	E13	22.0	E3	21.7	E5	21.7
06/18/12	D5	E8	21.9	E4	21.9	E1	21.6	E2	21.8	E9	21.8
06/19/12	D6	E12	21.9	E10	22.0	E6	21.9	E11	21.9	E7	22.1
06/20/12	D7	E14	22.1	E15	21.9	E13	22.1	E3	22.2	E5	21.8
06/21/12	D8	E8	22.2	E4	22.1	E1	22.0	E2	21.9	E9	22.1
06/22/12	D9	E12	21.8	E10	22.0	E6	21.8	E11	21.7	E7	22.0
06/23/12	D10	E14	21.8	E15	21.9	E13	21.9	E3	21.9	E5	22.1
06/24/12	D11	E8	22.0	E4	22.0	E1	21.9	E2	22.0	E9	21.9
06/25/12	D12	E12	21.7	E10	22.0	E6	21.7	E11	21.6	E7	22.0
06/26/12	D13	E14	22.0	E15	22.0	E13	22.0	E3	21.9	E5	22.0
06/27/12	D14	E8	21.9	E4	21.8	E1	22.0	E2	22.0	E9	21.9
06/28/12	D15	E12	22.0	E10	22.2	E6	21.8	E11	21.9	E7	22.1
06/29/12	D16	E14	22.0	F15	22.0	E13	22.0	E3	21.9	E5	21.9
06/30/12	D17	E8	21.8	E4	22.1	E1	22.0	E2	22.0	E9	22.1
07/01/12	D18	E12	22.1	E10	22.1	E6	22.1	E11	22.1	E7	22.1
07/02/12	D19	E14	22.1	E15	21.9	E13	22.1	E3	21.8	E5	21.7
07/03/12	D20	E8	22.0	E4	22.1	E1	21.8	E2	21.9	E9	22.0
07/04/12	D21	E12	22.0	E10	22.0	E6	21.8	E11	21.8	E7	22.0
07/05/12	D22	E14	22.0	E15	21.8	E13	22.0	E3	22.0	E5	21.7
Mean			21.9		22.0		21.9		21.9		21.9
(SD)			(0.2)		(0.1)		(0.1)		(0.2)		(0.1)
Minimum			21.5		21.6		21.6		21.5		21.6
Maximum			22.2		22.2		22.1		22.2		22.1
Grand Mean			21.9								
(SD)			(0.0)								

Item Number 4
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages: 49-50) and Lab Notebook #2 (pages: 1-14)
Data Source: File Folder: 21B
Forms: 14

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 LMB Water Chem.xlsx]LMB Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	06/18/12	Rep 1	E1	130	176	365
		Rep 2		131	178	345
		Rep 3		131	180	360
			Mean	131	178	357
			(SD)	(1)	(2)	(10)
2	06/25/12	Rep 1	E9	129	176	378
		Rep 2		130	172	378
		Rep 3		131	174	382
			Mean	130	174	378
			(SD)	(1)	(2)	(5)
3	07/02/12	Rep 1	E12	133	168	360
		Rep 2		132	170	352
		Rep 3		130	174	362
			Mean	132	171	358
			(SD)	2	3	5
			Grand Mean	131	174	364
			(SD)	(1)	(4)	(12)

FOLDER NO. 21B
Item Number 4
Page 5 of 5

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED
Initials: JKL Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)	Created.....	1-May-13	KLW
Data Source: File Folder: 22B	Revised.....	10 MAY 13	KLW
Forms: 1b, 1c	Reviewed...	10 MAY 13	KLW
	Certified...	5/10/13	JHC
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Micropterus dolomieu*

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Data Explanation:

Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations

NONE

FOLDER NO. 22B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)
Data Source: File Folder: 22B
Forms: 1b, 1c

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
A	A2	0	8.05	8.22	22.0
	A3	50	8.01	8.02	22.0
	A1	100	8.02	8.18	21.9
	A4	200	8.02	8.05	22.0
	A5	300	8.03	8.18	21.9
B	B1	0	8.04	8.04	21.9
	B5	50	8.03	8.11	21.9
	B3	100	7.97	7.69	21.9
	B2	200	8.04	8.09	21.9
	B4	300	8.03	8.13	21.9
C	C1	0	8.03	8.06	22.1
	C3	50	8.00	8.06	22.0
	C2	100	8.01	8.02	22.0
	C5	200	8.01	8.00	22.2
	C4	300	8.01	8.10	22.2
		Mean	N/A	8.06	22.0
		(SD)	N/A	(0.12)	(0.1)
		Minimum	7.97	7.69	21.9
		Maximum	8.05	8.22	22.2

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	130	172	364
B	130	174	369
C	131	172	366
Mean	130	173	366
(SD)	(0)	(1)	(2)
Minimum	130	172	364
Maximum	131	174	369

Item Number 1
Page 2 of 2

FOLDER NO. 22B

CREATED BY:
INITIALS: KW
DATE: 10 MAY 13

PROOFED BY
Initials: EW Date: 10 MAY 13
REVIEWED BY
Initials: SM Date: 5/14/13

Study Number: AEH-12 PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)	Created.....	1-May-13	KLW
Data Source: File Folder: 22B	Revised.....		
Forms: 4, 5, 6	Reviewed...		
	Certified...		

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB Exposure Water Chem.

Exposure Period Water Chemistry - *Micropterus dolomieu*

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 22B

Item Number 2
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)
Data Source: File Folder: 22B
Forms: 4, 5, 6

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A2	0	8.18	8.11	22.0	8.22	8.08	21.9	8.28	8.08	21.9	8.04	7.96	21.9	369	174	129
	A3	50	8.15	8.10	22.1	8.09	7.97	22.0	8.00	7.94	22.0	7.10	7.72	22.0	370	174	133
	A1	100	8.14	8.04	22.0	8.00	7.91	22.0	7.80	7.88	21.9	6.62	7.58	22.0	371	174	139
	A4	200	8.13	7.99	22.0	7.89	7.80	22.0	7.35	7.73	21.9	6.01	7.37	22.0	376	172	136
	A5	300	8.18	7.95	21.9	7.73	7.68	21.9	7.21	7.62	21.8	6.17	7.32	21.9	384	174	140
B	B1	0	8.21	8.15	21.9	8.26	8.14	21.8	8.28	8.08	21.9	8.07	8.03	21.8	366	170	129
	B5	50	8.14	8.12	22.0	8.05	8.01	22.0	7.88	7.91	22.0	7.22	7.78	21.9	371	174	130
	B3	100	8.18	8.08	22.0	7.94	7.88	21.9	7.65	7.83	22.0	6.35	7.55	21.9	372	172	131
	B2	200	8.14	7.95	22.0	7.90	7.82	21.9	7.31	7.71	22.0	6.11	7.39	21.9	379	172	135
	B4	300	8.05	7.88	22.1	7.77	7.73	21.9	7.07	7.62	22.1	5.82	7.26	22.0	380	174	138
C	C1	0	8.14	8.14	22.2	8.17	8.14	22.0	8.27	8.14	22.0	8.01	8.07	22.0	360	172	128
	C3	50	8.02	8.09	22.1	7.86	7.99	22.0	7.64	7.93	22.0	6.74	7.72	22.0	366	172	131
	C2	100	7.97	8.05	22.0	7.81	7.95	21.9	7.43	7.88	22.0	6.26	7.61	21.9	370	172	133
	C5	200	8.30	8.07	21.9	7.29	7.74	21.8	7.36	7.60	21.7	4.57	7.21	21.4	380	172	135
	C4	300	8.17	7.95	22.0	7.78	7.71	22.0	6.09	7.69	22.1	6.61	7.44	21.9	390	174	137
Mean			8.14	N/A	22.0	7.92	N/A	21.9	7.57	N/A	22.0	6.65	N/A	21.9	374	173	134
(SD)			(0.08)	N/A	(0.1)	(0.23)	N/A	(0.1)	(0.55)	N/A	(0.1)	(0.91)	N/A	(0.1)	(8)	(1)	(4)
Minimum			7.97	7.88	21.9	7.29	7.68	21.8	6.09	7.60	21.7	4.57	7.21	21.4	360	170	128
Maximum			8.30	8.15	22.2	8.28	8.14	22.0	8.28	8.14	22.1	8.07	8.07	22.0	390	174	140

Item Number 2
Page 2 of 2

FOLDER NO. 22B

CREATED BY
INITIALS: EW
DATE: 1MAY13

PROOFED BY
Initials: EW Date: 10MAY13
REVIEWED BY
Initials: JLC Date: 5/14/13

Study Number: AEH-12-PSEUDO-03 Lab Notebook #2 (page 7-8) TAN Data Source: LTRMP Report (File Folder 15) pH and Temperature Data Source: Form 7 (File Folder 22B)	Action	Date	Initials
	Created.....	7-May-13	KLW KW
	Revised.....	8MAY13	KW
	Reviewed...	8MAY13	KW
	Certified.....	5/9/13	JH —
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]SMB Ammonia Data			

24 h Post-dosing Initiation Ammonia

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
1) Water samples were collected and acidified at 6 and 12h from each treatment group replicate, but these samples were not analyzed.

FOLDER NO. 22B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 7-8)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 228)

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3

Exposure Date: 6/20/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
SMB	0	A	7.96	21.9	0.069	0.0398	0.002746	0.003309	0.000790
		B	8.03	21.8	0.096	0.0461	0.004426		
		C	8.07	22.0	0.054	0.0510	0.002756		
	50	A	7.72	22.0	0.131	0.0235	0.003073	0.003068	0.000044
		B	7.78	21.9	0.113	0.0266	0.003011		
		C	7.72	22.0	0.133	0.0235	0.003120		
	100	A	7.58	22.0	0.147	0.0171	0.002514	0.002685	0.000235
		B	7.55	21.9	0.159	0.0159	0.002523		
		C	7.61	21.9	0.166	0.0182	0.003017		
	200	A	7.37	22.0	0.185	0.0106	0.001964	0.002018	0.000198
		B	7.39	21.9	0.207	0.0110	0.002283		
		C	7.21	21.4	0.256	0.0071	0.001807		
	300	A	7.32	21.9	0.197	0.0094	0.001853	0.002076	0.000490
		B	7.26	22.0	0.196	0.0083	0.001619		
		C	7.44	21.9	0.223	0.0124	0.002756		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

954

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (page 7-8)
TAN Data Source: LTRMP Report (File Folder 15)
pH and Temperature Data Source: Form 7 (File Folder 22B)

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
SMB	0	A	7.96	21.9	0.069	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	8.03	21.8	0.096	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	8.07	22.0	0.054	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.72	22.0	0.131	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.78	21.9	0.113	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.72	22.0	0.133	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.58	22.0	0.147	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.55	21.9	0.159	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.61	21.9	0.166	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.37	22.0	0.185	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.39	21.9	0.207	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.21	21.4	0.256	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.32	21.9	0.197	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.26	22.0	0.196	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.44	21.9	0.223	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018-\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

FOLDER NO. 22B

Item No. 3

Pg 3 of 3

CREATED BY:
INITIALS: KW
DATE: 7MAY13

PROOFED BY
Initials: KW Date: 8MAY13
REVIEWED BY:
Initials: JSC Date: 5/8/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)	Created.....	1-May-13	KLW
Data Source: File Folder: 22B, 22C	Revised.....	[illegible]	[illegible]
Forms: 9, 12, 14	Reviewed...	[illegible]	[illegible]
	certified...	5/14/13	[illegible]
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Micropterus dolomieu*

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4569-4 (5) #3
Exposure Date: 6/20/2012

Data Explanation:

Form 12 (File Folder 22B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB Temp. Holding Period by Day

Form 14 (File Folder 22B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB Weekly Water Chem.

Form 9 (File Folder 22C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations.

Data Anomalies and Deviations

Deviation #13 - Exposure chamber A4 (holding chamber D10) accidentally placed in MS-222 during transfer; fish euthanized (Data removed from statistical analysis)

Holding Chamber ID	Treatment Group (mg/L)	Date Empty[1]
D10	200	21-Jun-12

[1] No surviving test organisms present

FOLDER NO. 22B

4

Item Number

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-2C)
Data Source: File Folder: 228
Forms: 12

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
06/21/12	D0	D6	8.22	D3	8.22	D1	8.10	D10	-	D9	8.34
06/22/12	D1	D15	8.13	D8	8.19	D4	8.07	D5	8.14	D14	8.29
06/23/12	D2	D7	7.86	D2	7.82	D11	7.84	D12	7.97	D13	7.98
06/24/12	D3	D6	8.09	D3	8.09	D1	7.91	D10	-	D9	8.12
06/25/12	D4	D15	8.15	D8	8.25	D4	8.13	D5	8.20	D14	8.33
06/26/12	D5	D7	8.20	D2	8.16	D11	8.17	D12	8.29	D13	8.30
06/27/12	D6	D6	7.97	D3	7.88	D1	7.79	D10	-	D9	8.05
06/28/12	D7	D15	8.00	D8	8.14	D4	8.21	D5	8.14	D14	8.15
06/29/12	D8	D7	8.05	D2	8.11	D11	7.89	D12	8.07	D13	8.09
06/30/12	D9	D6	8.00	D3	8.03	D1	8.12	D10	-	D9	8.09
07/01/12	D10	D15	7.85	D8	7.99	D4	7.97	D5	8.02	D14	8.19
07/02/12	D11	D7	7.78	D2	7.79	D11	7.69	D12	7.81	D13	7.83
07/03/12	D12	D6	8.18	D3	8.21	D1	8.24	D10	-	D9	8.26
07/04/12	D13	D15	8.00	D8	8.05	D4	8.04	D5	8.05	D14	8.24
07/05/12	D14	D7	8.15	D2	8.14	D11	8.05	D12	8.16	D13	8.17
07/06/12	D15	D6	8.09	D3	8.14	D1	8.23	D10	-	D9	8.20
07/07/12	D16	D15	7.98	D8	7.98	D4	7.97	D5	7.99	D14	8.19
07/08/12	D17	D7	8.23	D2	8.04	D11	8.01	D12	8.13	D13	8.11
07/09/12	D18	D6	7.97	D3	8.04	D1	8.06	D10	-	D9	8.12
07/10/12	D19	D15	7.79	D8	7.90	D4	7.86	D5	7.87	D14	8.05
07/11/12	D20	D7	8.20	D2	8.11	D11	8.06	D12	8.12	D13	8.16
07/12/12	D21	D6	8.19	D3	8.30	D1	8.34	D10	-	D9	8.19
07/13/12	D22	D15	8.01	D8	8.06	D4	8.03	D5	8.02	D14	8.13
Mean			8.05		8.07		8.08		8.07		8.16
(SD)			(0.13)		(0.13)		(0.15)		(0.12)		(0.11)
Minimum			7.78		7.79		7.69		7.81		7.83
Maximum			8.23		8.30		8.34		8.29		8.34
Grand Mean			8.07								
(SD)			(0.04)								

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)
Data Source: File Folder: 228
Forms: 12

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
06/21/12	D0	D6	8.08	D3	8.09	D1	7.97	D10	-	D9	8.15
06/22/12	D1	D15	8.12	D8	8.21	D4	8.12	D5	8.15	D14	8.21
06/23/12	D2	D7	8.07	D2	8.05	D11	8.07	D12	8.11	D13	8.11
06/24/12	D3	D6	8.16	D3	8.16	D1	8.02	D10	-	D9	8.12
06/25/12	D4	D15	8.11	D8	8.22	D4	8.11	D5	8.14	D14	8.22
06/26/12	D5	D7	8.12	D2	8.10	D11	8.11	D12	8.14	D13	8.13
06/27/12	D6	D6	8.18	D3	8.13	D1	8.01	D10	-	D9	8.17
06/28/12	D7	D15	8.03	D8	8.20	D4	8.25	D5	8.18	D14	8.13
06/29/12	D8	D7	8.14	D2	8.23	D11	8.08	D12	8.08	D13	8.10
06/30/12	D9	D6	8.18	D3	8.24	D1	8.28	D10	-	D9	8.18
07/01/12	D10	D15	8.04	D8	8.10	D4	8.12	D5	8.14	D14	8.24
07/02/12	D11	D7	8.11	D2	8.19	D11	8.06	D12	8.11	D13	8.10
07/03/12	D12	D6	8.17	D3	8.20	D1	8.22	D10	-	D9	8.17
07/04/12	D13	D15	8.14	D8	8.22	D4	8.21	D5	8.22	D14	8.30
07/05/12	D14	D7	8.30	D2	8.28	D11	8.13	D12	8.28	D13	8.26
07/06/12	D15	D6	8.20	D3	8.29	D1	8.31	D10	-	D9	8.29
07/07/12	D16	D15	8.20	D8	8.28	D4	8.23	D5	8.21	D14	8.32
07/08/12	D17	D7	8.46	D2	8.24	D11	8.21	D12	8.26	D13	8.25
07/09/12	D18	D6	8.25	D3	8.31	D1	8.30	D10	-	D9	8.29
07/10/12	D19	D15	8.04	D8	8.18	D4	8.10	D5	8.11	D14	8.17
07/11/12	D20	D7	8.15	D2	8.05	D11	8.03	D12	8.05	D13	8.06
07/12/12	D21	D6	8.15	D3	8.25	D1	8.24	D10	-	D9	8.09
07/13/12	D22	D15	8.11	D8	8.18	D4	8.13	D5	8.12	D14	8.12
Minimum			8.03		8.05		7.97		8.05		8.06
Maximum			8.46		8.31		8.31		8.28		8.32
22-d Minimum (all treatment groups)			7.97								
22-d Maximum (all treatment groups)			8.46								

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)
Data Source: File Folder: 22B
Forms: 12

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot # TR 4669-4-(5) #3
Exposure Date: 6/20/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
06/21/12	D0	D6	22.0	D3	21.9	D1	21.8	D10	-	D9	21.7
06/22/12	D1	D15	21.8	D8	22.1	D4	21.9	D5	21.8	D14	21.8
06/23/12	D2	D7	22.0	D2	22.0	D11	21.9	D12	21.9	D13	21.8
06/24/12	D3	D6	22.1	D3	22.0	D1	22.0	D10	-	D9	22.0
06/25/12	D4	D15	21.7	D8	22.0	D4	21.9	D5	21.8	D14	21.9
06/26/12	D5	D7	22.1	D2	22.0	D11	22.1	D12	22.0	D13	22.0
06/27/12	D6	D6	22.0	D3	22.0	D1	21.8	D10	-	D9	22.0
06/28/12	D7	D15	22.3	D8	22.1	D4	22.0	D5	22.1	D14	22.2
06/29/12	D8	D7	22.1	D2	21.9	D11	22.1	D12	22.0	D13	21.9
06/30/12	D9	D6	22.1	D3	21.9	D1	21.8	D10	-	D9	22.0
07/01/12	D10	D15	22.0	D8	22.2	D4	22.0	D5	21.9	D14	21.9
07/02/12	D11	D7	22.1	D2	22.0	D11	22.0	D12	21.9	D13	21.9
07/03/12	D12	D6	22.0	D3	22.0	D1	21.9	D10	-	D9	22.0
07/04/12	D13	D15	21.9	D8	22.1	D4	22.0	D5	21.9	D14	22.0
07/05/12	D14	D7	22.0	D2	22.0	D11	22.1	D12	21.9	D13	22.0
07/06/12	D15	D6	21.9	D3	22.0	D1	21.7	D10	-	D9	21.9
07/07/12	D16	D15	21.0	D8	21.9	D4	21.7	D5	21.7	D14	21.5
07/08/12	D17	D7	21.5	D2	21.8	D11	21.6	D12	21.5	D13	21.6
07/09/12	D18	D6	21.7	D3	21.9	D1	21.7	D10	-	D9	21.7
07/10/12	D19	D15	22.0	D8	22.0	D4	22.0	D5	22.0	D14	21.9
07/11/12	D20	D7	22.1	D2	22.0	D11	22.0	D12	22.0	D13	22.0
07/12/12	D21	D6	22.0	D3	21.9	D1	21.7	D10	-	D9	22.0
07/13/12	D22	D15	21.5	D8	21.9	D4	21.8	D5	21.8	D14	22.0
Mean			21.9		22.0		21.9		21.9		21.9
(SD)			(0.3)		(0.1)		(0.1)		(0.1)		(0.2)
Minimum			21.0		21.8		21.6		21.5		21.5
Maximum			22.3		22.2		22.1		22.1		22.2
Grand Mean			21.9								
(SD)			(0.6)								

Item Number 4
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages: 1-20)
Data Source: File Folder: 22B
Forms: 14

Species: Smallmouth Bass (*Micropterus dolomieu*) Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 SMB Water Chem.xlsx]SMB Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	06/25/12	Rep 1	D9	131	174	379
		Rep 2		130	172	380
		Rep 3		131	170	377
			Mean	131	172	379
			(SD)	(1)	(2)	(2)
2	07/02/12	Rep 1	D12	128	168	352
		Rep 2		130	170	352
		Rep 3		131	172	350
			Mean	130	170	351
			(SD)	(2)	(2)	(1)
3	07/09/12	Rep 1	D3	127	170	372
		Rep 2		130	172	371
		Rep 3		128	172	373
			Mean	128	171	372
			(SD)	(2)	(1)	(1)
			Grand Mean	130	171	367
			(SD)	(1)	(1)	(14)

CREATED BY:
INITIALS: KW
DATE: 10MAY13

FOLDER NO. 22B
4
Item Number
Page 5 of 5

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED BY
Initials: JRL Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages: 16-28)	Created.....	1-May-13	KJW
Data Source: File Folder: 23B	Revised	10/18/13	
Forms: 1b, 1c	Reviewed..	10/18/13	
	Certified...	5/14/13	
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Lepomis macrochirus*

Species: Bluegill (*Leporris macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Lot #: TR 4669-3 (7)
Exposure Date: 7/11/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 23B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO 03
Lab Notebook #2 (pages: 16-28)
Data Source: File Folder: 238
Forms: 1b, 1c

Species: Bluegill (*Lepomis macrochirus*) Lot number: 1:4500
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
	A1	0	8.07	7.75	21.9
	A4	50	8.07	7.78	21.8
A	A2	100	8.07	7.78	21.8
	A5	200	8.11	7.85	21.8
	A3	300	8.05	7.78	21.9
	B3	0	8.05	7.73	21.9
	B4	50	8.06	7.75	21.8
B	B2	100	8.05	7.83	21.7
	B1	200	8.08	7.81	21.7
	B5	300	8.09	7.80	21.8
	C2	0	8.09	7.83	21.8
	C3	50	8.12	7.96	21.8
C	C4	100	8.12	7.89	21.9
	C5	200	8.11	7.89	21.8
	C8	300	8.10	7.92	21.9
		Mean	N/A	7.85	21.8
		(SD)	N/A	(0.07)	(0.1)
		Minimum	8.05	7.73	21.7
		Maximum	8.12	7.96	21.9

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	129	174	370
B	132	172	367
C	130	174	368
Mean	130	173	368
(SD)	(1)	(1)	(1)
Minimum	129	172	367
Maximum	132	174	370

Item Number 1
Page 2 of 2

FOLDER NO. 238

CREATED BY:
INITIALS: BW
DATE: 10MAY13

PROOFED BY
Initials: BW Date: 10MAY13
REVIEWED
Initials: SM Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 16-28)	Created.....	1-May-13	KLW
Data Source: File Folder: 238	Revised.....	5/14/13	KLW
Forms: 4, 5, 6	Reviewed...	5/14/13	KLW
	Certified...	5/14/13	JM

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 B..G Water Chem.xlsx]BLG Exposure Water Chem.

Exposure Period Water Chemistry - *Lepomis macrochirus*

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 238

Item Number 2
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Study Number: AEH-12-PSEUDC-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23B
Forms: 4, 5, 6

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A1	0	7.95	8.11	21.8	7.98	8.18	21.8	7.98	8.09	21.7	8.10	8.17	21.8	376	172	130
	A4	50	7.95	8.06	21.8	7.77	8.07	21.8	7.64	7.95	21.7	6.94	7.84	21.9	384	174	130
	A2	100	7.90	8.03	21.9	7.81	8.03	21.9	7.67	7.93	21.8	6.73	7.78	21.8	390	172	131
	A5	200	7.98	7.98	21.6	7.78	7.96	21.6	7.49	7.81	21.7	6.58	7.63	21.8	395	172	133
	A3	300	7.78	7.83	21.9	7.56	7.80	21.9	7.08	7.64	21.8	5.94	7.40	21.9	397	174	135
B	B3	0	7.96	8.14	21.8	7.99	8.18	21.8	7.92	8.14	21.8	8.11	8.19	21.9	383	176	130
	B4	50	7.81	8.06	21.9	7.85	8.08	21.7	7.63	8.01	21.8	6.98	7.86	21.9	390	174	130
	B2	100	7.73	7.98	21.9	7.63	7.95	21.7	7.10	7.83	21.8	6.18	7.67	21.9	394	178	133
	B1	200	7.79	7.96	21.8	7.80	7.93	21.7	7.32	7.82	21.8	5.86	7.54	21.8	397	174	134
	B5	300	7.77	7.90	21.9	7.56	7.81	21.8	6.99	7.64	21.9	5.52	7.29	21.9	402	176	136
C	C2	0	7.96	8.16	21.8	8.00	8.19	21.7	7.95	8.18	21.8	8.14	8.22	21.8	373	174	131
	C1	50	7.92	8.11	21.8	7.87	8.08	21.8	7.59	7.99	21.9	6.83	7.83	21.9	384	172	130
	C4	100	7.88	8.07	21.9	7.73	8.00	21.8	7.20	7.88	21.9	6.21	7.69	21.9	393	174	133
	C5	200	7.84	8.02	21.7	7.73	7.94	21.5	7.11	7.82	21.7	5.80	7.55	21.6	401	172	134
	C3	300	7.86	7.96	21.9	7.63	7.85	21.8	6.92	7.70	21.9	5.58	7.37	21.9	414	174	136
Mean			7.87	N/A	21.8	7.78	N/A	21.8	7.44	N/A	21.8	6.63	N/A	21.8	392	174	132
(SD)			(0.08)	N/A	(0.1)	(0.14)	N/A	(0.1)	(0.35)	N/A	(0.1)	(0.87)	N/A	(0.1)	(10)	(2)	(2)
Minimum			7.73	7.83	21.6	7.56	7.80	21.5	6.92	7.64	21.7	5.52	7.29	21.6	373	172	130
Maximum			7.98	8.16	21.9	8.00	8.19	21.9	7.98	8.18	21.9	8.14	8.22	21.9	414	178	136

Item Number 2
Page 2 of 2

FOLDER NO. 23B

CREATED BY:
INITIALS: KMW
DATE: 10MAY13

PROOFED BY
Initials: KMW Date: 10MAY13
REVIEWED BY
Initials: JL Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (page 18)	Created.....	7-May-13	KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8 MAY 13	KLW
pH and Temperature Data Source: Form 7 (File Folder 23B)	Reviewed...	8 MAY 13	KLW
	Certified.....	5/9/13	

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]BLG Ammonia Data

24 h Post-dosing Initiation Ammonia

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
NONE

FOLDER NO. 233

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 18)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 238)

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)

Exposure Date: 7/11/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
BLG	0	A	8.17	21.8	0.080	0.0626	0.005004	0.004828	0.001085
		B	8.19	21.9	0.052	0.0657	0.003419		
		C	8.22	21.8	0.087	0.0697	0.006060		
	50	A	7.84	21.9	0.116	0.0305	0.003535	0.004038	0.000406
		B	7.86	21.9	0.127	0.0319	0.004047		
		C	7.83	21.9	0.152	0.0298	0.004530		
	100	A	7.78	21.8	0.090	0.0265	0.002382	0.003057	0.000477
		B	7.67	21.9	0.163	0.0208	0.003392		
		C	7.69	21.9	0.156	0.0218	0.003396		
	200	A	7.63	21.8	0.217	0.0189	0.004097	0.003519	0.001224
		B	7.54	21.8	0.118	0.0154	0.001817		
		C	7.55	21.6	0.299	0.0155	0.004644		
	300	A	7.40	21.9	0.227	0.0113	0.002562	0.002394	0.000298
		B	7.29	21.9	0.225	0.0088	0.001976		
		C	7.37	21.9	0.251	0.0105	0.002645		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{10^{\left[0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right]-pH}\right\}+1}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

Study Number: AEH-12-PSEJDO-03

Lab Notebook #2 (page 18)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 23B)

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4659-3-(7)

Exposure Date: 7/11/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
BLG	0	A	8.17	21.8	0.080	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	8.19	21.9	0.052	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	8.22	21.8	0.087	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.84	21.9	0.116	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.86	21.9	0.127	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.83	21.9	0.152	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.78	21.8	0.090	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.67	21.9	0.163	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.69	21.9	0.156	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.63	21.8	0.217	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.54	21.8	0.118	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.55	21.6	0.299	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.40	21.9	0.227	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.29	21.9	0.225	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.37	21.9	0.251	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018 - \left(\frac{2729.92}{(273.15+T_c)}\right)\right) - pH}\right] + 1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

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FOLDER NO. 23B

Item No. 3

Pg 3 of 3

CREATED BY:
INITIALS: KW
DATE: 7MAY13

PROOFED BY
Initials: KW Date: 8MAY13
REVIEWED BY
Initials: SP Date: 5/9/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #? (pages 16-28)	Created.....	1-May-13	KW KW
Data Source: File Folder: 23B, 23C	Revised.....	10 MAY 13	KW
Forms: 9, 12, 14	Reviewed..	10 MAY 13	KW
	Certified..	5/14/13	JS
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Lepomis macrochirus*

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDS) Lot #: TR 4669-8-(7)
Exposure Date: 7/11/2012

Data Explanation:

Form 12 (File Folder 23B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG DO Ho ding Period by Dav

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG Temp. Holding Period by Day

Form 14 (File Folder 23B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period.

Weedy Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG Weekly Water Chem.

Form 9 (File Folder 23C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations. All ho ding chambers for *Lepomis macrochirus* contained at least 1 test organism throughout the 22-d Holding period. Therefore, no water quality measurements were removed from analysis.

Data Anomalies and Deviations
NONE

FOLDER NO. 23B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23B
Forms: 12

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
07/12/12	D0	E11	8.97	E13	8.85	E1	8.75	E9	8.65	E2	8.67
07/13/12	D1	E14	8.25	E12	8.07	E6	8.01	E15	8.14	E8	8.10
07/14/12	D2	E10	8.23	E7	7.70	E4	8.15	E5	8.21	E3	8.22
07/15/12	D3	E11	8.11	E13	8.06	E1	8.04	E9	7.86	E2	8.08
07/16/12	D4	E14	8.20	E12	8.18	E6	8.12	E15	8.05	E8	8.10
07/17/12	D5	E10	8.25	E7	8.14	E4	8.17	E5	8.30	E3	8.35
07/18/12	D6	E11	8.29	E13	8.13	E1	8.20	E9	8.18	E2	8.23
07/19/12	D7	E14	8.14	E12	8.15	E6	8.25	E15	8.06	E8	8.21
07/20/12	D8	E10	8.26	E7	8.15	E4	8.21	E5	8.30	E3	8.37
07/21/12	D9	E11	8.06	E13	7.96	E1	8.06	E9	8.01	E2	8.07
07/22/12	D10	E14	8.09	E12	7.95	E6	8.09	E15	7.80	E8	8.08
07/23/12	D11	E10	8.19	E7	8.11	E4	8.22	E5	8.12	E3	8.28
07/24/12	D12	E11	8.17	E13	8.03	E1	8.14	E9	8.08	E2	8.20
07/25/12	D13	E14	8.19	E12	8.17	E6	8.32	E15	8.00	E8	8.27
07/26/12	D14	E10	8.13	E7	8.19	E4	8.17	E5	8.25	E3	8.23
07/27/12	D15	E11	8.27	E13	7.91	E1	8.20	E9	8.19	E2	8.26
07/28/12	D16	E14	8.09	E12	8.23	E6	8.39	E15	8.03	E8	8.25
07/29/12	D17	E10	7.97	E7	8.05	E4	8.00	E5	7.98	E3	7.99
07/30/12	D18	E11	8.11	E13	8.08	E1	7.91	E9	8.06	E2	8.14
07/31/12	D19	E14	8.28	E12	8.25	E6	8.35	E15	8.38	E8	8.20
08/01/12	D20	E10	7.60	E7	7.64	E4	7.71	E5	7.81	E3	7.81
08/02/12	D21	E11	8.09	E13	8.18	E1	8.02	E9	8.17	E2	8.22
08/03/12	D22	E14	8.16	E12	8.13	E6	8.05	E15	8.21	E8	8.03
Mean			8.18		8.10		8.15		8.12		8.19
(SD)			(0.22)		(0.22)		(0.19)		(0.18)		(0.16)
Minimum			7.60		7.64		7.71		7.80		7.81
Maximum			8.97		8.85		8.75		8.65		8.67
Grand Mean			8.15								
(SD)			(0.03)								

Item Number 4
Page 8 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23B
Forms: 12

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
07/12/12	D0	E11	8.15	E13	8.17	E1	8.15	E9	8.16	E2	8.17
07/13/12	D1	E14	8.34	E12	8.20	E6	8.14	E15	8.25	E8	8.24
07/14/12	D2	E10	8.19	E7	7.93	E4	8.18	E5	8.15	E3	8.21
07/15/12	D3	E11	8.05	E13	8.04	E1	8.06	E9	8.01	E2	8.09
07/16/12	D4	E14	8.22	E12	8.26	E6	8.21	E15	8.11	E8	8.20
07/17/12	D5	E10	8.22	E7	8.14	E4	8.17	E5	8.22	E3	8.29
07/18/12	D6	E11	8.18	E13	8.08	E1	8.11	E9	8.11	E2	8.16
07/19/12	D7	F14	8.14	F12	8.20	F6	8.23	E15	8.08	E8	8.22
07/20/12	D8	E10	8.20	E7	8.13	E4	8.16	E5	8.19	E3	8.27
07/21/12	D9	E11	8.25	E13	8.14	E1	8.18	E9	8.18	E2	8.18
07/22/12	D10	E14	8.20	E12	8.11	E6	8.23	E15	8.00	E8	8.24
07/23/12	D11	E10	8.19	E7	8.13	E4	8.12	E5	8.17	E3	8.26
07/24/12	D12	E11	8.27	E13	8.14	E1	8.21	E9	8.18	E2	8.27
07/25/12	D13	E14	8.24	E12	8.24	E6	8.33	E15	8.12	E8	8.34
07/26/12	D14	E10	8.20	E7	8.24	E4	8.24	E5	8.25	E3	8.27
07/27/12	D15	E11	8.25	E13	8.05	E1	8.21	E9	8.22	E2	8.26
07/28/12	D16	E14	8.21	E12	8.28	E6	8.36	E15	8.11	E8	8.27
07/29/12	D17	E10	8.16	E7	8.21	E4	8.19	E5	8.17	E3	8.15
07/30/12	D18	E11	8.18	E13	8.17	E1	8.09	E9	8.20	E2	8.22
07/31/12	D19	E14	8.13	E12	8.12	E6	8.14	E15	8.13	E8	8.04
08/01/12	D20	E10	7.97	E7	7.97	E4	7.96	E5	7.99	E3	7.93
08/02/12	D21	E11	8.03	E13	8.14	E1	8.01	E9	8.12	E2	8.14
08/03/12	D22	E14	8.18	E12	8.16	E6	8.09	E15	8.09	E8	8.18
Minimum			7.92		7.92		7.96		7.99		7.93
Maximum			8.34		8.28		8.36		8.25		8.34

22-d Minimum (all treatment groups)	7.92
22-d Maximum (all treatment groups)	8.36

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook N2 (pages 16-28)
Data Source: File Folder: 238
Forms: 12

Species: B uegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens* Pf -CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
07/12/12	D0	E11	21.7	E13	21.7	E1	21.8	E9	21.9	E2	21.8
07/13/12	D1	E14	21.6	E12	21.8	E6	21.7	E15	21.7	E8	21.9
07/14/12	D2	E10	21.5	E7	21.8	E4	21.7	E5	21.4	E3	21.7
07/15/12	D3	E11	21.8	E13	21.8	E1	22.2	E9	21.9	E2	22.1
07/16/12	D4	E14	21.4	E12	21.6	E6	21.5	E15	22.0	E8	21.9
07/17/12	D5	E10	21.9	E7	22.0	E4	22.1	E5	21.7	E3	21.9
07/18/12	D6	E11	21.9	E13	22.0	E1	22.2	E9	22.1	E2	22.2
07/19/12	D7	E14	21.7	E12	21.8	E6	21.8	E15	21.9	E8	21.9
07/20/12	D8	E10	21.8	E7	21.9	E4	22.0	E5	21.6	E3	21.9
07/21/12	D9	E11	21.6	E13	21.6	E1	21.7	E9	21.9	E2	21.8
07/22/12	D10	E14	21.4	E12	22.0	E6	21.7	E15	21.8	E8	21.8
07/23/12	D11	E10	21.6	E7	21.9	E4	22.0	E5	21.6	E3	21.8
07/24/12	D12	E11	21.8	E13	21.5	E1	21.8	E9	22.0	E2	21.9
07/25/12	D13	E14	21.9	E12	21.9	E6	21.7	E15	21.8	E8	21.8
07/26/12	D14	E10	21.9	E7	21.9	E4	22.0	E5	21.6	E3	22.0
07/27/12	D15	E11	22.2	E13	22.3	E1	22.5	E9	22.4	E2	22.4
07/28/12	D16	E14	22.0	E12	21.9	E6	21.5	E15	22.0	E8	22.0
07/29/12	D17	E10	21.9	E7	21.6	E4	21.7	E5	21.9	E3	21.9
07/30/12	D18	E11	21.6	E13	22.0	E1	21.7	E9	21.8	E2	21.7
07/31/12	D19	E14	21.8	E12	21.9	E6	21.8	E15	21.7	E8	22.1
08/01/12	D20	E10	21.9	E7	22.0	E4	22.0	E5	21.9	E3	22.1
08/02/12	D21	E11	21.7	E13	21.8	E1	21.7	E9	21.9	E2	21.8
08/03/12	D22	E14	21.7	E12	21.7	E6	21.7	E15	21.6	E8	22.0
Mean			21.8		21.9		21.8		21.8		21.9
(SD)			(0.2)		(0.2)		(0.2)		(0.2)		(0.2)
Minimum			21.4		21.6		21.5		21.4		21.7
Maximum			22.2		22.3		22.5		22.4		22.4
Grand Mean			21.8								
(SD)			(0.1)								

Item Number 4
Page 21 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23B
Forms: 14

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

File Name: I:\AEH-12-PSEUDO 03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 BLG Water Chem.xlsx]BLG Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	07/16/12	Rep 1	E7	130	174	374
		Rep 2		130	172	370
		Rep 3		131	174	373
			Mean	130	173	372
			(SD)	(1)	(1)	(2)
2	07/23/12	Rep 1	E2	121	164	365
		Rep 2		125	170	363
		Rep 3		124	168	361
			Mean	123	167	363
			(SD)	(2)	(3)	(2)
3	07/30/12	Rep 1	E10	127	174	372
		Rep 2		129	172	374
		Rep 3		130	172	370
			Mean	129	173	372
			(SD)	(2)	(1)	(2)
			Grand Mean	127	171	369
			(SD)	(4)	(3)	(5)

FOLDER NO. 23B

Item Number 4
Page 5 of 5

CREATED BY:
INITIALS: KW
DATE: 10MAY13

PROOFED BY
Initials: KW Date: 10MAY13
REVIEWED BY:
Initials: JAC Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages: 35-44)	Created.....	1-May-13	KLW
Data Source: File Folder: 24B	Revised.....	13MAY13	KLW
Forms: 1b, 1c	Reviewed...	13MAY13	KLW
	Certified...	5/14/13	JLC
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF PreExposure Water Chem.			

Pre-Exposure Water Chemistry - *Ictalurus punctatus*

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Data Explanation:
Pre-Exposure - Dissolved oxygen, pH, and temperature were measured prior to exposure initiation in all chambers of each diluter system. Alkalinity, hardness, and conductivity were measured on water samples from the headbox of each respective diluter system.

Data anomalies and deviations
NONE

FOLDER NO. 24B

Item Number 1
Page 1 of 2

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages: 35-44)
Data Source: File Folder: 24B
Forms: 3b, 3c

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 14SA (SDP) Lot #: 401P12154G-C2 #2
Exposure Date: 9/26/2012

Pre-Exposure Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	pH	DO (mg/L)	Temp (°C)
A	A4	0	8.03	7.76	21.5
	A2	50	8.03	7.77	21.5
	A5	100	8.05	7.84	21.4
	A3	200	8.02	7.74	21.5
	A1	300	7.98	7.61	21.6
B	B5	0	8.02	7.76	21.5
	B4	50	8.01	7.68	21.4
	B3	100	8.07	7.86	21.4
	B2	200	8.04	7.81	21.4
	B1	300	8.08	8.04	21.4
C	C3	0	8.09	7.83	21.5
	C5	50	8.06	7.72	21.4
	C2	100	8.06	7.74	21.4
	C1	200	8.13	7.94	21.3
	C4	300	8.16	7.99	21.2
		Mean	N/A	7.81	21.4
		(SD)	N/A	(0.11)	(0.1)
		Minimum	7.98	7.61	21.2
		Maximum	8.16	8.04	21.6

Diluter ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
A	127	174	374
B	129	174	371
C	129	174	373
Mean	128	174	373
(SD)	(1)	(0)	(1)
Minimum	127	174	371
Maximum	129	174	374

Item Number 1
Page 3 of 12

FOLDER NO. 24B

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 13MAY13
REVIEWED BY:
Initials: JMC Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages: 35-44)	Created.....	1-May-13	KLW
Data Source: File Folder: 24B	Revised.....	13MAY13	
Forms: 4, 5, 6	Reviewed...	13 MAY 13	
	Certified...	5/14/13	
File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF Exposure Water Chem.			

Exposure Period Water Chemistry - *Ictalurus punctatus*

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Data Explanation:
Exposure - Dissolved oxygen, pH, and temperature measurements from all exposure chambers gathered at 1, 6, 12, and 24h. Alkalinity, hardness, and conductivity from all exposure chambers measured at 3h.

Data anomalies and deviations
NONE

FOLDER NO. 24B

Item Number 2
Page 1 of 2

Study Number: AEH 12 PSEUDO 03
Lab Notebook #2 (pages: 35-44)
Data Source: File Folder: 24B
Forms: 4, 5, 6

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Exposure Period Water Chemistry

Diluter ID	Chamber ID	Treatment Group (mg/L)	1 Hour			6 Hour			12 Hour			24 Hour			3 Hour		
			DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	DO (mg/L)	pH	Temp. (°C)	Conductivity (µS)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
A	A4	0	7.57	8.01	21.6	7.78	7.87	21.6	7.80	8.10	21.7	7.90	8.00	21.5	369	174	126
	A2	50	7.67	7.99	21.6	7.64	7.90	21.6	7.44	7.98	21.6	7.17	7.83	21.6	377	174	130
	A5	100	7.67	7.96	21.4	7.68	7.89	21.6	7.31	7.90	21.6	6.75	7.72	21.4	380	174	130
	A3	200	7.65	7.88	21.6	7.70	7.83	21.5	7.38	7.84	21.6	6.57	7.61	21.6	392	174	132
	A1	300	7.38	7.78	21.6	7.38	7.72	21.4	6.93	7.68	21.7	6.19	7.45	21.6	396	176	133
B	B5	0	7.53	7.90	21.6	7.75	8.09	21.6	7.77	8.09	21.6	7.81	8.05	21.6	373	176	128
	B4	50	7.47	7.87	21.5	7.41	8.00	21.6	7.22	7.92	21.6	6.65	7.79	21.5	378	176	131
	B3	100	7.64	7.88	21.6	7.66	7.97	21.6	7.60	7.92	21.6	6.81	7.74	21.6	385	176	132
	B2	200	7.53	7.78	21.6	7.49	7.88	21.6	7.36	7.80	21.6	5.99	7.53	21.6	387	176	135
	B1	300	7.88	7.79	21.6	7.89	7.85	21.6	7.75	7.81	21.6	6.41	7.51	21.6	398	176	136
C	C3	0	7.81	8.12	21.5	7.94	8.17	21.5	7.92	8.16	21.5	8.07	8.15	21.5	358	174	129
	C5	50	7.58	8.00	21.5	7.75	8.05	21.5	7.67	8.01	21.6	7.17	7.87	21.5	375	176	131
	C2	100	7.60	7.98	21.6	7.83	8.03	21.6	7.66	7.98	21.5	6.83	7.78	21.5	384	176	132
	C1	200	7.70	7.98	21.4	7.74	7.98	21.5	7.71	7.93	21.6	6.50	7.65	21.2	390	178	136
	C4	300	7.69	7.89	21.7	7.80	7.87	21.7	7.52	7.79	21.6	5.75	7.45	21.6	396	178	136
Mean			7.62	N/A	21.6	7.70	N/A	21.6	7.54	N/A	21.6	6.84	N/A	21.5	383	176	132
(SD)			(0.12)	N/A	(0.1)	(0.16)	N/A	(0.1)	(0.25)	N/A	(0.1)	(0.66)	N/A	(0.1)	(11)	(1)	(3)
Minimum			7.38	7.78	21.4	7.38	7.72	21.4	6.93	7.68	21.5	5.75	7.45	21.2	358	174	126
Maximum			7.88	8.12	21.7	7.94	8.17	21.7	7.92	8.16	21.7	8.07	8.15	21.6	398	178	136

Item Number 9
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FOLDER NO. 24B

CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 13MAY13
REVIEWED BY
Initials: JAC Date: 5/14/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (page 37)	Created.....	7-May-13	KLW KLW
TAN Data Source: LTRMP Report (File Folder 15)	Revised.....	8MAY13	KLW
pH and Temperature Data Source: Form 7 (File Folder 24B)	Reviewed...	8MAY13	PLW
	Certified.....	5/8/13	JM

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\[AEH-12-PSEUDO-03 Ammonia Data.xlsx]CCF Ammonia Data

24 h Post-dosing Initiation Ammonia

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Data Explanation:
1) Water samples collected at 24h from each treatment group replicate. Samples were acidified with sulfuric acid and analyzed by the 4500-NH_3 G. Automated Phenate Method (Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005) on a Technicon Autoanalyzer II by the UMESC water quality laboratory.
2) The un-ionized ammonia fractions were calculated using the sample pH and temperature according to the formula in Emerson et al. (1975).

Data Anomalies and Deviations:
NONE

FOLDER NO. 24B

Item No. 3

Pg 1 of 3

Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 37)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 24B)

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2

Exposure Date: 9/26/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
CCF	0	A	8.00	21.5	0.153	0.0423	0.006468	0.007297	0.000950
		B	8.05	21.6	0.143	0.0475	0.006795		
		C	8.15	21.5	0.147	0.0587	0.008628		
	50	A	7.83	21.6	0.165	0.0292	0.004815	0.005191	0.000454
		B	7.79	21.5	0.186	0.0265	0.004928		
		C	7.87	21.5	0.184	0.0317	0.005830		
	100	A	7.72	21.4	0.239	0.0225	0.005373	0.006080	0.000500
		B	7.74	21.6	0.269	0.0239	0.006416		
		C	7.78	21.5	0.249	0.0259	0.006451		
	200	A	7.61	21.6	0.289	0.0178	0.005142	0.005730	0.002124
		B	7.53	21.6	0.234	0.0148	0.003473		
		C	7.65	21.2	0.453	0.0189	0.008575		
	300	A	7.45	21.6	0.325	0.0124	0.004022	0.004062	0.000276
		B	7.51	21.6	0.264	0.0142	0.003745		
		C	7.45	21.6	0.357	0.0124	0.004418		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al. 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa - 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

Item No. 3

Pg 2 of 3

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Study Number: AEH-12-PSEUDO-03

Lab Notebook #2 (page 37)

TAN Data Source: LTRMP Report (File Folder 15)

pH and Temperature Data Source: Form 7 (File Folder 248)

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 128000

Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2

Exposure Date: 9/26/2012

24 h Post-dosing Initiation Ammonia

Species	Treatment Group (mg/L)	Diluter	pH	Temperature (°C)	TAN as NH_3-N (mg/L)	Un-Ionized Fraction[1]	NH_3 (mg/L)[2]	Mean NH_3 (mg/L)	Std Dev
CCF	0	A	8.00	21.5	0.153	x=1/(10^(0.09018+(2729.92/(273.15+E12))-D12)+1)	x=G12*F12		
		B	8.05	21.6	0.143	x=1/(10^(0.09018+(2729.92/(273.15+E13))-D13)+1)	x=G13*F13	x=AVERAGE(H12:H14)	x=STDEV.P(H12:H14)
		C	8.15	21.5	0.147	x=1/(10^(0.09018+(2729.92/(273.15+E14))-D14)+1)	x=G14*F14		
	50	A	7.83	21.6	0.165	x=1/(10^(0.09018+(2729.92/(273.15+E15))-D15)+1)	x=G15*F15		
		B	7.79	21.5	0.186	x=1/(10^(0.09018+(2729.92/(273.15+E16))-D16)+1)	x=G16*F16	x=AVERAGE(H15:H17)	x=STDEV.P(H15:H17)
		C	7.87	21.5	0.184	x=1/(10^(0.09018+(2729.92/(273.15+E17))-D17)+1)	x=G17*F17		
	100	A	7.72	21.4	0.239	x=1/(10^(0.09018+(2729.92/(273.15+E18))-D18)+1)	x=G18*F18		
		B	7.74	21.6	0.269	x=1/(10^(0.09018+(2729.92/(273.15+E19))-D19)+1)	x=G19*F19	x=AVERAGE(H18:H20)	x=STDEV.P(H18:H20)
		C	7.78	21.5	0.249	x=1/(10^(0.09018+(2729.92/(273.15+E20))-D20)+1)	x=G20*F20		
	200	A	7.61	21.6	0.289	x=1/(10^(0.09018+(2729.92/(273.15+E21))-D21)+1)	x=G21*F21		
		B	7.53	21.6	0.234	x=1/(10^(0.09018+(2729.92/(273.15+E22))-D22)+1)	x=G22*F22	x=AVERAGE(H21:H23)	x=STDEV.P(H21:H23)
		C	7.65	21.2	0.453	x=1/(10^(0.09018+(2729.92/(273.15+E23))-D23)+1)	x=G23*F23		
	300	A	7.45	21.6	0.325	x=1/(10^(0.09018+(2729.92/(273.15+E24))-D24)+1)	x=G24*F24		
		B	7.51	21.6	0.264	x=1/(10^(0.09018+(2729.92/(273.15+E25))-D25)+1)	x=G25*F25	x=AVERAGE(H24:H26)	x=STDEV.P(H24:H26)
		C	7.45	21.6	0.357	x=1/(10^(0.09018+(2729.92/(273.15+E26))-D26)+1)	x=G26*F26		

[1] Un-ionized fraction (f) is calculated based on the following formula (Emerson et al 1975): $f = \frac{1}{(10^{pKa-pH})+1}$; $pKa = 0.09018 + \frac{2729.92}{T_k}$

$T_k = T_c + 273.15$; $pKa = 0.09018 + \frac{2729.92}{(273.15 + T_c)}$; The final calculation used is then: $f = \frac{1}{\left\{\left[10^{\left(0.09018+\left(\frac{2729.92}{(273.15+T_c)}\right)\right)-pH}\right]+1\right\}}$

[2] Un-ionized ammonia is calculated based on the following formula: Un-ionized ammonia = f * TAN (mg/L)

979

FOLDER NO. 248

Item No. 3

Pg 3 of 3

CREATED BY:

INITIALS: KW

DATE: 7MAY13

PROOFED BY

Initials: KW Date: 8MAY13

REVIEWED B:

Initials: JA Date: 5/9/13

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 [pages: 35-44]	Created.....	1-May-13	KLW
Data Source: File Folder: 24B, 24C	Revised.....	13MAY13	KMW
Forms: 9, 12, 14	Reviewed...	14MAY13	KLW
	Certified...	5/14/13	JA
File Name: See individual filenames as indicated below.			

22d Holding Period Water Chemistry - *Ictalurus punctatus*

Species: Channel Catfish (*Ictalurus punctatus*) ..ct number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-Cl 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Data Explanation:

Form 12 (File Folder 24B): Daily water chemistry measurements (dissolved oxygen, pH and temperature) were observed for one representative holding chamber for each treatment group.

Dissolved Oxygen File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF DO Holding Period by Day

pH File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF pH Holding Period by Day

Temperature File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF Temp. Holding Period by Day

Form 14 (File Folder 24B): Alkalinity, hardness, and conductivity were measured weekly in triplicate from a randomly chosen representative chamber throughout the 22d holding period
Weekly Water Chemistry File Name:
I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF Weekly Water Chem.

Form 9 (File Folder 24C): Form 9 was used to determine the date holding chambers no longer contained test organisms. Water quality parameters were recorded for the tanks on a rotation and those that no longer contained test organisms continued to be monitored. Measurements taken from empty holding chambers were removed from analysis and are noted in Data Anomalies and Deviations.

Data Anomalies and Deviations

Holding Chamber ID	Treatment Group (mg/L)	Date Empty[1]
E6	300	28-Sep-12
E14	300	8-Oct-12
E15	300	28-Sep-12

[1] No surviving test organisms present

FOLDER NO. 24B

Item Number 4
Page 1 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 35-44)
Data Source: File Folder: 24B
Forms: 12

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Lot #: 401P121545-02 #2
Exposure Date: 9/26/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF DO Holding Period by Day

Dissolved Oxygen (mg/L): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)	Chamber ID	DO (mg/L)
09/27/12	D0	E8	8.15	E2	8.03	E9	7.92	E13	8.00	E15	8.05
09/28/12	D1	E3	7.24	F4	7.70	E7	7.83	E12	8.03	E14	8.07
09/29/12	D2	E10	8.12	E11	7.89	E5	7.76	E1	7.92	E6	-
09/30/12	D3	E8	8.04	E2	7.95	E9	7.89	E13	8.07	E15	-
10/01/12	D4	E3	7.40	E4	7.91	E7	8.03	E12	8.13	F14	8.07
10/02/12	D5	E10	8.02	E11	7.79	E5	7.75	E1	7.89	E6	-
10/03/12	D6	E8	8.07	E2	8.01	E9	7.99	E13	8.11	E15	-
10/04/12	D7	E3	7.71	E4	8.10	E7	8.24	E12	8.27	E14	8.37
10/05/12	D8	E10	7.99	E11	8.26	E5	8.05	E1	8.25	E6	-
10/06/12	D9	E8	8.21	E2	8.16	E9	8.16	E13	8.22	E15	-
10/07/12	D10	E3	7.77	E4	8.21	E7	8.22	E12	8.28	E14	8.34
10/08/12	D11	E10	7.47	E11	7.67	E5	7.80	E1	7.69	E6	-
10/09/12	D12	E8	8.29	E2	8.19	E9	8.28	E13	8.38	E15	-
10/10/12	D13	E3	7.65	E4	7.97	E7	8.24	E12	8.32	E14	-
10/11/12	D14	E10	8.01	E11	8.02	E5	8.32	E1	8.19	E6	-
10/12/12	D15	E8	8.06	E2	7.97	E9	8.00	E13	8.19	E15	-
10/13/12	D16	E3	7.48	E4	7.75	E7	7.87	E12	8.00	E14	-
10/14/12	D17	F10	7.82	E11	7.94	E5	8.16	E1	8.12	E6	-
10/15/12	D18	E8	7.93	E2	7.92	E9	7.99	E13	8.16	E15	-
10/16/12	D19	E3	7.70	E4	7.96	E7	8.24	E12	8.14	E14	-
10/17/12	D20	E10	8.05	E11	7.97	E5	8.31	E1	8.28	F6	-
10/18/12	D21	E8	8.28	E2	8.24	E9	8.29	E13	8.43	E15	-
10/19/12	D22	E3	7.74	E4	8.02	E7	8.25	E12	8.22	E14	-
Mean			7.88		7.98		8.07		8.14		8.18
(SD)			(0.28)		(0.16)		(0.19)		(0.17)		(0.14)
Minimum			7.24		7.67		7.75		7.69		8.05
Maximum			8.29		8.26		8.32		8.43		8.37
Grand Mean			8.05								
(SD)			(0.11)								

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 35-44)
Data Source: File Folder: 24B
Forms: 12

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P121546-02 #2
Exposure Date: 9/26/2012

File Name: :\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF pH Holding Period by Day

pH: 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH	Chamber ID	pH
09/27/12	D0	E8	7.99	E2	7.86	E9	7.89	E13	7.92	E15	7.91
09/28/12	D1	E3	7.69	E4	7.73	E7	7.71	E12	7.80	E14	7.79
09/29/12	D2	E10	8.19	E11	8.03	E5	8.00	E1	8.03	E6	-
09/30/12	D3	E8	8.12	E2	8.06	E9	8.02	E13	8.06	E15	-
10/01/12	D4	E3	7.89	E4	8.03	E7	8.05	E12	8.14	E14	8.04
10/02/12	D5	E10	8.18	E11	8.01	E5	8.04	E1	8.07	E6	-
10/03/12	D6	E8	8.14	E2	8.11	E9	8.09	E13	8.11	E15	-
10/04/12	D7	E3	7.96	E4	8.07	E7	8.14	E12	8.16	E14	8.14
10/05/12	D8	E10	8.05	E11	8.15	E5	8.06	E1	8.12	E6	-
10/06/12	D9	E8	8.13	E2	8.10	E9	8.09	E13	8.09	E15	-
10/07/12	D10	E3	7.93	E4	8.09	E7	8.13	E12	8.18	E14	8.15
10/08/12	D11	E10	7.82	E11	7.92	E5	7.96	E1	7.95	E6	-
10/09/12	D12	E8	8.10	E2	8.07	E9	8.07	E13	8.10	E15	-
10/10/12	D13	E3	7.91	E4	7.98	E7	8.08	E12	8.12	E14	-
10/11/12	D14	E10	7.94	E11	7.95	E5	8.06	E1	7.99	E6	-
10/12/12	D15	E8	7.88	E2	7.87	E9	7.85	E13	7.92	E15	-
10/13/12	D16	E3	7.90	E4	7.98	E7	8.00	E12	8.10	E14	-
10/14/12	D17	E10	7.98	E11	7.96	E5	8.11	E1	8.00	E6	-
10/15/12	D18	E8	7.97	E2	7.96	E9	7.97	E13	8.01	E15	-
10/16/12	D19	E3	7.84	E4	7.92	E7	8.10	E12	7.92	E14	-
10/17/12	D20	E10	7.89	E11	7.88	E5	8.06	E1	8.01	E6	-
10/18/12	D21	E8	8.14	E2	8.13	E9	8.12	E13	8.15	E15	-
10/19/12	D22	E3	7.98	E4	8.05	E7	8.16	E12	8.06	E14	-
	Minimum		7.69		7.73		7.71		7.80		7.79
	Maximum		8.19		8.15		8.16		8.18		8.15

22-d Minimum (all treatment groups)	7.69
22-d Maximum (all treatment groups)	8.19

Item Number 4
Page 3 of 5

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 35-44)
Data Source: File Folder: 24B
Forms: 12

Species: Channel Catfish *Ictalurus punctatus* } Lot number: 123C00
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF Temp. Holding Period by Day

In Tank Temperatures (°C): 22d Holding Period

Date	Holding Day	Treatment Group									
		Control		50 mg/L		100 mg/L		200 mg/L		300 mg/L	
		Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)	Chamber ID	Temp. (°C)
09/27/12	D0	E8	22.0	E2	21.8	E9	21.9	E13	21.8	E15	21.9
09/28/12	D1	E3	21.7	E4	21.7	E7	21.8	E12	21.8	E14	21.6
09/29/12	D2	F10	21.4	E11	21.6	E5	21.4	E1	21.6	E6	-
09/30/12	D3	E8	21.7	E2	21.8	E9	21.9	E13	21.6	E15	-
10/01/12	D4	E3	21.8	E4	21.7	E7	21.8	E12	21.9	E14	21.5
10/02/12	D5	E10	21.6	E11	21.8	E5	21.5	E1	21.8	E6	-
10/03/12	D6	E8	22.0	E2	21.9	E9	22.0	E13	22.0	E15	-
10/04/12	D7	E3	22.1	E4	22.1	E7	22.0	E12	22.1	E14	21.9
10/05/12	D8	E10	21.8	E11	21.8	E5	21.8	E1	21.6	E6	-
10/06/12	D9	E8	21.8	E2	21.7	E9	21.8	E13	21.8	E15	-
10/07/12	D10	E3	21.8	E4	21.8	E7	21.9	E12	21.9	E14	21.4
10/08/12	D11	E10	21.7	E11	21.7	E5	21.7	E1	21.6	E6	-
10/09/12	D12	E8	21.9	E2	21.8	E9	21.9	E13	21.9	E15	-
10/10/12	D13	E3	22.0	E4	22.0	E7	21.9	E12	21.7	E14	-
10/11/12	D14	E10	22.0	E11	21.8	E5	21.9	E1	21.6	E6	-
10/12/12	D15	E8	21.9	E2	22.0	E9	22.0	E13	21.8	E15	-
10/13/12	D16	E3	22.2	E4	22.0	E7	22.1	E12	21.9	E14	-
10/14/12	D17	E10	22.1	E11	22.0	E5	22.0	E1	21.9	E6	-
10/15/12	D18	E8	21.8	E2	21.8	E9	21.9	E13	21.7	E15	-
10/16/12	D19	E3	22.1	E4	22.1	E7	22.0	E12	22.1	E14	-
10/17/12	D20	E10	22.0	E11	22.0	E5	22.1	E1	21.8	E6	-
10/18/12	D21	E8	22.0	E2	22.0	E9	22.0	E13	22.1	E15	-
10/19/12	D22	E3	22.1	E4	22.1	E7	22.0	E12	22.0	E14	-
Mean			21.9		21.9		21.9		21.8		21.7
(SD)			(0.2)		(0.1)		(0.2)		(0.2)		(0.2)
Minimum			21.4		21.6		21.4		21.6		21.4
Maximum			22.2		22.1		22.1		22.1		21.9
Grand Mean			21.8								
(SD)			(0.1)								

Item Number 4
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 33-44)
Data Source: File Folder: 248
Forms: 14

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

File Name: I:\AEH-12-PSEUDO-03\Data Summaries\Water Chemistry Data\[AEH-12-PSEUDO-03 CCF Water Chem.xlsx]CCF Weekly Water Chem.

Weekly Water Chemistry: 22d Holding Period

Week Number	Date	Replicate Number	Chamber ID	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Conductivity (µS)
1	10/02/12	Rep 1	E8	127	176	371
		Rep 2		128	178	370
		Rep 3		128	174	372
			Mean	128	176	371
			(SD)	(1)	(2)	(1)
2	10/09/12	Rep 1	E13	127	172	385
		Rep 2		125	174	384
		Rep 3		129	170	384
			Mean	127	172	384
			(SD)	(2)	(2)	(1)
3	10/15/12	Rep 1	E4	128	168	374
		Rep 2		129	172	376
		Rep 3		129	172	376
			Mean	129	171	375
			(SD)	(1)	(2)	(1)
			Grand Mean	128	173	377
			(SD)	(1)	(3)	(7)

FOLDER NO. 248

Item Number 4
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CREATED BY:
INITIALS: KW
DATE: 1MAY13

PROOFED BY
Initials: KW Date: 13MAY13
REVIEWED BY
Initials: JM Date: 5/14/13

Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
attn: James Luoma
2630 Fanta Reed Road
La Crosse, WI54603

Water Quality Laboratory
Upper Midwest Environmental Sciences Center
USGS
2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date: 03/19/2012
Report Date: 03/21/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
RBT-100-A-24H	0.130
RBT-100-B-24H	0.142
RBT-100-C-24H	0.124
RBT-200-A-24H	0.180
RBT-200-B-24H	0.204
RBT-200-C-24H	0.189
RBT-300-A-24H	0.228
RBT-300-B-24H	0.256
RBT-300-C-24H	0.455
RBT-50-A-24H	0.096
RBT-50-B-24H	0.098
RBT-50-C-24H	0.095
RBT-CONTROL-A-24H	0.087
RBT-CONTROL-B-24H	0.072
RBT-CONTROL-C-24H	0.068
YEP-100-A-24H	0.142
YEP-100-B-24H	0.150
YEP-100-C-24H	0.152
YEP-200-A-24H	0.194
YEP-200-B-24H	0.194
YEP-200-C-24H	0.192
YEP-300-A-24H	0.259
YEP-300-B-24H	0.237
YEP-300-C-24H	0.234
YEP-50-A-24H	0.112
YEP-50-B-24H	0.132
YEP-50-C-24H	0.099
YEP-CONTROL-A-24H	0.082
YEP-CONTROL-B-24H	0.090
YEP-CONTROL-C-24H	0.074

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[redacted]
Xiaoli Yuan

FF # 15
Item No. 1
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Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
attn: James Luoma
2630 Fanta Reed Road
La Crosse, WI54603

Water Quality Laboratory
Upper Midwest Environmental Sciences Center
USGS
2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date: 04/12/2012
Report Date: 04/13/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
WAE-100-A-24H	0.168
WAE-100-B-24H	0.147
WAE-100-C-24H	0.134
WAE-200-A-24H	0.217
WAE-200-B-24H	0.211
WAE-200-C-24H	0.226
WAE-300-A-24H	0.3
WAE-300-B-24H	0.253
WAE-300-C-24H	0.281
WAE-50-A-24H	0.107
WAE-50-B-24H	0.079
WAE-50-C-24H	0.113
WAE-CONTROL-A-24H	0.09
WAE-CONTROL-B-24H	0.058
WAE-CONTROL-C-24H	0.066

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FF # 15
Item No. 3
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Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
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Water Quality Laboratory
Upper Midwest Environmental Sciences Center
USGS
2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date: 05/21/2012
Report Date: 05/24/2012

REPORT OF ANALYSIS

AEH-12-PSEUDO-03

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
BKT-100-A-24H	0.153
BKT-100-B-24H	0.159
BKT-100-C-24H	0.147
BKT-200-A-24H	0.18
BKT-200-B-24H	0.181
BKT-200-C-24H	0.184
BKT-300-A-24H	0.207
BKT-300-B-24H	0.216
BKT-300-C-24H	0.207
BKT-50-A-24H	0.143
BKT-50-B-24H	0.135
BKT-50-C-24H	0.133
BKT-CONTROL-A-24H	0.132
BKT-CONTROL-B-24H	0.121
BKT-CONTROL-C-24H	0.122

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[redacted]

FF # 15
Item No. 3
Pg 1 of 1

Pg 1 of 1

Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
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Water Quality Laboratory
Upper Midwest Environmental Sciences Center
USGS
2630 Fanta Reed Road
La Crosse, Wi 54603

Analyzing Date: 06/29/2012
Report Date: 07/10/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
LMB-100-A-24H	0.144
LMB-100-B-24H	0.115
LMB-100-C-24H	0.122
LMB-200-A-24H	0.158
LMB-200-B-24H	0.177
LMB-200-C-24H	0.165
LMB-300-A-24H	0.223
LMB-300-B-24H	0.224
LMB-300-C-24H	0.196
LMB-50-A-24H	0.107
LMB-50-B-24H	0.098
LMB-50-C-24H	0.11
LMB-CONTROL-A-24H	0.096
LMB-CONTROL-B-24H	0.069
LMB-CONTROL-C-24H	0.068
SMB-100-A-24H	0.147
SMB-100-B-24H	0.159
SMB-100-C-24H	0.166
SMB-200-A-24H	0.185
SMB-200-B-24H	0.207
SMB-200-C-24H	0.256
SMB-300-A-24H	0.197
SMB-300-B-24H	0.196
SMB-300-C-24H	0.223
SMB-50-A-24H	0.131
SMB-50-B-24H	0.113
SMB-50-C-24H	0.133
SMB-CONTROL-A-24H	0.069
SMB-CONTROL-B-24H	0.096
SMB-CONTROL-C-24H	0.054

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Item No. 4
Pg 1 of 1

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Pg 1 of 1

Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
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Water Quality Laboratory
Upper Midwest Environmental Sciences Center
USGS
2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date: 07/23/2012
Report Date: 07/26/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
BLG-100-A-24H	0.09
BLG-100-B-24H	0.163
BLG-100-C-24H	0.156
BLG-200-A-24H	0.217
BLG-200-B-24H	0.118
BLG-200-C-24H	0.299
BLG-300-A-24H	0.227
BLG-300-B-24H	0.225
BLG-300-C-24H	0.251
BLG-50-A-24H	0.116
BLG-50-B-24H	0.127
BLG-50-C-24H	0.152
BLG-CONTROL-A-24H	0.08
BLG-CONTROL-B-24H	0.052
BLG-CONTROL-C-24H	0.087

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FF # 15
Item No. 3
Pg 1 of 1

Pg 1 of 1

Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
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La Crosse, WI54603

Water Quality Laboratory
Upper Midwest Environmental Sciences Center
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2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date: 08/07/2012
Report Date: 08/14/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
LST-100-A-24H	0.138
LST-100-B-24H	0.148
LST-100-C-24H	0.137
LST-200-A-24H	0.166
LST-200-B-24H	0.172
LST-200-C-24H	0.194
LST-300-A-24H	0.205
LST-300-B-24H	0.193
LST-300-C-24H	0.229
LST-50-A-24H	0.116
LST-50-B-24H	0.116
LST-50-C-24H	0.112
LST-CONTROL-A-24H	0.108
LST-CONTROL-B-24H	0.096
LST-CONTROL-C-24H	0.09

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FF # 15
Item No. 16
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Sample Description: 3 mL acidified exposure water (0.45 µm filtrated)
Study #: AEH-12-PSEUDO-03

Upper Midwest Environmental Sciences Center
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USGS
2630 Fanta Reed Road
La Crosse, WI 54603

Analyzing Date:10/09/2012
Report Date: 10/16/2012

AEH-12-PSEUDO-03

REPORT OF ANALYSIS

Sample Code	Results (Total Ammonia Nitrogen, mg NH_3-N/L)
CCF-100-A-24H	0.239
CCF-100-B-24H	0.269
CCF-100-C-24H	0.249
CCF-200-A-24H	0.289
CCF-200-B-24H	0.234
CCF-200-C-24H	0.453
CCF-300-A-24H	0.325
CCF-300-B-24H	0.264
CCF-300-C-24H	0.357
CCF-50-A-24H	0.165
CCF-50-B-24H	0.186
CCF-50-C-24H	0.184
CCF-CONTROL-A-24H	0.153
CCF-CONTROL-B-24H	0.143
CCF-CONTROL-C-24H	0.147

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FF # 15
Item No. 7
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Appendix 8. Spectrophotometric Summaries, SAS Outputs, Programs, and Logs

Item number	Item description	Number of pages	Report page number
1	Spectrophotometric Data – *Oncorhynchus mykiss*: Data Summary	7	993
2	Spectrophotometric Data – *Salvelinus fontinalis*: Data Summary	6	1000
3	Spectrophotometric Data – *Sander vitreus*: Data Summary	6	1006
4	Spectrophotometric Data – *Perca flavescens*: Data Summary	7	1012
5	Spectrophotometric Data – *Acipenser fulvescens*: Data Summary	6	1019
6	Spectrophotometric Data – *Micropterus salmoides*: Data Summary	6	1025
7	Spectrophotometric Data – *Micropterus dolomieu*: Data Summary	7	1031
8	Spectrophotometric Data – *Lepomis macrochirus*: Data Summary	6	1038
9	Spectrophotometric Data – *Ictalurus punctatus*: Data Summary	7	1044
10	SAS Spectrophotometric Analysis for *Oncorhynchus mykiss*	28	1051
11	SAS Spectrophotometric Analysis for *Salvelinus fontinalis*	27	1079
12	SAS Spectrophotometric Analysis for *Sander vitreus*	26	1106
13	SAS Spectrophotometric Analysis for *Perca flavescens*	28	1132
14	SAS Spectrophotometric Analysis for *Acipenser fulvescens*	27	1160
15	SAS Spectrophotometric Analysis for *Micropterus salmoides*	27	1187
16	SAS Spectrophotometric Analysis for *Micropterus dolomieu*	27	1214
17	SAS Spectrophotometric Analysis for *Lepomis macrochirus*	27	1241
18	SAS Spectrophotometric Analysis for *Ictalurus punctatus*	27	1268

	Action	Date	Initials
Study Number: AEH-12-PSEUDO-03	Created.....	5/1/2013	KLW
Lab Notebook #1 (pages 2-5)	Revised.....	2/9/2015	KLW
File Folder: 16E	Reviewed...	10 FEB 15	
Data Source: DU800 spectrophotometer output (dated: February 29, 2012 to March 1, 2012)	Certified.....	2/10/15	

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]RBT Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]RBT Sample Verification

Spectrophotometric Data - *Oncorhynchus mykiss*

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Non-linear Curve #1		Non-linear Curve #2	
Coefficient A	-0.00000058	Coefficient A	-0.00000033
Coefficient B	0.00203805	Coefficient B	0.00174071
Coefficient C	0.00090435	Coefficient C	-0.00253401
Variance	0.00000491	Variance	0.00001716

Data Explanation:
1) Two non-linear standard curves were created with 50, 100, 200, 300 and 400 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from analytical stocks. The first curve was used to determine sample concentrations from 1 to 12h. The second curve was used to determine sample concentrations from 15 to 24 h.
2) Non-linear Curve #1 created on February 29, 2012 at RBT exposure initiation from Analytical Stock #2
3) Non-linear Curve #2 created on March 1, 2012 for 15 to 24h sampling times from Analytical Stock #3
4) Standard Checks at 1 hour were verified using Standard Set #1 (created with Analytical Stock #2 at dosing initiation) against Non-linear Curve #1
5) Standard Checks at 6h were verified in triplicate using Standard Set #1 (created with Analytical Stock #2 at dosing initiation) against Non-linear Curve #1
6) Standard Checks at 12h were verified twice (1 hour apart) using Standard Set #1 (created with Analytical Stock #2 at dosing initiation) against Non-linear Curve #1
7) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #3 between 10 and 12 hour post-dosing initiation) against Non-linear Curve #2
8) Sample concentration verifications from exposure chambers at 1, 3, 6 and 12h were analyzed against Non-linear Curve #1
9) Sample concentration verifications from exposure chambers at 15, 18 and 24h were analyzed against Non-linear Curve #2

Data Anomalies and Deviations:
1) Analytical Stock #1 was spilled during preparation of the stock and thus discarded
2) Additional samples concentration verifications were analyzed at 1h from delivery tubes. These samples were taken to verify that the intended concentration was being delivered to the exposure chambers. These samples will not be analyzed. The 1h spectrophotometer concentration verification samples analyzed were collected from the exposure chambers.
3) Standard Checks were verified at 1h.
4) Standard Checks were verified at 6h in triplicate.
5) Standard Checks were verified at 12h in duplicate approximately 1h apart.

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column.
Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

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File Folder: 16E

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 2-5)
File Folder: 16E
Data Source: DU800 spectrophotometer output (dated: February 29, 2012 to March 1, 2012)

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf-CL 145A* [SDP] Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Spectrophotometric Data - *Oncorhynchus mykiss*

Standard Curve

Non-linear Curve #1

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
50	0.1036	51.1382	0.1022	50.4461	0.1032	50.9103
100	0.1963	98.6250	0.1946	97.7557	0.1997	100.3750
200	0.3862	200.4354	0.3825	198.3956	0.3847	199.5751
300	0.5605	300.0484	0.5650	302.6923	0.5630	301.5201
400	0.7255	401.0615	0.7284	402.8722	0.7147	394.1874

Non-linear Curve #1

Coefficient A	-0.00000058
Coefficient B	0.00208805
Coefficient C	0.00090485
Variance	0.00000491

Non-linear Curve #2

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
50	0.0801	47.9320	0.0821	49.0759	0.0834	49.8285
100	0.1691	100.5264	0.1712	101.7998	0.1685	100.1446
200	0.3379	203.4625	0.3364	202.4790	0.3341	201.0486
300	0.4713	287.9831	0.4881	298.8398	0.4943	302.8581
400	0.6323	394.2195	0.6465	403.8337	0.6497	406.0287

Non-linear Curve #2

Coefficient A	-0.00000033
Coefficient B	0.00174071
Coefficient C	-0.00253401
Variance	0.00001756

Standard Checks

STD Conc [mg/L]	1h		6h - Rep 1		6h - Rep 2		6h - Rep 3		12h - Rep 1		12h - Rep 2		18h		24h	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
50	0.0958	47.2026	0.0845	41.5153	0.0883	43.7012	0.0913	44.9466	0.0859	42.2618	0.0950	46.7743	0.0852	51.4834	0.0871	51.3860
100	0.1900	98.3680	0.1832	91.8408	0.1845	92.5252	0.1859	93.7343	0.1851	93.3878	0.1853	92.9076	0.1697	100.8865	0.1764	104.8871
200	0.3762	194.5826	0.3440	177.2538	0.3542	182.8105	0.3520	181.6218	0.3659	189.2418	0.3604	186.2089	0.3283	197.4603	0.3364	202.4983
300	0.5348	284.9451	0.5181	275.2105	0.5250	279.2075	0.5243	278.7990	0.5221	278.1176	0.5209	276.8286	0.4826	295.2712	0.4921	301.4136
400	0.7064	388.9728	0.6363	345.5820	0.6769	370.5155	0.6901	378.7807	0.6784	371.4549	0.6728	368.0047	0.6174	384.2050	0.6310	393.3942

Standard Check Averages

Std Conc	Average	Std Dev
50 mg/L	46.86	3.96
100 mg/L	95.69	4.38
200 mg/L	189.00	8.12
300 mg/L	283.72	8.97
400 mg/L	375.11	14.05

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Study Number: AEM-12-PSEUDO-08
Lab Notebook #1 (pages 2-5)
File Folder: 16E
Data Source: DU800 spectrophotometer output (dated: February 29, 2012 to March 1, 2012)

Species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Spectrophotometric Data - *Oncorhynchus mykiss*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	0	-0.0045	-2.6380	-0.0066	-3.6685	-0.0058	-3.2999	-0.0052	-3.0160	-0.0065	-2.2760	-0.0071	-2.6011	-0.0007	1.0037
A2	50	0.0818	15.2110	0.0556	27.0589	0.0606	29.5058	0.0582	28.3483	0.0582	35.1446	0.0597	36.0039	0.0650	39.1048
A3	200	0.1785	89.4102	0.2407	121.8470	0.2400	121.5136	0.2393	121.1233	0.2446	146.0486	0.2454	146.5191	0.2485	148.3916
A4	300	0.2836	144.6533	0.3470	178.8740	0.3524	181.8044	0.3504	180.7164	0.3576	215.7293	0.3560	214.7436	0.3634	219.3724
A5	100	0.0697	34.0946	0.1035	51.0755	0.1087	53.7071	0.1101	54.4184	0.1075	64.0041	0.1119	66.5801	0.1171	69.6511
B1	100	0.1148	56.7797	0.1298	64.4003	0.1369	68.0137	0.1338	66.4459	0.1439	85.5125	0.1457	86.6058	0.1452	86.2834
B2	0	-0.0023	-1.5834	-0.0079	-4.2941	-0.0061	-3.4485	-0.0066	-3.6678	-0.0067	-2.4133	-0.0002	1.3429	-0.0009	0.9504
B3	200	0.1832	91.8569	0.2319	117.2356	0.2407	121.8723	0.2402	121.6122	0.2497	149.1029	0.2593	154.9917	0.2571	153.6505
B4	300	0.2484	125.9484	0.3285	168.8544	0.3428	176.5956	0.3412	175.7205	0.3619	218.4329	0.4319	262.7122	0.3640	219.7462
B5	50	0.0396	19.1066	0.0614	29.9175	0.0597	29.0820	0.0630	30.7241	0.0627	37.7530	0.0678	40.7187	0.0696	41.7948
C1	100	0.0632	30.8500	0.1038	51.2453	0.1102	54.4527	0.1091	53.9106	0.1101	65.5051	0.1147	68.2212	0.1124	66.9000
C2	50	0.0270	12.8535	0.0567	27.5892	0.0577	28.0913	0.0568	27.6587	0.0591	35.6554	0.0670	40.2272	0.0658	39.5668
C3	200	0.1821	91.2698	0.2418	122.4516	0.2425	122.7948	0.2389	120.8892	0.2421	144.5065	0.2583	154.3883	0.2417	144.2592
C4	0	-0.0058	-3.2692	-0.0055	-3.1567	-0.0056	-3.1718	-0.0034	-2.1099	-0.0050	-1.3926	0.0005	1.7525	0.0023	2.8040
C5	300	0.2894	147.7139	0.3657	183.6505	0.3618	186.9751	0.3620	187.0830	0.3568	215.2318	0.3605	217.5302	0.3540	213.4784

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-2.35 (1.46)	30.05 (7.33)	56.22 (11.17)	127.84 (19.64)	190.84 (25.26)
B	-1.87 (2.08)	32.73 (7.39)	73.44 (11.48)	130.05 (21.72)	192.57 (41.17)
C	-1.22 (2.32)	30.23 (8.76)	55.87 (12.07)	128.65 (19.60)	193.10 (23.07)
Grand Mean	-1.81 (0.46)	31.01 (1.22)	61.84 (8.20)	128.84 (0.91)	192.17 (0.96)

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tank	theor	time	abs	conc
.	50	0	0.1036	50
.	100	0	0.1963	100
.	200	0	0.3862	200
.	300	0	0.5605	300
.	400	0	0.7255	400
.	50	0	0.1022	50
.	100	0	0.1946	100
.	200	0	0.3825	200
.	300	0	0.5650	300
.	400	0	0.7284	400
.	50	0	0.1032	50
.	100	0	0.1997	100
.	200	0	0.3847	200
.	300	0	0.5630	300
.	400	0	0.7147	400
.	50	0	0.0801	50
.	100	0	0.1691	100
.	200	0	0.3379	200
.	300	0	0.4713	300
.	400	0	0.6323	400
.	50	0	0.0821	50
.	100	0	0.1712	100
.	200	0	0.3364	200
.	300	0	0.4881	300
.	400	0	0.6465	400
.	50	0	0.0834	50
.	100	0	0.1685	100
.	200	0	0.3341	200
.	300	0	0.4943	300
.	400	0	0.6497	400
A1	0	1	-0.0045	.
A2	50	1	0.0318	.
A3	200	1	0.1785	.
A4	300	1	0.2836	.
A5	100	1	0.0697	.
B1	100	1	0.1148	.
B2	0	1	-0.0023	.
B3	200	1	0.1832	.
B4	300	1	0.2484	.
B5	50	1	0.0396	.
C1	100	1	0.0632	.
C2	50	1	0.0270	.
C3	200	1	0.1821	.
C4	0	1	-0.0058	.
C5	300	1	0.2894	.
A1	0	3	-0.0066	.

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A2	50	3	0.0556	.
A3	200	3	0.2407	.
A4	300	3	0.3470	.
A5	100	3	0.1035	.
B1	100	3	0.1298	.
B2	0	3	-0.0079	.
B3	200	3	0.2319	.
B4	300	3	0.3286	.
B5	50	3	0.0614	.
C1	100	3	0.1038	.
C2	50	3	0.0567	.
C3	200	3	0.2418	.
C4	0	3	-0.0055	.
C5	300	3	0.3557	.
A1	0	6	-0.0058	.
A2	50	6	0.0605	.
A3	200	6	0.2400	.
A4	300	6	0.3524	.
A5	100	6	0.1087	.
B1	100	6	0.1369	.
B2	0	6	-0.0061	.
B3	200	6	0.2407	.
B4	300	6	0.3428	.
B5	50	6	0.0597	.
C1	100	6	0.1102	.
C2	50	6	0.0577	.
C3	200	6	0.2425	.
C4	0	6	-0.0056	.
C5	300	6	0.3618	.
A1	0	12	-0.0052	.
A2	50	12	0.0582	.
A3	200	12	0.2393	.
A4	300	12	0.3504	.
A5	100	12	0.1101	.
B1	100	12	0.1338	.
B2	0	12	-0.0066	.
B3	200	12	0.2402	.
B4	300	12	0.3412	.
B5	50	12	0.0630	.
C1	100	12	0.1091	.
C2	50	12	0.0568	.
C3	200	12	0.2389	.
C4	0	12	-0.0034	.
C5	300	12	0.3620	.
A1	0	15	-0.0065	.
A2	50	15	0.0582	.
A3	200	15	0.2446	.

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A4	300	15	0.3576	.
A5	100	15	0.1075	.
B1	100	15	0.1439	.
B2	0	15	-0.0067	.
B3	200	15	0.2497	.
B4	300	15	0.3619	.
B5	50	15	0.0627	.
C1	100	15	0.1101	.
C2	50	15	0.0591	.
C3	200	15	0.2421	.
C4	0	15	-0.0050	.
C5	300	15	0.3568	.
A1	0	18	-0.0071	.
A2	50	18	0.0597	.
A3	200	18	0.2454	.
A4	300	18	0.3560	.
A5	100	18	0.1119	.
B1	100	18	0.1457	.
B2	0	18	-0.0002	.
B3	200	18	0.2593	.
B4	300	18	0.4319	.
B5	50	18	0.0678	.
C1	100	18	0.1147	.
C2	50	18	0.0670	.
C3	200	18	0.2583	.
C4	0	18	0.0005	.
C5	300	18	0.3605	.
A1	0	24	-0.0007	.
A2	50	24	0.0650	.
A3	200	24	0.2485	.
A4	300	24	0.3634	.
A5	100	24	0.1171	.
B1	100	24	0.1452	.
B2	0	24	-0.0009	.
B3	200	24	0.2571	.
B4	300	24	0.3640	.
B5	50	24	0.0696	.
C1	100	24	0.1124	.
C2	50	24	0.0658	.
C3	200	24	0.2417	.
C4	0	24	0.0023	.
C5	300	24	0.3540	.
SC1	50	1	0.0958	.
SC2	100	1	0.1900	.
SC3	200	1	0.3762	.
SC4	300	1	0.5348	.
SC5	400	1	0.7064	.

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SC1	50	6	0.0845
SC2	100	6	0.1832
SC3	200	6	0.3440
SC4	300	6	0.5181
SC5	400	6	0.6363
SC1	50	6.1	0.0889
SC2	100	6.1	0.1845
SC3	200	6.1	0.3542
SC4	300	6.1	0.5250
SC5	400	6.1	0.6769
SC1	50	6.2	0.0913
SC2	100	6.2	0.1869
SC3	200	6.2	0.3520
SC4	300	6.2	0.5243
SC5	400	6.2	0.6901
SC1	50	12	0.0959
SC2	100	12	0.1861
SC3	200	12	0.3659
SC4	300	12	0.5231
SC5	400	12	0.6784
SC1	50	12.1	0.0950
SC2	100	12.1	0.1853
SC3	200	12.1	0.3604
SC4	300	12.1	0.5209
SC5	400	12.1	0.6728
SC1	50	12.1	0.0862
SC2	100	18	0.1697
SC3	200	18	0.3283
SC4	300	18	0.4826
SC5	400	18	0.6174
SC1	50	24	0.0871
SC2	100	24	0.1764
SC3	200	24	0.3364
SC4	300	24	0.4921
SC5	400	24	0.6310

AEH-12-PSEUDO-03

FF # 16e
Item No. 1
Pg 1 of 1

	Action	Date	Initials
Study Number: AEH-12-PSEUDO-03	Created.....	5/1/2013	KLW
Lab Notebook #1 (pages 37-40)	Revised.....	2/9/2015	KLW
File Folder: 17E	Reviewed...	2/10/15	
Data Source: DU800 spectrophotometer output (dated: May 2 to 3, 2012)	Certified.....	2/10/15	

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]BKT Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]BKT Sample Verification

Spectrophotometric Data - *Salvelinus fontinalis*

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Non-linear Curve #1

Coefficient A	-0.00000009
Coefficient B	0.00157793
Coefficient C	0.00748658
Variance	0.00000051

Data Explanation:
1) Non-linear Standard Curve #1 was created on May 2, 2012 for BKT exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
2) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #2 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
1) Diluter B 3h samples were recnecked 3.5h into exposure. Diluter B was re-sampled 30 minutes late because the origina 100 (Chamber B2) and 200 (Chamber B4) mg/L sample concentrations were similar, indicating a sampling error. The 3.5h samples were used for analysis (DU800 Spectrophotometer output; dated: May 2, 2012; Time stamped: 12:30 PM)

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the co umn.
Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 17e

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 37-40)
File Folder: 17E
Data Source: DU800 spectrophotometer output (dated: May 2 to 3, 2012)

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Spectrophotometric Data - *Salvelinus fontinalis*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0479	25.6542	0.0460	24.4200	0.0484	25.9509
50	0.0871	50.9815	0.0853	49.4398	0.0852	49.4169
100	0.1652	100.5618	0.1631	99.1868	0.1625	98.8240
200	0.3193	199.9989	0.3196	200.1354	0.3214	201.3088
300	0.4727	300.1215	0.4722	299.7845	0.4719	299.6161

Non-linear Curve #1

Coefficient A	-0.00000309
Coefficient B	0.00157793
Coefficient C	0.00748658
Variance	0.00000051

Standard Checks

STD Conc (mg/L)	6h		12h		18h		24h	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0475	25.4036	0.0471	25.1143	0.0425	22.2086	0.0454	24.0580
50	0.0811	46.7717	0.0858	52.3286	0.0803	46.2447	0.0804	46.3443
100	0.1574	95.5186	0.1583	96.7389	0.1579	95.8458	0.1495	90.5040
200	0.3096	193.6574	0.3026	189.1304	0.3173	198.7048	0.3309	207.5001
300	0.4549	288.4627	0.4544	288.1273	0.4723	299.8503	0.4473	283.4605

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	24.20	1.25
50 mg/L	47.92	2.55
100 mg/L	94.65	2.44
200 mg/L	197.25	6.82
300 mg/L	289.98	6.03

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 37-40)
File Folder: 17E
Data Source: DU800 spectrophotometer output (dated: May 2 to 3, 2012)

Species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120308
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Spectrophotometric Data - *Salvelinus fontinalis*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	300	0.3305	207.2529	0.3878	244.2081	0.3923	247.4770	0.3949	249.2138	0.3722	234.3797	0.3698	232.8374	0.3715	233.9202
A2	50	0.0404	20.8716	0.0601	33.4071	0.0627	35.0789	0.0626	34.9821	0.0596	33.1055	0.0599	33.3038	0.0583	32.2326
A3	100	0.0868	50.4227	0.1161	69.1242	0.1190	70.9861	0.1201	71.6413	0.1141	67.8069	0.1148	68.3055	0.1151	68.5063
A4	0	-0.0004	-5.0164	-0.0001	-4.8162	-0.0004	-4.9907	-0.0003	-4.9181	0.0051	-1.5218	-0.0002	-4.8539	-0.0014	-5.6566
A5	200	0.2279	140.8710	0.2657	165.2565	0.2688	167.2864	0.2672	166.1918	0.2559	158.9247	0.2544	157.9295	0.2559	158.9498
B1	300	0.3537	228.8316	0.3989	251.8222	0.4018	253.7010	0.4074	257.3810	0.4022	257.0296	0.4246	268.5999	0.4240	268.2027
B2	100	0.1310	78.6290	0.1493	90.3767	0.1581	95.9778	0.1528	92.5761	0.1587	96.3538	0.1595	96.9000	0.1591	96.6372
B3	50	0.0550	30.1490	0.0663	37.3404	0.0673	38.0083	0.0707	40.1519	0.0740	42.2550	0.0722	41.1323	0.0734	41.8657
B4	200	0.2500	155.0933	0.2696	167.7541	0.2714	168.9484	0.2720	169.2965	0.2850	177.7248	0.2874	179.3006	0.2856	178.1497
B5	0	0.0042	-2.1002	0.0003	-4.5789	-0.0004	-4.9818	-0.0008	-5.2777	-0.0009	-5.2872	-0.0012	-5.4807	-0.0014	-5.6012
C1	0	-0.0007	-5.1625	0.0001	-4.6793	-0.0003	-4.9359	-0.0009	-5.2965	-0.0008	-5.2318	-0.0008	-5.2782	-0.0011	-5.4262
C2	100	0.0926	54.1245	0.1142	67.8807	0.1194	71.1985	0.1243	74.3764	0.1243	74.5425	0.1243	74.3267	0.1230	73.5544
C3	300	0.3420	214.7490	0.3817	240.5465	0.3873	244.2499	0.3946	248.9773	0.3994	252.1203	0.3980	251.2005	0.3996	252.2317
C4	200	0.2408	149.1936	0.2619	162.7902	0.2625	163.1651	0.2709	168.6317	0.2727	169.7925	0.2738	170.5152	0.2765	172.2515
C5	50	0.0436	22.9315	0.0660	37.1374	0.0681	38.4858	0.0701	39.7952	0.0717	40.7711	0.0704	39.9391	0.0732	41.7371

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	C	50	100	200	300
A	-4.54 (1.26)	31.85 (4.58)	66.68 (6.77)	158.34 (8.35)	235.61 (13.18)
B	-4.76 (1.13)	38.70 (5.89)	92.49 (6.10)	170.90 (7.89)	256.51 (13.04)
C	-5.14 (0.24)	37.26 (6.01)	69.97 (6.84)	165.19 (7.34)	243.44 (12.40)
Grand Mean	-4.81 (0.25)	35.94 (2.95)	76.38 (11.47)	165.14 (4.72)	245.19 (8.62)

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tank	theor	time	abs	conc
.	25	0	0.0479	25
.	50	0	0.0871	50
.	100	0	0.1652	100
.	200	0	0.3193	200
.	300	0	0.4727	300
.	25	0	0.0460	25
.	50	0	0.0853	50
.	100	0	0.1631	100
.	200	0	0.3196	200
.	300	0	0.4722	300
.	25	0	0.0484	25
.	50	0	0.0852	50
.	100	0	0.1625	100
.	200	0	0.3214	200
.	300	0	0.4719	300
A1	300	1	0.3305	.
A2	50	1	0.0404	.
A3	100	1	0.0868	.
A4	0	1	-0.0004	.
A5	200	1	0.2279	.
B1	300	1	0.3637	.
B2	100	1	0.1310	.
B3	50	1	0.0550	.
B4	200	1	0.2500	.
B5	0	1	0.0042	.
C1	0	1	-0.0007	.
C2	100	1	0.0926	.
C3	300	1	0.3420	.
C4	200	1	0.2408	.
C5	50	1	0.0436	.
A1	300	3	0.3873	.
A2	50	3	0.0601	.
A3	100	3	0.1161	.
A4	0	3	-0.0001	.
A5	200	3	0.2657	.
B1	300	3	0.3989	.
B2	100	3	0.1493	.
B3	50	3	0.0663	.
B4	200	3	0.2696	.
B5	0	3	0.0003	.
C1	0	3	0.0001	.
C2	100	3	0.1142	.
C3	300	3	0.3817	.
C4	200	3	0.2619	.
C5	50	3	0.0660	.
A1	300	6	0.3923	.

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A2	50	6	0.0627	.
A3	100	6	0.1190	.
A4	0	6	-0.0004	.
A5	200	6	0.2688	.
B1	300	6	0.4018	.
B2	100	6	0.1581	.
B3	50	6	0.0673	.
B4	200	6	0.2714	.
B5	0	6	-0.0004	.
C1	0	6	-0.0003	.
C2	100	6	0.1194	.
C3	300	6	0.3873	.
C4	200	6	0.2625	.
C5	50	6	0.0681	.
A1	300	12	0.3949	.
A2	50	12	0.0626	.
A3	100	12	0.1201	.
A4	0	12	-0.0003	.
A5	200	12	0.2672	.
B1	300	12	0.4074	.
B2	100	12	0.1528	.
B3	50	12	0.0707	.
B4	200	12	0.2720	.
B5	0	12	-0.0008	.
C1	0	12	-0.0009	.
C2	100	12	0.1243	.
C3	300	12	0.3946	.
C4	200	12	0.2709	.
C5	50	12	0.0701	.
A1	300	15	0.3722	.
A2	50	15	0.0596	.
A3	100	15	0.1141	.
A4	0	15	0.0051	.
A5	200	15	0.2559	.
B1	300	15	0.4222	.
B2	100	15	0.1587	.
B3	50	15	0.0740	.
B4	200	15	0.2850	.
B5	0	15	-0.0009	.
C1	0	15	-0.0008	.
C2	100	15	0.1243	.
C3	300	15	0.3994	.
C4	200	15	0.2727	.
C5	50	15	0.0717	.
A1	300	18	0.3698	.
A2	50	18	0.0599	.
A3	100	18	0.1148	.

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A4	0	18	-0.0002	.
A5	200	18	0.2544	.
B1	300	18	0.4246	.
B2	100	18	0.1595	.
B3	50	18	0.0722	.
B4	200	18	0.2874	.
B5	0	18	-0.0012	.
C1	0	18	-0.0008	.
C2	100	18	0.1243	.
C3	300	18	0.3980	.
C4	200	18	0.2738	.
C5	50	18	0.0704	.
A1	300	24	0.3715	.
A2	50	24	0.0583	.
A3	100	24	0.1151	.
A4	0	24	-0.0014	.
A5	200	24	0.2559	.
B1	300	24	0.4240	.
B2	100	24	0.1591	.
B3	50	24	0.0734	.
B4	200	24	0.2856	.
B5	0	24	-0.0014	.
C1	0	24	-0.0011	.
C2	100	24	0.1230	.
C3	300	24	0.3996	.
C4	200	24	0.2765	.
C5	50	24	0.0732	.
SC1	25	6	0.0475	.
SC2	50	6	0.0811	.
SC3	100	6	0.1574	.
SC4	200	6	0.3096	.
SC5	300	6	0.4549	.
SC1	25	12	0.0471	.
SC2	50	12	0.0898	.
SC3	100	12	0.1593	.
SC4	200	12	0.3026	.
SC5	300	12	0.4544	.
SC1	25	18	0.0425	.
SC2	50	18	0.0803	.
SC3	100	18	0.1579	.
SC4	200	18	0.3173	.
SC5	300	18	0.4723	.
SC1	25	24	0.0454	.
SC2	50	24	0.0804	.
SC3	100	24	0.1495	.
SC4	200	24	0.3309	.
SC5	300	24	0.4473	.

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Study Number: AEH-12-PSEUDO-03 Lab Notebook #1 (pages 21-24) File Folder: 18E Data Source: DU800 spectrophotometer output (dated: March 21 to 22, 2012)	Action	Date	Initials
	Created.....	5/1/2013	KLW
	Revisec.....	2/9/2015	KLW
	Reviewed..	10 Feb 15	
	Certified.....	2/10/15	SL

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]WAE Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]WAE Sample Verification

Spectrophotometric Data - *Sander vitreus*

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical Lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Non-linear Curve #2	
Coefficient A	-0.0000003
Coefficient B	0.0016635
Coefficient C	0.00154101
Variance	0.00000006

Data Explanation:
1) Non-linear standard Curve #2 was created on March 21, 2012 for WAE exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
2) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #4 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 18 and 24h

Data Anomalies and Deviations:
1) In an attempt to reduce variation, an initial standard curve was made from three replicates of 25, 50, 100, 200 and 300 mg/L dilutions of 3 different 2,000 mg/L active ingredient analytical stocks. These were Analytical Stocks #1, 2 and 3. Due to variation in samples and poor line fit, the initial standard curve was discarded along with Analytical Stocks #2 and 3. Dilutions of 25, 50, 100, 200 and 300 mg/L from Analytical Stock #1 were used to create Non-linear Standard Curve #2 which was used to verify sample concentrations during the WAE exposure.
2) Concentration verification samples were not collected or analyzed at 15h.

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 18E

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 21-24)
File Folder: 18E
Data Source: DU800 spectrophotometer output (dated: March 21 to 22, 2012)

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Spectrophotometric Data - *Sander vitreus*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0429	24.8647	0.0431	25.3681	0.0421	24.5142
50	0.0836	49.7720	0.0852	50.7428	0.0840	50.0017
100	0.1663	100.8522	0.1646	99.8146	0.1640	99.4697
200	0.3236	200.8930	0.3220	200.5101	0.3196	198.2815
300	0.4740	300.2642	0.4741	300.3770	0.4728	299.4765

Non-linear Curve #2

Coefficient A	0.0000083
Coefficient B	0.0016635
Coefficient C	0.00154101
Variance	0.00000006

Standard Checks

STD Conc (mg/L)	6h		12h		18h		24h	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0388	22.5086	0.0418	24.3030	0.0406	23.5592	0.0422	24.5700
50	0.0777	46.1492	0.0772	45.8433	0.0801	47.6113	0.0810	48.2052
100	0.1557	94.2675	0.1561	94.5145	0.1365	82.3245	0.1591	96.3748
200	0.3171	196.7029	0.3132	194.1412	0.3057	189.2802	0.3152	195.4571
300	0.4617	291.9912	0.4514	285.0707	0.4404	277.7497	0.4723	299.1459

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	23.74	0.80
50 mg/L	46.93	0.58
100 mg/L	91.87	5.57
200 mg/L	193.90	2.81
300 mg/L	288.49	7.55

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 21-24)
File Folder: 18E
Data Source: DU800 spectrophotometer output (dated: March 21 to 22, 2012)

Species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4869-4-(7-8)
Exposure Date: 3/21/2012

Spectrophotometric Data - *Sander vitreus*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	200	0.1974	120.8451	0.2622	162.3972	0.2727	168.1291	0.2516	154.6388	-	-	0.2168	132.5790	0.2231	136.5457
A2	0	0.0007	-0.4873	0.0008	-0.4704	-0.0017	-1.9674	-0.0025	-2.4723	-	-	-0.0035	-3.0032	-0.0022	-2.2252
A3	300	0.2998	183.5233	0.3901	244.3535	0.3978	249.4603	0.3760	235.0525	-	-	0.3198	198.4420	0.3267	202.9157
A4	100	0.0712	42.1665	0.1164	69.8992	0.1201	72.2151	0.1120	67.2261	-	-	0.0978	58.4784	0.1009	60.3761
A5	50	0.0348	20.0913	0.0649	38.3478	0.0702	41.5780	0.0601	35.4128	-	-	0.0537	31.5581	0.0589	34.7769
B1	200	0.2168	132.5756	0.2446	150.1675	0.2427	148.9941	0.2401	147.3041	-	-	0.2436	149.5422	0.2534	155.7712
B2	50	0.0347	20.0084	0.0557	32.7317	0.0557	32.7652	0.0558	32.8187	-	-	0.0563	33.1016	0.0638	37.7079
B3	100	0.1072	64.2863	0.1312	79.0637	0.1384	83.5256	0.1306	78.7222	-	-	0.1342	80.9302	0.1430	86.3692
B4	300	0.3188	197.8078	0.3612	225.3557	0.3631	226.6463	0.3587	223.4102	-	-	0.3610	225.2546	0.3784	236.6403
B5	0	0.0013	-0.1576	0.0003	-0.7822	-0.0015	-1.8159	-0.0019	-2.0570	-	-	-0.0034	-2.9680	-0.0023	-2.3226
C1	300	0.2660	163.8375	0.3637	227.0271	0.3797	237.4823	0.3715	232.1041	-	-	0.3626	226.3113	0.3579	223.2220
C2	200	0.1664	100.9321	0.2463	151.2354	0.2560	157.4201	0.2512	154.4110	-	-	0.2509	154.2016	0.2504	153.8504
C3	0	0.0000	-0.9346	0.0002	-0.7824	-0.0014	-1.7408	-0.0029	-2.6700	-	-	-0.0018	-1.9981	-0.0021	-2.1703
C4	100	0.0558	32.8890	0.1066	63.9105	0.1135	68.1115	0.1129	67.7509	-	-	0.1208	72.6711	0.1247	75.0481
C5	50	0.0315	18.0689	0.0582	34.2630	0.0605	35.6444	0.0616	36.3482	-	-	0.0714	42.3438	0.0767	45.5509

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-1.52 (0.97)	33.62 (6.80)	85.73 (10.02)	145.60 (16.97)	219.29 (26.60)
B	-1.68 (0.96)	31.52 (5.45)	78.82 (7.01)	147.39 (7.13)	222.52 (11.86)
C	-1.72 (0.67)	35.37 (8.70)	83.38 (14.12)	145.34 (19.94)	218.33 (24.80)
Grand Mean	-1.64 (0.09)	33.50 (1.57)	82.98 (7.69)	146.11 (0.91)	220.05 (1.79)

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tank	theor	time	abs	conc
.	25	0	0.0429	25
.	50	0	0.0836	50
.	100	0	0.1663	100
.	200	0	0.3236	200
.	300	0	0.4740	300
.	25	0	0.0431	25
.	50	0	0.0852	50
.	100	0	0.1646	100
.	200	0	0.3230	200
.	300	0	0.4741	300
.	25	0	0.0421	25
.	50	0	0.0840	50
.	100	0	0.1640	100
.	200	0	0.3196	200
.	300	0	0.4728	300
A1	200	1	0.1974	.
A2	0	1	0.0007	.
A3	300	1	0.2998	.
A4	100	1	0.0712	.
A5	50	1	0.0348	.
B1	200	1	0.2168	.
B2	50	1	0.0347	.
B3	100	1	0.1072	.
B4	300	1	0.3188	.
B5	0	1	0.0013	.
C1	300	1	0.2660	.
C2	200	1	0.1664	.
C3	0	1	0.0000	.
C4	100	1	0.0558	.
C5	50	1	0.0315	.
A1	200	3	0.2622	.
A2	0	3	0.0008	.
A3	300	3	0.3901	.
A4	100	3	0.1164	.
A5	50	3	0.0649	.
B1	200	3	0.2446	.
B2	50	3	0.0557	.
B3	100	3	0.1312	.
B4	300	3	0.3612	.
B5	0	3	0.0003	.
C1	300	3	0.3637	.
C2	200	3	0.2463	.
C3	0	3	0.0002	.
C4	100	3	0.1066	.
C5	50	3	0.0582	.
A1	200	6	0.2727	.

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A2	0	6	-0.0017	.
A3	300	6	0.3978	.
A4	100	6	0.1201	.
A5	50	6	0.0702	.
B1	200	6	0.2427	.
B2	50	6	0.0557	.
B3	100	6	0.1384	.
B4	300	6	0.3631	.
B5	0	6	-0.0015	.
C1	300	6	0.3797	.
C2	200	6	0.2560	.
C3	0	6	-0.0014	.
C4	100	6	0.1135	.
C5	50	6	0.0605	.
A1	200	12	0.2516	.
A2	0	12	-0.0026	.
A3	300	12	0.3760	.
A4	100	12	0.1120	.
A5	50	12	0.0601	.
B1	200	12	0.2401	.
B2	50	12	0.0558	.
B3	100	12	0.1306	.
B4	300	12	0.3582	.
B5	0	12	-0.0019	.
C1	300	12	0.3715	.
C2	200	12	0.2512	.
C3	0	12	-0.0029	.
C4	100	12	0.1129	.
C5	50	12	0.0616	.
A1	200	18	0.2168	.
A2	0	18	-0.0035	.
A3	300	18	0.3198	.
A4	100	18	0.0978	.
A5	50	18	0.0537	.
B1	200	18	0.2436	.
B2	50	18	0.0563	.
B3	100	18	0.1342	.
B4	300	18	0.3610	.
B5	0	18	-0.0034	.
C1	300	18	0.3626	.
C2	200	18	0.2509	.
C3	0	18	-0.0018	.
C4	100	18	0.1208	.
C5	50	18	0.0714	.
A1	200	24	0.2231	.
A2	0	24	-0.0022	.
A3	300	24	0.3267	.

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A4	100	24	0.1009	.
A5	50	24	0.0589	.
B1	200	24	0.2534	.
B2	50	24	0.0638	.
B3	100	24	0.1430	.
B4	300	24	0.3784	.
B5	0	24	-0.0023	.
C1	300	24	0.3579	.
C2	200	24	0.2504	.
C3	0	24	-0.0021	.
C4	100	24	0.1247	.
C5	50	24	0.0767	.
SC1	25	6	0.0388	.
SC2	50	6	0.0777	.
SC3	100	6	0.1557	.
SC4	200	6	0.3171	.
SC5	300	6	0.4617	.
SC1	25	12	0.0418	.
SC2	50	12	0.0772	.
SC3	100	12	0.1561	.
SC4	200	12	0.3132	.
SC5	300	12	0.4514	.
SC1	25	18	0.0406	.
SC2	50	18	0.0801	.
SC3	100	18	0.1365	.
SC4	200	18	0.3057	.
SC5	300	18	0.4404	.
SC1	25	24	0.0422	.
SC2	50	24	0.0810	.
SC3	100	24	0.1591	.
SC4	200	24	0.3152	.
SC5	300	24	0.4723	.

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	Action	Date	Initials
Study Number: AEH-12-PSEUDO-03	Created.....	5/1/2013	KLW
Lab Notebook #1 (pages 11-13)	Revised.....	2/9/2015	KLW
File Folder: 19E	Reviewed...	2/10/15	
Data Source: DU800 spectrophotometer output (dated: March 7 to 8, 2012)	Certified.....	2/10/15	

Standard Curve and Checks File Name:
:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]YEP Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]YEP Sample Verification

Spectrophotometric Data - *Perca flavescens*

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Non-linear Curve #1		Non-linear Curve #2	
Coefficient A	-0.0000004	Coefficient A	-0.00000057
Coefficient B	0.00161462	Coefficient B	0.00189038
Coefficient C	0.00534056	Coefficient C	0.00179998
Variance	0.0000002	Variance	0.00000108

Data Explanation:
1) Two non-linear standard curves were created with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from analytical stocks. The first curve was used to determine sample concentrations from 1 to 12h. The second curve was used to determine sample concentrations from 15 to 24h.
2) Non-linear Curve #1 created on March 7, 2012 at YEP exposure initiation from Analytical Stock #3
3) Non-linear Curve #2 created on March 7, 2012 for 15 to 24h sampling times from Analytical Stock #4
4) Standard Checks at 1, 3, and 6h were verified using Standard Set #1 (created with Analytical Stock #3 at dosing initiation) against Standard Curve #1
5) Standard Checks at 12h were verified using Standard Set #1 (created with Analytical Stock #3 at dosing initiation) and using Standard Set #2 (created with Analytical Stock #4 between 10 and 12h post-dosing initiation) against Standard Curve #1
6) Standard Checks at 15, 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #4) against Standard Curve #2
8) Sample concentration verifications from exposure chambers at 1, 3, 6 and 12h were analyzed against Standard Curve #1
9) Sample concentration verifications from exposure chambers at 15, 18 and 24h were analyzed against Standard Curve #2

Data Anomalies and Deviations:
1) Analytical Standards #1 and 2 (weighed out to be ca. 2.1g) were not used due to the weights being incorrect.
2) Standard Checks were analyzed at 1 and 15h.

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 19e

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 11-13)
File Folder: 19E
Data Source: DU800 spectrophotometer output (dated: March 7 to 8, 2012)

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Spectrophotometric Data - *Perca flavescens*

Standard Curves

Non-linear Curve #1

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0462	25.4601	0.0482	26.7346	0.0430	23.4428
50	0.0865	50.9001	0.0849	49.8759	0.0820	48.0585
100	0.1667	102.4852	0.1652	101.5061	0.1577	96.6679
200	0.3127	200.1936	0.3159	202.3518	0.3085	197.3175
300	0.4547	300.3762	0.4558	301.2317	0.4520	298.4102

Non-linear Curve #1

Coefficient A	-0.0000004
Coefficient B	0.00161462
Coefficient C	0.00534056
Variance	0.0000002

Non-linear Curve #2

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0492	25.2677	0.0495	25.4419	0.0492	25.2402
50	0.0948	49.9389	0.0925	48.7127	0.0935	49.2270
100	0.1860	100.4690	0.1874	101.2206	0.1852	100.0220
200	0.3572	199.9883	0.3596	201.4101	0.3537	197.8726
300	0.5121	296.2050	0.5231	303.2886	0.5191	300.7084

Non-linear Curve #2

Coefficient A	-0.00000057
Coefficient B	0.00189038
Coefficient C	0.00179958
Variance	0.00000108

Standard Checks

STD Conc (mg/L)	1h		3h		6h		12h - Std Set #1		12h - Std Set #2		15h		18h		24h	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0406	21.9414	0.0403	21.7565	0.0378	20.1850	0.0390	20.9827	0.0510	28.4919	0.0475	24.3532	0.0448	22.5133	0.0455	23.2603
50	0.0844	49.5700	0.0845	49.6301	0.0840	49.3017	0.0804	47.0120	0.0973	57.7534	0.0931	49.0108	0.0874	45.9259	0.0864	45.3956
100	0.1689	103.9747	0.1618	99.2893	0.1571	96.2441	0.1552	95.0194	0.1934	119.9843	0.1821	98.2824	0.1727	93.0065	0.1677	90.1829
200	0.3151	201.8336	0.3122	199.7981	0.3071	196.3293	0.3035	193.8986	0.3614	233.8934	0.3598	201.5150	0.3380	188.4875	0.3431	191.4993
300	0.4624	306.0279	0.4611	305.0805	0.4391	289.0952	0.4274	280.7248	0.5271	353.8233	0.5250	304.5399	0.5095	294.5432	0.4988	287.6512

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	22.99	2.42
50 mg/L	49.20	3.60
100 mg/L	99.50	8.67
200 mg/L	200.91	13.24
300 mg/L	302.69	21.20

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 11-13)
File Folder: 19E
Data Source: DU800 spectrophotometer output (dated: March 7 to 8, 2012)

Species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Spectrophotometric Data - *Perca flavescens*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	300	0.2540	167.0004	0.3850	250.5330	0.3958	258.1673	0.3767	244.6839	0.3785	252.8153	0.3796	213.4876	0.3677	206.2905
A2	100	0.0677	38.9923	0.1249	75.4210	0.1204	72.5275	0.1163	69.9169	0.1177	62.4647	0.1168	61.9978	0.1152	61.0785
A3	50	0.0311	15.9893	0.0633	36.2028	0.0657	37.7077	0.0661	37.9538	0.0640	33.2396	0.0637	33.0981	0.0618	32.0332
A4	0	0.0007	-2.8699	0.0002	-3.1735	-0.0025	-4.8378	0.0014	-2.4185	0.0013	-0.2498	0.0009	-0.4918	0.0029	0.5921
A5	200	0.1574	96.4818	0.2535	159.9322	0.2641	167.1190	0.2511	158.3647	0.2548	139.6978	0.2535	138.9269	0.2480	135.7491
B1	50	0.0230	10.9385	0.0516	28.8597	0.0560	31.6158	0.0582	33.0162	0.0586	30.2970	0.0585	30.2543	0.0537	27.6741
B2	200	0.1491	87.1709	0.2319	145.5053	0.2359	148.1596	0.2415	151.9415	0.2391	130.6386	0.2388	130.4730	0.2319	126.5164
B3	0	-0.0006	-3.5975	-0.0029	-5.1102	-0.0007	-3.7457	0.0009	-2.7583	0.0010	-0.4276	0.0010	-0.4031	-0.0043	-3.2313
B4	100	0.0652	37.3916	0.1217	73.3911	0.1278	77.3086	0.1300	78.7123	0.1287	68.5382	0.1285	68.6163	0.1234	65.5993
B5	300	0.2150	136.9265	0.3471	223.9608	0.3654	232.5430	0.3541	228.8517	0.3580	200.6563	0.3526	197.1856	0.3484	194.6703
C1	0	0.0005	-3.0226	0.0023	-1.8965	0.0014	-2.4407	0.0008	-2.7870	0.0007	-0.5729	0.0016	-0.1198	0.0023	0.2878
C2	50	0.0202	9.2157	0.0511	28.5635	0.0585	33.1931	0.0615	35.0810	0.0635	32.9635	0.0634	32.9171	0.0600	31.0808
C3	100	0.0473	26.1558	0.0982	58.3548	0.1076	64.3641	0.1097	65.7165	0.1101	58.2801	0.1119	58.8209	0.1087	57.5519
C4	300	0.1897	117.5792	0.3354	215.8591	0.3539	228.6765	0.3525	227.6783	0.3614	202.4825	0.3608	190.1539	0.3419	190.8027
C5	200	0.1278	77.2865	0.2343	147.0959	0.2408	151.4125	0.2425	152.5694	0.2411	131.8094	0.2380	129.9982	0.2374	129.6480

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)			
	0	50	100	200	300
A	-1.97 (1.79)	32.37 (7.01)	63.70 (11.17)	147.32 (21.86)	221.85 (29.44)
B	-2.75 (1.62)	27.52 (6.86)	67.08 (11.92)	131.49 (20.20)	202.11 (30.35)
C	-1.51 (1.25)	29.00 (8.29)	65.61 (12.39)	131.40 (23.99)	196.16 (35.29)
Grand Mean	-2.06 (0.52)	29.61 (2.00)	61.96 (4.76)	135.07 (5.13)	206.71 (10.98)

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tank	theor	time	abs	conc
.	25	0	0.0462	25
.	50	0	0.0865	50
.	100	0	0.1667	100
.	200	0	0.3127	200
.	300	0	0.4547	300
.	25	0	0.0482	25
.	50	0	0.0849	50
.	100	0	0.1652	100
.	200	0	0.3159	200
.	300	0	0.4558	300
.	25	0	0.0430	25
.	50	0	0.0820	50
.	100	0	0.1577	100
.	200	0	0.3085	200
.	300	0	0.4520	300
.	25	0	0.0492	25
.	50	0	0.0948	50
.	100	0	0.1860	100
.	200	0	0.3572	200
.	300	0	0.5121	300
.	25	0	0.0495	25
.	50	0	0.0925	50
.	100	0	0.1874	100
.	200	0	0.3596	200
.	300	0	0.5231	300
.	25	0	0.0492	25
.	50	0	0.0935	50
.	100	0	0.1852	100
.	200	0	0.3537	200
.	300	0	0.5191	300
A1	300	1	0.2640	.
A2	100	1	0.0677	.
A3	50	1	0.0311	.
A4	0	1	0.0007	.
A5	200	1	0.1574	.
B1	50	1	0.0230	.
B2	200	1	0.1431	.
B3	0	1	-0.0005	.
B4	100	1	0.0652	.
B5	300	1	0.2190	.
C1	0	1	0.0005	.
C2	50	1	0.0202	.
C3	100	1	0.0473	.
C4	300	1	0.1897	.
C5	200	1	0.1278	.
A1	300	3	0.3850	.

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A2	100	3	0.1249	.
A3	50	3	0.0633	.
A4	0	3	0.0002	.
A5	200	3	0.2535	.
B1	50	3	0.0516	.
B2	200	3	0.2319	.
B3	0	3	-0.0029	.
B4	100	3	0.1217	.
B5	300	3	0.3471	.
C1	0	3	0.0023	.
C2	50	3	0.0511	.
C3	100	3	0.0982	.
C4	300	3	0.3354	.
C5	200	3	0.2343	.
A1	300	6	0.3958	.
A2	100	6	0.1204	.
A3	50	6	0.0657	.
A4	0	6	-0.0025	.
A5	200	6	0.2641	.
B1	50	6	0.0560	.
B2	200	6	0.2359	.
B3	0	6	-0.0007	.
B4	100	6	0.1278	.
B5	300	6	0.3594	.
C1	0	6	0.0014	.
C2	50	6	0.0585	.
C3	100	6	0.1076	.
C4	300	6	0.3539	.
C5	200	6	0.2408	.
A1	300	12	0.3767	.
A2	100	12	0.1163	.
A3	50	12	0.0661	.
A4	0	12	0.0014	.
A5	200	12	0.2511	.
B1	50	12	0.0582	.
B2	200	12	0.2415	.
B3	0	12	0.0009	.
B4	100	12	0.1300	.
B5	300	12	0.3541	.
C1	0	12	0.0008	.
C2	50	12	0.0615	.
C3	100	12	0.1097	.
C4	300	12	0.3525	.
C5	200	12	0.2425	.
A1	300	15	0.3785	.
A2	100	15	0.1177	.
A3	50	15	0.0640	.

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A4	0	15	0.0013	.
A5	200	15	0.2548	.
B1	50	15	0.0586	.
B2	200	15	0.2391	.
B3	0	15	0.0010	.
B4	100	15	0.1287	.
B5	300	15	0.3583	.
C1	0	15	0.0007	.
C2	50	15	0.0635	.
C3	100	15	0.1101	.
C4	300	15	0.3614	.
C5	200	15	0.2411	.
A1	300	18	0.3796	.
A2	100	18	0.1168	.
A3	50	18	0.0637	.
A4	0	18	0.0009	.
A5	200	18	0.2535	.
B1	50	18	0.0585	.
B2	200	18	0.2388	.
B3	0	18	0.0010	.
B4	100	18	0.1288	.
B5	300	18	0.3526	.
C1	0	18	0.0016	.
C2	50	18	0.0634	.
C3	100	18	0.1110	.
C4	300	18	0.3408	.
C5	200	18	0.2380	.
A1	300	24	0.3677	.
A2	100	24	0.1152	.
A3	50	24	0.0618	.
A4	0	24	0.0029	.
A5	200	24	0.2480	.
B1	50	24	0.0537	.
B2	200	24	0.2319	.
B3	0	24	-0.0043	.
B4	100	24	0.1234	.
B5	300	24	0.3484	.
C1	0	24	0.0023	.
C2	50	24	0.0600	.
C3	100	24	0.1087	.
C4	300	24	0.3419	.
C5	200	24	0.2374	.
SC1	25	1	0.0406	.
SC2	50	1	0.0844	.
SC3	100	1	0.1689	.
SC4	200	1	0.3151	.
SC5	300	1	0.4624	.

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SC1	25	3	0.0403	.
SC2	50	3	0.0845	.
SC3	100	3	0.1618	.
SC4	200	3	0.3122	.
SC5	300	3	0.4611	.
SC1	25	6	0.0378	.
SC2	50	6	0.0840	.
SC3	100	6	0.1571	.
SC4	200	6	0.3071	.
SC5	300	6	0.4391	.
SC1	25	12	0.0390	.
SC2	50	12	0.0804	.
SC3	100	12	0.1552	.
SC4	200	12	0.3035	.
SC5	300	12	0.4274	.
SC1	25	12.1	0.0510	.
SC2	50	12.1	0.0973	.
SC3	100	12.1	0.1934	.
SC4	200	12.1	0.3614	.
SC5	300	12.1	0.5271	.
SC1	25	15	0.0475	.
SC2	50	15	0.0931	.
SC3	100	15	0.1821	.
SC4	200	15	0.3598	.
SC5	300	15	0.5250	.
SC1	25	18	0.0448	.
SC2	50	18	0.0874	.
SC3	100	18	0.1727	.
SC4	200	18	0.3380	.
SC5	300	18	0.5095	.
SC1	25	24	0.0455	.
SC2	50	24	0.0864	.
SC3	100	24	0.1677	.
SC4	200	24	0.3431	.
SC5	300	24	0.4988	.

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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 25-27)	Created.....	5/1/2013	KLW
File Folder: 20E	Revised.....	2/9/2015	KLW
Data Source: DU800 spectrophotometer output (dated: August 1 to 2, 2012)	Reviewed...	2/10/15	
	Certified.....	2/10/15	

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]LST Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]LST Sample Verification

Spectrophotometric Data - *Acipenser fulvescens*

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02
Exposure Date: 8/1/2012

Non-linear Curve #1

Coefficient A	-0.00000021
Coefficient B	0.00171486
Coefficient C	0.0008082
Variance	0.00000138

Data Explanation:
1) Non-linear Standard Curve #1 was created on August 1, 2012 for LST exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
2) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #2 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
NONE

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 25-27)
File Folder: 20E
Data Source: DU800 spectrophotometer output (dated: August 1 to 2, 2012)

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf-CL 145A* (SDP) Chemical lot #: 40-P121546-02
Exposure Date: 8/_/2012

Spectrophotometric Data - *Acipenser fulvescens*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0438	25.1492	0.0447	25.6563	0.0442	25.3795
50	0.0861	50.0465	0.0860	50.0056	0.0856	49.7403
100	0.1692	99.3719	0.1689	99.2217	0.1684	98.8967
200	0.3376	201.2522	0.3364	200.5154	0.3364	200.5154
300	0.4965	299.8898	0.4963	299.7779	0.4960	299.5821

Non-linear Curve #1

Coefficient A	-0.00000021
Coefficient B	0.00171486
Coefficient C	0.0008032
Variance	0.00000138

Standard Checks

STD Conc	6h		12h		18h		24h	
(mg/L)	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.
25	0.0440	25.2892	0.0450	25.8422	0.0476	27.3637	0.0468	26.9880
50	0.0895	48.5080	0.0903	52.5069	0.0904	52.5731	0.0952	55.4852
100	0.1641	96.3568	0.1629	95.6301	0.1793	105.4009	0.1793	105.4400
200	0.3260	194.2013	0.3336	198.8054	0.3583	213.9933	0.3494	208.5245
300	0.4715	284.2812	0.4650	280.1055	0.4962	299.6360	0.5017	303.1347

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	26.27	0.78
50 mg/L	52.26	2.47
100 mg/L	100.71	4.72
200 mg/L	203.88	7.80
300 mg/L	291.78	9.80

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Study Number: AEH-12-PSEU00-03
Lab Notebook #2 (pages 25-27)
File Folder: 20E
Data Source: DU800 spectrophotometer output (dated: August 1 to 2, 2012)

Species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P121S4G-02
Exposure Date: 8/1/2012

Spectrophotometric Data - *Acipenser fulvescens*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	100	0.0776	45.0197	0.1138	66.3923	0.1159	67.6516	0.1150	67.1367	0.1315	76.9065	0.1183	68.0746	0.1184	69.1711
A2	200	0.1855	109.1436	0.2572	152.3322	0.2618	154.8042	0.2583	152.9712	0.2956	175.4224	0.2660	157.6544	0.2637	156.2581
A3	300	0.3127	186.0562	0.3778	226.0155	0.3791	226.7794	0.3705	221.4771	0.4256	255.5835	0.3867	231.5007	0.3853	230.5954
A4	0	-0.0025	-1.9311	0.0007	-0.0433	0.0004	-0.2656	0.0001	-0.3689	-0.0010	-1.0557	-0.0013	-1.2458	-0.0013	-1.2129
A5	50	0.0381	21.8229	0.0566	32.6593	0.0571	32.9746	0.0565	32.5923	0.0637	36.8137	0.0567	32.7084	0.0560	32.2905
B1	300	0.3205	190.8062	0.3724	222.6547	0.3716	222.1621	0.3757	224.7156	0.3904	238.7891	0.3789	226.6647	0.3736	223.3931
B2	100	0.1164	67.9879	0.1314	76.8772	0.1317	77.0470	0.1293	75.6130	0.1367	80.0345	0.1321	77.3078	0.1313	76.8172
B3	50	0.0426	24.4689	0.0562	32.4046	0.0568	32.7568	0.0567	32.7389	0.0571	32.9513	0.0554	31.9343	0.0563	32.4702
B4	200	0.2145	126.5763	0.2558	151.4694	0.2558	151.4765	0.2490	147.3394	0.2668	158.1345	0.2560	151.5748	0.2532	149.8583
B5	0	-0.0011	-1.1378	0.0000	-0.4877	-0.0007	-0.8905	-0.0008	-0.9193	-0.0016	-1.4022	-0.0007	-0.8912	-0.0016	-1.4279
C1	50	0.0501	28.8250	0.0696	40.5305	0.0720	41.7375	0.0768	44.5637	0.0778	45.1508	0.0737	42.7540	0.0751	43.5269
C2	200	0.1802	105.9533	0.2412	142.6197	0.2540	150.3726	0.2636	156.1946	0.2697	159.8793	0.2540	150.3956	0.2433	143.9251
C3	300	0.2992	177.8168	0.3774	225.7204	0.3758	224.7493	0.3983	238.6762	0.3947	236.4349	0.3780	226.0965	0.3677	219.7450
C4	0	-0.0008	-0.9405	0.0000	-0.4630	-0.0003	-0.6440	0.0000	-0.4960	-0.0013	-1.2126	-0.0005	-0.7353	-0.0005	-0.7684
C5	100	0.0932	54.2531	0.1224	71.4926	0.1246	72.8320	0.1370	80.1911	0.1303	79.7547	0.1304	76.2957	0.1258	73.5098

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-0.88	31.69	69.91	151.26	225.43
	(0.62)	(4.28)	(9.12)	(18.71)	(19.05)
B	-0.98	31.39	75.95	148.05	220.60
	(0.34)	(2.84)	(3.48)	(9.29)	(12.70)
C	-0.75	40.98	72.62	144.19	221.32
	(0.24)	(5.19)	(8.12)	(16.61)	(18.82)
Grand Mean	-0.87 (0.09)	34.69 (4.45)	71.48 (4.18)	147.83 (2.89)	222.45 (2.13)

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tank	theor	time	abs	conc
.	25	0	0.0438	25
.	50	0	0.0861	50
.	100	0	0.1692	100
.	200	0	0.3376	200
.	300	0	0.4965	300
.	25	0	0.0447	25
.	50	0	0.0860	50
.	100	0	0.1689	100
.	200	0	0.3364	200
.	300	0	0.4963	300
.	25	0	0.0442	25
.	50	0	0.0856	50
.	100	0	0.1684	100
.	200	0	0.3364	200
.	300	0	0.4960	300
A1	100	1	0.0776	.
A2	200	1	0.1855	.
A3	300	1	0.3127	.
A4	0	1	-0.0025	.
A5	50	1	0.0381	.
B1	300	1	0.3205	.
B2	100	1	0.1164	.
B3	50	1	0.0426	.
B4	200	1	0.2145	.
B5	0	1	-0.0011	.
C1	50	1	0.0501	.
C2	200	1	0.1802	.
C3	300	1	0.2992	.
C4	0	1	-0.0008	.
C5	100	1	0.0932	.
A1	100	3	0.1138	.
A2	200	3	0.2572	.
A3	300	3	0.3778	.
A4	0	3	0.0007	.
A5	50	3	0.0566	.
B1	300	3	0.3724	.
B2	100	3	0.1314	.
B3	50	3	0.0562	.
B4	200	3	0.2558	.
B5	0	3	0.0000	.
C1	50	3	0.0696	.
C2	200	3	0.2412	.
C3	300	3	0.3774	.
C4	0	3	0.0000	.
C5	100	3	0.1224	.
A1	100	6	0.1159	.

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A2	200	6	0.2613	.
A3	300	6	0.3791	.
A4	0	6	0.0004	.
A5	50	6	0.0571	.
B1	300	6	0.3716	.
B2	100	6	0.1317	.
B3	50	6	0.0568	.
B4	200	6	0.2558	.
B5	0	6	-0.0007	.
C1	50	6	0.0720	.
C2	200	6	0.2540	.
C3	300	6	0.3758	.
C4	0	6	-0.0003	.
C5	100	6	0.1246	.
A1	100	12	0.1150	.
A2	200	12	0.2583	.
A3	300	12	0.3705	.
A4	0	12	0.0001	.
A5	50	12	0.0565	.
B1	300	12	0.3757	.
B2	100	12	0.1293	.
B3	50	12	0.0567	.
B4	200	12	0.2490	.
B5	0	12	-0.0003	.
C1	50	12	0.0768	.
C2	200	12	0.2636	.
C3	300	12	0.3983	.
C4	0	12	0.0000	.
C5	100	12	0.1370	.
A1	100	15	0.1315	.
A2	200	15	0.2956	.
A3	300	15	0.4256	.
A4	0	15	-0.0010	.
A5	50	15	0.0637	.
B1	300	15	0.3904	.
B2	100	15	0.1367	.
B3	50	15	0.0571	.
B4	200	15	0.2668	.
B5	0	15	-0.0016	.
C1	50	15	0.0778	.
C2	200	15	0.2697	.
C3	300	15	0.3947	.
C4	0	15	-0.0013	.
C5	100	15	0.1363	.
A1	100	18	0.1183	.
A2	200	18	0.2660	.
A3	300	18	0.3867	.

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A4	0	18	-0.0013	.
A5	50	18	0.0567	.
B1	300	18	0.3789	.
B2	100	18	0.1321	.
B3	50	18	0.0554	.
B4	200	18	0.2560	.
B5	0	18	-0.0007	.
C1	50	18	0.0737	.
C2	200	18	0.2540	.
C3	300	18	0.3780	.
C4	0	18	-0.0005	.
C5	100	18	0.1304	.
A1	100	24	0.1184	.
A2	200	24	0.2637	.
A3	300	24	0.3853	.
A4	0	24	-0.0013	.
A5	50	24	0.0560	.
B1	300	24	0.3736	.
B2	100	24	0.1313	.
B3	50	24	0.0563	.
B4	200	24	0.2532	.
B5	0	24	-0.0016	.
C1	50	24	0.0751	.
C2	200	24	0.2433	.
C3	300	24	0.3677	.
C4	0	24	-0.0005	.
C5	100	24	0.1258	.
SC1	25	6	0.0440	.
SC2	50	6	0.0835	.
SC3	100	6	0.1641	.
SC4	200	6	0.3260	.
SC5	300	6	0.4715	.
SC1	25	12	0.0450	.
SC2	50	12	0.0903	.
SC3	100	12	0.1629	.
SC4	200	12	0.3336	.
SC5	300	12	0.4650	.
SC1	25	18	0.0476	.
SC2	50	18	0.0904	.
SC3	100	18	0.1793	.
SC4	200	18	0.3583	.
SC5	300	18	0.4961	.
SC1	25	24	0.0463	.
SC2	50	24	0.0952	.
SC3	100	24	0.1793	.
SC4	200	24	0.3494	.
SC5	300	24	0.5017	.

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Study Number: AEH-12-PSEUDO-03 Lab Notebook #2 (pages 1-3) File Folder: 21E Data Source: DU800 spectrophotometer output (dated: June 12 to 13, 2012)	Action	Date	Initials
	Created.....	5/1/2013	KLW
	Revised.....	2/9/2015	KLW
	Reviewed..	10/22/15	
	Certified.....	2/10/16	

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]LMB Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]LMB Sample Verification

Spectrophotometric Data - *Micropterus salmoides*

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Non-linear Curve #1	
Coefficient A	-0.00000028
Coefficient B	0.00151302
Coefficient C	-0.00009595
Variance	0.00000392

Data Explanation:
1) Non-linear Standard Curve #1 was created on June 12, 2012 for LMB exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1.
2) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created using Analytical Stock #2 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
NONE

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 21e

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 1-3)
File Folder: 2.E
Data Source: DU800 spectrophotometer output (dated: June 12 to 13, 2012)

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Spectrophotometric Data - *Micropterus salmoides*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0376	25.0544	0.0407	27.1099	0.0386	25.6641
50	0.0749	49.9959	0.0739	49.3501	0.0738	49.2925
100	0.1468	98.9228	0.1457	98.1604	0.1468	98.5206
200	0.2929	201.1068	0.2925	200.8440	0.2948	202.4856
300	0.4308	301.5814	0.4264	298.3307	0.4268	298.6156

Non-linear Curve #1

Coefficient A	-0.00000028
Coefficient B	0.00151302
Coefficient C	-0.00009595
Variance	0.00000392

Standard Checks

STD Conc	6h		12h		18h		24h	
(mg/L)	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.
25	0.0392	26.1041	0.0387	25.7716	0.0371	24.6793	0.0464	30.9384
50	0.0736	49.1589	0.0764	51.0688	0.0730	48.7681	0.0883	59.0736
100	0.1524	102.7298	0.1481	99.7533	0.1480	99.7201	0.1603	108.1391
200	0.2870	196.9452	0.2878	197.4719	0.2903	199.2368	0.3154	217.2568
300	0.4155	293.2770	0.4233	296.9986	0.4345	304.3675	0.4428	310.5211

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	26.87	2.41
50 mg/L	52.02	4.17
100 mg/L	102.59	3.43
200 mg/L	202.73	8.43
300 mg/L	301.02	6.86

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Study Number: AEH-12-PSEU00-03
Lab Notebook #2 (pages 1-3)
File Folder: 21E
Data Source: DU800 spectrophotometer output (dated: June 12 to 13, 2012)

Species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4569-4-(5) #2
Exposure Date: 6/12/2012

Spectrophotometric Data - *Micropterus salmoides*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	200	0.1950	132.1750	0.2307	157.1007	0.2261	153.8407	0.2218	150.8356	0.2116	143.7616	0.2065	142.2527	0.2075	140.8807
A2	300	0.2986	205.2178	0.3364	232.3417	0.3401	235.0519	0.3428	237.0104	0.3249	224.0914	0.3195	220.1949	0.3168	218.2282
A3	0	-0.0008	-0.4843	0.0002	0.1856	-0.0002	-0.0401	-0.0003	-0.1532	-0.0002	-0.0777	-0.0023	-1.4286	-0.0020	-1.2566
A4	100	0.0747	49.8922	0.0964	64.5193	0.0989	66.2111	0.1001	67.0633	0.0966	64.6559	0.0900	60.2134	0.0914	61.1926
A5	50	0.0517	21.0728	0.0518	34.5470	0.0525	35.0110	0.0535	35.6488	0.0502	33.4308	0.0481	32.0562	0.0485	32.3407
B1	50	0.0576	24.9979	0.0537	35.7756	0.0620	41.3887	0.0583	38.8582	0.0521	34.7088	0.0539	35.9837	0.0558	37.2057
B2	100	0.1105	74.1030	0.1309	87.9898	0.1360	91.4675	0.1349	90.7684	0.1268	85.2165	0.1237	83.0787	0.1237	83.0903
B3	0	-0.0014	-0.8437	0.0001	0.1105	0.0056	3.7719	-0.0006	-0.3322	-0.0022	-1.4087	-0.0023	-1.4569	0.0001	0.1387
B4	300	0.3300	227.7625	0.3725	258.5786	0.3801	264.1638	0.3776	262.3735	0.3568	247.1844	0.3493	241.7029	0.3495	241.8746
B5	200	0.2163	146.9910	0.2481	169.3146	0.2525	172.4255	0.2505	170.9981	0.2338	159.2708	0.2337	159.2017	0.2328	158.5559
C1	300	0.3129	215.4802	0.3510	242.9408	0.3571	247.3595	0.3858	268.3480	0.3876	269.6629	0.3729	258.9389	0.3726	258.6528
C2	50	0.0443	29.5133	0.0562	37.4850	0.0561	37.3676	0.0618	41.1910	0.0614	40.9904	0.0624	41.5947	0.0683	45.5903
C3	100	0.0855	57.2017	0.1028	68.8654	0.1049	70.2983	0.1131	75.9019	0.1150	77.1832	0.1108	74.3363	0.1155	77.5146
C4	0	-0.0007	-0.3981	0.0005	0.3928	-0.0001	0.0258	0.0011	0.7894	-0.0022	-1.4090	-0.0021	-1.3057	0.0010	0.7409
C5	200	0.2076	140.9672	0.2329	158.6379	0.2365	161.1527	0.2494	170.2596	0.2529	172.7240	0.2528	172.6713	0.2405	164.0014

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-0.47 (0.59)	32.02 (4.64)	61.96 (5.44)	145.64 (7.97)	224.59 (10.41)
B	0.00 (1.66)	35.55 (4.78)	85.10 (5.48)	162.39 (8.41)	249.09 (12.30)
C	-0.17 (0.84)	39.10 (4.68)	71.61 (6.64)	162.92 (10.35)	251.62 (17.37)
Grand Mean	-0.21 (0.19)	35.55 (2.89)	72.89 (9.49)	157.05 (7.93)	241.77 (12.19)

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tank	theor	time	abs	conc
.	25	0	0.0376	25
.	50	0	0.0749	50
.	100	0	0.1468	100
.	200	0	0.2929	200
.	300	0	0.4308	300
.	25	0	0.0407	25
.	50	0	0.0739	50
.	100	0	0.1457	100
.	200	0	0.2925	200
.	300	0	0.4264	300
.	25	0	0.0386	25
.	50	0	0.0738	50
.	100	0	0.1463	100
.	200	0	0.2948	200
.	300	0	0.4268	300
A1	200	1	0.1950	.
A2	300	1	0.2986	.
A3	0	1	-0.0008	.
A4	100	1	0.0747	.
A5	50	1	0.0317	.
B1	50	1	0.0376	.
B2	100	1	0.1105	.
B3	0	1	-0.0014	.
B4	300	1	0.3300	.
B5	200	1	0.2163	.
C1	300	1	0.3129	.
C2	50	1	0.0443	.
C3	100	1	0.0855	.
C4	0	1	-0.0007	.
C5	200	1	0.2076	.
A1	200	3	0.2307	.
A2	300	3	0.3364	.
A3	0	3	0.0002	.
A4	100	3	0.0964	.
A5	50	3	0.0518	.
B1	50	3	0.0537	.
B2	100	3	0.1309	.
B3	0	3	0.0001	.
B4	300	3	0.3725	.
B5	200	3	0.2481	.
C1	300	3	0.3510	.
C2	50	3	0.0562	.
C3	100	3	0.1028	.
C4	0	3	0.0005	.
C5	200	3	0.2329	.
A1	200	6	0.2261	.

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A2	300	6	0.3401
A3	0	6	-0.0002
A4	100	6	0.0989
A5	50	6	0.0525
B1	50	6	0.0620
B2	100	6	0.1360
B3	0	6	0.0056
B4	300	6	0.3801
B5	200	6	0.2525
C1	300	6	0.3571
C2	50	6	0.0561
C3	100	6	0.1049
C4	0	6	-0.0001
C5	200	6	0.2365
A1	200	12	0.2218
A2	300	12	0.3428
A3	0	12	-0.0003
A4	100	12	0.1001
A5	50	12	0.0535
B1	50	12	0.0583
B2	100	12	0.1349
B3	0	12	-0.0006
B4	300	12	0.3776
B5	200	12	0.2505
C1	300	12	0.3858
C2	50	12	0.0618
C3	100	12	0.1131
C4	0	12	0.0011
C5	200	12	0.2494
A1	200	15	0.2116
A2	300	15	0.3249
A3	0	15	-0.0002
A4	100	15	0.0966
A5	50	15	0.0502
B1	50	15	0.0521
B2	100	15	0.1268
B3	0	15	-0.0022
B4	300	15	0.3568
B5	200	15	0.2338
C1	300	15	0.3876
C2	50	15	0.0614
C3	100	15	0.1150
C4	0	15	-0.0022
C5	200	15	0.2529
A1	200	18	0.2095
A2	300	18	0.3195
A3	0	18	-0.0023

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A4	100	18	0.0900	.
A5	50	18	0.0481	.
B1	50	18	0.0539	.
B2	100	18	0.1237	.
B3	0	18	-0.0023	.
B4	300	18	0.3493	.
B5	200	18	0.2337	.
C1	300	18	0.3729	.
C2	50	18	0.0624	.
C3	100	18	0.1108	.
C4	0	18	-0.0021	.
C5	200	18	0.2528	.
A1	200	24	0.2075	.
A2	300	24	0.3168	.
A3	0	24	-0.0020	.
A4	100	24	0.0914	.
A5	50	24	0.0485	.
B1	50	24	0.0558	.
B2	100	24	0.1237	.
B3	0	24	0.0001	.
B4	300	24	0.3495	.
B5	200	24	0.2328	.
C1	300	24	0.3726	.
C2	50	24	0.0683	.
C3	100	24	0.1155	.
C4	0	24	0.0010	.
C5	200	24	0.2405	.
SC1	25	6	0.0392	.
SC2	50	6	0.0736	.
SC3	100	6	0.1524	.
SC4	200	6	0.2870	.
SC5	300	6	0.4195	.
SC1	25	12	0.0387	.
SC2	50	12	0.0764	.
SC3	100	12	0.1481	.
SC4	200	12	0.2878	.
SC5	300	12	0.4233	.
SC1	25	18	0.0371	.
SC2	50	18	0.0730	.
SC3	100	18	0.1480	.
SC4	200	18	0.2903	.
SC5	300	18	0.4345	.
SC1	25	24	0.0464	.
SC2	50	24	0.0883	.
SC3	100	24	0.1603	.
SC4	200	24	0.3154	.
SC5	300	24	0.4428	.

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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 6-8)	Created.....	5/1/2013	KLW
File Folder: 22E	Revised.....	2/9/2015	KLW
Data Source: DU800 spectrophotometer output (dated: June 20 to 21, 2012)	Reviewed...	10/20/15	KLW
	Certified.....	2/10/15	JM

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]SMB Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]SMB Sample Verification

Spectrophotometric Data - *Micropterus dolomieu*

Species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Non-linear Curve #1	
Coefficient A	-0.00000076
Coefficient B	0.00184537
Coefficient C	-0.00199736
Variance	0.00000866

Data Explanation:
1) Non-linear Standard Curve #1 was created on June 20, 2012 for SMB exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
2) Standard Checks at 6, 12, 18 and 24h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #2 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
1) Standard Checks were verified at 18 and 24h using Standard Sets #1 and #2.

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 22e

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 6-8)
File Folder: 22E
Data Source: DU800 spectrophotometer output (dated: June 20 to 21, 2012)

Species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens* Pf-QL 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Spectrophotometric Data - *Micropterus dolomieu*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0458	26.1898	0.0463	16.4441	0.0455	26.0409
50	0.0869	49.1793	0.0873	49.4043	0.0872	49.3650
100	0.1721	98.8091	0.1729	98.8388	0.1706	97.4499
200	0.3395	201.9211	0.3394	201.7988	0.3400	202.2249
300	0.4818	299.1569	0.4822	299.4057	0.4820	299.2813

Non-linear Curve #1

Coefficient A	-0.00000076
Coefficient B	0.00184537
Coefficient C	-0.00139736
Variance	0.00000866

Standard Checks

STD Conc	6h		12h		18h - Std Set #1		18h - Std Set #2		24h - Std Set #1		24h - Std Set #2	
(mg/L)	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.
25	0.0441	25.2340	0.0439	25.1601	0.0433	24.7808	0.0382	21.9858	0.0444	25.4213	0.0416	23.8382
50	0.0826	46.7384	0.0868	49.1106	0.0895	50.6544	0.0786	44.4664	0.0861	48.7024	0.0800	45.2894
100	0.1691	96.5784	0.1732	99.0009	0.1736	99.2163	0.1452	83.2735	0.1720	98.2713	0.1526	86.8717
200	0.3202	189.3930	0.3293	195.2672	0.3258	193.0102	0.2871	168.3609	0.3212	190.0463	0.3018	177.3730
300	0.4598	283.4453	0.4696	290.4118	0.4650	280.0026	0.3903	241.5845	0.4517	277.6860	0.4220	257.0563

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	24.40	1.20
50 mg/L	47.49	2.19
100 mg/L	93.85	6.38
200 mg/L	185.58	9.55
300 mg/L	271.70	16.90

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 6-8)
File Folder: 22E
Data Source: DU800 spectrophotometer output (dated: June 20 to 21, 2012)

Species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Spectrophotometric Data - *Micropterus dolomieu*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	100	0.0844	47.7645	0.1061	60.0407	0.1073	61.0218	0.1081	61.1813	0.1048	59.3297	0.1050	59.4612	0.1062	58.9672
A2	0	0.0005	1.3517	0.0000	1.0598	-0.0001	1.0065	-0.0005	0.8296	-0.0004	0.8469	0.0003	1.2520	0.0000	1.0675
A3	50	0.0396	22.7454	0.0541	30.8148	0.0570	32.4158	0.0556	31.6484	0.0547	31.1192	0.0545	31.0873	0.0547	31.1216
A4	200	0.2217	127.9910	0.2591	147.1901	0.2566	149.3273	0.2501	145.3346	0.2372	137.4037	0.2315	133.9374	0.2335	135.1437
A5	300	0.3258	186.6221	0.3882	230.7469	0.3861	232.6487	0.3803	228.8184	0.3659	219.2381	0.3555	212.3829	0.3581	234.0201
B1	0	-0.0003	0.9294	-0.0001	1.0292	-0.0001	1.0445	0.0004	1.2827	-0.0002	0.9753	0.0005	1.3596	0.0003	1.2365
B2	200	0.2026	116.4518	0.2468	143.3167	0.2502	145.3868	0.2373	137.4902	0.2319	134.1065	0.2353	136.1015	0.2314	133.8763
B3	100	0.0939	53.1398	0.1294	73.4293	0.1342	76.1974	0.1282	72.7357	0.1223	69.3543	0.1239	70.2550	0.1213	68.7896
B4	300	0.3010	177.1841	0.3740	224.5528	0.3813	229.4585	0.3673	216.8159	0.3458	206.0187	0.3507	209.1777	0.3498	208.6356
B5	50	0.0360	20.7518	0.0518	29.5301	0.0585	33.2507	0.0524	29.8639	0.0513	29.2610	0.0516	29.3958	0.0503	28.6776
C1	0	0.0000	1.0905	0.0003	1.2440	-0.0002	0.9678	-0.0008	0.6454	-0.0006	0.7681	0.0007	1.4675	0.0001	1.1443
C2	100	0.0769	40.1847	0.1081	61.2289	0.1111	62.8987	0.1081	61.1890	0.1067	60.4187	0.1076	60.9067	0.1134	64.2371
C3	50	0.0373	21.4886	0.0622	35.3111	0.0653	37.0568	0.0643	36.4727	0.0644	36.5160	0.0661	37.4582	0.0718	40.7003
C4	300	0.2619	152.6058	0.3641	218.0373	0.3723	223.4407	0.3530	210.7320	0.3487	207.8585	0.3348	198.8085	0.3360	199.6470
C5	200	0.1328	75.3955	0.2208	127.4233	0.2396	138.8989	0.2303	133.2176	0.2169	125.0542	0.2063	119.7026	0.2217	127.9824

Means Observed Concentrations
(Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	1.06 (0.18)	30.18 (3.06)	58.25 (4.35)	139.48 (7.33)	220.64 (15.67)
B	1.12 (0.16)	28.68 (3.52)	69.15 (6.95)	135.26 (8.70)	210.26 (15.73)
C	1.05 (0.26)	35.00 (5.73)	58.72 (7.67)	120.95 (19.50)	201.60 (21.65)
Grand Mean	1.08 (0.03)	31.27 (2.70)	62.03 (5.02)	131.90 (7.93)	210.83 (7.79)

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tank	theor	time	abs	conc
.	25	0	0.0458	25
.	50	0	0.0869	50
.	100	0	0.1721	100
.	200	0	0.3395	200
.	300	0	0.4818	300
.	25	0	0.0463	25
.	50	0	0.0873	50
.	100	0	0.1729	100
.	200	0	0.3394	200
.	300	0	0.4822	300
.	25	0	0.0455	25
.	50	0	0.0872	50
.	100	0	0.1706	100
.	200	0	0.3400	200
.	300	0	0.4820	300
A1	100	1	0.0844	.
A2	0	1	0.0005	.
A3	50	1	0.0396	.
A4	200	1	0.2217	.
A5	300	1	0.3158	.
B1	0	1	-0.0003	.
B2	200	1	0.2026	.
B3	100	1	0.0939	.
B4	300	1	0.3010	.
B5	50	1	0.0360	.
C1	0	1	0.0000	.
C2	100	1	0.0709	.
C3	50	1	0.0373	.
C4	300	1	0.2619	.
C5	200	1	0.1328	.
A1	100	3	0.1061	.
A2	0	3	0.0000	.
A3	50	3	0.0541	.
A4	200	3	0.2531	.
A5	300	3	0.3832	.
B1	0	3	-0.0001	.
B2	200	3	0.2468	.
B3	100	3	0.1294	.
B4	300	3	0.3740	.
B5	50	3	0.0518	.
C1	0	3	0.0003	.
C2	100	3	0.1081	.
C3	50	3	0.0622	.
C4	300	3	0.3641	.
C5	200	3	0.2208	.
A1	100	6	0.1078	.

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A2	0	6	-0.0001	.
A3	50	6	0.0570	.
A4	200	6	0.2566	.
A5	300	6	0.3861	.
B1	0	6	-0.0001	.
B2	200	6	0.2502	.
B3	100	6	0.1342	.
B4	300	6	0.3813	.
B5	50	6	0.0585	.
C1	0	6	-0.0002	.
C2	100	6	0.1111	.
C3	50	6	0.0653	.
C4	300	6	0.3723	.
C5	200	6	0.2396	.
A1	100	12	0.1081	.
A2	0	12	-0.0005	.
A3	50	12	0.0556	.
A4	200	12	0.2501	.
A5	300	12	0.3803	.
B1	0	12	0.0004	.
B2	200	12	0.2373	.
B3	100	12	0.1282	.
B4	300	12	0.3623	.
B5	50	12	0.0524	.
C1	0	12	-0.0008	.
C2	100	12	0.1081	.
C3	50	12	0.0643	.
C4	300	12	0.3530	.
C5	200	12	0.2303	.
A1	100	15	0.1048	.
A2	0	15	-0.0004	.
A3	50	15	0.0547	.
A4	200	15	0.2372	.
A5	300	15	0.3659	.
B1	0	15	-0.0002	.
B2	200	15	0.2319	.
B3	100	15	0.1223	.
B4	300	15	0.3458	.
B5	50	15	0.0513	.
C1	0	15	-0.0006	.
C2	100	15	0.1067	.
C3	50	15	0.0644	.
C4	300	15	0.3487	.
C5	200	15	0.2169	.
A1	100	18	0.1050	.
A2	0	18	0.0003	.
A3	50	18	0.0546	.

A4	200	18	0.2315
A5	300	18	0.3555
B1	0	18	0.0005
B2	200	18	0.2350
B3	100	18	0.1239
B4	300	18	0.3507
B5	50	18	0.0516
C1	0	18	0.0007
C2	100	18	0.1076
C3	50	18	0.0661
C4	300	18	0.3348
C5	200	18	0.2063
A1	100	24	0.1042
A2	0	24	0.0000
A3	50	24	0.0547
A4	200	24	0.2335
A5	300	24	0.3881
B1	0	24	0.0003
B2	200	24	0.2314
B3	100	24	0.1213
B4	300	24	0.3498
B5	50	24	0.0503
C1	0	24	0.0001
C2	100	24	0.1134
C3	50	24	0.0718
C4	300	24	0.3360
C5	200	24	0.2217
SC1	25	6	0.0441
SC2	50	6	0.0826
SC3	100	6	0.1691
SC4	200	6	0.3202
SC5	300	6	0.4598
SC1	25	12	0.0439
SC2	50	12	0.0868
SC3	100	12	0.1732
SC4	200	12	0.3293
SC5	300	12	0.4696
SC1	25	18	0.0433
SC2	50	18	0.0895
SC3	100	18	0.1736
SC4	200	18	0.3258
SC5	300	18	0.4550
SC1	25	18.1	0.0382
SC2	50	18.1	0.0786
SC3	100	18.1	0.1462
SC4	200	18.1	0.2871
SC5	300	18.1	0.3993

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SC1	25	24	0.0444	.
SC2	50	24	0.0861	.
SC3	100	24	0.1720	.
SC4	200	24	0.3212	.
SC5	300	24	0.4517	.
SC1	25	24.1	0.0416	.
SC2	50	24.1	0.0800	.
SC3	100	24.1	0.1526	.
SC4	200	24.1	0.3013	.
SC5	300	24.1	0.4220	.

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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 17-19)	Created.....	5/1/2013	KLW
File Folder: 23E	Revised.....	2/9/2015	KLW
Data Source: DU800 spectrophotometer output (dated: July 11 to 12, 2012)	Reviewed...	[illegible]	[illegible]
	Certified.....	2/10/15	[illegible]

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]BLG Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]BLG Sample Verification

Spectrophotometric Data - *Lepomis macrochirus*

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date:7/11/2012

Non-linear Curve #1	
Coefficient A	0.00000001
Coefficient B	0.00147707
Coefficient C	-0.00001702
Variance	0.00000044

Data Explanation:
1) Non-linear Standard Curve #1 was created on July 11, 2012 for BLG exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
2) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
3) Standard Checks at 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #2 between 10 and 12h post-dosing initiation)
4) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
NONE

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for al time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 23e

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 17-19)
File Folder: 25E
Data Source: DU 800 spectrophotometer output (dated: July 11 to 12, 2012)

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Spectrophotometric Data - *Lepomis macrochirus*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0365	24.7181	0.0358	24.2474	0.0370	25.0323
50	0.0750	50.7681	0.0741	50.1400	0.0752	50.9168
100	0.1478	100.0185	0.1464	99.0742	0.1476	99.8968
200	0.2969	200.7674	0.2946	199.2117	0.2961	200.2353
300	0.4422	298.8283	0.4446	300.4523	0.4450	300.6926

Non-linear Curve #1

Coefficient A	0.00000001
Coefficient B	0.00147707
Coefficient C	-0.00001702
Variance	0.00000044

Standard Checks

STD Conc (mg/L)	6h		12h		18h		24h	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0415	28.0702	0.0375	25.3818	0.0361	24.4159	0.0383	25.9333
50	0.0746	50.5084	0.0748	50.6263	0.0717	48.5507	0.0765	51.7824
100	0.1572	106.3522	0.1449	98.0577	0.1440	97.4737	0.1456	98.5126
200	0.3011	203.5960	0.2992	202.2889	0.2925	197.7816	0.2944	199.0382
300	0.4333	292.8137	0.4327	292.4373	0.4285	289.5426	0.4291	290.0102

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	25.95	1.34
50 mg/L	50.37	1.16
100 mg/L	100.10	3.63
200 mg/L	200.68	2.36
300 mg/L	291.20	1.44

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 17-19)
File Folder: 23E
Data Source: DU800 spectrophotometer output (dated: July 11 to 12, 2012)

Species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date: 7/11/2012

Spectrophotometric Data - *Lepomis macrochirus*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	0	-0.0004	-0.2753	0.0002	0.1549	-0.0005	-0.2948	-0.0011	-0.7544	-0.0013	-0.8710	-0.0012	-0.7848	-0.0028	-1.8515
A2	100	0.0696	47.1236	0.0942	63.7536	0.0957	64.7669	0.0938	63.4892	0.1022	69.1764	0.0974	65.9225	0.0999	67.5831
A3	300	0.2954	199.7470	0.3328	224.9806	0.3294	222.7325	0.3288	222.3400	0.3120	210.9810	0.3310	223.8072	0.3300	223.1235
A4	50	0.0335	22.6799	0.0489	33.0958	0.0583	39.4930	0.0505	34.2148	0.0537	36.3503	0.0548	37.0722	0.0593	40.1323
A5	200	0.1780	120.4055	0.2078	140.5773	0.2104	142.3349	0.2121	143.4432	0.2230	150.8722	0.2240	151.5493	0.2275	153.8786
B1	200	0.1795	121.4603	0.2150	145.4199	0.2131	144.1214	0.2103	142.2295	0.2124	143.7092	0.2084	140.9811	0.2145	145.0731
B2	100	0.0976	66.0929	0.1172	79.3283	0.1145	77.4832	0.1153	78.0482	0.1164	78.7659	0.1127	76.2404	0.1244	84.1584
B3	0	0.0002	0.1262	-0.0006	-0.3901	0.0007	0.5000	-0.0012	-0.7831	0.0036	2.4804	-0.0042	-2.8453	-0.0010	-0.6432
B4	50	0.0391	26.5111	0.0466	31.5796	0.0468	31.6703	0.0474	32.1282	0.0513	34.7465	0.0474	32.0871	0.0570	38.5840
B5	300	0.2816	190.4243	0.3194	215.9445	0.3220	217.7140	0.3163	213.8617	0.3231	218.4505	0.3198	215.8628	0.3389	229.1257
C1	50	0.0319	21.5834	0.0520	35.1901	0.0536	36.3035	0.0582	39.3904	0.0588	39.7931	0.0568	38.4471	0.0661	44.7517
C2	0	-0.0003	-0.1892	0.0005	0.3774	0.0034	2.3182	-0.0003	-0.1896	0.0001	0.1076	-0.0041	-2.7786	-0.0001	-0.0655
C3	300	0.2418	163.5598	0.2987	201.9494	0.3075	207.8963	0.3260	220.4296	0.3168	214.1822	0.3138	212.1378	0.3195	216.0770
C4	100	0.0640	43.3259	0.0909	61.5112	0.0949	64.2408	0.1021	69.1058	0.1007	68.1822	0.1003	67.9062	0.1056	71.4781
C5	200	0.1560	105.5661	0.1909	129.1601	0.1965	133.0035	0.2098	141.9458	0.2050	138.6770	0.1984	134.1861	0.1956	132.2976

Means Observed Concentrations (Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-0.67 (0.59)	34.72 (5.45)	63.12 (6.80)	143.29 (10.49)	218.24 (8.72)
B	-0.22 (1.48)	32.47 (3.38)	77.17 (5.09)	140.43 (7.88)	214.48 (10.85)
C	-0.07 (1.38)	36.49 (6.71)	68.68 (8.85)	130.69 (10.98)	205.17 (17.85)
Grand Mean	-0.32 (0.25)	34.56 (1.65)	69.59 (6.49)	138.14 (5.39)	212.63 (5.50)

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tank	theor	time	abs	conc
.	25	0	0.0365	25
.	50	0	0.0750	50
.	100	0	0.1478	100
.	200	0	0.2969	200
.	300	0	0.4422	300
.	25	0	0.0358	25
.	50	0	0.0741	50
.	100	0	0.1464	100
.	200	0	0.2946	200
.	300	0	0.4446	300
.	25	0	0.0370	25
.	50	0	0.0752	50
.	100	0	0.1476	100
.	200	0	0.2961	200
.	300	0	0.4450	300
A1	0	1	-0.0004	.
A2	100	1	0.0696	.
A3	300	1	0.2954	.
A4	50	1	0.0335	.
A5	200	1	0.1780	.
B1	200	1	0.1795	.
B2	100	1	0.0976	.
B3	0	1	0.0002	.
B4	50	1	0.0391	.
B5	300	1	0.2816	.
C1	50	1	0.0319	.
C2	0	1	-0.0003	.
C3	300	1	0.2418	.
C4	100	1	0.0640	.
C5	200	1	0.1560	.
A1	0	3	0.0002	.
A2	100	3	0.0942	.
A3	300	3	0.3328	.
A4	50	3	0.0489	.
A5	200	3	0.2078	.
B1	200	3	0.2150	.
B2	100	3	0.1172	.
B3	0	3	-0.0006	.
B4	50	3	0.0466	.
B5	300	3	0.3194	.
C1	50	3	0.0520	.
C2	0	3	0.0005	.
C3	300	3	0.2987	.
C4	100	3	0.0909	.
C5	200	3	0.1909	.
A1	0	6	-0.0005	.

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A2	100	6	0.0957	.
A3	300	6	0.3294	.
A4	50	6	0.0583	.
A5	200	6	0.2104	.
B1	200	6	0.2131	.
B2	100	6	0.1145	.
B3	0	6	0.0007	.
B4	50	6	0.0468	.
B5	300	6	0.3220	.
C1	50	6	0.0536	.
C2	0	6	0.0034	.
C3	300	6	0.3075	.
C4	100	6	0.0949	.
C5	200	6	0.1966	.
A1	0	12	-0.0011	.
A2	100	12	0.0938	.
A3	300	12	0.3289	.
A4	50	12	0.0505	.
A5	200	12	0.2121	.
B1	200	12	0.2103	.
B2	100	12	0.1153	.
B3	0	12	-0.0012	.
B4	50	12	0.0474	.
B5	300	12	0.3163	.
C1	50	12	0.0582	.
C2	0	12	-0.0003	.
C3	300	12	0.3260	.
C4	100	12	0.1021	.
C5	200	12	0.2098	.
A1	0	15	-0.0013	.
A2	100	15	0.1022	.
A3	300	15	0.3120	.
A4	50	15	0.0537	.
A5	200	15	0.2230	.
B1	200	15	0.2124	.
B2	100	15	0.1164	.
B3	0	15	0.0036	.
B4	50	15	0.0513	.
B5	300	15	0.3231	.
C1	50	15	0.0588	.
C2	0	15	0.0001	.
C3	300	15	0.3168	.
C4	100	15	0.1007	.
C5	200	15	0.2050	.
A1	0	18	-0.0012	.
A2	100	18	0.0974	.
A3	300	18	0.3310	.

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A4	50	18	0.0548	.
A5	200	18	0.2240	.
B1	200	18	0.2084	.
B2	100	18	0.1127	.
B3	0	18	-0.0042	.
B4	50	18	0.0474	.
B5	300	18	0.3193	.
C1	50	18	0.0568	.
C2	0	18	-0.0041	.
C3	300	18	0.3138	.
C4	100	18	0.1003	.
C5	200	18	0.1984	.
A1	0	24	-0.0028	.
A2	100	24	0.0999	.
A3	300	24	0.3300	.
A4	50	24	0.0593	.
A5	200	24	0.2275	.
B1	200	24	0.2145	.
B2	100	24	0.1244	.
B3	0	24	-0.0010	.
B4	50	24	0.0570	.
B5	300	24	0.3389	.
C1	50	24	0.0661	.
C2	0	24	-0.0001	.
C3	300	24	0.3195	.
C4	100	24	0.1056	.
C5	200	24	0.1956	.
SC1	25	6	0.0415	.
SC2	50	6	0.0746	.
SC3	100	6	0.1572	.
SC4	200	6	0.3011	.
SC5	300	6	0.4333	.
SC1	25	12	0.0375	.
SC2	50	12	0.0748	.
SC3	100	12	0.1449	.
SC4	200	12	0.2992	.
SC5	300	12	0.4327	.
SC1	25	18	0.0361	.
SC2	50	18	0.0717	.
SC3	100	18	0.1440	.
SC4	200	18	0.2925	.
SC5	300	18	0.4285	.
SC1	25	24	0.0383	.
SC2	50	24	0.0765	.
SC3	100	24	0.1456	.
SC4	200	24	0.2944	.
SC5	300	24	0.4291	.

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-37)
File Folder: 24E
Data Source: DU800 spectrophotometer output (dated: September 26 to 27, 2012)

Action	Date	nitials
Created.....	5/1/2013	KLW
Revised.....	2/9/2015	KLW
Reviewed...	10/22/15	
Certified.....	2/10/15	

Standard Curve and Checks File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]CCF Std Curve and Checks

Sample Verification File Name:
I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Spectrophotometric Data (w SAS).xlsx]CCF Sample Verification

Spectrophotometric Data - *Ictalurus punctatus*

Species: Channel Catfish (*Ictalurus punctotus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf* -Cl. 145A (SDP) Chemical lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Linear Non-Zero Intercept Curve #1

Slope	0.00184525
Intercept	0.00973523
Correlation Coefficient	0.99989411
Variance	0.0000125

Data Explanation:
1) Linear Non-Zero Intercept Standard Curve #1 was created on September 26, 2012 for CCF exposure with 25, 50, 100, 200 and 300 mg/L dilutions from a 2,000 mg/L active ingredient stock prepared from Analytical Stock #1
3) Standard Checks at 6 and 12h were verified using Standard Set #1 (created with Analytical Stock #1 at dosing initiation)
4) Standard Checks at 12, 18 and 24h were verified using Standard Set #2 (created with Analytical Stock #2 between 10 and 12h post-dosing initiation)
5) Sample Concentration verifications were analyzed from exposure chambers at 1, 3, 6, 12, 15, 18 and 24h

Data Anomalies and Deviations:
1) Linear Non-Zero Intercept curve used.
2) Deviation #19 - Incorrect routing of the diluter test chemical delivery lines during the channel catfish exposure initiated September 26, 2012
3) Deviation #20 - Delivery tube from exposure chamber C2 (100 mg/L) fell off at approximately 1240 (around 3 hour sampling time). Chemical was dripping into exposure chamber C3 (0 mg/L). The delivery tube was immediately replaced. Initial 3h concentration (sampled at 12:44 PM) in exposure chamber C2 (100 mg/L) was slightly lower than expected while initial 3h concentration (sampled at 12:44 PM) in exposure chamber C3 (0 mg/L) was slightly higher than expected. Exposure chamber C3 (0 mg/L) was immediately flushed through a draw down and flushed once with water from the headbox. Within 10 minutes (sampled at 12:51 PM) of the initial 3h sampling, samples were taken directly from the delivery tubes of C2 (100 mg/L) and C3 (0 mg/L) to verify that the appropriate concentrations were being delivered. Additional samples from exposure chamber C3 (0 mg/L) were analyzed again approximately 30 minutes after the initial discovery (sampled at 1:13 PM). Additional samples from exposure chamber C2 (100 mg/L) were analyzed every 30 minutes for 3 additional samples (sampled at 1:13 PM, 1:35 PM and 2:05 PM).
4) Standard Checks were verified at 12h using Standard Sets #1 and #2.

Data Analysis:
Standard Checks:
Average = Average of each standard concentration for all time points
Std Dev = Standard deviation (population) of each standard concentration for all time points

Sample Verification:
Average = Average concentration of each treatment group reading for all time points
Std Dev = Standard deviation (population) of each treatment group reading for all time points

SAS Data Importation for regression and concentration determination:
Absorbance data from standard curve, standard checks, and sample verification is placed in a format for importation into SAS. Standard check replicates conducted at the same time (if any) are listed as .1 and .2 (i.e. triplicate 12 hour standard checks would be listed as 12, 12.1, and 12.2). The SAS program uses all the standards to calculate a single standard curve and predicted concentrations are calculated for all standards, standard checks, and samples from the regression. Input columns include the tank (tank), theoretical concentration (theor), sampling time (time), observed absorbance from the DU800 spectrophotometer (abs), concentration of standards (conc). Data that does not apply to the sample (i.e. tank for standards, concentration for samples) has a "." placed in the column. Standard checks are listed as SC1, SC2, SC3, SC4 and SC5.
The SAS method provides a uniform method for creating a zero-intercept linear regression and determining sample concentrations. Previous linear regressions and sample concentrations calculated by the DU800 spectrophotometer will not be utilized.

File Folder: 24e

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Study Number: AFH-12-PSEUDO-03
Lab Notebook #2 (pages 34-37)
File Folder: 24E
Data Source: DU800 spectrophotometer output (dated: September 26 to 27, 2012)

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Spectrophotometric Data - *Ictalurus punctatus*

Standard Curve

STD Conc (mg/L)	Rep 1		Rep 2		Rep 3	
	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
25	0.0578	26.0225	0.0499	21.7600	0.0496	21.6098
50	0.1107	54.7165	0.1051	51.6563	0.1034	50.7450
100	0.1970	101.5036	0.1953	100.5507	0.1857	95.2834
200	0.3818	201.6238	0.3801	200.7148	0.3795	200.4125
300	0.5595	297.9780	0.5563	296.1916	0.5710	304.1814

Linear Non-Zero Intercept Curve #:

Slope	0.00184525
Intercept	0.00973523
Correlation Coefficient	0.99989411
Variance	0.0000125

Standard Checks

STD Conc	6h		12h Std Set 1		12h Std Set 2		18h		24h	
(mg/L)	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.	Abs	Conc.
25	0.0427	17.8472	0.0479	23.6753	0.0524	28.1365	0.0527	28.3084	0.0487	21.1424
50	0.0912	44.1252	0.0973	47.4801	0.1044	51.2671	0.1043	51.2530	0.0995	48.6230
100	0.1751	89.8054	0.1807	92.8387	0.2087	108.3485	0.1933	100.8778	0.1976	101.8051
200	0.3426	180.3846	0.3517	185.3251	0.4091	216.4439	0.3879	204.9332	0.3799	200.6233
300	0.5042	267.9929	0.5084	267.5101	0.5952	317.2648	0.5649	300.8869	0.5409	287.8380

Standard Check Averages

Std Conc	Average	Std Dev
25 mg/L	23.23	1.89
50 mg/L	48.55	2.67
100 mg/L	98.66	6.74
200 mg/L	197.54	13.15
300 mg/L	288.30	19.19

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-37)
File Folder: 24E
Data Source: DU800 spectrophotometer output (dated: September 26 to 27, 2012)

Species: Channel Catfish (*Ictalurus punctatus*) Lot number: 122000
Test Chemical: *Pseudomonas fluorescens Pf*-CL145A (SDP) Chemical lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Spectrophotometric Data - *Ictalurus punctatus*

Sample Concentrations

Chamber ID	Treatment (mg/L)	1h		3h		6h		12h		15h		18h		24h	
		Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)	Abs (660nm)	Conc. (mg/L)
A1	300	0.3011	157.8854	0.3568	188.1002	0.3655	192.7897	0.3583	188.9128	0.3461	182.2766	0.3486	183.6675	0.3503	184.5362
A2	50	0.0375	15.0674	0.0496	21.6028	0.0526	23.2239	0.0506	22.1644	0.0512	22.4758	0.0512	22.4478	0.0530	23.4468
A3	200	0.2144	110.8978	0.2839	171.4689	0.2973	178.3515	0.2776	168.0835	0.2756	116.9949	0.2744	116.3509	0.2747	116.7280
A4	0	-0.0007	-5.6390	-0.0024	-6.5674	-0.0028	-6.7870	-0.0018	-6.2673	-0.0036	-7.2356	-0.0029	-6.8435	-0.0028	-6.7758
A5	100	0.0754	35.6059	0.0973	47.4627	0.1002	49.0505	0.0983	48.0066	0.0973	47.4320	0.0956	46.5577	0.0972	47.3876
B1	300	0.3272	172.0422	0.3827	202.1451	0.3903	206.2067	0.3750	197.9383	0.3685	194.4053	0.3664	193.2984	0.3588	189.1785
B2	200	0.2264	117.4413	0.2502	130.2585	0.2573	134.1447	0.2447	127.3582	0.2418	125.7391	0.2405	125.0482	0.2318	120.3618
B3	100	0.1083	53.6721	0.1257	62.8486	0.1339	67.2799	0.1286	64.4223	0.1250	62.4608	0.1238	61.8034	0.1232	61.5056
B4	50	0.0398	16.7986	0.0510	22.3592	0.0570	25.6313	0.0552	24.6432	0.0533	23.6337	0.0535	23.7041	0.0528	23.3318
B5	0	-0.0006	-5.5217	-0.0057	-8.3618	-0.0023	-6.5348	-0.0023	-6.5428	-0.0023	-6.5378	-0.0033	-7.0509	-0.0031	-6.9678
C1	200	0.2121	109.6621	0.2375	123.4589	0.2470	128.5553	0.2464	128.2455	0.2340	121.5352	0.2339	121.5043	0.2174	112.5553
C2	100	0.1049	51.8939	0.1110	54.8657	0.1204	59.9818	0.1269	63.5132	0.1185	58.9446	0.1202	59.8381	0.1234	61.5876
C3	0	-0.0023	-5.9885	0.0210	6.1102	-0.0017	-6.2132	-0.0011	-5.8988	-0.0037	-7.2814	-0.0034	-7.1057	-0.0032	-7.0138
C4	300	0.3488	183.7639	0.3866	204.2245	0.3938	208.1550	0.3967	209.6887	0.3794	200.3382	0.3790	200.1041	0.3714	195.9948
C5	50	0.0519	22.8361	0.0673	31.1888	0.0722	33.8473	0.0741	34.8939	0.0737	34.6719	0.0748	35.2728	0.0805	38.3478

Mean Observed Concentrations
(Std Dev)

Diluter ID	Treatment Group (mg/L)				
	0	50	100	200	300
A	-6.59 (0.47)	21.49 (2.68)	45.33 (4.27)	117.63 (3.73)	182.60 (±0.62)
B	-6.80 (0.77)	22.80 (2.82)	62.00 (3.86)	125.77 (5.24)	193.60 (±0.26)
C	-4.77 (4.47)	32.01 (4.59)	58.62 (3.77)	120.79 (6.72)	200.32 (8.08)
Grand Mean	-6.05 (0.91)	25.77 (5.15)	55.52 (6.92)	121.40 (3.85)	192.17 (7.51)

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tank	theor	time	abs	conc
.	25	0	0.0578	25
.	50	0	0.1107	50
.	100	0	0.1970	100
.	200	0	0.3818	200
.	300	0	0.5595	300
.	25	0	0.0499	25
.	50	0	0.1051	50
.	100	0	0.1953	100
.	200	0	0.3801	200
.	300	0	0.5563	300
.	25	0	0.0496	25
.	50	0	0.1034	50
.	100	0	0.1857	100
.	200	0	0.3795	200
.	300	0	0.5710	300
A1	300	1	0.3011	.
A2	50	1	0.0375	.
A3	200	1	0.2144	.
A4	0	1	-0.0007	.
A5	100	1	0.0754	.
B1	300	1	0.3272	.
B2	200	1	0.2264	.
B3	100	1	0.1088	.
B4	50	1	0.0398	.
B5	0	1	-0.0006	.
C1	200	1	0.2121	.
C2	100	1	0.1049	.
C3	0	1	-0.0013	.
C4	300	1	0.3488	.
C5	50	1	0.0519	.
A1	300	3	0.3568	.
A2	50	3	0.0496	.
A3	200	3	0.2339	.
A4	0	3	-0.0024	.
A5	100	3	0.0973	.
B1	300	3	0.3827	.
B2	200	3	0.2502	.
B3	100	3	0.1257	.
B4	50	3	0.0510	.
B5	0	3	-0.0057	.
C1	200	3	0.2375	.
C2	100	3	0.1110	.
C3	0	3	0.0210	.
C4	300	3	0.3866	.
C5	50	3	0.0673	.
A1	300	6	0.3655	.

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A2	50	6	0.0526	.
A3	200	6	0.2373	.
A4	0	6	-0.0028	.
A5	100	6	0.1002	.
B1	300	6	0.3903	.
B2	200	6	0.2573	.
B3	100	6	0.1339	.
B4	50	6	0.0570	.
B5	0	6	-0.0023	.
C1	200	6	0.2470	.
C2	100	6	0.1204	.
C3	0	6	-0.0017	.
C4	300	6	0.3938	.
C5	50	6	0.0722	.
A1	300	12	0.3583	.
A2	50	12	0.0506	.
A3	200	12	0.2276	.
A4	0	12	-0.0018	.
A5	100	12	0.0983	.
B1	300	12	0.3750	.
B2	200	12	0.2447	.
B3	100	12	0.1286	.
B4	50	12	0.0552	.
B5	0	12	-0.0023	.
C1	200	12	0.2464	.
C2	100	12	0.1269	.
C3	0	12	-0.0011	.
C4	300	12	0.3967	.
C5	50	12	0.0741	.
A1	300	15	0.3461	.
A2	50	15	0.0512	.
A3	200	15	0.2256	.
A4	0	15	-0.0036	.
A5	100	15	0.0973	.
B1	300	15	0.3685	.
B2	200	15	0.2418	.
B3	100	15	0.1250	.
B4	50	15	0.0533	.
B5	0	15	-0.0023	.
C1	200	15	0.2340	.
C2	100	15	0.1185	.
C3	0	15	-0.0037	.
C4	300	15	0.3794	.
C5	50	15	0.0737	.
A1	300	18	0.3486	.
A2	50	18	0.0512	.
A3	200	18	0.2244	.

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A4	0	18	-0.0029	.
A5	100	18	0.0956	.
B1	300	18	0.3664	.
B2	200	18	0.2405	.
B3	100	18	0.1238	.
B4	50	18	0.0535	.
B5	0	18	-0.0033	.
C1	200	18	0.2339	.
C2	100	18	0.1202	.
C3	0	18	-0.0034	.
C4	300	18	0.3790	.
C5	50	18	0.0748	.
A1	300	24	0.3503	.
A2	50	24	0.0530	.
A3	200	24	0.2242	.
A4	0	24	-0.0028	.
A5	100	24	0.0972	.
B1	300	24	0.3588	.
B2	200	24	0.2318	.
B3	100	24	0.1232	.
B4	50	24	0.0528	.
B5	0	24	-0.0031	.
C1	200	24	0.2174	.
C2	100	24	0.1234	.
C3	0	24	-0.0032	.
C4	300	24	0.3714	.
C5	50	24	0.0805	.
SC1	25	6	0.0427	.
SC2	50	6	0.0912	.
SC3	100	6	0.1751	.
SC4	200	6	0.3426	.
SC5	300	6	0.5042	.
SC1	25	12	0.0479	.
SC2	50	12	0.0973	.
SC3	100	12	0.1807	.
SC4	200	12	0.3517	.
SC5	300	12	0.5034	.
SC1	25	12.1	0.0524	.
SC2	50	12.1	0.1044	.
SC3	100	12.1	0.2097	.
SC4	200	12.1	0.4091	.
SC5	300	12.1	0.5952	.
SC1	25	18	0.0527	.
SC2	50	18	0.1043	.
SC3	100	18	0.1959	.
SC4	200	18	0.3879	.
SC5	300	18	0.5649	.

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SC1	25	24	0.0487	.
SC2	50	24	0.0995	.
SC3	100	24	0.1976	.
SC4	200	24	0.3799	.
SC5	300	24	0.5409	.

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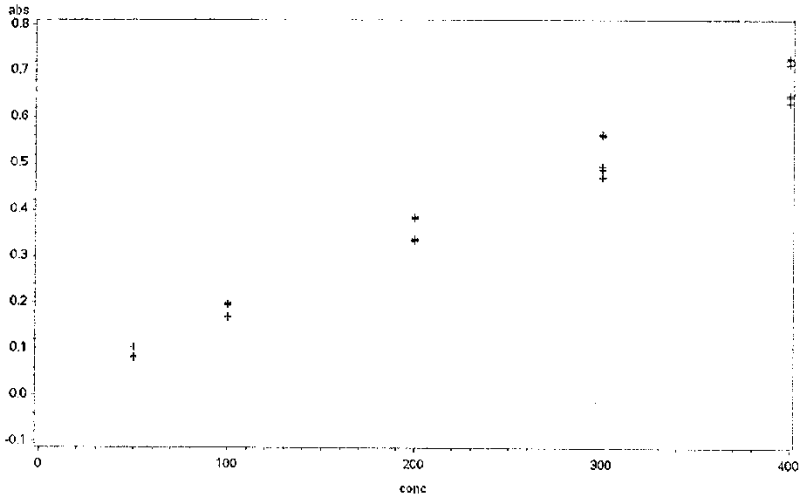
Standard Curve Linear Regression and sample concentrations
Rainbow Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

AEH-12-PSEUDO-03



Performed by James A. Luoma 9.3 00:52 05FEB15 JAL 2/5/15

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Pg 20 of 20
Wrong page number JAL 19APR15

Standard Curve Linear Regression and sample concentrations
Rainbow Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	176
Number of Observations Used	30
Number of Observations with Missing Values	146

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1805983	1805983	5808.59	<.0001
Error	29	9016.56329	310.91598		
Uncorrected Total	30	1815000			

Root MSE	17.63281	R-Square	0.9950
Dependent Mean	210.00000	Adj R-Sq	0.9949
Coeff Var	8.39658		

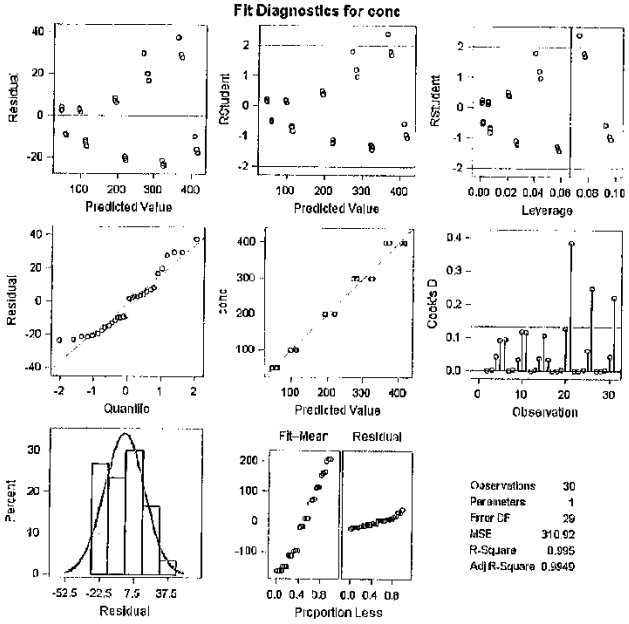
Parameter Estimates

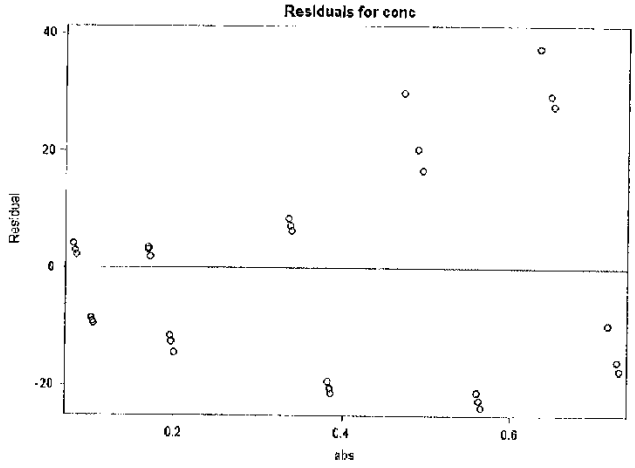
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	573.04974	7.51895	76.21	<.0001	0.99751

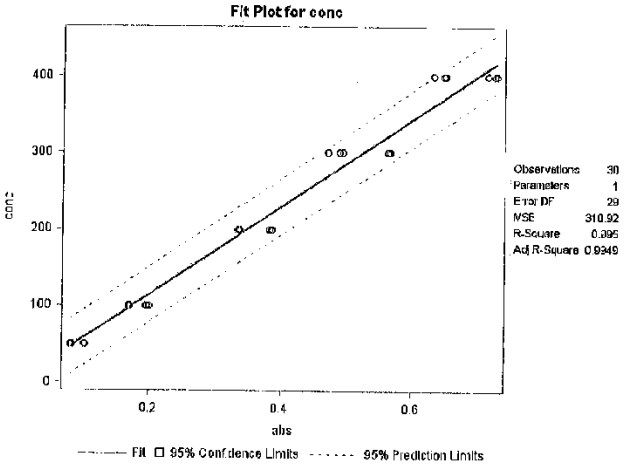
Performed by James A. Luoma 9.3 09:52 05FEB15

Standard Curve Linear Regression and sample concentrations
Rainbow Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc







Performed by James A. Luoma 9.3 09:52 05FEB15

Standard Curve Linear Regression and sample concentrations
Rainbow Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	F6	predicted_ppm
1	.	.	.	.	.		.
2	.	50	0.0	0.1036	50		59.368
3	.	100	0.0	0.1963	100		112.490
4	.	200	0.0	0.3862	200		221.312
5	.	300	0.0	0.5605	300		321.194
6	.	400	0.0	0.7255	400		415.748
7	.	50	0.0	0.1022	50		58.566
8	.	100	0.0	0.1946	100		111.515
9	.	200	0.0	0.3825	200		219.192
10	.	300	0.0	0.5650	300		323.773
11	.	400	0.0	0.7284	400		417.409
12	.	50	0.0	0.1032	50		59.139
13	.	100	0.0	0.1997	100		114.438
14	.	200	0.0	0.3847	200		220.452
15	.	300	0.0	0.5630	300		322.627
16	.	400	0.0	0.7147	400		409.559
17	.	50	0.0	0.0801	50		45.901
18	.	100	0.0	0.1691	100		96.903
19	.	200	0.0	0.3379	200		193.634
20	.	300	0.0	0.4713	300		270.078
21	.	400	0.0	0.6323	400		362.339
22	.	50	0.0	0.0821	50		47.047
23	.	100	0.0	0.1712	100		98.106
24	.	200	0.0	0.3364	200		192.774
25	.	300	0.0	0.4881	300		279.706
26	.	400	0.0	0.6465	400		370.477
27	.	50	0.0	0.0834	50		47.792
28	.	100	0.0	0.1685	100		96.559
29	.	200	0.0	0.3341	200		191.456
30	.	300	0.0	0.4943	300		283.258
31	.	400	0.0	0.6497	400		372.310
32	A1	0	1.0	-0.0045	.		-2.579
33	A2	50	1.0	0.0318	.		18.223
34	A3	200	1.0	0.1785	.		102.289
35	A4	300	1.0	0.2836	.		162.517
36	A5	100	1.0	0.0697	.		39.942
37	B1	100	1.0	0.1148	.		65.786

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38	B2	0	1.0	-0.0023	.	-1.318
39	B3	200	1.0	0.1832	.	104.983
40	B4	300	1.0	0.2484	.	142.346
41	B5	50	1.0	0.0396	.	22.693
42	C1	100	1.0	0.0632	.	36.217
43	C2	50	1.0	0.0270	.	15.472
44	C3	200	1.0	0.1821	.	104.352
45	C4	0	1.0	-0.0058	.	-3.324
46	C5	300	1.0	0.2894	.	165.841
47	SC1	50	1.0	0.0958	.	54.898
48	SC2	100	1.0	0.1900	.	108.879
49	SC3	200	1.0	0.3762	.	215.581
50	SC4	300	1.0	0.5348	.	306.467
51	SC5	400	1.0	0.7064	.	404.802
52	A1	0	3.0	-0.0066	.	-3.782
53	A2	50	3.0	0.0556	.	31.862
54	A3	200	3.0	0.2407	.	137.933
55	A4	300	3.0	0.3470	.	198.848
56	A5	100	3.0	0.1035	.	59.311
57	B1	100	3.0	0.1298	.	74.382
58	B2	0	3.0	-0.0079	.	-4.527
59	B3	200	3.0	0.2319	.	132.890
60	B4	300	3.0	0.3266	.	188.304
61	B5	50	3.0	0.0614	.	35.185
62	C1	100	3.0	0.1038	.	59.483
63	C2	50	3.0	0.0567	.	32.492
64	C3	200	3.0	0.2418	.	138.563
65	C4	0	3.0	-0.0055	.	-3.152
66	C5	300	3.0	0.3557	.	203.834
67	A1	0	6.0	-0.0058	.	-3.324
68	A2	50	6.0	0.0605	.	34.670
69	A3	200	6.0	0.2400	.	137.532
70	A4	300	6.0	0.3524	.	201.943
71	A5	100	6.0	0.1087	.	62.291
72	B1	100	6.0	0.1369	.	78.451
73	B2	0	6.0	-0.0061	.	-3.496
74	B3	200	6.0	0.2407	.	137.933
75	B4	300	6.0	0.3428	.	196.441
76	B5	50	6.0	0.0597	.	34.211
77	C1	100	6.0	0.1102	.	63.150
78	C2	50	6.0	0.0577	.	33.065
79	C3	200	6.0	0.2425	.	138.965
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	C4	0	6.0	-0.0056	.	-3.209
81	C5	300	6.0	0.3618	.	207.329
82	SC1	50	6.0	0.0845	.	48.423
83	SC2	100	6.0	0.1832	.	104.983
84	SC3	200	6.0	0.3440	.	197.129
85	SC4	300	6.0	0.5181	.	296.897
86	SC5	400	6.0	0.6383	.	364.632
87	SC1	50	6.1	0.0889	.	50.944
88	SC2	100	6.1	0.1845	.	105.728
89	SC3	200	6.1	0.3542	.	202.974
90	SC4	300	6.1	0.5250	.	300.851
91	SC5	400	6.1	0.6769	.	387.897
92	SC1	50	6.2	0.0913	.	52.319
93	SC2	100	6.2	0.1869	.	107.103
94	SC3	200	6.2	0.3520	.	201.714
95	SC4	300	6.2	0.5243	.	300.450
96	SC5	400	6.2	0.6901	.	395.462
97	A1	0	12.0	-0.0052	.	-2.980
98	A2	50	12.0	0.0582	.	33.351
99	A3	200	12.0	0.2393	.	137.131
100	A4	300	12.0	0.3504	.	200.797
101	A5	100	12.0	0.1101	.	63.093
102	B1	100	12.0	0.1338	.	76.674
103	B2	0	12.0	-0.0066	.	-3.782
104	B3	200	12.0	0.2402	.	137.647
105	B4	300	12.0	0.3412	.	195.525
106	B5	50	12.0	0.0630	.	36.102
107	C1	100	12.0	0.1091	.	62.520
108	C2	50	12.0	0.0568	.	32.549
109	C3	200	12.0	0.2389	.	136.902
110	C4	0	12.0	-0.0034	.	-1.948
111	C5	300	12.0	0.3620	.	207.444
112	SC1	50	12.0	0.0959	.	54.955
113	SC2	100	12.0	0.1861	.	106.645
114	SC3	200	12.0	0.3659	.	209.679
115	SC4	300	12.0	0.5231	.	299.762
116	SC5	400	12.0	0.6784	.	388.757
117	SC1	50	12.1	0.0950	.	54.440
118	SC1	50	12.1	0.0862	.	49.397
119	SC2	100	12.1	0.1853	.	106.186
120	SC3	200	12.1	0.3604	.	206.527
121	SC4	300	12.1	0.5209	.	298.502
122						

	SC5	400	12.1	0.6728	.	385.548
123	A1	0	15.0	-0.0065	.	-3.725
124	A2	50	15.0	0.0582	.	33.351
125	A3	200	15.0	0.2446	.	140.168
126	A4	300	15.0	0.3576	.	204.923
127	A5	100	15.0	0.1075	.	61.603
128	B1	100	15.0	0.1439	.	82.462
129	B2	0	15.0	-0.0067	.	-3.839
130	B3	200	15.0	0.2497	.	143.091
131	B4	300	15.0	0.3619	.	207.387
132	B5	50	15.0	0.0627	.	35.930
133	C1	100	15.0	0.1101	.	63.093
134	C2	50	15.0	0.0591	.	33.867
135	C3	200	15.0	0.2421	.	138.735
136	C4	0	15.0	-0.0050	.	-2.865
137	C5	300	15.0	0.3568	.	204.464
138	A1	0	18.0	-0.0071	.	-4.069
139	A2	50	18.0	0.0597	.	34.211
140	A3	200	18.0	0.2454	.	140.626
141	A4	300	18.0	0.3560	.	204.006
142	A5	100	18.0	0.1119	.	64.124
143	B1	100	18.0	0.1457	.	83.483
144	B2	0	18.0	-0.0002	.	-0.115
145	B3	200	18.0	0.2593	.	148.592
146	B4	300	18.0	0.4319	.	247.500
147	B5	50	18.0	0.0678	.	38.853
148	C1	100	18.0	0.1147	.	65.729
149	C2	50	18.0	0.0670	.	38.394
150	C3	200	18.0	0.2583	.	148.019
151	C4	0	18.0	0.0005	.	0.287
152	C5	300	18.0	0.3605	.	206.584
153	SC2	100	18.0	0.1697	.	97.247
154	SC3	200	18.0	0.3283	.	188.132
155	SC4	300	18.0	0.4826	.	276.554
156	SC5	400	18.0	0.6174	.	353.801
157	A1	0	24.0	-0.0007	.	-0.401
158	A2	50	24.0	0.0650	.	37.248
159	A3	200	24.0	0.2485	.	142.403
160	A4	300	24.0	0.3634	.	208.246
161	A5	100	24.0	0.1171	.	67.104
162	B1	100	24.0	0.1452	.	83.207
163	B2	0	24.0	-0.0009	.	-0.516
164						

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	B3	200	24.0	0.2571	.		147.331
165	B4	300	24.0	0.3640	.		208.590
166	B5	50	24.0	0.0686	.		39.884
167	C1	100	24.0	0.1124	.		64.411
168	C2	50	24.0	0.0658	.		37.707
169	C3	200	24.0	0.2417	.		138.506
170	C4	0	24.0	0.0023	.		1.318
171	C5	300	24.0	0.3540	.		202.860
172	SC1	50	24.0	0.0871	.		49.913
173	SC2	100	24.0	0.1764	.		101.086
174	SC3	200	24.0	0.3364	.		192.774
175	SC4	300	24.0	0.4921	.		281.998
176	SC5	400	24.0	0.6310	.		361.594

Performed by James A. Luoma 9.3 09:52 05FEB15

Mean treatment concentration by tank for all exposure sampling times individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

tank=A1 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.9799	1.2459	-4.1321	-1.8276

tank=A2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.8452	6.2299	26.0835	37.6069

tank=A3 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
134.0	14.1178	121.0	147.1

tank=A4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
197.3	15.6468	182.9	211.8

tank=A5 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
59.6381	9.0070	51.3080	67.9682

tank=B1 theor=100

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
77.7792	6.3388	71.9168	83.6417

tank=B2 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.5132	1.8056	-4.1831	-0.8433

tank=B3 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
136.1	14.8064	122.4	149.8

tank=B4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
198.0	31.2264	169.1	226.9

tank=B5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.6941	5.6605	29.4590	39.9292

tank=C1 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
59.2288	10.3268	49.6781	68.7795

tank=C2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.9352	7.6567	24.8540	39.0165

tank=C3 theor=200

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
134.9	13.9458	122.0	147.8

tank=C4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.8419	1.8866	-3.5867	-0.0972

tank=C5 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
199.8	15.0653	185.8	213.7

Performed by James A. Luoma 9.3 09:52 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.4068	1.0138	-4.9253	0.1117

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-3.8203	0.6885	-5.5305	-2.1101

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-3.3428	0.1442	-3.7010	-2.9845

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.9035	0.9193	-5.1870	-0.6199

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-3.4765	0.5325	-4.7992	-2.1538

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.2989	2.4070	-7.2783	4.6805

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.1337	1.0272	-2.4181	2.6855

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
18.7960	3.6442	9.7434	27.8486

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.1796	1.7853	28.7943	37.5649

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.9818	0.8265	31.9288	36.0349

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.0010	1.8634	29.3721	38.6298

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.3830	1.3645	30.9933	37.7727

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.1527	2.5578	30.7987	43.5068

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
38.2797	1.4084	34.7812	41.7783

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
47.3148	16.1047	7.3086	87.3210

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
64.3917	8.6522	42.8985	85.8849

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.9637	9.0920	45.3779	90.5495

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.4289	8.0117	47.5267	87.3310

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.0525	11.6367	40.1453	97.9597

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.1155	10.7495	44.4122	97.8188

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.5739	10.1640	46.3251	96.8227

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
103.9	1.4087	100.4	107.4

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
136.5	3.1095	128.7	144.2

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
138.1	0.7391	136.3	140.0

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
137.2	0.3816	136.3	138.2

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
140.7	2.2197	135.2	146.2

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
145.7	4.4426	134.7	156.8

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
142.7	4.4225	131.8	153.7

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
156.9	12.7145	125.3	188.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
197.0	7.9289	177.3	216.7

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
201.9	5.4441	188.4	215.4

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
201.3	5.9729	186.4	216.1

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
205.6	1.5718	201.7	209.5

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
219.4	24.4012	158.7	280.0

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
206.6	3.2139	198.6	214.5

Performed by James A. Luoma 9.3 09:52 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.4450	1.6554	-3.1986	-1.6915

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.8248	6.3780	29.9216	35.7281

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
65.5487	12.1222	60.0308	71.0666

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
135.0	13.5888	128.8	141.2

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
198.4	20.8607	188.9	207.9

Performed by James A. Luoma 9.3 09:52 05FEB15

Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
51.9111	2.6233	49.7180	54.1042

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
104.7	3.7602	101.6	107.9

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
201.6	6.9907	194.3	209.3

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
295.2	10.3027	286.6	303.8

theor=400

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
380.3	18.0658	365.2	395.4

Performed by James A. Luoma 9.3 09:52 05FEB15

FF # 29
Item No. 7
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Rainbow Trout Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL       Page 1 of 3              *
* Analysis completion date:  05FEB2015        JAL                            *
*****************************************************************************/

data Zeq; set fish.RBT2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure sampl
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 'Individual enclosure means';
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 8
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if theor = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = 'C5' then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AEH-12-PSEUDO-03

FF # 29
Item No. 8
Pg 3 of 3

```
119  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
120
121  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
122
123  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
124
125  title1 'Standard Curve Linear Regression and sample concentrations';
126  title2 'Rainbow Trout Spectrophotometer analysis';
127  title3 h=1 'Study # AEH-12-PSEUDO-03';
128  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
129
130  /*****************************************************************************
131  * SAS ver 9.3       Analysis prepared by:  JAL       Page 1 of 5             *
132  * Analysis completion date:  05FEB2015                                      *
133  *****************************************************************************/
134
135  data Zeq; set fish.RBT2;
136  run;

NOTE: There were 176 observations read from the data set FISH.RBT2.
NOTE: The data set WORK.ZEQ has 176 observations and 6 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


137
138  proc sort;
139  by tank time ; run;

NOTE: There were 176 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 176 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


140
141  run;
142  proc gplot data= zeq;
143  plot abs * conc;
144  run;

NOTE: 146 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 3 records written to C:\Users\JLUOMA\gplot1.png.

NOTE: There were 176 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.21 seconds
      cpu time            0.18 seconds


145  proc reg data = zeq;
146  model conc = abs / stb noint edf;
147  output out=output_out p=predicted_ppm;
```

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```
148  run;

NOTE: The data set WORK.OUTPUT_OUT has 176 observations and 7 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.24 seconds
      cpu time            0.46 seconds


149  proc sort;
150  by time tank;

NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 176 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds


151  proc print data=output_out;
152  run;

NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.09 seconds
      cpu time            0.07 seconds


153  data zeq2; set output_out;
154  if tank = "." then delete;
155  if thero = "." then delete;
156  if tank = "SC1" then delete;
157  if tank = "SC2" then delete;
158  if tank = "SC3" then delete;
159  if tank = "SC4" then delete;
160  if tank = "SC5" then delete;
161  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


162  proc sort data = zeq2;
163  by tank;
164  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

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```
165  /*************************************************************************************************
165! ************************
166  * This procedure produces the mean concentrations for each treatment replicate over all
166! exposure sampling times     *
167  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
167! period                  *
168  *************************************************************************************************
168! ************************/
169  title1 'Mean treatment concentration by tank for all exposure sampling times';
170  title2 'Individual enclosure means';
171  proc means data = zeq2 mean std lclm uclm fw=8;
172  by tank theor;
173  var predicted_ppm;
174  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.03 seconds


175  proc sort;
176  by theor time;
177  /*************************************************************************************************
177! ***********
178  * This procedure produces the mean concentrations for each treatment group at each sampling
178! time      *
179  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
179! replicates     *
180  * at each sample time over the entire exposure
180!           *
181  *************************************************************************************************
181! **********/
182  title1 'Mean treatment concentration by treatment group at each exposure sampling time';

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


183  proc means data = zeq2 mean std lclm uclm fw=8;
184  by theor time;
185  var predicted_ppm;
186  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.09 seconds
      cpu time            0.06 seconds


187  /*************************************************************************************************
187! ***********
```

```
188  * This procedure produces the mean concentrations for each treatment group over all sampling
188!  times    *
189  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
189! replicates     *
190  * over the entire exposure
190!           *
191  ************************************************************************************************
191! *********/
192  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
193  proc means data = zeq2 mean std lclm uclm fw=8;
194  by theor;
195  var predicted_ppm;
196  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.06 seconds


197  data zeq3; set output_out;
198  if tank = "." then delete;
199  if thero = "." then delete;
200  if tank = "A1" then delete;
201  if tank = "A2" then delete;
202  if tank = "A3" then delete;
203  if tank = "A4" then delete;
204  if tank = "A5" then delete;
205  if tank = "B1" then delete;
206  if tank = "B2" then delete;
207  if tank = "B3" then delete;
208  if tank = "B4" then delete;
209  if tank = "B5" then delete;
210  if tank = "C1" then delete;
211  if tank = "C2" then delete;
212  if tank = "C3" then delete;
213  if tank = "C4" then delete;
214  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 41 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
215  proc sort;
216  by theor time;
217
218  /************************************************************************************************
218! ***************
219  * This procedure produces the mean concentrations for each standard check conc. over all
219! sampling times    *
220  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
220! replicates          *
```

```
221  * over the entire exposure
221!                *
222  ************************************************************************************************
222! ***************/
223  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 41 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 41 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


224  proc means data = zeq3 mean std lclm uclm fw=8;
225  by theor;
226  var predicted_ppm;
227  run;

NOTE: There were 41 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


228
229  quit;
230  run;
```

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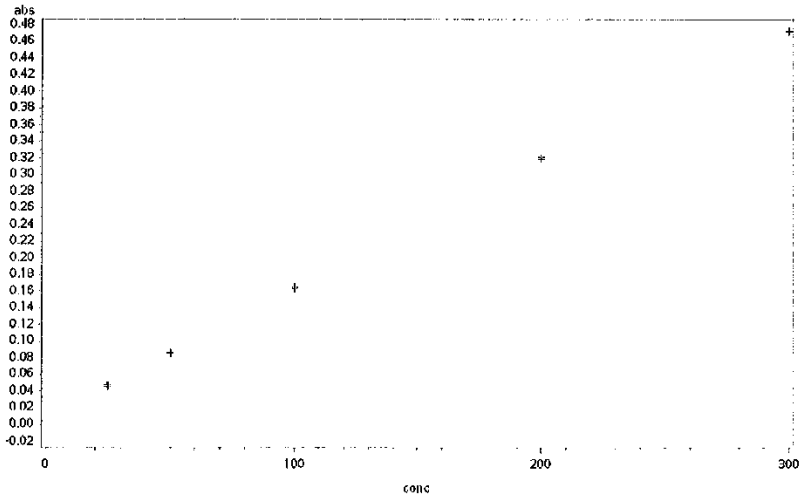
Standard Curve Linear Regression and sample concentrations AEH-12-PSEUDO-03

Brook Trout Spectrophotometer analysis

Study # AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15 JAL 2/5/15

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AEH-12-PSEUDO-03

Standard Curve Linear Regression and sample concentrations
Brook Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	141
Number of Observations Used	15
Number of Observations with Missing Values	126

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429195	429195	33389.3	<.0001
Error	14	179.95994	12.85428		
Uncorrected Total	15	429375			

Root MSE	3.58529	R-Square	0.9996
Dependent Mean	135.00000	Adj R-Sq	0.9996
Coeff Var	2.65577		

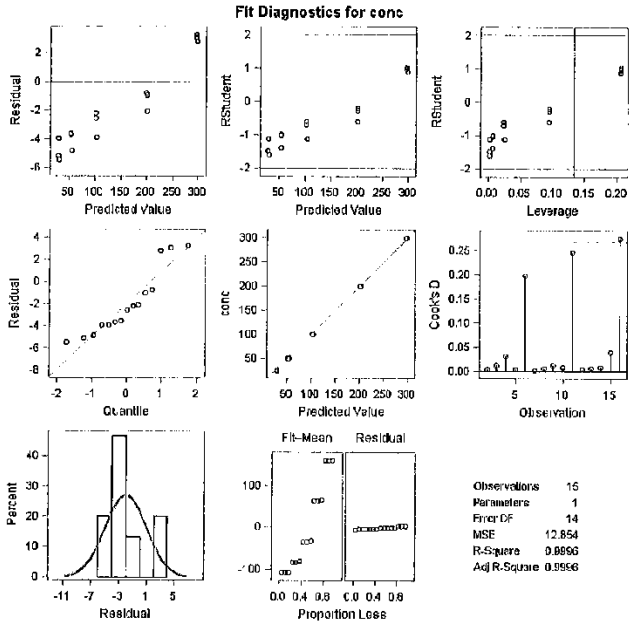
Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	628.74896	3.44091	182.73	<.0001	0.99979

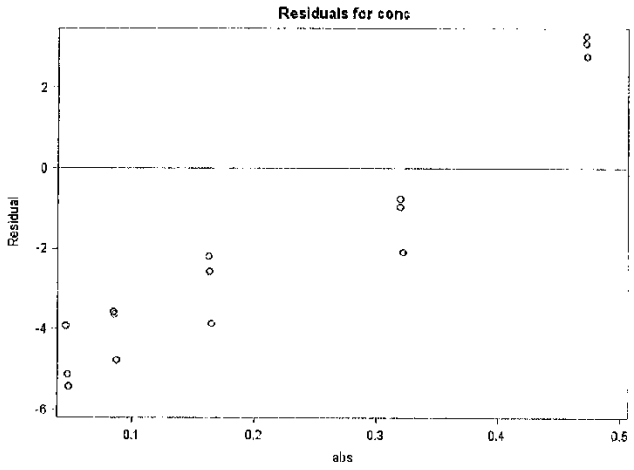
Performed by James A. Luoma 9.3 11:06 05FEB15

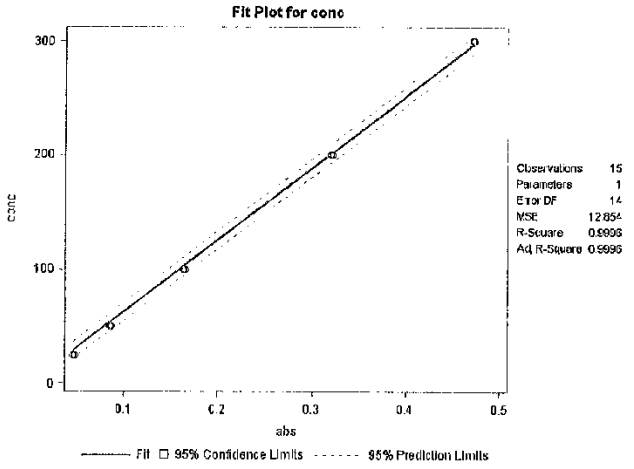
Standard Curve Linear Regression and sample concentrations
Brook Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc



AEH-12-PSEUDO-03





Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Brook Trout Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	predicted_ppm
1						
2	.	25	0	0.0479	25	30.117
3	.	50	0	0.0871	50	54.764
4	.	100	0	0.1652	100	103.869
5	.	200	0	0.3193	200	200.760
6	.	300	0	0.4727	300	297.210
7	.	25	0	0.0460	25	28.922
8	.	50	0	0.0853	50	53.632
9	.	100	0	0.1631	100	102.549
10	.	200	0	0.3198	200	200.948
11	.	300	0	0.4722	300	296.895
12	.	25	0	0.0484	25	30.431
13	.	50	0	0.0852	50	53.569
14	.	100	0	0.1625	100	102.172
15	.	200	0	0.3214	200	202.080
16	.	300	0	0.4719	300	296.707
17	A1	300	1	0.3305	.	207.802
18	A2	50	1	0.0404	.	25.401
19	A3	100	1	0.0868	.	54.575
20	A4	0	1	-0.0004	.	-0.251
21	A5	200	1	0.2279	.	143.292
22	B1	300	1	0.3637	.	228.676
23	B2	100	1	0.1310	.	82.368
24	B3	50	1	0.0550	.	34.581
25	B4	200	1	0.2500	.	157.187
26	B5	0	1	0.0042	.	2.641
27	C1	0	1	-0.0007	.	-0.440
28	C2	100	1	0.0926	.	58.222
29	C3	300	1	0.3420	.	215.032
30	C4	200	1	0.2408	.	151.403
31	C5	50	1	0.0436	.	27.413
32	A1	300	3	0.3873	.	243.514
33	A2	50	3	0.0601	.	37.788
34	A3	100	3	0.1161	.	72.996
35	A4	0	3	-0.0001	.	-0.063
36	A5	200	3	0.2657	.	167.059
37	B1	300	3	0.3989	.	250.808

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38	B2	100	3	0.1493	.	93.872
39	B3	50	3	0.0663	.	41.686
40	B4	200	3	0.2696	.	169.511
41	B5	0	3	0.0003	.	0.189
42	C1	0	3	0.0001	.	0.063
43	C2	100	3	0.1142	.	71.803
44	C3	300	3	0.3817	.	239.993
45	C4	200	3	0.2619	.	164.669
46	C5	50	3	0.0660	.	41.497
47	A1	300	6	0.3923	.	246.658
48	A2	50	6	0.0627	.	39.423
49	A3	100	6	0.1190	.	74.821
50	A4	0	6	-0.0004	.	-0.251
51	A5	200	6	0.2688	.	169.008
52	B1	300	6	0.4018	.	252.631
53	B2	100	6	0.1581	.	99.405
54	B3	50	6	0.0673	.	42.315
55	B4	200	6	0.2714	.	170.642
56	B5	0	6	-0.0004	.	-0.251
57	C1	0	6	-0.0003	.	-0.189
58	C2	100	6	0.1194	.	75.073
59	C3	300	6	0.3873	.	243.514
60	C4	200	6	0.2625	.	165.047
61	C5	50	6	0.0681	.	42.818
62	SC1	25	6	0.0475	.	29.866
63	SC2	50	6	0.0811	.	50.992
64	SC3	100	6	0.1574	.	98.965
65	SC4	200	6	0.3096	.	194.661
66	SC5	300	6	0.4549	.	286.018
67	A1	300	12	0.3949	.	248.293
68	A2	50	12	0.0626	.	39.360
69	A3	100	12	0.1201	.	75.513
70	A4	0	12	-0.0003	.	-0.189
71	A5	200	12	0.2672	.	168.002
72	B1	300	12	0.4074	.	256.152
73	B2	100	12	0.1528	.	96.073
74	B3	50	12	0.0707	.	44.453
75	B4	200	12	0.2720	.	171.020
76	B5	0	12	-0.0008	.	-0.503
77	C1	0	12	-0.0009	.	-0.566
78	C2	100	12	0.1243	.	78.153
79	C3	300	12	0.3946	.	248.104
80						

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	C4	200	12	0.2709	.	170.328
81	C5	50	12	0.0701	.	44.075
82	SC1	25	12	0.0471	.	29.614
83	SC2	50	12	0.0896	.	56.462
84	SC3	100	12	0.1593	.	100.160
85	SC4	200	12	0.3026	.	190.259
86	SC5	300	12	0.4544	.	285.704
87	A1	300	15	0.3722	.	234.020
88	A2	50	15	0.0596	.	37.473
89	A3	100	15	0.1141	.	71.740
90	A4	0	15	0.0051	.	3.207
91	A5	200	15	0.2559	.	160.897
92	B1	300	15	0.4222	.	265.468
93	B2	100	15	0.1587	.	99.782
94	B3	50	15	0.0740	.	46.527
95	B4	200	15	0.2850	.	179.193
96	B5	0	15	-0.0009	.	-0.566
97	C1	0	15	-0.0008	.	-0.503
98	C2	100	15	0.1243	.	78.153
99	C3	300	15	0.3994	.	251.122
100	C4	200	15	0.2727	.	171.460
101	C5	50	15	0.0717	.	45.081
102	A1	300	18	0.3698	.	232.511
103	A2	50	18	0.0599	.	37.662
104	A3	100	18	0.1148	.	72.180
105	A4	0	18	-0.0002	.	-0.126
106	A5	200	18	0.2544	.	159.954
107	B1	300	18	0.4246	.	266.967
108	B2	100	18	0.1595	.	100.285
109	B3	50	18	0.0722	.	45.396
110	B4	200	18	0.2874	.	180.702
111	B5	0	18	-0.0012	.	-0.754
112	C1	0	18	-0.0008	.	-0.503
113	C2	100	18	0.1243	.	78.153
114	C3	300	18	0.3980	.	250.242
115	C4	200	18	0.2738	.	172.151
116	C5	50	18	0.0704	.	44.264
117	SC1	25	18	0.0425	.	26.722
118	SC2	50	18	0.0803	.	50.489
119	SC3	100	18	0.1579	.	99.279
120	SC4	200	18	0.3173	.	199.502
121	SC5	300	18	0.4723	.	296.958
122						

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	A1	300	24	0.3715	.	233.580
123	A2	50	24	0.0583	.	36.656
124	A3	100	24	0.1151	.	72.369
125	A4	0	24	-0.0014	.	-0.880
126	A5	200	24	0.2559	.	160.897
127	B1	300	24	0.4240	.	266.590
128	B2	100	24	0.1591	.	100.034
129	B3	50	24	0.0734	.	46.150
130	B4	200	24	0.2856	.	179.571
131	B5	0	24	-0.0014	.	-0.880
132	C1	0	24	-0.0011	.	-0.692
133	C2	100	24	0.1230	.	77.336
134	C3	300	24	0.3996	.	251.248
135	C4	200	24	0.2765	.	173.849
136	C5	50	24	0.0732	.	46.024
137	SC1	25	24	0.0454	.	28.545
138	SC2	50	24	0.0804	.	50.551
139	SC3	100	24	0.1495	.	93.998
140	SC4	200	24	0.3309	.	208.053
141	SC5	300	24	0.4473	.	281.239

Performed by James A. Luoma 9.3 11:06 05FEB15

AEH-12-PSEUDO-03

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

tank=A1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
235.2	13.7403	222.5	247.9

tank=A2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.2519	4.0896	31.7298	40.7740

tank=A3 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
70.5995	7.2044	63.9366	77.2624

tank=A4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.2066	1.3503	-1.0423	1.4554

tank=A5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
161.3	8.7931	153.2	169.4

tank=B1 theor=300

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
255.3	13.5623	242.8	267.9

tank=B2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
95.9740	6.4672	89.9928	102.0

tank=B3 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
43.0154	4.1490	39.1782	46.8526

tank=B4 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
172.5	6.2777	164.9	180.2

tank=B5 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0180	1.2239	-1.1499	1.1139

tank=C1 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4042	0.2563	-0.6413	-0.1671

tank=C2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
73.8421	7.2758	67.1130	80.5711

tank=C3 theor=300

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
242.8	12.9330	230.8	254.7

tank=C4 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
167.0	7.7129	159.9	174.1

tank=C5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
41.5962	6.4248	35.6543	47.5382

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.6497	1.7269	-3.6401	4.9395

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0629	0.1257	-0.2495	0.3753

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2305	0.0363	-0.3207	-0.1404

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4192	0.2021	-0.9212	0.0829

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.7126	2.1601	-4.6535	6.0786

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4611	0.3165	-1.2472	0.3251

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.8174	0.1059	-1.0879	-0.5468

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
29.1320	4.8251	17.1457	41.1184

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
40.3238	2.1982	34.8631	45.7845

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
41.5184	1.8324	36.9665	46.0703

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
42.6292	2.8377	35.5796	49.6785

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
43.0274	4.8639	30.9448	55.1100

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
42.4408	4.1768	32.0648	52.8163

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
42.9436	5.4455	29.4162	56.4709

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
65.0546	15.1027	27.5373	102.6

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
79.5577	12.4111	48.7268	110.4

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.0997	14.1216	48.0197	118.2

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.2464	11.1863	55.4582	111.0

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.2254	14.6930	46.7259	119.7

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.5398	14.8085	46.7584	120.3

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.2464	14.7491	46.6076	119.9

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
150.6	6.9801	133.3	168.0

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
167.1	2.4208	161.1	173.1

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
168.2	2.8774	161.1	175.4

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
169.8	1.5811	165.9	173.7

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
170.5	9.1847	147.7	193.3

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
170.9	10.4276	145.0	196.8

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
171.4	9.5674	147.7	195.2

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
217.2	10.6002	190.8	243.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
244.8	5.5158	231.1	258.5

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
247.6	4.6310	236.1	259.1

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
250.8	4.5930	239.4	262.3

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
250.2	15.7390	211.1	289.3

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
249.9	17.2302	207.1	292.7

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
250.5	16.5183	209.4	291.5

Performed by James A. Luoma 9.3 11 06 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0719	1.0406	-0.5455	0.4018

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
40.2878	5.7987	37.6483	42.9274

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
80.1385	13.3225	74.0742	86.2029

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
166.9	9.1504	162.8	171.1

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
244.4	15.3109	237.5	251.4

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
28.6867	1.4295	26.4120	30.9613

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
52.1233	2.9009	47.5073	56.7393

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
98.1006	2.7814	93.6747	102.5

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
198.1	7.6230	186.0	210.2

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
287.5	6.6851	276.8	298.1

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FF # 29
Item No. 16
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Brook Trout Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL      Page 1 of 3              *
* Analysis completion date:  05FEB2015                                       *
*****************************************************************************/

data Zeq; set fish.BKT2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure samp
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************
title1 "Mean treatment concentration by tank for all exposure sampling times';
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 11
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 'Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = '.' then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = 'A3" then delete;
if tank = 'A4" then delete;
if tank = 'A5" then delete;
if tank = 'B1" then delete;
if tank = 'B2" then delete;
if tank = 'B3" then delete;
if tank = 'B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AEM-12-PSEUDO-03

FF # 29
Item No. 11
Pg 3 of 3

```
4    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
5
6    FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
7
8    options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
9
10   title1 'Standard Curve Linear Regression and sample concentrations';
11   title2 'Brook Trout Spectrophotometer analysis';
12   title3 h=1 'Study # AEH-12-PSEUDO-03';
13   title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
14
15   /*****************************************************************************
16   * SAS ver 9.3       Analysis prepared by:  JAL        Page 1 of 5            *
17   * Analysis completion date:  05FEB2015       JAL                            *
18   *****************************************************************************/
19
20   data Zeq; set fish.BKT2;
21   run;

NOTE: There were 141 observations read from the data set FISH.BKT2.
NOTE: The data set WORK.ZEQ has 141 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


22
23   proc sort;
24   by tank time ; run;

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 141 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds


25
26   run;
27   proc gplot data= zeq;
28   plot abs * conc;
29   run;

NOTE: 126 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 4 records written to C:\Users\JLUOMA\gplot.png.

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.26 seconds
      cpu time            0.24 seconds


30   proc reg data = zeq;
31   model conc = abs / stb noint edf;
32   output out=output_out p=predicted_ppm;
```

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FF # 29
Item No. 12
Pg 1 of 5

```
33   run;

NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 6 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.66 seconds
      cpu time            0.35 seconds


34   proc sort;
35   by time tank;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


36   proc print data=output_out;
37   run;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.06 seconds


38   data zeq2; set output_out;
39   if tank = "." then delete;
40   if thero = "." then delete;
41   if tank = "SC1" then delete;
42   if tank = "SC2" then delete;
43   if tank = "SC3" then delete;
44   if tank = "SC4" then delete;
45   if tank = "SC5" then delete;
46   run;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


47   proc sort data = zeq2;
48   by tank;
49   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

```
50   /*************************************************************************************************
50 ! ************************
51   * This procedure produces the mean concentrations for each treatment replicate over all
51 ! exposure sampling times     *
52   * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
52 ! period                  *
53   *************************************************************************************************
53 ! ************************/
54   title1 "Mean treatment concentration by tank for all exposure sampling times";
55   title2 "Individual enclosure means";
56   proc means data = zeq2 mean std lclm uclm fw=8;
57   by tank theor;
58   var predicted_ppm;
59   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


60   proc sort;
61   by theor time;
62   /*************************************************************************************************
62 ! ***********
63   * This procedure produces the mean concentrations for each treatment group at each sampling
63 ! time      *
64   * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
64 ! replicates     *
65   * at each sample time over the entire exposure
65 !           *
66   *************************************************************************************************
66 ! **********/
67   title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


68   proc means data = zeq2 mean std lclm uclm fw=8;
69   by theor time;
70   var predicted_ppm;
71   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.04 seconds


72   /*************************************************************************************************
72 ! ***********
```

```
73   * This procedure produces the mean concentrations for each treatment group over all sampling
73 !  times    *
74   * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
74 ! replicates     *
75   * over the entire exposure
75 !          *
76   ***************************************************************************************
76 ! **********/
77   title1 "Mean treatment concentration by treatment group over all exposure sampling times";
78   proc means data = zeq2 mean std lclm uclm fw=8;
79   by theor;
80   var predicted_ppm;
81   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


82   data zeq3; set output_out;
83   if tank = "." then delete;
84   if thero = "." then delete;
85   if tank = "A1" then delete;
86   if tank = "A2" then delete;
87   if tank = "A3" then delete;
88   if tank = "A4" then delete;
89   if tank = "A5" then delete;
90   if tank = "B1" then delete;
91   if tank = "B2" then delete;
92   if tank = "B3" then delete;
93   if tank = "B4" then delete;
94   if tank = "B5" then delete;
95   if tank = "C1" then delete;
96   if tank = "C2" then delete;
97   if tank = "C3" then delete;
98   if tank = "C4" then delete;
99   if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
100  proc sort;
101  by theor time;
102
103  /***************************************************************************************
103! ***************
104  * This procedure produces the mean concentrations for each standard check conc. over all
104! sampling times    *
105  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
105! replicates          *
```

```
106  * over the entire exposure
106!              *
107  ************************************************************************************************
107! ***************/
108  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


109  proc means data = zeq3 mean std lclm uclm fw=8;
110  by theor;
111  var predicted_ppm;
112  run;

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


113
114  quit;
115  run;
```

FF # 29
Item No. 12
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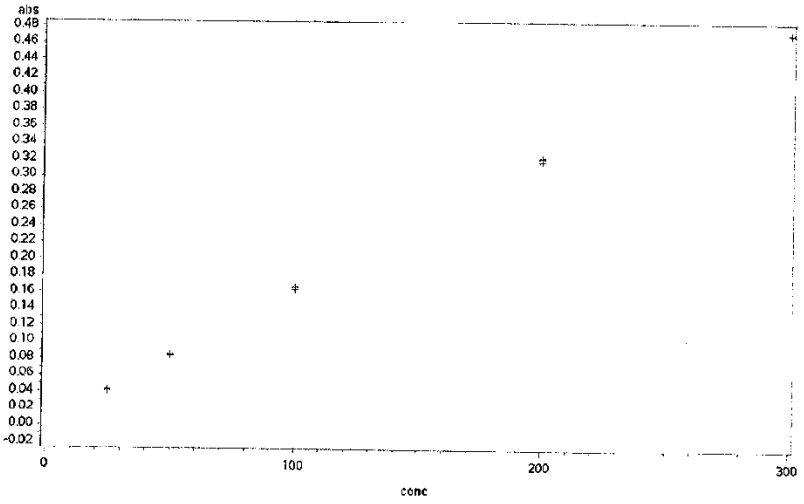
Standard Curve Linear Regression and sample concentrations AEH-12-PSEUDO-03

Walleye Spectrophotometer analysis

Study # AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15

JAL 2/5/15

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Item No. 13
Pg 1 of 18

AEH-12-PSEUDO-03

Standard Curve Linear Regression and sample concentrations
Walleye Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	126
Number of Observations Used	15
Number of Observations with Missing Values	111

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429261	429261	52876.3	<.0001
Error	14	113.65515	8.11822		
Uncorrected Total	15	429375			

Root MSE	2.84925	R-Square	0.9997
Dependent Mean	135.00000	Adj R-Sq	0.9997
Coeff Var	2.11056		

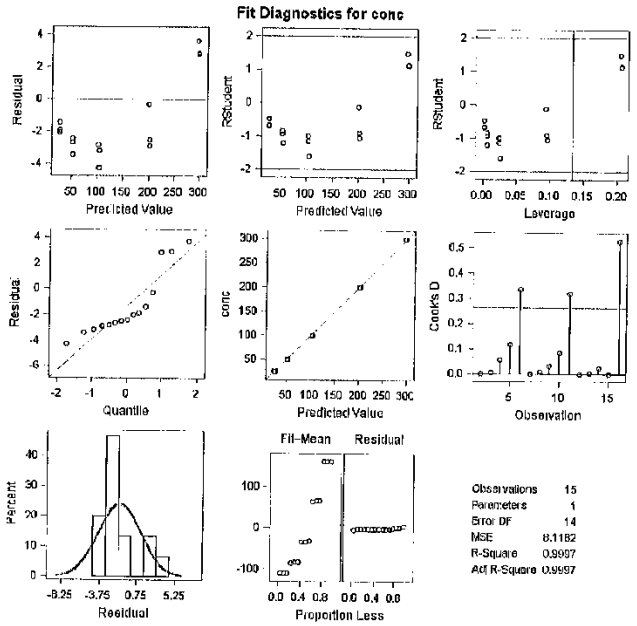
Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	626.80302	2.72584	229.95	<.0001	0.99987

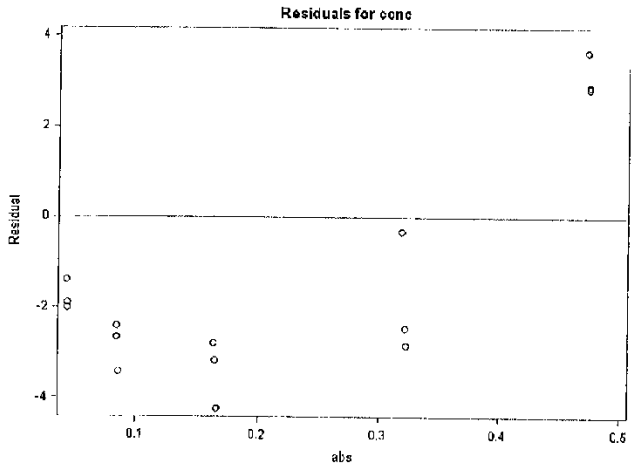
Performed by James A. Luoma 9.3 11:06 05FEB15

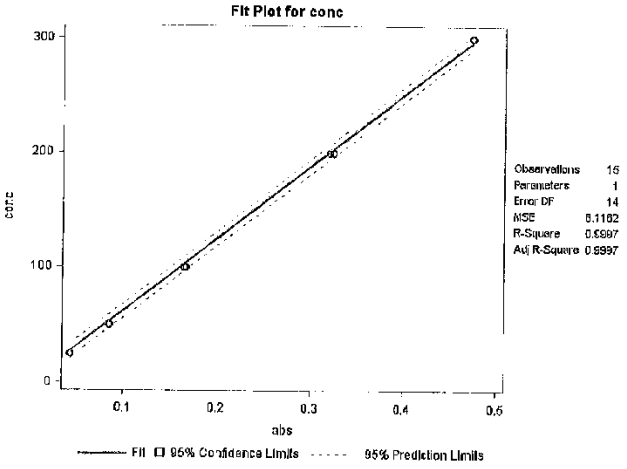
Standard Curve Linear Regression and sample concentrations
Walleye Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc



AEH-12 PSEUDO-03





Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Walleye Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	predicted_ppm
1	.	.	.	.	.	.
2	.	25	0	0.0429	25	26.690
3	.	50	0	0.0836	50	52.401
4	.	100	0	0.1663	100	104.237
5	.	200	0	0.3236	200	202.833
6	.	300	0	0.4740	300	297.105
7	.	25	0	0.0431	25	27.015
8	.	50	0	0.0852	50	53.404
9	.	100	0	0.1648	100	103.172
10	.	200	0	0.3230	200	202.457
11	.	300	0	0.4741	300	297.187
12	.	25	0	0.0421	25	26.388
13	.	50	0	0.0840	50	52.651
14	.	100	0	0.1640	100	102.796
15	.	200	0	0.3196	200	200.326
16	.	300	0	0.4728	300	296.352
17	A1	200	1	0.1974	.	123.731
18	A2	0	1	0.0007	.	0.439
19	A3	300	1	0.2998	.	187.916
20	A4	100	1	0.0712	.	44.628
21	A5	50	1	0.0348	.	21.813
22	B1	200	1	0.2168	.	135.891
23	B2	50	1	0.0347	.	21.750
24	B3	100	1	0.1072	.	67.193
25	B4	300	1	0.3188	.	199.825
26	B5	0	1	0.0013	.	0.815
27	C1	300	1	0.2660	.	166.730
28	C2	200	1	0.1664	.	104.300
29	C3	0	1	0.0000	.	0.000
30	C4	100	1	0.0558	.	34.975
31	C5	50	1	0.0315	.	19.744
32	A1	200	3	0.2622	.	164.348
33	A2	0	3	0.0008	.	0.501
34	A3	300	3	0.3901	.	244.516
35	A4	100	3	0.1164	.	72.960
36	A5	50	3	0.0649	.	40.680
37	B1	200	3	0.2446	.	153.316

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38	B2	50	3	0.0557	34.913
39	B3	100	3	0.1312	82.237
40	B4	300	3	0.3612	226.401
41	B5	0	3	0.0003	0.188
42	C1	300	3	0.3637	227.968
43	C2	200	3	0.2463	154.382
44	C3	0	3	0.0002	0.125
45	C4	100	3	0.1066	66.817
46	C5	50	3	0.0562	36.480
47	A1	200	6	0.2727	170.929
48	A2	0	6	-0.0017	-1.066
49	A3	300	6	0.3978	249.342
50	A4	100	6	0.1201	75.279
51	A5	50	6	0.0702	44.002
52	B1	200	6	0.2427	152.125
53	B2	50	6	0.0557	34.913
54	B3	100	6	0.1384	86.750
55	B4	300	6	0.3631	227.592
56	B5	0	6	-0.0015	-0.940
57	C1	300	6	0.3797	237.997
58	C2	200	6	0.2560	160.462
59	C3	0	6	-0.0014	-0.878
60	C4	100	6	0.1135	71.142
61	C5	50	6	0.0605	37.922
62	SC1	25	6	0.0388	24.320
63	SC2	50	6	0.0777	48.703
64	SC3	100	6	0.1557	97.593
65	SC4	200	6	0.3171	198.759
66	SC5	300	6	0.4617	289.395
67	A1	200	12	0.2516	157.704
68	A2	0	12	-0.0026	-1.630
69	A3	300	12	0.3760	235.678
70	A4	100	12	0.1120	70.202
71	A5	50	12	0.0601	37.671
72	B1	200	12	0.2401	150.495
73	B2	50	12	0.0558	34.976
74	B3	100	12	0.1306	81.860
75	B4	300	12	0.3582	224.521
76	B5	0	12	-0.0019	-1.191
77	C1	300	12	0.3715	232.857
78	C2	200	12	0.2512	157.453
79	C3	0	12	-0.0029	-1.818
80					

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	C4	100	12	0.1129	.	70.766
81	C5	50	12	0.0616	.	38.611
82	SC1	25	12	0.0418	.	26.200
83	SC2	50	12	0.0772	.	48.389
84	SC3	100	12	0.1561	.	97.844
85	SC4	200	12	0.3132	.	196.315
86	SC5	300	12	0.4514	.	282.939
87	A1	200	18	0.2168	.	135.891
88	A2	0	18	-0.0035	.	-2.194
89	A3	300	18	0.3198	.	200.452
90	A4	100	18	0.0978	.	61.301
91	A5	50	18	0.0537	.	33.659
92	B1	200	18	0.2436	.	152.689
93	B2	50	18	0.0563	.	35.289
94	B3	100	18	0.1342	.	84.117
95	B4	300	18	0.3610	.	226.276
96	B5	0	18	-0.0034	.	-2.131
97	C1	300	18	0.3626	.	227.279
98	C2	200	18	0.2509	.	157.265
99	C3	0	18	-0.0018	.	-1.128
100	C4	100	18	0.1208	.	75.718
101	C5	50	18	0.0714	.	44.754
102	SC1	25	18	0.0406	.	25.448
103	SC2	50	18	0.0801	.	50.207
104	SC3	100	18	0.1365	.	85.559
105	SC4	200	18	0.3057	.	191.614
106	SC5	300	18	0.4404	.	276.044
107	A1	200	24	0.2231	.	139.840
108	A2	0	24	-0.0022	.	-1.379
109	A3	300	24	0.3267	.	204.777
110	A4	100	24	0.1009	.	63.244
111	A5	50	24	0.0589	.	36.919
112	B1	200	24	0.2534	.	158.832
113	B2	50	24	0.0638	.	39.990
114	B3	100	24	0.1430	.	89.633
115	B4	300	24	0.3784	.	237.162
116	B5	0	24	-0.0023	.	-1.442
117	C1	300	24	0.3579	.	224.333
118	C2	200	24	0.2504	.	156.951
119	C3	0	24	-0.0021	.	-1.316
120	C4	100	24	0.1247	.	78.162
121	C5	50	24	0.0767	.	48.076
122						

	SC1	25	24	0.0422	.	26.451
123	SC2	50	24	0.0810	.	50.771
124	SC3	100	24	0.1591	.	99.724
125	SC4	200	24	0.3152	.	197.568
126	SC5	300	24	0.4723	.	296.039

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

tank=A1 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
148.7	18.3634	129.5	168.0

tank=A2 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.8980	1.1152	-2.0583	0.2824

tank=A3 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
220.4	25.8840	193.3	247.6

tank=A4 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
64.8025	11.1973	52.8517	76.3533

tank=A5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.7905	7.6948	27.7152	43.8657

tank=B1 theor=200

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
150.6	7.7226	142.5	158.7

tank=B2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.6384	6.1553	27.1789	40.0980

tank=B3 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
81.9649	7.8052	73.7739	90.1560

tank=B4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
223.6	12.5022	210.5	236.8

tank=B5 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.7535	1.0898	-1.9272	0.3602

tank=C1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
219.5	26.3091	191.9	247.1

tank=C2 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
148.5	21.7242	125.7	171.3

tank=C3 theor=0

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.8357	0.7622	-1.6356	-0.0359

tank=C4 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
66.2635	15.8384	49.6421	82.8849

tank=C5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.5977	9.8196	27.2927	47.9028

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.4179	0.4078	-0.5952	1.4310

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.2716	0.2015	-0.2289	0.7721

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.9611	0.0957	-1.1989	-0.7233

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.5461	0.3217	-2.3451	-0.7471

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.8177	0.5979	-3.3031	-0.3324

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.3790	0.0627	-1.5347	-1.2233

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
21.1024	1.1765	18.1787	24.0261

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.3575	2.9818	29.9503	44.7646

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
38.9454	4.6300	27.4438	50.4469

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.0858	1.8870	32.3982	41.7734

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.9007	5.9906	23.0192	52.7821

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
41.6615	5.7633	27.3447	55.9783

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
48.9324	16.5345	7.8586	90.0063

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.0045	7.7626	54.7212	93.2879

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
77.7236	8.0858	57.6374	97.8097

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.2762	6.5743	57.9448	90.6075

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
73.7120	11.5393	45.0466	102.4

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
77.0132	13.2317	44.1439	109.9

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
121.3	15.9343	81.7243	160.9

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
157.3	6.0849	142.2	172.5

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
161.2	9.4222	137.8	184.6

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
155.2	4.0912	145.1	165.4

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
148.6	11.2544	120.7	176.6

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
151.9	10.4646	125.9	177.9

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
184.8	16.7629	143.2	226.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
233.0	10.0367	208.0	257.9

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
238.3	10.8784	211.3	265.3

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
231.0	5.8013	216.6	245.4

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
218.0	15.2074	180.2	255.8

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
222.1	16.3181	181.6	262.6

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.8357	0.9423	-1.3043	-0.3671

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.6755	7.7280	31.8335	39.5176

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
70.9437	13.9057	64.0285	77.8588

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
149.3	16.0137	141.3	157.2

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
221.2	21.2104	210.7	231.7

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
25.6049	0.9568	24.0825	27.1273

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
49.5174	1.1524	47.6838	51.3511

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
95.1800	6.4844	84.8619	105.5

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
196.1	3.1303	191.1	201.0

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
286.1	8.5782	272.5	299.8

Performed by James A. Luoma 9.3 11:06 05FEB15

FF # 29
Item No. 13
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Walleye Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL  JH  Page 1 of 3              *
* Analysis completion date:  05FEB2015                                       *
*****************************************************************************/

data Zeq; set fish.WAE2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure samp
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 14
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AER-12-PSZ-UDO-03

FF # 29
Item No. 14
Pg 3 of 5

```
234  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
235
236  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
237
238  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
239
240  title1 'Standard Curve Linear Regression and sample concentrations';
241  title2 'Walleye Spectrophotometer analysis';
242  title3 h=1 'Study # AEH-12-PSEUDO-03';
243  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
244
245  /*****************************************************************************
246  * SAS ver 9.3       Analysis prepared by:  JAL  JA~  Page 1 of 5              *
247  * Analysis completion date:  05FEB2015                                        *
248  *****************************************************************************/
249
250  data Zeq; set fish.WAE2;
251  run;

NOTE: There were 126 observations read from the data set FISH.WAE2.
NOTE: The data set WORK.ZEQ has 126 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


252
253  proc sort;
254  by tank time ; run;

NOTE: There were 126 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 126 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


255
256  run;
257  proc gplot data= zeq;
258  plot abs * conc;
259  run;

NOTE: 111 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 4 records written to C:\Users\JLUOMA\gplot2.png.

NOTE: There were 126 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.23 seconds
      cpu time            0.20 seconds


260  proc reg data = zeq;
261  model conc = abs / stb noint edf;
262  output out=output_out p=predicted_ppm;
```

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FF # 21
Item No. 15
Pg 1 of 5

```
263  run;

NOTE: The data set WORK.OUTPUT_OUT has 126 observations and 6 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.18 seconds
      cpu time            0.56 seconds


264  proc sort;
265  by time tank;

NOTE: There were 126 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 126 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


266  proc print data=output_out;
267  run;

NOTE: There were 126 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds


268  data zeq2; set output_out;
269  if tank = "." then delete;
270  if thero = "." then delete;
271  if tank = "SC1" then delete;
272  if tank = "SC2" then delete;
273  if tank = "SC3" then delete;
274  if tank = "SC4" then delete;
275  if tank = "SC5" then delete;
276  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 126 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 91 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


277  proc sort data = zeq2;
278  by tank;
279  run;

NOTE: There were 91 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 91 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

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```
280  /*****************************************************************************************
280! ************************
281  * This procedure produces the mean concentrations for each treatment replicate over all
281! exposure sampling times     *
282  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
282! period                  *
283  *****************************************************************************************
283! ************************/
284  title1 "Mean treatment concentration by tank for all exposure sampling times";
285  title2 "Individual enclosure means";
286  proc means data = zeq2 mean std lclm uclm fw=8;
287  by tank theor;
288  var predicted_ppm;
289  run;

NOTE: There were 91 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.03 seconds


290  proc sort;
291  by theor time;
292  /*****************************************************************************************
292! ***********
293  * This procedure produces the mean concentrations for each treatment group at each sampling
293! time      *
294  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
294! replicates     *
295  * at each sample time over the entire exposure
295!           *
296  *****************************************************************************************
296! **********/
297  title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 91 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 91 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


298  proc means data = zeq2 mean std lclm uclm fw=8;
299  by theor time;
300  var predicted_ppm;
301  run;

NOTE: There were 91 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.09 seconds
      cpu time            0.06 seconds

302  /*****************************************************************************************
302! ***********
```

```
303  * This procedure produces the mean concentrations for each treatment group over all sampling
303! times    *
304  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
304! replicates     *
305  * over the entire exposure
305!          *
306  ************************************************************************************************
306! **********/
307  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
308  proc means data = zeq2 mean std lclm uclm fw=8;
309  by theor;
310  var predicted_ppm;
311  run;

NOTE: There were 91 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


312  data zeq3; set output_out;
313  if tank = "." then delete;
314  if thero = "." then delete;
315  if tank = "A1" then delete;
316  if tank = "A2" then delete;
317  if tank = "A3" then delete;
318  if tank = "A4" then delete;
319  if tank = "A5" then delete;
320  if tank = "B1" then delete;
321  if tank = "B2" then delete;
322  if tank = "B3" then delete;
323  if tank = "B4" then delete;
324  if tank = "B5" then delete;
325  if tank = "C1" then delete;
326  if tank = "C2" then delete;
327  if tank = "C3" then delete;
328  if tank = "C4" then delete;
329  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 126 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
330  proc sort;
331  by theor time;
332
333  /************************************************************************************************
333! ***************
334  * This procedure produces the mean concentrations for each standard check conc. over all
334! sampling times    *
335  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
335! replicates          *
```

```
* over the entire exposure
          *
******************************************************************************************
****************/
title1 'Mean Standard Check concentration over all sampling times';

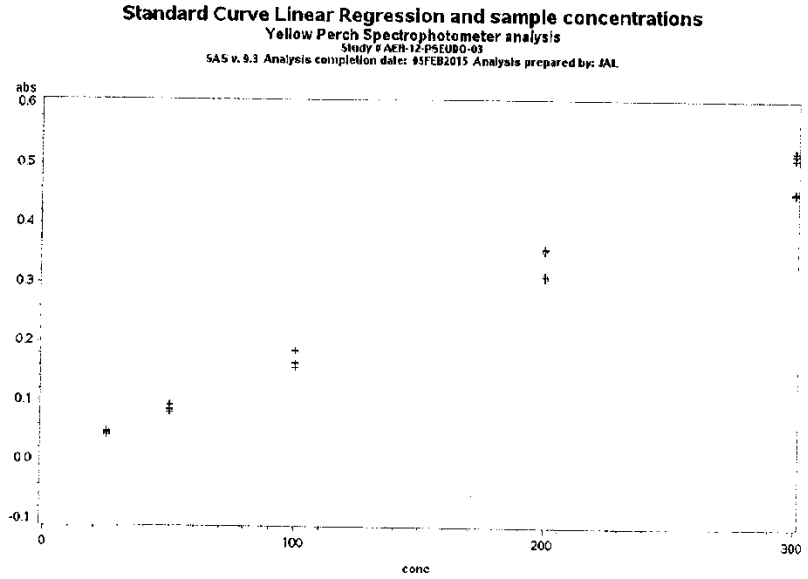
NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


quit;
run;
```

FF # 29
Item No. 15
Pg 5 of 5



JAL 2/5/15

FF # 29
Item No. 16
Pg 1 of 20

Standard Curve Linear Regression and sample concentrations
Yellow Perch Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	176
Number of Observations Used	30
Number of Observations with Missing Values	146

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	854398	854398	5693.86	<.0001
Error	29	4351.62419	150.05601		
Uncorrected Total	30	858750			

Root MSE	12.24973	R-Square	0.9949
Dependent Mean	135.00000	Adj R-Sq	0.9948
Coeff Var	9.07386		

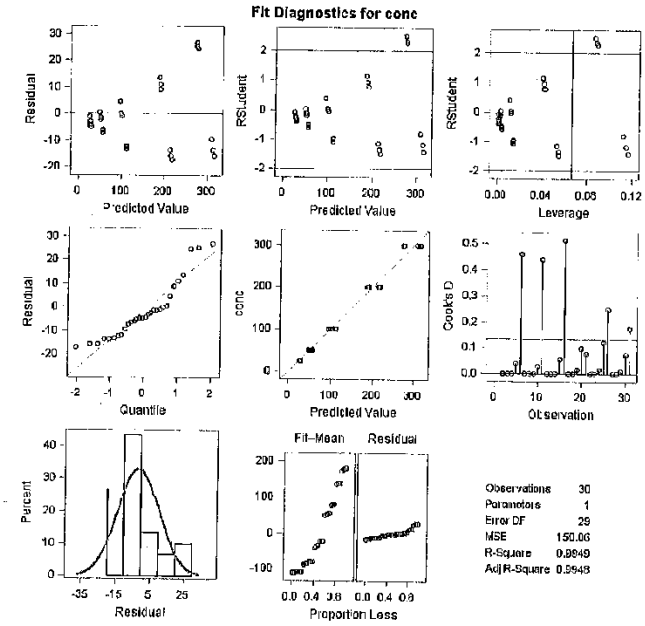
Parameter Estimates

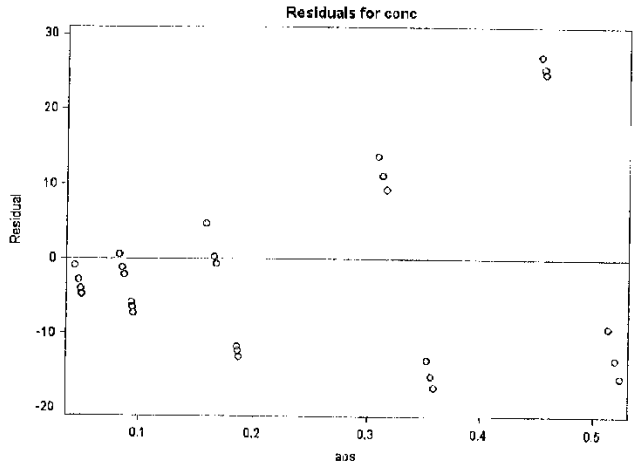
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	603.72018	8.00078	75.46	<.0001	0.99746

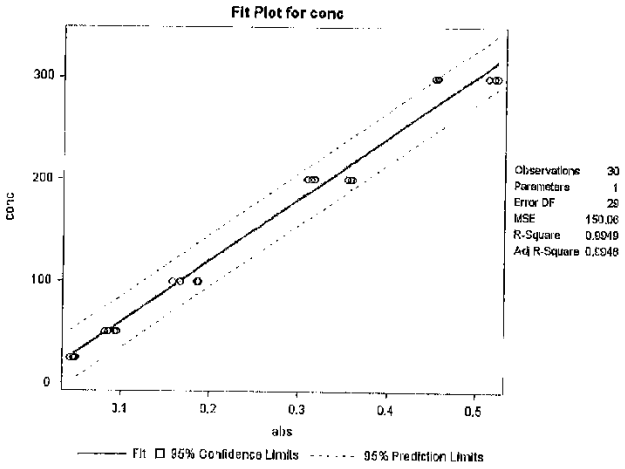
Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Yellow Perch Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc







Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Yellow Perch Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	predicted_ppm
1	.	.	.	.	.	.
2	.	25	0.0	0.0462	25	27.892
3	.	50	0.0	0.0865	50	52.222
4	.	100	0.0	0.1667	100	100.640
5	.	200	0.0	0.3127	200	188.783
6	.	300	0.0	0.4547	300	274.512
7	.	25	0.0	0.0482	25	29.099
8	.	50	0.0	0.0849	50	51.256
9	.	100	0.0	0.1652	100	99.735
10	.	200	0.0	0.3159	200	190.715
11	.	300	0.0	0.4558	300	275.176
12	.	25	0.0	0.0430	25	25.960
13	.	50	0.0	0.0820	50	49.505
14	.	100	0.0	0.1577	100	95.207
15	.	200	0.0	0.3085	200	186.248
16	.	300	0.0	0.4520	300	272.882
17	.	25	0.0	0.0492	25	29.703
18	.	50	0.0	0.0948	50	57.233
19	.	100	0.0	0.1860	100	112.292
20	.	200	0.0	0.3572	200	215.649
21	.	300	0.0	0.5121	300	309.165
22	.	25	0.0	0.0495	25	29.884
23	.	50	0.0	0.0925	50	55.844
24	.	100	0.0	0.1874	100	113.137
25	.	200	0.0	0.3596	200	217.098
26	.	300	0.0	0.5231	300	315.806
27	.	25	0.0	0.0492	25	29.703
28	.	50	0.0	0.0935	50	56.448
29	.	100	0.0	0.1852	100	111.809
30	.	200	0.0	0.3537	200	213.536
31	.	300	0.0	0.5191	300	313.391
32	A1	300	1.0	0.2640	.	159.382
33	A2	100	1.0	0.0677	.	40.872
34	A3	50	1.0	0.0311	.	18.776
35	A4	0	1.0	0.0007	.	0.423
36	A5	200	1.0	0.1574	.	95.026
37	B1	50	1.0	0.0230	.	13.886

38	B2	200	1.0	0.1431	.	86.392
39	B3	0	1.0	-0.0005	.	-0.302
40	B4	100	1.0	0.0652	.	39.363
41	B5	300	1.0	0.2190	.	132.215
42	C1	0	1.0	0.0005	.	0.302
43	C2	50	1.0	0.0202	.	12.195
44	C3	100	1.0	0.0473	.	28.556
45	C4	300	1.0	0.1897	.	114.526
46	C5	200	1.0	0.1278	.	77.155
47	SC1	25	1.0	0.0408	.	24.511
48	SC2	50	1.0	0.0844	.	50.954
49	SC3	100	1.0	0.1689	.	101.968
50	SC4	200	1.0	0.3151	.	190.232
51	SC5	300	1.0	0.4624	.	279.160
52	A1	300	3.0	0.3850	.	232.432
53	A2	100	3.0	0.1249	.	75.405
54	A3	50	3.0	0.0633	.	38.215
55	A4	0	3.0	0.0002	.	0.121
56	A5	200	3.0	0.2535	.	153.043
57	B1	50	3.0	0.0516	.	31.152
58	B2	200	3.0	0.2319	.	140.003
59	B3	0	3.0	-0.0029	.	-1.751
60	B4	100	3.0	0.1217	.	73.473
61	B5	300	3.0	0.3471	.	209.551
62	C1	0	3.0	0.0023	.	1.389
63	C2	50	3.0	0.0511	.	30.850
64	C3	100	3.0	0.0982	.	59.285
65	C4	300	3.0	0.3354	.	202.488
66	C5	200	3.0	0.2343	.	141.452
67	SC1	25	3.0	0.0403	.	24.330
68	SC2	50	3.0	0.0845	.	51.014
69	SC3	100	3.0	0.1618	.	97.682
70	SC4	200	3.0	0.3122	.	188.481
71	SC5	300	3.0	0.4611	.	278.375
72	A1	300	6.0	0.3953	.	238.952
73	A2	100	6.0	0.1204	.	72.688
74	A3	50	6.0	0.0657	.	39.664
75	A4	0	6.0	-0.0025	.	-1.509
76	A5	200	6.0	0.2641	.	159.442
77	B1	50	6.0	0.0560	.	33.808
78	B2	200	6.0	0.2359	.	142.418
79	B3	0	6.0	-0.0007	.	-0.423
80						

	B4	100	6.0	0.1278	.	77.155
81	B5	300	6.0	0.3594	.	216.977
82	C1	0	6.0	0.0014	.	0.845
83	C2	50	6.0	0.0585	.	35.318
84	C3	100	6.0	0.1076	.	64.960
85	C4	300	6.0	0.3539	.	213.657
86	C5	200	6.0	0.2408	.	145.376
87	SC1	25	6.0	0.0378	.	22.821
88	SC2	50	6.0	0.0840	.	50.712
89	SC3	100	6.0	0.1571	.	94.844
90	SC4	200	6.0	0.3071	.	185.402
91	SC5	300	6.0	0.4391	.	265.094
92	A1	300	12.0	0.3767	.	227.421
93	A2	100	12.0	0.1163	.	70.213
94	A3	50	12.0	0.0661	.	39.906
95	A4	0	12.0	0.0014	.	0.845
96	A5	200	12.0	0.2511	.	151.594
97	B1	50	12.0	0.0582	.	35.137
98	B2	200	12.0	0.2415	.	145.798
99	B3	0	12.0	0.0009	.	0.543
100	B4	100	12.0	0.1300	.	78.484
101	B5	300	12.0	0.3541	.	213.777
102	C1	0	12.0	0.0008	.	0.483
103	C2	50	12.0	0.0615	.	37.129
104	C3	100	12.0	0.1097	.	66.228
105	C4	300	12.0	0.3525	.	212.811
106	C5	200	12.0	0.2425	.	146.402
107	SC1	25	12.0	0.0390	.	23.545
108	SC2	50	12.0	0.0804	.	48.539
109	SC3	100	12.0	0.1552	.	93.697
110	SC4	200	12.0	0.3035	.	183.229
111	SC5	300	12.0	0.4274	.	258.030
112	SC1	25	12.1	0.0510	.	30.790
113	SC2	50	12.1	0.0973	.	58.742
114	SC3	100	12.1	0.1934	.	116.759
115	SC4	200	12.1	0.3614	.	218.184
116	SC5	300	12.1	0.5271	.	318.221
117	A1	300	15.0	0.3785	.	228.508
118	A2	100	15.0	0.1177	.	71.058
119	A3	50	15.0	0.0640	.	38.636
120	A4	0	15.0	0.0013	.	0.785
121	A5	200	15.0	0.2548	.	153.828
122						

	B1	50	15.0	0.0586	.	35.378
123	B2	200	15.0	0.2391	.	144.349
124	B3	0	15.0	0.0010	.	0.604
125	B4	100	15.0	0.1287	.	77.699
126	B5	300	15.0	0.3583	.	216.313
127	C1	0	15.0	0.0007	.	0.423
128	C2	50	15.0	0.0635	.	38.336
129	C3	100	15.0	0.1101	.	66.470
130	C4	300	15.0	0.3614	.	218.184
131	C5	200	15.0	0.2411	.	145.557
132	SC1	25	15.0	0.0475	.	28.677
133	SC2	50	15.0	0.0931	.	56.206
134	SC3	100	15.0	0.1821	.	109.937
135	SC4	200	15.0	0.3598	.	217.219
136	SC5	300	15.0	0.5250	.	316.953
137	A1	300	18.0	0.3795	.	229.172
138	A2	100	18.0	0.1168	.	70.515
139	A3	50	18.0	0.0637	.	38.457
140	A4	0	18.0	0.0009	.	0.543
141	A5	200	18.0	0.2535	.	153.043
142	B1	50	18.0	0.0585	.	35.318
143	B2	200	18.0	0.2388	.	144.168
144	B3	0	18.0	0.0010	.	0.604
145	B4	100	18.0	0.1288	.	77.759
146	B5	300	18.0	0.3526	.	212.872
147	C1	0	18.0	0.0016	.	0.966
148	C2	50	18.0	0.0634	.	38.276
149	C3	100	18.0	0.1110	.	67.013
150	C4	300	18.0	0.3408	.	205.748
151	C5	200	18.0	0.2380	.	143.685
152	SC1	25	18.0	0.0448	.	27.047
153	SC2	50	18.0	0.0874	.	52.765
154	SC3	100	18.0	0.1727	.	104.262
155	SC4	200	18.0	0.3380	.	204.057
156	SC5	300	18.0	0.5095	.	307.595
157	A1	300	24.0	0.3677	.	221.988
158	A2	100	24.0	0.1152	.	69.549
159	A3	50	24.0	0.0618	.	37.310
160	A4	0	24.0	0.0029	.	1.751
161	A5	200	24.0	0.2480	.	149.723
162	B1	50	24.0	0.0537	.	32.420
163	B2	200	24.0	0.2319	.	140.003
164						

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	B3	0	24.0	-0.0043	.	-2.596
165	B4	100	24.0	0.1234	.	74.499
166	B5	300	24.0	0.3484	.	210.336
167	C1	0	24.0	0.0023	.	1.389
168	C2	50	24.0	0.0600	.	36.223
169	C3	100	24.0	0.1087	.	65.624
170	C4	300	24.0	0.3419	.	206.412
171	C5	200	24.0	0.2374	.	143.323
172	SC1	25	24.0	0.0455	.	27.469
173	SC2	50	24.0	0.0884	.	52.181
174	SC3	100	24.0	0.1677	.	101.244
175	SC4	200	24.0	0.3431	.	207.136
176	SC5	300	24.0	0.4988	.	301.136

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

tank=A1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
219.7	27.0899	194.6	244.7

tank=A2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.1854	11.7691	56.3009	78.0700

tank=A3 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.8524	7.5810	28.8411	42.8636

tank=A4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.4226	0.9926	-0.4954	1.3406

tank=A5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
145.1	22.2825	124.5	165.7

tank=B1 theor=50

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.0140	7.7217	23.8726	38.1553

tank=B2 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
134.7	21.4296	114.9	154.6

tank=B3 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4744	1.2598	-1.6395	0.6908

tank=B4 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.2045	14.1624	58.1064	84.3025

tank=B5 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
201.7	30.7734	173.3	230.2

tank=C1 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.8280	0.4487	0.4130	1.2429

tank=C2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.6181	9.3591	23.9824	41.2739

tank=C3 theor=100

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
59.7338	13.9929	46.7925	72.6751

tank=C4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
196.3	36.4455	162.6	230.0

tank=C6 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
134.7	25.4324	111.2	158.2

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.1409	0.3881	-0.8233	1.1051

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0805	1.5793	-4.0037	3.8427

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.3622	1.1784	-3.2896	2.5651

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.6238	0.1941	0.1418	1.1059

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.6037	0.1811	0.1538	1.0536

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.7043	0.2286	0.1368	1.2721

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.1811	2.4119	-5.8103	6.1725

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
14.9521	3.4175	6.4627	23.4416

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.4058	4.1680	23.0520	43.7597

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.2635	3.0405	28.7105	43.8164

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.3904	2.3954	31.4398	43.3410

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.4508	1.8014	32.9758	41.9257

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.3502	1.7625	32.9717	41.7286

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.3176	2.5678	28.9390	41.6963

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.2635	6.7174	19.5765	52.9504

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.3876	8.8020	47.5223	91.2529

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.8012	6.1698	56.2746	86.9278

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.6415	6.2514	56.1120	87.1709

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.7421	5.6458	57.7172	85.7670

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.7622	5.4807	58.1474	85.3770

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.8907	4.4472	58.8432	80.9382

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
86.1911	8.9368	63.9910	108.4

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
144.8	7.1474	127.1	162.6

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
149.1	9.0964	126.5	171.7

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
147.9	3.1862	140.0	155.8

theor=200 time=16

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
147.9	5.1592	135.1	160.7

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
147.0	5.2668	133.9	160.1

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
144.3	4.9406	132.1	156.6

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
135.4	22.5945	79.2464	191.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.8	15.6530	175.9	253.7

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
223.2	13.7467	189.0	257.3

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
218.0	8.1705	197.7	238.3

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
221.0	6.5676	204.7	237.3

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
215.9	12.0080	186.1	245.8

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
212.9	8.1012	192.8	233.0

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Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.2587	1.0691	-0.2279	0.7454

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.1615	6.1030	29.4730	36.8499

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
66.0412	13.5713	59.8637	72.2188

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
138.2	22.4923	127.9	148.4

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
205.9	31.7485	191.4	220.3

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
26.1486	2.7858	23.8196	28.4776

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
52.6369	3.2997	49.8782	55.3955

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
102.5	7.7727	96.0513	109.0

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
199.2	14.2046	187.4	211.1

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
290.6	23.4488	271.0	310.2

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Item No. 16
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Yellow Perch Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL JA~  Page 1 of 3              *
* Analysis completion date:  05FEB2015                                       *
*****************************************************************************/

data Zeq; set fish.YEP2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure sampl
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 'Mean treatment concentration by tank for all exposure sampling times';
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 17
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

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FF # 29
Item No. 17
Pg 3 of 3

```
119  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
120
121  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
122
123  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
124
125  title1 'Standard Curve Linear Regression and sample concentrations';
126  title2 'Yellow Perch Spectrophotometer analysis';
127  title3 h=1 'Study # AEH-12-PSEUDO-03';
128  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
129
130  /*****************************************************************************
131  * SAS ver 9.3       Analysis prepared by:  JAL      Page 1 of 5              *
132  * Analysis completion date:  05FEB2015        JAL                           *
133  *****************************************************************************/
134
135  data Zeq; set fish.YEP2;
136  run;

NOTE: There were 176 observations read from the data set FISH.YEP2.
NOTE: The data set WORK.ZEQ has 176 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.06 seconds
      cpu time            0.00 seconds


137
138  proc sort;
139  by tank time ; run;

NOTE: There were 176 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 176 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


140
141  run;
142  proc gplot data= zeq;
143  plot abs * conc;
144  run;

NOTE: 146 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 3 records written to C:\Users\JLUOMA\gplot1.png.

NOTE: There were 176 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.21 seconds
      cpu time            0.18 seconds


145  proc reg data = zeq;
146  model conc = abs / stb noint edf;
147  output out=output_out p=predicted_ppm;
```

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FF # 29
Item No. 18
Pg 1 of 5

```
148  run;


NOTE: The data set WORK.OUTPUT_OUT has 176 observations and 6 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.31 seconds
      cpu time            0.53 seconds
```

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```
149  proc sort;
150  by time tank;

NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 176 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


151  proc print data=output_out;
152  run;

NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds


153  data zeq2; set output_out;
154  if tank = "." then delete;
155  if thero = "." then delete;
156  if tank = "SC1" then delete;
157  if tank = "SC2" then delete;
158  if tank = "SC3" then delete;
159  if tank = "SC4" then delete;
160  if tank = "SC5" then delete;
161  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


162  proc sort data = zeq2;
163  by tank;
164  run;
```

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```
NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

```
165  /*************************************************************************************************
1651 ************************
166  * This procedure produces the mean concentrations for each treatment replicate over all
1661 exposure sampling times     *
167  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
1671 period                    *
168  *************************************************************************************************
1681 ************************/
169  title1 "Mean treatment concentration by tank for all exposure sampling times";
170  title2 "Individual enclosure means";
171  proc means data = zeq2 mean std lclm uclm fw=8;
172  by tank theor;
173  var predicted_ppm;
174  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.04 seconds


175  proc sort;
176  by theor time;
177  /*************************************************************************************************
1771 ***********
178  * This procedure produces the mean concentrations for each treatment group at each sampling
1781 time      *
179  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
1791 replicates     *
180  * at each sample time over the entire exposure
1801          *
181  *************************************************************************************************
1811 **********/
182  title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


183  proc means data = zeq2 mean std lclm uclm fw=8;
184  by theor time;
185  var predicted_ppm;
186  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.06 seconds


187  /*************************************************************************************************
1871 ***********
```

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```
188  * This procedure produces the mean concentrations for each treatment group over all sampling
188! times    *
189  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
189! replicates     *
190  * over the entire exposure
190!          *
191  ************************************************************************************************
191! **********/
192  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
193  proc means data = zeq2 mean std lclm uclm fw=8;
194  by theor;
195  var predicted_ppm;
196  run;
```

AEH-12-PSEUDO-05

```
NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


197  data zeq3; set output_out;
198  if tank = "." then delete;
199  if thero = "." then delete;
200  if tank = "A1" then delete;
201  if tank = "A2" then delete;
202  if tank = "A3" then delete;
203  if tank = "A4" then delete;
204  if tank = "A5" then delete;
205  if tank = "B1" then delete;
206  if tank = "B2" then delete;
207  if tank = "B3" then delete;
208  if tank = "B4" then delete;
209  if tank = "B5" then delete;
210  if tank = "C1" then delete;
211  if tank = "C2" then delete;
212  if tank = "C3" then delete;
213  if tank = "C4" then delete;
214  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 176 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 41 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
215  proc sort;
216  by theor time;
217
218  /************************************************************************************************
218! ***************
219  * This procedure produces the mean concentrations for each standard check conc. over all
219! sampling times    *
220  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
220! replicates         *
```

```
221  * over the entire exposure
221!              *
222  ************************************************************************************************
222! ***************/
223  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 41 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 41 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


224  proc means data = zeq3 mean std lclm uclm fw=8;
225  by theor;
226  var predicted_ppm;
227  run;

NOTE: There were 41 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


228
229  quit;
230  run;
```

AEH-12-PSEUDO-06

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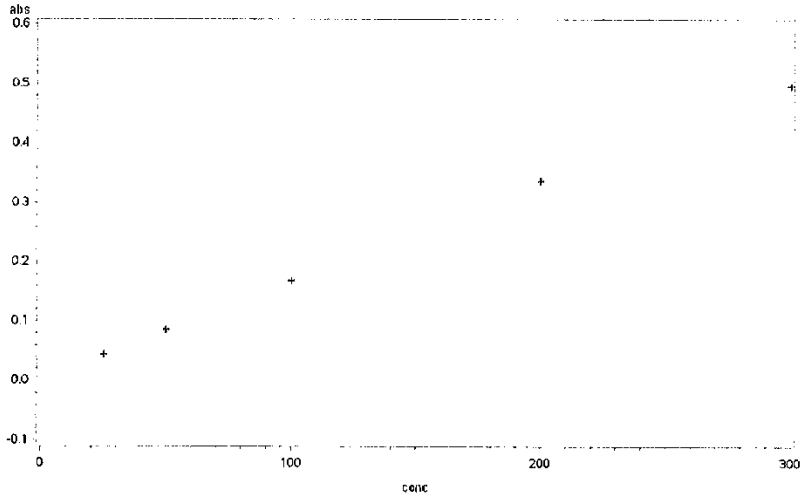
AEH-12-PSEUDO-03

Standard Curve Linear Regression and sample concentrations
Lake Sturgeon Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15

JAL 2/5/15

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wrong page # JAL 12MAR15

Standard Curve Linear Regression and sample concentrations
Lake Sturgeon Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL JL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	141
Number of Observations Used	15
Number of Observations with Missing Values	126

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429327	429327	125125	<.0001
Error	14	48.03658	3.43118		
Uncorrected Total	15	429375			

Root MSE	1.85235	R-Square	0.9999
Dependent Mean	135.00000	Adj R-Sq	0.9999
Coeff Var	1.37211		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	599.97689	1.69614	353.73	<.0001	0.99994

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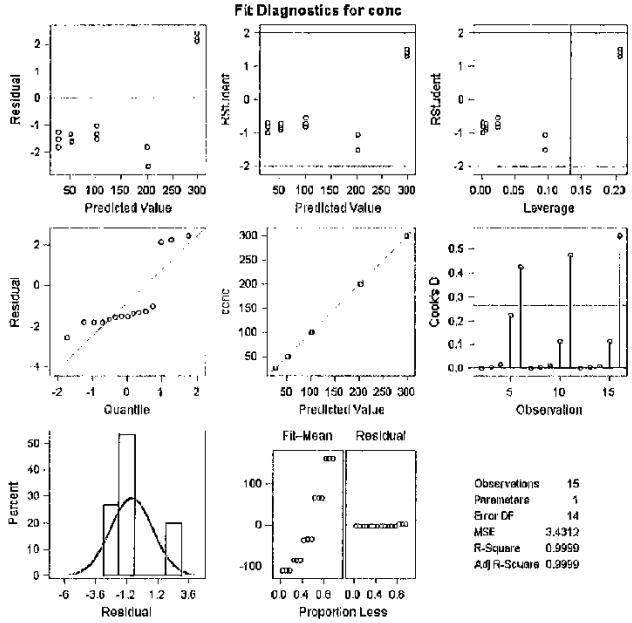
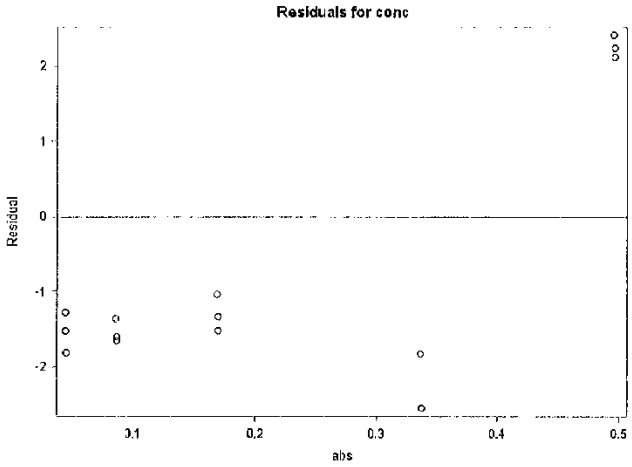
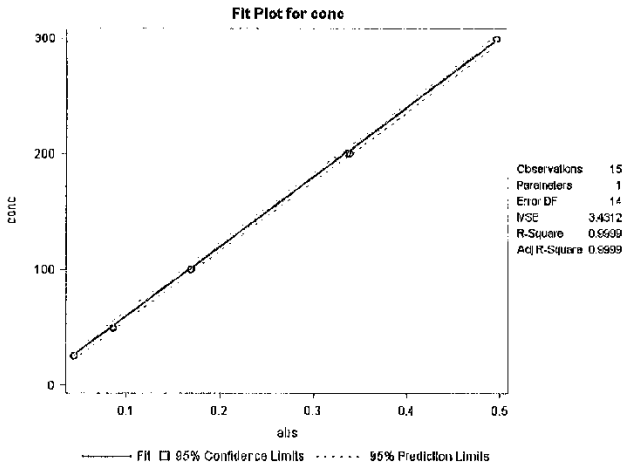
Standard Curve Linear Regression and sample concentrations
Lake Sturgeon Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc



AFH-12-PSEUDO-03





Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Lake Sturgeon Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	predicted_ppm
1		.	.	.	.	.
2	.	25	0	0.0438	25	26.279
3	.	50	0	0.0861	50	51.658
4	.	100	0	0.1692	100	101.516
5	.	200	0	0.3376	200	202.552
6	.	300	0	0.4965	300	297.889
7	.	25	0	0.0447	25	26.819
8	.	50	0	0.0860	50	51.598
9	.	100	0	0.1689	100	101.336
10	.	200	0	0.3364	200	201.832
11	.	300	0	0.4963	300	297.769
12	.	25	0	0.0442	25	26.519
13	.	50	0	0.0856	50	51.358
14	.	100	0	0.1684	100	101.036
15	.	200	0	0.3364	200	201.832
16	.	300	0	0.4960	300	297.589
17	A1	100	1	0.0776	.	46.558
18	A2	200	1	0.1855	.	111.296
19	A3	300	1	0.3127	.	187.613
20	A4	0	1	-0.0025	.	-1.500
21	A5	50	1	0.0381	.	22.859
22	B1	300	1	0.3205	.	192.293
23	B2	100	1	0.1164	.	69.837
24	B3	50	1	0.0426	.	25.559
25	B4	200	1	0.2145	.	128.695
26	B5	0	1	-0.0011	.	-0.660
27	C1	50	1	0.0501	.	30.059
28	C2	200	1	0.1802	.	108.116
29	C3	300	1	0.2992	.	179.513
30	C4	0	1	-0.0008	.	-0.480
31	C5	100	1	0.0932	.	55.918
32	A1	100	3	0.1138	.	68.277
33	A2	200	3	0.2572	.	154.314
34	A3	300	3	0.3778	.	226.671
35	A4	0	3	0.0007	.	0.420
36	A5	50	3	0.0566	.	33.959
37	B1	300	3	0.3724	.	223.431

38	B2	100	3	0.1314	.	78.837
39	B3	50	3	0.0562	.	33.719
40	B4	200	3	0.2558	.	153.474
41	B5	0	3	0.0000	.	0.000
42	C1	50	3	0.0696	.	41.758
43	C2	200	3	0.2412	.	144.714
44	C3	300	3	0.3774	.	226.431
45	C4	0	3	0.0000	.	0.000
46	C5	100	3	0.1224	.	73.437
47	A1	100	6	0.1159	.	69.537
48	A2	200	6	0.2613	.	156.774
49	A3	300	6	0.3791	.	227.451
50	A4	0	6	0.0004	.	0.240
51	A5	50	6	0.0571	.	34.259
52	B1	300	6	0.3716	.	222.951
53	B2	100	6	0.1317	.	79.017
54	B3	50	6	0.0568	.	34.079
55	B4	200	6	0.2558	.	153.474
56	B5	0	6	-0.0007	.	-0.420
57	C1	50	6	0.0720	.	43.198
58	C2	200	6	0.2540	.	152.394
59	C3	300	6	0.3758	.	225.471
60	C4	0	6	-0.0003	.	-0.180
61	C5	100	6	0.1246	.	74.757
62	SC1	25	6	0.0440	.	26.399
63	SC2	50	6	0.0835	.	50.098
64	SC3	100	6	0.1641	.	98.456
65	SC4	200	6	0.3260	.	195.592
66	SC5	300	6	0.4715	.	282.889
67	A1	100	12	0.1150	.	68.997
68	A2	200	12	0.2583	.	154.974
69	A3	300	12	0.3705	.	222.291
70	A4	0	12	0.0001	.	0.060
71	A5	50	12	0.0565	.	33.899
72	B1	300	12	0.3757	.	225.411
73	B2	100	12	0.1293	.	77.577
74	B3	50	12	0.0567	.	34.019
75	B4	200	12	0.2490	.	149.394
76	B5	0	12	-0.0003	.	-0.180
77	C1	50	12	0.0768	.	46.078
78	C2	200	12	0.2636	.	158.154
79	C3	300	12	0.3983	.	238.971
80						

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	C4	0	12	0.0000	.	0.000
81	C5	100	12	0.1370	.	82.197
82	SC1	25	12	0.0450	.	26.999
83	SC2	50	12	0.0903	.	54.178
84	SC3	100	12	0.1629	.	97.736
85	SC4	200	12	0.3336	.	200.152
86	SC5	300	12	0.4650	.	278.999
87	A1	100	15	0.1315	.	78.897
88	A2	200	15	0.2956	.	177.353
89	A3	300	15	0.4256	.	255.350
90	A4	0	15	-0.0010	.	-0.600
91	A5	50	15	0.0637	.	38.219
92	B1	300	15	0.3904	.	234.231
93	B2	100	15	0.1367	.	82.017
94	B3	50	15	0.0571	.	34.259
95	B4	200	15	0.2668	.	160.074
96	B5	0	15	-0.0016	.	-0.960
97	C1	50	15	0.0778	.	46.678
98	C2	200	15	0.2697	.	161.814
99	C3	300	15	0.3947	.	236.811
100	C4	0	15	-0.0013	.	-0.780
101	C5	100	15	0.1363	.	81.777
102	A1	100	18	0.1183	.	70.977
103	A2	200	18	0.2660	.	159.594
104	A3	300	18	0.3867	.	232.011
105	A4	0	18	-0.0013	.	-0.780
106	A5	50	18	0.0567	.	34.019
107	B1	300	18	0.3789	.	227.331
108	B2	100	18	0.1321	.	79.257
109	B3	50	18	0.0554	.	33.239
110	B4	200	18	0.2560	.	153.594
111	B5	0	18	-0.0007	.	-0.420
112	C1	50	18	0.0737	.	44.218
113	C2	200	18	0.2540	.	152.394
114	C3	300	18	0.3780	.	226.791
115	C4	0	18	-0.0005	.	-0.300
116	C5	100	18	0.1304	.	78.237
117	SC1	25	18	0.0476	.	28.559
118	SC2	50	18	0.0904	.	54.238
119	SC3	100	18	0.1793	.	107.576
120	SC4	200	18	0.3583	.	214.972
121	SC5	300	18	0.4961	.	297.649
122						

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	A1	100	24	0.1184	.	71.037
123	A2	200	24	0.2637	.	158.214
124	A3	300	24	0.3853	.	231.171
125	A4	0	24	-0.0013	.	-0.760
126	A5	50	24	0.0560	.	33.599
127	B1	300	24	0.3736	.	224.151
128	B2	100	24	0.1313	.	78.777
129	B3	50	24	0.0563	.	33.779
130	B4	200	24	0.2532	.	151.914
131	B5	0	24	-0.0016	.	-0.960
132	C1	50	24	0.0751	.	45.058
133	C2	200	24	0.2433	.	145.974
134	C3	300	24	0.3677	.	220.612
135	C4	0	24	-0.0005	.	-0.300
136	C5	100	24	0.1258	.	75.477
137	SC1	25	24	0.0463	.	27.779
138	SC2	50	24	0.0952	.	57.119
139	SC3	100	24	0.1793	.	107.576
140	SC4	200	24	0.3494	.	209.632
141	SC5	300	24	0.5017	.	301.008

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

tank=A1 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.7545	9.9966	58.6092	76.9999

tank=A2 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
153.2	20.0936	134.6	171.8

tank=A3 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
226.1	20.0589	207.5	244.6

tank=A4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4200	0.6867	-1.0551	0.2151

tank=A5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.9730	4.7394	28.5898	37.3562

tank=B1 theor=300

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
221.4	13.3993	209.0	233.8

tank=B2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
77.9027	3.8034	74.3851	81.4203

tank=B3 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.6645	3.1503	29.7509	35.5780

tank=B4 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
150.1	9.9701	140.9	159.3

tank=B5 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.5143	0.3680	-0.8548	-0.1739

tank=C1 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
42.4355	5.7089	37.1567	47.7144

tank=C2 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
146.2	17.8703	129.7	162.8

tank=C3 theor=300

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
222.1	19.8705	203.7	240.5

tank=C4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2914	0.2759	-0.5468	-0.0363

tank=C5 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.5428	8.8844	66.3262	82.7595

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Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.9800	0.5444	-2.2323	0.4724

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.1400	0.2425	-0.4624	0.7423

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.1200	0.3341	-0.9498	0.7098

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0400	0.1249	-0.3503	0.2703

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.7800	0.1600	-1.2271	-0.3328

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.5000	0.2498	-1.1205	0.1205

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.6800	0.3412	-1.5275	0.1675

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
26.1590	3.6372	17.1238	35.1942

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.4786	4.5740	25.1161	47.8411

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.1786	5.2140	24.2262	50.1310

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.9985	6.9975	20.6158	55.3812

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
39.7185	6.3442	23.9587	55.4783

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.1566	6.1263	21.9399	52.3772

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.4786	6.5648	21.1706	53.7865

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
57.4378	11.7137	28.3392	86.5363

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
73.5172	5.2803	60.4003	86.6340

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.4371	4.7479	62.6427	86.2316

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
76.2571	6.6980	59.6183	92.8958

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
80.8969	1.7361	76.5841	85.2097

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
76.1571	4.5147	64.9418	87.3723

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
75.0971	3.8838	65.4492	84.7450

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
116.0	11.0781	88.5159	143.6

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
150.8	5.3165	137.6	164.0

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
154.2	2.2818	148.5	159.9

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
154.2	4.4343	143.2	165.2

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
166.4	9.5138	142.8	190.0

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
155.2	3.6573	145.6	164.8

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
152.0	6.1206	136.8	167.2

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
186.5	6.4858	170.4	202.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
225.5	1.8053	221.0	230.0

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
225.3	2.2553	219.7	230.9

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
228.9	8.8675	206.9	250.9

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
242.1	11.5209	213.5	270.8

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
228.7	2.8705	221.6	235.8

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
225.3	5.3745	212.0	238.7

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4086	0.4623	-0.6190	-0.1981

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.0243	6.4101	33.1065	38.9422

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
73.4000	8.7583	69.4133	77.3867

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
149.8	15.9795	142.6	157.1

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
223.2	17.2480	215.3	231.0

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
27.4339	0.9390	25.9399	28.9280

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
53.9079	2.8868	49.3145	58.5014

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
102.8	5.4810	94.1146	111.6

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
205.1	8.8103	191.1	219.1

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
290.1	10.8230	272.9	307.4

Performed by James A. Luoma 9.3 11:06 05FEB15

FF # 29
Item No. 19
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Lake Sturgeon Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL       Page 1 of 3          *
* Analysis completion date:  05FEB2015                                    *
*****************************************************************************/

data Zeq; set fish.LST2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure sampl
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 20
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = 'A5" then delete;
if tank = 'B1" then delete;
if tank = 'B2" then delete;
if tank = 'B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

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FF # 29
Item No. 20
Pg 3 of 3

```
579  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
580
581  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
582
583  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
584
585  title1 'Standard Curve Linear Regression and sample concentrations';
586  title2 'Lake Sturgeon Spectrophotometer analysis';
587  title3 h=1 'Study # AEH-12-PSEUDO-03';
588  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
589
590  /*****************************************************************************
591  * SAS ver 9.3       Analysis prepared by:  JAL        Page 1 of 5            *
592  * Analysis completion date:  05FEB2015      JAL                              *
593  *****************************************************************************/
594
595  data Zeq; set fish.LST2;
596  run;

NOTE: There were 141 observations read from the data set FISH.LST2.
NOTE: The data set WORK.ZEQ has 141 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


597
598  proc sort;
599  by tank time ; run;

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 141 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


600
601  run;
602  proc gplot data= zeq;
603  plot abs * conc;
604  run;

NOTE: 126 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 3 records written to C:\Users\JLUOMA\gplot5.png.

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.21 seconds
      cpu time            0.21 seconds


605  proc reg data = zeq;
606  model conc = abs / stb noint edf;
607  output out=output_out p=predicted_ppm;
```

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```
608  run;


NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 6 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.04 seconds
      cpu time            0.45 seconds
```



```
609  proc sort;
610  by time tank;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


611  proc print data=output_out;
612  run;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.06 seconds


613  data zeq2; set output_out;
614  if tank = "." then delete;
615  if thero = "." then delete;
616  if tank = "SC1" then delete;
617  if tank = "SC2" then delete;
618  if tank = "SC3" then delete;
619  if tank = "SC4" then delete;
620  if tank = "SC5" then delete;
621  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
622  proc sort data = zeq2;
623  by tank;
624  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds
```

```
625  /*************************************************************************************************
625! ************************
626  * This procedure produces the mean concentrations for each treatment replicate over all
626! exposure sampling times     *
627  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
627! period                    *
628  *************************************************************************************************
628! ************************/
629  title1 'Mean treatment concentration by tank for all exposure sampling times";
630  title2 'Individual enclosure means";
631  proc means data = zeq2 mean std lclm uclm fw=8;
632  by tank theor;
633  var predicted_ppm;
634  run;

NOTE: There were 106 oobservations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.04 seconds


635  proc sort;
636  by theor time;
637  /*************************************************************************************************
637! ***********
638  * This procedure produces the mean concentrations for each treatment group at each sampling
638! time      *
639  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
639! replicates     *
640  * at each sample time over the entire exposure
640!           *
641  *************************************************************************************************
641! **********/
642  title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


643  proc means data = zeq2 mean std lclm uclm fw=8;
644  by theor time;
645  var predicted_ppm;
646  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.04 seconds


647  /*************************************************************************************************
647! ***********
```

```
648  * This procedure produces the mean concentrations for each treatment group over all sampling
648!  times    *
649  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
649! replicates     *
650  * over the entire exposure
650!          *
651  ***************************************************************************************
651! **********/
652  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
653  proc means data = zeq2 mean std lclm uclm fw=8;
654  by theor;
655  var predicted_ppm;
656  run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


657  data zeq3; set output_out;
658  if tank = "." then delete;
659  if thero = "." then delete;
660  if tank = "A1" then delete;
661  if tank = "A2" then delete;
662  if tank = "A3" then delete;
663  if tank = "A4" then delete;
664  if tank = "A5" then delete;
665  if tank = "B1" then delete;
666  if tank = "B2" then delete;
667  if tank = "B3" then delete;
668  if tank = "B4" then delete;
669  if tank = "B5" then delete;
670  if tank = "C1" then delete;
671  if tank = "C2" then delete;
672  if tank = "C3" then delete;
673  if tank = "C4" then delete;
674  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```

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```
675  proc sort;
676  by theor time;
677
678  /***************************************************************************************
678! ***************
679  * This procedure produces the mean concentrations for each standard check conc. over all
679! sampling times    *
680  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
680! replicates          *
```

```
681  * over the entire exposure
681!             *
682  ******************************************************************************************
682! ****************/
683  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 21 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


684  proc means data = zeq3 mean std lclm uclm fw=8;
685  by theor;
686  var predicted_ppm;
687  run;

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.00 seconds


688
689  quit;
690  run;
```

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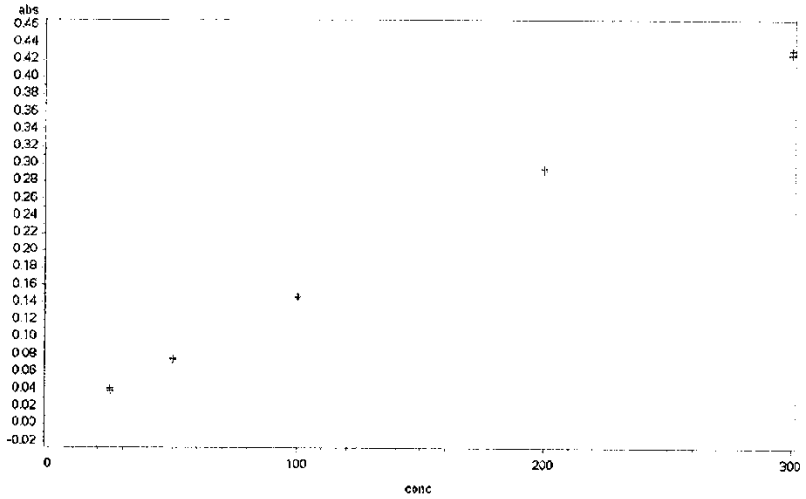
Standard Curve Linear Regression and sample concentrations

Largemouth Bass Spectrophotometer analysis

Study # AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15

JAL 2/5/15

FF # 29
Item No. 22
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Standard Curve Linear Regression and sample concentrations
Largemouth Bass Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	140
Number of Observations Used	15
Number of Observations with Missing Values	125

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429273	429273	59170.2	<.0001
Error	14	101.56842	7.25489		
Uncorrected Total	15	429375			

Root MSE	2.69349	R-Square	0.9998
Dependent Mean	135.00000	Adj R-Sq	0.9997
Coeff Var	1.99516		

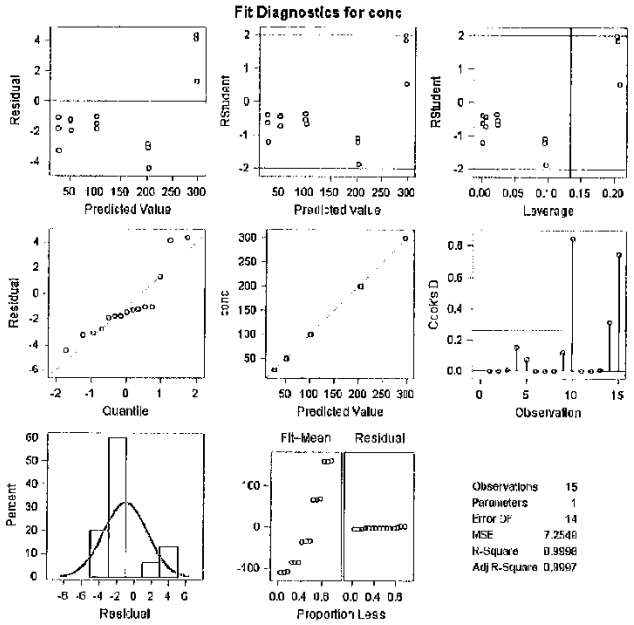
Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	693.30184	2.85017	243.25	<.0001	0.99988

Performed by James A. Luoma 9.3 11:06 05FEB15

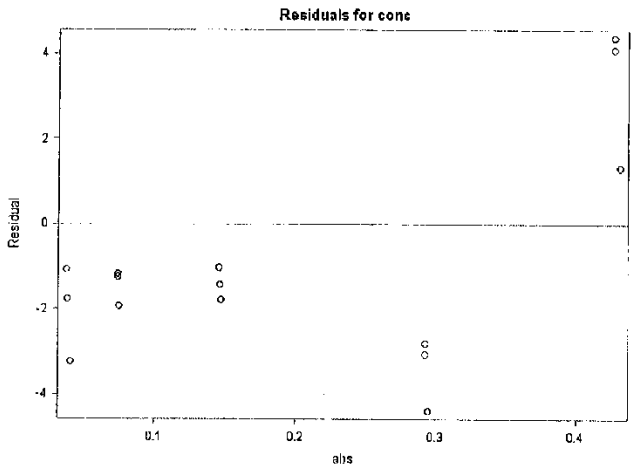
Standard Curve Linear Regression and sample concentrations
Largemouth Bass Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

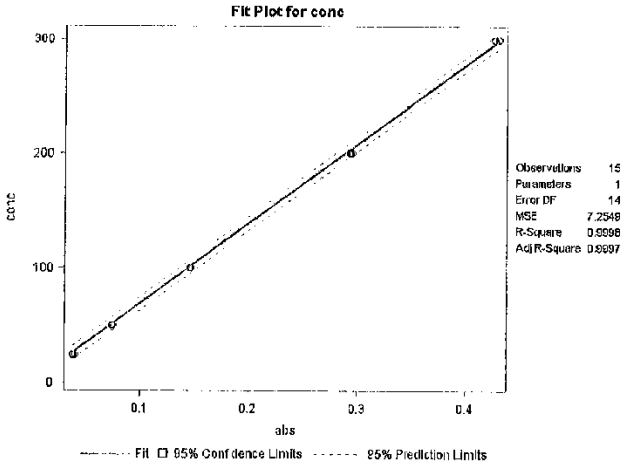
The REG Procedure
Model: MODEL1
Dependent Variable: conc conc



Observations	15
Parameters	1
Error DF	14
MSE	7.2548
R-Square	0.9998
Adj R-Square	0.9997

AEH-12-PSEUDO-03





Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Largemouth Bass Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	predicted_ppm
1	.	25	0	0.0376	25	26.068
2	.	50	0	0.0749	50	51.628
3	.	100	0	0.1466	100	101.777
4	.	200	0	0.2929	200	203.068
5	.	300	0	0.4308	300	298.674
6	.	25	0	0.0407	25	28.217
7	.	50	0	0.0739	50	51.235
8	.	100	0	0.1457	100	101.014
9	.	200	0	0.2925	200	202.791
10	.	300	0	0.4264	300	295.624
11	.	25	0	0.0386	25	26.761
12	.	50	0	0.0738	50	51.166
13	.	100	0	0.1463	100	101.430
14	.	200	0	0.2948	200	204.385
15	.	300	0	0.4269	300	295.901
16	A1	200	1	0.1950	.	135.194
17	A2	300	1	0.2986	.	207.020
18	A3	0	1	-0.0008	.	-0.555
19	A4	100	1	0.0747	.	51.790
20	A5	50	1	0.0317	.	21.978
21	B1	50	1	0.0376	.	26.068
22	B2	100	1	0.1105	.	76.610
23	B3	0	1	-0.0014	.	-0.971
24	B4	300	1	0.3300	.	228.790
25	B5	200	1	0.2163	.	149.961
26	C1	300	1	0.3129	.	216.934
27	C2	50	1	0.0443	.	30.713
28	C3	100	1	0.0855	.	59.277
29	C4	0	1	-0.0007	.	-0.485
30	C5	200	1	0.2076	.	143.929
31	A1	200	3	0.2307	.	159.945
32	A2	300	3	0.3364	.	233.227
33	A3	0	3	0.0002	.	0.139
34	A4	100	3	0.0964	.	66.834
35	A5	50	3	0.0518	.	35.913
36	B1	50	3	0.0537	.	37.230
37	B2	100	3	0.1309	.	90.753

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38	B3	0	3	0.0001	.	0.069
39	B4	300	3	0.3725	.	258.255
40	B5	200	3	0.2481	.	172.008
41	C1	300	3	0.3510	.	243.349
42	C2	50	3	0.0562	.	38.964
43	C3	100	3	0.1028	.	71.271
44	C4	0	3	0.0005	.	0.347
45	C5	200	3	0.2329	.	161.470
46	A1	200	6	0.2261	.	156.756
47	A2	300	6	0.3401	.	235.792
48	A3	0	6	-0.0002	.	-0.139
49	A4	100	6	0.0989	.	68.568
50	A5	50	6	0.0525	.	36.398
51	B1	50	6	0.0620	.	42.985
52	B2	100	6	0.1360	.	94.289
53	B3	0	6	0.0056	.	3.882
54	B4	300	6	0.3801	.	263.524
55	B5	200	6	0.2525	.	175.059
56	C1	300	6	0.3571	.	247.578
57	C2	50	6	0.0561	.	38.894
58	C3	100	6	0.1049	.	72.727
59	C4	0	6	-0.0001	.	-0.069
60	C5	200	6	0.2365	.	163.966
61	SC1	25	6	0.0392	.	27.177
62	SC2	50	6	0.0736	.	51.027
63	SC3	100	6	0.1524	.	105.659
64	SC4	200	6	0.2870	.	198.978
65	SC5	300	6	0.4195	.	290.845
66	A1	200	12	0.2218	.	153.774
67	A2	300	12	0.3428	.	237.664
68	A3	0	12	-0.0003	.	-0.208
69	A4	100	12	0.1001	.	69.400
70	A5	50	12	0.0535	.	37.092
71	B1	50	12	0.0583	.	40.419
72	B2	100	12	0.1349	.	93.526
73	B3	0	12	-0.0006	.	-0.416
74	B4	300	12	0.3776	.	261.791
75	B5	200	12	0.2505	.	173.672
76	C1	300	12	0.3858	.	267.476
77	C2	50	12	0.0618	.	42.846
78	C3	100	12	0.1131	.	78.412
79	C4	0	12	0.0011	.	0.763
80						

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	C5	200	12	0.2494	.	172.909
81	SC1	25	12	0.0387	.	26.831
82	SC2	50	12	0.0764	.	52.968
83	SC3	100	12	0.1481	.	102.678
84	SC4	200	12	0.2878	.	199.532
85	SC5	300	12	0.4233	.	293.475
86	A1	200	15	0.2116	.	146.703
87	A2	300	15	0.3249	.	225.254
88	A3	0	15	-0.0002	.	-0.139
89	A4	100	15	0.0986	.	68.373
90	A5	50	15	0.0502	.	34.804
91	B1	50	15	0.0521	.	36.121
92	B2	100	15	0.1268	.	87.911
93	B3	0	15	-0.0022	.	-1.525
94	B4	300	15	0.3568	.	247.370
95	B5	200	15	0.2338	.	162.094
96	C1	300	15	0.3876	.	268.724
97	C2	50	15	0.0614	.	42.569
98	C3	100	15	0.1150	.	79.730
99	C4	0	15	-0.0022	.	-1.525
100	C5	200	15	0.2529	.	175.336
101	A1	200	18	0.2095	.	145.247
102	A2	300	18	0.3195	.	221.510
103	A3	0	18	-0.0023	.	-1.595
104	A4	100	18	0.0900	.	62.397
105	A5	50	18	0.0481	.	33.348
106	B1	50	18	0.0539	.	37.369
107	B2	100	18	0.1237	.	85.761
108	B3	0	18	-0.0023	.	-1.595
109	B4	300	18	0.3493	.	242.170
110	B5	200	18	0.2337	.	162.025
111	C1	300	18	0.3729	.	258.532
112	C2	50	18	0.0624	.	43.262
113	C3	100	18	0.1108	.	76.818
114	C4	0	18	-0.0021	.	-1.456
115	C5	200	18	0.2528	.	175.267
116	SC1	25	18	0.0371	.	25.721
117	SC2	50	18	0.0730	.	50.611
118	SC3	100	18	0.1480	.	102.609
119	SC4	200	18	0.2903	.	201.266
120	SC5	300	18	0.4345	.	301.240
121	A1	200	24	0.2075	.	143.860
122						

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	A2	300	24	0.3168	.	219.638
123	A3	0	24	-0.0020	.	-1.387
124	A4	100	24	0.0914	.	63.368
125	A5	50	24	0.0485	.	33.625
126	B1	50	24	0.0558	.	38.688
127	B2	100	24	0.1237	.	85.761
128	B3	0	24	0.0001	.	0.069
129	B4	300	24	0.3495	.	242.309
130	B5	200	24	0.2328	.	161.401
131	C1	300	24	0.3726	.	258.324
132	C2	50	24	0.0683	.	47.353
133	C3	100	24	0.1155	.	80.076
134	C4	0	24	0.0010	.	0.693
135	C5	200	24	0.2405	.	166.739
136	SC1	25	24	0.0464	.	32.169
137	SC2	50	24	0.0883	.	61.219
138	SC3	100	24	0.1603	.	111.135
139	SC4	200	24	0.3154	.	218.667
140	SC5	300	24	0.4428	.	306.994

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=A1 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
148.8	8.5517	140.9	156.7

tank=A2 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
225.7	10.6403	215.7	235.6

tank=A3 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.5546	0.6734	-1.1774	0.0681

tank=A4 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
64.1898	6.0374	58.6062	69.7735

tank=A5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.3082	5.1660	28.5119	38.1045

tank=B1 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.9827	5.3357	32.0480	41.9174

tank=B2 theor=100

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
87.8017	6.0161	82.2377	93.3657

tank=B3 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0693	1.8723	-1.8010	1.6623

tank=B4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
249.2	12.6657	237.5	260.9

tank=B5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
165.2	8.9601	156.9	173.5

tank=C1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
251.6	17.9095	235.0	268.1

tank=C2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
40.6572	5.2427	35.8085	45.5059

tank=C3 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.0446	7.3368	67.2592	80.8300

tank=C4 theor=0

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2476	0.9522	-1.1282	0.6330

tank=C5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
165.7	11.0474	155.4	175.9

Performed by James A. Luoma 9.3 11:06 05FEB15

AEH-12-PSEUDO-03

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.6702	0.2625	-1.3222	-0.0182

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.1849	0.1443	-0.1736	0.5434

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
1.2248	2.3019	-4.4933	6.9430

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0462	0.9291	-1.5165	1.6090

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.0631	0.8008	-3.0518	0.9256

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.5484	0.0801	-1.7472	-1.3495

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

AEH-12-PSEUDO-03

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2080	1.0673	-2.8594	2.4434

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
26.2530	4.3707	15.3955	37.1105

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.3690	1.5300	33.5683	41.1697

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
39.4258	3.3252	31.1655	47.6860

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
40.1191	2.8889	32.9425	47.2956

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.8312	4.1554	27.5086	48.1537

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.9929	4.9865	25.6059	50.3800

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
39.8880	6.9421	22.6427	57.1332

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
62.5589	12.7314	30.9325	94.1854

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
76.2863	12.7236	44.6791	107.9

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
78.5280	13.8070	44.2294	112.8

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
80.4461	12.1913	50.1612	110.7

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
78.2044	10.5519	51.9922	104.4

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.9921	11.7886	45.7075	104.3

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
76.4019	11.6402	47.4859	105.3

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
143.0	7.4248	124.6	161.5

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
164.5	8.5690	146.2	180.8

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
165.3	9.2200	142.4	188.2

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
166.8	11.2743	138.8	194.8

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
161.4	14.3301	125.8	197.0

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
160.8	15.0446	123.5	198.2

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
157.3	11.9695	127.6	187.1

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
217.6	10.8993	190.5	244.7

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
244.9	12.5901	213.7	276.2

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
249.0	13.9179	214.4	283.5

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
255.6	15.8281	216.3	295.0

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
247.1	21.7381	193.1	301.1

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
240.7	18.5527	194.7	286.8

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
240.1	19.4383	191.8	288.4

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2905	1.2255	-0.8484	0.2673

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.9827	5.8572	34.3165	39.6489

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
75.3454	11.6789	70.0292	80.6616

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
159.9	12.1344	154.3	165.4

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
242.2	17.9508	234.0	250.3

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
27.9747	2.8644	23.4168	32.5327

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
53.9552	4.9493	46.0807	61.8317

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
105.5	4.0048	99.1480	111.9

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
204.6	9.4217	189.6	219.6

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
296.1	7.3724	286.4	309.9

Performed by James A. Luoma 9.3 11:06 05FEB15

FF # 29
Item No. 20
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Largemouth Bass Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL        Page  1  of  3          *
* Analysis completion date:  05FEB2015                                       *
*****************************************************************************/

data Zeq; set fish.LMB2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = 'SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure samp
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 23
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 'Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if theo = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = 'C4' then delete;
if tank = 'C5' then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AEH-12-PSEUDO-03

FF # 29
Item No. 23
Pg 3 of 3

```
349  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
350
351  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
352                                                                    AEH-12-PSEUDO-03
353  options ls=97 ps=54 formdlim= -' pageno = 1 nocenter nodate nosource2;
354
355  title1 'Standard Curve Linear Regression and sample concentrations';
356  title2 'Largemouth Bass Spectrophotometer analysis';
357  title3 h=1 'Study # AEH-12-PSEUDO-03';
358  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
359
360  /*****************************************************************************
361  * SAS ver 9.3       Analysis prepared by:  JAL        Page 1 of 5            *
362  * Analysis completion date:  05FEB2015      JAL                               *
363  *****************************************************************************/
364
365  data Zeq; set fish.LMB2;
366  run;

NOTE: There were 140 observations read from the data set FISH.LMB2.
NOTE: The data set WORK.ZEQ has 140 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.00 seconds


367
368  proc sort;
369  by tank time ; run;

NOTE: There were 140 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 140 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


370
371  run;
372  proc gplot data= zeq;
373  plot abs * conc;
374  run;

NOTE: 125 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 4 records written to C:\Users\JLUOMA\gplot3.png.

NOTE: There were 140 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.23 seconds
      cpu time            0.21 seconds

FF # 29
Item No. 24
Pg 1 of 5

375  proc reg data = zeq;
376  model conc = abs / stb noint edf;
377  output out=output_out p=predicted_ppm;
```

```
378  run;

NOTE: The data set WORK.OUTPUT_OUT has 140 observations and 6 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.10 seconds
      cpu time            0.49 seconds


379  proc sort;
380  by time tank;

NOTE: There were 140 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 140 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


381  proc print data=output_out;
382  run;

NOTE: There were 140 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.17 seconds
      cpu time            0.06 seconds


383  data zeq2; set output_out;
384  if tank = "." then delete;
385  if thero = "." then delete;
386  if tank = "SC1" then delete;
387  if tank = "SC2" then delete;
388  if tank = "SC3" then delete;
389  if tank = "SC4" then delete;
390  if tank = "SC5" then delete;
391  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 140 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 105 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


392  proc sort data = zeq2;
393  by tank;
394  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 105 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

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```
395  /*****************************************************************************************
395! ************************
396  * This procedure produces the mean concentrations for each treatment replicate over all
396! exposure sampling times     *
397  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
397! period                  *
398  *****************************************************************************************
398! ************************/
399  title1 "Mean treatment concentration by tank for all exposure sampling times";
400  title2 "Individual enclosure means";
401  proc means data = zeq2 mean std lclm uclm fw=8;
402  by tank theor;
403  var predicted_ppm;
404  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.03 seconds


405  proc sort;
406  by theor time;
407  /*****************************************************************************************
407! ***********
408  * This procedure produces the mean concentrations for each treatment group at each sampling
408! time      *
409  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
409! replicates     *
410  * at each sample time over the entire exposure
410!          *
411  *****************************************************************************************
411! **********/
412  title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 105 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds


413  proc means data = zeq2 mean std lclm uclm fw=8;
414  by theor time;
415  var predicted_ppm;
416  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.09 seconds
      cpu time            0.06 seconds


417  /*****************************************************************************************
417! ***********
```

```
418  * This procedure produces the mean concentrations for each treatment group over all sampling
418!  times    *
419  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
419! replicates     *
420  * over the entire exposure
420!          *
421  ***************************************************************************************************
421! **********/
422  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
423  proc means data = zeq2 mean std lclm uclm fw=8;
424  by theor;
425  var predicted_ppm;
426  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


427  data zeq3; set output_out;
428  if tank = "." then delete;
429  if thero = "." then delete;
430  if tank = "A1" then delete;
431  if tank = "A2" then delete;
432  if tank = "A3" then delete;
433  if tank = "A4" then delete;
434  if tank = "A5" then delete;
435  if tank = "B1" then delete;
436  if tank = "B2" then delete;
437  if tank = "B3" then delete;
438  if tank = "B4" then delete;
439  if tank = "B5" then delete;
440  if tank = "C1" then delete;
441  if tank = "C2" then delete;
442  if tank = "C3" then delete;
443  if tank = "C4" then delete;
444  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 140 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 20 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds
```



```
445  proc sort;
446  by theor time;
447
448  /***************************************************************************************************
448! ***************
449  * This procedure produces the mean concentrations for each standard check conc. over all
449! sampling times    *
450  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
450! replicates         *
```

```
451  * over the entire exposure
4511                 *
452  ************************************************************************************
4521 ****************/
453  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 20 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 20 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


454  proc means data = zeq3 mean std lclm uclm fw=8;
455  by theor;
456  var predicted_ppm;
457  run;

NOTE: There were 20 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.03 seconds


458
459  quit;
460  run;
```

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Item No. 24
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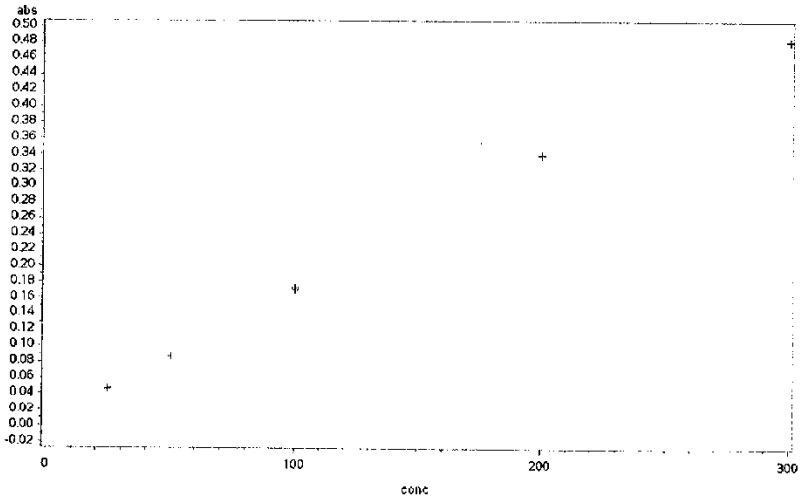
AEH-12-PSEUDO-03

Standard Curve Linear Regression and sample concentrations

Smallmouth Bass Spectrophotometer analysis

Study # AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15

2/5/15

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Item No. 25
Pg 1 of 19

Standard Curve Linear Regression and sample concentrations
Smallmouth Bass Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	152
Number of Observations Used	15
Number of Observations with Missing Values	137

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	428990	428990	15608.4	<.0001
Error	14	384.76024	27.48287		
Uncorrected Total	15	429375			

Root MSE	5.24241	R-Square	0.9991
Dependent Mean	135.00000	Adj R-Sq	0.9990
Coeff Var	3.88327		

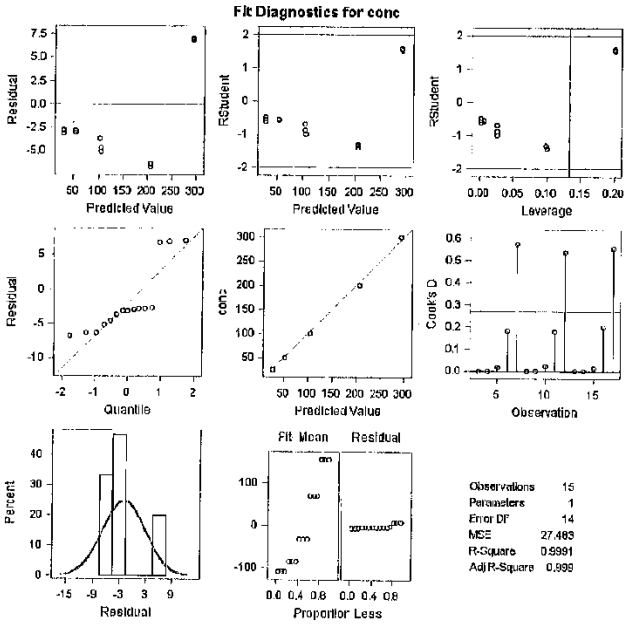
Parameter Estimates

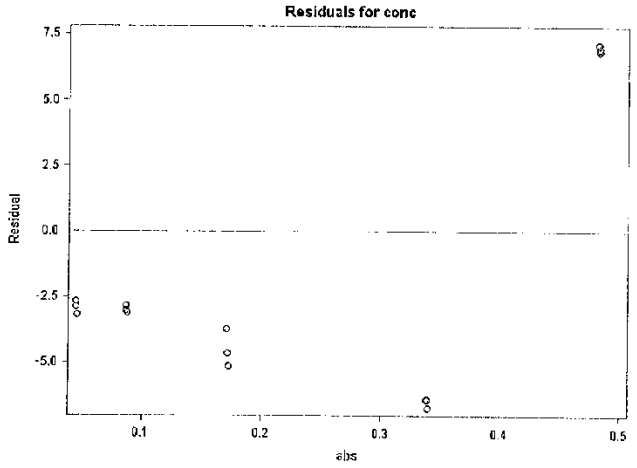
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	607.93629	4.86593	124.94	<.0001	0.99955

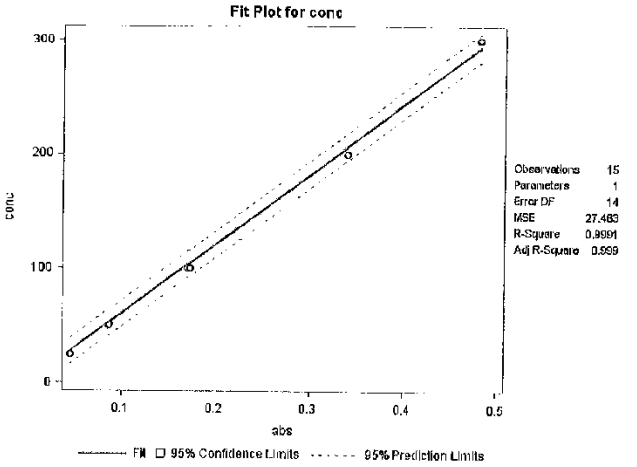
Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Smallmouth Bass Spectrophotometer analysis
Study # AER-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc







Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Smallmouth Bass Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	F6	predicted_ppm
1		.	.	.	.		.
2		.	.	.	.		.
3	.	25	0.0	0.0458	25		27.843
4	.	50	0.0	0.0869	50		52.830
5	.	100	0.0	0.1721	100		104.626
6	.	200	0.0	0.3395	200		206.394
7	.	300	0.0	0.4818	300		292.904
8	.	25	0.0	0.0463	25		28.147
9	.	50	0.0	0.0873	50		53.073
10	.	100	0.0	0.1729	100		105.112
11	.	200	0.0	0.3394	200		206.334
12	.	300	0.0	0.4822	300		293.147
13	.	25	0.0	0.0455	25		27.661
14	.	50	0.0	0.0872	50		53.012
15	.	100	0.0	0.1706	100		103.714
16	.	200	0.0	0.3400	200		206.698
17	.	300	0.0	0.4820	300		293.025
18	A1	100	1.0	0.0844	.		51.310
19	A2	0	1.0	0.0005	.		0.304
20	A3	50	1.0	0.0396	.		24.074
21	A4	200	1.0	0.2217	.		134.779
22	A5	300	1.0	0.3158	.		191.986
23	B1	0	1.0	-0.0003	.		-0.182
24	B2	200	1.0	0.2026	.		123.166
25	B3	100	1.0	0.0939	.		57.065
26	B4	300	1.0	0.3010	.		182.989
27	B5	50	1.0	0.0360	.		21.886
28	C1	0	1.0	0.0000	.		0.000
29	C2	100	1.0	0.0709	.		43.103
30	C3	50	1.0	0.0373	.		22.676
31	C4	300	1.0	0.2619	.		159.219
32	C5	200	1.0	0.1328	.		80.734
33	A1	100	3.0	0.1061	.		64.502
34	A2	0	3.0	0.0000	.		0.000
35	A3	50	3.0	0.0541	.		32.889
36	A4	200	3.0	0.2531	.		153.869
37	A5	300	3.0	0.3832	.		232.961

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38	B1	0	3.0	-0.0001	.	-0.061
39	B2	200	3.0	0.2468	.	150.039
40	B3	100	3.0	0.1294	.	78.667
41	B4	300	3.0	0.3740	.	227.368
42	B5	50	3.0	0.0518	.	31.491
43	C1	0	3.0	0.0003	.	0.182
44	C2	100	3.0	0.1081	.	65.718
45	C3	50	3.0	0.0622	.	37.814
46	C4	300	3.0	0.3641	.	221.350
47	C5	200	3.0	0.2208	.	134.232
48	A1	100	6.0	0.1078	.	65.536
49	A2	0	6.0	-0.0001	.	-0.061
50	A3	50	6.0	0.0570	.	34.652
51	A4	200	6.0	0.2566	.	155.996
52	A5	300	6.0	0.3861	.	234.724
53	B1	0	6.0	-0.0001	.	-0.061
54	B2	200	6.0	0.2502	.	152.108
55	B3	100	6.0	0.1342	.	81.585
56	B4	300	6.0	0.3813	.	231.806
57	B5	50	6.0	0.0585	.	35.564
58	C1	0	6.0	-0.0002	.	-0.122
59	C2	100	6.0	0.1111	.	67.542
60	C3	50	6.0	0.0653	.	39.698
61	C4	300	6.0	0.3723	.	226.335
62	C5	200	6.0	0.2396	.	145.662
63	SC1	25	6.0	0.0441	.	26.810
64	SC2	50	6.0	0.0826	.	50.216
65	SC3	100	6.0	0.1691	.	102.802
66	SC4	200	6.0	0.3202	.	194.661
67	SC5	300	6.0	0.4598	.	279.529
68	A1	100	12.0	0.1081	.	65.718
69	A2	0	12.0	-0.0005	.	-0.304
70	A3	50	12.0	0.0556	.	33.801
71	A4	200	12.0	0.2501	.	152.045
72	A5	300	12.0	0.3803	.	231.196
73	B1	0	12.0	0.0004	.	0.243
74	B2	200	12.0	0.2373	.	144.263
75	B3	100	12.0	0.1282	.	77.937
76	B4	300	12.0	0.3623	.	220.255
77	B5	50	12.0	0.0524	.	31.856
78	C1	0	12.0	-0.0008	.	-0.486
79	C2	100	12.0	0.1081	.	65.718
80						

	C3	50	12.0	0.0543	.	39.090
81	C4	300	12.0	0.3530	.	214.602
82	C5	200	12.0	0.2303	.	140.008
83	SC1	25	12.0	0.0439	.	26.688
84	SC2	50	12.0	0.0868	.	52.769
85	SC3	100	12.0	0.1732	.	105.295
86	SC4	200	12.0	0.3293	.	200.193
87	SC5	300	12.0	0.4698	.	285.487
88	A1	100	15.0	0.1048	.	63.712
89	A2	0	15.0	-0.0004	.	-0.243
90	A3	50	15.0	0.0547	.	33.254
91	A4	200	15.0	0.2372	.	144.202
92	A5	300	15.0	0.3659	.	222.444
93	B1	0	15.0	-0.0002	.	-0.122
94	B2	200	15.0	0.2319	.	140.980
95	B3	100	15.0	0.1223	.	74.351
96	B4	300	15.0	0.3458	.	210.224
97	B5	50	15.0	0.0513	.	31.187
98	C1	0	15.0	-0.0006	.	-0.365
99	C2	100	15.0	0.1067	.	64.867
100	C3	50	15.0	0.0644	.	39.151
101	C4	300	15.0	0.3487	.	211.987
102	C5	200	15.0	0.2189	.	131.861
103	A1	100	18.0	0.1050	.	63.833
104	A2	0	18.0	0.0003	.	0.182
105	A3	50	18.0	0.0546	.	33.193
106	A4	200	18.0	0.2315	.	140.737
107	A5	300	18.0	0.3555	.	216.121
108	B1	0	18.0	0.0005	.	0.304
109	B2	200	18.0	0.2350	.	142.865
110	B3	100	18.0	0.1239	.	75.323
111	B4	300	18.0	0.3507	.	213.203
112	B5	50	18.0	0.0516	.	31.370
113	C1	0	18.0	0.0007	.	0.426
114	C2	100	18.0	0.1076	.	65.414
115	C3	50	18.0	0.0661	.	40.185
116	C4	300	18.0	0.3348	.	203.537
117	C5	200	18.0	0.2063	.	125.417
118	SC1	25	18.0	0.0433	.	26.324
119	SC2	50	18.0	0.0895	.	54.410
120	SC3	100	18.0	0.1736	.	105.539
121	SC4	200	18.0	0.3258	.	198.066
122						

	SC5	300	18.0	0.4550	.	276.611
123	SC1	25	18.1	0.0382	.	23.223
124	SC2	50	18.1	0.0786	.	47.784
125	SC3	100	18.1	0.1462	.	88.880
126	SC4	200	18.1	0.2871	.	174.539
127	SC5	300	18.1	0.3993	.	242.749
128	A1	100	24.0	0.1042	.	63.347
129	A2	0	24.0	0.0000	.	0.000
130	A3	50	24.0	0.0547	.	33.254
131	A4	200	24.0	0.2335	.	141.953
132	A5	300	24.0	0.3881	.	235.940
133	B1	0	24.0	0.0003	.	0.182
134	B2	200	24.0	0.2314	.	140.676
135	B3	100	24.0	0.1213	.	73.743
136	B4	300	24.0	0.3498	.	212.656
137	B5	50	24.0	0.0503	.	30.579
138	C1	0	24.0	0.0001	.	0.061
139	C2	100	24.0	0.1134	.	68.940
140	C3	50	24.0	0.0718	.	43.650
141	C4	300	24.0	0.3360	.	204.267
142	C5	200	24.0	0.2217	.	134.779
143	SC1	25	24.0	0.0444	.	26.992
144	SC2	50	24.0	0.0861	.	52.343
145	SC3	100	24.0	0.1720	.	104.565
146	SC4	200	24.0	0.3212	.	195.269
147	SC5	300	24.0	0.4517	.	274.605
148	SC1	25	24.1	0.0416	.	25.290
149	SC2	50	24.1	0.0800	.	48.635
150	SC3	100	24.1	0.1526	.	92.771
151	SC4	200	24.1	0.3013	.	183.171
152	SC5	300	24.1	0.4220	.	256.549

Performed by James A. Luoma 9.3 11:05 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

tank=A1 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
62.5653	5.0453	57.8992	67.2315

tank=A2 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0174	0.2156	-0.2167	0.1820

tank=A3 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.1598	3.6120	28.8193	35.5004

tank=A4 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
146.2	7.8659	139.0	153.5

tank=A5 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
223.6	15.6854	209.1	238.1

tank=B1 theor=0

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0434	0.1945	-0.1365	0.2233

tank=B2 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
142.0	9.3991	133.3	150.7

tank=B3 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.0987	7.9875	66.7116	81.4859

tank=B4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.1	16.8811	199.4	228.8

tank=B5 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
30.5618	4.1610	26.7136	34.4101

tank=C1 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0434	0.3134	-0.3332	0.2464

tank=C2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
63.0430	8.9059	54.8064	71.2795

tank=C3 theor=50

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.4662	6.7695	31.2055	43.7270

tank=C4 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
205.9	22.1978	185.4	226.4

tank=C5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
127.5	21.5832	107.6	147.5

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0405	0.2457	-0.5693	0.6509

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0405	0.1266	-0.2738	0.3549

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0611	0.0351	-0.1682	0.00613

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.1824	0.3797	-1.1256	0.7607

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2432	0.1216	-0.5452	0.0589

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.3040	0.1216	0.00193	0.6060

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0811	0.0929	-0.1496	0.3117

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
22.8787	1.1083	20.1256	25.6318

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.0647	3.3211	25.8145	42.3148

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.6383	2.6889	29.9686	43.3180

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.9158	3.7438	25.6157	44.2159

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.5308	4.1326	24.2648	44.7968

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.9158	4.6531	23.3568	46.4748

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.8277	6.9049	18.6749	52.9805

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
50.4992	7.0264	33.0446	67.9538

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.6290	7.8507	50.1268	89.1312

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.5541	8.7448	49.8309	93.2773

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.7911	7.0549	52.2656	87.3165

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.6430	5.8376	53.1417	82.1443

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
68.1902	6.2278	52.7194	83.6609

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
68.8765	5.2029	55.7518	81.6012

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
112.9	28.4499	42.2202	183.6

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
146.0	10.4091	120.2	171.9

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
151.3	5.2198	138.3	164.2

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
145.4	6.1040	130.3	160.6

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
139.0	6.4011	123.1	154.9

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
136.3	9.5189	112.7	160.0

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
139.1	3.8268	129.6	148.6

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
178.1	16.9296	136.0	220.1

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
227.2	5.8071	212.8	241.7

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
231.0	4.2590	220.4	241.5

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
222.0	8.4376	201.1	243.0

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.9	6.6051	198.5	231.3

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
211.0	6.5868	194.6	227.3

thoor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
217.6	16.4100	176.9	258.4

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.00579	0.2369	-0.1136	0.1021

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.3960	5.6569	30.8210	35.9710

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
66.5690	8.9653	62.4881	70.6500

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
138.6	15.8795	131.4	145.8

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.5	18.7746	206.0	223.1

Performed by James A. Luoma 9.3 11:06 05FEB15

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
25.8880	1.4394	24.3774	27.3985

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
51.0261	2.5734	48.3255	53.7268

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
99.9751	7.2566	92.3598	107.6

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
191.0	9.9834	180.5	201.5

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
269.3	16.2220	252.2	286.3

Performed by James A. Luoma 9.3 11:06 05FEB15

FF # 24
Item No. 25
Pg 19 of 19

```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Smallmouth Bass Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL        Page 1 of 3            *
* Analysis completion date:  05FEB2015                                       *
*****************************************************************************/

data Zeq; set fish.SMB2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure sampl
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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FF # 29
Item No. 26
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "A1" then delete;
if tank = 'A2' then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = 'B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AEH-12-PSEUDO-03

FF # 29 wrong item #
Item No. ~~25~~ 26
Pg 3 of 3
in 12 HARTS

```
464  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
465
466  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or urquoted text.
467
468  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
469
470  title1 'Standard Curve Linear Regression and sample concentrations';
471  title2 'Smallmouth Bass Spectrophotometer analysis';
472  title3 h=1 'Study # AEH-12-PSEUDO-03';
473  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
474
475  /*************************************************************************
476  * SAS ver 9.3       Analysis prepared by:  JAL      Page 1 of 5          *
477  * Analysis completion date:  05FEB2015                                  *
478  *************************************************************************/
479
480  data Zeq; set fish.SMB2;
481  run;

NOTE: There were 152 observations read from the data set FISH.SMB2.
NOTE: The data set WORK.ZEQ has 152 observations and 6 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.00 seconds


482
483  proc sort;
484  by tank time ; run;

NOTE: There were 152 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 152 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


485
486  run;
487  proc gplot data= zeq;
488  plot abs * conc;
489  run;

NOTE: 137 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 4 records written to C:\Users\JLUOMA\gplot4.png.

NOTE: There were 152 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.23 seconds
      cpu time            0.21 seconds


490  proc reg data = zeq;
491  model conc = abs / stb noint edf;
492  output out=output_out p=predicted_ppm;
```

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FF # 29 wrong item # pw 12MAR15
Item No. 2627
Pg 1 of 5

```
493  run;

NOTE: The data set WORK.OUTPUT_OUT has 152 observations and 7 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.06 seconds
      cpu time            0.54 seconds

494  proc sort;
495  by time tank;

NOTE: There were 152 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 152 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds

496  proc print data=output_out;
497  run;

NOTE: There were 152 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds

498  data zeq2; set output_out;
499  if tank = "." then delete;
500  if thero = "." then delete;
501  if tank = "SC1" then delete;
502  if tank = "SC2" then delete;
503  if tank = "SC3" then delete;
504  if tank = "SC4" then delete;
505  if tank = "SC5" then delete;
506  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 152 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 107 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds

507  proc sort data = zeq2;
508  by tank;
509  run;

NOTE: There were 107 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 107 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

AEH-12-PSEUDO-03

```
510  /*****************************************************************************************
510! ************************
511  * This procedure produces the mean concentrations for each treatment replicate over all
511! exposure sampling times     *
512  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
512! period                    *
513  *****************************************************************************************
513! ************************/
514  title1 "Mean treatment concentration by tank for all exposure sampling times";
515  title2 "Individual enclosure means";
516  proc means data = zeq2 mean std lclm uclm fw=8;
517  by tank theor;
518  var predicted_ppm;
519  run;

NOTE: There were 107 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


520  proc sort;
521  by theor time;
522  /*****************************************************************************************
522! ***********
523  * This procedure produces the mean concentrations for each treatment group at each sampling
523! time      *
524  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
524! replicates     *
525  * at each sample time over the entire exposure
525!          *
526  *****************************************************************************************
526! **********/
527  title1 "Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 107 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 107 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


528  proc means data = zeq2 mean std lclm uclm fw=8;
529  by theor time;
530  var predicted_ppm;
531  run;

NOTE: There were 107 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.09 seconds
      cpu time            0.07 seconds


532  /*****************************************************************************************
532! ***********
```

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```
533  * This procedure produces the mean concentrations for each treatment group over all sampling
533!  times    *
534  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
534! replicates     *
535  * over the entire exposure
535!          *
536  ***************************************************************************************
536! **********/
537  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
538  proc means data = zeq2 mean std lclm uclm fw=8;
539  by theor;
540  var predicted_ppm;
541  run;
```

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```
NOTE: There were 107 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.01 seconds


542  data zeq3; set output_out;
543  if tank = "." then delete;
544  if theor = "." then delete;
545  if tank = "A1" then delete;
546  if tank = "A2" then delete;
547  if tank = "A3" then delete;
548  if tank = "A4" then delete;
549  if tank = "A5" then delete;
550  if tank = "B1" then delete;
551  if tank = "B2" then delete;
552  if tank = "B3" then delete;
553  if tank = "B4" then delete;
554  if tank = "B5" then delete;
555  if tank = "C1" then delete;
556  if tank = "C2" then delete;
557  if tank = "C3" then delete;
558  if tank = "C4" then delete;
559  if tank = "C5" then delete;

NOTE: Variable theor is uninitialized.
NOTE: There were 152 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 32 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds
```



```
560  proc sort;
561  by theor time;
562
563  /***************************************************************************************
563! ***************
564  * This procedure produces the mean concentrations for each standard check conc. over all
564! sampling times    *
565  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
565! replicates          *
```

```
566  * over the entire exposure
5661                 *
567  ************************************************************************************************
5671 ***************/
568  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 32 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 32 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


569  proc means data = zeq3 mean std lclm uclm fw=8;
570  by theor;
571  var predicted_ppm;
572  run;

NOTE: There were 32 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.15 seconds
      cpu time            0.01 seconds


573
574  quit;
575  run;
```

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FF # 29
Item No. 27
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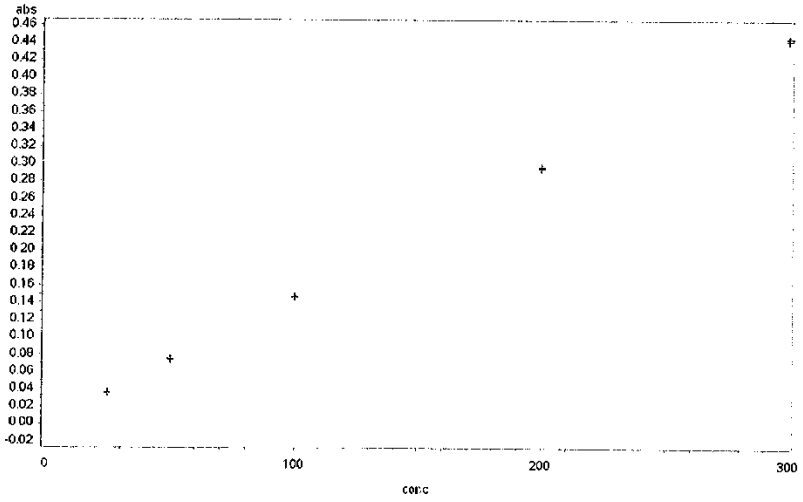
Standard Curve Linear Regression and sample concentrations AEH-12-PSEUDO-03

Bluegill Spectrophotometer analysis

Study # AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 10FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 09:29 10FEB15 JAL 2/10/15

FF # 29
Item No. 28
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Standard Curve Linear Regression and sample concentrations
Bluegill Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 10FEB2015 Analysis prepared by: JAL JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	141
Number of Observations Used	15
Number of Observations with Missing Values	126

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429369	429369	933816	<.0001
Error	14	6.43720	0.45980		
Uncorrected Total	15	429375			

Root MSE	0.67809	R-Square	1.0000
Dependent Mean	135.00000	Adj R-Sq	1.0000
Coeff Var	0.50229		

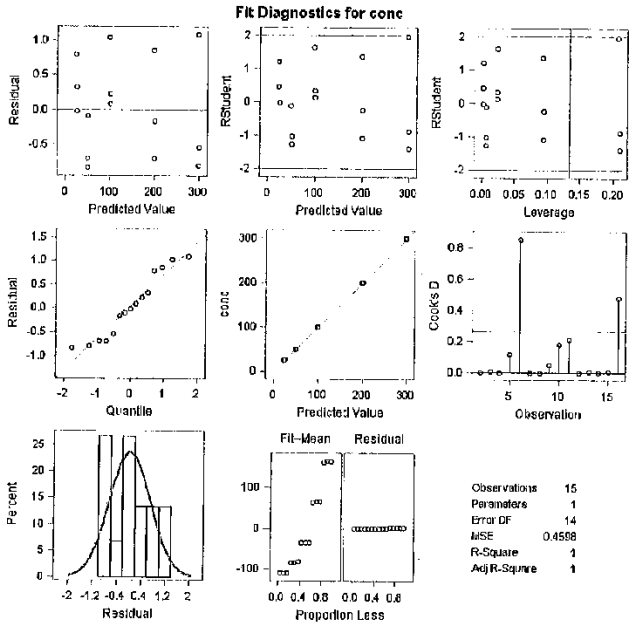
Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	675.97137	0.69952	966.34	<.0001	0.99999

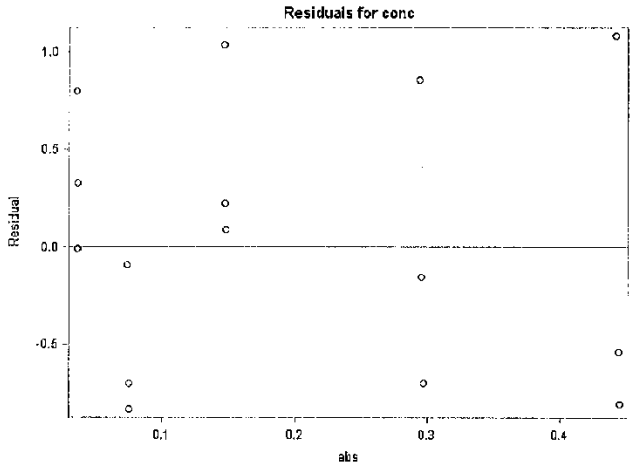
Performed by James A. Luoma 9.3 09:29 10FEB15

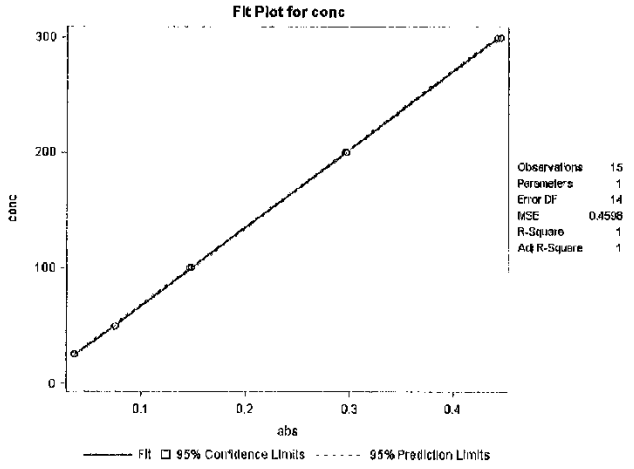
Standard Curve Linear Regression and sample concentrations
Bluegill Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 10FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc



AEH-12-PSEUDO-03





Performed by James A Luoma 9.3 09:29 10FEB15

Standard Curve Linear Regression and sample concentrations
Bluegill Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 10FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	F8	predicted_ppm
1		.	.	.	.		.
2	.	25	0	0.0365	25		24.673
3	.	50	0	0.0750	50		50.698
4	.	100	0	0.1478	100		99.909
5	.	200	0	0.2969	200		200.696
6	.	300	0	0.4422	300		298.915
7	.	25	0	0.0358	25		24.200
8	.	50	0	0.0741	50		50.089
9	.	100	0	0.1464	100		98.962
10	.	200	0	0.2946	200		199.141
11	.	300	0	0.4446	300		300.537
12	.	25	0	0.0370	25		25.011
13	.	50	0	0.0752	50		50.833
14	.	100	0	0.1476	100		99.773
15	.	200	0	0.2961	200		200.155
16	.	300	0	0.4450	300		300.807
17	A1	0	1	-0.0004	.		-0.270
18	A2	100	1	0.0696	.		47.048
19	A3	300	1	0.2954	.		199.682
20	A4	50	1	0.0335	.		22.645
21	A5	200	1	0.1780	.		120.323
22	B1	200	1	0.1795	.		121.337
23	B2	100	1	0.0976	.		65.975
24	B3	0	1	0.0002	.		0.135
25	B4	50	1	0.0391	.		26.430
26	B5	300	1	0.2816	.		190.354
27	C1	50	1	0.0319	.		21.563
28	C2	0	1	-0.0003	.		-0.203
29	C3	300	1	0.2418	.		163.450
30	C4	100	1	0.0640	.		43.262
31	C5	200	1	0.1560	.		105.452
32	A1	0	3	0.0002	.		0.135
33	A2	100	3	0.0942	.		63.677
34	A3	300	3	0.3328	.		224.963
35	A4	50	3	0.0489	.		33.055
36	A5	200	3	0.2078	.		140.467
37	B1	200	3	0.2150	.		145.334

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38	B2	100	3	0.1172	.	79.224
39	B3	0	3	-0.0006	.	-0.406
40	B4	50	3	0.0466	.	31.500
41	B5	300	3	0.3194	.	215.905
42	C1	50	3	0.0520	.	35.151
43	C2	0	3	0.0005	.	0.338
44	C3	300	3	0.2987	.	201.913
45	C4	100	3	0.0909	.	61.446
46	C5	200	3	0.1909	.	129.043
47	A1	0	6	-0.0005	.	-0.338
48	A2	100	6	0.0957	.	64.690
49	A3	300	6	0.3294	.	222.665
50	A4	50	6	0.0583	.	39.409
51	A5	200	6	0.2104	.	142.224
52	B1	200	6	0.2131	.	144.049
53	B2	100	6	0.1145	.	77.399
54	B3	0	6	0.0007	.	0.473
55	B4	50	6	0.0468	.	31.635
56	B5	300	6	0.3220	.	217.663
57	C1	50	6	0.0536	.	36.232
58	C2	0	6	0.0034	.	2.298
59	C3	300	6	0.3075	.	207.861
60	C4	100	6	0.0949	.	64.150
61	C5	200	6	0.1966	.	132.896
62	SC1	25	6	0.0415	.	28.053
63	SC2	50	6	0.0746	.	50.427
64	SC3	100	6	0.1572	.	106.263
65	SC4	200	6	0.301	.	203.535
66	SC5	300	6	0.4333	.	292.898
67	A1	0	12	-0.0011	.	-0.744
68	A2	100	12	0.0938	.	63.406
69	A3	300	12	0.3289	.	222.327
70	A4	50	12	0.0505	.	34.137
71	A5	200	12	0.2121	.	143.374
72	B1	200	12	0.2103	.	142.157
73	B2	100	12	0.1153	.	77.939
74	B3	0	12	-0.0012	.	-0.811
75	B4	50	12	0.0474	.	32.041
76	B5	300	12	0.3163	.	213.810
77	C1	50	12	0.0582	.	39.342
78	C2	0	12	-0.0003	.	-0.203
79	C3	300	12	0.3260	.	220.367
80						

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	C4	100	12	0.1021	.	69.017
81	C5	200	12	0.2098	.	141.819
82	SC1	25	12	0.0375	.	25.349
83	SC2	50	12	0.0748	.	50.563
84	SC3	100	12	0.1449	.	97.948
85	SC4	200	12	0.2992	.	202.251
86	SC5	300	12	0.4327	.	292.493
87	A1	0	15	-0.0013	.	-0.879
88	A2	100	15	0.1022	.	69.084
89	A3	300	15	0.3120	.	210.903
90	A4	50	15	0.0537	.	36.300
91	A5	200	15	0.2230	.	150.742
92	B1	200	15	0.2124	.	143.576
93	B2	100	15	0.1164	.	78.683
94	B3	0	15	0.0036	.	2.433
95	B4	50	15	0.0513	.	34.677
96	B5	300	15	0.3231	.	218.406
97	C1	50	15	0.0588	.	39.747
98	C2	0	15	0.0001	.	0.068
99	C3	300	15	0.3168	.	214.148
100	C4	100	15	0.1007	.	68.070
101	C5	200	15	0.2050	.	138.574
102	A1	0	18	-0.0012	.	-0.811
103	A2	100	18	0.0974	.	65.840
104	A3	300	18	0.3310	.	223.747
105	A4	50	18	0.0548	.	37.043
106	A5	200	18	0.2240	.	151.418
107	B1	200	18	0.2084	.	140.872
108	B2	100	18	0.1127	.	76.182
109	B3	0	18	-0.0042	.	-2.839
110	B4	50	18	0.0474	.	32.041
111	B5	300	18	0.3193	.	215.838
112	C1	50	18	0.0568	.	38.395
113	C2	0	18	-0.0041	.	-2.771
114	C3	300	18	0.3138	.	212.120
115	C4	100	18	0.1003	.	67.800
116	C5	200	18	0.1984	.	134.113
117	SC1	25	18	0.0361	.	24.403
118	SC2	50	18	0.0717	.	48.467
119	SC3	100	18	0.1440	.	97.340
120	SC4	200	18	0.2925	.	197.722
121	SC5	300	18	0.4285	.	289.654
122						

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	A1	0	24	-0.0028	.	-1.893
123	A2	100	24	0.0999	.	67.530
124	A3	300	24	0.3300	.	223.071
125	A4	50	24	0.0593	.	40.085
126	A5	200	24	0.2275	.	153.783
127	B1	200	24	0.2145	.	144.996
128	B2	100	24	0.1244	.	84.091
129	B3	0	24	-0.0010	.	-0.676
130	B4	50	24	0.0570	.	38.530
131	B5	300	24	0.3389	.	229.087
132	C1	50	24	0.0661	.	44.682
133	C2	0	24	-0.0001	.	-0.068
134	C3	300	24	0.3195	.	215.973
135	C4	100	24	0.1056	.	71.383
136	C5	200	24	0.1956	.	132.220
137	SC1	25	24	0.0383	.	25.890
138	SC2	50	24	0.0765	.	51.712
139	SC3	100	24	0.1456	.	98.421
140	SC4	200	24	0.2944	.	199.006
141	SC5	300	24	0.4291	.	290.059

Performed by James A. Luoma 9.3 09:29 10FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=' ' theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

tank=A1 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.6856	0.0430	-1.2803	-0.0910

tank=A2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
83.0392	7.3433	56.2477	89.8306

tank=A3 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
218.2	9.4283	209.5	226.9

tank=A4 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.6677	5.8817	29.2281	40.1073

tank=A5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
143.2	11.3154	132.7	153.7

tank=B1 theor=200

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
140.3	8.5201	132.5	148.2

tank=B2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
77.0704	5.4968	71.9867	82.1541

tank=B3 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.2414	1.5862	-1.7084	1.2256

tank=B4 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.4080	3.6527	29.0298	35.7862

tank=B5 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.4	11.7262	203.6	225.3

tank=C1 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.4445	7.2356	29.7527	43.1363

tank=C2 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.0773	1.4791	-1.4452	1.2907

tank=C3 theor=300

Analysis Variable : predicted_ppm Predicted

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Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
205.1	19.3000	187.3	223.0

tank=C4 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
63.5896	9.5403	54.7663	72.4129

tank=C5 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
130.6	11.8642	119.6	141.6

Performed by James A. Luoma 9.3 09:29 10FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=. time=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.1127	0.2173	-0.6525	0.4271

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.0225	0.3844	-0.9323	0.9774

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.8112	1.3503	-2.5430	4.1654

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.5858	0.3334	-1.4142	0.2425

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.5408	1.7061	-3.6973	4.7789

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-2.1406	1.1518	-5.0018	0.7207

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.8788	0.9293	-3.1873	1.4298

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
23.5463	2.5556	17.1978	29.8948

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
33.2353	1.8318	28.6848	37.7857

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.7589	3.9084	26.0499	45.4678

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.1730	3.7590	25.8352	44.5109

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
36.9080	2.5891	30.4764	43.3396

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
35.8265	3.3473	27.5114	44.1415

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
41.0991	3.1985	33.1534	49.0447

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
52.0949	12.1685	21.8667	82.3231

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
68.1154	9.6847	44.0574	92.1734

theor=100 time=5

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
68.7463	7.4981	50.1200	87.3726

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
70.1208	7.3293	51.9137	88.3278

theor=100 time=15

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
71.9459	5.8566	57.3974	86.4944

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
69.9405	5.4934	56.2941	83.5869

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
74.3343	8.6662	52.8062	95.8625

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
115.7	8.8932	93.6119	137.8

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
138.3	8.3625	117.5	159.1

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
139.7	5.9826	124.9	154.6

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
142.4	0.8177	140.4	144.5

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
144.3	6.1157	129.1	159.5

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
142.1	8.7212	120.5	163.8

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
143.7	10.8430	116.7	170.6

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
184.5	16.8131	137.8	231.2

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.3	11.5130	185.4	243.1

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
216.1	7.5304	197.4	234.8

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
218.8	4.4606	207.8	229.9

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
214.5	3.7630	205.1	223.8

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
217.2	5.9379	202.5	232.0

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
222.7	6.5644	206.4	239.0

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Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.3348	1.2667	-0.9114	0.2418

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
34.5067	5.7404	31.8937	37.1197

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
67.8997	9.8363	63.4223	72.3772

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
138.0	11.5314	132.8	143.3

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
212.6	14.5397	206.0	219.2

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=.

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
.	.	.	.

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
25.9235	1.5469	23.4621	28.3849

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
50.2923	1.3463	48.1500	52.4345

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
99.9931	4.2031	93.3049	106.7

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
200.6	2.7179	196.3	205.0

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
291.3	1.6558	288.6	293.9

Performed by James A. Luoma 9.3 09:29 10FEB15

FF # 29
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```
ods html close; /* close previous */;
ods html; /* open new */;
ods graphics on;
DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;

FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
```

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```
options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 'Standard Curve Linear Regression and sample concentrations';
title2 'Bluegill Spectrophotometer analysis';
title3 h=1 'Study # AEH-12-PSEUDO-03';
title4 h=1 'SAS v. 9.3  Analysis completion date:  10FEB2015  Analysis prepared by: JAL';

/*****************************************************************************
* SAS ver 9.3       Analysis prepared by:  JAL      Page 1 of 3          *
* Analysis completion date:  10FEB2015                                   *
*****************************************************************************/

data Zeq; set fish.BLG2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure samp
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************/
title1 "Mean treatment concentration by tank for all exposure sampling times";
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

FF # 29
Item No. 29
Pg 1 of 3

```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if theo = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = "A4" then delete;
if tank = "A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = 'C4" then delete;
if tank = 'C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************/
title1 'Mean Standard Check concentration over all sampling times';
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

AEH-12-PSEUDO-03

FF # 29
Item No. 29
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```
4    DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
5
6    FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
7
8    options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
9
10   title1 'Standard Curve Linear Regression and sample concentrations';
11   title2 'Bluegill Spectrophotometer analysis';
12   title3 h=1 'Study # AEH-12-PSEUDO-03';
13   title4 h=1 'SAS v. 9.3  Analysis completion date:  10FEB2015  Analysis prepared by: JAL';
14
15   /*************************************************************************
16   * SAS ver 9.3       Analysis prepared by: JAL JAL  Page 1 of 5          *
17   * Analysis completion date:  10FEB2015                                  *
18   *************************************************************************/
19
20   data Zeq; set fish.BLG2;
21   run;

NOTE: There were 141 observations read from the data set FISH.BLG2.
NOTE: The data set WORK.ZEQ has 141 observations and 6 variables.
NOTE: DATA statement used (Total process time):
      real time           0.05 seconds
      cpu time            0.00 seconds


22
23   proc sort;
24   by tank time ; run;

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 141 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.02 seconds
      cpu time            0.01 seconds


25
26   run;
27   proc gplot data= zeq;
28   plot abs * conc;
29   run;

NOTE: 126 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 4 records written to C:\Users\JLUOMA\gplot.png.

NOTE: There were 141 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.46 seconds
      cpu time            0.25 seconds


30   proc reg data = zeq;
31   model conc = abs / stb noint edf;
32   output out=output_out p=predicted_ppm;
```

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FF # 29
Item No. 30
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```
33   run;


NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 7 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.69 seconds
      cpu time            0.40 seconds


34   proc sort;
35   by time tank;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 141 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


36   proc print data=output_out;
37   run;

NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.10 seconds
      cpu time            0.06 seconds


38   data zeq2; set output_out;
39   if tank = "." then delete;
40   if thero = "." then delete;
41   if tank = "SC1" then delete;
42   if tank = "SC2" then delete;
43   if tank = "SC3" then delete;
44   if tank = "SC4" then delete;
45   if tank = "SC5" then delete;
46   run;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


47   proc sort data = zeq2;
48   by tank;
49   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

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```
50   /*************************************************************************************************
50 ! ************************
51   * This procedure produces the mean concentrations for each treatment replicate over all
51 ! exposure sampling times     *
52   * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
52 ! period                    *
53   *************************************************************************************************
53 ! ************************/
54   title1 "Mean treatment concentration by tank for all exposure sampling times";
55   title2 "Individual enclosure means";
56   proc means data = zeq2 mean std lclm uclm fw=8;
57   by tank theor;
58   var predicted_ppm;
59   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.08 seconds
      cpu time            0.04 seconds


60   proc sort;
61   by theor time;
62   /*************************************************************************************************
62 ! ************
63   * This procedure produces the mean concentrations for each treatment group at each sampling
63 ! time      *
64   * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
64 ! replicates     *
65   * at each sample time over the entire exposure
65 !           *
66   *************************************************************************************************
66 ! **********/
67   title1 'Mean treatment concentration by treatment group at each exposure sampling time';

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 106 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


68   proc means data = zeq2 mean std lclm uclm fw=8;
69   by theor time;
70   var predicted_ppm;
71   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.08 seconds
      cpu time            0.04 seconds


72   /*************************************************************************************************
72 ! ************
```

```
73   * This procedure produces the mean concentrations for each treatment group over all sampling
73 !  times    *
74   * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
74 ! replicates     *
75   * over the entire exposure                                                    AEH-12-PSEUDO-03
75 !          *
76   ***************************************************************************************************
76 ! **********/
77   title1 "Mean treatment concentration by treatment group over all exposure sampling times";
78   proc means data = zeq2 mean std lclm uclm fw=8;
79   by theor;
80   var predicted_ppm;
81   run;

NOTE: There were 106 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


82   data zeq3; set output_out;
83   if tank = "." then delete;
84   if thero = "." then delete;
85   if tank = "A1" then delete;
86   if tank = "A2" then delete;
87   if tank = "A3" then delete;
88   if tank = "A4" then delete;
89   if tank = "A5" then delete;
90   if tank = "B1" then delete;
91   if tank = "B2" then delete;
92   if tank = "B3" then delete;
93   if tank = "B4" then delete;
94   if tank = "B5" then delete;
95   if tank = "C1" then delete;
96   if tank = "C2" then delete;
97   if tank = "C3" then delete;
98   if tank = "C4" then delete;
99   if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 141 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 21 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
100  proc sort;
101  by theor time;
102
103  /***************************************************************************************************
103! ***************
104  * This procedure produces the mean concentrations for each standard check conc. over all
104! sampling times    *
105  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
105! replicates          *
```

```
106  * over the entire exposure
106!               *
107  *********************************************************************************************
107! ****************/
108  title1 'Mean Standard Check concentration over all sampling times";

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 21 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


109  proc means data = zeq3 mean std lclm uclm fw=8;
110  by theor;
111  var predicted_ppm;
112  run;

NOTE: There were 21 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.05 seconds
      cpu time            0.01 seconds


113
114  quit;
115  run;
```

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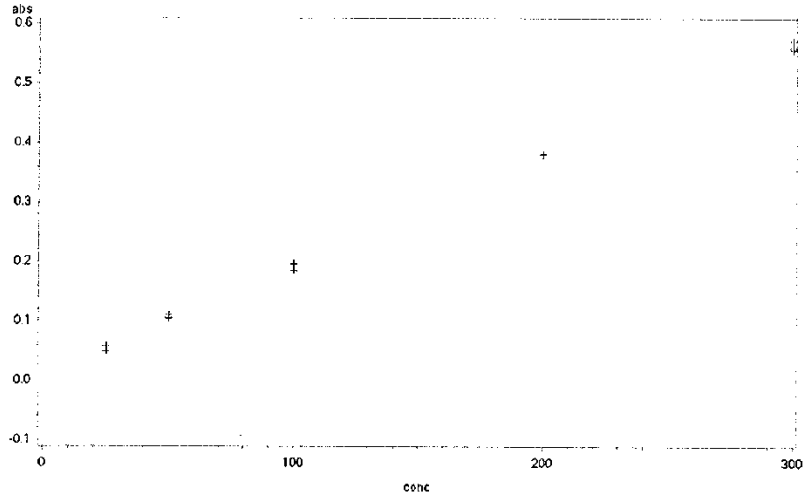
AEH-12-PSEUDO 03

Standard Curve Linear Regression and sample concentrations
Channel Catfish Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL



Performed by James A. Luoma 9.3 11:06 05FEB15 JAL 2/5/15

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Standard Curve Linear Regression and sample concentrations
Channel Catfish Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc

Number of Observations Read	145
Number of Observations Used	15
Number of Observations with Missing Values	130

Note: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	429124	429124	23895.4	<.0001
Error	14	251.41786	17.95842		
Uncorrected Total	15	429375			

Root MSE	4.23774	R-Square	0.9994
Dependent Mean	135.00000	Adj R-Sq	0.9994
Coeff Var	3.13906		

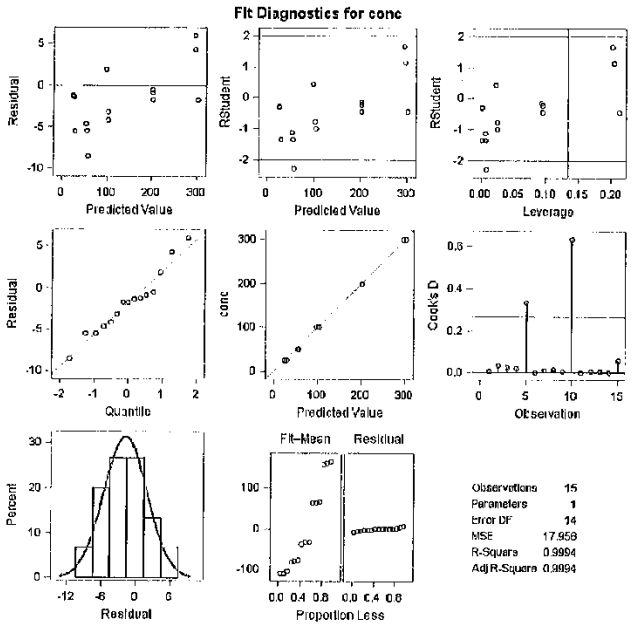
Parameter Estimates

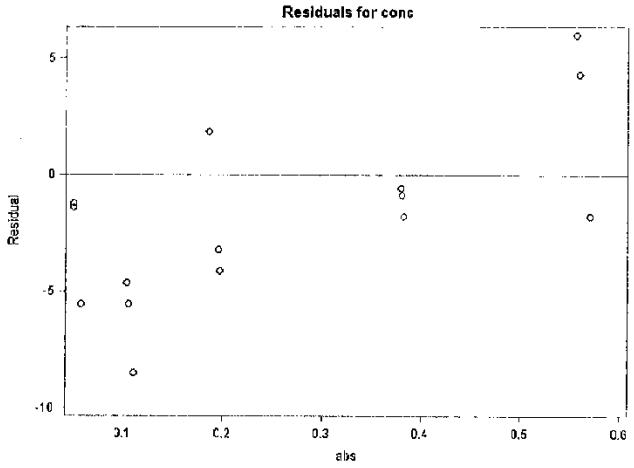
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
abs	abs	1	528.46918	3.41871	154.58	<.0001	0.99971

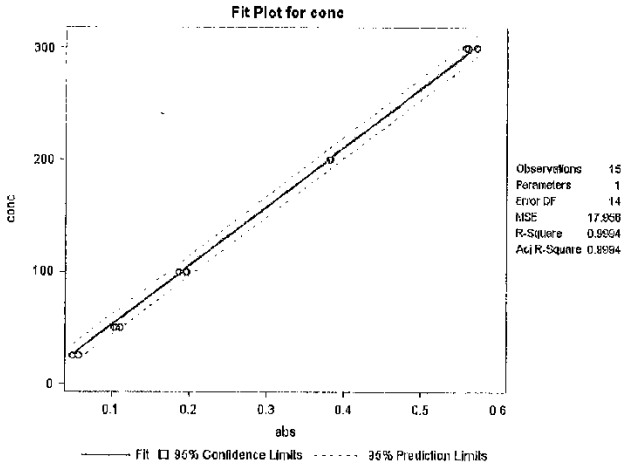
Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Channel Catfish Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

The REG Procedure
Model: MODEL1
Dependent Variable: conc conc







Performed by James A. Luoma 9.3 11:06 05FEB15

Standard Curve Linear Regression and sample concentrations
Channel Catfish Spectrophotometer analysis
Study # AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 05FEB2015 Analysis prepared by: JAL

Obs	tank	theor	time	abs	conc	F6	predicted_ppm
1	.	25	0.0	0.0578	25		30.546
2	.	50	0.0	0.1107	50		56.532
3	.	100	0.0	0.1970	100		104.108
4	.	200	0.0	0.3818	200		201.770
5	.	300	0.0	0.5595	300		295.679
6	.	25	0.0	0.0499	25		26.371
7	.	50	0.0	0.1051	50		55.542
8	.	100	0.0	0.1953	100		103.210
9	.	200	0.0	0.3801	200		200.871
10	.	300	0.0	0.5563	300		293.987
11	.	25	0.0	0.0496	25		26.212
12	.	50	0.0	0.1034	50		54.644
13	.	100	0.0	0.1857	100		98.137
14	.	200	0.0	0.3795	200		200.554
15	.	300	0.0	0.5710	300		301.756
16	A1	300	1.0	0.3011	.		159.122
17	A2	50	1.0	0.0375	.		19.818
18	A3	200	1.0	0.2144	.		113.304
19	A4	0	1.0	-0.0007	.		-0.370
20	A5	100	1.0	0.0754	.		39.847
21	B1	300	1.0	0.3272	.		172.915
22	B2	200	1.0	0.2264	.		119.645
23	B3	100	1.0	0.1088	.		57.497
24	B4	50	1.0	0.0398	.		21.033
25	B5	0	1.0	-0.0006	.		-0.317
26	C1	200	1.0	0.2121	.		112.088
27	C2	100	1.0	0.1049	.		55.436
28	C3	0	1.0	-0.0013	.		-0.687
29	C4	300	1.0	0.3488	.		184.330
30	C5	50	1.0	0.0519	.		27.428
31	A1	300	3.0	0.3568	.		188.558
32	A2	50	3.0	0.0496	.		26.212
33	A3	200	3.0	0.2339	.		123.609
34	A4	0	3.0	-0.0024	.		-1.268
35	A5	100	3.0	0.0973	.		51.420
36	B1	300	3.0	0.3827	.		202.245
37	B2	200	3.0	0.2502	.		132.223

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38	B3	100	3.0	0.1257	.	65.429
39	B4	50	3.0	0.0510	.	26.952
40	B5	0	3.0	-0.0057	.	-3.012
41	C1	200	3.0	0.2375	.	125.511
42	C2	100	3.0	0.1110	.	58.660
43	C3	0	3.0	0.0210	.	11.098
44	C4	300	3.0	0.3866	.	204.306
45	C5	50	3.0	0.0673	.	35.566
46	A1	300	6.0	0.3655	.	193.155
47	A2	50	6.0	0.0528	.	27.797
48	A3	200	6.0	0.2373	.	125.406
49	A4	0	6.0	-0.0028	.	-1.480
50	A5	100	6.0	0.1002	.	52.953
51	B1	300	6.0	0.3903	.	206.262
52	B2	200	6.0	0.2573	.	135.975
53	B3	100	6.0	0.1339	.	70.762
54	B4	50	6.0	0.0570	.	30.123
55	B5	0	6.0	-0.0023	.	-1.215
56	C1	200	6.0	0.2470	.	130.532
57	C2	100	6.0	0.1204	.	63.628
58	C3	0	6.0	-0.0017	.	-0.898
59	C4	300	6.0	0.3938	.	208.111
60	C5	50	6.0	0.0722	.	38.155
61	SC1	25	6.0	0.0427	.	22.566
62	SC2	50	6.0	0.0912	.	48.196
63	SC3	100	6.0	0.1751	.	92.535
64	SC4	200	6.0	0.3426	.	181.054
65	SC5	300	6.0	0.5042	.	266.454
66	A1	300	12.0	0.3583	.	189.351
67	A2	50	12.0	0.0506	.	26.741
68	A3	200	12.0	0.2276	.	120.280
69	A4	0	12.0	-0.0018	.	-0.951
70	A5	100	12.0	0.0983	.	51.949
71	B1	300	12.0	0.3750	.	198.176
72	B2	200	12.0	0.2447	.	129.316
73	B3	100	12.0	0.1286	.	67.961
74	B4	50	12.0	0.0552	.	29.171
75	B5	0	12.0	-0.0023	.	-1.215
76	C1	200	12.0	0.2464	.	130.215
77	C2	100	12.0	0.1269	.	67.083
78	C3	0	12.0	-0.0011	.	-0.581
79	C4	300	12.0	0.3967	.	209.644
80						

	C5	50	12.0	0.0741	.	39.160
81	SC1	25	12.0	0.0479	.	25.314
82	SC2	50	12.0	0.0973	.	51.420
83	SC3	100	12.0	0.1807	.	95.494
84	SC4	200	12.0	0.3517	.	185.863
85	SC5	300	12.0	0.5034	.	266.031
86	SC1	25	12.1	0.0524	.	27.692
87	SC2	50	12.1	0.1044	.	55.172
88	SC3	100	12.1	0.2097	.	110.820
89	SC4	200	12.1	0.4091	.	216.197
90	SC5	300	12.1	0.5952	.	314.545
91	A1	300	15.0	0.3461	.	182.903
92	A2	50	15.0	0.0512	.	27.058
93	A3	200	15.0	0.2256	.	119.223
94	A4	0	15.0	-0.0036	.	-1.902
95	A5	100	15.0	0.0973	.	51.420
96	B1	300	15.0	0.3685	.	194.741
97	B2	200	15.0	0.2418	.	127.784
98	B3	100	15.0	0.1250	.	66.059
99	B4	50	15.0	0.0533	.	28.167
100	B5	0	15.0	-0.0023	.	-1.215
101	C1	200	15.0	0.2340	.	123.662
102	C2	100	15.0	0.1186	.	62.624
103	C3	0	15.0	-0.0037	.	-1.955
104	C4	300	15.0	0.3794	.	200.501
105	C5	50	15.0	0.0737	.	38.948
106	A1	300	18.0	0.3486	.	184.224
107	A2	50	18.0	0.0512	.	27.058
108	A3	200	18.0	0.2244	.	118.588
109	A4	0	18.0	-0.0029	.	-1.533
110	A5	100	18.0	0.0956	.	50.522
111	B1	300	18.0	0.3664	.	193.631
112	B2	200	18.0	0.2405	.	127.087
113	B3	100	18.0	0.1238	.	65.424
114	B4	50	18.0	0.0535	.	28.273
115	B5	0	18.0	-0.0033	.	-1.744
116	C1	200	18.0	0.2339	.	123.609
117	C2	100	18.0	0.1202	.	63.522
118	C3	0	18.0	-0.0034	.	-1.797
119	C4	300	18.0	0.3790	.	200.290
120	C5	50	18.0	0.0748	.	39.529
121	SC1	25	18.0	0.0527	.	27.850
122						

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	SC2	50	18.0	0.1043	.	55.119
123	SC3	100	18.0	0.1959	.	103.527
124	SC4	200	18.0	0.3879	.	204.993
125	SC5	300	18.0	0.5649	.	298.532
126	A1	300	24.0	0.3503	.	185.123
127	A2	50	24.0	0.0530	.	28.009
128	A3	200	24.0	0.2242	.	118.483
129	A4	0	24.0	-0.0028	.	-1.480
130	A5	100	24.0	0.0972	.	51.367
131	B1	300	24.0	0.3588	.	189.615
132	B2	200	24.0	0.2316	.	122.409
133	B3	100	24.0	0.1232	.	65.107
134	B4	50	24.0	0.0528	.	27.903
135	B5	0	24.0	-0.0031	.	-1.638
136	C1	200	24.0	0.2174	.	114.889
137	C2	100	24.0	0.1234	.	65.213
138	C3	0	24.0	-0.0032	.	-1.691
139	C4	300	24.0	0.3714	.	196.273
140	C5	50	24.0	0.0805	.	42.542
141	SC1	25	24.0	0.0487	.	25.736
142	SC2	50	24.0	0.0995	.	52.583
143	SC3	100	24.0	0.1976	.	104.428
144	SC4	200	24.0	0.3799	.	200.765
145	SC5	300	24.0	0.5409	.	285.849

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by tank for all exposure sampling times
Individual enclosure means

The MEANS Procedure

tank=A1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
183.2	11.1820	172.9	193.5

tank=A2 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
26.0988	2.8388	23.4761	28.7215

tank=A3 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
119.8	3.9134	116.2	123.5

tank=A4 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.2834	0.4945	-1.7408	-0.8261

tank=A5 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
49.9252	4.5045	45.7593	54.0912

tank=B1 theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
193.9	10.8030	183.9	203.9

tank=B2 theor=200

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
127.8	5.5345	122.7	132.9

tank=B3 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
65.6057	4.0629	61.8481	69.3632

tank=B4 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
27.3747	2.9690	24.6288	30.1206

tank=B5 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.4797	0.8170	-2.2353	-0.7241

tank=C1 theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
122.9	7.0795	116.4	129.5

tank=C2 theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
62.3065	3.9768	58.6286	65.9844

tank=C3 theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0.4983	4.7073	-3.8553	4.8518

tank=C4 theor=300

Analysis Variable : predicted_ppm Predicted

Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
200.5	8.5186	192.6	208.4

tank=C6 theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
37.3326	4.8273	32.8681	41.7971

Performed by James A. Luoma 9.3 11:06 05FEB15

Mean treatment concentration by treatment group at each exposure sampling time

The MEANS Procedure

theor=0 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.4580	0.2001	-0.9550	0.0390

theor=0 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2.2724	7.6926	-16.8371	21.3820

theor=0 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.1979	0.2911	-1.9209	-0.4748

theor=0 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.9160	0.3185	-1.7073	-0.1247

theor=0 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.6911	0.4127	-2.7164	-0.6658

theor=0 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.6911	0.1398	-2.0384	-1.3438

theor=0 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-1.6030	0.1100	-1.8763	-1.3297

theor=50 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
22.7594	4.0882	12.6039	32.9150

theor=50 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
29.5767	5.2001	16.6590	42.4944

theor=50 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.0252	5.4348	18.5245	45.5259

theor=50 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.5905	6.5816	15.3410	48.0401

theor=50 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.3911	6.5681	15.0749	47.7072

theor=50 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
31.6201	6.8767	14.5375	48.7027

theor=50 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
32.8179	8.4213	11.6984	53.7375

theor=100 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
50.9268	9.6509	26.9525	74.9011

theor=100 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
58.8362	7.5056	40.1908	77.4817

theor=100 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
62.4474	8.9632	40.1817	84.7132

theor=100 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
62.3241	8.9968	39.9749	84.6733

theor=100 time=16

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
60.0341	7.6551	41.0177	79.0505

theor=100 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
59.8227	8.1109	39.6741	79.9714

theor=100 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
60.5626	7.9636	40.7799	80.3452

theor=200 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
115.0	4.0580	104.9	125.1

theor=200 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
127.1	4.5252	115.9	138.4

theor=200 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
130.6	5.2855	117.5	143.8

theor=200 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
126.6	5.4951	113.0	140.3

theor=200 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
123.6	4.2616	112.9	134.2

theor=200 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
123.1	4.2771	112.5	133.7

theor=200 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
118.6	3.8069	109.2	126.1

theor=300 time=1

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
172.1	12.6227	140.8	203.5

theor=300 time=3

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
198.4	8.5596	177.1	219.6

theor=300 time=6

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
202.5	8.1533	182.3	222.8

theor=300 time=12

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
199.1	10.1752	173.8	224.3

theor=300 time=15

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
192.7	8.9722	170.4	215.0

theor=300 time=18

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
192.7	8.0718	172.7	212.8

theor=300 time=24

Analysis Variable : predicted_ppm Predicted Value of conc

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Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
190.3	5.8103	176.4	204.3

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Mean treatment concentration by treatment group over all exposure sampling times

The MEANS Procedure

theor=0

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
-0.7550	2.7843	-2.0224	0.5125

theor=50

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
30.2687	6.2072	27.4432	33.0942

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
59.2791	7.9764	55.6483	62.9100

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
123.5	6.3295	120.6	126.4

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
192.5	12.1499	187.0	198.1

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Mean Standard Check concentration over all sampling times

The MEANS Procedure

theor=25

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
25.8316	2.1494	23.1628	28.5004

theor=60

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
52.4981	2.9024	48.8943	56.1019

theor=100

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
101.4	7.3463	92.2388	110.5

theor=200

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
197.8	14.3346	180.0	215.6

theor=300

Analysis Variable : predicted_ppm Predicted Value of conc			
Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
286.3	20.9301	260.3	312.3

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FF # 29
Item No. 3
Pg 19 of 19

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title2 'Channel Catfish Spectrophotometer analysis';
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title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';

/******************************************************************************
* SAS ver 9.3      Analysis prepared by:  JAL        Page 1 of 3           *
* Analysis completion date:  05FEB2015     JAL                              *
******************************************************************************/

data Zeq; set fish.CCF2;
run;

proc sort;
by tank time ; run;

run;
proc gplot data= zeq;
plot abs * conc;
run;
proc reg data = zeq;
model conc = abs / stb noint edf;
output out=output_out p=predicted_ppm;
run;
proc sort;
by time tank;
proc print data=output_out;
run;
data zeq2; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "SC1" then delete;
if tank = "SC2" then delete;
if tank = "SC3" then delete;
if tank = "SC4" then delete;
if tank = "SC5" then delete;
run;
proc sort data = zeq2;
by tank;
run;
/*****************************************************************************************************
* This procedure produces the mean concentrations for each treatment replicate over all exposure samp
* i.e. It gives the mean concentration of each treatment replicate over the entire exposure period
*****************************************************************************************************
title1 "Mean treatment concentration by tank for all exposure sampling times';
title2 "Individual enclosure means";
proc means data = zeq2 mean std lclm uclm fw=8;
```

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```
by tank theor;
var predicted_ppm;
run;
proc sort;
by theor time;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group at each sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* at each sample time over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group at each exposure sampling time";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor time;
var predicted_ppm;
run;
/*************************************************************************************************
* This procedure produces the mean concentrations for each treatment group over all sampling times
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean treatment concentration by treatment group over all exposure sampling times";
proc means data = zeq2 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
data zeq3; set output_out;
if tank = "." then delete;
if thero = "." then delete;
if tank = "A1" then delete;
if tank = "A2" then delete;
if tank = "A3" then delete;
if tank = 'A4" then delete;
if tank = 'A5" then delete;
if tank = "B1" then delete;
if tank = "B2" then delete;
if tank = "B3" then delete;
if tank = "B4" then delete;
if tank = "B5" then delete;
if tank = "C1" then delete;
if tank = "C2" then delete;
if tank = "C3" then delete;
if tank = "C4" then delete;
if tank = "C5" then delete;
proc sort;
by theor time;

/*************************************************************************************************
* This procedure produces the mean concentrations for each standard check conc. over all sampling time
* i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment replicates
* over the entire exposure
*************************************************************************************************
title1 "Mean Standard Check concentration over all sampling times";
proc means data = zeq3 mean std lclm uclm fw=8;
by theor;
var predicted_ppm;
run;
```

```
quit;
run;
```

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AEH-12-PSEUDO-03

```
810  DM 'LOG; CLEAR; OUTPUT; CLEAR;';  * CLEAR LOG AND OUTPUT;
811
812  FOOTNOTE1 'Performed by James A. Luoma' &SYSVER &SYSTIME &SYSDATE;
WARNING: The FOOTNOTE statement is ambiguous due to invalid options or unquoted text.
813
814  options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
815
816  title1 'Standard Curve Linear Regression and sample concentrations';
817  title2 'Channel Catfish Spectrophotometer analysis';
818  title3 h=1 'Study # AEH-12-PSEUDO-03';
819  title4 h=1 'SAS v. 9.3  Analysis completion date:  05FEB2015  Analysis prepared by: JAL';
820
821  /*****************************************************************************
822  * SAS ver 9.3       Analysis prepared by:  JAL        Page 1 of 5            *
823  * Analysis completion date:  05FEB2015       JAL                            *
824  *****************************************************************************/
825
826  data Zeq; set fish.CCF2;
827  run;

NOTE: There were 145 observations read from the data set FISH.CCF2.
NOTE: The data set WORK.ZEQ has 145 observations and 6 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


828
829  proc sort;
830  by tank time ; run;

NOTE: There were 145 observations read from the data set WORK.ZEQ.
NOTE: The data set WORK.ZEQ has 145 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


831
832  run;
833  proc gplot data= zeq;
834  plot abs * conc;
835  run;

NOTE: 130 observation(s) contained a MISSING value for the abs * conc request.
NOTE: 3 records written to C:\Users\JLUOMA\gplot7.png.

NOTE: There were 145 observations read from the data set WORK.ZEQ.
NOTE: PROCEDURE GPLOT used (Total process time):
      real time           0.23 seconds
      cpu time            0.18 seconds


836  proc reg data = zeq;
837  model conc = abs / stb noint cdf;
838  output out=output_out p=predicted_ppm;
```

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Item No. 33
Pg 1 of 5

```
839  run;
```

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```
NOTE: The data set WORK.OUTPUT_OUT has 145 observations and 7 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           1.12 seconds
      cpu time            0.53 seconds


840  proc sort;
841  by time tank;

NOTE: There were 145 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.OUTPUT_OUT has 145 observations and 7 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


842  proc print data=output_out;
843  run;

NOTE: There were 145 observations read from the data set WORK.OUTPUT_OUT.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds


844  data zeq2; set output_out;
845  if tank = "." then delete;
846  if thero = "." then delete;
847  if tank = "SC1" then delete;
848  if tank = "SC2" then delete;
849  if tank = "SC3" then delete;
850  if tank = "SC4' then delete;
851  if tank = "SC5" then delete;
852  run;

NOTE: Variable thero is uninitialized.
NOTE: There were 145 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ2 has 105 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
853  proc sort data = zeq2;
854  by tank;
855  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 105 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

```
856  /*****************************************************************************************
856! ************************
857  * This procedure produces the mean concentrations for each treatment replicate over all
857! exposure sampling times     *
858  * i.e. It gives the mean concentration of each treatment replicate over the entire exposure
858! period                  *
859  *****************************************************************************************
859! ************************/
860  title1 "Mean treatment concentration by tank for all exposure sampling times";
861  title2 "Individual enclosure means";
862  proc means data = zeq2 mean std lclm uclm fw=8;
863  by tank theor;
864  var predicted_ppm;
865  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.07 seconds


866  proc sort;
867  by theor time;
868  /*****************************************************************************************
868! ***********
869  * This procedure produces the mean concentrations for each treatment group at each sampling
869! time      *
870  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
870! replicates     *
871  * at each sample time over the entire exposure
871!          *
872  *****************************************************************************************
872! **********/
873  title1 'Mean treatment concentration by treatment group at each exposure sampling time";

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: The data set WORK.ZEQ2 has 105 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


874  proc means data = zeq2 mean std lclm uclm fw=8;
875  by theor time;
876  var predicted_ppm;
877  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.07 seconds
      cpu time            0.06 seconds


878  /*****************************************************************************************
878! ***********
```

```
879  * This procedure produces the mean concentrations for each treatment group over all sampling
879!  times    *
880  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
880! replicates     *
881  * over the entire exposure
881!          *
882  ************************************************************************************************
882! **********/
883  title1 "Mean treatment concentration by treatment group over all exposure sampling times";
884  proc means data = zeq2 mean std lclm uclm fw=8;
885  by theor;
886  var predicted_ppm;
887  run;

NOTE: There were 105 observations read from the data set WORK.ZEQ2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


888  data zeq3; set output_out;
889  if tank = "." then delete;
890  if thero = "." then delete;
891  if tank = "A1" then delete;
892  if tank = "A2" then delete;
893  if tank = "A3" then delete;
894  if tank = "A4" then delete;
895  if tank = "A5" then delete;
896  if tank = "B1" then delete;
897  if tank = "B2" then delete;
898  if tank = "B3" then delete;
899  if tank = "B4" then delete;
900  if tank = "B5" then delete;
901  if tank = "C1" then delete;
902  if tank = "C2" then delete;
903  if tank = "C3" then delete;
904  if tank = "C4" then delete;
905  if tank = "C5" then delete;

NOTE: Variable thero is uninitialized.
NOTE: There were 145 observations read from the data set WORK.OUTPUT_OUT.
NOTE: The data set WORK.ZEQ3 has 25 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.03 seconds
      cpu time            0.03 seconds
```



```
906  proc sort;
907  by theor time;
908
909  /************************************************************************************************
909! ****************
910  * This procedure produces the mean concentrations for each standard check conc. over all
910! sampling times    *
911  * i.e. It gives the mean concentration of the three control, 50ppm, & 100ppm treatment
911! replicates          *
```

```
912  * over the entire exposure
912!              *
913  ************************************************************************************************
913! ***************/
914  title1 "Mean Standard Check concentration over all sampling times";

NOTE: There were 25 observations read from the data set WORK.ZEQ3.
NOTE: The data set WORK.ZEQ3 has 25 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


915  proc means data = zeq3 mean std lclm uclm fw=8;
916  by theor;
917  var predicted_ppm;
918  run;

NOTE: There were 25 observations read from the data set WORK.ZEQ3.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


919
920  quit;
921  run;
```

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Appendix 9. Condition Index and Survival Assessment Summaries, SAS Outputs, Programs, and Logs

Item number	Item description	Number of pages	Report page number
1	Length and Weight Data- All Fish Species; SAS Input File	56	1296
2	SAS analysis for fish condition index	77	1352
3	Length/Weight Data Summaries	63	1429
4	Mortality Data – All Fish Species; SAS Input File	13	1492
5	SAS analysis for fish survival	53	1505
6	SAS analysis for LC_{50} analysis	75	1558

Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 and 2 (See individual species for page numbers)	Created.....	5/1/2013	KLW
Data Source: File Folder: 16D to 24D	Revised.....	3/20/2015	KLW
Forms: 3, 11, 11a	Reviewed...	3/24/15	
	Certified.....	3/25/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Mortality Data.xlsx]Summary for SAS			

Length and Weight Data - All Fish Species; SAS Input File

Species:
Rainbow Trout (*Oncorhynchus mykiss*; Lot number 116000)
Yellow Perch (*Perca flavescens;* Lot number 113000)
Walleye (*Sander vitreus*; Lot number 112100)
Coaster Brook Trout (*Salvelinus fontinalis*; Lot number 120300)
Largemouth Bass (*Micropterus salmoides*; Lot number 114000)
Smallmouth Bass (*Micropterus dolomieu*; Lot number 112400)
Bluegill (*Lepomis macrochirus*; Lot number 114500)
Lake Sturgeon (*Acipenser fulvescens*; Lot number 122300)
Channel Catfish (*Ictalurus punctatus;* Lot number 123000)

Data Source/Explanation:

sps = Fish species code
time= Sample Time
- 0 = Distribution
- 1 = Exposure Termination
- 2 = 22-day Termination

id = Sample ID
- d### = Distribtuion Sample
- A, B, C = Diluter ID
- 1-5 = Test Chamber ID
- D, E, F, G = Holding Rack Quadrate
- 1-5 = Holding Chamber ID

treat = treatment levels
- . = Distribution Sample
- 0 = 0 mg/L
- 50 = 50 mg/L
- 100 = 100 mg/L
- 200 = 200 mg/L
- 300 = 300 mg/L

samp = Fish sample ID (sps-id-num)
num = Fish Sample Number
tot = total length (cm)
wt = Total weight (g)
cond = condition index (= wt/(tot^3))

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Table 5.

sps	time	id	treat	samp	num	tot	wt	cond
RBT	0	D0001	.	RBT-DIS#1-01	1	49	1.00	8.49986E-06
RBT	0	D0001	.	RBT-DIS#1-02	2	52	1.36	9.67228E-06
RBT	0	D0001	.	RBT-DIS#1-03	3	50	0.96	0.00000768
RBT	0	D0001	.	RBT-DIS#1-04	4	48	1.11	1.00369E-05
RBT	0	D0001	.	RBT-DIS#1-05	5	45	0.98	1.07545E-05
RBT	0	D0001	.	RBT-DIS#1-06	6	49	1.13	9.60484E-06
RBT	0	D0001	.	RBT-DIS#1-07	7	46	0.87	8.93811E-06
RBT	0	D0001	.	RBT-DIS#1-08	8	54	1.53	9.71651E-06
RBT	0	D0001	.	RBT-DIS#1-09	9	47	1.00	9.63178E-06
RBT	0	D0001	.	RBT-DIS#1-10	10	45	0.77	8.44993E-06
RBT	0	D0002	.	RBT-DIS#2-01	11	54	1.33	8.44638E-06
RBT	0	D0002	.	RBT-DIS#2-02	12	49	0.78	6.62989E-06
RBT	0	D0002	.	RBT-DIS#2-03	13	47	0.99	9.53546E-06
RBT	0	D0002	.	RBT-DIS#2-04	14	50	1.15	0.0000092
RBT	0	D0002	.	RBT-DIS#2-05	15	46	0.85	8.73264E-06
RBT	0	D0002	.	RBT-DIS#2-06	16	46	0.99	1.0171E-05
RBT	0	D0002	.	RBT-DIS#2-07	17	51	1.42	1.07048E-05
RBT	0	D0002	.	RBT-DIS#2-08	18	49	1.28	1.08798E-05
RBT	0	D0002	.	RBT-DIS#2-09	19	44	0.79	9.27404E-06
RBT	0	D0002	.	RBT-DIS#2-10	20	52	1.34	9.53004E-06
RBT	0	D0003	.	RBT-DIS#3-01	21	45	0.93	1.02058E-05
RBT	0	D0003	.	RBT-DIS#3-02	22	45	0.98	1.07545E-05
RBT	0	D0003	.	RBT-DIS#3-03	23	51	1.34	1.01017E-05
RBT	0	D0003	.	RBT-DIS#3-04	24	54	1.81	1.14947E-05
RBT	0	D0003	.	RBT-DIS#3-05	25	42	0.79	1.0663E-05
RBT	0	D0003	.	RBT-DIS#3-06	26	49	1.30	1.10498E-05
RBT	0	D0003	.	RBT-DIS#3-07	27	52	1.29	9.17444E-06
RBT	0	D0003	.	RBT-DIS#3-08	28	53	1.89	1.2695E-05
RBT	0	D0003	.	RBT-DIS#3-09	29	46	1.04	1.06846E-05
RBT	0	D0003	.	RBT-DIS#3-10	30	47	0.98	9.43914E-06
RBT	0	D0004	.	RBT-DIS#4-01	31	48	1.12	1.01273E-05
RBT	0	D0004	.	RBT-DIS#4-02	32	51	1.47	1.10817E-05
RBT	0	D0004	.	RBT-DIS#4-03	33	45	0.85	9.32785E-06
RBT	0	D0004	.	RBT-DIS#4-04	34	49	1.10	9.34985E-06
RBT	0	D0004	.	RBT-DIS#4-05	35	45	0.97	1.06447E-05
RBT	0	D0004	.	RBT-DIS#4-06	36	41	0.69	1.00115E-05
RBT	0	D0004	.	RBT-DIS#4-07	37	48	1.20	1.08507E-05
RBT	0	D0004	.	RBT-DIS#4-08	38	45	0.99	1.08642E-05
RBT	0	D0004	.	RBT-DIS#4-09	39	51	1.25	9.42322E-06
RBT	0	D0004	.	RBT-DIS#4-10	40	47	0.99	9.53546E-06
YEP	0	D0001	.	YEP-DIS#1-01	1	51	1	7.53858E-06
YEP	0	D0001	.	YEP-DIS#1-02	2	49	0.97	8.24486E-06
YEP	0	D0001	.	YEP-DIS#1-03	3	53	1.3	8.73204E-06
YEP	0	D0001	.	YEP-DIS#1-04	4	55	1.5	9.01578E-06
YEP	0	D0001	.	YEP-DIS#1-05	5	54	1.33	8.44638E-06
YEP	0	D0001	.	YEP-DIS#1-06	6	54	1.28	8.12884E-06
YEP	0	D0001	.	YEP-DIS#1-07	7	53	1.33	8.93355E-06

YEP	0	D0001	.	YEP-DIS#1-08	8	52	1.31	9.31668E-06
YEP	0	D0001	.	YEP-DIS#1-09	9	51	1.21	9.12168E-06
YEP	0	D0001	.	YEP-DIS#1-10	10	49	1.02	8.66986E-06
YEP	0	D0002	.	YEP-DIS#2-01	11	52	1.34	9.53004E-06
YEP	0	D0002	.	YEP-DIS#2-02	12	48	0.95	8.59013E-06
YEP	0	D0002	.	YEP-DIS#2-03	13	52	1.35	9.60116E-06
YEP	0	D0002	.	YEP-DIS#2-04	14	52	1.16	8.24989E-06
YEP	0	D0002	.	YEP-DIS#2-05	15	53	1.38	9.2694E-06
YEP	0	D0002	.	YEP-DIS#2-06	16	55	1.49	8.95567E-06
YEP	0	D0002	.	YEP-DIS#2-07	17	53	1.22	8.19468E-06
YEP	0	D0002	.	YEP-DIS#2-08	18	50	1.12	0.00000896
YEP	0	D0002	.	YEP-DIS#2-09	19	51	1.25	9.42322E-06
YEP	0	D0002	.	YEP-DIS#2-10	20	45	0.74	8.12071E-06
YEP	0	D0003	.	YEP-DIS#3-01	21	50	1.02	0.00000816
YEP	0	D0003	.	YEP-DIS#3-02	22	50	1.07	0.00000856
YEP	0	D0003	.	YEP-DIS#3-03	23	50	1.15	0.0000092
YEP	0	D0003	.	YEP-DIS#3-04	24	46	0.85	8.73264E-06
YEP	0	D0003	.	YEP-DIS#3-05	25	50	1.05	0.0000084
YEP	0	D0003	.	YEP-DIS#3-06	26	54	1.3	8.25586E-06
YEP	0	D0003	.	YEP-DIS#3-07	27	51	1.2	9.04629E-06
YEP	0	D0003	.	YEP-DIS#3-08	28	49	1	8.49986E-06
YEP	0	D0003	.	YEP-DIS#3-09	29	50	0.96	0.00000768
YEP	0	D0003	.	YEP-DIS#3-10	30	51	1.22	9.19707E-06
YEP	0	D0004	.	YEP-DIS#4-01	31	47	0.92	8.86123E-06
YEP	0	D0004	.	YEP-DIS#4-02	32	55	1.47	8.83546E-06
YEP	0	D0004	.	YEP-DIS#4-03	33	54	1.3	8.25586E-06
YEP	0	D0004	.	YEP-DIS#4-04	34	55	1.39	8.35462E-06
YEP	0	D0004	.	YEP-DIS#4-05	35	54	1.31	8.31936E-06
YEP	0	D0004	.	YEP-DIS#4-06	36	48	0.9	8.13802E-06
YEP	0	D0004	.	YEP-DIS#4-07	37	49	1.07	9.09485E-06
YEP	0	D0004	.	YEP-DIS#4-08	38	53	1.25	8.39619E-06
YEP	0	D0004	.	YEP-DIS#4-09	39	47	0.94	9.05387E-06
YEP	0	D0004	.	YEP-DIS#4-10	40	54	1.45	9.20845E-06
WAE	0	D0001	.	WAE-DIS#1-01	1	57	1.12	6.04774E-06
WAE	0	D0001	.	WAE-DIS#1-02	2	68	2.02	6.42428E-06
WAE	0	D0001	.	WAE-DIS#1-03	3	65	1.83	6.66363E-06
WAE	0	D0001	.	WAE-DIS#1-04	4	75	2.65	6.28148E-06
WAE	0	D0001	.	WAE-DIS#1-05	5	71	2.19	6.11884E-06
WAE	0	D0001	.	WAE-DIS#1-06	6	67	1.65	5.48605E-06
WAE	0	D0001	.	WAE-DIS#1-07	7	64	1.14	4.34875E-06
WAE	0	D0001	.	WAE-DIS#1-08	8	61	1.22	5.3749E-06
WAE	0	D0001	.	WAE-DIS#1-09	9	69	1.6	4.87049E-06
WAE	0	D0001	.	WAE-DIS#1-10	10	66	1.75	6.08704E-06
WAE	0	D0002	.	WAE-DIS#2-01	11	69	1.87	5.69239E-06
WAE	0	D0002	.	WAE-DIS#2-02	12	71	2.21	6.17472E-06
WAE	0	D0002	.	WAE-DIS#2-03	13	66	1.7	5.91313E-06
WAE	0	D0002	.	WAE-DIS#2-04	14	72	2.6	6.96588E-06
WAE	0	D0002	.	WAE-DIS#2-05	15	76	2.45	5.58117E-06

WAE	0	D0002	.	WAE-DIS#2-06	16	62	1.34	5.6225E-06
WAE	0	D0002	.	WAE-DIS#2-07	17	75	2.43	0.00000576
WAE	0	D0002	.	WAE-DIS#2-08	18	70	2.19	6.38484E-06
WAE	0	D0002	.	WAE-DIS#2-09	19	71	2.1	5.86738E-06
WAE	0	D0002	.	WAE-DIS#2-10	20	72	2.01	5.38516E-06
WAE	0	D0003	.	WAE-DIS#3-01	21	66	1.44	5.00877E-06
WAE	0	D0003	.	WAE-DIS#3-02	22	70	2.4	6.99708E-06
WAE	0	D0003	.	WAE-DIS#3-03	23	63	1.51	6.03886E-06
WAE	0	D0003	.	WAE-DIS#3-04	24	60	1.09	5.0463E-06
WAE	0	D0003	.	WAE-DIS#3-05	25	66	1.73	6.01748E-06
WAE	0	D0003	.	WAE-DIS#3-06	26	62	1.22	5.119E-06
WAE	0	D0003	.	WAE-DIS#3-07	27	69	2.08	6.33164E-06
WAE	0	D0003	.	WAE-DIS#3-08	28	73	2.38	6.11798E-06
WAE	0	D0003	.	WAE-DIS#3-09	29	79	3.19	6.47008E-06
WAE	0	D0003	.	WAE-DIS#3-10	30	76	2.81	6.40126E-06
WAE	0	D0004	.	WAE-DIS#4-01	31	67	1.94	6.45026E-06
WAE	0	D0004	.	WAE-DIS#4-02	32	69	2.02	6.14899E-06
WAE	0	D0004	.	WAE-DIS#4-03	33	67	2.06	6.84925E-06
WAE	0	D0004	.	WAE-DIS#4-04	34	66	1.61	5.60008E-06
WAE	0	D0004	.	WAE-DIS#4-05	35	74	2.29	5.6512E-06
WAE	0	D0004	.	WAE-DIS#4-06	36	70	1.99	5.80175E-06
WAE	0	D0004	.	WAE-DIS#4-07	37	68	1.7	5.40657E-06
WAE	0	D0004	.	WAE-DIS#4-08	38	70	2.18	6.35569E-06
WAE	0	D0004	.	WAE-DIS#4-09	39	67	1.88	6.25077E-06
WAE	0	D0004	.	WAE-DIS#4-10	40	65	1.85	6.73646E-06
BKT	0	D0001	.	BKT-DIS#1-01	1	42	0.56	7.55858E-06
BKT	0	D0001	.	BKT-DIS#1-02	2	54	1.26	8.00183E-06
BKT	0	D0001	.	BKT-DIS#1-03	3	56	1.31	7.45946E-06
BKT	0	D0001	.	BKT-DIS#1-04	4	48	0.93	8.40929E-06
BKT	0	D0001	.	BKT-DIS#1-05	5	58	1.53	7.84165E-06
BKT	0	D0001	.	BKT-DIS#1-06	6	62	1.82	7.63653E-06
BKT	0	D0001	.	BKT-DIS#1-07	7	56	1.35	7.68723E-06
BKT	0	D0001	.	BKT-DIS#1-08	8	58	1.49	7.63664E-06
BKT	0	D0001	.	BKT-DIS#1-09	9	52	1.12	7.96541E-06
BKT	0	D0001	.	BKT-DIS#1-10	10	45	0.68	7.46228E-06
BKT	0	D0002	.	BKT-DIS#2-01	11	52	1.1	7.82317E-06
BKT	0	D0002	.	BKT-DIS#2-02	12	54	1.28	8.12884E-06
BKT	0	D0002	.	BKT-DIS#2-03	13	59	1.61	7.83917E-06
BKT	0	D0002	.	BKT-DIS#2-04	14	56	1.31	7.45946E-06
BKT	0	D0002	.	BKT-DIS#2-05	15	59	1.72	8.37476E-06
BKT	0	D0002	.	BKT-DIS#2-06	16	47	0.84	8.09069E-06
BKT	0	D0002	.	BKT-DIS#2-07	17	59	1.55	7.54702E-06
BKT	0	D0002	.	BKT-DIS#2-08	18	57	1.35	7.28969E-06
BKT	0	D0002	.	BKT-DIS#2-09	19	57	1.54	8.31565E-06
BKT	0	D0002	.	BKT-DIS#2-10	20	54	1.24	7.87482E-06
BKT	0	D0003	.	BKT-DIS#3-01	21	64	1.94	7.40051E-06
BKT	0	D0003	.	BKT-DIS#3-02	22	51	1.41	1.06294E-05
BKT	0	D0003	.	BKT-DIS#3-03	23	59	1.57	7.6444E-06

BKT	0	D0003	.	BKT-DIS#3-04	24	59	1.69	8.22869E-06
BKT	0	D0003	.	BKT-DIS#3-05	25	54	1.28	8.12884E-06
BKT	0	D0003	.	BKT-DIS#3-06	26	55	1.23	7.39294E-06
BKT	0	D0003	.	BKT-DIS#3-07	27	60	1.53	7.08333E-06
BKT	0	D0003	.	BKT-DIS#3-08	28	52	1.12	7.96541E-06
BKT	0	D0003	.	BKT-DIS#3-09	29	57	1.39	7.50568E-06
BKT	0	D0003	.	BKT-DIS#3-10	30	43	0.58	7.29496E-06
BKT	0	D0004	.	BKT-DIS#4-01	31	61	1.83	8.06235E-06
BKT	0	D0004	.	BKT-DIS#4-02	32	54	1.32	8.38287E-06
BKT	0	D0004	.	BKT-DIS#4-03	33	55	1.21	7.27273E-06
BKT	0	D0004	.	BKT-DIS#4-04	34	54	1.16	7.36676E-06
BKT	0	D0004	.	BKT-DIS#4-05	35	60	1.53	7.08333E-06
BKT	0	D0004	.	BKT-DIS#4-06	36	54	1.11	7.04923E-06
BKT	0	D0004	.	BKT-DIS#4-07	37	49	0.9	7.64987E-06
BKT	0	D0004	.	BKT-DIS#4-08	38	55	1.38	8.29452E-06
BKT	0	D0004	.	BKT-DIS#4-09	39	63	2.2	8.79835E-06
BKT	0	D0004	.	BKT-DIS#4-10	40	55	1.27	7.63336E-06
LMB	0	D0001	.	LMB-DIS#1-01	1	47	1.12	1.07876E-05
LMB	0	D0001	.	LMB-DIS#1-02	2	43	0.84	1.05651E-05
LMB	0	D0001	.	LMB-DIS#1-03	3	45	0.99	1.08642E-05
LMB	0	D0001	.	LMB-DIS#1-04	4	47	1.13	1.08839E-05
LMB	0	D0001	.	LMB-DIS#1-05	5	54	1.67	1.06056E-05
LMB	0	D0001	.	LMB-DIS#1-06	6	44	0.9	1.05654E-05
LMB	0	D0001	.	LMB-DIS#1-07	7	45	0.89	9.7668E-06
LMB	0	D0001	.	LMB-DIS#1-08	8	44	0.98	1.15045E-05
LMB	0	D0001	.	LMB-DIS#1-09	9	54	1.7	1.07961E-05
LMB	0	D0001	.	LMB-DIS#1-10	10	50	1.29	0.00001032
LMB	0	D0002	.	LMB-DIS#2-01	11	54	1.59	1.00975E-05
LMB	0	D0002	.	LMB-DIS#2-02	12	45	0.85	9.32785E-06
LMB	0	D0002	.	LMB-DIS#2-03	13	58	2.35	1.20444E-05
LMB	0	D0002	.	LMB-DIS#2-04	14	46	1.16	1.19175E-05
LMB	0	D0002	.	LMB-DIS#2-05	15	43	0.77	9.68468E-06
LMB	0	D0002	.	LMB-DIS#2-06	16	52	1.49	1.05968E-05
LMB	0	D0002	.	LMB-DIS#2-07	17	43	0.89	1.1194E-05
LMB	0	D0002	.	LMB-DIS#2-08	18	43	0.84	1.05651E-05
LMB	0	D0002	.	LMB-DIS#2-09	19	44	0.98	1.15045E-05
LMB	0	D0002	.	LMB-DIS#2-10	20	41	0.71	1.03016E-05
LMB	0	D0003	.	LMB-DIS#3-01	21	46	0.94	9.65727E-06
LMB	0	D0003	.	LMB-DIS#3-02	22	46	1.14	1.1712E-05
LMB	0	D0003	.	LMB-DIS#3-03	23	55	2.02	1.21412E-05
LMB	0	D0003	.	LMB-DIS#3-04	24	47	1.1	1.0595E-05
LMB	0	D0003	.	LMB-DIS#3-05	25	47	1.14	1.09802E-05
LMB	0	D0003	.	LMB-DIS#3-06	26	50	1.36	0.00001088
LMB	0	D0003	.	LMB-DIS#3-07	27	52	1.6	1.13792E-05
LMB	0	D0003	.	LMB-DIS#3-08	28	44	0.99	1.16219E-05
LMB	0	D0003	.	LMB-DIS#3-09	29	45	1.1	1.20713E-05
LMB	0	D0003	.	LMB-DIS#3-10	30	43	0.96	1.20744E-05
LMB	0	D0004	.	LMB-DIS#4-01	31	53	1.56	1.04784E-05

LMB	0	D0004	.	LMB-DIS#4-02	32	44	0.9	1.05654E-05
LMB	0	D0004	.	LMB-DIS#4-03	33	41	0.68	9.86637E-06
LMB	0	D0004	.	LMB-DIS#4-04	34	45	0.99	1.08642E-05
LMB	0	D0004	.	LMB-DIS#4-05	35	48	1.28	1.15741E-05
LMB	0	D0004	.	LMB-DIS#4-06	36	47	1.11	1.06913E-05
LMB	0	D0004	.	LMB-DIS#4-07	37	55	1.86	1.11796E-05
LMB	0	D0004	.	LMB-DIS#4-08	38	42	0.81	1.09329E-05
LMB	0	D0004	.	LMB-DIS#4-09	39	40	0.64	0.00001
LMB	0	D0004	.	LMB-DIS#4-10	40	44	0.96	1.12697E-05
SMB	0	D0001	.	SMB-DIS#1-01	1	50	1.52	0.00001216
SMB	0	D0001	.	SMB-DIS#1-02	2	49	1.35	1.14748E-05
SMB	0	D0001	.	SMB-DIS#1-03	3	56	2.12	1.20718E-05
SMB	0	D0001	.	SMB-DIS#1-04	4	51	1.43	1.07802E-05
SMB	0	D0001	.	SMB-DIS#1-05	5	55	1.82	1.09391E-05
SMB	0	D0001	.	SMB-DIS#1-06	6	54	1.75	1.11137E-05
SMB	0	D0001	.	SMB-DIS#1-07	7	54	1.49	9.46248E-06
SMB	0	D0001	.	SMB-DIS#1-08	8	56	1.58	8.9969E-06
SMB	0	D0001	.	SMB-DIS#1-09	9	55	1.45	8.71525E-06
SMB	0	D0001	.	SMB-DIS#1-10	10	49	1.43	1.21548E-05
SMB	0	D0002	.	SMB-DIS#2-01	11	53	1.71	1.1486E-05
SMB	0	D0002	.	SMB-DIS#2-02	12	52	1.65	1.17348E-05
SMB	0	D0002	.	SMB-DIS#2-03	13	48	1.19	1.07603E-05
SMB	0	D0002	.	SMB-DIS#2-04	14	54	1.75	1.11137E-05
SMB	0	D0002	.	SMB-DIS#2-05	15	50	1.39	0.00001112
SMB	0	D0002	.	SMB-DIS#2-06	16	55	2.26	1.35838E-05
SMB	0	D0002	.	SMB-DIS#2-07	17	52	1.41	1.00279E-05
SMB	0	D0002	.	SMB-DIS#2-08	18	56	1.93	1.09899E-05
SMB	0	D0002	.	SMB-DIS#2-09	19	48	1.18	1.06698E-05
SMB	0	D0002	.	SMB-DIS#2-10	20	55	1.92	1.15402E-05
SMB	0	D0003	.	SMB-DIS#3-01	21	53	1.8	1.20905E-05
SMB	0	D0003	.	SMB-DIS#3-02	22	55	2.18	1.31029E-05
SMB	0	D0003	.	SMB-DIS#3-03	23	54	1.86	1.18122E-05
SMB	0	D0003	.	SMB-DIS#3-04	24	47	1.17	1.12692E-05
SMB	0	D0003	.	SMB-DIS#3-05	25	50	1.49	0.00001192
SMB	0	D0003	.	SMB-DIS#3-06	26	56	1.96	1.11607E-05
SMB	0	D0003	.	SMB-DIS#3-07	27	46	1.16	1.19175E-05
SMB	0	D0003	.	SMB-DIS#3-08	28	57	2.05	1.10695E-05
SMB	0	D0003	.	SMB-DIS#3-09	29	55	2.46	1.47859E-05
SMB	0	D0003	.	SMB-DIS#3-10	30	50	1.39	0.00001112
SMB	0	D0004	.	SMB-DIS#4-01	31	57	2.33	1.25815E-05
SMB	0	D0004	.	SMB-DIS#4-02	32	49	1.3	1.10498E-05
SMB	0	D0004	.	SMB-DIS#4-03	33	52	1.68	1.19481E-05
SMB	0	D0004	.	SMB-DIS#4-04	34	52	1.67	1.1877E-05
SMB	0	D0004	.	SMB-DIS#4-05	35	49	1.43	1.21548E-05
SMB	0	D0004	.	SMB-DIS#4-06	36	56	2.08	1.1844E-05
SMB	0	D0004	.	SMB-DIS#4-07	37	54	1.72	1.09231E-05
SMB	0	D0004	.	SMB-DIS#4-08	38	53	1.84	1.23592E-05
SMB	0	D0004	.	SMB-DIS#4-09	39	57	2.06	1.11235E-05

SMB	0	D0004	.	SMB-DIS#4-10	40	49	1.37	1.16448E-05
BLG	0	D0001	.	BLG-DIS#1-01	1	60	3.36	1.55556E-05
BLG	0	D0001	.	BLG-DIS#1-02	2	49	1.62	1.37698E-05
BLG	0	D0001	.	BLG-DIS#1-03	3	60	3.25	1.50463E-05
BLG	0	D0001	.	BLG-DIS#1-04	4	51	1.95	1.47002E-05
BLG	0	D0001	.	BLG-DIS#1-05	5	50	1.6	0.0000128
BLG	0	D0001	.	BLG-DIS#1-06	6	53	1.92	1.28966E-05
BLG	0	D0001	.	BLG-DIS#1-07	7	49	1.76	1.49598E-05
BLG	0	D0001	.	BLG-DIS#1-08	8	58	3.13	1.60421E-05
BLG	0	D0001	.	BLG-DIS#1-09	9	54	2.45	1.55591E-05
BLG	0	D0001	.	BLG-DIS#1-10	10	44	1.08	1.26784E-05
BLG	0	D0002	.	BLG-DIS#2-01	11	55	2.42	1.45455E-05
BLG	0	D0002	.	BLG-DIS#2-02	12	46	1.35	1.38695E-05
BLG	0	D0002	.	BLG-DIS#2-03	13	42	1.02	1.37674E-05
BLG	0	D0002	.	BLG-DIS#2-04	14	50	1.88	0.00001504
BLG	0	D0002	.	BLG-DIS#2-05	15	45	1.31	1.43759E-05
BLG	0	D0002	.	BLG-DIS#2-06	16	42	0.94	1.26876E-05
BLG	0	D0002	.	BLG-DIS#2-07	17	53	2.1	1.41056E-05
BLG	0	D0002	.	BLG-DIS#2-08	18	49	1.66	1.41098E-05
BLG	0	D0002	.	BLG-DIS#2-09	19	45	1.3	1.42661E-05
BLG	0	D0002	.	BLG-DIS#2-10	20	50	1.86	0.00001488
BLG	0	D0003	.	BLG-DIS#3-01	21	56	2.59	1.47481E-05
BLG	0	D0003	.	BLG-DIS#3-02	22	54	2.2	1.39714E-05
BLG	0	D0003	.	BLG-DIS#3-03	23	47	1.68	1.61814E-05
BLG	0	D0003	.	BLG-DIS#3-04	24	49	1.66	1.41098E-05
BLG	0	D0003	.	BLG-DIS#3-05	25	40	0.92	0.000014375
BLG	0	D0003	.	BLG-DIS#3-06	26	47	1.44	1.38698E-05
BLG	0	D0003	.	BLG-DIS#3-07	27	55	2.31	1.38843E-05
BLG	0	D0003	.	BLG-DIS#3-08	28	49	1.64	1.39398E-05
BLG	0	D0003	.	BLG-DIS#3-09	29	55	2.65	1.59279E-05
BLG	0	D0003	.	BLG-DIS#3-10	30	53	1.99	1.33667E-05
BLG	0	D0004	.	BLG-DIS#4-01	31	52	2	1.42239E-05
BLG	0	D0004	.	BLG-DIS#4-02	32	57	2.8	1.51194E-05
BLG	0	D0004	.	BLG-DIS#4-03	33	50	1.77	0.00001416
BLG	0	D0004	.	BLG-DIS#4-04	34	53	2.25	1.51131E-05
BLG	0	D0004	.	BLG-DIS#4-05	35	59	3.22	1.56783E-05
BLG	0	D0004	.	BLG-DIS#4-06	36	44	1.16	1.36176E-05
BLG	0	D0004	.	BLG-DIS#4-07	37	56	2.74	1.56022E-05
BLG	0	D0004	.	BLG-DIS#4-08	38	46	1.34	1.37667E-05
BLG	0	D0004	.	BLG-DIS#4-09	39	46	1.39	1.42804E-05
BLG	0	D0004	.	BLG-DIS#4-10	40	43	1.05	1.32064E-05
LST	0	D0001	.	LST-DIS#1-01	1	111	4.68	3.42198E-06
LST	0	D0001	.	LST-DIS#1-02	2	119	5.27	3.1273E-06
LST	0	D0001	.	LST-DIS#1-03	3	114	5.19	3.5031E-06
LST	0	D0001	.	LST-DIS#1-04	4	108	4.38	3.47699E-06
LST	0	D0001	.	LST-DIS#1-05	5	107	4.28	3.49375E-06
LST	0	D0001	.	LST-DIS#1-06	6	121	6.09	3.43765E-06
LST	0	D0001	.	LST-DIS#1-07	7	116	5.11	3.27376E-06

LST	0	D0001	.	LST-DIS#1-08	8	112	4.68	3.33113E-06
LST	0	D0001	.	LST-DIS#1-09	9	97	3.43	3.75819E-06
LST	0	D0001	.	LST-DIS#1-10	10	123	6.11	3.28342E-06
LST	0	D0002	.	LST-DIS#2-01	11	100	3.6	0.0000036
LST	0	D0002	.	LST-DIS#2-02	12	123	6.58	3.53599E-06
LST	0	D0002	.	LST-DIS#2-03	13	135	7.16	2.91013E-06
LST	0	D0002	.	LST-DIS#2-04	14	135	8.04	3.26779E-06
LST	0	D0002	.	LST-DIS#2-05	15	121	6.16	3.47716E-06
LST	0	D0002	.	LST-DIS#2-06	16	138	8.83	3.35988E-06
LST	0	D0002	.	LST-DIS#2-07	17	111	4.81	3.51703E-06
LST	0	D0002	.	LST-DIS#2-08	18	109	4.71	3.63698E-06
LST	0	D0002	.	LST-DIS#2-09	19	104	4.16	3.69822E-06
LST	0	D0002	.	LST-DIS#2-10	20	113	5.5	3.81178E-06
LST	0	D0003	.	LST-DIS#3-01	21	142	10.09	3.52392E-06
LST	0	D0003	.	LST-DIS#3-02	22	117	5.59	3.49023E-06
LST	0	D0003	.	LST-DIS#3-03	23	109	4.89	3.77598E-06
LST	0	D0003	.	LST-DIS#3-04	24	106	4	3.35848E-06
LST	0	D0003	.	LST-DIS#3-05	25	119	5.6	3.32313E-06
LST	0	D0003	.	LST-DIS#3-06	26	115	4.69	3.08375E-06
LST	0	D0003	.	LST-DIS#3-07	27	111	5.1	3.72908E-06
LST	0	D0003	.	LST-DIS#3-08	28	125	6.58	3.36896E-06
LST	0	D0003	.	LST-DIS#3-09	29	95	2.93	3.41741E-06
LST	0	D0003	.	LST-DIS#3-10	30	116	4.95	3.17126E-06
LST	0	D0004	.	LST-DIS#4-01	31	139	8.9	3.31395E-06
LST	0	D0004	.	LST-DIS#4-02	32	119	5.92	3.51302E-06
LST	0	D0004	.	LST-DIS#4-03	33	121	6.07	3.42636E-06
LST	0	D0004	.	LST-DIS#4-04	34	103	3.58	3.27621E-06
LST	0	D0004	.	LST-DIS#4-05	35	106	4.16	3.49282E-06
LST	0	D0004	.	LST-DIS#4-06	36	107	4.4	3.59171E-06
LST	0	D0004	.	LST-DIS#4-07	37	113	4.41	3.05635E-06
LST	0	D0004	.	LST-DIS#4-08	38	111	4.7	3.4366E-06
LST	0	D0004	.	LST-DIS#4-09	39	108	4.18	3.31822E-06
LST	0	D0004	.	LST-DIS#4-10	40	108	4.12	3.27059E-06
CCF	0	D0001	.	CCF-DIS#1-01	1	60	1.78	8.24074E-06
CCF	0	D0001	.	CCF-DIS#1-02	2	55	1.48	8.89557E-06
CCF	0	D0001	.	CCF-DIS#1-03	3	54	1.4	8.89092E-06
CCF	0	D0001	.	CCF-DIS#1-04	4	56	1.48	8.42748E-06
CCF	0	D0001	.	CCF-DIS#1-05	5	56	1.56	8.88302E-06
CCF	0	D0001	.	CCF-DIS#1-06	6	61	2.03	8.94348E-06
CCF	0	D0001	.	CCF-DIS#1-07	7	49	1.07	9.09485E-06
CCF	0	D0001	.	CCF-DIS#1-08	8	58	1.72	8.81545E-06
CCF	0	D0001	.	CCF-DIS#1-09	9	54	1.41	8.95443E-06
CCF	0	D0001	.	CCF-DIS#1-10	10	51	1.24	9.34784E-06
CCF	0	D0002	.	CCF-DIS#2-01	11	65	2.68	9.75876E-06
CCF	0	D0002	.	CCF-DIS#2-02	12	57	1.7	9.17961E-06
CCF	0	D0002	.	CCF-DIS#2-03	13	57	1.65	8.90962E-06
CCF	0	D0002	.	CCF-DIS#2-04	14	56	1.7	9.68021E-06
CCF	0	D0002	.	CCF-DIS#2-05	15	62	1.96	8.22396E-06

CCF	0	D0002	.	CCF-DIS#2-06	16	56	1.54	8.76913E-06
CCF	0	D0002	.	CCF-DIS#2-07	17	63	2.31	9.23826E-06
CCF	0	D0002	.	CCF-DIS#2-08	18	53	1.38	9.2694E-06
CCF	0	D0002	.	CCF-DIS#2-09	19	52	1.26	8.96108E-06
CCF	0	D0002	.	CCF-DIS#2-10	20	54	1.43	9.08144E-06
CCF	0	D0003	.	CCF-DIS#3-01	21	61	2.04	8.98754E-06
CCF	0	D0003	.	CCF-DIS#3-02	22	60	1.89	0.00000875
CCF	0	D0003	.	CCF-DIS#3-03	23	64	2.28	8.69751E-06
CCF	0	D0003	.	CCF-DIS#3-04	24	60	2.02	9.35185E-06
CCF	0	D0003	.	CCF-DIS#3-05	25	53	1.15	7.7245E-06
CCF	0	D0003	.	CCF-DIS#3-06	26	60	1.98	9.16667E-06
CCF	0	D0003	.	CCF-DIS#3-07	27	54	1.41	8.95443E-06
CCF	0	D0003	.	CCF-DIS#3-08	28	54	1.36	8.63689E-06
CCF	0	D0003	.	CCF-DIS#3-09	29	51	1.12	8.44321E-06
CCF	0	D0003	.	CCF-DIS#3-10	30	56	1.55	8.82608E-06
CCF	0	D0004	.	CCF-DIS#4-01	31	51	1.57	1.18356E-05
CCF	0	D0004	.	CCF-DIS#4-02	32	53	1.3	8.73204E-06
CCF	0	D0004	.	CCF-DIS#4-03	33	55	1.47	8.83546E-06
CCF	0	D0004	.	CCF-DIS#4-04	34	55	1.53	9.19609E-06
CCF	0	D0004	.	CCF-DIS#4-05	35	55	1.61	9.67693E-06
CCF	0	D0004	.	CCF-DIS#4-06	36	57	1.6	8.63964E-06
CCF	0	D0004	.	CCF-DIS#4-07	37	55	1.56	9.37641E-06
CCF	0	D0004	.	CCF-DIS#4-08	38	56	1.54	8.76913E-06
CCF	0	D0004	.	CCF-DIS#4-09	39	59	1.87	9.10512E-06
CCF	0	D0004	.	CCF-DIS#4-10	40	55	1.54	9.2562E-06
RBT	1	A1E11	0	RBT-CONTROL-A-01	1	48	0.84	7.59549E-06
RBT	1	A1E11	0	RBT-CONTROL-A-02	2	46	0.71	7.29432E-06
RBT	1	A1E11	0	RBT-CONTROL-A-03	3	50	0.96	0.00000768
RBT	1	A1E11	0	RBT-CONTROL-A-04	4	47	0.93	8.95755E-06
RBT	1	A1E11	0	RBT-CONTROL-A-05	5	51	1.02	7.68935E-06
RBT	1	A2E10	50	RBT-50-A-01	1	51	1.09	8.21705E-06
RBT	1	A2E10	50	RBT-50-A-02	2	52	1.17	8.32101E-06
RBT	1	A2E10	50	RBT-50-A-03	3	47	0.84	8.09069E-06
RBT	1	A2E10	50	RBT-50-A-04	4	54	1.15	7.30326E-06
RBT	1	A2E10	50	RBT-50-A-05	5	47	0.72	6.93488E-06
RBT	1	A3E15	200	RBT-200-A-01	1	49	0.99	8.41486E-06
RBT	1	A3E15	200	RBT-200-A-02	2	51	1.08	8.14166E-06
RBT	1	A3E15	200	RBT-200-A-03	3	51	1.07	8.06628E-06
RBT	1	A3E15	200	RBT-200-A-04	4	43	0.62	7.79806E-06
RBT	1	A3E15	200	RBT-200-A-05	5	49	0.81	6.88489E-06
RBT	1	A4E14	300	RBT-300-A-01	1	46	0.83	8.52716E-06
RBT	1	A4E14	300	RBT-300-A-02	2	45	0.68	7.46228E-06
RBT	1	A4E14	300	RBT-300-A-03	3	53	1.13	7.59016E-06
RBT	1	A4E14	300	RBT-300-A-04	4	47	0.82	7.89806E-06
RBT	1	A4E14	300	RBT-300-A-05	5	50	0.99	0.00000792
RBT	1	A5E12	100	RBT-100-A-01	1	49	1.10	9.34985E-06
RBT	1	A5E12	100	RBT-100-A-02	2	58	1.44	7.38038E-06
RBT	1	A5E12	100	RBT-100-A-03	3	46	0.84	8.6299E-06

RBT	1	A5E12	100	RBT-100-A-04	4	45	0.65	7.13306E-06
RBT	1	A5E12	100	RBT-100-A-05	5	50	0.95	0.0000076
RBT	1	B1E05	100	RBT-100-B-01	1	53	1.11	7.45582E-06
RBT	1	B1E05	100	RBT-100-B-02	2	53	1.20	8.06035E-06
RBT	1	B1E05	100	RBT-100-B-03	3	50	0.84	0.00000672
RBT	1	B1E05	100	RBT-100-B-04	4	45	0.67	7.35254E-06
RBT	1	B1E05	100	RBT-100-B-05	5	48	0.88	7.95718E-06
RBT	1	B2E03	0	RBT-CONTROL-B-01	1	48	0.91	8.22844E-06
RBT	1	B2E03	0	RBT-CONTROL-B-02	2	45	0.72	7.90123E-06
RBT	1	B2E03	0	RBT-CONTROL-B-03	3	48	0.84	7.59549E-06
RBT	1	B2E03	0	RBT-CONTROL-B-04	4	54	1.37	8.7004E-06
RBT	1	B2E03	0	RBT-CONTROL-B-05	5	52	1.05	7.46757E-06
RBT	1	B3E04	200	RBT-200-B-01	1	46	0.91	9.34906E-06
RBT	1	B3E04	200	RBT-200-B-02	2	48	0.91	8.22844E-06
RBT	1	B3E04	200	RBT-200-B-03	3	50	1.11	0.00000888
RBT	1	B3E04	200	RBT-200-B-04	4	50	1.01	0.00000808
RBT	1	B3E04	200	RBT-200-B-05	5	50	0.86	0.00000688
RBT	1	B4E08	300	RBT-300-B-01	1	48	0.95	8.59013E-06
RBT	1	B4E08	300	RBT-300-B-02	2	49	0.99	8.41486E-06
RBT	1	B4E08	300	RBT-300-B-03	3	47	0.89	8.57228E-06
RBT	1	B4E08	300	RBT-300-B-04	4	44	0.67	7.86533E-06
RBT	1	B4E08	300	RBT-300-B-05	5	48	0.99	8.95182E-06
RBT	1	B5E01	50	RBT-50-B-01	1	57	1.47	7.93767E-06
RBT	1	B5E01	50	RBT-50-B-02	2	54	1.18	7.49378E-06
RBT	1	B5E01	50	RBT-50-B-03	3	52	1.20	8.53437E-06
RBT	1	B5E01	50	RBT-50-B-04	4	45	0.71	7.7915E-06
RBT	1	B5E01	50	RBT-50-B-05	5	52	1.05	7.46757E-06
RBT	1	C1E09	100	RBT-100-C-01	1	52	1.26	8.96108E-06
RBT	1	C1E09	100	RBT-100-C-02	2	55	1.44	8.65515E-06
RBT	1	C1E09	100	RBT-100-C-03	3	48	0.85	7.68591E-06
RBT	1	C1E09	100	RBT-100-C-04	4	56	1.39	7.915E-06
RBT	1	C1E09	100	RBT-100-C-05	5	45	0.65	7.13306E-06
RBT	1	C2E06	50	RBT-50-C-01	1	54	1.32	8.38287E-06
RBT	1	C2E06	50	RBT-50-C-02	2	51	1.06	7.99089E-06
RBT	1	C2E06	50	RBT-50-C-03	3	46	0.76	7.80801E-06
RBT	1	C2E06	50	RBT-50-C-04	4	44	0.64	7.51315E-06
RBT	1	C3E07	200	RBT-200-C-01	1	54	1.38	8.76391E-06
RBT	1	C3E07	200	RBT-200-C-02	2	40	0.46	7.1875E-06
RBT	1	C3E07	200	RBT-200-C-03	3	51	1.00	7.53858E-06
RBT	1	C3E07	200	RBT-200-C-04	4	46	0.66	6.78064E-06
RBT	1	C3E07	200	RBT-200-C-05	5	44	0.58	6.80879E-06
RBT	1	C4E13	0	RBT-CONTROL-C-01	1	48	0.94	8.49971E-06
RBT	1	C4E13	0	RBT-CONTROL-C-02	2	54	1.24	7.87482E-06
RBT	1	C4E13	0	RBT-CONTROL-C-03	3	49	0.84	7.13988E-06
RBT	1	C4E13	0	RBT-CONTROL-C-04	4	52	1.14	8.10765E-06
RBT	1	C4E13	0	RBT-CONTROL-C-05	5	47	0.83	7.99438E-06
RBT	1	C5E02	300	RBT-300-C-01	1	44	0.62	7.27836E-06
RBT	1	C5E02	300	RBT-300-C-02	2	48	0.82	7.41464E-06

RBT	1	C5E02	300	RBT-300-C-03	3	47	1.00	9.63178E-06
RBT	1	C5E02	300	RBT-300-C-04	4	48	0.88	7.95718E-06
YEP	1	A1G06	300	YEP-300-A1-01	1	54	1.3	8.25586E-06
YEP	1	A1G06	300	YEP-300-A1-02	2	52	1.2	8.53437E-06
YEP	1	A1G06	300	YEP-300-A1-03	3	49	1	8.49986E-06
YEP	1	A1G06	300	YEP-300-A1-04	4	50	1.2	0.0000096
YEP	1	A2G09	100	YEP-100-A2-01	1	48	0.9	8.13802E-06
YEP	1	A2G09	100	YEP-100-A2-02	2	51	1.07	8.06628E-06
YEP	1	A2G09	100	YEP-100-A2-03	3	49	0.99	8.41486E-06
YEP	1	A2G09	100	YEP-100-A2-04	4	49	0.93	7.90487E-06
YEP	1	A2G09	100	YEP-100-A2-05	5	50	1.03	0.00000824
YEP	1	A3G01	50	YEP-50-A3-01	1	54	1.28	8.12884E-06
YEP	1	A3G01	50	YEP-50-A3-02	2	55	1.36	8.17431E-06
YEP	1	A3G01	50	YEP-50-A3-03	3	51	1.17	8.82014E-06
YEP	1	A3G01	50	YEP-50-A3-04	4	49	1.11	9.43484E-06
YEP	1	A3G01	50	YEP-50-A3-05	5	40	0.5	7.8125E-06
YEP	1	A4G02	0	YEP-CONTROL-A4-01	1	52	1.14	8.10765E-06
YEP	1	A4G02	0	YEP-CONTROL-A4-02	2	54	1.17	7.43027E-06
YEP	1	A4G02	0	YEP-CONTROL-A4-03	3	51	1.09	8.21705E-06
YEP	1	A4G02	0	YEP-CONTROL-A4-04	4	47	0.77	7.41647E-06
YEP	1	A4G02	0	YEP-CONTROL-A4-05	5	50	1.16	0.00000928
YEP	1	A5G10	200	YEP-200-A5-01	1	50	0.96	0.00000768
YEP	1	A5G10	200	YEP-200-A5-02	2	51	1.19	8.97091E-06
YEP	1	A5G10	200	YEP-200-A5-03	3	48	0.94	8.49971E-06
YEP	1	A5G10	200	YEP-200-A5-04	4	48	0.95	8.59013E-06
YEP	1	B1G14	50	YEP-50-B1-01	1	53	1.28	8.5977E-06
YEP	1	B1G14	50	YEP-50-B1-02	2	53	1.24	8.32902E-06
YEP	1	B1G14	50	YEP-50-B1-03	3	50	1.16	0.00000928
YEP	1	B1G14	50	YEP-50-B1-04	4	55	1.39	8.35462E-06
YEP	1	B1G14	50	YEP-50-B1-05	5	50	1.08	0.00000864
YEP	1	B2G12	200	YEP-200-B2-01	1	46	0.86	8.83537E-06
YEP	1	B2G12	200	YEP-200-B2-02	2	54	1.28	8.12884E-06
YEP	1	B2G12	200	YEP-200-B2-03	3	50	1.04	0.00000832
YEP	1	B2G12	200	YEP-200-B2-04	4	50	1.1	0.0000088
YEP	1	B3G05	0	YEP-CONTROL-B3-01	1	50	1.01	0.00000808
YEP	1	B3G05	0	YEP-CONTROL-B3-02	2	53	1.17	7.85884E-06
YEP	1	B3G05	0	YEP-CONTROL-B3-03	3	52	1.08	7.68093E-06
YEP	1	B3G05	0	YEP-CONTROL-B3-04	4	47	0.91	8.76492E-06
YEP	1	B3G05	0	YEP-CONTROL-B3-05	5	44	0.72	8.45229E-06
YEP	1	B4G02	100	YEP-100-B4-01	1	55	1.46	8.77536E-06
YEP	1	B4G02	100	YEP-100-B4-02	2	50	1.07	0.00000856
YEP	1	B4G02	100	YEP-100-B4-03	3	52	1.14	8.10765E-06
YEP	1	B4G02	100	YEP-100-B4-04	4	49	1.22	1.03698E-05
YEP	1	B4G02	100	YEP-100-B4-05	5	53	1.26	8.46336E-06
YEP	1	B5G07	300	YEP-300-B5-01	1	50	1.1	0.0000088
YEP	1	B5G07	300	YEP-300-B5-02	2	51	1.01	7.61396E-06
YEP	1	B5G07	300	YEP-300-B5-03	3	53	1.28	8.5977E-06
YEP	1	C1G04	0	YEP-CONTROL-C1-01	1	55	1.16	6.9722E-06

YEP	1	C1G04	0	YEP-CONTROL-C1-02	2	47	0.79	7.6091E-06
YEP	1	C1G04	0	YEP-CONTROL-C1-03	3	50	0.87	0.00000696
YEP	1	C1G04	0	YEP-CONTROL-C1-04	4	53	1.07	7.18714E-06
YEP	1	C1G04	0	YEP-CONTROL-C1-05	5	50	0.94	0.00000752
YEP	1	C2G11	50	YEP-50-C2-01	1	51	0.98	7.38781E-06
YEP	1	C2G11	50	YEP-50-C2-02	2	48	0.88	7.95718E-06
YEP	1	C2G11	50	YEP-50-C2-03	3	56	1.28	7.28863E-06
YEP	1	C2G11	50	YEP-50-C2-04	4	53	1.09	7.32148E-06
YEP	1	C2G11	50	YEP-50-C2-05	5	51	1.08	8.14166E-06
YEP	1	C3G15	100	YEP-100-C3-01	1	49	0.81	6.88489E-06
YEP	1	C3G15	100	YEP-100-C3-02	2	51	0.96	7.23704E-06
YEP	1	C3G15	100	YEP-100-C3-03	3	54	1.16	7.36676E-06
YEP	1	C3G15	100	YEP-100-C3-04	4	53	1.09	7.32148E-06
YEP	1	C3G15	100	YEP-100-C3-05	5	52	1.12	7.96541E-06
YEP	1	C4G13	300	YEP-300-C4-01	1	54	1.3	8.25586E-06
YEP	1	C4G13	300	YEP-300-C4-02	2	55	1.31	7.87378E-06
YEP	1	C4G13	300	YEP-300-C4-03	3	50	1	0.000008
YEP	1	C4G13	300	YEP-300-C4-04	4	49	0.93	7.90487E-06
YEP	1	C5G03	200	YEP-200-C5-01	1	53	1.15	7.7245E-06
YEP	1	C5G03	200	YEP-200-C5-02	2	53	1.12	7.52299E-06
YEP	1	C5G03	200	YEP-200-C5-03	3	45	0.7	7.68176E-06
YEP	1	C5G03	200	YEP-200-C5-04	4	49	0.85	7.22488E-06
YEP	1	C5G03	200	YEP-200-C5-05	5	49	0.95	8.07487E-06
WAE	1	A1F12	200	WAE-200-A-01	1	80	2.98	5.82031E-06
WAE	1	A1F12	200	WAE-200-A-02	2	69	1.9	5.78371E-06
WAE	1	A1F12	200	WAE-200-A-03	3	65	1.38	5.02503E-06
WAE	1	A1F12	200	WAE-200-A-04	4	69	2.07	6.3012E-06
WAE	1	A1F12	200	WAE-200-A-05	5	61	1.17	5.15462E-06
WAE	1	A2F10	0	WAE-CONTROL-A-01	1	67	1.57	5.22006E-06
WAE	1	A2F10	0	WAE-CONTROL-A-02	2	74	2.18	5.37974E-06
WAE	1	A2F10	0	WAE-CONTROL-A-03	3	66	1.65	5.73921E-06
WAE	1	A2F10	0	WAE-CONTROL-A-04	4	63	1.11	4.43917E-06
WAE	1	A2F10	0	WAE-CONTROL-A-05	5	70	1.87	5.4519E-06
WAE	1	A3F11	300	WAE-300-A-01	1	68	1.87	5.94723E-06
WAE	1	A3F11	300	WAE-300-A-02	2	71	2.16	6.03502E-06
WAE	1	A3F11	300	WAE-300-A-03	3	72	2.53	6.77834E-06
WAE	1	A3F11	300	WAE-300-A-04	4	62	1.54	6.46168E-06
WAE	1	A4F09	100	WAE-100-A-01	1	65	1.65	6.00819E-06
WAE	1	A4F09	100	WAE-100-A-02	2	70	2.11	6.1516E-06
WAE	1	A4F09	100	WAE-100-A-03	3	62	1.4	5.87426E-06
WAE	1	A4F09	100	WAE-100-A-04	4	71	2.03	5.6718E-06
WAE	1	A4F09	100	WAE-100-A-05	5	66	1.2	4.17397E-06
WAE	1	A5F01	50	WAE-50-A-01	1	62	1.24	5.20291E-06
WAE	1	A5F01	50	WAE-50-A-02	2	65	1.56	5.68047E-06
WAE	1	A5F01	50	WAE-50-A-03	3	59	1.11	5.40464E-06
WAE	1	A5F01	50	WAE-50-A-04	4	69	1.92	5.84459E-06
WAE	1	A5F01	50	WAE-50-A-05	5	71	2.16	6.03502E-06
WAE	1	B1F07	200	WAE-200-B-01	1	65	1.7	6.19026E-06

WAE	1	B1F07	200	WAE-200-B-02	2	65	1.16	4.22394E-06
WAE	1	B1F07	200	WAE-200-B-03	3	76	2.73	6.21902E-06
WAE	1	B1F07	200	WAE-200-B-04	4	65	1.26	4.58807E-06
WAE	1	B1F07	200	WAE-200-B-05	5	66	1.69	5.87834E-06
WAE	1	B2F15	50	WAE-50-B-01	1	65	1.53	5.57123E-06
WAE	1	B2F15	50	WAE-50-B-02	2	68	1.66	5.27936E-06
WAE	1	B2F15	50	WAE-50-B-03	3	72	2.06	5.51912E-06
WAE	1	B2F15	50	WAE-50-B-04	4	67	1.84	6.11777E-06
WAE	1	B2F15	50	WAE-50-B-05	5	77	2.77	6.06747E-06
WAE	1	B3F04	100	WAE-100-B-01	1	77	2.65	5.80462E-06
WAE	1	B3F04	100	WAE-100-B-02	2	74	2.53	6.24346E-06
WAE	1	B3F04	100	WAE-100-B-03	3	69	1.77	5.38798E-06
WAE	1	B3F04	100	WAE-100-B-04	4	74	2.42	5.97201E-06
WAE	1	B3F04	100	WAE-100-B-05	5	70	1.88	5.48105E-06
WAE	1	B4F06	300	WAE-300-B-01	1	72	2.34	6.26929E-06
WAE	1	B4F06	300	WAE-300-B-02	2	60	1.39	6.43519E-06
WAE	1	B4F06	300	WAE-300-B-03	3	75	2.68	6.35259E-06
WAE	1	B5F14	0	WAE-CONTROL-B-01	1	67	1.56	5.18681E-06
WAE	1	B5F14	0	WAE-CONTROL-B-02	2	74	2.41	5.94733E-06
WAE	1	B5F14	0	WAE-CONTROL-B-03	3	67	1.79	5.95153E-06
WAE	1	B5F14	0	WAE-CONTROL-B-04	4	65	1.28	4.6609E-06
WAE	1	B5F14	0	WAE-CONTROL-B-05	5	68	1.91	6.07445E-06
WAE	1	C1F02	300	WAE-300-C-01	1	72	2.35	6.29608E-06
WAE	1	C1F02	300	WAE-300-C-02	2	64	1.42	5.41687E-06
WAE	1	C1F02	300	WAE-300-C-03	3	70	2.17	6.32653E-06
WAE	1	C1F02	300	WAE-300-C-04	4	60	1.45	6.71296E-06
WAE	1	C1F02	300	WAE-300-C-05	5	70	2.08	6.06414E-06
WAE	1	C2F05	200	WAE-200-C-01	1	69	1.69	5.14446E-06
WAE	1	C2F05	200	WAE-200-C-02	2	73	2.36	6.06657E-06
WAE	1	C2F05	200	WAE-200-C-03	3	69	1.76	5.35754E-06
WAE	1	C2F05	200	WAE-200-C-04	4	66	1.63	5.66964E-06
WAE	1	C2F05	200	WAE-200-C-05	5	62	1.16	4.86724E-06
WAE	1	C3F13	0	WAE-CONTROL-C-01	1	70	2.03	5.91837E-06
WAE	1	C3F13	0	WAE-CONTROL-C-02	2	63	1.39	5.55895E-06
WAE	1	C3F13	0	WAE-CONTROL-C-03	3	65	1.76	6.40874E-06
WAE	1	C3F13	0	WAE-CONTROL-C-04	4	60	1.21	5.60185E-06
WAE	1	C3F13	0	WAE-CONTROL-C-05	5	68	1.74	5.53379E-06
WAE	1	C4F03	100	WAE-100-C-01	1	63	1.37	5.47897E-06
WAE	1	C4F03	100	WAE-100-C-02	2	72	2.12	5.67987E-06
WAE	1	C4F03	100	WAE-100-C-03	3	69	1.87	5.69239E-06
WAE	1	C4F03	100	WAE-100-C-04	4	57	1.09	5.88575E-06
WAE	1	C4F03	100	WAE-100-C-05	5	62	1.19	4.99312E-06
WAE	1	C5F08	50	WAE-50-C-01	1	74	2.33	5.74991E-06
WAE	1	C5F08	50	WAE-50-C-02	2	67	1.8	5.98478E-06
WAE	1	C5F08	50	WAE-50-C-03	3	74	2.25	5.55248E-06
WAE	1	C5F08	50	WAE-50-C-04	4	71	1.89	5.28064E-06
WAE	1	C5F08	50	WAE-50-C-05	5	67	1.87	6.21752E-06
BKT	1	A1E12	300	BKT-300-A-01	1	58	1.39	7.12411E-06

BKT	1	A1E12	300	BKT-300-A-02	2	62	1.89	7.93025E-06
BKT	1	A1E12	300	BKT-300-A-03	3	58	1.42	7.27787E-06
BKT	1	A1E12	300	BKT-300-A-04	4	60	1.64	7.59259E-06
BKT	1	A1E12	300	BKT-300-A-05	5	64	1.91	7.28607E-06
BKT	1	A2E09	50	BKT-50-A-01	1	62	1.68	7.04911E-06
BKT	1	A2E09	50	BKT-50-A-02	2	55	1.23	7.39294E-06
BKT	1	A2E09	50	BKT-50-A-03	3	60	1.49	6.89815E-06
BKT	1	A2E09	50	BKT-50-A-04	4	67	2.19	7.28148E-06
BKT	1	A2E09	50	BKT-50-A-05	5	57	1.32	7.1277E-06
BKT	1	A3E02	100	BKT-100-A-01	1	62	1.87	7.84633E-06
BKT	1	A3E02	100	BKT-100-A-02	2	56	1.37	7.80111E-06
BKT	1	A3E02	100	BKT-100-A-03	3	46	0.7	7.19158E-06
BKT	1	A3E02	100	BKT-100-A-04	4	59	1.5	7.30357E-06
BKT	1	A3E02	100	BKT-100-A-05	5	58	1.54	7.8929E-06
BKT	1	A4E13	0	BKT-CONTROL-A-01	1	51	0.93	7.01088E-06
BKT	1	A4E13	0	BKT-CONTROL-A-02	2	57	1.31	7.0737E-06
BKT	1	A4E13	0	BKT-CONTROL-A-03	3	56	1.19	6.77615E-06
BKT	1	A4E13	0	BKT-CONTROL-A-04	4	50	0.9	0.0000072
BKT	1	A4E13	0	BKT-CONTROL-A-05	5	58	1.32	6.76535E-06
BKT	1	A5E10	200	BKT-200-A-01	1	49	0.85	7.22488E-06
BKT	1	A5E10	200	BKT-200-A-02	2	59	1.53	7.44964E-06
BKT	1	A5E10	200	BKT-200-A-03	3	61	1.72	7.57773E-06
BKT	1	A5E10	200	BKT-200-A-04	4	49	0.92	7.81987E-06
BKT	1	A5E10	200	BKT-200-A-05	5	60	1.49	6.89815E-06
BKT	1	B1E14	300	BKT-300-B-01	1	57	1.48	7.99166E-06
BKT	1	B1E14	300	BKT-300-B-02	2	54	1.22	7.7478E-06
BKT	1	B1E14	300	BKT-300-B-03	3	61	1.82	8.01829E-06
BKT	1	B1E14	300	BKT-300-B-04	4	59	1.55	7.54702E-06
BKT	1	B1E14	300	BKT-300-B-05	5	55	1.2	7.21262E-06
BKT	1	B2E06	100	BKT-100-B-01	1	55	1.26	7.57325E-06
BKT	1	B2E06	100	BKT-100-B-02	2	59	1.47	7.1575E-06
BKT	1	B2E06	100	BKT-100-B-03	3	63	1.78	7.11866E-06
BKT	1	B2E06	100	BKT-100-B-04	4	52	1.26	8.96108E-06
BKT	1	B2E06	100	BKT-100-B-05	5	60	1.67	7.73148E-06
BKT	1	B3E03	50	BKT-50-B-01	1	57	1.36	7.34369E-06
BKT	1	B3E03	50	BKT-50-B-02	2	58	1.32	6.76535E-06
BKT	1	B3E03	50	BKT-50-B-03	3	54	1.13	7.17624E-06
BKT	1	B3E03	50	BKT-50-B-04	4	52	1.01	7.18309E-06
BKT	1	B3E03	50	BKT-50-B-05	5	45	0.55	6.03567E-06
BKT	1	B4E08	200	BKT-200-B-01	1	65	2.09	7.61038E-06
BKT	1	B4E08	200	BKT-200-B-02	2	59	1.49	7.25488E-06
BKT	1	B4E08	200	BKT-200-B-03	3	54	1.14	7.23975E-06
BKT	1	B4E08	200	BKT-200-B-04	4	56	1.37	7.80111E-06
BKT	1	B4E08	200	BKT-200-B-05	5	46	0.79	8.11622E-06
BKT	1	B5E07	0	BKT-CONTROL-B-01	1	56	1.3	7.40251E-06
BKT	1	B5E07	0	BKT-CONTROL-B-02	2	55	1.19	7.15252E-06
BKT	1	B5E07	0	BKT-CONTROL-B-03	3	45	0.78	8.55967E-06
BKT	1	B5E07	0	BKT-CONTROL-B-04	4	58	1.46	7.48288E-06

BKT	1	B5E07	0	BKT-CONTROL-B-05	5	60	1.36	6.2963E-06
BKT	1	C1E01	0	BKT-CONTROL-C-01	1	57	1.29	6.96571E-06
BKT	1	C1E01	0	BKT-CONTROL-C-02	2	62	1.62	6.79735E-06
BKT	1	C1E01	0	BKT-CONTROL-C-03	3	56	1.24	7.06086E-06
BKT	1	C1E01	0	BKT-CONTROL-C-04	4	45	0.69	7.57202E-06
BKT	1	C1E01	0	BKT-CONTROL-C-05	5	54	1.18	7.49378E-06
BKT	1	C2E11	100	BKT-100-C-01	1	51	0.95	7.16165E-06
BKT	1	C2E11	100	BKT-100-C-02	2	54	1.17	7.43027E-06
BKT	1	C2E11	100	BKT-100-C-03	3	58	1.51	7.73914E-06
BKT	1	C2E11	100	BKT-100-C-04	4	55	1.24	7.45304E-06
BKT	1	C2E11	100	BKT-100-C-05	5	62	1.86	7.80437E-06
BKT	1	C3E04	300	BKT-300-C-01	1	55	1.22	7.33283E-06
BKT	1	C3E04	300	BKT-300-C-02	2	53	1.06	7.11997E-06
BKT	1	C3E04	300	BKT-300-C-03	3	50	0.94	0.00000752
BKT	1	C3E04	300	BKT-300-C-04	4	55	1.22	7.33283E-06
BKT	1	C3E04	300	BKT-300-C-05	5	60	1.72	7.96296E-06
BKT	1	C4E15	200	BKT-200-C-01	1	60	1.52	7.03704E-06
BKT	1	C4E15	200	BKT-200-C-02	2	52	1.09	7.75205E-06
BKT	1	C4E15	200	BKT-200-C-03	3	51	1.03	7.76474E-06
BKT	1	C4E15	200	BKT-200-C-04	4	57	1.34	7.23569E-06
BKT	1	C4E15	200	BKT-200-C-05	5	57	1.34	7.23569E-06
BKT	1	C5E05	50	BKT-50-C-01	1	52	0.97	6.89861E-06
BKT	1	C5E05	50	BKT-50-C-02	2	54	1.16	7.36676E-06
BKT	1	C5E05	50	BKT-50-C-03	3	54	1.1	6.98572E-06
BKT	1	C5E05	50	BKT-50-C-04	4	52	1.04	7.39645E-06
BKT	1	C5E05	50	BKT-50-C-05	5	57	1.31	7.0737E-06
LMB	1	A1E11	200	LMB-200-A-01	1	53	1.62	1.08815E-05
LMB	1	A1E11	200	LMB-200-A-02	2	50	1.32	0.00001056
LMB	1	A1E11	200	LMB-200-A-03	3	40	0.61	9.53125E-06
LMB	1	A1E11	200	LMB-200-A-04	4	43	0.89	1.1194E-05
LMB	1	A1E11	200	LMB-200-A-05	5	47	0.73	7.0312E-06
LMB	1	A3E12	0	LMB-CONTROL-A-01	1	48	1.19	1.07603E-05
LMB	1	A3E12	0	LMB-CONTROL-A-02	2	49	1.34	1.13898E-05
LMB	1	A3E12	0	LMB-CONTROL-A-03	3	53	1.33	8.93355E-06
LMB	1	A3E12	0	LMB-CONTROL-A-04	4	48	1.14	1.03082E-05
LMB	1	A3E12	0	LMB-CONTROL-A-05	5	42	0.7	9.44822E-06
LMB	1	A4E06	100	LMB-100-A-01	1	46	0.9	9.24632E-06
LMB	1	A4E06	100	LMB-100-A-02	2	44	0.8	9.39144E-06
LMB	1	A4E06	100	LMB-100-A-03	3	52	1.53	1.08813E-05
LMB	1	A4E06	100	LMB-100-A-04	4	47	0.93	8.95755E-06
LMB	1	A4E06	100	LMB-100-A-05	5	60	2.35	1.08796E-05
LMB	1	A5E10	50	LMB-50-A-01	1	44	0.82	9.62622E-06
LMB	1	A5E10	50	LMB-50-A-02	2	44	0.8	9.39144E-06
LMB	1	A5E10	50	LMB-50-A-03	3	49	1.4	1.18998E-05
LMB	1	A5E10	50	LMB-50-A-04	4	49	1.23	1.04548E-05
LMB	1	A5E10	50	LMB-50-A-05	5	45	0.94	1.03155E-05
LMB	1	B1E15	50	LMB-50-B-01	1	48	1.18	1.06698E-05
LMB	1	B1E15	50	LMB-50-B-02	2	45	1.01	1.10837E-05

LMB	1	B1E15	50	LMB-50-B-03	3	40	0.62	9.6875E-06
LMB	1	B1E15	50	LMB-50-B-04	4	39	0.5	8.429E-06
LMB	1	B1E15	50	LMB-50-B-05	5	55	1.82	1.09391E-05
LMB	1	B2E13	100	LMB-100-B-01	1	49	1.31	1.11348E-05
LMB	1	B2E13	100	LMB-100-B-02	2	42	0.73	9.85315E-06
LMB	1	B2E13	100	LMB-100-B-03	3	47	1.02	9.82441E-06
LMB	1	B2E13	100	LMB-100-B-04	4	51	1.14	8.59398E-06
LMB	1	B2E13	100	LMB-100-B-05	5	47	0.72	6.93488E-06
LMB	1	B3E14	0	LMB-CONTROL-B-01	1	43	0.79	9.93623E-06
LMB	1	B3E14	0	LMB-CONTROL-B-02	2	45	0.95	1.04252E-05
LMB	1	B3E14	0	LMB-CONTROL-B-03	3	44	0.74	8.68708E-06
LMB	1	B3E14	0	LMB-CONTROL-B-04	4	46	0.97	9.96548E-06
LMB	1	B3E14	0	LMB-CONTROL-B-05	5	41	0.68	9.86637E-06
LMB	1	B5E03	200	LMB-200-B-01	1	48	1.16	1.0489E-05
LMB	1	B5E03	200	LMB-200-B-02	2	53	1.44	9.67241E-06
LMB	1	B5E03	200	LMB-200-B-03	3	46	1.13	1.16093E-05
LMB	1	C2E04	50	LMB-50-C-01	1	48	1.1	9.94647E-06
LMB	1	C2E04	50	LMB-50-C-02	2	46	0.97	9.96548E-06
LMB	1	C2E04	50	LMB-50-C-03	3	43	0.7	8.80426E-06
LMB	1	C2E04	50	LMB-50-C-04	4	46	1.1	1.13011E-05
LMB	1	C2E04	50	LMB-50-C-05	5	53	1.48	9.94109E-06
LMB	1	C3E01	100	LMB-100-C-01	1	45	0.95	1.04252E-05
LMB	1	C3E01	100	LMB-100-C-02	2	44	0.94	1.10349E-05
LMB	1	C3E01	100	LMB-100-C-03	3	50	1.31	0.00001048
LMB	1	C3E01	100	LMB-100-C-04	4	49	1.35	1.14748E-05
LMB	1	C3E01	100	LMB-100-C-05	5	49	1.29	1.09648E-05
LMB	1	C4E08	0	LMB-CONTROL-C-01	1	45	0.85	9.32785E-06
LMB	1	C4E08	0	LMB-CONTROL-C-02	2	47	0.81	7.80174E-06
LMB	1	C4E08	0	LMB-CONTROL-C-03	3	50	1.17	0.00000936
LMB	1	C4E08	0	LMB-CONTROL-C-04	4	45	0.83	9.10837E-06
LMB	1	C4E08	0	LMB-CONTROL-C-05	5	41	0.71	1.03016E-05
LMB	1	C5E02	200	LMB-200-C-01	1	48	1.2	1.08507E-05
LMB	1	C5E02	200	LMB-200-C-02	2	49	1.19	1.01148E-05
LMB	1	C5E02	200	LMB-200-C-03	3	39	0.53	8.93474E-06
LMB	1	C5E02	200	LMB-200-C-04	4	43	0.73	9.18158E-06
SMB	1	A2D06	0	SMB-CONTROL-A-01	1	53	1.6	1.07471E-05
SMB	1	A2D06	0	SMB-CONTROL-A-02	2	48	1.28	1.15741E-05
SMB	1	A2D06	0	SMB-CONTROL-A-03	3	51	1.42	1.07048E-05
SMB	1	A2D06	0	SMB-CONTROL-A-04	4	53	1.65	1.1083E-05
SMB	1	A2D06	0	SMB-CONTROL-A-05	5	54	1.61	1.02246E-05
SMB	1	A3D03	50	SMB-50-A-01	1	57	1.77	9.5576E-06
SMB	1	A3D03	50	SMB-50-A-02	2	53	1.51	1.01426E-05
SMB	1	A3D03	50	SMB-50-A-03	3	51	1.3	9.80015E-06
SMB	1	A3D03	50	SMB-50-A-04	4	55	1.9	1.142E-05
SMB	1	A3D03	50	SMB-50-A-05	5	52	1.34	9.53004E-06
SMB	1	A1D01	100	SMB-100-A-01	1	53	1.55	1.04113E-05
SMB	1	A1D01	100	SMB-100-A-02	2	53	1.6	1.07471E-05
SMB	1	A1D01	100	SMB-100-A-03	3	49	1.39	1.18148E-05

SMB	1	A1D01	100	SMB-100-A-04	4	51	1.44	1.08556E-05
SMB	1	A1D01	100	SMB-100-A-05	5	57	1.94	1.04756E-05
SMB	1	A4D10	200	SMB-200-A-01	1	58	2.1	1.0763E-05
SMB	1	A4D10	200	SMB-200-A-02	2	49	1.41	1.19848E-05
SMB	1	A4D10	200	SMB-200-A-03	3	56	1.9	1.08191E-05
SMB	1	A4D10	200	SMB-200-A-04	4	50	1.22	0.00000976
SMB	1	A4D10	200	SMB-200-A-05	5	52	1.46	1.03835E-05
SMB	1	B1D15	0	SMB-CONTROL-B-01	1	56	1.71	9.73715E-06
SMB	1	B1D15	0	SMB-CONTROL-B-02	2	55	1.72	1.03381E-05
SMB	1	B1D15	0	SMB-CONTROL-B-03	3	52	1.48	1.05257E-05
SMB	1	B1D15	0	SMB-CONTROL-B-04	4	47	1.13	1.08839E-05
SMB	1	B1D15	0	SMB-CONTROL-B-05	5	53	1.67	1.12173E-05
SMB	1	B5D08	50	SMB-50-B-01	1	50	1.23	0.00000984
SMB	1	B5D08	50	SMB-50-B-02	2	53	1.55	1.04113E-05
SMB	1	B5D08	50	SMB-50-B-03	3	52	1.35	9.60116E-06
SMB	1	B5D08	50	SMB-50-B-04	4	53	1.47	9.87392E-06
SMB	1	B5D08	50	SMB-50-B-05	5	52	1.5	1.0668E-05
SMB	1	B3D04	100	SMB-100-B-01	1	54	1.85	1.17487E-05
SMB	1	B3D04	100	SMB-100-B-02	2	52	1.39	9.88564E-06
SMB	1	B3D04	100	SMB-100-B-03	3	55	1.87	1.12397E-05
SMB	1	B3D04	100	SMB-100-B-04	4	47	1.03	9.92073E-06
SMB	1	B3D04	100	SMB-100-B-05	5	56	1.8	1.02496E-05
SMB	1	B2D05	200	SMB-200-B-01	1	55	1.83	1.09992E-05
SMB	1	B2D05	200	SMB-200-B-02	2	48	1.28	1.15741E-05
SMB	1	B2D05	200	SMB-200-B-03	3	52	1.42	1.0099E-05
SMB	1	B2D05	200	SMB-200-B-04	4	53	1.63	1.09486E-05
SMB	1	B2D05	200	SMB-200-B-05	5	43	1.19	1.49672E-05
SMB	1	C1D07	0	SMB-CONTROL-C-01	1	47	1.11	1.06913E-05
SMB	1	C1D07	0	SMB-CONTROL-C-02	2	56	1.84	1.04774E-05
SMB	1	C1D07	0	SMB-CONTROL-C-03	3	50	1.16	0.00000928
SMB	1	C1D07	0	SMB-CONTROL-C-04	4	50	1.18	0.00000944
SMB	1	C1D07	0	SMB-CONTROL-C-05	5	53	1.65	1.1083E-05
SMB	1	C3D02	50	SMB-50-C-01	1	53	1.41	9.47091E-06
SMB	1	C3D02	50	SMB-50-C-02	2	51	1.38	1.04032E-05
SMB	1	C3D02	50	SMB-50-C-03	3	53	1.74	1.16875E-05
SMB	1	C3D02	50	SMB-50-C-04	4	50	1.25	0.00001
SMB	1	C3D02	50	SMB-50-C-05	5	47	1.39	1.33882E-05
SMB	1	C2D11	100	SMB-100-C-01	1	55	1.8	1.08189E-05
SMB	1	C2D11	100	SMB-100-C-02	2	52	1.51	1.07391E-05
SMB	1	C2D11	100	SMB-100-C-03	3	53	1.63	1.09486E-05
SMB	1	C2D11	100	SMB-100-C-04	4	54	1.63	1.03516E-05
SMB	1	C2D11	100	SMB-100-C-05	5	53	1.62	1.08815E-05
SMB	1	C5D12	200	SMB-200-C-01	1	58	2.04	1.04555E-05
SMB	1	C5D12	200	SMB-200-C-02	2	56	1.75	9.96492E-06
SMB	1	C5D12	200	SMB-200-C-03	3	54	1.69	1.07326E-05
SMB	1	C4D13	300	SMB-300-C-01	1	53	1.68	1.12845E-05
SMB	1	C4D13	300	SMB-300-C-02	2	51	1.3	9.80015E-06
SMB	1	C4D13	300	SMB-300-C-03	3	54	1.58	1.0034E-05

BLG	1	A1E11	0	BLG-CONTROL-A-01	1	47	1.43	1.37734E-05
BLG	1	A1E11	0	BLG-CONTROL-A-02	2	50	1.61	0.00001288
BLG	1	A1E11	0	BLG-CONTROL-A-03	3	40	1.21	1.89063E-05
BLG	1	A1E11	0	BLG-CONTROL-A-04	4	47	1.36	1.30992E-05
BLG	1	A1E11	0	BLG-CONTROL-A-05	5	55	2.26	1.35838E-05
BLG	1	A2E01	100	BLG-100-A-01	1	58	2.96	1.51708E-05
BLG	1	A2E01	100	BLG-100-A-02	2	53	2.13	1.43071E-05
BLG	1	A2E01	100	BLG-100-A-03	3	54	2.35	1.4924E-05
BLG	1	A2E01	100	BLG-100-A-04	4	47	1.35	1.30029E-05
BLG	1	A2E01	100	BLG-100-A-05	5	49	1.52	1.29198E-05
BLG	1	A3E02	300	BLG-300-A-01	1	55	2.49	1.49662E-05
BLG	1	A3E02	300	BLG-300-A-02	2	45	1.18	1.29492E-05
BLG	1	A3E02	300	BLG-300-A-03	3	47	1.45	1.39661E-05
BLG	1	A3E02	300	BLG-300-A-04	4	55	2.32	1.39444E-05
BLG	1	A3E02	300	BLG-300-A-05	5	55	2.74	1.64688E-05
BLG	1	A4E13	50	BLG-50-A-01	1	49	1.66	1.41098E-05
BLG	1	A4E13	50	BLG-50-A-02	2	49	1.6	1.35998E-05
BLG	1	A4E13	50	BLG-50-A-03	3	42	1	1.34975E-05
BLG	1	A4E13	50	BLG-50-A-04	4	50	1.8	0.0000144
BLG	1	A4E13	50	BLG-50-A-05	5	45	1.09	1.19616E-05
BLG	1	A5E09	200	BLG-200-A-01	1	55	2.22	1.33434E-05
BLG	1	A5E09	200	BLG-200-A-02	2	54	2.21	1.4035E-05
BLG	1	A5E09	200	BLG-200-A-03	3	49	1.74	1.47898E-05
BLG	1	A5E09	200	BLG-200-A-04	4	50	1.6	0.0000128
BLG	1	A5E09	200	BLG-200-A-05	5	44	1.1	1.29132E-05
BLG	1	B1E15	200	BLG-200-B-01	1	57	2.81	1.51734E-05
BLG	1	B1E15	200	BLG-200-B-02	2	51	1.87	1.40971E-05
BLG	1	B1E15	200	BLG-200-B-03	3	49	1.68	1.42798E-05
BLG	1	B1E15	200	BLG-200-B-04	4	45	1.22	1.33882E-05
BLG	1	B1E15	200	BLG-200-B-05	5	64	3.69	1.40762E-05
BLG	1	B2E06	100	BLG-100-B-01	1	47	1.35	1.30029E-05
BLG	1	B2E06	100	BLG-100-B-02	2	54	2.28	1.44795E-05
BLG	1	B2E06	100	BLG-100-B-03	3	55	2.61	1.56875E-05
BLG	1	B2E06	100	BLG-100-B-04	4	42	0.92	1.24177E-05
BLG	1	B2E06	100	BLG-100-B-05	5	58	2.93	1.5017E-05
BLG	1	B3E14	0	BLG-CONTROL-B-01	1	56	2.51	1.42925E-05
BLG	1	B3E14	0	BLG-CONTROL-B-02	2	50	1.82	0.00001456
BLG	1	B3E14	0	BLG-CONTROL-B-03	3	54	2.27	1.4416E-05
BLG	1	B3E14	0	BLG-CONTROL-B-04	4	58	2.52	1.29157E-05
BLG	1	B3E14	0	BLG-CONTROL-B-05	5	58	2.81	1.4402E-05
BLG	1	B4E12	50	BLG-50-B-01	1	49	1.6	1.35998E-05
BLG	1	B4E12	50	BLG-50-B-02	2	49	1.56	1.32598E-05
BLG	1	B4E12	50	BLG-50-B-03	3	54	2.38	1.51146E-05
BLG	1	B4E12	50	BLG-50-B-04	4	53	2.01	1.35011E-05
BLG	1	B4E12	50	BLG-50-B-05	5	49	1.35	1.14748E-05
BLG	1	B5E08	300	BLG-300-B-01	1	53	1.95	1.30981E-05
BLG	1	B5E08	300	BLG-300-B-02	2	53	2.17	1.45758E-05
BLG	1	B5E08	300	BLG-300-B-03	3	50	1.84	0.00001472

BLG	1	B5E08	300	BLG-300-B-04	4	51	1.87	1.40971E-05
BLG	1	B5E08	300	BLG-300-B-05	5	45	1.33	1.45953E-05
BLG	1	C1E07	50	BLG-50-C-01	1	50	1.59	0.00001272
BLG	1	C1E07	50	BLG-50-C-02	2	45	1.21	1.32785E-05
BLG	1	C1E07	50	BLG-50-C-03	3	61	3.5	1.54198E-05
BLG	1	C1E07	50	BLG-50-C-04	4	51	1.71	1.2891E-05
BLG	1	C1E07	50	BLG-50-C-05	5	42	0.99	1.33625E-05
BLG	1	C2E10	0	BLG-CONTROL-C-01	1	56	2.54	1.44634E-05
BLG	1	C2E10	0	BLG-CONTROL-C-02	2	62	3.61	1.51472E-05
BLG	1	C2E10	0	BLG-CONTROL-C-03	3	59	3.09	1.50454E-05
BLG	1	C2E10	0	BLG-CONTROL-C-04	4	54	2.23	1.4162E-05
BLG	1	C2E10	0	BLG-CONTROL-C-05	5	49	1.53	1.30048E-05
BLG	1	C3E03	300	BLG-300-C-01	1	60	3.13	1.44907E-05
BLG	1	C3E03	300	BLG-300-C-02	2	53	2.2	1.47773E-05
BLG	1	C3E03	300	BLG-300-C-03	3	60	3.1	1.43519E-05
BLG	1	C3E03	300	BLG-300-C-04	4	54	2.43	1.54321E-05
BLG	1	C3E03	300	BLG-300-C-05	5	43	1.09	1.37095E-05
BLG	1	C4E04	100	BLG-100-C-01	1	62	3.6	1.51052E-05
BLG	1	C4E04	100	BLG-100-C-02	2	42	1.03	1.39024E-05
BLG	1	C4E04	100	BLG-100-C-03	3	48	1.49	1.34729E-05
BLG	1	C4E04	100	BLG-100-C-04	4	46	1.43	1.46914E-05
BLG	1	C4E04	100	BLG-100-C-05	5	52	1.92	1.3655E-05
BLG	1	C5E05	200	BLG-200-C-01	1	52	1.9	1.35127E-05
BLG	1	C5E05	200	BLG-200-C-02	2	54	2.41	1.53051E-05
BLG	1	C5E05	200	BLG-200-C-03	3	59	2.93	1.42663E-05
BLG	1	C5E05	200	BLG-200-C-04	4	46	1.33	1.3664E-05
BLG	1	C5E05	200	BLG-200-C-05	5	47	1.37	1.31955E-05
LST	1	A1G07	100	LST-100-A-01	1	102	3.19	3.00601E-06
LST	1	A1G07	100	LST-100-A-02	2	105	3.16	2.72973E-06
LST	1	A1G07	100	LST-100-A-03	3	135	6.65	2.70284E-06
LST	1	A1G07	100	LST-100-A-04	4	110	4.45	3.34335E-06
LST	1	A1G07	100	LST-100-A-05	5	119	4.75	2.81873E-06
LST	1	A2G13	200	LST-200-A-01	1	106	3.77	3.16536E-06
LST	1	A2G13	200	LST-200-A-02	2	98	2.6	2.76245E-06
LST	1	A2G13	200	LST-200-A-03	3	114	4.49	3.03062E-06
LST	1	A2G13	200	LST-200-A-04	4	102	3.45	3.25101E-06
LST	1	A3G03	300	LST-300-A-01	1	114	4.33	2.92263E-06
LST	1	A3G03	300	LST-300-A-02	2	132	6.25	2.71743E-06
LST	1	A3G03	300	LST-300-A-03	3	126	6.26	3.12941E-06
LST	1	A4G04	0	LST-CONTROL-A-01	1	105	3.6	3.10982E-06
LST	1	A4G04	0	LST-CONTROL-A-02	2	102	3.22	3.03428E-06
LST	1	A4G04	0	LST-CONTROL-A-03	3	121	5.28	2.98042E-06
LST	1	A4G04	0	LST-CONTROL-A-04	4	108	3.72	2.95306E-06
LST	1	A4G04	0	LST-CONTROL-A-05	5	102	3.13	2.94947E-06
LST	1	A5G06	50	LST-50-A-01	1	119	4.63	2.74752E-06
LST	1	A5G06	50	LST-50-A-02	2	123	5.63	3.02547E-06
LST	1	A5G06	50	LST-50-A-03	3	97	2.65	2.90356E-06
LST	1	A5G06	50	LST-50-A-04	4	114	4.22	2.84838E-06

LST	1	A5G06	50	LST-50-A-05	5	115	3.89	2.55774E-06
LST	1	B1G09	300	LST-300-B-01	1	108	3.47	2.7546E-06
LST	1	B1G09	300	LST-300-B-02	2	106	3.31	2.77914E-06
LST	1	B1G09	300	LST-300-B-03	3	117	4.28	2.67231E-06
LST	1	B1G09	300	LST-300-B-04	4	111	3.99	2.91745E-06
LST	1	B2G01	100	LST-100-B-01	1	128	6.27	2.98977E-06
LST	1	B2G01	100	LST-100-B-02	2	107	3.96	3.23254E-06
LST	1	B2G01	100	LST-100-B-03	3	120	4.77	2.76042E-06
LST	1	B2G01	100	LST-100-B-04	4	114	4.7	3.17237E-06
LST	1	B2G01	100	LST-100-B-05	5	102	3.62	3.41121E-06
LST	1	B3G02	50	LST-50-B-01	1	110	3.79	2.84748E-06
LST	1	B3G02	50	LST-50-B-02	2	118	5.55	3.3779E-06
LST	1	B3G02	50	LST-50-B-03	3	116	4.38	2.80608E-06
LST	1	B3G02	50	LST-50-B-04	4	103	2.98	2.72712E-06
LST	1	B3G02	50	LST-50-B-05	5	92	3.19	4.09663E-06
LST	1	B4G15	200	LST-200-B-01	1	107	3.59	2.93051E-06
LST	1	B4G15	200	LST-200-B-02	2	108	3.43	2.72284E-06
LST	1	B4G15	200	LST-200-B-03	3	112	4.21	2.99659E-06
LST	1	B4G15	200	LST-200-B-04	4	105	3.32	2.86794E-06
LST	1	B4G15	200	LST-200-B-05	5	124	5.99	3.14168E-06
LST	1	B5G08	0	LST-CONTROL-B-01	1	119	5.21	3.0917E-06
LST	1	B5G08	0	LST-CONTROL-B-02	2	108	3.9	3.09595E-06
LST	1	B5G08	0	LST-CONTROL-B-03	3	110	3.99	2.99775E-06
LST	1	B5G08	0	LST-CONTROL-B-04	4	120	4.33	2.50579E-06
LST	1	B5G08	0	LST-CONTROL-B-05	5	99	2.62	2.7002E-06
LST	1	C1G05	50	LST-50-C-01	1	126	5.59	2.79447E-06
LST	1	C1G05	50	LST-50-C-02	2	113	4.09	2.83458E-06
LST	1	C1G05	50	LST-50-C-03	3	104	3.58	3.18261E-06
LST	1	C1G05	50	LST-50-C-04	4	113	4.33	3.00091E-06
LST	1	C1G05	50	LST-50-C-05	5	105	3.4	2.93705E-06
LST	1	C2G12	200	LST-200-C-01	1	114	3.99	2.69314E-06
LST	1	C2G12	200	LST-200-C-02	2	108	3.62	2.87367E-06
LST	1	C2G12	200	LST-200-C-03	3	128	5.91	2.81811E-06
LST	1	C2G12	200	LST-200-C-04	4	96	2.74	3.09697E-06
LST	1	C2G12	200	LST-200-C-05	5	109	3.79	2.92658E-06
LST	1	C4G10	0	LST-CONTROL-C-01	1	110	3.62	2.71976E-06
LST	1	C4G10	0	LST-CONTROL-C-02	2	104	3.29	2.9248E-06
LST	1	C4G10	0	LST-CONTROL-C-03	3	112	5.17	3.6799E-06
LST	1	C4G10	0	LST-CONTROL-C-04	4	118	5.15	3.13445E-06
LST	1	C4G10	0	LST-CONTROL-C-05	5	110	3.72	2.79489E-06
LST	1	C5G11	100	LST-100-C-01	1	122	5.37	2.9573E-06
LST	1	C5G11	100	LST-100-C-02	2	124	5.68	2.97909E-06
LST	1	C5G11	100	LST-100-C-03	3	103	3.73	3.41348E-06
LST	1	C5G11	100	LST-100-C-04	4	111	4.53	3.3123E-06
LST	1	C5G11	100	LST-100-C-05	5	109	3.92	3.02696E-06
CCF	1	A2E02	50	CCF-50-A-01	1	53	1.02	6.85129E-06
CCF	1	A2E02	50	CCF-50-A-02	2	60	1.77	8.19444E-06
CCF	1	A2E02	50	CCF-50-A-03	3	57	1.47	7.93767E-06

CCF	1	A2E02	50	CCF-50-A-04	4	55	1.35	8.1142E-06
CCF	1	A2E02	50	CCF-50-A-05	5	55	1.37	8.23441E-06
CCF	1	A3E13	200	CCF-200-A-01	1	58	1.48	7.58539E-06
CCF	1	A3E13	200	CCF-200-A-02	2	54	1.38	8.76391E-06
CCF	1	A3E13	200	CCF-200-A-03	3	60	1.77	8.19444E-06
CCF	1	A3E13	200	CCF-200-A-04	4	52	1.21	8.60548E-06
CCF	1	A3E13	200	CCF-200-A-05	5	61	1.95	8.59103E-06
CCF	1	A4E08	0	CCF-CONTROL-A-01	1	55	1.17	7.03231E-06
CCF	1	A4E08	0	CCF-CONTROL-A-02	2	55	1.33	7.99399E-06
CCF	1	A4E08	0	CCF-CONTROL-A-03	3	59	1.79	8.71559E-06
CCF	1	A4E08	0	CCF-CONTROL-A-04	4	56	1.46	8.31359E-06
CCF	1	A4E08	0	CCF-CONTROL-A-05	5	56	1.45	8.25665E-06
CCF	1	A5E09	100	CCF-100-A-01	1	54	1.28	8.12884E-06
CCF	1	A5E09	100	CCF-100-A-02	2	50	0.98	0.00000784
CCF	1	A5E09	100	CCF-100-A-03	3	60	1.74	8.05556E-06
CCF	1	A5E09	100	CCF-100-A-04	4	52	1.13	8.03653E-06
CCF	1	A5E09	100	CCF-100-A-05	5	57	1.52	8.20765E-06
CCF	1	B2E12	200	CCF-200-B-01	1	56	1.55	8.82608E-06
CCF	1	B2E12	200	CCF-200-B-02	2	53	1.26	8.46336E-06
CCF	1	B2E12	200	CCF-200-B-03	3	58	1.62	8.30292E-06
CCF	1	B2E12	200	CCF-200-B-04	4	54	1.34	8.50988E-06
CCF	1	B2E12	200	CCF-200-B-05	5	54	1.35	8.57339E-06
CCF	1	B3E07	100	CCF-100-B-01	1	61	1.78	7.84207E-06
CCF	1	B3E07	100	CCF-100-B-02	2	60	1.79	8.28704E-06
CCF	1	B3E07	100	CCF-100-B-03	3	54	1.18	7.49378E-06
CCF	1	B3E07	100	CCF-100-B-04	4	56	1.32	7.5164E-06
CCF	1	B3E07	100	CCF-100-B-05	5	55	1.33	7.99399E-06
CCF	1	B4E04	50	CCF-50-B-01	1	62	1.61	6.7554E-06
CCF	1	B4E04	50	CCF-50-B-02	2	53	1.3	8.73204E-06
CCF	1	B4E04	50	CCF-50-B-03	3	51	1.36	1.02525E-05
CCF	1	B4E04	50	CCF-50-B-04	4	53	1.38	9.2694E-06
CCF	1	B4E04	50	CCF-50-B-05	5	52	1.18	8.39213E-06
CCF	1	B5E03	0	CCF-CONTROL-B-01	1	54	1.21	7.6843E-06
CCF	1	B5E03	0	CCF-CONTROL-B-02	2	54	1.3	8.25586E-06
CCF	1	B5E03	0	CCF-CONTROL-B-03	3	52	1.18	8.39213E-06
CCF	1	B5E03	0	CCF-CONTROL-B-04	4	54	1.22	7.7478E-06
CCF	1	B5E03	0	CCF-CONTROL-B-05	5	59	1.6	7.79048E-06
CCF	1	C1E01	200	CCF-200-C-01	1	56	1.51	8.59831E-06
CCF	1	C1E01	200	CCF-200-C-02	2	52	1.18	8.39213E-06
CCF	1	C1E01	200	CCF-200-C-03	3	59	1.67	8.13131E-06
CCF	1	C1E01	200	CCF-200-C-04	4	54	1.17	7.43027E-06
CCF	1	C1E01	200	CCF-200-C-05	5	54	1.13	7.17624E-06
CCF	1	C2E05	100	CCF-100-C-01	1	60	1.64	7.59259E-06
CCF	1	C2E05	100	CCF-100-C-02	2	55	1.14	6.85199E-06
CCF	1	C2E05	100	CCF-100-C-03	3	57	1.52	8.20765E-06
CCF	1	C2E05	100	CCF-100-C-04	4	48	0.9	8.13802E-06
CCF	1	C2E05	100	CCF-100-C-05	5	42	0.64	8.63838E-06
CCF	1	C3E10	0	CCF-CONTROL-C-01	1	50	1.17	0.00000936

CCF	1	C3E10	0	CCF-CONTROL-C-02	2	66	2.15	7.47836E-06
CCF	1	C3E10	0	CCF-CONTROL-C-03	3	65	2.24	8.15658E-06
CCF	1	C3E10	0	CCF-CONTROL-C-04	4	55	1.32	7.93388E-06
CCF	1	C3E10	0	CCF-CONTROL-C-05	5	54	1.3	8.25586E-06
CCF	1	C5E11	50	CCF-50-C-01	1	52	1.12	7.96541E-06
CCF	1	C5E11	50	CCF-50-C-02	2	61	1.76	7.75395E-06
CCF	1	C5E11	50	CCF-50-C-03	3	65	2.03	7.3919E-06
CCF	1	C5E11	50	CCF-50-C-04	4	55	1.29	7.75357E-06
CCF	1	C5E11	50	CCF-50-C-05	5	55	1.37	8.23441E-06
RBT	2	A1E11	0	RBT-CONTROL-E11-T1	1	62	2.52	1.05737E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T2	2	62	2.37	9.94428E-06
RBT	2	A1E11	0	RBT-CONTROL-E11-T3	3	65	3.13	1.13974E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T4	4	60	2.24	1.03704E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T5	5	60	2.11	9.76852E-06
RBT	2	A1E11	0	RBT-CONTROL-E11-T6	6	64	2.87	1.09482E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T7	7	73	4.10	1.05394E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T8	8	57	1.89	1.02056E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T9	9	67	3.39	1.12713E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T10	10	63	2.61	1.0438E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T11	11	65	2.80	1.01957E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T12	12	66	3.07	1.06784E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T13	13	65	2.79	1.01593E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T14	14	57	1.92	1.03676E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T15	15	60	2.15	9.9537E-06
RBT	2	A1E11	0	RBT-CONTROL-E11-T16	16	70	3.31	9.65015E-06
RBT	2	A1E11	0	RBT-CONTROL-E11-T17	17	68	3.52	1.11948E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T18	18	64	2.76	1.05286E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T19	19	57	2.07	1.11775E-05
RBT	2	A1E11	0	RBT-CONTROL-E11-T20	20	52	1.37	9.7434E-06
RBT	2	A2E10	50	RBT-50-E10-T1	1	58	2.16	1.10706E-05
RBT	2	A2E10	50	RBT-50-E10-T2	2	53	1.35	9.06789E-06
RBT	2	A2E10	50	RBT-50-E10-T3	3	52	1.08	7.68093E-06
RBT	2	A2E10	50	RBT-50-E10-T4	4	45	0.78	8.55967E-06
RBT	2	A2E10	50	RBT-50-E10-T5	5	47	0.93	8.95755E-06
RBT	2	A2E10	50	RBT-50-E10-T6	6	61	2.11	9.29593E-06
RBT	2	A2E10	50	RBT-50-E10-T7	7	56	1.54	8.76913E-06
RBT	2	A2E10	50	RBT-50-E10-T8	8	55	1.62	9.73704E-06
RBT	2	A2E10	50	RBT-50-E10-T9	9	54	1.40	8.89092E-06
RBT	2	B1E05	100	RBT-100-E5-T1	1	45	0.65	7.13306E-06
RBT	2	B1E05	100	RBT-100-E5-T2	2	49	1.11	9.43484E-06
RBT	2	B1E05	100	RBT-100-E5-T3	3	47	1.03	9.92073E-06
RBT	2	B1E05	100	RBT-100-E5-T4	4	47	0.79	7.6091E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T1	1	65	2.96	1.07783E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T2	2	67	3.19	1.06064E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T3	3	59	2.04	9.93286E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T4	4	57	1.77	9.5576E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T5	5	53	1.35	9.06789E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T6	6	65	3.00	1.0924E-05

RBT	2	B2E03	0	RBT-CONTROL-E3-T7	7	69	3.61	1.0989E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T8	8	64	2.61	9.95636E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T9	9	65	2.78	1.01229E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T10	10	64	2.58	9.84192E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T11	11	62	2.52	1.05737E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T12	12	56	2.92	1.66272E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T13	13	62	2.57	1.07835E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T14	14	70	3.56	1.0379E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T15	15	62	2.53	1.06156E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T16	16	65	2.74	9.97724E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T17	17	68	3.29	1.04633E-05
RBT	2	B2E03	0	RBT-CONTROL-E3-T18	18	56	1.72	9.7941E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T19	19	56	1.75	9.96492E-06
RBT	2	B2E03	0	RBT-CONTROL-E3-T20	20	62	2.19	9.18902E-06
RBT	2	B5E01	50	RBT-50-E1-T1	1	49	1.05	8.92485E-06
RBT	2	B5E01	50	RBT-50-E1-T2	2	57	1.46	7.88367E-06
RBT	2	B5E01	50	RBT-50-E1-T3	3	44	0.74	8.68708E-06
RBT	2	C1E09	100	RBT-100-E9-T1	1	49	0.98	8.32986E-06
RBT	2	C2E06	50	RBT-50-E6-T1	1	57	1.47	7.93767E-06
RBT	2	C2E06	50	RBT-50-E6-T2	2	53	1.34	9.00072E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T1	1	66	3.33	1.15828E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T2	2	63	2.67	1.0678E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T3	3	60	2.19	1.01389E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T4	4	61	2.23	9.82461E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T5	5	58	2.03	1.04043E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T6	6	58	1.80	9.22547E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T7	7	62	2.30	9.65057E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T8	8	66	3.15	1.09567E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T9	9	67	2.92	9.70864E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T10	10	60	2.17	1.00463E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T11	11	61	2.32	1.02211E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T12	12	72	3.68	9.8594E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T13	13	74	4.49	1.10803E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T14	14	71	4.06	1.13436E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T15	15	70	3.67	1.06997E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T16	16	70	3.36	9.79592E-06
RBT	2	C4E13	0	RBT-CONTROL-E13-T17	17	65	3.05	1.11061E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T18	18	62	2.44	1.0238E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T19	19	63	2.65	1.0598E-05
RBT	2	C4E13	0	RBT-CONTROL-E13-T20	20	60	2.24	1.03704E-05
YEP	2	A1G06	300	YEP-300-G6-T1	1	51	0.97	7.31242E-06
YEP	2	A1G06	300	YEP-300-G6-T2	2	51	1	7.53858E-06
YEP	2	A1G06	300	YEP-300-G6-T3	3	51	0.98	7.38781E-06
YEP	2	A1G06	300	YEP-300-G6-T4	4	48	0.82	7.41464E-06
YEP	2	A1G06	300	YEP-300-G6-T5	5	53	0.9	6.04526E-06
YEP	2	A1G06	300	YEP-300-G6-T6	6	53	1.12	7.52299E-06
YEP	2	A1G06	300	YEP-300-G6-T7	7	49	0.89	7.56488E-06
YEP	2	A1G06	300	YEP-300-G6-T8	8	52	1.17	8.32101E-06

YEP	2	A1G06	300	YEP-300-G6-T9	9	51	1.03	7.76474E-06
YEP	2	A1G06	300	YEP-300-G6-T10	10	52	1.08	7.68093E-06
YEP	2	A2G09	100	YEP-100-G9-T1	1	56	1.34	7.63028E-06
YEP	2	A2G09	100	YEP-100-G9-T2	2	57	1.51	8.15366E-06
YEP	2	A2G09	100	YEP-100-G9-T3	3	50	0.93	0.00000744
YEP	2	A2G09	100	YEP-100-G9-T4	4	55	1.35	8.1142E-06
YEP	2	A2G09	100	YEP-100-G9-T5	5	50	0.89	0.00000712
YEP	2	A2G09	100	YEP-100-G9-T6	6	57	1.35	7.28969E-06
YEP	2	A2G09	100	YEP-100-G9-T7	7	52	1.14	8.10765E-06
YEP	2	A2G09	100	YEP-100-G9-T8	8	59	1.33	6.47583E-06
YEP	2	A2G09	100	YEP-100-G9-T9	9	53	1.04	6.98563E-06
YEP	2	A2G09	100	YEP-100-G9-T10	10	57	1.44	7.77567E-06
YEP	2	A2G09	100	YEP-100-G9-T11	11	54	1.01	6.41416E-06
YEP	2	A2G09	100	YEP-100-G9-T12	12	47	0.8	7.70542E-06
YEP	2	A2G09	100	YEP-100-G9-T13	13	55	1.11	6.67168E-06
YEP	2	A2G09	100	YEP-100-G9-T14	14	50	0.88	0.00000704
YEP	2	A2G09	100	YEP-100-G9-T15	15	55	1.32	7.93388E-06
YEP	2	A2G09	100	YEP-100-G9-T16	16	61	1.55	6.82877E-06
YEP	2	A2G09	100	YEP-100-G9-T17	17	52	1.17	8.32101E-06
YEP	2	A2G09	100	YEP-100-G9-T18	18	55	1.18	7.09241E-06
YEP	2	A2G09	100	YEP-100-G9-T19	19	51	1.07	8.06628E-06
YEP	2	A3G01	50	YEP-50-G1-T1	1	52	1.19	8.46325E-06
YEP	2	A3G01	50	YEP-50-G1-T2	2	58	1.77	9.07171E-06
YEP	2	A3G01	50	YEP-50-G1-T3	3	51	1.23	9.27245E-06
YEP	2	A3G01	50	YEP-50-G1-T4	4	48	1.01	9.13267E-06
YEP	2	A3G01	50	YEP-50-G1-T5	5	55	1.43	8.59504E-06
YEP	2	A3G01	50	YEP-50-G1-T6	6	56	1.62	9.22467E-06
YEP	2	A3G01	50	YEP-50-G1-T7	7	49	0.94	7.98987E-06
YEP	2	A3G01	50	YEP-50-G1-T8	8	53	1.24	8.32902E-06
YEP	2	A3G01	50	YEP-50-G1-T9	9	54	1.34	8.50988E-06
YEP	2	A3G01	50	YEP-50-G1-T10	10	53	1.23	8.26185E-06
YEP	2	A3G01	50	YEP-50-G1-T11	11	54	1.36	8.63689E-06
YEP	2	A3G01	50	YEP-50-G1-T12	12	53	1.03	6.91846E-06
YEP	2	A3G01	50	YEP-50-G1-T13	13	59	1.47	7.1575E-06
YEP	2	A3G01	50	YEP-50-G1-T14	14	51	1.14	8.59398E-06
YEP	2	A3G01	50	YEP-50-G1-T15	15	48	0.83	7.50506E-06
YEP	2	A3G01	50	YEP-50-G1-T16	16	54	1.22	7.7478E-06
YEP	2	A3G01	50	YEP-50-G1-T17	17	52	1.22	8.6766E-06
YEP	2	A3G01	50	YEP-50-G1-T18	18	53	1.19	7.99318E-06
YEP	2	A3G01	50	YEP-50-G1-T19	19	53	1.24	8.32902E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T1	1	57	1.36	7.34369E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T2	2	54	1.17	7.43027E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T3	3	52	1.03	7.32533E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T4	4	60	1.37	6.34259E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T5	5	55	1.21	7.27273E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T6	6	62	1.75	7.34282E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T7	7	50	0.99	0.00000792
YEP	2	A4G08	0	YEP-CONTROL-G8-T8	8	55	1.15	6.9121E-06

YEP	2	A4G08	0	YEP-CONTROL-G8-T9	9	54	1.17	7.43027E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T10	10	51	0.93	7.01088E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T11	11	49	0.96	8.15987E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T12	12	56	1.43	8.14277E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T13	13	53	1.09	7.32148E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T14	14	50	1.08	0.00000864
YEP	2	A4G08	0	YEP-CONTROL-G8-T15	15	51	1	7.53858E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T16	16	55	1.22	7.33283E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T17	17	54	1.3	8.25586E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T18	18	55	1.37	8.23441E-06
YEP	2	A4G08	0	YEP-CONTROL-G8-T19	19	55	1.2	7.21262E-06
YEP	2	A5G10	200	YEP-200-G10-T1	1	54	1.23	7.81131E-06
YEP	2	A5G10	200	YEP-200-G10-T2	2	54	1.1	6.98572E-06
YEP	2	A5G10	200	YEP-200-G10-T3	3	53	0.99	6.64978E-06
YEP	2	A5G10	200	YEP-200-G10-T4	4	46	0.69	7.08885E-06
YEP	2	A5G10	200	YEP-200-G10-T5	5	52	0.93	6.61413E-06
YEP	2	A5G10	200	YEP-200-G10-T6	6	56	1.18	6.71921E-06
YEP	2	A5G10	200	YEP-200-G10-T7	7	57	1.12	6.04774E-06
YEP	2	A5G10	200	YEP-200-G10-T8	8	53	0.96	6.44828E-06
YEP	2	A5G10	200	YEP-200-G10-T9	9	52	1.09	7.75205E-06
YEP	2	A5G10	200	YEP-200-G10-T10	10	47	0.78	7.51279E-06
YEP	2	A5G10	200	YEP-200-G10-T11	11	56	1.1	6.26367E-06
YEP	2	A5G10	200	YEP-200-G10-T12	12	53	1.06	7.11997E-06
YEP	2	A5G10	200	YEP-200-G10-T13	13	56	1.2	6.83309E-06
YEP	2	A5G10	200	YEP-200-G10-T14	14	54	1.03	6.54118E-06
YEP	2	B1G14	50	YEP-50-G14-T1	1	55	1.3	7.81367E-06
YEP	2	B1G14	50	YEP-50-G14-T2	2	47	0.83	7.99438E-06
YEP	2	B1G14	50	YEP-50-G14-T3	3	56	1.32	7.5164E-06
YEP	2	B1G14	50	YEP-50-G14-T4	4	49	1.03	8.75486E-06
YEP	2	B1G14	50	YEP-50-G14-T5	5	57	1.41	7.61368E-06
YEP	2	B1G14	50	YEP-50-G14-T6	6	58	1.62	8.30292E-06
YEP	2	B1G14	50	YEP-50-G14-T7	7	53	1.22	8.19468E-06
YEP	2	B1G14	50	YEP-50-G14-T8	8	53	1.14	7.65733E-06
YEP	2	B1G14	50	YEP-50-G14-T9	9	57	1.44	7.77567E-06
YEP	2	B1G14	50	YEP-50-G14-T10	10	52	0.94	6.68525E-06
YEP	2	B1G14	50	YEP-50-G14-T11	11	57	1.27	6.85771E-06
YEP	2	B1G14	50	YEP-50-G14-T12	12	52	1.09	7.75205E-06
YEP	2	B1G14	50	YEP-50-G14-T13	13	49	0.91	7.73487E-06
YEP	2	B1G14	50	YEP-50-G14-T14	14	57	1.51	8.15366E-06
YEP	2	B1G14	50	YEP-50-G14-T15	15	55	1.41	8.47483E-06
YEP	2	B1G14	50	YEP-50-G14-T16	16	52	1.05	7.46757E-06
YEP	2	B1G14	50	YEP-50-G14-T17	17	56	1.29	7.34557E-06
YEP	2	B1G14	50	YEP-50-G14-T18	18	57	1.2	6.47973E-06
YEP	2	B1G14	50	YEP-50-G14-T19	19	51	0.99	7.46319E-06
YEP	2	B2G12	200	YEP-200-G12-T1	1	51	0.97	7.31242E-06
YEP	2	B2G12	200	YEP-200-G12-T2	2	56	1.31	7.45946E-06
YEP	2	B2G12	200	YEP-200-G12-T3	3	50	0.86	0.00000688
YEP	2	B2G12	200	YEP-200-G12-T4	4	52	1.06	7.53869E-06

YEP	2	B2G12	200	YEP-200-G12-T5	5	47	0.83	7.99438E-06
YEP	2	B2G12	200	YEP-200-G12-T6	6	46	0.74	7.60253E-06
YEP	2	B2G12	200	YEP-200-G12-T7	7	53	0.99	6.64978E-06
YEP	2	B2G12	200	YEP-200-G12-T8	8	58	1.33	6.8166E-06
YEP	2	B2G12	200	YEP-200-G12-T9	9	52	0.95	6.75637E-06
YEP	2	B2G12	200	YEP-200-G12-T10	10	52	1.12	7.96541E-06
YEP	2	B2G12	200	YEP-200-G12-T11	11	45	0.89	9.7668E-06
YEP	2	B2G12	200	YEP-200-G12-T12	12	51	1.02	7.68935E-06
YEP	2	B2G12	200	YEP-200-G12-T13	13	54	1.06	6.7317E-06
YEP	2	B2G12	200	YEP-200-G12-T14	14	49	0.91	7.73487E-06
YEP	2	B2G12	200	YEP-200-G12-T15	15	56	1.22	6.94698E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T1	1	60	1.66	7.68519E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T2	2	57	1.51	8.15366E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T3	3	50	1.13	0.00000904
YEP	2	B3G05	0	YEP-CONTROL-G5-T4	4	57	1.57	8.47764E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T5	5	55	1.17	7.03231E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T6	6	55	1.24	7.45304E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T7	7	52	1.08	7.68093E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T8	8	60	1.54	7.12963E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T9	9	55	1.36	8.17431E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T10	10	57	1.42	7.66768E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T11	11	57	1.24	6.69572E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T12	12	58	1.5	7.68789E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T13	13	50	1.13	0.00000904
YEP	2	B3G05	0	YEP-CONTROL-G5-T14	14	57	1.5	8.09966E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T15	15	55	1.24	7.45304E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T16	16	54	1.24	7.87482E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T17	17	63	1.75	6.99868E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T18	18	57	1.36	7.34369E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T19	19	56	1.26	7.17474E-06
YEP	2	B3G05	0	YEP-CONTROL-G5-T20	20	59	0.64	3.11619E-06
YEP	2	B4G02	100	YEP-100-G2-T1	1	54	1.34	8.50988E-06
YEP	2	B4G02	100	YEP-100-G2-T2	2	43	0.62	7.79806E-06
YEP	2	B4G02	100	YEP-100-G2-T3	3	54	1.29	8.19235E-06
YEP	2	B4G02	100	YEP-100-G2-T4	4	52	0.98	6.96973E-06
YEP	2	B4G02	100	YEP-100-G2-T5	5	53	1.05	7.0528E-06
YEP	2	B4G02	100	YEP-100-G2-T6	6	47	0.73	7.0312E-06
YEP	2	B4G02	100	YEP-100-G2-T7	7	52	1.16	8.24989E-06
YEP	2	B4G02	100	YEP-100-G2-T8	8	54	1.1	6.98572E-06
YEP	2	B4G02	100	YEP-100-G2-T9	9	55	1.28	7.69346E-06
YEP	2	B4G02	100	YEP-100-G2-T10	10	51	0.91	6.86011E-06
YEP	2	B4G02	100	YEP-100-G2-T11	11	55	1.37	8.23441E-06
YEP	2	B4G02	100	YEP-100-G2-T12	12	55	1.39	8.35462E-06
YEP	2	B4G02	100	YEP-100-G2-T13	13	53	1.16	7.79167E-06
YEP	2	B4G02	100	YEP-100-G2-T14	14	54	1.1	6.98572E-06
YEP	2	B4G02	100	YEP-100-G2-T15	15	47	0.65	6.26066E-06
YEP	2	B4G02	100	YEP-100-G2-T16	16	49	0.98	8.32986E-06
YEP	2	B4G02	100	YEP-100-G2-T17	17	51	1	7.53858E-06

YEP	2	B4G02	100	YEP-100-G2-T18	18	52	0.94	6.68525E-06
YEP	2	B5G07	300	YEP-300-G7-T1	1	54	1.19	7.55728E-06
YEP	2	B5G07	300	YEP-300-G7-T2	2	54	1.02	6.47767E-06
YEP	2	B5G07	300	YEP-300-G7-T3	3	55	1.07	6.43125E-06
YEP	2	B5G07	300	YEP-300-G7-T4	4	50	0.92	0.00000736
YEP	2	B5G07	300	YEP-300-G7-T5	5	59	1.39	6.76798E-06
YEP	2	B5G07	300	YEP-300-G7-T6	6	50	0.7	0.0000056
YEP	2	B5G07	300	YEP-300-G7-T7	7	52	0.89	6.32965E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T1	1	55	1.5	9.01578E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T2	2	53	1.13	7.59016E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T3	3	52	1.27	9.0322E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T4	4	54	1.3	8.25586E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T5	5	53	1.35	9.06789E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T6	6	53	1.19	7.99318E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T7	7	56	1.28	7.28863E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T8	8	57	1.36	7.34369E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T9	9	55	1.44	8.65515E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T10	10	52	1.2	8.53437E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T11	11	53	1.21	8.12751E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T12	12	49	0.94	7.98987E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T13	13	51	1.13	8.51859E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T14	14	53	1.24	8.32902E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T15	15	51	1.18	8.89552E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T16	16	56	1.53	8.71219E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T17	17	54	1.16	7.36676E-06
YEP	2	C1G04	0	YEP-CONTROL-G4-T18	18	50	0.99	0.00000792
YEP	2	C1G04	0	YEP-CONTROL-G4-T19	19	50	1.1	0.0000088
YEP	2	C1G04	0	YEP-CONTROL-G4-T20	20	52	1.1	7.82317E-06
YEP	2	C2G11	50	YEP-50-G11-T1	1	54	1.07	6.7952E-06
YEP	2	C2G11	50	YEP-50-G11-T2	2	60	1.55	7.17593E-06
YEP	2	C2G11	50	YEP-50-G11-T3	3	55	1.12	6.73178E-06
YEP	2	C2G11	50	YEP-50-G11-T4	4	52	1.07	7.60981E-06
YEP	2	C2G11	50	YEP-50-G11-T5	5	52	1.14	8.10765E-06
YEP	2	C2G11	50	YEP-50-G11-T6	6	57	1.49	8.04566E-06
YEP	2	C2G11	50	YEP-50-G11-T7	7	55	1.53	9.19609E-06
YEP	2	C2G11	50	YEP-50-G11-T8	8	51	1.05	7.91551E-06
YEP	2	C2G11	50	YEP-50-G11-T9	9	45	0.84	9.21811E-06
YEP	2	C2G11	50	YEP-50-G11-T10	10	52	1.15	8.17877E-06
YEP	2	C2G11	50	YEP-50-G11-T11	11	52	1.22	8.6766E-06
YEP	2	C2G11	50	YEP-50-G11-T12	12	47	0.75	7.22383E-06
YEP	2	C2G11	50	YEP-50-G11-T13	13	49	0.97	8.24486E-06
YEP	2	C2G11	50	YEP-50-G11-T14	14	57	1.46	7.88367E-06
YEP	2	C2G11	50	YEP-50-G11-T15	15	53	1.13	7.59016E-06
YEP	2	C2G11	50	YEP-50-G11-T16	16	58	1.29	6.61159E-06
YEP	2	C2G11	50	YEP-50-G11-T17	17	52	1.06	7.53869E-06
YEP	2	C2G11	50	YEP-50-G11-T18	18	53	1.18	7.92601E-06
YEP	2	C2G11	50	YEP-50-G11-T19	19	56	1.49	8.48442E-06
YEP	2	C2G11	50	YEP-50-G11-T20	20	50	0.89	0.00000712

YEP	2	C3G15	100	YEP-100-G15-T1	1	54	0.98	6.22364E-06
YEP	2	C3G15	100	YEP-100-G15-T2	2	51	1.03	7.76474E-06
YEP	2	C3G15	100	YEP-100-G15-T3	3	53	1.25	8.39619E-06
YEP	2	C3G15	100	YEP-100-G15-T4	4	57	1.42	7.66768E-06
YEP	2	C3G15	100	YEP-100-G15-T5	5	55	1.45	8.71525E-06
YEP	2	C3G15	100	YEP-100-G15-T6	6	55	1.07	6.43125E-06
YEP	2	C3G15	100	YEP-100-G15-T7	7	54	1.18	7.49378E-06
YEP	2	C3G15	100	YEP-100-G15-T8	8	52	0.9	6.40077E-06
YEP	2	C3G15	100	YEP-100-G15-T9	9	53	1.21	8.12751E-06
YEP	2	C3G15	100	YEP-100-G15-T10	10	48	0.92	8.31887E-06
YEP	2	C3G15	100	YEP-100-G15-T11	11	51	0.95	7.16165E-06
YEP	2	C3G15	100	YEP-100-G15-T12	12	47	0.77	7.41647E-06
YEP	2	C3G15	100	YEP-100-G15-T13	13	55	1.4	8.41473E-06
YEP	2	C3G15	100	YEP-100-G15-T14	14	51	1.07	8.06628E-06
YEP	2	C3G15	100	YEP-100-G15-T15	15	54	1.06	6.7317E-06
YEP	2	C3G15	100	YEP-100-G15-T16	16	54	1.18	7.49378E-06
YEP	2	C3G15	100	YEP-100-G15-T17	17	50	0.97	0.00000776
YEP	2	C3G15	100	YEP-100-G15-T18	18	50	1	0.000008
YEP	2	C3G15	100	YEP-100-G15-T19	19	43	0.6	7.54651E-06
YEP	2	C3G15	100	YEP-100-G15-T20	20	52	1.12	7.96541E-06
YEP	2	C4G13	300	YEP-300-G13-T1	1	54	1.22	7.7478E-06
YEP	2	C4G13	300	YEP-300-G13-T2	2	48	0.76	6.87211E-06
YEP	2	C4G13	300	YEP-300-G13-T3	3	54	1.22	7.7478E-06
YEP	2	C4G13	300	YEP-300-G13-T4	4	47	0.89	8.57228E-06
YEP	2	C4G13	300	YEP-300-G13-T5	5	51	0.93	7.01088E-06
YEP	2	C4G13	300	YEP-300-G13-T6	6	54	0.97	6.16014E-06
YEP	2	C4G13	300	YEP-300-G13-T7	7	52	1.04	7.39645E-06
YEP	2	C5G03	200	YEP-200-G3-T1	1	55	1.21	7.27273E-06
YEP	2	C5G03	200	YEP-200-G3-T2	2	54	1.05	6.66819E-06
YEP	2	C5G03	200	YEP-200-G3-T3	3	56	1.13	6.43449E-06
YEP	2	C5G03	200	YEP-200-G3-T4	4	54	1.16	7.36676E-06
YEP	2	C5G03	200	YEP-200-G3-T5	5	52	1.03	7.32533E-06
YEP	2	C5G03	200	YEP-200-G3-T6	6	54	0.94	5.96962E-06
YEP	2	C5G03	200	YEP-200-G3-T7	7	52	1.02	7.25421E-06
YEP	2	C5G03	200	YEP-200-G3-T8	8	55	1.29	7.75357E-06
YEP	2	C5G03	200	YEP-200-G3-T9	9	56	1.32	7.5164E-06
YEP	2	C5G03	200	YEP-200-G3-T10	10	52	1.02	7.25421E-06
YEP	2	C5G03	200	YEP-200-G3-T11	11	58	1.28	6.56033E-06
YEP	2	C5G03	200	YEP-200-G3-T12	12	55	1.22	7.33283E-06
YEP	2	C5G03	200	YEP-200-G3-T13	13	48	0.76	6.87211E-06
YEP	2	C5G03	200	YEP-200-G3-T14	14	47	0.88	8.47596E-06
YEP	2	C5G03	200	YEP-200-G3-T15	15	50	0.9	0.0000072
YEP	2	C5G03	200	YEP-200-G3-T16	16	53	1.16	7.79167E-06
WAE	2	A5F01	50	WAE-50-F1-T1	1	84	3.31	5.58458E-06
WAE	2	A5F01	50	WAE-50-F1-T2	2	70	2.08	6.06414E-06
WAE	2	A5F01	50	WAE-50-F1-T3	3	73	1.94	4.98693E-06
WAE	2	A5F01	50	WAE-50-F1-T4	4	60	1.14	5.27778E-06
WAE	2	A5F01	50	WAE-50-F1-T5	5	77	2.4	5.25701E-06

WAE	2	A5F01	50	WAE-50-F1-T6	6	69	1.87	5.69239E-06
WAE	2	A5F01	50	WAE-50-F1-T7	7	67	1.83	6.08453E-06
WAE	2	A5F01	50	WAE-50-F1-T8	8	80	3.06	5.97656E-06
WAE	2	A5F01	50	WAE-50-F1-T9	9	60	1.04	4.81481E-06
WAE	2	A5F01	50	WAE-50-F1-T10	10	73	1.78	4.57564E-06
WAE	2	A5F01	50	WAE-50-F1-T11	11	63	1.24	4.95907E-06
WAE	2	A5F01	50	WAE-50-F1-T12	12	68	1.84	5.85182E-06
WAE	2	A5F01	50	WAE-50-F1-T13	13	69	1.69	5.14446E-06
WAE	2	A5F01	50	WAE-50-F1-T14	14	75	2.17	5.1437E-06
WAE	2	A5F01	50	WAE-50-F1-T15	15	74	2.5	6.16943E-06
WAE	2	A5F01	50	WAE-50-F1-T16	16	79	2.63	5.33426E-06
WAE	2	A5F01	50	WAE-50-F1-T17	17	82	3.18	5.76747E-06
WAE	2	A5F01	50	WAE-50-F1-T18	18	66	1.27	4.41745E-06
WAE	2	C1F02	300	WAE-300-F2-T1	1	77	2.47	5.41034E-06
WAE	2	C1F02	300	WAE-300-F2-T2	2	77	2.72	5.95795E-06
WAE	2	C1F02	300	WAE-300-F2-T3	3	60	1.39	6.43519E-06
WAE	2	C1F02	300	WAE-300-F2-T4	4	73	2.18	5.60387E-06
WAE	2	C1F02	300	WAE-300-F2-T5	5	70	1.61	4.69388E-06
WAE	2	C1F02	300	WAE-300-F2-T6	6	75	2.45	5.80741E-06
WAE	2	C4F03	100	WAE-100-F3-T1	1	71	1.9	5.30858E-06
WAE	2	C4F03	100	WAE-100-F3-T2	2	68	1.64	5.21575E-06
WAE	2	C4F03	100	WAE-100-F3-T3	3	66	1.69	5.87834E-06
WAE	2	C4F03	100	WAE-100-F3-T4	4	74	2.44	6.02136E-06
WAE	2	C4F03	100	WAE-100-F3-T5	5	70	2.04	5.94752E-06
WAE	2	C4F03	100	WAE-100-F3-T6	6	67	1.74	5.78529E-06
WAE	2	C4F03	100	WAE-100-F3-T7	7	76	2.88	6.56072E-06
WAE	2	C4F03	100	WAE-100-F3-T8	8	70	2.07	6.03499E-06
WAE	2	C4F03	100	WAE-100-F3-T9	9	70	2.08	6.06414E-06
WAE	2	C4F03	100	WAE-100-F3-T10	10	74	2.52	6.21878E-06
WAE	2	C4F03	100	WAE-100-F3-T11	11	55	1.36	8.17431E-06
WAE	2	C4F03	100	WAE-100-F3-T12	12	72	2.39	6.40325E-06
WAE	2	C4F03	100	WAE-100-F3-T13	13	72	2.21	5.921E-06
WAE	2	C4F03	100	WAE-100-F3-T14	14	81	3.28	6.1719E-06
WAE	2	C4F03	100	WAE-100-F3-T15	15	62	1.27	5.32879E-06
WAE	2	C4F03	100	WAE-100-F3-T16	16	82	3.05	5.5317E-06
WAE	2	C4F03	100	WAE-100-F3-T17	17	73	2.31	5.93804E-06
WAE	2	B2F04	100	WAE-100-F4-T1	1	72	2.31	6.18891E-06
WAE	2	B2F04	100	WAE-100-F4-T2	2	75	2.76	6.54222E-06
WAE	2	B2F04	100	WAE-100-F4-T3	3	74	2.56	6.31749E-06
WAE	2	B2F04	100	WAE-100-F4-T4	4	70	1.83	5.33528E-06
WAE	2	B2F04	100	WAE-100-F4-T5	5	78	3.02	6.3639E-06
WAE	2	B2F04	100	WAE-100-F4-T6	6	74	2.4	5.92265E-06
WAE	2	B2F04	100	WAE-100-F4-T7	7	63	1.3	5.19902E-06
WAE	2	B2F04	100	WAE-100-F4-T8	8	83	3.04	5.31667E-06
WAE	2	B2F04	100	WAE-100-F4-T9	9	68	1.53	4.86592E-06
WAE	2	B2F04	100	WAE-100-F4-T10	10	75	2.35	5.57037E-06
WAE	2	B2F04	100	WAE-100-F4-T11	11	75	2.12	5.02519E-06
WAE	2	B2F04	100	WAE-100-F4-T12	12	67	1.73	5.75204E-06

WAE	2	B2F04	100	WAE-100-F4-T13	13	72	2.54	6.80513E-06
WAE	2	B2F04	100	WAE-100-F4-T14	14	77	2.92	6.39603E-06
WAE	2	B2F04	100	WAE-100-F4-T15	15	68	1.58	5.02493E-06
WAE	2	B2F04	100	WAE-100-F4-T16	16	75	2.57	6.09185E-06
WAE	2	B2F04	100	WAE-100-F4-T17	17	62	1.29	5.41271E-06
WAE	2	B2F04	100	WAE-100-F4-T18	18	72	2.13	5.70666E-06
WAE	2	B2F04	100	WAE-100-F4-T19	19	88	3.91	5.73758E-06
WAE	2	B2F04	100	WAE-100-F4-T20	20	66	1.67	5.80878E-06
WAE	2	B2F04	100	WAE-100-F4-T21	21	73	2.26	5.80951E-06
WAE	2	B2F04	100	WAE-100-F4-T22	22	70	1.93	5.62682E-06
WAE	2	B2F04	100	WAE-100-F4-T23	23	70	1.68	4.89796E-06
WAE	2	B2F04	100	WAE-100-F4-T24	24	67	1.72	5.71879E-06
WAE	2	B2F04	100	WAE-100-F4-T25	25	74	2.28	5.62652E-06
WAE	2	B2F04	100	WAE-100-F4-T26	26	67	1.71	5.68554E-06
WAE	2	B2F04	100	WAE-100-F4-T27	27	57	1.44	7.77567E-06
WAE	2	C2F05	200	WAE-200-F5-T1	1	67	1.76	5.85178E-06
WAE	2	C2F05	200	WAE-200-F5-T2	2	69	1.74	5.29666E-06
WAE	2	C2F05	200	WAE-200-F5-T3	3	70	2.11	6.1516E-06
WAE	2	C2F05	200	WAE-200-F5-T4	4	58	1.2	6.15031E-06
WAE	2	C2F05	200	WAE-200-F5-T5	5	60	1.22	5.64815E-06
WAE	2	C2F05	200	WAE-200-F5-T6	6	68	1.99	6.32887E-06
WAE	2	C2F05	200	WAE-200-F5-T7	7	71	1.95	5.44828E-06
WAE	2	C2F05	200	WAE-200-F5-T8	8	67	1.64	5.4528E-06
WAE	2	C2F05	200	WAE-200-F5-T9	9	73	2.33	5.98946E-06
WAE	2	C2F05	200	WAE-200-F5-T10	10	66	1.85	6.43487E-06
WAE	2	C2F05	200	WAE-200-F5-T11	11	68	1.71	5.43838E-06
WAE	2	C2F05	200	WAE-200-F5-T12	12	70	2.23	6.50146E-06
WAE	2	B4F06	300	WAE-300-F6-T1	1	70	2.27	6.61808E-06
WAE	2	B4F06	300	WAE-300-F6-T2	2	69	1.92	5.84459E-06
WAE	2	B1F07	200	WAE-200-F7-T1	1	68	1.98	6.29707E-06
WAE	2	B1F07	200	WAE-200-F7-T2	2	66	1.78	6.19139E-06
WAE	2	B1F07	200	WAE-200-F7-T3	3	72	2.31	6.18891E-06
WAE	2	B1F07	200	WAE-200-F7-T4	4	65	1.6	5.82613E-06
WAE	2	B1F07	200	WAE-200-F7-T5	5	70	1.68	4.89796E-06
WAE	2	B1F07	200	WAE-200-F7-T6	6	65	1.92	6.99135E-06
WAE	2	B1F07	200	WAE-200-F7-T7	7	63	1.2	4.7991E-06
WAE	2	B1F07	200	WAE-200-F7-T8	8	68	1.9	6.04264E-06
WAE	2	B1F07	200	WAE-200-F7-T9	9	67	1.83	6.08453E-06
WAE	2	B1F07	200	WAE-200-F7-T10	10	74	2.55	6.29282E-06
WAE	2	B1F07	200	WAE-200-F7-T11	11	67	1.81	6.01803E-06
WAE	2	B1F07	200	WAE-200-F7-T12	12	70	2.05	5.97668E-06
WAE	2	B1F07	200	WAE-200-F7-T13	13	70	2.01	5.86006E-06
WAE	2	B1F07	200	WAE-200-F7-T14	14	70	2.4	6.99708E-06
WAE	2	B1F07	200	WAE-200-F7-T15	15	55	0.83	4.98873E-06
WAE	2	C5F08	50	WAE-50-F8-T1	1	77	2.77	6.06747E-06
WAE	2	C5F08	50	WAE-50-F8-T2	2	73	2.13	5.47534E-06
WAE	2	C5F08	50	WAE-50-F8-T3	3	69	1.88	5.72283E-06
WAE	2	C5F08	50	WAE-50-F8-T4	4	70	1.84	5.36443E-06

WAE	2	C5F08	50	WAE-50-F8-T5	5	88	4.52	6.6327E-06
WAE	2	C5F08	50	WAE-50-F8-T6	6	67	1.85	6.15102E-06
WAE	2	C5F08	50	WAE-50-F8-T7	7	65	1.56	5.68047E-06
WAE	2	C5F08	50	WAE-50-F8-T8	8	79	2.92	5.92245E-06
WAE	2	C5F08	50	WAE-50-F8-T9	9	70	1.98	5.77259E-06
WAE	2	C5F08	50	WAE-50-F8-T10	10	63	1.38	5.51896E-06
WAE	2	C5F08	50	WAE-50-F8-T11	11	66	1.73	6.01748E-06
WAE	2	C5F08	50	WAE-50-F8-T12	12	76	2.49	5.67229E-06
WAE	2	C5F08	50	WAE-50-F8-T13	13	72	2.04	5.46553E-06
WAE	2	C5F08	50	WAE-50-F8-T14	14	77	2.84	6.2208E-06
WAE	2	C5F08	50	WAE-50-F8-T15	15	68	1.94	6.16986E-06
WAE	2	C5F08	50	WAE-50-F8-T16	16	77	2.69	5.89224E-06
WAE	2	C5F08	50	WAE-50-F8-T17	17	73	2.18	5.60387E-06
WAE	2	C5F08	50	WAE-50-F8-T18	18	78	2.86	6.02674E-06
WAE	2	C5F08	50	WAE-50-F8-T19	19	65	1.43	5.2071E-06
WAE	2	C5F08	50	WAE-50-F8-T20	20	67	1.56	5.18681E-06
WAE	2	A4F09	100	WAE-100-F9-T1	1	76	2.75	6.26458E-06
WAE	2	A4F09	100	WAE-100-F9-T2	2	67	1.69	5.61904E-06
WAE	2	A4F09	100	WAE-100-F9-T3	3	65	1.35	4.91579E-06
WAE	2	A4F09	100	WAE-100-F9-T4	4	76	2.2	5.01166E-06
WAE	2	A4F09	100	WAE-100-F9-T5	5	72	2.05	5.49233E-06
WAE	2	A4F09	100	WAE-100-F9-T6	6	69	1.58	4.80961E-06
WAE	2	A4F09	100	WAE-100-F9-T7	7	72	2.08	5.5727E-06
WAE	2	A4F09	100	WAE-100-F9-T8	8	67	1.44	4.78782E-06
WAE	2	A4F09	100	WAE-100-F9-T9	9	70	2.02	5.88921E-06
WAE	2	A4F09	100	WAE-100-F9-T10	10	76	2.49	5.67229E-06
WAE	2	A4F09	100	WAE-100-F9-T11	11	77	2.72	5.95795E-06
WAE	2	A4F09	100	WAE-100-F9-T12	12	75	2.26	5.35704E-06
WAE	2	A4F09	100	WAE-100-F9-T13	13	71	2.6	7.26438E-06
WAE	2	A4F09	100	WAE-100-F9-T14	14	77	2.85	6.2427E-06
WAE	2	A4F09	100	WAE-100-F9-T15	15	75	2.26	5.35704E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T1	1	73	2.37	6.09228E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T2	2	73	2.56	6.58069E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T3	3	61	1.19	5.24273E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T4	4	59	1.31	6.37845E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T5	5	60	1.19	5.50926E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T6	6	73	2.49	6.40075E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T7	7	71	1.81	5.05712E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T8	8	75	2.38	5.64148E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T9	9	82	2.97	5.3866E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T10	10	67	1.87	6.21752E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T11	11	67	1.94	6.45026E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T12	12	73	2.35	6.04087E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T13	13	70	2.13	6.20991E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T14	14	72	2.34	6.26929E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T15	15	66	1.68	5.84356E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T16	16	72	2.11	5.65308E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T17	17	65	1.23	4.47883E-06

WAE	2	A2F10	0	WAE-CONTROL-F10-T18	18	80	2.98	5.82031E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T19	19	66	1.89	6.574E-06
WAE	2	A2F10	0	WAE-CONTROL-F10-T20	20	60	1.3	6.01852E-06
WAE	2	A3F11	300	WAE-300-F11-T1	1	84	3.6	6.07386E-06
WAE	2	A3F11	300	WAE-300-F11-T2	2	60	1.26	5.83333E-06
WAE	2	A3F11	300	WAE-300-F11-T3	3	64	1.62	6.17981E-06
WAE	2	A3F11	300	WAE-300-F11-T4	4	72	2.68	7.18021E-06
WAE	2	A3F11	300	WAE-300-F11-T5	5	68	2	6.36068E-06
WAE	2	A3F11	300	WAE-300-F11-T6	6	65	1.54	5.60765E-06
WAE	2	A3F11	300	WAE-300-F11-T7	7	75	2.8	6.63704E-06
WAE	2	A3F11	300	WAE-300-F11-T8	8	68	2.12	6.74232E-06
WAE	2	A1F12	200	WAE-200-F12-T1	1	75	2.7	0.0000064
WAE	2	A1F12	200	WAE-200-F12-T2	2	74	1.71	4.21989E-06
WAE	2	A1F12	200	WAE-200-F12-T3	3	66	1.33	4.62615E-06
WAE	2	A1F12	200	WAE-200-F12-T4	4	65	1.78	6.48157E-06
WAE	2	A1F12	200	WAE-200-F12-T5	5	72	1.87	5.01007E-06
WAE	2	A1F12	200	WAE-200-F12-T6	6	68	1.96	6.23346E-06
WAE	2	A1F12	200	WAE-200-F12-T7	7	61	1.29	5.6833E-06
WAE	2	A1F12	200	WAE-200-F12-T8	8	60	0.87	4.02778E-06
WAE	2	A1F12	200	WAE-200-F12-T9	9	77	2.82	6.17699E-06
WAE	2	A1F12	200	WAE-200-F12-T10	10	67	1.81	6.01803E-06
WAE	2	A1F12	200	WAE-200-F12-T11	11	63	1.55	6.19883E-06
WAE	2	A1F12	200	WAE-200-F12-T12	12	78	2.98	6.27961E-06
WAE	2	A1F12	200	WAE-200-F12-T13	13	70	2.51	7.31778E-06
WAE	2	A1F12	200	WAE-200-F12-T14	14	68	1.31	4.16624E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T1	1	62	1.1	4.61549E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T2	2	75	2.5	5.92593E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T3	3	77	2.49	5.45415E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T4	4	65	1.28	4.6609E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T5	5	71	2.28	6.3703E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T6	6	65	1.38	5.02503E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T7	7	75	1.99	4.71704E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T8	8	70	2.13	6.20991E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T9	9	63	1.45	5.79891E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T10	10	75	2.22	5.26222E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T11	11	58	1.15	5.89405E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T12	12	71	2.25	6.28648E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T13	13	65	1.5	5.46199E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T14	14	72	2.48	6.64438E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T15	15	71	1.66	4.63802E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T16	16	62	1.3	5.45467E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T17	17	78	3	6.32175E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T18	18	72	2.26	6.05496E-06
WAE	2	C3F13	0	WAE-CONTROL-F13-T19	19	66	2.18	7.58271E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T1	1	67	1.51	5.02056E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T2	2	75	3.2	7.58519E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T3	3	72	2.22	5.94779E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T4	4	62	1.41	5.91622E-06

WAE	2	B5F14	0	WAE-CONTROL-F14-T5	5	75	2.6	6.16296E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T6	6	67	1.67	5.55254E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T7	7	70	2.02	5.88921E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T8	8	67	1.82	6.05128E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T9	9	68	1.84	5.85182E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T10	10	60	1.15	5.32407E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T11	11	77	2.79	6.11128E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T12	12	76	2.5	5.69507E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T13	13	65	1.33	4.84297E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T14	14	67	1.46	4.85432E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T15	15	63	1.3	5.19902E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T16	16	73	2.5	6.42645E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T17	17	69	2.26	6.87957E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T18	18	55	0.89	5.34936E-06
WAE	2	B5F14	0	WAE-CONTROL-F14-T19	19	80	2.82	5.50781E-06
WAE	2	B2F15	50	WAE-50-F15-T1	1	65	1.1	4.00546E-06
WAE	2	B2F15	50	WAE-50-F15-T2	2	61	1.08	4.75811E-06
WAE	2	B2F15	50	WAE-50-F15-T3	3	62	1.39	5.8323E-06
WAE	2	B2F15	50	WAE-50-F15-T4	4	65	1.32	4.80655E-06
WAE	2	B2F15	50	WAE-50-F15-T5	5	68	1.68	5.34297E-06
WAE	2	B2F15	50	WAE-50-F15-T6	6	66	1.21	4.20875E-06
WAE	2	B2F15	50	WAE-50-F15-T7	7	66	1.63	5.66964E-06
WAE	2	B2F15	50	WAE-50-F15-T8	8	67	1.8	5.98478E-06
WAE	2	B2F15	50	WAE-50-F15-T9	9	61	1.04	4.58188E-06
WAE	2	B2F15	50	WAE-50-F15-T10	10	76	2.73	6.21902E-06
WAE	2	B2F15	50	WAE-50-F15-T11	11	72	2.25	6.02816E-06
WAE	2	B2F15	50	WAE-50-F15-T12	12	61	1.34	5.90358E-06
WAE	2	B2F15	50	WAE-50-F15-T13	13	67	1.65	5.48605E-06
WAE	2	B2F15	50	WAE-50-F15-T14	14	72	2.34	6.26929E-06
WAE	2	B2F15	50	WAE-50-F15-T15	15	68	1.85	5.88363E-06
WAE	2	B2F15	50	WAE-50-F15-T16	16	70	1.94	5.65598E-06
WAE	2	B2F15	50	WAE-50-F15-T17	17	63	1.5	5.99887E-06
WAE	2	B2F15	50	WAE-50-F15-T18	18	62	1.3	5.45467E-06
WAE	2	B2F15	50	WAE-50-F15-T19	19	68	1.53	4.86592E-06
WAE	2	B2F15	50	WAE-50-F15-T20	20	70	1.97	5.74344E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T1	1	58	1.58	8.09791E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T2	2	66	2.69	9.35665E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T3	3	72	3.34	8.94847E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T4	4	64	2.38	9.07898E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T5	5	71	3.02	8.43785E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T6	6	71	3.12	8.71725E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T7	7	60	1.75	8.10185E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T8	8	64	2.04	7.78198E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T9	9	62	2.15	9.02118E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T10	10	58	1.58	8.09791E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T11	11	67	2.55	8.47844E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T12	12	57	1.45	7.82967E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T13	13	64	2.25	8.58307E-06

BKT	2	C1E01	0	BKT-CONTROL-E1-T14	14	72	2.83	7.58209E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T15	15	57	1.39	7.50568E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T16	16	61	1.89	8.32669E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T17	17	64	2.46	9.38416E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T18	18	67	2.5	8.31219E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T19	19	63	2	7.9985E-06
BKT	2	C1E01	0	BKT-CONTROL-E1-T20	20	65	2.32	8.44788E-06
BKT	2	A3E02	100	BKT-100-E2-T1	1	57	1.34	7.23569E-06
BKT	2	A3E02	100	BKT-100-E2-T2	2	63	1.89	7.55858E-06
BKT	2	A3E02	100	BKT-100-E2-T3	3	57	1.35	7.28969E-06
BKT	2	A3E02	100	BKT-100-E2-T4	4	58	1.41	7.22662E-06
BKT	2	A3E02	100	BKT-100-E2-T5	5	55	1.2	7.21262E-06
BKT	2	A3E02	100	BKT-100-E2-T6	6	49	0.75	6.37489E-06
BKT	2	A3E02	100	BKT-100-E2-T7	7	54	1.05	6.66819E-06
BKT	2	A3E02	100	BKT-100-E2-T8	8	56	1.26	7.17474E-06
BKT	2	A3E02	100	BKT-100-E2-T9	9	63	1.77	7.07867E-06
BKT	2	A3E02	100	BKT-100-E2-T10	10	49	0.79	6.71489E-06
BKT	2	A3E02	100	BKT-100-E2-T11	11	53	0.96	6.44828E-06
BKT	2	A3E02	100	BKT-100-E2-T12	12	57	1.14	6.15574E-06
BKT	2	A3E02	100	BKT-100-E2-T13	13	59	1.28	6.23238E-06
BKT	2	A3E02	100	BKT-100-E2-T14	14	55	1.18	7.09241E-06
BKT	2	A3E02	100	BKT-100-E2-T15	15	59	1.3	6.32976E-06
BKT	2	B3E03	50	BKT-50-E3-T1	1	62	1.86	7.80437E-06
BKT	2	B3E03	50	BKT-50-E3-T2	2	57	1.2	6.47973E-06
BKT	2	B3E03	50	BKT-50-E3-T3	3	58	1.54	7.8929E-06
BKT	2	B3E03	50	BKT-50-E3-T4	4	56	1.34	7.63028E-06
BKT	2	B3E03	50	BKT-50-E3-T5	5	61	1.9	8.37074E-06
BKT	2	B3E03	50	BKT-50-E3-T6	6	60	1.84	8.51852E-06
BKT	2	B3E03	50	BKT-50-E3-T7	7	49	0.85	7.22488E-06
BKT	2	B3E03	50	BKT-50-E3-T8	8	41	0.62	8.99581E-06
BKT	2	B3E03	50	BKT-50-E3-T9	9	56	1.44	8.19971E-06
BKT	2	B3E03	50	BKT-50-E3-T10	10	57	1.61	8.69363E-06
BKT	2	B3E03	50	BKT-50-E3-T11	11	55	1.08	6.49136E-06
BKT	2	B3E03	50	BKT-50-E3-T12	12	53	1.12	7.52299E-06
BKT	2	B3E03	50	BKT-50-E3-T13	13	47	0.9	8.6686E-06
BKT	2	B3E03	50	BKT-50-E3-T14	14	53	1.13	7.59016E-06
BKT	2	B3E03	50	BKT-50-E3-T15	15	51	0.97	7.31242E-06
BKT	2	B3E03	50	BKT-50-E3-T16	16	55	1.12	6.73178E-06
BKT	2	B3E03	50	BKT-50-E3-T17	17	61	1.98	8.7232E-06
BKT	2	B3E03	50	BKT-50-E3-T18	18	57	1.4	7.55968E-06
BKT	2	B3E03	50	BKT-50-E3-T19	19	60	1.64	7.59259E-06
BKT	2	B3E03	50	BKT-50-E3-T20	20	59	1.59	7.74178E-06
BKT	2	C5E05	50	BKT-50-E5-T1	1	63	2.2	8.79835E-06
BKT	2	C5E05	50	BKT-50-E5-T2	2	53	1.19	7.99318E-06
BKT	2	C5E05	50	BKT-50-E5-T3	3	50	0.89	0.00000712
BKT	2	C5E05	50	BKT-50-E5-T4	4	59	1.61	7.83917E-06
BKT	2	C5E05	50	BKT-50-E5-T5	5	57	1.44	7.77567E-06
BKT	2	C5E05	50	BKT-50-E5-T6	6	61	1.9	8.37074E-06

BKT	2	C5E05	50	BKT-50-E5-T7	7	57	1.26	6.80371E-06
BKT	2	C5E05	50	BKT-50-E5-T8	8	51	0.95	7.16165E-06
BKT	2	C5E05	50	BKT-50-E5-T9	9	59	1.76	8.56952E-06
BKT	2	C5E05	50	BKT-50-E5-T10	10	54	1.24	7.87482E-06
BKT	2	C5E05	50	BKT-50-E5-T11	11	56	1.45	8.25665E-06
BKT	2	C5E05	50	BKT-50-E5-T12	12	58	1.5	7.68789E-06
BKT	2	C5E05	50	BKT-50-E5-T13	13	59	1.77	8.61821E-06
BKT	2	C5E05	50	BKT-50-E5-T14	14	59	1.55	7.54702E-06
BKT	2	C5E05	50	BKT-50-E5-T15	15	59	1.78	8.6669E-06
BKT	2	C5E05	50	BKT-50-E5-T16	16	56	1.23	7.00392E-06
BKT	2	C5E05	50	BKT-50-E5-T17	17	58	1.52	7.7904E-06
BKT	2	C5E05	50	BKT-50-E5-T18	18	51	1.14	8.59398E-06
BKT	2	C5E05	50	BKT-50-E5-T19	19	57	1.32	7.1277E-06
BKT	2	C5E05	50	BKT-50-E5-T20	20	55	1.14	6.85199E-06
BKT	2	B2E06	100	BKT-100-E6-T1	1	61	1.63	7.18122E-06
BKT	2	B2E06	100	BKT-100-E6-T2	2	54	1.01	6.41416E-06
BKT	2	B2E06	100	BKT-100-E6-T3	3	58	1.3	6.66284E-06
BKT	2	B2E06	100	BKT-100-E6-T4	4	56	1.2	6.83309E-06
BKT	2	B2E06	100	BKT-100-E6-T5	5	45	0.64	7.02332E-06
BKT	2	B2E06	100	BKT-100-E6-T6	6	60	1.68	7.77778E-06
BKT	2	B2E06	100	BKT-100-E6-T7	7	58	1.4	7.17537E-06
BKT	2	B2E06	100	BKT-100-E6-T8	8	57	1.37	7.39769E-06
BKT	2	B2E06	100	BKT-100-E6-T9	9	65	1.86	6.77287E-06
BKT	2	B2E06	100	BKT-100-E6-T10	10	55	1.12	6.73178E-06
BKT	2	B2E06	100	BKT-100-E6-T11	11	62	1.76	7.38478E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T1	1	66	2.57	8.93925E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T2	2	64	2.34	8.92639E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T3	3	63	2.14	8.55839E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T4	4	61	2.23	9.82461E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T5	5	68	2.44	7.76002E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T6	6	58	1.64	8.40543E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T7	7	70	2.84	8.27988E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T8	8	66	2.72	9.461E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T9	9	65	2.4	8.73919E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T10	10	73	3.5	8.99704E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T11	11	57	1.65	8.90962E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T12	12	65	2.27	8.26582E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T13	13	70	3.17	9.24198E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T14	14	63	2.11	8.43841E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T15	15	64	2.26	8.62122E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T16	16	68	2.6	8.26888E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T17	17	59	1.79	8.71559E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T18	18	50	1.06	0.00000848
BKT	2	B5E07	0	BKT-CONTROL-E7-T19	19	58	1.63	8.35418E-06
BKT	2	B5E07	0	BKT-CONTROL-E7-T20	20	60	1.88	8.7037E-06
BKT	2	B4E08	200	BKT-200-E8-T1	1	59	1.25	6.08631E-06
BKT	2	B4E08	200	BKT-200-E8-T2	2	60	1.47	6.80556E-06
BKT	2	B4E08	200	BKT-200-E8-T3	3	57	1.24	6.69572E-06

BKT	2	A2E09	50	BKT-50-E9-T1	1	63	1.98	7.91851E-06
BKT	2	A2E09	50	BKT-50-E9-T2	2	55	1.04	6.25094E-06
BKT	2	A2E09	50	BKT-50-E9-T3	3	54	1.12	7.11274E-06
BKT	2	A2E09	50	BKT-50-E9-T4	4	58	1.53	7.84165E-06
BKT	2	A2E09	50	BKT-50-E9-T5	5	55	1.28	7.69346E-06
BKT	2	A2E09	50	BKT-50-E9-T6	6	62	1.7	7.13303E-06
BKT	2	A2E09	50	BKT-50-E9-T7	7	50	0.83	0.00000664
BKT	2	A2E09	50	BKT-50-E9-T8	8	55	1.16	6.9722E-06
BKT	2	A2E09	50	BKT-50-E9-T9	9	65	2.46	8.95767E-06
BKT	2	A2E09	50	BKT-50-E9-T10	10	52	1.17	8.32101E-06
BKT	2	A2E09	50	BKT-50-E9-T11	11	61	1.71	7.53367E-06
BKT	2	A2E09	50	BKT-50-E9-T12	12	48	0.8	7.2338E-06
BKT	2	A2E09	50	BKT-50-E9-T13	13	49	0.77	6.54489E-06
BKT	2	A2E09	50	BKT-50-E9-T14	14	49	0.83	7.05488E-06
BKT	2	A2E09	50	BKT-50-E9-T15	15	55	1.4	8.41473E-06
BKT	2	A2E09	50	BKT-50-E9-T16	16	56	1.71	9.73715E-06
BKT	2	A2E09	50	BKT-50-E9-T17	17	57	1.61	8.69363E-06
BKT	2	A2E09	50	BKT-50-E9-T18	18	55	1.1	6.61157E-06
BKT	2	A2E09	50	BKT-50-E9-T19	19	54	1.08	6.85871E-06
BKT	2	A2E09	50	BKT-50-E9-T20	20	57	1.47	7.93767E-06
BKT	2	A5E10	200	BKT-200-E10-T1	1	59	1.37	6.67059E-06
BKT	2	A5E10	200	BKT-200-E10-T2	2	61	1.59	7.00499E-06
BKT	2	A5E10	200	BKT-200-E10-T3	3	61	1.6	7.04905E-06
BKT	2	A5E10	200	BKT-200-E10-T4	4	57	1.19	6.42573E-06
BKT	2	A5E10	200	BKT-200-E10-T5	5	60	1.36	6.2963E-06
BKT	2	A5E10	200	BKT-200-E10-T6	6	56	1.3	7.40251E-06
BKT	2	C2E11	100	BKT-100-E11-T1	1	53	1.01	6.78412E-06
BKT	2	C2E11	100	BKT-100-E11-T2	2	52	1.07	7.60981E-06
BKT	2	C2E11	100	BKT-100-E11-T3	3	60	1.62	0.0000075
BKT	2	C2E11	100	BKT-100-E11-T4	4	56	1.09	6.20672E-06
BKT	2	C2E11	100	BKT-100-E11-T5	5	60	1.44	6.66667E-06
BKT	2	C2E11	100	BKT-100-E11-T6	6	57	1.25	6.74972E-06
BKT	2	C2E11	100	BKT-100-E11-T7	7	62	1.7	7.13303E-06
BKT	2	C2E11	100	BKT-100-E11-T8	8	55	1.17	7.03231E-06
BKT	2	C2E11	100	BKT-100-E11-T9	9	58	2.42	1.24031E-05
BKT	2	C2E11	100	BKT-100-E11-T10	10	55	1.13	6.79189E-06
BKT	2	C2E11	100	BKT-100-E11-T11	11	57	1.28	6.91171E-06
BKT	2	C2E11	100	BKT-100-E11-T12	12	54	1.1	6.98572E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T1	1	57	1.51	8.15366E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T2	2	67	2.61	8.67793E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T3	3	66	2.56	8.90447E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T4	4	64	2.01	7.66754E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T5	5	63	1.86	7.4386E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T6	6	64	2.52	9.61304E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T7	7	59	1.66	8.08262E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T8	8	60	1.78	8.24074E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T9	9	63	2.22	8.87833E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T10	10	57	1.55	8.36965E-06

BKT	2	A4E13	0	BKT-CONTROL-E13-T11	11	67	2.43	8.07945E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T12	12	63	2.17	8.67837E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T13	13	61	2.24	9.86867E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T14	14	57	1.49	8.04566E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T15	15	63	2.02	8.07848E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T16	16	54	1.29	8.19235E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T17	17	62	1.9	7.97221E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T18	18	67	2.43	8.07945E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T19	19	61	1.9	8.37074E-06
BKT	2	A4E13	0	BKT-CONTROL-E13-T20	20	59	1.73	8.42345E-06
BKT	2	C4E15	200	BKT-200-E15-T1	1	60	1.68	7.77778E-06
BKT	2	C4E15	200	BKT-200-E15-T2	2	54	1.02	6.47767E-06
BKT	2	C4E15	200	BKT-200-E15-T3	3	66	1.89	6.574E-06
BKT	2	C4E15	200	BKT-200-E15-T4	4	62	1.74	7.30086E-06
BKT	2	C4E15	200	BKT-200-E15-T5	5	55	1.13	6.79189E-06
BKT	2	C4E15	200	BKT-200-E15-T6	6	65	1.99	7.24624E-06
LMB	2	C3E01	100	LMB-100-E1-T1	1	54	1.5	9.52599E-06
LMB	2	C3E01	100	LMB-100-E1-T2	2	43	0.66	8.30116E-06
LMB	2	C3E01	100	LMB-100-E1-T3	3	52	1.3	9.24556E-06
LMB	2	C3E01	100	LMB-100-E1-T4	4	55	1.74	1.04583E-05
LMB	2	C3E01	100	LMB-100-E1-T5	5	45	0.93	1.02058E-05
LMB	2	C3E01	100	LMB-100-E1-T6	6	54	1.56	9.90703E-06
LMB	2	C3E01	100	LMB-100-E1-T7	7	52	1.39	9.88564E-06
LMB	2	C3E01	100	LMB-100-E1-T8	8	44	0.86	1.00958E-05
LMB	2	C3E01	100	LMB-100-E1-T9	9	57	1.71	9.23361E-06
LMB	2	C3E01	100	LMB-100-E1-T10	10	55	1.68	1.00977E-05
LMB	2	C3E01	100	LMB-100-E1-T11	11	43	0.74	9.30736E-06
LMB	2	C3E01	100	LMB-100-E1-T12	12	52	1.38	9.81452E-06
LMB	2	C3E01	100	LMB-100-E1-T13	13	53	1.45	9.73958E-06
LMB	2	C3E01	100	LMB-100-E1-T14	14	48	0.92	8.31887E-06
LMB	2	C3E01	100	LMB-100-E1-T15	15	51	1.37	1.03279E-05
LMB	2	C3E01	100	LMB-100-E1-T16	16	48	1.11	1.00369E-05
LMB	2	C3E01	100	LMB-100-E1-T17	17	45	0.76	8.34019E-06
LMB	2	C3E01	100	LMB-100-E1-T18	18	51	1.37	1.03279E-05
LMB	2	C3E01	100	LMB-100-E1-T19	19	46	0.93	9.55453E-06
LMB	2	C3E01	100	LMB-100-E1-T20	20	47	1.02	9.82441E-06
LMB	2	C5E02	200	LMB-200-E2-T1	1	44	0.66	7.74793E-06
LMB	2	C5E02	200	LMB-200-E2-T2	2	54	1.52	9.653E-06
LMB	2	C5E02	200	LMB-200-E2-T3	3	61	2.27	1.00008E-05
LMB	2	C5E02	200	LMB-200-E2-T4	4	47	0.96	9.24651E-06
LMB	2	C5E02	200	LMB-200-E2-T5	5	51	1.34	1.01017E-05
LMB	2	C5E02	200	LMB-200-E2-T6	6	67	2.96	9.84164E-06
LMB	2	C5E02	200	LMB-200-E2-T7	7	57	1.7	9.17961E-06
LMB	2	C5E02	200	LMB-200-E2-T8	8	45	0.8	8.77915E-06
LMB	2	C5E02	200	LMB-200-E2-T9	9	51	1.28	9.64938E-06
LMB	2	C5E02	200	LMB-200-E2-T10	10	54	1.44	9.14495E-06
LMB	2	C5E02	200	LMB-200-E2-T11	11	54	1.47	9.33547E-06
LMB	2	C5E02	200	LMB-200-E2-T12	12	44	0.89	1.0448E-05

LMB	2	B5E03	200	LMB-200-E3-T1	1	52	1.43	1.01701E-05
LMB	2	B5E03	200	LMB-200-E3-T2	2	49	1.13	9.60484E-06
LMB	2	B5E03	200	LMB-200-E3-T3	3	52	1.28	9.10332E-06
LMB	2	B5E03	200	LMB-200-E3-T4	4	55	1.68	1.00977E-05
LMB	2	B5E03	200	LMB-200-E3-T5	5	47	1.14	1.09802E-05
LMB	2	B5E03	200	LMB-200-E3-T6	6	55	1.74	1.04583E-05
LMB	2	B5E03	200	LMB-200-E3-T7	7	49	1.18	1.00298E-05
LMB	2	B5E03	200	LMB-200-E3-T8	8	52	1.42	1.0099E-05
LMB	2	B5E03	200	LMB-200-E3-T9	9	50	1.15	0.0000092
LMB	2	B5E03	200	LMB-200-E3-T10	10	54	1.59	1.00975E-05
LMB	2	B5E03	200	LMB-200-E3-T11	11	62	2.23	9.35685E-06
LMB	2	B5E03	200	LMB-200-E3-T12	12	54	1.57	9.97053E-06
LMB	2	C2E04	50	LMB-50-E4-T1	1	55	1.78	1.06987E-05
LMB	2	C2E04	50	LMB-50-E4-T2	2	51	1.29	9.72477E-06
LMB	2	C2E04	50	LMB-50-E4-T3	3	49	1.24	1.05398E-05
LMB	2	C2E04	50	LMB-50-E4-T4	4	53	1.56	1.04784E-05
LMB	2	C2E04	50	LMB-50-E4-T5	5	56	1.72	9.7941E-06
LMB	2	C2E04	50	LMB-50-E4-T6	6	47	1.07	1.0306E-05
LMB	2	C2E04	50	LMB-50-E4-T7	7	59	2.39	1.1637E-05
LMB	2	C2E04	50	LMB-50-E4-T8	8	45	0.83	9.10837E-06
LMB	2	C2E04	50	LMB-50-E4-T9	9	45	1.01	1.10837E-05
LMB	2	C2E04	50	LMB-50-E4-T10	10	52	1.48	1.05257E-05
LMB	2	C2E04	50	LMB-50-E4-T11	11	58	2.08	1.06605E-05
LMB	2	C2E04	50	LMB-50-E4-T12	12	55	1.54	9.2562E-06
LMB	2	C2E04	50	LMB-50-E4-T13	13	47	1.06	1.02097E-05
LMB	2	C2E04	50	LMB-50-E4-T14	14	55	1.83	1.09992E-05
LMB	2	C2E04	50	LMB-50-E4-T15	15	49	1.18	1.00298E-05
LMB	2	C2E04	50	LMB-50-E4-T16	16	46	0.9	9.24632E-06
LMB	2	C2E04	50	LMB-50-E4-T17	17	59	1.94	9.44595E-06
LMB	2	C2E04	50	LMB-50-E4-T18	18	44	0.89	1.0448E-05
LMB	2	C2E04	50	LMB-50-E4-T19	19	48	1.13	1.02177E-05
LMB	2	B4E05	300	LMB-300-E5-T1	1	53	1.4	9.40374E-06
LMB	2	B4E05	300	LMB-300-E5-T2	2	47	1.07	1.0306E-05
LMB	2	A4E06	100	LMB-100-E6-T1	1	47	0.94	9.05387E-06
LMB	2	A4E06	100	LMB-100-E6-T2	2	60	2.13	9.86111E-06
LMB	2	A4E06	100	LMB-100-E6-T3	3	47	0.96	9.24651E-06
LMB	2	A4E06	100	LMB-100-E6-T4	4	62	2.34	9.8184E-06
LMB	2	A4E06	100	LMB-100-E6-T5	5	49	1.14	9.68984E-06
LMB	2	A4E06	100	LMB-100-E6-T6	6	51	1.36	1.02525E-05
LMB	2	A4E06	100	LMB-100-E6-T7	7	50	1.28	0.00001024
LMB	2	A4E06	100	LMB-100-E6-T8	8	45	0.94	1.03155E-05
LMB	2	A4E06	100	LMB-100-E6-T9	9	49	1.2	1.01998E-05
LMB	2	A4E06	100	LMB-100-E6-T10	10	46	0.96	9.86274E-06
LMB	2	A4E06	100	LMB-100-E6-T11	11	55	1.6	9.61683E-06
LMB	2	A4E06	100	LMB-100-E6-T12	12	57	1.81	9.77359E-06
LMB	2	A4E06	100	LMB-100-E6-T13	13	51	1.42	1.07048E-05
LMB	2	A4E06	100	LMB-100-E6-T14	14	43	0.72	9.05581E-06
LMB	2	A4E06	100	LMB-100-E6-T15	15	56	1.73	9.85104E-06

LMB	2	A4E06	100	LMB-100-E6-T16	16	51	1.37	1.03279E-05
LMB	2	A4E06	100	LMB-100-E6-T17	17	48	1.12	1.01273E-05
LMB	2	A4E06	100	LMB-100-E6-T18	18	47	0.9	8.6686E-06
LMB	2	A2E07	300	LMB-300-E7-T1	1	55	1.52	9.13599E-06
LMB	2	A2E07	300	LMB-300-E7-T2	2	56	1.69	9.62327E-06
LMB	2	A2E07	300	LMB-300-E7-T3	3	56	1.69	9.62327E-06
LMB	2	A2E07	300	LMB-300-E7-T4	4	47	0.91	8.76492E-06
LMB	2	A2E07	300	LMB-300-E7-T5	5	46	0.9	9.24632E-06
LMB	2	C4E08	0	LMB-CONTROL-E8-T1	1	52	1.59	1.1308E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T2	2	49	1.26	1.07098E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T3	3	47	1.12	1.07876E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T4	4	57	1.88	1.01516E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T5	5	50	1.33	0.00001064
LMB	2	C4E08	0	LMB-CONTROL-E8-T6	6	46	0.89	9.14359E-06
LMB	2	C4E08	0	LMB-CONTROL-E8-T7	7	52	1.29	9.17444E-06
LMB	2	C4E08	0	LMB-CONTROL-E8-T8	8	54	1.64	1.04151E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T9	9	61	2.29	1.0089E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T10	10	57	1.83	9.88158E-06
LMB	2	C4E08	0	LMB-CONTROL-E8-T11	11	48	1.27	1.14837E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T12	12	50	1.38	0.00001104
LMB	2	C4E08	0	LMB-CONTROL-E8-T13	13	49	1.28	1.08798E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T14	14	49	1.22	1.03698E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T15	15	51	1.33	1.00263E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T16	16	54	1.7	1.07961E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T17	17	45	1.06	1.16324E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T18	18	48	1.23	1.1122E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T19	19	42	0.76	1.02581E-05
LMB	2	C4E08	0	LMB-CONTROL-E8-T20	20	48	1.13	1.02177E-05
LMB	2	C1E09	300	LMB-300-E9-T1	1	61	2.24	9.86867E-06
LMB	2	A5E10	50	LMB-50-E10-T1	1	49	1.19	1.01148E-05
LMB	2	A5E10	50	LMB-50-E10-T2	2	54	1.63	1.03516E-05
LMB	2	A5E10	50	LMB-50-E10-T3	3	46	1.07	1.09928E-05
LMB	2	A5E10	50	LMB-50-E10-T4	4	46	1.03	1.05819E-05
LMB	2	A5E10	50	LMB-50-E10-T5	5	46	1.09	1.11983E-05
LMB	2	A5E10	50	LMB-50-E10-T6	6	48	1.08	9.76563E-06
LMB	2	A5E10	50	LMB-50-E10-T7	7	47	1.1	1.0595E-05
LMB	2	A5E10	50	LMB-50-E10-T8	8	50	1.27	0.00001016
LMB	2	A5E10	50	LMB-50-E10-T9	9	49	1.2	1.01998E-05
LMB	2	A5E10	50	LMB-50-E10-T10	10	49	1.24	1.05398E-05
LMB	2	A5E10	50	LMB-50-E10-T11	11	51	1.3	9.80015E-06
LMB	2	A5E10	50	LMB-50-E10-T12	12	50	1.4	0.0000112
LMB	2	A5E10	50	LMB-50-E10-T13	13	53	1.55	1.04113E-05
LMB	2	A5E10	50	LMB-50-E10-T14	14	51	1.46	1.10063E-05
LMB	2	A5E10	50	LMB-50-E10-T15	15	47	1.14	1.09802E-05
LMB	2	A5E10	50	LMB-50-E10-T16	16	60	2.16	0.00001
LMB	2	A5E10	50	LMB-50-E10-T17	17	45	0.93	1.02058E-05
LMB	2	A5E10	50	LMB-50-E10-T18	18	52	1.49	1.05968E-05
LMB	2	A5E10	50	LMB-50-E10-T19	19	59	2.1	1.0225E-05

LMB	2	A5E10	50	LMB-50-E10-T20	20	56	1.87	1.06482E-05
LMB	2	A1E11	200	LMB-200-E11-T1	1	55	1.56	9.37641E-06
LMB	2	A1E11	200	LMB-200-E11-T2	2	43	0.81	1.01878E-05
LMB	2	A1E11	200	LMB-200-E11-T3	3	55	1.6	9.61683E-06
LMB	2	A1E11	200	LMB-200-E11-T4	4	59	2.12	1.03224E-05
LMB	2	A1E11	200	LMB-200-E11-T5	5	44	0.78	9.15665E-06
LMB	2	A1E11	200	LMB-200-E11-T6	6	44	0.79	9.27404E-06
LMB	2	A1E11	200	LMB-200-E11-T7	7	66	2.73	9.49578E-06
LMB	2	A1E11	200	LMB-200-E11-T8	8	57	1.83	9.88158E-06
LMB	2	A1E11	200	LMB-200-E11-T9	9	57	1.36	7.34369E-06
LMB	2	A1E11	200	LMB-200-E11-T10	10	56	1.69	9.62327E-06
LMB	2	A1E11	200	LMB-200-E11-T11	11	56	1.59	9.05384E-06
LMB	2	A1E11	200	LMB-200-E11-T12	12	50	1.15	0.0000092
LMB	2	A1E11	200	LMB-200-E11-T13	13	47	1.09	1.04986E-05
LMB	2	A1E11	200	LMB-200-E11-T14	14	42	0.66	8.90833E-06
LMB	2	A3E12	0	LMB-CONTROL-E12-T1	1	47	1.11	1.06913E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T2	2	47	1.06	1.02097E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T3	3	50	1.3	0.0000104
LMB	2	A3E12	0	LMB-CONTROL-E12-T4	4	47	1.1	1.0595E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T5	5	49	1.3	1.10498E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T6	6	52	1.47	1.04546E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T7	7	49	1.12	9.51984E-06
LMB	2	A3E12	0	LMB-CONTROL-E12-T8	8	61	2.47	1.0882E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T9	9	47	1.16	1.11729E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T10	10	57	1.88	1.01516E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T11	11	49	1.3	1.10498E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T12	12	46	1.08	1.10956E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T13	13	49	1.23	1.04548E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T14	14	50	1.26	0.00001008
LMB	2	A3E12	0	LMB-CONTROL-E12-T15	15	42	0.74	9.98812E-06
LMB	2	A3E12	0	LMB-CONTROL-E12-T16	16	59	2.14	1.04198E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T17	17	45	0.77	8.44993E-06
LMB	2	A3E12	0	LMB-CONTROL-E12-T18	18	53	1.46	9.80675E-06
LMB	2	A3E12	0	LMB-CONTROL-E12-T19	19	49	1.31	1.11348E-05
LMB	2	A3E12	0	LMB-CONTROL-E12-T20	20	44	0.98	1.15045E-05
LMB	2	B2E13	100	LMB-100-E13-T1	1	50	1.3	0.0000104
LMB	2	B2E13	100	LMB-100-E13-T2	2	41	0.64	9.28599E-06
LMB	2	B2E13	100	LMB-100-E13-T3	3	49	1.17	9.94484E-06
LMB	2	B2E13	100	LMB-100-E13-T4	4	51	1.35	1.01771E-05
LMB	2	B2E13	100	LMB-100-E13-T5	5	47	1.05	1.01134E-05
LMB	2	B2E13	100	LMB-100-E13-T6	6	51	1.41	1.06294E-05
LMB	2	B2E13	100	LMB-100-E13-T7	7	46	0.91	9.34906E-06
LMB	2	B2E13	100	LMB-100-E13-T8	8	54	1.48	9.39897E-06
LMB	2	B2E13	100	LMB-100-E13-T9	9	45	0.97	1.06447E-05
LMB	2	B2E13	100	LMB-100-E13-T10	10	47	0.97	9.34282E-06
LMB	2	B2E13	100	LMB-100-E13-T11	11	49	1.17	9.94484E-06
LMB	2	B2E13	100	LMB-100-E13-T12	12	52	1.3	9.24556E-06
LMB	2	B2E13	100	LMB-100-E13-T13	13	47	1.07	1.0306E-05

LMB	2	B2E13	100	LMB-100-E13-T14	14	44	0.83	9.74361E-06
LMB	2	B2E13	100	LMB-100-E13-T15	15	47	1.15	1.10765E-05
LMB	2	B2E13	100	LMB-100-E13-T16	16	46	1.08	1.10956E-05
LMB	2	B2E13	100	LMB-100-E13-T17	17	51	1.26	9.49861E-06
LMB	2	B2E13	100	LMB-100-E13-T18	18	44	0.91	1.06828E-05
LMB	2	B2E13	100	LMB-100-E13-T19	19	43	0.85	1.06909E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T1	1	51	1.45	1.09309E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T2	2	51	1.42	1.07048E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T3	3	50	1.24	0.00000992
LMB	2	B3E14	0	LMB-CONTROL-E14-T4	4	44	0.86	1.00958E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T5	5	43	0.84	1.05651E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T6	6	59	2.02	9.83547E-06
LMB	2	B3E14	0	LMB-CONTROL-E14-T7	7	46	1.05	1.07874E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T8	8	50	1.28	0.00001024
LMB	2	B3E14	0	LMB-CONTROL-E14-T9	9	55	1.83	1.09992E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T10	10	54	1.84	1.16852E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T11	11	43	0.78	9.81046E-06
LMB	2	B3E14	0	LMB-CONTROL-E14-T12	12	49	1.22	1.03698E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T13	13	52	1.49	1.05968E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T14	14	52	1.42	1.0099E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T15	15	44	0.93	1.09175E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T16	16	49	1.27	1.07948E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T17	17	46	1.15	1.18147E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T18	18	54	1.66	1.05421E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T19	19	46	1.06	1.08901E-05
LMB	2	B3E14	0	LMB-CONTROL-E14-T20	20	53	1.59	1.068E-05
LMB	2	B1E15	50	LMB-50-E15-T1	1	50	1.39	0.00001112
LMB	2	B1E15	50	LMB-50-E15-T2	2	45	0.91	9.98628E-06
LMB	2	B1E15	50	LMB-50-E15-T3	3	55	1.77	1.06386E-05
LMB	2	B1E15	50	LMB-50-E15-T4	4	45	0.91	9.98628E-06
LMB	2	B1E15	50	LMB-50-E15-T5	5	48	1.32	1.19358E-05
LMB	2	B1E15	50	LMB-50-E15-T6	6	47	0.98	9.43914E-06
LMB	2	B1E15	50	LMB-50-E15-T7	7	47	1.04	1.0017E-05
LMB	2	B1E15	50	LMB-50-E15-T8	8	47	0.97	9.34282E-06
LMB	2	B1E15	50	LMB-50-E15-T9	9	47	1.15	1.10765E-05
LMB	2	B1E15	50	LMB-50-E15-T10	10	52	1.59	1.1308E-05
LMB	2	B1E15	50	LMB-50-E15-T11	11	50	1.3	0.0000104
LMB	2	B1E15	50	LMB-50-E15-T12	12	49	1.17	9.94484E-06
LMB	2	B1E15	50	LMB-50-E15-T13	13	47	1.09	1.04986E-05
LMB	2	B1E15	50	LMB-50-E15-T14	14	52	1.4	9.95676E-06
LMB	2	B1E15	50	LMB-50-E15-T15	15	54	1.45	9.20845E-06
LMB	2	B1E15	50	LMB-50-E15-T16	16	49	1.19	1.01148E-05
LMB	2	B1E15	50	LMB-50-E15-T17	17	53	1.44	9.67241E-06
LMB	2	B1E15	50	LMB-50-E15-T18	18	48	1.18	1.06698E-05
LMB	2	B1E15	50	LMB-50-E15-T19	19	61	2.18	9.60433E-06
LMB	2	B1E15	50	LMB-50-E15-T20	20	45	0.92	1.0096E-05
SMB	2	A1D01	100	SMB-100-D1-T1	1	56	2.01	1.14454E-05
SMB	2	A1D01	100	SMB-100-D1-T2	2	48	1.12	1.01273E-05

SMB	2	A1D01	100	SMB-100-D1-T3	3	49	1.22	1.03698E-05
SMB	2	A1D01	100	SMB-100-D1-T4	4	52	1.55	1.10236E-05
SMB	2	A1D01	100	SMB-100-D1-T5	5	56	1.83	1.04205E-05
SMB	2	A1D01	100	SMB-100-D1-T6	6	57	2.08	1.12315E-05
SMB	2	A1D01	100	SMB-100-D1-T7	7	54	1.75	1.11137E-05
SMB	2	A1D01	100	SMB-100-D1-T8	8	54	1.64	1.04151E-05
SMB	2	A1D01	100	SMB-100-D1-T9	9	53	1.64	1.10158E-05
SMB	2	A1D01	100	SMB-100-D1-T10	10	55	1.74	1.04583E-05
SMB	2	A1D01	100	SMB-100-D1-T11	11	55	1.67	1.00376E-05
SMB	2	A1D01	100	SMB-100-D1-T12	12	55	1.81	1.0879E-05
SMB	2	A1D01	100	SMB-100-D1-T13	13	47	1.07	1.0306E-05
SMB	2	A1D01	100	SMB-100-D1-T14	14	53	1.51	1.01426E-05
SMB	2	A1D01	100	SMB-100-D1-T15	15	47	1.02	9.82441E-06
SMB	2	A1D01	100	SMB-100-D1-T16	16	52	1.47	1.04546E-05
SMB	2	A1D01	100	SMB-100-D1-T17	17	58	2.14	1.09681E-05
SMB	2	A1D01	100	SMB-100-D1-T18	18	55	1.85	1.11195E-05
SMB	2	A1D01	100	SMB-100-D1-T19	19	57	2.1	1.13395E-05
SMB	2	C3D02	50	SMB-50-D2-T1	1	64	2.7	1.02997E-05
SMB	2	C3D02	50	SMB-50-D2-T2	2	62	2.5	1.04897E-05
SMB	2	C3D02	50	SMB-50-D2-T3	3	55	1.77	1.06386E-05
SMB	2	C3D02	50	SMB-50-D2-T4	4	57	2	1.07995E-05
SMB	2	C3D02	50	SMB-50-D2-T5	5	57	2.01	1.08535E-05
SMB	2	C3D02	50	SMB-50-D2-T6	6	53	1.63	1.09486E-05
SMB	2	C3D02	50	SMB-50-D2-T7	7	52	2.04	1.45084E-05
SMB	2	C3D02	50	SMB-50-D2-T8	8	55	1.69	1.01578E-05
SMB	2	C3D02	50	SMB-50-D2-T9	9	55	1.72	1.03381E-05
SMB	2	C3D02	50	SMB-50-D2-T10	10	51	1.3	9.80015E-06
SMB	2	C3D02	50	SMB-50-D2-T11	11	49	1.18	1.00298E-05
SMB	2	C3D02	50	SMB-50-D2-T12	12	60	2.14	9.90741E-06
SMB	2	C3D02	50	SMB-50-D2-T13	13	54	1.7	1.07961E-05
SMB	2	C3D02	50	SMB-50-D2-T14	14	58	2.08	1.06605E-05
SMB	2	C3D02	50	SMB-50-D2-T15	15	59	1.98	9.64071E-06
SMB	2	C3D02	50	SMB-50-D2-T16	16	62	2.91	1.22101E-05
SMB	2	C3D02	50	SMB-50-D2-T17	17	54	1.58	1.0034E-05
SMB	2	C3D02	50	SMB-50-D2-T18	18	53	1.6	1.07471E-05
SMB	2	C3D02	50	SMB-50-D2-T19	19	49	1.22	1.03698E-05
SMB	2	C3D02	50	SMB-50-D2-T20	20	57	2.02	1.09075E-05
SMB	2	A3D03	50	SMB-50-D3-T1	1	58	2.05	1.05068E-05
SMB	2	A3D03	50	SMB-50-D3-T2	2	56	1.94	1.10468E-05
SMB	2	A3D03	50	SMB-50-D3-T3	3	58	2.28	1.16856E-05
SMB	2	A3D03	50	SMB-50-D3-T4	4	56	1.98	1.12746E-05
SMB	2	A3D03	50	SMB-50-D3-T5	5	57	1.48	7.99166E-06
SMB	2	A3D03	50	SMB-50-D3-T6	6	57	2.2	1.18795E-05
SMB	2	A3D03	50	SMB-50-D3-T7	7	56	1.98	1.12746E-05
SMB	2	A3D03	50	SMB-50-D3-T8	8	55	1.86	1.11796E-05
SMB	2	A3D03	50	SMB-50-D3-T9	9	55	1.55	9.3163E-06
SMB	2	A3D03	50	SMB-50-D3-T10	10	58	2.04	1.04555E-05
SMB	2	A3D03	50	SMB-50-D3-T11	11	54	1.71	1.08596E-05

SMB	2	A3D03	50	SMB-50-D3-T12	12	55	1.72	1.03381E-05
SMB	2	A3D03	50	SMB-50-D3-T13	13	53	1.61	1.08143E-05
SMB	2	A3D03	50	SMB-50-D3-T14	14	57	2.18	1.17715E-05
SMB	2	A3D03	50	SMB-50-D3-T15	15	47	1.14	1.09802E-05
SMB	2	A3D03	50	SMB-50-D3-T16	16	58	1.95	9.99426E-06
SMB	2	A3D03	50	SMB-50-D3-T17	17	54	1.66	1.05421E-05
SMB	2	A3D03	50	SMB-50-D3-T18	18	53	1.67	1.12173E-05
SMB	2	B3D04	100	SMB-100-D4-T1	1	58	2.07	1.06093E-05
SMB	2	B3D04	100	SMB-100-D4-T2	2	55	1.62	9.73704E-06
SMB	2	B3D04	100	SMB-100-D4-T3	3	57	2.08	1.12315E-05
SMB	2	B3D04	100	SMB-100-D4-T4	4	50	1.47	0.00001176
SMB	2	B3D04	100	SMB-100-D4-T5	5	57	1.92	1.03676E-05
SMB	2	B3D04	100	SMB-100-D4-T6	6	56	1.83	1.04205E-05
SMB	2	B3D04	100	SMB-100-D4-T7	7	56	2.06	1.17301E-05
SMB	2	B3D04	100	SMB-100-D4-T8	8	63	2.83	1.13179E-05
SMB	2	B3D04	100	SMB-100-D4-T9	9	53	1.59	1.068E-05
SMB	2	B3D04	100	SMB-100-D4-T10	10	51	1.35	1.01771E-05
SMB	2	B3D04	100	SMB-100-D4-T11	11	57	1.95	1.05296E-05
SMB	2	B3D04	100	SMB-100-D4-T12	12	52	1.45	1.03124E-05
SMB	2	B3D04	100	SMB-100-D4-T13	13	53	1.68	1.12845E-05
SMB	2	B3D04	100	SMB-100-D4-T14	14	57	2.04	1.10155E-05
SMB	2	B3D04	100	SMB-100-D4-T15	15	51	1.43	1.07802E-05
SMB	2	B3D04	100	SMB-100-D4-T16	16	61	2.54	1.11904E-05
SMB	2	B3D04	100	SMB-100-D4-T17	17	56	1.94	1.10468E-05
SMB	2	B3D04	100	SMB-100-D4-T18	18	55	1.83	1.09992E-05
SMB	2	B3D04	100	SMB-100-D4-T19	19	51	1.33	1.00263E-05
SMB	2	B2D05	200	SMB-200-D5-T1	1	57	1.89	1.02056E-05
SMB	2	B2D05	200	SMB-200-D5-T2	2	52	1.38	9.81452E-06
SMB	2	B2D05	200	SMB-200-D5-T3	3	55	1.56	9.37641E-06
SMB	2	B2D05	200	SMB-200-D5-T4	4	48	1	9.04225E-06
SMB	2	B2D05	200	SMB-200-D5-T5	5	53	1.6	1.07471E-05
SMB	2	B2D05	200	SMB-200-D5-T6	6	65	3.25	1.18343E-05
SMB	2	B2D05	200	SMB-200-D5-T7	7	51	1.16	8.74475E-06
SMB	2	B2D05	200	SMB-200-D5-T8	8	54	1.65	1.04786E-05
SMB	2	B2D05	200	SMB-200-D5-T9	9	57	1.88	1.01516E-05
SMB	2	B2D05	200	SMB-200-D5-T10	10	57	1.97	1.06376E-05
SMB	2	B2D05	200	SMB-200-D5-T11	11	47	1.12	1.07876E-05
SMB	2	B2D05	200	SMB-200-D5-T12	12	56	1.77	1.00788E-05
SMB	2	B2D05	200	SMB-200-D5-T13	13	50	1.22	0.00000976
SMB	2	B2D05	200	SMB-200-D5-T14	14	58	2.02	1.0353E-05
SMB	2	B2D05	200	SMB-200-D5-T15	15	56	1.82	1.03635E-05
SMB	2	B2D05	200	SMB-200-D5-T16	16	56	1.9	1.08191E-05
SMB	2	B2D05	200	SMB-200-D5-T17	17	64	2.83	1.07956E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T1	1	62	2.79	1.17066E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T2	2	50	1.49	0.00001192
SMB	2	A2D06	0	SMB-CONTROL-D6-T3	3	54	1.87	1.18757E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T4	4	59	2.32	1.12962E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T5	5	52	1.71	1.21615E-05

SMB	2	A2D06	0	SMB-CONTROL-D6-T6	6	56	2.04	1.16163E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T7	7	54	1.77	1.12407E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T8	8	57	2.02	1.09075E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T9	9	54	1.73	1.09866E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T10	10	56	1.89	1.07621E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T11	11	51	1.54	1.16094E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T12	12	51	1.44	1.08556E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T13	13	55	1.86	1.11796E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T14	14	57	2.04	1.10155E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T15	15	55	1.8	1.08189E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T16	16	49	1.24	1.05398E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T17	17	55	1.83	1.09992E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T18	18	59	2.16	1.05171E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T19	19	52	1.67	1.1877E-05
SMB	2	A2D06	0	SMB-CONTROL-D6-T20	20	57	2.06	1.11235E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T1	1	63	2.68	1.0718E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T2	2	59	2.27	1.10527E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T3	3	57	1.98	1.06915E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T4	4	57	2.2	1.18795E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T5	5	58	2.18	1.11731E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T6	6	56	2.01	1.14454E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T7	7	55	1.78	1.06987E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T8	8	49	1.38	1.17298E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T9	9	54	1.74	1.10501E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T10	10	52	1.41	1.00279E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T11	11	54	1.79	1.13677E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T12	12	52	1.62	1.15214E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T13	13	60	2.6	1.2037E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T14	14	55	1.79	1.07588E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T15	15	55	1.91	1.14801E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T16	16	56	2.04	1.16163E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T17	17	57	2.07	1.11775E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T18	18	57	1.98	1.06915E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T19	19	55	1.78	1.06987E-05
SMB	2	C1D07	0	SMB-CONTROL-D7-T20	20	53	1.67	1.12173E-05
SMB	2	B5D08	50	SMB-50-D8-T1	1	65	2.79	1.01593E-05
SMB	2	B5D08	50	SMB-50-D8-T2	2	60	2.32	1.07407E-05
SMB	2	B5D08	50	SMB-50-D8-T3	3	58	2.06	1.0558E-05
SMB	2	B5D08	50	SMB-50-D8-T4	4	54	1.67	1.06056E-05
SMB	2	B5D08	50	SMB-50-D8-T5	5	53	1.7	1.14188E-05
SMB	2	B5D08	50	SMB-50-D8-T6	6	54	1.63	1.03516E-05
SMB	2	B5D08	50	SMB-50-D8-T7	7	59	2.25	1.09554E-05
SMB	2	B5D08	50	SMB-50-D8-T8	8	51	1.38	1.04032E-05
SMB	2	B5D08	50	SMB-50-D8-T9	9	55	1.83	1.09992E-05
SMB	2	B5D08	50	SMB-50-D8-T10	10	56	1.74	9.90798E-06
SMB	2	B5D08	50	SMB-50-D8-T11	11	56	1.91	1.0876E-05
SMB	2	B5D08	50	SMB-50-D8-T12	12	57	1.96	1.05836E-05
SMB	2	B5D08	50	SMB-50-D8-T13	13	50	1.33	0.00001064

SMB	2	B5D08	50	SMB-50-D8-T14	14	54	1.9	1.20663E-05
SMB	2	B5D08	50	SMB-50-D8-T15	15	56	2.09	1.1901E-05
SMB	2	B5D08	50	SMB-50-D8-T16	16	57	1.55	8.36965E-06
SMB	2	B5D08	50	SMB-50-D8-T17	17	52	1.47	1.04546E-05
SMB	2	B5D08	50	SMB-50-D8-T18	18	54	1.72	1.09231E-05
SMB	2	B5D08	50	SMB-50-D8-T19	19	53	1.67	1.12173E-05
SMB	2	B5D08	50	SMB-50-D8-T20	20	54	1.53	9.71651E-06
SMB	2	A5D09	300	SMB-300-D9-T1	1	62	2.57	1.07835E-05
SMB	2	A5D09	300	SMB-300-D9-T2	2	57	1.74	9.3956E-06
SMB	2	A5D09	300	SMB-300-D9-T3	3	51	1.35	1.01771E-05
SMB	2	C2D11	100	SMB-100-D11-T1	1	54	1.62	1.02881E-05
SMB	2	C2D11	100	SMB-100-D11-T2	2	48	0.95	8.59013E-06
SMB	2	C2D11	100	SMB-100-D11-T3	3	55	1.75	1.05184E-05
SMB	2	C2D11	100	SMB-100-D11-T4	4	53	1.68	1.12845E-05
SMB	2	C2D11	100	SMB-100-D11-T5	5	55	1.7	1.02179E-05
SMB	2	C2D11	100	SMB-100-D11-T6	6	59	2.38	1.15883E-05
SMB	2	C2D11	100	SMB-100-D11-T7	7	66	3.4	1.18263E-05
SMB	2	C2D11	100	SMB-100-D11-T8	8	55	1.75	1.05184E-05
SMB	2	C2D11	100	SMB-100-D11-T9	9	53	1.33	8.93355E-06
SMB	2	C2D11	100	SMB-100-D11-T10	10	56	1.99	1.13315E-05
SMB	2	C2D11	100	SMB-100-D11-T11	11	54	1.55	9.84352E-06
SMB	2	C2D11	100	SMB-100-D11-T12	12	45	0.97	1.06447E-05
SMB	2	C2D11	100	SMB-100-D11-T13	13	56	1.89	1.07621E-05
SMB	2	C2D11	100	SMB-100-D11-T14	14	54	1.51	9.58949E-06
SMB	2	C2D11	100	SMB-100-D11-T15	15	55	1.54	9.2562E-06
SMB	2	C2D11	100	SMB-100-D11-T16	16	55	1.83	1.09992E-05
SMB	2	C5D12	200	SMB-200-D12-T1	1	60	2.31	1.06944E-05
SMB	2	C5D12	200	SMB-200-D12-T2	2	55	1.9	1.142E-05
SMB	2	C5D12	200	SMB-200-D12-T3	3	57	2.06	1.11235E-05
SMB	2	C5D12	200	SMB-200-D12-T4	4	48	1.13	1.02177E-05
SMB	2	C5D12	200	SMB-200-D12-T5	5	55	1.56	9.37641E-06
SMB	2	C5D12	200	SMB-200-D12-T6	6	57	1.97	1.06376E-05
SMB	2	C5D12	200	SMB-200-D12-T7	7	58	2.18	1.11731E-05
SMB	2	C5D12	200	SMB-200-D12-T8	8	57	1.96	1.05836E-05
SMB	2	C5D12	200	SMB-200-D12-T9	9	63	3.01	1.20377E-05
SMB	2	C5D12	200	SMB-200-D12-T10	10	54	1.57	9.97053E-06
SMB	2	C4D13	300	SMB-300-D13-T1	1	55	1.9	1.142E-05
SMB	2	C4D13	300	SMB-300-D13-T2	2	47	1.18	1.13655E-05
SMB	2	C4D13	300	SMB-300-D13-T3	3	54	1.63	1.03516E-05
SMB	2	C4D13	300	SMB-300-D13-T4	4	53	1.43	9.60524E-06
SMB	2	C4D13	300	SMB-300-D13-T5	5	48	1.06	9.58478E-06
SMB	2	C4D13	300	SMB-300-D13-T6	6	53	1.56	1.04784E-05
SMB	2	C4D13	300	SMB-300-D13-T7	7	55	1.7	1.02179E-05
SMB	2	C4D13	300	SMB-300-D13-T8	8	51	0.99	7.46319E-06
SMB	2	B4D14	300	SMB-300-D14-T1	1	60	2.52	1.16667E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T1	1	62	2.95	1.23779E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T2	2	60	2.47	1.14352E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T3	3	60	2.45	1.13426E-05

SMB	2	B1D15	0	SMB-CONTROL-D15-T4	4	60	2.49	1.15278E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T5	5	60	2.56	1.18519E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T6	6	59	2.34	1.13936E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T7	7	50	1.65	0.0000132
SMB	2	B1D15	0	SMB-CONTROL-D15-T8	8	56	1.95	1.11038E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T9	9	51	1.49	1.12325E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T10	10	50	1.41	0.00001128
SMB	2	B1D15	0	SMB-CONTROL-D15-T11	11	66	3.35	1.16523E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T12	12	57	2.08	1.12315E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T13	13	60	2.33	1.0787E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T14	14	58	2.28	1.16856E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T15	15	62	2.6	1.09093E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T16	16	57	2.22	1.19875E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T17	17	60	2.61	1.20833E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T18	18	51	1.49	1.12325E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T19	19	46	1.11	1.14038E-05
SMB	2	B1D15	0	SMB-CONTROL-D15-T20	20	56	2.07	1.17871E-05
BLG	2	A2E01	100	BLG-100-E1-T1	1	60	3.44	1.59259E-05
BLG	2	A2E01	100	BLG-100-E1-T2	2	48	1.69	1.52814E-05
BLG	2	A2E01	100	BLG-100-E1-T3	3	57	2.58	1.39314E-05
BLG	2	A2E01	100	BLG-100-E1-T4	4	48	1.83	1.65473E-05
BLG	2	A2E01	100	BLG-100-E1-T5	5	47	1.62	1.56035E-05
BLG	2	A2E01	100	BLG-100-E1-T6	6	50	2	0.000016
BLG	2	A2E01	100	BLG-100-E1-T7	7	50	1.8	0.0000144
BLG	2	A2E01	100	BLG-100-E1-T8	8	54	2.72	1.72738E-05
BLG	2	A2E01	100	BLG-100-E1-T9	9	51	2.01	1.51525E-05
BLG	2	A2E01	100	BLG-100-E1-T10	10	43	1.32	1.66023E-05
BLG	2	A2E01	100	BLG-100-E1-T11	11	48	1.76	1.59144E-05
BLG	2	A2E01	100	BLG-100-E1-T12	12	47	1.68	1.61814E-05
BLG	2	A2E01	100	BLG-100-E1-T13	13	43	1.13	1.42126E-05
BLG	2	A2E01	100	BLG-100-E1-T14	14	58	2.85	1.4607E-05
BLG	2	A2E01	100	BLG-100-E1-T15	15	58	2.71	1.38895E-05
BLG	2	A2E01	100	BLG-100-E1-T16	16	49	1.9	1.61497E-05
BLG	2	A2E01	100	BLG-100-E1-T17	17	52	2.01	1.42951E-05
BLG	2	A2E01	100	BLG-100-E1-T18	18	54	2.05	1.30188E-05
BLG	2	A2E01	100	BLG-100-E1-T19	19	53	2.09	1.40384E-05
BLG	2	A2E01	100	BLG-100-E1-T20	20	54	2.11	1.33999E-05
BLG	2	A3E02	300	BLG-300-E2-T1	1	62	3.55	1.48954E-05
BLG	2	A3E02	300	BLG-300-E2-T2	2	51	1.92	1.44741E-05
BLG	2	A3E02	300	BLG-300-E2-T3	3	50	1.81	0.00001448
BLG	2	A3E02	300	BLG-300-E2-T4	4	42	1.41	1.90314E-05
BLG	2	A3E02	300	BLG-300-E2-T5	5	47	1.63	1.56998E-05
BLG	2	A3E02	300	BLG-300-E2-T6	6	50	1.65	0.0000132
BLG	2	A3E02	300	BLG-300-E2-T7	7	60	3.31	1.53241E-05
BLG	2	A3E02	300	BLG-300-E2-T8	8	58	2.38	1.21981E-05
BLG	2	A3E02	300	BLG-300-E2-T9	9	41	1.31	1.90073E-05
BLG	2	A3E02	300	BLG-300-E2-T10	10	51	1.54	1.16094E-05
BLG	2	A3E02	300	BLG-300-E2-T11	11	47	1.52	1.46403E-05

BLG	2	A3E02	300	BLG-300-E2-T12	12	50	1.68	0.00001344
BLG	2	A3E02	300	BLG-300-E2-T13	13	50	1.79	0.00001432
BLG	2	A3E02	300	BLG-300-E2-T14	14	54	2.27	1.4416E-05
BLG	2	A3E02	300	BLG-300-E2-T15	15	55	2.27	1.36439E-05
BLG	2	A3E02	300	BLG-300-E2-T16	16	45	1.28	1.40466E-05
BLG	2	C3E03	300	BLG-300-E3-T1	1	55	2.71	1.62885E-05
BLG	2	C3E03	300	BLG-300-E3-T2	2	59	2.78	1.3536E-05
BLG	2	C3E03	300	BLG-300-E3-T3	3	50	1.76	0.00001408
BLG	2	C3E03	300	BLG-300-E3-T4	4	47	1.58	1.52182E-05
BLG	2	C3E03	300	BLG-300-E3-T5	5	43	1.05	1.32064E-05
BLG	2	C3E03	300	BLG-300-E3-T6	6	65	3.49	1.27082E-05
BLG	2	C3E03	300	BLG-300-E3-T7	7	52	2.15	1.52907E-05
BLG	2	C3E03	300	BLG-300-E3-T8	8	50	1.54	0.00001232
BLG	2	C3E03	300	BLG-300-E3-T9	9	39	0.78	1.31492E-05
BLG	2	C3E03	300	BLG-300-E3-T10	10	44	1.1	1.29132E-05
BLG	2	C3E03	300	BLG-300-E3-T11	11	54	2.25	1.4289E-05
BLG	2	C3E03	300	BLG-300-E3-T12	12	64	3.57	1.36185E-05
BLG	2	C3E03	300	BLG-300-E3-T13	13	45	1.26	1.38272E-05
BLG	2	C3E03	300	BLG-300-E3-T14	14	56	2.49	1.41787E-05
BLG	2	C3E03	300	BLG-300-E3-T15	15	46	1.33	1.3664E-05
BLG	2	C3E03	300	BLG-300-E3-T16	16	47	1.33	1.28103E-05
BLG	2	C4E04	100	BLG-100-E4-T1	1	51	2.17	1.63587E-05
BLG	2	C4E04	100	BLG-100-E4-T2	2	53	2.11	1.41728E-05
BLG	2	C4E04	100	BLG-100-E4-T3	3	52	1.79	1.27304E-05
BLG	2	C4E04	100	BLG-100-E4-T4	4	49	1.71	1.45348E-05
BLG	2	C4E04	100	BLG-100-E4-T5	5	46	1.31	1.34585E-05
BLG	2	C4E04	100	BLG-100-E4-T6	6	65	4.35	1.58398E-05
BLG	2	C4E04	100	BLG-100-E4-T7	7	64	4.07	1.55258E-05
BLG	2	C4E04	100	BLG-100-E4-T8	8	49	2.23	1.89547E-05
BLG	2	C4E04	100	BLG-100-E4-T9	9	59	3.18	1.54836E-05
BLG	2	C4E04	100	BLG-100-E4-T10	10	54	2.06	1.30824E-05
BLG	2	C4E04	100	BLG-100-E4-T11	11	54	2.38	1.51146E-05
BLG	2	C4E04	100	BLG-100-E4-T12	12	52	1.94	1.37972E-05
BLG	2	C4E04	100	BLG-100-E4-T13	13	54	2.25	1.4289E-05
BLG	2	C4E04	100	BLG-100-E4-T14	14	53	2.12	1.42399E-05
BLG	2	C4E04	100	BLG-100-E4-T15	15	52	1.93	1.37261E-05
BLG	2	C4E04	100	BLG-100-E4-T16	16	54	2.22	1.40985E-05
BLG	2	C4E04	100	BLG-100-E4-T17	17	56	2.06	1.17301E-05
BLG	2	C4E04	100	BLG-100-E4-T18	18	43	1.16	1.45899E-05
BLG	2	C4E04	100	BLG-100-E4-T19	19	44	1.2	1.40872E-05
BLG	2	C4E04	100	BLG-100-E4-T20	20	48	1.37	1.23879E-05
BLG	2	C5E05	200	BLG-200-E5-T1	1	63	3.59	1.43573E-05
BLG	2	C5E05	200	BLG-200-E5-T2	2	57	2.72	1.46874E-05
BLG	2	C5E05	200	BLG-200-E5-T3	3	56	2.28	1.29829E-05
BLG	2	C5E05	200	BLG-200-E5-T4	4	45	1.29	1.41564E-05
BLG	2	C5E05	200	BLG-200-E5-T5	5	44	1.1	1.29132E-05
BLG	2	C5E05	200	BLG-200-E5-T6	6	37	0.67	1.32273E-05
BLG	2	C5E05	200	BLG-200-E5-T7	7	51	1.89	1.42479E-05

BLG	2	C5E05	200	BLG-200-E5-T8	8	60	2.84	1.31481E-05
BLG	2	C5E05	200	BLG-200-E5-T9	9	54	2.26	1.43525E-05
BLG	2	C5E05	200	BLG-200-E5-T10	10	58	2.96	1.51708E-05
BLG	2	C5E05	200	BLG-200-E5-T11	11	65	2.86	1.04142E-05
BLG	2	C5E05	200	BLG-200-E5-T12	12	51	2.53	1.90726E-05
BLG	2	C5E05	200	BLG-200-E5-T13	13	54	2.2	1.39714E-05
BLG	2	C5E05	200	BLG-200-E5-T14	14	65	2.41	8.7756E-06
BLG	2	C5E05	200	BLG-200-E5-T15	15	50	1.85	0.0000148
BLG	2	C5E05	200	BLG-200-E5-T16	16	49	1.63	1.38548E-05
BLG	2	C5E05	200	BLG-200-E5-T17	17	47	1.37	1.31955E-05
BLG	2	C5E05	200	BLG-200-E5-T18	18	54	2.08	1.32094E-05
BLG	2	B2E06	100	BLG-100-E6-T1	1	63	3.67	1.46772E-05
BLG	2	B2E06	100	BLG-100-E6-T2	2	60	2.97	0.00001375
BLG	2	B2E06	100	BLG-100-E6-T3	3	58	2.71	1.38895E-05
BLG	2	B2E06	100	BLG-100-E6-T4	4	48	1.35	1.2207E-05
BLG	2	B2E06	100	BLG-100-E6-T5	5	49	1.42	1.20698E-05
BLG	2	B2E06	100	BLG-100-E6-T6	6	55	2.11	1.26822E-05
BLG	2	B2E06	100	BLG-100-E6-T7	7	45	1.28	1.40466E-05
BLG	2	B2E06	100	BLG-100-E6-T8	8	59	2.87	1.39742E-05
BLG	2	B2E06	100	BLG-100-E6-T9	9	60	3.12	1.44444E-05
BLG	2	B2E06	100	BLG-100-E6-T10	10	58	2.69	1.3787E-05
BLG	2	B2E06	100	BLG-100-E6-T11	11	59	2.92	1.42176E-05
BLG	2	B2E06	100	BLG-100-E6-T12	12	54	2.23	1.4162E-05
BLG	2	B2E06	100	BLG-100-E6-T13	13	55	2.39	1.43651E-05
BLG	2	B2E06	100	BLG-100-E6-T14	14	44	1.1	1.29132E-05
BLG	2	B2E06	100	BLG-100-E6-T15	15	50	1.64	0.00001312
BLG	2	B2E06	100	BLG-100-E6-T16	16	54	2	1.27013E-05
BLG	2	B2E06	100	BLG-100-E6-T17	17	54	1.58	1.0034E-05
BLG	2	B2E06	100	BLG-100-E6-T18	18	47	1.4	1.34845E-05
BLG	2	B2E06	100	BLG-100-E6-T19	19	49	1.75	1.48748E-05
BLG	2	B2E06	100	BLG-100-E6-T20	20	50	1.73	0.00001384
BLG	2	C1E07	50	BLG-50-E7-T1	1	48	1.6	1.44676E-05
BLG	2	C1E07	50	BLG-50-E7-T2	2	56	2.49	1.41787E-05
BLG	2	C1E07	50	BLG-50-E7-T3	3	54	2.14	1.35904E-05
BLG	2	C1E07	50	BLG-50-E7-T4	4	55	2.33	1.40045E-05
BLG	2	C1E07	50	BLG-50-E7-T5	5	49	1.76	1.49598E-05
BLG	2	C1E07	50	BLG-50-E7-T6	6	62	3.36	1.40982E-05
BLG	2	C1E07	50	BLG-50-E7-T7	7	57	2.37	1.27975E-05
BLG	2	C1E07	50	BLG-50-E7-T8	8	49	1.84	1.56397E-05
BLG	2	C1E07	50	BLG-50-E7-T9	9	53	2.06	1.38369E-05
BLG	2	C1E07	50	BLG-50-E7-T10	10	57	2.57	1.38774E-05
BLG	2	C1E07	50	BLG-50-E7-T11	11	49	1.61	1.36848E-05
BLG	2	C1E07	50	BLG-50-E7-T12	12	50	1.68	0.00001344
BLG	2	C1E07	50	BLG-50-E7-T13	13	50	1.67	0.00001336
BLG	2	C1E07	50	BLG-50-E7-T14	14	48	1.5	1.35634E-05
BLG	2	C1E07	50	BLG-50-E7-T15	15	55	2.38	1.4305E-05
BLG	2	C1E07	50	BLG-50-E7-T16	16	48	1.11	1.00369E-05
BLG	2	C1E07	50	BLG-50-E7-T17	17	50	1.8	0.0000144

BLG	2	C1E07	50	BLG-50-E7-T18	18	43	1.14	1.43384E-05
BLG	2	C1E07	50	BLG-50-E7-T19	19	43	0.81	1.01878E-05
BLG	2	C1E07	50	BLG-50-E7-T20	20	49	1.58	1.34298E-05
BLG	2	B5E08	300	BLG-300-E8-T1	1	54	2.14	1.35904E-05
BLG	2	B5E08	300	BLG-300-E8-T2	2	46	1.4	1.43832E-05
BLG	2	B5E08	300	BLG-300-E8-T3	3	52	1.76	1.25171E-05
BLG	2	B5E08	300	BLG-300-E8-T4	4	46	1.47	1.51023E-05
BLG	2	B5E08	300	BLG-300-E8-T5	5	48	1.68	1.5191E-05
BLG	2	B5E08	300	BLG-300-E8-T6	6	49	1.48	1.25798E-05
BLG	2	B5E08	300	BLG-300-E8-T7	7	50	1.73	0.00001384
BLG	2	B5E08	300	BLG-300-E8-T8	8	55	2.31	1.38843E-05
BLG	2	B5E08	300	BLG-300-E8-T9	9	57	2.54	1.37154E-05
BLG	2	B5E08	300	BLG-300-E8-T10	10	55	2.36	1.41848E-05
BLG	2	B5E08	300	BLG-300-E8-T11	11	51	1.77	1.33433E-05
BLG	2	B5E08	300	BLG-300-E8-T12	12	62	3.43	1.43919E-05
BLG	2	B5E08	300	BLG-300-E8-T13	13	64	3.76	1.43433E-05
BLG	2	B5E08	300	BLG-300-E8-T14	14	59	2.73	1.32925E-05
BLG	2	B5E08	300	BLG-300-E8-T15	15	59	2.68	1.3049E-05
BLG	2	B5E08	300	BLG-300-E8-T16	16	50	1.89	0.00001512
BLG	2	A5E09	200	BLG-200-E9-T1	1	63	3.62	1.44773E-05
BLG	2	A5E09	200	BLG-200-E9-T2	2	54	2.13	1.35269E-05
BLG	2	A5E09	200	BLG-200-E9-T3	3	53	1.98	1.32996E-05
BLG	2	A5E09	200	BLG-200-E9-T4	4	52	2.07	1.47218E-05
BLG	2	A5E09	200	BLG-200-E9-T5	5	55	2.27	1.36439E-05
BLG	2	A5E09	200	BLG-200-E9-T6	6	55	2.58	1.55071E-05
BLG	2	A5E09	200	BLG-200-E9-T7	7	53	2.19	1.47101E-05
BLG	2	A5E09	200	BLG-200-E9-T8	8	51	2.03	1.53033E-05
BLG	2	A5E09	200	BLG-200-E9-T9	9	60	3.17	1.46759E-05
BLG	2	A5E09	200	BLG-200-E9-T10	10	52	1.97	1.40106E-05
BLG	2	A5E09	200	BLG-200-E9-T11	11	53	2.13	1.43071E-05
BLG	2	A5E09	200	BLG-200-E9-T12	12	55	2.44	1.46657E-05
BLG	2	A5E09	200	BLG-200-E9-T13	13	65	3.89	1.41648E-05
BLG	2	A5E09	200	BLG-200-E9-T14	14	52	2.03	1.44373E-05
BLG	2	A5E09	200	BLG-200-E9-T15	15	50	1.78	0.00001424
BLG	2	A5E09	200	BLG-200-E9-T16	16	45	1.06	1.16324E-05
BLG	2	A5E09	200	BLG-200-E9-T17	17	45	1.16	1.27298E-05
BLG	2	A5E09	200	BLG-200-E9-T18	18	59	2.72	1.32438E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T1	1	57	2.56	1.38234E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T2	2	55	2.6	1.56273E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T3	3	46	1.34	1.37667E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T4	4	53	2.05	1.37698E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T5	5	47	1.4	1.34845E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T6	6	61	3.57	1.57282E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T7	7	52	1.75	1.24459E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T8	8	50	1.75	0.000014
BLG	2	C2E10	0	BLG-CONTROL-E10-T9	9	60	3.46	1.60185E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T10	10	51	1.94	1.46248E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T11	11	66	4.12	1.43306E-05

BLG	2	C2E10	0	BLG-CONTROL-E10-T12	12	53	2.15	1.44415E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T13	13	59	3.04	1.48019E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T14	14	50	1.73	0.00001384
BLG	2	C2E10	0	BLG-CONTROL-E10-T15	15	49	1.7	1.44498E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T16	16	52	1.89	1.34416E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T17	17	62	3.64	1.52731E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T18	18	51	1.82	1.37202E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T19	19	48	1.54	1.39251E-05
BLG	2	C2E10	0	BLG-CONTROL-E10-T20	20	45	1.31	1.43759E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T1	1	58	2.84	1.45557E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T2	2	48	1.68	1.5191E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T3	3	56	2.64	1.50328E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T4	4	54	1.7	1.07961E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T5	5	55	1.8	1.08189E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T6	6	63	3.54	1.41573E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T7	7	58	2.99	1.53245E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T8	8	52	2.14	1.52196E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T9	9	55	2.31	1.38843E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T10	10	55	2.36	1.41848E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T11	11	52	2.03	1.44373E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T12	12	52	1.97	1.40106E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T13	13	57	2.64	1.42554E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T14	14	63	3.7	1.47972E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T15	15	51	2.04	1.53787E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T16	16	50	1.83	0.00001464
BLG	2	A1E11	0	BLG-CONTROL-E11-T17	17	49	1.81	1.53847E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T18	18	45	1.19	1.3059E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T19	19	45	1.36	1.49246E-05
BLG	2	A1E11	0	BLG-CONTROL-E11-T20	20	45	1.39	1.52538E-05
BLG	2	B4E12	50	BLG-50-E12-T1	1	65	4	1.45653E-05
BLG	2	B4E12	50	BLG-50-E12-T2	2	51	1.9	1.43233E-05
BLG	2	B4E12	50	BLG-50-E12-T3	3	53	2.16	1.45086E-05
BLG	2	B4E12	50	BLG-50-E12-T4	4	55	2.6	1.56273E-05
BLG	2	B4E12	50	BLG-50-E12-T5	5	52	1.99	1.41528E-05
BLG	2	B4E12	50	BLG-50-E12-T6	6	65	3.83	1.39463E-05
BLG	2	B4E12	50	BLG-50-E12-T7	7	54	2.37	1.50511E-05
BLG	2	B4E12	50	BLG-50-E12-T8	8	53	2.03	1.36354E-05
BLG	2	B4E12	50	BLG-50-E12-T9	9	57	2.58	1.39314E-05
BLG	2	B4E12	50	BLG-50-E12-T10	10	56	2.48	1.41217E-05
BLG	2	B4E12	50	BLG-50-E12-T11	11	60	3.21	1.48611E-05
BLG	2	B4E12	50	BLG-50-E12-T12	12	54	2.26	1.43525E-05
BLG	2	B4E12	50	BLG-50-E12-T13	13	60	3.15	1.45833E-05
BLG	2	B4E12	50	BLG-50-E12-T14	14	54	2.02	1.28283E-05
BLG	2	B4E12	50	BLG-50-E12-T15	15	51	1.94	1.46248E-05
BLG	2	B4E12	50	BLG-50-E12-T16	16	58	3.13	1.60421E-05
BLG	2	B4E12	50	BLG-50-E12-T17	17	55	2.34	1.40646E-05
BLG	2	B4E12	50	BLG-50-E12-T18	18	55	1.73	1.03982E-05
BLG	2	B4E12	50	BLG-50-E12-T19	19	47	1.36	1.30992E-05

BLG	2	A4E13	50	BLG-50-E13-T1	1	64	3.78	1.44196E-05
BLG	2	A4E13	50	BLG-50-E13-T2	2	59	2.3	1.11988E-05
BLG	2	A4E13	50	BLG-50-E13-T3	3	60	3.12	1.44444E-05
BLG	2	A4E13	50	BLG-50-E13-T4	4	55	2.46	1.47859E-05
BLG	2	A4E13	50	BLG-50-E13-T5	5	51	1.84	1.3871E-05
BLG	2	A4E13	50	BLG-50-E13-T6	6	60	3.94	1.82407E-05
BLG	2	A4E13	50	BLG-50-E13-T7	7	50	1.86	0.00001488
BLG	2	A4E13	50	BLG-50-E13-T8	8	59	3.04	1.48019E-05
BLG	2	A4E13	50	BLG-50-E13-T9	9	63	3.68	1.47172E-05
BLG	2	A4E13	50	BLG-50-E13-T10	10	60	3.62	1.67593E-05
BLG	2	A4E13	50	BLG-50-E13-T11	11	52	1.89	1.34416E-05
BLG	2	A4E13	50	BLG-50-E13-T12	12	50	1.73	0.00001384
BLG	2	A4E13	50	BLG-50-E13-T13	13	45	1.21	1.32785E-05
BLG	2	A4E13	50	BLG-50-E13-T14	14	50	1.72	0.00001376
BLG	2	A4E13	50	BLG-50-E13-T15	15	50	1.82	0.00001456
BLG	2	A4E13	50	BLG-50-E13-T16	16	47	1.51	1.4544E-05
BLG	2	A4E13	50	BLG-50-E13-T17	17	49	1.3	1.10498E-05
BLG	2	A4E13	50	BLG-50-E13-T18	18	52	1.72	1.22326E-05
BLG	2	A4E13	50	BLG-50-E13-T19	19	52	1.81	1.28727E-05
BLG	2	A4E13	50	BLG-50-E13-T20	20	44	1.26	1.47915E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T1	1	61	3.12	1.37456E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T2	2	61	3.17	1.39659E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T3	3	57	2.73	1.47414E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T4	4	50	1.78	0.00001424
BLG	2	B3E14	0	BLG-CONTROL-E14-T5	5	46	1.52	1.5616E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T6	6	56	2.44	1.3894E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T7	7	55	2.36	1.41848E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T8	8	48	1.55	1.40155E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T9	9	55	2.58	1.55071E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T10	10	55	2.43	1.46056E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T11	11	49	1.61	1.36848E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T12	12	62	2.71	1.13709E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T13	13	57	2.78	1.50114E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T14	14	61	3.28	1.44505E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T15	15	54	2.53	1.60672E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T16	16	54	2.35	1.4924E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T17	17	47	1.63	1.56998E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T18	18	54	2.07	1.31459E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T19	19	51	1.93	1.45495E-05
BLG	2	B3E14	0	BLG-CONTROL-E14-T20	20	50	1.92	0.00001536
BLG	2	B1E15	200	BLG-200-E15-T1	1	55	2.39	1.43651E-05
BLG	2	B1E15	200	BLG-200-E15-T2	2	52	1.96	1.39395E-05
BLG	2	B1E15	200	BLG-200-E15-T3	3	55	2.46	1.47859E-05
BLG	2	B1E15	200	BLG-200-E15-T4	4	54	1.5	9.52599E-06
BLG	2	B1E15	200	BLG-200-E15-T5	5	43	1.1	1.38353E-05
BLG	2	B1E15	200	BLG-200-E15-T6	6	65	4.01	1.46017E-05
BLG	2	B1E15	200	BLG-200-E15-T7	7	64	3.73	1.42288E-05
BLG	2	B1E15	200	BLG-200-E15-T8	8	65	4.17	1.51843E-05

BLG	2	B1E15	200	BLG-200-E15-T9	9	54	2.15	1.36539E-05
BLG	2	B1E15	200	BLG-200-E15-T10	10	45	1.2	1.31687E-05
BLG	2	B1E15	200	BLG-200-E15-T11	11	54	2.15	1.36539E-05
BLG	2	B1E15	200	BLG-200-E15-T12	12	51	1.88	1.41725E-05
BLG	2	B1E15	200	BLG-200-E15-T13	13	46	1.18	1.2123E-05
BLG	2	B1E15	200	BLG-200-E15-T14	14	50	1.84	0.00001472
BLG	2	B1E15	200	BLG-200-E15-T15	15	49	1.48	1.25798E-05
LST	2	A2G13	200	LST-200-G13-T1	1	107	4.25	3.46927E-06
LST	2	A4G04	0	LST-CONTROL-G4-T1	1	130	7.06	3.21347E-06
LST	2	A4G04	0	LST-CONTROL-G4-T2	2	142	8.97	3.13276E-06
LST	2	A4G04	0	LST-CONTROL-G4-T3	3	164	14.21	3.22153E-06
LST	2	A4G04	0	LST-CONTROL-G4-T4	4	137	9.71	3.77622E-06
LST	2	A4G04	0	LST-CONTROL-G4-T5	5	127	6.96	3.3978E-06
LST	2	A4G04	0	LST-CONTROL-G4-T6	6	129	7.44	3.4658E-06
LST	2	A4G04	0	LST-CONTROL-G4-T7	7	136	8.87	3.5262E-06
LST	2	A4G04	0	LST-CONTROL-G4-T8	8	133	8.38	3.56196E-06
LST	2	A4G04	0	LST-CONTROL-G4-T9	9	134	7.6	3.15863E-06
LST	2	A4G04	0	LST-CONTROL-G4-T10	10	135	8.43	3.42631E-06
LST	2	A4G04	0	LST-CONTROL-G4-T11	11	149	11.92	3.60344E-06
LST	2	A4G04	0	LST-CONTROL-G4-T12	12	139	7.94	2.95649E-06
LST	2	A4G04	0	LST-CONTROL-G4-T13	13	132	8.04	3.4957E-06
LST	2	A4G04	0	LST-CONTROL-G4-T14	14	146	10.54	3.38674E-06
LST	2	A4G04	0	LST-CONTROL-G4-T15	15	142	9.93	3.46804E-06
LST	2	A4G04	0	LST-CONTROL-G4-T16	16	136	8.94	3.55403E-06
LST	2	A4G04	0	LST-CONTROL-G4-T17	17	145	9.94	3.26049E-06
LST	2	A4G04	0	LST-CONTROL-G4-T18	18	124	7.68	4.02806E-06
LST	2	A4G04	0	LST-CONTROL-G4-T19	19	133	7.92	3.36644E-06
LST	2	A4G04	0	LST-CONTROL-G4-T20	20	134	7.79	3.2376E-06
LST	2	A5G06	50	LST-50-G6-T1	1	114	4.62	3.11837E-06
LST	2	B3G02	50	LST-50-G2-T1	1	123	6.73	3.61659E-06
LST	2	B3G02	50	LST-50-G2-T2	2	138	9.34	3.55394E-06
LST	2	B3G02	50	LST-50-G2-T3	3	121	5.92	3.34169E-06
LST	2	B3G02	50	LST-50-G2-T4	4	129	7.8	3.6335E-06
LST	2	B5G08	0	LST-CONTROL-G8-T1	1	140	8.73	3.18149E-06
LST	2	B5G08	0	LST-CONTROL-G8-T2	2	158	14.26	3.61533E-06
LST	2	B5G08	0	LST-CONTROL-G8-T3	3	129	7.06	3.28879E-06
LST	2	B5G08	0	LST-CONTROL-G8-T4	4	138	9.24	3.51589E-06
LST	2	B5G08	0	LST-CONTROL-G8-T5	5	125	6.13	3.13856E-06
LST	2	B5G08	0	LST-CONTROL-G8-T6	6	120	5.01	2.89931E-06
LST	2	B5G08	0	LST-CONTROL-G8-T7	7	165	14.21	3.16331E-06
LST	2	B5G08	0	LST-CONTROL-G8-T8	8	156	12.56	3.30838E-06
LST	2	B5G08	0	LST-CONTROL-G8-T9	9	152	11.98	3.41135E-06
LST	2	B5G08	0	LST-CONTROL-G8-T10	10	135	8.95	3.63766E-06
LST	2	B5G08	0	LST-CONTROL-G8-T11	11	151	11.91	3.45924E-06
LST	2	B5G08	0	LST-CONTROL-G8-T12	12	145	10.63	3.48682E-06
LST	2	B5G08	0	LST-CONTROL-G8-T13	13	111	5.69	4.16048E-06
LST	2	B5G08	0	LST-CONTROL-G8-T14	14	154	11.43	3.12957E-06
LST	2	B5G08	0	LST-CONTROL-G8-T15	15	145	10.36	3.39825E-06

LST	2	B5G08	0	LST-CONTROL-G8-T16	16	157	13.24	3.42128E-06
LST	2	B5G08	0	LST-CONTROL-G8-T17	17	134	9.5	3.94829E-06
LST	2	B5G08	0	LST-CONTROL-G8-T18	18	140	10.95	3.99052E-06
LST	2	B5G08	0	LST-CONTROL-G8-T19	19	137	8.58	3.33676E-06
LST	2	B5G08	0	LST-CONTROL-G8-T20	20	139	10.06	3.74588E-06
LST	2	C1G05	50	LST-50-G5-T1	1	130	7.23	3.29085E-06
LST	2	C1G05	50	LST-50-G5-T2	2	139	10.1	3.76077E-06
LST	2	C4G10	0	LST-CONTROL-G10-T1	1	149	10.98	3.31928E-06
LST	2	C4G10	0	LST-CONTROL-G10-T2	2	138	9.22	3.50828E-06
LST	2	C4G10	0	LST-CONTROL-G10-T3	3	141	9.36	3.33902E-06
LST	2	C4G10	0	LST-CONTROL-G10-T4	4	142	10.06	3.51344E-06
LST	2	C4G10	0	LST-CONTROL-G10-T5	5	165	14.06	3.12992E-06
LST	2	C4G10	0	LST-CONTROL-G10-T6	6	111	4.93	3.60477E-06
LST	2	C4G10	0	LST-CONTROL-G10-T7	7	148	11.42	3.52274E-06
LST	2	C4G10	0	LST-CONTROL-G10-T8	8	137	8.52	3.31343E-06
LST	2	C4G10	0	LST-CONTROL-G10-T9	9	126	6.72	3.35937E-06
LST	2	C4G10	0	LST-CONTROL-G10-T10	10	141	9.4	3.35329E-06
LST	2	C4G10	0	LST-CONTROL-G10-T11	11	145	9.8	3.21456E-06
LST	2	C4G10	0	LST-CONTROL-G10-T12	12	146	9.44	3.03329E-06
LST	2	C4G10	0	LST-CONTROL-G10-T13	13	158	13.21	3.34913E-06
LST	2	C4G10	0	LST-CONTROL-G10-T14	14	143	11.41	3.90191E-06
LST	2	C4G10	0	LST-CONTROL-G10-T15	15	139	8.28	3.08309E-06
LST	2	C4G10	0	LST-CONTROL-G10-T16	16	137	9.8	3.81122E-06
LST	2	C4G10	0	LST-CONTROL-G10-T17	17	151	11.02	3.20074E-06
LST	2	C4G10	0	LST-CONTROL-G10-T18	18	135	7.89	3.20683E-06
LST	2	C4G10	0	LST-CONTROL-G10-T19	19	150	11.19	3.31556E-06
LST	2	C4G10	0	LST-CONTROL-G10-T20	20	126	6.96	3.47935E-06
CCF	2	C1E01	200	CCF-200-E1-T1	1	59	1.55	7.54702E-06
CCF	2	C1E01	200	CCF-200-E1-T2	2	56	1.37	7.80111E-06
CCF	2	C1E01	200	CCF-200-E1-T3	3	53	1.07	7.18714E-06
CCF	2	A2E02	50	CCF-50-E2-T1	1	61	1.82	8.01829E-06
CCF	2	A2E02	50	CCF-50-E2-T2	2	53	1.18	7.92601E-06
CCF	2	A2E02	50	CCF-50-E2-T3	3	61	1.81	7.97424E-06
CCF	2	A2E02	50	CCF-50-E2-T4	4	46	0.66	6.78064E-06
CCF	2	A2E02	50	CCF-50-E2-T5	5	66	2.19	7.6175E-06
CCF	2	A2E02	50	CCF-50-E2-T6	6	65	2.27	8.26582E-06
CCF	2	A2E02	50	CCF-50-E2-T7	7	64	2.13	8.12531E-06
CCF	2	A2E02	50	CCF-50-E2-T8	8	69	2.56	7.79278E-06
CCF	2	A2E02	50	CCF-50-E2-T9	9	65	2.28	8.30223E-06
CCF	2	A2E02	50	CCF-50-E2-T10	10	66	2.14	7.44358E-06
CCF	2	A2E02	50	CCF-50-E2-T11	11	59	1.71	8.32607E-06
CCF	2	A2E02	50	CCF-50-E2-T12	12	65	2.1	7.64679E-06
CCF	2	A2E02	50	CCF-50-E2-T13	13	64	2.17	8.27789E-06
CCF	2	A2E02	50	CCF-50-E2-T14	14	58	1.66	8.50793E-06
CCF	2	A2E02	50	CCF-50-E2-T15	15	58	1.64	8.40543E-06
CCF	2	A2E02	50	CCF-50-E2-T16	16	61	1.91	8.4148E-06
CCF	2	A2E02	50	CCF-50-E2-T17	17	57	1.75	9.4496E-06
CCF	2	A2E02	50	CCF-50-E2-T18	18	59	1.64	7.98524E-06

CCF	2	A2E02	50	CCF-50-E2-T19	19	63	2.1	8.39842E-06
CCF	2	A2E02	50	CCF-50-E2-T20	20	51	1.06	7.99089E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T1	1	58	1.59	8.14917E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T2	2	59	1.69	8.22869E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T3	3	63	2.11	8.43841E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T4	4	60	1.82	8.42593E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T5	5	66	2.16	7.51315E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T6	6	63	2.02	8.07848E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T7	7	60	1.91	8.84259E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T8	8	59	1.62	7.88786E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T9	9	64	1.95	7.43866E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T10	10	64	2.19	8.35419E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T11	11	57	1.53	8.26165E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T12	12	59	1.75	8.52083E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T13	13	59	1.75	8.52083E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T14	14	55	1.43	8.59504E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T15	15	67	2.45	8.14595E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T16	16	57	1.52	8.20765E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T17	17	57	1.47	7.93767E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T18	18	62	1.8	7.55262E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T19	19	61	1.92	8.45886E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T20	20	62	1.89	7.93025E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T21	21	59	1.77	8.61821E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T22	22	70	2.9	8.45481E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T23	23	60	1.9	8.7963E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T24	24	57	1.6	8.63964E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T25	25	57	1.54	8.31565E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T26	26	56	1.39	7.915E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T27	27	59	1.65	8.03393E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T28	28	53	1.29	8.66487E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T29	29	55	1.42	8.53494E-06
CCF	2	B5E03	0	CCF-CONTROL-E3-T30	30	64	2.13	8.12531E-06
CCF	2	B4E04	50	CCF-50-E4-T1	1	60	1.71	7.91667E-06
CCF	2	B4E04	50	CCF-50-E4-T2	2	63	1.84	7.35862E-06
CCF	2	B4E04	50	CCF-50-E4-T3	3	64	2.14	8.16345E-06
CCF	2	B4E04	50	CCF-50-E4-T4	4	56	1.51	8.59831E-06
CCF	2	B4E04	50	CCF-50-E4-T5	5	56	1.52	8.65525E-06
CCF	2	B4E04	50	CCF-50-E4-T6	6	66	2.26	7.86098E-06
CCF	2	B4E04	50	CCF-50-E4-T7	7	67	1.76	5.85178E-06
CCF	2	B4E04	50	CCF-50-E4-T8	8	54	1.31	8.31936E-06
CCF	2	B4E04	50	CCF-50-E4-T9	9	58	1.48	7.58539E-06
CCF	2	B4E04	50	CCF-50-E4-T10	10	58	1.65	8.45668E-06
CCF	2	B4E04	50	CCF-50-E4-T11	11	63	1.95	7.79853E-06
CCF	2	B4E04	50	CCF-50-E4-T12	12	56	1.17	6.66226E-06
CCF	2	B4E04	50	CCF-50-E4-T13	13	61	1.77	7.79801E-06
CCF	2	B4E04	50	CCF-50-E4-T14	14	58	1.53	7.84165E-06
CCF	2	B4E04	50	CCF-50-E4-T15	15	56	1.5	8.54136E-06
CCF	2	B4E04	50	CCF-50-E4-T16	16	61	1.96	8.63508E-06

CCF	2	B4E04	50	CCF-50-E4-T17	17	59	1.64	7.98524E-06
CCF	2	B4E04	50	CCF-50-E4-T18	18	53	1.3	8.73204E-06
CCF	2	B4E04	50	CCF-50-E4-T19	19	60	1.74	8.05556E-06
CCF	2	B4E04	50	CCF-50-E4-T20	20	53	1.16	7.79167E-06
CCF	2	C2E05	100	CCF-100-E5-T1	1	53	1.2	8.06035E-06
CCF	2	C2E05	100	CCF-100-E5-T2	2	56	1.34	7.63028E-06
CCF	2	C2E05	100	CCF-100-E5-T3	3	57	1.65	8.90962E-06
CCF	2	C2E05	100	CCF-100-E5-T4	4	55	1.3	7.81367E-06
CCF	2	C2E05	100	CCF-100-E5-T5	5	59	1.52	7.40095E-06
CCF	2	B3E07	100	CCF-100-E7-T1	1	60	1.74	8.05556E-06
CCF	2	B3E07	100	CCF-100-E7-T2	2	57	1.51	8.15366E-06
CCF	2	B3E07	100	CCF-100-E7-T3	3	57	1.46	7.88367E-06
CCF	2	B3E07	100	CCF-100-E7-T4	4	58	1.54	7.8929E-06
CCF	2	B3E07	100	CCF-100-E7-T5	5	59	1.36	6.6219E-06
CCF	2	B3E07	100	CCF-100-E7-T6	6	56	1.41	8.02888E-06
CCF	2	B3E07	100	CCF-100-E7-T7	7	56	1.5	8.54136E-06
CCF	2	B3E07	100	CCF-100-E7-T8	8	53	1.22	8.19468E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T1	1	62	2.05	8.60159E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T2	2	66	2.42	8.41751E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T3	3	64	2.18	8.31604E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T4	4	61	1.89	8.32669E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T5	5	67	2.52	8.37869E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T6	6	57	1.71	9.23361E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T7	7	56	1.34	7.63028E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T8	8	61	1.84	8.10641E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T9	9	57	1.56	8.42364E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T10	10	61	1.92	8.45886E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T11	11	56	1.52	8.65525E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T12	12	53	1.19	7.99318E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T13	13	70	2.86	8.33819E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T14	14	58	1.57	8.04666E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T15	15	59	1.66	8.08262E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T16	16	62	2.01	8.43376E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T17	17	61	2.08	9.16376E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T18	18	64	2.09	7.97272E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T19	19	51	1.02	7.68935E-06
CCF	2	A4E08	0	CCF-CONTROL-E8-T20	20	64	2.33	8.88824E-06
CCF	2	A5E09	100	CCF-100-E9-T1	1	59	1.61	7.83917E-06
CCF	2	A5E09	100	CCF-100-E9-T2	2	65	2.15	7.82886E-06
CCF	2	A5E09	100	CCF-100-E9-T3	3	57	1.52	8.20765E-06
CCF	2	A5E09	100	CCF-100-E9-T4	4	59	1.54	7.49833E-06
CCF	2	A5E09	100	CCF-100-E9-T5	5	53	1.21	8.12751E-06
CCF	2	A5E09	100	CCF-100-E9-T6	6	59	1.6	7.79048E-06
CCF	2	A5E09	100	CCF-100-E9-T7	7	62	1.71	7.17499E-06
CCF	2	A5E09	100	CCF-100-E9-T8	8	66	2.14	7.44358E-06
CCF	2	A5E09	100	CCF-100-E9-T9	9	59	1.7	8.27738E-06
CCF	2	A5E09	100	CCF-100-E9-T10	10	56	1.42	8.08582E-06
CCF	2	A5E09	100	CCF-100-E9-T11	11	63	2.1	8.39842E-06

CCF	2	A5E09	100	CCF-100-E9-T12	12	58	1.54	7.8929E-06
CCF	2	A5E09	100	CCF-100-E9-T13	13	50	0.84	0.00000672
CCF	2	A5E09	100	CCF-100-E9-T14	14	55	1.66	9.97746E-06
CCF	2	A5E09	100	CCF-100-E9-T15	15	56	1.43	8.14277E-06
CCF	2	A5E09	100	CCF-100-E9-T16	16	54	1.19	7.55728E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T1	1	61	1.92	8.45886E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T2	2	60	1.74	8.05556E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T3	3	60	1.77	8.19444E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T4	4	65	2.17	7.90168E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T5	5	56	1.57	8.93996E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T6	6	61	1.83	8.06235E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T7	7	57	1.44	7.77567E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T8	8	66	2.34	8.13924E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T9	9	54	1.28	8.12884E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T10	10	67	2.39	7.94646E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T11	11	64	2.32	8.8501E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T12	12	65	2.21	8.04734E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T13	13	65	1.69	6.15385E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T14	14	54	1.24	7.87482E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T15	15	59	1.72	8.37476E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T16	16	63	2.05	8.19846E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T17	17	60	1.82	8.42593E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T18	18	54	1.3	8.25586E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T19	19	60	1.72	7.96296E-06
CCF	2	C3E10	0	CCF-CONTROL-E10-T20	20	56	1.38	7.85805E-06
CCF	2	C5E11	50	CCF-50-E11-T1	1	63	2.01	8.03849E-06
CCF	2	C5E11	50	CCF-50-E11-T2	2	63	1.95	7.79853E-06
CCF	2	C5E11	50	CCF-50-E11-T3	3	60	1.98	9.16667E-06
CCF	2	C5E11	50	CCF-50-E11-T4	4	54	1.29	8.19235E-06
CCF	2	C5E11	50	CCF-50-E11-T5	5	57	1.59	8.58564E-06
CCF	2	C5E11	50	CCF-50-E11-T6	6	60	1.8	8.33333E-06
CCF	2	C5E11	50	CCF-50-E11-T7	7	63	2.08	8.31844E-06
CCF	2	C5E11	50	CCF-50-E11-T8	8	55	1.39	8.35462E-06
CCF	2	C5E11	50	CCF-50-E11-T9	9	56	1.36	7.74417E-06
CCF	2	C5E11	50	CCF-50-E11-T10	10	57	1.62	8.74763E-06
CCF	2	C5E11	50	CCF-50-E11-T11	11	55	1.48	8.89557E-06
CCF	2	C5E11	50	CCF-50-E11-T12	12	56	1.45	8.25665E-06
CCF	2	C5E11	50	CCF-50-E11-T13	13	58	1.64	8.40543E-06
CCF	2	C5E11	50	CCF-50-E11-T14	14	56	1.44	8.19971E-06
CCF	2	C5E11	50	CCF-50-E11-T15	15	54	1.27	8.06534E-06
CCF	2	C5E11	50	CCF-50-E11-T16	16	53	1.28	8.5977E-06
CCF	2	C5E11	50	CCF-50-E11-T17	17	61	1.79	7.88612E-06
CCF	2	C5E11	50	CCF-50-E11-T18	18	62	1.87	7.84633E-06
CCF	2	C5E11	50	CCF-50-E11-T19	19	57	1.65	8.90962E-06
CCF	2	C5E11	50	CCF-50-E11-T20	20	63	2.07	8.27844E-06
CCF	2	B2E12	200	CCF-200-E12-T1	1	54	1.37	8.7004E-06
CCF	2	A3E13	200	CCF-200-E13-T1	1	55	1.33	7.99399E-06

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

AEH-12-PSEUDO-03

Condition Index Analysis

Study Number AEH-12-PSEUDO-03

SAS v. 9.3 Analysis completion date: 3APR2015 Analysis prepared by: KLW

Obs	sps	time	id	treat	samp	num	tot	wt	cond	condbig
1	BKT	2	C1E01	0	BKT-CONTROL-E1-T1	1	58	1.58	.000008098	0.80979
2	BKT	2	C1E01	0	BKT-CONTROL-E1-T2	2	66	2.69	.000009357	0.93567
3	BKT	2	C1E01	0	BKT-CONTROL-E1-T3	3	72	3.34	.000008948	0.89485
4	BKT	2	C1E01	0	BKT-CONTROL-E1-T4	4	64	2.38	.000009079	0.90790
5	BKT	2	C1E01	0	BKT-CONTROL-E1-T5	5	71	3.02	.000008438	0.84379
6	BKT	2	C1E01	0	BKT-CONTROL-E1-T6	6	71	3.12	.000008717	0.87173
7	BKT	2	C1E01	0	BKT-CONTROL-E1-T7	7	60	1.75	.000008102	0.81019
8	BKT	2	C1E01	0	BKT-CONTROL-E1-T8	8	64	2.04	.000007782	0.77820
9	BKT	2	C1E01	0	BKT-CONTROL-E1-T9	9	62	2.15	.000009021	0.90212
10	BKT	2	C1E01	0	BKT-CONTROL-E1-T10	10	58	1.58	.000008098	0.80979
11	BKT	2	C1E01	0	BKT-CONTROL-E1-T11	11	67	2.55	.000008478	0.84784
12	BKT	2	C1E01	0	BKT-CONTROL-E1-T12	12	57	1.45	.000007830	0.78297
13	BKT	2	C1E01	0	BKT-CONTROL-E1-T13	13	64	2.25	.000008583	0.85831
14	BKT	2	C1E01	0	BKT-CONTROL-E1-T14	14	72	2.83	.000007582	0.75821
15	BKT	2	C1E01	0	BKT-CONTROL-E1-T15	15	57	1.39	.000007506	0.75057
16	BKT	2	C1E01	0	BKT-CONTROL-E1-T16	16	61	1.89	.000008327	0.83267
17	BKT	2	C1E01	0	BKT-CONTROL-E1-T17	17	64	2.46	.000009384	0.93842
18	BKT	2	C1E01	0	BKT-CONTROL-E1-T18	18	67	2.50	.000008312	0.83122
19	BKT	2	C1E01	0	BKT-CONTROL-E1-T19	19	63	2.00	.000007998	0.79985
20	BKT	2	C1E01	0	BKT-CONTROL-E1-T20	20	65	2.32	.000008448	0.84479
21	BKT	2	B5E07	0	BKT-CONTROL-E7-T1	1	66	2.57	.000008939	0.89393
22	BKT	2	B5E07	0	BKT-CONTROL-E7-T2	2	64	2.34	.000008926	0.89264
23	BKT	2	B5E07	0	BKT-CONTROL-E7-T3	3	63	2.14	.000008558	0.85584
24	BKT	2	B5E07	0	BKT-CONTROL-E7-T4	4	61	2.23	.000009825	0.98246
25	BKT	2	B5E07	0	BKT-CONTROL-E7-T5	5	68	2.44	.000007760	0.77600
26	BKT	2	B5E07	0	BKT-CONTROL-E7-T6	6	58	1.64	.000008405	0.84054
27	BKT	2	B5E07	0	BKT-CONTROL-E7-T7	7	70	2.84	.000008280	0.82799
28	BKT	2	B5E07	0	BKT-CONTROL-E7-T8	8	66	2.72	.000009461	0.94610
29	BKT	2	B5E07	0	BKT-CONTROL-E7-T9	9	65	2.40	.000008739	0.87392
30	BKT	2	B5E07	0	BKT-CONTROL-E7-T10	10	73	3.50	.000008997	0.89970

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31	BKT	2	B5E07	0	BKT-CONTROL-E7-T11	11	57	1.65	.000008910	0.89096
32	BKT	2	B5E07	0	BKT-CONTROL-E7-T12	12	65	2.27	.000008266	0.82658
33	BKT	2	B5E07	0	BKT-CONTROL-E7-T13	13	70	3.17	.000009242	0.92420
34	BKT	2	B5E07	0	BKT-CONTROL-E7-T14	14	63	2.11	.000008438	0.84384
35	BKT	2	B5E07	0	BKT-CONTROL-E7-T15	15	64	2.26	.000008621	0.86212
36	BKT	2	B5E07	0	BKT-CONTROL-E7-T16	16	68	2.60	.000008269	0.82689
37	BKT	2	B5E07	0	BKT-CONTROL-E7-T17	17	59	1.79	.000008716	0.87156
38	BKT	2	B5E07	0	BKT-CONTROL-E7-T18	18	50	1.06	.000008480	0.84800
39	BKT	2	B5E07	0	BKT-CONTROL-E7-T19	19	58	1.63	.000008354	0.83542
40	BKT	2	B5E07	0	BKT-CONTROL-E7-T20	20	60	1.88	.000008704	0.87037
41	BKT	2	A4E13	0	BKT-CONTROL-E13-T1	1	57	1.51	.000008154	0.81537
42	BKT	2	A4E13	0	BKT-CONTROL-E13-T2	2	67	2.61	.000008678	0.86779
43	BKT	2	A4E13	0	BKT-CONTROL-E13-T3	3	66	2.56	.000008904	0.89045
44	BKT	2	A4E13	0	BKT-CONTROL-E13-T4	4	64	2.01	.000007668	0.76675
45	BKT	2	A4E13	0	BKT-CONTROL-E13-T5	5	63	1.86	.000007439	0.74386
46	BKT	2	A4E13	0	BKT-CONTROL-E13-T6	6	64	2.52	.000009613	0.96130
47	BKT	2	A4E13	0	BKT-CONTROL-E13-T7	7	59	1.66	.000008083	0.80826
48	BKT	2	A4E13	0	BKT-CONTROL-E13-T8	8	60	1.78	.000008241	0.82407
49	BKT	2	A4E13	0	BKT-CONTROL-E13-T9	9	63	2.22	.000008878	0.88783
50	BKT	2	A4E13	0	BKT-CONTROL-E13-T10	10	57	1.55	.000008370	0.83696
51	BKT	2	A4E13	0	BKT-CONTROL-E13-T11	11	67	2.43	.000008079	0.80795
52	BKT	2	A4E13	0	BKT-CONTROL-E13-T12	12	63	2.17	.000008678	0.86784
53	BKT	2	A4E13	0	BKT-CONTROL-E13-T13	13	61	2.24	.000009869	0.98687
54	BKT	2	A4E13	0	BKT-CONTROL-E13-T14	14	57	1.49	.000008046	0.80457
55	BKT	2	A4E13	0	BKT-CONTROL-E13-T15	15	63	2.02	.000008078	0.80785
56	BKT	2	A4E13	0	BKT-CONTROL-E13-T16	16	54	1.29	.000008192	0.81923
57	BKT	2	A4E13	0	BKT-CONTROL-E13-T17	17	62	1.90	.000007972	0.79722
58	BKT	2	A4E13	0	BKT-CONTROL-E13-T18	18	67	2.43	.000008079	0.80795
59	BKT	2	A4E13	0	BKT-CONTROL-E13-T19	19	61	1.90	.000008371	0.83707
60	BKT	2	A4E13	0	BKT-CONTROL-E13-T20	20	59	1.73	.000008423	0.84235
61	BKT	2	A3E02	100	BKT-100-E2-T1	1	57	1.34	.000007236	0.72357
62	BKT	2	A3E02	100	BKT-100-E2-T2	2	63	1.89	.000007559	0.75586
63	BKT	2	A3E02	100	BKT-100-E2-T3	3	57	1.35	.000007290	0.72897
64	BKT	2	A3E02	100	BKT-100-E2-T4	4	58	1.41	.000007227	0.72266
65	BKT	2	A3E02	100	BKT-100-E2-T5	5	55	1.20	.000007213	0.72126

	BKT	2	A3E02	100	BKT-100-E2-T6	6	49	0.75	.000006375	0.63749
67	BKT	2	A3E02	100	BKT-100-E2-T7	7	54	1.05	.000006668	0.66682
68	BKT	2	A3E02	100	BKT-100-E2-T8	8	56	1.26	.000007175	0.71747
69	BKT	2	A3E02	100	BKT-100-E2-T9	9	63	1.77	.000007079	0.70787
70	BKT	2	A3E02	100	BKT-100-E2-T10	10	49	0.79	.000006715	0.67149
71	BKT	2	A3E02	100	BKT-100-E2-T11	11	53	0.96	.000006448	0.64483
72	BKT	2	A3E02	100	BKT-100-E2-T12	12	57	1.14	.000006156	0.61557
73	BKT	2	A3E02	100	BKT-100-E2-T13	13	59	1.28	.000006232	0.62324
74	BKT	2	A3E02	100	BKT-100-E2-T14	14	55	1.18	.000007092	0.70924
75	BKT	2	A3E02	100	BKT-100-E2-T15	15	59	1.30	.000006330	0.63298
76	BKT	2	B2E06	100	BKT-100-E6-T1	1	61	1.63	.000007181	0.71812
77	BKT	2	B2E06	100	BKT-100-E6-T2	2	54	1.01	.000006414	0.64142
78	BKT	2	B2E06	100	BKT-100-E6-T3	3	58	1.30	.000006663	0.66628
79	BKT	2	B2E06	100	BKT-100-E6-T4	4	56	1.20	.000006833	0.68331
80	BKT	2	B2E06	100	BKT-100-E6-T5	5	45	0.64	.000007023	0.70233
81	BKT	2	B2E06	100	BKT-100-E6-T6	6	60	1.68	.000007778	0.77778
82	BKT	2	B2E06	100	BKT-100-E6-T7	7	58	1.40	.000007175	0.71754
83	BKT	2	B2E06	100	BKT-100-E6-T8	8	57	1.37	.000007398	0.73977
84	BKT	2	B2E06	100	BKT-100-E6-T9	9	65	1.86	.000006773	0.67729
85	BKT	2	B2E06	100	BKT-100-E6-T10	10	55	1.12	.000006732	0.67318
86	BKT	2	B2E06	100	BKT-100-E6-T11	11	62	1.76	.000007385	0.73848
87	BKT	2	C2E11	100	BKT-100-E11-T1	1	53	1.01	.000006784	0.67841
88	BKT	2	C2E11	100	BKT-100-E11-T2	2	52	1.07	.000007610	0.76098
89	BKT	2	C2E11	100	BKT-100-E11-T3	3	60	1.62	.000007500	0.75000
90	BKT	2	C2E11	100	BKT-100-E11-T4	4	56	1.09	.000006207	0.62067
91	BKT	2	C2E11	100	BKT-100-E11-T5	5	60	1.44	.000006667	0.66667
92	BKT	2	C2E11	100	BKT-100-E11-T6	6	57	1.25	.000006750	0.67497
93	BKT	2	C2E11	100	BKT-100-E11-T7	7	62	1.70	.000007133	0.71330
94	BKT	2	C2E11	100	BKT-100-E11-T8	8	55	1.17	.000007032	0.70323
95	BKT	2	C2E11	100	BKT-100-E11-T9	9	58	2.42	.000012403	1.24031
96	BKT	2	C2E11	100	BKT-100-E11-T10	10	55	1.13	.000006792	0.67919
97	BKT	2	C2E11	100	BKT-100-E11-T11	11	57	1.28	.000006912	0.69117
98	BKT	2	C2E11	100	BKT-100-E11-T12	12	54	1.10	.000006986	0.69857
99	BKT	2	B4E08	200	BKT-200-E8-T1	1	59	1.25	.000006086	0.60863
100	BKT	2	B4E08	200	BKT-200-E8-T2	2	60	1.47	.000006806	0.68056

	BKT	2	B4E08	200	BKT-200-E8-T3	3	57	1.24	.000006696	0.66957
102	BKT	2	A5E10	200	BKT-200-E10-T1	1	59	1.37	.000006671	0.66706
103	BKT	2	A5E10	200	BKT-200-E10-T2	2	61	1.59	.000007005	0.70050
104	BKT	2	A5E10	200	BKT-200-E10-T3	3	61	1.60	.000007049	0.70490
105	BKT	2	A5E10	200	BKT-200-E10-T4	4	57	1.19	.000006426	0.64257
106	BKT	2	A5E10	200	BKT-200-E10-T5	5	60	1.36	.000006296	0.62963
107	BKT	2	A5E10	200	BKT-200-E10-T6	6	56	1.30	.000007403	0.74025
108	BKT	2	C4E15	200	BKT-200-E15-T1	1	60	1.68	.000007778	0.77778
109	BKT	2	C4E15	200	BKT-200-E15-T2	2	54	1.02	.000006478	0.64777
110	BKT	2	C4E15	200	BKT-200-E15-T3	3	66	1.89	.000006574	0.65740
111	BKT	2	C4E15	200	BKT-200-E15-T4	4	62	1.74	.000007301	0.73009
112	BKT	2	C4E15	200	BKT-200-E15-T5	5	55	1.13	.000006792	0.67919
113	BKT	2	C4E15	200	BKT-200-E15-T6	6	65	1.99	.000007246	0.72462
114	BKT	2	B3E03	50	BKT-50-E3-T1	1	62	1.86	.000007804	0.78044
115	BKT	2	B3E03	50	BKT-50-E3-T2	2	57	1.20	.000006480	0.64797
116	BKT	2	B3E03	50	BKT-50-E3-T3	3	58	1.54	.000007893	0.78929
117	BKT	2	B3E03	50	BKT-50-E3-T4	4	56	1.34	.000007630	0.76303
118	BKT	2	B3E03	50	BKT-50-E3-T5	5	61	1.90	.000008371	0.83707
119	BKT	2	B3E03	50	BKT-50-E3-T6	6	60	1.84	.000008519	0.85185
120	BKT	2	B3E03	50	BKT-50-E3-T7	7	49	0.85	.000007225	0.72249
121	BKT	2	B3E03	50	BKT-50-E3-T8	8	41	0.62	.000008996	0.89958
122	BKT	2	B3E03	50	BKT-50-E3-T9	9	56	1.44	.000008200	0.81997
123	BKT	2	B3E03	50	BKT-50-E3-T10	10	57	1.61	.000008694	0.86936
124	BKT	2	B3E03	50	BKT-50-E3-T11	11	55	1.08	.000006491	0.64914
125	BKT	2	B3E03	50	BKT-50-E3-T12	12	53	1.12	.000007523	0.75230
126	BKT	2	B3E03	50	BKT-50-E3-T13	13	47	0.90	.000008669	0.86686
127	BKT	2	B3E03	50	BKT-50-E3-T14	14	53	1.13	.000007590	0.75902
128	BKT	2	B3E03	50	BKT-50-E3-T15	15	51	0.97	.000007312	0.73124
129	BKT	2	B3E03	50	BKT-50-E3-T16	16	55	1.12	.000006732	0.67318
130	BKT	2	B3E03	50	BKT-50-E3-T17	17	61	1.98	.000008723	0.87232
131	BKT	2	B3E03	50	BKT-50-E3-T18	18	57	1.40	.000007560	0.75597
132	BKT	2	B3E03	50	BKT-50-E3-T19	19	60	1.64	.000007593	0.75926
133	BKT	2	B3E03	50	BKT-50-E3-T20	20	59	1.59	.000007742	0.77418
134	BKT	2	C5E05	50	BKT-50-E5-T1	1	63	2.20	.000008798	0.87983
135	BKT	2	C5E05	50	BKT-50-E5-T2	2	53	1.19	.000007993	0.79932

	BKT	2	C5E05	50	BKT-50-E5-T3	3	50	0.89	.000007120	0.71200
137	BKT	2	C5E05	50	BKT-50-E5-T4	4	59	1.61	.000007839	0.78392
138	BKT	2	C5E05	50	BKT-50-E5-T5	5	57	1.44	.000007776	0.77757
139	BKT	2	C5E05	50	BKT-50-E5-T6	6	61	1.90	.000008371	0.83707
140	BKT	2	C5E05	50	BKT-50-E5-T7	7	57	1.25	.000006804	0.68037
141	BKT	2	C5E05	50	BKT-50-E5-T8	8	51	0.95	.000007162	0.71616
142	BKT	2	C5E05	50	BKT-50-E5-T9	9	59	1.76	.000008570	0.85695
143	BKT	2	C5E05	50	BKT-50-E5-T10	10	54	1.24	.000007875	0.78748
144	BKT	2	C5E05	50	BKT-50-E5-T11	11	56	1.45	.000008257	0.82567
145	BKT	2	C5E05	50	BKT-50-E5-T12	12	58	1.50	.000007688	0.76879
146	BKT	2	C5E05	50	BKT-50-E5-T13	13	59	1.77	.000008618	0.86182
147	BKT	2	C5E05	50	BKT-50-E5-T14	14	59	1.55	.000007547	0.75470
148	BKT	2	C5E05	50	BKT-50-E5-T15	15	59	1.78	.000008667	0.86669
149	BKT	2	C5E05	50	BKT-50-E5-T16	16	56	1.23	.000007004	0.70039
150	BKT	2	C5E05	50	BKT-50-E5-T17	17	58	1.52	.000007790	0.77904
151	BKT	2	C5E05	50	BKT-50-E5-T18	18	51	1.14	.000008594	0.85940
152	BKT	2	C5E05	50	BKT-50-E5-T19	19	57	1.32	.000007128	0.71277
153	BKT	2	C5E05	50	BKT-50-E5-T20	20	55	1.14	.000006852	0.68520
154	BKT	2	A2E09	50	BKT-50-E9-T1	1	63	1.98	.000007919	0.79185
155	BKT	2	A2E09	50	BKT-50-E9-T2	2	55	1.04	.000006251	0.62509
156	BKT	2	A2E09	50	BKT-50-E9-T3	3	54	1.12	.000007113	0.71127
157	BKT	2	A2E09	50	BKT-50-E9-T4	4	58	1.53	.000007842	0.78416
158	BKT	2	A2E09	50	BKT-50-E9-T5	5	55	1.28	.000007693	0.76935
159	BKT	2	A2E09	50	BKT-50-E9-T6	6	62	1.70	.000007133	0.71330
160	BKT	2	A2E09	50	BKT-50-E9-T7	7	50	0.83	.000006640	0.66400
161	BKT	2	A2E09	50	BKT-50-E9-T8	8	55	1.16	.000006972	0.69722
162	BKT	2	A2E09	50	BKT-50-E9-T9	9	65	2.46	.000008958	0.89577
163	BKT	2	A2E09	50	BKT-50-E9-T10	10	52	1.17	.000008321	0.83210
164	BKT	2	A2E09	50	BKT-50-E9-T11	11	61	1.71	.000007534	0.75337
165	BKT	2	A2E09	50	BKT-50-E9-T12	12	48	0.80	.000007234	0.72338
166	BKT	2	A2E09	50	BKT-50-E9-T13	13	49	0.77	.000006545	0.65449
167	BKT	2	A2E09	50	BKT-50-E9-T14	14	49	0.83	.000007055	0.70549
168	BKT	2	A2E09	50	BKT-50-E9-T15	15	55	1.40	.000008415	0.84147
169	BKT	2	A2E09	50	BKT-50-E9-T16	16	56	1.71	.000009737	0.97372
170	BKT	2	A2E09	50	BKT-50-E9-T17	17	57	1.61	.000008694	0.86936

	BKT	2	A2E09	50	BKT-50-E9-T18	18	55	1.10	.000006612	0.66116
172	BKT	2	A2E09	50	BKT-50-E9-T19	19	54	1.08	.000006859	0.68587
173	BKT	2	A2E09	50	BKT-50-E9-T20	20	57	1.47	.000007938	0.79377
174	BLG	2	C2E10	0	BLG-CONTROL-E10-T1	1	57	2.56	.000013823	1.38234
175	BLG	2	C2E10	0	BLG-CONTROL-E10-T2	2	55	2.60	.000015627	1.56273
176	BLG	2	C2E10	0	BLG-CONTROL-E10-T3	3	46	1.34	.000013767	1.37667
177	BLG	2	C2E10	0	BLG-CONTROL-E10-T4	4	53	2.05	.000013770	1.37698
178	BLG	2	C2E10	0	BLG-CONTROL-E10-T5	5	47	1.40	.000013484	1.34845
179	BLG	2	C2E10	0	BLG-CONTROL-E10-T6	6	61	3.57	.000015728	1.57282
180	BLG	2	C2E10	0	BLG-CONTROL-E10-T7	7	52	1.75	.000012446	1.24459
181	BLG	2	C2E10	0	BLG-CONTROL-E10-T8	8	50	1.75	.000014000	1.40000
182	BLG	2	C2E10	0	BLG-CONTROL-E10-T9	9	60	3.48	.000016019	1.60185
183	BLG	2	C2E10	0	BLG-CONTROL-E10-T10	10	51	1.94	.000014625	1.46248
184	BLG	2	C2E10	0	BLG-CONTROL-E10-T11	11	66	4.12	.000014331	1.43306
185	BLG	2	C2E10	0	BLG-CONTROL-E10-T12	12	53	2.15	.000014441	1.44415
186	BLG	2	C2E10	0	BLG-CONTROL-E10-T13	13	59	3.04	.000014802	1.48019
187	BLG	2	C2E10	0	BLG-CONTROL-E10-T14	14	50	1.73	.000013840	1.38400
188	BLG	2	C2E10	0	BLG-CONTROL-E10-T15	15	49	1.70	.000014450	1.44498
189	BLG	2	C2E10	0	BLG-CONTROL-E10-T16	16	52	1.89	.000013442	1.34416
190	BLG	2	C2E10	0	BLG-CONTROL-E10-T17	17	62	3.64	.000015273	1.52731
191	BLG	2	C2E10	0	BLG-CONTROL-E10-T18	18	51	1.82	.000013720	1.37202
192	BLG	2	C2E10	0	BLG-CONTROL-E10-T19	19	48	1.54	.000013925	1.39251
193	BLG	2	C2E10	0	BLG-CONTROL-E10-T20	20	45	1.31	.000014376	1.43759
194	BLG	2	A1E11	0	BLG-CONTROL-E11-T1	1	58	2.84	.000014556	1.45557
195	BLG	2	A1E11	0	BLG-CONTROL-E11-T2	2	48	1.68	.000015191	1.51910
196	BLG	2	A1E11	0	BLG-CONTROL-E11-T3	3	56	2.64	.000015033	1.50328
197	BLG	2	A1E11	0	BLG-CONTROL-E11-T4	4	54	1.70	.000010796	1.07961
198	BLG	2	A1E11	0	BLG-CONTROL-E11-T5	5	55	1.80	.000010819	1.08189
199	BLG	2	A1E11	0	BLG-CONTROL-E11-T6	6	63	3.54	.000014157	1.41573
200	BLG	2	A1E11	0	BLG-CONTROL-E11-T7	7	58	2.99	.000015325	1.53245
201	BLG	2	A1E11	0	BLG-CONTROL-E11-T8	8	52	2.14	.000015220	1.52196
202	BLG	2	A1E11	0	BLG-CONTROL-E11-T9	9	55	2.31	.000013884	1.38843
203	BLG	2	A1E11	0	BLG-CONTROL-E11-T10	10	55	2.36	.000014185	1.41848
204	BLG	2	A1E11	0	BLG-CONTROL-E11-T11	11	52	2.03	.000014437	1.44373
205	BLG	2	A1E11	0	BLG-CONTROL-E11-T12	12	52	1.97	.000014011	1.40106

	BLG	2	A1E11	0	BLG-CONTROL-E11-T13	13	57	2.64	.000014255	1.42554
207	BLG	2	A1E11	0	BLG-CONTROL-E11-T14	14	63	3.70	.000014797	1.47972
208	BLG	2	A1E11	0	BLG-CONTROL-E11-T15	15	51	2.04	.000015379	1.53787
209	BLG	2	A1E11	0	BLG-CONTROL-E11-T16	16	50	1.83	.000014640	1.46400
210	BLG	2	A1E11	0	BLG-CONTROL-E11-T17	17	49	1.81	.000015385	1.53847
211	BLG	2	A1E11	0	BLG-CONTROL-E11-T18	18	45	1.19	.000013059	1.30590
212	BLG	2	A1E11	0	BLG-CONTROL-E11-T19	19	45	1.36	.000014925	1.49246
213	BLG	2	A1E11	0	BLG-CONTROL-E11-T20	20	45	1.39	.000015254	1.52538
214	BLG	2	B3E14	0	BLG-CONTROL-E14-T1	1	61	3.12	.000013746	1.37456
215	BLG	2	B3E14	0	BLG-CONTROL-E14-T2	2	61	3.17	.000013966	1.39659
216	BLG	2	B3E14	0	BLG-CONTROL-E14-T3	3	57	2.73	.000014741	1.47414
217	BLG	2	B3E14	0	BLG-CONTROL-E14-T4	4	50	1.78	.000014240	1.42400
218	BLG	2	B3E14	0	BLG-CONTROL-E14-T5	5	46	1.52	.000015616	1.56160
219	BLG	2	B3E14	0	BLG-CONTROL-E14-T6	6	56	2.44	.000013894	1.38940
220	BLG	2	B3E14	0	BLG-CONTROL-E14-T7	7	55	2.36	.000014185	1.41848
221	BLG	2	B3E14	0	BLG-CONTROL-E14-T8	8	48	1.55	.000014015	1.40155
222	BLG	2	B3E14	0	BLG-CONTROL-E14-T9	9	55	2.58	.000015507	1.55071
223	BLG	2	B3E14	0	BLG-CONTROL-E14-T10	10	55	2.43	.000014606	1.46056
224	BLG	2	B3E14	0	BLG-CONTROL-E14-T11	11	49	1.61	.000013685	1.36848
225	BLG	2	B3E14	0	BLG-CONTROL-E14-T12	12	62	2.71	.000011371	1.13709
226	BLG	2	B3E14	0	BLG-CONTROL-E14-T13	13	57	2.78	.000015011	1.50114
227	BLG	2	B3E14	0	BLG-CONTROL-E14-T14	14	61	3.28	.000014451	1.44505
228	BLG	2	B3E14	0	BLG-CONTROL-E14-T15	15	64	2.53	.000016067	1.60672
229	BLG	2	B3E14	0	BLG-CONTROL-E14-T16	16	54	2.35	.000014924	1.49240
230	BLG	2	B3E14	0	BLG-CONTROL-E14-T17	17	47	1.63	.000015700	1.56998
231	BLG	2	B3E14	0	BLG-CONTROL-E14-T18	18	64	2.07	.000013146	1.31459
232	BLG	2	B3E14	0	BLG-CONTROL-E14-T19	19	61	1.93	.000014549	1.45495
233	BLG	2	B3E14	0	BLG-CONTROL-E14-T20	20	50	1.92	.000015360	1.53600
234	BLG	2	A2E01	100	BLG-100-E1-T1	1	60	3.44	.000015926	1.59259
235	BLG	2	A2E01	100	BLG-100-E1-T2	2	48	1.69	.000015281	1.52814
236	BLG	2	A2E01	100	BLG-100-E1-T3	3	57	2.58	.000013931	1.39314
237	BLG	2	A2E01	100	BLG-100-E1-T4	4	48	1.83	.000016547	1.65473
238	BLG	2	A2E01	100	BLG-100-E1-T5	5	47	1.62	.000015603	1.56035
239	BLG	2	A2E01	100	BLG-100-E1-T6	6	50	2.00	.000016000	1.60000
240	BLG	2	A2E01	100	BLG-100-E1-T7	7	50	1.80	.000014400	1.44000

	BLG	2	A2E01	100	BLG-100-E1-T8	8	54	2.72	.000017274	1.72738
242	BLG	2	A2E01	100	BLG-100-E1-T9	9	51	2.01	.000015153	1.51525
243	BLG	2	A2E01	100	BLG-100-E1-T10	10	43	1.32	.000016602	1.66023
244	BLG	2	A2E01	100	BLG-100-E1-T11	11	48	1.76	.000015914	1.59144
245	BLG	2	A2E01	100	BLG-100-E1-T12	12	47	1.68	.000016181	1.61814
246	BLG	2	A2E01	100	BLG-100-E1-T13	13	43	1.13	.000014213	1.42126
247	BLG	2	A2E01	100	BLG-100-E1-T14	14	58	2.85	.000014607	1.46070
248	BLG	2	A2E01	100	BLG-100-E1-T15	15	58	2.71	.000013889	1.38895
249	BLG	2	A2E01	100	BLG-100-E1-T16	16	49	1.90	.000016150	1.61497
250	BLG	2	A2E01	100	BLG-100-E1-T17	17	52	2.01	.000014295	1.42951
251	BLG	2	A2E01	100	BLG-100-E1-T18	18	54	2.05	.000013019	1.30188
252	BLG	2	A2E01	100	BLG-100-E1-T19	19	53	2.09	.000014038	1.40384
253	BLG	2	A2E01	100	BLG-100-E1-T20	20	54	2.11	.000013400	1.33999
254	BLG	2	C4E04	100	BLG-100-E4-T1	1	51	2.17	.000016359	1.63587
255	BLG	2	C4E04	100	BLG-100-E4-T2	2	53	2.11	.000014173	1.41728
256	BLG	2	C4E04	100	BLG-100-E4-T3	3	52	1.79	.000012730	1.27304
257	BLG	2	C4E04	100	BLG-100-E4-T4	4	49	1.71	.000014535	1.45348
258	BLG	2	C4E04	100	BLG-100-E4-T5	5	46	1.31	.000013459	1.34585
259	BLG	2	C4E04	100	BLG-100-E4-T6	6	65	4.35	.000015840	1.58398
260	BLG	2	C4E04	100	BLG-100-E4-T7	7	64	4.07	.000015526	1.55258
261	BLG	2	C4E04	100	BLG-100-E4-T8	8	49	2.23	.000018955	1.89547
262	BLG	2	C4E04	100	BLG-100-E4-T9	9	59	3.18	.000015484	1.54836
263	BLG	2	C4E04	100	BLG-100-E4-T10	10	54	2.06	.000013082	1.30824
264	BLG	2	C4E04	100	BLG-100-E4-T11	11	54	2.38	.000015115	1.51146
265	BLG	2	C4E04	100	BLG-100-E4-T12	12	52	1.94	.000013797	1.37972
266	BLG	2	C4E04	100	BLG-100-E4-T13	13	54	2.25	.000014289	1.42890
267	BLG	2	C4E04	100	BLG-100-E4-T14	14	53	2.12	.000014240	1.42399
268	BLG	2	C4E04	100	BLG-100-E4-T15	15	52	1.93	.000013726	1.37261
269	BLG	2	C4E04	100	BLG-100-E4-T16	16	54	2.22	.000014098	1.40985
270	BLG	2	C4E04	100	BLG-100-E4-T17	17	56	2.06	.000011730	1.17301
271	BLG	2	C4E04	100	BLG-100-E4-T18	18	43	1.16	.000014590	1.45899
272	BLG	2	C4E04	100	BLG-100-E4-T19	19	44	1.20	.000014087	1.40872
273	BLG	2	C4E04	100	BLG-100-E4-T20	20	48	1.37	.000012388	1.23879
274	BLG	2	B2E06	100	BLG-100-E6-T1	1	63	3.67	.000014677	1.46772
275	BLG	2	B2E06	100	BLG-100-E6-T2	2	60	2.97	.000013750	1.37500

	BLG	2	B2E06	100	BLG-100-E6-T3	3	58	2.71	.000013889	1.38895
277	BLG	2	B2E06	100	BLG-100-E6-T4	4	48	1.35	.000012207	1.22070
278	BLG	2	B2E06	100	BLG-100-E6-T5	5	49	1.42	.000012070	1.20698
279	BLG	2	B2E06	100	BLG-100-E6-T6	6	55	2.11	.000012682	1.26822
280	BLG	2	B2E06	100	BLG-100-E6-T7	7	45	1.28	.000014047	1.40466
281	BLG	2	B2E06	100	BLG-100-E6-T8	8	59	2.87	.000013974	1.39742
282	BLG	2	B2E06	100	BLG-100-E6-T9	9	60	3.12	.000014444	1.44444
283	BLG	2	B2E06	100	BLG-100-E6-T10	10	58	2.69	.000013787	1.37870
284	BLG	2	B2E06	100	BLG-100-E6-T11	11	59	2.92	.000014218	1.42176
285	BLG	2	B2E06	100	BLG-100-E6-T12	12	54	2.23	.000014162	1.41620
286	BLG	2	B2E06	100	BLG-100-E6-T13	13	55	2.39	.000014365	1.43651
287	BLG	2	B2E06	100	BLG-100-E6-T14	14	44	1.10	.000012913	1.29132
288	BLG	2	B2E06	100	BLG-100-E6-T15	15	50	1.64	.000013120	1.31200
289	BLG	2	B2E06	100	BLG-100-E6-T16	16	54	2.00	.000012701	1.27013
290	BLG	2	B2E06	100	BLG-100-E6-T17	17	54	1.58	.000010034	1.00340
291	BLG	2	B2E06	100	BLG-100-E6-T18	18	47	1.40	.000013484	1.34845
292	BLG	2	B2E06	100	BLG-100-E6-T19	19	49	1.75	.000014875	1.48748
293	BLG	2	B2E06	100	BLG-100-E6-T20	20	50	1.73	.000013840	1.38400
294	BLG	2	C5E05	200	BLG-200-E5-T1	1	63	3.59	.000014357	1.43573
295	BLG	2	C5E05	200	BLG-200-E5-T2	2	57	2.72	.000014687	1.46874
296	BLG	2	C5E05	200	BLG-200-E5-T3	3	56	2.28	.000012983	1.29829
297	BLG	2	C5E05	200	BLG-200-E5-T4	4	45	1.29	.000014156	1.41564
298	BLG	2	C5E05	200	BLG-200-E5-T5	5	44	1.10	.000012913	1.29132
299	BLG	2	C5E05	200	BLG-200-E5-T6	6	37	0.67	.000013227	1.32273
300	BLG	2	C5E05	200	BLG-200-E5-T7	7	51	1.89	.000014248	1.42479
301	BLG	2	C5E05	200	BLG-200-E5-T8	8	60	2.84	.000013148	1.31481
302	BLG	2	C5E05	200	BLG-200-E5-T9	9	54	2.26	.000014352	1.43525
303	BLG	2	C5E05	200	BLG-200-E5-T10	10	58	2.96	.000015171	1.51708
304	BLG	2	C5E05	200	BLG-200-E5-T11	11	65	2.86	.000010414	1.04142
305	BLG	2	C5E05	200	BLG-200-E5-T12	12	51	2.53	.000019073	1.90726
306	BLG	2	C5E05	200	BLG-200-E5-T13	13	54	2.20	.000013971	1.39714
307	BLG	2	C5E05	200	BLG-200-E5-T14	14	65	2.41	.000008776	0.87756
308	BLG	2	C5E05	200	BLG-200-E5-T15	15	50	1.85	.000014800	1.48000
309	BLG	2	C5E05	200	BLG-200-E5-T16	16	49	1.63	.000013855	1.38548
310	BLG	2	C5E05	200	BLG-200-E5-T17	17	47	1.37	.000013196	1.31955

	BLG	2	C5E05	200	BLG-200-E5-T18	18	54	2.08	.000013209	1.32094
312	BLG	2	A5E09	200	BLG-200-E9-T1	1	63	3.52	.000014477	1.44773
313	BLG	2	A5E09	200	BLG-200-E9-T2	2	54	2.13	.000013527	1.35269
314	BLG	2	A5E09	200	BLG-200-E9-T3	3	53	1.98	.000013300	1.32996
315	BLG	2	A5E09	200	BLG-200-E9-T4	4	52	2.07	.000014722	1.47218
316	BLG	2	A5E09	200	BLG-200-E9-T5	5	55	2.27	.000013644	1.36439
317	BLG	2	A5E09	200	BLG-200-E9-T6	6	55	2.58	.000015507	1.55071
318	BLG	2	A5E09	200	BLG-200-E9-T7	7	53	2.19	.000014710	1.47101
319	BLG	2	A5E09	200	BLG-200-E9-T8	8	51	2.03	.000015303	1.53033
320	BLG	2	A5E09	200	BLG-200-E9-T9	9	60	3.17	.000014676	1.46759
321	BLG	2	A5E09	200	BLG-200-E9-T10	10	52	1.97	.000014011	1.40106
322	BLG	2	A5E09	200	BLG-200-E9-T11	11	53	2.13	.000014307	1.43071
323	BLG	2	A5E09	200	BLG-200-E9-T12	12	55	2.44	.000014666	1.46657
324	BLG	2	A5E09	200	BLG-200-E9-T13	13	65	3.89	.000014165	1.41648
325	BLG	2	A5E09	200	BLG-200-E9-T14	14	52	2.03	.000014437	1.44373
326	BLG	2	A5E09	200	BLG-200-E9-T15	15	50	1.78	.000014240	1.42400
327	BLG	2	A5E09	200	BLG-200-E9-T16	16	45	1.06	.000011632	1.16324
328	BLG	2	A5E09	200	BLG-200-E9-T17	17	45	1.16	.000012730	1.27298
329	BLG	2	A5E09	200	BLG-200-E9-T18	18	59	2.72	.000013244	1.32438
330	BLG	2	B1E15	200	BLG-200-E15-T1	1	55	2.39	.000014365	1.43651
331	BLG	2	B1E15	200	BLG-200-E15-T2	2	52	1.96	.000013939	1.39395
332	BLG	2	B1E15	200	BLG-200-E15-T3	3	55	2.46	.000014786	1.47859
333	BLG	2	B1E15	200	BLG-200-E15-T4	4	54	1.50	.000009526	0.95260
334	BLG	2	B1E15	200	BLG-200-E15-T5	5	43	1.10	.000013835	1.38353
335	BLG	2	B1E15	200	BLG-200-E15-T6	6	65	4.01	.000014602	1.46017
336	BLG	2	B1E15	200	BLG-200-E15-T7	7	64	3.73	.000014229	1.42288
337	BLG	2	B1E15	200	BLG-200-E15-T8	8	65	4.17	.000015184	1.51843
338	BLG	2	B1E15	200	BLG-200-E15-T9	9	54	2.15	.000013654	1.36539
339	BLG	2	B1E15	200	BLG-200-E15-T10	10	45	1.20	.000013169	1.31687
340	BLG	2	B1E15	200	BLG-200-E15-T11	11	54	2.15	.000013654	1.36539
341	BLG	2	B1E15	200	BLG-200-E15-T12	12	51	1.88	.000014173	1.41725
342	BLG	2	B1E15	200	BLG-200-E15-T13	13	46	1.18	.000012123	1.21230
343	BLG	2	B1E15	200	BLG-200-E15-T14	14	50	1.84	.000014720	1.47200
344	BLG	2	B1E15	200	BLG-200-E15-T15	15	49	1.48	.000012580	1.25798
345	BLG	2	A3E02	300	BLG-300-E2-T1	1	62	3.55	.000014895	1.48954

	BLG	2	A3E02	300	BLG-300-E2-T2	2	51	1.92	.000014474	1.44741
347	BLG	2	A3E02	300	BLG-300-E2-T3	3	50	1.81	.000014480	1.44800
348	BLG	2	A3E02	300	BLG-300-E2-T4	4	42	1.41	.000019031	1.90314
349	BLG	2	A3E02	300	BLG-300-E2-T5	5	47	1.63	.000015700	1.56998
350	BLG	2	A3E02	300	BLG-300-E2-T6	6	50	1.65	.000013200	1.32000
351	BLG	2	A3E02	300	BLG-300-E2-T7	7	60	3.31	.000015324	1.53241
352	BLG	2	A3E02	300	BLG-300-E2-T8	8	58	2.38	.000012198	1.21981
353	BLG	2	A3E02	300	BLG-300-E2-T9	9	41	1.31	.000019007	1.90073
354	BLG	2	A3E02	300	BLG-300-E2-T10	10	51	1.54	.000011609	1.16094
355	BLG	2	A3E02	300	BLG-300-E2-T11	11	47	1.52	.000014640	1.46403
356	BLG	2	A3E02	300	BLG-300-E2-T12	12	50	1.68	.000013440	1.34400
357	BLG	2	A3E02	300	BLG-300-E2-T13	13	50	1.79	.000014320	1.43200
358	BLG	2	A3E02	300	BLG-300-E2-T14	14	54	2.27	.000014416	1.44160
359	BLG	2	A3E02	300	BLG-300-E2-T15	15	55	2.27	.000013644	1.36439
360	BLG	2	A3E02	300	BLG-300-E2-T16	16	45	1.28	.000014047	1.40466
361	BLG	2	C3E03	300	BLG-300-E3-T1	1	55	2.71	.000016289	1.62885
362	BLG	2	C3E03	300	BLG-300-E3-T2	2	59	2.78	.000013536	1.35360
363	BLG	2	C3E03	300	BLG-300-E3-T3	3	50	1.76	.000014080	1.40800
364	BLG	2	C3E03	300	BLG-300-E3-T4	4	47	1.58	.000015218	1.52182
365	BLG	2	C3E03	300	BLG-300-E3-T5	5	43	1.05	.000013206	1.32064
366	BLG	2	C3E03	300	BLG-300-E3-T6	6	65	3.49	.000012708	1.27082
367	BLG	2	C3E03	300	BLG-300-E3-T7	7	52	2.15	.000015291	1.52907
368	BLG	2	C3E03	300	BLG-300-E3-T8	8	50	1.54	.000012320	1.23200
369	BLG	2	C3E03	300	BLG-300-E3-T9	9	39	0.78	.000013149	1.31492
370	BLG	2	C3E03	300	BLG-300-E3-T10	10	44	1.10	.000012913	1.29132
371	BLG	2	C3E03	300	BLG-300-E3-T11	11	54	2.25	.000014289	1.42890
372	BLG	2	C3E03	300	BLG-300-E3-T12	12	64	3.57	.000013618	1.36185
373	BLG	2	C3E03	300	BLG-300-E3-T13	13	45	1.26	.000013827	1.38272
374	BLG	2	C3E03	300	BLG-300-E3-T14	14	56	2.49	.000014179	1.41787
375	BLG	2	C3E03	300	BLG-300-E3-T15	15	46	1.33	.000013664	1.36640
376	BLG	2	C3E03	300	BLG-300-E3-T16	16	47	1.33	.000012810	1.28103
377	BLG	2	B5E08	300	BLG-300-E8-T1	1	54	2.14	.000013590	1.35904
378	BLG	2	B5E08	300	BLG-300-E8-T2	2	46	1.40	.000014383	1.43832
379	BLG	2	B5E08	300	BLG-300-E8-T3	3	52	1.76	.000012517	1.25171
380	BLG	2	B5E08	300	BLG-300-E8-T4	4	46	1.47	.000015102	1.51023

	BLG	2	B5E08	300	BLG-300-E8-T5	5	48	1.68	.000015191	1.51910
382	BLG	2	B5E08	300	BLG-300-E8-T6	6	49	1.48	.000012580	1.25798
383	BLG	2	B5E08	300	BLG-300-E8-T7	7	50	1.73	.000013840	1.38400
384	BLG	2	B5E08	300	BLG-300-E8-T8	8	55	2.31	.000013884	1.38843
385	BLG	2	B5E08	300	BLG-300-E8-T9	9	57	2.54	.000013715	1.37154
386	BLG	2	B5E08	300	BLG-300-E8-T10	10	55	2.36	.000014185	1.41848
387	BLG	2	B5E08	300	BLG-300-E8-T11	11	51	1.77	.000013343	1.33433
388	BLG	2	B5E08	300	BLG-300-E8-T12	12	62	3.43	.000014392	1.43919
389	BLG	2	B5E08	300	BLG-300-E8-T13	13	64	3.76	.000014343	1.43433
390	BLG	2	B5E08	300	BLG-300-E8-T14	14	59	2.73	.000013292	1.32925
391	BLG	2	B5E08	300	BLG-300-E8-T15	15	59	2.68	.000013049	1.30490
392	BLG	2	B5E08	300	BLG-300-E8-T16	16	50	1.89	.000015120	1.51200
393	BLG	2	C1E07	50	BLG-50-E7-T1	1	48	1.60	.000014468	1.44676
394	BLG	2	C1E07	50	BLG-50-E7-T2	2	56	2.49	.000014179	1.41787
395	BLG	2	C1E07	50	BLG-50-E7-T3	3	54	2.14	.000013590	1.35904
396	BLG	2	C1E07	50	BLG-50-E7-T4	4	55	2.33	.000014005	1.40045
397	BLG	2	C1E07	50	BLG-50-E7-T5	5	49	1.76	.000014960	1.49598
398	BLG	2	C1E07	50	BLG-50-E7-T6	6	62	3.36	.000014098	1.40982
399	BLG	2	C1E07	50	BLG-50-E7-T7	7	57	2.37	.000012797	1.27975
400	BLG	2	C1E07	50	BLG-50-E7-T8	8	49	1.84	.000015640	1.56397
401	BLG	2	C1E07	50	BLG-50-E7-T9	9	53	2.06	.000013837	1.38369
402	BLG	2	C1E07	50	BLG-50-E7-T10	10	57	2.57	.000013877	1.38774
403	BLG	2	C1E07	50	BLG-50-E7-T11	11	49	1.61	.000013685	1.36848
404	BLG	2	C1E07	50	BLG-50-E7-T12	12	50	1.68	.000013440	1.34400
405	BLG	2	C1E07	50	BLG-50-E7-T13	13	50	1.67	.000013360	1.33600
406	BLG	2	C1E07	50	BLG-50-E7-T14	14	48	1.50	.000013563	1.35634
407	BLG	2	C1E07	50	BLG-50-E7-T15	15	55	2.38	.000014305	1.43050
408	BLG	2	C1E07	50	BLG-50-E7-T16	16	48	1.11	.000010037	1.00369
409	BLG	2	C1E07	50	BLG-50-E7-T17	17	50	1.80	.000014400	1.44000
410	BLG	2	C1E07	50	BLG-50-E7-T18	18	43	1.14	.000014338	1.43381
411	BLG	2	C1E07	50	BLG-50-E7-T19	19	43	0.81	.000010188	1.01878
412	BLG	2	C1E07	50	BLG-50-E7-T20	20	49	1.58	.000013430	1.34298
413	BLG	2	B4E12	50	BLG-50-E12-T1	1	65	4.00	.000014565	1.45653
414	BLG	2	B4E12	50	BLG-50-E12-T2	2	51	1.90	.000014323	1.43233
415	BLG	2	B4E12	50	BLG-50-E12-T3	3	53	2.16	.000014509	1.45086

	BLG	2	B4E12	50	BLG-50-E12-T4	4	55	2.60	.000015627	1.56273
417	BLG	2	B4E12	50	BLG-50-E12-T5	5	52	1.99	.000014153	1.41528
418	BLG	2	B4E12	50	BLG-50-E12-T6	6	65	3.83	.000013946	1.39463
419	BLG	2	B4E12	50	BLG-50-E12-T7	7	64	2.37	.000015051	1.50511
420	BLG	2	B4E12	50	BLG-50-E12-T8	8	53	2.03	.000013635	1.36354
421	BLG	2	B4E12	50	BLG-50-E12-T9	9	57	2.58	.000013931	1.39314
422	BLG	2	B4E12	50	BLG-50-E12-T10	10	56	2.48	.000014122	1.41217
423	BLG	2	B4E12	50	BLG-50-E12-T11	11	60	3.21	.000014861	1.48611
424	BLG	2	B4E12	50	BLG-50-E12-T12	12	54	2.26	.000014352	1.43525
425	BLG	2	B4E12	50	BLG-50-E12-T13	13	60	3.15	.000014583	1.45833
426	BLG	2	B4E12	50	BLG-50-E12-T14	14	54	2.02	.000012828	1.28283
427	BLG	2	B4E12	50	BLG-50-E12-T15	15	51	1.94	.000014625	1.46248
428	BLG	2	B4E12	50	BLG-50-E12-T16	16	58	3.13	.000016042	1.60421
429	BLG	2	B4E12	50	BLG-50-E12-T17	17	55	2.34	.000014065	1.40646
430	BLG	2	B4E12	50	BLG-50-E12-T18	18	55	1.73	.000010398	1.03982
431	BLG	2	B4E12	50	BLG-50-E12-T19	19	47	1.36	.000013099	1.30992
432	BLG	2	A4E13	50	BLG-50-E13-T1	1	64	3.78	.000014420	1.44196
433	BLG	2	A4E13	50	BLG-50-E13-T2	2	59	2.30	.000011199	1.11988
434	BLG	2	A4E13	50	BLG-50-E13-T3	3	60	3.12	.000014444	1.44444
435	BLG	2	A4E13	50	BLG-50-E13-T4	4	65	2.46	.000014786	1.47859
436	BLG	2	A4E13	50	BLG-50-E13-T5	5	51	1.84	.000013871	1.38710
437	BLG	2	A4E13	50	BLG-50-E13-T6	6	60	3.94	.000018241	1.82407
438	BLG	2	A4E13	50	BLG-50-E13-T7	7	50	1.86	.000014880	1.48800
439	BLG	2	A4E13	50	BLG-50-E13-T8	8	59	3.04	.000014802	1.48019
440	BLG	2	A4E13	50	BLG-50-E13-T9	9	63	3.68	.000014717	1.47172
441	BLG	2	A4E13	50	BLG-50-E13-T10	10	60	3.62	.000016759	1.67593
442	BLG	2	A4E13	50	BLG-50-E13-T11	11	52	1.89	.000013442	1.34416
443	BLG	2	A4E13	50	BLG-50-E13-T12	12	50	1.73	.000013840	1.38400
444	BLG	2	A4E13	50	BLG-50-E13-T13	13	45	1.21	.000013278	1.32785
445	BLG	2	A4E13	50	BLG-50-E13-T14	14	50	1.72	.000013760	1.37600
446	BLG	2	A4E13	50	BLG-50-E13-T15	15	50	1.82	.000014560	1.45600
447	BLG	2	A4E13	50	BLG-50-E13-T16	16	47	1.51	.000014544	1.45440
448	BLG	2	A4E13	50	BLG-50-E13-T17	17	49	1.30	.000011050	1.10498
449	BLG	2	A4E13	50	BLG-50-E13-T18	18	52	1.72	.000012233	1.22326
450	BLG	2	A4E13	50	BLG-50-E13-T19	19	52	1.81	.000012873	1.28727

	BLG	2	A4E13	50	BLG-50-E13-T20	20	44	1.26	.000014792	1.47915
452	CCF	2	B5E03	0	CCF-CONTROL-E3-T1	1	58	1.59	.000008149	0.81492
453	CCF	2	B5E03	0	CCF-CONTROL-E3-T2	2	59	1.59	.000008229	0.82287
454	CCF	2	B5E03	0	CCF-CONTROL-E3-T3	3	63	2.11	.000008438	0.84384
455	CCF	2	B5E03	0	CCF-CONTROL-E3-T4	4	60	1.82	.000008426	0.84259
456	CCF	2	B5E03	0	CCF-CONTROL-E3-T5	5	66	2.16	.000007513	0.75131
457	CCF	2	B5E03	0	CCF-CONTROL-E3-T6	6	63	2.02	.000008078	0.80785
458	CCF	2	B5E03	0	CCF-CONTROL-E3-T7	7	60	1.91	.000008843	0.88426
459	CCF	2	B5E03	0	CCF-CONTROL-E3-T8	8	59	1.62	.000007888	0.78879
460	CCF	2	B5E03	0	CCF-CONTROL-E3-T9	9	64	1.95	.000007439	0.74387
461	CCF	2	B5E03	0	CCF-CONTROL-E3-T10	10	64	2.19	.000008354	0.83542
462	CCF	2	B5E03	0	CCF-CONTROL-E3-T11	11	57	1.53	.000008262	0.82617
463	CCF	2	B5E03	0	CCF-CONTROL-E3-T12	12	59	1.75	.000008521	0.85208
464	CCF	2	B5E03	0	CCF-CONTROL-E3-T13	13	59	1.75	.000008521	0.85208
465	CCF	2	B5E03	0	CCF-CONTROL-E3-T14	14	55	1.43	.000008595	0.85950
466	CCF	2	B5E03	0	CCF-CONTROL-E3-T15	15	67	2.45	.000008146	0.81459
467	CCF	2	B5E03	0	CCF-CONTROL-E3-T16	16	57	1.52	.000008208	0.82077
468	CCF	2	B5E03	0	CCF-CONTROL-E3-T17	17	57	1.47	.000007938	0.79377
469	CCF	2	B5E03	0	CCF-CONTROL-E3-T18	18	62	1.80	.000007553	0.75526
470	CCF	2	B5E03	0	CCF-CONTROL-E3-T19	19	61	1.92	.000008459	0.84589
471	CCF	2	B5E03	0	CCF-CONTROL-E3-T20	20	62	1.89	.000007930	0.79302
472	CCF	2	B5E03	0	CCF-CONTROL-E3-T21	21	59	1.77	.000008618	0.86182
473	CCF	2	B5E03	0	CCF-CONTROL-E3-T22	22	70	2.90	.000008455	0.84548
474	CCF	2	B5E03	0	CCF-CONTROL-E3-T23	23	60	1.90	.000008796	0.87963
475	CCF	2	B5E03	0	CCF-CONTROL-E3-T24	24	57	1.60	.000008640	0.86396
476	CCF	2	B5E03	0	CCF-CONTROL-E3-T25	25	57	1.54	.000008316	0.83156
477	CCF	2	B5E03	0	CCF-CONTROL-E3-T26	26	56	1.39	.000007915	0.79150
478	CCF	2	B5E03	0	CCF-CONTROL-E3-T27	27	59	1.65	.000008034	0.80339
479	CCF	2	B5E03	0	CCF-CONTROL-E3-T28	28	53	1.29	.000008665	0.86649
480	CCF	2	B5E03	0	CCF-CONTROL-E3-T29	29	55	1.42	.000008536	0.85349
481	CCF	2	B5E03	0	CCF-CONTROL-E3-T30	30	64	2.13	.000008125	0.81253
482	CCF	2	A4E08	0	CCF-CONTROL-E8-T1	1	62	2.05	.000008602	0.86016
483	CCF	2	A4E08	0	CCF-CONTROL-E8-T2	2	66	2.42	.000008418	0.84175
484	CCF	2	A4E08	0	CCF-CONTROL-E8-T3	3	64	2.18	.000008316	0.83160
485	CCF	2	A4E08	0	CCF-CONTROL-E8-T4	4	61	1.89	.000008327	0.83267

	CCF	2	A4E08	0	CCF-CONTROL-E8-T5	5	67	2.52	.000008379	0.83787
487	CCF	2	A4E08	0	CCF-CONTROL-E8-T6	6	57	1.71	.000009234	0.92336
488	CCF	2	A4E08	0	CCF-CONTROL-E8-T7	7	56	1.34	.000007630	0.76303
489	CCF	2	A4E08	0	CCF-CONTROL-E8-T8	8	61	1.84	.000008106	0.81064
490	CCF	2	A4E08	0	CCF-CONTROL-E8-T9	9	57	1.56	.000008424	0.84236
491	CCF	2	A4E08	0	CCF-CONTROL-E8-T10	10	61	1.92	.000008459	0.84589
492	CCF	2	A4E08	0	CCF-CONTROL-E8-T11	11	56	1.52	.000008655	0.86552
493	CCF	2	A4E08	0	CCF-CONTROL-E8-T12	12	53	1.19	.000007993	0.79932
494	CCF	2	A4E08	0	CCF-CONTROL-E8-T13	13	70	2.86	.000008338	0.83382
495	CCF	2	A4E08	0	CCF-CONTROL-E8-T14	14	58	1.57	.000008047	0.80467
496	CCF	2	A4E08	0	CCF-CONTROL-E8-T15	15	59	1.66	.000008083	0.80826
497	CCF	2	A4E08	0	CCF-CONTROL-E8-T16	16	62	2.01	.000008434	0.84338
498	CCF	2	A4E08	0	CCF-CONTROL-E8-T17	17	61	2.08	.000009164	0.91638
499	CCF	2	A4E08	0	CCF-CONTROL-E8-T18	18	64	2.09	.000007973	0.79727
500	CCF	2	A4E08	0	CCF-CONTROL-E8-T19	19	51	1.02	.000007689	0.76894
501	CCF	2	A4E08	0	CCF-CONTROL-E8-T20	20	64	2.33	.000008868	0.88682
502	CCF	2	C3E10	0	CCF-CONTROL-E10-T1	1	61	1.92	.000008459	0.84589
503	CCF	2	C3E10	0	CCF-CONTROL-E10-T2	2	60	1.74	.000008056	0.80556
504	CCF	2	C3E10	0	CCF-CONTROL-E10-T3	3	60	1.77	.000008194	0.81944
505	CCF	2	C3E10	0	CCF-CONTROL-E10-T4	4	65	2.17	.000007902	0.79017
506	CCF	2	C3E10	0	CCF-CONTROL-E10-T5	5	56	1.57	.000008940	0.89400
507	CCF	2	C3E10	0	CCF-CONTROL-E10-T6	6	61	1.83	.000008062	0.80623
508	CCF	2	C3E10	0	CCF-CONTROL-E10-T7	7	57	1.44	.000007776	0.77757
509	CCF	2	C3E10	0	CCF-CONTROL-E10-T8	8	66	2.34	.000008139	0.81392
510	CCF	2	C3E10	0	CCF-CONTROL-E10-T9	9	54	1.28	.000008129	0.81288
511	CCF	2	C3E10	0	CCF-CONTROL-E10-T10	10	67	2.39	.000007946	0.79465
512	CCF	2	C3E10	0	CCF-CONTROL-E10-T11	11	64	2.32	.000008850	0.88501
513	CCF	2	C3E10	0	CCF-CONTROL-E10-T12	12	65	2.21	.000008047	0.80473
514	CCF	2	C3E10	0	CCF-CONTROL-E10-T13	13	65	1.69	.000006154	0.61538
515	CCF	2	C3E10	0	CCF-CONTROL-E10-T14	14	54	1.24	.000007875	0.78748
516	CCF	2	C3E10	0	CCF-CONTROL-E10-T15	15	59	1.72	.000008375	0.83748
517	CCF	2	C3E10	0	CCF-CONTROL-E10-T16	16	63	2.05	.000008198	0.81985
518	CCF	2	C3E10	0	CCF-CONTROL-E10-T17	17	60	1.82	.000008426	0.84259
519	CCF	2	C3E10	0	CCF-CONTROL-E10-T18	18	54	1.30	.000008256	0.82559
520	CCF	2	C3E10	0	CCF-CONTROL-E10-T19	19	60	1.72	.000007963	0.79630

	CCF	2	C3E10	0	CCF-CONTROL-E10-T20	20	56	1.38	.000007858	0.78581
522	CCF	2	C2E05	100	CCF-100-E5-T1	1	53	1.20	.000008060	0.80603
523	CCF	2	C2E05	100	CCF-100-E5-T2	2	56	1.34	.000007630	0.76303
524	CCF	2	C2E05	100	CCF-100-E5-T3	3	57	1.65	.000008910	0.89096
525	CCF	2	C2E05	100	CCF-100-E5-T4	4	55	1.30	.000007814	0.78137
526	CCF	2	C2E05	100	CCF-100-E5-T5	5	59	1.52	.000007401	0.74010
527	CCF	2	B3E07	100	CCF-100-E7-T1	1	60	1.74	.000008056	0.80556
528	CCF	2	B3E07	100	CCF-100-E7-T2	2	57	1.51	.000008154	0.81537
529	CCF	2	B3E07	100	CCF-100-E7-T3	3	57	1.46	.000007884	0.78837
530	CCF	2	B3E07	100	CCF-100-E7-T4	4	58	1.54	.000007893	0.78929
531	CCF	2	B3E07	100	CCF-100-E7-T5	5	59	1.36	.000006622	0.66219
532	CCF	2	B3E07	100	CCF-100-E7-T6	6	56	1.41	.000008029	0.80289
533	CCF	2	B3E07	100	CCF-100-E7-T7	7	56	1.50	.000008541	0.85414
534	CCF	2	B3E07	100	CCF-100-E7-T8	8	53	1.22	.000008195	0.81947
535	CCF	2	A5E09	100	CCF-100-E9-T1	1	59	1.61	.000007839	0.78392
536	CCF	2	A5E09	100	CCF-100-E9-T2	2	65	2.15	.000007829	0.78289
537	CCF	2	A5E09	100	CCF-100-E9-T3	3	57	1.52	.000008208	0.82077
538	CCF	2	A5E09	100	CCF-100-E9-T4	4	59	1.54	.000007498	0.74983
539	CCF	2	A5E09	100	CCF-100-E9-T5	5	53	1.21	.000008128	0.81275
540	CCF	2	A5E09	100	CCF-100-E9-T6	6	59	1.60	.000007790	0.77905
541	CCF	2	A5E09	100	CCF-100-E9-T7	7	62	1.71	.000007175	0.71750
542	CCF	2	A5E09	100	CCF-100-E9-T8	8	66	2.14	.000007444	0.74436
543	CCF	2	A5E09	100	CCF-100-E9-T9	9	59	1.70	.000008277	0.82774
544	CCF	2	A5E09	100	CCF-100-E9-T10	10	56	1.42	.000008086	0.80858
545	CCF	2	A5E09	100	CCF-100-E9-T11	11	63	2.10	.000008398	0.83984
546	CCF	2	A5E09	100	CCF-100-E9-T12	12	58	1.54	.000007893	0.78929
547	CCF	2	A5E09	100	CCF-100-E9-T13	13	50	0.84	.000006720	0.67200
548	CCF	2	A5E09	100	CCF-100-E9-T14	14	55	1.66	.000009977	0.99775
549	CCF	2	A5E09	100	CCF-100-E9-T15	15	56	1.43	.000008143	0.81428
550	CCF	2	A5E09	100	CCF-100-E9-T16	16	54	1.19	.000007557	0.75573
551	CCF	2	C1E01	200	CCF-200-E1-T1	1	59	1.55	.000007547	0.75470
552	CCF	2	C1E01	200	CCF-200-E1-T2	2	56	1.37	.000007801	0.78011
553	CCF	2	C1E01	200	CCF-200-E1-T3	3	53	1.07	.000007187	0.71871
554	CCF	2	B2E12	200	CCF-200-E12-T1	1	54	1.37	.000008700	0.87004
555	CCF	2	A3E13	200	CCF-200-E13-T1	1	55	1.33	.000007994	0.79940

	CCF	2	A2E02	50	CCF-50-E2-T1	1	61	1.82	.000008018	0.80183
557	CCF	2	A2E02	50	CCF-50-E2-T2	2	53	1.18	.000007926	0.79260
558	CCF	2	A2E02	50	CCF-50-E2-T3	3	61	1.81	.000007974	0.79742
559	CCF	2	A2E02	50	CCF-50-E2-T4	4	46	0.66	.000006781	0.67806
560	CCF	2	A2E02	50	CCF-50-E2-T5	5	66	2.19	.000007617	0.76175
561	CCF	2	A2E02	50	CCF-50-E2-T6	6	65	2.27	.000008266	0.82658
562	CCF	2	A2E02	50	CCF-50-E2-T7	7	64	2.13	.000008125	0.81253
563	CCF	2	A2E02	50	CCF-50-E2-T8	8	69	2.56	.000007793	0.77928
564	CCF	2	A2E02	50	CCF-50-E2-T9	9	65	2.28	.000008302	0.83022
565	CCF	2	A2E02	50	CCF-50-E2-T10	10	66	2.14	.000007444	0.74436
566	CCF	2	A2E02	50	CCF-50-E2-T11	11	59	1.71	.000008326	0.83261
567	CCF	2	A2E02	50	CCF-50-E2-T12	12	65	2.10	.000007647	0.76468
568	CCF	2	A2E02	50	CCF-50-E2-T13	13	64	2.17	.000008278	0.82779
569	CCF	2	A2E02	50	CCF-50-E2-T14	14	58	1.66	.000008508	0.85079
570	CCF	2	A2E02	50	CCF-50-E2-T15	15	58	1.64	.000008405	0.84054
571	CCF	2	A2E02	50	CCF-50-E2-T16	16	61	1.91	.000008415	0.84148
572	CCF	2	A2E02	50	CCF-50-E2-T17	17	57	1.75	.000009450	0.94496
573	CCF	2	A2E02	50	CCF-50-E2-T18	18	59	1.64	.000007985	0.79852
574	CCF	2	A2E02	50	CCF-50-E2-T19	19	63	2.10	.000008398	0.83984
575	CCF	2	A2E02	50	CCF-50-E2-T20	20	51	1.06	.000007991	0.79909
576	CCF	2	B4E04	50	CCF-50-E4-T1	1	60	1.71	.000007917	0.79167
577	CCF	2	B4E04	50	CCF-50-E4-T2	2	63	1.84	.000007359	0.73586
578	CCF	2	B4E04	50	CCF-50-E4-T3	3	64	2.14	.000008163	0.81635
579	CCF	2	B4E04	50	CCF-50-E4-T4	4	56	1.51	.000008598	0.85983
580	CCF	2	B4E04	50	CCF-50-E4-T5	5	58	1.52	.000008655	0.86552
581	CCF	2	B4E04	50	CCF-50-E4-T6	6	66	2.26	.000007861	0.78610
582	CCF	2	B4E04	50	CCF-50-E4-T7	7	67	1.76	.000005852	0.58518
583	CCF	2	B4E04	50	CCF-50-E4-T8	8	54	1.31	.000008319	0.83194
584	CCF	2	B4E04	50	CCF-50-E4-T9	9	58	1.48	.000007585	0.75854
585	CCF	2	B4E04	50	CCF-50-E4-T10	10	58	1.65	.000008457	0.84567
586	CCF	2	B4E04	50	CCF-50-E4-T11	11	63	1.95	.000007799	0.77985
587	CCF	2	B4E04	50	CCF-50-E4-T12	12	56	1.17	.000006662	0.66623
588	CCF	2	B4E04	50	CCF-50-E4-T13	13	61	1.77	.000007798	0.77980
589	CCF	2	B4E04	50	CCF-50-E4-T14	14	58	1.53	.000007842	0.78416
590	CCF	2	B4E04	50	CCF-50-E4-T15	15	56	1.50	.000008541	0.85414

	CCF	2	B4E04	50	CCF-50-E4-T16	16	61	1.96	.000008635	0.86351
592	CCF	2	B4E04	50	CCF-50-E4-T17	17	59	1.64	.000007985	0.79852
593	CCF	2	B4E04	50	CCF-50-E4-T18	18	53	1.30	.000008732	0.87320
594	CCF	2	B4E04	50	CCF-50-E4-T19	19	60	1.74	.000008056	0.80556
595	CCF	2	B4E04	50	CCF-50-E4-T20	20	53	1.16	.000007792	0.77917
596	CCF	2	C5E11	50	CCF-50-E11-T1	1	63	2.01	.000008038	0.80385
597	CCF	2	C5E11	50	CCF-50-E11-T2	2	63	1.95	.000007799	0.77985
598	CCF	2	C5E11	50	CCF-50-E11-T3	3	60	1.98	.000009167	0.91667
599	CCF	2	C5E11	50	CCF-50-E11-T4	4	54	1.29	.000008192	0.81923
600	CCF	2	C5E11	50	CCF-50-E11-T5	5	57	1.59	.000008586	0.85856
601	CCF	2	C5E11	50	CCF-50-E11-T6	6	60	1.80	.000008333	0.83333
602	CCF	2	C5E11	50	CCF-50-E11-T7	7	63	2.08	.000008318	0.83184
603	CCF	2	C5E11	50	CCF-50-E11-T8	8	55	1.39	.000008355	0.83545
604	CCF	2	C5E11	50	CCF-50-E11-T9	9	56	1.36	.000007744	0.77442
605	CCF	2	C5E11	50	CCF-50-E11-T10	10	57	1.62	.000008748	0.87476
606	CCF	2	C5E11	50	CCF-50-E11-T11	11	55	1.48	.000008896	0.88956
607	CCF	2	C5E11	50	CCF-50-E11-T12	12	56	1.45	.000008257	0.82567
608	CCF	2	C5E11	50	CCF-50-E11-T13	13	58	1.64	.000008405	0.84054
609	CCF	2	C5E11	50	CCF-50-E11-T14	14	56	1.44	.000008200	0.81997
610	CCF	2	C5E11	50	CCF-50-E11-T15	15	54	1.27	.000008065	0.80653
611	CCF	2	C5E11	50	CCF-50-E11-T16	16	53	1.28	.000008598	0.85977
612	CCF	2	C5E11	50	CCF-50-E11-T17	17	61	1.79	.000007886	0.78861
613	CCF	2	C5E11	50	CCF-50-E11-T18	18	62	1.87	.000007846	0.78463
614	CCF	2	C5E11	50	CCF-50-E11-T19	19	57	1.65	.000008910	0.89096
615	CCF	2	C5E11	50	CCF-50-E11-T20	20	63	2.07	.000008278	0.82784
616	LMB	2	C4E08	0	LMB-CONTROL-E8-T1	1	52	1.59	.000011308	1.13080
617	LMB	2	C4E08	0	LMB-CONTROL-E8-T2	2	49	1.26	.000010710	1.07098
618	LMB	2	C4E08	0	LMB-CONTROL-E8-T3	3	47	1.12	.000010788	1.07876
619	LMB	2	C4E08	0	LMB-CONTROL-E8-T4	4	57	1.88	.000010152	1.01516
620	LMB	2	C4E08	0	LMB-CONTROL-E8-T5	5	50	1.33	.000010640	1.06400
621	LMB	2	C4E08	0	LMB-CONTROL-E8-T6	6	46	0.89	.000009144	0.91436
622	LMB	2	C4E08	0	LMB-CONTROL-E8-T7	7	52	1.29	.000009174	0.91744
623	LMB	2	C4E08	0	LMB-CONTROL-E8-T8	8	54	1.64	.000010415	1.04151
624	LMB	2	C4E08	0	LMB-CONTROL-E8-T9	9	61	2.29	.000010089	1.00890
625	LMB	2	C4E08	0	LMB-CONTROL-E8-T10	10	57	1.83	.000009882	0.98816

	LMB	2	C4E08	0	LMB-CONTROL-E8-T11	11	48	1.27	.000011484	1.14837
627	LMB	2	C4E08	0	LMB-CONTROL-E8-T12	12	50	1.38	.000011040	1.10400
628	LMB	2	C4E08	0	LMB-CONTROL-E8-T13	13	49	1.28	.000010880	1.08798
629	LMB	2	C4E08	0	LMB-CONTROL-E8-T14	14	49	1.22	.000010370	1.03698
630	LMB	2	C4E08	0	LMB-CONTROL-E8-T15	15	51	1.33	.000010026	1.00263
631	LMB	2	C4E08	0	LMB-CONTROL-E8-T16	16	54	1.70	.000010796	1.07961
632	LMB	2	C4E08	0	LMB-CONTROL-E8-T17	17	45	1.06	.000011632	1.16324
633	LMB	2	C4E08	0	LMB-CONTROL-E8-T18	18	48	1.23	.000011122	1.11220
634	LMB	2	C4E08	0	LMB-CONTROL-E8-T19	19	42	0.76	.000010258	1.02581
635	LMB	2	C4E08	0	LMB-CONTROL-E8-T20	20	48	1.13	.000010218	1.02177
636	LMB	2	A3E12	0	LMB-CONTROL-E12-T1	1	47	1.11	.000010691	1.06913
637	LMB	2	A3E12	0	LMB-CONTROL-E12-T2	2	47	1.06	.000010210	1.02097
638	LMB	2	A3E12	0	LMB-CONTROL-E12-T3	3	50	1.30	.000010400	1.04000
639	LMB	2	A3E12	0	LMB-CONTROL-E12-T4	4	47	1.10	.000010595	1.05950
640	LMB	2	A3E12	0	LMB-CONTROL-E12-T5	5	49	1.30	.000011050	1.10498
641	LMB	2	A3E12	0	LMB-CONTROL-E12-T6	6	52	1.47	.000010455	1.04546
642	LMB	2	A3E12	0	LMB-CONTROL-E12-T7	7	49	1.12	.000009520	0.95198
643	LMB	2	A3E12	0	LMB-CONTROL-E12-T8	8	61	2.47	.000010882	1.08820
644	LMB	2	A3E12	0	LMB-CONTROL-E12-T9	9	47	1.16	.000011173	1.11729
645	LMB	2	A3E12	0	LMB-CONTROL-E12-T10	10	57	1.88	.000010152	1.01516
646	LMB	2	A3E12	0	LMB-CONTROL-E12-T11	11	49	1.30	.000011050	1.10498
647	LMB	2	A3E12	0	LMB-CONTROL-E12-T12	12	46	1.08	.000011096	1.10956
648	LMB	2	A3E12	0	LMB-CONTROL-E12-T13	13	49	1.23	.000010455	1.04548
649	LMB	2	A3E12	0	LMB-CONTROL-E12-T14	14	50	1.26	.000010080	1.00800
650	LMB	2	A3E12	0	LMB-CONTROL-E12-T15	15	42	0.74	.000009988	0.99881
651	LMB	2	A3E12	0	LMB-CONTROL-E12-T16	16	59	2.14	.000010420	1.04198
652	LMB	2	A3E12	0	LMB-CONTROL-E12-T17	17	45	0.77	.000008450	0.84499
653	LMB	2	A3E12	0	LMB-CONTROL-E12-T18	18	53	1.46	.000009807	0.98068
654	LMB	2	A3E12	0	LMB-CONTROL-E12-T19	19	49	1.31	.000011135	1.11348
655	LMB	2	A3E12	0	LMB-CONTROL-E12-T20	20	44	0.98	.000011505	1.15045
656	LMB	2	B3E14	0	LMB-CONTROL-E14-T1	1	51	1.45	.000010931	1.09309
657	LMB	2	B3E14	0	LMB-CONTROL-E14-T2	2	51	1.42	.000010705	1.07048
658	LMB	2	B3E14	0	LMB-CONTROL-E14-T3	3	50	1.24	.000009920	0.99200
659	LMB	2	B3E14	0	LMB-CONTROL-E14-T4	4	44	0.86	.000010096	1.00958
660	LMB	2	B3E14	0	LMB-CONTROL-E14-T5	5	43	0.84	.000010565	1.05651

	LMB	2	B3E14	0	LMB-CONTROL-E14-T6	6	59	2.02	.000009835	0.98355
662	LMB	2	B3E14	0	LMB-CONTROL-E14-T7	7	46	1.05	.000010787	1.07874
663	LMB	2	B3E14	0	LMB-CONTROL-E14-T8	8	50	1.28	.000010240	1.02400
664	LMB	2	B3E14	0	LMB-CONTROL-E14-T9	9	55	1.83	.000010999	1.09992
665	LMB	2	B3E14	0	LMB-CONTROL-E14-T10	10	54	1.84	.000011685	1.16852
666	LMB	2	B3E14	0	LMB-CONTROL-E14-T11	11	43	0.78	.000009810	0.98105
667	LMB	2	B3E14	0	LMB-CONTROL-E14-T12	12	49	1.22	.000010370	1.03698
668	LMB	2	B3E14	0	LMB-CONTROL-E14-T13	13	52	1.49	.000010597	1.05968
669	LMB	2	B3E14	0	LMB-CONTROL-E14-T14	14	52	1.42	.000010099	1.00990
670	LMB	2	B3E14	0	LMB-CONTROL-E14-T15	15	44	0.93	.000010918	1.09175
671	LMB	2	B3E14	0	LMB-CONTROL-E14-T16	16	49	1.27	.000010795	1.07948
672	LMB	2	B3E14	0	LMB-CONTROL-E14-T17	17	46	1.15	.000011815	1.18147
673	LMB	2	B3E14	0	LMB-CONTROL-E14-T18	18	54	1.66	.000010542	1.05421
674	LMB	2	B3E14	0	LMB-CONTROL-E14-T19	19	46	1.06	.000010890	1.08901
675	LMB	2	B3E14	0	LMB-CONTROL-E14-T20	20	53	1.59	.000010680	1.06800
676	LMB	2	C3E01	100	LMB-100-E1-T1	1	54	1.50	.000009526	0.95250
677	LMB	2	C3E01	100	LMB-100-E1-T2	2	43	0.66	.000008301	0.83012
678	LMB	2	C3E01	100	LMB-100-E1-T3	3	52	1.30	.000009246	0.92466
679	LMB	2	C3E01	100	LMB-100-E1-T4	4	55	1.74	.000010458	1.04583
680	LMB	2	C3E01	100	LMB-100-E1-T5	5	45	0.93	.000010206	1.02058
681	LMB	2	C3E01	100	LMB-100-E1-T6	6	54	1.56	.000009907	0.99070
682	LMB	2	C3E01	100	LMB-100-E1-T7	7	52	1.39	.000009886	0.98856
683	LMB	2	C3E01	100	LMB-100-E1-T8	8	44	0.86	.000010096	1.00958
684	LMB	2	C3E01	100	LMB-100-E1-T9	9	57	1.71	.000009234	0.92336
685	LMB	2	C3E01	100	LMB-100-E1-T10	10	55	1.68	.000010098	1.00977
686	LMB	2	C3E01	100	LMB-100-E1-T11	11	43	0.74	.000009307	0.93074
687	LMB	2	C3E01	100	LMB-100-E1-T12	12	52	1.38	.000009815	0.98145
688	LMB	2	C3E01	100	LMB-100-E1-T13	13	53	1.45	.000009740	0.97396
689	LMB	2	C3E01	100	LMB-100-E1-T14	14	48	0.92	.000008319	0.83189
690	LMB	2	C3E01	100	LMB-100-E1-T15	15	51	1.37	.000010328	1.03279
691	LMB	2	C3E01	100	LMB-100-E1-T16	16	48	1.11	.000010037	1.00369
692	LMB	2	C3E01	100	LMB-100-E1-T17	17	45	0.76	.000008340	0.83402
693	LMB	2	C3E01	100	LMB-100-E1-T18	18	51	1.37	.000010328	1.03279
694	LMB	2	C3E01	100	LMB-100-E1-T19	19	46	0.93	.000009555	0.95545
695	LMB	2	C3E01	100	LMB-100-E1-T20	20	47	1.02	.000009824	0.98244

	LMB	2	A4E06	100	LMB-100-E6-T1	1	47	0.94	.000009054	0.90539
697	LMB	2	A4E06	100	LMB-100-E6-T2	2	60	2.13	.000009861	0.98611
698	LMB	2	A4E06	100	LMB-100-E6-T3	3	47	0.96	.000009247	0.92465
699	LMB	2	A4E06	100	LMB-100-E6-T4	4	62	2.34	.000009818	0.98184
700	LMB	2	A4E06	100	LMB-100-E6-T5	5	49	1.14	.000009690	0.96898
701	LMB	2	A4E06	100	LMB-100-E6-T6	6	51	1.36	.000010252	1.02525
702	LMB	2	A4E06	100	LMB-100-E6-T7	7	50	1.28	.000010240	1.02400
703	LMB	2	A4E06	100	LMB-100-E6-T8	8	45	0.94	.000010316	1.03155
704	LMB	2	A4E06	100	LMB-100-E6-T9	9	49	1.20	.000010200	1.01998
705	LMB	2	A4E06	100	LMB-100-E6-T10	10	46	0.96	.000009863	0.98627
706	LMB	2	A4E06	100	LMB-100-E6-T11	11	55	1.60	.000009617	0.96168
707	LMB	2	A4E06	100	LMB-100-E6-T12	12	57	1.81	.000009774	0.97736
708	LMB	2	A4E06	100	LMB-100-E6-T13	13	51	1.42	.000010705	1.07048
709	LMB	2	A4E06	100	LMB-100-E6-T14	14	43	0.72	.000009056	0.90558
710	LMB	2	A4E06	100	LMB-100-E6-T15	15	56	1.73	.000009851	0.98510
711	LMB	2	A4E06	100	LMB-100-E6-T16	16	51	1.37	.000010328	1.03279
712	LMB	2	A4E06	100	LMB-100-E6-T17	17	48	1.12	.000010127	1.01273
713	LMB	2	A4E06	100	LMB-100-E6-T18	18	47	0.90	.000008669	0.86686
714	LMB	2	B2E13	100	LMB-100-E13-T1	1	50	1.30	.000010400	1.04000
715	LMB	2	B2E13	100	LMB-100-E13-T2	2	41	0.64	.000009286	0.92860
716	LMB	2	B2E13	100	LMB-100-E13-T3	3	49	1.17	.000009945	0.99448
717	LMB	2	B2E13	100	LMB-100-E13-T4	4	51	1.35	.000010177	1.01771
718	LMB	2	B2E13	100	LMB-100-E13-T5	5	47	1.05	.000010113	1.01134
719	LMB	2	B2E13	100	LMB-100-E13-T6	6	51	1.41	.000010629	1.06294
720	LMB	2	B2E13	100	LMB-100-E13-T7	7	45	0.91	.000009349	0.93491
721	LMB	2	B2E13	100	LMB-100-E13-T8	8	54	1.48	.000009399	0.93990
722	LMB	2	B2E13	100	LMB-100-E13-T9	9	45	0.97	.000010645	1.06447
723	LMB	2	B2E13	100	LMB-100-E13-T10	10	47	0.97	.000009343	0.93428
724	LMB	2	B2E13	100	LMB-100-E13-T11	11	49	1.17	.000009945	0.99448
725	LMB	2	B2E13	100	LMB-100-E13-T12	12	52	1.30	.000009246	0.92456
726	LMB	2	B2E13	100	LMB-100-E13-T13	13	47	1.07	.000010306	1.03060
727	LMB	2	B2E13	100	LMB-100-E13-T14	14	44	0.83	.000009744	0.97436
728	LMB	2	B2E13	100	LMB-100-E13-T15	15	47	1.15	.000011077	1.10765
729	LMB	2	B2E13	100	LMB-100-E13-T16	16	46	1.08	.000011096	1.10956
730	LMB	2	B2E13	100	LMB-100-E13-T17	17	51	1.26	.000009499	0.94986

	LMB	2	B2E13	100	LMB-100-E13-T18	18	44	0.91	.000010683	1.06828
732	LMB	2	B2E13	100	LMB-100-E13-T19	19	43	0.85	.000010691	1.06909
733	LMB	2	C5E02	200	LMB-200-E2-T1	1	44	0.66	.000007748	0.77479
734	LMB	2	C5E02	200	LMB-200-E2-T2	2	54	1.52	.000009653	0.96530
735	LMB	2	C5E02	200	LMB-200-E2-T3	3	61	2.27	.000010001	1.00008
736	LMB	2	C5E02	200	LMB-200-E2-T4	4	47	0.96	.000009247	0.92465
737	LMB	2	C5E02	200	LMB-200-E2-T5	5	51	1.34	.000010102	1.01017
738	LMB	2	C5E02	200	LMB-200-E2-T6	6	67	2.96	.000009842	0.98416
739	LMB	2	C5E02	200	LMB-200-E2-T7	7	57	1.70	.000009180	0.91796
740	LMB	2	C5E02	200	LMB-200-E2-T8	8	46	0.80	.000008779	0.87791
741	LMB	2	C5E02	200	LMB-200-E2-T9	9	51	1.28	.000009649	0.96494
742	LMB	2	C5E02	200	LMB-200-E2-T10	10	54	1.44	.000009145	0.91449
743	LMB	2	C5E02	200	LMB-200-E2-T11	11	54	1.47	.000009335	0.93355
744	LMB	2	C5E02	200	LMB-200-E2-T12	12	44	0.89	.000010448	1.04480
745	LMB	2	B5E03	200	LMB-200-E3-T1	1	52	1.43	.000010170	1.01701
746	LMB	2	B5E03	200	LMB-200-E3-T2	2	49	1.13	.000009605	0.96048
747	LMB	2	B5E03	200	LMB-200-E3-T3	3	52	1.28	.000009103	0.91033
748	LMB	2	B5E03	200	LMB-200-E3-T4	4	55	1.68	.000010098	1.00977
749	LMB	2	B5E03	200	LMB-200-E3-T5	5	47	1.14	.000010980	1.09802
750	LMB	2	B5E03	200	LMB-200-E3-T6	6	55	1.74	.000010458	1.04583
751	LMB	2	B5E03	200	LMB-200-E3-T7	7	49	1.18	.000010030	1.00298
752	LMB	2	B5E03	200	LMB-200-E3-T8	8	52	1.42	.000010099	1.00990
753	LMB	2	B5E03	200	LMB-200-E3-T9	9	50	1.15	.000009200	0.92000
754	LMB	2	B5E03	200	LMB-200-E3-T10	10	54	1.59	.000010098	1.00975
755	LMB	2	B5E03	200	LMB-200-E3-T11	11	62	2.23	.000009357	0.93569
756	LMB	2	B5E03	200	LMB-200-E3-T12	12	54	1.57	.000009971	0.99705
757	LMB	2	A1E11	200	LMB-200-E11-T1	1	55	1.56	.000009376	0.93764
758	LMB	2	A1E11	200	LMB-200-E11-T2	2	43	0.81	.000010188	1.01878
759	LMB	2	A1E11	200	LMB-200-E11-T3	3	55	1.60	.000009617	0.96168
760	LMB	2	A1E11	200	LMB-200-E11-T4	4	59	2.12	.000010322	1.03224
761	LMB	2	A1E11	200	LMB-200-E11-T5	5	44	0.78	.000009157	0.91566
762	LMB	2	A1E11	200	LMB-200-E11-T6	6	44	0.79	.000009274	0.92740
763	LMB	2	A1E11	200	LMB-200-E11-T7	7	66	2.73	.000009496	0.94958
764	LMB	2	A1E11	200	LMB-200-E11-T8	8	57	1.83	.000009882	0.98816
765	LMB	2	A1E11	200	LMB-200-E11-T9	9	57	1.36	.000007344	0.73437

	LMB	2	A1E11	200	LMB-200-E11-T10	10	56	1.69	.000009623	0.96233
767	LMB	2	A1E11	200	LMB-200-E11-T11	11	56	1.59	.000009054	0.90538
768	LMB	2	A1E11	200	LMB-200-E11-T12	12	50	1.15	.000009200	0.92000
769	LMB	2	A1E11	200	LMB-200-E11-T13	13	47	1.09	.000010499	1.04986
770	LMB	2	A1E11	200	LMB-200-E11-T14	14	42	0.66	.000008908	0.89083
771	LMB	2	B4E05	300	LMB-300-E5-T1	1	53	1.40	.000009404	0.94037
772	LMB	2	B4E05	300	LMB-300-E5-T2	2	47	1.07	.000010306	1.03060
773	LMB	2	A2E07	300	LMB-300-E7-T1	1	55	1.52	.000009136	0.91360
774	LMB	2	A2E07	300	LMB-300-E7-T2	2	56	1.69	.000009623	0.96233
775	LMB	2	A2E07	300	LMB-300-E7-T3	3	56	1.69	.000009623	0.96233
776	LMB	2	A2E07	300	LMB-300-E7-T4	4	47	0.91	.000008765	0.87649
777	LMB	2	A2E07	300	LMB-300-E7-T5	5	46	0.90	.000009246	0.92463
778	LMB	2	C1E09	300	LMB-300-E9-T1	1	61	2.24	.000009869	0.98687
779	LMB	2	C2E04	50	LMB-50-E4-T1	1	55	1.78	.000010699	1.06987
780	LMB	2	C2E04	50	LMB-50-E4-T2	2	51	1.29	.000009725	0.97248
781	LMB	2	C2E04	50	LMB-50-E4-T3	3	49	1.24	.000010540	1.05398
782	LMB	2	C2E04	50	LMB-50-E4-T4	4	53	1.56	.000010478	1.04784
783	LMB	2	C2E04	50	LMB-50-E4-T5	5	56	1.72	.000009794	0.97941
784	LMB	2	C2E04	50	LMB-50-E4-T6	6	47	1.07	.000010306	1.03060
785	LMB	2	C2E04	50	LMB-50-E4-T7	7	59	2.39	.000011637	1.16370
786	LMB	2	C2E04	50	LMB-50-E4-T8	8	45	0.83	.000009108	0.91084
787	LMB	2	C2E04	50	LMB-50-E4-T9	9	45	1.01	.000011084	1.10837
788	LMB	2	C2E04	50	LMB-50-E4-T10	10	52	1.48	.000010526	1.05257
789	LMB	2	C2E04	50	LMB-50-E4-T11	11	58	2.08	.000010661	1.06605
790	LMB	2	C2E04	50	LMB-50-E4-T12	12	55	1.54	.000009256	0.92562
791	LMB	2	C2E04	50	LMB-50-E4-T13	13	47	1.06	.000010210	1.02097
792	LMB	2	C2E04	50	LMB-50-E4-T14	14	55	1.83	.000010999	1.09992
793	LMB	2	C2E04	50	LMB-50-E4-T15	15	49	1.18	.000010030	1.00298
794	LMB	2	C2E04	50	LMB-50-E4-T16	16	46	0.90	.000009246	0.92463
795	LMB	2	C2E04	50	LMB-50-E4-T17	17	59	1.94	.000009446	0.94460
796	LMB	2	C2E04	50	LMB-50-E4-T18	18	44	0.89	.000010448	1.04480
797	LMB	2	C2E04	50	LMB-50-E4-T19	19	48	1.13	.000010218	1.02177
798	LMB	2	A5E10	50	LMB-50-E10-T1	1	49	1.19	.000010115	1.01148
799	LMB	2	A5E10	50	LMB-50-E10-T2	2	54	1.63	.000010352	1.03516
800	LMB	2	A5E10	50	LMB-50-E10-T3	3	46	1.07	.000010998	1.09928

	LMB	2	A5E10	50	LMB-50-E10-T4	4	46	1.03	.000010582	1.05819
802	LMB	2	A5E10	50	LMB-50-E10-T5	5	46	1.09	.000011198	1.11983
803	LMB	2	A5E10	50	LMB-50-E10-T6	6	48	1.08	.000009766	0.97656
804	LMB	2	A5E10	50	LMB-50-E10-T7	7	47	1.10	.000010595	1.05950
805	LMB	2	A5E10	50	LMB-50-E10-T8	8	50	1.27	.000010160	1.01600
806	LMB	2	A5E10	50	LMB-50-E10-T9	9	49	1.20	.000010200	1.01998
807	LMB	2	A5E10	50	LMB-50-E10-T10	10	49	1.24	.000010540	1.05398
808	LMB	2	A5E10	50	LMB-50-E10-T11	11	51	1.30	.000009800	0.98002
809	LMB	2	A5E10	50	LMB-50-E10-T12	12	50	1.40	.000011200	1.12000
810	LMB	2	A5E10	50	LMB-50-E10-T13	13	53	1.55	.000010411	1.04113
811	LMB	2	A5E10	50	LMB-50-E10-T14	14	51	1.46	.000011006	1.10063
812	LMB	2	A5E10	50	LMB-50-E10-T15	15	47	1.14	.000010980	1.09802
813	LMB	2	A5E10	50	LMB-50-E10-T16	16	60	2.16	.000010000	1.00000
814	LMB	2	A5E10	50	LMB-50-E10-T17	17	45	0.93	.000010206	1.02058
815	LMB	2	A5E10	50	LMB-50-E10-T18	18	52	1.49	.000010597	1.05958
816	LMB	2	A5E10	50	LMB-50-E10-T19	19	59	2.10	.000010225	1.02250
817	LMB	2	A5E10	50	LMB-50-E10-T20	20	56	1.87	.000010648	1.06482
818	LMB	2	B1E15	50	LMB-50-E15-T1	1	50	1.39	.000011120	1.11200
819	LMB	2	B1E15	50	LMB-50-E15-T2	2	45	0.91	.000009986	0.99863
820	LMB	2	B1E15	50	LMB-50-E15-T3	3	55	1.77	.000010639	1.06386
821	LMB	2	B1E15	50	LMB-50-E15-T4	4	45	0.91	.000009986	0.99863
822	LMB	2	B1E15	50	LMB-50-E15-T5	5	48	1.32	.000011936	1.19358
823	LMB	2	B1E15	50	LMB-50-E15-T6	6	47	0.98	.000009439	0.94391
824	LMB	2	B1E15	50	LMB-50-E15-T7	7	47	1.04	.000010017	1.00170
825	LMB	2	B1E15	50	LMB-50-E15-T8	8	47	0.97	.000009343	0.93428
826	LMB	2	B1E15	50	LMB-50-E15-T9	9	47	1.15	.000011077	1.10785
827	LMB	2	B1E15	50	LMB-50-E15-T10	10	52	1.59	.000011308	1.13080
828	LMB	2	B1E15	50	LMB-50-E15-T11	11	50	1.30	.000010400	1.04000
829	LMB	2	B1E15	50	LMB-50-E15-T12	12	49	1.17	.000009945	0.99448
830	LMB	2	B1E15	50	LMB-50-E15-T13	13	47	1.09	.000010499	1.04986
831	LMB	2	B1E15	50	LMB-50-E15-T14	14	52	1.40	.000009957	0.99568
832	LMB	2	B1E15	50	LMB-50-E15-T15	15	54	1.45	.000009208	0.92085
833	LMB	2	B1E15	50	LMB-50-E15-T16	16	49	1.19	.000010115	1.01148
834	LMB	2	B1E15	50	LMB-50-E15-T17	17	53	1.44	.000009672	0.96724
835	LMB	2	B1E15	50	LMB-50-E15-T18	18	48	1.18	.000010670	1.06698

	LMB	2	B1E15	50	LMB-50-E15-T19	19	61	2.18	.000009604	0.96043
837	LMB	2	B1E15	50	LMB-50-E15-T20	20	45	0.92	.000010096	1.00960
838	LST	2	A4G04	0	LST-CONTROL-G4-T1	1	130	7.06	.000003213	0.32135
839	LST	2	A4G04	0	LST-CONTROL-G4-T2	2	142	8.97	.000003133	0.31328
840	LST	2	A4G04	0	LST-CONTROL-G4-T3	3	164	14.21	.000003222	0.32215
841	LST	2	A4G04	0	LST-CONTROL-G4-T4	4	137	9.71	.000003776	0.37762
842	LST	2	A4G04	0	LST-CONTROL-G4-T5	5	127	6.96	.000003398	0.33978
843	LST	2	A4G04	0	LST-CONTROL-G4-T6	6	129	7.44	.000003466	0.34658
844	LST	2	A4G04	0	LST-CONTROL-G4-T7	7	136	8.87	.000003526	0.35262
845	LST	2	A4G04	0	LST-CONTROL-G4-T8	8	133	8.38	.000003562	0.35620
846	LST	2	A4G04	0	LST-CONTROL-G4-T9	9	134	7.60	.000003159	0.31586
847	LST	2	A4G04	0	LST-CONTROL-G4-T10	10	135	8.43	.000003426	0.34263
848	LST	2	A4G04	0	LST-CONTROL-G4-T11	11	149	11.92	.000003603	0.36034
849	LST	2	A4G04	0	LST-CONTROL-G4-T12	12	139	7.94	.000002956	0.29565
850	LST	2	A4G04	0	LST-CONTROL-G4-T13	13	132	8.04	.000003496	0.34957
851	LST	2	A4G04	0	LST-CONTROL-G4-T14	14	146	10.54	.000003387	0.33867
852	LST	2	A4G04	0	LST-CONTROL-G4-T15	15	142	9.93	.000003468	0.34680
853	LST	2	A4G04	0	LST-CONTROL-G4-T16	16	136	8.94	.000003554	0.35540
854	LST	2	A4G04	0	LST-CONTROL-G4-T17	17	145	9.94	.000003260	0.32605
855	LST	2	A4G04	0	LST-CONTROL-G4-T18	18	124	7.68	.000004028	0.40281
856	LST	2	A4G04	0	LST-CONTROL-G4-T19	19	133	7.92	.000003366	0.33664
857	LST	2	A4G04	0	LST-CONTROL-G4-T20	20	134	7.79	.000003238	0.32376
858	LST	2	B5G08	0	LST-CONTROL-G8-T1	1	140	8.73	.000003181	0.31815
859	LST	2	B5G08	0	LST-CONTROL-G8-T2	2	158	14.26	.000003615	0.36153
860	LST	2	B5G08	0	LST-CONTROL-G8-T3	3	129	7.06	.000003289	0.32888
861	LST	2	B5G08	0	LST-CONTROL-G8-T4	4	138	9.24	.000003516	0.35159
862	LST	2	B5G08	0	LST-CONTROL-G8-T5	5	125	6.13	.000003139	0.31386
863	LST	2	B5G08	0	LST-CONTROL-G8-T6	6	120	5.01	.000002899	0.28993
864	LST	2	B5G08	0	LST-CONTROL-G8-T7	7	165	14.21	.000003163	0.31633
865	LST	2	B5G08	0	LST-CONTROL-G8-T8	8	156	12.56	.000003308	0.33084
866	LST	2	B5G08	0	LST-CONTROL-G8-T9	9	152	11.98	.000003411	0.34113
867	LST	2	B5G08	0	LST-CONTROL-G8-T10	10	135	8.95	.000003638	0.36377
868	LST	2	B5G08	0	LST-CONTROL-G8-T11	11	151	11.91	.000003459	0.34592
869	LST	2	B5G08	0	LST-CONTROL-G8-T12	12	145	10.63	.000003487	0.34868
870	LST	2	B5G08	0	LST-CONTROL-G8-T13	13	111	5.69	.000004160	0.41605

	LST	2	B5G08	0	LST-CONTROL-G8-T14	14	154	11.43	.000003130	0.31296
872	LST	2	B5G08	0	LST-CONTROL-G8-T15	15	145	10.36	.000003398	0.33983
873	LST	2	B5G08	0	LST-CONTROL-G8-T16	16	157	13.24	.000003421	0.34213
874	LST	2	B5G08	0	LST-CONTROL-G8-T17	17	134	9.50	.000003948	0.39483
875	LST	2	B5G08	0	LST-CONTROL-G8-T18	18	140	10.95	.000003991	0.39905
876	LST	2	B5G08	0	LST-CONTROL-G8-T19	19	137	8.58	.000003337	0.33368
877	LST	2	B5G08	0	LST-CONTROL-G8-T20	20	139	10.06	.000003746	0.37459
878	LST	2	C4G10	0	LST-CONTROL-G10-T1	1	149	10.98	.000003319	0.33193
879	LST	2	C4G10	0	LST-CONTROL-G10-T2	2	138	9.22	.000003508	0.35083
880	LST	2	C4G10	0	LST-CONTROL-G10-T3	3	141	9.36	.000003339	0.33390
881	LST	2	C4G10	0	LST-CONTROL-G10-T4	4	142	10.06	.000003513	0.35134
882	LST	2	C4G10	0	LST-CONTROL-G10-T5	5	165	14.06	.000003130	0.31299
883	LST	2	C4G10	0	LST-CONTROL-G10-T6	6	111	4.93	.000003605	0.36048
884	LST	2	C4G10	0	LST-CONTROL-G10-T7	7	148	11.42	.000003523	0.35227
885	LST	2	C4G10	0	LST-CONTROL-G10-T8	8	137	8.52	.000003313	0.33134
886	LST	2	C4G10	0	LST-CONTROL-G10-T9	9	126	6.72	.000003359	0.33594
887	LST	2	C4G10	0	LST-CONTROL-G10-T10	10	141	9.40	.000003353	0.33533
888	LST	2	C4G10	0	LST-CONTROL-G10-T11	11	145	9.80	.000003215	0.32146
889	LST	2	C4G10	0	LST-CONTROL-G10-T12	12	146	9.44	.000003033	0.30333
890	LST	2	C4G10	0	LST-CONTROL-G10-T13	13	168	13.21	.000003349	0.33491
891	LST	2	C4G10	0	LST-CONTROL-G10-T14	14	143	11.41	.000003902	0.39019
892	LST	2	C4G10	0	LST-CONTROL-G10-T15	15	139	8.28	.000003083	0.30831
893	LST	2	C4G10	0	LST-CONTROL-G10-T16	16	137	9.80	.000003811	0.38112
894	LST	2	C4G10	0	LST-CONTROL-G10-T17	17	151	11.02	.000003201	0.32007
895	LST	2	C4G10	0	LST-CONTROL-G10-T18	18	135	7.89	.000003207	0.32068
896	LST	2	C4G10	0	LST-CONTROL-G10-T19	19	150	11.19	.000003316	0.33156
897	LST	2	C4G10	0	LST-CONTROL-G10-T20	20	126	6.96	.000003479	0.34793
898	LST	2	A2G13	200	LST-200-G13-T1	1	107	4.25	.000003469	0.34693
899	LST	2	A5G06	50	LST-50-G6-T1	1	114	4.62	.000003118	0.31184
900	LST	2	B3G02	50	LST-50-G2-T1	1	123	6.73	.000003617	0.36166
901	LST	2	B3G02	50	LST-50-G2-T2	2	138	9.34	.000003554	0.35539
902	LST	2	B3G02	50	LST-50-G2-T3	3	121	5.92	.000003342	0.33417
903	LST	2	B3G02	50	LST-50-G2-T4	4	129	7.80	.000003634	0.36335
904	LST	2	C1G05	50	LST-50-G5-T1	1	130	7.23	.000003291	0.32909
906	LST	2	C1G05	50	LST-50-G5-T2	2	139	10.10	.000003761	0.37608

	RBT	2	A1E11	0	RBT-CONTROL-E11-T1	1	62	2.52	.000010574	1.05737
907	RBT	2	A1E11	0	RBT-CONTROL-E11-T2	2	62	2.37	.000009944	0.99443
908	RBT	2	A1E11	0	RBT-CONTROL-E11-T3	3	65	3.13	.000011397	1.13974
909	RBT	2	A1E11	0	RBT-CONTROL-E11-T4	4	60	2.24	.000010370	1.03704
910	RBT	2	A1E11	0	RBT-CONTROL-E11-T5	5	60	2.11	.000009769	0.97685
911	RBT	2	A1E11	0	RBT-CONTROL-E11-T6	6	64	2.87	.000010948	1.09482
912	RBT	2	A1E11	0	RBT-CONTROL-E11-T7	7	73	4.10	.000010539	1.05394
913	RBT	2	A1E11	0	RBT-CONTROL-E11-T8	8	57	1.89	.000010206	1.02056
914	RBT	2	A1E11	0	RBT-CONTROL-E11-T9	9	67	3.39	.000011271	1.12713
915	RBT	2	A1E11	0	RBT-CONTROL-E11-T10	10	63	2.61	.000010438	1.04380
916	RBT	2	A1E11	0	RBT-CONTROL-E11-T11	11	65	2.80	.000010196	1.01957
917	RBT	2	A1E11	0	RBT-CONTROL-E11-T12	12	66	3.07	.000010678	1.06784
918	RBT	2	A1E11	0	RBT-CONTROL-E11-T13	13	65	2.79	.000010159	1.01593
919	RBT	2	A1E11	0	RBT-CONTROL-E11-T14	14	57	1.92	.000010368	1.03676
920	RBT	2	A1E11	0	RBT-CONTROL-E11-T15	15	60	2.15	.000009954	0.99537
921	RBT	2	A1E11	0	RBT-CONTROL-E11-T16	16	70	3.31	.000009650	0.96501
922	RBT	2	A1E11	0	RBT-CONTROL-E11-T17	17	68	3.52	.000011195	1.11948
923	RBT	2	A1E11	0	RBT-CONTROL-E11-T18	18	64	2.76	.000010529	1.05286
924	RBT	2	A1E11	0	RBT-CONTROL-E11-T19	19	57	2.07	.000011178	1.11775
925	RBT	2	A1E11	0	RBT-CONTROL-E11-T20	20	52	1.37	.000009743	0.97434
926	RBT	2	B2E03	0	RBT-CONTROL-E3-T1	1	65	2.96	.000010778	1.07783
927	RBT	2	B2E03	0	RBT-CONTROL-E3-T2	2	67	3.19	.000010606	1.06064
928	RBT	2	B2E03	0	RBT-CONTROL-E3-T3	3	59	2.04	.000009933	0.99329
929	RBT	2	B2E03	0	RBT-CONTROL-E3-T4	4	57	1.77	.000009558	0.95576
930	RBT	2	B2E03	0	RBT-CONTROL-E3-T5	5	53	1.35	.000009068	0.90679
931	RBT	2	B2E03	0	RBT-CONTROL-E3-T6	6	65	3.00	.000010924	1.09240
932	RBT	2	B2E03	0	RBT-CONTROL-E3-T7	7	69	3.61	.000010989	1.09890
933	RBT	2	B2E03	0	RBT-CONTROL-E3-T8	8	64	2.61	.000009956	0.99564
934	RBT	2	B2E03	0	RBT-CONTROL-E3-T9	9	65	2.78	.000010123	1.01229
935	RBT	2	B2E03	0	RBT-CONTROL-E3-T10	10	64	2.58	.000009842	0.98419
936	RBT	2	B2E03	0	RBT-CONTROL-E3-T11	11	62	2.52	.000010574	1.05737
937	RBT	2	B2E03	0	RBT-CONTROL-E3-T12	12	56	2.92	.000016627	1.66272
938	RBT	2	B2E03	0	RBT-CONTROL-E3-T13	13	62	2.57	.000010783	1.07835
939	RBT	2	B2E03	0	RBT-CONTROL-E3-T14	14	70	3.56	.000010379	1.03790
940	RBT	2	B2E03	0	RBT-CONTROL-E3-T15	15	62	2.53	.000010616	1.06156

	RBT	2	B2E03	0	RBT-CONTROL-E3-T16	16	65	2.74	.000009977	0.99772
942	RBT	2	B2E03	0	RBT-CONTROL-E3-T17	17	68	3.29	.000010463	1.04633
943	RBT	2	B2E03	0	RBT-CONTROL-E3-T18	18	56	1.72	.000009794	0.97941
944	RBT	2	B2E03	0	RBT-CONTROL-E3-T19	19	56	1.75	.000009965	0.99649
945	RBT	2	B2E03	0	RBT-CONTROL-E3-T20	20	62	2.19	.000009189	0.91890
946	RBT	2	C4E13	0	RBT-CONTROL-E13-T1	1	66	3.33	.000011583	1.15828
947	RBT	2	C4E13	0	RBT-CONTROL-E13-T2	2	63	2.67	.000010678	1.06780
948	RBT	2	C4E13	0	RBT-CONTROL-E13-T3	3	60	2.19	.000010139	1.01389
949	RBT	2	C4E13	0	RBT-CONTROL-E13-T4	4	61	2.23	.000009825	0.98246
950	RBT	2	C4E13	0	RBT-CONTROL-E13-T5	5	58	2.03	.000010404	1.04043
951	RBT	2	C4E13	0	RBT-CONTROL-E13-T6	6	58	1.80	.000009225	0.92255
952	RBT	2	C4E13	0	RBT-CONTROL-E13-T7	7	62	2.30	.000009651	0.96506
953	RBT	2	C4E13	0	RBT-CONTROL-E13-T8	8	66	3.15	.000010957	1.09567
954	RBT	2	C4E13	0	RBT-CONTROL-E13-T9	9	67	2.92	.000009709	0.97086
955	RBT	2	C4E13	0	RBT-CONTROL-E13-T10	10	60	2.17	.000010046	1.00463
956	RBT	2	C4E13	0	RBT-CONTROL-E13-T11	11	61	2.32	.000010221	1.02211
957	RBT	2	C4E13	0	RBT-CONTROL-E13-T12	12	72	3.68	.000009859	0.98594
958	RBT	2	C4E13	0	RBT-CONTROL-E13-T13	13	74	4.49	.000011080	1.10803
959	RBT	2	C4E13	0	RBT-CONTROL-E13-T14	14	71	4.06	.000011344	1.13436
960	RBT	2	C4E13	0	RBT-CONTROL-E13-T15	15	70	3.67	.000010700	1.06997
961	RBT	2	C4E13	0	RBT-CONTROL-E13-T16	16	70	3.36	.000009796	0.97959
962	RBT	2	C4E13	0	RBT-CONTROL-E13-T17	17	65	3.05	.000011106	1.11061
963	RBT	2	C4E13	0	RBT-CONTROL-E13-T18	18	62	2.44	.000010238	1.02380
964	RBT	2	C4E13	0	RBT-CONTROL-E13-T19	19	63	2.65	.000010598	1.05980
965	RBT	2	C4E13	0	RBT-CONTROL-E13-T20	20	60	2.24	.000010370	1.03704
966	RBT	2	B1E05	100	RBT-100-E5-T1	1	45	0.65	.000007133	0.71331
967	RBT	2	B1E05	100	RBT-100-E5-T2	2	49	1.11	.000009435	0.94348
968	RBT	2	B1E05	100	RBT-100-E5-T3	3	47	1.03	.000009921	0.99207
969	RBT	2	B1E05	100	RBT-100-E5-T4	4	47	0.79	.000007609	0.76091
970	RBT	2	C1E09	100	RBT-100-E9-T1	1	49	0.98	.000008330	0.83299
971	RBT	2	A2E10	50	RBT-50-E10-T1	1	58	2.16	.000011071	1.10706
972	RBT	2	A2E10	50	RBT-50-E10-T2	2	53	1.35	.000009068	0.90679
973	RBT	2	A2E10	50	RBT-50-E10-T3	3	52	1.08	.000007681	0.76809
974	RBT	2	A2E10	50	RBT-50-E10-T4	4	45	0.78	.000008560	0.85597
975	RBT	2	A2E10	50	RBT-50-E10-T5	5	47	0.93	.000008958	0.89576

	RBT	2	A2E10	50	RBT-50-E10-T6	6	61	2.11	.000009296	0.92959
977	RBT	2	A2E10	50	RBT-50-E10-T7	7	56	1.54	.000008769	0.87691
978	RBT	2	A2E10	50	RBT-50-E10-T8	8	55	1.62	.000009737	0.97370
979	RBT	2	A2E10	50	RBT-50-E10-T9	9	54	1.40	.000008891	0.88909
980	RBT	2	B5E01	50	RBT-50-E1-T1	1	49	1.05	.000008925	0.89249
981	RBT	2	B5E01	50	RBT-50-E1-T2	2	57	1.46	.000007884	0.78837
982	RBT	2	B5E01	50	RBT-50-E1-T3	3	44	0.74	.000008687	0.86871
983	RBT	2	C2E06	50	RBT-50-E6-T1	1	57	1.47	.000007938	0.79377
984	RBT	2	C2E06	50	RBT-50-E6-T2	2	53	1.34	.000009001	0.90007
985	SMB	2	A2D06	0	SMB-CONTROL-D6-T1	1	62	2.79	.000011707	1.17066
986	SMB	2	A2D06	0	SMB-CONTROL-D6-T2	2	50	1.49	.000011920	1.19200
987	SMB	2	A2D06	0	SMB-CONTROL-D6-T3	3	54	1.87	.000011876	1.18757
988	SMB	2	A2D06	0	SMB-CONTROL-D6-T4	4	59	2.32	.000011296	1.12962
989	SMB	2	A2D06	0	SMB-CONTROL-D6-T5	5	52	1.71	.000012161	1.21615
990	SMB	2	A2D06	0	SMB-CONTROL-D6-T6	6	56	2.04	.000011616	1.16163
991	SMB	2	A2D06	0	SMB-CONTROL-D6-T7	7	54	1.77	.000011241	1.12407
992	SMB	2	A2D06	0	SMB-CONTROL-D6-T8	8	57	2.02	.000010908	1.09075
993	SMB	2	A2D06	0	SMB-CONTROL-D6-T9	9	54	1.73	.000010987	1.09866
994	SMB	2	A2D06	0	SMB-CONTROL-D6-T10	10	56	1.89	.000010762	1.07621
995	SMB	2	A2D06	0	SMB-CONTROL-D6-T11	11	51	1.54	.000011609	1.16094
996	SMB	2	A2D06	0	SMB-CONTROL-D6-T12	12	51	1.44	.000010856	1.08556
997	SMB	2	A2D06	0	SMB-CONTROL-D6-T13	13	55	1.86	.000011180	1.11796
998	SMB	2	A2D06	0	SMB-CONTROL-D6-T14	14	57	2.04	.000011016	1.10155
999	SMB	2	A2D06	0	SMB-CONTROL-D6-T15	15	55	1.80	.000010819	1.08189
1000	SMB	2	A2D06	0	SMB-CONTROL-D6-T16	16	49	1.24	.000010540	1.05398
1001	SMB	2	A2D06	0	SMB-CONTROL-D6-T17	17	55	1.83	.000010999	1.09992
1002	SMB	2	A2D06	0	SMB-CONTROL-D6-T18	18	59	2.16	.000010517	1.05171
1003	SMB	2	A2D06	0	SMB-CONTROL-D6-T19	19	52	1.67	.000011877	1.18770
1004	SMB	2	A2D06	0	SMB-CONTROL-D6-T20	20	57	2.06	.000011124	1.11235
1005	SMB	2	C1D07	0	SMB-CONTROL-D7-T1	1	63	2.68	.000010718	1.07180
1006	SMB	2	C1D07	0	SMB-CONTROL-D7-T2	2	59	2.27	.000011053	1.10527
1007	SMB	2	C1D07	0	SMB-CONTROL-D7-T3	3	57	1.98	.000010692	1.06915
1008	SMB	2	C1D07	0	SMB-CONTROL-D7-T4	4	57	2.20	.000011879	1.18795
1009	SMB	2	C1D07	0	SMB-CONTROL-D7-T5	5	58	2.18	.000011173	1.11731
1010	SMB	2	C1D07	0	SMB-CONTROL-D7-T6	6	56	2.01	.000011445	1.14454

	SMB	2	C1D07	0	SMB-CONTROL-D7-T7	7	55	1.78	.000010699	1.06987
1012	SMB	2	C1D07	0	SMB-CONTROL-D7-T8	8	49	1.38	.000011730	1.17298
1013	SMB	2	C1D07	0	SMB-CONTROL-D7-T9	9	54	1.74	.000011050	1.10501
1014	SMB	2	C1D07	0	SMB-CONTROL-D7-T10	10	52	1.41	.000010028	1.00279
1015	SMB	2	C1D07	0	SMB-CONTROL-D7-T11	11	54	1.79	.000011368	1.13677
1016	SMB	2	C1D07	0	SMB-CONTROL-D7-T12	12	52	1.62	.000011521	1.15214
1017	SMB	2	C1D07	0	SMB-CONTROL-D7-T13	13	60	2.60	.000012037	1.20370
1018	SMB	2	C1D07	0	SMB-CONTROL-D7-T14	14	55	1.79	.000010759	1.07588
1019	SMB	2	C1D07	0	SMB-CONTROL-D7-T15	15	55	1.91	.000011480	1.14801
1020	SMB	2	C1D07	0	SMB-CONTROL-D7-T16	16	56	2.04	.000011616	1.16163
1021	SMB	2	C1D07	0	SMB-CONTROL-D7-T17	17	57	2.07	.000011178	1.11775
1022	SMB	2	C1D07	0	SMB-CONTROL-D7-T18	18	57	1.98	.000010692	1.06915
1023	SMB	2	C1D07	0	SMB-CONTROL-D7-T19	19	55	1.78	.000010699	1.06987
1024	SMB	2	C1D07	0	SMB-CONTROL-D7-T20	20	53	1.67	.000011217	1.12173
1025	SMB	2	B1D15	0	SMB-CONTROL-D15-T1	1	62	2.95	.000012378	1.23779
1026	SMB	2	B1D15	0	SMB-CONTROL-D15-T2	2	60	2.47	.000011435	1.14352
1027	SMB	2	B1D15	0	SMB-CONTROL-D15-T3	3	60	2.45	.000011343	1.13426
1028	SMB	2	B1D15	0	SMB-CONTROL-D15-T4	4	60	2.49	.000011528	1.15278
1029	SMB	2	B1D15	0	SMB-CONTROL-D15-T5	5	60	2.56	.000011852	1.18519
1030	SMB	2	B1D15	0	SMB-CONTROL-D15-T6	6	59	2.34	.000011394	1.13936
1031	SMB	2	B1D15	0	SMB-CONTROL-D15-T7	7	50	1.65	.000013200	1.32000
1032	SMB	2	B1D15	0	SMB-CONTROL-D15-T8	8	56	1.95	.000011104	1.11038
1033	SMB	2	B1D15	0	SMB-CONTROL-D15-T9	9	51	1.49	.000011232	1.12325
1034	SMB	2	B1D15	0	SMB-CONTROL-D15-T10	10	50	1.41	.000011280	1.12800
1035	SMB	2	B1D15	0	SMB-CONTROL-D15-T11	11	66	3.35	.000011652	1.16523
1036	SMB	2	B1D15	0	SMB-CONTROL-D15-T12	12	57	2.08	.000011232	1.12315
1037	SMB	2	B1D15	0	SMB-CONTROL-D15-T13	13	60	2.33	.000010787	1.07870
1038	SMB	2	B1D15	0	SMB-CONTROL-D15-T14	14	58	2.28	.000011686	1.16856
1039	SMB	2	B1D15	0	SMB-CONTROL-D15-T15	15	62	2.60	.000010909	1.09093
1040	SMB	2	B1D15	0	SMB-CONTROL-D15-T16	16	57	2.22	.000011987	1.19875
1041	SMB	2	B1D15	0	SMB-CONTROL-D15-T17	17	60	2.61	.000012083	1.20833
1042	SMB	2	B1D15	0	SMB-CONTROL-D15-T18	18	51	1.49	.000011232	1.12325
1043	SMB	2	B1D15	0	SMB-CONTROL-D15-T19	19	46	1.11	.000011404	1.14038
1044	SMB	2	B1D15	0	SMB-CONTROL-D15-T20	20	56	2.07	.000011787	1.17871
1045	SMB	2	A1D01	100	SMB-100-D1-T1	1	56	2.01	.000011445	1.14454

	SMB	2	A1D01	100	SMB-100-D1-T2	2	48	1.12	.000010127	1.01273
1047	SMB	2	A1D01	100	SMB-100-D1-T3	3	49	1.22	.000010370	1.03698
1048	SMB	2	A1D01	100	SMB-100-D1-T4	4	52	1.55	.000011024	1.10236
1049	SMB	2	A1D01	100	SMB-100-D1-T5	5	56	1.83	.000010420	1.04205
1050	SMB	2	A1D01	100	SMB-100-D1-T6	6	57	2.08	.000011232	1.12315
1051	SMB	2	A1D01	100	SMB-100-D1-T7	7	54	1.75	.000011114	1.11137
1052	SMB	2	A1D01	100	SMB-100-D1-T8	8	54	1.64	.000010415	1.04151
1053	SMB	2	A1D01	100	SMB-100-D1-T9	9	53	1.64	.000011016	1.10158
1054	SMB	2	A1D01	100	SMB-100-D1-T10	10	55	1.74	.000010468	1.04683
1055	SMB	2	A1D01	100	SMB-100-D1-T11	11	55	1.67	.000010038	1.00376
1056	SMB	2	A1D01	100	SMB-100-D1-T12	12	55	1.81	.000010879	1.08790
1057	SMB	2	A1D01	100	SMB-100-D1-T13	13	47	1.07	.000010306	1.03060
1058	SMB	2	A1D01	100	SMB-100-D1-T14	14	53	1.51	.000010143	1.01426
1059	SMB	2	A1D01	100	SMB-100-D1-T15	15	47	1.02	.000009824	0.98244
1060	SMB	2	A1D01	100	SMB-100-D1-T16	16	52	1.47	.000010455	1.04546
1061	SMB	2	A1D01	100	SMB-100-D1-T17	17	58	2.14	.000010968	1.09681
1062	SMB	2	A1D01	100	SMB-100-D1-T18	18	55	1.85	.000011119	1.11195
1063	SMB	2	A1D01	100	SMB-100-D1-T19	19	57	2.10	.000011340	1.13395
1064	SMB	2	B3D04	100	SMB-100-D4-T1	1	58	2.07	.000010609	1.06093
1065	SMB	2	B3D04	100	SMB-100-D4-T2	2	55	1.62	.000009737	0.97370
1066	SMB	2	B3D04	100	SMB-100-D4-T3	3	57	2.08	.000011232	1.12315
1067	SMB	2	B3D04	100	SMB-100-D4-T4	4	50	1.47	.000011760	1.17600
1068	SMB	2	B3D04	100	SMB-100-D4-T5	5	57	1.92	.000010368	1.03678
1069	SMB	2	B3D04	100	SMB-100-D4-T6	6	56	1.83	.000010420	1.04205
1070	SMB	2	B3D04	100	SMB-100-D4-T7	7	56	2.06	.000011730	1.17301
1071	SMB	2	B3D04	100	SMB-100-D4-T8	8	63	2.83	.000011318	1.13179
1072	SMB	2	B3D04	100	SMB-100-D4-T9	9	53	1.59	.000010680	1.06800
1073	SMB	2	B3D04	100	SMB-100-D4-T10	10	51	1.35	.000010177	1.01771
1074	SMB	2	B3D04	100	SMB-100-D4-T11	11	57	1.95	.000010530	1.05296
1075	SMB	2	B3D04	100	SMB-100-D4-T12	12	52	1.45	.000010312	1.03124
1076	SMB	2	B3D04	100	SMB-100-D4-T13	13	53	1.68	.000011284	1.12845
1077	SMB	2	B3D04	100	SMB-100-D4-T14	14	57	2.04	.000011016	1.10155
1078	SMB	2	B3D04	100	SMB-100-D4-T15	15	51	1.43	.000010780	1.07802
1079	SMB	2	B3D04	100	SMB-100-D4-T16	16	61	2.54	.000011190	1.11904
1080	SMB	2	B3D04	100	SMB-100-D4-T17	17	56	1.94	.000011047	1.10468

	SMB	2	B3D04	100	SMB-100-D4-T18	18	55	1.83	.000010999	1.09992
1082	SMB	2	B3D04	100	SMB-100-D4-T19	19	51	1.33	.000010026	1.00263
1083	SMB	2	C2D11	100	SMB-100-D11-T1	1	54	1.62	.000010288	1.02881
1084	SMB	2	C2D11	100	SMB-100-D11-T2	2	48	0.95	.000008590	0.85901
1085	SMB	2	C2D11	100	SMB-100-D11-T3	3	55	1.75	.000010518	1.05184
1086	SMB	2	C2D11	100	SMB-100-D11-T4	4	53	1.68	.000011284	1.12845
1087	SMB	2	C2D11	100	SMB-100-D11-T5	5	55	1.70	.000010218	1.02179
1088	SMB	2	C2D11	100	SMB-100-D11-T6	6	59	2.38	.000011588	1.15883
1089	SMB	2	C2D11	100	SMB-100-D11-T7	7	66	3.40	.000011826	1.18263
1090	SMB	2	C2D11	100	SMB-100-D11-T8	8	55	1.75	.000010518	1.05184
1091	SMB	2	C2D11	100	SMB-100-D11-T9	9	53	1.33	.000008934	0.89335
1092	SMB	2	C2D11	100	SMB-100-D11-T10	10	56	1.99	.000011332	1.13315
1093	SMB	2	C2D11	100	SMB-100-D11-T11	11	54	1.55	.000009844	0.98435
1094	SMB	2	C2D11	100	SMB-100-D11-T12	12	45	0.97	.000010645	1.06447
1095	SMB	2	C2D11	100	SMB-100-D11-T13	13	56	1.89	.000010762	1.07621
1096	SMB	2	C2D11	100	SMB-100-D11-T14	14	54	1.51	.000009589	0.95895
1097	SMB	2	C2D11	100	SMB-100-D11-T15	15	55	1.54	.000009256	0.92562
1098	SMB	2	C2D11	100	SMB-100-D11-T16	16	55	1.83	.000010999	1.09992
1099	SMB	2	B2D05	200	SMB-200-D5-T1	1	57	1.89	.000010206	1.02056
1100	SMB	2	B2D05	200	SMB-200-D5-T2	2	52	1.38	.000009815	0.98145
1101	SMB	2	B2D05	200	SMB-200-D5-T3	3	55	1.56	.000009376	0.93764
1102	SMB	2	B2D05	200	SMB-200-D5-T4	4	48	1.00	.000009042	0.90422
1103	SMB	2	B2D05	200	SMB-200-D5-T5	5	53	1.60	.000010747	1.07471
1104	SMB	2	B2D05	200	SMB-200-D5-T6	6	65	3.25	.000011834	1.18343
1105	SMB	2	B2D05	200	SMB-200-D5-T7	7	51	1.16	.000008745	0.87448
1106	SMB	2	B2D05	200	SMB-200-D5-T8	8	54	1.65	.000010479	1.04786
1107	SMB	2	B2D05	200	SMB-200-D5-T9	9	57	1.88	.000010152	1.01516
1108	SMB	2	B2D05	200	SMB-200-D5-T10	10	57	1.97	.000010638	1.06376
1109	SMB	2	B2D05	200	SMB-200-D5-T11	11	47	1.12	.000010788	1.07876
1110	SMB	2	B2D05	200	SMB-200-D5-T12	12	56	1.77	.000010079	1.00788
1111	SMB	2	B2D05	200	SMB-200-D5-T13	13	50	1.22	.000009760	0.97600
1112	SMB	2	B2D05	200	SMB-200-D5-T14	14	58	2.02	.000010353	1.03530
1113	SMB	2	B2D05	200	SMB-200-D5-T15	15	56	1.82	.000010364	1.03635
1114	SMB	2	B2D05	200	SMB-200-D5-T16	16	56	1.90	.000010819	1.08191
1115	SMB	2	B2D05	200	SMB-200-D5-T17	17	64	2.83	.000010796	1.07956

	SMB	2	C5D12	200	SMB-200-D12-T1	1	60	2.31	.000010694	1.06944
1117	SMB	2	C5D12	200	SMB-200-D12-T2	2	55	1.90	.000011420	1.14200
1118	SMB	2	C5D12	200	SMB-200-D12-T3	3	57	2.06	.000011124	1.11235
1119	SMB	2	C5D12	200	SMB-200-D12-T4	4	48	1.13	.000010218	1.02177
1120	SMB	2	C5D12	200	SMB-200-D12-T5	5	55	1.56	.000009376	0.93764
1121	SMB	2	C5D12	200	SMB-200-D12-T6	6	57	1.97	.000010638	1.06376
1122	SMB	2	C5D12	200	SMB-200-D12-T7	7	58	2.18	.000011173	1.11731
1123	SMB	2	C5D12	200	SMB-200-D12-T8	8	57	1.96	.000010584	1.05836
1124	SMB	2	C5D12	200	SMB-200-D12-T9	9	63	3.01	.000012038	1.20377
1125	SMB	2	C5D12	200	SMB-200-D12-T10	10	54	1.57	.000009971	0.99705
1126	SMB	2	A5D09	300	SMB-300-D9-T1	1	62	2.57	.000010783	1.07835
1127	SMB	2	A5D09	300	SMB-300-D9-T2	2	57	1.74	.000009396	0.93956
1128	SMB	2	A5D09	300	SMB-300-D9-T3	3	51	1.35	.000010177	1.01771
1129	SMB	2	C4D13	300	SMB-300-D13-T1	1	55	1.90	.000011420	1.14200
1130	SMB	2	C4D13	300	SMB-300-D13-T2	2	47	1.18	.000011365	1.13655
1131	SMB	2	C4D13	300	SMB-300-D13-T3	3	54	1.63	.000010352	1.03516
1132	SMB	2	C4D13	300	SMB-300-D13-T4	4	53	1.43	.000009605	0.96052
1133	SMB	2	C4D13	300	SMB-300-D13-T5	5	48	1.06	.000009585	0.95848
1134	SMB	2	C4D13	300	SMB-300-D13-T6	6	53	1.56	.000010478	1.04784
1135	SMB	2	C4D13	300	SMB-300-D13-T7	7	55	1.70	.000010218	1.02179
1136	SMB	2	C4D13	300	SMB-300-D13-T8	8	51	0.99	.000007463	0.74632
1137	SMB	2	B4D14	300	SMB-300-D14-T1	1	60	2.52	.000011667	1.16667
1138	SMB	2	C3D02	50	SMB-50-D2-T1	1	64	2.70	.000010300	1.02997
1139	SMB	2	C3D02	50	SMB-50-D2-T2	2	62	2.50	.000010490	1.04897
1140	SMB	2	C3D02	50	SMB-50-D2-T3	3	55	1.77	.000010639	1.06386
1141	SMB	2	C3D02	50	SMB-50-D2-T4	4	57	2.00	.000010800	1.07995
1142	SMB	2	C3D02	50	SMB-50-D2-T5	5	57	2.01	.000010854	1.08535
1143	SMB	2	C3D02	50	SMB-50-D2-T6	6	53	1.63	.000010949	1.09486
1144	SMB	2	C3D02	50	SMB-50-D2-T7	7	52	2.04	.000014508	1.45084
1145	SMB	2	C3D02	50	SMB-50-D2-T8	8	55	1.69	.000010158	1.01578
1146	SMB	2	C3D02	50	SMB-50-D2-T9	9	55	1.72	.000010338	1.03381
1147	SMB	2	C3D02	50	SMB-50-D2-T10	10	51	1.30	.000009800	0.98002
1148	SMB	2	C3D02	50	SMB-50-D2-T11	11	49	1.18	.000010030	1.00298
1149	SMB	2	C3D02	50	SMB-50-D2-T12	12	60	2.14	.000009907	0.99074
1150	SMB	2	C3D02	50	SMB-50-D2-T13	13	54	1.70	.000010796	1.07961

	SMB	2	C3D02	50	SMB-50-D2-T14	14	58	2.08	.000010861	1.08605
1152	SMB	2	C3D02	50	SMB-50-D2-T15	15	59	1.98	.000009641	0.96407
1153	SMB	2	C3D02	50	SMB-50-D2-T16	16	62	2.91	.000012210	1.22101
1154	SMB	2	C3D02	50	SMB-50-D2-T17	17	54	1.58	.000010034	1.00340
1155	SMB	2	C3D02	50	SMB-50-D2-T18	18	53	1.60	.000010747	1.07471
1156	SMB	2	C3D02	50	SMB-50-D2-T19	19	49	1.22	.000010370	1.03698
1157	SMB	2	C3D02	50	SMB-50-D2-T20	20	57	2.02	.000010908	1.09075
1158	SMB	2	A3D03	50	SMB-50-D3-T1	1	58	2.05	.000010507	1.05068
1159	SMB	2	A3D03	50	SMB-50-D3-T2	2	56	1.94	.000011047	1.10468
1160	SMB	2	A3D03	50	SMB-50-D3-T3	3	58	2.28	.000011686	1.16856
1161	SMB	2	A3D03	50	SMB-50-D3-T4	4	56	1.98	.000011275	1.12746
1162	SMB	2	A3D03	50	SMB-50-D3-T5	5	57	1.48	.000007992	0.79917
1163	SMB	2	A3D03	50	SMB-50-D3-T6	6	57	2.20	.000011879	1.18795
1164	SMB	2	A3D03	50	SMB-50-D3-T7	7	56	1.98	.000011275	1.12746
1166	SMB	2	A3D03	50	SMB-50-D3-T8	8	55	1.86	.000011180	1.11796
1166	SMB	2	A3D03	50	SMB-50-D3-T9	9	55	1.55	.000009316	0.93163
1167	SMB	2	A3D03	50	SMB-50-D3-T10	10	58	2.04	.000010456	1.04555
1168	SMB	2	A3D03	50	SMB-50-D3-T11	11	54	1.71	.000010860	1.08596
1169	SMB	2	A3D03	50	SMB-50-D3-T12	12	55	1.72	.000010338	1.03381
1170	SMB	2	A3D03	50	SMB-50-D3-T13	13	53	1.61	.000010814	1.08143
1171	SMB	2	A3D03	50	SMB-50-D3-T14	14	57	2.18	.000011772	1.17715
1172	SMB	2	A3D03	50	SMB-50-D3-T15	15	47	1.14	.000010980	1.09802
1173	SMB	2	A3D03	50	SMB-50-D3-T16	16	58	1.95	.000009994	0.99943
1174	SMB	2	A3D03	50	SMB-50-D3-T17	17	54	1.66	.000010542	1.05421
1175	SMB	2	A3D03	50	SMB-50-D3-T18	18	53	1.67	.000011217	1.12173
1176	SMB	2	B5D08	50	SMB-50-D8-T1	1	65	2.79	.000010159	1.01593
1177	SMB	2	B5D08	50	SMB-50-D8-T2	2	60	2.32	.000010741	1.07407
1178	SMB	2	B5D08	50	SMB-50-D8-T3	3	58	2.06	.000010558	1.05580
1179	SMB	2	B5D08	50	SMB-50-D8-T4	4	54	1.67	.000010606	1.06056
1180	SMB	2	B5D08	50	SMB-50-D8-T5	5	53	1.70	.000011419	1.14188
1181	SMB	2	B5D08	50	SMB-50-D8-T6	6	54	1.63	.000010352	1.03516
1182	SMB	2	B5D08	50	SMB-50-D8-T7	7	59	2.25	.000010955	1.09554
1183	SMB	2	B5D08	50	SMB-50-D8-T8	8	51	1.38	.000010403	1.04032
1184	SMB	2	B5D08	50	SMB-50-D8-T9	9	55	1.83	.000010999	1.09992
1185	SMB	2	B5D08	50	SMB-50-D8-T10	10	56	1.74	.000009908	0.99080

	SMB	2	B5D08	50	SMB-50-D8-T11	11	56	1.91	.000010876	1.08760
1187	SMB	2	B5D08	50	SMB-50-D8-T12	12	57	1.96	.000010584	1.05836
1188	SMB	2	B5D08	50	SMB-50-D8-T13	13	50	1.33	.000010640	1.06400
1189	SMB	2	B5D08	50	SMB-50-D8-T14	14	54	1.90	.000012066	1.20663
1190	SMB	2	B5D08	50	SMB-50-D8-T15	15	56	2.09	.000011901	1.19010
1191	SMB	2	B5D08	50	SMB-50-D8-T16	16	57	1.55	.000008370	0.83696
1192	SMB	2	B5D08	50	SMB-50-D8-T17	17	52	1.47	.000010455	1.04546
1193	SMB	2	B5D08	50	SMB-50-D8-T18	18	54	1.72	.000010923	1.09231
1194	SMB	2	B5D08	50	SMB-50-D8-T19	19	53	1.67	.000011217	1.12173
1195	SMB	2	B5D08	50	SMB-50-D8-T20	20	54	1.53	.000009717	0.97165
1196	WAE	2	A2F10	0	WAE-CONTROL-F10-T1	1	73	2.37	.000006092	0.60923
1197	WAE	2	A2F10	0	WAE-CONTROL-F10-T2	2	73	2.56	.000006581	0.65807
1198	WAE	2	A2F10	0	WAE-CONTROL-F10-T3	3	61	1.19	.000005243	0.52427
1199	WAE	2	A2F10	0	WAE-CONTROL-F10-T4	4	59	1.31	.000006378	0.63785
1200	WAE	2	A2F10	0	WAE-CONTROL-F10-T5	5	60	1.19	.000005509	0.55093
1201	WAE	2	A2F10	0	WAE-CONTROL-F10-T6	6	73	2.49	.000006401	0.64007
1202	WAE	2	A2F10	0	WAE-CONTROL-F10-T7	7	71	1.81	.000005057	0.50571
1203	WAE	2	A2F10	0	WAE-CONTROL-F10-T8	8	75	2.38	.000005641	0.56415
1204	WAE	2	A2F10	0	WAE-CONTROL-F10-T9	9	82	2.97	.000005387	0.53866
1205	WAE	2	A2F10	0	WAE-CONTROL-F10-T10	10	67	1.87	.000006218	0.62175
1206	WAE	2	A2F10	0	WAE-CONTROL-F10-T11	11	67	1.94	.000006450	0.64503
1207	WAE	2	A2F10	0	WAE-CONTROL-F10-T12	12	73	2.35	.000006041	0.60409
1208	WAE	2	A2F10	0	WAE-CONTROL-F10-T13	13	70	2.13	.000006210	0.62099
1209	WAE	2	A2F10	0	WAE-CONTROL-F10-T14	14	72	2.34	.000006269	0.62693
1210	WAE	2	A2F10	0	WAE-CONTROL-F10-T15	15	66	1.68	.000005844	0.58436
1211	WAE	2	A2F10	0	WAE-CONTROL-F10-T16	16	72	2.11	.000005653	0.56531
1212	WAE	2	A2F10	0	WAE-CONTROL-F10-T17	17	65	1.23	.000004479	0.44788
1213	WAE	2	A2F10	0	WAE-CONTROL-F10-T18	18	80	2.98	.000005820	0.58203
1214	WAE	2	A2F10	0	WAE-CONTROL-F10-T19	19	66	1.89	.000006574	0.65740
1215	WAE	2	A2F10	0	WAE-CONTROL-F10-T20	20	60	1.30	.000006019	0.60185
1216	WAE	2	C3F13	0	WAE-CONTROL-F13-T1	1	62	1.10	.000004615	0.46155
1217	WAE	2	C3F13	0	WAE-CONTROL-F13-T2	2	75	2.50	.000005926	0.59259
1218	WAE	2	C3F13	0	WAE-CONTROL-F13-T3	3	77	2.49	.000005454	0.54542
1219	WAE	2	C3F13	0	WAE-CONTROL-F13-T4	4	65	1.28	.000004661	0.46609
1220	WAE	2	C3F13	0	WAE-CONTROL-F13-T5	5	71	2.28	.000006370	0.63703

	WAE	2	C3F13	0	WAE-CONTROL-F13-T6	6	65	1.38	.000005025	0.50250
1222	WAE	2	C3F13	0	WAE-CONTROL-F13-T7	7	75	1.99	.000004717	0.47170
1223	WAE	2	C3F13	0	WAE-CONTROL-F13-T8	8	70	2.13	.000006210	0.62099
1224	WAE	2	C3F13	0	WAE-CONTROL-F13-T9	9	63	1.45	.000005799	0.57989
1225	WAE	2	C3F13	0	WAE-CONTROL-F13-T10	10	75	2.22	.000005262	0.52622
1226	WAE	2	C3F13	0	WAE-CONTROL-F13-T11	11	58	1.15	.000005894	0.58941
1227	WAE	2	C3F13	0	WAE-CONTROL-F13-T12	12	71	2.25	.000006286	0.62865
1228	WAE	2	C3F13	0	WAE-CONTROL-F13-T13	13	65	1.50	.000005462	0.54620
1229	WAE	2	C3F13	0	WAE-CONTROL-F13-T14	14	72	2.48	.000006644	0.66444
1230	WAE	2	C3F13	0	WAE-CONTROL-F13-T15	15	71	1.66	.000004638	0.46380
1231	WAE	2	C3F13	0	WAE-CONTROL-F13-T16	16	62	1.30	.000005455	0.54547
1232	WAE	2	C3F13	0	WAE-CONTROL-F13-T17	17	78	3.00	.000006322	0.63218
1233	WAE	2	C3F13	0	WAE-CONTROL-F13-T18	18	72	2.26	.000006055	0.60550
1234	WAE	2	C3F13	0	WAE-CONTROL-F13-T19	19	66	2.18	.000007583	0.75827
1235	WAE	2	B5F14	0	WAE-CONTROL-F14-T1	1	67	1.51	.000005021	0.50206
1236	WAE	2	B5F14	0	WAE-CONTROL-F14-T2	2	75	3.20	.000007585	0.75852
1237	WAE	2	B5F14	0	WAE-CONTROL-F14-T3	3	72	2.22	.000005948	0.59478
1238	WAE	2	B5F14	0	WAE-CONTROL-F14-T4	4	62	1.41	.000005916	0.59162
1239	WAE	2	B5F14	0	WAE-CONTROL-F14-T5	5	75	2.60	.000006163	0.61630
1240	WAE	2	B5F14	0	WAE-CONTROL-F14-T6	6	67	1.67	.000005553	0.55525
1241	WAE	2	B5F14	0	WAE-CONTROL-F14-T7	7	70	2.02	.000005889	0.58892
1242	WAE	2	B5F14	0	WAE-CONTROL-F14-T8	8	67	1.82	.000006051	0.60513
1243	WAE	2	B5F14	0	WAE-CONTROL-F14-T9	9	68	1.84	.000005852	0.58518
1244	WAE	2	B5F14	0	WAE-CONTROL-F14-T10	10	60	1.15	.000005324	0.53241
1245	WAE	2	B5F14	0	WAE-CONTROL-F14-T11	11	77	2.79	.000006111	0.61113
1246	WAE	2	B5F14	0	WAE-CONTROL-F14-T12	12	76	2.50	.000005695	0.56951
1247	WAE	2	B5F14	0	WAE-CONTROL-F14-T13	13	65	1.33	.000004843	0.48430
1248	WAE	2	B5F14	0	WAE-CONTROL-F14-T14	14	67	1.46	.000004854	0.48543
1249	WAE	2	B5F14	0	WAE-CONTROL-F14-T15	15	63	1.30	.000005199	0.51990
1250	WAE	2	B5F14	0	WAE-CONTROL-F14-T16	16	73	2.50	.000006426	0.64265
1251	WAE	2	B5F14	0	WAE-CONTROL-F14-T17	17	69	2.26	.000006880	0.68796
1252	WAE	2	B5F14	0	WAE-CONTROL-F14-T18	18	65	0.89	.000005349	0.53494
1253	WAE	2	B5F14	0	WAE-CONTROL-F14-T19	19	80	2.82	.000005508	0.55078
1254	WAE	2	C4F03	100	WAE-100-F3-T1	1	71	1.90	.000005309	0.53086
1255	WAE	2	C4F03	100	WAE-100-F3-T2	2	68	1.64	.000005216	0.52158

	WAE	2	C4F03	100	WAE-100-F3-T3	3	66	1.69	.000005878	0.58783
1257	WAE	2	C4F03	100	WAE-100-F3-T4	4	74	2.44	.000006021	0.60214
1258	WAE	2	C4F03	100	WAE-100-F3-T5	5	70	2.04	.000005948	0.59475
1259	WAE	2	C4F03	100	WAE-100-F3-T6	6	67	1.74	.000005785	0.57853
1260	WAE	2	C4F03	100	WAE-100-F3-T7	7	76	2.88	.000006561	0.65607
1261	WAE	2	C4F03	100	WAE-100-F3-T8	8	70	2.07	.000006035	0.60350
1262	WAE	2	C4F03	100	WAE-100-F3-T9	9	70	2.08	.000006064	0.60641
1263	WAE	2	C4F03	100	WAE-100-F3-T10	10	74	2.52	.000006219	0.62188
1264	WAE	2	C4F03	100	WAE-100-F3-T11	11	55	1.36	.000008174	0.81743
1265	WAE	2	C4F03	100	WAE-100-F3-T12	12	72	2.39	.000006403	0.64032
1266	WAE	2	C4F03	100	WAE-100-F3-T13	13	72	2.21	.000005921	0.59210
1267	WAE	2	C4F03	100	WAE-100-F3-T14	14	81	3.28	.000006172	0.61719
1268	WAE	2	C4F03	100	WAE-100-F3-T15	15	62	1.27	.000005329	0.53288
1269	WAE	2	C4F03	100	WAE-100-F3-T16	16	82	3.05	.000005532	0.55317
1270	WAE	2	C4F03	100	WAE-100-F3-T17	17	73	2.31	.000005938	0.59380
1271	WAE	2	B2F04	100	WAE-100-F4-T1	1	72	2.31	.000006189	0.61889
1272	WAE	2	B2F04	100	WAE-100-F4-T2	2	75	2.76	.000006542	0.65422
1273	WAE	2	B2F04	100	WAE-100-F4-T3	3	74	2.56	.000006317	0.63175
1274	WAE	2	B2F04	100	WAE-100-F4-T4	4	70	1.83	.000005335	0.53353
1275	WAE	2	B2F04	100	WAE-100-F4-T5	5	78	3.02	.000006364	0.63639
1276	WAE	2	B2F04	100	WAE-100-F4-T6	6	74	2.40	.000005923	0.59227
1277	WAE	2	B2F04	100	WAE-100-F4-T7	7	63	1.30	.000005199	0.51990
1278	WAE	2	B2F04	100	WAE-100-F4-T8	8	83	3.04	.000005317	0.53167
1279	WAE	2	B2F04	100	WAE-100-F4-T9	9	68	1.53	.000004866	0.48659
1280	WAE	2	B2F04	100	WAE-100-F4-T10	10	75	2.35	.000005570	0.55704
1281	WAE	2	B2F04	100	WAE-100-F4-T11	11	75	2.12	.000005025	0.50252
1282	WAE	2	B2F04	100	WAE-100-F4-T12	12	67	1.73	.000005752	0.57520
1283	WAE	2	B2F04	100	WAE-100-F4-T13	13	72	2.54	.000006805	0.68051
1284	WAE	2	B2F04	100	WAE-100-F4-T14	14	77	2.92	.000006396	0.63960
1285	WAE	2	B2F04	100	WAE-100-F4-T15	15	68	1.58	.000005025	0.50249
1286	WAE	2	B2F04	100	WAE-100-F4-T16	16	75	2.57	.000006092	0.60919
1287	WAE	2	B2F04	100	WAE-100-F4-T17	17	62	1.29	.000005413	0.54127
1288	WAE	2	B2F04	100	WAE-100-F4-T18	18	72	2.13	.000005707	0.57067
1289	WAE	2	B2F04	100	WAE-100-F4-T19	19	88	3.91	.000005738	0.57376
1290	WAE	2	B2F04	100	WAE-100-F4-T20	20	66	1.67	.000005809	0.58088

	WAE	2	B2F04	100	WAE-100-F4-T21	21	73	2.26	.000005810	0.58095
1292	WAE	2	B2F04	100	WAE-100-F4-T22	22	70	1.93	.000005627	0.56268
1293	WAE	2	B2F04	100	WAE-100-F4-T23	23	70	1.68	.000004898	0.48980
1294	WAE	2	B2F04	100	WAE-100-F4-T24	24	67	1.72	.000005719	0.57188
1295	WAE	2	B2F04	100	WAE-100-F4-T25	25	74	2.28	.000005627	0.56265
1296	WAE	2	B2F04	100	WAE-100-F4-T26	26	67	1.71	.000005686	0.56855
1297	WAE	2	B2F04	100	WAE-100-F4-T27	27	57	1.44	.000007776	0.77757
1298	WAE	2	A4F09	100	WAE-100-F9-T1	1	76	2.75	.000006265	0.62646
1299	WAE	2	A4F09	100	WAE-100-F9-T2	2	67	1.69	.000005619	0.56190
1300	WAE	2	A4F09	100	WAE-100-F9-T3	3	65	1.35	.000004916	0.49158
1301	WAE	2	A4F09	100	WAE-100-F9-T4	4	76	2.20	.000005012	0.50117
1302	WAE	2	A4F09	100	WAE-100-F9-T5	5	72	2.05	.000005492	0.54923
1303	WAE	2	A4F09	100	WAE-100-F9-T6	6	69	1.58	.000004810	0.48096
1304	WAE	2	A4F09	100	WAE-100-F9-T7	7	72	2.08	.000005573	0.55727
1305	WAE	2	A4F09	100	WAE-100-F9-T8	8	67	1.44	.000004788	0.47878
1306	WAE	2	A4F09	100	WAE-100-F9-T9	9	70	2.02	.000005889	0.58892
1307	WAE	2	A4F09	100	WAE-100-F9-T10	10	76	2.49	.000005672	0.56723
1308	WAE	2	A4F09	100	WAE-100-F9-T11	11	77	2.72	.000005958	0.59579
1309	WAE	2	A4F09	100	WAE-100-F9-T12	12	75	2.26	.000005357	0.53570
1310	WAE	2	A4F09	100	WAE-100-F9-T13	13	71	2.60	.000007264	0.72644
1311	WAE	2	A4F09	100	WAE-100-F9-T14	14	77	2.85	.000006243	0.62427
1312	WAE	2	A4F09	100	WAE-100-F9-T15	15	75	2.26	.000005357	0.53570
1313	WAE	2	C2F05	200	WAE-200-F5-T1	1	67	1.76	.000005852	0.58518
1314	WAE	2	C2F05	200	WAE-200-F5-T2	2	69	1.74	.000005297	0.52967
1315	WAE	2	C2F05	200	WAE-200-F5-T3	3	70	2.11	.000006152	0.61516
1316	WAE	2	C2F05	200	WAE-200-F5-T4	4	58	1.20	.000006150	0.61503
1317	WAE	2	C2F05	200	WAE-200-F5-T5	5	60	1.22	.000005648	0.56481
1318	WAE	2	C2F05	200	WAE-200-F5-T6	6	68	1.99	.000006329	0.63289
1319	WAE	2	C2F05	200	WAE-200-F5-T7	7	71	1.95	.000005448	0.54483
1320	WAE	2	C2F05	200	WAE-200-F5-T8	8	67	1.64	.000005453	0.54528
1321	WAE	2	C2F05	200	WAE-200-F5-T9	9	73	2.33	.000005989	0.59895
1322	WAE	2	C2F05	200	WAE-200-F5-T10	10	66	1.85	.000006436	0.64349
1323	WAE	2	C2F05	200	WAE-200-F5-T11	11	68	1.71	.000005438	0.54384
1324	WAE	2	C2F05	200	WAE-200-F5-T12	12	70	2.23	.000006501	0.65015
1325	WAE	2	B1F07	200	WAE-200-F7-T1	1	68	1.98	.000006297	0.62971

	WAE	2	B1F07	200	WAE-200-F7-T2	2	66	1.78	.000006191	0.61914
1327	WAE	2	B1F07	200	WAE-200-F7-T3	3	72	2.31	.000006189	0.61889
1328	WAE	2	B1F07	200	WAE-200-F7-T4	4	65	1.60	.000005826	0.58261
1329	WAE	2	B1F07	200	WAE-200-F7-T5	5	70	1.68	.000004898	0.48980
1330	WAE	2	B1F07	200	WAE-200-F7-T6	6	65	1.92	.000006991	0.69914
1331	WAE	2	B1F07	200	WAE-200-F7-T7	7	63	1.20	.000004799	0.47991
1332	WAE	2	B1F07	200	WAE-200-F7-T8	8	68	1.90	.000006043	0.60426
1333	WAE	2	B1F07	200	WAE-200-F7-T9	9	67	1.83	.000006085	0.60845
1334	WAE	2	B1F07	200	WAE-200-F7-T10	10	74	2.55	.000006293	0.62928
1335	WAE	2	B1F07	200	WAE-200-F7-T11	11	67	1.81	.000006018	0.60180
1336	WAE	2	B1F07	200	WAE-200-F7-T12	12	70	2.05	.000005977	0.59767
1337	WAE	2	B1F07	200	WAE-200-F7-T13	13	70	2.01	.000005860	0.58601
1338	WAE	2	B1F07	200	WAE-200-F7-T14	14	70	2.40	.000006997	0.69971
1339	WAE	2	B1F07	200	WAE-200-F7-T15	15	55	0.83	.000004989	0.49887
1340	WAE	2	A1F12	200	WAE-200-F12-T1	1	75	2.70	.000006400	0.64000
1341	WAE	2	A1F12	200	WAE-200-F12-T2	2	74	1.71	.000004220	0.42199
1342	WAE	2	A1F12	200	WAE-200-F12-T3	3	66	1.33	.000004626	0.46262
1343	WAE	2	A1F12	200	WAE-200-F12-T4	4	65	1.78	.000006482	0.64816
1344	WAE	2	A1F12	200	WAE-200-F12-T5	5	72	1.87	.000005010	0.50101
1345	WAE	2	A1F12	200	WAE-200-F12-T6	6	68	1.96	.000006233	0.62335
1346	WAE	2	A1F12	200	WAE-200-F12-T7	7	61	1.29	.000005683	0.56833
1347	WAE	2	A1F12	200	WAE-200-F12-T8	8	60	0.87	.000004028	0.40278
1348	WAE	2	A1F12	200	WAE-200-F12-T9	9	77	2.82	.000006177	0.61770
1349	WAE	2	A1F12	200	WAE-200-F12-T10	10	67	1.81	.000006018	0.60180
1350	WAE	2	A1F12	200	WAE-200-F12-T11	11	63	1.55	.000006199	0.61988
1351	WAE	2	A1F12	200	WAE-200-F12-T12	12	78	2.98	.000006280	0.62796
1352	WAE	2	A1F12	200	WAE-200-F12-T13	13	70	2.51	.000007318	0.73178
1353	WAE	2	A1F12	200	WAE-200-F12-T14	14	68	1.31	.000004166	0.41662
1354	WAE	2	C1F02	300	WAE-300-F2-T1	1	77	2.47	.000005410	0.54103
1355	WAE	2	C1F02	300	WAE-300-F2-T2	2	77	2.72	.000005958	0.59579
1356	WAE	2	C1F02	300	WAE-300-F2-T3	3	60	1.39	.000006435	0.64352
1357	WAE	2	C1F02	300	WAE-300-F2-T4	4	73	2.18	.000005604	0.56039
1358	WAE	2	C1F02	300	WAE-300-F2-T5	5	70	1.61	.000004694	0.46939
1359	WAE	2	C1F02	300	WAE-300-F2-T6	6	75	2.45	.000005807	0.58074
1360	WAE	2	B4F06	300	WAE-300-F6-T1	1	70	2.27	.000006618	0.66181

	WAE	2	B4F06	300	WAE-300-F6-T2	2	69	1.92	.000005845	0.58446
1362	WAE	2	A3F11	300	WAE-300-F11-T1	1	84	3.60	.000006074	0.60739
1363	WAE	2	A3F11	300	WAE-300-F11-T2	2	60	1.26	.000005833	0.58333
1364	WAE	2	A3F11	300	WAE-300-F11-T3	3	64	1.62	.000006180	0.61798
1365	WAE	2	A3F11	300	WAE-300-F11-T4	4	72	2.68	.000007180	0.71802
1366	WAE	2	A3F11	300	WAE-300-F11-T5	5	68	2.00	.000006361	0.63607
1367	WAE	2	A3F11	300	WAE-300-F11-T6	6	65	1.54	.000005608	0.56076
1368	WAE	2	A3F11	300	WAE-300-F11-T7	7	75	2.80	.000006637	0.66370
1369	WAE	2	A3F11	300	WAE-300-F11-T8	8	68	2.12	.000006742	0.67423
1370	WAE	2	A5F01	50	WAE-50-F1-T1	1	84	3.31	.000005585	0.55845
1371	WAE	2	A5F01	50	WAE-50-F1-T2	2	70	2.08	.000006064	0.60641
1372	WAE	2	A5F01	50	WAE-50-F1-T3	3	73	1.94	.000004987	0.49869
1373	WAE	2	A5F01	50	WAE-50-F1-T4	4	60	1.14	.000005278	0.52778
1374	WAE	2	A5F01	50	WAE-50-F1-T5	5	77	2.40	.000005257	0.52570
1375	WAE	2	A5F01	50	WAE-50-F1-T6	6	69	1.87	.000005692	0.56924
1376	WAE	2	A5F01	50	WAE-50-F1-T7	7	67	1.83	.000006085	0.60845
1377	WAE	2	A5F01	50	WAE-50-F1-T8	8	80	3.06	.000005977	0.59766
1378	WAE	2	A5F01	50	WAE-50-F1-T9	9	60	1.04	.000004815	0.48148
1379	WAE	2	A5F01	50	WAE-50-F1-T10	10	73	1.78	.000004576	0.45756
1380	WAE	2	A5F01	50	WAE-50-F1-T11	11	63	1.24	.000004959	0.49591
1381	WAE	2	A5F01	50	WAE-50-F1-T12	12	68	1.84	.000005852	0.58518
1382	WAE	2	A5F01	50	WAE-50-F1-T13	13	69	1.69	.000005144	0.51445
1383	WAE	2	A5F01	50	WAE-50-F1-T14	14	75	2.17	.000005144	0.51437
1384	WAE	2	A5F01	50	WAE-50-F1-T15	15	74	2.50	.000006169	0.61694
1385	WAE	2	A5F01	50	WAE-50-F1-T16	16	79	2.63	.000005334	0.53343
1386	WAE	2	A5F01	50	WAE-50-F1-T17	17	82	3.18	.000005767	0.57675
1387	WAE	2	A5F01	50	WAE-50-F1-T18	18	66	1.27	.000004417	0.44175
1388	WAE	2	C5F08	50	WAE-50-F8-T1	1	77	2.77	.000006067	0.60675
1389	WAE	2	C5F08	50	WAE-50-F8-T2	2	73	2.13	.000005475	0.54753
1390	WAE	2	C5F08	50	WAE-50-F8-T3	3	69	1.88	.000005723	0.57228
1391	WAE	2	C5F08	50	WAE-50-F8-T4	4	70	1.84	.000005364	0.53644
1392	WAE	2	C5F08	50	WAE-50-F8-T5	5	88	4.52	.000006633	0.66327
1393	WAE	2	C5F08	50	WAE-50-F8-T6	6	67	1.85	.000006151	0.61510
1394	WAE	2	C5F08	50	WAE-50-F8-T7	7	65	1.56	.000005680	0.56805
1395	WAE	2	C5F08	50	WAE-50-F8-T8	8	79	2.92	.000005922	0.59225

	WAE	2	C5F08	50	WAE-50-F8-T9	9	70	1.98	.000005773	0.57726
1397	WAE	2	C5F08	50	WAE-50-F8-T10	10	63	1.38	.000005519	0.55190
1398	WAE	2	C5F08	50	WAE-50-F8-T11	11	66	1.73	.000006017	0.60175
1399	WAE	2	C5F08	50	WAE-50-F8-T12	12	76	2.49	.000005672	0.56723
1400	WAE	2	C5F08	50	WAE-50-F8-T13	13	72	2.04	.000005466	0.54655
1401	WAE	2	C5F08	50	WAE-50-F8-T14	14	77	2.84	.000006221	0.62208
1402	WAE	2	C5F08	50	WAE-50-F8-T15	15	68	1.94	.000006170	0.61699
1403	WAE	2	C5F08	50	WAE-50-F8-T16	16	77	2.69	.000005892	0.58922
1404	WAE	2	C5F08	50	WAE-50-F8-T17	17	73	2.18	.000005604	0.56039
1405	WAE	2	C5F08	50	WAE-50-F8-T18	18	78	2.86	.000006027	0.60267
1406	WAE	2	C5F08	50	WAE-50-F8-T19	19	65	1.43	.000005207	0.52071
1407	WAE	2	C5F08	50	WAE-50-F8-T20	20	67	1.56	.000005187	0.51868
1408	WAE	2	B2F15	50	WAE-50-F15-T1	1	65	1.10	.000004005	0.40055
1409	WAE	2	B2F15	50	WAE-50-F15-T2	2	61	1.08	.000004758	0.47581
1410	WAE	2	B2F15	50	WAE-50-F15-T3	3	62	1.39	.000005832	0.58323
1411	WAE	2	B2F15	50	WAE-50-F15-T4	4	65	1.32	.000004807	0.48066
1412	WAE	2	B2F15	50	WAE-50-F15-T5	5	68	1.68	.000005343	0.53430
1413	WAE	2	B2F15	50	WAE-50-F15-T6	6	66	1.21	.000004209	0.42088
1414	WAE	2	B2F15	50	WAE-50-F15-T7	7	66	1.63	.000005670	0.56696
1415	WAE	2	B2F15	50	WAE-50-F15-T8	8	67	1.80	.000005985	0.59848
1416	WAE	2	B2F15	50	WAE-50-F15-T9	9	61	1.04	.000004582	0.45819
1417	WAE	2	B2F15	50	WAE-50-F15-T10	10	76	2.73	.000006219	0.62190
1418	WAE	2	B2F15	50	WAE-50-F15-T11	11	72	2.25	.000006028	0.60282
1419	WAE	2	B2F15	50	WAE-50-F15-T12	12	61	1.34	.000005904	0.59036
1420	WAE	2	B2F15	50	WAE-50-F15-T13	13	67	1.65	.000005486	0.54860
1421	WAE	2	B2F15	50	WAE-50-F15-T14	14	72	2.34	.000006269	0.62693
1422	WAE	2	B2F15	50	WAE-50-F15-T15	15	68	1.85	.000005884	0.58836
1423	WAE	2	B2F15	50	WAE-50-F15-T16	16	70	1.94	.000005656	0.56560
1424	WAE	2	B2F15	50	WAE-50-F15-T17	17	63	1.50	.000005999	0.59989
1425	WAE	2	B2F15	50	WAE-50-F15-T18	18	62	1.30	.000005455	0.54547
1426	WAE	2	B2F15	50	WAE-50-F15-T19	19	68	1.53	.000004866	0.48659
1427	WAE	2	B2F15	50	WAE-50-F15-T20	20	70	1.97	.000005743	0.57434
1428	YEP	2	A4G08	0	YEP-CONTROL-G8-T1	1	57	1.36	.000007344	0.73437
1429	YEP	2	A4G08	0	YEP-CONTROL-G8-T2	2	54	1.17	.000007430	0.74303
1430	YEP	2	A4G08	0	YEP-CONTROL-G8-T3	3	52	1.03	.000007325	0.73253

	YEP	2	A4G08	0	YEP-CONTROL-G8-T4	4	60	1.37	.000006343	0.63426
1432	YEP	2	A4G08	0	YEP-CONTROL-G8-T5	5	55	1.21	.000007273	0.72727
1433	YEP	2	A4G08	0	YEP-CONTROL-G8-T6	6	82	1.75	.000007343	0.73428
1434	YEP	2	A4G08	0	YEP-CONTROL-G8-T7	7	50	0.99	.000007920	0.79200
1435	YEP	2	A4G08	0	YEP-CONTROL-G8-T8	8	55	1.15	.000006912	0.69121
1436	YEP	2	A4G08	0	YEP-CONTROL-G8-T9	9	54	1.17	.000007430	0.74303
1437	YEP	2	A4G08	0	YEP-CONTROL-G8-T10	10	51	0.93	.000007011	0.70109
1438	YEP	2	A4G08	0	YEP-CONTROL-G8-T11	11	49	0.96	.000008160	0.81599
1439	YEP	2	A4G08	0	YEP-CONTROL-G8-T12	12	56	1.43	.000008143	0.81428
1440	YEP	2	A4G08	0	YEP-CONTROL-G8-T13	13	53	1.09	.000007321	0.73215
1441	YEP	2	A4G08	0	YEP-CONTROL-G8-T14	14	50	1.08	.000008640	0.86400
1442	YEP	2	A4G08	0	YEP-CONTROL-G8-T15	15	51	1.00	.000007539	0.75386
1443	YEP	2	A4G08	0	YEP-CONTROL-G8-T16	16	55	1.22	.000007333	0.73328
1444	YEP	2	A4G08	0	YEP-CONTROL-G8-T17	17	54	1.30	.000008256	0.82559
1445	YEP	2	A4G08	0	YEP-CONTROL-G8-T18	18	55	1.37	.000008234	0.82344
1446	YEP	2	A4G08	0	YEP-CONTROL-G8-T19	19	55	1.20	.000007213	0.72126
1447	YEP	2	B3G05	0	YEP-CONTROL-G5-T1	1	60	1.66	.000007685	0.76852
1448	YEP	2	B3G05	0	YEP-CONTROL-G5-T2	2	57	1.51	.000008154	0.81537
1449	YEP	2	B3G05	0	YEP-CONTROL-G5-T3	3	50	1.13	.000009040	0.90400
1450	YEP	2	B3G05	0	YEP-CONTROL-G5-T4	4	57	1.57	.000008478	0.84776
1451	YEP	2	B3G05	0	YEP-CONTROL-G5-T5	5	55	1.17	.000007032	0.70323
1452	YEP	2	B3G05	0	YEP-CONTROL-G5-T6	6	55	1.24	.000007453	0.74530
1453	YEP	2	B3G05	0	YEP-CONTROL-G5-T7	7	52	1.08	.000007681	0.76809
1454	YEP	2	B3G05	0	YEP-CONTROL-G5-T8	8	60	1.54	.000007130	0.71296
1455	YEP	2	B3G05	0	YEP-CONTROL-G5-T9	9	55	1.36	.000008174	0.81743
1456	YEP	2	B3G05	0	YEP-CONTROL-G5-T10	10	57	1.42	.000007668	0.76677
1457	YEP	2	B3G05	0	YEP-CONTROL-G5-T11	11	57	1.24	.000006696	0.66957
1458	YEP	2	B3G05	0	YEP-CONTROL-G5-T12	12	58	1.50	.000007688	0.76879
1459	YEP	2	B3G05	0	YEP-CONTROL-G5-T13	13	50	1.13	.000009040	0.90400
1460	YEP	2	B3G05	0	YEP-CONTROL-G5-T14	14	57	1.50	.000008100	0.80997
1461	YEP	2	B3G05	0	YEP-CONTROL-G5-T15	15	55	1.24	.000007453	0.74530
1462	YEP	2	B3G05	0	YEP-CONTROL-G5-T16	16	54	1.24	.000007875	0.78748
1463	YEP	2	B3G05	0	YEP-CONTROL-G5-T17	17	63	1.75	.000006999	0.69987
1464	YEP	2	B3G05	0	YEP-CONTROL-G5-T18	18	57	1.36	.000007344	0.73437
1465	YEP	2	B3G05	0	YEP-CONTROL-G5-T19	19	56	1.26	.000007175	0.71747

	YEP	2	B3G05	0	YEP-CONTROL-G5-T20	20	59	0.64	.000003116	0.31162
1467	YEP	2	C1G04	0	YEP-CONTROL-G4-T1	1	55	1.50	.000009016	0.90158
1468	YEP	2	C1G04	0	YEP-CONTROL-G4-T2	2	53	1.13	.000007590	0.75902
1469	YEP	2	C1G04	0	YEP-CONTROL-G4-T3	3	52	1.27	.000009032	0.90322
1470	YEP	2	C1G04	0	YEP-CONTROL-G4-T4	4	54	1.30	.000008256	0.82559
1471	YEP	2	C1G04	0	YEP-CONTROL-G4-T5	5	53	1.35	.000009068	0.90679
1472	YEP	2	C1G04	0	YEP-CONTROL-G4-T6	6	53	1.19	.000007993	0.79932
1473	YEP	2	C1G04	0	YEP-CONTROL-G4-T7	7	56	1.28	.000007289	0.72886
1474	YEP	2	C1G04	0	YEP-CONTROL-G4-T8	8	57	1.36	.000007344	0.73437
1475	YEP	2	C1G04	0	YEP-CONTROL-G4-T9	9	55	1.44	.000008655	0.86551
1476	YEP	2	C1G04	0	YEP-CONTROL-G4-T10	10	52	1.20	.000008534	0.85344
1477	YEP	2	C1G04	0	YEP-CONTROL-G4-T11	11	53	1.21	.000008128	0.81275
1478	YEP	2	C1G04	0	YEP-CONTROL-G4-T12	12	49	0.94	.000007990	0.79899
1479	YEP	2	C1G04	0	YEP-CONTROL-G4-T13	13	51	1.13	.000008519	0.85186
1480	YEP	2	C1G04	0	YEP-CONTROL-G4-T14	14	53	1.24	.000008329	0.83290
1481	YEP	2	C1G04	0	YEP-CONTROL-G4-T15	15	51	1.18	.000008896	0.88955
1482	YEP	2	C1G04	0	YEP-CONTROL-G4-T16	16	56	1.53	.000008712	0.87122
1483	YEP	2	C1G04	0	YEP-CONTROL-G4-T17	17	54	1.16	.000007367	0.73668
1484	YEP	2	C1G04	0	YEP-CONTROL-G4-T18	18	50	0.99	.000007920	0.79200
1485	YEP	2	C1G04	0	YEP-CONTROL-G4-T19	19	50	1.10	.000008800	0.88000
1486	YEP	2	C1G04	0	YEP-CONTROL-G4-T20	20	52	1.10	.000007823	0.78232
1487	YEP	2	A2G09	100	YEP-100-G9-T1	1	56	1.34	.000007630	0.76303
1488	YEP	2	A2G09	100	YEP-100-G9-T2	2	57	1.51	.000008154	0.81537
1489	YEP	2	A2G09	100	YEP-100-G9-T3	3	50	0.93	.000007440	0.74400
1490	YEP	2	A2G09	100	YEP-100-G9-T4	4	55	1.35	.000008114	0.81142
1491	YEP	2	A2G09	100	YEP-100-G9-T5	5	50	0.89	.000007120	0.71200
1492	YEP	2	A2G09	100	YEP-100-G9-T6	6	57	1.35	.000007290	0.72897
1493	YEP	2	A2G09	100	YEP-100-G9-T7	7	52	1.14	.000008108	0.81076
1494	YEP	2	A2G09	100	YEP-100-G9-T8	8	59	1.33	.000006476	0.64758
1495	YEP	2	A2G09	100	YEP-100-G9-T9	9	53	1.04	.000006986	0.69856
1496	YEP	2	A2G09	100	YEP-100-G9-T10	10	57	1.44	.000007776	0.77757
1497	YEP	2	A2G09	100	YEP-100-G9-T11	11	54	1.01	.000006414	0.64142
1498	YEP	2	A2G09	100	YEP-100-G9-T12	12	47	0.80	.000007705	0.77054
1499	YEP	2	A2G09	100	YEP-100-G9-T13	13	55	1.11	.000006672	0.66717
1500	YEP	2	A2G09	100	YEP-100-G9-T14	14	50	0.88	.000007040	0.70400

	YEP	2	A2G09	100	YEP-100-G9-T15	15	55	1.32	.000007934	0.79339
1502	YEP	2	A2G09	100	YEP-100-G9-T16	16	61	1.55	.000006829	0.68288
1503	YEP	2	A2G09	100	YEP-100-G9-T17	17	52	1.17	.000008321	0.83210
1504	YEP	2	A2G09	100	YEP-100-G9-T18	18	55	1.18	.000007092	0.70924
1505	YEP	2	A2G09	100	YEP-100-G9-T19	19	51	1.07	.000008066	0.80663
1506	YEP	2	B4G02	100	YEP-100-G2-T1	1	54	1.34	.000008510	0.85099
1507	YEP	2	B4G02	100	YEP-100-G2-T2	2	43	0.62	.000007798	0.77981
1508	YEP	2	B4G02	100	YEP-100-G2-T3	3	54	1.29	.000008192	0.81923
1509	YEP	2	B4G02	100	YEP-100-G2-T4	4	52	0.98	.000006970	0.69697
1510	YEP	2	B4G02	100	YEP-100-G2-T5	5	53	1.05	.000007053	0.70528
1511	YEP	2	B4G02	100	YEP-100-G2-T6	6	47	0.73	.000007031	0.70312
1512	YEP	2	B4G02	100	YEP-100-G2-T7	7	52	1.16	.000008250	0.82499
1513	YEP	2	B4G02	100	YEP-100-G2-T8	8	54	1.10	.000006986	0.69857
1514	YEP	2	B4G02	100	YEP-100-G2-T9	9	55	1.28	.000007693	0.76935
1515	YEP	2	B4G02	100	YEP-100-G2-T10	10	51	0.91	.000006860	0.68601
1516	YEP	2	B4G02	100	YEP-100-G2-T11	11	55	1.37	.000008234	0.82344
1517	YEP	2	B4G02	100	YEP-100-G2-T12	12	55	1.39	.000008355	0.83546
1518	YEP	2	B4G02	100	YEP-100-G2-T13	13	53	1.16	.000007792	0.77917
1519	YEP	2	B4G02	100	YEP-100-G2-T14	14	54	1.10	.000006986	0.69857
1520	YEP	2	B4G02	100	YEP-100-G2-T15	15	47	0.65	.000006261	0.62607
1521	YEP	2	B4G02	100	YEP-100-G2-T16	16	49	0.98	.000008330	0.83299
1522	YEP	2	B4G02	100	YEP-100-G2-T17	17	51	1.00	.000007539	0.75386
1523	YEP	2	B4G02	100	YEP-100-G2-T18	18	52	0.94	.000006685	0.66853
1524	YEP	2	C3G15	100	YEP-100-G15-T1	1	54	0.98	.000006224	0.62236
1525	YEP	2	C3G15	100	YEP-100-G15-T2	2	51	1.03	.000007765	0.77647
1526	YEP	2	C3G15	100	YEP-100-G15-T3	3	53	1.25	.000008396	0.83962
1527	YEP	2	C3G15	100	YEP-100-G15-T4	4	57	1.42	.000007668	0.76677
1528	YEP	2	C3G15	100	YEP-100-G15-T5	5	55	1.45	.000008715	0.87153
1529	YEP	2	C3G15	100	YEP-100-G15-T6	6	55	1.07	.000006431	0.64313
1530	YEP	2	C3G15	100	YEP-100-G15-T7	7	54	1.18	.000007494	0.74938
1531	YEP	2	C3G15	100	YEP-100-G15-T8	8	52	0.90	.000006401	0.64008
1532	YEP	2	C3G15	100	YEP-100-G15-T9	9	53	1.21	.000008128	0.81275
1533	YEP	2	C3G15	100	YEP-100-G15-T10	10	48	0.92	.000008319	0.83189
1534	YEP	2	C3G15	100	YEP-100-G15-T11	11	51	0.95	.000007162	0.71616
1535	YEP	2	C3G15	100	YEP-100-G15-T12	12	47	0.77	.000007416	0.74165

	YEP	2	C3G15	100	YEP-100-G15-T13	13	55	1.40	.000008415	0.84147
1537	YEP	2	C3G15	100	YEP-100-G15-T14	14	51	1.07	.000006066	0.60663
1538	YEP	2	C3G15	100	YEP-100-G15-T15	15	54	1.06	.000006732	0.67317
1539	YEP	2	C3G15	100	YEP-100-G15-T16	16	54	1.18	.000007494	0.74938
1540	YEP	2	C3G15	100	YEP-100-G15-T17	17	50	0.97	.000007760	0.77600
1541	YEP	2	C3G15	100	YEP-100-G15-T18	18	50	1.00	.000008000	0.80000
1542	YEP	2	C3G15	100	YEP-100-G15-T19	19	43	0.60	.000007547	0.75465
1543	YEP	2	C3G15	100	YEP-100-G15-T20	20	52	1.12	.000007965	0.79654
1544	YEP	2	A5G10	200	YEP-200-G10-T1	1	54	1.23	.000007811	0.78113
1545	YEP	2	A5G10	200	YEP-200-G10-T2	2	54	1.10	.000006986	0.69857
1546	YEP	2	A5G10	200	YEP-200-G10-T3	3	53	0.99	.000006650	0.66498
1547	YEP	2	A5G10	200	YEP-200-G10-T4	4	46	0.69	.000007089	0.70888
1548	YEP	2	A5G10	200	YEP-200-G10-T5	5	52	0.93	.000006614	0.66141
1549	YEP	2	A5G10	200	YEP-200-G10-T6	6	56	1.18	.000006719	0.67192
1550	YEP	2	A5G10	200	YEP-200-G10-T7	7	57	1.12	.000006048	0.60477
1551	YEP	2	A5G10	200	YEP-200-G10-T8	8	53	0.96	.000006448	0.64483
1552	YEP	2	A5G10	200	YEP-200-G10-T9	9	52	1.09	.000007752	0.77520
1553	YEP	2	A5G10	200	YEP-200-G10-T10	10	47	0.78	.000007513	0.75128
1554	YEP	2	A5G10	200	YEP-200-G10-T11	11	56	1.10	.000006264	0.62637
1555	YEP	2	A5G10	200	YEP-200-G10-T12	12	53	1.06	.000007120	0.71200
1556	YEP	2	A5G10	200	YEP-200-G10-T13	13	56	1.20	.000006833	0.68331
1557	YEP	2	A5G10	200	YEP-200-G10-T14	14	54	1.03	.000006541	0.65412
1558	YEP	2	B2G12	200	YEP-200-G12-T1	1	51	0.97	.000007312	0.73124
1559	YEP	2	B2G12	200	YEP-200-G12-T2	2	56	1.31	.000007459	0.74595
1560	YEP	2	B2G12	200	YEP-200-G12-T3	3	50	0.86	.000006880	0.68800
1561	YEP	2	B2G12	200	YEP-200-G12-T4	4	52	1.06	.000007539	0.75387
1562	YEP	2	B2G12	200	YEP-200-G12-T5	5	47	0.83	.000007994	0.79944
1563	YEP	2	B2G12	200	YEP-200-G12-T6	6	46	0.74	.000007603	0.76025
1564	YEP	2	B2G12	200	YEP-200-G12-T7	7	53	0.99	.000006650	0.66498
1565	YEP	2	B2G12	200	YEP-200-G12-T8	8	58	1.33	.000006817	0.68166
1566	YEP	2	B2G12	200	YEP-200-G12-T9	9	52	0.95	.000006756	0.67564
1567	YEP	2	B2G12	200	YEP-200-G12-T10	10	52	1.12	.000007965	0.79654
1568	YEP	2	B2G12	200	YEP-200-G12-T11	11	45	0.89	.000009767	0.97668
1569	YEP	2	B2G12	200	YEP-200-G12-T12	12	51	1.02	.000007689	0.76894
1570	YEP	2	B2G12	200	YEP-200-G12-T13	13	54	1.06	.000006732	0.67317

	YEP	2	B2G12	200	YEP-200-G12-T14	14	49	0.91	.000007736	0.77349
1572	YEP	2	B2G12	200	YEP-200-G12-T15	15	56	1.22	.000006947	0.69470
1573	YEP	2	C5G03	200	YEP-200-G3-T1	1	55	1.21	.000007273	0.72727
1574	YEP	2	C5G03	200	YEP-200-G3-T2	2	54	1.06	.000006668	0.66682
1575	YEP	2	C5G03	200	YEP-200-G3-T3	3	56	1.13	.000006434	0.64345
1576	YEP	2	C5G03	200	YEP-200-G3-T4	4	54	1.16	.000007367	0.73668
1577	YEP	2	C5G03	200	YEP-200-G3-T5	5	52	1.03	.000007325	0.73253
1578	YEP	2	C5G03	200	YEP-200-G3-T6	6	54	0.94	.000005970	0.59696
1579	YEP	2	C5G03	200	YEP-200-G3-T7	7	52	1.02	.000007254	0.72542
1580	YEP	2	C5G03	200	YEP-200-G3-T8	8	55	1.29	.000007754	0.77536
1581	YEP	2	C5G03	200	YEP-200-G3-T9	9	56	1.32	.000007516	0.75164
1582	YEP	2	C5G03	200	YEP-200-G3-T10	10	52	1.02	.000007254	0.72542
1583	YEP	2	C5G03	200	YEP-200-G3-T11	11	58	1.28	.000006560	0.65603
1584	YEP	2	C5G03	200	YEP-200-G3-T12	12	55	1.22	.000007333	0.73328
1585	YEP	2	C5G03	200	YEP-200-G3-T13	13	48	0.76	.000006872	0.68721
1586	YEP	2	C5G03	200	YEP-200-G3-T14	14	47	0.88	.000008476	0.84760
1587	YEP	2	C5G03	200	YEP-200-G3-T15	15	50	0.90	.000007200	0.72000
1588	YEP	2	C5G03	200	YEP-200-G3-T16	16	53	1.16	.000007792	0.77917
1589	YEP	2	A1G06	300	YEP-300-G6-T1	1	51	0.97	.000007312	0.73124
1590	YEP	2	A1G06	300	YEP-300-G6-T2	2	51	1.00	.000007539	0.75386
1591	YEP	2	A1G06	300	YEP-300-G6-T3	3	51	0.98	.000007388	0.73878
1592	YEP	2	A1G06	300	YEP-300-G6-T4	4	48	0.82	.000007415	0.74146
1593	YEP	2	A1G06	300	YEP-300-G6-T5	5	53	0.90	.000006045	0.60453
1594	YEP	2	A1G06	300	YEP-300-G6-T6	6	53	1.12	.000007523	0.75230
1595	YEP	2	A1G06	300	YEP-300-G6-T7	7	49	0.89	.000007565	0.75649
1596	YEP	2	A1G06	300	YEP-300-G6-T8	8	52	1.17	.000008321	0.83210
1597	YEP	2	A1G06	300	YEP-300-G6-T9	9	51	1.03	.000007765	0.77647
1598	YEP	2	A1G06	300	YEP-300-G6-T10	10	52	1.08	.000007681	0.76809
1599	YEP	2	B5G07	300	YEP-300-G7-T1	1	54	1.19	.000007557	0.75573
1600	YEP	2	B5G07	300	YEP-300-G7-T2	2	54	1.02	.000006478	0.64777
1601	YEP	2	B5G07	300	YEP-300-G7-T3	3	55	1.07	.000006431	0.64313
1602	YEP	2	B5G07	300	YEP-300-G7-T4	4	50	0.92	.000007360	0.73600
1603	YEP	2	B5G07	300	YEP-300-G7-T5	5	59	1.39	.000006768	0.67680
1604	YEP	2	B5G07	300	YEP-300-G7-T6	6	50	0.70	.000005600	0.56000
1605	YEP	2	B5G07	300	YEP-300-G7-T7	7	52	0.89	.000006330	0.63297

	YEP	2	C4G13	300	YEP-300-G13-T1	1	54	1.22	.000007748	0.77478
1607	YEP	2	C4G13	300	YEP-300-G13-T2	2	48	0.76	.000006872	0.68721
1608	YEP	2	C4G13	300	YEP-300-G13-T3	3	54	1.22	.000007748	0.77478
1609	YEP	2	C4G13	300	YEP-300-G13-T4	4	47	0.89	.000008572	0.85723
1610	YEP	2	C4G13	300	YEP-300-G13-T5	5	51	0.93	.000007011	0.70109
1611	YEP	2	C4G13	300	YEP-300-G13-T6	6	54	0.97	.000006160	0.61601
1612	YEP	2	C4G13	300	YEP-300-G13-T7	7	52	1.04	.000007396	0.73964
1613	YEP	2	A3G01	50	YEP-50-G1-T1	1	52	1.19	.000008463	0.84632
1614	YEP	2	A3G01	50	YEP-50-G1-T2	2	58	1.77	.000009072	0.90717
1615	YEP	2	A3G01	50	YEP-50-G1-T3	3	51	1.23	.000009272	0.92725
1616	YEP	2	A3G01	50	YEP-50-G1-T4	4	48	1.01	.000009133	0.91327
1617	YEP	2	A3G01	50	YEP-50-G1-T5	5	55	1.43	.000008595	0.85950
1618	YEP	2	A3G01	50	YEP-50-G1-T6	6	56	1.62	.000009225	0.92247
1619	YEP	2	A3G01	50	YEP-50-G1-T7	7	49	0.94	.000007990	0.79899
1620	YEP	2	A3G01	50	YEP-50-G1-T8	8	53	1.24	.000008329	0.83290
1621	YEP	2	A3G01	50	YEP-50-G1-T9	9	54	1.34	.000008510	0.85099
1622	YEP	2	A3G01	50	YEP-50-G1-T10	10	53	1.23	.000008262	0.82619
1623	YEP	2	A3G01	50	YEP-50-G1-T11	11	54	1.36	.000008637	0.86369
1624	YEP	2	A3G01	50	YEP-50-G1-T12	12	53	1.03	.000006918	0.69185
1625	YEP	2	A3G01	50	YEP-50-G1-T13	13	59	1.47	.000007157	0.71575
1626	YEP	2	A3G01	50	YEP-50-G1-T14	14	51	1.14	.000008594	0.85940
1627	YEP	2	A3G01	50	YEP-50-G1-T15	15	48	0.83	.000007505	0.75051
1628	YEP	2	A3G01	50	YEP-50-G1-T16	16	54	1.22	.000007748	0.77478
1629	YEP	2	A3G01	50	YEP-50-G1-T17	17	52	1.22	.000008677	0.86786
1630	YEP	2	A3G01	50	YEP-50-G1-T18	18	53	1.19	.000007993	0.79932
1631	YEP	2	A3G01	50	YEP-50-G1-T19	19	53	1.24	.000008329	0.83290
1632	YEP	2	B1G14	50	YEP-50-G14-T1	1	55	1.30	.000007814	0.78137
1633	YEP	2	B1G14	50	YEP-50-G14-T2	2	47	0.83	.000007994	0.79944
1634	YEP	2	B1G14	50	YEP-50-G14-T3	3	56	1.32	.000007516	0.75164
1635	YEP	2	B1G14	50	YEP-50-G14-T4	4	49	1.03	.000008755	0.87549
1636	YEP	2	B1G14	50	YEP-50-G14-T5	5	57	1.41	.000007614	0.76137
1637	YEP	2	B1G14	50	YEP-50-G14-T6	6	58	1.62	.000008303	0.83029
1638	YEP	2	B1G14	50	YEP-50-G14-T7	7	53	1.22	.000008195	0.81947
1639	YEP	2	B1G14	50	YEP-50-G14-T8	8	53	1.14	.000007657	0.76573
1640	YEP	2	B1G14	50	YEP-50-G14-T9	9	57	1.44	.000007776	0.77757

	YEP	2	B1G14	50	YEP-50-G14-T10	10	52	0.94	.000006685	0.66853
1642	YEP	2	B1G14	50	YEP-50-G14-T11	11	57	1.27	.000006858	0.68577
1643	YEP	2	B1G14	50	YEP-50-G14-T12	12	52	1.09	.000007752	0.77520
1644	YEP	2	B1G14	50	YEP-50-G14-T13	13	49	0.91	.000007735	0.77349
1645	YEP	2	B1G14	50	YEP-50-G14-T14	14	57	1.51	.000008154	0.81537
1646	YEP	2	B1G14	50	YEP-50-G14-T15	15	55	1.41	.000008475	0.84748
1647	YEP	2	B1G14	50	YEP-50-G14-T16	16	52	1.05	.000007468	0.74676
1648	YEP	2	B1G14	50	YEP-50-G14-T17	17	56	1.29	.000007346	0.73456
1649	YEP	2	B1G14	50	YEP-50-G14-T18	18	57	1.20	.000006480	0.64797
1650	YEP	2	B1G14	50	YEP-50-G14-T19	19	51	0.99	.000007463	0.74632
1651	YEP	2	C2G11	50	YEP-50-G11-T1	1	54	1.07	.000008795	0.87952
1652	YEP	2	C2G11	50	YEP-50-G11-T2	2	60	1.55	.000007176	0.71759
1653	YEP	2	C2G11	50	YEP-50-G11-T3	3	55	1.12	.000006732	0.67318
1654	YEP	2	C2G11	50	YEP-50-G11-T4	4	52	1.07	.000007610	0.76098
1655	YEP	2	C2G11	50	YEP-50-G11-T5	5	52	1.14	.000008108	0.81076
1656	YEP	2	C2G11	50	YEP-50-G11-T6	6	57	1.49	.000008046	0.80457
1657	YEP	2	C2G11	50	YEP-50-G11-T7	7	55	1.53	.000009196	0.91961
1658	YEP	2	C2G11	50	YEP-50-G11-T8	8	51	1.05	.000007916	0.79155
1659	YEP	2	C2G11	50	YEP-50-G11-T9	9	45	0.84	.000009218	0.92181
1660	YEP	2	C2G11	50	YEP-50-G11-T10	10	52	1.15	.000008179	0.81788
1661	YEP	2	C2G11	50	YEP-50-G11-T11	11	52	1.22	.000008677	0.86766
1662	YEP	2	C2G11	50	YEP-50-G11-T12	12	47	0.75	.000007224	0.72238
1663	YEP	2	C2G11	50	YEP-50-G11-T13	13	49	0.97	.000008245	0.82449
1664	YEP	2	C2G11	50	YEP-50-G11-T14	14	57	1.46	.000007884	0.78837
1665	YEP	2	C2G11	50	YEP-50-G11-T15	15	53	1.13	.000007590	0.75902
1666	YEP	2	C2G11	50	YEP-50-G11-T16	16	58	1.29	.000006612	0.66116
1667	YEP	2	C2G11	50	YEP-50-G11-T17	17	52	1.06	.000007539	0.75387
1668	YEP	2	C2G11	50	YEP-50-G11-T18	18	53	1.18	.000007926	0.79260
1669	YEP	2	C2G11	50	YEP-50-G11-T19	19	56	1.49	.000008484	0.84844
1670	YEP	2	C2G11	50	YEP-50-G11-T20	20	50	0.89	.000007120	0.71200

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

KW 3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Condition Index Analysis
Study Number AEH-12-PSEUDO-03
SAS v. 9.3 Analysis completion date: 3APR2015 Analysis prepared by: KLW

The MEANS Procedure

sps=BKT

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	8.497E-6	5.479E-7	8.355E-6	8.638E-6
	100	38	7.077E-6	9.771E-7	6.756E-6	7.398E-6
	200	15	6.84E-6	4.578E-7	6.587E-6	7.094E-6
	50	60	7.728E-6	7.685E-7	7.529E-6	7.926E-6

sps=BLG

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	0.000014	1.088E-6	0.000014	0.000015
	100	60	0.000014	1.464E-6	0.000014	0.000015
	200	51	0.000014	1.526E-6	0.000013	0.000014
	300	48	0.000014	1.417E-6	0.000014	0.000015
	50	59	0.000014	1.405E-6	0.000014	0.000014

sps=CCF

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	70	8.234E-6	4.461E-7	8.127E-6	8.34E-6
	100	29	7.936E-6	6.252E-7	7.698E-6	8.174E-6
	200	5	7.846E-6	5.651E-7	7.144E-6	8.548E-6
	50	60	8.115E-6	5.703E-7	7.967E-6	8.262E-6

sps=LMB

Analysis Variable : cond cond

time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	0.000011	6.34E-7	0.000010	0.000011
	100	57	9.838E-6	6.283E-7	9.672E-6	0.000010
	200	38	9.585E-6	7.074E-7	9.353E-6	9.818E-6
	300	8	9.497E-6	4.724E-7	9.102E-6	9.891E-6
	50	59	0.000010	6.178E-7	0.000010	0.000010

sps=LST

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	3.417E-6	2.617E-7	3.35E-6	3.485E-6
	200	1	3.489E-6	.	.	.
	50	7	3.474E-6	2.28E-7	3.263E-6	3.685E-6

sps=RBT

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	0.000010	9.913E-7	0.000010	0.000011
	100	5	8.486E-6	1.181E-6	7.019E-6	9.952E-6
	50	14	8.89E-6	8.428E-7	8.404E-6	9.377E-6

sps=SMB

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	60	0.000011	5.348E-7	0.000011	0.000011
	100	54	0.000011	6.84E-7	0.000010	0.000011
	200	27	0.000010	7.744E-7	0.000010	0.000011
	300	12	0.000010	1.14E-6	9.484E-6	0.000011
	50	58	0.000011	9.176E-7	0.000010	0.000011

sps=WAE

Analysis Variable : cond cond						
					Lower 95%	Upper 95%

AEH-12-PSEUDO-03

time	treat	N Obs	Mean	Std Dev	CL for Mean	CL for Mean
2	0	58	5.8E-6	6.74E-7	5.623E-6	5.977E-6
	100	59	5.818E-6	6.595E-7	5.646E-6	5.99E-6
	200	41	5.829E-6	7.523E-7	5.591E-6	6.066E-6
	300	16	6.062E-6	6.046E-7	5.739E-6	6.384E-6
	50	58	5.544E-6	5.586E-7	5.397E-6	5.691E-6

sps=YEP

Analysis Variable : cond cond						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
2	0	59	7.77E-6	9.034E-7	7.534E-6	8.005E-6
	100	57	7.523E-6	6.623E-7	7.347E-6	7.698E-6
	200	45	7.184E-6	6.762E-7	6.981E-6	7.387E-6
	300	24	7.191E-6	7.254E-7	6.885E-6	7.497E-6
	50	58	7.943E-6	7.158E-7	7.755E-6	8.132E-6

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

KW 3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Overall Model: Fish condition factor at termination of observation period
Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=BKT

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	4	0 100 200 50
id	12	A2E09 A3E02 A4E13 A5E10 B2E06 B3E03 B4E08 B5E07 C1E01 C2E11 C4E15 C5E05

Dimensions	
Covariance Parameters	2
Columns in X	5
Columns in Z Per Subject	1
Subjects	12
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	173
Number of Observations Used	173
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

AEH-12-PSEUDO-03

0	1	-389.08834192	
1	2	-389.11150478	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000028
Residual		0.005355

Fit Statistics	
-2 Res Log Likelihood	-389.1
AIC (smaller is better)	-385.1
AICC (smaller is better)	-385.0
BIC (smaller is better)	-384.1

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	3	161	36.37	<.0001

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	0.8497	0.009930	161	85.57	<.0001
treat	100	0.7078	0.01226	161	57.71	<.0001
treat	200	0.6839	0.01916	161	35.70	<.0001
treat	50	0.7728	0.009930	161	77.82	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.1418	0.01578	161	-8.99	<.0001
treat	200	0	-0.1657	0.02158	161	-7.68	<.0001
treat	50	0	-0.07689	0.01404	161	-5.48	<.0001

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

3-APR-15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=BLG

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	5	0 100 200 300 50
id	15	A1E11 A2E01 A3E02 A4E13 A5E09 B1E15 B2E06 B3E14 B4E12 B5E08 C1E07 C2E10 C3E03 C4E04 C5E05

Dimensions	
Covariance Parameters	2
Columns in X	6
Columns in Z Per Subject	1
Subjects	15
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	278
Number of Observations Used	278
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

AEH-12-PSEUDO-03

0	1	-285.69363167	
1	2	-289.75393478	0.00000009
2	1	-289.75396891	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	Id	0.001183
Residual		0.01829

Fit Statistics	
-2 Res Log Likelihood	-289.8
AIC (smaller is better)	-285.8
AICC (smaller is better)	-285.7
BIC (smaller is better)	-284.3

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	4	263	0.74	0.5649

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	1.4333	0.02644	263	54.20	<.0001
treat	100	1.4331	0.02644	263	54.20	<.0001
treat	200	1.3806	0.02747	263	50.27	<.0001
treat	300	1.4126	0.02785	263	50.73	<.0001
treat	50	1.3958	0.02654	263	52.59	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.00018	0.03740	263	-0.00	0.9962
treat	200	0	-0.05266	0.03813	263	-1.38	0.1684
treat	300	0	-0.02068	0.03840	263	-0.54	0.5906
treat	50	0	-0.03752	0.03747	263	-1.00	0.3175

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

KW 3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Overall Model: Fish condition factor at termination of observation period
Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=CCF

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	4	0 100 200 50
id	12	A2E02 A3E13 A4E08 A5E09 B2E12 B3E07 B4E04 B5E03 C1E01 C2E05 C3E10 C5E11

Dimensions	
Covariance Parameters	2
Columns in X	5
Columns in Z Per Subject	1
Subjects	12
Max Obs Per Subject	30

Number of Observations	
Number of Observations Read	164
Number of Observations Used	164
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

0	1	-471.89714406	
1	2	-472.85224254	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000106
Residual		0.002752

Fit Statistics	
-2 Res Log Likelihood	-472.9
AIC (smaller is better)	-468.9
AICC (smaller is better)	-468.8
BIC (smaller is better)	-467.9

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	3	152	1.74	0.1604

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	0.8232	0.008672	152	94.92	<.0001
treat	100	0.7937	0.01166	152	68.06	<.0001
treat	200	0.7860	0.02441	152	32.20	<.0001
treat	50	0.8115	0.009002	152	90.14	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.02951	0.01453	152	-2.03	0.0440
treat	200	0	-0.03716	0.02591	152	-1.43	0.1535
treat	50	0	-0.01173	0.01250	152	-0.94	0.3494

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=LMB

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	5	0 100 200 300 50
id	15	A1E11 A2E07 A3E12 A4E06 A5E10 B1E15 B2E13 B3E14 B4E05 B5E03 C1E09 C2E04 C3E01 C4E08 C5E02

Dimensions	
Covariance Parameters	2
Columns in X	6
Columns in Z Per Subject	1
Subjects	15
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	222
Number of Observations Used	222
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

AEH-12-PSEUDO-03

0	1	-561.32536026	
1	2	-562.12790248	0.00000014
2	1	-562.12797190	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000126
Residual		0.003974

Fit Statistics	
-2 Res Log Likelihood	-562.1
AIC (smaller is better)	-558.1
AICC (smaller is better)	-558.1
BIC (smaller is better)	-556.7

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	4	207	12.78	<.0001

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	1.0525	0.01041	207	101.10	<.0001
treat	100	0.9840	0.01058	207	93.01	<.0001
treat	200	0.9588	0.01212	207	79.11	<.0001
treat	300	0.9510	0.02355	207	40.38	<.0001
treat	50	1.0321	0.01047	207	98.63	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.06856	0.01484	207	-4.62	<.0001
treat	200	0	-0.09375	0.01598	207	-5.87	<.0001
treat	300	0	-0.1015	0.02575	207	-3.94	0.0001
treat	50	0	-0.02038	0.01476	207	-1.38	0.1689

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

KW 3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=LST

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	3	0 200 50
id	7	A2G13 A4G04 A5G06 B3G02 B5G08 C1G05 C4G10

Dimensions	
Covariance Parameters	2
Columns in X	4
Columns in Z Per Subject	1
Subjects	7
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	68
Number of Observations Used	68
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

0	1	-284.58175909	
1	1	-284.58175909	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Intercept	id	0
Residual		0.000669

Fit Statistics

-2 Res Log Likelihood	-284.6
AIC (smaller is better)	-282.6
AICC (smaller is better)	-282.5
BIC (smaller is better)	-282.6

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	2	61	0.16	0.8485

Least Squares Means

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	0.3417	0.003340	61	102.30	<.0001
treat	200	0.3469	0.02587	61	13.41	<.0001
treat	50	0.3474	0.009780	61	35.52	<.0001

Differences of Least Squares Means

Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	200	0	0.005203	0.02609	61	0.20	0.8426
treat	50	0	0.005644	0.01033	61	0.55	0.5870

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Overall Model: Fish condition factor at termination of observation period
Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=RBT

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	3	0 100 50
id	8	A1E11 A2E10 B1E05 B2E03 B5E01 C1E09 C2E06 C4E13

Dimensions	
Covariance Parameters	2
Columns in X	4
Columns in Z Per Subject	1
Subjects	8
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	79
Number of Observations Used	79
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

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0	1	-129.25103083	
1	1	-129.25103083	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0
Residual		0.009578

Fit Statistics	
-2 Res Log Likelihood	-129.3
AIC (smaller is better)	-127.3
AICC (smaller is better)	-127.2
BIC (smaller is better)	-127.2

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	2	71	21.14	<.0001

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	1.0446	0.01263	71	82.68	<.0001
treat	100	0.8486	0.04377	71	19.39	<.0001
treat	50	0.8890	0.02616	71	33.99	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.1961	0.04555	71	-4.30	<.0001
treat	50	0	-0.1556	0.02905	71	-5.36	<.0001

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

3APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=SMB

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	5	0 100 200 300 50
id	14	A1D01 A2D06 A3D03 A5D09 B1D15 B2D05 B3D04 B4D14 B5D08 C1D07 C2D11 C3D02 C4D13 C5D12

Dimensions	
Covariance Parameters	2
Columns in X	6
Columns in Z Per Subject	1
Subjects	14
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	211
Number of Observations Used	211
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

0	1	-458.19886097	
1	2	-458.30121172	0.00000001

Convergence criteria met

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000062
Residual		0.005765

Fit Statistics	
-2 Res Log Likelihood	-458.3
AIC (smaller is better)	-454.3
AICC (smaller is better)	-454.2
BIC (smaller is better)	-453.0

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	4	197	9.82	<.0001

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	1.1326	0.01081	197	104.80	<.0001
treat	100	1.0630	0.01129	197	94.11	<.0001
treat	200	1.0423	0.01570	197	66.40	<.0001
treat	300	1.0217	0.02263	197	45.16	<.0001
treat	50	1.0692	0.01096	197	97.55	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.06963	0.01563	197	-4.45	<.0001
treat	200	0	-0.09025	0.01906	197	-4.74	<.0001
treat	300	0	-0.1109	0.02507	197	-4.42	<.0001
treat	50	0	-0.06340	0.01539	197	-4.12	<.0001

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=WAE

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	5	0 100 200 300 50
id	15	A1F12 A2F10 A3F11 A4F09 A5F01 B1F07 B2F04 B2F15 B4F06 B5F14 C1F02 C2F05 C3F13 C4F03 C5F08

Dimensions	
Covariance Parameters	2
Columns in X	6
Columns in Z Per Subject	1
Subjects	15
Max Obs Per Subject	27

Number of Observations	
Number of Observations Read	232
Number of Observations Used	232
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

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0	1	-575.43878074	
1	2	-575.99388783	0.00000020
2	1	-575.99398542	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000110
Residual		0.004203

Fit Statistics	
-2 Res Log Likelihood	-576.0
AIC (smaller is better)	-572.0
AICC (smaller is better)	-571.9
BIC (smaller is better)	-570.6

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	4	217	1.99	0.0968

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	0.5800	0.01044	217	55.53	<.0001
treat	100	0.5817	0.01046	217	55.59	<.0001
treat	200	0.5829	0.01180	217	49.38	<.0001
treat	300	0.6058	0.01751	217	34.59	<.0001
treat	50	0.5543	0.01045	217	53.06	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	0.001746	0.01478	217	0.12	0.9060
treat	200	0	0.002905	0.01576	217	0.18	0.8540
treat	300	0	0.02583	0.02039	217	1.27	0.2065
treat	50	0	-0.02569	0.01477	217	-1.74	0.0834

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Overall Model: Fish condition factor at termination of observation period

Compares treated groups to untreated control group to determine differences in condition factor of fish

The Mixed Procedure

sps=YEP

Model Information	
Data Set	WORK.CONDITION2
Dependent Variable	condbig
Covariance Structure	Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
treat	5	0 100 200 300 50
id	15	A1G06 A2G09 A3G01 A4G08 A5G10 B1G14 B2G12 B3G05 B4G02 B5G07 C1G04 C2G11 C3G15 C4G13 C5G03

Dimensions	
Covariance Parameters	2
Columns in X	6
Columns in Z Per Subject	1
Subjects	15
Max Obs Per Subject	20

Number of Observations	
Number of Observations Read	243
Number of Observations Used	243
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion

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0	1	-539.35745925	
1	2	-550.35872763	0.00000000

Convergence criteria met.

Covariance Parameter Estimates		
Cov Parm	Subject	Estimate
Intercept	id	0.000776
Residual		0.005082

Fit Statistics	
-2 Res Log Likelihood	-550.4
AIC (smaller is better)	-546.4
AICC (smaller is better)	-546.3
BIC (smaller is better)	-544.9

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
treat	4	228	3.16	0.0149

Least Squares Means						
Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	0	0.7767	0.01857	228	41.82	<.0001
treat	100	0.7522	0.01866	228	40.32	<.0001
treat	200	0.7179	0.01929	228	37.23	<.0001
treat	300	0.7169	0.02177	228	32.93	<.0001
treat	50	0.7945	0.01861	228	42.69	<.0001

Differences of Least Squares Means							
Effect	treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
treat	100	0	-0.02451	0.02633	228	-0.93	0.3528
treat	200	0	-0.05873	0.02678	228	-2.19	0.0293
treat	300	0	-0.05973	0.02862	228	-2.09	0.0380
treat	50	0	0.01785	0.02629	228	0.68	0.4980

Performed by K. Weber using SAS version 9.4 at 15:56 on 03APR15

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Item No. 34
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```
ods html close; /* close previous */;
ods html; /* open new */;

DM 'LOG; CLEAR; OUTPUT; CLEAR;';    /* clears output and log when code is run */
FOOTNOTE1 'Performed by K. Weber using SAS version ' "&SYSVER" ' at ' "&SYSTIME" ' on ' "&SYSDATE";

options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;

title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species';
title3 h=2 'Condition Index Analysis';
title4 h=1.5 'Study Number AEH-12-PSEUDO-03';
title5 h=1 'SAS v. 9.3  Analysis completion date:  3APR2015  Analysis prepared by: KLW';

/*************************************************
* SAS ver 9.3       Analysis prepared by:  KLW    *
* Analysis completion date:  3APR2015             *
*************************************************/

/*************************************************
* Variable Names:                                *
* sps = Fish species code                        *
* time= Sample Time                              *
*       0 = Distribution                         *
*       1 = Exposure Termination                 *
*       2 = Observation Termination              *
* id = Sample ID                                 *
*       d### = Distribtuion Sample               *
*       A, B, C = Diluter ID                     *
*       1-5 = Test Chamber ID                    *
*       D, E, F, G = Holding Rack Quadrate       *
*       1-5 = Holding Chamber ID                 *
* treat = treatment levels                       *
*       . = Distribution Sample                  *
*       0 = 0 mg/L                               *
*       50 = 50 mg/L                             *
*       100 = 100 mg/L                           *
*       200 = 200 mg/L                           *
*       300 = 300 mg/L                           *
* samp = Fish Sample ID (sps-id-num)             *
* num = Fish Sample Number                       *
* tot = total length (cm)                        *
* wt = Total weight (g)                          *
* cond = condition index (= wt/(tot^3))          *
*************************************************/
data condition; set Pseudo03.Lengwt;
proc sort;
by sps time treat; run;

data condition2; set condition;
if time ne 2 then delete;
condbig=cond*100000;
run;
proc sort;
by sps treat; run;
proc print data = condition2; run;
Proc means data = condition2 mean std clm fw=8;
```

FF # 29
Item No. 35
Pg 1 of 2

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```
by sps;
class time treat;
var conc;
run;

title2 'Overall Model: Fish condition factor at termination of observation period';
title3 'Compares treated groups to untreated control group to determine differences in condition fact(
proc mixed data=condition2;
by sps;
class treat id;
model condbig = treat;
random intercept / subject = id;
lsmeans treat / pdiff=control('0');
run;
```

FW 3APR15

FF # 29
Item No. 35
Pg. 2 of 2

```
3
4    DM 'LOG; CLEAR; OUTPUT; CLEAR;';    /* clears output and log when code is run */
5    FOOTNOTE1 'Performed by K. Weber using SAS version ' "&SYSVER" ' at ' "&SYSTIME" ' on '
5  ! "&SYSDATE";
6
7    options ls=97 ps=54 formdlim='-' pageno = 1 nocenter nodate nosource2;
8
9    title1 h=2 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish
9  ! species';
10   title3 h=2 'Condition Incex Analysis';
11   title4 h=1.5 'Study Number AEH-12-PSEUDO-03';
12   title5 h=1 'SAS v. 9.3  Analysis completion date:  3APR2015  Analysis prepared by: KLW';
13
14   /*************************************************
15   * SAS ver 9.3       Analysis prepared by:  KLW    *
16   * Analysis completion date:  3APR2015   KLW 3APR15
17   *************************************************/
18
19   /*************************************************
20   * Variable Names:                                *
21   * sps = Fish species code                        *
22   * time= Sample Time                              *
23   *       0 = Distribution                         *
24   *       1 = Exposure Termination                 *
25   *       2 = Observation Termination              *
26   * id = Sample ID                                 *
27   *       d### = Distribtuion Sample               *
28   *       A, B, C = Diluter ID                     *
29   *       1-5 = Test Chamber ID                    *
30   *       D, E, F, G = Holding Rack Quadrate       *
31   *       1-5 = Holding Chamber ID                 *
32   * treat = treatment levels                       *
33   *       . = Distribution Sample                  *
34   *       0 = 0 mg/L                               *
35   *       50 = 50 mg/L                             *
36   *       100 = 100 mg/L                           *
37   *       200 = 200 mg/L                           *
38   *       300 = 300 mg/L                           *
39   * samp = Fish Sample ID (sps-id-num)             *
40   * num = Fish Sample Number                       *
41   * tot = total length (cm)                        *
42   * wt = Total weight (g)                          *
43   * cond = condition index (= wt/(tot^3))          *
44   *************************************************/
45   data condition; set Pseudo03.Lengwt;

NOTE: There were 2638 observations read from the data set PSEUDO03.LENGWT.
NOTE: The data set WORK.CONDITION has 2638 observations and 9 variables.
NOTE: DATA statement used (Total process time):
      real time           0.04 seconds
      cpu time            0.03 seconds


46   proc sort;
47   by sps time treat; run;
```

FF # 29
Item No. 36
Pg 1 of 3

```
NOTE: There were 2638 observations read from the data set WORK.CONDITION.
NOTE: The data set WORK.CONDITION has 2638 observations and 9 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


48
49   data condition2; set condition;
50   if time ne 2 then delete;
51   condbig=cond*100000;
52   run;

NOTE: There were 2638 observations read from the data set WORK.CONDITION.
NOTE: The data set WORK.CONDITION2 has 1670 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


53   proc sort;
54   by sps treat; run;

NOTE: There were 1670 observations read from the data set WORK.CONDITION2.
NOTE: The data set WORK.CONDITION2 has 1670 observations and 10 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


55   proc print data = condition2; run;

NOTE: There were 1670 observations read from the data set WORK.CONDITION2.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.86 seconds
      cpu time            0.82 seconds


56   Proc means data = condition2 mean std clm fw=8;
57   by sps;
58   class time treat;
59   var cond;
60   run;

NOTE: There were 1670 observations read from the data set WORK.CONDITION2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.06 seconds
      cpu time            0.04 seconds


61
62   title2 'Overall Model: Fish condition factor at termination of observation period';
63   title3 'Compares treated groups to untreated control group to determine differences in
63 ! condition factor of fish';
64   proc mixed data=condition2;
65   by sps;
```

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```
66   class treat id;
67   model condbig = treat;
68   random intercept / subject = id;
69   lsmeans treat / pdiff=control('0');
70   run;

NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=BKT
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=BLG
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=CCF
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=LMB
NOTE: Convergence criteria met.
NOTE: Estimated G matrix is not positive definite.
NOTE: The above message was for the following BY group:
      sps=LST
NOTE: Convergence criteria met.
NOTE: Estimated G matrix is not positive definite.
NOTE: The above message was for the following BY group:
      sps=RBT
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=SMB
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=WAE
NOTE: Convergence criteria met.
NOTE: The above message was for the following BY group:
      sps=YEP
NOTE: PROCEDURE MIXED used (Total process time):
      real time           0.31 seconds
      cpu time            0.20 seconds
```

JMW 3APR15

FF # 29
Item No. 36
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages 1-26)	Created.....	5/1/2013	KLW
Data Source: File Folder: 16D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3 MAR 15	
	Certified.....	3/25/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]RBT LengthWeight

Length/Weight Data - *Oncorhynchus mykiss*

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #2 - Fish length measurement error
Deviation #7 - Sequential numbering error during holding period.
Deviation #32 - Incorrect numbers and labeling of mortality from March 9, 2012 (See Deviation #36 for further clarification)
Deviation #36 - Sequential numbering and labeling error during 22-d holding period

File Folder: 16d

Item Number 1
Page 1 of 7

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-26)
Data Source: File Folder: 16D
Forms 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 115000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 1/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	RBT	NA	RBT-DIS#1-01	1	49	1.00	
DISTRO	D0001	RBT	NA	RBT-DIS#1-02	2	52	1.36	
DISTRO	D0001	RBT	NA	RBT-DIS#1-03	3	50	0.96	
DISTRO	D0001	RBT	NA	RBT-DIS#1-04	4	48	1.11	
DISTRO	D0001	RBT	NA	RBT-DIS#1-05	5	45	0.98	
DISTRO	D0001	RBT	NA	RBT-DIS#1-06	6	49	1.13	
DISTRO	D0001	RBT	NA	RBT-DIS#1-07	7	46	0.87	
DISTRO	D0001	RBT	NA	RBT-DIS#1-08	8	54	1.53	
DISTRO	D0001	RBT	NA	RBT-DIS#1-09	9	47	1.00	
DISTRO	D0001	RBT	NA	RBT-DIS#1-10	10	45	0.77	
DISTRO	D0001	RBT	NA	RBT-DIS#2-01	11	54	1.33	
DISTRO	D0001	RBT	NA	RBT-DIS#2-02	12	49	0.78	
DISTRO	D0001	RBT	NA	RBT-DIS#2-03	13	47	0.99	
DISTRO	D0001	RBT	NA	RBT-DIS#2-04	14	50	1.15	
DISTRO	D0001	RBT	NA	RBT-DIS#2-05	15	46	0.85	
DISTRO	D0001	RBT	NA	RBT-DIS#2-06	16	46	0.99	
DISTRO	D0001	RBT	NA	RBT-DIS#2-07	17	51	1.42	
DISTRO	D0001	RBT	NA	RBT-DIS#2-08	18	49	1.28	
DISTRO	D0001	RBT	NA	RBT-DIS#2-09	19	44	0.79	
DISTRO	D0001	RBT	NA	RBT-DIS#2-10	20	52	1.34	
DISTRO	D0001	RBT	NA	RBT-DIS#3-01	21	45	0.93	
DISTRO	D0001	RBT	NA	RBT-DIS#3-02	22	48	0.98	
DISTRO	D0001	RBT	NA	RBT-DIS#3-03	23	51	1.34	
DISTRO	D0001	RBT	NA	RBT-DIS#3-04	24	54	1.81	
DISTRO	D0001	RBT	NA	RBT-DIS#3-05	25	42	0.79	
DISTRO	D0001	RBT	NA	RBT-DIS#3-06	26	49	1.30	
DISTRO	D0001	RBT	NA	RBT-DIS#3-07	27	52	1.29	
DISTRO	D0001	RBT	NA	RBT-DIS#3-08	28	53	1.89	
DISTRO	D0001	RBT	NA	RBT-DIS#3-09	29	46	1.04	
DISTRO	D0001	RBT	NA	RBT-DIS#3-10	30	47	0.98	
DISTRO	D0001	RBT	NA	RBT-DIS#4-01	31	48	1.12	
DISTRO	D0001	RBT	NA	RBT-DIS#4-02	32	51	1.47	
DISTRO	D0001	RBT	NA	RBT-DIS#4-03	33	45	0.85	
DISTRO	D0001	RBT	NA	RBT-DIS#4-04	34	49	1.10	
DISTRO	D0001	RBT	NA	RBT-DIS#4-05	35	45	0.97	
DISTRO	D0001	RBT	NA	RBT-DIS#4-06	36	41	0.68	
DISTRO	D0001	RBT	NA	RBT-DIS#4-07	37	48	1.20	
DISTRO	D0001	RBT	NA	RBT-DIS#4-08	38	45	0.99	
DISTRO	D0001	RBT	NA	RBT-DIS#4-09	39	51	1.25	
DISTRO	D0001	RBT	NA	RBT-DIS#4-10	40	47	0.99	
EXPTER	A1E11	RBT	0	RBT-CONTROL-A-01	1	48	0.84	
EXPTER	A1E11	RBT	0	RBT-CONTROL-A-02	2	46	0.71	
EXPTER	A1E11	RBT	0	RBT-CONTROL-A-03	3	50	0.96	
EXPTER	A1E11	RBT	0	RBT-CONTROL-A-04	4	47	0.93	
EXPTER	A1E11	RBT	0	RBT-CONTROL-A-05	5	51	1.02	
EXPTER	A2E10	RBT	50	RBT-50-A-01	1	51	1.09	
EXPTER	A2E10	RBT	50	RBT-50-A-02	2	52	1.17	
EXPTER	A2E10	RBT	50	RBT-50-A-03	3	47	0.84	
EXPTER	A2E10	RBT	50	RBT-50-A-04	4	54	1.15	
EXPTER	A2E10	RBT	50	RBT-50-A-05	5	47	0.72	
EXPTER	A3E15	RBT	200	RBT-200-A-01	1	49	0.99	
EXPTER	A3E15	RBT	200	RBT-200-A-02	2	51	1.08	
EXPTER	A3E15	RBT	200	RBT-200-A-03	3	51	1.07	
EXPTER	A3E15	RBT	200	RBT-200-A-04	4	43	0.62	
EXPTER	A3E15	RBT	200	RBT-200-A-05	5	49	0.81	
EXPTER	A4E14	RBT	300	RBT-300-A-01	1	46	0.83	
EXPTER	A4E14	RBT	300	RBT-300-A-02	2	45	0.68	
EXPTER	A4E14	RBT	300	RBT-300-A-03	3	53	1.13	
EXPTER	A4E14	RBT	300	RBT-300-A-04	4	47	0.82	
EXPTER	A4E14	RBT	300	RBT-300-A-05	5	50	0.99	
EXPTER	A5E12	RBT	100	RBT-100-A-01	1	49	1.10	
EXPTER	A5E12	RBT	100	RBT-100-A-02	2	58	1.44	
EXPTER	A5E12	RBT	100	RBT-100-A-03	3	46	0.84	
EXPTER	A5E12	RBT	100	RBT-100-A-04	4	45	0.65	
EXPTER	A5E12	RBT	100	RBT-100-A-05	5	50	0.95	
EXPTER	B1E05	RBT	100	RBT-100-B-01	1	53	1.11	
EXPTER	B1E05	RBT	100	RBT-100-B-02	2	53	1.20	
EXPTER	B1E05	RBT	100	RBT-100-B-03	3	50	0.84	
EXPTER	B1E05	RBT	100	RBT-100-B-04	4	45	0.67	
EXPTER	B1E05	RBT	100	RBT-100-B-05	5	48	0.88	
EXPTER	B2E03	RBT	0	RBT-CONTROL-B-01	1	48	0.93	
EXPTER	B2E03	RBT	0	RBT-CONTROL-B-02	2	45	0.72	
EXPTER	B2E03	RBT	0	RBT-CONTROL-B-03	3	48	0.84	
EXPTER	B2E03	RBT	0	RBT-CONTROL-B-04	4	54	1.37	

Item Number 1
Page 2 of 7

Study Number: AEH-12-PSEUDO-03
Lab Notebook #: (pages 1-26)
Data Source: File Folder: 16D
Forms: 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116009
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B2E03	RBT	0	RBT-CONTROL-B-05	5	52	1.05	
EXPTER	B3E04	RBT	200	RBT-200-B-01	1	46	0.91	
EXPTER	B3E04	RBT	200	RBT-200-B-02	2	48	0.91	
EXPTER	B3E04	RBT	200	RBT-200-B-03	3	50	1.11	
EXPTER	B3E04	RBT	200	RBT-200-B-04	4	50	1.01	
EXPTER	B3E04	RBT	200	RBT-200-B-05	5	50	0.86	
EXPTER	B4E08	RBT	300	RBT-300-B-01	1	48	0.95	
EXPTER	B4E08	RBT	300	RBT-300-B-02	2	49	0.99	
EXPTER	B4E08	RBT	300	RBT-300-B-03	3	47	0.89	
EXPTER	B4E08	RBT	300	RBT-300-B-04	4	44	0.67	
EXPTER	B4E08	RBT	300	RBT-300-B-05	5	48	0.99	
EXPTER	B5E01	RBT	50	RBT-50-B-01	1	57	1.47	
EXPTER	B5E01	RBT	50	RBT-50-B-02	2	54	1.18	
EXPTER	B5E01	RBT	50	RBT-50-B-03	3	52	1.20	
EXPTER	B5E01	RBT	50	RBT-50-B-04	4	45	0.71	
EXPTER	B5E01	RBT	50	RBT-50-B-05	5	52	1.05	
EXPTER	C1E09	RBT	100	RBT-100-C-01	1	52	1.26	
EXPTER	C1E09	RBT	100	RBT-100-C-02	2	55	1.44	
EXPTER	C1E09	RBT	100	RBT-100-C-03	3	48	0.85	
EXPTER	C1E09	RBT	100	RBT-100-C-04	4	56	1.39	
EXPTER	C1E09	RBT	100	RBT-100-C-05	5	45	0.55	
EXPTER	C2E06	RBT	50	RBT-50-C-01	1	54	1.32	
EXPTER	C2E06	RBT	50	RBT-50-C-02	2	51	1.06	
EXPTER	C2E06	RBT	50	RBT-50-C-03	3	46	0.76	
EXPTER	C2E06	RBT	50	RBT-50-C-04	4	44	0.64	
EXPTER	C3E07	RBT	200	RBT-200-C-01	1	54	1.38	
EXPTER	C3E07	RBT	200	RBT-200-C-02	2	40	0.46	
EXPTER	C3E07	RBT	200	RBT-200-C-03	3	51	1.00	
EXPTER	C3E07	RBT	200	RBT-200-C-04	4	46	0.66	
EXPTER	C3E07	RBT	200	RBT-200-C-05	5	44	0.58	
EXPTER	C4E13	RBT	0	RBT-CONTROL-C-01	1	46	0.94	
EXPTER	C4E13	RBT	0	RBT-CONTROL-C-02	2	54	1.24	
EXPTER	C4E13	RBT	0	RBT-CONTROL-C-03	3	46	0.84	
EXPTER	C4E13	RBT	0	RBT-CONTROL-C-04	4	52	1.14	
EXPTER	C4E13	RBT	0	RBT-CONTROL-C-05	5	47	0.85	
EXPTER	C5E02	RBT	300	RBT-300-C-01	1	44	0.62	
EXPTER	C5E02	RBT	300	RBT-300-C-02	2	48	0.82	
EXPTER	C5E02	RBT	300	RBT-300-C-03	3	47	1.00	
EXPTER	C5E02	RBT	300	RBT-300-C-04	4	48	0.88	
EXMORT	C5E02	RBT	300	RBT-300-C-M1	1	50	0.89	
HDMORT	A2E10	RBT	50	RBT-50-E10-M1	1	47	0.90	
HDMORT	A2E10	RBT	50	RBT-50-E10-M2	2	46	1.07	
HDMORT	A2E10	RBT	50	RBT-50-E10-M3	3	53	1.35	
HDMORT	A2E10	RBT	50	RBT-50-E10-M4	4	45	0.94	Decomposed (hidden behind standpipe)
HDMORT	A2E10	RBT	50	RBT-50-E10-M5	5	50	1.38	
HDMORT	A2E10	RBT	50	RBT-50-E10-M6	6	47	0.97	
HDMORT	A2E10	RBT	50	RBT-50-E10-M7	7	51	1.06	
HDMORT	A2E10	RBT	50	RBT-50-E10-M8	8	54	1.58	
HDMORT	A2E10	RBT	50	RBT-50-E10-M9	9	51	1.45	
HDMORT	A2E10	RBT	50	RBT-50-E10-M10	10	54	1.53	
HDMORT	A2E10	RBT	50	RBT-50-E10-M11	11	45	0.97	
HDMORT	A3E15	RBT	200	RBT-200-E15-M1	1	48	1.04	
HDMORT	A3E15	RBT	200	RBT-200-E15-M2	2	53	1.43	
HDMORT	A3E15	RBT	200	RBT-200-E15-M3	3	48	0.91	
HDMORT	A3E15	RBT	200	RBT-200-E15-M4	4	46	1.19	See Deviation 2
HDMORT	A3E15	RBT	200	RBT-200-E15-M5	5	54	1.89	See Deviation 2
HDMORT	A3E15	RBT	200	RBT-200-E15-M6	6	47	1.09	
HDMORT	A3E15	RBT	200	RBT-200-E15-M7	7	48	1.22	
HDMORT	A3E15	RBT	200	RBT-200-E15-M8	8	45	0.94	
HDMORT	A3E15	RBT	200	RBT-200-E15-M9	9	48	1.19	
HDMORT	A3E15	RBT	200	RBT-200-E15-M10	10	49	0.67	
HDMORT	A3E15	RBT	200	RBT-200-E15-M11	11	47	1.02	
HDMORT	A3E15	RBT	200	RBT-200-E15-M12	12	49	0.78	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M13	13	46	0.76	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M14	14	46	0.77	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M15	15	47	0.93	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M16	16	49	1.11	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M17	17	49	1.09	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M18	18	48	0.96	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M19	19	48	1.08	See Deviation 36
HDMORT	A3E15	RBT	200	RBT-200-E15-M20	20	49	0.95	See Deviation 36
HDMORT	A4E14	RBT	300	RBT-300-E14-M1	1	45	0.76	
HDMORT	A4E14	RBT	300	RBT-300-E14-M2	2	48	1.03	
HDMORT	A4E14	RBT	300	RBT-300-E14-M3	3	51	1.33	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-26)
Data Source: File Folder; 16D
Forms 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 115000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669 3-(6)
Exposure Date: 2/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	A4E14	RBT	300	RBT-300-E14-M4	4	54	1.68	
HDMORT	A4E14	RBT	300	RBT-300-E14-M5	5	47	0.95	
HDMORT	A4E14	RBT	300	RBT-300-E14-M6	6	49	1.05	
HDMORT	A4E14	RBT	300	RBT-300-E14-M7	7	49	1.15	
HDMORT	A4E14	RBT	300	RBT-300-E14-M8	8	50	1.12	
HDMORT	A4E14	RBT	300	RBT-300-E14-M9	9	48	1.00	See Deviation 2
HDMORT	A4E14	RBT	300	RBT-300-E14-M10	10	55	1.58	See Deviation 2
HDMORT	A4E14	RBT	300	RBT-300-E14-M11	11	44	0.88	See Deviation 2
HDMORT	A4E14	RBT	300	RBT-300-E14-M12	12	50	1.52	
HDMORT	A4E14	RBT	300	RBT-300-E14-M13	13	47	0.95	
HDMORT	A4E14	RBT	300	RBT-300-E14-M14	14	42	0.75	
HDMORT	A4E14	RBT	300	RBT-300-E14-M15	15	48	1.15	
HDMORT	A4E14	RBT	300	RBT-300-E14-M16	16	42	0.72	
HDMORT	A4E14	RBT	300	RBT-300-E14-M17	17	49	1.07	
HDMORT	A4E14	RBT	300	RBT-300-E14-M18	18	46	0.81	
HDMORT	A4E14	RBT	300	RBT-300-E14-M19	19	48	1.03	
HDMORT	A4E14	RBT	300	RBT-300-E14-M20	20	46	0.94	
HDMORT	A5E12	RBT	100	RBT-100-E12-M1	1	45	0.81	See Deviation 2
HDMORT	A5E12	RBT	100	RBT-100-E12-M2	2	45	1.00	
HDMORT	A5E12	RBT	100	RBT-100-E12-M3	3	47	1.08	
HDMORT	A5E12	RBT	100	RBT-100-E12-M4	4	47	1.00	
HDMORT	A5E12	RBT	100	RBT-100-E12-M5	5	50	1.38	
HDMORT	A5E12	RBT	100	RBT-100-E12-M6	6	42	0.67	
HDMORT	A5E12	RBT	100	RBT-100-E12-M7	7	48	1.13	
HDMORT	A5E12	RBT	100	RBT-100-E12-M8	8	47	0.91	
HDMORT	A5E12	RBT	100	RBT-100-E12-M9	9	48	1.15	
HDMORT	A5E12	RBT	100	RBT-100-E12-M10	10	45	0.95	
HDMORT	A5E12	RBT	100	RBT-100-E12-M11	11	43	0.64	
HDMORT	A5E12	RBT	100	RBT-100-E12-M12	12	52	1.42	
HDMORT	A5E12	RBT	100	RBT-100-E12-M13	13	42	0.71	
HDMORT	A5E12	RBT	100	RBT-100-E12-M14	14	43	0.82	
HDMORT	A5E12	RBT	100	RBT-100-E12-M15	15	45	0.93	
HDMORT	A5E12	RBT	100	RBT-100-E12-M16	16	45	0.84	
HDMORT	A5E12	RBT	100	RBT-100-E12-M17	17	42	0.66	
HDMORT	A5E12	RBT	100	RBT-100-E12-M18	18	47	1.23	
HDMORT	A5E12	RBT	100	RBT-100-E12-M19	19	50	1.06	
HDMORT	A5E12	RBT	100	RBT-100-E12-M20	20	47	0.98	
HDMORT	B1E05	RBT	100	RBT-100-E5-M1	1	47	0.85	
HDMORT	B1E05	RBT	100	RBT-100-E5-M2	2	48	1.13	
HDMORT	B1E05	RBT	100	RBT-100-E5-M3	3	55	1.40	
HDMORT	B1E05	RBT	100	RBT-100-E5-M4	4	42	0.72	
HDMORT	B1E05	RBT	100	RBT-100-E5-M5	5	48	0.99	
HDMORT	B1E05	RBT	100	RBT-100-E5-M6	6	44	0.62	
HDMORT	B1E05	RBT	100	RBT-100-E5-M7	7	49	1.10	
HDMORT	B1E05	RBT	100	RBT-100-E5-M8	8	46	0.85	
HDMORT	B1E05	RBT	100	RBT-100-E5-M9	9	46	0.90	
HDMORT	B1E05	RBT	100	RBT-100-E5-M10	10	47	0.85	
HDMORT	B1E05	RBT	100	RBT-100-E5-M11	11	44	0.77	
HDMORT	B1E05	RBT	100	RBT-100-E5-M12	12	45	0.84	
HDMORT	B1E05	RBT	100	RBT-100-E5-M13	13	46	0.77	
HDMORT	B1E05	RBT	100	RBT-100-E5-M14	14	48	0.96	
HDMORT	B1E05	RBT	100	RBT-100-E5-M15	15	43	0.58	
HDMORT	B1E05	RBT	100	RBT-100-E5-M16	16	41	0.58	
HDMORT	B3E04	RBT	200	RBT-200-E4-M1	1	49	1.03	
HDMORT	B3E04	RBT	200	RBT-200-E4-M2	2	45	0.84	
HDMORT	B3E04	RBT	200	RBT-200-E4-M3	3	44	0.71	
HDMORT	B3E04	RBT	200	RBT-200-E4-M4	4	43	0.80	
HDMORT	B3E04	RBT	200	RBT-200-E4-M5	5	47	0.86	See Deviation 2
HDMORT	B3E04	RBT	200	RBT-200-E4-M6	6	44	0.89	See Deviation 2
HDMORT	B3E04	RBT	200	RBT-200-E4-M7	7	48	1.20	See Deviation 2
HDMORT	B3E04	RBT	200	RBT-200-E4-M8	8	49	1.10	See Deviation 2; Slit in pectoral region
HDMORT	B3E04	RBT	200	RBT-200-E4-M9	9	42	1.14	
HDMORT	B3E04	RBT	200	RBT-200-E4-M10	10	47	1.08	
HDMORT	B3E04	RBT	200	RBT-200-E4-M11	11	47	1.07	
HDMORT	B3E04	RBT	200	RBT-200-E4-M12	12	46	0.99	
HDMORT	B3E04	RBT	200	RBT-200-E4-M13	13	53	1.39	
HDMORT	B3E04	RBT	200	RBT-200-E4-M14	14	47	1.00	
HDMORT	B3E04	RBT	200	RBT-200-E4-M15	15	46	0.99	
HDMORT	B3E04	RBT	200	RBT-200-E4-M16	16	44	0.74	
HDMORT	B3E04	RBT	200	RBT-200-E4-M17	17	42	0.64	
HDMORT	B3E04	RBT	200	RBT-200-E4-M18	18	51	1.35	
HDMORT	B3E04	RBT	200	RBT-200-E4-M19	19	44	0.79	
HDMORT	B3E04	RBT	200	RBT-200-E4-M20	20	49	0.91	
HDMORT	B4E08	RBT	300	RBT-300-E8-M1	1	51	1.28	

Item Number 1
Page 4 of 7

Study Number: AEH-12-PSEUDO-03
Lab Notebook #: (pages 1-26)
Date Source: File Folder: 18D
Forms: 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	B4E08	RBT	300	RBT-300-E8-M2	2	51	1.13	
HDMORT	B4E08	RBT	300	RBT-300-E8-M3	3	52	1.29	
HDMORT	B4E08	RBT	300	RBT-300-E8-M4	4	49	1.05	
HDMORT	B4E08	RBT	300	RBT-300-E8-M5	5	45	0.80	
HDMORT	B4E08	RBT	300	RBT-300-E8-M6	6	48	0.88	
HDMORT	B4E08	RBT	300	RBT-300-E8-M7	7	47	1.32	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M8	8	44	0.95	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M9	9	49	1.31	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M10	10	49	1.22	See Deviation 2; Scales appear to be missing and skin thin near stomach
HDMORT	B4E08	RBT	300	RBT-300-E8-M11	11	43	0.76	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M12	12	44	0.97	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M13	13	51	1.30	See Deviation 2
HDMORT	B4E08	RBT	300	RBT-300-E8-M14	14	46	1.24	
HDMORT	B4E08	RBT	300	RBT-300-E8-M15	15	47	1.02	
HDMORT	B4E08	RBT	300	RBT-300-E8-M16	16	49	1.17	
HDMORT	B4E08	RBT	300	RBT-300-E8-M17	17	50	1.23	
HDMORT	B4E08	RBT	300	RBT-300-E8-M18	18	48	1.01	
HDMORT	B4E08	RBT	300	RBT-300-E8-M19	19	46	0.95	
HDMORT	B4E08	RBT	300	RBT-300-E8-M20	20	48	0.85	
HDMORT	B5E01	RBT	50	RBT-50-E1-M1	1	43	0.80	
HDMORT	B5E01	RBT	50	RBT-50-E1-M2	2	52	1.57	
HDMORT	B5E01	RBT	50	RBT-50-E1-M3	3	51	1.44	
HDMORT	B5E01	RBT	50	RBT-50-E1-M4	4	51	1.22	
HDMORT	B5E01	RBT	50	RBT-50-E1-M5	5	52	1.48	
HDMORT	B5E01	RBT	50	RBT-50-E1-M6	6	50	1.14	
HDMORT	B5E01	RBT	50	RBT-50-E1-M7	7	48	0.87	
HDMORT	B5E01	RBT	50	RBT-50-E1-M8	8	47	1.09	
HDMORT	B5E01	RBT	50	RBT-50-E1-M9	9	45	0.74	
HDMORT	B5E01	RBT	50	RBT-50-E1-M10	10	50	1.11	
HDMORT	B5E01	RBT	50	RBT-50-E1-M11	11	50	0.90	
HDMORT	B5E01	RBT	50	RBT-50-E1-M12	12	50	1.10	
HDMORT	B5E01	RBT	50	RBT-50-E1-M13	13	51	1.39	
HDMORT	B5E01	RBT	50	RBT-50-E1-M14	14	47	0.95	
HDMORT	B5E01	RBT	50	RBT-50-E1-M15	15	49	1.18	
HDMORT	B5E01	RBT	50	RBT-50-E1-M16	16	43	0.82	
HDMORT	B5E01	RBT	50	RBT-50-E1-M17	17	48	1.34	Decomposed (hidden behind standpipe)
HDMORT	C1E09	RBT	100	RBT-100-E9-M1	1	49	1.22	See Deviation 2
HDMORT	C1E09	RBT	100	RBT-100-E9-M2	2	50	1.16	
HDMORT	C1E09	RBT	100	RBT-100-E9-M3	3	49	1.05	
HDMORT	C1E09	RBT	100	RBT-100-E9-M4	4	48	1.11	
HDMORT	C1E09	RBT	100	RBT-100-E9-M5	5	47	1.10	
HDMORT	C1E09	RBT	100	RBT-100-E9-M6	6	54	1.51	
HDMORT	C1E09	RBT	100	RBT-100-E9-M7	7	49	1.32	
HDMORT	C1E09	RBT	100	RBT-100-E9-M8	8	42	0.55	
HDMORT	C1E09	RBT	100	RBT-100-E9-M9	9	40	0.52	
HDMORT	C1E09	RBT	100	RBT-100-E9-M10	10	50	1.21	
HDMORT	C1E09	RBT	100	RBT-100-E9-M11	11	50	1.08	
HDMORT	C1E09	RBT	100	RBT-100-E9-M12	12	48	1.03	
HDMORT	C1E09	RBT	100	RBT-100-E9-M13	13	44	1.06	
HDMORT	C1E09	RBT	100	RBT-100-E9-M14	14	50	1.12	
HDMORT	C1E09	RBT	100	RBT-100-E9-M15	15	57	1.84	
HDMORT	C1E09	RBT	100	RBT-100-E9-M16	16	44	0.89	Decomposed (hidden behind standpipe)
HDMORT	C1E09	RBT	100	RBT-100-E9-M17	17	47	1.18	
HDMORT	C1E09	RBT	100	RBT-100-E9-M18	18	44	0.66	
HDMORT	C1E09	RBT	100	RBT-100-E9-M19	19	47	0.90	
HDMORT	C2E06	RBT	50	RBT-50-E6-M1	1	50	1.33	
HDMORT	C2E06	RBT	50	RBT-50-E6-M2	2	46	0.84	
HDMORT	C2E06	RBT	50	RBT-50-E6-M3	3	48	0.90	
HDMORT	C2E06	RBT	50	RBT-50-E6-M4	4	45	1.24	
HDMORT	C2E06	RBT	50	RBT-50-E6-M5	5	46	0.89	
HDMORT	C2E06	RBT	50	RBT-50-E6-M6	6	48	1.14	Tear in gut
HDMORT	C2E06	RBT	50	RBT-50-E6-M7	7	50	1.27	
HDMORT	C2E06	RBT	50	RBT-50-E6-M8	8	47	1.32	
HDMORT	C2E06	RBT	50	RBT-50-E6-M9	9	48	1.14	
HDMORT	C2E06	RBT	50	RBT-50-E6-M10	10	52	1.22	
HDMORT	C2E06	RBT	50	RBT-50-E6-M11	11	45	1.12	
HDMORT	C2E06	RBT	50	RBT-50-E6-M12	12	50	1.46	
HDMORT	C2E06	RBT	50	RBT-50-E6-M13	13	41	1.03	
HDMORT	C3E07	RBT	200	RBT-200-E7-M1	1	50	0.93	
HDMORT	C3E07	RBT	200	RBT-200-E7-M2	2	49	0.89	
HDMORT	C3E07	RBT	200	RBT-200-E7-M3	3	60	1.74	
HDMORT	C3E07	RBT	200	RBT-200-E7-M4	4	42	0.85	See Deviation 2
HDMORT	C3E07	RBT	200	RBT-200-E7-M5	5	43	0.79	See Deviation 2; Hemorrhaging around pectoral girdle
HDMORT	C3E07	RBT	200	RBT-200-E7-M6	6	50	1.33	See Deviation 2

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-2G)
Data Source: File Folder: 1GD
Forms: 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total length (mm)	Weight (g)	Comments
HDMORT	C3E07	RBT	200	RBT-200-E7-M7	7	41	0.65	See Deviation 2
HDMORT	C3E07	RBT	200	RBT-200-E7-M8	8	50	1.36	
HDMORT	C3E07	RBT	200	RBT-200-E7-M9	9	46	0.89	
HDMORT	C3E07	RBT	200	RBT-200-E7-M10	10	48	1.07	
HDMORT	C3E07	RBT	200	RBT-200-E7-M11	11	52	1.48	
HDMORT	C3E07	RBT	200	RBT-200-E7-M12	12	47	0.96	
HDMORT	C3E07	RBT	200	RBT-200-E7-M13	13	46	0.88	
HDMORT	C3E07	RBT	200	RBT-200-E7-M14	14	46	0.90	
HDMORT	C3E07	RBT	200	RBT-200-E7-M15	15	47	0.90	
HDMORT	C3E07	RBT	200	RBT-200-E7-M16	16	43	0.59	
HDMORT	C3E07	RBT	200	RBT-200-E7-M17	17	41	0.62	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M18	18	52	1.13	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M19	19	47	0.88	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M20	20	50	1.04	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M21	21	42	0.76	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M22	22	45	1.00	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M23	23	51	1.36	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M24	24	48	1.07	See Deviation 36
HDMORT	C3E07	RBT	200	RBT-200-E7-M25	25	44	0.92	See Deviation 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M1	1	50	1.28	
HDMORT	C5E02	RBT	300	RBT-300-E2-M2	2	43	0.69	
HDMORT	C5E02	RBT	300	RBT-300-E2-M3	3	46	0.82	
HDMORT	C5E02	RBT	300	RBT-300-E2-M4	4	48	1.11	
HDMORT	C5E02	RBT	300	RBT-300-E2-M5	5	49	1.16	
HDMORT	C5E02	RBT	300	RBT-300-E2-M6	6	48	0.90	
HDMORT	C5E02	RBT	300	RBT-300-E2-M7	7	54	1.38	
HDMORT	C5E02	RBT	300	RBT-300-E2-M8	8	43	1.12	See Deviation 2; Slit in pectoral region
HDMORT	C5E02	RBT	300	RBT-300-E2-M9	9	45	0.84	See Deviation 2
HDMORT	C5E02	RBT	300	RBT-300-E2-M10	10	41	0.85	See Deviation 2
HDMORT	C5E02	RBT	300	RBT-300-E2-M11	11	51	1.45	See Deviation 2
HDMORT	C5E02	RBT	300	RBT-300-E2-M12	12	47	1.14	See Deviation 2
HDMORT	C5E02	RBT	300	RBT-300-E2-M13	13	48	1.12	See Deviation 2
HDMORT	C5E02	RBT	300	RBT-300-E2-M14	14	50	1.37	
HDMORT	C5E02	RBT	300	RBT-300-E2-M15	15	47	1.02	See Deviations 7, 32 and 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M16	16	46	1.08	See Deviations 7, 32 and 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M17	17	46	0.91	See Deviations 7, 32 and 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M18	18	47	0.94	See Deviations 7, 32 and 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M19	19	55	1.52	See Deviations 7, 32 and 36
HDMORT	C5E02	RBT	300	RBT-300-E2-M20	20	50	1.23	See Deviations 7, 32 and 36; Tear in gut
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T1	1	62	2.52	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T2	2	62	2.37	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T3	3	65	3.13	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T4	4	60	2.24	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T5	5	60	2.11	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T6	6	64	2.87	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T7	7	73	4.10	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T8	8	57	1.89	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T9	9	67	3.39	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T10	10	63	2.61	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T11	11	65	2.80	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T12	12	66	3.07	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T13	13	65	2.79	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T14	14	57	1.92	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T15	15	60	2.15	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T16	16	70	3.31	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T17	17	68	3.52	
TERMIN	A1E11	RBT	0	RBT CONTROL-E11 T18	18	64	2.76	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T19	19	57	2.07	
TERMIN	A1E11	RBT	0	RBT-CONTROL-E11-T20	20	52	1.37	
TERMIN	A2E10	RBT	50	RBT-50-E10-T1	1	58	2.16	
TERMIN	A2E10	RBT	50	RBT-50-E10-T2	2	53	1.35	
TERMIN	A2E10	RBT	50	RBT-50-E10-T3	3	52	1.08	
TERMIN	A2E10	RBT	50	RBT-50-E10-T4	4	45	0.78	
TERMIN	A2E10	RBT	50	RBT-50-E10-T5	5	47	0.93	
TERMIN	A2E10	RBT	50	RBT-50-E10-T6	6	61	2.11	
TERMIN	A2E10	RBT	50	RBT-50-E10-T7	7	56	1.54	
TERMIN	A2E10	RBT	50	RBT-50-E10-T8	8	55	1.62	
TERMIN	A2E10	RBT	50	RBT-50-E10-T9	9	54	1.40	
TERMIN	B1E05	RBT	100	RBT-100-E5-T1	1	45	0.65	
TERMIN	B1E05	RBT	100	RBT-100-E5-T2	2	49	1.11	
TERMIN	B1E05	RBT	100	RBT-100-E5-T3	3	47	1.03	
TERMIN	B1E05	RBT	100	RBT-100-E5-T4	4	47	0.79	
TERMIN	D2E03	RBT	0	RBT-CONTROL-E3-T1	1	65	2.96	
TERMIN	D2E03	RBT	0	RBT-CONTROL-E3-T2	2	67	3.19	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-26)
Data Source: File Folder: 160
Forms: 3, 3a

Fish species: Rainbow Trout (*Oncorhynchus mykiss*) Lot number: 116000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Chemical lot #: TR 4669-3-(6)
Exposure Date: 2/29/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T3	3	59	2.04	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T4	4	57	1.77	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T5	5	58	1.35	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T6	6	65	3.00	
TERMIN	B2E03	RBT	0	RBT-CONTROL E3-T7	7	60	3.61	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T8	8	64	2.61	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T9	9	65	2.78	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T10	10	64	2.58	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T11	11	62	2.52	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T12	12	56	2.92	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T13	13	62	2.57	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T14	14	70	3.56	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T15	15	62	2.53	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T16	16	65	2.74	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T17	17	68	3.29	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T18	18	56	1.77	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T19	19	56	1.75	
TERMIN	B2E03	RBT	0	RBT-CONTROL-E3-T20	20	62	2.19	
TERMIN	B5E01	RBT	50	RBT-50-E1-T1	1	49	1.05	
TERMIN	B5E01	RBT	50	RBT-50-E1-T2	2	57	1.46	
TERMIN	B5E01	RBT	50	RBT-50-E1-T3	3	44	0.74	
TERMIN	C1E09	RBT	100	RBT-100-E9-T1	1	48	0.98	
TERMIN	C2E06	RBT	50	RBT-50-E6-T1	1	57	1.47	
TERMIN	C2E06	RBT	50	RBT-50-E6-T2	2	53	1.34	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T1	1	66	3.33	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T2	2	62	2.67	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T3	3	60	2.19	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T4	4	61	2.23	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T5	5	58	2.03	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T6	6	58	1.80	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T7	7	62	2.30	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T8	8	66	3.15	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T9	9	67	2.92	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T10	10	60	2.17	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T11	11	61	2.32	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T12	12	72	3.68	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T13	13	74	4.48	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T14	14	71	4.06	
TERMIN	C4E13	RBT	0	RBT CONTROL-E13 T15	15	70	3.67	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T16	16	70	3.06	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T17	17	65	3.05	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T18	18	62	2.44	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T19	19	63	2.65	
TERMIN	C4E13	RBT	0	RBT-CONTROL-E13-T20	20	60	2.24	

File Folder: 16d

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (pages 38-49)	Created.....	5/1/2013	KLW
Data Source: File Folder: 17D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/24/15	
	Certified.....	3/25/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]BKT LengthWeight			

Length/Weight Data - *Salvelinus fontinalis*

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #27 - Accidental death of fish from Chamber E10; fish length and weight taken (Length/weight data removed from analysis)
Deviation #36 - Sequential numbering and labeling error during 22-d holding period

File Folder: 17d

Item Number 1
Page 1 of 9

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder, 17D
Forms: 3, 3a

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -Cl. 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	BKT	NA	BKT-DIS#1-01	1	42	0.56	
DISTRO	D0001	BKT	NA	BKT-DIS#1-02	2	54	1.26	
DISTRO	D0001	BKT	NA	BKT-DIS#1-03	3	56	1.31	
DISTRO	D0001	BKT	NA	BKT-DIS#1-04	4	48	0.93	
DISTRO	D0001	BKT	NA	BKT-DIS#1-05	5	58	1.53	
DISTRO	D0001	BKT	NA	BKT-DIS#1-06	6	62	1.82	
DISTRO	D0001	BKT	NA	BKT-DIS#1-07	7	56	1.35	
DISTRO	D0001	BKT	NA	BKT-DIS#1-08	8	58	1.49	
DISTRO	D0001	BKT	NA	BKT-DIS#1-09	9	52	1.12	
DISTRO	D0001	BKT	NA	BKT-DIS#1-10	10	45	0.68	
DISTRO	D0001	BKT	NA	BKT-DIS#2-01	11	52	1.10	
DISTRO	D0001	BKT	NA	BKT-DIS#2-02	12	54	1.28	
DISTRO	D0001	BKT	NA	BKT-DIS#2-03	13	59	1.61	
DISTRO	D0001	BKT	NA	BKT-DIS#2-04	14	56	1.31	
DISTRO	D0001	BKT	NA	BKT-DIS#2-05	15	59	1.72	
DISTRO	D0001	BKT	NA	BKT-DIS#2-06	16	47	0.84	
DISTRO	D0001	BKT	NA	BKT-DIS#2-07	17	59	1.55	
DISTRO	D0001	BKT	NA	BKT-DIS#2-08	18	57	1.35	
DISTRO	D0001	BKT	NA	BKT-DIS#2-09	19	57	1.54	
DISTRO	D0001	BKT	NA	BKT-DIS#2-10	20	54	1.24	
DISTRO	D0001	BKT	NA	BKT-DIS#3-01	21	64	1.94	
DISTRO	D0001	BKT	NA	BKT-DIS#3-02	22	51	1.41	
DISTRO	D0001	BKT	NA	BKT-DIS#3-03	23	59	1.57	
DISTRO	D0001	BKT	NA	BKT-DIS#3-04	24	59	1.69	
DISTRO	D0001	BKT	NA	BKT-DIS#3-05	25	54	1.28	
DISTRO	D0001	BKT	NA	BKT-DIS#3-06	26	55	1.23	
DISTRO	D0001	BKT	NA	BKT-DIS#3-07	27	60	1.53	
DISTRO	D0001	BKT	NA	BKT-DIS#3-08	28	52	1.12	
DISTRO	D0001	BKT	NA	BKT-DIS#3-09	29	57	1.39	
DISTRO	D0001	BKT	NA	BKT-DIS#3-10	30	43	0.58	
DISTRO	D0001	BKT	NA	BKT-DIS#4-01	31	61	1.83	
DISTRO	D0001	BKT	NA	BKT-DIS#4-02	32	54	1.32	
DISTRO	D0001	BKT	NA	BKT-DIS#4-03	33	55	1.21	
DISTRO	D0001	BKT	NA	BKT-DIS#4-04	34	54	1.16	
DISTRO	D0001	BKT	NA	BKT-DIS#4-05	35	60	1.53	
DISTRO	D0001	BKT	NA	BKT-DIS#4-06	36	54	1.11	
DISTRO	D0001	BKT	NA	BKT-DIS#4-07	37	49	0.90	
DISTRO	D0001	BKT	NA	BKT-DIS#4-08	38	55	1.38	
DISTRO	D0001	BKT	NA	BKT-DIS#4-09	39	63	2.20	
DISTRO	D0001	BKT	NA	BKT-DIS#4-10	40	55	1.27	
EXPTER	A1E12	BKT	300	BKT-300-A-01	1	56	1.39	
EXPTER	A1E12	BKT	300	BKT-300-A-02	2	62	1.89	
EXPTER	A1E12	BKT	300	BKT-300-A-03	3	58	1.42	
EXPTER	A1E12	BKT	300	BKT-300-A-04	4	60	1.64	
EXPTER	A1E12	BKT	300	BKT-300-A-05	5	64	1.91	
EXPTER	A2E09	BKT	50	BKT-50-A-01	1	62	1.68	
EXPTER	A2E09	BKT	50	BKT-50-A-02	2	55	1.23	
EXPTER	A2E09	BKT	50	BKT-50-A-03	3	60	1.49	
EXPTER	A2E09	BKT	50	BKT-50-A-04	4	67	2.19	
EXPTER	A2E09	BKT	50	BKT-50-A-05	5	57	1.32	
EXPTER	A3E02	BKT	100	BKT-100-A-01	1	62	1.87	
EXPTER	A3E02	BKT	100	BKT-100-A-02	2	56	1.37	
EXPTER	A3E02	BKT	100	BKT-100-A-03	3	46	0.70	
EXPTER	A3E02	BKT	100	BKT-100-A-04	4	58	1.50	
EXPTER	A3E02	BKT	100	BKT-100-A-05	5	58	1.54	
EXPTER	A4E13	BKT	0	BKT-CONTROL-A-01	1	51	0.93	
EXPTER	A4E13	BKT	0	BKT-CONTROL-A-02	2	57	1.31	
EXPTER	A4E13	BKT	0	BKT-CONTROL-A-03	3	56	1.19	
EXPTER	A4E13	BKT	0	BKT-CONTROL-A-04	4	50	0.90	
EXPTER	A4E13	BKT	0	BKT-CONTROL-A-05	5	58	1.32	
EXPTER	A5E10	BKT	200	BKT-200-A-01	1	49	0.85	
EXPTER	A5E10	BKT	200	BKT-200-A-02	2	59	1.53	
EXPTER	A5E10	BKT	200	BKT-200-A-03	3	61	1.72	
EXPTER	A5E10	BKT	200	BKT-200-A-04	4	49	0.92	
EXPTER	A5E10	BKT	200	BKT-200-A-05	5	60	1.49	
EXPTER	B1E14	BKT	300	BKT-300-B-01	1	57	1.48	
EXPTER	B1E14	BKT	300	BKT-300-B-02	2	54	1.22	
EXPTER	B1E14	BKT	300	BKT-300-B-03	3	61	1.82	
EXPTER	B1E14	BKT	300	BKT-300-B-04	4	59	1.55	
EXPTER	B1E14	BKT	300	BKT-300-B-05	5	55	1.20	
EXPTER	B2E06	BKT	100	BKT-100-B-01	1	55	1.26	
EXPTER	B2E06	BKT	100	BKT-100-B-02	2	59	1.47	
EXPTER	B2E06	BKT	100	BKT-100-B-03	3	63	1.78	
EXPTER	B2E06	BKT	100	BKT-100-B-04	4	52	1.26	

Item Number 1-3
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 170
Forms: 3, 3a

Fish species: Coaster Brook Trout [*Salvelinus fontinalis*] Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: TR 4666 4-(S)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B2E06	BKT	100	BKT-100-B-05	5	60	1.67	
EXPTER	B3E03	BKT	50	BKT-50-B-01	1	57	1.36	
EXPTER	B3E03	BKT	50	BKT-50-B-02	2	58	1.32	
EXPTER	B3E03	BKT	50	BKT-50-B-03	3	54	1.13	
EXPTER	B3E03	BKT	50	BKT-50-B-04	4	52	1.01	
EXPTER	B3E03	BKT	50	BKT-50-B-05	5	45	0.55	
EXPTER	B4E08	BKT	200	BKT-200-B-01	1	65	2.09	
EXPTER	B4E08	BKT	200	BKT-200-B-02	2	59	1.49	
EXPTER	B4E08	BKT	200	BKT-200-B-03	3	54	1.14	
EXPTER	B4E08	BKT	200	BKT-200-B-04	4	56	1.37	
EXPTER	B4E08	BKT	200	BKT-200-B-05	5	46	0.79	
EXPTER	B5E07	BKT	0	BKT-CONTROL-B-01	1	56	1.30	
EXPTER	B5E07	BKT	0	BKT-CONTROL-B-02	2	55	1.19	
EXPTER	B5E07	BKT	0	BKT-CONTROL-B-03	3	45	0.78	
EXPTER	B5E07	BKT	0	BKT-CONTROL-B-04	4	58	1.46	
EXPTER	B5E07	BKT	0	BKT-CONTROL-B-05	5	60	1.36	
EXPTER	C1E01	BKT	0	BKT-CONTROL-C-01	1	57	1.29	
EXPTER	C1E01	BKT	0	BKT-CONTROL-C-02	2	62	1.62	
EXPTER	C1E01	BKT	0	BKT-CONTROL-C-03	3	56	1.24	
EXPTER	C1E01	BKT	0	BKT-CONTROL-C-04	4	45	0.69	
EXPTER	C1E01	BKT	0	BKT-CONTROL-C-05	5	54	1.16	
EXPTER	C2E11	BKT	100	BKT-100-C-01	1	51	0.95	
EXPTER	C2E11	BKT	100	BKT-100-C-02	2	54	1.17	
EXPTER	C2E11	BKT	100	BKT-100-C-03	3	58	1.51	
EXPTER	C2E11	BKT	100	BKT-100-C-04	4	55	1.24	
EXPTER	C2E11	BKT	100	BKT-100-C-05	5	62	1.86	
EXPTER	C3E04	BKT	300	BKT-300-C-01	1	55	1.22	
EXPTER	C3E04	BKT	300	BKT-300-C-02	2	53	1.05	
EXPTER	C3E04	BKT	300	BKT-300-C-03	3	50	0.94	
EXPTER	C3E04	BKT	300	BKT-300-C-04	4	55	1.22	
EXPTER	C3E04	BKT	300	BKT-300-C-05	5	66	1.72	
EXPTER	C4E15	BKT	200	BKT-200-C-01	1	66	1.52	
EXPTER	C4E15	BKT	200	BKT-200-C-02	2	52	1.09	
EXPTER	C4E15	BKT	200	BKT-200-C-03	3	51	1.03	
EXPTER	C4E15	BKT	200	BKT-200-C-04	4	57	1.34	
EXPTER	C4E15	BKT	200	BKT-200-C-05	5	57	1.34	
EXPTER	C5E05	BKT	50	BKT-50-C-01	1	52	0.97	
EXPTER	C5E05	BKT	50	BKT-50-C-02	2	54	1.16	
EXPTER	C5E05	BKT	50	BKT-50-C-03	3	54	1.10	
EXPTER	C5E05	BKT	50	BKT-50-C-04	4	52	1.04	
EXPTER	C5E05	BKT	50	BKT-50-C-05	5	57	1.31	
HDMORT	A1E12	BKT	300	BKT-300-E12-M1	1	52	1.10	
HDMORT	A1E12	BKT	300	BKT-300-E12-M2	2	52	1.42	
HDMORT	A1E12	BKT	300	BKT-300-E12-M3	3	56	1.72	
HDMORT	A1E12	BKT	300	BKT-300-E12-M4	4	45	0.91	
HDMORT	A1E12	BKT	300	BKT-300-E12-M5	5	44	0.66	
HDMORT	A1E12	BKT	300	BKT-300-E12-M6	6	58	2.00	
HDMORT	A1E12	BKT	300	BKT-300-E12-M7	7	54	1.46	
HDMORT	A1E12	BKT	300	BKT-300-E12-M8	8	53	1.34	
HDMORT	A1E12	BKT	300	BKT-300-E12-M9	9	60	1.97	
HDMORT	A1E12	BKT	300	BKT-300-E12-M10	10	54	1.64	
HDMORT	A1E12	BKT	300	BKT-300-E12-M11	11	62	2.36	
HDMORT	A1E12	BKT	300	BKT-300-E12-M12	12	51	1.30	
HDMORT	A1E12	BKT	300	BKT-300-E12-M13	13	48	1.02	
HDMORT	A1E12	BKT	300	BKT-300-E12-M14	14	60	2.40	
HDMORT	A1E12	BKT	300	BKT-300-E12-M15	15	50	1.11	
HDMORT	A1E12	BKT	300	BKT-300-E12-M16	16	47	1.05	
HDMORT	A1E12	BKT	300	BKT-300-E12-M17	17	58	1.57	
HDMORT	A1E12	BKT	300	BKT-300-E12-M18	18	55	1.97	
HDMORT	A1E12	BKT	300	BKT-300-E12-M19	19	50	1.34	
HDMORT	A1E12	BKT	300	BKT-300-E12-M20	20	61	2.99	
HDMORT	A3E02	BKT	100	BKT-100-E2-M1	1	52	1.42	
HDMORT	A3E02	BKT	100	BKT-100-E2-M2	2	57	1.70	
HDMORT	A3E02	BKT	100	BKT-100-E2-M3	3	61	2.50	
HDMORT	A3E02	BKT	100	BKT-100-E2-M4	4	52	1.43	
HDMORT	A3E02	BKT	100	BKT-100-E2-M5	5	52	1.64	
HDMORT	A5E10	BKT	200	BKT-200-E10-M2	1	44	0.77	See Deviation # 27
HDMORT	A5E10	BKT	200	BKT-200-E10-M3	2	52	1.35	
HDMORT	A5E10	BKT	200	BKT-200-E10-M4	3	60	2.54	
HDMORT	A5E10	BKT	200	BKT-200-E10-M5	4	61	1.58	
HDMORT	A5E10	BKT	200	BKT-200-E10-M6	5	44	0.89	
HDMORT	A5E10	BKT	200	BKT-200-E10-M7	6	45	1.09	
HDMORT	A5E10	BKT	200	BKT-200-E10-M8	7	59	1.58	
HDMORT	A5E10	BKT	200	BKT-200-E10-M9	8	55	1.33	

Item Number 1
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Study Number: AEH-12-PSEUDO-08
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17D
Forms: 3, 3a

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	A5E10	BKT	200	BKT-200-E10-M10	9	54	1.42	
HDMORT	A5E10	BKT	200	BKT-200-E10-M11	10	52	1.26	
HDMORT	A5E10	BKT	200	BKT-200-E10-M12	11	50	1.61	
HDMORT	A5E10	BKT	200	BKT-200-E10-M13	12	55	1.61	
HDMORT	A5E10	BKT	200	BKT-200-E10-M14	13	53	1.32	
HDMORT	B1E14	BKT	300	BKT-300-E14-M1	1	49	1.22	
HDMORT	B1E14	BKT	300	BKT-300-E14-M2	2	54	1.45	
HDMORT	B1E14	BKT	300	BKT-300-E14-M3	3	56	1.74	
HDMORT	B1E14	BKT	300	BKT-300-E14-M4	4	51	1.16	
HDMORT	B1E14	BKT	300	BKT-300-E14-M5	5	54	1.54	
HDMORT	B1E14	BKT	300	BKT 300 E14-M6	6	49	0.91	
HDMORT	B1E14	BKT	300	BKT-300-E14-M7	7	63	2.32	
HDMORT	B1E14	BKT	300	BKT-300-E14-M8	8	45	0.72	
HDMORT	B1E14	BKT	300	BKT-300-E14-M9	9	59	1.66	
HDMORT	B1E14	BKT	300	BKT-300-E14-M10	10	58	1.61	
HDMORT	B1E14	BKT	300	BKT-300-E14-M11	11	46	0.60	
HDMORT	B1E14	BKT	300	BKT-300-E14-M12	12	56	1.63	
HDMORT	B1E14	BKT	300	BKT-300-E14-M13	13	55	1.63	
HDMORT	B1E14	BKT	300	BKT-300-E14-M14	14	48	0.98	
HDMORT	B1E14	BKT	300	BKT-300-E14-M15	15	58	1.83	
HDMORT	B1E14	BKT	300	BKT-300-E14-M16	16	49	1.05	
HDMORT	B1E14	BKT	300	BKT-300-E14-M17	17	61	1.98	
HDMORT	B1E14	BKT	300	BKT-300-E14-M18	18	52	1.51	
HDMORT	B1E14	BKT	300	BKT-300-E14-M19	19	54	1.83	
HDMORT	B1E14	BKT	300	BKT-300-E14-M20	20	62	2.27	
HDMORT	B2E06	BKT	100	BKT-100-E6-M1	1	52	1.58	
HDMORT	B2E06	BKT	100	BKT-100-E6-M2	2	50	1.85	
HDMORT	B2E06	BKT	100	BKT-100-E6-M3	3	51	1.33	
HDMORT	B2E06	BKT	100	BKT-100-E6-M4	4	50	1.72	
HDMORT	B2E06	BKT	100	BKT-100-E6-M5	5	56	2.28	
HDMORT	B2E06	BKT	100	BKT-100-E6-M6	6	63	2.30	
HDMORT	B2E06	BKT	100	BKT-100-E6-M7	7	58	2.60	
HDMORT	B2E06	BKT	100	BKT-100-E6-M8	8	57	2.23	
HDMORT	B2E06	BKT	100	BKT-100-E6-M9	9	49	0.74	
HDMORT	B4E08	BKT	200	BKT-200-E8-M1	1	55	1.76	
HDMORT	B4E08	BKT	200	BKT-200-E8-M2	2	53	1.31	
HDMORT	B4E08	BKT	200	BKT-200-E8-M3	3	52	1.36	
HDMORT	B4E08	BKT	200	BKT-200-E8-M4	4	48	1.03	
HDMORT	B4E08	BKT	200	BKT-200-E8-M5	5	54	1.30	
HDMORT	B4E08	BKT	200	BKT-200-E8-M6	6	52	1.08	
HDMORT	B4E08	BKT	200	BKT-200-E8-M7	7	47	0.89	
HDMORT	B4E08	BKT	200	BKT-200-E8-M8	8	53	1.35	
HDMORT	B4E08	BKT	200	BKT-200-E8-M9	9	48	1.15	
HDMORT	B4E08	BKT	200	BKT 200-E8-M10	10	56	1.74	
HDMORT	B4E08	BKT	200	BKT-200-E8-M11	11	53	1.39	
HDMORT	B4E08	BKT	200	BKT-200-E8-M12	12	58	2.60	
HDMORT	B4E08	BKT	200	BKT-200-E8-M13	13	45	0.90	
HDMORT	B4E08	BKT	200	BKT-200-E8-M14	14	44	1.15	
HDMORT	B4E08	BKT	200	BKT-200-E8-M15	15	44	0.74	
HDMORT	B4E08	BKT	200	BKT-200-E8-M16	16	45	0.69	
HDMORT	B4E08	BKT	200	BKT-200-E8-M17	17	60	1.72	
HDMORT	C2E11	BKT	100	BKT-100-E11-M1	1	54	1.56	
HDMORT	C2E11	BKT	100	BKT-100-E11-M2	2	44	1.03	
HDMORT	C2E11	BKT	100	BKT-100-E11-M3	3	44	0.81	
HDMORT	C2E11	BKT	100	BKT-100-E11-M4	4	49	1.10	
HDMORT	C2E11	BKT	100	BKT-100-F11-M5	5	56	1.31	
HDMORT	C2E11	BKT	100	BKT-100-F11-M6	6	56	1.57	See Deviation #36
HDMORT	C2E11	BKT	100	BKT-100-E11-M7	7	55	1.47	
HDMORT	C2E11	BKT	100	BKT-100-E11-M8	8	45	1.07	See Deviation #36
HDMORT	C3E04	BKT	300	BKT-300-E4-M1	1	45	0.79	
HDMORT	C3E04	BKT	300	BKT-300-E4-M2	2	51	1.44	
HDMORT	C3E04	BKT	300	BKT-300-E4-M3	3	60	2.10	
HDMORT	C3E04	BKT	300	BKT-300-E4-M4	4	60	1.99	
HDMORT	C3E04	BKT	300	BKT-300-E4-M5	5	52	1.18	
HDMORT	C3E04	BKT	300	BKT-300-E4-M6	6	60	2.27	
HDMORT	C3E04	BKT	300	BKT-300-E4-M7	7	54	1.18	
HDMORT	C3E04	BKT	300	BKT-300-E4-M8	8	50	1.11	
HDMORT	C3E04	BKT	300	BKT-300-E4-M9	9	42	0.62	
HDMORT	C3E04	BKT	300	BKT-300-E4-M10	10	50	1.03	
HDMORT	C3E04	BKT	300	BKT-300-E4-M11	11	54	1.44	
HDMORT	C3E04	BKT	300	BKT-300-E4-M12	12	53	1.32	
HDMORT	C3E04	BKT	300	BKT-300-E4-M13	13	52	1.34	
HDMORT	C3E04	BKT	300	BKT-300-E4-M14	14	41	0.60	
HDMORT	C3E04	BKT	300	BKT-300-E4-M15	15	56	1.84	

Item Number
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Study Number: AEP-12-PSEU00-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17D
Forms: 3, 3a

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HOMORT	C3E04	BKT	300	BKT-300-E4-M16	16	58	2.13	
HOMORT	C3E04	BKT	300	BKT-300-E4-M17	17	59	1.82	
HOMORT	C3E04	BKT	300	BKT-300-E4-M18	18	55	1.54	
HOMORT	C3E04	BKT	300	BKT-300-E4-M19	19	59	1.81	
HOMORT	C3E04	BKT	300	BKT-300-E4-M20	20	60	1.86	
HOMORT	C4E15	BKT	200	BKT-200-E15-M1	1	51	1.06	
HOMORT	C4E15	BKT	200	BKT-200-E15-M2	2	51	1.10	
HOMORT	C4E15	BKT	200	BKT-200-E15-M3	3	51	1.45	
HOMORT	C4E15	BKT	200	BKT-200-E15-M4	4	59	1.97	
HOMORT	C4E15	BKT	200	BKT-200-E15-M5	5	54	1.74	
HOMORT	C4E15	BKT	200	BKT-200-E15-M6	6	53	1.58	
HOMORT	C4E15	BKT	200	BKT-200-E15-M7	7	51	1.40	
HOMORT	C4E15	BKT	200	BKT-200-E15-M8	8	59	2.23	
HOMORT	C4E15	BKT	200	BKT-200-E15-M9	9	56	2.35	
HOMORT	C4E15	BKT	200	BKT-200-E15-M10	10	59	2.07	
HOMORT	C4E15	BKT	200	BKT-200-E15-M11	11	54	1.30	
HOMORT	C4E15	BKT	200	BKT-200-E15-M12	12	51	1.70	
HOMORT	C4E15	BKT	200	BKT-200-E15-M13	13	53	1.15	
HOMORT	C4E15	BKT	200	BKT-200-E15-M14	14	57	1.77	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T1	1	58	1.58	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T2	2	66	2.69	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T3	3	72	3.34	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T4	4	64	2.38	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T5	5	71	3.02	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T6	6	71	3.12	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T7	7	60	1.75	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T8	8	64	2.04	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T9	9	62	2.15	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T10	10	58	1.58	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T11	11	67	2.55	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T12	12	57	1.45	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T13	13	64	2.25	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T14	14	72	2.83	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T15	15	57	1.39	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T16	16	61	1.89	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T17	17	64	2.46	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T18	18	67	2.50	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T19	19	63	2.00	
TERMIN	C1E01	BKT	0	BKT-CONTROL-E1-T20	20	65	2.32	
TERMIN	A3E02	BKT	100	BKT-100-E2-T1	1	57	1.34	
TERMIN	A3E02	BKT	100	BKT-100-E2-T2	2	63	1.89	
TERMIN	A3E02	BKT	100	BKT-100-E2-T3	3	57	1.35	
TERMIN	A3E02	BKT	100	BKT-100-E2-T4	4	58	1.41	
TERMIN	A3E02	BKT	100	BKT-100-E2-T5	5	55	1.20	
TERMIN	A3E02	BKT	100	BKT-100-E2-T6	6	49	0.75	
TERMIN	A3E02	BKT	100	BKT-100-E2-T7	7	54	1.05	
TERMIN	A3E02	BKT	100	BKT-100-E2-T8	8	56	1.26	
TERMIN	A3E02	BKT	100	BKT-100-E2-T9	9	65	1.77	
TERMIN	A3E02	BKT	100	BKT-100-E2-T10	10	49	0.79	
TERMIN	A3E02	BKT	100	BKT-100-E2-T11	11	53	0.96	
TERMIN	A3E02	BKT	100	BKT-100-E2-T12	12	57	1.14	
TERMIN	A3E02	BKT	100	BKT-100-E2-T13	13	59	1.28	
TERMIN	A3E02	BKT	100	BKT-100-E2-T14	14	55	1.18	
TERMIN	A3E02	BKT	100	BKT-100-E2-T15	15	59	1.30	
TERMIN	B3E03	BKT	50	BKT-50-E3-T1	1	62	1.86	
TERMIN	B3E03	BKT	50	BKT-50-E3-T2	2	57	1.20	
TERMIN	B3E03	BKT	50	BKT-50-E3-T3	3	58	1.54	
TERMIN	B3E03	BKT	50	BKT-50-E3-T4	4	56	1.34	
TERMIN	B3E03	BKT	50	BKT-50-E3-T5	5	61	1.90	
TERMIN	B3E03	BKT	50	BKT-50-E3-T6	6	60	1.86	
TERMIN	B3E03	BKT	50	BKT-50-E3-T7	7	49	0.85	
TERMIN	B3E03	BKT	50	BKT-50-E3-T8	8	41	0.62	
TERMIN	B3E03	BKT	50	BKT-50-E3-T9	9	56	1.44	
TERMIN	B3E03	BKT	50	BKT-50-E3-T10	10	57	1.61	
TERMIN	B3E03	BKT	50	BKT-50-E3-T11	11	55	1.08	
TERMIN	B3E03	BKT	50	BKT-50-E3-T12	12	53	1.12	
TERMIN	B3E03	BKT	50	BKT-50-E3-T13	13	47	0.90	
TERMIN	B3E03	BKT	50	BKT-50-E3-T14	14	53	1.13	
TERMIN	B3E03	BKT	50	BKT-50-E3-T15	15	51	0.97	
TERMIN	B3E03	BKT	50	BKT-50-E3-T16	16	55	1.12	
TERMIN	B3E03	BKT	50	BKT-50-E3-T17	17	61	1.98	
TERMIN	B3E03	BKT	50	BKT-50-E3-T18	18	57	1.40	
TERMIN	B3E03	BKT	50	BKT-50-E3-T19	19	60	1.64	
TERMIN	B3E03	BKT	50	BKT-50-E3-T20	20	59	1.59	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17D
Forms: 3, 3a

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot number: 120300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4666-4-(5)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C5E05	BKT	50	BKT-50-E5-T1	1	53	2.20	
TERMIN	C5E05	BKT	50	BKT-50-E5-T2	2	53	1.19	
TERMIN	C5E05	BKT	50	BKT-50-E5-T3	3	50	0.89	
TERMIN	C5E05	BKT	50	BKT-50-E5-T4	4	59	1.61	
TERMIN	C5E05	BKT	50	BKT-50-E5-T5	5	57	1.44	
TERMIN	C5E05	BKT	50	BKT-50-E5-T6	6	61	1.98	
TERMIN	C5E05	BKT	50	BKT-50-E5-T7	7	57	1.26	
TERMIN	C5E05	BKT	50	BKT-50-E5-T8	8	51	0.95	
TERMIN	C5E05	BKT	50	BKT-50-E5-T9	9	59	1.76	
TERMIN	C5E05	BKT	50	BKT-50-E5-T10	10	54	1.24	
TERMIN	C5E05	BKT	50	BKT-50-E5-T11	11	56	1.45	
TERMIN	C5E05	BKT	50	BKT-50-E5-T12	12	58	1.50	
TERMIN	C5E05	BKT	50	BKT-50-E5-T13	13	59	1.77	
TERMIN	C5E05	BKT	50	BKT-50-E5-T14	14	59	1.55	
TERMIN	C5E05	BKT	50	BKT-50-E5-T15	15	59	1.78	
TERMIN	C5E05	BKT	50	BKT-50-E5-T16	16	56	1.23	
TERMIN	C5E05	BKT	50	BKT-50-E5-T17	17	58	1.52	
TERMIN	C5E05	BKT	50	BKT-50-E5-T18	18	51	1.14	
TERMIN	C5E05	BKT	50	BKT-50-E5-T19	19	57	1.32	
TERMIN	C5E05	BKT	50	BKT-50-E5-T20	20	55	1.14	
TERMIN	B2E06	BKT	100	BKT-100-E6-T1	1	61	1.63	
TERMIN	B2E06	BKT	100	BKT-100-E6-T2	2	54	1.01	
TERMIN	B2E06	BKT	100	BKT-100-E6-T3	3	56	1.30	
TERMIN	B2E06	BKT	100	BKT-100-E6-T4	4	56	1.20	
TERMIN	B2E06	BKT	100	BKT-100-E6-T5	5	48	0.64	
TERMIN	B2E06	BKT	100	BKT-100-E6-T6	6	60	1.68	
TERMIN	B2E06	BKT	100	BKT-100-E6-T7	7	58	1.40	
TERMIN	B2E06	BKT	100	BKT-100-E6-T8	8	57	1.37	
TERMIN	B2E06	BKT	100	BKT-100-E6-T9	9	65	1.86	
TERMIN	B2E06	BKT	100	BKT-100-E6-T10	10	53	1.12	
TERMIN	B2E06	BKT	100	BKT-100-E6-T11	11	62	1.76	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T1	1	66	2.57	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T2	2	64	2.34	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T3	3	63	2.14	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T4	4	61	2.23	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T5	5	68	2.44	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T6	6	58	1.64	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T7	7	70	2.84	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T8	8	66	2.72	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T9	9	65	2.40	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T10	10	73	3.50	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T11	11	57	1.65	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T12	12	65	2.27	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T13	13	70	3.17	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T14	14	63	2.11	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T15	15	64	2.26	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T16	16	68	2.60	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T17	17	59	1.75	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T18	18	50	1.06	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T19	19	58	1.63	
TERMIN	B5E07	BKT	0	BKT-CONTROL-E7-T20	20	60	1.88	
TERMIN	B4E08	BKT	200	BKT-200-E8-T1	1	59	1.25	
TERMIN	B4E08	BKT	200	BKT-200-E8-T2	2	60	1.47	
TERMIN	B4E08	BKT	200	BKT-200-E8-T3	3	57	1.24	
TERMIN	A2E09	BKT	50	BKT-50-E9-T1	1	63	1.98	
TERMIN	A2E09	BKT	50	BKT-50-E9-T2	2	55	1.04	
TERMIN	A2E09	BKT	50	BKT-50-E9-T3	3	54	1.12	
TERMIN	A2E09	BKT	50	BKT-50-E9-T4	4	58	1.53	
TERMIN	A2E09	BKT	50	BKT 50 E9 T5	5	55	1.28	
TERMIN	A2E09	BKT	50	BKT-50 E9-T6	6	62	1.70	
TERMIN	A2E09	BKT	50	BKT-50-E9-T7	7	50	0.83	
TERMIN	A2E09	BKT	50	BKT-50-E9-T8	8	55	1.16	
TERMIN	A2E09	BKT	50	BKT-50-E9-T9	9	65	2.46	
TERMIN	A2E09	BKT	50	BKT-50-E9-T10	10	52	1.17	
TERMIN	A2E09	BKT	50	BKT-50-E9-T11	11	61	1.71	
TERMIN	A2E09	BKT	50	BKT-50-E9-T12	12	48	0.80	
TERMIN	A2E09	BKT	50	BKT-50-E9-T13	13	49	0.77	
TERMIN	A2E09	BKT	50	BKT-50-E9-T14	14	49	0.83	
TERMIN	A2E09	BKT	50	BKT-50-E9-T15	15	55	1.40	
TERMIN	A2E09	BKT	50	BKT-50-E9-T16	16	56	1.71	
TERMIN	A2E09	BKT	50	BKT-50-E9-T17	17	57	1.61	
TERMIN	A2E09	BKT	50	BKT-50-E9-T18	18	55	1.10	
TERMIN	A2E09	BKT	50	BKT-50-E9-T19	19	54	1.08	
TERMIN	A2E09	BKT	50	BKT-50-E9-T20	20	57	1.47	

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Study Number: AEP-12-PSEUDO-03
Lab Notebook #1 (pages 38-49)
Data Source: File Folder: 17D
Forms: 3, 3a

Fish species: Coaster Brook Trout (*Salvelinus fontinalis*) Lot Number: 120300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: TR 4669-4-(5)
Exposure Date: 5/2/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A5E10	BKT	200	BKT-200-E10-T1	1	59	1.37	
TERMIN	A5E10	BKT	200	BKT-200-E10-T2	2	61	1.59	
TERMIN	A5E10	BKT	200	BKT-200-E10-T3	3	61	1.60	
TERMIN	A5E10	BKT	200	BKT-200-E10-T4	4	57	1.19	
TERMIN	A5E10	BKT	200	BKT-200-E10-T5	5	60	1.86	
TERMIN	A5E10	BKT	200	BKT-200-E10-T6	6	55	1.30	
TERMIN	C2E11	BKT	100	BKT-100-E11-T1	1	53	1.01	
TERMIN	C2E11	BKT	100	BKT-100-E11-T2	2	52	1.07	
TERMIN	C2E11	BKT	100	BKT-100-E11-T3	3	60	1.62	
TERMIN	C2E11	BKT	100	BKT-100-E11-T4	4	56	1.09	
TERMIN	C2E11	BKT	100	BKT-100-E11-T5	5	60	1.44	
TERMIN	C2E11	BKT	100	BKT-100-E11-T6	6	57	1.25	
TERMIN	C2E11	BKT	100	BKT-100-E11-T7	7	62	1.70	
TERMIN	C2E11	BKT	100	BKT-100-E11-T8	8	55	1.17	
TERMIN	C2E11	BKT	100	BKT-100-E11-T9	9	58	2.42	Heavy fungus on tail
TERMIN	C2E11	BKT	100	BKT-100-E11-T10	10	55	1.13	
TERMIN	C2E11	BKT	100	BKT-100-E11-T11	11	57	1.28	
TERMIN	C2E11	BKT	100	BKT-100-E11-T12	12	54	1.10	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T1	1	57	1.51	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T2	2	67	2.61	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T3	3	66	2.56	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T4	4	64	2.01	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T5	5	63	1.86	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T6	6	64	2.52	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T7	7	59	1.66	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T8	8	60	1.78	
TERMIN	A4E13	BKT	0	BKT CONTROL-E13-T9	9	63	2.22	
TERMIN	A4E13	BKT	0	BKT CONTROL-E13-T10	10	57	1.55	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T11	11	67	2.43	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T12	12	63	2.17	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T13	13	61	2.24	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T14	14	57	1.49	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T15	15	63	2.02	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T16	16	54	1.29	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T17	17	52	1.90	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T18	18	67	2.43	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T19	19	61	1.90	
TERMIN	A4E13	BKT	0	BKT-CONTROL-E13-T20	20	59	1.73	
TERMIN	C4E15	BKT	200	BKT-200-E15-T1	1	60	1.68	
TERMIN	C4E15	BKT	200	BKT-200-E15-T2	2	54	1.02	
TERMIN	C4E15	BKT	200	BKT-200-E15-T3	3	66	1.89	
TERMIN	C4E15	BKT	200	BKT-200-E15-T4	4	62	1.74	
TERMIN	C4E15	BKT	200	BKT-200-E15-T5	5	55	1.13	
TERMIN	C4E15	BKT	200	BKT-200-E15-T6	6	65	1.99	

File Folder: 17D

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #: (pages 14-37)	Created.....	5/1/2013	KLW
Data Source: File Folder: 18D	Revised.. ...	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/25/15	
	Certified.....	3/25/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]WAE LengthWeight

Length/Weight Data - *Sander vitreus*

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #10 - Jumper found; Length and weight not taken and mortality not used for analysis (See Deviation #25 for further clarification)
Deviation# 25 - Correction to Deviation #10; Jumper from Chamber F14 (not used for analysis)

File Folder: 18d

Item Number 1
Page 1 of 7

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 14-37)
Data Source: File Folder; 18D
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment - Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	WAE	NA	WAE-DIS#1-01	1	57	1.12	
DISTRO	D0001	WAE	NA	WAE-DIS#1-02	2	68	2.02	
DISTRO	D0001	WAE	NA	WAE-DIS#1-03	3	65	1.83	
DISTRO	D0001	WAE	NA	WAE-DIS#1-04	4	75	2.65	
DISTRO	D0001	WAE	NA	WAE-DIS#1-05	5	71	2.19	
DISTRO	D0001	WAE	NA	WAE-DIS#1-06	6	67	1.65	
DISTRO	D0001	WAE	NA	WAE-DIS#1-07	7	64	1.14	
DISTRO	D0001	WAE	NA	WAE-DIS#1-08	8	61	1.22	
DISTRO	D0001	WAE	NA	WAE-DIS#1-09	9	69	1.60	
DISTRO	D0001	WAE	NA	WAE-DIS#1-10	10	66	1.75	
DISTRO	D0001	WAE	NA	WAE-DIS#2-01	11	69	1.87	
DISTRO	D0001	WAE	NA	WAE-DIS#2-02	12	71	2.21	
DISTRO	D0001	WAE	NA	WAE-DIS#2-03	13	66	1.70	
DISTRO	D0001	WAE	NA	WAE-DIS#2-04	14	72	2.60	
DISTRO	D0001	WAE	NA	WAE-DIS#2-05	15	76	2.45	
DISTRO	D0001	WAE	NA	WAE-DIS#2-06	16	62	1.34	
DISTRO	D0001	WAE	NA	WAE-DIS#2-07	17	75	2.43	
DISTRO	D0001	WAE	NA	WAE-DIS#2-08	18	70	2.19	
DISTRO	D0001	WAE	NA	WAE-DIS#2-09	19	71	2.10	
DISTRO	D0001	WAE	NA	WAE-DIS#2-10	20	72	2.01	
DISTRO	D0001	WAE	NA	WAE-DIS#3-01	21	66	1.44	
DISTRO	D0001	WAE	NA	WAE-DIS#3-02	22	70	2.40	
DISTRO	D0001	WAE	NA	WAE-DIS#3-03	23	63	1.51	
DISTRO	D0001	WAE	NA	WAE-DIS#3-04	24	60	1.09	
DISTRO	D0001	WAE	NA	WAE-DIS#3-05	25	66	1.73	
DISTRO	D0001	WAE	NA	WAE-DIS#3-06	26	62	1.22	
DISTRO	D0001	WAE	NA	WAE-DIS#3-07	27	69	2.08	
DISTRO	D0001	WAE	NA	WAE-DIS#3-08	28	73	2.38	
DISTRO	D0001	WAE	NA	WAE-DIS#3-09	29	79	3.19	
DISTRO	D0001	WAE	NA	WAE-DIS#3-10	30	76	2.81	
DISTRO	D0001	WAE	NA	WAE-DIS#4-01	31	67	1.94	
DISTRO	D0001	WAE	NA	WAE-DIS#4-02	32	69	2.02	
DISTRO	D0001	WAE	NA	WAE-DIS#4-03	33	67	2.06	
DISTRO	D0001	WAE	NA	WAE-DIS#4-04	34	66	1.61	
DISTRO	D0001	WAE	NA	WAE-DIS#4-05	35	74	2.29	
DISTRO	D0001	WAE	NA	WAE-DIS#4-06	36	70	1.99	
DISTRO	D0001	WAE	NA	WAE-DIS#4-07	37	68	1.70	
DISTRO	D0001	WAE	NA	WAE-DIS#4-08	38	70	2.18	
DISTRO	D0001	WAE	NA	WAE-DIS#4-09	39	67	1.88	
DISTRO	D0001	WAE	NA	WAE-DIS#4-10	40	65	1.85	
EXPTER	A1F12	WAE	200	WAE-200-A-01	1	80	2.98	
EXPTER	A1F12	WAE	200	WAE-200-A-02	2	69	1.90	
EXPTER	A1F12	WAE	200	WAE-200-A-03	3	65	1.38	
EXPTER	A1F12	WAE	200	WAE-200-A-04	4	69	2.07	
EXPTER	A1F12	WAE	200	WAE-200-A-05	5	61	1.17	
EXPTER	A2F10	WAE	0	WAE-CONTROL-A-01	1	67	1.57	
EXPTER	A2F10	WAE	0	WAE-CONTROL-A-02	2	74	2.18	
EXPTER	A2F10	WAE	0	WAE-CONTROL-A-03	3	66	1.65	
EXPTER	A2F10	WAE	0	WAE-CONTROL-A-04	4	63	1.11	
EXPTER	A2F10	WAE	0	WAE-CONTROL-A-05	5	70	1.87	
EXPTER	A3F11	WAE	300	WAE-300-A-01	1	68	1.87	
EXPTER	A3F11	WAE	300	WAE-300-A-02	2	73	2.16	
EXPTER	A3F11	WAE	300	WAE-300-A-03	3	72	2.53	
EXPTER	A3F11	WAE	300	WAE-300-A-04	4	62	1.54	
EXPTER	A4F09	WAE	100	WAE-100-A-01	1	65	1.65	
EXPTER	A4F09	WAE	100	WAE 100 A 02	2	70	2.11	
EXPTER	A4F09	WAE	100	WAE 100 A 03	3	62	1.40	
EXPTER	A4F09	WAE	100	WAE-100-A-04	4	71	2.03	
EXPTER	A4F09	WAE	100	WAE-100-A-05	5	66	1.20	
EXPTER	A5F01	WAE	50	WAE-50-A-01	1	62	1.24	
EXPTER	A5F01	WAE	50	WAE-50-A-02	2	65	1.56	
EXPTER	A5F01	WAE	50	WAE-50-A-03	3	59	1.11	
EXPTER	A5F01	WAE	50	WAE-50-A-04	4	69	1.92	
EXPTER	A5F01	WAE	50	WAE-50-A-05	5	71	2.16	
EXPTER	B1F07	WAE	200	WAE-200-B-01	1	65	1.70	
EXPTER	B1F07	WAE	200	WAE-200-B-02	2	65	1.16	
EXPTER	B1F07	WAE	200	WAE-200-B-03	3	76	2.73	
EXPTER	B1F07	WAE	200	WAE-200-B-04	4	65	1.26	
EXPTER	B1F07	WAE	200	WAE-200-B-05	5	66	1.69	
EXPTER	B2F15	WAE	50	WAE-50-B-01	1	65	1.53	
EXPTER	B2F15	WAE	50	WAE-50-B-02	2	68	1.66	
EXPTER	B2F15	WAE	50	WAE-50-B-03	3	72	2.06	
EXPTER	B2F15	WAE	50	WAE 50 B 04	4	67	1.84	
EXPTER	B2F15	WAE	50	WAE-50-B-05	5	77	2.77	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #: (pages 14-37)
Data Source: File Folder: 18D
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens* Pf -CL 145A (SDP) Chemical lot #: TR 4669-4-(7-6)
Exposure Date: 8/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B3F04	WAE	100	WAE-100-B-01	1	77	2.65	
EXPTER	B3F04	WAE	100	WAE-100-B-02	2	74	2.53	
EXPTER	B3F04	WAE	100	WAE-100-B-03	3	69	1.77	
EXPTER	B3F04	WAE	100	WAE-100-B-04	4	74	2.42	
EXPTER	B3F04	WAE	100	WAE-100-B-05	5	70	1.88	
EXPTER	B4F06	WAE	300	WAE-300-B-01	1	72	2.34	
EXPTER	B4F06	WAE	300	WAE-300-B-02	2	60	1.39	
EXPTER	B4F06	WAE	300	WAE-300-B-03	3	75	2.68	
EXPTER	B5F14	WAE	0	WAE-CONTROL-B-01	1	67	1.56	
EXPTER	B5F14	WAE	0	WAE-CONTROL-B-02	2	74	2.41	
EXPTER	B5F14	WAE	0	WAE-CONTROL-B-03	3	67	1.79	
EXPTER	B5F14	WAE	0	WAE-CONTROL-B-04	4	65	1.28	
EXPTER	B5F14	WAE	0	WAE-CONTROL-B-05	5	68	1.91	
EXPTER	C1F02	WAE	300	WAE-300-C-01	1	71	2.35	
EXPTER	C1F02	WAE	300	WAE-300-C-02	2	64	1.42	
EXPTER	C1F02	WAE	300	WAE-300-C-03	3	70	2.17	
EXPTER	C1F02	WAE	300	WAE-300-C-04	4	60	1.45	
EXPTER	C1F02	WAE	300	WAE-300-C-05	5	70	2.08	
EXPTER	C2F05	WAE	200	WAE-200-C-01	1	69	1.69	
EXPTER	C2F05	WAE	200	WAE-200-C-02	2	73	2.36	
EXPTER	C2F05	WAE	200	WAE-200-C-03	3	68	1.76	
EXPTER	C2F05	WAE	200	WAE-200-C-04	4	66	1.63	
EXPTER	C2F05	WAE	200	WAE-200-C-05	5	62	1.16	
EXPTER	C3F13	WAE	0	WAE-CONTROL-C-01	1	70	2.03	
EXPTER	C3F13	WAE	0	WAE-CONTROL-C-02	2	63	1.39	
EXPTER	C3F13	WAE	0	WAE-CONTROL-C-03	3	65	1.76	
EXPTER	C3F13	WAE	0	WAE-CONTROL-C-04	4	60	1.21	
EXPTER	C3F13	WAE	0	WAE-CONTROL-C-05	5	68	1.74	
EXPTER	C4F03	WAE	100	WAE-100-C-01	1	63	1.37	
EXPTER	C4F03	WAE	100	WAE-100-C-02	2	72	2.12	
EXPTER	C4F03	WAE	100	WAE-100-C-03	3	69	1.87	
EXPTER	C4F03	WAE	100	WAE-100-C-04	4	57	1.09	
EXPTER	C4F03	WAE	100	WAE-100-C-05	5	62	1.19	
EXPTER	C5F08	WAE	50	WAE-50-C-01	1	74	2.33	
EXPTER	C5F08	WAE	50	WAE-50-C-02	2	67	1.80	
EXPTER	C5F08	WAE	50	WAE-50-C-03	3	74	2.25	
EXPTER	C5F08	WAE	50	WAE-50-C-04	4	71	1.89	
EXPTER	C5F08	WAE	50	WAE-50-C-05	5	67	1.87	
EXMORT	A1F12	WAE	200	WAE-200-A-M1	1	69	2.21	
EXMORT	A3F11	WAE	300	WAE-300-A-M1	1	56	1.02	
EXMORT	A3F11	WAE	300	WAE-300-A-M2	2	74	2.62	
EXMORT	A3F11	WAE	300	WAE-300-A-M3	3	60	1.39	
EXMORT	A3F11	WAE	300	WAE-300-A-M4	4	61	1.80	
EXMORT	A3F11	WAE	300	WAE-300-A-M5	5	70	2.30	
EXMORT	A5F01	WAE	50	WAE-50-A-M1	1	67	1.80	
EXMORT	B1F07	WAE	200	WAE-200-B-M1	1	65	1.77	
EXMORT	B4F06	WAE	300	WAE-300-B-M1	1	59	1.35	
EXMORT	B4F06	WAE	300	WAE-300-B-M2	2	63	1.45	
EXMORT	B4F06	WAE	300	WAE-300-B-M3	3	69	2.14	
EXMORT	B4F06	WAE	300	WAE-300-B-M4	4	62	1.47	
EXMORT	C1F02	WAE	300	WAE-300-C-M1	1	69	1.20	
EXMORT	C1F02	WAE	300	WAE-300-C-M2	2	69	1.84	
EXMORT	C1F02	WAE	300	WAE-300-C-M3	3	63	1.62	
EXMORT	C1F02	WAE	300	WAE-300-C-M4	4	61	1.11	
EXMORT	C2F05	WAE	200	WAE-200-C-M1	1	59	0.99	
HDMORT	A1F12	WAE	200	WAE-200-F12-M1	1	62	1.62	
HDMORT	A1F12	WAE	200	WAE-200-F12-M2	2	67	1.96	
HDMORT	A1F12	WAE	200	WAE-200-F12-M3	3	71	2.44	
HDMORT	A1F12	WAE	200	WAE-200-F12-M4	4	66	2.08	
HDMORT	A1F12	WAE	200	WAE-200-F12-M5	5	64	1.96	
HDMORT	A3F11	WAE	300	WAE-300-F11-M1	1	59	1.30	
HDMORT	A3F11	WAE	300	WAE-300-F11-M2	2	69	2.20	
HDMORT	A3F11	WAE	300	WAE-300-F11-M3	3	62	1.61	
HDMORT	A3F11	WAE	300	WAE-300-F11-M4	4	67	1.96	
HDMORT	A3F11	WAE	300	WAE-300-F11-M5	5	65	1.84	
HDMORT	A3F11	WAE	300	WAE-300-F11-M6	6	66	2.12	
HDMORT	A3F11	WAE	300	WAE-300-F11-M7	7	70	2.25	
HDMORT	A3F11	WAE	300	WAE-300-F11-M8	8	63	1.93	
HDMORT	A4F09	WAE	100	WAE-100-F9-M1	1	60	1.25	
HDMORT	A4F09	WAE	100	WAE-100-F9-M2	2	65	1.79	
HDMORT	A4F09	WAE	100	WAE-100-F9-M3	3	57	0.96	
HDMORT	A4F09	WAE	100	WAE-100-F9-M4	4	63	1.14	
HDMORT	A4F09	WAE	100	WAE-100-F9-M5	5	61	1.09	Pinhead
HDMORT	A5F01	WAE	50	WAE-50-F1-M1	1	61	0.89	

Item Number 1
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Study Number: ACH-12-PSEUDO-03
Lab Notebook #1 (pages 14-37)
Data Source: File Folder: 18D
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-7-8)
Exposure Date: 3/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	B1F07	WAE	200	WAE-200-F7-M1	1	72	2.22	
HDMORT	B1F07	WAE	200	WAE-200-F7-M2	2	66	1.94	
HDMORT	B1F07	WAE	200	WAE-200-F7-M3	3	75	2.53	
HDMORT	B1F07	WAE	200	WAE-200-F7-M4	4	55	0.79	
HDMORT	B3F04	WAE	100	WAE-100-F4-M1	1	59	1.22	
HDMORT	B3F04	WAE	100	WAE-100-F4-M2	2	67	1.77	
HDMORT	B3F04	WAE	100	WAE-100-F4-M3	3	56	0.87	
HDMORT	B4F06	WAE	300	WAE-300-F6-M1	1	71	2.08	
HDMORT	B4F06	WAE	300	WAE-300-F6-M2	2	62	1.43	
HDMORT	B4F06	WAE	300	WAE-300-F6-M3	3	70	2.49	
HDMORT	B4F06	WAE	300	WAE-300-F6-M4	4	77	2.77	
HDMORT	B4F06	WAE	300	WAE-300-F6-M5	5	61	1.17	
HDMORT	B4F06	WAE	300	WAE-300-F6-M6	6	62	1.34	
HDMORT	C1F02	WAE	300	WAE-300-F2-M1	1	69	2.27	
HDMORT	C1F02	WAE	300	WAE-300-F2-M2	2	65	1.95	
HDMORT	C1F02	WAE	300	WAE-300-F2-M3	3	59	1.23	
HDMORT	C1F02	WAE	300	WAE-300-F2-M4	4	65	1.62	
HDMORT	C1F02	WAE	300	WAE-300-F2-M5	5	64	1.68	
HDMORT	C1F02	WAE	300	WAE-300-F2-M6	6	69	2.00	
HDMORT	C1F02	WAE	300	WAE-300-F2-M7	7	62	1.47	
HDMORT	C1F02	WAE	300	WAE-300-F2-M8	8	67	2.19	
HDMORT	C1F02	WAE	300	WAE-300-F2-M9	9	64	1.84	
HDMORT	C1F02	WAE	300	WAE-300-F2-M10	10	63	1.75	
HDMORT	C2F05	WAE	200	WAE-200-F5-M1	1	73	2.39	
HDMORT	C2F05	WAE	200	WAE-200-F5-M2	2	65	1.92	
HDMORT	C2F05	WAE	200	WAE-200-F5-M3	3	55	1.16	
HDMORT	C2F05	WAE	200	WAE-200-F5-M4	4	70	2.31	
HDMORT	C2F05	WAE	200	WAE-200-F5-M5	5	64	2.08	
HDMORT	C2F05	WAE	200	WAE-200-F5-M6	6	66	1.70	
HDMORT	C2F05	WAE	200	WAE-200-F5-M7	7	57	1.25	
HDMORT	C3F13	WAE	0	WAE-CONTROL-F13-M1	1	55	0.83	Pinhead
HDMORT	C4F03	WAE	100	WAE-100-F3-M1	1	63	1.34	
HDMORT	C4F03	WAE	100	WAE-100-F3-M2	2	71	2.47	
HDMORT	C4F03	WAE	100	WAE-100-F3-M3	3	66	1.47	
TERMIN	A5F01	WAE	50	WAE-50-F1-T1	1	84	3.31	
TERMIN	A5F01	WAE	50	WAE-50-F1-T2	2	70	2.08	
TERMIN	A5F01	WAE	50	WAE-50-F1-T3	3	73	1.94	
TERMIN	A5F01	WAE	50	WAE-50-F1-T4	4	60	1.14	
TERMIN	A5F01	WAE	50	WAE-50-F1-T5	5	77	2.40	
TERMIN	A5F01	WAE	50	WAE-50-F1-T6	6	69	1.87	
TERMIN	A5F01	WAE	50	WAE-50-F1-T7	7	67	1.83	
TERMIN	A5F01	WAE	50	WAE-50-F1-T8	8	80	3.06	
TERMIN	A5F01	WAE	50	WAE-50-F1-T9	9	60	1.04	
TERMIN	A5F01	WAE	50	WAE-50-F1-T10	10	73	1.78	
TERMIN	A5F01	WAE	50	WAE-50-F1-T11	11	63	1.24	
TERMIN	A5F01	WAE	50	WAE-50-F1-T12	12	68	1.84	
TERMIN	A5F01	WAE	50	WAE-50-F1-T13	13	69	1.69	
TERMIN	A5F01	WAE	50	WAE-50-F1-T14	14	75	2.27	
TERMIN	A5F01	WAE	50	WAE-50-F1-T15	15	74	2.50	
TERMIN	A5F01	WAE	50	WAE-50-F1-T16	16	79	2.63	
TERMIN	A5F01	WAE	50	WAE-50-F1-T17	17	82	3.18	
TERMIN	A5F01	WAE	50	WAE-50-F1-T18	18	66	1.77	
TERMIN	C1F02	WAE	300	WAE-300-F2-T1	1	77	2.47	
TERMIN	C1F02	WAE	300	WAE-300-F2-T2	2	77	2.72	
TERMIN	C1F02	WAE	300	WAE-300-F2-T3	3	60	1.39	
TERMIN	C1F02	WAE	300	WAE-300-F2-T4	4	73	2.18	
TERMIN	C1F02	WAE	300	WAE-300-F2-T5	5	70	1.61	
TERMIN	C1F02	WAE	300	WAE-300-F2-T6	6	75	2.45	
TERMIN	C4F03	WAE	100	WAE-100-F3-T1	1	71	1.90	
TERMIN	C4F03	WAE	100	WAE-100-F3-T2	2	68	1.64	
TERMIN	C4F03	WAE	100	WAE-100-F3-T3	3	66	1.69	
TERMIN	C4F03	WAE	100	WAE-100-F3-T4	4	74	2.44	
TERMIN	C4F03	WAE	100	WAE-100-F3-T5	5	70	2.04	
TERMIN	C4F03	WAE	100	WAE-100-F3-T6	6	67	1.74	
TERMIN	C4F03	WAE	100	WAE-100-F3-T7	7	76	2.88	
TERMIN	C4F03	WAE	100	WAE-100-F3-T8	8	70	2.07	
TERMIN	C4F03	WAE	100	WAE-100-F3-T9	9	70	2.08	
TERMIN	C4F03	WAE	100	WAE-100-F3-T10	10	74	2.52	
TERMIN	C4F03	WAE	100	WAE-100-F3-T11	11	55	1.36	
TERMIN	C4F03	WAE	100	WAE-100-F3-T12	12	72	2.39	
TERMIN	C4F03	WAE	100	WAE-100-F3-T13	13	72	2.21	
TERMIN	C4F03	WAE	100	WAE-100-F3-T14	14	81	3.28	
TERMIN	C4F03	WAE	100	WAE-100-F3-T15	15	62	1.27	
TERMIN	C4F03	WAE	100	WAE 100 F3-T16	16	82	3.05	

Item Number 1-7
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 14-37)
Data Source: File Folder: 18D
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C4F03	WAE	100	WAE-100-F3-T17	17	73	2.31	
TERMIN	B2F04	WAE	100	WAE-100-F4-T1	1	72	2.31	
TERMIN	B2F04	WAE	100	WAE-100-F4-T2	2	75	2.76	
TERMIN	B2F04	WAE	100	WAE-100-F4-T3	3	74	2.56	
TERMIN	B2F04	WAE	100	WAE-100-F4-T4	4	70	1.83	
TERMIN	B2F04	WAE	100	WAE-100-F4-T5	5	78	3.02	
TERMIN	B2F04	WAE	100	WAE-100-F4-T6	6	74	2.40	
TERMIN	B2F04	WAE	100	WAE-100-F4-T7	7	63	1.30	
TERMIN	B2F04	WAE	100	WAE-100-F4-T8	8	83	3.04	
TERMIN	B2F04	WAE	100	WAE-100-F4-T9	9	68	1.53	
TERMIN	B2F04	WAE	100	WAE-100-F4-T10	10	75	2.35	
TERMIN	B2F04	WAE	100	WAE-100-F4-T11	11	75	2.12	
TERMIN	B2F04	WAE	100	WAE-100-F4-T12	12	67	1.73	
TERMIN	B2F04	WAE	100	WAE-100-F4-T13	13	72	2.54	
TERMIN	B2F04	WAE	100	WAE-100-F4-T14	14	77	2.92	
TERMIN	B2F04	WAE	100	WAE-100-F4-T15	15	68	1.58	
TERMIN	B2F04	WAE	100	WAE-100-F4-T16	16	75	2.57	
TERMIN	B2F04	WAE	100	WAE-100-F4-T17	17	62	1.29	
TERMIN	B2F04	WAE	100	WAE-100-F4-T18	18	72	2.13	
TERMIN	B2F04	WAE	100	WAE-100-F4-T19	19	88	3.91	
TERMIN	B2F04	WAE	100	WAE-100-F4-T20	20	66	1.67	
TERMIN	B2F04	WAE	100	WAE-100-F4-T21	21	73	2.26	
TERMIN	B2F04	WAE	100	WAE-100-F4-T22	22	70	1.93	
TERMIN	B2F04	WAE	100	WAE-100-F4-T23	23	70	1.68	
TERMIN	B2F04	WAE	100	WAE-100-F4-T24	24	67	1.72	
TERMIN	B2F04	WAE	100	WAE-100-F4-T25	25	74	2.28	
TERMIN	B2F04	WAE	100	WAE-100-F4-T26	26	67	1.71	
TERMIN	B2F04	WAE	100	WAE-100-F4-T27	27	57	1.44	
TERMIN	C2F05	WAE	200	WAE-200-F5-T1	1	67	1.76	
TERMIN	C2F05	WAE	200	WAE-200-F5-T2	2	69	1.74	
TERMIN	C2F05	WAE	200	WAE-200-F5-T3	3	70	2.11	
TERMIN	C2F05	WAE	200	WAE-200-F5-T4	4	58	1.20	
TERMIN	C2F05	WAE	200	WAE-200-F5-T5	5	60	1.22	
TERMIN	C2F05	WAE	200	WAE-200-F5-T6	6	68	1.99	
TERMIN	C2F05	WAE	200	WAE-200-F5-T7	7	71	1.95	
TERMIN	C2F05	WAE	200	WAE-200-F5-T8	8	67	1.64	
TERMIN	C2F05	WAE	200	WAE-200-F5-T9	9	73	2.38	
TERMIN	C2F05	WAE	200	WAE-200-F5-T10	10	66	1.85	
TERMIN	C2F05	WAE	200	WAE-200-F5-T11	11	68	1.71	
TERMIN	C2F05	WAE	200	WAE-200-F5-T12	12	70	2.23	
TERMIN	B4F06	WAE	300	WAE-300 F6 T1	1	70	2.27	
TERMIN	B4F06	WAE	300	WAE-300 F6 T2	2	69	1.92	
TERMIN	B1F07	WAE	200	WAE-200-F7-T1	1	68	1.98	
TERMIN	B1F07	WAE	200	WAE-200-F7-T2	2	66	1.78	
TERMIN	B1F07	WAE	200	WAE-200-F7-T3	3	72	2.31	
TERMIN	B1F07	WAE	200	WAE-200-F7-T4	4	65	1.50	
TERMIN	B1F07	WAE	200	WAE-200-F7-T5	5	70	1.68	
TERMIN	B1F07	WAE	200	WAE-200-F7-T6	6	65	1.92	
TERMIN	B1F07	WAE	200	WAE-200-F7-T7	7	63	1.20	
TERMIN	B1F07	WAE	200	WAE-200-F7-T8	8	68	1.90	
TERMIN	B1F07	WAE	200	WAE-200-F7-T9	9	67	1.83	
TERMIN	B1F07	WAE	200	WAE-200-F7-T10	10	74	2.55	
TERMIN	B1F07	WAE	200	WAE-200-F7-T11	11	67	1.81	
TERMIN	B1F07	WAE	200	WAE-200-F7-T12	12	70	2.05	
TERMIN	B1F07	WAE	200	WAE-200-F7-T13	13	70	2.01	
TERMIN	B1F07	WAE	200	WAE-200-F7-T14	14	70	2.40	
TERMIN	B1F07	WAE	200	WAE-200-F7-T15	15	55	0.85	
TERMIN	C5F08	WAE	50	WAE-50 F8 T1	1	77	2.77	
TERMIN	C5F08	WAE	50	WAE-50-F8-T2	2	73	2.13	
TERMIN	C5F08	WAE	50	WAE-50-F8-T3	3	69	1.86	
TERMIN	C5F08	WAE	50	WAE-50-F8-T4	4	70	1.84	
TERMIN	C5F08	WAE	50	WAE-50-F8-T5	5	88	4.52	
TERMIN	C5F08	WAE	50	WAE-50-F8-T6	6	67	1.85	
TERMIN	C5F08	WAE	50	WAE-50-F8-T7	7	65	1.56	
TERMIN	C5F08	WAE	50	WAE-50-F8-T8	8	79	2.92	
TERMIN	C5F08	WAE	50	WAE-50-F8-T9	9	70	1.98	
TERMIN	C5F08	WAE	50	WAE-50-F8-T10	10	63	1.38	
TERMIN	C5F08	WAE	50	WAE-50-F8-T11	11	66	1.73	
TERMIN	C5F08	WAE	50	WAE-50-F8-T12	12	76	2.49	
TERMIN	C5F08	WAE	50	WAE-50-F8-T13	13	72	2.04	
TERMIN	C5F08	WAE	50	WAE-50-F8-T14	14	77	2.84	
TERMIN	C5F08	WAE	50	WAE-50-F8-T15	15	68	1.94	
TERMIN	C5F08	WAE	50	WAE-50-F8-T16	16	77	2.69	
TERMIN	C5F08	WAE	50	WAE-50 F8 T17	17	73	2.18	

Item Number 1
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Study Number AEH-12-PSEUDO-03
Lab Notebook #: (pages 14-37)
Data Source: File Folder: 180
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR4669-4-(7-8)
Exposure Date: 3/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C5F08	WAE	50	WAE-50-F8-T18	18	78	2.86	
TERMIN	C5F08	WAE	50	WAE-50-F8-T19	19	65	1.43	
TERMIN	C5F08	WAE	50	WAE-50-F8-T20	20	67	1.56	
TERMIN	A4F09	WAE	100	WAE-100-F9-T1	1	76	2.75	
TERMIN	A4F09	WAE	100	WAE-100-F9-T2	2	67	1.69	
TERMIN	A4F09	WAE	100	WAE-100-F9-T3	3	65	1.35	
TERMIN	A4F09	WAE	100	WAE-100-F9-T4	4	76	2.20	
TERMIN	A4F09	WAE	100	WAE-100-F9-T5	5	72	2.05	
TERMIN	A4F09	WAE	100	WAE-100-F9-T6	6	69	1.58	
TERMIN	A4F09	WAE	100	WAE-100-F9-T7	7	72	2.08	
TERMIN	A4F09	WAE	100	WAE-100-F9-T8	8	67	1.44	
TERMIN	A4F09	WAE	100	WAE-100-F9-T9	9	70	2.02	
TERMIN	A4F09	WAE	100	WAE-100-F9-T10	10	76	2.49	
TERMIN	A4F09	WAE	100	WAE-100-F9-T11	11	77	2.72	
TERMIN	A4F09	WAE	100	WAE-100-F9-T12	12	75	2.26	
TERMIN	A4F09	WAE	100	WAE-100-F9-T13	13	71	2.60	
TERMIN	A4F09	WAE	100	WAE-100-F9-T14	14	77	2.85	
TERMIN	A4F09	WAE	100	WAE-100-F9-T15	15	75	2.26	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T1	1	73	2.37	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T2	2	73	2.56	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T3	3	61	1.19	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T4	4	59	1.31	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T5	5	60	1.19	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T6	6	73	2.49	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T7	7	71	1.81	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T8	8	75	2.38	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T9	9	82	2.97	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T10	10	67	1.87	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T11	11	67	1.94	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T12	12	73	2.35	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T13	13	70	2.13	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T14	14	72	2.34	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T15	15	66	1.68	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T16	16	72	2.11	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T17	17	65	1.23	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T18	18	80	2.98	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T19	19	66	1.89	
TERMIN	A2F10	WAE	0	WAE-CONTROL-F10-T20	20	60	1.30	
TERMIN	A3F11	WAE	300	WAE-300-F11-T1	1	84	3.60	
TERMIN	A3F11	WAE	300	WAE-300-F11-T2	2	60	1.26	
TERMIN	A3F11	WAE	300	WAE-300-F11-T3	3	64	1.62	
TERMIN	A3F11	WAE	300	WAE-300-F11-T4	4	72	2.58	
TERMIN	A3F11	WAE	300	WAE-300-F11-T5	5	68	2.00	
TERMIN	A3F11	WAE	300	WAE-300-F11-T6	6	65	1.54	
TERMIN	A3F11	WAE	300	WAE-300-F11-T7	7	75	2.80	
TERMIN	A3F11	WAE	300	WAE-300-F11-T8	8	68	2.12	
TERMIN	A1F12	WAE	200	WAE-200-F12-T1	1	75	2.70	
TERMIN	A1F12	WAE	200	WAE-200-F12-T2	2	74	1.71	
TERMIN	A1F12	WAE	200	WAE-200-F12-T3	3	66	1.83	
TERMIN	A1F12	WAE	200	WAE-200-F12-T4	4	65	1.78	
TERMIN	A1F12	WAE	200	WAE-200-F12-T5	5	72	1.87	
TERMIN	A1F12	WAE	200	WAE-200-F12-T6	6	68	1.96	
TERMIN	A1F12	WAE	200	WAE-200-F12-T7	7	61	1.29	
TERMIN	A1F12	WAE	200	WAE-200-F12-T8	8	60	0.87	
TERMIN	A1F12	WAE	200	WAE-200-F12-T9	9	77	2.82	
TERMIN	A1F12	WAE	200	WAE 200 F12-T10	10	67	1.81	
TERMIN	A1F12	WAE	200	WAE-200 F12-T11	11	63	1.55	
TERMIN	A1F12	WAE	200	WAE-200-F12-T12	12	78	2.38	
TERMIN	A1F12	WAE	200	WAE-200-F12-T13	13	70	2.51	
TERMIN	A1F12	WAE	200	WAE-200-F12-T14	14	68	1.31	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T1	1	62	1.10	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T2	2	75	2.30	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T3	3	77	2.49	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T4	4	65	1.28	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T5	5	71	2.28	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T6	6	65	1.38	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T7	7	75	1.99	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T8	8	70	2.13	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T9	9	63	1.45	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T10	10	75	2.22	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T11	11	58	1.15	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T12	12	71	2.25	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T13	13	65	1.50	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T14	14	72	2.48	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 14-37)
Data Source: File Folder: 18D
Forms: 3, 3a

Fish species: Walleye (*Sander vitreus*) Lot number: 112100
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(7-8)
Exposure Date: 3/21/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T15	15	71	1.66	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T16	16	62	1.30	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T17	17	78	3.00	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T18	18	72	2.26	
TERMIN	C3F13	WAE	0	WAE-CONTROL-F13-T19	19	66	2.18	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T1	1	67	1.51	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T2	2	75	3.20	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T3	3	72	2.22	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T4	4	62	1.41	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T5	5	76	2.60	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T6	6	67	1.67	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T7	7	70	2.02	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T8	8	67	1.82	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T9	9	68	1.84	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T10	10	60	1.15	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T11	11	77	2.79	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T12	12	76	2.50	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T13	13	65	1.33	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T14	14	67	1.46	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T15	15	63	1.30	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T16	16	73	2.50	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T17	17	69	2.26	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T18	18	55	0.89	
TERMIN	B5F14	WAE	0	WAE-CONTROL-F14-T19	19	80	2.82	
TERMIN	B2F15	WAE	50	WAE-50-F15-T1	1	65	1.10	
TERMIN	B2F15	WAE	50	WAE-50-F15-T2	2	61	1.08	
TERMIN	B2F15	WAE	50	WAE-50-F15-T3	3	62	1.39	
TERMIN	B2F15	WAE	50	WAE-50-F15-T4	4	65	1.32	
TERMIN	B2F15	WAE	50	WAE-50-F15-T5	5	68	1.58	
TERMIN	B2F15	WAE	50	WAE-50-F15-T6	6	66	1.21	
TERMIN	B2F15	WAE	50	WAE-50-F15-T7	7	66	1.53	
TERMIN	B2F15	WAE	50	WAE-50-F15-T8	8	67	1.80	
TERMIN	B2F15	WAE	50	WAE-50-F15-T9	9	61	1.04	
TERMIN	B2F15	WAE	50	WAE-50-F15-T10	10	76	2.73	
TERMIN	B2F15	WAE	50	WAE-50-F15-T11	11	72	2.25	
TERMIN	B2F15	WAE	50	WAE-50-F15-T12	12	61	1.34	
TERMIN	B2F15	WAE	50	WAE-50-F15-T13	13	67	1.65	
TERMIN	B2F15	WAE	50	WAE-50-F15-T14	14	72	2.34	
TERMIN	B2F15	WAE	50	WAE-50-F15-T15	15	68	1.85	
TERMIN	B2F15	WAE	50	WAE-50-F15-T16	16	70	1.94	
TERMIN	B2F15	WAE	50	WAE-50-F15-T17	17	68	1.50	
TERMIN	B2F15	WAE	50	WAE-50-F15-T18	18	62	1.30	
TERMIN	B2F15	WAE	50	WAE-50-F15-T19	19	68	1.53	
TERMIN	B2F15	WAE	50	WAE-50-F15-T20	20	70	1.97	

File Folder: 18d

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #: (pages 1-30)	Created.....	5/1/2013	KLW
Data Source: File Folder: 19D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/25/15	
	Certified.....	3/25/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]YEP LengthWeight			

Length/Weight Data - *Perca flavescens*

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #34 - Accidental death of fish from Chamber A4; fish length and weight was taken, but removed for analysis

File Folder: 19d

Item Number 1
Page 1 of 3

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-30)
Data Source: File Folder: 19D
Forms: 3, 3a

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens* Pf -CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	YEP	NA	YEP-DIS#1-01	1	51	1.00	
DISTRO	D0001	YEP	NA	YEP-DIS#1-02	2	49	0.97	
DISTRO	D0001	YEP	NA	YEP-DIS#1-03	3	53	1.30	
DISTRO	D0001	YEP	NA	YEP-DIS#1-04	4	55	1.50	
DISTRO	D0001	YEP	NA	YEP-DIS#1-05	5	54	1.33	
DISTRO	D0001	YEP	NA	YEP-DIS#1-06	6	54	1.26	
DISTRO	D0001	YEP	NA	YEP-DIS#1-07	7	53	1.38	
DISTRO	D0001	YEP	NA	YEP-DIS#1-08	8	52	1.31	
DISTRO	D0001	YEP	NA	YEP-DIS#1-09	9	51	1.21	
DISTRO	D0001	YEP	NA	YEP-DIS#1-10	10	49	1.02	
DISTRO	D0001	YEP	NA	YEP-DIS#2-01	11	52	1.34	
DISTRO	D0001	YEP	NA	YEP-DIS#2-02	12	48	0.95	
DISTRO	D0001	YEP	NA	YEP-DIS#2-03	13	52	1.35	
DISTRO	D0001	YEP	NA	YEP-DIS#2-04	14	52	1.16	
DISTRO	D0001	YEP	NA	YEP-DIS#2-05	15	53	1.38	
DISTRO	D0001	YEP	NA	YEP-DIS#2-06	16	55	1.49	
DISTRO	D0001	YEP	NA	YEP-DIS#2-07	17	53	1.22	
DISTRO	D0001	YEP	NA	YEP-DIS#2-08	18	50	1.12	
DISTRO	D0001	YEP	NA	YEP-DIS#2-09	19	51	1.25	
DISTRO	D0001	YEP	NA	YEP-DIS#2-10	20	45	0.74	
DISTRO	D0001	YEP	NA	YEP-DIS#3-01	21	50	1.02	
DISTRO	D0001	YEP	NA	YEP-DIS#3-02	22	50	1.07	
DISTRO	D0001	YEP	NA	YEP-DIS#3-03	23	50	1.15	
DISTRO	D0001	YEP	NA	YEP-DIS#3-04	24	46	0.85	
DISTRO	D0001	YEP	NA	YEP-DIS#3-05	25	50	1.05	
DISTRO	D0001	YEP	NA	YEP-DIS#3-06	26	54	1.30	
DISTRO	D0001	YEP	NA	YEP-DIS#3-07	27	51	1.20	
DISTRO	D0001	YEP	NA	YEP-DIS#3-08	28	49	1.00	
DISTRO	D0001	YEP	NA	YEP-DIS#3-09	29	50	0.96	
DISTRO	D0001	YEP	NA	YEP-DIS#3-10	30	51	1.22	
DISTRO	D0001	YEP	NA	YEP-DIS#4-01	31	47	0.92	
DISTRO	D0001	YEP	NA	YEP-DIS#4-02	32	55	1.47	
DISTRO	D0001	YEP	NA	YEP-DIS#4-03	33	54	1.30	
DISTRO	D0001	YEP	NA	YEP-DIS#4-04	34	55	1.39	
DISTRO	D0001	YEP	NA	YEP-DIS#4-05	35	54	1.31	
DISTRO	D0001	YEP	NA	YEP-DIS#4-06	36	48	0.90	
DISTRO	D0001	YEP	NA	YEP-DIS#4-07	37	49	1.07	
DISTRO	D0001	YEP	NA	YEP-DIS#4-08	38	53	1.25	
DISTRO	D0001	YEP	NA	YEP-DIS#4-09	39	47	0.94	
DISTRO	D0001	YEP	NA	YEP-DIS#4-10	40	54	1.45	
EXPTER	A1G06	YEP	300	YEP-300-A1-01	1	54	1.30	
EXPTER	A1G06	YEP	300	YEP-300-A1-02	2	52	1.20	
EXPTER	A1G06	YEP	300	YEP-300-A1-03	3	49	1.00	
EXPTER	A1G06	YEP	300	YEP-300-A1-04	4	50	1.20	Missing operculum
EXPTER	A2G09	YEP	100	YEP-100-A2-01	1	48	0.90	
EXPTER	A2G09	YEP	100	YEP-100-A2-02	2	51	1.07	
EXPTER	A2G09	YEP	100	YEP-100-A2-03	3	49	0.99	
EXPTER	A2G09	YEP	100	YEP-100-A2-04	4	49	0.93	
EXPTER	A2G09	YEP	100	YEP-100-A2-05	5	50	1.03	
EXPTER	A3G01	YEP	50	YEP-50-A3-01	1	54	1.28	
EXPTER	A3G01	YEP	50	YEP-50-A3-02	2	55	1.36	
EXPTER	A3G01	YEP	50	YEP-50-A3-03	3	51	1.17	
EXPTER	A3G01	YEP	50	YEP-50-A3-04	4	49	1.10	
EXPTER	A3G01	YEP	50	YEP-50-A3-05	5	40	0.50	
EXPTER	A4G02	YEP	0	YEP-CONTROL-A4-01	1	52	1.14	
EXPTER	A4G02	YEP	0	YEP-CONTROL-A4-02	2	54	1.17	
EXPTER	A4G02	YEP	0	YEP-CONTROL-A4-03	3	51	1.09	
EXPTER	A4G02	YEP	0	YEP CONTROL A4-04	4	47	0.77	
EXPTER	A4G02	YEP	0	YEP CONTROL-A4-05	5	50	1.16	
EXPTER	A5G10	YEP	200	YEP-200-A5-01	1	50	0.96	
EXPTER	A5G10	YEP	200	YEP-200-A5-02	2	51	1.19	
EXPTER	A5G10	YEP	200	YEP-200-A5-03	3	48	0.94	
EXPTER	A5G10	YEP	200	YEP-200-A5-04	4	48	0.95	
EXPTER	B1G14	YEP	50	YEP-50-B1-01	1	53	1.28	
EXPTER	B1G14	YEP	50	YEP-50-B1-02	2	53	1.24	
EXPTER	B1G14	YEP	50	YEP-50-B1-03	3	50	1.16	
EXPTER	B1G14	YEP	50	YEP-50-B1-04	4	55	1.39	
EXPTER	B1G14	YEP	50	YEP-50-B1-05	5	50	1.08	
EXPTER	B2G12	YEP	200	YEP-200-B2-01	1	46	0.86	
EXPTER	B2G12	YEP	200	YEP-200-B2-02	2	54	1.28	
EXPTER	B2G12	YEP	200	YEP-200-B2-03	3	50	1.04	
EXPTER	B2G12	YEP	200	YEP-200-B2-04	4	50	1.10	
EXPTER	B3G05	YEP	0	YEP-CONTROL-B3-01	1	50	1.01	
EXPTER	B3G05	YEP	0	YEP CONTROL B3-02	2	53	1.17	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-30)
Data Source: File Folder; 19D
Forms: 3, 3a

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 11300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B3G05	YEP	0	YEP-CONTROL-B3-03	3	52	1.08	
EXPTER	B3G05	YEP	0	YEP-CONTROL-B3-04	4	47	0.91	
EXPTER	B3G05	YEP	0	YEP-CONTROL-B3-05	5	44	0.72	
EXPTER	B4G02	YEP	100	YEP-100-B4-01	1	55	1.46	
EXPTER	B4G02	YEP	100	YEP-100-B4-02	2	50	1.07	
EXPTER	B4G02	YEP	100	YEP-100-B4-03	3	52	1.14	
EXPTER	B4G02	YEP	100	YEP-100-B4-04	4	49	1.22	
EXPTER	B4G02	YEP	100	YEP-100-B4-05	5	53	1.26	
EXPTER	B5G07	YEP	300	YEP-300-B5-01	1	50	1.10	
EXPTER	B5G07	YEP	300	YEP-300-B5-02	2	51	1.01	
EXPTER	B5G07	YEP	300	YEP-300-B5-03	3	53	1.28	
EXPTER	C1G04	YEP	0	YEP-CONTROL-C1-01	1	55	1.16	
EXPTER	C1G04	YEP	0	YEP-CONTROL-C1-02	2	47	0.79	
EXPTER	C1G04	YEP	0	YEP-CONTROL-C1-03	3	50	0.87	
EXPTER	C1G04	YEP	0	YEP-CONTROL-C1-04	4	53	1.07	
EXPTER	C1G04	YEP	0	YEP-CONTROL-C1-05	5	50	0.94	
EXPTER	C2G11	YEP	50	YEP-50-C2-01	1	51	0.98	
EXPTER	C2G11	YEP	50	YEP-50-C2-02	2	48	0.88	
EXPTER	C2G11	YEP	50	YEP-50-C2-03	3	56	1.28	
EXPTER	C2G11	YEP	50	YEP-50-C2-04	4	53	1.09	
EXPTER	C2G11	YEP	50	YEP-50-C2-05	5	51	1.08	
EXPTER	C3G15	YEP	100	YEP-100-C3-01	1	48	0.81	
EXPTER	C3G15	YEP	100	YEP-100-C3-02	2	51	0.96	
EXPTER	C3G15	YEP	100	YEP-100-C3-03	3	54	1.16	
EXPTER	C3G15	YEP	100	YEP-100-C3-04	4	53	1.09	
EXPTER	C3G15	YEP	100	YEP-100-C3-05	5	52	1.13	
EXPTER	C4G13	YEP	300	YEP-300-C4-01	1	54	1.30	
EXPTER	C4G13	YEP	300	YEP-300-C4-02	2	55	1.31	
EXPTER	C4G13	YEP	300	YEP-300-C4-03	3	50	1.00	
EXPTER	C4G13	YEP	300	YEP-300-C4-04	4	49	0.93	
EXPTER	C5G03	YEP	200	YEP-200-C5-01	1	53	1.15	
EXPTER	C5G03	YEP	200	YEP-200-C5-02	2	53	1.12	
EXPTER	C5G03	YEP	200	YEP-200-C5-03	3	45	0.70	
EXPTER	C5G03	YEP	200	YEP-200-C5-04	4	49	0.85	
EXPTER	C5G03	YEP	200	YEP-200-C5-05	5	49	0.95	
EXMORT	A1G06	YEP	300	YEP-300-A1-M1	1	52	1.42	
EXMORT	A1G06	YEP	300	YEP-300-A1-M2	2	51	1.22	
EXMORT	A1G06	YEP	300	YEP-300-A1-M3	3	48	1.09	
EXMORT	A1G06	YEP	300	YEP-300-A1-M4	4	50	1.38	
EXMORT	A1G06	YEP	300	YEP-300-A1-M5	5	51	1.37	
EXMORT	A1G06	YEP	300	YEP-300-A1-M6	6	50	1.19	
EXMORT	A3G01	YEP	50	YEP-50-A3-M1	1	51	1.25	
EXMORT	A5G10	YEP	200	YEP-200-A5-M1	1	55	1.67	
EXMORT	A5G10	YEP	200	YEP-200-A5-M2	2	50	1.28	
EXMORT	A5G10	YEP	200	YEP-200-A5-M3	3	50	1.00	
EXMORT	A5G10	YEP	200	YEP-200-A5-M4	4	52	1.26	
EXMORT	A5G10	YEP	200	YEP-200-A5-M5	5	48	1.15	
EXMORT	B1G14	YEP	200	YEP-50-B1-M1	1	48	1.09	
EXMORT	B2G12	YEP	200	YEP-200-B2-M1	1	52	1.32	
EXMORT	B2G12	YEP	200	YEP-200-B2-M2	2	53	1.38	
EXMORT	B2G12	YEP	200	YEP-200-B2-M3	3	52	1.37	
EXMORT	B2G12	YEP	200	YEP-200-B2-M4	4	46	1.14	
EXMORT	B2G12	YEP	200	YEP-200-B2-M5	5	47	1.10	
EXMORT	B2G12	YEP	200	YEP-200-B2-M6	6	51	1.30	
EXMORT	B4G02	YEP	100	YEP-100-B4-M1	1	50	1.12	
EXMORT	B5G07	YEP	300	YEP-300-B5-M1	1	48	1.20	
EXMORT	B5G07	YEP	300	YEP-300-B5-M2	2	48	1.20	
EXMORT	B5G07	YEP	300	YEP-300-B5-M3	3	51	1.19	
EXMORT	B5G07	YEP	300	YEP-300-B5-M4	4	43	0.78	
EXMORT	B5G07	YEP	300	YEP-300-B5-M5	5	52	1.22	
EXMORT	B5G07	YEP	300	YEP-300-B5-M6	6	50	1.44	
EXMORT	B5G07	YEP	300	YEP-300-B5-M7	7	50	1.33	
EXMORT	B5G07	YEP	300	YEP-300-B5-M8	8	49	1.26	
EXMORT	B5G07	YEP	300	YEP-300-B5-M9	9	53	1.12	
EXMORT	B5G07	YEP	300	YEP-300-B5-M10	10	51	1.23	
EXMORT	B5G07	YEP	300	YEP-300-B5-M11	11	49	1.18	
EXMORT	B5G07	YEP	300	YEP-300-B5-M12	12	46	1.01	
EXMORT	C4G13	YEP	300	YEP-300-C4-M1	1	49	1.19	
EXMORT	C4G13	YEP	300	YEP-300-C4-M2	2	46	0.97	
EXMORT	C4G13	YEP	300	YEP-300-C4-M3	3	52	1.26	
EXMORT	C4G13	YEP	300	YEP-300-C4-M4	4	49	1.09	
EXMORT	C4G13	YEP	300	YEP-300-C4-M5	5	47	1.17	
EXMORT	C4G13	YEP	300	YEP-300-C4-M6	6	49	1.03	
EXMORT	C4G13	YEP	300	YEP-300-C4-M7	7	54	1.50	

Item Number 1-2
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-30)
Data Source: File Folder: 19D
Forms: 3, 3a

Fish species: Ye low Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXMORT	C4G13	YEP	300	YEP-300-C4-M8	8	45	1.04	
EXMORT	C4G13	YEP	300	YEP-300-C4-M9	9	48	0.89	
EXMORT	C5G03	YEP	200	YEP-200-C5-M1	1	54	1.25	
EXMORT	C5G03	YEP	200	YEP-200-C5-M2	2	49	1.11	
EXMORT	C5G03	YEP	200	YEP-200-C5-M3	3	51	1.24	
EXMORT	C5G03	YEP	200	YEP-200-C5-M4	4	47	0.96	
HDMORT	A1G06	YEP	300	YEP-300-G6-M1	1	51	1.16	
HDMORT	A1G06	YEP	300	YEP-300-G6-M2	2	51	1.24	
HDMORT	A1G06	YEP	300	YEP-300-G6-M3	3	50	1.20	
HDMORT	A1G06	YEP	300	YEP-300-G6-M4	4	49	0.97	
HDMORT	A1G06	YEP	300	YEP-300-G6 M5	5	53	1.40	
HDMORT	A2G09	YEP	100	YEP-100-G9-M1	1	48	0.98	
HDMORT	A5G10	YEP	200	YEP-200-G10-M1	1	55	1.39	
HDMORT	A5G10	YEP	200	YEP-200-G10-M2	2	48	1.02	
HDMORT	B4G02	YEP	100	YEP-100-G2-M1	1	48	0.93	
HDMORT	B5G07	YEP	300	YEP-300-G7-M1	1	44	0.67	
HDMORT	B5G07	YEP	300	YEP-300-G7-M2	2	54	1.46	
HDMORT	B5G07	YEP	300	YEP-300-G7-M3	3	46	1.33	
HDMORT	C4G13	YEP	300	YEP-300-G13-M1	1	52	1.16	
HDMORT	C4G13	YEP	300	YEP-300-G13-M2	2	46	0.71	
HDMORT	C4G13	YEP	300	YEP-300-G13-M3	3	48	1.13	
HDMORT	C4G13	YEP	300	YEP-300-G13-M4	4	47	1.08	
HDMORT	C4G13	YEP	300	YEP-300-G13-M5	5	51	1.33	
TERMIN	A1G06	YEP	300	YEP-300-G6-T1	1	51	0.97	
TERMIN	A1G06	YEP	300	YEP-300-G6-T2	2	51	1.30	
TERMIN	A1G06	YEP	300	YEP-300-G6-T3	3	51	0.98	
TERMIN	A1G06	YEP	300	YEP-300-G6-T4	4	48	0.82	
TERMIN	A1G06	YEP	300	YEP-300-G6-T5	5	53	0.80	
TERMIN	A1G06	YEP	300	YEP-300-G6-T6	6	53	1.12	
TERMIN	A1G06	YEP	300	YEP-300-G6-T7	7	49	0.89	
TERMIN	A1G06	YEP	300	YEP-300-G6-T8	8	52	1.17	
TERMIN	A1G06	YEP	300	YEP-300-G6-T9	9	51	1.03	
TERMIN	A1G06	YEP	300	YEP-300-G6-T10	10	52	1.08	
TERMIN	A2G09	YEP	100	YEP-100-G9-T1	1	56	1.34	
TERMIN	A2G09	YEP	100	YEP-100-G9-T2	2	57	1.51	
TERMIN	A2G09	YEP	100	YEP-100-G9-T3	3	50	0.93	
TERMIN	A2G09	YEP	100	YEP-100-G9-T4	4	55	1.35	
TERMIN	A2G09	YEP	100	YEP-100-G9-T5	5	50	0.89	
TERMIN	A2G09	YEP	100	YEP-100-G9-T6	6	57	1.35	
TERMIN	A2G09	YEP	100	YEP-100-G9-T7	7	52	1.14	
TERMIN	A2G09	YEP	100	YEP-100-G9-T8	8	56	1.33	
TERMIN	A2G09	YEP	100	YEP-100-G9-T9	9	53	1.04	
TERMIN	A2G09	YEP	100	YEP-100-G9-T10	10	57	1.44	
TERMIN	A2G09	YEP	100	YEP-100-G9-T11	11	54	1.01	
TERMIN	A2G09	YEP	100	YEP-100-G9-T12	12	47	0.80	
TERMIN	A2G09	YEP	100	YEP-100-G9-T13	13	55	1.11	
TERMIN	A2G09	YEP	100	YEP-100-G9-T14	14	50	0.88	
TERMIN	A2G09	YEP	100	YEP-100-G9-T15	15	55	1.32	
TERMIN	A2G09	YEP	100	YEP-100-G9-T16	16	61	1.55	
TERMIN	A2G09	YEP	100	YEP-100-G9-T17	17	52	1.17	
TERMIN	A2G09	YEP	100	YEP-100-G9-T18	18	55	1.18	
TERMIN	A2G09	YEP	100	YEP-100-G9-T19	19	53	1.07	
TERMIN	A3G01	YEP	50	YEP-50-G1-T1	1	52	1.19	
TERMIN	A3G01	YEP	50	YEP-50-G1-T2	2	58	1.77	
TERMIN	A3G01	YEP	50	YEP-50-G1-T3	3	51	1.23	
TERMIN	A3G01	YEP	50	YEP-50-G1-T4	4	48	1.01	
TERMIN	A3G01	YEP	50	YEP-50-G1-T5	5	55	1.48	
TERMIN	A3G01	YEP	50	YEP-50-G1-T6	6	56	1.62	
TERMIN	A3G01	YEP	50	YEP-50-G1-T7	7	49	0.94	
TERMIN	A3G01	YEP	50	YEP-50-G1-T8	8	53	1.24	
TERMIN	A3G01	YEP	50	YEP-50-G1-T9	9	54	1.34	
TERMIN	A3G01	YEP	50	YEP-50-G1-T10	10	53	1.23	
TERMIN	A3G01	YEP	50	YEP-50-G1-T11	11	54	1.36	
TERMIN	A3G01	YEP	50	YEP-50-G1-T12	12	53	1.03	
TERMIN	A3G01	YEP	50	YEP-50-G1-T13	13	59	1.47	
TERMIN	A3G01	YEP	50	YEP-50-G1-T14	14	51	1.14	
TERMIN	A3G01	YEP	50	YEP-50-G1-T15	15	48	0.83	
TERMIN	A3G01	YEP	50	YEP-50-G1-T16	16	54	1.22	
TERMIN	A3G01	YEP	50	YEP-50-G1-T17	17	52	1.22	
TERMIN	A3G01	YEP	50	YEP-50-G1-T18	18	53	1.19	
TERMIN	A3G01	YEP	50	YEP-50-G1-T19	19	53	1.24	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T1	1	57	1.36	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T2	2	54	1.17	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T3	3	52	1.03	

Item Number 4-19
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-30)
Data Source: File Folder: 19D
Forms: 3, 3a

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-OL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T4	4	60	1.37	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T5	5	55	1.21	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T6	6	62	1.75	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T7	7	50	0.99	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T8	8	55	1.15	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T9	9	54	1.17	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T10	10	51	0.93	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T11	11	49	0.96	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T12	12	56	1.43	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T13	13	53	1.09	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T14	14	50	1.08	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T15	15	51	1.00	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T16	16	55	1.22	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T17	17	54	1.30	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T18	18	55	1.37	
TERMIN	A4G08	YEP	0	YEP-CONTROL-G8-T19	19	55	1.20	
TERMIN	A5G10	YEP	200	YEP-200-G10-T1	1	54	1.23	
TERMIN	A5G10	YEP	200	YEP-200-G10-T2	2	54	1.10	
TERMIN	A5G10	YEP	200	YEP-200-G10-T3	3	53	0.99	
TERMIN	A5G10	YEP	200	YEP-200-G10-T4	4	46	0.69	
TERMIN	A5G10	YEP	200	YEP-200-G10-T5	5	52	0.93	
TERMIN	A5G10	YEP	200	YEP-200-G10-T6	6	56	1.18	
TERMIN	A5G10	YEP	200	YEP-200-G10-T7	7	57	1.12	
TERMIN	A5G10	YEP	200	YEP-200-G10-T8	8	53	0.96	
TERMIN	A5G10	YEP	200	YEP-200-G10-T9	9	52	1.09	
TERMIN	A5G10	YEP	200	YEP-200-G10-T10	10	47	0.78	
TERMIN	A5G10	YEP	200	YEP-200-G10-T11	11	56	1.10	
TERMIN	A5G10	YEP	200	YEP-200-G10-T12	12	53	1.06	
TERMIN	A5G10	YEP	200	YEP-200-G10-T13	13	56	1.20	
TERMIN	A5G10	YEP	200	YEP-200-G10-T14	14	54	1.03	
TERMIN	B1G14	YEP	50	YEP-50-G14-T1	1	55	1.30	
TERMIN	B1G14	YEP	50	YEP-50-G14-T2	2	47	0.83	
TERMIN	B1G14	YEP	50	YEP-50-G14-T3	3	56	1.32	
TERMIN	B1G14	YEP	50	YEP-50-G14-T4	4	49	1.03	
TERMIN	B1G14	YEP	50	YEP-50-G14-T5	5	57	1.41	
TERMIN	B1G14	YEP	50	YEP-50-G14-T6	6	58	1.67	
TERMIN	B1G14	YEP	50	YEP-50-G14-T7	7	53	1.22	
TERMIN	B1G14	YEP	50	YEP-50-G14-T8	8	53	1.14	
TERMIN	B1G14	YEP	50	YEP-50-G14-T9	9	57	1.44	
TERMIN	B1G14	YEP	50	YEP-50-G14-T10	10	52	0.94	
TERMIN	B1G14	YEP	50	YEP-50-G14-T11	11	57	1.27	
TERMIN	B1G14	YEP	50	YEP-50-G14-T12	12	52	1.05	
TERMIN	B1G14	YEP	50	YEP-50-G14-T13	13	49	0.91	
TERMIN	B1G14	YEP	50	YEP-50-G14-T14	14	57	1.51	
TERMIN	B1G14	YEP	50	YEP-50-G14-T15	15	55	1.41	
TERMIN	B1G14	YEP	50	YEP-50-G14-T16	16	52	1.05	
TERMIN	B1G14	YEP	50	YEP-50-G14-T17	17	56	1.25	
TERMIN	B1G14	YEP	50	YEP-50-G14-T18	18	57	1.20	
TERMIN	B1G14	YEP	50	YEP-50-G14-T19	19	51	0.99	
TERMIN	B2G12	YEP	200	YEP-200-G12-T1	1	51	0.97	
TERMIN	B2G12	YEP	200	YEP-200-G12-T2	2	56	1.31	
TERMIN	B2G12	YEP	200	YEP-200-G12-T3	3	50	0.86	
TERMIN	B2G12	YEP	200	YEP-200-G12-T4	4	52	1.06	
TERMIN	B2G12	YEP	200	YEP-200-G12-T5	5	47	0.83	
TERMIN	B2G12	YEP	200	YEP-200-G12-T6	6	46	0.74	
TERMIN	B2G12	YEP	200	YEP-200-G12-T7	7	53	0.99	
TERMIN	B2G12	YEP	200	YEP-200-G12-T8	8	58	1.33	
TERMIN	B2G12	YEP	200	YEP-200-G12-T9	9	52	0.95	
TERMIN	B2G12	YEP	200	YEP-200-G12-T10	10	52	1.12	
TERMIN	B2G12	YEP	200	YEP-200-G12-T11	11	45	0.89	
TERMIN	B2G12	YEP	200	YEP-200-G12-T12	12	51	1.02	
TERMIN	B2G12	YEP	200	YEP-200-G12-T13	13	54	1.06	
TERMIN	B2G12	YEP	200	YEP-200-G12-T14	14	49	0.91	
TERMIN	B2G12	YEP	200	YEP-200-G12-T15	15	56	1.22	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T1	1	60	1.66	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T2	2	57	1.51	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T3	3	50	1.13	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T4	4	57	1.57	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T5	5	55	1.17	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T6	6	55	1.24	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T7	7	52	1.08	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T8	8	60	1.54	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T9	9	55	1.36	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T10	10	57	1.42	

Item Number 1-3
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 1-30)
Data Source: File Folder: 19D
Forms: 3, 3a

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(6)
Exposure Date: 3/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T11	11	57	1.24	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T12	12	58	1.50	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T13	13	50	1.13	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T14	14	57	1.50	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T15	15	55	1.24	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T16	16	54	1.24	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T17	17	63	1.75	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T18	18	57	1.36	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T19	19	56	1.26	
TERMIN	B3G05	YEP	0	YEP-CONTROL-G5-T20	20	59	0.64	
TERMIN	B4G02	YEP	100	YEP-100-G2-T1	1	54	1.34	
TERMIN	B4G02	YEP	100	YEP-100-G2-T2	2	43	0.62	
TERMIN	B4G02	YEP	100	YEP-100-G2-T3	3	54	1.29	
TERMIN	B4G02	YEP	100	YEP-100-G2-T4	4	52	0.98	
TERMIN	B4G02	YEP	100	YEP-100-G2-T5	5	53	1.05	
TERMIN	B4G02	YEP	100	YEP-100-G2-T6	6	47	0.73	
TERMIN	B4G02	YEP	100	YEP-100-G2-T7	7	52	1.16	
TERMIN	B4G02	YEP	100	YEP-100-G2-T8	8	54	1.10	
TERMIN	B4G02	YEP	100	YEP-100-G2-T9	9	55	1.28	
TERMIN	B4G02	YEP	100	YEP-100-G2-T10	10	51	0.91	
TERMIN	B4G02	YEP	100	YEP-100-G2-T11	11	55	1.37	
TERMIN	B4G02	YEP	100	YEP-100-G2-T12	12	55	1.39	
TERMIN	B4G02	YEP	100	YEP-100-G2-T13	13	53	1.16	
TERMIN	B4G02	YEP	100	YEP-100-G2-T14	14	54	1.10	
TERMIN	B4G02	YEP	100	YEP-100-G2-T15	15	47	0.65	
TERMIN	B4G02	YEP	100	YEP-100-G2-T16	16	49	0.98	
TERMIN	B4G02	YEP	100	YEP-100-G2-T17	17	51	1.00	
TERMIN	B4G02	YEP	100	YEP-100-G2-T18	18	52	0.94	
TERMIN	B5G07	YEP	300	YEP-300-G7-T1	1	54	1.19	
TERMIN	B5G07	YEP	300	YEP-300-G7-T2	2	54	1.02	
TERMIN	B5G07	YEP	300	YEP-300-G7-T3	3	55	1.07	
TERMIN	B5G07	YEP	300	YEP-300-G7-T4	4	50	0.92	
TERMIN	B5G07	YEP	300	YEP-300-G7-T5	5	59	1.39	
TERMIN	B5G07	YEP	300	YEP-300-G7-T6	6	50	0.70	
TERMIN	B5G07	YEP	300	YEP-300-G7-T7	7	52	0.89	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T1	1	55	1.50	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T2	2	53	1.13	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T3	3	52	1.27	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T4	4	54	1.30	
TERMIN	C1G04	YEP	0	YEP CONTROL G4-T5	5	53	1.35	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T6	6	53	1.19	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T7	7	56	1.28	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T8	8	57	1.36	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T9	9	55	1.44	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T10	10	52	1.20	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T11	11	53	1.21	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T12	12	49	0.94	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T13	13	51	1.13	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T14	14	53	1.24	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T15	15	51	1.18	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T16	16	56	1.53	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T17	17	54	1.16	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T18	18	50	0.99	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T19	19	50	1.10	
TERMIN	C1G04	YEP	0	YEP-CONTROL-G4-T20	20	52	1.10	
TERMIN	C2G11	YEP	50	YEP-50-G11-T1	1	54	1.07	
TERMIN	C2G11	YEP	50	YEP-50-G11-T2	2	60	1.55	
TERMIN	C2G11	YEP	50	YEP-50-G11-T3	3	55	1.12	
TERMIN	C2G11	YEP	50	YEP-50-G11-T4	4	52	1.07	
TERMIN	C2G11	YEP	50	YEP-50-G11-T5	5	52	1.14	
TERMIN	C2G11	YEP	50	YEP-50-G11-T6	6	57	1.49	
TERMIN	C2G11	YEP	50	YEP-50-G11-T7	7	55	1.53	
TERMIN	C2G11	YEP	50	YEP-50-G11-T8	8	51	1.05	
TERMIN	C2G11	YEP	50	YEP-50-G11-T9	9	45	0.84	
TERMIN	C2G11	YEP	50	YEP-50-G11-T10	10	52	1.15	
TERMIN	C2G11	YEP	50	YEP-50-G11-T11	11	52	1.22	
TERMIN	C2G11	YEP	50	YEP-50-G11-T12	12	47	0.75	
TERMIN	C2G11	YEP	50	YEP-50-G11-T13	13	49	0.97	
TERMIN	C2G11	YEP	50	YEP-50-G11-T14	14	57	1.46	
TERMIN	C2G11	YEP	50	YEP-50-G11-T15	15	53	1.13	
TERMIN	C2G11	YEP	50	YEP-50-G11-T16	16	58	1.29	
TERMIN	C2G11	YEP	50	YEP-50-G11-T17	17	52	1.06	
TERMIN	C2G11	YEP	50	YEP-50-G11-T18	18	53	1.18	
TERMIN	C2G11	YEP	50	YEP-50-G11-T19	19	56	1.49	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
lab Notebook #1 (pages 1-30)
Data Source: File Folder: 19D
Forms: 3, 3a

Fish species: Yellow Perch (*Perca flavescens*) Lot number: 113000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A [SDP] Chemical lot #: TR 4669-4-(6)
Exposure Date: 9/7/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C2G11	YEP	50	YEP-50-G11-T20	20	50	0.89	
TERMIN	C3G15	YEP	100	YEP-100-G15-T1	1	54	0.98	
TERMIN	C3G15	YEP	100	YEP-100-G15-T2	2	51	1.03	
TERMIN	C3G15	YEP	100	YEP-100-G15-T3	3	53	1.25	
TERMIN	C3G15	YEP	100	YEP-100-G15-T4	4	57	1.42	
TERMIN	C3G15	YEP	100	YEP-100-G15-T5	5	55	1.45	
TERMIN	C3G15	YEP	100	YEP-100-G15-T6	6	55	1.07	
TERMIN	C3G15	YEP	100	YEP-100-G15-T7	7	54	1.18	
TERMIN	C3G15	YEP	100	YEP-100-G15-T8	8	52	0.90	
TERMIN	C3G15	YEP	100	YEP-100-G15-T9	9	53	1.21	
TERMIN	C3G15	YEP	100	YEP-100-G15-T10	10	48	0.92	
TERMIN	C3G15	YEP	100	YEP-100-G15-T11	11	51	0.95	
TERMIN	C3G15	YEP	100	YEP-100-G15-T12	12	47	0.77	
TERMIN	C3G15	YEP	100	YEP-100-G15-T13	13	55	1.40	
TERMIN	C3G15	YEP	100	YEP-100-G15-T14	14	51	1.07	
TERMIN	C3G15	YEP	100	YEP-100-G15-T15	15	54	1.06	
TERMIN	C3G15	YEP	100	YEP-100-G15-T16	16	54	1.18	
TERMIN	C3G15	YEP	100	YEP-100-G15-T17	17	50	0.97	
TERMIN	C3G15	YEP	100	YEP-100-G15-T18	18	50	1.00	
TERMIN	C3G15	YEP	100	YEP-100-G15-T19	19	43	0.60	
TERMIN	C3G15	YEP	100	YEP-100-G15-T20	20	52	1.12	
TERMIN	C4G13	YEP	300	YEP-300-G13-T1	1	54	1.22	
TERMIN	C4G13	YEP	300	YEP-300-G13-T2	2	48	0.76	
TERMIN	C4G13	YEP	300	YEP 300-G13-T3	3	54	1.22	
TERMIN	C4G13	YEP	300	YEP 300 G13-T4	4	47	0.89	
TERMIN	C4G13	YEP	300	YEP-300-G13-T5	5	51	0.93	
TERMIN	C4G13	YEP	300	YEP-300-G13-T6	6	54	0.97	
TERMIN	C4G13	YEP	300	YEP-300-G13-T7	7	52	1.04	
TERMIN	C5G03	YEP	200	YEP-200-G3-T1	1	55	1.21	
TERMIN	C5G03	YEP	200	YEP-200-G3-T2	2	54	1.05	
TERMIN	C5G03	YEP	200	YEP-200-G3-T3	3	56	1.13	
TERMIN	C5G03	YEP	200	YEP-200-G3-T4	4	54	1.16	
TERMIN	C5G03	YEP	200	YEP-200-G3-T5	5	52	1.03	
TERMIN	C5G03	YEP	200	YEP-200-G3-T6	6	54	0.94	
TERMIN	C5G03	YEP	200	YEP-200-G3-T7	7	52	1.02	
TERMIN	C5G03	YEP	200	YEP-200-G3-T8	8	55	1.29	
TERMIN	C5G03	YEP	200	YEP-200-G3-T9	9	56	1.32	
TERMIN	C5G03	YEP	200	YEP-200-G3-T10	10	52	1.02	
TERMIN	C5G03	YEP	200	YEP-200-G3-T11	11	58	1.28	
TERMIN	C5G03	YEP	200	YEP-200-G3-T12	12	55	1.22	
TERMIN	C5G03	YEP	200	YEP 200-G3-T13	13	48	0.76	
TERMIN	C5G03	YEP	200	YEP-200-G3-T14	14	47	0.88	
TERMIN	C5G03	YEP	200	YEP-200-G3-T15	15	50	0.90	
TERMIN	C5G03	YEP	200	YEP-200-G3-T16	16	53	1.16	

File Folder: 19D

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 24-34)	Created.....	5/1/2013	KLW
Data Source: File Folder: 20D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	20MAR15	
	Certified.....	3/25/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]LST LengthWeight

Length/Weight Data - *Acipenser fulvescens*

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02
Exposure Date: 8/1/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #36 - Sequential numbering and labeling error during 22-d holding period

File Folder: 20d

Item Number 1-7
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Data Source: File Folder: 20D
Forms: 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-01 145A (SDP) Chemical Lot #: 403P12154G-02
Exposure Date: 8/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	LST	NA	LST-DIS#1-01	1	111	4.68	
DISTRO	D0001	LST	NA	LST-DIS#1-02	2	119	5.27	
DISTRO	D0001	LST	NA	LST-DIS#1-03	3	114	5.19	
DISTRO	D0001	LST	NA	LST-DIS#1-04	4	108	4.38	
DISTRO	D0001	LST	NA	LST-DIS#1-05	5	107	4.28	
DISTRO	D0001	LST	NA	LST-DIS#1-06	6	121	6.09	
DISTRO	D0001	LST	NA	LST-DIS#1-07	7	116	5.11	
DISTRO	D0001	LST	NA	LST-DIS#1-08	8	112	4.68	
DISTRO	D0001	LST	NA	LST-DIS#1-09	9	97	3.43	
DISTRO	D0001	LST	NA	LST-DIS#1-10	10	123	6.11	
DISTRO	D0001	LST	NA	LST-DIS#2-01	11	100	3.60	
DISTRO	D0001	LST	NA	LST-DIS#2-02	12	123	6.58	
DISTRO	D0001	LST	NA	LST-DIS#2-03	13	135	7.16	
DISTRO	D0001	LST	NA	LST-DIS#2-04	14	135	8.04	
DISTRO	D0001	LST	NA	LST-DIS#2-05	15	121	6.16	
DISTRO	D0001	LST	NA	LST-DIS#2-06	16	138	8.83	
DISTRO	D0001	LST	NA	LST-DIS#2-07	17	111	4.81	
DISTRO	D0001	LST	NA	LST-DIS#2-08	18	109	4.71	
DISTRO	D0001	LST	NA	LST-DIS#2-09	19	104	4.16	
DISTRO	D0001	LST	NA	LST-DIS#2-10	20	113	5.50	
DISTRO	D0001	LST	NA	LST-DIS#3-01	21	142	10.09	
DISTRO	D0001	LST	NA	LST-DIS#3-02	22	117	5.59	
DISTRO	D0001	LST	NA	LST-DIS#3-03	23	109	4.89	
DISTRO	D0001	LST	NA	LST-DIS#3-04	24	106	4.00	
DISTRO	D0001	LST	NA	LST-DIS#3-05	25	119	5.60	
DISTRO	D0001	LST	NA	LST-DIS#3-06	26	115	4.69	
DISTRO	D0001	LST	NA	LST-DIS#3-07	27	111	5.10	
DISTRO	D0001	LST	NA	LST-DIS#3-08	28	125	6.58	
DISTRO	D0001	LST	NA	LST-DIS#3-09	29	95	2.93	
DISTRO	D0001	LST	NA	LST-DIS#3-10	30	116	4.95	
DISTRO	D0001	LST	NA	LST-DIS#4-01	31	139	8.90	
DISTRO	D0001	LST	NA	LST-DIS#4-02	32	119	5.92	
DISTRO	D0001	LST	NA	LST-DIS#4-03	33	121	6.07	
DISTRO	D0001	LST	NA	LST-DIS#4-04	34	103	3.58	
DISTRO	D0001	LST	NA	LST-DIS#4-05	35	106	4.16	
DISTRO	D0001	LST	NA	LST-DIS#4-06	36	107	4.46	
DISTRO	D0001	LST	NA	LST-DIS#4-07	37	113	4.41	
DISTRO	D0001	LST	NA	LST-DIS#4-08	38	111	4.70	
DISTRO	D0001	LST	NA	LST-DIS#4-09	39	108	4.18	
DISTRO	D0001	LST	NA	LST-DIS#4-10	40	108	4.12	
EXPTER	A1G07	LST	100	LST-100-A-01	1	102	3.19	
EXPTER	A1G07	LST	100	LST-100-A-02	2	105	3.16	
EXPTER	A1G07	LST	100	LST-100-A-03	3	135	6.55	
EXPTER	A1G07	LST	100	LST-100-A-04	4	110	4.45	
EXPTER	A1G07	LST	100	LST-100-A-05	5	119	4.75	
EXPTER	A2G13	LST	200	LST-200-A-01	1	106	3.77	
EXPTER	A2G13	LST	200	LST-200-A-02	2	98	2.60	
EXPTER	A2G13	LST	200	LST-200-A-03	3	114	4.49	
EXPTER	A2G13	LST	200	LST-200-A-04	4	102	3.45	
EXPTER	A3G03	LST	300	LST-300-A-01	1	114	4.33	
EXPTER	A3G03	LST	300	LST-300-A-02	2	132	6.25	
EXPTER	A3G03	LST	300	LST-300 A 03	3	126	6.26	
EXPTER	A4G04	LST	0	LST-CONTROL-A-01	1	105	3.60	
EXPTER	A4G04	LST	0	LST-CONTROL-A-02	2	102	3.22	
EXPTER	A4G04	LST	0	LST-CONTROL-A-03	3	121	5.28	
EXPTER	A4G04	LST	0	LST-CONTROL-A-04	4	108	3.72	
EXPTER	A4G04	LST	0	LST-CONTROL-A-05	5	102	3.13	
EXPTER	A5G06	LST	50	LST-50-A-01	1	119	4.65	
EXPTER	A5G06	LST	50	LST-50-A-02	2	123	5.68	
EXPTER	A5G06	LST	50	LST-50-A-03	3	97	2.65	
EXPTER	A5G06	LST	50	LST-50-A-04	4	114	4.22	
EXPTER	A5G06	LST	50	LST-50-A-05	5	115	3.89	
EXPTER	B1G09	LST	300	LST-300-B-01	1	108	3.47	
EXPTER	B1G09	LST	300	LST-300-B-02	2	106	3.31	
EXPTER	B1G09	LST	300	LST-300-B-03	3	117	4.26	
EXPTER	B1G09	LST	300	LST-300-B-04	4	111	3.99	
EXPTER	B2G01	LST	100	LST-100-B-01	1	128	6.27	
EXPTER	B2G01	LST	100	LST-100-B-02	2	107	3.96	
EXPTER	B2G01	LST	100	LST-100-B-03	3	120	4.77	
EXPTER	B2G01	LST	100	LST-100-B-04	4	114	4.70	
EXPTER	B2G01	LST	100	LST-100-B-05	5	102	3.62	
EXPTER	B3G02	LST	50	LST-50-B-01	1	110	3.75	
EXPTER	B3G02	LST	50	LST-50-B-02	2	118	5.55	
EXPTER	B3G02	LST	50	LST-50-B-03	3	116	4.38	

Item Number 1
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Study Number AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Data Source: File Folder: 20D
Forms: 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: 401P12154G-02
Exposure Date: 6/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B3G02	LST	50	LST-50-B-04	4	103	2.98	
EXPTER	B3G02	LST	50	LST-50-B-05	5	92	3.19	
EXPTER	B4G15	LST	200	LST-200-B-01	1	107	3.59	
EXPTER	B4G15	LST	200	LST-200-B-02	2	108	3.43	
EXPTER	B4G15	LST	200	LST-200-B-03	3	112	4.21	
EXPTER	B4G15	LST	200	LST-200-B-04	4	105	3.32	
EXPTER	B4G15	LST	200	LST-200-B-05	5	124	5.98	
EXPTER	B5G08	LST	0	LST-CONTROL-B-01	1	119	5.21	
EXPTER	B5G08	LST	0	LST-CONTROL-B-02	2	108	3.90	
EXPTER	B5G08	LST	0	LST-CONTROL-B-03	3	110	3.99	
EXPTER	B5G08	LST	0	LST-CONTROL-B-04	4	120	4.33	
EXPTER	B5G08	LST	0	LST-CONTROL-B-05	5	89	2.62	
EXPTER	C1G05	LST	50	LST-50-C-01	1	126	5.58	
EXPTER	C1G05	LST	50	LST-50-C-02	2	113	4.09	
EXPTER	C1G05	LST	50	LST-50-C-03	3	104	3.58	
EXPTER	C1G05	LST	50	LST-50-C-04	4	113	4.33	
EXPTER	C1G05	LST	50	LST-50-C-05	5	105	3.40	
EXPTER	C2G12	LST	200	LST-200-C-01	1	114	3.99	
EXPTER	C2G12	LST	200	LST-200-C-02	2	108	3.62	
EXPTER	C2G12	LST	200	LST-200-C-03	3	128	5.91	
EXPTER	C2G12	LST	200	LST-200-C-04	4	96	2.74	
EXPTER	C2G12	LST	200	LST-200-C-05	5	109	3.79	
EXPTER	C4G10	LST	0	LST-CONTROL-C-01	1	110	3.62	
EXPTER	C4G10	LST	0	LST-CONTROL-C-02	2	101	3.29	
EXPTER	C4G10	LST	0	LST-CONTROL-C-03	3	112	5.17	
EXPTER	C4G10	LST	0	LST-CONTROL-C-04	4	118	5.15	
EXPTER	C4G10	LST	0	LST-CONTROL-C-05	5	110	3.72	
EXPTER	C5G11	LST	100	LST-100-C-01	1	122	5.37	
EXPTER	C5G11	LST	100	LST-100-C-02	2	124	5.68	
EXPTER	C5G11	LST	100	LST-100-C-03	3	103	3.75	
EXPTER	C5G11	LST	100	LST-100-C-04	4	111	4.53	
EXPTER	C5G11	LST	100	LST-100-C-05	5	109	3.92	
EXMORT	A2G13	LST	200	LST-200-A-M1	1	104	3.79	
EXMORT	A2G13	LST	200	LST-200-A-M2	2	132	6.95	
EXMORT	A2G13	LST	200	LST-200-A-M3	3	96	3.64	
EXMORT	A2G13	LST	200	LST-200-A-M4	4	107	3.99	
EXMORT	A2G13	LST	200	LST-200-A-M5	5	106	4.42	
EXMORT	A3G03	LST	300	LST-300-A-M1	1	93	2.48	
EXMORT	A3G03	LST	300	LST-300-A-M2	2	113	4.83	
EXMORT	A3G03	LST	300	LST-300-A-M3	3	101	3.12	
EXMORT	A3G03	LST	300	LST-300-A-M4	4	119	5.48	
EXMORT	A3G03	LST	300	LST-300-A-M5	5	89	2.48	
EXMORT	A3G03	LST	300	LST-300 A M6	6	105	3.64	
EXMORT	A3G03	LST	300	LST-300-A-M7	7	110	5.00	
EXMORT	A3G03	LST	300	LST-300-A-M8	8	102	3.33	
EXMORT	A3G03	LST	300	LST-300-A-M9	9	101	3.20	
EXMORT	A3G03	LST	300	LST-300-A-M10	10	115	5.63	
EXMORT	A3G03	LST	300	LST-300-A-M11	11	110	4.14	
EXMORT	A3G03	LST	300	LST-300-A-M12	12	105	3.95	
EXMORT	B1G09	LST	300	LST-300-B-M1	1	109	4.09	
EXMORT	B1G09	LST	300	LST-300-B-M2	2	99	2.92	
EXMORT	B1G09	LST	300	LST-300-B-M3	3	110	4.45	
EXMORT	B1G09	LST	300	LST-300-B-M4	4	115	4.30	
EXMORT	B1G09	LST	300	LST-300-B-M5	5	100	3.23	
EXMORT	B1G09	LST	300	LST-300-B-M6	6	116	4.53	
EXMORT	B4G15	LST	200	LST-200-B-M1	1	105	3.15	
EXMORT	B4G15	LST	200	LST-200-B-M2	2	107	3.75	
EXMORT	B4G15	LST	200	LST-200-B-M3	3	100	3.20	
EXMORT	B4G15	LST	200	LST 200 B M4	4	113	4.69	
EXMORT	C2G12	LST	200	LST-200 C M1	1	102	3.13	
EXMORT	C2G12	LST	200	LST-200-C-M2	2	105	3.40	
EXMORT	C3G14	LST	300	LST-300-C-M1	1	115	4.74	
EXMORT	C3G14	LST	300	LST-300-C-M2	2	113	4.16	
EXMORT	C3G14	LST	300	LST-300-C-M3	3	115	4.50	
EXMORT	C3G14	LST	300	LST-300-C-M4	4	110	4.30	
EXMORT	C3G14	LST	300	LST-300-C-M5	5	104	3.47	
EXMORT	C3G14	LST	300	LST-300-C-M6	6	125	5.92	
EXMORT	C3G14	LST	300	LST-300-C-M7	7	100	3.10	
EXMORT	C3G14	LST	300	LST-300-C-M8	8	101	3.23	
EXMORT	C3G14	LST	300	LST-300-C-M9	9	105	3.76	
EXMORT	C3G14	LST	300	LST-300-C-M10	10	131	7.30	
EXMORT	C3G14	LST	300	LST-300-C-M11	11	100	3.14	
EXMORT	C3G14	LST	300	LST-300-C-M12	12	115	5.00	
EXMORT	C3G14	LST	300	LST-300-C-M13	13	114	4.53	

Item Number 12
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Data Source: File Folder: 20D
Forms: 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: 401P121546-02
Exposure Date: 8/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXMORT	C3G14	LST	300	LST-300-C-M14	14	110	4.05	
EXMORT	C3G14	LST	300	LST-300-C-M15	15	99	2.94	
HDMORT	A1G07	LST	100	LST-100-G7-M1	1	95	3.65	
HDMORT	A1G07	LST	100	LST-100-G7-M2	2	101	3.34	
HDMORT	A1G07	LST	100	LST-100-G7-M3	3	80	2.68	Missing tip of tail
HDMORT	A1G07	LST	100	LST-100-G7-M4	4	99	2.85	
HDMORT	A1G07	LST	100	LST-100-G7-M5	5	105	4.38	
HDMORT	A1G07	LST	100	LST-100-G7-M6	6	101	3.13	
HDMORT	A1G07	LST	100	LST-100-G7-M7	7	99	3.95	
HDMORT	A1G07	LST	100	LST-100-G7-M8	8	92	2.96	
HDMORT	A1G07	LST	100	LST-100-G7-M9	9	108	3.40	
HDMORT	A1G07	LST	100	LST-100-G7-M10	10	89	3.68	Missing tip of tail
HDMORT	A1G07	LST	100	LST-100-G7-M11	11	116	6.56	
HDMORT	A1G07	LST	100	LST-100-G7-M12	12	117	4.93	
HDMORT	A1G07	LST	100	LST-100-G7-M13	13	117	4.65	
HDMORT	A1G07	LST	100	LST-100-G7-M14	14	97	3.32	
HDMORT	A1G07	LST	100	LST-100-G7-M15	15	109	4.36	
HDMORT	A1G07	LST	100	LST-100-G7-M16	16	131	6.45	
HDMORT	A1G07	LST	100	LST-100-G7-M17	17	120	4.79	
HDMORT	A1G07	LST	100	LST-100-G7-M18	18	110	3.43	
HDMORT	A1G07	LST	100	LST-100-G7-M19	19	115	4.45	
HDMORT	A1G07	LST	100	LST-100-G7-M20	20	130	6.65	
HDMORT	A2G13	LST	200	LST-200-G13-M1	1	119	5.19	
HDMORT	A2G13	LST	200	LST-200-G13-M2	2	114	4.66	
HDMORT	A2G13	LST	200	LST-200-G13-M3	3	111	4.05	
HDMORT	A2G13	LST	200	LST-200-G13-M4	4	110	4.47	
HDMORT	A2G13	LST	200	LST-200-G13-M5	5	104	3.74	
HDMORT	A2G13	LST	200	LST-200-G13-M6	6	90	2.87	
HDMORT	A2G13	LST	200	LST-200-G13-M7	7	101	3.65	
HDMORT	A2G13	LST	200	LST-200-G13-M8	8	94	2.85	
HDMORT	A2G13	LST	200	LST-200-G13-M9	9	114	4.89	
HDMORT	A2G13	LST	200	LST-200-G13-M10	10	92	2.73	
HDMORT	A2G13	LST	200	LST-200-G13-M11	11	92	3.33	
HDMORT	A2G13	LST	200	LST-200-G13-M12	12	100	4.93	
HDMORT	A2G13	LST	200	LST-200-G13-M13	13	100	3.76	
HDMORT	A2G13	LST	200	LST-200-G13-M14	14	111	6.38	Missing tip of tail
HDMORT	A2G13	LST	200	LST-200-G13-M15	15	107	6.79	
HDMORT	A3G03	LST	300	LST-300-G3-M1	1	121	5.50	
HDMORT	A3G03	LST	300	LST-300-G3-M2	2	117	5.22	
HDMORT	A3G03	LST	300	LST-300-G3-M3	3	115	3.89	
HDMORT	A3G03	LST	300	LST-300-G3-M4	4	136	8.90	
HDMORT	A3G03	LST	300	LST-300-G3-M5	5	123	7.15	
HDMORT	A3G03	LST	300	LST-300-G3-M6	6	107	4.16	
HDMORT	A3G03	LST	300	LST-300-G3-M7	7	133	7.49	
HDMORT	A3G03	LST	300	LST-300-G3-M8	8	114	4.85	
HDMORT	A3G03	LST	300	LST-300-G3-M9	9	117	4.88	See Deviation 36
HDMORT	A3G03	LST	300	LST-300-G3-M10	10	97	3.95	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M1	1	109	3.49	
HDMORT	A5G06	LST	50	LST-50-G6-M2	2	107	3.12	
HDMORT	A5G06	LST	50	LST-50-G6-M3	3	130	6.88	
HDMORT	A5G06	LST	50	LST-50-G6-M4	4	107	2.98	
HDMORT	A5G06	LST	50	LST-50-G6-M5	5	111	5.54	
HDMORT	A5G06	LST	50	LST-50-G6-M6	6	114	4.80	
HDMORT	A5G06	LST	50	LST-50-G6-M7	7	115	4.40	
HDMORT	A5G06	LST	50	LST-50-G6-M8	8	108	3.36	
HDMORT	A5G06	LST	50	LST-50-G6-M9	9	111	5.33	
HDMORT	A5G06	LST	50	LST-50-G6-M10	10	119	5.35	
HDMORT	A5G06	LST	50	LST-50-G6-M11	11	118	4.64	
HDMORT	A5G06	LST	50	LST-50-G6-M12	12	101	3.40	
HDMORT	A5G06	LST	50	LST-50-G6-M13	13	111	4.94	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M14	14	108	4.05	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M15	15	105	2.73	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M16	16	110	5.11	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M17	17	121	4.59	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M18	18	138	8.25	See Deviation 36
HDMORT	A5G06	LST	50	LST-50-G6-M19	19	124	6.41	See Deviation 36; Fungus on fish
HDMORT	B1G09	LST	300	LST-300-G9-M1	1	114	3.96	
HDMORT	B1G09	LST	300	LST-300-G9-M2	2	119	5.18	
HDMORT	B1G09	LST	300	LST-300-G9-M3	3	110	4.17	
HDMORT	B1G09	LST	300	LST-300-G9-M4	4	105	3.76	
HDMORT	B1G09	LST	300	LST-300-G9-M5	5	114	5.02	
HDMORT	B1G09	LST	300	LST-300-G9-M6	6	104	4.44	
HDMORT	B1G09	LST	300	LST-300-G9-M7	7	121	6.30	
HDMORT	B1G09	LST	300	LST-300-G9-M8	8	112	4.99	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Data Source: File Folder; 20D
Forms 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemica lot #: 401P1215AG-02
Exposure Date: 8/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	B1G09	LST	300	LST-300-G9-M9	9	111	4.27	
HDMORT	B1G09	LST	300	LST-300-G9-M10	10	121	6.27	
HDMORT	B1G09	LST	300	LST-300-G9-M11	11	115	6.09	
HDMORT	B1G09	LST	300	LST-300-G9-M12	12	121	6.37	See Deviation 36
HDMORT	B1G09	LST	300	LST-300-G9-M13	13	106	3.91	See Deviation 36
HDMORT	B1G09	LST	300	LST-300 G9 M14	14	115	5.20	See Deviation 36
HDMORT	B1G09	LST	300	LST-300-G9-M15	15	114	5.01	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M1	1	114	4.76	
HDMORT	B2G01	LST	100	LST-100-G1-M2	2	85	3.24	
HDMORT	B2G01	LST	100	LST-100-G1-M3	3	106	5.02	
HDMORT	B2G01	LST	100	LST-100-G1-M4	4	91	3.33	
HDMORT	B2G01	LST	100	LST-100-G1-M5	5	111	3.86	
HDMORT	B2G01	LST	100	LST-100-G1-M6	6	113	4.27	
HDMORT	B2G01	LST	100	LST-100-G1-M7	7	98	3.18	
HDMORT	B2G01	LST	100	LST-100-G1-M8	8	107	3.70	
HDMORT	B2G01	LST	100	LST-100-G1-M9	9	121	5.30	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M10	10	107	4.14	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M11	11	121	5.34	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M12	12	100	2.76	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M13	13	102	3.19	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M14	14	113	5.13	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M15	15	114	3.97	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M16	16	112	4.54	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M17	17	114	4.10	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M18	18	106	3.49	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M19	19	132	7.41	See Deviation 36
HDMORT	B2G01	LST	100	LST-100-G1-M20	20	125	7.30	See Deviation 36; Fungus on fish
HDMORT	B3G02	LST	50	LST-50-G2-M1	1	97	3.24	
HDMORT	B3G02	LST	50	LST-50-G2-M2	2	110	4.48	
HDMORT	B3G02	LST	50	LST-50-G2-M3	3	108	3.05	
HDMORT	B3G02	LST	50	LST-50-G2-M4	4	100	7.61	
HDMORT	B3G02	LST	50	LST-50-G2-M5	5	109	3.53	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M6	6	107	3.56	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M7	7	105	3.58	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M8	8	112	4.26	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M9	9	125	6.17	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M10	10	115	6.41	See Deviation 36
HDMORT	B3G02	LST	50	LST-50 G2-M11	11	103	3.96	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M12	12	107	3.37	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M13	13	97	2.50	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M14	14	115	6.37	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M15	15	116	6.43	See Deviation 36
HDMORT	B3G02	LST	50	LST-50-G2-M16	16	120	7.59	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M1	1	121	5.66	
HDMORT	B4G15	LST	200	LST-200-G15-M2	2	116	4.91	
HDMORT	B4G15	LST	200	LST-200-G15-M3	3	102	3.89	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M4	4	116	5.52	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M5	5	105	3.86	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M6	6	105	3.77	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M7	7	98	3.45	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M8	8	111	5.15	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M9	9	135	8.94	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M10	10	113	5.24	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M11	11	108	4.65	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M12	12	99	3.96	See Deviation 36
HDMORT	B4G15	LST	200	LST-200 G15 M13	13	104	3.96	See Deviation 36
HDMORT	B4G15	LST	200	LST 200 G15-M14	14	97	3.55	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G13-M15	15	108	5.22	See Deviation 36
HDMORT	B4G15	LST	200	LST-200-G15-M16	16	107	5.18	See Deviation 36
HDMORT	C1G05	LST	50	LST-50-G5-M1	1	99	2.75	
HDMORT	C1G05	LST	50	LST-50-G5-M2	2	108	4.23	
HDMORT	C1G05	LST	50	LST-50-G5-M3	3	101	3.57	
HDMORT	C1G05	LST	50	LST-50-G5-M4	4	129	6.37	
HDMORT	C1G05	LST	50	LST-50-G5-M5	5	106	3.19	
HDMORT	C1G05	LST	50	LST-50-G5-M6	6	96	2.91	
HDMORT	C1G05	LST	50	LST-50-G5-M7	7	101	3.31	
HDMORT	C1G05	LST	50	LST-50-G5-M8	8	102	3.90	
HDMORT	C1G05	LST	50	LST-50-G5-M9	9	100	3.40	
HDMORT	C1G05	LST	50	LST-50-G5-M10	10	117	4.04	
HDMORT	C1G05	LST	50	LST-50-G5-M11	11	110	4.24	
HDMORT	C1G05	LST	50	LST 50 G5 M12	12	113	4.28	
HDMORT	C1G05	LST	50	LST 50 G5 M13	13	98	3.67	See Deviation 36
HDMORT	C1G05	LST	50	LST-50-G5-M14	14	125	5.55	See Deviation 36
HDMORT	C1G05	LST	50	LST-50-G5-M15	15	118	5.85	See Deviation 36

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Data Source: File Folder: 20D
Forms: 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) Lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02
Exposure Date: 8/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	C1G05	LST	50	LST-50-G5-M16	16	119	5.95	See Deviation 36
HDMORT	C1G05	LST	50	LST-50-G5-M17	17	120	7.79	See Deviation 36; Fungus on tail half of fish
HDMORT	C1G05	LST	50	LST-50-G5-M18	18	129	7.63	See Deviation 36; Fungus on fish
HDMORT	C2G12	LST	200	LST-200-G12-M1	1	107	4.07	
HDMORT	C2G12	LST	200	LST-200-G12-M2	2	105	3.60	
HDMORT	C2G12	LST	200	LST-200-G12-M3	3	105	3.96	
HDMORT	C2G12	LST	200	LST-200-G12-M4	4	133	8.12	
HDMORT	C2G12	LST	200	LST-200-G12-M5	5	106	4.57	
HDMORT	C2G12	LST	200	LST-200-G12-M6	6	115	5.17	
HDMORT	C2G12	LST	200	LST-200-G12-M7	7	113	5.27	
HDMORT	C2G12	LST	200	LST-200-G12-M8	8	99	3.15	
HDMORT	C2G12	LST	200	LST-200-G12-M9	9	105	3.65	
HDMORT	C2G12	LST	200	LST-200-G12-M10	10	112	5.25	
HDMORT	C2G12	LST	200	LST-200-G12-M11	11	99	4.84	
HDMORT	C2G12	LST	200	LST-200-G12-M12	12	106	4.34	
HDMORT	C2G12	LST	200	LST-200-G12-M13	13	104	3.65	
HDMORT	C2G12	LST	200	LST-200-G12-M14	14	110	4.63	
HDMORT	C2G12	LST	200	LST-200-G12-M15	15	105	4.87	
HDMORT	C2G12	LST	200	LST-200-G12-M16	16	120	5.52	
HDMORT	C2G12	LST	200	LST-200-G12-M17	17	131	7.23	
HDMORT	C2G12	LST	200	LST-200-G12-M18	18	110	4.24	
HDMORT	C3G14	LST	300	LST-300-G14-M1	1	116	4.72	
HDMORT	C3G14	LST	300	LST-300-G14-M2	2	100	3.79	
HDMORT	C3G14	LST	300	LST-300-G14-M3	3	110	4.42	
HDMORT	C3G14	LST	300	LST-300-G14-M4	4	112	4.22	
HDMORT	C3G14	LST	300	LST-300-G14-M5	5	105	3.62	
HDMORT	C3G14	LST	300	LST-300-G14-M6	6	124	5.87	
HDMORT	C3G14	LST	300	LST-300-G14-M7	7	120	6.45	
HDMORT	C3G14	LST	300	LST-300-G14-M8	8	122	6.71	
HDMORT	C3G14	LST	300	LST-300-G14-M9	9	111	5.10	
HDMORT	C3G14	LST	300	LST-300-G14-M10	10	126	7.65	
HDMORT	C5G11	LST	100	LST-100-G11-M1	1	84	3.26	
HDMORT	C5G11	LST	100	LST-100-G11-M2	2	103	4.57	
HDMORT	C5G11	LST	100	LST-100-G11-M3	3	104	4.60	
HDMORT	C5G11	LST	100	LST-100-G11-M4	4	105	3.66	
HDMORT	C5G11	LST	100	LST-100-G11-M5	5	98	4.03	
HDMORT	C5G11	LST	100	LST-100-G11-M6	6	86	3.45	
HDMORT	C5G11	LST	100	LST-100-G11-M7	7	111	4.46	
HDMORT	C5G11	LST	100	LST-100-G11-M8	8	106	3.52	
HDMORT	C5G11	LST	100	LST-100-G11-M9	9	103	3.51	
HDMORT	C5G11	LST	100	LST-100-G11-M10	10	97	3.15	
HDMORT	C5G11	LST	100	LST-100-G11-M11	11	113	5.39	
HDMORT	C5G11	LST	100	LST-100-G11-M12	12	124	5.48	
HDMORT	C5G11	LST	100	LST-100-G11-M13	13	117	5.70	
HDMORT	C5G11	LST	100	LST-100-G11-M14	14	121	5.49	
HDMORT	C5G11	LST	100	LST-100-G11-M15	15	124	5.82	
HDMORT	C5G11	LST	100	LST-100-G11-M16	16	118	5.53	
HDMORT	C5G11	LST	100	LST-100-G11-M17	17	114	4.76	
HDMORT	C5G11	LST	100	LST-100-G11-M18	18	121	6.95	
HDMORT	C5G11	LST	100	LST-100-G11-M19	19	107	5.14	
HDMORT	C5G11	LST	100	LST-100-G11-M20	20	125	6.70	
TERMIN	A2G13	LST	200	LST-200-G13-T1	1	107	4.25	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T1	1	130	7.06	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T2	2	142	8.97	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T3	3	164	14.21	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T4	4	137	9.71	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T5	5	127	6.96	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T6	6	129	7.44	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T7	7	136	8.87	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T8	8	133	8.38	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T9	9	134	7.60	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T10	10	135	8.43	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T11	11	149	11.92	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T12	12	139	7.94	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T13	13	132	8.04	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T14	14	146	10.54	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T15	15	142	9.93	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T16	16	136	8.94	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T17	17	145	9.94	
TERMIN	A4G04	LST	0	LST CONTROL G4-T18	18	124	7.68	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T19	19	133	7.92	
TERMIN	A4G04	LST	0	LST-CONTROL-G4-T20	20	134	7.79	
TERMIN	A5G06	LST	50	LST-50-G6-T1	1	114	4.62	
TERMIN	B3G02	LST	50	LST-50-G2-T1	1	123	6.73	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 24-34)
Date Source; File Folder: 200
Forms: 3, 3a

Fish species: Lake Sturgeon (*Acipenser fulvescens*) lot number: 122300
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02
Exposure Date: 8/1/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	B3G02	LST	50	LST-50-G2-T2	2	138	9.34	
TERMIN	B3G02	LST	50	LST-50-G2-T3	3	121	5.92	
TERMIN	B3G02	LST	50	LST-50-G2-T4	4	129	7.80	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T1	1	140	8.73	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T2	2	158	14.26	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T3	3	129	7.06	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T4	4	138	9.24	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T5	5	125	6.13	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T6	6	120	5.01	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T7	7	165	14.21	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T8	8	156	12.56	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T9	9	152	11.98	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T10	10	135	8.95	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T11	11	151	11.91	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T12	12	145	10.63	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T13	13	111	5.69	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T14	14	154	11.43	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T15	15	145	10.36	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T16	16	157	13.24	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T17	17	134	9.50	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T18	18	143	10.95	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T19	19	137	8.58	
TERMIN	B5G08	LST	0	LST-CONTROL-G8-T20	20	139	10.06	
TERMIN	C1G05	LST	50	LST-50-G5-T1	1	130	7.23	
TERMIN	C1G05	LST	50	LST-50-G5-T2	2	139	10.10	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T1	1	148	10.98	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T2	2	138	9.22	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T3	3	141	9.36	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T4	4	142	10.05	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T5	5	165	14.06	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T6	6	111	4.93	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T7	7	148	11.42	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T8	8	137	8.52	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T9	9	126	6.72	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T10	10	141	9.40	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T11	11	145	9.80	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T12	12	146	9.44	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T13	13	158	13.21	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T14	14	143	11.41	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T15	15	139	8.28	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T16	16	137	9.80	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T17	17	151	11.02	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T18	18	135	7.89	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T19	19	150	11.19	
TERMIN	C4G10	LST	0	LST-CONTROL-G10-T20	20	126	6.96	

File Folder: 204

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	nitials
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)	Created.....	5/1/2013	KLW
Data Source: File Folder: 21D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed..	3/25/15	
	Certified.....	3/25/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]LMB LengthWeight			

Length/Weight Data - *Micropterus salmoides*

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsecuent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
NONE

File Folder: 21d

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 21D
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDF) Chemical lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	LMB	NA	LMB-DIS#1-01	1	47	1.12	
DISTRO	D0001	LMB	NA	LMB-DIS#1-02	2	43	0.84	
DISTRO	D0001	LMB	NA	LMB-DIS#1-03	3	45	0.99	
DISTRO	D0001	LMB	NA	LMB-DIS#1-04	4	47	1.13	
DISTRO	D0001	LMB	NA	LMB-DIS#1-05	5	54	1.67	
DISTRO	D0001	LMB	NA	LMB-DIS#1-06	6	44	0.90	
DISTRO	D0001	LMB	NA	LMB-DIS#1-07	7	45	0.89	
DISTRO	D0001	LMB	NA	LMB-DIS#1-08	8	44	0.98	
DISTRO	D0001	LMB	NA	LMB-DIS#1-09	9	54	1.70	
DISTRO	D0001	LMB	NA	LMB-DIS#1-10	10	50	1.29	
DISTRO	D0001	LMB	NA	LMB-DIS#2-01	11	54	1.59	
DISTRO	D0001	LMB	NA	LMB-DIS#2-02	12	45	0.85	
DISTRO	D0001	LMB	NA	LMB-DIS#2-03	13	58	2.35	
DISTRO	D0001	LMB	NA	LMB-DIS#2-04	14	46	1.16	
DISTRO	D0001	LMB	NA	LMB-DIS#2-05	15	43	0.77	
DISTRO	D0001	LMB	NA	LMB-DIS#2-06	16	52	1.49	
DISTRO	D0001	LMB	NA	LMB-DIS#2-07	17	43	0.89	
DISTRO	D0001	LMB	NA	LMB-DIS#2-08	18	43	0.84	
DISTRO	D0001	LMB	NA	LMB-DIS#2-09	19	44	0.98	
DISTRO	D0001	LMB	NA	LMB-DIS#2-10	20	41	0.71	
DISTRO	D0001	LMB	NA	LMB-DIS#3-01	21	46	0.94	
DISTRO	D0001	LMB	NA	LMB-DIS#3-02	22	46	1.14	
DISTRO	D0001	LMB	NA	LMB-DIS#3-03	23	55	2.02	
DISTRO	D0001	LMB	NA	LMB-DIS#3-04	24	47	1.10	
DISTRO	D0001	LMB	NA	LMB-DIS#3-05	25	47	1.14	
DISTRO	D0001	LMB	NA	LMB-DIS#3-06	26	50	1.36	
DISTRO	D0001	LMB	NA	LMB-DIS#3-07	27	52	1.60	
DISTRO	D0001	LMB	NA	LMB-DIS#3-08	28	44	0.98	
DISTRO	D0001	LMB	NA	LMB-DIS#3-09	29	45	1.10	
DISTRO	D0001	LMB	NA	LMB-DIS#3-10	30	43	0.96	
DISTRO	D0001	LMB	NA	LMB-DIS#4-01	31	53	1.56	
DISTRO	D0001	LMB	NA	LMB-DIS#4-02	32	44	0.90	
DISTRO	D0001	LMB	NA	LMB-DIS#4-03	33	41	0.68	
DISTRO	D0001	LMB	NA	LMB-DIS#4-04	34	45	0.99	
DISTRO	D0001	LMB	NA	LMB-DIS#4-05	35	48	1.28	
DISTRO	D0001	LMB	NA	LMB-DIS#4-06	36	47	1.11	
DISTRO	D0001	LMB	NA	LMB-DIS#4-07	37	55	1.86	
DISTRO	D0001	LMB	NA	LMB DIS#4 08	38	42	0.81	
DISTRO	D0001	LMB	NA	LMB-DIS#4-09	39	40	0.64	
DISTRO	D0001	LMB	NA	LMB-DIS#4-10	40	44	0.96	
EXPTER	A1E11	LMB	200	LMB-200-A-01	1	53	1.62	
EXPTER	A1E11	LMB	200	LMB-200-A-02	2	50	1.32	
EXPTER	A1E11	LMB	200	LMB-200-A-03	3	40	0.61	
EXPTER	A1E11	LMB	200	LMB-200-A-04	4	43	0.89	
EXPTER	A1E11	LMB	200	LMB-200-A-05	5	47	0.73	
EXPTER	A3E12	LMB	0	LMB-CONTROL-A-01	1	48	1.19	
EXPTER	A3E12	LMB	0	LMB-CONTROL-A-02	2	49	1.34	
EXPTER	A3E12	LMB	0	LMB-CONTROL-A-03	3	53	1.33	
EXPTER	A3E12	LMB	0	LMB-CONTROL-A-04	4	48	1.14	
EXPTER	A3E12	LMB	0	LMB-CONTROL-A-05	5	42	0.70	
EXPTER	A4E06	LMB	100	LMB-100-A-01	1	46	0.90	
EXPTER	A4E06	LMB	100	LMB-100-A-02	2	44	0.80	
EXPTER	A4E06	LMB	100	LMB-100-A-03	3	52	1.53	
EXPTER	A4E06	LMB	100	LMB-100-A-04	4	47	0.93	
EXPTER	A4E06	LMB	100	LMB-100-A-05	5	60	2.35	
EXPTER	A5E10	LMB	50	LMB-50-A-01	1	44	0.82	
EXPTER	A5E10	LMB	50	LMB-50-A-02	2	44	0.80	
EXPTER	A5E10	LMB	50	LMB-50-A-03	3	49	1.40	
EXPTER	A5E10	LMB	50	LMB-50-A-04	4	49	1.23	
EXPTER	A5E10	LMB	50	LMB-50-A-05	5	45	0.94	
EXPTER	B1E15	LMB	50	LMB 50 B 01	1	48	1.18	
EXPTER	B1E15	LMB	50	LMB-50-B-02	2	45	1.01	
EXPTER	B1E15	LMB	50	LMB-50-B-03	3	40	0.62	
EXPTER	B1E15	LMB	50	LMB-50-B-04	4	39	0.50	
EXPTER	B1E15	LMB	50	LMB-50-B-05	5	55	1.82	
EXPTER	B2E13	LMB	100	LMB-100-B-01	1	49	1.31	
EXPTER	B2E13	LMB	100	LMB-100-B-02	2	42	0.73	
EXPTER	B2E13	LMB	100	LMB-100-B-03	3	47	1.02	
EXPTER	B2E13	LMB	100	LMB-100-B-04	4	51	1.14	
EXPTER	B2E13	LMB	100	LMB-100-B-05	5	47	0.72	
EXPTER	B3E14	LMB	0	LMB-CONTROL-B-01	1	43	0.79	
EXPTER	B3E14	LMB	0	LMB-CONTROL-B-02	2	45	0.95	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 21D
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4565-4-[5] #2
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B3E14	LMB	0	LMB-CONTROL-B-03	3	44	0.74	
EXPTER	B3E14	LMB	0	LMB-CONTROL-B-04	4	46	0.97	
EXPTER	B3E14	LMB	0	LMB-CONTROL-B-05	5	41	0.68	
EXPTER	B5E03	LMB	200	LMB-200-B-01	1	48	1.16	
EXPTER	B5E03	LMB	200	LMB-200-B-02	2	53	1.44	
EXPTER	B5E03	LMB	200	LMB-200-B-03	3	46	1.13	
EXPTER	C2E04	LMB	50	LMB-50-C-01	1	48	1.10	
EXPTER	C2E04	LMB	50	LMB-50-C-02	2	46	0.97	
EXPTER	C2E04	LMB	50	LMB-50-C-03	3	43	0.70	
EXPTER	C2E04	LMB	50	LMB-50-C-04	4	46	1.10	
EXPTER	C2E04	LMB	50	LMB-50-C-05	5	53	1.48	
EXPTER	C3E01	LMB	100	LMB-100-C-01	1	45	0.95	
EXPTER	C3E01	LMB	100	LMB-100-C-02	2	44	0.94	
EXPTER	C3E01	LMB	100	LMB-100-C-03	3	50	1.31	
EXPTER	C3E01	LMB	100	LMB-100-C-04	4	49	1.35	
EXPTER	C3E01	LMB	100	LMB-100-C-05	5	49	1.29	
EXPTER	C4E08	LMB	0	LMB-CONTROL-C-01	1	45	0.85	
EXPTER	C4E08	LMB	0	LMB-CONTROL-C-02	2	47	0.81	
EXPTER	C4E08	LMB	0	LMB-CONTROL-C-03	3	50	1.17	
EXPTER	C4E08	LMB	0	LMB-CONTROL-C-04	4	45	0.88	
EXPTER	C4E08	LMB	0	LMB CONTROL C 05	5	41	0.71	
EXPTER	C5E02	LMB	200	LMB-200-C-01	1	48	1.20	
EXPTER	C5E02	LMB	200	LMB-200-C-02	2	49	1.19	
EXPTER	C5E02	LMB	200	LMB-200-C-03	3	39	0.53	
EXPTER	C5E02	LMB	200	LMB-200-C-04	4	43	0.73	
EXMORT	A1E11	LMB	200	LMB-200-A1-M1	1	45	1.10	
EXMORT	A1E11	LMB	200	LMB-200-A1-M2	2	43	0.99	
EXMORT	A1E11	LMB	200	LMB-200-A1-M3	3	42	0.81	
EXMORT	A2E07	LMB	300	LMB 300 A2 M1	1	46	1.05	
EXMORT	A2E07	LMB	300	LMB-300-A2-M2	2	46	1.18	
EXMORT	A2E07	LMB	300	LMB-300-A2-M3	3	46	1.10	
EXMORT	A2E07	LMB	300	LMB-300-A2-M4	4	45	0.93	
EXMORT	A2E07	LMB	300	LMB-300-A2-M5	5	45	0.96	
EXMORT	A2E07	LMB	300	LMB-300-A2-M6	6	40	0.64	
EXMORT	A2E07	LMB	300	LMB-300-A2-M7	7	42	0.86	
EXMORT	A2E07	LMB	300	LMB-300-A2-M8	8	45	0.80	
EXMORT	A2E07	LMB	300	LMB-300-A2-M9	9	43	1.09	
EXMORT	A2E07	LMB	300	LMB-300-A2-M10	10	45	1.02	
EXMORT	A2E07	LMB	300	LMB-300-A2-M11	11	45	0.99	
EXMORT	A2E07	LMB	300	LMB-300-A2-M12	12	49	1.38	
EXMORT	A2E07	LMB	300	LMB-300-A2-M13	13	42	0.89	
EXMORT	A2E07	LMB	300	LMB-300-A2-M14	14	42	0.79	
EXMORT	A2E07	LMB	300	LMB-300-A2-M15	15	47	1.03	
EXMORT	A2E07	LMB	300	LMB-300-A2-M16	16	47	1.09	
EXMORT	A4E06	LMB	100	LMB-100-A4-M1	1	43	0.86	
EXMORT	B4E05	LMB	300	LMB-300-B4-M1	1	58	2.37	
EXMORT	B4E05	LMB	300	LMB-300-B4-M2	2	55	1.94	
EXMORT	B4E05	LMB	300	LMB-300-B4-M3	3	42	0.73	
EXMORT	B4E05	LMB	300	LMB-300-B4-M4	4	56	2.07	
EXMORT	B4E05	LMB	300	LMB-300-B4-M5	5	47	1.14	
EXMORT	B4E05	LMB	300	LMB-300-B4-M6	6	43	0.84	
EXMORT	B4E05	LMB	300	LMB-300-B4-M7	7	51	1.56	
EXMORT	B4E05	LMB	300	LMB-300-B4-M8	8	45	1.08	
EXMORT	B4E05	LMB	300	LMB-300-B4-M9	9	48	1.22	
EXMORT	B4E05	LMB	300	LMB-300-B4-M10	10	51	1.54	
EXMORT	B4E05	LMB	300	LMB-300-B4-M11	11	45	1.13	
EXMORT	B4E05	LMB	300	LMB-300-B4-M12	12	41	0.72	
EXMORT	B4E05	LMB	300	LMB-300-B4-M13	13	43	0.96	
EXMORT	B4E05	LMB	300	LMB-300-B4-M14	14	46	1.06	
EXMORT	B4E05	LMB	300	LMB-300-B4-M15	15	45	1.04	
EXMORT	B4E05	LMB	300	LMB 300 B4-M16	16	49	1.32	
EXMORT	B4E05	LMB	300	LMB-300-B4-M17	17	43	0.91	
EXMORT	B4E05	LMB	300	LMB-300-B4-M18	18	46	1.01	
EXMORT	B4E05	LMB	300	LMB-300-B4-M19	19	61	2.54	
EXMORT	B4E05	LMB	300	LMB-300-B4-M20	20	43	0.93	
EXMORT	B5E03	LMB	200	LMB-200-B5-M1	1	50	1.25	
EXMORT	B5E03	LMB	200	LMB-200-B5-M2	2	50	1.42	
EXMORT	B5E03	LMB	200	LMB-200-B5-M3	3	44	0.98	
EXMORT	B5E03	LMB	200	LMB-200-B5-M4	4	42	0.75	
EXMORT	B5E03	LMB	200	LMB-200-B5-M5	5	46	1.15	
EXMORT	B5E03	LMB	200	LMB-200-B5-M6	6	44	0.79	
EXMORT	B5E03	LMB	200	LMB-200-B5-M7	7	47	1.25	

Item Number 19
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 21D
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-[5] #2
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total length (mm)	Weight (g)	Comments
EXMORT	35E03	LMB	200	LMB-200-B5-M8	8	47	1.15	
EXMORT	35E03	LMB	200	LMB-200-B5-M9	9	50	1.40	
EXMORT	35E03	LMB	200	LMB-200-B5-M10	10	47	1.28	
EXMORT	C1E09	LMB	300	LMB-300-C1-M1	1	50	1.45	
EXMORT	C1E09	LMB	300	LMB-300-C1-M2	2	45	1.06	
EXMORT	C1E09	LMB	300	LMB-300-C1-M3	3	43	1.01	
EXMORT	C1E09	LMB	300	LMB-300-C1-M4	4	44	1.02	
EXMORT	C1E09	LMB	300	LMB-300-C1-M5	5	45	1.04	
EXMORT	C1E09	LMB	300	LMB-300-C1-M6	6	47	1.10	
EXMORT	C1E09	LMB	300	LMB-300-C1-M7	7	45	1.06	
EXMORT	C1E09	LMB	300	LMB-300-C1-M8	8	41	0.81	
EXMORT	C1E09	LMB	300	LMB-300-C1-M9	9	49	1.40	
EXMORT	C1E09	LMB	300	LMB-300-C1-M10	10	52	1.65	
EXMORT	C1E09	LMB	300	LMB-300-C1-M11	11	52	1.85	
EXMORT	C1E09	LMB	300	LMB-300-C1-M12	12	42	0.86	
EXMORT	C1E09	LMB	300	LMB-300-C1-M13	13	43	0.87	
EXMORT	C1E09	LMB	300	LMB-300-C1-M14	14	42	0.76	
EXMORT	C1E09	LMB	300	LMB-300-C1-M15	15	44	0.97	
EXMORT	C1E09	LMB	300	LMB-300-C1-M16	16	57	1.91	
EXMORT	C1E09	LMB	300	LMB-300-C1-M17	17	40	0.74	
EXMORT	C1E09	LMB	300	LMB-300-C1-M18	18	42	0.81	
EXMORT	C1E09	LMB	300	LMB-300-C1-M19	19	42	0.95	
EXMORT	C1E09	LMB	300	LMB-300-C1-M20	20	49	1.14	
EXMORT	C1E09	LMB	300	LMB-300-C1-M21	21	49	1.55	
EXMORT	C1E09	LMB	300	LMB-300-C1-M22	22	43	0.98	
EXMORT	C1E09	LMB	300	LMB-300-C1-M23	23	45	1.05	
EXMORT	C5E02	LMB	200	LMB-200-C5-M1	1	56	1.91	
EXMORT	C5E02	LMB	200	LMB-200-C5-M2	2	45	0.98	
EXMORT	C5E02	LMB	200	LMB-200-C5-M3	3	46	1.22	
EXMORT	C5E02	LMB	200	LMB-200-C5-M4	4	41	0.76	
EXMORT	C5E02	LMB	200	LMB-200-C5-M5	5	43	0.86	
EXMORT	C5E02	LMB	200	LMB-200-C5-M6	6	42	0.78	
HDMORT	A1E11	LMB	200	LMB-200-E11-M1	1	49	1.16	
HDMORT	A1E11	LMB	200	LMB-200-E11-M2	2	46	1.09	
HDMORT	A1E11	LMB	200	LMB-200-E11-M3	3	55	1.55	
HDMORT	A2E07	LMB	300	LMB-300-E7-M1	1	52	1.60	
HDMORT	A2E07	LMB	300	LMB-300-E7-M2	2	46	1.29	
HDMORT	A2E07	LMB	300	LMB-300-E7-M3	3	45	1.06	
HDMORT	A2E07	LMB	300	LMB-300-E7-M4	4	45	1.16	
HDMORT	A4E06	LMB	100	LMB-100-E6-M1	1	46	1.25	
HDMORT	B2E13	LMB	100	LMB-100-E13-M1	1	45	0.92	
HDMORT	B4E05	LMB	300	LMB-300-E5-M1	1	57	1.95	
HDMORT	B4E05	LMB	300	LMB-300-E5-M2	2	42	1.23	
HDMORT	B4E05	LMB	300	LMB-300-E5-M3	3	47	0.67	
HDMORT	C3E09	LMB	300	LMB-300-E9-M1	1	44	1.11	
HDMORT	C5E02	LMB	200	LMB-200 E2 M1	1	51	1.38	
HDMORT	C5E02	LMB	200	LMB-200-E2-M2	2	62	2.60	
TERMIN	C3E01	LMB	100	LMB-100-E1-T1	1	54	1.50	
TERMIN	C3E01	LMB	100	LMB-100-E1-T2	2	48	0.66	
TERMIN	C3E01	LMB	100	LMB-100-E1-T3	3	52	1.30	
TERMIN	C3E01	LMB	100	LMB-100-E1-T4	4	55	1.74	
TERMIN	C3E01	LMB	100	LMB-100-E1-T5	5	45	0.93	
TERMIN	C3E01	LMB	100	LMB-100-E1-T6	6	54	1.56	
TERMIN	C3E01	LMB	100	LMB-100-E1-T7	7	52	1.39	
TERMIN	C3E01	LMB	100	LMB-100-E1-T8	8	44	0.86	
TERMIN	C3E01	LMB	100	LMB-100-E1-T9	9	57	1.71	
TERMIN	C3E01	LMB	100	LMB-100-E1-T10	10	55	1.68	
TERMIN	C3E01	LMB	100	LMB-100-E1-T11	11	43	0.74	
TERMIN	C3E01	LMB	100	LMB-100-E1-T12	12	52	1.38	
TERMIN	C3E01	LMB	100	LMB-100-E1-T13	13	53	1.45	
TERMIN	C3E01	LMB	100	LMB-100-E1-T14	14	48	0.92	
TERMIN	C3E01	LMB	100	LMB-100-E1-T15	15	51	1.37	
TERMIN	C3E01	LMB	100	LMB-100-E1-T16	16	48	1.11	
TERMIN	C3E01	LMB	100	LMB-100-E1-T17	17	45	0.76	
TERMIN	C3E01	LMB	100	LMB-100-E1-T18	18	51	1.37	
TERMIN	C3E01	LMB	100	LMB-100-E1-T19	19	46	0.93	
TERMIN	C3E01	LMB	100	LMB-100-F1-T20	20	47	1.02	
TERMIN	C5E02	LMB	200	LMB-200-E2-T1	1	44	0.66	
TERMIN	C5E02	LMB	200	LMB-200-E2-T2	2	54	1.52	
TERMIN	C5E02	LMB	200	LMB 200 E2 T3	3	61	2.27	
TERMIN	C5E02	LMB	200	LMB-200-E2-T4	4	47	0.96	
TERMIN	C5E02	LMB	200	LMB-200-E2-T5	5	51	1.34	

Item Number 17
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Study Number: AEII-12-?5EUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 21D
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: TR 4569-4-[5] #2
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C5E02	LMB	200	LMB-200-E2-T6	6	67	2.96	
TERMIN	C5E02	LMB	200	LMB-200-E2-T7	7	57	1.70	
TERMIN	C5E02	LMB	200	LMB-200-E2-T8	8	45	0.80	
TERMIN	C5E02	LMB	200	LMB 200 E2-T9	9	51	1.26	
TERMIN	C5E02	LMB	200	LMB-200-E2-T10	10	54	1.44	
TERMIN	C5E02	LMB	200	LMB-200-E2-T11	11	54	1.47	
TERMIN	C5E02	LMB	200	LMB-200-E2-T12	12	44	0.89	
TERMIN	B5E03	LMB	200	LMB-200-E3-T1	1	52	1.43	
TERMIN	B5E03	LMB	200	LMB-200-E3-T2	2	49	1.13	
TERMIN	B5E03	LMB	200	LMB-200-E3-T3	3	52	1.26	
TERMIN	B5E03	LMB	200	LMB-200 E3-T4	4	55	1.68	
TERMIN	B5E03	LMB	200	LMB-200-E3-T5	5	47	1.14	
TERMIN	B5E03	LMB	200	LMB-200-E3-T6	6	55	1.74	
TERMIN	B5E03	LMB	200	LMB-200-E3-T7	7	49	1.18	
TERMIN	B5E03	LMB	200	LMB-200-E3-T8	8	52	1.42	
TERMIN	B5E03	LMB	200	LMB-200-E3-T9	9	50	1.15	
TERMIN	B5E03	LMB	200	LMB-200-E3-T10	10	54	1.59	
TERMIN	B5E03	LMB	200	LMB-200-E3-T11	11	62	2.23	
TERMIN	B5E03	LMB	200	LMB-200-E3-T12	12	54	1.57	
TERMIN	C2E04	LMB	50	LMB-50-E4-T1	1	55	1.78	
TERMIN	C2E04	LMB	50	LMB-50-E4-T2	2	51	1.29	
TERMIN	C2E04	LMB	50	LMB-50-E4-T3	3	49	1.24	
TERMIN	C2E04	LMB	50	LMB-50-E4-T4	4	53	1.56	
TERMIN	C2E04	LMB	50	LMB-50-E4-T5	5	56	1.72	
TERMIN	C2E04	LMB	50	LMB-50-E4-T6	6	47	1.07	
TERMIN	C2E04	LMB	50	LMB-50-E4-T7	7	59	2.36	
TERMIN	C2E04	LMB	50	LMB-50-E4-T8	8	45	0.83	
TERMIN	C2E04	LMB	50	LMB-50-E4-T9	9	45	1.01	
TERMIN	C2E04	LMB	50	LMB-50-E4-T10	10	52	1.48	
TERMIN	C2E04	LMB	50	LMB-50-E4-T11	11	58	2.08	
TERMIN	C2E04	LMB	50	LMB-50-E4-T12	12	55	1.54	
TERMIN	C2E04	LMB	50	LMB-50-E4-T13	13	47	1.06	
TERMIN	C2E04	LMB	50	LMB-50-E4-T14	14	55	1.83	
TERMIN	C2E04	LMB	50	LMB-50-E4-T15	15	49	1.18	
TERMIN	C2E04	LMB	50	LMB-50-E4-T16	16	46	0.90	
TERMIN	C2E04	LMB	50	LMB-50-E4-T17	17	59	1.94	
TERMIN	C2E04	LMB	50	LMB-50-E4-T18	18	44	0.85	
TERMIN	C2E04	LMB	50	LMB-50-E4-T19	19	48	1.13	
TERMIN	B4E05	LMB	300	LMB-300-E5-T1	1	53	1.40	
TERMIN	B4E05	LMB	300	LMB-300-E5-T2	2	47	1.07	
TERMIN	A4E06	LMB	100	LMB-100-E6-T1	1	47	0.94	
TERMIN	A4E06	LMB	100	LMB-100-E6-T2	2	60	2.13	
TERMIN	A4E06	LMB	100	LMB 100 E6-T3	3	47	0.96	
TERMIN	A4E06	LMB	100	LMB-100-E6-T4	4	62	2.34	
TERMIN	A4E06	LMB	100	LMB-100-E6-T5	5	49	1.14	
TERMIN	A4E06	LMB	100	LMB-100-E6-T6	6	51	1.36	
TERMIN	A4E06	LMB	100	LMB-100-E6-T7	7	50	1.28	
TERMIN	A4E06	LMB	100	LMB-100-E6-T8	8	45	0.94	
TERMIN	A4E06	LMB	100	LMB-100-E6-T9	9	49	1.20	
TERMIN	A4E06	LMB	100	LMB-100-E6-T10	10	46	0.96	
TERMIN	A4E06	LMB	100	LMB-100-E6-T11	11	55	1.60	
TERMIN	A4E06	LMB	100	LMB-100-E6-T12	12	57	1.81	
TERMIN	A4E06	LMB	100	LMB-100-E6-T13	13	51	1.42	
TERMIN	A4E06	LMB	100	LMB-100-E6-T14	14	43	0.72	
TERMIN	A4E06	LMB	100	LMB-100-E6-T15	15	56	1.73	
TERMIN	A4E06	LMB	100	LMB-100-E6-T16	16	51	1.37	
TERMIN	A4E06	LMB	100	LMB-100-E6-T17	17	48	1.12	
TERMIN	A4E06	LMB	100	LMB-100-E6-T18	18	47	0.90	
TERMIN	A2E07	LMB	300	LMB-300-E7-T1	1	55	1.52	
TERMIN	A2E07	LMB	300	LMB-300-E7-T2	2	56	1.69	
TERMIN	A2E07	LMB	300	LMB-300-E7-T3	3	56	1.69	
TERMIN	A2E07	LMB	300	LMB-300-E7-T4	4	47	0.91	
TERMIN	A2E07	LMB	300	LMB-300-E7-T5	5	46	0.90	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T1	1	52	1.59	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T2	2	49	1.26	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T3	3	47	1.12	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T4	4	57	1.88	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T5	5	50	1.33	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T6	6	46	0.89	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T7	7	52	1.29	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T8	8	54	1.64	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T9	9	61	2.29	

Item Number 1
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Study Number: AER-12-PSEUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 210
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #1
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	D luter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T10	10	57	1.85	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T11	11	48	1.27	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T12	12	50	1.38	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T13	13	49	1.28	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T14	14	49	1.22	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T15	15	51	1.33	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T16	16	54	1.70	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T17	17	45	1.06	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T18	18	48	1.23	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T19	19	42	0.76	
TERMIN	C4E08	LMB	0	LMB-CONTROL-E8-T20	20	48	1.13	
TERMIN	C1E09	LMB	300	LMB-300-E9-T1	1	61	2.24	
TERMIN	A5E10	LMB	50	LMB-50-E10-T1	1	49	1.19	
TERMIN	A5E10	LMB	50	LMB-50-E10-T2	2	54	1.63	
TERMIN	A5E10	LMB	50	LMB-50-E10-T3	3	46	1.07	
TERMIN	A5E10	LMB	50	LMB-50-E10-T4	4	46	1.03	
TERMIN	A5E10	LMB	50	LMB-50-E10-T5	5	46	1.05	
TERMIN	A5E10	LMB	50	LMB-50-E10-T6	6	48	1.08	
TERMIN	A5E10	LMB	50	LMB-50-E10-T7	7	47	1.10	
TERMIN	A5E10	LMB	50	LMB-50-E10-T8	8	50	1.27	
TERMIN	A5E10	LMB	50	LMB-50-E10-T9	9	49	1.20	
TERMIN	A5E10	LMB	50	LMB-50-E10-T10	10	49	1.24	
TERMIN	A5E10	LMB	50	LMB-50-E10-T11	11	51	1.30	
TERMIN	A5E10	LMB	50	LMB-50-E10-T12	12	50	1.40	
TERMIN	A5E10	LMB	50	LMB-50-E10-T13	13	53	1.55	
TERMIN	A5E10	LMB	50	LMB-50-E10-T14	14	51	1.46	
TERMIN	A5E10	LMB	50	LMB-50-E10-T15	15	47	1.14	
TERMIN	A5E10	LMB	50	LMB-50-E10-T16	16	60	2.16	
TERMIN	A5E10	LMB	50	LMB-50-E10-T17	17	45	0.93	
TERMIN	A5E10	LMB	50	LMB-50-E10-T18	18	52	1.46	
TERMIN	A5E10	LMB	50	LMB-50-E10-T19	19	59	2.10	
TERMIN	A5E10	LMB	50	LMB-50-E10-T20	20	56	1.87	
TERMIN	A1E11	LMB	200	LMB-200-E11-T1	1	55	1.56	
TERMIN	A1E11	LMB	200	LMB-200-E11-T2	2	43	0.81	
TERMIN	A1E11	LMB	200	LMB-200-E11-T3	3	55	1.60	
TERMIN	A1E11	LMB	200	LMB-200-E11-T4	4	59	2.12	
TERMIN	A1E11	LMB	200	LMB-200-E11-T5	5	44	0.78	
TERMIN	A1E11	LMB	200	LMB-200-E11-T6	6	44	0.79	
TERMIN	A1E11	LMB	200	LMB-200-E11-T7	7	66	2.73	
TERMIN	A1E11	LMB	200	LMB-200-E11-T8	8	57	1.83	
TERMIN	A1E11	LMB	200	LMB-200-E11-T9	9	57	1.96	
TERMIN	A1E11	LMB	200	LMB-200-E11-T10	10	56	1.69	
TERMIN	A1E11	LMB	200	LMB-200-E11-T11	11	56	1.59	
TERMIN	A1E11	LMB	200	LMB-200-E11-T12	12	50	1.15	
TERMIN	A1E11	LMB	200	LMB-200-E11-T13	13	47	1.09	
TERMIN	A1E11	LMB	200	LMB-200-E11-T14	14	42	0.66	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T1	1	47	1.11	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T2	2	47	1.06	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T3	3	50	1.30	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T4	4	47	1.10	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T5	5	49	1.30	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T6	6	52	1.47	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T7	7	49	1.12	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T8	8	61	2.47	
TERMIN	A3E12	LMB	0	LMB CONTROL E12 T9	9	47	1.16	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T10	10	57	1.88	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T11	11	49	1.30	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T12	12	46	1.08	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T13	13	49	1.23	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T14	14	50	1.26	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T15	15	42	0.74	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T16	16	59	2.14	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T17	17	45	0.77	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T18	18	53	1.46	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T19	19	49	1.31	
TERMIN	A3E12	LMB	0	LMB-CONTROL-E12-T20	20	44	0.98	
TERMIN	B2E13	LMB	100	LMB-100-E13-T1	1	50	1.30	
TERMIN	B2E13	LMB	100	LMB-100-E13-T2	2	41	0.64	
TERMIN	B2E13	LMB	100	LMB-100-E13-T3	3	49	1.17	
TERMIN	B2E13	LMB	100	LMB-100-E13-T4	4	51	1.35	
TERMIN	B2E13	LMB	100	LMB-100-E13-T5	5	47	1.05	
TERMIN	B2E13	LMB	100	LMB-100-E13-T6	6	51	1.41	

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (pages 49-50) and Lab Notebook #2 (pages 1-14)
Data Source: File Folder: 210
Forms: 3, 3a

Fish species: Largemouth Bass (*Micropterus salmoides*) Lot number: 114000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #2
Exposure Date: 6/12/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	B2E13	LMB	100	LMB-100-E13-T7	7	46	0.91	
TERMIN	B2E13	LMB	100	LMB-100-E13-T8	8	54	1.48	
TERMIN	B2E13	LMB	100	LMB-100-E13-T9	9	45	0.97	
TERMIN	B2E13	LMB	100	LMB-100-E13-T10	10	47	0.97	
TERMIN	B2E13	LMB	100	LMB 100 E13 T11	11	49	1.17	
TERMIN	B2E13	LMB	100	LMB-100-E13-T12	12	52	1.30	
TERMIN	B2E13	LMB	100	LMB-100-E13-T13	13	47	1.07	
TERMIN	B2E13	LMB	100	LMB-100-E13-T14	14	44	0.83	
TERMIN	B2E13	LMB	100	LMB-100-E13-T15	15	47	1.15	
TERMIN	B2E13	LMB	100	LMB-100-E13-T16	16	46	1.08	
TERMIN	B2E13	LMB	100	LMB-100-E13-T17	17	51	1.26	
TERMIN	B2E13	LMB	100	LMB-100-E13-T18	18	44	0.91	
TERMIN	B2E13	LMB	100	LMB-100-E13-T19	19	43	0.85	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T1	1	51	1.45	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T2	2	51	1.42	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T3	3	50	1.24	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T4	4	44	0.86	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T5	5	43	0.84	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T6	6	59	2.02	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T7	7	46	1.05	
TERMIN	B3E14	LMB	0	LMB CONTROL E14 T8	8	50	1.28	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T9	9	55	1.83	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T10	10	54	1.84	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T11	11	43	0.78	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T12	12	49	1.22	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T13	13	52	1.45	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T14	14	52	1.42	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T15	15	44	0.93	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T16	16	49	1.27	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T17	17	46	1.15	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T18	18	54	1.66	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T19	19	46	1.06	
TERMIN	B3E14	LMB	0	LMB-CONTROL-E14-T20	20	53	1.58	
TERMIN	B1E15	LMB	50	LMB-50-E15-T1	1	50	1.35	
TERMIN	B1E15	LMB	50	LMB-50-E15-T2	2	45	0.91	
TERMIN	B1E15	LMB	50	LMB-50-E15-T3	3	55	1.77	
TERMIN	B1E15	LMB	50	LMB 50 E15 T4	4	45	0.91	
TERMIN	B1E15	LMB	50	LMB-50-E15-T5	5	48	1.32	
TERMIN	B1E15	LMB	50	LMB-50-E15-T6	6	47	0.98	
TERMIN	B1E15	LMB	50	LMB-50-E15-T7	7	47	1.04	
TERMIN	B1E15	LMB	50	LMB-50-E15-T8	8	47	0.97	
TERMIN	B1E15	LMB	50	LMB-50-E15-T9	9	47	1.15	
TERMIN	B1E15	LMB	50	LMB-50-E15-T10	10	52	1.59	
TERMIN	B1E15	LMB	50	LMB-50-E15-T11	11	50	1.30	
TERMIN	B1E15	LMB	50	LMB-50-E15-T12	12	49	1.17	
TERMIN	B1E15	LMB	50	LMB-50-E15-T13	13	47	1.09	
TERMIN	B1E15	LMB	50	LMB-50-E15-T14	14	52	1.40	
TERMIN	B1E15	LMB	50	LMB-50-E15-T15	15	54	1.45	
TERMIN	B1E15	LMB	50	LMB-50-E15-T16	16	49	1.19	
TERMIN	B1E15	LMB	50	LMB-50-E15-T17	17	53	1.44	
TERMIN	B1E15	LMB	50	LMB-50-E15-T18	18	48	1.28	
TERMIN	B1E15	LMB	50	LMB-50-E15-T19	19	61	2.28	
TERMIN	B1E15	LMB	50	LMB-50-E15-T20	20	45	0.92	

File Folder: 2 d

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)	Created.....	5/1/2013	KLW
Data Source: File Folder: 22D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/20/15	KW
	Certified.....	3/25/15	JM
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]SMB LengthWeight			

Length/Weight Data - *Micropterus dolomieu*

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #13 - Fish from exposure chamber A4 accidentally placed in MS-222 during transfer; fish euthanized
Deviation #14 - A net was used to remove foam during exposure termination; a mort was scooped out accidentally from Chamber A4 or A5
Deviation #18 - Labeling error; Cassettes/tags were labeled with quadrant "E" instead of correct quadrant "D"
Deviation #30 - Accidental death of fish from Chamber D11; Fish length and weight not taken (not used in analysis)

File Folder: 22D

Item Number 1
Page 1 of 7

Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder: 22D
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SOP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment (eve)	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	SMB	NA	SMB-DIS#1-01	1	50	1.52	
DISTRO	D0001	SMB	NA	SMB-DIS#1-02	2	49	1.35	
DISTRO	D0001	SMB	NA	SMB-DIS#1-03	3	56	2.12	
DISTRO	D0001	SMB	NA	SMB-DIS#1-04	4	51	1.43	
DISTRO	D0001	SMB	NA	SMB-DIS#1-05	5	55	1.82	
DISTRO	D0001	SMB	NA	SMB-DIS#1-06	6	54	1.75	
DISTRO	D0001	SMB	NA	SMB-DIS#1-07	7	54	1.49	
DISTRO	D0001	SMB	NA	SMB-DIS#1-08	8	56	1.58	
DISTRO	D0001	SMB	NA	SMB-DIS#1-09	9	55	1.45	
DISTRO	D0001	SMB	NA	SMB-DIS#1-10	10	49	1.43	
DISTRO	D0001	SMB	NA	SMB-DIS#2-01	11	53	1.71	
DISTRO	D0001	SMB	NA	SMB-DIS#2-02	12	52	1.65	
DISTRO	D0001	SMB	NA	SMB-DIS#2-03	13	46	1.19	
DISTRO	D0001	SMB	NA	SMB-DIS#2-04	14	54	1.75	
DISTRO	D0001	SMB	NA	SMB-DIS#2-05	15	50	1.39	
DISTRO	D0001	SMB	NA	SMB-DIS#2-06	16	56	2.26	
DISTRO	D0001	SMB	NA	SMB-DIS#2-07	17	52	1.41	
DISTRO	D0001	SMB	NA	SMB-DIS#2-08	18	56	1.93	
DISTRO	D0001	SMB	NA	SMB-DIS#2-09	19	48	1.16	
DISTRO	D0001	SMB	NA	SMB-DIS#2-10	20	55	1.92	
DISTRO	D0001	SMB	NA	SMB-DIS#3-01	21	53	1.80	
DISTRO	D0001	SMB	NA	SMB-DIS#3-02	22	55	2.18	
DISTRO	D0001	SMB	NA	SMB-DIS#3-03	23	54	1.86	
DISTRO	D0001	SMB	NA	SMB-DIS#3-04	24	47	1.17	
DISTRO	D0001	SMB	NA	SMB-DIS#3-05	25	50	1.49	
DISTRO	D0001	SMB	NA	SMB-DIS#3-06	26	56	1.96	
DISTRO	D0001	SMB	NA	SMB-DIS#3-07	27	46	1.16	
DISTRO	D0001	SMB	NA	SMB-DIS#3-08	28	57	2.05	
DISTRO	D0001	SMB	NA	SMB-DIS#3-09	29	55	2.46	
DISTRO	D0001	SMB	NA	SMB-DIS#3-10	30	50	1.36	
DISTRO	D0001	SMB	NA	SMB-DIS#4-01	31	57	2.33	
DISTRO	D0001	SMB	NA	SMB-DIS#4-02	32	49	1.30	
DISTRO	D0001	SMB	NA	SMB-DIS#4-03	33	52	1.68	
DISTRO	D0001	SMB	NA	SMB-DIS#4-04	34	52	1.67	
DISTRO	D0001	SMB	NA	SMB-DIS#4-05	35	49	1.43	
DISTRO	D0001	SMB	NA	SMB-DIS#4-06	36	56	2.08	
DISTRO	D0001	SMB	NA	SMB-DIS#4-07	37	54	1.72	
DISTRO	D0001	SMB	NA	SMB-DIS#4-08	38	53	1.84	
DISTRO	D0001	SMB	NA	SMB-DIS#4-09	39	57	2.06	
DISTRO	D0001	SMB	NA	SMB-DIS#4-10	40	49	1.37	
EXPTER	A2D06	SMB	0	SMB-CONTROL-A-01	1	53	1.60	
EXPTER	A2D06	SMB	0	SMB-CONTROL-A-02	2	48	1.28	
EXPTER	A2D06	SMB	0	SMB-CONTROL-A-03	3	51	1.42	
EXPTER	A2D06	SMB	0	SMB-CONTROL-A-04	4	53	1.65	
EXPTER	A2D06	SMB	0	SMB-CONTROL-A-05	5	54	1.61	
EXPTER	A3D03	SMB	50	SMB-50-A-01	1	57	1.77	
EXPTER	A3D03	SMB	50	SMB-50-A-02	2	53	1.51	
EXPTER	A3D03	SMB	50	SMB-50-A-03	3	51	1.30	
EXPTER	A3D03	SMB	50	SMB-50-A-04	4	55	1.90	
EXPTER	A3D03	SMB	50	SMB-50-A-05	5	52	1.34	
EXPTER	A1D01	SMB	100	SMB-100-A-01	1	53	1.55	
EXPTER	A1D01	SMB	100	SMB-100-A-02	2	53	1.60	
EXPTER	A1D01	SMB	100	SMB-100-A-03	3	49	1.39	
EXPTER	A1D01	SMB	100	SMB-100-A-04	4	51	1.44	
EXPTER	A1D01	SMB	100	SMB-100-A-05	5	57	1.94	
EXPTER	A4D10	SMB	200	SMB-200-A-01	1	58	2.10	
EXPTER	A4D10	SMB	200	SMB-200-A-02	2	49	1.41	
EXPTER	A4D10	SMB	200	SMB-200-A-03	3	56	1.90	
EXPTER	A4D10	SMB	200	SMB-200-A-04	4	50	1.22	
EXPTER	A4D10	SMB	200	SMB-200-A-05	5	52	1.46	
EXPTER	B1D15	SMB	0	SMB-CONTROL-B-01	1	56	1.71	
EXPTER	B1D15	SMB	0	SMB-CONTROL-B-02	2	55	1.72	
EXPTER	B1D15	SMB	0	SMB-CONTROL-B-03	3	52	1.48	
EXPTER	B1D15	SMB	0	SMB-CONTROL-B-04	4	47	1.13	
EXPTER	B1D15	SMB	0	SMB-CONTROL-B-05	5	53	1.67	
EXPTER	B5D08	SMB	50	SMB-50-B-01	1	50	1.23	
EXPTER	B5D08	SMB	50	SMB 50 B 02	2	53	1.55	
EXPTER	B5D08	SMB	50	SMB-50-B-03	3	52	1.55	
EXPTER	B5D08	SMB	50	SMB-50-B-04	4	53	1.47	
EXPTER	B5D08	SMB	50	SMB-50-B-05	5	52	1.50	
EXPTER	B3D04	SMB	100	SMB-100-B-01	1	54	1.65	
EXPTER	B3D04	SMB	100	SMB-100-B-02	2	52	1.39	
EXPTER	B3D04	SMB	100	SMB-100-B-03	3	55	1.87	
EXPTER	B3D04	SMB	100	SMB-100-B-04	4	47	1.03	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder 22D
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-15) #3
Exposure Date: 6/20/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B3D04	SMB	100	SMB-100-B-05	5	56	1.80	
EXPTER	B2D05	SMB	200	SMB-200-B-01	1	55	1.83	
EXPTER	B2D05	SMB	200	SMB-200-B-02	2	48	1.28	
EXPTER	B2D05	SMB	200	SMB-200-B-03	3	52	1.42	
EXPTER	B2D05	SMB	200	SMB-200-B-04	4	53	1.63	
EXPTER	B2D05	SMB	200	SMB-200-B-05	5	48	1.19	
EXPTER	C1D07	SMB	0	SMB-CONTROL-C-01	1	47	1.11	
EXPTER	C1D07	SMB	0	SMB-CONTROL-C-02	2	56	1.84	
EXPTER	C1D07	SMB	0	SMB-CONTROL-C-03	3	50	1.16	
EXPTER	C1D07	SMB	0	SMB-CONTROL-C-04	4	50	1.18	
EXPTER	C1D07	SMB	0	SMB-CONTROL-C-05	5	53	1.65	
EXPTER	C3D02	SMB	50	SMB-50-C-01	1	53	1.41	
EXPTER	C3D02	SMB	50	SMB-50-C-02	2	51	1.38	
EXPTER	C3D02	SMB	50	SMB-50-C-03	3	53	1.74	
EXPTER	C3D02	SMB	50	SMB-50-C-04	4	50	1.25	
EXPTER	C3D02	SMB	50	SMB-50-C-05	5	47	1.39	
EXPTER	C2D11	SMB	100	SMB-100-C-01	1	55	1.80	
EXPTER	C2D11	SMB	100	SMB-100-C-02	2	52	1.51	
EXPTER	C2D11	SMB	100	SMB-100-C-03	3	53	1.53	
EXPTER	C2D11	SMB	100	SMB-100-C-04	4	54	1.53	
EXPTER	C2D11	SMB	100	SMB-100-C-05	5	53	1.62	
EXPTER	C5D12	SMB	200	SMB-200-C-01	1	58	2.04	
EXPTER	C5D12	SMB	200	SMB-200-C-02	2	56	1.75	
EXPTER	C5D12	SMB	200	SMB-200-C-03	3	54	1.69	
EXPTER	C4D13	SMB	300	SMB-300-C-01	1	53	1.68	
EXPTER	C4D13	SMB	300	SMB-300-C-02	2	51	1.30	
EXPTER	C4D13	SMB	300	SMB-300-C-03	3	54	1.38	
EXMORT	A4D10	SMB	200	SMB-200-A-M1	1	55	1.88	
EXMORT	A5D09	SMB	300	SMB-300-A-M1	1	55	1.75	
EXMORT	A5D09	SMB	300	SMB-300-A-M2	2	56	1.91	
EXMORT	A5D09	SMB	300	SMB-300-A-M3	3	44	1.07	
EXMORT	A5D09	SMB	300	SMB 300-A-M4	4	52	1.69	
EXMORT	A5D09	SMB	300	SMB-300-A-M5	5	53	1.79	
EXMORT	A5D09	SMB	300	SMB-300-A-M6	6	54	1.79	
EXMORT	A5D09	SMB	300	SMB-300-A-M7	7	48	1.19	
EXMORT	A5D09	SMB	300	SMB 300 A-M8	8	54	1.72	
EXMORT	A5D09	SMB	300	SMB-300-A-M9	9	52	1.64	
EXMORT	A5D09	SMB	300	SMB-300-A-M10	10	55	1.87	
EXMORT	A5D09	SMB	300	SMB-300-A-M11	11	55	1.86	
EXMORT	A5D09	SMB	300	SMB-300-A-M12	12	56	2.36	
EXMORT	A5D09	SMB	300	SMB-300-A-M13	13	47	1.17	
EXMORT	A5D09	SMB	300	SMB-300-A-M14	14	49	1.45	
EXMORT	A5D09	SMB	300	SMB-300-A-M15	15	53	1.55	
EXMORT	B4D14	SMB	300	SMB-300-B-M1	1	49	1.34	
EXMORT	B4D14	SMB	300	SMB-300-B-M2	2	57	1.98	
EXMORT	B4D14	SMB	300	SMB-300-B-M3	3	53	1.68	
EXMORT	B4D14	SMB	300	SMB-300-B-M4	4	51	1.68	
EXMORT	B4D14	SMB	300	SMB-300-B-M5	5	55	2.07	
EXMORT	B4D14	SMB	300	SMB-300-B-M6	6	50	1.74	
EXMORT	B4D14	SMB	300	SMB-300-B-M7	7	50	1.48	
EXMORT	B4D14	SMB	300	SMB-300-B-M8	8	52	1.74	
EXMORT	B4D14	SMB	300	SMB-300-B-M9	9	50	1.83	
EXMORT	B4D14	SMB	300	SMB-300-B-M10	10	49	1.50	
EXMORT	B4D14	SMB	300	SMB-300-B-M11	11	51	1.76	
EXMORT	B4D14	SMB	300	SMB-300-B-M12	12	47	1.24	
EXMORT	B4D14	SMB	300	SMB-300-B-M13	13	50	1.62	
EXMORT	B4D14	SMB	300	SMB-300-B-M14	14	54	1.85	
EXMORT	B4D14	SMB	300	SMB-300-B-M15	15	52	1.84	
EXMORT	B4D14	SMB	300	SMB-300-B-M16	16	49	1.59	
EXMORT	B4D14	SMB	300	SMB-300-B-M17	17	51	1.66	
EXMORT	B4D14	SMB	300	SMB-300-B-M18	18	51	1.66	
EXMORT	C4D13	SMB	300	SMB-300-C-M1	1	50	1.67	
EXMORT	C4D13	SMB	300	SMB-300-C-M2	2	52	1.85	
EXMORT	C4D13	SMB	300	SMB-300-C-M3	3	46	1.25	
EXMORT	C4D13	SMB	300	SMB-300-C-M4	4	51	1.60	
EXMORT	C4D13	SMB	300	SMB-300-C-M5	5	56	2.08	
EXMORT	C4D13	SMB	300	SMB-300-C-M6	6	50	1.48	
EXMORT	C4D13	SMB	300	SMB-300-C-M7	7	50	1.55	
EXMORT	C4D13	SMB	300	SMB-300-C-M8	8	50	1.56	
EXMORT	C4D13	SMB	300	SMB-300-C-M9	9	54	1.93	
EXMORT	C4D13	SMB	300	SMB-300-C-M10	10	52	1.57	
EXMORT	C5D12	SMB	200	SMB-200-C-M1	1	50	1.45	
EXMORT	C5D12	SMB	200	SMB-200-C-M2	2	46	1.27	
EXMORT	C5D12	SMB	200	SMB-200-C-M3	3	55	1.81	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder: 220
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/20/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXMORT	C5D12	SMB	200	SMB-200-C-M4	4	55	1.84	
EXMORT	C5D12	SMB	200	SMB-200-C-M5	5	50	1.33	
EXMORT	C5D12	SMB	200	SMB-200-C-M6	6	53	1.64	
EXMORT	C5D12	SMB	200	SMB-200-C-M7	7	55	1.77	
EXMORT	C5D12	SMB	200	SMB-200-C-M8	8	54	1.98	
EXMORT	C5D12	SMB	200	SMB-200-C-M9	9	49	1.58	
EXMORT	C5D12	SMB	200	SMB-200-C-M10	10	54	2.14	
EXMORT	C5D12	SMB	200	SMB-200-C-M11	11	48	1.29	
EXMORT	C5D12	SMB	200	SMB-200-C-M12	12	48	1.42	
HDMORT	A3D03	SMB	50	SMB-50-D3-M1	1	49	1.56	
HDMORT	A3D03	SMB	50	SMB-50-D3-M2	2	50	2.21	
HDMORT	A5D09	SMB	300	SMB-300-D9-M1	1	59	1.88	
HDMORT	A5D09	SMB	300	SMB-300-D9-M2	2	52	1.91	
HDMORT	A5D09	SMB	300	SMB-300-D9-M3	3	58	2.73	
HDMORT	A5D09	SMB	300	SMB-300-D9-M4	4	55	2.06	
HDMORT	A5D09	SMB	300	SMB-300-D9-M5	5	52	1.39	
HDMORT	A5D09	SMB	300	SMB-300-D9-M6	6	57	2.76	
HDMORT	B2D05	SMB	200	SMB-200-D5-M1	1	52	1.72	
HDMORT	B2D05	SMB	200	SMB-200-D5-M2	2	50	1.54	
HDMORT	B2D05	SMB	200	SMB-200-D5-M3	3	49	1.42	
HDMORT	B3D04	SMB	100	SMB-100-D4-M1	1	53	2.41	
HDMORT	B4D14	SMB	300	SMB-300-D14-M1	1	54	1.94	
HDMORT	B4D14	SMB	300	SMB-300-D14-M2	2	47	1.09	
HDMORT	B4D14	SMB	300	SMB-300-D14-M3	3	53	2.07	
HDMORT	B4D14	SMB	300	SMB-300-D14-M4	4	52	1.84	
HDMORT	B4D14	SMB	300	SMB-300-D14-M5	5	50	1.66	
HDMORT	B4D14	SMB	300	SMB-300-D14-M6	6	48	1.97	Most of caudal fin missing
HDMORT	C2D11	SMB	100	SMB-100-D11-M1	1	48	1.20	
HDMORT	C2D11	SMB	100	SMB-100-D11-M2	2	50	1.74	
HDMORT	C2D11	SMB	100	SMB-100-D11-M3	3	48	1.53	
HDMORT	C4D13	SMB	300	SMB-300-D13-M1	1	54	1.67	
HDMORT	C4D13	SMB	300	SMB-300-D13-M2	2	47	1.45	
HDMORT	C4D13	SMB	300	SMB-300-D13-M3	3	56	2.28	
HDMORT	C4D13	SMB	300	SMB-300-D13-M4	4	53	2.19	
TERMIN	A1D01	SMB	100	SMB-100-D1-T1	1	56	2.01	
TERMIN	A1D01	SMB	100	SMB-100-D1-T2	2	48	1.12	
TERMIN	A1D01	SMB	100	SMB-100-D1-T3	3	49	1.22	
TERMIN	A1D01	SMB	100	SMB-100-D1-T4	4	52	1.55	
TERMIN	A1D01	SMB	100	SMB-100-D1-T5	5	56	1.83	
TERMIN	A1D01	SMB	100	SMB-100-D1-T6	6	57	2.08	
TERMIN	A1D01	SMB	100	SMB-100-D1-T7	7	54	1.75	
TERMIN	A1D01	SMB	100	SMB-100-D1-T8	8	54	1.64	
TERMIN	A1D01	SMB	100	SMB-100-D1-T9	9	53	1.64	
TERMIN	A1D01	SMB	100	SMB-100-D1-T10	10	55	1.74	
TERMIN	A1D01	SMB	100	SMB-100-D1-T11	11	55	1.67	
TERMIN	A1D01	SMB	100	SMB-100-D1-T12	12	55	1.81	
TERMIN	A1D01	SMB	100	SMB-100-D1-T13	13	47	1.07	
TERMIN	A1D01	SMB	100	SMB-100-D1-T14	14	53	1.51	
TERMIN	A1D01	SMB	100	SMB-100-D1-T15	15	47	1.02	
TERMIN	A1D01	SMB	100	SMB-100-D1-T16	16	52	1.47	
TERMIN	A1D01	SMB	100	SMB-100-D1-T17	17	58	2.14	
TERMIN	A1D01	SMB	100	SMB-100-D1-T18	18	55	1.85	
TERMIN	A1D01	SMB	100	SMB-100-D1-T19	19	57	2.10	
TERMIN	C3D02	SMB	50	SMB-50-D2-T1	1	64	2.70	
TERMIN	C3D02	SMB	50	SMB-50-D2-T2	2	62	2.50	
TERMIN	C3D02	SMB	50	SMB-50-D2-T3	3	55	1.77	
TERMIN	C3D02	SMB	50	SMB-50-D2-T4	4	57	2.00	
TERMIN	C3D02	SMB	50	SMB-50-D2-T5	5	57	2.01	
TERMIN	C3D02	SMB	50	SMB-50-D2-T6	6	53	1.63	
TERMIN	C3D02	SMB	50	SMB-50-D2-T7	7	52	2.04	
TERMIN	C3D02	SMB	50	SMB-50-D2-T8	8	55	1.69	
TERMIN	C3D02	SMB	50	SMB-50-D2-T9	9	55	1.72	
TERMIN	C3D02	SMB	50	SMB-50-D2-T10	10	51	1.30	
TERMIN	C3D02	SMB	50	SMB-50-D2-T11	11	49	1.18	
TERMIN	C3D02	SMB	50	SMB-50-D2-T12	12	60	2.14	
TERMIN	C3D02	SMB	50	SMB-50-D2-T13	13	54	1.70	
TERMIN	C3D02	SMB	50	SMB-50-D2-T14	14	58	2.08	
TERMIN	C3D02	SMB	50	SMB-50-D2-T15	15	59	1.88	
TERMIN	C3D02	SMB	50	SMB-50-D2-T16	16	62	2.91	
TERMIN	C3D02	SMB	50	SMB-50-D2-T17	17	54	1.58	
TERMIN	C3D02	SMB	50	SMB-50-D2-T18	18	53	1.60	
TERMIN	C3D02	SMB	50	SMB-50-D2-T19	19	49	1.22	
TERMIN	C3D02	SMB	50	SMB-50-D2-T20	20	57	2.02	
TERMIN	A3D03	SMB	50	SMB-50-D3-T1	1	58	2.05	

Item Number 1
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Study Number: AEH-12-P5 EUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder: 22D
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SOP) Chemical lot #: TR 4665-4-(5) #3
Exposure Date: 6/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A3D03	SMB	50	SMB-50-D3-T2	2	56	1.94	
TERMIN	A3D03	SMB	50	SMB-50-D3-T3	3	58	2.28	
TERMIN	A3D03	SMB	50	SMB-50-D3-T4	4	56	1.98	
TERMIN	A3D03	SMB	50	SMB-50-D3-T5	5	57	1.88	
TERMIN	A3D03	SMB	50	SMB-50-D3-T6	6	57	2.20	
TERMIN	A3D03	SMB	50	SMB-50-D3-T7	7	56	1.98	
TERMIN	A3D03	SMB	50	SMB-50-D3-T8	8	55	1.86	
TERMIN	A3D03	SMB	50	SMB-50-D3-T9	9	55	1.55	
TERMIN	A3D03	SMB	50	SMB-50-D3-T10	10	58	2.04	
TERMIN	A3D03	SMB	50	SMB-50-D3-T11	11	54	1.71	
TERMIN	A3D03	SMB	50	SMB-50-D3-T12	12	55	1.72	
TERMIN	A3D03	SMB	50	SMB-50-D3-T13	13	53	1.61	
TERMIN	A3D03	SMB	50	SMB-50-D3-T14	14	57	2.18	
TERMIN	A3D03	SMB	50	SMB-50-D3-T15	15	47	1.14	
TERMIN	A3D03	SMB	50	SMB-50-D3-T16	16	58	1.95	
TERMIN	A3D03	SMB	50	SMB-50-D3-T17	17	54	1.66	
TERMIN	A3D03	SMB	50	SMB-50-D3-T18	18	53	1.67	
TERMIN	B3D04	SMB	100	SMB-100-D4-T1	1	58	2.07	
TERMIN	B3D04	SMB	100	SMB-100-D4-T2	2	55	1.62	
TERMIN	B3D04	SMB	100	SMB-100-D4-T3	3	57	2.06	
TERMIN	B3D04	SMB	100	SMB-100-D4-T4	4	50	1.47	
TERMIN	B3D04	SMB	100	SMB-100-D4-T5	5	57	1.92	
TERMIN	B3D04	SMB	100	SMB-100-D4-T6	6	56	1.83	
TERMIN	B3D04	SMB	100	SMB-100-D4-T7	7	56	2.06	
TERMIN	B3D04	SMB	100	SMB-100-D4-T8	8	63	2.83	
TERMIN	B3D04	SMB	100	SMB-100-D4-T9	9	53	1.55	
TERMIN	B3D04	SMB	100	SMB-100-D4-T10	10	51	1.35	
TERMIN	B3D04	SMB	100	SMB-100-D4-T11	11	57	1.95	
TERMIN	B3D04	SMB	100	SMB-100-D4-T12	12	52	1.45	
TERMIN	B3D04	SMB	100	SMB-100-D4-T13	13	53	1.68	
TERMIN	B3D04	SMB	100	SMB-100-D4-T14	14	57	2.04	
TERMIN	B3D04	SMB	100	SMB-100-D4-T15	15	51	1.43	
TERMIN	B3D04	SMB	100	SMB-100-D4-T16	16	61	2.54	
TERMIN	B3D04	SMB	100	SMB-100-D4-T17	17	56	1.94	
TERMIN	B3D04	SMB	100	SMB-100-D4-T18	18	55	1.83	
TERMIN	B3D04	SMB	100	SMB-100-D4-T19	19	51	1.33	
TERMIN	B2D05	SMB	200	SMB-200-D5-T1	1	57	1.89	
TERMIN	B2D05	SMB	200	SMB-200-D5-T2	2	52	1.38	
TERMIN	B2D05	SMB	200	SMB-200-D5-T3	3	55	1.56	
TERMIN	B2D05	SMB	200	SMB-200-D5-T4	4	48	1.00	
TERMIN	B2D05	SMB	200	SMB-200-D5-T5	5	53	1.60	
TERMIN	B2D05	SMB	200	SMB-200-D5-T6	6	65	3.25	
TERMIN	B2D05	SMB	200	SMB-200-D5-T7	7	51	1.16	
TERMIN	B2D05	SMB	200	SMB-200-D5-T8	8	54	1.65	
TERMIN	B2D05	SMB	200	SMB-200-D5-T9	9	57	1.88	
TERMIN	B2D05	SMB	200	SMB-200-D5-T10	10	57	1.97	
TERMIN	B2D05	SMB	200	SMB-200-D5-T11	11	47	1.12	
TERMIN	B2D05	SMB	200	SMB-200-D5-T12	12	56	1.77	
TERMIN	B2D05	SMB	200	SMB-200-D5-T13	13	50	1.22	
TERMIN	B2D05	SMB	200	SMB-200-D5-T14	14	58	2.02	
TERMIN	B2D05	SMB	200	SMB-200-D5-T15	15	56	1.82	
TERMIN	B2D05	SMB	200	SMB-200-D5-T16	16	56	1.90	
TERMIN	B2D05	SMB	200	SMB-200-D5-T17	17	64	2.83	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T1	1	62	2.70	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T2	2	50	1.49	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T3	3	54	1.67	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T4	4	59	2.32	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T5	5	52	1.71	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T6	6	56	2.04	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T7	7	54	1.77	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T8	8	57	2.02	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T9	9	54	1.73	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T10	10	56	1.89	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T11	11	51	1.54	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T12	12	51	1.44	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T13	13	55	1.86	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T14	14	57	2.04	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T15	15	55	1.80	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T16	16	49	1.24	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T17	17	55	1.83	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T18	18	59	2.16	
TERMIN	A2D06	SMB	0	SMB-CONTROL-D6-T19	19	52	1.67	
TERMIN	A2D06	SMB	0	SMB CONTROL-D6-T20	20	57	2.06	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T1	1	63	2.68	

Item Number 1
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Study Number: ACH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder: 220
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropter us dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-C, 145A (SDP) Chemical lot #: TR 4669-4-(5) #3
Exposure Date: 6/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T2	2	59	2.27	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T3	3	57	1.98	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T4	4	57	2.20	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T5	5	58	2.18	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T6	6	56	2.01	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T7	7	55	1.78	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T8	8	49	1.38	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T9	9	54	1.74	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T10	10	52	1.41	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T11	11	54	1.79	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T12	12	52	1.52	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T13	13	60	2.50	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T14	14	55	1.79	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T15	15	55	1.91	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T16	16	56	2.04	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T17	17	57	2.07	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T18	18	57	1.98	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T19	19	55	1.78	
TERMIN	C1D07	SMB	0	SMB-CONTROL-D7-T20	20	53	1.67	
TERMIN	B5D08	SMB	50	SMB-50-D8-T1	1	65	2.79	
TERMIN	B5D08	SMB	50	SMB-50-D8-T2	2	60	2.32	
TERMIN	B5D08	SMB	50	SMB-50-D8-T3	3	58	2.06	
TERMIN	B5D08	SMB	50	SMB-50-D8-T4	4	54	1.67	
TERMIN	B5D08	SMB	50	SMB-50-D8-T5	5	53	1.70	
TERMIN	B5D08	SMB	50	SMB-50-D8-T6	6	54	1.65	
TERMIN	B5D08	SMB	50	SMB-50-D8-T7	7	55	2.25	
TERMIN	B5D08	SMB	50	SMB-50-D8-T8	8	51	1.38	
TERMIN	B5D08	SMB	50	SMB-50-D8-T9	9	55	1.83	
TERMIN	B5D08	SMB	50	SMB-50-D8-T10	10	56	1.76	
TERMIN	B5D08	SMB	50	SMB-50-D8-T11	11	56	1.91	
TERMIN	B5D08	SMB	50	SMB-50-D8-T12	12	57	1.96	
TERMIN	B5D08	SMB	50	SMB-50-D8-T13	13	50	1.33	
TERMIN	B5D08	SMB	50	SMB-50-D8-T14	14	54	1.90	
TERMIN	B5D08	SMB	50	SMB-50-D8-T15	15	56	2.09	
TERMIN	B5D08	SMB	50	SMB-50-D8-T16	16	57	1.55	
TERMIN	B5D08	SMB	50	SMB-50-D8-T17	17	52	1.47	
TERMIN	B5D08	SMB	50	SMB-50-D8-T18	18	54	1.72	
TERMIN	B5D08	SMB	50	SMB-50-D8-T19	19	53	1.67	
TERMIN	B5D08	SMB	50	SMB-50-D8-T20	20	54	1.53	
TERMIN	A5D09	SMB	300	SMB-300-D9-T1	1	62	2.57	
TERMIN	A5D09	SMB	300	SMB-300-D9-T2	2	57	1.74	
TERMIN	A5D09	SMB	300	SMB-300-D9-T3	3	51	1.35	
TERMIN	C2D11	SMB	100	SMB-100-D11-T1	1	54	1.62	
TERMIN	C2D11	SMB	100	SMB-100-D11-T2	2	48	0.95	
TERMIN	C2D11	SMB	100	SMB-100-D11-T3	3	55	1.75	
TERMIN	C2D11	SMB	100	SMB-100-D11-T4	4	53	1.68	
TERMIN	C2D11	SMB	100	SMB-100-D11-T5	5	55	1.70	
TERMIN	C2D11	SMB	100	SMB-100-D11-T6	6	59	2.38	
TERMIN	C2D11	SMB	100	SMB-100-D11-T7	7	66	3.40	
TERMIN	C2D11	SMB	100	SMB-100-D11-T8	8	55	1.75	
TERMIN	C2D11	SMB	100	SMB-100-D11-T9	9	53	1.33	
TERMIN	C2D11	SMB	100	SMB-100-D11-T10	10	56	1.99	
TERMIN	C2D11	SMB	100	SMB-100-D11-T11	11	54	1.55	
TERMIN	C2D11	SMB	100	SMB-100-D11-T12	12	45	0.97	
TERMIN	C2D11	SMB	100	SMB-100-D11-T13	13	56	1.89	
TERMIN	C2D11	SMB	100	SMB-100-D11-T14	14	54	1.51	
TERMIN	C2D11	SMB	100	SMB-100-D11-T15	15	55	1.54	
TERMIN	C2D11	SMB	100	SMB-100-D11-T16	16	55	1.83	
TERMIN	C5D12	SMB	200	SMB-200-D12-T1	1	60	2.31	
TERMIN	C5D12	SMB	200	SMB-200-D12-T2	2	55	1.90	
TERMIN	C5D12	SMB	200	SMB-200-D12-T3	3	57	2.06	
TERMIN	C5D12	SMB	200	SMB-200-D12-T4	4	48	1.13	
TERMIN	C5D12	SMB	200	SMB-200-D12-T5	5	55	1.56	
TERMIN	C5D12	SMB	200	SMB-200-D12-T6	6	57	1.97	
TERMIN	C5D12	SMB	200	SMB-200-D12-T7	7	58	2.18	
TERMIN	C5D12	SMB	200	SMB-200-D12-T8	8	57	1.96	
TERMIN	C5D12	SMB	200	SMB-200-D12-T9	9	63	3.03	
TERMIN	C5D12	SMB	200	SMB-200-D12-T10	10	54	1.57	
TERMIN	C4D13	SMB	300	SMB-300-D13-T1	1	55	1.90	
TERMIN	C4D13	SMB	300	SMB-300-D13-T2	2	47	1.18	
TERMIN	C4D13	SMB	300	SMB 300 D13 T3	3	54	1.63	
TERMIN	C4D13	SMB	300	SMB 300 D13 T4	4	53	1.43	
TERMIN	C4D13	SMB	300	SMB-300-D13-T5	5	48	1.06	
TERMIN	C4D13	SMB	300	SMB-300-D13-T6	6	53	1.56	

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Study Number: AEH-12-PSEUDO-03
Lab Notebook #1 (page 50) and Lab Notebook #2 (pages 1-20)
Data Source: File Folder: 22D
Forms: 3, 3a

Fish species: Smallmouth Bass *(Micropterus dolomieu)* Lot number: 112400
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-4-[5] #3
Exposure Date: 6/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C4D13	SMB	300	SMB-300-D13-T7	7	55	1.70	
TERMIN	C4D13	SMB	300	SMB-300-D13-T8	8	51	0.98	
TERMIN	B4D14	SMB	300	SMB-300-D14-T1	1	60	2.52	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T1	1	62	2.95	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T2	2	60	2.47	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T3	3	60	2.45	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T4	4	60	2.49	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T5	5	60	2.56	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T6	6	59	2.34	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T7	7	50	1.65	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T8	8	56	1.95	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T9	9	51	1.49	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T10	10	50	1.41	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T11	11	66	3.35	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T12	12	57	2.08	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T13	13	60	2.33	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T14	14	58	2.28	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T15	15	62	2.60	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T16	16	57	2.22	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T17	17	60	2.61	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T18	18	51	1.48	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T19	19	46	1.13	
TERMIN	B1D15	SMB	0	SMB-CONTROL-D15-T20	20	56	2.07	

File Folder: 22A

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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 16-28)	Created.....	5/1/2013	KLW
Data Source: File Folder: 23D	Revised.....	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/20/15	
	Certified.....	3/20/15	
File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]BLG LengthWeight			

Length/Weight Data - *Lepomis macrochirus*

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date:7/11/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (D STRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #16 - Fish from Chamber B4 accidentally dropped on ground during transfer; fish not recovered or used for analysis

File Folder: 23D

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Study Number: AEH-12-FSEUDO-09
Lab Notebook #2 (pages 16-78)
Data Source: File Folder: 23D
Forms 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date:7/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	BLG	NA	BLG-DIS#1-01	1	60	3.36	
DISTRO	D0001	BLG	NA	BLG-DIS#1-02	2	49	1.62	
DISTRO	D0001	BLG	NA	BLG-DIS#1-03	3	60	3.23	
DISTRO	D0001	BLG	NA	BLG-DIS#1-04	4	51	1.95	
DISTRO	D0001	BLG	NA	BLG-DIS#1-05	5	50	1.60	
DISTRO	D0001	BLG	NA	BLG-DIS#1-06	6	53	1.92	
DISTRO	D0001	BLG	NA	BLG-DIS#1-07	7	49	1.76	
DISTRO	D0001	BLG	NA	BLG-DIS#1-08	8	58	3.13	
DISTRO	D0001	BLG	NA	BLG-DIS#1-09	9	54	2.45	
DISTRO	D0001	BLG	NA	BLG-DIS#1-10	10	44	1.08	
DISTRO	D0001	BLG	NA	BLG-DIS#2-01	11	55	2.42	
DISTRO	D0001	BLG	NA	BLG-DIS#2-02	12	46	1.35	
DISTRO	D0001	BLG	NA	BLG-DIS#2-03	13	42	1.02	
DISTRO	D0001	BLG	NA	BLG-DIS#2-04	14	50	1.88	
DISTRO	D0001	BLG	NA	BLG-DIS#2-05	15	45	1.31	
DISTRO	D0001	BLG	NA	BLG-DIS#2-06	16	42	0.94	
DISTRO	D0001	BLG	NA	BLG-DIS#2-07	17	53	2.10	
DISTRO	D0001	BLG	NA	BLG-DIS#2-08	18	40	1.66	
DISTRO	D0001	BLG	NA	BLG-DIS#2-09	19	45	1.30	
DISTRO	D0001	BLG	NA	BLG-DIS#2-10	20	50	1.86	
DISTRO	D0001	BLG	NA	BLG-DIS#3-01	21	56	2.59	
DISTRO	D0001	BLG	NA	BLG-DIS#3-02	22	54	2.20	
DISTRO	D0001	BLG	NA	BLG-DIS#3-03	23	47	1.58	
DISTRO	D0001	BLG	NA	BLG-DIS#3-04	24	49	1.66	
DISTRO	D0001	BLG	NA	BLG-DIS#3-05	25	40	0.92	
DISTRO	D0001	BLG	NA	BLG-DIS#3-06	26	47	1.44	
DISTRO	D0001	BLG	NA	BLG-DIS#3-07	27	55	2.31	
DISTRO	D0001	BLG	NA	BLG-DIS#3-08	28	49	1.64	
DISTRO	D0001	BLG	NA	BLG-DIS#3-09	29	55	2.65	
DISTRO	D0001	BLG	NA	BLG-DIS#3-10	30	53	1.98	
DISTRO	D0001	BLG	NA	BLG-DIS#4-01	31	52	2.30	
DISTRO	D0001	BLG	NA	BLG-DIS#4-02	32	57	2.80	
DISTRO	D0001	BLG	NA	BLG-DIS#4-03	33	50	1.77	
DISTRO	D0001	BLG	NA	BLG-DIS#4-04	34	53	2.25	
DISTRO	D0001	BLG	NA	BLG-DIS#4-05	35	59	3.22	
DISTRO	D0001	BLG	NA	BLG-DIS#4-06	36	44	1.16	
DISTRO	D0001	BLG	NA	BLG-DIS#4-07	37	56	2.74	
DISTRO	D0001	BLG	NA	BLG-DIS#4-08	38	46	1.34	
DISTRO	D0001	BLG	NA	BLG-DIS#4-09	39	46	1.39	
DISTRO	D0001	BLG	NA	BLG-DIS#4-10	40	48	1.05	
EXPTER	A1E11	BLG	0	BLG-CONTROL-A-01	1	47	1.43	
EXPTER	A1E11	BLG	0	BLG-CONTROL-A-02	2	50	1.61	
EXPTER	A1E11	BLG	0	BLG-CONTROL-A-03	3	40	1.21	
EXPTER	A1E11	BLG	0	BLG-CONTROL-A-04	4	47	1.36	
EXPTER	A1E11	BLG	0	BLG-CONTROL-A-05	5	55	2.26	
EXPTER	A2E01	BLG	100	BLG-100-A-01	1	58	2.96	
EXPTER	A2E01	BLG	100	BLG-100-A-02	2	53	2.13	
EXPTER	A2E01	BLG	100	BLG-100-A-03	3	54	2.35	
EXPTER	A2E01	BLG	100	BLG-100-A-04	4	47	1.35	
EXPTER	A2E01	BLG	100	BLG-100-A-05	5	49	1.52	
EXPTER	A3E02	BLG	300	BLG-300-A-01	1	55	2.48	
EXPTER	A3E02	BLG	300	BLG-300-A-02	2	45	1.18	
EXPTER	A3E02	BLG	300	BLG-300-A-03	3	47	1.45	
EXPTER	A3E02	BLG	300	BLG-300-A-04	4	55	2.32	
EXPTER	A3E02	BLG	300	BLG-300-A-05	5	55	2.74	
EXPTER	A4E13	BLG	50	BLG-50-A-01	1	49	1.66	
EXPTER	A4E13	BLG	50	BLG-50-A-02	2	48	1.60	
EXPTER	A4E13	BLG	50	BLG-50-A-03	3	42	1.00	
EXPTER	A4E13	BLG	50	BLG-50-A-04	4	50	1.80	
EXPTER	A4E13	BLG	50	BLG-50-A-05	5	45	1.09	
EXPTER	A5E09	BLG	200	BLG-200-A-01	1	55	2.22	
EXPTER	A5E09	BLG	200	BLG-200-A-02	2	54	2.21	
EXPTER	A5E09	BLG	200	BLG-200-A-03	3	49	1.74	
EXPTER	A5E09	BLG	200	BLG-200-A-04	4	50	1.60	
EXPTER	A5E09	BLG	200	BLG-200-A-05	5	44	1.10	
EXPTER	B1E15	BLG	200	BLG-200-B-01	1	57	2.61	
EXPTER	B1E15	BLG	200	BLG-200-B-02	2	51	1.87	
EXPTER	B1E15	BLG	200	BLG-200-B-03	3	49	1.68	
EXPTER	B1E15	BLG	200	BLG-200-B-04	4	45	1.22	White substance on right gill
EXPTER	B1E15	BLG	200	BLG-200-B-05	5	64	3.69	
EXPTER	B2E06	BLG	100	BLG-100-B-01	1	47	1.35	
EXPTER	B2E06	BLG	100	BLG-100-B-02	2	54	2.28	
EXPTER	B2E06	BLG	100	BLG-100-B-03	3	55	2.61	
EXPTER	B2E06	BLG	100	BLG-100-B-04	4	42	0.92	

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Study Number: AE-I-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23D
Forms: 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date:7/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B2E06	BLG	100	BLG-100-B-05	5	58	2.93	
EXPTER	B3E14	BLG	0	BLG-CONTROL-B-01	1	56	2.51	
EXPTER	B3E14	BLG	0	BLG-CONTROL-B-02	2	50	1.82	
EXPTER	B3E14	BLG	0	BLG-CONTROL-B-03	3	54	2.27	
EXPTER	B3E14	BLG	0	BLG-CONTROL-B-04	4	58	2.52	
EXPTER	B3E14	BLG	0	BLG-CONTROL-B-05	5	58	2.81	
EXPTER	B4E12	BLG	50	BLG-50-B-01	1	49	1.60	
EXPTER	B4E12	BLG	50	BLG-50-B-02	2	49	1.56	
EXPTER	B4E12	BLG	50	BLG-50-B-03	3	54	2.38	
EXPTER	B4E12	BLG	50	BLG-50-B-04	4	53	2.01	
EXPTER	B4E12	BLG	50	BLG-50-B-05	5	49	1.35	
EXPTER	B5E08	BLG	300	BLG-300-B-01	1	53	1.95	
EXPTER	B5E08	BLG	300	BLG-300-B-02	2	53	2.17	
EXPTER	B5E08	BLG	300	BLG-300-B-03	3	50	1.84	
EXPTER	B5E08	BLG	300	BLG-300-B-04	4	51	1.87	
EXPTER	B5E08	BLG	300	BLG-300-B-05	5	45	1.33	White substance on left gill
EXPTER	C1E07	BLG	50	BLG-50-C-01	1	50	1.56	
EXPTER	C1E07	BLG	50	BLG-50-C-02	2	45	1.21	
EXPTER	C1E07	BLG	50	BLG-50-C-03	3	61	3.50	
EXPTER	C1E07	BLG	50	BLG-50-C-04	4	51	1.71	
EXPTER	C1E07	BLG	50	BLG-50-C-05	5	42	0.99	
EXPTER	C2E10	BLG	0	BLG-CONTROL-C-01	1	56	2.54	
EXPTER	C2E10	BLG	0	BLG-CONTROL-C-02	2	62	3.61	
EXPTER	C2E10	BLG	0	BLG-CONTROL-C-03	3	59	3.05	
EXPTER	C2E10	BLG	0	BLG-CONTROL-C-04	4	54	2.23	
EXPTER	C2E10	BLG	0	BLG-CONTROL-C-05	5	49	1.53	
EXPTER	C3E03	BLG	300	BLG-300-C-01	1	60	3.13	
EXPTER	C3E03	BLG	300	BLG-300-C-02	2	53	2.20	
EXPTER	C3E03	BLG	300	BLG-300-C-03	3	60	3.10	
EXPTER	C3E03	BLG	300	BLG-300-C-04	4	54	2.43	
EXPTER	C3E03	BLG	300	BLG-300-C-05	5	43	1.09	
EXPTER	C4E04	BLG	100	BLG-100-C-01	1	62	3.60	
EXPTER	C4E04	BLG	100	BLG-100-C-02	2	42	1.03	
EXPTER	C4E04	BLG	100	BLG-100-C-03	3	48	1.49	
EXPTER	C4E04	BLG	100	BLG-100-C-04	4	46	1.43	
EXPTER	C4E04	BLG	100	BLG-100-C-05	5	52	1.92	
EXPTER	C5E05	BLG	200	BLG-200-C-01	1	52	1.90	
EXPTER	C5E05	BLG	200	BLG-200-C-02	2	54	2.41	
EXPTER	C5E05	BLG	200	BLG-200-C-03	3	59	2.93	
EXPTER	C5E05	BLG	200	BLG-200-C-04	4	46	1.33	
EXPTER	C5E05	BLG	200	BLG-200-C-05	5	47	1.37	
EXMORT	B5E08	BLG	300	BLG-300-B-M1	1	47	1.55	
EXMORT	C3E03	BLG	300	BLG-300-C-M1	1	43	1.11	
HDMORT	A3E02	BLG	300	BLG-300-E2-M1	1	41	1.03	
HDMORT	A3E02	BLG	300	BLG-300-E2-M2	2	54	2.53	
HDMORT	A3E02	BLG	300	BLG-300-E2-M3	3	49	1.84	
HDMORT	A3E02	BLG	300	BLG-300-E2-M4	4	47	2.07	
HDMORT	A5E09	BLG	200	BLG-200-E9-M1	1	46	1.42	
HDMORT	A5E09	BLG	200	BLG-200-E9-M2	2	53	2.51	
HDMORT	B1E15	BLG	200	BLG-200-E15-M1	1	54	2.32	
HDMORT	B1E15	BLG	200	BLG-200-E15-M2	2	60	3.04	
HDMORT	B1E15	BLG	200	BLG 200 E15-M3	3	47	1.70	
HDMORT	B1E15	BLG	200	BLG-200-E15-M4	4	49	1.73	
HDMORT	B1C15	BLG	200	BLG-200-E15-M5	5	58	2.84	
HDMORT	B5E08	BLG	300	BLG-300-E8-M1	1	43	1.08	
HDMORT	B5E08	BLG	300	BLG-300-E8-M2	2	50	2.20	
HDMORT	B5E08	BLG	300	BLG-300-E8-M3	3	47	1.67	
HDMORT	C3E03	BLG	300	BLG-300-E3-M1	1	42	1.04	
HDMORT	C3E03	BLG	300	BLG-300-E3-M2	2	53	2.52	
HDMORT	C3E03	BLG	300	BLG-300-E3-M2	3	56	2.85	
HDMORT	C5E05	BLG	200	BLG-200-E5-M1	1	51	1.79	
HDMORT	C5E05	BLG	200	BLG-200-E5-M2	2	50	1.76	
TERMIN	A2E01	BLG	100	BLG-100-E1-T1	1	60	3.44	
TERMIN	A2E01	BLG	100	BLG-100-E1-T2	2	48	1.69	
TERMIN	A2E01	BLG	100	BLG-100-E1-T3	3	57	2.58	
TERMIN	A2E01	BLG	100	BLG-100-E1-T4	4	48	1.83	
TERMIN	A2E01	BLG	100	BLG-100-E1-T5	5	47	1.62	
TERMIN	A2E01	BLG	100	BLG-100-E1-T6	6	50	2.00	
TERMIN	A2E01	BLG	100	BLG-100-E1-T7	7	50	1.80	
TERMIN	A2E01	BLG	100	BLG-100-E1-T8	8	54	2.72	
TERMIN	A2E01	BLG	100	BLG-100-E1-T9	9	51	2.01	
TERMIN	A2E01	BLG	100	BLG-100-E1-T10	10	43	1.32	
TERMIN	A2E01	BLG	100	BLG-100-E1-T11	11	48	1.76	
TERMIN	A2E01	BLG	100	BLG-100-E1-T12	12	47	1.68	

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Study Number: AE-I-12-PSEUDO-03
Lab Notebook #2 [pages 16-28]
Data Source: File Folder: 23D
Forms: 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens* Pf-CL 145A (SDP) Chemical lot #: TR 4669-3-[illegible]
Exposure Date:7/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A2E01	BLG	100	BLG-100-E1-T13	13	48	1.13	
TERMIN	A2E01	BLG	100	BLG-100-E1-T14	14	56	2.85	
TERMIN	A2E01	BLG	100	BLG-100-E1-T15	15	56	2.71	
TERMIN	A2E01	BLG	100	BLG-100-E1-T16	16	49	1.90	
TERMIN	A2E01	BLG	100	BLG-100-E1-T17	17	52	2.01	
TERMIN	A2E01	BLG	100	BLG-100-E1-T18	18	54	2.05	
TERMIN	A2E01	BLG	100	BLG-100-E1-T19	19	53	2.09	
TERMIN	A2E01	BLG	100	BLG-100-E1-T20	20	54	2.11	
TERMIN	A3E02	BLG	300	BLG-300-E2-T1	1	62	3.55	
TERMIN	A3E02	BLG	300	BLG-300-E2-T2	2	51	1.92	
TERMIN	A3E02	BLG	300	BLG-300-E2-T3	3	50	1.81	
TERMIN	A3E02	BLG	300	BLG-300-E2-T4	4	42	1.41	
TERMIN	A3E02	BLG	300	BLG-300-E2-T5	5	47	1.68	
TERMIN	A3E02	BLG	300	BLG-300-E2-T6	6	50	1.65	
TERMIN	A3E02	BLG	300	BLG-300-E2-T7	7	60	3.31	
TERMIN	A3E02	BLG	300	BLG-300-E2-T8	8	58	2.38	
TERMIN	A3E02	BLG	300	BLG-300-E2-T9	9	41	1.31	
TERMIN	A3E02	BLG	300	BLG-300-E2-T10	10	51	1.54	
TERMIN	A3E02	BLG	300	BLG-300-E2-T11	11	47	1.52	
TERMIN	A3E02	BLG	300	BLG-300-E2-T12	12	50	1.68	
TERMIN	A3E02	BLG	300	BLG-300-E2-T13	13	50	1.79	
TERMIN	A3E02	BLG	300	BLG-300-E2-T14	14	54	2.27	
TERMIN	A3E02	BLG	300	BLG-300-E2-T15	15	55	2.27	
TERMIN	A3E02	BLG	300	BLG-300-E2-T16	16	45	1.28	
TERMIN	C3E03	BLG	300	BLG-300-E3-T1	1	55	2.71	
TERMIN	C3E03	BLG	300	BLG-300-E3-T2	2	59	2.78	
TERMIN	C3E03	BLG	300	BLG-300-E3-T3	3	50	1.76	
TERMIN	C3E03	BLG	300	BLG-300-E3-T4	4	47	1.58	
TERMIN	C3E03	BLG	300	BLG-300-E3-T5	5	43	1.05	
TERMIN	C3E03	BLG	300	BLG-300-E3-T6	6	65	3.49	
TERMIN	C3E03	BLG	300	BLG-300-E3-T7	7	52	2.15	
TERMIN	C3E03	BLG	300	BLG-300-E3-T8	8	50	1.54	
TERMIN	C3E03	BLG	300	BLG-300-E3-T9	9	39	0.78	
TERMIN	C3E03	BLG	300	BLG-300-E3-T10	10	44	1.10	
TERMIN	C3E03	BLG	300	BLG-300-E3-T11	11	54	2.25	
TERMIN	C3E03	BLG	300	BLG-300-E3-T12	12	64	3.57	
TERMIN	C3E03	BLG	300	BLG-300-E3-T13	13	45	1.26	
TERMIN	C3E03	BLG	300	BLG-300-E3-T14	14	56	2.49	
TERMIN	C3E03	BLG	300	BLG-300-E3-T15	15	46	1.33	
TERMIN	C3E03	BLG	300	BLG-300-E3-T16	16	47	1.33	
TERMIN	C4E04	BLG	100	BLG-100-E4-T1	1	51	2.17	
TERMIN	C4E04	BLG	100	BLG-100-E4-T2	2	53	2.11	
TERMIN	C4E04	BLG	100	BLG-100-E4-T3	3	52	1.79	
TERMIN	C4E04	BLG	100	BLG-100-E4-T4	4	49	1.71	
TERMIN	C4E04	BLG	100	BLG-100-E4-T5	5	46	1.31	
TERMIN	C4E04	BLG	100	BLG-100-E4-T6	6	65	4.35	
TERMIN	C4E04	BLG	100	BLG-100-E4-T7	7	64	4.07	
TERMIN	C4E04	BLG	100	BLG-100-E4-T8	8	49	2.23	
TERMIN	C4E04	BLG	100	BLG-100-E4-T9	9	59	3.18	
TERMIN	C4E04	BLG	100	BLG-100-E4-T10	10	54	2.06	
TERMIN	C4E04	BLG	100	BLG-100-E4-T11	11	54	2.36	
TERMIN	C4E04	BLG	100	BLG-100-E4-T12	12	52	1.94	
TERMIN	C4E04	BLG	100	BLG-100-E4-T13	13	54	2.25	
TERMIN	C4E04	BLG	100	BLG-100-E4-T14	14	53	2.12	
TERMIN	C4E04	BLG	100	BLG-100-E4-T15	15	52	1.93	
TERMIN	C4E04	BLG	100	BLG-100-E4-T16	16	54	2.22	
TERMIN	C4E04	BLG	100	BLG-100-E4-T17	17	56	2.06	
TERMIN	C4E04	BLG	100	BLG-100-E4-T18	18	43	1.16	
TERMIN	C4E04	BLG	100	BLG-100-E4-T19	19	44	1.20	
TERMIN	C4E04	BLG	100	BLG-100-E4-T20	20	48	1.37	
TERMIN	C5E05	BLG	200	BLG-200-E5-T1	1	63	3.59	
TERMIN	C5E05	BLG	200	BLG-200-E5-T2	2	57	2.72	
TERMIN	C5E05	BLG	200	BLG-200-E5-T3	3	56	2.28	
TERMIN	C5E05	BLG	200	BLG-200-E5-T4	4	45	1.29	
TERMIN	C5E05	BLG	200	BLG-200-E5-T5	5	44	1.10	
TERMIN	C5E05	BLG	200	BLG-200-E5-T6	6	37	0.67	
TERMIN	C5E05	BLG	200	BLG-200-E5-T7	7	51	1.89	
TERMIN	C5E05	BLG	200	BLG-200-E5-T8	8	60	2.84	
TERMIN	C5E05	BLG	200	BLG-200-E5-T9	9	54	2.26	
TERMIN	C5E05	BLG	200	BLG-200-E5-T10	10	58	2.96	
TERMIN	C5E05	BLG	200	BLG-200-E5-T11	11	65	2.86	
TERMIN	C5E05	BLG	200	BLG-200-E5-T12	12	51	2.53	
TERMIN	C5E05	BLG	200	BLG-200-E5-T13	13	54	2.20	
TERMIN	C5E05	BLG	200	BLG-200-E5-T14	14	65	2.41	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: Z3D
Forms: 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-[7]
Exposure Date:7/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	C5E05	BLG	200	B.G-200-E5-T15	15	50	1.85	
TERMIN	C5E05	BLG	200	B.G-200-E5-T16	16	49	1.63	
TERMIN	C5E05	BLG	200	B.G-200-E5-T17	17	47	1.37	
TERMIN	C5E05	BLG	200	B.G-200-E5-T18	18	54	2.08	
TERMIN	B2E06	BLG	100	BLG-100-E6-T1	1	53	3.67	
TERMIN	B2E06	BLG	100	BLG-100-E6-T2	2	60	2.97	
TERMIN	B2E06	BLG	100	BLG-100-E6-T3	3	58	2.71	
TERMIN	B2E06	BLG	100	BLG-100-E6-T4	4	48	1.35	
TERMIN	B2E06	BLG	100	BLG-100-E6-T5	5	49	1.42	
TERMIN	B2E06	BLG	100	BLG-100-E6-T6	6	55	2.11	
TERMIN	B2E06	BLG	100	BLG-100-E6-T7	7	46	1.28	
TERMIN	B2E06	BLG	100	BLG-100-E6-T8	8	59	2.87	
TERMIN	B2E06	BLG	100	BLG-100-E6-T9	9	60	3.12	
TERMIN	B2E06	BLG	100	BLG-100-E6-T10	10	58	2.69	
TERMIN	B2E06	BLG	100	BLG-100-E6-T11	11	59	2.92	
TERMIN	B2E06	BLG	100	BLG-100-E6-T12	12	54	2.23	
TERMIN	B2E06	BLG	100	BLG-100-E6-T13	13	55	2.39	
TERMIN	B2E06	BLG	100	BLG-100-E6-T14	14	46	1.10	
TERMIN	B2E06	BLG	100	BLG-100-E6-T15	15	50	1.64	
TERMIN	B2E06	BLG	100	BLG-100-E6-T16	16	54	2.00	
TERMIN	B2E06	BLG	100	BLG-100-E6-T17	17	54	1.58	
TERMIN	B2E06	BLG	100	BLG-100-E6-T18	18	47	1.40	
TERMIN	B2E06	BLG	100	BLG-100-E6-T19	19	49	1.75	
TERMIN	B2E06	BLG	100	BLG-100-E6-T20	20	50	1.73	
TERMIN	C1E07	BLG	50	BLG-50-E7-T1	1	48	1.60	
TERMIN	C1E07	BLG	50	BLG-50-E7-T2	2	56	2.49	
TERMIN	C1E07	BLG	50	BLG-50-E7-T3	3	54	2.14	
TERMIN	C1E07	BLG	50	BLG-50-E7-T4	4	55	2.33	
TERMIN	C1E07	BLG	50	BLG-50-E7-T5	5	48	1.76	
TERMIN	C1E07	BLG	50	BLG-50-E7-T6	6	62	3.36	
TERMIN	C1E07	BLG	50	BLG-50-E7-T7	7	57	2.37	
TERMIN	C1E07	BLG	50	BLG-50-E7-T8	8	49	1.84	
TERMIN	C1E07	BLG	50	BLG-50-E7-T9	9	53	2.06	
TERMIN	C1E07	BLG	50	BLG-50-E7-T10	10	57	2.57	
TERMIN	C1E07	BLG	50	BLG-50-E7-T11	11	49	1.61	
TERMIN	C1E07	BLG	50	BLG-50-E7-T12	12	50	1.68	
TERMIN	C1E07	BLG	50	BLG-50-E7-T13	13	50	1.67	
TERMIN	C1E07	BLG	50	BLG-50-E7-T14	14	48	1.50	
TERMIN	C1E07	BLG	50	BLG-50-E7-T15	15	55	2.38	
TERMIN	C1E07	BLG	50	BLG-50-E7-T16	16	48	1.11	
TERMIN	C1E07	BLG	50	BLG-50-E7-T17	17	50	1.80	
TERMIN	C1E07	BLG	50	BLG-50-E7-T18	18	43	1.14	
TERMIN	C1E07	BLG	50	BLG-50-E7-T19	19	43	0.81	
TERMIN	C1E07	BLG	50	BLG-50-E7-T20	20	49	1.58	
TERMIN	B5E08	BLG	300	BLG-300-E8-T1	1	54	2.14	
TERMIN	B5E08	BLG	300	BLG-300-E8-T2	2	46	1.40	
TERMIN	B5E08	BLG	300	BLG-300-E8-T3	3	52	1.76	
TERMIN	B5E08	BLG	300	BLG-300-E8-T4	4	46	1.47	
TERMIN	B5E08	BLG	300	BLG-300-E8-T5	5	48	1.68	
TERMIN	B5E08	BLG	300	BLG-300-E8-T6	6	49	1.48	
TERMIN	B5E08	BLG	300	BLG-300-E8-T7	7	50	1.73	
TERMIN	B5E08	BLG	300	BLG-300-E8-T8	8	55	2.31	
TERMIN	B5E08	BLG	300	BLG-300-E8-T9	9	57	2.54	
TERMIN	B5E08	BLG	300	BLG-300-E8-T10	10	55	2.36	
TERMIN	B5E08	BLG	300	BLG-300-E8-T11	11	51	1.77	
TERMIN	B5E08	BLG	300	BLG-300-E8-T12	12	62	3.43	
TERMIN	B5E08	BLG	300	BLG-300-E8-T13	13	64	3.76	
TERMIN	B5E08	BLG	300	BLG-300-E8-T14	14	59	2.73	
TERMIN	B5E08	BLG	300	BLG-300-E8-T15	15	59	2.68	
TERMIN	B5E08	BLG	300	BLG-300-E8-T16	16	50	1.89	
TERMIN	A5E09	BLG	200	BLG-200-E9-T1	1	63	3.62	
TERMIN	A5E09	BLG	200	BLG-200-E9-T2	2	54	2.13	
TERMIN	A5E09	BLG	200	BLG-200-E9-T3	3	53	1.98	
TERMIN	A5E09	B.G	200	BLG-200-E9-T4	4	52	2.07	
TERMIN	A5E09	B.G	200	BLG-200-E9-T5	5	55	2.27	
TERMIN	A5E09	B.G	200	BLG-200-E9-T6	6	55	2.58	
TERMIN	A5E09	B.G	200	BLG-200-E9-T7	7	53	2.19	
TERMIN	A5E09	B.G	200	BLG-200-E9-T8	8	51	2.03	
TERMIN	A5E09	B.G	200	BLG-200-E9-T9	9	60	3.17	
TERMIN	A5E09	B.G	200	BLG 200 E9 T10	10	52	1.97	
TERMIN	A5E09	BLG	200	BLG-200-E9-T11	11	53	2.13	
TERMIN	A5E09	BLG	200	BLG-200-E9-T12	12	55	2.44	
TERMIN	A5E09	BLG	200	BLG-200-E9-T13	13	65	3.89	
TERMIN	A5E09	BLG	200	BLG-200-E9-T14	14	52	2.03	

Item Number 1 wg
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 15-28)
Data Source: File Folder: 23D
Forms: 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114500
Test Chemical: *Pseudomonas fluorescens Pf* -CL 145A (SDP) Chemical lot #: TR 4669-3-(7)
Exposure Date:7/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total length (mm)	Weight (g)	Comments
TERMIN	ASE09	BLG	200	BLG-200-E9-T15	15	50	1.78	
TERMIN	ASE09	BLG	200	BLG-200-E9-T16	16	45	1.05	
TERMIN	ASE09	BLG	200	BLG-200-E9-T17	17	45	1.16	
TERMIN	ASE09	BLG	200	BLG-200-E9-T18	18	59	2.72	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T1	1	57	2.56	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T2	2	55	2.69	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T3	3	48	1.34	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T4	4	53	2.05	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T5	5	47	1.40	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T6	6	61	3.57	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T7	7	52	1.75	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T8	8	50	1.75	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T9	9	60	3.46	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T10	10	51	1.94	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T11	11	66	4.12	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T12	12	53	2.15	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T13	13	59	3.04	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T14	14	50	1.73	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T15	15	49	1.70	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T16	16	52	1.89	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T17	17	62	3.64	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T18	18	51	1.82	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T19	19	48	1.54	
TERMIN	C2E10	BLG	0	BLG-CONTROL-E10-T20	20	45	1.31	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T1	1	58	2.84	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T2	2	48	1.68	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T3	3	56	2.64	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T4	4	54	1.70	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T5	5	55	1.80	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T6	6	63	3.54	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T7	7	58	2.99	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T8	8	52	2.14	
TERMIN	A1E11	BLG	0	BLG CONTROL E11-T9	9	55	2.31	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T10	10	55	2.36	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T11	11	52	2.03	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T12	12	52	1.97	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T13	13	57	2.64	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T14	14	63	3.70	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T15	15	51	2.04	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T16	16	50	1.83	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T17	17	49	1.81	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T18	18	45	1.19	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T19	19	45	1.36	
TERMIN	A1E11	BLG	0	BLG-CONTROL-E11-T20	20	45	1.39	
TERMIN	B4E12	BLG	50	BLG-50-E12-T1	1	65	4.00	
TERMIN	B4E12	BLG	50	BLG-50-E12-T2	2	53	1.90	
TERMIN	B4E12	BLG	50	BLG-50-E12-T3	3	53	2.16	
TERMIN	B4E12	BLG	50	BLG-50-E12-T4	4	55	2.60	
TERMIN	B4E12	BLG	50	BLG-50-E12-T5	5	52	1.99	
TERMIN	B4E12	BLG	50	BLG-50-E12-T6	6	65	3.83	
TERMIN	B4E12	BLG	50	BLG-50-E12-T7	7	54	2.37	
TERMIN	B4E12	BLG	50	BLG-50-E12-T8	8	53	2.03	
TERMIN	B4E12	BLG	50	BLG-50-E12-T9	9	57	2.58	
TERMIN	B4E12	BLG	50	BLG-50-E12-T10	10	56	2.48	
TERMIN	B4E12	BLG	50	BLG-50-E12-T11	11	60	3.21	
TERMIN	B4E12	BLG	50	BLG-50-E12-T12	12	54	2.26	
TERMIN	B4E12	BLG	50	BLG-50-E12-T13	13	60	3.15	
TERMIN	B4E12	BLG	50	BLG-50-E12-T14	14	54	2.02	
TERMIN	B4E12	BLG	50	BLG-50-E12-T15	15	51	1.94	
TERMIN	B4E12	BLG	50	BLG-50-E12-T16	16	58	3.13	
TERMIN	B4E12	BLG	50	BLG-50-E12-T17	17	55	2.34	
TERMIN	B4E12	BLG	50	BLG-50-E12-T18	18	55	1.73	
TERMIN	B4E12	BLG	50	BLG-50-E12-T19	19	47	1.36	
TERMIN	A4E13	BLG	50	BLG-50-E13-T1	1	64	3.78	
TERMIN	A4E13	BLG	50	BLG-50-E13-T2	2	59	2.30	
TERMIN	A4E13	BLG	50	BLG-50-E13-T3	3	60	3.12	
TERMIN	A4E13	BLG	50	BLG 50 E13-T4	4	55	2.46	
TERMIN	A4E13	BLG	50	BLG-50-E13-T5	5	51	1.84	
TERMIN	A4E13	BLG	50	BLG-50-E13-T6	6	60	3.94	
TERMIN	A4E13	BLG	50	BLG-50-E13-T7	7	50	1.86	
TERMIN	A4E13	BLG	50	BLG-50-E13-T8	8	59	3.04	
TERMIN	A4E13	BLG	50	BLG-50-E13-T9	9	63	3.68	
TERMIN	A4E13	BLG	50	BLG-50-E13-T10	10	60	3.62	
TERMIN	A4E13	BLG	50	BLG-50-E13-T11	11	52	1.89	

Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 16-28)
Data Source: File Folder: 23D
Forms: 3, 3a

Fish species: Bluegill (*Lepomis macrochirus*) Lot number: 114530
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: TR 4669-3-[7]
Exposure Date: ?/11/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A4E13	BLG	50	BLG-50-E13-T12	12	50	1.73	
TERMIN	A4E13	BLG	50	BLG-50-E13-T13	13	45	1.21	
TERMIN	A4E13	BLG	50	B.G-50-E13-T14	14	50	1.72	
TERMIN	A4E13	BLG	50	B.G-50-E13-T15	15	50	1.82	
TERMIN	A4E13	BLG	50	B.G-50-E13-T16	16	47	1.51	
TERMIN	A4E13	BLG	50	B.G-50-E13-T17	17	49	1.30	
TERMIN	A4E13	BLG	50	BLG-50-E13-T18	18	52	1.72	
TERMIN	A4E13	BLG	50	BLG-50-E13-T19	19	52	1.81	
TERMIN	A4E13	BLG	50	BLG-50-E13-T20	20	44	1.26	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T1	1	61	3.12	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T2	2	61	3.17	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T3	3	57	2.73	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T4	4	50	1.78	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T5	5	46	1.52	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T6	6	56	2.44	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T7	7	55	2.36	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T8	8	48	1.55	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T9	9	55	2.58	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T10	10	55	2.43	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T11	11	49	1.61	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T12	12	62	2.71	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T13	13	57	2.76	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T14	14	61	3.28	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T15	15	54	2.53	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T16	16	54	2.35	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T17	17	47	1.63	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T18	18	54	2.07	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T19	19	51	1.93	
TERMIN	B3E14	BLG	0	BLG-CONTROL-E14-T20	20	50	1.92	
TERMIN	B1E15	BLG	200	BLG-200-E15-T1	1	55	2.39	
TERMIN	B1E15	BLG	200	BLG-200-E15-T2	2	52	1.96	
TERMIN	B1E15	BLG	200	BLG-200-E15-T3	3	55	2.46	
TERMIN	B1E15	BLG	200	BLG-200-E15-T4	4	54	1.50	
TERMIN	B1E15	BLG	200	BLG-200-E15-T5	5	48	1.10	
TERMIN	B1E15	BLG	200	BLG-200-E15-T6	6	65	4.01	
TERMIN	B1E15	BLG	200	BLG-200-E15-T7	7	64	3.73	
TERMIN	B1E15	BLG	200	BLG-200-E15-T8	8	65	4.17	
TERMIN	B1E15	BLG	200	BLG-200-E15-T9	9	54	2.15	
TERMIN	B1E15	BLG	200	BLG-200-E15-T10	10	45	1.20	
TERMIN	B1E15	BLG	200	BLG-200-E15-T11	11	54	2.15	
TERMIN	B1E15	BLG	200	BLG-200-E15-T12	12	51	1.88	
TERMIN	B1E15	BLG	200	BLG-200-E15-T13	13	46	1.18	
TERMIN	B1E15	BLG	200	BLG-200-E15-T14	14	50	1.84	
TERMIN	B1E15	BLG	200	BLG-200-E15-T15	15	49	1.48	

File Folder: 23d

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #2 (pages 34-44)	Created.....	5/1/2013	KLW
Data Source: File Folder: 24D	Revised	3/20/2015	KLW
Forms: 3, 3a	Reviewed...	3/20/15	
	Certified.....	3/20/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 LengthWeight Data (w SAS).xlsx]CCF LengthWeight

Length/Weight Data - *Ictalurus punctatus*

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Data Explanation:
Sample Time - Sample time of test organism is from 1 of 5 sampling times.
DISTRO = Histology specimen sampled during distribution of test organisms to exposure chambers.
EXPTER = Histology specimen sampled at termination of exposure
EXMORT = Mortality observed at termination of exposure
HDMORT = Mortality observed throughout the 22-day holding period
TERMIN = Surviving test organism from the 22-day holding period.

Diluter/holding chamber - 4 alpha-numeric code indicating the diluter ID and the subsequent holding chamber ID
D0001-D0009 Indicates that the test organism was from distribution
Diluter IDs start the 4 alpha-numeric code and are indicated by A, B, or C; followed by a single digit numeric chamber ID
Holding rack chamber IDs end the 4 alpha-numeric code and are indicated by D, E, F, or G; followed by 2 digit numeric chamber ID
Species - Three letter code for the species
Treatment Level - Treatment group the animal was exposed to
Sample ID - Identification code assigned to individual test organism and recorded on data forms and histology tags/cassettes
Fish # - Sequential order assigned to fish based on each sample time (DISTRO, EXPTER, EXMORT, HDMORT, and TERMIN)
Total length - Total Length of test organism in millimeters (mm)
Weight - Weight of test organism in grams (g)

Data Anomalies and Deviations:
Deviation #22 - Fish escaped from Chamber E7
Deviation #36 - Sequential numbering and labeling error during 22-d holding period

File Folder: 24d

Item Number 1
Page 1 of 7

Study Number: AEH-12-PSEUDO-09
Lab Notebook #7 (pages 34-44)
Data Source: File Folder: 24D
Forms: 5, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemtica, lot #: 401P12154G-07 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
DISTRO	D0001	CCF	NA	CCF-DIS#1-01	1	60	1.78	
DISTRO	D0001	CCF	NA	CCF-DIS#1-02	2	55	1.48	
DISTRO	D0001	CCF	NA	CCF-DIS#1-03	3	54	1.40	
DISTRO	D0001	CCF	NA	CCF-DIS#1-04	4	56	1.48	
DISTRO	D0001	CCF	NA	CCF-DIS#1-05	5	58	1.56	
DISTRO	D0001	CCF	NA	CCF-DIS#1-06	6	61	2.03	
DISTRO	D0001	CCF	NA	CCF-DIS#1-07	7	49	1.07	
DISTRO	D0001	CCF	NA	CCF-DIS#1-08	8	58	1.72	
DISTRO	D0001	CCF	NA	CCF-DIS#1-09	9	54	1.41	
DISTRO	D0001	CCF	NA	CCF-DIS#1-10	10	51	1.24	
DISTRO	D0001	CCF	NA	CCF-DIS#2-01	11	65	2.68	
DISTRO	D0001	CCF	NA	CCF-DIS#2-02	12	57	1.70	
DISTRO	D0001	CCF	NA	CCF-DIS#2-03	13	57	1.65	
DISTRO	D0001	CCF	NA	CCF-DIS#2-04	14	56	1.70	
DISTRO	D0001	CCF	NA	CCF-DIS#2-05	15	62	1.96	
DISTRO	D0001	CCF	NA	CCF-DIS#2-06	16	56	1.54	
DISTRO	D0001	CCF	NA	CCF-DIS#2-07	17	63	2.31	
DISTRO	D0001	CCF	NA	CCF-DIS#2-08	18	53	1.38	
DISTRO	D0001	CCF	NA	CCF-DIS#2-09	19	52	1.26	
DISTRO	D0001	CCF	NA	CCF-DIS#2-10	20	54	1.43	
DISTRO	D0001	CCF	NA	CCF-DIS#3-01	21	61	2.04	
DISTRO	D0001	CCF	NA	CCF-DIS#3-02	22	60	1.89	
DISTRO	D0001	CCF	NA	CCF-DIS#3-03	23	64	2.28	
DISTRO	D0001	CCF	NA	CCF-DIS#3-04	24	60	2.02	
DISTRO	D0001	CCF	NA	CCF-DIS#3-05	25	55	1.15	
DISTRO	D0001	CCF	NA	CCF-DIS#3-06	26	60	1.98	
DISTRO	D0001	CCF	NA	CCF-DIS#3-07	27	54	1.41	
DISTRO	D0001	CCF	NA	CCF-DIS#3-08	28	54	1.36	
DISTRO	D0001	CCF	NA	CCF-DIS#3-09	29	53	1.12	
DISTRO	D0001	CCF	NA	CCF-DIS#3-10	30	56	1.35	
DISTRO	D0001	CCF	NA	CCF-DIS#4-01	31	53	1.57	
DISTRO	D0001	CCF	NA	CCF-DIS#4-02	32	53	1.30	
DISTRO	D0001	CCF	NA	CCF-DIS#4-03	33	55	1.47	
DISTRO	D0001	CCF	NA	CCF-DIS#4-04	34	55	1.53	
DISTRO	D0001	CCF	NA	CCF-DIS#4-05	35	55	1.61	
DISTRO	D0001	CCF	NA	CCF-DIS#4-06	36	57	1.80	
DISTRO	D0001	CCF	NA	CCF-DIS#4-07	37	55	1.56	
DISTRO	D0001	CCF	NA	CCF-DIS#4-08	38	56	1.56	
DISTRO	D0001	CCF	NA	CCF-DIS#4-09	39	58	1.87	
DISTRO	D0001	CCF	NA	CCF-DIS#4-10	40	55	1.56	
EXPTER	A2E02	CCF	50	CCF-50-A-01	1	53	1.02	
EXPTER	A2E02	CCF	50	CCF-50-A-02	2	60	1.77	
EXPTER	A2E02	CCF	50	CCF-50-A-03	3	57	1.47	
EXPTER	A2E02	CCF	50	CCF-50-A-04	4	55	1.35	
EXPTER	A2E02	CCF	50	CCF-50-A-05	5	55	1.37	
EXPTER	A3E13	CCF	200	CCF-200-A-01	1	58	1.48	
EXPTER	A3E13	CCF	200	CCF-200-A-02	2	54	1.38	
EXPTER	A3E13	CCF	200	CCF-200-A-03	3	60	1.77	
EXPTER	A3E13	CCF	200	CCF-200-A-04	4	52	1.21	
EXPTER	A3E13	CCF	200	CCF-200-A-05	5	61	1.95	
EXPTER	A4E08	CCF	0	CCF CONTROL-A-01	1	55	1.17	
EXPTER	A4E08	CCF	0	CCF-CONTROL-A-02	2	55	1.33	
EXPTER	A4E08	CCF	0	CCF-CONTROL-A-03	3	59	1.79	
EXPTER	A4E08	CCF	0	CCF-CONTROL-A-04	4	56	1.46	
EXPTER	A4E08	CCF	0	CCF-CONTROL-A-05	5	56	1.45	
EXPTER	A5E09	CCF	100	CCF-100-A-01	1	54	1.28	
EXPTER	A5E09	CCF	100	CCF-100-A-02	2	50	0.98	
EXPTER	A5E09	CCF	100	CCF-100-A-03	3	60	1.74	
EXPTER	A5E09	CCF	100	CCF-100-A-04	4	52	1.13	
EXPTER	A5E09	CCF	100	CCF-100-A-05	5	57	1.52	
EXPTER	B2E12	CCF	200	CCF-200-B-01	1	56	1.55	
EXPTER	B2E12	CCF	200	CCF-200-B-02	2	53	1.26	
EXPTER	B2E12	CCF	200	CCF-200-B-03	3	58	1.62	
EXPTER	B2E12	CCF	200	CCF-200-B-04	4	54	1.34	
EXPTER	B2E12	CCF	200	CCF-200-B-05	5	54	1.35	
EXPTER	B3E07	CCF	100	CCF-100-B-01	1	61	1.78	
EXPTER	B3E07	CCF	100	CCF-100-B-02	2	60	1.79	
EXPTER	B3E07	CCF	100	CCF-100-B-03	3	54	1.18	
EXPTER	B3E07	CCF	100	CCF-100-B-04	4	56	1.32	
EXPTER	B3E07	CCF	100	CCF-100-B-05	5	55	1.33	
EXPTER	B4E04	CCF	50	CCF-50-B-01	1	62	1.61	
EXPTER	B4E04	CCF	50	CCF-50-B-02	2	53	1.30	
EXPTER	B4E04	CCF	50	CCF-50-B-03	3	51	1.36	
EXPTER	B4E04	CCF	50	CCF-50-B-04	4	53	1.38	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-44)
Data Source: File Folder: 24D
Forms: 3, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 40192154G-02 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXPTER	B4E04	CCF	50	CCF-50-B-05	5	52	1.18	
EXPTER	B5E03	CCF	0	CCF-CONTROL-B-01	1	54	1.21	
EXPTER	B5E03	CCF	0	CCF-CONTROL-B-02	2	54	1.30	
EXPTER	B5E03	CCF	0	CCF-CONTROL-B-03	3	52	1.18	
EXPTER	B5E03	CCF	0	CCF-CONTROL-B-04	4	54	1.22	
EXPTER	B5E03	CCF	0	CCF-CONTROL-B-05	5	59	1.50	
EXPTER	C1E01	CCF	200	CCF-200-C-01	1	56	1.51	
EXPTER	C1E01	CCF	200	CCF-200-C-02	2	52	1.18	
EXPTER	C1E01	CCF	200	CCF-200-C-03	3	59	1.57	
EXPTER	C1E01	CCF	200	CCF-200-C-04	4	54	1.17	
EXPTER	C1E01	CCF	200	CCF-200-C-05	5	54	1.13	
EXPTER	C2E05	CCF	100	CCF-100-C-01	1	60	1.64	
EXPTER	C2E05	CCF	100	CCF-100-C-02	2	55	1.14	
EXPTER	C2E05	CCF	100	CCF-100-C-03	3	57	1.52	
EXPTER	C2E05	CCF	100	CCF-100-C-04	4	48	0.90	
EXPTER	C2E05	CCF	100	CCF-100-C-05	5	42	0.64	
EXPTER	C3E10	CCF	0	CCF-CONTROL-C-01	1	50	1.17	
EXPTER	C3E10	CCF	0	CCF-CONTROL-C-02	2	66	2.15	
EXPTER	C3E10	CCF	0	CCF-CONTROL-C-03	3	65	2.24	
EXPTER	C3E10	CCF	0	CCF-CONTROL-C-04	4	55	1.32	
EXPTER	C3E10	CCF	0	CCF-CONTROL-C-05	5	54	1.30	
EXPTER	C5E11	CCF	50	CCF-50-C-01	1	52	1.12	
EXPTER	C5E11	CCF	50	CCF-50-C-02	2	61	1.76	
EXPTER	C5E11	CCF	50	CCF-50-C-03	3	65	2.03	
EXPTER	C5E11	CCF	50	CCF-50-C-04	4	55	1.29	
EXPTER	C5E11	CCF	50	CCF-50-C-05	5	55	1.37	
EXMORT	A1E15	CCF	300	CCF-300-A1-M1	1	46	1.70	Necrotic tail
EXMORT	A1E15	CCF	300	CCF-300-A1-M2	2	54	1.75	
EXMORT	A1E15	CCF	300	CCF-300-A1-M3	3	55	1.71	
EXMORT	A1E15	CCF	300	CCF-300-A1-M4	4	53	1.52	
EXMORT	A1E15	CCF	300	CCF-300-A1-M5	5	48	1.01	
EXMORT	A1E15	CCF	300	CCF-300-A1-M6	6	50	1.32	
EXMORT	A1E15	CCF	300	CCF-300-A1-M7	7	49	1.18	
EXMORT	A1E15	CCF	300	CCF-300-A1-M8	8	55	1.73	
EXMORT	A1E15	CCF	300	CCF-300-A1-M9	9	53	1.58	
EXMORT	A1E15	CCF	300	CCF-300-A1-M10	10	53	1.49	
EXMORT	A1E15	CCF	300	CCF-300-A1-M11	11	53	1.30	
EXMORT	A1E15	CCF	300	CCF-300-A1-M12	12	51	1.46	
EXMORT	A1E15	CCF	300	CCF-300-A1-M13	13	53	1.48	
EXMORT	A1E15	CCF	300	CCF-300-A1-M14	14	51	1.40	
EXMORT	A1E15	CCF	300	CCF-300-A1-M15	15	52	2.08	
EXMORT	A1E15	CCF	300	CCF-300-A1-M16	16	59	2.16	
EXMORT	A1E15	CCF	300	CCF-300-A1-M17	17	55	1.86	
EXMORT	A1E15	CCF	300	CCF-300-A1-M18	18	54	1.77	
EXMORT	A1E15	CCF	300	CCF-300-A1-M19	19	57	1.90	
EXMORT	A1E15	CCF	300	CCF-300-A1-M20	20	54	1.83	
EXMORT	A1E15	CCF	300	CCF-300-A1-M21	21	56	2.08	
EXMORT	A1E15	CCF	300	CCF-300-A1-M22	22	53	1.75	
EXMORT	A1E15	CCF	300	CCF-300-A1-M23	23	52	1.37	
EXMORT	A3E08	CCF	100	CCF-100-A3-M1	1	54	1.34	
EXMORT	B1E14	CCF	300	CCF-300-B-M1	1	54	1.73	
EXMORT	B1E14	CCF	300	CCF-300-B-M2	2	53	1.67	
EXMORT	B1E14	CCF	300	CCF-300-B-M3	3	51	1.51	
EXMORT	B1E14	CCF	300	CCF-300-B-M4	4	49	1.23	
EXMORT	B1E14	CCF	300	CCF-300-B-M5	5	54	1.63	
EXMORT	B1E14	CCF	300	CCF-300-B-M6	6	46	1.02	
EXMORT	B1E14	CCF	300	CCF-300-B-M7	7	53	1.32	
EXMORT	B1E14	CCF	300	CCF-300-B-M8	8	48	1.09	
EXMORT	B1E14	CCF	300	CCF-300-B-M9	9	48	1.13	
EXMORT	B1E14	CCF	300	CCF-300-B-M10	10	59	2.13	
EXMORT	B1E14	CCF	300	CCF-300-B-M11	11	52	1.52	
EXMORT	B2E12	CCF	200	CCF-200-B-M1	1	52	1.66	
EXMORT	B3E07	CCF	100	CCF-100-B-M1	1	52	1.41	
EXMORT	B4E04	CCF	50	CCF-50 B M1	1	54	1.63	
EXMORT	C4E06	CCF	300	CCF-300-C-M1	1	54	1.74	
EXMORT	C4E06	CCF	300	CCF-300-C-M2	2	58	2.21	
EXMORT	C4E06	CCF	300	CCF-300-C-M3	3	59	2.00	
EXMORT	C4E06	CCF	300	CCF-300-C-M4	4	49	1.19	
EXMORT	C4E06	CCF	300	CCF-300-C-M5	5	51	1.51	
EXMORT	C4E06	CCF	300	CCF-300-C-M6	6	51	1.58	
EXMORT	C4E06	CCF	300	CCF-300-C-M7	7	52	1.41	
EXMORT	C4E06	CCF	300	CCF-300-C-M8	8	59	2.26	
EXMORT	C4E06	CCF	300	CCF-300-C-M9	9	54	1.55	
EXMORT	C4E06	CCF	300	CCF-300-C-M10	10	57	1.95	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-44)
Data Source: File Folder: 24D
Forms: 3, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 40LP12154G-02 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
EXMORT	C4E06	CCF	300	CCF-300-C-M11	11	49	1.26	
EXMORT	C4E06	CCF	300	CCF-300-C-M12	12	59	2.26	
EXMORT	C4E06	CCF	300	CCF-300-C-M13	13	57	1.75	
EXMORT	C4E06	CCF	300	CCF-300-C-M14	14	48	1.18	
EXMORT	C4E06	CCF	300	CCF-300-C-M15	15	52	1.96	
EXMORT	C4E06	CCF	300	CCF-300-C-M16	16	53	1.35	
EXMORT	C4E06	CCF	300	CCF-300-C-M17	17	52	1.41	
EXMORT	C4E06	CCF	300	CCF-300-C-M18	18	55	1.59	
EXMORT	C4E06	CCF	300	CCF-300-C-M19	19	51	1.53	
EXMORT	C4E06	CCF	300	CCF-300-C-M20	20	50	1.48	
EXMORT	C4E06	CCF	300	CCF-300-C-M21	21	53	1.49	
EXMORT	C4E06	CCF	300	CCF-300-C-M22	22	51	1.27	
EXMORT	C4E06	CCF	300	CCF-300-C-M23	23	52	1.67	
HDMORT	A1E15	CCF	300	CCF-300-E15-M1	1	51	1.71	
HDMORT	A1E15	CCF	300	CCF-300-E15-M2	2	48	1.24	
HDMORT	A3E13	CCF	200	CCF-200-E13-M1	1	51	1.66	
HDMORT	A3E13	CCF	200	CCF-200-E13-M2	2	52	1.71	
HDMORT	A3E13	CCF	200	CCF-200-E13-M3	3	54	2.08	
HDMORT	A3E13	CCF	200	CCF-200-E13-M4	4	51	1.49	
HDMORT	A3E13	CCF	200	CCF-200-E13-M5	5	60	2.11	
HDMORT	A3E13	CCF	200	CCF-200-E13-M6	6	52	1.39	
HDMORT	A3E13	CCF	200	CCF-200-E13-M7	7	56	2.29	
HDMORT	A3E13	CCF	200	CCF-200-E13-M8	8	50	1.51	
HDMORT	A3E13	CCF	200	CCF-200-E13-M9	9	62	2.73	Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M10	10	55	1.95	Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M11	11	50	1.36	Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M12	12	53	1.76	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M13	13	60	2.61	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M14	14	53	1.51	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M15	15	57	1.44	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M16	16	59	2.15	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M17	17	55	2.15	See Deviation 36; Covered in fungus
HDMORT	A3E13	CCF	200	CCF-200-E13-M18	18	48	1.42	See Deviation 36; Fungused
HDMORT	A3E13	CCF	200	CCF-200-E13-M19	19	59	1.77	See Deviation 36
HDMORT	A5E09	CCF	100	CCF-100-E9-M1	1	54	1.38	
HDMORT	A5E09	CCF	100	CCF-100-E9-M2	2	51	0.97	
HDMORT	A5E09	CCF	100	CCF-100-E9-M3	3	51	1.20	Covered in fungus
HDMORT	B1E14	CCF	300	CCF-300-E14-M1	1	57	1.94	
HDMORT	B1E14	CCF	300	CCF-300-E14-M2	2	61	2.69	
HDMORT	B1E14	CCF	300	CCF-300-E14-M3	3	57	1.96	
HDMORT	B1E14	CCF	300	CCF-300-E14-M4	4	58	2.08	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M1	1	55	1.55	
HDMORT	B2E12	CCF	200	CCF-200-E12-M2	2	51	1.82	
HDMORT	B2E12	CCF	200	CCF-200-E12-M3	3	54	1.35	
HDMORT	B2E12	CCF	200	CCF-200-E12-M4	4	50	1.35	
HDMORT	B2E12	CCF	200	CCF-200-E12-M5	5	57	1.75	
HDMORT	B2E12	CCF	200	CCF-200-E12-M6	6	46	1.12	
HDMORT	B2E12	CCF	200	CCF-200-E12-M7	7	53	1.86	
HDMORT	B2E12	CCF	200	CCF-200-E12-M8	8	50	1.18	
HDMORT	B2E12	CCF	200	CCF-200-E12-M9	9	60	1.68	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M10	10	56	2.29	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M11	11	50	1.51	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M12	12	55	2.01	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M13	13	63	2.41	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M14	14	54	1.66	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M15	15	55	1.65	Covered in fungus
HDMORT	B2E12	CCF	200	CCF-200-E12-M16	16	48	1.71	
HDMORT	B2E12	CCF	200	CCF-200-E12-M17	17	59	2.35	Very fungused
HDMORT	B2E12	CCF	200	CCF-200-E12-M18	18	48	1.76	Very fungused
HDMORT	B3E07	CCF	100	CCF-100-E7-M2	1	59	2.03	See Deviation 22; Head covered in white fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M3	2	52	1.26	Head covered in white fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M4	3	50	1.86	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M5	4	56	1.97	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M6	5	56	1.81	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M7	6	60	2.41	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M8	7	54	1.50	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M9	8	56	1.42	Covered in fungus
HDMORT	B3E07	CCF	100	CCF-100-E7-M10	9	58	1.70	
HDMORT	B3E07	CCF	100	CCF-100-E7-M11	10	53	1.42	
HDMORT	C1E01	CCF	200	CCF-200-E1-M1	1	56	1.95	
HDMORT	C1E01	CCF	200	CCF-200-E1-M2	2	57	1.88	
HDMORT	C1E01	CCF	200	CCF-200-E1-M3	3	53	1.39	
HDMORT	C1E01	CCF	200	CCF-200-E1-M4	4	55	1.36	
HDMORT	C1E01	CCF	200	CCF-200-E1-M5	5	62	2.33	Covered in fungus

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-44)
Data Source: File Folder: 24D
Forms: 3, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P121546-02 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
HDMORT	C1E01	CCF	200	CCF-200-E1-M6	6	50	1.14	
HDMORT	C1E01	CCF	200	CCF-200-E1-M7	7	57	1.48	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M8	8	56	2.00	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M9	9	66	2.53	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M10	10	60	1.81	Small amount of fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M11	11	56	1.69	
HDMORT	C1E01	CCF	200	CCF-200-E1-M12	12	54	1.62	Hemorrhages
HDMORT	C1E01	CCF	200	CCF-200-E1-M13	13	54	1.41	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M14	14	54	1.36	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M15	15	54	2.05	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M16	16	55	2.21	Covered in fungus
HDMORT	C1E01	CCF	200	CCF-200-E1-M17	17	54	1.47	
HDMORT	C2E05	CCF	100	CCF-100-E5-M1	1	54	1.38	
HDMORT	C2E05	CCF	100	CCF-100-E5-M2	2	51	1.33	Head covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M3	3	57	1.63	Head covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M4	4	59	1.48	Head covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M5	5	58	1.66	Head covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M6	6	56	1.90	Head covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M7	7	59	2.11	Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M8	8	52	1.27	
HDMORT	C2E05	CCF	100	CCF-100-E5-M9	9	46	0.86	Pinhead; Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M10	10	53	1.46	Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M11	11	58	1.61	Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M12	12	64	2.26	Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M13	13	61	1.68	
HDMORT	C2E05	CCF	100	CCF-100-E5-M14	14	56	1.35	Covered in fungus
HDMORT	C2E05	CCF	100	CCF-100-E5-M15	15	49	0.98	Covered in fungus
HDMORT	C4E06	CCF	300	CCF-300-E6-M1	1	53	1.40	
HDMORT	C4E06	CCF	300	CCF-300-E6-M2	2	54	1.53	
TERMIN	C1E01	CCF	200	CCF-200-E1-T1	1	59	1.55	
TERMIN	C1E01	CCF	200	CCF-200-E1-T2	2	56	1.37	
TERMIN	C1E01	CCF	200	CCF-200-E1-T3	3	53	1.07	
TERMIN	A2E02	CCF	50	CCF-50-E2-T1	1	61	1.82	
TERMIN	A2E02	CCF	50	CCF-50-E2-T2	2	53	1.18	
TERMIN	A2E02	CCF	50	CCF-50-E2-T3	3	61	1.81	
TERMIN	A2E02	CCF	50	CCF-50-E2-T4	4	46	0.66	
TERMIN	A2E02	CCF	50	CCF-50-E2-T5	5	66	2.19	
TERMIN	A2E02	CCF	50	CCF-50-E2-T6	6	65	2.27	
TERMIN	A2E02	CCF	50	CCF-50-E2-T7	7	64	2.13	
TERMIN	A2E02	CCF	50	CCF-50-E2-T8	8	69	2.56	
TERMIN	A2E02	CCF	50	CCF-50-E2-T9	9	65	2.28	
TERMIN	A2E02	CCF	50	CCF-50-E2-T10	10	66	2.14	
TERMIN	A2E02	CCF	50	CCF-50-E2-T11	11	59	1.71	
TERMIN	A2E02	CCF	50	CCF-50-E2-T12	12	65	2.10	
TERMIN	A2E02	CCF	50	CCF-50-E2-T13	13	64	2.17	
TERMIN	A2E02	CCF	50	CCF-50-E2-T14	14	58	1.66	
TERMIN	A2E02	CCF	50	CCF-50-E2-T15	15	58	1.64	
TERMIN	A2E02	CCF	50	CCF 50 E2-T16	16	61	1.91	
TERMIN	A2E02	CCF	50	CCF-50-E2-T17	17	57	1.75	
TERMIN	A2E02	CCF	50	CCF-50-E2-T18	18	59	1.64	
TERMIN	A2E02	CCF	50	CCF-50-E2-T19	19	63	2.10	
TERMIN	A2E02	CCF	50	CCF-50-E2-T20	20	51	1.06	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T1	1	58	1.59	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T2	2	59	1.69	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T3	3	63	2.11	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T4	4	60	1.82	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T5	5	66	2.16	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T6	6	68	2.02	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T7	7	60	1.91	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T8	8	59	1.62	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T9	9	64	1.95	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T10	10	64	2.19	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T11	11	57	1.53	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T12	12	59	1.75	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T13	13	59	1.75	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T14	14	55	1.43	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T15	15	67	2.45	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T16	16	57	1.52	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T17	17	57	1.47	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T18	18	62	1.80	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T19	19	61	1.92	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T20	20	62	1.89	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T21	21	59	1.77	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T22	22	70	2.90	

Study Number: AFH-12-PSEUDO-03
Lab Notebook #2 (pages 34-44)
Data Source: File Folder: 24D
Forms: 3, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123000
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P121 54G-02 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T23	23	60	1.90	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T24	24	57	1.60	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T25	25	57	1.54	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T26	26	56	1.39	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T27	27	59	1.65	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T28	28	53	1.29	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T29	29	55	1.42	
TERMIN	B5E03	CCF	0	CCF-CONTROL-E3-T30	30	64	2.13	
TERMIN	B4E04	CCF	50	CCF-50-E4-T1	1	60	1.71	
TERMIN	B4E04	CCF	50	CCF-50-E4-T2	2	63	1.84	
TERMIN	B4E04	CCF	50	CCF-50-E4-T3	3	64	2.14	
TERMIN	B4E04	CCF	50	CCF-50-E4-T4	4	56	1.51	
TERMIN	B4E04	CCF	50	CCF-50-E4-T5	5	56	1.52	
TERMIN	B4E04	CCF	50	CCF-50-E4-T6	6	66	2.26	
TERMIN	B4E04	CCF	50	CCF-50-E4-T7	7	67	1.76	
TERMIN	B4E04	CCF	50	CCF-50-E4-T8	8	54	1.31	
TERMIN	B4E04	CCF	50	CCF-50-E4-T9	9	58	1.48	
TERMIN	B4E04	CCF	50	CCF-50-E4-T10	10	58	1.65	
TERMIN	B4E04	CCF	50	CCF-50-E4-T11	11	63	1.95	
TERMIN	B4E04	CCF	50	CCF-50-E4-T12	12	56	1.17	
TERMIN	B4E04	CCF	50	CCF-50-E4-T13	13	61	1.77	
TERMIN	B4E04	CCF	50	CCF-50-E4-T14	14	58	1.53	
TERMIN	B4E04	CCF	50	CCF-50-E4-T15	15	56	1.50	
TERMIN	B4E04	CCF	50	CCF-50-E4-T16	16	61	1.96	
TERMIN	B4E04	CCF	50	CCF-50-E4-T17	17	59	1.64	
TERMIN	B4E04	CCF	50	CCF-50-E4-T18	18	53	1.30	
TERMIN	B4E04	CCF	50	CCF-50-E4-T19	19	60	1.74	
TERMIN	B4E04	CCF	50	CCF-50-E4-T20	20	53	1.16	
TERMIN	C2E05	CCF	100	CCF-100-E5-T1	1	53	1.20	
TERMIN	C2E05	CCF	100	CCF-100-E5-T2	2	56	1.34	
TERMIN	C2E05	CCF	100	CCF-100-E5-T3	3	57	1.65	
TERMIN	C2E05	CCF	100	CCF-100-E5-T4	4	55	1.30	
TERMIN	C2E05	CCF	100	CCF-100-E5-T5	5	59	1.52	
TERMIN	B3E07	CCF	100	CCF-100-E7-T1	1	60	1.74	
TERMIN	B3E07	CCF	100	CCF-100-E7-T2	2	57	1.51	
TERMIN	B3E07	CCF	100	CCF-100-E7-T3	3	57	1.46	
TERMIN	B3E07	CCF	100	CCF-100-E7-T4	4	58	1.54	
TERMIN	B3E07	CCF	100	CCF-100-E7-T5	5	59	1.36	
TERMIN	B3E07	CCF	100	CCF-100-E7-T6	6	56	1.41	
TERMIN	B3E07	CCF	100	CCF-100-E7-T7	7	56	1.50	
TERMIN	B3E07	CCF	100	CCF-100-E7-T8	8	53	1.22	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T1	1	67	2.05	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T2	2	66	2.42	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T3	3	64	2.18	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T4	4	61	1.89	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T5	5	67	2.52	
TERMIN	A4E08	CCF	0	CCF CONTROL E8 T6	6	57	1.71	
TERMIN	A4E08	CCF	0	CCF CONTROL E8 T7	7	56	1.34	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T8	8	61	1.84	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T9	9	57	1.56	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T10	10	61	1.92	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T11	11	56	1.52	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T12	12	53	1.19	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T13	13	70	2.86	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T14	14	58	1.57	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T15	15	59	1.66	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T16	16	62	2.01	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T17	17	61	2.08	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T18	18	64	2.09	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T19	19	51	1.02	
TERMIN	A4E08	CCF	0	CCF-CONTROL-E8-T20	20	64	2.33	
TERMIN	A5E09	CCF	100	CCF-100-E9-T1	1	59	1.61	
TERMIN	A5E09	CCF	100	CCF-100-E9-T2	2	65	2.15	
TERMIN	A5E09	CCF	100	CCF-100-E9-T3	3	57	1.52	
TERMIN	A5E09	CCF	100	CCF-100-E9-T4	4	59	1.54	
TERMIN	A5E09	CCF	100	CCF-100-E9-T5	5	53	1.21	
TERMIN	A5E09	CCF	100	CCF-100-E9-T6	6	59	1.60	
TERMIN	A5E09	CCF	100	CCF-100-E9-T7	7	62	1.71	
TERMIN	A5E09	CCF	100	CCF-100-E9-T8	8	66	2.14	
TERMIN	A5E09	CCF	100	CCF-100-E9-T9	9	59	1.70	
TERMIN	A5E09	CCF	100	CCF-100-E9-T10	10	56	1.42	
TERMIN	A5E09	CCF	100	CCF-100-E9-T11	11	63	2.10	
TERMIN	A5E09	CCF	100	CCF-100-E9-T12	12	58	1.54	
TERMIN	A5E09	CCF	100	CCF-100-E9-T13	13	50	0.84	

Item Number 1
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Study Number: AEH-12-PSEUDO-03
Lab Notebook #2 (pages 34-44)
Data Source: File Folder: 24D
Forms: 3, 3a

Fish species: Channel Catfish (*Ictalurus punctatus*) Lot number: 123003
Test Chemical: *Pseudomonas fluorescens Pf*-CL 145A (SDP) Chemical lot #: 401P12154G-02 #2
Exposure Date: 9/26/2012

Fish Length Summary

Sample Time	Diluter/holding chamber	Species	Treatment Level	Sample ID	Fish #	Total Length (mm)	Weight (g)	Comments
TERMIN	A5E09	CCF	100	CCF-100-E9-T14	14	55	1.86	
TERMIN	A5E09	CCF	100	CCF-100-E9-T15	15	56	1.48	
TERMIN	A5E09	CCF	100	CCF-100-E9-T16	16	54	1.19	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T1	1	61	1.92	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T2	2	60	1.74	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T3	3	60	1.77	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T4	4	65	2.17	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T5	5	56	1.57	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T6	6	61	1.83	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T7	7	57	1.44	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T8	8	66	2.34	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T9	9	54	1.28	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T10	10	67	2.39	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T11	11	64	2.32	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T12	12	65	2.21	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T13	13	55	1.69	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T14	14	54	1.24	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T15	15	55	1.72	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T16	16	63	2.05	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T17	17	60	1.82	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T18	18	54	1.30	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T19	19	60	1.72	
TERMIN	C3E10	CCF	0	CCF-CONTROL-E10-T20	20	56	1.38	
TERMIN	C5E11	CCF	50	CCF-50-E11-T1	1	69	2.01	
TERMIN	C5E11	CCF	50	CCF-50-E11-T2	2	63	1.95	
TERMIN	C5E11	CCF	50	CCF-50-E11-T3	3	60	1.98	
TERMIN	C5E11	CCF	50	CCF-50-E11-T4	4	54	1.29	
TERMIN	C5E11	CCF	50	CCF-50-E11-T5	5	57	1.59	
TERMIN	C5E11	CCF	50	CCF-50-E11-T6	6	60	1.80	
TERMIN	C5E11	CCF	50	CCF-50-E11-T7	7	63	2.06	
TERMIN	C5E11	CCF	50	CCF-50-E11-T8	8	55	1.39	
TERMIN	C5E11	CCF	50	CCF-50-E11-T9	9	56	1.36	
TERMIN	C5E11	CCF	50	CCF-50-E11-T10	10	57	1.62	
TERMIN	C5E11	CCF	50	CCF-50-E11-T11	11	55	1.48	
TERMIN	C5E11	CCF	50	CCF-50-E11-T12	12	56	1.45	
TERMIN	C5E11	CCF	50	CCF-50-E11-T13	13	58	1.64	
TERMIN	C5E11	CCF	50	CCF-50-E11-T14	14	56	1.44	
TERMIN	C5E11	CCF	50	CCF-50-E11-T15	15	54	1.27	
TERMIN	C5E11	CCF	50	CCF-50-E11-T16	16	53	1.28	
TERMIN	C5E11	CCF	50	CCF-50-E11-T17	17	61	1.79	
TERMIN	C5E11	CCF	50	CCF-50-E11-T18	18	62	1.87	
TERMIN	C5E11	CCF	50	CCF-50-E11-T19	19	57	1.65	
TERMIN	C5E11	CCF	50	CCF-50-E11-T20	20	63	2.07	
TERMIN	B2E12	CCF	200	CCF-200-E12-T1	1	54	1.37	
TERMIN	A3E13	CCF	200	CCF-200-E13-T1	1	55	1.33	

File Folder: 24d

Item Number 1
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Study Number: AEH-12-PSEUDO-03	Action	Date	Initials
Lab Notebook #1 and 2 (See individual species for page numbers)	Created.....	4/25/2013	KLW
Data Source: File Folder: 16C to 24C and 16D to 24D	Revised.....	3/20/2015	KLW
Forms: 3, 11, 11a	Reviewed...	[illegible]	
	Certified.....	3/25/15	

File Name: I:\AEH-12-PSEUDO-03\Data\Data Summaries\[AEH-12-PSEUDO-03 Mortality Data (3-20-2015).xlsx]Summary for SAS

Mortality Data - All Fish Species; SAS Input File

Species: Rainbow Trout (*Oncorhynchus mykiss* ; Lot number 116000)
Yellow Perch (*Perca flavescens;* Lot number 113000)
Walleye (*Sander vitreus* ; Lot number 112100)
Coaster Brook Trout (*Salvelinus fontinalis* ; Lot number 120300)
Largemouth Bass (*Micropterus salmoides* ; Lot number 114000)
Smallmouth Bass (*Micropterus dolomieu* ; Lot number 112400)
Bluegill (*Lepomis macrochirus* ; Lot number 114500)
Lake Sturgeon (*Acipenser fulvescens* ; Lot number 122300)
Channel Catfish (*Ictalurus punctatus;* Lot number 123000)

Data Source/Explanation:
Form 3 (Fish Length and Weight: Expsoure Termination - Histology Samples) was used to verify "Histo Sample" numbers
Form 3 (Fish Length and Weight: Post-Exposure Termination) was used to verify "Number Remaining" numbers
Form 11 (Daily Mortality and Maintenance - Post Exposure) was used to verify incidental and treatment mortality numbers
Form 11a (Exposure Mortality) was used to verify during exposure treatment mortality numbers ("Exp. Morts")

sps = Species
did = Diluter Chamber ID
hld = Holding Chamber ID
treat = Nominal Treatment Concentration (in mg/L)
conc = Actual Concentration (in mg/L)
time = cumulative mortality time
- 0 = end of exposure period
- 7 = 7 days post-exposure
- 14 = 14 days post-exposure
- 22 = 22 days post-exposure (end of observation period

emort = Exposure period mortalities
ar = number of animals at risk
- Time 0 = all animals in exposure chamber during exposure
- Time 7, 14 and 22 = number at potential risk for entire 22-d period (histo samples and incidental mortalities removed)

hmort = cumulative holding mortality to time period
cmort = cumulative mort (emort + hmort)

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sps	did	hid	treat	conc	time	emort	ar	hmort	cmort
BKT	A1	E12	300	235.2	0	0	25	0	0
BKT	A2	E9	50	36.3	0	0	25	0	0
BKT	A3	E2	100	70.6	0	0	25	0	0
BKT	A4	E13	0	0.2	0	0	25	0	0
BKT	A5	E10	200	161.3	0	0	25	0	0
BKT	B1	E14	300	255.3	0	0	25	0	0
BKT	B2	E6	100	96.0	0	0	25	0	0
BKT	B3	E3	50	43.0	0	0	25	0	0
BKT	B4	E8	200	172.5	0	0	25	0	0
BKT	B5	E7	0	0.0	0	0	25	0	0
BKT	C1	E1	0	-0.4	0	0	25	0	0
BKT	C2	E11	100	73.8	0	0	25	0	0
BKT	C3	E4	300	242.8	0	0	25	0	0
BKT	C4	E15	200	167.0	0	0	25	0	0
BKT	C5	E5	50	41.6	0	0	25	0	0
BKT	A1	E12	300	235.2	7	0	20	0	0
BKT	A2	E9	50	36.3	7	0	20	0	0
BKT	A3	E2	100	70.6	7	0	20	0	0
BKT	A4	E13	0	0.2	7	0	20	0	0
BKT	A5	E10	200	161.3	7	0	19	0	0
BKT	B1	E14	300	255.3	7	0	20	5	5
BKT	B2	E6	100	96.0	7	0	20	0	0
BKT	B3	E3	50	43.0	7	0	20	0	0
BKT	B4	E8	200	172.5	7	0	20	3	3
BKT	B5	E7	0	0.0	7	0	20	0	0
BKT	C1	E1	0	-0.4	7	0	20	0	0
BKT	C2	E11	100	73.8	7	0	20	0	0
BKT	C3	E4	300	242.8	7	0	20	8	8
BKT	C4	E15	200	167.0	7	0	20	0	0
BKT	C5	E5	50	41.6	7	0	20	0	0
BKT	A1	E12	300	235.2	14	0	20	19	19
BKT	A2	E9	50	36.3	14	0	20	0	0
BKT	A3	E2	100	70.6	14	0	20	0	0
BKT	A4	E13	0	0.2	14	0	20	0	0
BKT	A5	E10	200	161.3	14	0	19	5	5
BKT	B1	E14	300	255.3	14	0	20	19	19
BKT	B2	E6	100	96.0	14	0	20	0	0
BKT	B3	E3	50	43.0	14	0	20	0	0
BKT	B4	E8	200	172.5	14	0	20	12	12
BKT	B5	E7	0	0.0	14	0	20	0	0
BKT	C1	E1	0	-0.4	14	0	20	0	0
BKT	C2	E11	100	73.8	14	0	20	0	0
BKT	C3	E4	300	242.8	14	0	20	19	19
BKT	C4	E15	200	167.0	14	0	20	7	7

BKT	C5	E5	50	41.6	14	0	20	0	0
BKT	A1	E12	300	235.2	22	0	20	20	20
BKT	A2	E9	50	36.3	22	0	20	0	0
BKT	A3	E2	100	70.6	22	0	20	5	5
BKT	A4	E13	0	0.2	22	0	20	0	0
BKT	A5	E10	200	161.3	22	0	19	13	13
BKT	B1	E14	300	255.3	22	0	20	20	20
BKT	B2	E6	100	96.0	22	0	20	9	9
BKT	B3	E3	50	43.0	22	0	20	0	0
BKT	B4	E8	200	172.5	22	0	20	17	17
BKT	B5	E7	0	0.0	22	0	20	0	0
BKT	C1	E1	0	-0.4	22	0	20	0	0
BKT	C2	E11	100	73.8	22	0	20	8	8
BKT	C3	E4	300	242.8	22	0	20	20	20
BKT	C4	E15	200	167.0	22	0	20	14	14
BKT	C5	E5	50	41.6	22	0	20	0	0
BLG	A1	E11	0	-0.7	0	0	25	0	0
BLG	A2	E1	100	63.0	0	0	25	0	0
BLG	A3	E2	300	218.2	0	0	25	0	0
BLG	A4	E13	50	34.7	0	0	25	0	0
BLG	A5	E9	200	143.2	0	0	25	0	0
BLG	B1	E15	200	140.3	0	0	25	0	0
BLG	B2	E6	100	77.1	0	0	25	0	0
BLG	B3	E14	0	-0.2	0	0	25	0	0
BLG	B4	E12	50	32.4	0	0	25	0	0
BLG	B5	E8	300	214.4	0	1	25	0	1
BLG	C1	E7	50	36.4	0	0	25	0	0
BLG	C2	E10	0	-0.1	0	0	25	0	0
BLG	C3	E3	300	205.1	0	1	25	0	1
BLG	C4	E4	100	63.6	0	0	25	0	0
BLG	C5	E5	200	130.6	0	0	25	0	0
BLG	A1	E11	0	-0.7	7	0	20	0	0
BLG	A2	E1	100	63.0	7	0	20	0	0
BLG	A3	E2	300	218.2	7	0	20	4	4
BLG	A4	E13	50	34.7	7	0	20	0	0
BLG	A5	E9	200	143.2	7	0	20	2	2
BLG	B1	E15	200	140.3	7	0	20	5	5
BLG	B2	E6	100	77.1	7	0	20	0	0
BLG	B3	E14	0	-0.2	7	0	20	0	0
BLG	B4	E12	50	32.4	7	0	19	0	0
BLG	B5	E8	300	214.4	7	1	20	3	4
BLG	C1	E7	50	36.4	7	0	20	0	0
BLG	C2	E10	0	-0.1	7	0	20	0	0
BLG	C3	E3	300	205.1	7	1	20	3	4
BLG	C4	E4	100	63.6	7	0	20	0	0

BLG	C5	E5	200	130.6	7	0	20	2	2
BLG	A1	E11	0	-0.7	14	0	20	0	0
BLG	A2	E1	100	63.0	14	0	20	0	0
BLG	A3	E2	300	218.2	14	0	20	4	4
BLG	A4	E13	50	34.7	14	0	20	0	0
BLG	A5	E9	200	143.2	14	0	20	2	2
BLG	B1	E15	200	140.3	14	0	20	5	5
BLG	B2	E6	100	77.1	14	0	20	0	0
BLG	B3	E14	0	-0.2	14	0	20	0	0
BLG	B4	E12	50	32.4	14	0	19	0	0
BLG	B5	E8	300	214.4	14	1	20	3	4
BLG	C1	E7	50	36.4	14	0	20	0	0
BLG	C2	E10	0	-0.1	14	0	20	0	0
BLG	C3	E3	300	205.1	14	1	20	3	4
BLG	C4	E4	100	63.6	14	0	20	0	0
BLG	C5	E5	200	130.6	14	0	20	2	2
BLG	A1	E11	0	-0.7	22	0	20	0	0
BLG	A2	E1	100	63.0	22	0	20	0	0
BLG	A3	E2	300	218.2	22	0	20	4	4
BLG	A4	E13	50	34.7	22	0	20	0	0
BLG	A5	E9	200	143.2	22	0	20	2	2
BLG	B1	E15	200	140.3	22	0	20	5	5
BLG	B2	E6	100	77.1	22	0	20	0	0
BLG	B3	E14	0	-0.2	22	0	20	0	0
BLG	B4	E12	50	32.4	22	0	19	0	0
BLG	B5	E8	300	214.4	22	1	20	3	4
BLG	C1	E7	50	36.4	22	0	20	0	0
BLG	C2	E10	0	-0.1	22	0	20	0	0
BLG	C3	E3	300	205.1	22	1	20	3	4
BLG	C4	E4	100	63.6	22	0	20	0	0
BLG	C5	E5	200	130.6	22	0	20	2	2
CCF	A1	E15	300	183.2	0	23	25	0	23
CCF	A2	E2	50	26.1	0	0	25	0	0
CCF	A3	E13	200	119.8	0	0	25	0	0
CCF	A4	E8	0	-1.3	0	0	25	0	0
CCF	A5	E9	100	49.9	0	1	25	0	1
CCF	B1	E14	300	193.9	0	11	15	0	11
CCF	B2	E12	200	127.8	0	1	25	0	1
CCF	B3	E7	100	65.6	0	1	25	0	1
CCF	B4	E4	50	27.4	0	1	26	0	1
CCF	B5	E3	0	-1.5	0	0	35	0	0
CCF	C1	E1	200	122.9	0	0	25	0	0
CCF	C2	E5	100	62.3	0	0	25	0	0
CCF	C3	E10	0	0.5	0	0	25	0	0
CCF	C4	E6	300	200.5	0	23	25	0	23

CCF	C5	E11	50	37.3	0	0	25	0	0
CCF	A1	E15	300	183.2	7	23	25	2	25
CCF	A2	E2	50	26.1	7	0	20	0	0
CCF	A3	E13	200	119.8	7	0	20	4	4
CCF	A4	E8	0	-1.3	7	0	20	0	0
CCF	A5	E9	100	49.9	7	1	20	1	2
CCF	B1	E14	300	193.9	7	11	15	3	14
CCF	B2	E12	200	127.8	7	1	20	6	7
CCF	B3	E7	100	65.6	7	1	19	2	3
CCF	B4	E4	50	27.4	7	1	21	0	1
CCF	B5	E3	0	-1.5	7	0	30	0	0
CCF	C1	E1	200	122.9	7	0	20	0	0
CCF	C2	E5	100	62.3	7	0	20	3	3
CCF	C3	E10	0	0.5	7	0	20	0	0
CCF	C4	E6	300	200.5	7	23	25	2	25
CCF	C5	E11	50	37.3	7	0	20	0	0
CCF	A1	E15	300	183.2	14	23	25	2	25
CCF	A2	E2	50	26.1	14	0	20	0	0
CCF	A3	E13	200	119.8	14	0	20	19	19
CCF	A4	E8	0	-1.3	14	0	20	0	0
CCF	A5	E9	100	49.9	14	1	20	3	4
CCF	B1	E14	300	193.9	14	11	15	4	15
CCF	B2	E12	200	127.8	14	1	20	18	19
CCF	B3	E7	100	65.6	14	1	19	10	11
CCF	B4	E4	50	27.4	14	1	21	0	1
CCF	B5	E3	0	-1.5	14	0	30	0	0
CCF	C1	E1	200	122.9	14	0	20	12	12
CCF	C2	E5	100	62.3	14	0	20	15	15
CCF	C3	E10	0	0.5	14	0	20	0	0
CCF	C4	E6	300	200.5	14	23	25	2	25
CCF	C5	E11	50	37.3	14	0	20	0	0
CCF	A1	E15	300	183.2	22	23	25	2	25
CCF	A2	E2	50	26.1	22	0	20	0	0
CCF	A3	E13	200	119.8	22	0	20	19	19
CCF	A4	E8	0	-1.3	22	0	20	0	0
CCF	A5	E9	100	49.9	22	1	20	3	4
CCF	B1	E14	300	193.9	22	11	15	4	15
CCF	B2	E12	200	127.8	22	1	20	18	19
CCF	B3	E7	100	65.6	22	1	19	10	11
CCF	B4	E4	50	27.4	22	1	21	0	1
CCF	B5	E3	0	-1.5	22	0	30	0	0
CCF	C1	E1	200	122.9	22	0	20	17	17
CCF	C2	E5	100	62.3	22	0	20	15	15
CCF	C3	E10	0	0.5	22	0	20	0	0
CCF	C4	E6	300	200.5	22	23	25	2	25

CCF	C5	E11	50	37.3	22	0	20	0	0
LMB	A1	E11	200	148.8	0	3	25	0	3
LMB	A2	E7	300	225.7	0	16	25	0	16
LMB	A3	E12	0	-0.6	0	0	25	0	0
LMB	A4	E6	100	64.2	0	1	25	0	1
LMB	A5	E10	50	33.3	0	0	25	0	0
LMB	B1	E15	50	37.0	0	0	25	0	0
LMB	B2	E13	100	87.8	0	0	25	0	0
LMB	B3	E14	0	-0.1	0	0	25	0	0
LMB	B4	E5	300	249.2	0	20	25	0	20
LMB	B5	E3	200	165.2	0	10	25	0	10
LMB	C1	E9	300	251.6	0	23	25	0	23
LMB	C2	E4	50	40.7	0	0	25	0	0
LMB	C3	E1	100	74.0	0	0	25	0	0
LMB	C4	E8	0	-0.2	0	0	25	0	0
LMB	C5	E2	200	165.7	0	6	24	0	6
LMB	A1	E11	200	148.8	7	3	20	3	6
LMB	A2	E7	300	225.7	7	16	25	4	20
LMB	A3	E12	0	-0.6	7	0	20	0	0
LMB	A4	E6	100	64.2	7	1	20	1	2
LMB	A5	E10	50	33.3	7	0	20	0	0
LMB	B1	E15	50	37.0	7	0	20	0	0
LMB	B2	E13	100	87.8	7	0	20	1	1
LMB	B3	E14	0	-0.1	7	0	20	0	0
LMB	B4	E5	300	249.2	7	20	25	3	23
LMB	B5	E3	200	165.2	7	10	22	0	10
LMB	C1	E9	300	251.6	7	23	25	1	24
LMB	C2	E4	50	40.7	7	0	19	0	0
LMB	C3	E1	100	74.0	7	0	20	0	0
LMB	C4	E8	0	-0.2	7	0	20	0	0
LMB	C5	E2	200	165.7	7	6	20	2	8
LMB	A1	E11	200	148.8	14	3	20	3	6
LMB	A2	E7	300	225.7	14	16	25	4	20
LMB	A3	E12	0	-0.6	14	0	20	0	0
LMB	A4	E6	100	64.2	14	1	20	1	2
LMB	A5	E10	50	33.3	14	0	20	0	0
LMB	B1	E15	50	37.0	14	0	20	0	0
LMB	B2	E13	100	87.8	14	0	20	1	1
LMB	B3	E14	0	-0.1	14	0	20	0	0
LMB	B4	E5	300	249.2	14	20	25	3	23
LMB	B5	E3	200	165.2	14	10	22	0	10
LMB	C1	E9	300	251.6	14	23	25	1	24
LMB	C2	E4	50	40.7	14	0	19	0	0
LMB	C3	E1	100	74.0	14	0	20	0	0
LMB	C4	E8	0	-0.2	14	0	20	0	0

LMB	C5	E2	200	165.7	14	6	20	2	8
LMB	A1	E11	200	148.8	22	3	20	3	6
LMB	A2	E7	300	225.7	22	16	25	4	20
LMB	A3	E12	0	-0.6	22	0	20	0	0
LMB	A4	E6	100	64.2	22	1	20	1	2
LMB	A5	E10	50	33.3	22	0	20	0	0
LMB	B1	E15	50	37.0	22	0	20	0	0
LMB	B2	E13	100	87.8	22	0	20	1	1
LMB	B3	E14	0	-0.1	22	0	20	0	0
LMB	B4	E5	300	249.2	22	20	25	3	23
LMB	B5	E3	200	165.2	22	10	22	0	10
LMB	C1	E9	300	251.6	22	23	25	1	24
LMB	C2	E4	50	40.7	22	0	19	0	0
LMB	C3	E1	100	74.0	22	0	20	0	0
LMB	C4	E8	0	-0.2	22	0	20	0	0
LMB	C5	E2	200	165.7	22	6	20	2	8
LST	A1	G7	100	67.8	0	0	25	0	0
LST	A2	G13	200	153.2	0	5	25	0	5
LST	A3	G3	300	226.1	0	12	25	0	12
LST	A4	G4	0	-0.4	0	0	25	0	0
LST	A5	G6	50	33.0	0	0	25	0	0
LST	B1	G9	300	221.4	0	6	25	0	6
LST	B2	G1	100	77.9	0	0	25	0	0
LST	B3	G2	50	32.7	0	0	25	0	0
LST	B4	G15	200	150.1	0	4	25	0	4
LST	B5	G8	0	-0.5	0	0	25	0	0
LST	C1	G5	50	42.4	0	0	25	0	0
LST	C2	G12	200	146.2	0	2	25	0	2
LST	C3	G14	300	222.1	0	15	25	0	15
LST	C4	G10	0	-0.3	0	0	25	0	0
LST	C5	G11	100	74.5	0	0	25	0	0
LST	A1	G7	100	67.8	7	0	20	2	2
LST	A2	G13	200	153.2	7	5	21	13	18
LST	A3	G3	300	226.1	7	12	22	10	22
LST	A4	G4	0	-0.4	7	0	20	0	0
LST	A5	G6	50	33.0	7	0	20	0	0
LST	B1	G9	300	221.4	7	6	21	15	21
LST	B2	G1	100	77.9	7	0	20	4	4
LST	B3	G2	50	32.7	7	0	20	0	0
LST	B4	G15	200	150.1	7	4	20	15	19
LST	B5	G8	0	-0.5	7	0	20	0	0
LST	C1	G5	50	42.4	7	0	20	0	0
LST	C2	G12	200	146.2	7	2	20	15	17
LST	C3	G14	300	222.1	7	15	25	10	25
LST	C4	G10	0	-0.3	7	0	20	0	0

LST	C5	G11	100	74.5	7	0	20	6	6
LST	A1	G7	100	67.8	14	0	20	19	19
LST	A2	G13	200	153.2	14	5	21	15	20
LST	A3	G3	300	226.1	14	12	22	10	22
LST	A4	G4	0	-0.4	14	0	20	0	0
LST	A5	G6	50	33.0	14	0	20	13	13
LST	B1	G9	300	221.4	14	6	21	15	21
LST	B2	G1	100	77.9	14	0	20	19	19
LST	B3	G2	50	32.7	14	0	20	7	7
LST	B4	G15	200	150.1	14	4	20	16	20
LST	B5	G8	0	-0.5	14	0	20	0	0
LST	C1	G5	50	42.4	14	0	20	13	13
LST	C2	G12	200	146.2	14	2	20	18	20
LST	C3	G14	300	222.1	14	15	25	10	25
LST	C4	G10	0	-0.3	14	0	20	0	0
LST	C5	G11	100	74.5	14	0	20	18	18
LST	A1	G7	100	67.8	22	0	20	20	20
LST	A2	G13	200	153.2	22	5	21	15	20
LST	A3	G3	300	226.1	22	12	22	10	22
LST	A4	G4	0	-0.4	22	0	20	0	0
LST	A5	G6	50	33.0	22	0	20	19	19
LST	B1	G9	300	221.4	22	6	21	15	21
LST	B2	G1	100	77.9	22	0	20	20	20
LST	B3	G2	50	32.7	22	0	20	16	16
LST	B4	G15	200	150.1	22	4	20	16	20
LST	B5	G8	0	-0.5	22	0	20	0	0
LST	C1	G5	50	42.4	22	0	20	18	18
LST	C2	G12	200	146.2	22	2	20	18	20
LST	C3	G14	300	222.1	22	15	25	10	25
LST	C4	G10	0	-0.3	22	0	20	0	0
LST	C5	G11	100	74.5	22	0	20	20	20
RBT	A1	E11	0	-3.0	0	0	25	0	0
RBT	A2	E10	50	31.8	0	0	25	0	0
RBT	A3	E15	200	134.0	0	0	25	0	0
RBT	A4	E14	300	197.3	0	0	25	0	0
RBT	A5	E12	100	59.6	0	0	25	0	0
RBT	B1	E5	100	77.8	0	0	25	0	0
RBT	B2	E3	0	-2.5	0	0	25	0	0
RBT	B3	E4	200	136.1	0	0	25	0	0
RBT	B4	E8	300	198.0	0	0	25	0	0
RBT	B5	E1	50	34.7	0	0	25	0	0
RBT	C1	E9	100	59.2	0	0	25	0	0
RBT	C2	E6	50	31.9	0	0	19	0	0
RBT	C3	E7	200	134.9	0	0	30	0	0
RBT	C4	E13	0	-1.8	0	0	25	0	0

RBT	C5	E2	300	199.8	0	1	25	0	1
RBT	A1	E11	0	-3.0	7	0	20	0	0
RBT	A2	E10	50	31.8	7	0	20	2	2
RBT	A3	E15	200	134.0	7	0	20	10	10
RBT	A4	E14	300	197.3	7	0	20	16	16
RBT	A5	E12	100	59.6	7	0	20	1	1
RBT	B1	E5	100	77.8	7	0	20	2	2
RBT	B2	E3	0	-2.5	7	0	20	0	0
RBT	B3	E4	200	136.1	7	0	20	10	10
RBT	B4	E8	300	198.0	7	0	20	16	16
RBT	B5	E1	50	34.7	7	0	20	0	0
RBT	C1	E9	100	59.2	7	0	20	1	1
RBT	C2	E6	50	31.9	7	0	15	0	0
RBT	C3	E7	200	134.9	7	0	25	15	15
RBT	C4	E13	0	-1.8	7	0	20	0	0
RBT	C5	E2	300	199.8	7	1	21	15	16
RBT	A1	E11	0	-3.0	14	0	20	0	0
RBT	A2	E10	50	31.8	14	0	20	5	5
RBT	A3	E15	200	134.0	14	0	20	17	17
RBT	A4	E14	300	197.3	14	0	20	20	20
RBT	A5	E12	100	59.6	14	0	20	13	13
RBT	B1	E5	100	77.8	14	0	20	11	11
RBT	B2	E3	0	-2.5	14	0	20	0	0
RBT	B3	E4	200	136.1	14	0	20	18	18
RBT	B4	E8	300	198.0	14	0	20	20	20
RBT	B5	E1	50	34.7	14	0	20	10	10
RBT	C1	E9	100	59.2	14	0	20	6	6
RBT	C2	E6	50	31.9	14	0	15	4	4
RBT	C3	E7	200	134.9	14	0	25	24	24
RBT	C4	E13	0	-1.8	14	0	20	0	0
RBT	C5	E2	300	199.8	14	1	21	18	19
RBT	A1	E11	0	-3.0	22	0	20	0	0
RBT	A2	E10	50	31.8	22	0	20	11	11
RBT	A3	E15	200	134.0	22	0	20	20	20
RBT	A4	E14	300	197.3	22	0	20	20	20
RBT	A5	E12	100	59.6	22	0	20	20	20
RBT	B1	E5	100	77.8	22	0	20	16	16
RBT	B2	E3	0	-2.5	22	0	20	0	0
RBT	B3	E4	200	136.1	22	0	20	20	20
RBT	B4	E8	300	198.0	22	0	20	20	20
RBT	B5	E1	50	34.7	22	0	20	17	17
RBT	C1	E9	100	59.2	22	0	20	19	19
RBT	C2	E6	50	31.9	22	0	15	13	13
RBT	C3	E7	200	134.9	22	0	25	25	25
RBT	C4	E13	0	-1.8	22	0	20	0	0

RBT	C5	E2	300	199.8	22	1	21	20	21
SMB	A1	D1	100	62.6	0	0	25	0	0
SMB	A2	D6	0	0.0	0	0	25	0	0
SMB	A3	D3	50	32.2	0	0	25	0	0
SMB	A5	D9	300	223.6	0	15	24	0	15
SMB	B1	D15	0	0.0	0	0	25	0	0
SMB	B2	D5	200	142.0	0	0	25	0	0
SMB	B3	D4	100	74.1	0	0	25	0	0
SMB	B4	D14	300	214.1	0	18	25	0	18
SMB	B5	D8	50	30.6	0	0	25	0	0
SMB	C1	D7	0	0.0	0	0	25	0	0
SMB	C2	D11	100	63.0	0	0	25	0	0
SMB	C3	D2	50	37.5	0	0	25	0	0
SMB	C4	D13	300	205.9	0	10	25	0	10
SMB	C5	D12	200	127.5	0	12	25	0	12
SMB	A1	D1	100	62.6	7	0	19	0	0
SMB	A2	D6	0	0.0	7	0	20	0	0
SMB	A3	D3	50	32.2	7	0	20	1	1
SMB	A5	D9	300	223.6	7	15	24	5	20
SMB	B1	D15	0	0.0	7	0	20	0	0
SMB	B2	D5	200	142.0	7	0	20	2	2
SMB	B3	D4	100	74.1	7	0	20	0	0
SMB	B4	D14	300	214.1	7	18	25	5	23
SMB	B5	D8	50	30.6	7	0	20	0	0
SMB	C1	D7	0	0.0	7	0	20	0	0
SMB	C2	D11	100	63.0	7	0	19	0	0
SMB	C3	D2	50	37.5	7	0	20	0	0
SMB	C4	D13	300	205.9	7	10	22	4	14
SMB	C5	D12	200	127.5	7	12	22	0	12
SMB	A1	D1	100	62.6	14	0	19	0	0
SMB	A2	D6	0	0.0	14	0	20	0	0
SMB	A3	D3	50	32.2	14	0	20	1	1
SMB	A5	D9	300	223.6	14	15	24	5	20
SMB	B1	D15	0	0.0	14	0	20	0	0
SMB	B2	D5	200	142.0	14	0	20	3	3
SMB	B3	D4	100	74.1	14	0	20	0	0
SMB	B4	D14	300	214.1	14	18	25	5	23
SMB	B5	D8	50	30.6	14	0	20	0	0
SMB	C1	D7	0	0.0	14	0	20	0	0
SMB	C2	D11	100	63.0	14	0	19	2	2
SMB	C3	D2	50	37.5	14	0	20	0	0
SMB	C4	D13	300	205.9	14	10	22	4	14
SMB	C5	D12	200	127.5	14	12	22	0	12
SMB	A1	D1	100	62.6	22	0	19	0	0
SMB	A2	D6	0	0.0	22	0	20	0	0

SMB	A3	D3	50	32.2	22	0	20	2	2
SMB	A5	D9	300	223.6	22	15	24	6	21
SMB	B1	D15	0	0.0	22	0	20	0	0
SMB	B2	D5	200	142.0	22	0	20	3	3
SMB	B3	D4	100	74.1	22	0	20	1	1
SMB	B4	D14	300	214.1	22	18	25	6	24
SMB	B5	D8	50	30.6	22	0	20	0	0
SMB	C1	D7	0	0.0	22	0	20	0	0
SMB	C2	D11	100	63.0	22	0	19	3	3
SMB	C3	D2	50	37.5	22	0	20	0	0
SMB	C4	D13	300	205.9	22	10	22	4	14
SMB	C5	D12	200	127.5	22	12	22	0	12
WAE	A1	F12	200	148.7	0	1	25	0	1
WAE	A2	F10	0	-0.9	0	0	25	0	0
WAE	A3	F11	300	220.4	0	5	25	0	5
WAE	A4	F9	100	64.6	0	0	25	0	0
WAE	A5	F1	50	35.8	0	1	25	0	1
WAE	B1	F7	200	150.6	0	1	25	0	1
WAE	B2	F15	50	33.6	0	0	25	0	0
WAE	B3	F4	100	82.0	0	0	35	0	0
WAE	B4	F6	300	223.6	0	4	15	0	4
WAE	B5	F14	0	-0.8	0	0	25	0	0
WAE	C1	F2	300	219.5	0	4	25	0	4
WAE	C2	F5	200	148.5	0	1	25	0	1
WAE	C3	F13	0	-0.8	0	0	25	0	0
WAE	C4	F3	100	66.3	0	0	25	0	0
WAE	C5	F8	50	37.6	0	0	25	0	0
WAE	A1	F12	200	148.7	7	1	20	5	6
WAE	A2	F10	0	-0.9	7	0	20	0	0
WAE	A3	F11	300	220.4	7	5	21	8	13
WAE	A4	F9	100	64.6	7	0	20	4	4
WAE	A5	F1	50	35.8	7	1	20	1	2
WAE	B1	F7	200	150.6	7	1	20	3	4
WAE	B2	F15	50	33.6	7	0	20	0	0
WAE	B3	F4	100	82.0	7	0	30	2	2
WAE	B4	F6	300	223.6	7	4	12	6	10
WAE	B5	F14	0	-0.8	7	0	19	0	0
WAE	C1	F2	300	219.5	7	4	20	9	13
WAE	C2	F5	200	148.5	7	1	20	6	7
WAE	C3	F13	0	-0.8	7	0	20	0	0
WAE	C4	F3	100	66.3	7	0	20	2	2
WAE	C5	F8	50	37.6	7	0	20	0	0
WAE	A1	F12	200	148.7	14	1	20	5	6
WAE	A2	F10	0	-0.9	14	0	20	0	0
WAE	A3	F11	300	220.4	14	5	21	8	13

WAE	A4	F9	100	64.6	14	0	20	4	4
WAE	A5	F1	50	35.8	14	1	20	1	2
WAE	B1	F7	200	150.6	14	1	20	4	5
WAE	B2	F15	50	33.6	14	0	20	0	0
WAE	B3	F4	100	82.0	14	0	30	3	3
WAE	B4	F6	300	223.6	14	4	12	6	10
WAE	B5	F14	0	-0.8	14	0	19	0	0
WAE	C1	F2	300	219.5	14	4	20	10	14
WAE	C2	F5	200	148.5	14	1	20	7	8
WAE	C3	F13	0	-0.8	14	0	20	0	0
WAE	C4	F3	100	66.3	14	0	20	3	3
WAE	C5	F8	50	37.6	14	0	20	0	0
WAE	A1	F12	200	148.7	22	1	20	5	6
WAE	A2	F10	0	-0.9	22	0	20	0	0
WAE	A3	F11	300	220.4	22	5	21	8	13
WAE	A4	F9	100	64.6	22	0	20	5	5
WAE	A5	F1	50	35.8	22	1	20	1	2
WAE	B1	F7	200	150.6	22	1	20	4	5
WAE	B2	F15	50	33.6	22	0	20	0	0
WAE	B3	F4	100	82.0	22	0	30	3	3
WAE	B4	F6	300	223.6	22	4	12	6	10
WAE	B5	F14	0	-0.8	22	0	19	0	0
WAE	C1	F2	300	219.5	22	4	20	10	14
WAE	C2	F5	200	148.5	22	1	20	7	8
WAE	C3	F13	0	-0.8	22	0	20	1	1
WAE	C4	F3	100	66.3	22	0	20	3	3
WAE	C5	F8	50	37.6	22	0	20	0	0
YEP	A1	G6	300	219.7	0	6	25	0	6
YEP	A2	G9	100	67.2	0	0	25	0	0
YEP	A3	G1	50	35.9	0	1	25	0	1
YEP	A4	G8	0	0.4	0	0	25	0	0
YEP	A5	G10	200	145.1	0	5	25	0	5
YEP	B1	G14	50	31.0	0	1	25	0	1
YEP	B2	G12	200	134.7	0	6	25	0	6
YEP	B3	G5	0	-0.5	0	0	25	0	0
YEP	B4	G2	100	71.2	0	1	25	0	1
YEP	B5	G7	300	201.7	0	12	25	0	12
YEP	C1	G4	0	0.8	0	0	25	0	0
YEP	C2	G11	50	32.6	0	0	25	0	0
YEP	C3	G15	100	59.7	0	0	25	0	0
YEP	C4	G13	300	196.3	0	9	25	0	9
YEP	C5	G3	200	134.7	0	4	25	0	4
YEP	A1	G6	300	219.7	7	6	21	5	11
YEP	A2	G9	100	67.2	7	0	20	1	1
YEP	A3	G1	50	35.9	7	1	20	0	1

YEP	A4	G8	0	0.4	7	0	19	0	0
YEP	A5	G10	200	145.1	7	5	21	2	7
YEP	B1	G14	50	31.0	7	1	20	0	1
YEP	B2	G12	200	134.7	7	6	21	0	6
YEP	B3	G5	0	-0.5	7	0	20	0	0
YEP	B4	G2	100	71.2	7	1	20	1	2
YEP	B5	G7	300	201.7	7	12	22	3	15
YEP	C1	G4	0	0.8	7	0	20	0	0
YEP	C2	G11	50	32.6	7	0	20	0	0
YEP	C3	G15	100	59.7	7	0	20	0	0
YEP	C4	G13	300	196.3	7	9	21	5	14
YEP	C5	G3	200	134.7	7	4	20	0	4
YEP	A1	G6	300	219.7	14	6	21	5	11
YEP	A2	G9	100	67.2	14	0	20	1	1
YEP	A3	G1	50	35.9	14	1	20	0	1
YEP	A4	G8	0	0.4	14	0	19	0	0
YEP	A5	G10	200	145.1	14	5	21	2	7
YEP	B1	G14	50	31.0	14	1	20	0	1
YEP	B2	G12	200	134.7	14	6	21	0	6
YEP	B3	G5	0	-0.5	14	0	20	0	0
YEP	B4	G2	100	71.2	14	1	20	1	2
YEP	B5	G7	300	201.7	14	12	22	3	15
YEP	C1	G4	0	0.8	14	0	20	0	0
YEP	C2	G11	50	32.6	14	0	20	0	0
YEP	C3	G15	100	59.7	14	0	20	0	0
YEP	C4	G13	300	196.3	14	9	21	5	14
YEP	C5	G3	200	134.7	14	4	20	0	4
YEP	A1	G6	300	219.7	22	6	21	5	11
YEP	A2	G9	100	67.2	22	0	20	1	1
YEP	A3	G1	50	35.9	22	1	20	0	1
YEP	A4	G8	0	0.4	22	0	19	0	0
YEP	A5	G10	200	145.1	22	5	21	2	7
YEP	B1	G14	50	31.0	22	1	20	0	1
YEP	B2	G12	200	134.7	22	6	21	0	6
YEP	B3	G5	0	-0.5	22	0	20	0	0
YEP	B4	G2	100	71.2	22	1	20	1	2
YEP	B5	G7	300	201.7	22	12	22	3	15
YEP	C1	G4	0	0.8	22	0	20	0	0
YEP	C2	G11	50	32.6	22	0	20	0	0
YEP	C3	G15	100	59.7	22	0	20	0	0
YEP	C4	G13	300	196.3	22	9	21	5	14
YEP	C5	G3	200	134.7	22	4	20	0	4

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Statistical analysis of fish survival following 24-h flow-through exposure to various concentrations of Pf-CL145A
Study number AEH-12-PSEUDO-03

Obs	sps	did	hid	treat	conc	time	emort	ar	hmort	cmort	per_sur	sur
1	BKT	A4	E13	0	0.2	0	0	25	0	0	100.000	1.01000
2	BKT	B5	E7	0	0.0	0	0	25	0	0	100.000	1.01000
3	BKT	C1	E1	0	-0.4	0	0	25	0	0	100.000	1.01000
4	BKT	A2	E9	50	36.3	0	0	25	0	0	100.000	1.01000
5	BKT	B3	E3	50	43.0	0	0	25	0	0	100.000	1.01000
6	BKT	C5	E5	50	41.6	0	0	25	0	0	100.000	1.01000
7	BKT	A3	E2	100	70.6	0	0	25	0	0	100.000	1.01000
8	BKT	B2	E6	100	96.0	0	0	25	0	0	100.000	1.01000
9	BKT	C2	E11	100	73.8	0	0	25	0	0	100.000	1.01000
10	BKT	A5	E10	200	161.3	0	0	25	0	0	100.000	1.01000
11	BKT	B4	E8	200	172.5	0	0	25	0	0	100.000	1.01000
12	BKT	C4	E15	200	167.0	0	0	25	0	0	100.000	1.01000
13	BKT	A1	E12	300	235.2	0	0	25	0	0	100.000	1.01000
14	BKT	B1	E14	300	255.3	0	0	25	0	0	100.000	1.01000
15	BKT	C3	E4	300	242.8	0	0	25	0	0	100.000	1.01000
16	BKT	A4	E13	0	0.2	7	0	20	0	0	100.000	1.01000
17	BKT	B5	E7	0	0.0	7	0	20	0	0	100.000	1.01000
18	BKT	C1	E1	0	-0.4	7	0	20	0	0	100.000	1.01000
19	BKT	A2	E9	50	36.3	7	0	20	0	0	100.000	1.01000
20	BKT	B3	E3	50	43.0	7	0	20	0	0	100.000	1.01000
21	BKT	C5	E5	50	41.6	7	0	20	0	0	100.000	1.01000
22	BKT	A3	E2	100	70.6	7	0	20	0	0	100.000	1.01000
23	BKT	B2	E6	100	96.0	7	0	20	0	0	100.000	1.01000
24	BKT	C2	E11	100	73.8	7	0	20	0	0	100.000	1.01000
25	BKT	A5	E10	200	161.3	7	0	19	0	0	100.000	1.01000
26	BKT	B4	E8	200	172.5	7	0	20	3	3	85.000	0.86000
27	BKT	C4	E15	200	167.0	7	0	20	0	0	100.000	1.01000
28	BKT	A1	E12	300	235.2	7	0	20	0	0	100.000	1.01000
29	BKT	B1	E14	300	255.3	7	0	20	5	5	75.000	0.76000
30	BKT	C3	E4	300	242.8	7	0	20	8	8	60.000	0.61000
31	BKT	A4	E13	0	0.2	14	0	20	0	0	100.000	1.01000
32	BKT	B5	E7	0	0.0	14	0	20	0	0	100.000	1.01000
33	BKT	C1	E1	0	-0.4	14	0	20	0	0	100.000	1.01000
34	BKT	A2	E9	50	36.3	14	0	20	0	0	100.000	1.01000
35	BKT	B3	E3	50	43.0	14	0	20	0	0	100.000	1.01000

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36	BKT	C5	E5	50	41.6	14	0	20	0	0	100.000	1.01000
37	BKT	A3	E2	100	70.6	14	0	20	0	0	100.000	1.01000
38	BKT	B2	E6	100	96.0	14	0	20	0	0	100.000	1.01000
39	BKT	C2	E11	100	73.8	14	0	20	0	0	100.000	1.01000
40	BKT	A5	E10	200	161.3	14	0	19	5	5	73.684	0.74684
41	BKT	B4	E8	200	172.5	14	0	20	12	12	40.000	0.41000
42	BKT	C4	E15	200	167.0	14	0	20	7	7	65.000	0.66000
43	BKT	A1	E12	300	235.2	14	0	20	19	19	5.000	0.06000
44	BKT	B1	E14	300	255.3	14	0	20	19	19	5.000	0.06000
45	BKT	C3	E4	300	242.8	14	0	20	19	19	5.000	0.06000
46	BKT	A4	E13	0	0.2	22	0	20	0	0	100.000	1.01000
47	BKT	B5	E7	0	0.0	22	0	20	0	0	100.000	1.01000
48	BKT	C1	E1	0	-0.4	22	0	20	0	0	100.000	1.01000
49	BKT	A2	E9	50	36.3	22	0	20	0	0	100.000	1.01000
50	BKT	B3	E3	50	43.0	22	0	20	0	0	100.000	1.01000
51	BKT	C5	E5	50	41.6	22	0	20	0	0	100.000	1.01000
52	BKT	A3	E2	100	70.6	22	0	20	5	5	75.000	0.76000
53	BKT	B2	E6	100	96.0	22	0	20	9	9	55.000	0.56000
54	BKT	C2	E11	100	73.8	22	0	20	8	8	60.000	0.61000
55	BKT	A5	E10	200	161.3	22	0	19	13	13	31.579	0.32579
56	BKT	B4	E8	200	172.5	22	0	20	17	17	15.000	0.16000
57	BKT	C4	E15	200	167.0	22	0	20	14	14	30.000	0.31000
58	BKT	A1	E12	300	235.2	22	0	20	20	20	0.000	0.01000
59	BKT	B1	E14	300	255.3	22	0	20	20	20	0.000	0.01000
60	BKT	C3	E4	300	242.8	22	0	20	20	20	0.000	0.01000
61	BLG	A1	E11	0	-0.7	0	0	25	0	0	100.000	1.01000
62	BLG	B3	E14	0	-0.2	0	0	25	0	0	100.000	1.01000
63	BLG	C2	E10	0	-0.1	0	0	25	0	0	100.000	1.01000
64	BLG	A4	E13	50	34.7	0	0	25	0	0	100.000	1.01000
65	BLG	B4	E12	50	32.4	0	0	25	0	0	100.000	1.01000
66	BLG	C1	E7	50	36.4	0	0	25	0	0	100.000	1.01000
67	BLG	A2	E1	100	83.0	0	0	25	0	0	100.000	1.01000
68	BLG	B2	E6	100	77.1	0	0	25	0	0	100.000	1.01000
69	BLG	C4	E4	100	63.6	0	0	25	0	0	100.000	1.01000
70	BLG	A5	E9	200	143.2	0	0	25	0	0	100.000	1.01000
71	BLG	B1	E15	200	140.3	0	0	25	0	0	100.000	1.01000
72	BLG	C5	E5	200	130.6	0	0	25	0	0	100.000	1.01000
73	BLG	A3	E2	300	218.2	0	0	25	0	0	100.000	1.01000
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	BLG	B5	E8	300	214.4	0	1	25	0	1	96.000	0.97000
75	BLG	C3	E3	300	205.1	0	1	25	0	1	96.000	0.97000
76	BLG	A1	E11	0	-0.7	7	0	20	0	0	100.000	1.01000
77	BLG	B3	E14	0	-0.2	7	0	20	0	0	100.000	1.01000
78	BLG	C2	E10	0	-0.1	7	0	20	0	0	100.000	1.01000
79	BLG	A4	E13	50	34.7	7	0	20	0	0	100.000	1.01000
80	BLG	B4	E12	50	32.4	7	0	19	0	0	100.000	1.01000
81	BLG	C1	E7	50	36.4	7	0	20	0	0	100.000	1.01000
82	BLG	A2	E1	100	63.0	7	0	20	0	0	100.000	1.01000
83	BLG	B2	E6	100	77.1	7	0	20	0	0	100.000	1.01000
84	BLG	C4	E4	100	63.6	7	0	20	0	0	100.000	1.01000
85	BLG	A5	E9	200	143.2	7	0	20	2	2	90.000	0.91000
86	BLG	B1	E15	200	140.3	7	0	20	5	5	75.000	0.76000
87	BLG	C5	E5	200	130.6	7	0	20	2	2	90.000	0.91000
88	BLG	A3	E2	300	218.2	7	0	20	4	4	80.000	0.81000
89	BLG	B5	E8	300	214.4	7	1	20	3	4	80.000	0.81000
90	BLG	C3	E3	300	205.1	7	1	20	3	4	80.000	0.81000
91	BLG	A1	E11	0	-0.7	14	0	20	0	0	100.000	1.01000
92	BLG	B3	E14	0	-0.2	14	0	20	0	0	100.000	1.01000
93	BLG	C2	E10	0	-0.1	14	0	20	0	0	100.000	1.01000
94	BLG	A4	E13	50	34.7	14	0	20	0	0	100.000	1.01000
95	BLG	B4	E12	50	32.4	14	0	19	0	0	100.000	1.01000
96	BLG	C1	E7	50	36.4	14	0	20	0	0	100.000	1.01000
97	BLG	A2	E1	100	63.0	14	0	20	0	0	100.000	1.01000
98	BLG	B2	E6	100	77.1	14	0	20	0	0	100.000	1.01000
99	BLG	C4	E4	100	63.6	14	0	20	0	0	100.000	1.01000
100	BLG	A5	E9	200	143.2	14	0	20	2	2	90.000	0.91000
101	BLG	B1	E15	200	140.3	14	0	20	5	5	75.000	0.76000
102	BLG	C5	E5	200	130.6	14	0	20	2	2	90.000	0.91000
103	BLG	A3	E2	300	218.2	14	0	20	4	4	80.000	0.81000
104	BLG	B5	E8	300	214.4	14	1	20	3	4	80.000	0.81000
105	BLG	C3	E3	300	205.1	14	1	20	3	4	80.000	0.81000
106	BLG	A1	E11	0	-0.7	22	0	20	0	0	100.000	1.01000
107	BLG	B3	E14	0	-0.2	22	0	20	0	0	100.000	1.01000
108	BLG	C2	E10	0	-0.1	22	0	20	0	0	100.000	1.01000
109	BLG	A4	E13	50	34.7	22	0	20	0	0	100.000	1.01000
110	BLG	B4	E12	50	32.4	22	0	19	0	0	100.000	1.01000
111	BLG	C1	E7	50	36.4	22	0	20	0	0	100.000	1.01000
112												

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	BLG	A2	E1	100	63.0	22	0	20	0	0	100.000	1.01000
113	BLG	B2	E6	100	77.1	22	0	20	0	0	100.000	1.01000
114	BLG	C4	E4	100	63.6	22	0	20	0	0	100.000	1.01000
115	BLG	A5	E9	200	143.2	22	0	20	2	2	90.000	0.91000
116	BLG	B1	E15	200	140.3	22	0	20	5	5	75.000	0.76000
117	BLG	C5	E5	200	130.6	22	0	20	2	2	90.000	0.91000
118	BLG	A3	E2	300	218.2	22	0	20	4	4	80.000	0.81000
119	BLG	B5	E8	300	214.4	22	1	20	3	4	80.000	0.81000
120	BLG	C3	E3	300	205.1	22	1	20	3	4	80.000	0.81000
121	CCF	A4	E8	0	-1.3	0	0	25	0	0	100.000	1.01000
122	CCF	B5	E3	0	-1.5	0	0	35	0	0	100.000	1.01000
123	CCF	C3	E10	0	0.5	0	0	25	0	0	100.000	1.01000
124	CCF	A2	E2	50	26.1	0	0	25	0	0	100.000	1.01000
125	CCF	B4	E4	50	27.4	0	1	26	0	1	96.154	0.97154
126	CCF	C5	E11	50	37.3	0	0	25	0	0	100.000	1.01000
127	CCF	A5	E9	100	49.9	0	1	25	0	1	96.000	0.97000
128	CCF	B3	E7	100	65.6	0	1	25	0	1	96.000	0.97000
129	CCF	C2	E5	100	62.3	0	0	25	0	0	100.000	1.01000
130	CCF	A3	E13	200	119.8	0	0	25	0	0	100.000	1.01000
131	CCF	B2	E12	200	127.8	0	1	25	0	1	96.000	0.97000
132	CCF	C1	E1	200	122.9	0	0	25	0	0	100.000	1.01000
133	CCF	A1	E15	300	183.2	0	23	25	0	23	8.000	0.09000
134	CCF	B1	E14	300	193.9	0	11	15	0	11	26.667	0.27667
135	CCF	C4	E6	300	200.5	0	23	25	0	23	8.000	0.09000
136	CCF	A4	E8	0	-1.3	7	0	20	0	0	100.000	1.01000
137	CCF	B5	E3	0	-1.5	7	0	30	0	0	100.000	1.01000
138	CCF	C3	E10	0	0.5	7	0	20	0	0	100.000	1.01000
139	CCF	A2	E2	50	26.1	7	0	20	0	0	100.000	1.01000
140	CCF	B4	E4	50	27.4	7	1	21	0	1	95.238	0.96238
141	CCF	C5	E11	50	37.3	7	0	20	0	0	100.000	1.01000
142	CCF	A5	E9	100	49.9	7	1	20	1	2	90.000	0.91000
143	CCF	B3	E7	100	65.6	7	1	19	2	3	84.211	0.85211
144	CCF	C2	E5	100	62.3	7	0	20	3	3	85.000	0.86000
145	CCF	A3	E13	200	119.8	7	0	20	4	4	80.000	0.81000
146	CCF	B2	E12	200	127.8	7	1	20	6	7	65.000	0.66000
147	CCF	C1	E1	200	122.9	7	0	20	0	0	100.000	1.01000
148	CCF	A1	E15	300	183.2	7	23	25	2	25	0.000	0.01000
149	CCF	B1	E14	300	193.9	7	11	15	3	14	6.667	0.07667
150												

	CCF	C4	E6	300	200.5	7	23	25	2	25	0.000	0.01000
151	CCF	A4	E8	0	-1.3	14	0	20	0	0	100.000	1.01000
152	CCF	B5	E3	0	-1.5	14	0	30	0	0	100.000	1.01000
153	CCF	C3	E10	0	0.5	14	0	20	0	0	100.000	1.01000
154	CCF	A2	E2	50	26.1	14	0	20	0	0	100.000	1.01000
155	CCF	B4	E4	50	27.4	14	1	21	0	1	95.238	0.96238
156	CCF	C5	E11	50	37.3	14	0	20	0	0	100.000	1.01000
157	CCF	A5	E9	100	49.9	14	1	20	3	4	80.000	0.81000
158	CCF	B3	E7	100	65.6	14	1	19	10	11	42.105	0.43105
159	CCF	C2	E5	100	62.3	14	0	20	15	15	25.000	0.26000
160	CCF	A3	E13	200	119.8	14	0	20	19	19	5.000	0.06000
161	CCF	B2	E12	200	127.8	14	1	20	18	19	5.000	0.06000
162	CCF	C1	E1	200	122.9	14	0	20	12	12	40.000	0.41000
163	CCF	A1	E15	300	183.2	14	23	25	2	25	0.000	0.01000
164	CCF	B1	E14	300	193.9	14	11	15	4	15	0.000	0.01000
165	CCF	C4	E6	300	200.5	14	23	25	2	25	0.000	0.01000
166	CCF	A4	E8	0	-1.3	22	0	20	0	0	100.000	1.01000
167	CCF	B5	E3	0	-1.5	22	0	30	0	0	100.000	1.01000
168	CCF	C3	E10	0	0.5	22	0	20	0	0	100.000	1.01000
169	CCF	A2	E2	50	26.1	22	0	20	0	0	100.000	1.01000
170	CCF	B4	E4	50	27.4	22	1	21	0	1	95.238	0.96238
171	CCF	C5	E11	50	37.3	22	0	20	0	0	100.000	1.01000
172	CCF	A5	E9	100	49.9	22	1	20	3	4	80.000	0.81000
173	CCF	B3	E7	100	65.6	22	1	19	10	11	42.105	0.43105
174	CCF	C2	E5	100	62.3	22	0	20	15	15	25.000	0.26000
175	CCF	A3	E13	200	119.8	22	0	20	19	19	5.000	0.06000
176	CCF	B2	E12	200	127.8	22	1	20	18	19	5.000	0.06000
177	CCF	C1	E1	200	122.9	22	0	20	17	17	15.000	0.16000
178	CCF	A1	E15	300	183.2	22	23	25	2	25	0.000	0.01000
179	CCF	B1	E14	300	193.9	22	11	15	4	15	0.000	0.01000
180	CCF	C4	E6	300	200.5	22	23	25	2	25	0.000	0.01000
181	LMB	A3	E12	0	-0.6	0	0	25	0	0	100.000	1.01000
182	LMB	B3	E14	0	-0.1	0	0	25	0	0	100.000	1.01000
183	LMB	C4	E8	0	-0.2	0	0	25	0	0	100.000	1.01000
184	LMB	A5	E10	50	33.3	0	0	25	0	0	100.000	1.01000
185	LMB	B1	E15	50	37.0	0	0	25	0	0	100.000	1.01000
186	LMB	C2	E4	50	40.7	0	0	25	0	0	100.000	1.01000
187	LMB	A4	E6	100	64.2	0	1	25	0	1	96.000	0.97000
188												

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	LMB	B2	E13	100	87.8	0	0	25	0	0	100.000	1.01000
189	LMB	C3	E1	100	74.0	0	0	25	0	0	100.000	1.01000
190	LMB	A1	E11	200	148.8	0	3	25	0	3	88.000	0.89000
191	LMB	B5	E3	200	165.2	0	10	25	0	10	60.000	0.61000
192	LMB	C5	E2	200	165.7	0	6	24	0	6	75.000	0.76000
193	LMB	A2	E7	300	225.7	0	16	25	0	16	36.000	0.37000
194	LMB	B4	E5	300	249.2	0	20	25	0	20	20.000	0.21000
195	LMB	C1	E9	300	251.6	0	23	25	0	23	8.000	0.09000
196	LMB	A3	E12	0	-0.6	7	0	20	0	0	100.000	1.01000
197	LMB	B3	E14	0	-0.1	7	0	20	0	0	100.000	1.01000
198	LMB	C4	E8	0	-0.2	7	0	20	0	0	100.000	1.01000
199	LMB	A5	E10	50	33.3	7	0	20	0	0	100.000	1.01000
200	LMB	B1	E15	50	37.0	7	0	20	0	0	100.000	1.01000
201	LMB	C2	E4	50	40.7	7	0	19	0	0	100.000	1.01000
202	LMB	A4	E6	100	64.2	7	1	20	1	2	90.000	0.91000
203	LMB	B2	E13	100	87.8	7	0	20	1	1	95.000	0.96000
204	LMB	C3	E1	100	74.0	7	0	20	0	0	100.000	1.01000
205	LMB	A1	E11	200	148.8	7	3	20	3	6	70.000	0.71000
206	LMB	B5	E3	200	165.2	7	10	22	0	10	54.545	0.55545
207	LMB	C5	E2	200	165.7	7	6	20	2	8	60.000	0.61000
208	LMB	A2	E7	300	225.7	7	16	25	4	20	20.000	0.21000
209	LMB	B4	E5	300	249.2	7	20	25	3	23	8.000	0.09000
210	LMB	C1	E9	300	251.6	7	23	25	1	24	4.000	0.05000
211	LMB	A3	E12	0	-0.6	14	0	20	0	0	100.000	1.01000
212	LMB	B3	E14	0	-0.1	14	0	20	0	0	100.000	1.01000
213	LMB	C4	E8	0	-0.2	14	0	20	0	0	100.000	1.01000
214	LMB	A5	E10	50	33.3	14	0	20	0	0	100.000	1.01000
215	LMB	B1	E15	50	37.0	14	0	20	0	0	100.000	1.01000
216	LMB	C2	E4	50	40.7	14	0	19	0	0	100.000	1.01000
217	LMB	A4	E6	100	64.2	14	1	20	1	2	90.000	0.91000
218	LMB	B2	E13	100	87.8	14	0	20	1	1	95.000	0.96000
219	LMB	C3	E1	100	74.0	14	0	20	0	0	100.000	1.01000
220	LMB	A1	E11	200	148.8	14	3	20	3	6	70.000	0.71000
221	LMB	B5	E3	200	165.2	14	10	22	0	10	54.545	0.55545
222	LMB	C5	E2	200	165.7	14	6	20	2	8	60.000	0.61000
223	LMB	A2	E7	300	225.7	14	16	25	4	20	20.000	0.21000
224	LMB	B4	E5	300	249.2	14	20	25	3	23	8.000	0.09000
225	LMB	C1	E9	300	251.6	14	23	25	1	24	4.000	0.05000
226												

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	LMB	A3	E12	0	-0.6	22	0	20	0	0	100.000	1.01000
227	LMB	B3	E14	0	-0.1	22	0	20	0	0	100.000	1.01000
228	LMB	C4	E8	0	-0.2	22	0	20	0	0	100.000	1.01000
229	LMB	A5	E10	50	33.3	22	0	20	0	0	100.000	1.01000
230	LMB	B1	E15	50	37.0	22	0	20	0	0	100.000	1.01000
231	LMB	C2	E4	50	40.7	22	0	19	0	0	100.000	1.01000
232	LMB	A4	E6	100	64.2	22	1	20	1	2	90.000	0.91000
233	LMB	B2	E13	100	87.8	22	0	20	1	1	95.000	0.96000
234	LMB	C3	E1	100	74.0	22	0	20	0	0	100.000	1.01000
235	LMB	A1	E11	200	148.8	22	3	20	3	6	70.000	0.71000
236	LMB	B5	E3	200	165.2	22	10	22	0	10	54.545	0.55545
237	LMB	C5	E2	200	165.7	22	6	20	2	8	60.000	0.61000
238	LMB	A2	E7	300	225.7	22	16	25	4	20	20.000	0.21000
239	LMB	B4	E5	300	249.2	22	20	25	3	23	8.000	0.09000
240	LMB	C1	E9	300	251.6	22	23	25	1	24	4.000	0.05000
241	LST	A4	G4	0	-0.4	0	0	25	0	0	100.000	1.01000
242	LST	B5	G8	0	-0.5	0	0	25	0	0	100.000	1.01000
243	LST	C4	G10	0	-0.3	0	0	25	0	0	100.000	1.01000
244	LST	A5	G6	50	33.0	0	0	25	0	0	100.000	1.01000
245	LST	B3	G2	50	32.7	0	0	25	0	0	100.000	1.01000
246	LST	C1	G5	50	42.4	0	0	25	0	0	100.000	1.01000
247	LST	A1	G7	100	67.8	0	0	25	0	0	100.000	1.01000
248	LST	B2	G1	100	77.9	0	0	25	0	0	100.000	1.01000
249	LST	C5	G11	100	74.5	0	0	25	0	0	100.000	1.01000
250	LST	A2	G13	200	153.2	0	5	25	0	5	80.000	0.81000
251	LST	B4	G15	200	150.4	0	4	25	0	4	84.000	0.85000
252	LST	C2	G12	200	146.2	0	2	25	0	2	92.000	0.93000
253	LST	A3	G3	300	226.1	0	12	25	0	12	52.000	0.53000
254	LST	B1	G9	300	221.4	0	6	25	0	6	76.000	0.77000
255	LST	C3	G14	300	222.1	0	15	25	0	15	40.000	0.41000
256	LST	A4	G4	0	-0.4	7	0	20	0	0	100.000	1.01000
257	LST	B5	G8	0	-0.5	7	0	20	0	0	100.000	1.01000
258	LST	C4	G10	0	-0.3	7	0	20	0	0	100.000	1.01000
259	LST	A5	G6	50	33.0	7	0	20	0	0	100.000	1.01000
260	LST	B3	G2	50	32.7	7	0	20	0	0	100.000	1.01000
261	LST	C1	G5	50	42.4	7	0	20	0	0	100.000	1.01000
262	LST	A1	G7	100	67.8	7	0	20	2	2	90.000	0.91000
263	LST	B2	G1	100	77.9	7	0	20	4	4	80.000	0.81000
264												

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	LST	C5	G11	100	74.5	7	0	20	6	6	70.000	0.71000
265	LST	A2	G13	200	153.2	7	5	21	13	18	14.286	0.15286
266	LST	B4	G15	200	150.1	7	4	20	15	19	5.000	0.06000
267	LST	C2	G12	200	146.2	7	2	20	15	17	15.000	0.16000
268	LST	A3	G3	300	226.1	7	12	22	10	22	0.000	0.01000
269	LST	B1	G9	300	221.4	7	6	21	15	21	0.000	0.01000
270	LST	C3	G14	300	222.1	7	15	25	10	25	0.000	0.01000
271	LST	A4	G4	0	-0.4	14	0	20	0	0	100.000	1.01000
272	LST	B5	G8	0	-0.5	14	0	20	0	0	100.000	1.01000
273	LST	C4	G10	0	-0.3	14	0	20	0	0	100.000	1.01000
274	LST	A5	G6	50	33.0	14	0	20	13	13	35.000	0.36000
275	LST	B3	G2	50	32.7	14	0	20	7	7	65.000	0.66000
276	LST	C1	G5	50	42.4	14	0	20	13	13	35.000	0.36000
277	LST	A1	G7	100	67.8	14	0	20	19	19	5.000	0.06000
278	LST	B2	G1	100	77.9	14	0	20	19	19	5.000	0.06000
279	LST	C5	G11	100	74.5	14	0	20	18	18	10.000	0.11000
280	LST	A2	G13	200	153.2	14	5	21	15	20	4.762	0.05762
281	LST	B4	G15	200	150.1	14	4	20	16	20	0.000	0.01000
282	LST	C2	G12	200	146.2	14	2	20	18	20	0.000	0.01000
283	LST	A3	G3	300	226.1	14	12	22	10	22	0.000	0.01000
284	LST	B1	G9	300	221.4	14	6	21	15	21	0.000	0.01000
285	LST	C3	G14	300	222.1	14	15	25	10	25	0.000	0.01000
286	LST	A4	G4	0	-0.4	22	0	20	0	0	100.000	1.01000
287	LST	B5	G8	0	-0.5	22	0	20	0	0	100.000	1.01000
288	LST	C4	G10	0	-0.3	22	0	20	0	0	100.000	1.01000
289	LST	A5	G6	50	33.0	22	0	20	19	19	5.000	0.06000
290	LST	B3	G2	50	32.7	22	0	20	16	16	20.000	0.21000
291	LST	C1	G5	50	42.4	22	0	20	18	18	10.000	0.11000
292	LST	A1	G7	100	67.8	22	0	20	20	20	0.000	0.01000
293	LST	B2	G1	100	77.9	22	0	20	20	20	0.000	0.01000
294	LST	C5	G11	100	74.5	22	0	20	20	20	0.000	0.01000
295	LST	A2	G13	200	153.2	22	5	21	15	20	4.762	0.05762
296	LST	B4	G15	200	150.1	22	4	20	16	20	0.000	0.01000
297	LST	C2	G12	200	146.2	22	2	20	18	20	0.000	0.01000
298	LST	A3	G3	300	226.1	22	12	22	10	22	0.000	0.01000
299	LST	B1	G9	300	221.4	22	6	21	15	21	0.000	0.01000
300	LST	C3	G14	300	222.1	22	15	25	10	25	0.000	0.01000
301	RBT	A1	E11	0	-3.0	0	0	25	0	0	100.000	1.01000
302												

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	RBT	B2	E3	0	-2.5	0	0	25	0	0	100.000	1.01000
303	RBT	C4	E13	0	-1.8	0	0	25	0	0	100.000	1.01000
304	RBT	A2	E10	50	31.8	0	0	25	0	0	100.000	1.01000
305	RBT	B5	E1	50	34.7	0	0	25	0	0	100.000	1.01000
306	RBT	C2	E6	50	31.9	0	0	19	0	0	100.000	1.01000
307	RBT	A5	E12	100	59.6	0	0	25	0	0	100.000	1.01000
308	RBT	B1	E5	100	77.8	0	0	25	0	0	100.000	1.01000
309	RBT	C1	E9	100	59.2	0	0	25	0	0	100.000	1.01000
310	RBT	A3	E15	200	134.0	0	0	25	0	0	100.000	1.01000
311	RBT	B3	E4	200	136.1	0	0	25	0	0	100.000	1.01000
312	RBT	C3	E7	200	134.9	0	0	30	0	0	100.000	1.01000
313	RBT	A4	E14	300	197.3	0	0	25	0	0	100.000	1.01000
314	RBT	B4	E8	300	198.0	0	0	25	0	0	100.000	1.01000
315	RBT	C5	E2	300	199.8	0	1	25	0	1	96.000	0.97000
316	RBT	A1	E11	0	-3.0	7	0	20	0	0	100.000	1.01000
317	RBT	B2	E3	0	-2.5	7	0	20	0	0	100.000	1.01000
318	RBT	C4	E13	0	-1.8	7	0	20	0	0	100.000	1.01000
319	RBT	A2	E10	50	31.8	7	0	20	2	2	90.000	0.91000
320	RBT	B5	E1	50	34.7	7	0	20	0	0	100.000	1.01000
321	RBT	C2	E6	50	31.9	7	0	15	0	0	100.000	1.01000
322	RBT	A5	E12	100	59.6	7	0	20	1	1	95.000	0.96000
323	RBT	B1	E5	100	77.8	7	0	20	2	2	90.000	0.91000
324	RBT	C1	E9	100	59.2	7	0	20	1	1	95.000	0.96000
325	RBT	A3	E15	200	134.0	7	0	20	10	10	50.000	0.51000
326	RBT	B3	E4	200	136.1	7	0	20	10	10	50.000	0.51000
327	RBT	C3	E7	200	134.9	7	0	25	15	15	40.000	0.41000
328	RBT	A4	E14	300	197.3	7	0	20	16	16	20.000	0.21000
329	RBT	B4	E8	300	198.0	7	0	20	16	16	20.000	0.21000
330	RBT	C5	E2	300	199.8	7	1	21	15	16	23.810	0.24810
331	RBT	A1	E11	0	-3.0	14	0	20	0	0	100.000	1.01000
332	RBT	B2	E3	0	-2.5	14	0	20	0	0	100.000	1.01000
333	RBT	C4	E13	0	-1.8	14	0	20	0	0	100.000	1.01000
334	RBT	A2	E10	50	31.8	14	0	20	5	5	75.000	0.76000
335	RBT	B5	E1	50	34.7	14	0	20	10	10	50.000	0.51000
336	RBT	C2	E6	50	31.9	14	0	15	4	4	73.333	0.74333
337	RBT	A5	E12	100	59.6	14	0	20	13	13	35.000	0.36000
338	RBT	B1	E5	100	77.8	14	0	20	11	11	45.000	0.46000
339	RBT	C1	E9	100	59.2	14	0	20	6	6	70.000	0.71000
340												

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	RBT	A3	E15	200	134.0	14	0	20	17	17	15.000	0.16000
341	RBT	B3	E4	200	136.1	14	0	20	18	18	10.000	0.11000
342	RBT	C3	E7	200	134.9	14	0	25	24	24	4.000	0.05000
343	RBT	A4	E14	300	197.3	14	0	20	20	20	0.000	0.01000
344	RBT	B4	E8	300	198.0	14	0	20	20	20	0.000	0.01000
345	RBT	C5	E2	300	199.8	14	1	21	18	19	9.524	0.10524
346	RBT	A1	E11	0	-3.0	22	0	20	0	0	100.000	1.01000
347	RBT	B2	E3	0	-2.5	22	0	20	0	0	100.000	1.01000
348	RBT	C4	E13	0	-1.8	22	0	20	0	0	100.000	1.01000
349	RBT	A2	E10	50	31.8	22	0	20	11	11	45.000	0.46000
350	RBT	B5	E1	50	34.7	22	0	20	17	17	15.000	0.16000
351	RBT	C2	E6	50	31.9	22	0	15	13	13	13.333	0.14333
352	RBT	A5	E12	100	59.6	22	0	20	20	20	0.000	0.01000
353	RBT	B1	E5	100	77.8	22	0	20	16	16	20.000	0.21000
354	RBT	C1	E9	100	59.2	22	0	20	19	19	5.000	0.06000
355	RBT	A3	E15	200	134.0	22	0	20	20	20	0.000	0.01000
356	RBT	B3	E4	200	136.1	22	0	20	20	20	0.000	0.01000
357	RBT	C3	E7	200	134.9	22	0	25	25	25	0.000	0.01000
358	RBT	A4	E14	300	197.3	22	0	20	20	20	0.000	0.01000
359	RBT	B4	E8	300	198.0	22	0	20	20	20	0.000	0.01000
360	RBT	C5	E2	300	199.8	22	1	21	20	21	0.000	0.01000
361	SMB	A2	D6	0	0.0	0	0	25	0	0	100.000	1.01000
362	SMB	B1	D15	0	0.0	0	0	25	0	0	100.000	1.01000
363	SMB	C1	D7	0	0.0	0	0	25	0	0	100.000	1.01000
364	SMB	A3	D3	50	32.2	0	0	25	0	0	100.000	1.01000
365	SMB	B5	D8	50	30.6	0	0	25	0	0	100.000	1.01000
366	SMB	C3	D2	50	37.5	0	0	25	0	0	100.000	1.01000
367	SMB	A1	D1	100	62.6	0	0	25	0	0	100.000	1.01000
368	SMB	B3	D4	100	74.1	0	0	25	0	0	100.000	1.01000
369	SMB	C2	D11	100	63.0	0	0	25	0	0	100.000	1.01000
370	SMB	B2	D5	200	142.0	0	0	25	0	0	100.000	1.01000
371	SMB	C5	D12	200	127.5	0	12	25	0	12	52.000	0.53000
372	SMB	A5	D9	300	223.6	0	15	24	0	15	37.500	0.38500
373	SMB	B4	D14	300	214.1	0	18	25	0	18	28.000	0.29000
374	SMB	C4	D13	300	205.9	0	10	25	0	10	60.000	0.61000
375	SMB	A2	D6	0	0.0	7	0	20	0	0	100.000	1.01000
376	SMB	B1	D15	0	0.0	7	0	20	0	0	100.000	1.01000
377	SMB	C1	D7	0	0.0	7	0	20	0	0	100.000	1.01000
378												

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	SMB	A3	D3	50	32.2	7	0	20	1	1	95.000	0.96000
379	SMB	B5	D8	50	30.6	7	0	20	0	0	100.000	1.01000
380	SMB	C3	D2	50	37.5	7	0	20	0	0	100.000	1.01000
381	SMB	A1	D1	100	62.6	7	0	19	0	0	100.000	1.01000
382	SMB	B3	D4	100	74.1	7	0	20	0	0	100.000	1.01000
383	SMB	C2	D11	100	63.0	7	0	19	0	0	100.000	1.01000
384	SMB	B2	D5	200	142.0	7	0	20	2	2	90.000	0.91000
385	SMB	C5	D12	200	127.5	7	12	22	0	12	45.455	0.46455
386	SMB	A5	D9	300	223.6	7	15	24	5	20	16.667	0.17667
387	SMB	B4	D14	300	214.1	7	18	25	5	23	8.000	0.09000
388	SMB	C4	D13	300	205.9	7	10	22	4	14	36.364	0.37364
389	SMB	A2	D6	0	0.0	14	0	20	0	0	100.000	1.01000
390	SMB	B1	D15	0	0.0	14	0	20	0	0	100.000	1.01000
391	SMB	C1	D7	0	0.0	14	0	20	0	0	100.000	1.01000
392	SMB	A3	D3	50	32.2	14	0	20	1	1	95.000	0.96000
393	SMB	B5	D8	50	30.6	14	0	20	0	0	100.000	1.01000
394	SMB	C3	D2	50	37.5	14	0	20	0	0	100.000	1.01000
395	SMB	A1	D1	100	62.6	14	0	19	0	0	100.000	1.01000
396	SMB	B3	D4	100	74.1	14	0	20	0	0	100.000	1.01000
397	SMB	C2	D11	100	63.0	14	0	19	2	2	89.474	0.90474
398	SMB	B2	D5	200	142.0	14	0	20	3	3	85.000	0.86000
399	SMB	C5	D12	200	127.5	14	12	22	0	12	45.455	0.46455
400	SMB	A5	D9	300	223.6	14	15	24	5	20	16.667	0.17667
401	SMB	B4	D14	300	214.1	14	18	25	5	23	8.000	0.09000
402	SMB	C4	D13	300	205.9	14	10	22	4	14	36.364	0.37364
403	SMB	A2	D6	0	0.0	22	0	20	0	0	100.000	1.01000
404	SMB	B1	D15	0	0.0	22	0	20	0	0	100.000	1.01000
405	SMB	C1	D7	0	0.0	22	0	20	0	0	100.000	1.01000
406	SMB	A3	D3	50	32.2	22	0	20	2	2	90.000	0.91000
407	SMB	B5	D8	50	30.6	22	0	20	0	0	100.000	1.01000
408	SMB	C3	D2	50	37.5	22	0	20	0	0	100.000	1.01000
409	SMB	A1	D1	100	62.6	22	0	19	0	0	100.000	1.01000
410	SMB	B3	D4	100	74.1	22	0	20	1	1	95.000	0.96000
411	SMB	C2	D11	100	63.0	22	0	19	3	3	84.211	0.85211
412	SMB	B2	D5	200	142.0	22	0	20	3	3	85.000	0.86000
413	SMB	C5	D12	200	127.5	22	12	22	0	12	45.455	0.46455
414	SMB	A5	D9	300	223.6	22	15	24	6	21	12.500	0.13500
415	SMB	B4	D14	300	214.1	22	18	25	6	24	4.000	0.05000
416												

	SMB	C4	D13	300	205.9	22	10	22	4	14	36.364	0.37364
417	WAE	A2	F10	0	-0.9	0	0	25	0	0	100.000	1.01000
418	WAE	B5	F14	0	-0.8	0	0	25	0	0	100.000	1.01000
419	WAE	C3	F13	0	-0.8	0	0	25	0	0	100.000	1.01000
420	WAE	A5	F1	50	35.8	0	1	25	0	1	96.000	0.97000
421	WAE	B2	F15	50	33.6	0	0	25	0	0	100.000	1.01000
422	WAE	C5	F8	50	37.6	0	0	25	0	0	100.000	1.01000
423	WAE	A4	F9	100	64.6	0	0	25	0	0	100.000	1.01000
424	WAE	B3	F4	100	82.0	0	0	35	0	0	100.000	1.01000
425	WAE	C4	F3	100	66.3	0	0	25	0	0	100.000	1.01000
426	WAE	A1	F12	200	148.7	0	1	25	0	1	96.000	0.97000
427	WAE	B1	F7	200	150.6	0	1	25	0	1	96.000	0.97000
428	WAE	C2	F5	200	148.5	0	1	25	0	1	96.000	0.97000
429	WAE	A3	F11	300	220.4	0	5	25	0	5	80.000	0.81000
430	WAE	B4	F6	300	223.6	0	4	15	0	4	73.333	0.74333
431	WAE	C1	F2	300	219.5	0	4	25	0	4	84.000	0.85000
432	WAE	A2	F10	0	-0.9	7	0	20	0	0	100.000	1.01000
433	WAE	B5	F14	0	-0.8	7	0	19	0	0	100.000	1.01000
434	WAE	C3	F13	0	-0.8	7	0	20	0	0	100.000	1.01000
435	WAE	A5	F1	50	35.8	7	1	20	1	2	90.000	0.91000
436	WAE	B2	F15	50	33.6	7	0	20	0	0	100.000	1.01000
437	WAE	C5	F8	50	37.6	7	0	20	0	0	100.000	1.01000
438	WAE	A4	F9	100	64.6	7	0	20	4	4	80.000	0.81000
439	WAE	B3	F4	100	82.0	7	0	30	2	2	93.333	0.94333
440	WAE	C4	F3	100	66.3	7	0	20	2	2	90.000	0.91000
441	WAE	A1	F12	200	148.7	7	1	20	5	6	70.000	0.71000
442	WAE	B1	F7	200	150.6	7	1	20	3	4	80.000	0.81000
443	WAE	C2	F5	200	148.5	7	1	20	6	7	65.000	0.66000
444	WAE	A3	F11	300	220.4	7	5	21	8	13	38.095	0.39095
445	WAE	B4	F6	300	223.6	7	4	12	6	10	16.667	0.17667
446	WAE	C1	F2	300	219.5	7	4	20	9	13	35.000	0.36000
447	WAE	A2	F10	0	-0.9	14	0	20	0	0	100.000	1.01000
448	WAE	B5	F14	0	-0.8	14	0	19	0	0	100.000	1.01000
449	WAE	C3	F13	0	-0.8	14	0	20	0	0	100.000	1.01000
450	WAE	A5	F1	50	35.8	14	1	20	1	2	90.000	0.91000
451	WAE	B2	F15	50	33.6	14	0	20	0	0	100.000	1.01000
452	WAE	C5	F8	50	37.6	14	0	20	0	0	100.000	1.01000
453	WAE	A4	F9	100	64.6	14	0	20	4	4	80.000	0.81000
454												

AEH-12-PSEUDO-03

AEH-12-PSEUDO-03

	WAE	B3	F4	100	82.0	14	0	30	3	3	90.000	0.91000
455	WAE	C4	F3	100	66.3	14	0	20	3	3	85.000	0.86000
456	WAE	A1	F12	200	148.7	14	1	20	5	6	70.000	0.71000
457	WAE	B1	F7	200	150.6	14	1	20	4	5	75.000	0.76000
458	WAE	C2	F5	200	148.5	14	1	20	7	8	60.000	0.61000
459	WAE	A3	F11	300	220.4	14	5	21	8	13	38.095	0.39095
460	WAE	B4	F6	300	223.6	14	4	12	6	10	16.667	0.17667
461	WAE	C1	F2	300	219.5	14	4	20	10	14	30.000	0.31000
462	WAE	A2	F10	0	-0.9	22	0	20	0	0	100.000	1.01000
463	WAE	B5	F14	0	-0.8	22	0	19	0	0	100.000	1.01000
464	WAE	C3	F13	0	-0.8	22	0	20	1	1	95.000	0.96000
465	WAE	A5	F1	50	35.8	22	1	20	1	2	90.000	0.91000
466	WAE	B2	F15	50	33.6	22	0	20	0	0	100.000	1.01000
467	WAE	C5	F8	50	37.6	22	0	20	0	0	100.000	1.01000
468	WAE	A4	F9	100	64.6	22	0	20	5	5	75.000	0.76000
469	WAE	B3	F4	100	82.0	22	0	30	3	3	90.000	0.91000
470	WAE	C4	F3	100	66.3	22	0	20	3	3	85.000	0.86000
471	WAE	A1	F12	200	148.7	22	1	20	5	6	70.000	0.71000
472	WAE	B1	F7	200	150.6	22	1	20	4	5	75.000	0.76000
473	WAE	C2	F5	200	148.5	22	1	20	7	8	60.000	0.61000
474	WAE	A3	F11	300	220.4	22	5	21	8	13	38.095	0.39095
475	WAE	B4	F6	300	223.6	22	4	12	6	10	16.667	0.17667
476	WAE	C1	F2	300	219.5	22	4	20	10	14	30.000	0.31000
477	YEP	A4	G8	0	0.4	0	0	25	0	0	100.000	1.01000
478	YEP	B3	G5	0	-0.5	0	0	25	0	0	100.000	1.01000
479	YEP	C1	G4	0	0.8	0	0	25	0	0	100.000	1.01000
480	YEP	A3	G1	50	35.9	0	1	25	0	1	96.000	0.97000
481	YEP	B1	G14	50	31.0	0	1	25	0	1	96.000	0.97000
482	YEP	C2	G11	50	32.6	0	0	25	0	0	100.000	1.01000
483	YEP	A2	G9	100	67.2	0	0	25	0	0	100.000	1.01000
484	YEP	B4	G2	100	71.2	0	1	25	0	1	96.000	0.97000
485	YEP	C3	G15	100	59.7	0	0	25	0	0	100.000	1.01000
486	YEP	A5	G10	200	145.1	0	5	25	0	5	80.000	0.81000
487	YEP	B2	G12	200	134.7	0	6	25	0	6	76.000	0.77000
488	YEP	C5	G3	200	134.7	0	4	25	0	4	84.000	0.85000
489	YEP	A1	G6	300	219.7	0	6	25	0	6	76.000	0.77000
490	YEP	B5	G7	300	201.7	0	12	25	0	12	52.000	0.53000
491	YEP	C4	G13	300	196.3	0	9	25	0	9	64.000	0.65000
492												

	YEP	A4	G8	0	0.4	7	0	19	0	0	100.000	1.01000
493	YEP	B3	G5	0	-0.5	7	0	20	0	0	100.000	1.01000
494	YEP	C1	G4	0	0.8	7	0	20	0	0	100.000	1.01000
495	YEP	A3	G1	50	35.9	7	1	20	0	1	95.000	0.96000
496	YEP	B1	G14	50	31.0	7	1	20	0	1	95.000	0.96000
497	YEP	C2	G11	50	32.6	7	0	20	0	0	100.000	1.01000
498	YEP	A2	G9	100	67.2	7	0	20	1	1	95.000	0.96000
499	YEP	B4	G2	100	71.2	7	1	20	1	2	90.000	0.91000
500	YEP	C3	G15	100	59.7	7	0	20	0	0	100.000	1.01000
501	YEP	A5	G10	200	145.1	7	5	21	2	7	66.667	0.67667
502	YEP	B2	G12	200	134.7	7	6	21	0	6	71.429	0.72429
503	YEP	C5	G3	200	134.7	7	4	20	0	4	80.000	0.81000
504	YEP	A1	G6	300	219.7	7	6	21	5	11	47.619	0.48619
505	YEP	B5	G7	300	201.7	7	12	22	3	15	31.818	0.32818
506	YEP	C4	G13	300	196.3	7	9	21	5	14	33.333	0.34333
507	YEP	A4	G8	0	0.4	14	0	19	0	0	100.000	1.01000
508	YEP	B3	G5	0	-0.5	14	0	20	0	0	100.000	1.01000
509	YEP	C1	G4	0	0.8	14	0	20	0	0	100.000	1.01000
510	YEP	A3	G1	50	35.9	14	1	20	0	1	95.000	0.96000
511	YEP	B1	G14	50	31.0	14	1	20	0	1	95.000	0.96000
512	YEP	C2	G11	50	32.6	14	0	20	0	0	100.000	1.01000
513	YEP	A2	G9	100	67.2	14	0	20	1	1	95.000	0.96000
514	YEP	B4	G2	100	71.2	14	1	20	1	2	90.000	0.91000
515	YEP	C3	G15	100	59.7	14	0	20	0	0	100.000	1.01000
516	YEP	A5	G10	200	145.1	14	5	21	2	7	66.667	0.67667
517	YEP	B2	G12	200	134.7	14	6	21	0	6	71.429	0.72429
518	YEP	C5	G3	200	134.7	14	4	20	0	4	80.000	0.81000
519	YEP	A1	G6	300	219.7	14	6	21	5	11	47.619	0.48619
520	YEP	B5	G7	300	201.7	14	12	22	3	15	31.818	0.32818
521	YEP	C4	G13	300	196.3	14	9	21	5	14	33.333	0.34333
522	YEP	A4	G8	0	0.4	22	0	19	0	0	100.000	1.01000
523	YEP	B3	G5	0	-0.5	22	0	20	0	0	100.000	1.01000
524	YEP	C1	G4	0	0.8	22	0	20	0	0	100.000	1.01000
525	YEP	A3	G1	50	35.9	22	1	20	0	1	95.000	0.96000
526	YEP	B1	G14	50	31.0	22	1	20	0	1	95.000	0.96000
527	YEP	C2	G11	50	32.6	22	0	20	0	0	100.000	1.01000
528	YEP	A2	G9	100	67.2	22	0	20	1	1	95.000	0.96000
529	YEP	B4	G2	100	71.2	22	1	20	1	2	90.000	0.91000
530												

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	YEP	C3	G15	100	59.7	22	0	20	0	0	100.000	1.01000
531	YEP	A5	G10	200	145.1	22	5	21	2	7	66.667	0.67667
532	YEP	B2	G12	200	134.7	22	6	21	0	6	71.429	0.72429
533	YEP	C5	G3	200	134.7	22	4	20	0	4	80.000	0.81000
534	YEP	A1	G6	300	219.7	22	6	21	5	11	47.619	0.48619
535	YEP	B5	G7	300	201.7	22	12	22	3	15	31.818	0.32818
536	YEP	C4	G13	300	196.3	22	9	21	5	14	33.333	0.34333

AEH-12-PSEUDO-[illegible]

Performed by K. Weber using SAS version 9.4 at 08:16 on 01APR15

klw 1APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Statistical analysis of fish survivel following 24-h flow-through exposure to various concentrations of Pf-CL145A
Study number AEH-12-PSEUDO-03

The MEANS Procedure

sps=BKT

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	100.0	0	.	.
	300	3	100.0	0	.	.
7	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	95.0000	8.6603	73.4867	116.5
	300	3	78.3333	20.2073	28.1357	128.5
14	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	59.5614	17.4883	16.1181	103.0
	300	3	5.0000	0	.	.
22	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	63.3333	10.4083	37.4776	89.1891
	200	3	25.5263	9.1502	2.7960	48.2566
	300	3	0	0	.	.

sps=BLG

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	100.0	0	.	.
	300	3	97.3333	2.3094	91.5965	103.1
7	0	3	100.0	0	.	.

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	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	85.0000	8.6603	63.4867	106.5
	300	3	80.0000	0	.	.
14	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	85.0000	8.6603	63.4867	106.5
	300	3	80.0000	0	.	.
22	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	85.0000	8.6603	63.4867	106.5
	300	3	80.0000	0	.	.

sps=CCF

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	98.7179	2.2206	93.2017	104.2
	100	3	97.3333	2.3094	91.5965	103.1
	200	3	98.6667	2.3094	92.9298	104.4
	300	3	14.2222	10.7772	-12.5498	40.9943
7	0	3	100.0	0	.	.
	50	3	98.4127	2.7493	91.5831	105.2
	100	3	86.4035	3.1396	78.6044	94.2026
	200	3	81.6667	17.5594	38.0466	125.3
	300	3	2.2222	3.8490	-7.3392	11.7837
14	0	3	100.0	0	.	.
	50	3	98.4127	2.7493	91.5831	105.2
	100	3	49.0351	28.1472	-20.8865	119.0
	200	3	16.6667	20.2073	-33.5309	66.8643
	300	3	0	0	.	.
22	0	3	100.0	0	.	.
	50	3	98.4127	2.7493	91.5831	105.2
	100	3	49.0351	28.1472	-20.8865	119.0
	200	3	8.3333	5.7735	-6.0088	22.6755
	300	3	0	0	.	.

AEH-12-PSEUDO-03

sps=LMB

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	98.6667	2.3094	92.9298	104.4
	200	3	74.3333	14.0119	39.5258	109.1
	300	3	21.3333	14.0475	-13.5627	56.2294
7	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	61.5152	7.8379	42.0448	80.9855
	300	3	10.6667	8.3267	-10.0179	31.3512
14	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	61.5152	7.8379	42.0448	80.9855
	300	3	10.6667	8.3267	-10.0179	31.3512
22	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	61.5152	7.8379	42.0448	80.9855
	300	3	10.6667	8.3267	-10.0179	31.3512

sps=LST

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	85.3333	6.1101	70.1550	100.5
	300	3	56.0000	18.3303	10.4650	101.5
7	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	80.0000	10.0000	55.1586	104.8
	200	3	11.4288	5.5787	-2.4298	25.2870

AEH-12-PSEUDO-03

	300	3	0	0	.	.
14	0	3	100.0	0	.	.
	50	3	45.0000	17.3205	1.9735	88.0265
	100	3	6.6667	2.8868	-0.5044	13.8378
	200	3	1.5873	2.7493	-5.2423	8.4169
	300	3	0	0	.	.
22	0	3	100.0	0	.	.
	50	3	11.6667	7.6376	-7.3062	30.6396
	100	3	0	0	.	.
	200	3	1.5873	2.7493	-5.2423	8.4169
	300	3	0	0	.	.

sps=RBT

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	3	100.0	0	.	.
	300	3	98.6667	2.3094	92.9298	104.4
7	0	3	100.0	0	.	.
	50	3	96.6667	5.7735	82.3245	111.0
	100	3	93.3333	2.8868	86.1622	100.5
	200	3	46.6667	5.7735	32.3245	61.0088
	300	3	21.2698	2.1994	15.8062	26.7335
14	0	3	100.0	0	.	.
	50	3	66.1111	13.9775	31.3891	100.8
	100	3	50.0000	18.0278	5.2166	94.7834
	200	3	9.6667	5.5076	-4.0149	23.3482
	300	3	3.1746	5.4986	-10.4846	16.8338
22	0	3	100.0	0	.	.
	50	3	24.4444	17.8211	-19.8257	68.7146
	100	3	8.3333	10.4083	-17.5224	34.1891
	200	3	0	0	.	.
	300	3	0	0	.	.

sps=SMB

Analysis Variable : per_sur

AEH-12-PSEUDO-00

time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	100.0	0	.	.
	100	3	100.0	0	.	.
	200	2	76.0000	33.9411	-228.9	380.9
	300	3	41.8333	16.4342	1.0085	82.6582
7	0	3	100.0	0	.	.
	50	3	98.3333	2.8868	91.1622	105.5
	100	3	100.0	0	.	.
	200	2	67.7273	31.4984	-215.3	350.7
	300	3	20.3434	14.5349	-15.7632	56.4501
14	0	3	100.0	0	.	.
	50	3	98.3333	2.8868	91.1622	105.5
	100	3	96.4912	6.0774	81.3942	111.6
	200	2	65.2273	27.9629	-186.0	316.5
	300	3	20.3434	14.5349	-15.7632	56.4501
22	0	3	100.0	0	.	.
	50	3	96.6667	5.7735	82.3245	111.0
	100	3	93.0702	8.0697	73.0239	113.1
	200	2	65.2273	27.9629	-186.0	316.5
	300	3	17.6212	16.7786	-24.0591	59.3016

sps=WAE

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	98.6667	2.3094	92.9298	104.4
	100	3	100.0	0	.	.
	200	3	96.0000	0	.	.
	300	3	79.1111	5.3886	65.7251	92.4971
7	0	3	100.0	0	.	.
	50	3	96.6667	5.7735	82.3245	111.0
	100	3	87.7778	6.9389	70.5406	105.0
	200	3	71.6667	7.6376	52.6938	90.6396
	300	3	29.9206	11.5821	1.1490	58.6923
14	0	3	100.0	0	.	.
	50	3	96.6667	5.7735	82.3245	111.0

AEH-12-PSEUDO-02

	100	3	85.0000	5.0000	72.5793	97.4207
	200	3	68.3333	7.6376	49.3604	87.3062
	300	3	28.2540	10.8205	1.3745	55.1335
22	0	3	98.3333	2.8868	91.1622	105.5
	50	3	96.6667	5.7735	82.3245	111.0
	100	3	83.3333	7.6376	64.3604	102.3
	200	3	68.3333	7.6376	49.3604	87.3062
	300	3	28.2540	10.8205	1.3745	55.1335

sps=YEP

Analysis Variable : per_sur						
time	treat	N Obs	Mean	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
0	0	3	100.0	0	.	.
	50	3	97.3333	2.3094	91.5965	103.1
	100	3	98.6667	2.3094	92.9298	104.4
	200	3	80.0000	4.0000	70.0634	89.9366
	300	3	64.0000	12.0000	34.1903	93.8097
7	0	3	100.0	0	.	.
	50	3	96.6667	2.8868	89.4956	103.8
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	72.6984	6.7568	55.9137	89.4831
	300	3	37.5902	8.7182	15.9329	59.2475
14	0	3	100.0	0	.	.
	50	3	96.6667	2.8868	89.4956	103.8
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	72.6984	6.7568	55.9137	89.4831
	300	3	37.5902	8.7182	15.9329	59.2475
22	0	3	100.0	0	.	.
	50	3	96.6667	2.8868	89.4956	103.8
	100	3	95.0000	5.0000	82.5793	107.4
	200	3	72.6984	6.7568	55.9137	89.4831
	300	3	37.5902	8.7182	15.9329	59.2475

Performed by K. Weber using SAS version 9.4 at 08:16 on 01APR15

KW 1APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=BKT time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Defau t
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	4	0 50 100 200

Number of Observations Read	12
Number of Observations Used	12

Dimensions	
Covariance Parameters	1
Columns in X	5
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	12

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	4
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	10.16659651	.	1.141687

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1	0	3	10.055861771	0.11073474	0.094327
2	0	3	10.05352729	0.00233448	0.002232
3	0	3	10.053524447	0.00000284	2.838E-6

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	20.11
AIC (smaller is better)	28.11
AICC (smaller is better)	33.82
BIC (smaller is better)	30.05
CAIC (smaller is better)	34.05
HQIC (smaller is better)	27.39
Pearson Chi-Square	0.10
Pearson Chi-Square / DF	0.01

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-1.3270	0.1233	8	-10.76	<.0001
treat	0	1.3370	0.1386	8	9.65	<.0001
treat	50	1.3370	0.1386	8	9.65	<.0001
treat	100	0.8859	0.1465	8	6.05	0.0003
treat	200	0	.	.	.	.
Residual		0.01210	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	3	8	38.27	<.0001

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.06320	8	0.16	0.8788	0.05	-0.1358	0.1557	1.0100	0.06383	0.8730	1.1685
50	0.009950	0.06320	8	0.16	0.8788	0.05	-0.1358	0.1557	1.0100	0.06383	0.8730	1.1685
100	-0.4411	0.07918	8	-5.57	0.0005	0.05	-0.6237	-0.2585	0.6433	0.05094	0.5360	0.7722
200	-1.3270	0.1233	8	-10.76	<.0001	0.05	-1.6114	-1.0427	0.2653	0.03271	0.1996	0.3525

Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	0	0.08937	8	0.00	1.0000	0.05	-0.2061	0.2061

AEH-12-PSEUDO-02

100	0	-0.4510	0.1013	8	-4.45	0.0021	0.05	-0.6847	-0.2174
200	0	-1.3370	0.1386	8	-9.65	<.0001	0.05	-1.6565	-1.0175

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AEH-12-PSEUDO-03

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=BLG time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	5	0 50 100 200 300

Number of Observations Read	15
Number of Observations Used	15

Dimensions	
Covariance Parameters	1
Columns in X	6
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	15

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	5
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	14.638893642	.	1.170951

AEH-12-PSEUDO-03

1	0	3	14.591887627	0.04700601	0.044615
2	0	3	14.591810762	0.00007687	0.000077
3	0	3	14.591810761	0.00000000	2.87E-10

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics	
-2 Log Likelihood	29.18
AIC (smaller is better)	39.18
AICC (smaller is better)	45.85
BIC (smaller is better)	42.72
CAIC (smaller is better)	47.72
HQIC (smaller is better)	39.15
Pearson Chi-Square	0.02
Pearson Chi-Square / DF	0.00

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-0.2107	0.02679	10	-7.87	<.0001
treat	0	0.2207	0.03596	10	6.14	0.0001
treat	50	0.2207	0.03596	10	6.14	0.0001
treat	100	0.2207	0.03596	10	6.14	0.0001
treat	200	0.05990	0.03733	10	1.60	0.1397
treat	300	0	.	.	.	.
Residual		0.001744	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	4	10	17.33	0.0002

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.02399	10	0.41	0.6871	0.05	-0.04351	0.06341	1.0100	0.02423	0.9574	1.0655
50	0.009950	0.02399	10	0.41	0.6871	0.05	-0.04351	0.06341	1.0100	0.02423	0.9574	1.0655
100	0.009950	0.02399	10	0.41	0.6871	0.05	-0.04351	0.06341	1.0100	0.02423	0.9574	1.0655
200	-0.1508	0.02600	10	-5.80	0.0002	0.05	-0.2088	-0.09289	0.8600	0.02236	0.8116	0.9113
300	-0.2107	0.02679	10	-7.87	<.0001	0.05	-0.2704	-0.1510	0.8100	0.02170	0.7631	0.8598

Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-833E-19	0.03393	10	-0.00	1.0000	0.05	-0.07560	0.07560
100	0	-833E-19	0.03393	10	-0.00	1.0000	0.05	-0.07560	0.07560
200	0	-0.1608	0.03538	10	-4.54	0.0011	0.05	-0.2396	-0.08194
300	0	-0.2207	0.03596	10	-6.14	0.0001	0.05	-0.3008	-0.1405

AEH-12-PSEUDO-00

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=CCF time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	4	0 50 100 200

Number of Observations Read	12
Number of Observations Used	12

Dimensions	
Covariance Parameters	1
Columns in X	5
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	12

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	4
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	9.3247610106	.	1.304543

AEH-12-PSEUDO-03

1	0	3	9.0868311979	0.23792981	0.176128
2	0	3	9.0646896497	0.02214155	0.016311
3	0	3	9.064139891	0.00054976	0.000528
4	0	3	9.064139393	0.00000050	4.974E-7

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	18.13
AIC (smaller is better)	26.13
AICC (smaller is better)	31.84
BIC (smaller is better)	28.07
CAIC (smaller is better)	32.07
HQIC (smaller is better)	25.41
Pearson Chi-Square	0.39
Pearson Chi-Square / DF	0.05

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-2.3716	0.4171	8	-5.69	0.0005
treat	0	2.3815	0.4359	8	5.46	0.0006
treat	50	2.3657	0.4362	8	5.42	0.0006
treat	100	1.6791	0.4543	8	3.70	0.0061
treat	200	0	.	.	.	.
Residual		0.04870	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	3	8	13.20	0.0018

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.1268	8	0.08	0.9394	0.05	-0.2824	0.3023	1.0100	0.1281	0.7540	1.3530
50	-0.00589	0.1278	8	-0.05	0.9644	0.05	-0.3006	0.2888	0.9941	0.1270	0.7404	1.3348
100	-0.6924	0.1801	8	-3.84	0.0049	0.05	-1.1078	-0.2771	0.5004	0.09013	0.3303	0.7580
200	-2.3716	0.4171	8	-5.69	0.0005	0.05	-3.3333	-1.4098	0.09333	0.03893	0.03567	0.2442

Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper

50	0	-0.01584	0.1800	8	-0.09	0.9320	0.05	-0.4310	0.3993
100	0	-0.7024	0.2203	8	-3.19	0.0128	0.05	-1.2103	-0.1944
200	0	-2.3815	0.4359	8	-5.46	0.0006	0.05	-3.3867	-1.3763

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AEH-12-PSEUDO-03

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=LMB time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	5	0 50 100 200 300

Number of Observations Read	15
Number of Observations Used	15

Dimensions	
Covariance Parameters	1
Columns in X	6
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	15

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	5
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	12.572124653	.	1.446897
.	.	.			

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1	0	3	12.366390592	0.20573406	0.1568	
2	0	3	12.351036008	0.01535458	0.013166	
3	0	3	12.350798975	0.00023703	0.000231	
4	0	3	12.350798898	0.00000008	7.647E-8	

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	24.70
AIC (smaller is better)	34.70
AICC (smaller is better)	41.37
BIC (smaller is better)	38.24
CAIC (smaller is better)	43.24
HQIC (smaller is better)	34.66
Pearson Chi-Square	0.14
Pearson Chi-Square / DF	0.01

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-2.1484	0.2026	10	-10.60	<.0001
treat	0	2.1584	0.2140	10	10.08	<.0001
treat	50	2.1584	0.2140	10	10.08	<.0001
treat	100	2.1076	0.2146	10	9.82	<.0001
treat	200	1.6787	0.2207	10	7.60	<.0001
treat	300	0	.	.	.	.
Residual		0.01437	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	4	10	30.94	<.0001

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.06887	10	0.14	0.8880	0.05	-0.1435	0.1634	1.0100	0.06956	0.8663	1.1775
50	0.009950	0.06887	10	0.14	0.8880	0.05	-0.1435	0.1634	1.0100	0.06956	0.8663	1.1775
100	-0.04082	0.07064	10	-0.58	0.5761	0.05	-0.1982	0.1166	0.9600	0.06782	0.8202	1.1236
200	-0.4698	0.08754	10	-5.37	0.0003	0.05	-0.6648	-0.2747	0.6252	0.05473	0.5144	0.7598
300	-2.1484	0.2026	10	-10.60	<.0001	0.05	-2.5999	-1.6969	0.1167	0.02364	0.07428	0.1832

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Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	0	0.09740	10	0.00	1.0000	0.05	-0.2170	0.2170
100	0	-0.05077	0.09866	10	-0.51	0.6180	0.05	-0.2706	0.1691
200	0	-0.4797	0.1114	10	-4.31	0.0015	0.05	-0.7279	-0.2315
300	0	-2.1584	0.2140	10	-10.08	<.0001	0.05	-2.6353	-1.6815

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=LST time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	3	0 50 200

Number of Observations Read	7
Number of Observations Used	7

Dimensions	
Covariance Parameters	1
Columns in X	4
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	7

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	3
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	4.4582636909	.	0.863605

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1	0	3	4.2225535984	0.23571009	0.166849
2	0	3	4.1961996905	0.02635391	0.021398
3	0	3	4.1952506244	0.00094907	0.000874
4	0	3	4.1952462253	0.00000440	4.364E-6

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	8.39
AIC (smaller is better)	14.39
AICC (smaller is better)	22.39
BIC (smaller is better)	14.23
CAIC (smaller is better)	17.23
HQIC (smaller is better)	12.38
Pearson Chi-Square	0.09
Pearson Chi-Square / DF	0.02

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-2.8538	0.6321	4	-4.51	0.0107
treat	0	2.8638	0.6381	4	4.49	0.0109
treat	50	0.7876	0.6784	4	1.16	0.3102
treat	200	0	.	.	.	.
Residual		0.02303	.	.	.	.

Typo III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	2	4	40.13	0.0023

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.08717	4	0.11	0.9146	0.05	-0.2321	0.2520	1.0100	0.08805	0.7929	1.2866
50	-2.0662	0.2462	4	-8.39	0.0011	0.05	-2.7497	-1.3827	0.1267	0.03118	0.06395	0.2509
200	-2.8538	0.6321	4	-4.51	0.0107	0.05	-4.6089	-1.0987	0.05762	0.03643	0.009962	0.3333

Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-2.0761	0.2611	4	-7.95	0.0014	0.05	-2.8012	-1.3511
200	0	-2.8638	0.6381	4	-4.49	0.0109	0.05	-4.6355	-1.0921

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Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species AEH-12-PSEUDO-03

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=RBT time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	3	0 50 100

Number of Observations Read	8
Number of Observations Used	8

Dimensions	
Covariance Parameters	1
Columns in X	4
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	8

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	3
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	5.4495820165	.	0.959359

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1	0	3	5.2609363248	0.18864569	0.145482
2	0	3	5.2503382856	0.01059804	0.009496
3	0	3	5.2502490486	0.00008924	0.000088
4	0	3	5.2502490358	0.00000001	1.283E-8

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics	
-2 Log Likelihood	10.50
AIC (smaller is better)	16.50
AICC (smaller is better)	22.50
BIC (smaller is better)	16.74
CAIC (smaller is better)	19.74
HQIC (smaller is better)	14.89
Pearson Chi-Square	0.33
Pearson Chi-Square / DF	0.07

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-2.0025	0.4966	5	-4.03	0.0100
treat	0	2.0124	0.5183	5	3.88	0.0116
treat	50	0.6338	0.5778	5	1.10	0.3227
treat	100	0	.	.	.	.
Residual		0.06659	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	2	5	14.40	0.0084

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.1483	5	0.07	0.9491	0.05	-0.3711	0.3910	1.0100	0.1497	0.6899	1.4785
50	-1.3687	0.2954	5	-4.63	0.0057	0.05	-2.1279	-0.6094	0.2544	0.07515	0.1191	0.5437
100	-2.0025	0.4966	5	-4.03	0.0100	0.05	-3.2791	-0.7258	0.1350	0.06705	0.03766	0.4839

Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-1.3786	0.3305	5	-4.17	0.0087	0.05	-2.2282	-0.5291
100	0	-2.0124	0.5183	5	-3.88	0.0116	0.05	-3.3447	-0.6801

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AEH-12-PSEUDO-03

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=SMB time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	5	0 50 100 200 300

Number of Observations Read	14
Number of Observations Used	14

Dimensions	
Covariance Parameters	1
Columns in X	6
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	14

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	5
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	12.06021765	.	1.351816

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1	0	3	11.904099196	0.15611845	0.126334
2	0	3	11.897716164	0.00638303	0.005854
3	0	3	11.897686772	0.00002939	0.000029
4	0	3	11.897686771	0.00000000	7.63E-10

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics	
-2 Log Likelihood	23.80
AIC (smaller is better)	33.80
AICC (smaller is better)	41.30
BIC (smaller is better)	36.99
CAIC (smaller is better)	41.99
HQIC (smaller is better)	33.50
Pearson Chi-Square	0.44
Pearson Chi-Square / DF	0.05

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-1.6809	0.2962	9	-5.67	0.0003
treat	0	1.6908	0.3224	9	5.25	0.0005
treat	50	1.6573	0.3232	9	5.13	0.0006
treat	100	1.6197	0.3242	9	5.00	0.0007
treat	200	1.2688	0.3532	9	3.59	0.0058
treat	300	0	.	.	.	.
Residual		0.04901	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	4	9	7.89	0.0052

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.1272	9	0.08	0.9394	0.05	-0.2778	0.2977	1.0100	0.1285	0.7575	1.3467
50	-0.02361	0.1293	9	-0.18	0.8592	0.05	-0.3162	0.2690	0.9767	0.1263	0.7289	1.3086
100	-0.06113	0.1318	9	-0.46	0.6538	0.05	-0.3592	0.2370	0.9407	0.1240	0.6982	1.2674
200	-0.4121	0.1924	9	-2.14	0.0608	0.05	-0.8472	0.02307	0.6623	0.1274	0.4286	1.0233
300	-1.6809	0.2962	9	-5.67	0.0003	0.05	-2.3509	-1.0108	0.1862	0.05516	0.09528	0.3639

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Differences of treat Least Squares Means

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-0.03356	0.1814	9	-0.19	0.8573	0.05	-0.4439	0.3768
100	0	-0.07108	0.1831	9	-0.39	0.7070	0.05	-0.4854	0.3432
200	0	-0.4220	0.2306	9	-1.83	0.1005	0.05	-0.9437	0.09963
300	0	-1.6908	0.3224	9	-5.25	0.0005	0.05	-2.4200	-0.9616

Performed by K. Weber using SAS version 9.4 at 08:16 on 01APR15

KW 1APR15

AEH-12-PSEUDO-03

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=WAE time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	5	0 50 100 200 300

Number of Observations Read	15
Number of Observations Used	15

Dimensions	
Covariance Parameters	1
Columns in X	6
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	15

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	5
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	13.074070471	.	1.378795

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1	0	3	12.961474432	0.11259604	0.098126
2	0	3	12.95968452	0.00178991	0.001725
3	0	3	12.959683024	0.00000150	1.494E-6

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	25.92
AIC (smaller is better)	35.92
AICC (smaller is better)	42.59
BIC (smaller is better)	39.46
CAIC (smaller is better)	44.46
HQIC (smaller is better)	35.88
Pearson Chi-Square	0.12
Pearson Chi-Square / DF	0.01

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-1.2292	0.1165	10	-10.55	<.0001
treat	0	1.2225	0.1328	10	9.22	<.0001
treat	50	1.2055	0.1329	10	9.07	<.0001
treat	100	1.0588	0.1353	10	7.83	<.0001
treat	200	0.8629	0.1390	10	6.21	0.0001
treat	300	0	.	.	.	.
Residual		0.01192	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	4	10	24.98	<.0001

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	-0.00669	0.06325	10	-0.11	0.9179	0.05	-0.1476	0.1342	0.9933	0.06283	0.8628	1.1437
50	-0.02361	0.06379	10	-0.37	0.7190	0.05	-0.1657	0.1185	0.9767	0.06230	0.8473	1.1258
100	-0.1704	0.06864	10	-2.48	0.0324	0.05	-0.3233	-0.01745	0.8433	0.05789	0.7237	0.9827
200	-0.3662	0.07571	10	-4.84	0.0007	0.05	-0.5349	-0.1976	0.6933	0.05249	0.5857	0.8207
300	-1.2292	0.1165	10	-10.55	<.0001	0.05	-1.4888	-0.9695	0.2925	0.03409	0.2256	0.3793

Differences of treat Least Squares Means

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treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-0.01692	0.08983	10	-0.19	0.8544	0.05	-0.2171	0.1832
100	0	-0.1637	0.09334	10	-1.75	0.1100	0.05	-0.3717	0.04427
200	0	-0.3596	0.09865	10	-3.64	0.0045	0.05	-0.5794	-0.1398
300	0	-1.2225	0.1326	10	-9.22	<.0001	0.05	-1.5179	-0.9270

Performed by K. Weber using SAS version 9.4 at 08:16 on 01APR15

dw 1APR15

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species

Logistic Model: Fish survival

The GLIMMIX Procedure

sps=YEP time=22

Model Information	
Data Set	WORK.FISH3
Response Variable	sur
Response Distribution	Poisson
Link Function	Log
Variance Function	Default
Variance Matrix	Diagonal
Estimation Technique	Maximum Likelihood
Degrees of Freedom Method	Residual

Class Level Information		
Class	Levels	Values
treat	5	0 50 100 200 300

Number of Observations Read	15
Number of Observations Used	15

Dimensions	
Covariance Parameters	1
Columns in X	6
Columns in Z	0
Subjects (Blocks in V)	1
Max Obs per Subject	15

Optimization Information	
Optimization Technique	Newton-Raphson
Parameters in Optimization	5
Lower Boundaries	0
Upper Boundaries	0
Fixed Effects	Not Profiled

Iteration History					
Iteration	Restarts	Evaluations	Objective Function	Change	Max Gradient
0	0	4	13.558132174	.	1.309237

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1	0	3	13.47249666	0.08563551	0.077 57
2	0	3	13.471769791	0.00072687	0.000713
3	0	3	13.471769616	0.00000018	1.752E-7

Convergence criterion (ABSGCONV=0.00001) satisfied.

Fit Statistics	
-2 Log Likelihood	26.94
AIC (smaller is better)	36.94
AICC (smaller is better)	43.61
BIC (smaller is better)	40.48
CAIC (smaller is better)	45.48
HQIC (smaller is better)	36.91
Pearson Chi-Square	0.06
Pearson Chi-Square / DF	0.01

Parameter Estimates

Effect	treat	Estimate	Standard Error	DF	t Value	Pr > |t|
Intercept		-0.9522	0.07120	10	-13.37	<.0001
treat	0	0.9621	0.06371	10	11.49	<.0001
treat	50	0.9286	0.08410	10	11.04	<.0001
treat	100	0.9114	0.08431	10	10.81	<.0001
treat	200	0.6470	0.08789	10	7.36	<.0001
treat	300	0	.	.	.	.
Residual		0.005870	.	.	.	.

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
treat	4	10	40.72	<.0001

treat Least Squares Means

treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper	Mean	Standard Error Mean	Lower Mean	Upper Mean
0	0.009950	0.04401	10	0.23	0.8257	0.05	-0.08812	0.1080	1.0100	0.04445	0.9157	1.1141
50	-0.02361	0.04476	10	-0.53	0.6094	0.05	-0.1233	0.07612	0.9767	0.04371	0.8840	1.0791
100	-0.04082	0.04514	10	-0.90	0.3871	0.05	-0.1414	0.05977	0.9600	0.04334	0.8681	1.0616
200	-0.3052	0.05152	10	-5.92	0.0001	0.05	-0.4200	-0.1904	0.7370	0.03797	0.6571	0.8266
300	-0.9522	0.07120	10	-13.37	<.0001	0.05	-1.1108	-0.7935	0.3859	0.02748	0.3293	0.4523

Differences of treat Least Squares Means

AEH-12-PSEUDO-03

treat	treat	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
50	0	-0.03356	0.06277	10	-0.53	0.6046	0.05	-0.1734	0.1063
100	0	-0.05077	0.06305	10	-0.81	0.4394	0.05	-0.1913	0.08971
200	0	-0.3151	0.06776	10	-4.65	0.0009	0.05	-0.4661	-0.1642
300	0	-0.9621	0.08371	10	-11.49	<.0001	0.05	-1.1486	-0.7756

Performed by K. Weber using SAS version 9.4 at 08:16 on 01APR15

CW 1APR15

FF # 29
Item No. 37
Pg 48 of 48

```
DM 'LOG; CLEAR; OUTPUT; CLEAR;';    /* clears output and log when code is run */
FOOTNOTE1 'Performed by K. Weber using SAS version   "&SYSVER" ' at ' "&SYSTIME" ' on ' "&SYSDATE";
options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
title1 h=1 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species';
title2 h=1 'Statistical analysis of fish survival following 24-h flow-through exposure to various conc
title3 h=0.5 'Study number AEH-12-PSEUDO-03';


/*****************************************
* SAS ver 9.4 Analysis prepared by: KLW
* Analysis completion date: 1APR15
*****************************************/
/*************************************************************************************************
* Variable Names:
* sps = Fish species code
* did = Diluter chamber ID
* hid = Holding chamber ID
* treat = nominal exposure concentration (in mg/L)
* conc = actual exposure concentration over all sampling times for each chamber (in mg/L)
* time = cumulative mortality time
*   0 = end of exposure period
*   7 = 7 days post-exposure
*   14 = 14 days post-exposure
*   22 = 22 days post-exposure (end of observation period
* emort = Exposure period mortalities
* ar = number of animals at risk
*       Time 0 = all animals in exposure chamber during exposure
*        Time 7, 14 and 22 = number at potential risk for entire 22-d period
*                                    (histo samples and incidental mortalities removed)
* hmort = cumulative holding mortality to time period
* cmort = cumulative mort (emort + hmort)
*************************************************************************************************/
data fish2; set Pseudo03.mortality2;
per_sur = (ar-cmort)/ar*100;
sur=((ar-cmort)/ar)+0.01;
run;

data fish3; set fish2;
if time ne 22 then delete;
if ar = cmort then delete;
run;

proc sort data=fish2; by sps time treat; run;
proc print data=fish2; run;

proc means data = fish2 mean std clm fw=8;
by sps;
class time treat;
var per_sur;
run;

title2 'Logistic Model: Fish survival';
proc glimmix data = fish3;
by sps time;
class treat;
model sur = treat / d = poisson link = log s or;
```

FF # 29
Item No. 38
Pg 1 of 2

```
lsmeans treat / pdiff=control('0') cl ilink or;
random _residual_;
run;
```

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FF # 29
Item No. 38
Pg 2 of 2

```
1    DM 'LOG; CLEAR; OUTPUT; CLEAR;';    /* clears output and log when code is run */
2    FOOTNOTE1 'Performed by K. Weber using SAS version ' "&SYSVER" ' at ' "&SYSTIME" ' on '
2 !  "&SYSDATE";
3    options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
4    title1 h=1 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish
4 !  species';
5    title2 h=1 'Statistical analysis of fish survival following 24-h flow-through exposure to
5 !  various concentrations of Pf-CL145A';
6    title3 h=0.5 'Study number AEH-12-PSEUDO-03';
7
8
9    /*****************************************
10   * SAS ver 9.4 Analysis prepared by: KLW
11   * Analysis completion date: 1APR15
12   *****************************************/
13   /*************************************************************************************************
13 ! *************
14   * Variable Names:
14 !             *
15   * sps = Fish species code
15 !             *
16   * did = Diluter chamber ID
16 !             *
17   * hid = Holding chamber ID
17 !             *
18   * treat = nominal exposure concentration (in mg/L)
18 !             *
19   * conc = actual exposure concentration over all sampling times for each chamber (in mg/L)
19 !             *
20   * time = cumulative mortality time
20 !             *
21   *   0 = end of exposure period
21 !             *
22   *   7 = 7 days post-exposure
22 !             *
23   *   14 = 14 days post-exposure
23 !             *
24   *   22 = 22 days post-exposure (end of observation period
24 !             *
25   * emort = Exposure period mortalities
25 !             *
26   * ar = number of animals at risk
26 !             *
27   *       Time 0 = all animals in exposure chamber during exposure
27 !             *
28   *        Time 7, 14 and 22 = number at potential risk for entire 22-d period
28 !             *
29   *                                        (histo samples and incidental mortalities removed)
29 !             *
30   * hmort = cumulative holding mortality to time period
30 !             *
31   * cmort = cumulative mort (emort + hmort)
31 !             *
32   *************************************************************************************************
32 ! *************/
33   data fish2; set Pseudo03.mortality2;
```

FF # 29
Item No. 39
Pg 1 of 3

```
34   per_sur = (ar-cmort)/ar*100;
35   sur=((ar-cmort)/ar)+0.01;
36   run;

NOTE: There were 536 observations read from the data set PSEUDO03.MORTALITY2.
NOTE: The data set WORK.FISH2 has 536 observations and 12 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


37
38   data fish3; set fish2;
39   if time ne 22 then delete;
40   if ar = cmort then delete;
41   run;

NOTE: There were 536 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH3 has 113 observations and 12 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


42
43   proc sort data=fish2; by sps time treat; run;

NOTE: There were 536 observations read from the data set WORK.FISH2.
NOTE: The data set WORK.FISH2 has 536 observations and 12 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


44   proc print data=fish2; run;
NOTE: Writing HTML Body file: sashtml.htm

NOTE: There were 536 observations read from the data set WORK.FISH2.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           2.95 seconds
      cpu time            0.93 seconds


45
46   proc means data = fish2 mean std clm fw=8;
47   by sps;
48   class time treat;
49   var per_sur;
50   run;

NOTE: There were 536 observations read from the data set WORK.FISH2.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.17 seconds
      cpu time            0.09 seconds
```

```
51
52   title2 'Logistic Model: Fish survival ;
53   proc glimmix data = fish3;
54   by sps time;
55   class treat;
56   model sur = treat / d = poisson link = log s or;
57   lsmeans treat / pdiff=control('0') cl ilink or;
58   random _residual_;
59   run;

NOTE: Odds ratios are computed only for the logit, cumulative logit, or the generalized logit
      link function.


NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=BKT time=22
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: The above message was for the following BY group:
      sps=BLG time=22
NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=CCF time=22
NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=LMB time=22
NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=LST time=22
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: The above message was for the following BY group:
      sps=RBT time=22
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: The above message was for the following BY group:
      sps=SMB time=22
NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=WAE time=22
NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.
NOTE: The above message was for the following BY group:
      sps=YEP time=22
NOTE: PROCEDURE GLIMMIX used (Total process time):
      real time           0.60 seconds
      cpu time            0.42 seconds
```

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FF # 29
Item No. 39
Pg 3 of 3

Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species
Determination of LC50 following 24-h flow-through exposure to various concentrations of Pf-CL145A
Study number AEH-12-PSEUDO-03
SAS v. 9.3 Analysis Completion Date: 29APR2015 Analysis prepared by: JAL

Data set for 22-day post-treatment LC50 calculation with Probit Analysis (RBT, BKT, YEP, LST, SMB, BLG, and CCF)

Obs	sps	did	hid	treat	conc	time	emort	ar	hmort	cmort
1	BKT	C1	E1	0	-0.4	22	0	20	0	0
2	BKT	B5	E7	0	0.0	22	0	20	0	0
3	BKT	A4	E13	0	0.2	22	0	20	0	0
4	BKT	A2	E9	50	36.3	22	0	20	0	0
5	BKT	C5	E5	50	41.6	22	0	20	0	0
6	BKT	B3	E3	50	43.0	22	0	20	0	0
7	BKT	A3	E2	100	70.6	22	0	20	5	5
8	BKT	C2	E11	100	73.8	22	0	20	8	8
9	BKT	B2	E6	100	96.0	22	0	20	9	9
10	BKT	A5	E10	200	161.3	22	0	19	13	13
11	BKT	C4	E15	200	167.0	22	0	20	14	14
12	BKT	B4	E8	200	172.5	22	0	20	17	17
13	BKT	A1	E12	300	235.2	22	0	20	20	20
14	BKT	C3	E4	300	242.8	22	0	20	20	20
15	BKT	B1	E14	300	255.3	22	0	20	20	20
16	BLG	A1	E11	0	-0.7	22	0	20	0	0
17	BLG	B3	E14	0	-0.2	22	0	20	0	0
18	BLG	C2	E10	0	-0.1	22	0	20	0	0
19	BLG	B4	E12	50	32.4	22	0	19	0	0
20	BLG	A4	E13	50	34.7	22	0	20	0	0
21	BLG	C1	E7	50	36.4	22	0	20	0	0
22	BLG	A2	E1	100	63.0	22	0	20	0	0
23	BLG	C4	E4	100	63.6	22	0	20	0	0
24	BLG	B2	E6	100	77.1	22	0	20	0	0
25	BLG	C5	E5	200	130.6	22	0	20	2	2
26	BLG	B1	E15	200	140.3	22	0	20	5	5
27	BLG	A5	E9	200	143.2	22	0	20	2	2
28	BLG	C3	E3	300	205.1	22	1	20	3	4
29	BLG	B5	E8	300	214.4	22	1	20	3	4
30	BLG	A3	E2	300	218.2	22	0	20	4	4

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Item No. 40
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31	CCF	B5	E3	0	-1.5	22	0	30	0	0
32	CCF	A4	E8	0	-1.3	22	0	20	0	0
33	CCF	C3	E10	0	0.5	22	0	20	0	0
34	CCF	A2	E2	50	26.1	22	0	20	0	0
35	CCF	B4	E4	50	27.4	22	1	21	0	1
36	CCF	C5	E11	50	37.3	22	0	20	0	0
37	CCF	A5	E9	100	49.9	22	1	20	3	4
38	CCF	C2	E5	100	62.3	22	0	20	15	15
39	CCF	B3	E7	100	65.6	22	1	19	10	11
40	CCF	A3	E13	200	119.8	22	0	20	19	19
41	CCF	C1	E1	200	122.9	22	0	20	17	17
42	CCF	B2	E12	200	127.8	22	1	20	18	19
43	CCF	A1	E15	300	183.2	22	23	25	2	25
44	CCF	B1	E14	300	193.9	22	11	15	4	15
45	CCF	C4	E6	300	200.5	22	23	25	2	25
46	LST	B5	G8	0	-0.5	22	0	20	0	0
47	LST	A4	G4	0	-0.4	22	0	20	0	0
48	LST	C4	G10	0	-0.3	22	0	20	0	0
49	LST	B3	G2	50	32.7	22	0	20	16	16
50	LST	A5	G6	50	33.0	22	0	20	19	19
51	LST	C1	G5	50	42.4	22	0	20	18	18
52	LST	A1	G7	100	67.8	22	0	20	20	20
53	LST	C5	G11	100	74.5	22	0	20	20	20
54	LST	B2	G1	100	77.9	22	0	20	20	20
55	LST	C2	G12	200	146.2	22	2	20	18	20
56	LST	B4	G15	200	150.1	22	4	20	16	20
57	LST	A2	G13	200	153.2	22	5	21	16	20
58	LST	B1	G9	300	221.4	22	6	21	15	21
59	LST	C3	G14	300	222.1	22	15	25	10	25
60	LST	A3	G3	300	226.1	22	12	22	10	22
61	RBT	A1	E11	0	-3.0	22	0	20	0	0
62	RBT	B2	E3	0	-2.5	22	0	20	0	0
63	RBT	C4	E13	0	-1.8	22	0	20	0	0
64	RBT	A2	E10	50	31.8	22	0	20	11	11
65	RBT	C2	E6	50	31.9	22	0	15	13	13

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	RBT	B5	E1	50	34.7	22	0	20	17	17
67	RBT	C1	E9	100	59.2	22	0	20	19	19
68	RBT	A5	E12	100	59.6	22	0	20	20	20
69	RBT	B1	E5	100	77.8	22	0	20	16	16
70	RBT	A3	E15	200	134.0	22	0	20	20	20
71	RBT	C3	E7	200	134.9	22	0	25	25	25
72	RBT	B3	E4	200	136.1	22	0	20	20	20
73	RBT	A4	E14	300	197.3	22	0	20	20	20
74	RBT	B4	E8	300	198.0	22	0	20	20	20
75	RBT	C5	E2	300	199.8	22	1	21	20	21
76	SMB	A2	D6	0	0.0	22	0	20	0	0
77	SMB	B1	D15	0	0.0	22	0	20	0	0
78	SMB	C1	D7	0	0.0	22	0	20	0	0
79	SMB	B5	D8	50	30.6	22	0	20	0	0
80	SMB	A3	D3	50	32.2	22	0	20	2	2
81	SMB	C3	D2	50	37.5	22	0	20	0	0
82	SMB	A1	D1	100	62.6	22	0	19	0	0
83	SMB	C2	D11	100	63.0	22	0	19	3	3
84	SMB	B3	D4	100	74.1	22	0	20	1	1
85	SMB	C5	D12	200	127.5	22	12	22	0	12
86	SMB	B2	D5	200	142.0	22	0	20	3	3
87	SMB	C4	D13	300	205.9	22	10	22	4	14
88	SMB	B4	D14	300	214.1	22	18	25	6	24
89	SMB	A5	D9	300	223.6	22	15	24	6	21
90	YEP	B3	G5	0	-0.5	22	0	20	0	0
91	YEP	A4	G8	0	0.4	22	0	19	0	0
92	YEP	C1	G4	0	0.8	22	0	20	0	0
93	YEP	B1	G14	50	31.0	22	1	20	0	1
94	YEP	C2	G11	50	32.6	22	0	20	0	0
95	YEP	A3	G1	50	35.9	22	1	20	0	1
96	YEP	C3	G15	100	59.7	22	0	20	0	0
97	YEP	A2	G9	100	67.2	22	0	20	1	1
98	YEP	B4	G2	100	71.2	22	1	20	1	2
99	YEP	B2	G12	200	134.7	22	6	21	0	6
100	YEP	C5	G3	200	134.7	22	4	20	0	4

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	YEP	A5	G10	200	145.1	22	5	21	2	7
102	YEP	C4	G13	300	196.3	22	9	21	5	14
103	YEP	B5	G7	300	201.7	22	12	22	3	15
104	YEP	A1	G6	300	219.7	22	6	21	5	11

AEH-12-PSEUDO-03

Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=BKT

AEH-12-PSEUDO-03

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-179.52512	0	0
1	0	-133.28181	-1.583143455	0.8525449624
2	0	-98.287028	-4.428234099	2.2467834022
3	0	-79.934694	-8.165205895	4.0677479079
4	0	-78.444429	-9.619668317	4.7679072583
5	0	-78.416228	-9.855877115	4.8807230258
6	0	-78.416214	-9.861411564	4.8833573046
7	0	-78.416214	-9.861411564	4.8833573046

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	13	
Number of Events	126	
Number of Trials	259	
Name of Distribution	Normal	
Log Likelihood	-78.41621354	

Number of Observations Read	15
Number of Observations Used	13
Number of Events	126
Number of Trials	259

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

Last Evaluation of the Negative

of the Gradient	
Intercept	Log10(conc)
5.9898154E-6	6.6250116E-6

AEH-12-PSEUDO-03

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	78.531856436	161.05747261
Log10(conc)	161.05747261	334.32814477

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	12.5544	11	1.1413	0.3234
L.R. Chi-Square	14.8512	11	1.3501	0.1894

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	13

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	95.9271	<.0001

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-9.8614	1.0288	-11.8777	-7.8451	91.89	<.0001
Log10(conc)	1	4.8834	0.4986	3.9061	5.8606	95.93	<.0001

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.01939177	0.20477715

Estimated Covariance Matrix for Tolerance

Parameters		
	MU	SIGMA
MU	0.000544	-0.000067
SIGMA	-0.000067	0.000437

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Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

AEH-12-PSEUDO-03

sps=BKT

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	1.54301	1.40630	1.63734
0.02	1.59883	1.47502	1.68493
0.03	1.63425	1.51849	1.71525
0.04	1.66089	1.55111	1.73814
0.05	1.68256	1.57758	1.75682
0.06	1.70101	1.60007	1.77276
0.07	1.71718	1.61975	1.78678
0.08	1.73167	1.63733	1.79937
0.09	1.74484	1.65329	1.81085
0.10	1.75696	1.66795	1.82145
0.15	1.80715	1.72830	1.86567
0.20	1.84705	1.77576	1.90133
0.25	1.88127	1.81600	1.93239
0.30	1.91201	1.85167	1.96075
0.35	1.94049	1.88425	1.98752
0.40	1.96751	1.91465	2.01342
0.45	1.99366	1.94353	2.03901
0.50	2.01939	1.97139	2.06477
0.55	2.04512	1.99864	2.09113
0.60	2.07127	2.02570	2.11854
0.65	2.09830	2.05300	2.14755
0.70	2.12678	2.08108	2.17880
0.75	2.15751	2.11067	2.21326
0.80	2.19174	2.14285	2.25238
0.85	2.23163	2.17953	2.29881
0.90	2.28182	2.22471	2.35821
0.91	2.29395	2.23550	2.37268
0.92	2.30712	2.24716	2.38845

0.93	2.32160	2.25994	2.40585
0.94	2.33777	2.27415	2.42534
0.95	2.35622	2.29029	2.44763
0.96	2.37789	2.30917	2.47390
0.97	2.40454	2.33227	2.50631
0.98	2.43995	2.36283	2.54954
0.99	2.49577	2.41071	2.61796

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

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sps=BKT

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	34.91475	25.48619	43.38525
0.02	39.70369	29.85498	48.40962
0.03	43.07727	32.99790	51.91007
0.04	45.80272	35.57191	54.71920
0.05	48.14635	37.80792	57.12371
0.06	50.23538	39.81715	59.25987
0.07	52.14150	41.66266	61.20417
0.08	53.90949	43.38403	63.00424
0.09	55.56941	45.00794	64.69199
0.10	57.14251	46.55331	66.28993
0.15	64.14368	53.49365	73.39611
0.20	70.31484	59.67061	79.67632
0.25	76.08021	65.46412	85.58374
0.30	81.65946	71.06807	91.35958
0.35	87.19407	76.60341	97.16671
0.40	92.79233	82.15853	103.13782
0.45	98.55058	87.80814	109.39856
0.50	104.56631	93.62477	116.08276
0.55	110.94924	99.68834	123.34632
0.60	117.83423	106.09677	131.38450
0.65	125.39973	112.98066	140.45824
0.70	133.89890	120.52700	150.93988
0.75	143.71823	129.02282	163.40140
0.80	155.50221	138.94655	178.80491
0.85	170.46281	151.19274	198.98063
0.90	191.34814	167.76959	228.14215
0.91	196.76496	171.98758	235.87409
0.92	202.82352	176.67065	244.59798

0.93	209.70078	181.94521	254.59411
0.94	217.65762	187.99683	266.27814
0.95	227.10161	195.11409	280.30387
0.96	238.72191	203.78225	297.78558
0.97	253.82555	214.91565	320.85660
0.98	275.39283	230.58179	354.44065
0.99	313.16604	257.45731	414.92037

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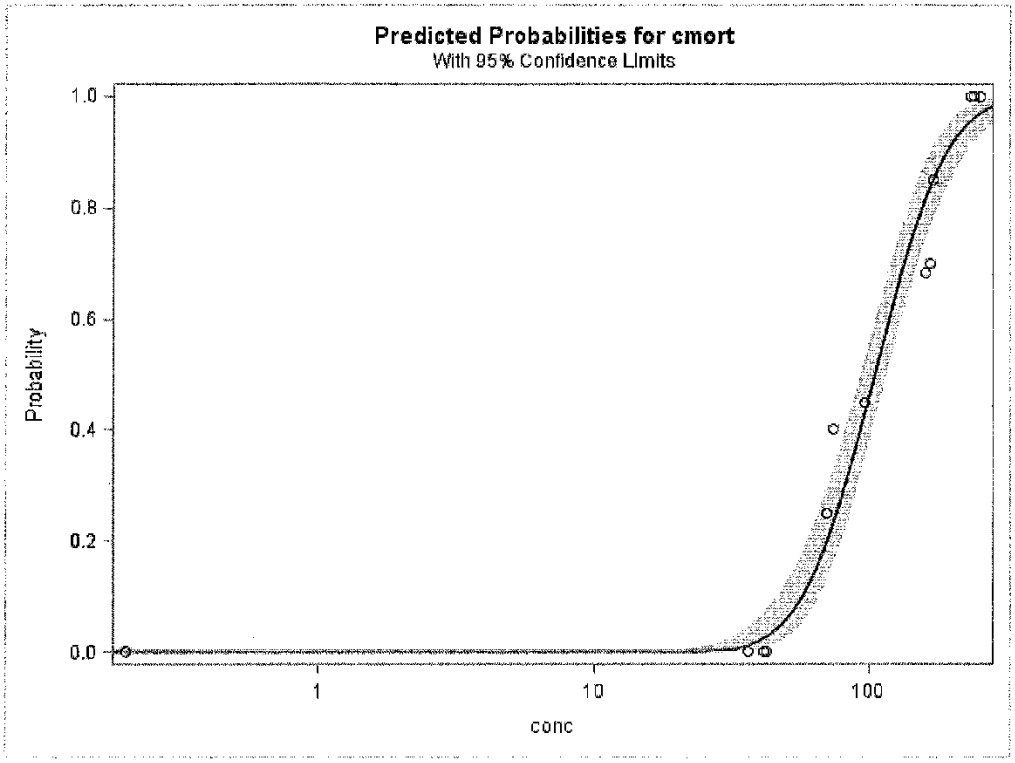

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

AEH-12-PSEUDO-03

sps=BLG

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-165.66218	0	0
1	0	-69.742278	-2.399503324	0.6970042491
2	0	-59.615779	-4.630930992	1.6348279671
3	0	-57.52651	-6.461485832	2.4493779808
4	0	-57.189126	-7.548402329	2.9320837464
5	0	-57.173074	-7.849479468	3.0652547243
6	0	-57.173025	-7.867139702	3.0730490562
7	0	-57.173025	-7.867195689	3.0730737516
8	0	-57.173025	-7.867195689	3.0730737516

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	12	
Number of Events	21	
Number of Trials	239	
Name of Distribution	Normal	
Log Likelihood	-57.17302518	

Number of Observations Read	15
Number of Observations Used	12
Number of Events	21
Number of Trials	239

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

AEH-12-PSEUDO-03

Last Evaluation of the Negative of the Gradient	
Intercept	Log10(conc)
8.046532E-10	1.4287792E-9

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	58.022840697	128.30274158
Log10(conc)	128.30274158	285.12345108

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	6.1590	10	0.6159	0.8017
L.R. Chi-Square	5.7977	10	0.5798	0.8320

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	12

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	13.3592	0.0003

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-7.8672	1.8638	-11.5202	-4.2142	17.82	<.0001
Log10(conc)	1	3.0731	0.8408	1.4252	4.7210	13.36	0.0003

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.56004129	0.32540709

Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.010932	0.008496
SIGMA	0.008496	0.007926

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure AEH-12-PSEUDO-03

sps=BLG

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	1.80303	1.31540	1.96114
0.02	1.89174	1.50264	2.02292
0.03	1.94802	1.62021	2.06335
0.04	1.99036	1.70760	2.09480
0.05	2.02479	1.77768	2.12140
0.06	2.05411	1.83632	2.14505
0.07	2.07981	1.88666	2.16686
0.08	2.10282	1.93061	2.18751
0.09	2.12375	1.96937	2.20750
0.10	2.14302	2.00377	2.22718
0.15	2.22278	2.12786	2.32701
0.20	2.28617	2.20231	2.43052
0.25	2.34056	2.25378	2.53172
0.30	2.38940	2.29451	2.62810
0.35	2.43466	2.32959	2.72006
0.40	2.47760	2.36143	2.80878
0.45	2.51915	2.39134	2.89551
0.50	2.56004	2.42017	2.98146
0.55	2.60093	2.44859	3.06784
0.60	2.64248	2.47714	3.15593
0.65	2.68543	2.50638	3.24724
0.70	2.73068	2.53698	3.34369
0.75	2.77953	2.56981	3.44797
0.80	2.83391	2.60618	3.56427
0.85	2.89730	2.64839	3.70002
0.90	2.97707	2.70128	3.87105
0.91	2.99633	2.71402	3.91238
0.92	3.01726	2.72786	3.95730

0.93	3.04027	2.74306	4.00670
0.94	3.06598	2.76002	4.06189
0.95	3.09529	2.77935	4.12485
0.96	3.12973	2.80204	4.19883
0.97	3.17206	2.82991	4.28982
0.98	3.22835	2.86692	4.41080
0.99	3.31705	2.92517	4.60157

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=BLG

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	63.53766	20.67302	91.44048
0.02	77.93577	31.81551	105.41925
0.03	88.71922	41.70673	115.70329
0.04	97.80378	51.00354	124.39518
0.05	105.87520	59.93557	132.25013
0.06	113.26792	68.59911	139.65277
0.07	120.17342	77.03047	146.84368
0.08	126.71296	85.23298	153.99681
0.09	132.96890	93.18990	161.25125
0.10	139.00017	100.87292	168.72486
0.15	167.02386	134.23235	212.32915
0.20	193.27326	159.33299	269.47601
0.25	219.05720	179.38157	340.18957
0.30	245.13066	197.01897	424.71329
0.35	272.05410	213.59603	524.87876
0.40	300.33113	229.84092	643.84483
0.45	330.48382	246.22697	786.16309
0.50	363.11258	263.13272	958.21696
0.55	398.96278	280.92350	1169
0.60	439.01791	300.00952	1432
0.65	484.64898	320.90807	1767
0.70	537.87943	344.33533	2206
0.75	601.90096	371.37230	2805
0.80	682.19858	403.81315	3667
0.85	789.41262	445.02769	5012
0.90	948.56536	502.66247	7431
0.91	991.59080	517.63305	8173
0.92	1041	534.38888	9064

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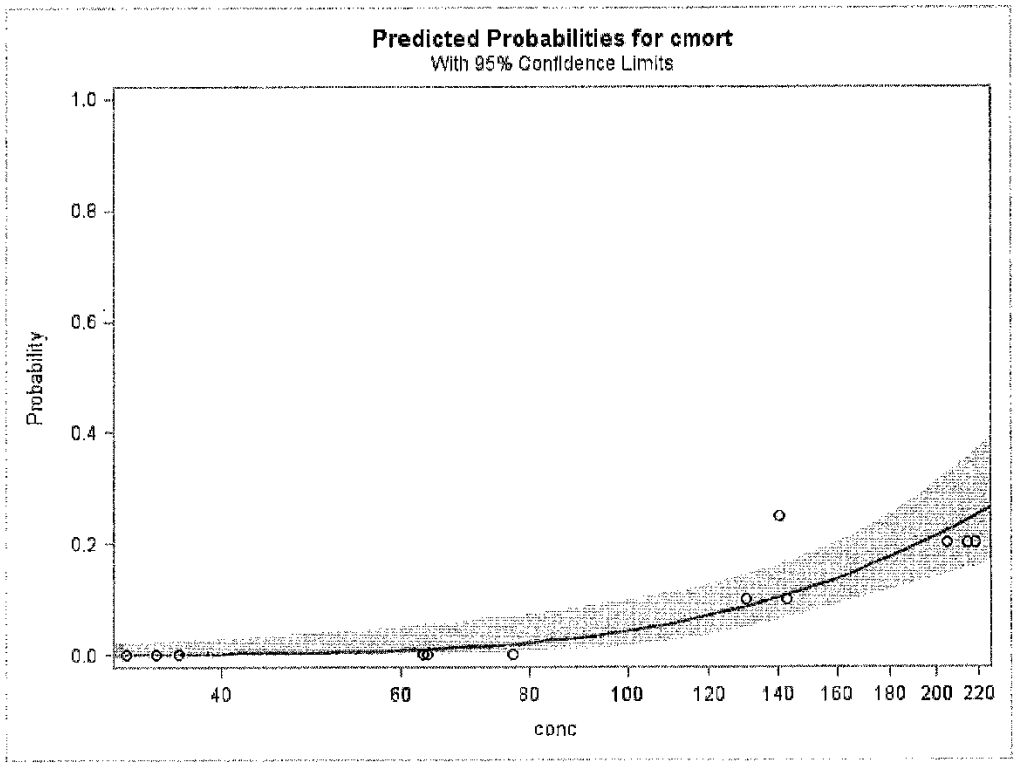
0.93	1097	553.42411	10156
0.94	1164	575.46781	11532
0.95	1245	601.65999	13330
0.96	1348	633.93029	15806
0.97	1486	675.94289	19490
0.98	1692	736.06644	25751
0.99	2075	841.72212	39955



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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=CCF

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-183.684	0	0
1	0	-115.53604	-1.929054014	1.2062323976
2	0	-77.252957	-5.175702587	2.9387678617
3	0	-63.769917	-8.325838884	4.630420941
4	0	-62.223443	-9.798164917	5.4421412334
5	0	-62.169858	-10.13179294	5.6284865907
6	0	-62.169763	-10.1464469	5.6367197221
7	0	-62.169763	-10.14647402	5.6367350088
8	0	-62.169763	-10.14647402	5.6367350088

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	13	
Number of Events	151	
Number of Trials	265	
Name of Distribution	Normal	
Log Likelihood	-62.16976269	

Number of Observations Read	15
Number of Observations Used	13
Number of Events	151
Number of Trials	265

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

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Last Evaluation of the Negative of the Gradient	
Intercept	Log10(conc)
-1.58177E-10	-4.30848E-10

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	62.735768265	114.04731535
Log10(conc)	114.04731535	210.03083352

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	13.8621	11	1.2602	0.2407
L.R. Chi-Square	15.1359	11	1.3760	0.1764

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	13

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	85.9227	<.0001

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-10.1465	1.1126	-12.3272	-7.9657	83.16	<.0001
Log10(conc)	1	5.6367	0.6081	4.4449	6.8286	85.92	<.0001

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
1.80006227	0.17740767

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Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.000505	-0.000037
SIGMA	-0.000037	0.000366

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=CCF

Probit Analysis on Log10(conc)			
Probability	**Log10(conc)**	**95% Fiducial Limits**	
0.01	1.38735	1.26185	1.47255
0.02	1.43571	1.32205	1.51360
0.03	1.46640	1.36011	1.53978
0.04	1.48948	1.38866	1.55956
0.05	1.50825	1.41182	1.57570
0.06	1.52423	1.43148	1.58950
0.07	1.53825	1.44868	1.60164
0.08	1.55079	1.46404	1.61254
0.09	1.56220	1.47798	1.62249
0.10	1.57271	1.49078	1.63168
0.15	1.61619	1.54342	1.67008
0.20	1.65075	1.58474	1.70112
0.25	1.68040	1.61971	1.72822
0.30	1.70703	1.65066	1.75302
0.35	1.73170	1.67887	1.77647
0.40	1.75512	1.70516	1.79919
0.45	1.77777	1.73011	1.82168
0.50	1.80006	1.75414	1.84432
0.55	1.82236	1.77764	1.86749
0.60	1.84501	1.80096	1.89159
0.65	1.86842	1.82450	1.91707
0.70	1.89309	1.84871	1.94451
0.75	1.91972	1.87423	1.97474
0.80	1.94937	1.90201	2.00904
0.85	1.98393	1.93367	2.04974
0.90	2.02742	1.97266	2.10179
0.91	2.03792	1.98197	2.11447
0.92	2.04933	1.99204	2.12829

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0.93	2.06188	2.00306	2.14354
0.94	2.07589	2.01531	2.16062
0.95	2.09187	2.02923	2.18016
0.96	2.11065	2.04551	2.20319
0.97	2.13373	2.06542	2.23160
0.98	2.16441	2.09175	2.26951
0.99	2.21277	2.13299	2.32952

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=CCF

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	24.39778	18.27463	29.68602
0.02	27.27165	20.99167	32.62891
0.03	29.26814	22.91440	34.65615
0.04	30.86577	24.47131	36.27073
0.05	32.22943	25.81176	37.64473
0.06	33.43748	27.00730	38.85960
0.07	34.53390	28.09831	39.96088
0.08	35.54609	29.11007	40.97686
0.09	36.49237	30.05954	41.92645
0.10	37.38567	30.95874	42.82296
0.15	41.32292	34.94792	46.78220
0.20	44.74579	38.43610	50.24813
0.25	47.90740	41.65939	53.48383
0.30	50.93656	44.73618	56.62690
0.35	53.91424	47.73864	59.76801
0.40	56.90056	50.71803	62.97877
0.45	59.94721	53.71624	66.32482
0.50	63.10478	56.77262	69.87407
0.55	66.42867	59.92912	73.70387
0.60	69.98549	63.23570	77.90961
0.65	73.86200	66.75735	82.61749
0.70	78.17987	70.58529	88.00636
0.75	83.12314	74.85740	94.34955
0.80	88.99638	79.80077	102.10420
0.85	96.36814	85.83612	112.13417
0.90	106.51710	93.89982	126.41111
0.91	109.12456	95.93339	130.15763
0.92	112.02959	98.18294	134.36678

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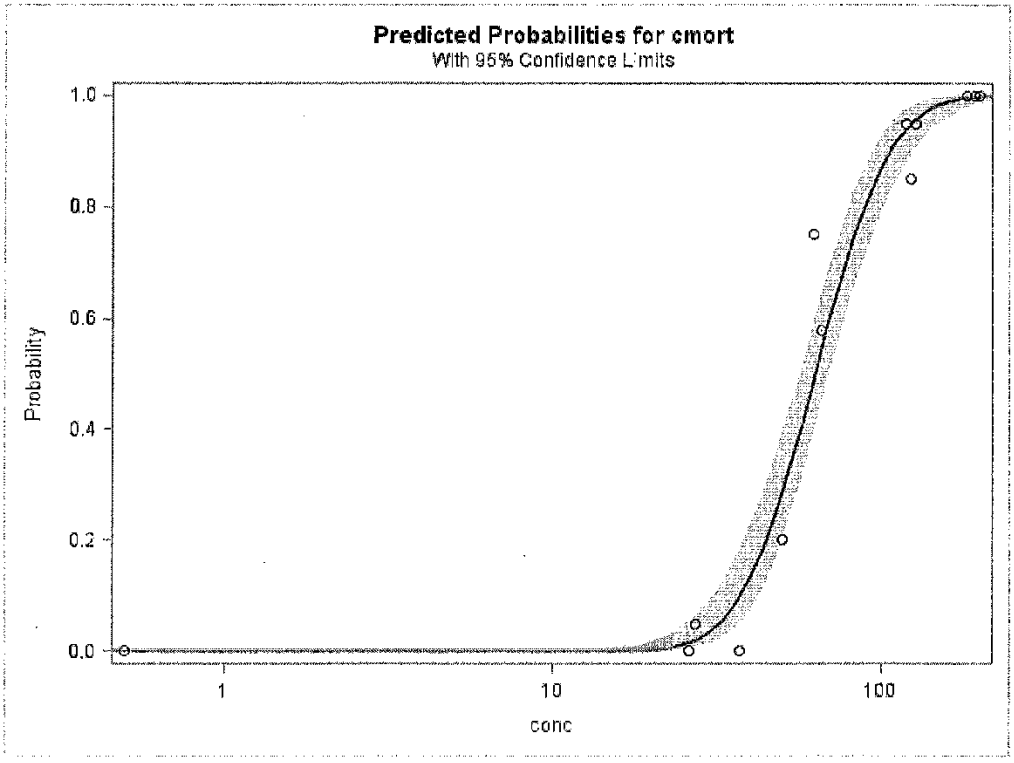
0.93	115.31317	100.70651	139.16726
0.94	119.09431	103.58906	144.74931
0.95	123.55830	106.96231	151.41093
0.96	129.01714	111.04696	159.65764
0.97	136.05969	116.25702	170.45191
0.98	146.02024	123.52339	185.99920
0.99	163.22032	135.82754	213.56074



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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=LST

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-172.59365	0	0
1	0	-46.492984	0.5377607412	0.3178088337
2	0	-32.053808	-0.085115094	0.8967871121
3	0	-29.492736	-1.115500774	1.5615836668
4	0	-29.081731	-1.802608001	1.9905919189
5	0	-29.058635	-2.010553998	2.1213390172
6	0	-29.058527	-2.025824496	2.1309904337
7	0	-29.058527	-2.025901116	2.1310389416
8	0	-29.058527	-2.025901116	2.1310389416

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	12	
Number of Events	241	
Number of Trials	249	
Name of Distribution	Normal	
Log Likelihood	-29.0585268	

Number of Observations Read	15
Number of Observations Used	12
Number of Events	241
Number of Trials	249

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

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Last Evaluation of the Negative of the Gradient	
Intercept	Log10(conc)
-4.895613E-9	-1.057759E-8

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	32.401149575	55.162939477
Log10(conc)	55.162939477	95.744391894

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	13.6052	10	1.3605	0.1918
L.R. Chi-Square	9.1164	10	0.9116	0.5211

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	12

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	8.3084	0.0039

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-2.0259	1.2709	-4.5168	0.4650	2.54	0.1109
Log10(conc)	1	2.1310	0.7393	0.6820	3.5801	8.31	0.0039

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
0.95066358	0.46925468

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Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.074830	-0.042463
SIGMA	-0.042463	0.026503

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=LST

Probit Analysis on Log10(conc)			
Probability	**Log10(conc)**	**95% Fiducial Limits**	
0.01	-0.14099	-4.06821	0.61556
0.02	-0.01307	-3.66927	0.69247
0.03	0.06809	-3.41622	0.74133
0.04	0.12915	-3.22590	0.77813
0.05	0.17881	-3.07112	0.80808
0.06	0.22108	-2.93939	0.83360
0.07	0.25814	-2.82391	0.85599
0.08	0.29133	-2.72052	0.87605
0.09	0.32151	-2.62651	0.89431
0.10	0.34929	-2.53999	0.91113
0.15	0.46431	-2.18188	0.98090
0.20	0.55573	-1.89744	1.03653
0.25	0.63416	-1.65359	1.08442
0.30	0.70459	-1.43476	1.12758
0.35	0.76985	-1.23214	1.16775
0.40	0.83178	-1.04006	1.20603
0.45	0.89170	-0.85442	1.24328
0.50	0.95066	-0.67195	1.28017
0.55	1.00963	-0.48978	1.31735
0.60	1.06955	-0.30505	1.35551
0.65	1.13148	-0.11464	1.39547
0.70	1.19674	0.08527	1.43834
0.75	1.26717	0.29977	1.48583
0.80	1.34560	0.53638	1.54097
0.85	1.43701	0.80709	1.61032
0.90	1.55204	1.13149	1.71380
0.91	1.57982	1.20482	1.74382
0.92	1.61000	1.28097	1.77994

0.93	1.64319	1.35940	1.82495
0.94	1.68025	1.43897	1.88326
0.95	1.72252	1.51793	1.96154
0.96	1.77218	1.59478	2.06943
0.97	1.83323	1.67017	2.22116
0.98	1.91439	1.74967	2.44357
0.99	2.04231	1.85157	2.81751

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=LST

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	0.72279	0.0000855	4.12625
0.02	0.97036	0.0002142	4.92573
0.03	1.16975	0.0003835	5.51229
0.04	1.34631	0.0005944	5.99965
0.05	1.50941	0.0008490	6.42808
0.06	1.66371	0.00115	6.81708
0.07	1.81193	0.00150	7.17777
0.08	1.95581	0.00190	7.51713
0.09	2.09656	0.00236	7.83991
0.10	2.23506	0.00288	8.14948
0.15	2.91281	0.00658	9.56968
0.20	3.59525	0.01266	10.87751
0.25	4.30681	0.02220	12.14562
0.30	5.06508	0.03675	13.41482
0.35	5.88641	0.05859	14.71456
0.40	6.78859	0.09119	16.07070
0.45	7.79285	0.13982	17.50970
0.50	8.92614	0.21284	19.06203
0.55	10.22423	0.32376	20.76594
0.60	11.73675	0.49539	22.67311
0.65	13.53558	0.76800	24.85818
0.70	15.73044	1.21694	27.43721
0.75	18.49997	1.99422	30.60772
0.80	22.16146	3.43858	34.75127
0.85	27.35362	6.41344	40.76822
0.90	35.64820	13.53613	51.73638
0.91	38.00311	16.02568	55.43955
0.92	40.73803	19.09709	60.24759

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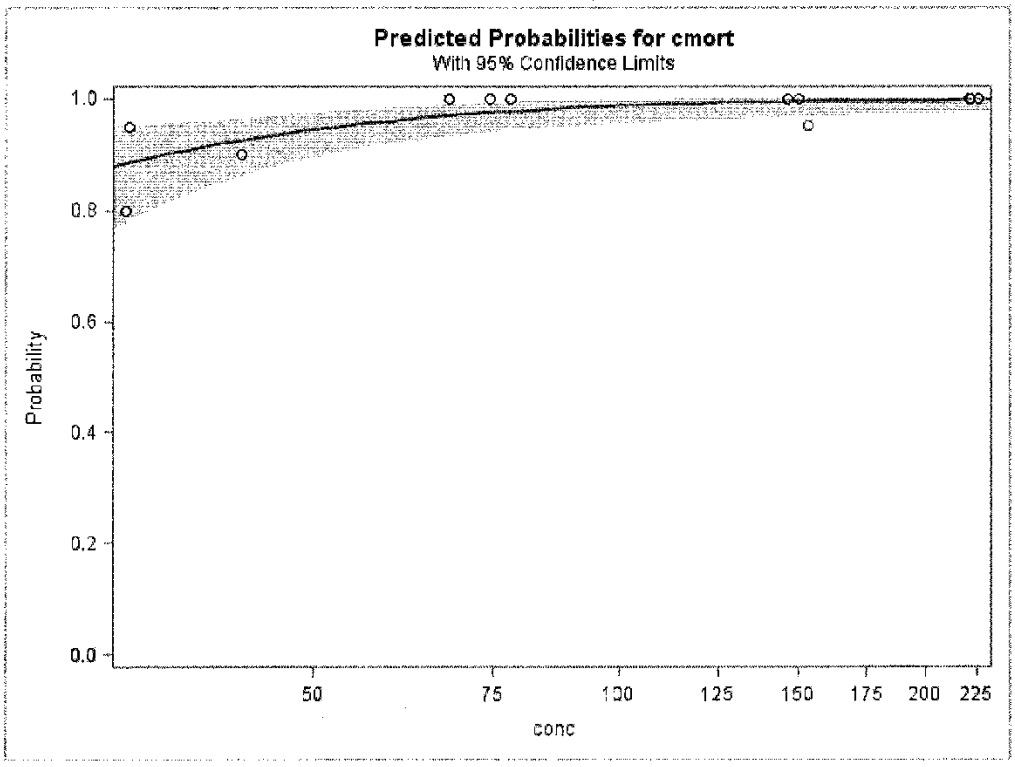
0.93	43.97293	22.87707	66.82734
0.94	47.89039	27.47674	76.42950
0.95	52.78601	32.95542	91.52566
0.96	59.18085	39.33489	117.33636
0.97	68.11375	46.79187	166.40088
0.98	82.10978	56.19099	277.69604
0.99	110.23340	71.05151	656.91788



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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=RBT

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-167.04847	0	0
1	0	-64.670678	-0.480221537	0.7862266163
2	0	-52.979014	-1.885985518	1.729059671
3	0	-50.896043	-3.010490962	2.4344169727
4	0	-50.67034	-3.526527873	2.7592720732
5	0	-50.665443	-3.615768683	2.8157396704
6	0	-50.665439	-3.618044452	2.8171831665
7	0	-50.665439	-3.618044452	2.8171831665

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	12	
Number of Events	222	
Number of Trials	241	
Name of Distribution	Normal	
Log Likelihood	-50.66543948	

Number of Observations Read	15
Number of Observations Used	12
Number of Events	222
Number of Trials	241

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

Last Evaluation of the Negative

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of the Gradient	
Intercept	Log10(conc)
-4.819739E-6	-0.000010276

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	51.90473396	87.040577982
Log10(conc)	87.040577982	148.34934417

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	20.0213	10	2.0021	0.0291
L.R. Chi-Square	17.1600	10	1.7160	0.0709

Heterogeneity Correction	
Pearson Test Level	0.1000
Heterogeneity Factor	2.0021
Fiducial Limit Quantile	2.2281

Note: Since the Pearson Chi-Square exceeds the test level (0.1000), the covariance matrix has been multiplied by the heterogeneity factor (Pearson Chi-Square / DF) 2.0021.

Note: Please check to be sure that the large chi-square ($p < 0.0291$) is not caused by systematic departure from the model. A t value of 2.23 will be used in computing fiducial limits.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	12

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	9.4678	0.0021

Analysis of Maximum Likelihood Parameter Estimates						
Parameter	DF	Estimate	Standard Error	95% Confidence Limits	Chi-Square	Pr > ChiSq

Intercept	1	-3.6180	1.5479	-6.6518	-0.5843	5.46	0.0194
Log10(conc)	1	2.8172	0.9156	1.0227	4.6117	9.47	0.0021

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
1.28427732	0.35496449

Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.021144	-0.014721
SIGMA	-0.014721	0.013308

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=RBT

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	0.45851	-2.75337	0.98387
0.02	0.55527	-2.40378	1.04115
0.03	0.61666	-2.18208	1.07761
0.04	0.66285	-2.01537	1.10510
0.05	0.70041	-1.87982	1.12751
0.06	0.73239	-1.76448	1.14663
0.07	0.76042	-1.66338	1.16342
0.08	0.78553	-1.57289	1.17848
0.09	0.80836	-1.49061	1.19220
0.10	0.82937	-1.41490	1.20485
0.15	0.91638	-1.10169	1.25751
0.20	0.98553	-0.85315	1.29974
0.25	1.04486	-0.64028	1.33633
0.30	1.09813	-0.44948	1.36956
0.35	1.14750	-0.27307	1.40074
0.40	1.19435	-0.10613	1.43078
0.45	1.23967	0.05484	1.46039
0.50	1.28428	0.21258	1.49021
0.55	1.32888	0.36941	1.52094
0.60	1.37421	0.52749	1.55344
0.65	1.42105	0.68897	1.58895
0.70	1.47042	0.85600	1.62951
0.75	1.52370	1.03049	1.67904
0.80	1.58302	1.21272	1.74627
0.85	1.65217	1.39652	1.85325
0.90	1.73918	1.56345	2.05218
0.91	1.76020	1.59354	2.11046
0.92	1.78303	1.62283	2.17716

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0.93	1.80813	1.65173	2.25382
0.94	1.83617	1.68081	2.34263
0.95	1.86814	1.71087	2.44702
0.96	1.90571	1.74314	2.57271
0.97	1.95189	1.77966	2.73039
0.98	2.01329	1.82467	2.94353
0.99	2.11005	1.89073	3.28435

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=RBT

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	2.87413	0.00176	9.63530
0.02	3.59145	0.00395	10.99395
0.03	4.13678	0.00658	11.95666
0.04	4.60093	0.00965	12.73801
0.05	5.01664	0.01319	13.41257
0.06	5.39993	0.01720	14.01604
0.07	5.76002	0.02171	14.56853
0.08	6.10277	0.02674	15.08264
0.09	6.43216	0.03231	15.56682
0.10	6.75106	0.03847	16.02706
0.15	8.24860	0.07912	18.09306
0.20	9.67234	0.14023	19.94089
0.25	11.08811	0.22894	21.69370
0.30	12.53527	0.35524	23.41835
0.35	14.04437	0.53324	25.16160
0.40	15.64401	0.78319	26.96374
0.45	17.36489	1.13459	28.86621
0.50	19.24320	1.63146	30.91818
0.55	21.32469	2.34104	33.18518
0.60	23.67045	3.36895	35.76364
0.65	26.36650	4.88622	38.81020
0.70	29.54071	7.17797	42.60953
0.75	33.39621	10.72731	47.75734
0.80	38.28450	16.31991	55.75357
0.85	44.89256	24.91826	71.32607
0.90	54.85076	36.59750	112.76558
0.91	57.57020	39.22271	128.96062
0.92	60.67752	41.95932	150.37122

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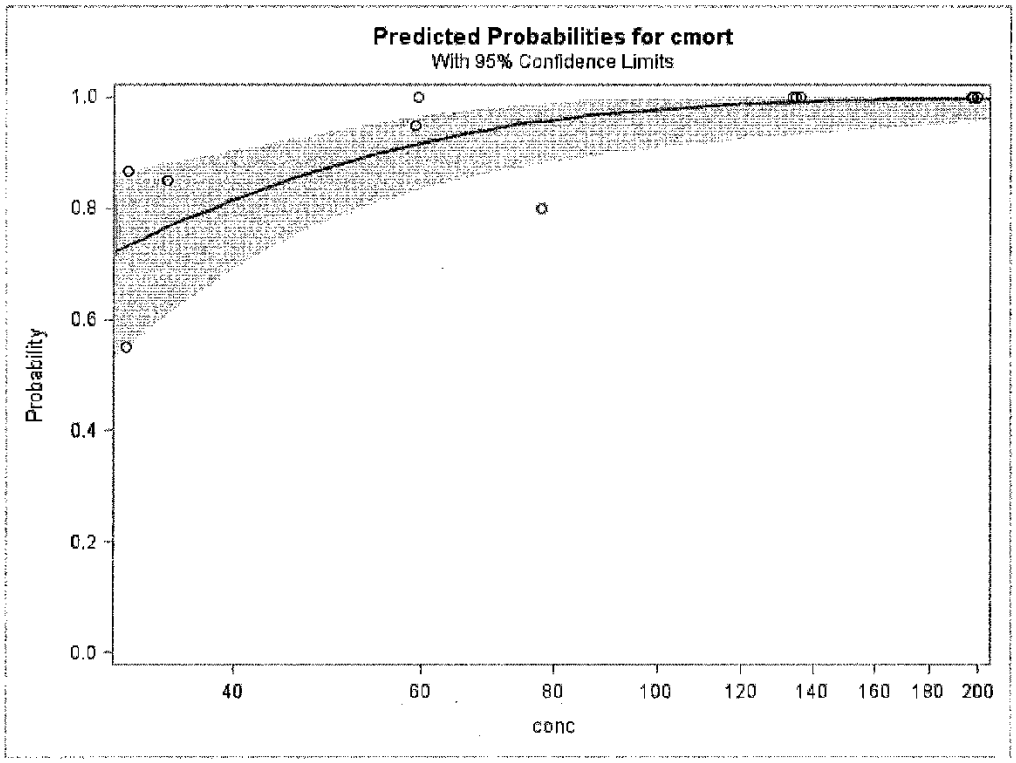
0.93	64.28812	44.84634	179.39966
0.94	68.57515	47.95192	220.10581
0.95	73.81455	51.38944	279.90884
0.96	80.48385	55.35311	373.86376
0.97	89.51427	60.20910	537.51551
0.98	103.10632	66.78397	878.07777
0.99	128.83926	77.75592	1925



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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=SMB

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-160.117	0	0
1	0	-95.790949	-5.162169382	2.4413663258
2	0	-88.816507	-7.405595404	3.4666723438
3	0	-88.320776	-8.189101602	3.8205785514
4	0	-88.316517	-8.269652307	3.8567701778
5	0	-88.316516	-8.270396448	3.8571036825
6	0	-88.316516	-8.270396448	3.8571036825

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	11	
Number of Events	80	
Number of Trials	231	
Name of Distribution	Normal	
Log Likelihood	-88.3165162	

Number of Observations Read	14
Number of Observations Used	11
Number of Events	80
Number of Trials	231

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

Last Evaluation of the Negative of the Gradient	

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Intercept	Log10(conc)
3.0855694E-7	5.0526278E-7

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	87.205102749	183.79051604
Log10(conc)	183.79051604	392.47990845

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	48.6682	9	5.4076	<.0001
L.R. Chi-Square	36.5668	9	4.0630	<.0001

Heterogeneity Correction	
Pearson Test Level	0.1000
Heterogeneity Factor	5.4076
Fiducial Limit Quantile	2.2622

Note: Since the Pearson Chi-Square exceeds the test level (0.1000), the covariance matrix has been multiplied by the heterogeneity factor (Pearson Chi-Square / DF) 5.4076.

Note: Please check to be sure that the large chi-square ($p < 0.0001$) is not caused by systematic departure from the model. A t value of 2.26 will be used in computing fiducial limits.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	11

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	14.1115	0.0002

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-8.2704	2.1783	-12.5397	-4.0011	14.42	0.0001

Log10(conc)	1	3.8571	1.0268	1.8447	5.8695	14.11	0.0002

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.14419863	0.25926189

Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.004263	0.000673
SIGMA	0.000673	0.004763

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=SMB

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	1.54107	0.65311	1.78439
0.02	1.61174	0.82671	1.83255
0.03	1.65658	0.93628	1.86370
0.04	1.69031	1.01830	1.88752
0.05	1.71775	1.08473	1.90719
0.06	1.74111	1.14101	1.92420
0.07	1.76158	1.19013	1.93933
0.08	1.77992	1.23392	1.95308
0.09	1.79659	1.27355	1.96577
0.10	1.81194	1.30985	1.97763
0.15	1.87549	1.45789	2.02901
0.20	1.92600	1.57191	2.07348
0.25	1.96933	1.66590	2.11545
0.30	2.00824	1.74613	2.15733
0.35	2.04430	1.81585	2.20076
0.40	2.07852	1.87700	2.24697
0.45	2.11162	1.93095	2.29690
0.50	2.14420	1.97886	2.35122
0.55	2.17678	2.02188	2.41043
0.60	2.20988	2.06119	2.47500
0.65	2.24410	2.09794	2.54562
0.70	2.28016	2.13329	2.62342
0.75	2.31907	2.16848	2.71033
0.80	2.36240	2.20501	2.80977
0.85	2.41291	2.24503	2.92824
0.90	2.47646	2.29271	3.07997
0.91	2.49181	2.30390	3.11695
0.92	2.50848	2.31593	3.15724

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0.93	2.52682	2.32904	3.20167
0.94	2.54729	2.34353	3.25143
0.95	2.57065	2.35989	3.30835
0.96	2.59808	2.37892	3.37542
0.97	2.63182	2.40207	3.45812
0.98	2.67666	2.43249	3.56841
0.99	2.74733	2.47980	3.74287

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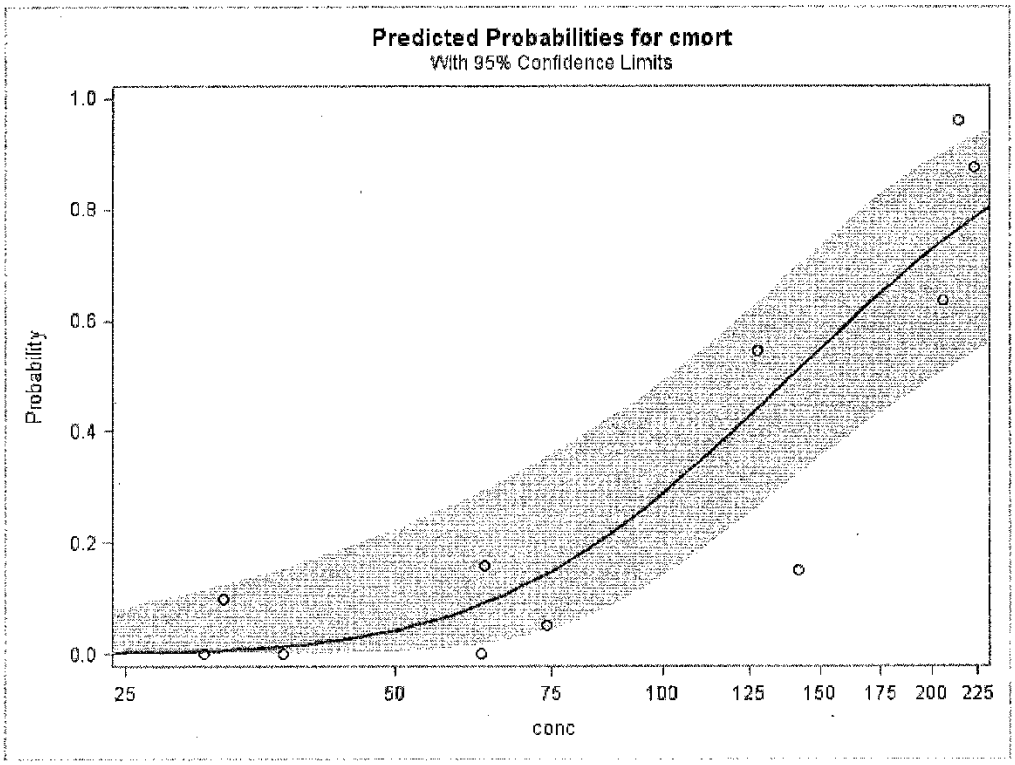
Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=SMB

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	34.75884	4.49891	60.86766
0.02	40.90155	6.70988	68.00646
0.03	45.35034	8.63528	73.06269
0.04	49.01313	10.43048	77.18200
0.05	52.20965	12.15416	80.75972
0.06	55.09410	13.83586	83.98424
0.07	57.75403	15.49286	86.96178
0.08	60.24446	17.13624	89.75894
0.09	62.60254	18.77364	92.42070
0.10	64.85465	20.41051	94.97922
0.15	75.07424	28.70045	106.90755
0.20	84.33315	37.31687	118.43511
0.25	93.18138	46.33418	130.45272
0.30	101.91581	55.73496	143.65850
0.35	110.73878	65.44092	158.76599
0.40	119.81616	75.33612	176.59156
0.45	129.30623	85.30017	198.10773
0.50	139.37941	95.24894	224.50310
0.55	150.23732	105.16826	257.29359
0.60	162.13691	115.13007	298.54033
0.65	175.42745	125.29556	351.25490
0.70	190.61440	135.92199	420.16150
0.75	208.48179	147.39560	513.24630
0.80	230.35569	160.32657	645.31807
0.85	258.76547	175.80478	847.69017
0.90	299.54089	196.20714	1202
0.91	310.31682	201.32623	1309
0.92	322.46319	206.98240	1436

0.93	336.36826	213.32211	1591
0.94	352.60801	220.56000	1784
0.95	372.08871	229.02920	2034
0.96	396.35544	239.28883	2374
0.97	428.36773	252.39004	2872
0.98	474.96047	270.70325	3702
0.99	558.89727	301.85393	5532



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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=YEP

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-197.54695	0	0
1	0	-130.55546	-1.482590821	0.4681538817
2	0	-116.54749	-2.750594062	1.0673679927
3	0	-104.43494	-5.235763663	2.2683707609
4	0	-102.27407	-6.760456434	2.9771127629
5	0	-102.19798	-7.098328253	3.129511571
6	0	-102.19783	-7.114042605	3.136569047
7	0	-102.19783	-7.114074916	3.1365835442
8	0	-102.19783	-7.114074916	3.1365835442

Model Information		
Data Set	WORK.LC50T22	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	14	
Number of Events	62	
Number of Trials	285	
Name of Distribution	Normal	
Log Likelihood	-102.1978326	

Number of Observations Read	15
Number of Observations Used	14
Number of Events	62
Number of Trials	285

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

Last Evaluation of the Negative of the Gradient	
Intercept	Log10(conc)
6.398295E-10	1.0553902E-9

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	98.881727288	209.98117445
Log10(conc)	209.98117445	450.84923844

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	14.4128	12	1.2011	0.2751
L.R. Chi-Square	12.3737	12	1.0311	0.4161

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	14

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	48.6186	<.0001

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-7.1141	0.9605	-8.9967	-5.2315	54.85	<.0001
Log10(conc)	1	3.1366	0.4498	2.2549	4.0182	48.62	<.0001

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.26809674	0.31881823

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Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.001458	0.000948
SIGMA	0.000948	0.002091

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=YEP

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	1.52641	1.28153	1.66884
0.02	1.61332	1.40062	1.73848
0.03	1.66847	1.47586	1.78298
0.04	1.70995	1.53225	1.81667
0.05	1.74369	1.57795	1.84425
0.06	1.77241	1.61669	1.86787
0.07	1.79759	1.65052	1.88873
0.08	1.82013	1.68069	1.90752
0.09	1.84064	1.70800	1.92474
0.10	1.85951	1.73303	1.94070
0.15	1.93766	1.83507	2.00836
0.20	1.99977	1.91356	2.06475
0.25	2.05306	1.97808	2.11593
0.30	2.10091	2.03312	2.16481
0.35	2.14525	2.08130	2.21292
0.40	2.18733	2.12448	2.26111
0.45	2.22803	2.16417	2.30983
0.50	2.26810	2.20154	2.35945
0.55	2.30816	2.23761	2.41038
0.60	2.34887	2.27324	2.46315
0.65	2.39094	2.30925	2.51851
0.70	2.43529	2.34653	2.57752
0.75	2.48314	2.38619	2.64178
0.80	2.53642	2.42984	2.71385
0.85	2.59653	2.48021	2.79835
0.90	2.67668	2.54306	2.90520
0.91	2.69555	2.55817	2.93108
0.92	2.71606	2.57457	2.95921

0.93	2.73861	2.59256	2.99018
0.94	2.76379	2.61263	3.02479
0.95	2.79251	2.63549	3.06431
0.96	2.82625	2.66229	3.11077
0.97	2.86773	2.69520	3.16795
0.98	2.92287	2.73885	3.24403
0.99	3.00978	2.80752	3.36410

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Probit LC50 Analysis of Concentration - 22d Post Exposure

The Probit Procedure

sps=YEP

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	33.60583	19.12174	46.64908
0.02	41.05104	25.15462	54.76257
0.03	46.60854	29.91334	60.67092
0.04	51.27978	34.06066	65.56483
0.05	55.42267	37.83956	69.86344
0.06	59.21157	41.37016	73.76915
0.07	62.74623	44.72182	77.39722
0.08	66.08978	47.93860	80.82046
0.09	69.28506	51.05045	84.08838
0.10	72.36270	54.07866	87.23657
0.15	86.62892	68.40282	101.94255
0.20	99.94764	81.95126	116.07803
0.25	112.99445	95.07891	130.59701
0.30	126.15611	107.92487	146.15331
0.35	139.71710	120.58602	163.27656
0.40	153.93064	133.19409	182.43420
0.45	169.05718	145.93713	204.09262
0.50	185.39446	159.05361	228.79680
0.55	203.31053	172.82814	257.26418
0.60	223.28956	187.60464	290.50401
0.65	246.00500	203.82310	329.99906
0.70	272.44898	222.09170	378.02837
0.75	304.18400	243.32664	438.30841
0.80	343.89109	269.05128	517.42352
0.85	396.76248	302.14269	628.55794
0.90	474.98373	349.18979	803.89792
0.91	496.08247	361.55421	853.25320
0.92	520.06684	375.46166	910.36308

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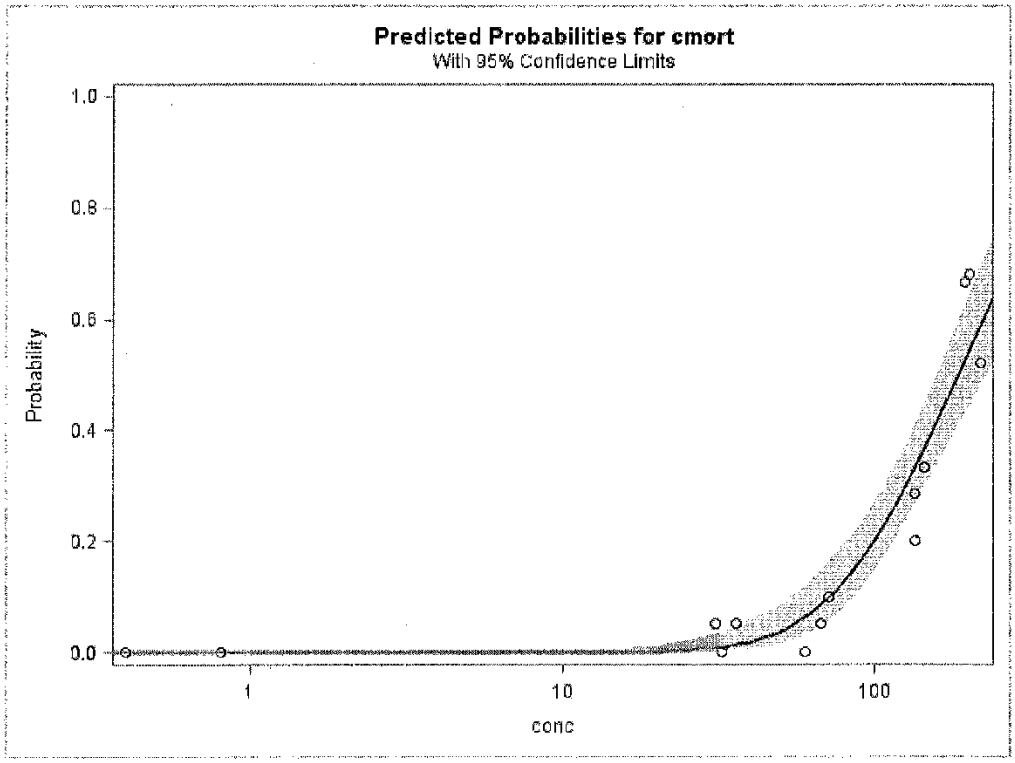
0.93	547.77955	391.34742	977.64155
0.94	580.47952	409.85639	1059
0.95	620.16329	432.00183	1160
0.96	670.26628	459.50841	1291
0.97	737.44226	495.67327	1472
0.98	837.27732	548.09211	1754
0.99	1023	641.97128	2313



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Data set for 22 day post-treatment LC50 calculation with Probit Analysis with Gompertz(LMB and WAE)

Obs	sps	did	hid	treat	conc	time	emort	ar	hmort	cmort
1	LMB	A3	E12	0	-0.6	22	0	20	0	0
2	LMB	C4	E8	0	-0.2	22	0	20	0	0
3	LMB	B3	E14	0	-0.1	22	0	20	0	0
4	LMB	A5	E10	50	33.3	22	0	20	0	0
5	LMB	B1	E15	50	37.0	22	0	20	0	0
6	LMB	C2	E4	50	40.7	22	0	19	0	0
7	LMB	A4	E6	100	64.2	22	1	20	1	2
8	LMB	C3	E1	100	74.0	22	0	20	0	0
9	LMB	B2	E13	100	87.8	22	0	20	1	1
10	LMB	A1	E11	200	148.8	22	3	20	3	6
11	LMB	B5	E3	200	165.2	22	10	22	0	10
12	LMB	C5	E2	200	165.7	22	6	20	2	8
13	LMB	A2	E7	300	225.7	22	16	25	4	20
14	LMB	B4	E5	300	249.2	22	20	25	3	23
15	LMB	C1	E9	300	251.6	22	23	25	1	24
16	WAE	A2	F10	0	-0.9	22	0	20	0	0
17	WAE	B5	F14	0	-0.8	22	0	19	0	0
18	WAE	C3	F13	0	-0.8	22	0	20	1	1
19	WAE	B2	F15	50	33.6	22	0	20	0	0
20	WAE	A5	F1	50	35.8	22	1	20	1	2
21	WAE	C5	F8	50	37.6	22	0	20	0	0
22	WAE	A4	F9	100	64.6	22	0	20	5	5
23	WAE	C4	F3	100	66.3	22	0	20	3	3
24	WAE	B3	F4	100	82.0	22	0	30	3	3
25	WAE	C2	F5	200	148.5	22	1	20	7	8
26	WAE	A1	F12	200	148.7	22	1	20	5	6
27	WAE	B1	F7	200	150.6	22	1	20	4	5
28	WAE	C1	F2	300	219.5	22	4	20	10	14
29	WAE	A3	F11	300	220.4	22	5	21	8	13
30	WAE	B4	F6	300	223.6	22	4	12	6	10

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Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=LMB

Iteration History for Parameter Estimates				
Iter	Ridge	Loglikelihood	Intercept	Log10(conc)
0	0	-205.11546	0	0
1	0	-127.76028	-4.142247666	1.8509730435
2	0	-94.993349	-8.546374896	3.7936109379
3	0	-82.053415	-13.03310503	5.7472950511
4	0	-78.404585	-16.75866105	7.3551269428
5	0	-77.996	-18.48606067	8.0958918497
6	0	-77.989624	-18.73295443	8.2013320934
7	0	-77.989622	-18.73713237	8.2031128912
8	0	-77.989622	-18.73713237	8.2031128912

Model Information		
Data Set	WORK.LC50T22GOMPERTZ	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	12	
Number of Events	94	
Number of Trials	256	
Name of Distribution	Gompertz	
Log Likelihood	-77.98962235	

Number of Observations Read	15
Number of Observations Used	12
Number of Events	94
Number of Trials	256

Parameter Information	
Parameter	Effect
Intercept	Intercept
Log10(conc)	Log10(conc)

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Last Evaluation of the Negative of the Gradient	
Intercept	Log10(conc)
1.627289E-6	3.2506571E-6

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	69.916087792	160.87777541
Log10(conc)	160.87777541	371.16338754

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	8.3150	10	0.8315	0.5981
L.R. Chi-Square	6.0081	10	0.6008	0.8146

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	12

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	66.0565	<.0001

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-18.7371	2.3255	-23.2950	-14.1793	64.92	<.0001
Log10(conc)	1	8.2031	1.0093	6.2249	10.1813	66.06	<.0001

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.28414903	0.12190494

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Estimated Covariance Matrix for Tolerance Parameters		
	MU	SIGMA
MU	0.000217	-0.000031
SIGMA	-0.000031	0.000225

Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=LMB

Probit Analysis on Log10(conc)			
Probability	Log10(conc)	95% Fiducial Limits	
0.01	1.72337	1.53690	1.83850
0.02	1.80848	1.64857	1.90757
0.03	1.85853	1.71416	1.94827
0.04	1.89423	1.76088	1.97735
0.05	1.92207	1.79727	2.00006
0.06	1.94493	1.82714	2.01875
0.07	1.96437	1.85250	2.03467
0.08	1.98130	1.87456	2.04855
0.09	1.99631	1.89411	2.06089
0.10	2.00982	1.91168	2.07200
0.15	2.06265	1.98017	2.11570
0.20	2.10130	2.02996	2.14797
0.25	2.13227	2.06956	2.17413
0.30	2.15847	2.10278	2.19656
0.35	2.18149	2.13164	2.21657
0.40	2.20226	2.15735	2.23497
0.45	2.22144	2.18072	2.25233
0.50	2.23947	2.20227	2.26906
0.55	2.25672	2.22243	2.28554
0.60	2.27349	2.24152	2.30207
0.65	2.29008	2.25982	2.31898
0.70	2.30678	2.27765	2.33661
0.75	2.32397	2.29536	2.35541
0.80	2.34216	2.31343	2.37597
0.85	2.36221	2.33263	2.39934
0.90	2.38582	2.35447	2.42764
0.91	2.39128	2.35942	2.43428
0.92	2.39710	2.36466	2.44140

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0.93	2.40338	2.37028	2.44912
0.94	2.41025	2.37638	2.45760
0.95	2.41790	2.38314	2.46710
0.96	2.42666	2.39081	2.47803
0.97	2.43710	2.39988	2.49112
0.98	2.45043	2.41138	2.50794
0.99	2.47032	2.42837	2.53318

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Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=LMB

Probit Analysis on conc			
Probability	conc	95% Fiducial Limits	
0.01	52.88934	34.42693	68.94531
0.02	64.34035	44.52181	80.82985
0.03	72.19949	51.77941	88.77072
0.04	78.38481	57.66082	94.91827
0.05	83.57330	62.70107	100.01483
0.06	88.09117	67.16431	104.41286
0.07	92.12313	71.20292	108.30976
0.08	95.78494	74.91383	111.82810
0.09	99.15437	78.36299	115.04966
0.10	102.28646	81.59760	118.03191
0.15	115.51876	95.53748	130.52578
0.20	126.26964	107.14248	140.59622
0.25	135.60252	117.37195	149.32515
0.30	144.03682	126.70109	157.24057
0.35	151.87513	135.40632	164.65473
0.40	159.31703	143.66631	171.78089
0.45	166.50857	151.60637	178.78414
0.50	173.56785	159.32148	185.80797
0.55	180.60057	166.89067	192.99073
0.60	187.71195	174.38842	200.47845
0.65	195.01865	181.89654	208.43821
0.70	202.66458	189.51922	217.07731
0.75	210.84697	197.40595	226.67792
0.80	219.86787	205.79301	237.67005
0.85	230.25511	215.09711	250.80787
0.90	243.12057	226.18997	267.69679
0.91	246.19312	228.78027	271.81906
0.92	249.51552	231.55886	276.31171

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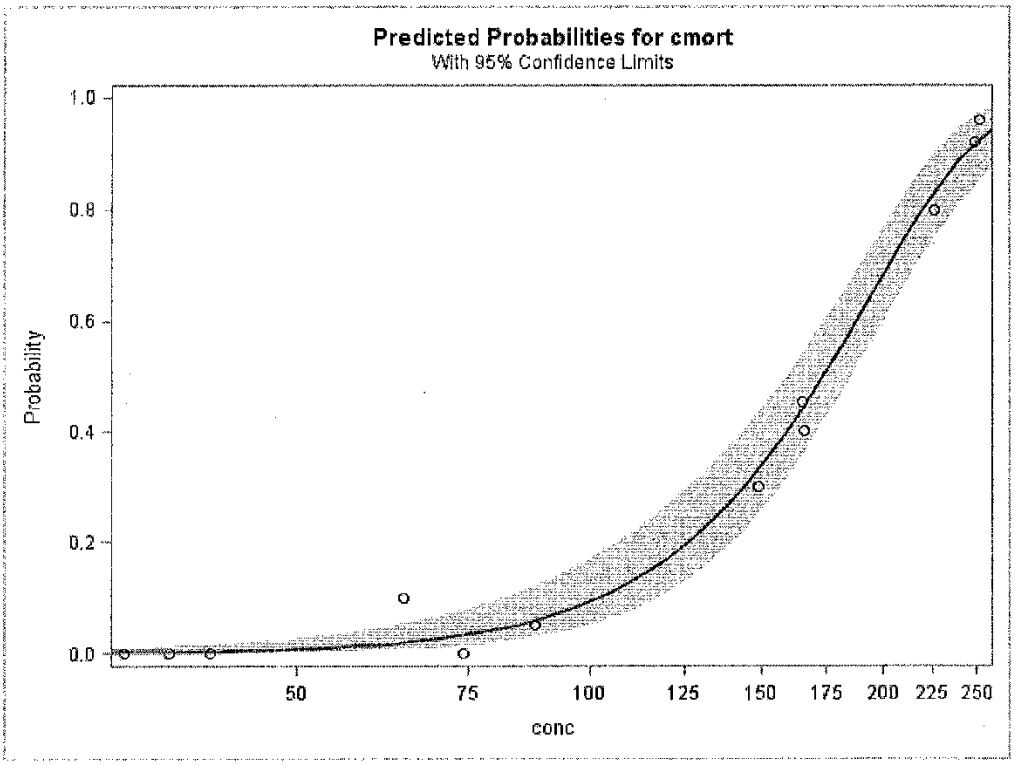
0.93	253.14998	234.57361	281.26635
0.94	257.18593	237.89312	286.81503
0.95	261.75908	241.62130	293.15881
0.96	267.09136	245.92754	300.62749
0.97	273.58686	251.11935	309.82404
0.98	282.12010	257.85979	322.05978
0.99	295.33830	268.14527	341.33211



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Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=WAE

Iteration History for Parameter Estimates				
Iter	**Ridge**	**Loglikelihood**	**Intercept**	**Log10(conc)**
0	0	-205.64859	0	0
1	0	-137.43358	-2.740356049	1.0776169347
2	0	-116.85336	-6.009930187	2.5168649002
3	0	-112.04517	-8.548915776	3.645547427
4	0	-111.58196	-9.617982767	4.1167643586
5	0	-111.57549	-9.762106124	4.1799940953
6	0	-111.57549	-9.764381368	4.1809906425
7	0	-111.57549	-9.764381368	4.1809906425

Model Information		
Data Set	WORK.LC50T22GOMPERTZ	
Events Variable	cmort	cmort
Trials Variable	ar	ar
Number of Observations	12	
Number of Events	69	
Number of Trials	243	
Name of Distribution	Gompertz	
Log Likelihood	-111.5754851	

Number of Observations Read	15
Number of Observations Used	12
Number of Events	69
Number of Trials	243

Parameter Information	
Parameter	**Effect**
Intercept	Intercept
Log10(conc)	Log10(conc)

Last Evaluation of the Negative

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of the Gradient	
Intercept	Log10(conc)
1.5467141E-6	2.7585046E-6

Last Evaluation of the Negative of the Hessian		
	Intercept	Log10(conc)
Intercept	65.431376818	143.10910259
Log10(conc)	143.10910259	315.55226826

Algorithm converged.

Goodness-of-Fit Tests				
Statistic	Value	DF	Value/DF	Pr > ChiSq
Pearson Chi-Square	14.0620	10	1.4062	0.1702
L.R. Chi-Square	14.2342	10	1.4234	0.1626

Note: Since the Pearson Chi-Square is small (p > 0.1000), fiducial limits will be calculated using a z value of 1.96.

Response-Covariate Profile	
Response Levels	2
Number of Covariate Values	12

Type III Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Log10(conc)	1	44.5635	<.0001

Analysis of Maximum Likelihood Parameter Estimates							
Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	-9.7644	1.3754	-12.4601	-7.0686	50.40	<.0001
Log10(conc)	1	4.1810	0.6263	2.9534	5.4085	44.56	<.0001

Probit Model in Terms of Tolerance Distribution	
MU	SIGMA
2.33542292	0.23917777

Estimated Covariance Matrix for Tolerance

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Parameters		
	MU	SIGMA
MU	0.001368	0.000796
SIGMA	0.000796	0.001284

Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=WAE

Probit Analysis on Log10(conc)			
Probability	**Log10(conc)**	**95% Fiducial Limits**	
0.01	1.23517	0.83354	1.45719
0.02	1.40217	1.06871	1.58752
0.03	1.50037	1.20673	1.66442
0.04	1.57040	1.30499	1.71945
0.05	1.62502	1.38147	1.76251
0.06	1.66988	1.44417	1.79800
0.07	1.70801	1.49736	1.82827
0.08	1.74123	1.54358	1.85474
0.09	1.77069	1.58449	1.87830
0.10	1.79719	1.62120	1.89959
0.15	1.90085	1.76366	1.98401
0.20	1.97667	1.86599	2.04764
0.25	2.03743	1.94591	2.10070
0.30	2.08885	2.01121	2.14793
0.35	2.13400	2.06600	2.19197
0.40	2.17476	2.11284	2.23435
0.45	2.21238	2.15360	2.27592
0.50	2.24776	2.18980	2.31715
0.55	2.28161	2.22272	2.35831
0.60	2.31451	2.25339	2.39967
0.65	2.34705	2.28267	2.44160
0.70	2.37982	2.31135	2.48464
0.75	2.41355	2.34021	2.52959
0.80	2.44924	2.37021	2.57773
0.85	2.48858	2.40276	2.63127
0.90	2.53490	2.44059	2.69483
0.91	2.54561	2.44927	2.70957
0.92	2.55703	2.45851	2.72533

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0.93	2.56935	2.46846	2.74235
0.94	2.58283	2.47931	2.76099
0.95	2.59785	2.49137	2.78180
0.96	2.61503	2.50514	2.80564
0.97	2.63550	2.52151	2.83409
0.98	2.66167	2.54237	2.87051
0.99	2.70069	2.57335	2.92491

Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

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Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure

The Probit Procedure

sps=WAE

Probit Analysis on conc			
Probability	**conc**	**95% Fiducial Limits**	
0.01	17.18579	6.81617	28.65421
0.02	25.24445	11.71419	38.68265
0.03	31.64941	16.09660	46.17646
0.04	37.18816	20.18338	52.41471
0.05	42.17142	24.06965	57.87730
0.06	46.76049	27.80786	62.80525
0.07	51.05205	31.43086	67.33954
0.08	55.10957	34.96097	71.57097
0.09	58.97742	38.41419	75.56210
0.10	62.68810	41.80246	79.35826
0.15	79.58776	58.03151	96.38513
0.20	94.76994	73.44942	111.59373
0.25	109.00126	88.29029	126.09579
0.30	122.70077	102.61522	140.58330
0.35	136.14419	116.41223	155.58556
0.40	149.54116	129.66868	171.53252
0.45	163.07260	142.42820	188.76600
0.50	176.91358	154.81142	207.56408
0.55	191.25173	167.00121	228.19665
0.60	206.30684	179.21981	250.99674
0.65	222.35757	191.72171	276.43837
0.70	239.78428	204.81021	305.23758
0.75	259.14723	218.88363	338.52520
0.80	281.34813	234.53494	378.20442
0.85	308.01884	252.78789	427.82414
0.90	342.69276	275.79846	495.25121
0.91	351.24173	281.36503	512.35216
0.92	360.60205	287.41624	531.28376

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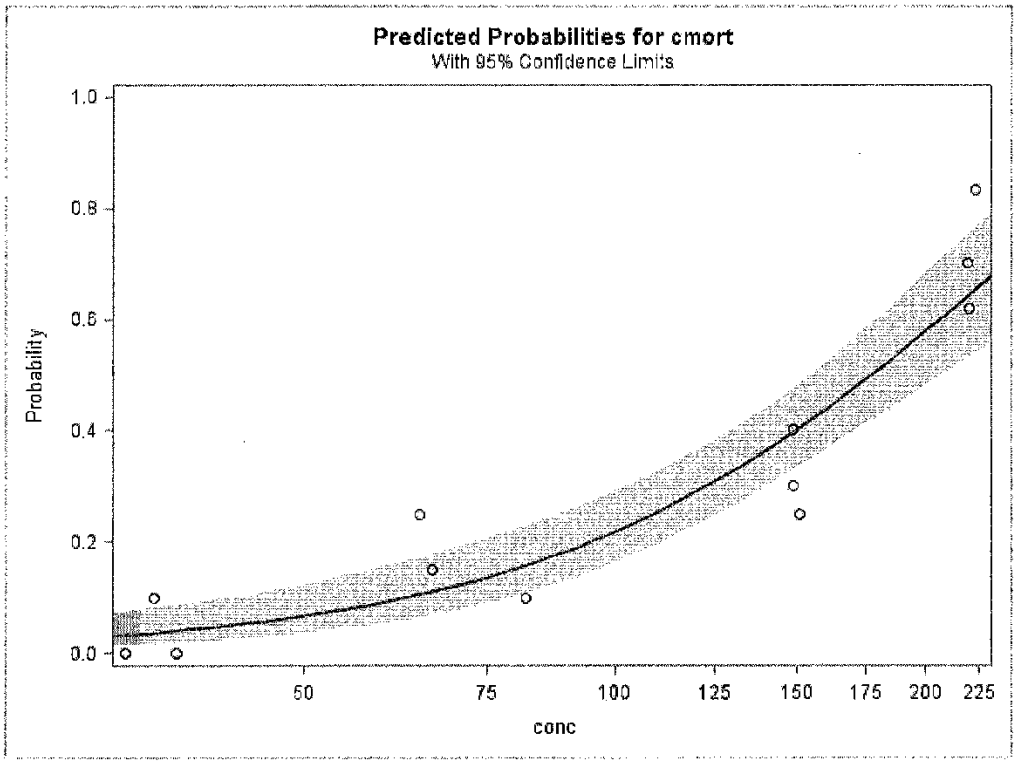
0.93	370.97977	294.07443	552.52180
0.94	382.67299	301.51595	576.75892
0.95	396.13759	310.00949	605.06159
0.96	412.12544	319.99620	639.20242
0.97	432.01984	332.28361	682.47333
0.98	458.85393	348.63085	742.17767
0.99	501.98452	374.41445	841.22829



Performed by J. Luoma using SAS version 9.3 at 11:35 on 29APR15

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```
DM 'LOG; CLEAR; OUTPUT; CLEAR;'; * CLEAR LOG AND OUTPUT;
FOOTNOTE1 'Performed by J. Luoma using SAS version ' "&SYSVER" ' at ' "&SYSTIME" ' on ' "&SYSDATE";
options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
title1 h=1 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish species';
title2 h=1 'Determination of LC50 following 24-h flow-through exposure to various concentrations of P1
title3 h=0.5 'Study number AEH-12-PSEUDO-03';
title4 h=0.5 'SAS v. 9.3 Analysis Completion Date: 29APR2015 Analysis prepared by: JAL';
title5 h = 2 'Data set for 22-day post-treatment LC50 calculation with Probit Analysis (RBT, BKT, YEP,

/*******************************************
* SAS ver 9.3 Analysis prepared by: JAL     *                    AEH-12-PSEUDO-03
* Analysis completion date: 29APR15 JL      *
*******************************************/
/*****************************************************************************************************
* Variable Names:
* sps = Fish species code
* did = Diluter chamber ID
* hid = Holding chamber ID
* treat = nominal exposure concentration (in mg/L)
* conc = actual exposure concentration over all sampling times for each chamber (in mg/L)
* time = cumulative mortality time
*   0 = end of exposure period
*   7 = 7 days post-exposure
*   14 = 14 days post-exposure
*   22 = 22 days post-exposure (end of observation period
* emort = Exposure period mortalities
* ar = number of animals at risk
*       Time 0 = all animals in exposure chamber during exposure
*        Time 7, 14 and 22 = number at potential risk for entire 22-d period
*                                    (histo samples and incidental mortalities removed)
* hmort = cumulative holding mortality to time period
* cmort = cumulative mort (emort + hmort)
*****************************************************************************************************
data LC50; set Pseudo03.mortality2;
proc sort data=LC50; by sps conc did; run;
data LC50T22; set LC50;
If time ne '22' then delete;
if sps = 'LMB' then delete;
if sps = 'WAE' then delete;
run;
proc print data=LC50T22; run;
title 'Probit LC50 Analysis of Concentration - 22d Post Exposure';
  proc probit log10 data=LC50T22 plot=predpplot;
  by sps;
  model cmort/ar=conc / lackfit inversecl itprint;
  output out=b p=prob std=std xbeta=xbeta;
  run;
data LC50T22gompertz; set LC50;
if time ne '22' then delete;
 if sps = 'YEP' then delete;
  if sps = 'RBT' then delete;
   if sps = 'BKT' then delete;
    if sps = 'CCF' then delete;
     if sps = 'BLG' then delete;
      if sps = 'LST' then delete;
       if sps = 'SMB' then delete;
```

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```
run;
title h = 2 'Data set for 22 day post-treatment LC50 calculation with Probit Analysis with Gompertz(LA
proc print data=LC50T22gompertz; run;
title 'Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure';
proc probit log10 data=LC50T22gompertz plot=predpplot;
  by sps;
  model cmort/ar=conc / lackfit inversecl itprint dist=gompertz;
  output out=b p=prob std=std xbeta=xbeta;
  run;
```

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SAC

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Item No. 41
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```
385  DM 'LOG; CLEAR; OUTPUT; CLEAR;'; * CLEAR LOG AND OUTPUT;
386  FOOTNOTE1 'Performed by J. Luoma using SAS version ' "&SYSVER" ' at ' "&SYSTIME"   on '
386! "&SYSDATE";
387  options ls=97 ps=57 formdlim='-' pageno = 1 nocenter nodate nosource2;
388  title1 h=1 'Effects of Pseudomonas fluorescens (Pf-CL145A) to ten different freshwater fish
388! species';
389  title2 h=1 'Determination of LC50 following 24-h flow-through exposure to various
389! concentrations of Pf-CL145A';
390  title3 h=0.5 'Study number AEH-12-PSEUDO-03';
391  title4 h=0.5 'SAS v. 9.3 Analysis Completion Date: 29APR2015 Analysis prepared by: JAL';
392  title5 h = 2 'Data set for 22-day post-treatment LC50 calculation with Probit Analysis (RBT,
392!  BKT, YEP, LST, SMB, BLG, and CCF)';
393
394  /*****************************************
395  * SAS ver 9.3 Analysis prepared by: JAL     *                    AEH-12-PSEUDO-03
396  * Analysis completion date: 29APR15 JAL     *
397  *****************************************/
398  /*************************************************************************************************
398! *************
399  * Variable Names:
399!             *
400  * sps = Fish species code
400!             *
401  * did = Diluter chamber ID
401!             *
402  * hid = Holding chamber ID
402!             *
403  * treat = nominal exposure concentration (in mg/L)
403!             *
404  * conc = actual exposure concentration over all sampling times for each chamber (in mg/L)
404!             *
405  * time = cumulative mortality time
405!             *
406  *   0 = end of exposure period
406!             *
407  *   7 = 7 days post-exposure
407!             *
408  *   14 = 14 days post-exposure
408!             *
409  *   22 = 22 days post-exposure (end of observation period
409!             *
410  * emort = Exposure period mortalities
410!             *
411  * ar = number of animals at risk
411!             *
412  *       Time 0 = all animals in exposure chamber during exposure
412!             *
413  *        Time 7, 14 and 22 = number at potential risk for entire 22-d period
413!             *
414  *                                        (histo samples and incidental mortalities removed)
414!             *
415  * hmort = cumulative holding mortality to time period
415!             *
416  * cmort = cumulative mort (emort + hmort)
416!             *
417  *************************************************************************************************
```

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```
417! ************/
418  data LC50; set Pseudo03.mortality2;

NOTE: There were 536 observations read from the data set PSEUDO03.MORTALITY2.
NOTE: The data set WORK.LC50 has 536 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds
```



```
419  proc sort data=LC50; by sps conc did; run;

NOTE: There were 536 observations read from the data set WORK.LC50.
NOTE: The data set WORK.LC50 has 536 observations and 10 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


420  data LC50T22; set LC50;
421  If time ne '22' then delete;
422  if sps = 'LMB' then delete;
423  if sps = 'WAE' then delete;
424  run;

NOTE: Character values have been converted to numeric values at the places given by:
      (Line):(Column).
      421:12
NOTE: There were 536 observations read from the data set WORK.LC50.
NOTE: The data set WORK.LC50T22 has 104 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      cpu time            0.01 seconds


425  proc print data=LC50T22; run;
NOTE: Writing HTML Body file: sashtml6.htm

NOTE: There were 104 observations read from the data set WORK.LC50T22.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.45 seconds
      cpu time            0.31 seconds


426  title 'Probit LC50 Analysis of Concentration - 22d Post Exposure';
427    proc probit log10 data=LC50T22 plot=predpplot;
428    by sps;
429    model cmort/ar=conc / lackfit inversecl itprint;
430    output out=b p=prob std=std xbeta=xbeta;
431    run;
```



```
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=BKT
```

```
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=BLG
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=CCF
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=LST
NOTE: Algorithm converged.
NOTE: All variances and covariances have been multiplied by the heterogeneity factor H= 2.0021.
      Please check to be sure that the large chi-square (p < 0.0291) is not caused by systematic
      departure from the model. A t value of  2.23 will be used in computing fiducial limits.
NOTE: The above message was for the following BY group:
      sps=RBT
NOTE: Algorithm converged.
NOTE: All variances and covariances have been multiplied by the heterogeneity factor H= 5.4076.
      Please check to be sure that the large chi-square (p < 0.0001) is not caused by systematic
      departure from the model. A t value of  2.26 will be used in computing fiducial limits.
NOTE: The above message was for the following BY group:
      sps=SMB
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=YEP
NOTE: The data set WORK.B has 104 observations and 13 variables.
NOTE: PROCEDURE PROBIT used (Total process time):
      real time           1.57 seconds
      cpu time            0.78 seconds


432  data LC50T22gompertz; set LC50;
433  if time ne '22' then delete;
434   if sps = 'YEP' then delete;
435    if sps = 'RBT' then delete;
436     if sps = 'BKT' then delete;
437      if sps = 'CCF' then delete;
438       if sps = 'BLG' then delete;
439        if sps =  LST' then delete;
440         if sps = 'SMB' then delete;
441  run;

NOTE: Character values have been converted to numeric values at the places given by:
      (Line):(Column).
      433:12
NOTE: There were 536 observations read from the data set WORK.LC50.
NOTE: The data set WORK.LC50T22GOMPERTZ has 30 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
```

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```
      cpu time            0.01 seconds


442  title h = 2 'Data set for 22 day post-treatment LC50 calculation with Probit Analysis with
442! Gompertz(LMB and WAE)';
443  proc print data=LC50T22gompertz; run;

NOTE: There were 30 observations read from the data set WORK.LC50T22GOMPERTZ.
NOTE: PROCEDURE PRINT used (Total process time):
      real time           0.03 seconds
      cpu time            0.01 seconds


444  title 'Probit LC50 Analysis with Gompertz Distribution - 22d Post Exposure';
445  proc probit log10 data=LC50T22gompertz plot=predpplot;
446    by sps;
447    model cmort/ar=conc / lackfit inversecl itprint dist=gompertz;
448    output out=b p=prob std=std xbeta=xbeta;
449    run;

NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=LMB
NOTE: Algorithm converged.
NOTE: Since the chi-square is small (p > 0.1000), fiducial limits will be calculated using a z
      value of  1.96.
NOTE: The above message was for the following BY group:
      sps=WAE
NOTE: The data set WORK.B has 30 observations and 13 variables.
NOTE: PROCEDURE PROBIT used (Total process time):
      real time           0.52 seconds
      cpu time            0.21 seconds
```

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