WATER QUALITY MONITORING
QUALITY ASSURANCE PROJECT PLAN

For

Name of Tribe's & Project Title

Insert Tribe's Logo

Prepared by

_____
_____
_____

Prepared for
US Environmental Protection Agency
IGAP Grant Program
Date: _____

Note: All blue text is for instructional purposes only. Please delete as you complete your QAPP. Also please check to make sure your Appendices and Tables are numbered, named and referenced correctly.

ACKNOWLEDGEMENTS

This Quality Assurance Project Plan (QAPP) template and guide was revised and updated by the University of Alaska Anchorage from the 2004 template and written by the Native American Fish and Wildlife Society, Cook Inlet Keeper, and University of Alaska Anchorage's Environment and Natural Resources Institute. This revision has been reviewed and approved by the United States Environmental Protection Agency (EPA), and Alaska Department of Environmental Conservation (ADEC). Special thanks to Gina Grepo-Grove, the USEPA Region 10 QA Manager, for her thorough review, guidance, and assistance in the development of this template. Thanks to Douglas Kolwaite, Quality Assurance Officer with ADEC Division of Water, for his thorough and timely review and input.

Many thanks to all the Native Alaskans from villages across Alaska and the volunteers from the Cook Inlet Citizens' Environmental Monitoring Program (CEMP) who have attended the various trainings that help make this document possible.

A. PROJECT MANAGEMENT AND ORGANIZATION
A1. APPROVAL PAGE

Name: _____
Title: Tribal Council Elder
Organization: _____

Signature: _____ Date: _____

Name: (Tribe's Project Manager)
Title: Project Manager
Organization: _____

Signature: _____ Date: _____

Name: (Tribe's Quality Assurance Officer – if available)
Title: QA Officer
Organization: _____

Signature: _____ Date: _____

Name: _____
Title: IGAP Coordinator
Project: Alaska Tribal IGAP Program
Organization: USEPA

Signature: _____ Date: _____

Name: Gina Grepo-Grove
Title: Quality Assurance Manager
Organization: U.S. EPA, Region 10
206-553-1632
Email: grepo-grove.gina@epa.gov

Signature: _____ Date: _____

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A3. DISTRIBUTION LIST

Official copies of this QAPP, accompanying documents and any subsequent revisions will be provided to:

Tribal Community

Name: _____
Title: Quality Assurance Manager, Tribe

Name: _____
Title: Project Manager, Tribe

U.S. Environmental Protection Agency

Name: Gina Grepo-Grove
Title: Quality Assurance Manager
Organization: U.S. EPA, Region 10 Phone: 206-553-1632

Name: _____
Title: IGAP Coordinator
Organization: USEPA Region 10 - Alaska Operations Office

Alaska Department of Environmental Conservation

Name: Douglas Kolwaite
Title: Quality Assurance Officer
Project: Air and Water Data and Monitoring Program
Organization: Division Water Quality
Alaska Department of Environmental Conservation Phone: 907-465-5305

University of Alaska

Name: Daniel Bogan
Title: Quality Assurance Officer, Technical Advisor
Organization: Aquatic Ecology Program, Alaska Natural Heritage Program
University of Alaska Anchorage Phone: 907-786-4964

Name: Dr. Todd Radenbaugh
Title: Technical Advisor
Project: Associate Professor of Environmental Science
Organization: University of Alaska Fairbanks, Bristol Bay Campus Phone: 907-842-5109

A4. PROJECT/TASK ORGANIZATION

List the key project personnel and their corresponding responsibilities. See QAPP Template Guide for specific examples. See Appendix B for project personnel training records. (A*n organizational chart illustrating the Project's flow of authority and flow of communication is highly recommended)*

Example:

Name	Project Title
	Local Community Elder(s)
	Technical Advisory Committee
	Project Manager
	Project Quality Assurance Officer
	Field/Sampling Leader
	Laboratory Manager/Point-of-Contact (for sub-contract laboratory analysis – optional)

A4.1 ROLES AND RESPONSIBILITIES

Local Community Elder(s) Responsibilities

List the names and titles of local tribal elders that will be involved in making decisions regarding this project. The main responsibility of the local community elder shall include providing historical and cultural information about the water resources that is being monitored based on their observations and experiences with the water resources and surrounding natural environment. Elders will assist the tribe in making decisions that will affect the tribe's cultural heritage.

Technical Advisory Committee (TAC) Responsibilities

List the names of personnel that will comprise the TAC and their respective training and qualification to adequately perform TAC's responsibilities. The TAC's main responsibility includes reviewing the monitoring plan and associated standard operating procedures as well as the results obtained from the monitoring effort on an annual basis. The committee may, at any time ask for additional information on any aspect of the project. If monitoring data raises a particular concern, the TAC will be asked to suggest and review any changes to the monitoring plan.

Project Manager (PM) Responsibilities

List the name of the Project Manager, educational background and other training that makes them a qualified Project Manager for the tribe. The Project Manager is the primary contact point for technical objectives, sampling, analytical procedures, QA requirements, problem resolution and general implementation of the QAPP. The Project Manager oversees the water quality monitoring efforts and other project activities, provides and ensures that each of the

project team members conducting water quality monitoring has completed all of the required monitoring elements training and refresher courses provided by the University of Alaska Anchorage (Mr. Dan Bogan) for the Tribal Water Quality Training Program (TWQTP).

Project Quality Assurance Officer (QAO) Responsibilities

Name the Tribe's QA Officer, qualifications and training (this can be put in an appendix if necessary). The QA Officer prepares the project QAPP and its subsequent revisions. The QA Officer ensures that the QAPP incorporates adequate QA and QC measures to meet the data quality objectives set forth by the project and the program and that the QAPPs are timely reviewed and approved by appropriate approving personnel. The QA Officer also ensures that the QA/QC measures specified in the QAPP are effectively implemented throughout the duration of the project. The QA officer coordinates and facilitates technical, performance and quality system audits conducted by appropriate authorities at the project-specified frequency.

Field/Sampling Leader (FSL) Responsibilities

Name the Project Field Sampling Leader. The Field or sampling leader(s) is/are responsible for the timely completion of assigned fieldwork with strict adherence to the QAPP's activity/task schedules, Standard Operating Procedures (SOPs) and sample chain-of-custody documentation.

Laboratory Manager/Leader Responsibilities

Specify the name of the laboratory that will perform the analyses for this project. Specify the name, phone number and/or e-mail address of the point- of-contact for the laboratory. The Laboratory Project Manager is responsible for the timely completion of the required fixed-laboratory analyses with strict adherence to the project-specified SOPs and program requirements.

Technical Support:

Specify who is under contract to the Tribe and who is providing support without compensation for technical support. Technical support can be obtained from UAA, ADEC or EPA, depending on availability of resources. If the personnel are part of the project grant, receiving honoraria by providing technical support for the Tribes, then, their names and description of responsibilities shall be included with the project's organization. If no compensation is involved then, the personnel listed below shall be listed under this Technical Support heading.

- **Quality Assurance Officer for Water Chemistry (QAOC)**

List the name, organization affiliation and contact information. The QAOC shall provide technical support and additional quality assurance for water chemistry.

- **Quality Assurance Officer for Biological Assessment (QAOB)**

List the name, organization affiliation and contact information. The QAOB shall provide technical support and additional quality assurance for Biological Assessment.

A5. BACKGROUND/PROBLEM IDENTIFICATION

Provide general information about the Tribe and the water body or watershed, including Locational information and boundaries. A map will be very useful. Provide history of usage, possible sources of contamination and environmental concerns that may affect water quality. Discuss previous environmental investigations conducted on the site and provide a summary of results. See examples in QAPP Template Guide.

EXAMPLE:

Cook Inlet is a large and dynamic embayment in South central Alaska. Although it is still relatively pristine, the Cook Inlet Basin is beginning to show the signs of environmental stress associated with increased population, development and urbanization. Currently this 39,000 square mile catchment basin is home to roughly two thirds of Alaska's human population. Long-time residents have seen local declines in inter-tidal biological communities and species abundance in Cook Inlet waters, but no one can say for sure whether pollution and human impacts are directly harming the resources of Cook Inlet. While a number of studies have been done by government, universities, and industry, the fact remains that there is not enough baseline data available to determine the effects of point and non-point source pollution on the water quality of the Cook Inlet Basin.

Cook Inlet waters support multi-million dollar sport and commercial fisheries, and provide important subsistence resources for native and other groups. Citizens, industry and resource managers need a comprehensive on-going water quality monitoring program to understand the potential effects of water pollution on Cook Inlet's magnificent but threatened resources in order to make economically and environmentally sound decisions.

Many state and federal agencies lack the resources to conduct continuous water quality monitoring projects at a representative number of sites throughout the basin. Cook Inlet Keeper's Citizen's Environmental Monitoring Program can collect accurate baseline data using trained volunteers in a cost effective manner while also raising public awareness of water quality issues and the watershed concept.

A6. PROJECT/TASK DESCRIPTION

Step 1. Provide the answer to the following questions in this section:

Define the focus of the study – example: major rivers, wadeable streams, lakes, traditional source of drinking water, residential drinking water
Type of monitoring the Tribe is planning to conduct- examples: physical, chemical and/or biological
For chemical testing, list the analytes the Tribe is concerned about

Step 2. Establish Reasonable and Achievable Project Objectives

The objectives of the (Name of Project) water quality monitoring effort are as follows: (examples below)

To assess impacts from present activities (define activities)
To develop baseline information to protect water from future impacts using state and federal laws. This may involve many years of data gathering.
To develop a baseline screening for water quality and identify potential impacts to water quality. This involves screening for problems and is intended to guide more refined efforts in the future.
To assess physical habitat limitations to fish and identify methods of restoration
To file for listing as "at risk" or "impaired" water body under Clean Water Act
To file for in-stream flow for fish and wildlife, water quality, or aesthetic value.

Step 3. Create a tentative timeline which details when specific tasks will be completed.

The annual schedule of tasks and the personnel conducting the tasks for this project are listed in Table 1 below.

All personnel will follow the required Standard Operating Procedures (SOPs) for training, sample collection, sample analysis, data collection, quality assurance and quality control, data management, equipment and kit management, and waste management. The (Name of Project) is an on-going project designed to continue as long as funding allows.

For each row in Table-1, place an "X" in the box representing the month(s) in which that activity is scheduled for completion.

Table T-1: ANNUAL SCHEDULE OF TASKS (Example – List only those tasks applicable to your project)

TASK CATEGORIES	PERSONNEL RESPONSIBLE	J	F	M	A	M	J	J	A	S	O	N	D
TRAINING/QAPP PREPARATION/REVIEW/APPROVAL PROCESSES													
Training	PM/Consultant or contractors												
Performance Evaluations & Recertification (Appendix A)													
Biological Monitoring Training & Re-certification													
PROJECT QA DOCUMENTATION													
Preparation of the QAPP	Tribe/Consultant/Contractor												
Review and Approval of the QAPP (see Approval Page)	Tribe/EPA Grant Coordinator/EPA QA Manager												
MONITORING ACTIVITIES (year start – completed)													
Testing for general physical and chemical parameters (water chemistry monitoring)	Tribal Personnel												
Biological Monitoring	Tribal Personnel												
Data Entry	PM/ Tribal Personnel												
Split or Confirmatory for Chemical Sample Analysis Using Commercial lab*	PM/ Tribal Personnel												
QC for bio-assessment sample collection and processing (10% of samples)	PM/QAO Tribe												
QC for bio-assessment identifications (5% of samples)	PM/QAO Tribe												
ASSESSMENT AND RESPONSE													
Quarterly Data Verification and Validation	Tribe's QAO and/or QAOB, QAOC												
Internal Technical System Review (annually)	PM/QAO												
Annual External Technical System Review	EPA/State/contractors												
Annual QAPP review/revision	PM/QAOs												
Review and Approval of QAPP Revision	Tribe/EPA Grant Coordinator/EPA QA Manager												
Annual Project Report	PM/QAOs to EPA												
Management System Review if EPA- approved QMP exist (every 3-5 years)	R10 QAM or designee												

***** Number of split or confirmatory samples depends on the frequency of sample collection. Recommendation: one per 20 total samples collected or once per year whichever is more frequent.

Example #1 CEMP

PROJECT / TASK DESCRIPTION

The Cook Inlet Keeper (Keeper) is a 501(c)(3) nonprofit organization based in Homer, Alaska, dedicated to protecting Cook Inlet waters and the life they sustain. Because citizens are the true owners of public water resources, Keeper strives to involve them in hands-on activities aimed at improving and protecting habitat and water quality, promoting resource stewardship, and establishing an environmental database for the Cook Inlet Basin.

The objectives of Keeper's Citizens Environmental Monitoring Program are to:

- *inventory baseline water quality in the waters of Cook Inlet Basin;*
- *detect and report significant changes and track water quality trends and*
- *increase public awareness on the importance of water quality through hands on involvement.*

To promote these objectives Keeper has selected water quality parameters that will enhance understanding of overall environmental health (see Section V. of the Volunteer Training Manual for a discussion of the importance of each testing parameter) and testing methods that have proven successful in citizen based programs throughout the United States.

Refinements in methods or additional testing parameters may be incorporated in this project in the future if it is determined that such changes would enhance efforts to achieve project goals and assuming additional funding is available. Any such changes will be submitted for EPA and ADEC approval.

General comparisons will be made between data collected and the water quality index developed by the National Sanitation Foundation as well as state and federal water quality standards as applicable. Data may be used by government agencies, landowners, and other resources managers to enhance understanding of basic water quality status and to identify water quality trends.

To develop and refine an Inlet-wide sampling program, Keeper has initiated a pilot project to monitor surface water quality in the Kachemak Bay region. In 1998, Keeper will expand its water quality monitoring efforts to include sites on Anchor River, Stariski Creek, Deep Creek and Ninilchik River. Keeper is also working with the Kenai Watershed Forum in training volunteers to monitor sites on the lower Kenai River. In the future Keeper will seek to foster monitoring throughout the Cook Inlet Basin, and will begin to incorporate water column and sediment sampling to gain a more comprehensive sense of water quality in Cook Inlet.

Keeper staff trains citizens and groups to take surface water samples using water test kits containing a combination of LaMotte, Hach, Hanna and Microbiology Laboratories equipment and supplies. Monitor training courses are held quarterly and retraining/Quality Control (QC) sessions are held biannually (see Section 8). Volunteers are instructed to monitor 16 times per

year -- once each month from September through April and twice a month from May through August (see Table -1).

Individual citizens and citizen teams test surface water samples primarily for water temperature, turbidity (clarity), pH, salinity, and dissolved oxygen. Current monitoring also includes tests for water color, conductivity, oxidation-reduction potential (ORP) and screening tests for nutrients (nitrate-nitrogen & ortho-phosphate), and bacteria (E. coli & total coliform). In the future additional test parameters may be incorporated including macroinvertebrates, heavy metals and hydrocarbons, as well as boat based programs for sediment and water column testing. These elements will be addressed in a future addendum to, or edition of this QAPP as they are implemented.

Citizens are also encouraged to record narrative environmental data, and to photograph each site. These visual and other observations complement the quantitative physical and chemical data collected at each established monitoring site.

Data collected by volunteers is turned in to the Keeper office where it is entered in the CEMP data system. Test results can then be evaluated using the water quality index developed by the National Sanitation Foundation and compared to state and federal water quality standards as applicable. As understanding of Cook Inlet water quality conditions increases, Keeper will work with other interested parties to develop a Cook Inlet-specific water quality index. This data will be made available on Keeper's web site and a data analysis and summary report will be published annually.

Keeper's water quality monitoring program is an on-going project designed to continue as long as funding allows.

Table T-1: ANNUAL SCHEDULE OF TASKS

MAJOR TASK CATEGORIES	J	F	M	A	M	J	J	A	S	O	N	D
volunteer training		X			X			X			X	
volunteer retraining/quality control			X						X			
monthly testing	X	X	X	X	XX	XX	XX	XX	X	X	X	X
data entry	X	X	X	X	X	X	X	X	X	X	X	X
annual analysis report	X											
annual QAPP review				X								

Example #2 - Matanuska-Susitna Borough

General Overview of Project

The goals of the MSB Water Quality Monitoring Program are:

- *A more informed public.*
- *Useful information for public agency use.*
- *Useful information for local decision-makers.*

The volunteer-based program will create a more informed public through outreach and education. The public will become better informed about water quality, the importance of good water quality and the means to protect its integrity. A sense of stewardship will be created by using volunteers to monitor the boroughs' lakes.

Data collected by volunteers will be turned in to the Matanuska-Susitna Borough Planning Department, where it will be entered into a database. It will later be compared to state and federal standards using reference conditions established by the Alaska Department of Fish and Game. The trophic status of individual lakes will be evaluated after several years of data is collected.

The study will also provide baseline information about the water quality of the borough. This baseline information will be used by local, state and federal agencies and local decision-makers. Over time, the baseline data will be used to predict problems and develop and evaluate management practices relating to water quality.

Lake/ponds: Data will be collected by citizen volunteers in accordance with this Quality Assurance Project Plan.

- *Samples will be taken from lakes and tested in a laboratory for Chlorophyll a and phosphorus.*
- *Hydrolab and Quanta probes will be used to test:*
  - *temperature*
  - *conductivity*
  - *pH*
  - *dissolved oxygen.*
- *Surveys will be conducted by volunteers for wildlife, birds, human use and land use.*
- *Water clarity will be assessed using a Secchi disk.*

In future years, it is envisioned that volunteers will be trained to collect and classify macro-invertebrates utilizing protocols established by the Environmental and Natural Resource Institute. Additionally, the volunteer program and testing procedures will be reviewed and revised as necessary.

Project Timetable

MAJOR TASKS	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Train Borough Staff	X	X									X	X
Evaluate Survey Form	X	X									X	X
Evaluate Sampling Protocols For Volunteers											X	X
Outreach to Citizens to Gather Support & Volunteers		X	X	X								
Select Sites			X	X								
Training Volunteers				X	X	X						
Take Samples					X	X	X	X	X	X		
Analyze Samples					X	X	X	X	X	X		
Input Data into Database					X	X	X	X	X	X	X	X
Draft & Distribute Annual Report	X										X	X

A7. DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are the quantitative and qualitative terms used by EPA to describe how good the data needs to be in order to meet the project's objectives. DQOs for measurement data, also commonly referred to as data quality indicators, are precision, accuracy, representativeness, completeness, comparability, and measurement range (sensitivity). The overall QA objective for analytical data is to ensure that data of known, acceptable and legally defensible quality are generated. To achieve this goal, data must be reviewed for 1) precision, 2) accuracy or bias, 3) representativeness, 4) comparability, and 5) completeness.

The summary of DQO requirements for this project listing the suite of parameter for analysis, analytical methods, frequency of collection and analysis of QA/QC samples, precision, accuracy, and completeness requirements, sample container and preservative requirements and holding times are shown in Table 2 – Data Quality Objectives Summary Table attached at the end of this QAPP. (Check Methods Reference Table. Be sure to double check your final QAPP to make sure your appendices and tables are numbered, named and referenced correctly.)

Precision and Accuracy

Precision is the degree of agreement among repeated measurements of the same characteristic, or parameter, and gives information about the consistency of methods. Accuracy is a measure of confidence that describes how close a measurement is to its "true" value. Replicate measurements will be performed during each testing event, monitoring and training sessions and during annual performance evaluation and re-certification. Replicate analysis acceptability criteria and applicability for each environmental measurement are described in the method's SOP.

Field analytical precision will be evaluated by the relative percent differences (RPD) between field duplicate samples and/or replicate readings using the following formula:

$$RPD = \frac{(R1 - R2)}{((R1 + R2)/2)} \times 100$$

Where: R1 = the larger of the two replicate values
R2 = the smaller of the two replicate values

Field accuracy will be routinely checked according to the instrument and analytical method accuracy requirements (see Table 2 - Summary of Data Quality Objectives) of each parameter.

Commercial laboratory Accuracy and Precision: QC samples for accuracy and precision in a laboratory setting may include the analysis of the following: duplicate samples, laboratory control check and laboratory control check duplicate samples (LCS/LCSD) and/or matrix spike and matrix spike duplicate (MS/MSD) sample analyses and addition of surrogate spikes. LCS and LCSD analyses are blank samples (from the lab) injected (spiked) with a known concentration of target compounds processed on the same date and same way and analyzed with the routine samples. LCS/LCSDs are usually performed in cases where insufficient amount of

routine samples are available for the MS/MSD QC analyses. MS/MSD analyses are routine samples injected with a known concentration of target compounds processed on the same date and same way and analyzed with the routine samples. Surrogate spike is a compound that is not one of the target compounds but belongs to same chemical category and has the same characteristics and behaves similarly as the target compounds. Accuracy are determined by calculating the recoveries (%R) of the target compounds spiked into the LCS/LCSD and/or MS/MSD samples or the surrogate spiked into the sample.

Laboratory Accuracy is calculated as follows:

$$\%R = \frac{SQ - NS \times 100}{spike}$$

where:

%R = percent recovery
SQ = the concentration of the spiked compound measured in the routine or blank sample
NS = concentration of the target compound native to the unspiked routine or blank sample
Spike = the concentration of the target compound spiked in the routine or blank sample

Laboratory precision is calculated as follows:

$$RPD = \frac{(R1 - R2)}{((R1 + R2)/2)} \times 100$$

where: RPD= Relative Percent Difference and
R1 and R2 are the initial and duplicate measurement values, respectively

In case of MS/MSD and/or LCSD/LCSD

R1 = % Recovery of the target compound in the initial analysis (from MS or LCS)
R2 = % Recovery of the target compound in duplicate analysis (from MSD or LCSD)

Note: The laboratory relative percent difference; laboratory duplicate samples; laboratory accuracy and precision; the spike recoveries; and the RPDs of the MS/MSD acceptance criteria will be defined by the laboratory you choose to do your analysis for your project. The Laboratory QA Manual, the summary of the laboratory established criteria for QC samples and certificates of accreditation or drinking water certification must be included in the Appendix of the QAPP.

Data Representativeness

Representativeness is the extent to which measurements actually represent the true environmental condition. It is the degree to which data from the project accurately represent a

particular characteristic of the watershed that is being tested. Representativeness of samples is ensured by adherence to standard field sampling, measurement and laboratory protocols. The design of the sampling scheme and number of samples for this project provide representativeness of the part of the watershed being monitored. As a whole, representativeness of the samples collected for this project will be determined during data assessment and data interpretation phase.

Data Comparability

Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling protocols, the same or comparable analytical methods and units of reporting with comparable sensitivity helps ensure comparability. The (fill in name of project) program has selected testing methods that are EPA-approved and/or currently being employed by other water quality monitoring programs throughout the country. As the program expands, site selection will favor locations where previous water quality monitoring has taken place. Efforts will be made to duplicate the effort of past studies where possible.

Data Completeness

Completeness is the comparison between the amounts of usable data collected versus the amount of data called for in the sampling plan. Completeness is the percentage of valid results obtained compared to the total number of samples taken for a parameter. The target completeness goal for this project shall be 85% or better.

%Completeness is calculated using the following formula:

$$\%\ Completeness\ (per\ parameter) = \frac{\#\ of\ valid\ results \quad x \quad 100}{Total\ \#\ of\ samples\ taken}$$

The parameters measured, analytical methods used, method sensitivity, QC samples, holding times, preservative and containers needed for this project are listed in Table 2 – Summary of Data Quality Objectives. Table 2 will be used as the criteria for evaluating and determining the quality, bias and usability of the data generated for the project conducted. This will be performed during the data validation process.

Table 2- Example – Summary of Analytical and Data Quality Objectives (Methods are based on CWA MUR 2012 list)

Analytical Group	Number of Samples [1]	# of QA Samples/Rep/ Dup/MS/MSD	Matrix	EPA Method/ Instrument Used	Reporting Limits (Range)	Target Accuracy (% recovery)	Target Precision (RPD)	Target Completeness	Preservation	Volume Sample Container	Holding Time
FIELD MEASUREMENTS											
Turbidity		1:10 rep or 1 per day	Water	SM2130B LaMotte 2020		NA	10%	95	None		Analyze Immediately
Dissolved Oxygen		1:10 rep or 1 per day	Water	YSI /Hanna/ Hach	0-50 mg/L	NA	10%	95	None		Analyze Immediately
Salinity		1:10 rep or 1 per day	Water	YSI /Hanna/ Hach	0-70 ppt	NA	10%	95	None		Analyze Immediately
Temperature (^oC)		1:10 rep or 1 per day	Water	YSI /Hanna/ Hach	0.1 unit	NA	10%	95	None		Analyze Immediately
Conductivity		1:10 rep or 1 per day	Water	YSI /Hanna/ Hach	___ mS	NA	10%	95	None		Analyze Immediately
Total Dissolved Solids		1:10 rep or 1 per day	Water	YSI /Hanna/ Hach		NA	10%	95	None		Analyze Immediately
pH (Acidity)		1:10 rep or 1 per day	Water	YSI/Hanna/Hach EPA 150.1	11-14 units	NA	10%	95	None		Analyze Immediately
LABORATORY MEASUREMENTS											
Alkalinity		1:20 QC sample	Water	SM2320B	5 mg/L	75-125% [3]	25% [3]	95	≤4ºC	1 L HDPE	14 days
Ammonia		1:20 QC sample	Water	350.1	0.3 mg/L	75-125% [3]	25% [3]	95	H2SO4 to pH<2, ≤4°C;	500 ml (HDPE)	28 days
BOD or CBOD 5		1:10 or 1 per day	Water	SM5210B	4 ml/L	75-125% [3]	25% [3]	95	≤4ºC	1L HDPE	48 hours
Chlorophyll		1:20 QC sample	Water Filtered	SM 10200H	1 ug/L	75-125% [3]	25% [3]	95	Frozen to-20C Not frozen	1 L HDPE	28 days (48 hours)
Hardness		1:20 QC sample	Water	SM2340B	0.3 mg/L	75-125% [3]	25% [3]	95	HNO_3 pH<2	500 ml HDPE	28 days
Metals		1:20 QC sample	Water	200.7/200.8/6010	0.038 – 700 ug/L	75-125% [3]	25% [3]	95	HNO_3 pH<2	500 ml HDPE	180 days
Nitrate as N		1:20 QC sample	Water	353.2	0.05 mg/L	75-125% [3]	25% [3]	95	H2SO4 to pH<2, ≤4°C;	500 ml (HDPE)	28 days
TKN-as Nitrogen		1:10 or 1 per day	Water	351.2	0.5 mg/L	75-125% [3]	25% [3]	95	H2SO4 to pH<2, ≤4°C;	500 ml (HDPE)	28 days
Nitrate+Nitrite		1:20 QC sample	Water	353.2	0.05 mg/L	75-125% [3]	25% [3]	95	H2SO4 to pH<2, ≤4°C;	500 ml (HDPE)	28 days
Settleable Solids		1:20 QC sample	Water	160.5 or SM2540F	0.5 mL/L/hr	75-125% [3]	25% [3]	95	≤4ºC	1 L HDPE	24 hours
T Phosphorus		1:20 QC sample	Water	365.1	0.02 mg/L	75-125% [3]	25% [3]	95	H2SO4 to pH<2, ≤4°C;	500 ml (HDPE)	28 days
Percent Solids		1:20 QC sample	Water	SM2540G	0.1 %	NA	25% [3]	95	≤4ºC	2 oz	7 days
Turbidity		1:10 rep or 1 per day	Water	180.1	0.5 NTU	NA	25% [3]	95	≤4ºC	200 ml	48 hours
Fecal Coliform		1:10 rep or 1 per day	Water	MPN; 9221 E	1 MPN/ 100 ml	NA	varies	95	Cool, <10ºC 0.0008% $Na_2S^2O_3$	250 ml HDPE or G	6 hours

1- Maximum samples per round of sampling including field QA samples such as field duplicates and blanks. NOTE: Include one temperature blank per ice chest shipped.
2- HDPE- High density polyethylene (plastic); G- Glass
3- Criteria may vary based on laboratory established control limits.

A8. TRAINING REQUIREMENTS AND CERTIFICATION

To be able to participate in the (name of project) water quality monitoring program, participants are required to complete the three phases of specialized training provided by TWQTP and maintain proficiency through annual performance evaluation and re-certification. The TWQTP will provide training to individual Tribes wishing to participate in the program. Upon completion of the 3 phases of training, the participant receives a certificate of training completion. Annual 16-hour performance evaluations, workshops and re-certifications will be conducted by UAA according to the Training SOP. Personnel performance is evaluated during training and annual performance evaluation and re-certification sessions. Trainers make note of each participant's precision and accuracy for all testing methods and comment on overall understanding of monitoring procedures and the watershed concept. This training program meets the USEPA's Office of Grant and Debarment requirement for field competency.

A9. DOCUMENTATION AND RECORDS

All data gathered during this project is recorded on site at the time sampling occurs using a datasheet printed on write-in-the-rain paper. The minimum required data to be recorded for each method is identified in each method's SOP. Appendix B contains the datasheet for this project Personnel are instructed to fill out the datasheet legibly and completely and to the decimal point identified in each method's SOP. Data is entered using an indelible marker. If a mistake is made, one line is drawn through the characters in question and the new characters are entered to the immediate right of the lined-out entries. The date and monitor's initials are entered immediately after the new characters.

Personnel are also instructed to use the comment section of the data sheet to report any problems or abnormalities with sampling procedures or equipment. All records and documents are kept at the Name of Tribe's office and are available for inspection at any time.

Monitoring equipment and supplies are inspected by the Tribe and UAA upon receipt and again during QC sessions. Equipment inspection form and corresponding SOPs for each method SOP are kept up-to-date for each equipment or measurement kit.

B. MEASUREMENT AND DATA ACQUISITION

B1. SAMPLING PROCESS DESIGN

B1.1 Sample Site Selection

State in the QAPP the name of the water resources that will be monitored by the Tribal Community and state the geographical boundaries covered by the monitoring activities. Each proposed site will be given a name and identified by a site number and a location description, as well as by its latitude, longitude and elevation as determined by using either a GIS mapping program, using USGS topographical maps or a GPS. Site selection for future monitoring within (Name of site) will be based on similar factors. See Appendix B for sample station table form.

Discuss in the QAPP the cultural and traditional importance of the water body to the Tribe and the

local community. If the following criteria are applicable, discuss them in the QAPP.

- Traditional/local Knowledge: Traditional and local knowledge will be collected from the Elders and local Community members. This will include observations and experiences with the water body proposed and will be used for water quality monitoring and its surrounding natural environment. State in the QAPP how this information will be useful and used for the project.

- Private property access: If a site requires entering or crossing private property the landowner should be considered in the site selection process. (Name of person –usually the PM) will be responsible for obtaining permission for property access in writing prior to entering the site for sampling.

- Historical Data: If historical data exists for the chosen waterbody, list the previous studies conducted on the site, the parameters/target analytes that were determined and the summary of results, if available.

- Representativeness: Will be met by selecting sites that represent the true natural environmental condition. State in the QAPP how water quality monitoring will represent and impact the true natural environmental condition.

- Logistical Access & Safety: Consideration will be given to select sites that are safe and reasonably accessible. Discuss the safety and reasonable access considerations and/or criteria used when choosing the proposed monitoring site.

B1.2 Sampling Parameters

As described in Section A6, testing parameters are selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Due to cost concerns, only the more affordable sampling and analytical parameters have been selected to ensure the viability of long term monitoring. A list of sampling and analytical parameters for this project can be found in Appendix C and Table 2 of this document.

B1.3 Sampling Frequency

The impact of rain events on water quality is a factor to be considered in the (fill in project name) program. Personnel will strive to maintain a regular monitoring schedule regardless of precipitation and to document past and present weather conditions at the time of sampling. Given the climate of Alaska it is likely that some sites may not be reasonably accessible on the appointed sampling date. Personnel will make efforts to reschedule sampling events as weather allows. Sampling frequency for all parameters measured in this project and the estimated schedule of activities are shown in Tables T-2 below.

Table T-2: Sampling Frequency				
Parameter	Months	Days	Time	Interval

Fill out Table T-2. List all the parameters being tested, the month(s) in which you will conduct the sampling, the day(s) of the month you plan to conduct the sampling, the time of day you plan to sample, and sampling frequency (interval).

B1.4 Site Safety Plans

The following safety precautions discussed below do not constitute a safety plan, and approval of this QAPP doesn't constitute a safety plan approval.

Sampling sites are selected, in part, because they are safely accessible. Personnel are instructed to use safe access routes and will be warned of site-specific hazards. Whenever possible, samples are collected by a field sampling team. In winter months, personnel are advised to exercise caution at sampling sites with no direct road or winter trail access and not to sample when weather conditions are extreme. Personnel may, at times, be required to chop and maintain holes in ice covered fresh water sites, but they are allowed not to monitor if ice may be too thin to support them safely.

Personnel will use appropriate safety equipment during sampling and analysis. This will include: goggles or protective eye wear, rubber gloves, and dust masks when necessary. Personnel who must sample their sites by wading in from shore will wear rubber boots and dress appropriately and be prepared for variable weather conditions.

Example #1 -

SAMPLING PROCESS DESIGN

Sample Site Selection

In order to meet the objectives described in Section 6, the project's design called for selecting four sampling sites on each of the four streams to be studied. Three of these sites were to become monitoring stations and the fourth was to be designated as an alternate site. The following criteria (Ashton 1998) were considered in site selection.

- ***Private property access*** *- if a site requires entering or crossing private property the landowner will be involved in the site selection process and permission will be obtained in writing prior to using the site for sampling.*
- ***Historical data*** *– special consideration is given to sites where water quality data has previously been collected.*

- ***Parameters previously measured*** *– consideration is given to which of the parameter previously measured at each site coincide with the parameters to be measured in this project.*

- ***Representativeness*** *- sampling sites should be located to be representative of a particular reach and not targeted to one specific point source or outfall.*
- ***Logistical access*** *– consideration is given to site proximity and accessibility*
- ***Actual field checks*** *- each site is to be visited prior the start of sampling to verify accessibility, representativeness, safety, and appropriateness.*

Historical water quality data on the four streams has been collected and summarized in Appendix G. These data, along with the other criteria listed above, were reviewed by the Technical Advisory Committee (TAC) and potential sites were ranked using a site selection matrix. Sites were ranked using a 1 to 3 scale, with one being the highest and three being the lowest (Appendix I).

The TAC decided that project objectives would be better served by altering the original study design. It was noted that the Anchor River watershed is quite large and contains at least two important tributaries while the Stariski Creek watershed is considerably smaller and contains no significant tributaries. In light of this, one site was removed from Stariski Creek and a site was added to the Anchor River drainage. In August 1999, the Upper Anchor River monitoring station was changed from its original location at the headwaters to Beaver Creek, a small tributary that is more accessible (Appendix B).

Each site has been assigned a site number and is identified by its latitude, longitude and elevation as determined using a GIS mapping program and data from previous sampling. Site locations will be verified on site using GPS equipment.

Sampling Parameters

As described in Section 6, testing parameters were selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Consideration was also given to data collected by previous studies on these streams and to the costs related to testing each parameter as related to available funding. The parameters to be tested are listed in Tables T-2 and T-3.

Sampling Frequency

The original plan called for sampling at all stations twice a month May through October and once a month November through April. In the fall of 1999, this schedule was amended to include monitoring at a minimum of six sites each month during the winter. In the spring of 2000, the plan was amended further to take samples at all monitoring stations every six weeks from May through October, with an additional sample taken from each site during a high flow event.

Given the climate of South central Alaska, it is likely that some sites may not be reasonably accessible on the scheduled sampling date. The Stream Ecologist will make efforts to reschedule samplings as weather allows, but this may not always be possible.

Site Safety Plans

Safety is a priority at all times for Cook Inlet Keeper staff and volunteers. Sampling sites were selected, in part, because they are safely accessible. The Stream Ecologist visited each selected site before sampling began to locate the safest access route and identify potential hazards. Permission from landowners was obtained prior to the first sampling event. The Project Stream Ecologist is accompanied at all times by a volunteer field assistant. A cell phone is also made available for use.

In winter months the Stream Ecologist and volunteer assistant will exercise caution in sampling sites with no direct road or winter trail access and will not sample when weather conditions are extreme. Sampling may, at times, require that holes be chopped and maintained in ice-covered fresh water sites, but sampling will not be conducted when thin ice prevents safe access.

The Stream Ecologist and volunteer assistants will use rubber gloves and goggles or eye glasses at all times during sampling and analysis. When wading is required, personnel will wear chest waders or hip boots. Personnel are trained to dress appropriately for weather and to be prepared for variable conditions which may require wearing extra layers of warm clothing and waterproof gear during all seasons.

Example #2 – CEMP

SAMPLING PROCESS DESIGN

Sample Site Selection

In order to obtain useful baseline inventory and monitoring information as described in Section 6, it is critical to select sampling sites which are representative of the various hydrologic, geographic, biologic, land use, and other conditions within the watershed. Because of the variability and distribution of human population densities in the Cook Inlet region, site selection should ensure a balance between more impacted and less impacted areas. In the challenging transitional and sub-arctic climate of Southcentral Alaska, it is also necessary to select sites that are safely and reasonably accessible. Finally, to maintain volunteer involvement, it is important to select monitoring sites in which volunteer team members have a personal interest.

Applying the above criteria, the Keeper has established twenty-two, (22) fresh water, near-shore and shore-based sampling stations in the Kachemak Bay watershed to conduct its pilot project. These sites include stations at or near: Anchor Point, Bluff Point/Diamond Creek, Bishops Beach, Bidarka Creek, Beluga Slough, Mud Bay, Homer Boat Harbor, McNeil Creek, Fritz Creek, East End Road, Fox River Flats, Bear Cove, Halibut Cove, Peterson Bay, Eldred

Passage, Kasitna-Jakolof Bay, Barbara Creek, Seldovia Boat Harbor, Seldovia Bay, English Bay and Port Graham Bay (see Appendix G for Sampling Station Map). Sixteen (16) additional sites have been proposed for future testing. Data collected from established pilot project sites prior to approval of this QAPP is included in the CEMP data system and will be identified as such in annual reports.

Each site is given a name and identified by a site number and a location description, as well as by its latitude, longitude and elevation as determined using USGS 1:63,360 scale topographical maps and on site GPS readings. Site selection for future monitoring within the basin will be based on similar factors.

Sampling Parameters & Collection Frequency

As described in Section 6, testing parameters are selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Due to cost concerns, only the more affordable sampling parameters have been selected to ensure the viability of long term monitoring. Primary sampling parameters in the CEMP's surface water testing include: water temperature, turbidity (clarity), pH, salinity, and dissolved oxygen; secondary parameters include: color, conductivity, oxidation-reduction potential, and screening test for nutrients (nitrate-nitrogen and ortho-phosphate), and bacteria (fecal and total coliform).

Surface water samples are taken at all monitoring stations monthly between September and April, and twice monthly from May through August for a total of 16 sampling events per site per year. The sampling period is designated as the last Sunday of each month (as well as the second Sunday of each month from May through August), plus or minus two days (i.e. Friday through Tuesday). The recommended time for sampling is 2:00 PM, and the time allowance range is from 1:00 PM to 5:00 PM. The initial sampling design is not tide dependent, although tide stage will be specifically recorded during field sampling and considered during data analysis.
Monitors are assigned to teams of two or more volunteers with one volunteer monitor identified as the team leader. If volunteers cannot conduct a scheduled sampling, they are instructed to contact their team leader or the Environmental Monitoring Coordinator as soon as possible, so that an alternate monitor can be found

The impact of rain events on water quality is a factor to be considered in the Keeper program. Monitors are asked to maintain a regular monitoring schedule regardless of precipitation and to document past and present weather conditions at the time of sampling. Given the climate of Southcentral Alaska it is likely that some sites may not be reasonably accessible on the appointed sampling date. Keeper staff will make efforts to reschedule samplings as weather allows, but since this may not always be possible, a total of 12 sampling events per year at any one site will be considered to be a complete set of data for that site. Table T-2 summarizes the water quality parameters currently monitored by the CEMP.

Site Safety Plans

Sampling sites are selected, in part, because they are safely accessible. Keeper personnel make an effort to visit each selected site before sampling begins to locate safe access routes and identify any potential hazards. If sites, or access routes to sites, are located on private property, written permission from landowners is obtained prior to the first sampling event. Monitors are instructed to use safe access routes and warned of site-specific hazards.

Whenever possible, monitors are to conduct samplings as a team. In winter months, monitors are instructed to exercise caution in sampling sites with no direct road or winter trail access and not to sample when weather conditions are extreme. Monitors may, at times, be required to chop and maintain holes in ice covered fresh water sites, but they are instructed not to monitor if ice may be too thin to support them safely.

Volunteers are provided with rubber gloves and told to wear them, as well as goggles or eye glasses at all times during sampling and analysis. Monitors who must sample their sites by wading in from shore are instructed to wear rubber boots, and all monitors are advised to dress appropriately and be prepared for variable weather conditions which may include wearing extra layers of warm clothing and waterproof outer gear during all seasons.

Volunteer safety is an integral part of monitor training and is covered in greater detail in Section IV of the Volunteer Training Manual (Appendix D).

B2. SAMPLING METHOD REQUIREMENTS

Grab samples will be collected from (specify type- e.g. stream, lake, estuary, etc.) at (specify depth- e.g. surface, mid depth, etc.) and at the following location (specify location- e.g. next to shore, mid stream, etc.). Sampling protocols for this project will be conducted as outlined in each method's Standard Operating Procedure (SOP) which identifies the parameter(s) it measures, sampling equipment, container, method of preservation, and maximum holding time before prior analysis and summarized in Table2 - Data Quality Objectives.

B3. SAMPLE HANDLING AND CUSTODY PROCEDURES

The project's training certified field personnel will conduct all of the field parameter testing for this project. Split samples or samples identified for additional fixed-laboratory analyses will be collected by the Tribe and sent to laboratory within the analytical holding times. Contract laboratories shall meet the EPA's Forum on Environment's policy for competency and shall be certified and/or accredited for the analyses the laboratory is contracted to analyze. The laboratory's QA Manual and certification of accreditation can be found in Appendix A of this QAPP.

Samples that require laboratory testing will be handled following this chain of custody procedure:

- Samples will be labeled (see Figure F-1) and logged in a monitor datasheet upon collection. When working with commercial laboratories, sample bottles and labels may be provided.
- Once samples have been collected they are returned to the list the place for sample processing and logged in for temporary storage.
- Samples will be the responsibility of the field crew and stay with the project personnel or

designated representative at all times until shipment to the lab.

- Samples are stored, preserved and analyzed as outlined by the method's SOP.
- Project personnel are responsible for coordinating sample transport to a laboratory for analysis.
- Laboratory personnel will record the date and time the sample arrives at the lab.
- Laboratory results and other contract deliverables are submitted the Tribes within 30 days of sample receipt at the lab.
- All results from the laboratory are reported in the annual report.
- The certified clean and appropriate sample container, preservative, sample container label, cooler and chain of custody shall be provided by the laboratory to the Tribe.

B4. ANALYTICAL METHODS REQUIREMENTS

Selecting your methods based on Data Quality Objectives

Using your list of analytes you will test for, from the [Project / Task Description] element of your plan you can now choose the testing methods from the Data Quality Objectives Table-2 that will answer your questions.

The SOPs offer many specific testing methods. You have many options regarding methodology. For example, there may be five of more methods of testing the same thing. Your needs define which is the best method. Sometimes you'll just want inexpensive screening tools to raise "red flags" to potential problems. In this case you can plan follow-up testing with different tools if the results are alarming or above regulatory requirements. In some situations you may already know that you need data quality that is relevant to specific regulatory laws. For example, if you know a new activity will make the stream silty or muddy you could conduct turbidity and settleable solids analysis under a QAPP using methods needed for regulatory compliance. This could document conditions before, during and after, allowing for regulatory review of impacts.

The primary limiting factor to any Tribal water quality monitoring effort is available funds. Funding will direct your scope, objectives, and methodology. The first step is to familiarize your self with the methodologies. The second is to define your parameters of interest. Third, your will choose specific tests based on funding/time limitations.

The analytical methods listed in Table 2 of this QAPP are designed for baseline and regulatory end use of the generated data like determination of water quality standards exceedances. If the data is for screening purposes only, the field or hand-held testing equipment will be sufficient.

When working with a laboratory, the summary of DQOs listed in Table 2 for Laboratory Analyses can be referred to by the Tribes. The maximum laboratory turnaround time from sample receipt to providing analytical results shall be (usually within 30 days of sample receipt date) (The analysis turn-around time is agreed upon by the Tribe and laboratory and included in the contract).

B5. QUALITY CONTROL REQUIREMENTS

The following quality assurance and quality control measures are taken to assure the quality of the

data collected:

- All of the personnel directly involved with the water quality monitoring program and this project are required to complete Phase I through III of training to be eligible to collect data.

- All of the personnel directly involved with this project are required to attend annual re-certification training and workshop to review monitoring procedures and maintain proficiency skills in sample collection and data generation. Re-certification training and workshop shall include the analysis of blind performance evaluation (PE) samples per water quality parameter re-certified as an overall check of performance and proficiency.

- QC For Field Measurements: Replicate measurements shall be performed in the field every 10 sample measurements. Precision of the replicate analyses shall be within the acceptable criteria set forth by the instrument or the method SOP. Only replicate measurements that meet the precision criteria will be entered in the project database. Should a problem arise due to unacceptable precision results, no other measurements for the parameter will be conducted until the cause of the problem is identified and resolved. Problems encountered will be documented in Corrective Action Form (Attachment 2). Deviations from the QAPP shall be documented in the Sample Alteration Form (Attachment 1)

- Calculation of precision, accuracy, and completeness are outlined in Section A-7.

- Depending on the frequency of the sample collection and measurement activities, split samples may be collected and analyzed by a laboratory. Split confirmatory samples may also be sent to the commercial laboratory in case questionable/anomalous high results were obtained in the field. The contracted laboratory must meet EPA's Competency Policy (See section B3 and Appendix A).

- QC For Chemical Analysis: The commercial laboratory performing the split or confirmatory analyses shall have the following QC analyses included in their data package deliverables: Results for method blank, sample and QC sample surrogate recoveries and a laboratory control/duplicate sample and or matrix spike/duplicate sample analyses.

- Three levels of data verification will be employed, i.e., during sample collection, data documentation and data entry and generation processes. Data that did not meet the DQO of the project are appropriately flagged or qualified in the database during the data validation process.

- QC For Biological and/or Habitat Testing: QC2 samples shall be collected and submitted to the QA Officers for Biological and/or Habitat Testing at the beginning of the project for

sample collection and processing, field taxa identification verification and monitor's proficiency evaluation. Thereafter, QC2 samples shall be collected and submitted for sample collection and processing at a frequency of 10% of total samples collected.

- QC For Macro-invertebrate Taxonomic Verification: A QC3 sample shall be collected and submitted to the QA Officers for Biological and/or Habitat Testing for Macroinvertebrate Taxonomic Verification at a frequency of 5% of total sites sampled.

- All calculations are performed automatically after entering the data in the database, thus, removing or minimizing the occurrence of errors.

- In consultation with the TAC, State, EPA and other technical specialists, data shall be evaluated for consistency and reliability and may necessitate re-sampling and sample analysis via commercial laboratory.

- Internal and external QA assessments shall be performed to assess the progress and effectiveness of the project annually.

- The (name of project) program periodically receives comments and technical advice from the Technical Advisory Committee (Appendix A).

- Additional QC activities may be conducted as dictated by the analytical methods of SOPs used in the collection of environmental measurements.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

The Training kit, manufacture's Manual and the environmental measurement SOPs describe the proper handling and maintenance of equipment. Proper equipment handling and maintenance is also emphasized during all training and QC sessions.

Initial inspection, testing and assurance that all of the sample collection and measurement kits meet the technical specifications as specified by the method and/or SOP are the responsibilities of the TWQTP and UAA and are performed upon receipt of the equipment/instrumentation and prior to distribution for use by the tribes. UAA shall also ensure that all of the reagent bottles deployed with the kits are dated with the expiration dates prior to being issued and that a Water Quality Test Kit Inspection Form is filled out appropriately and kept both on the project file and the UAA office. UAA shall evaluate the instruments/equipment annually during the re-certification phase of the program. Temperature calibration with a NIST thermometer shall also be performed by UAA during re-certifications.

The following are the responsibilities of the Tribes with regards to instrument/equipment maintenance:

(1) Before each sampling event, the monitoring personnel shall inspect and test all equipment and reagents and ensure that they are clean and in good working condition.
(2) If any equipment or chemical reagent is found to be defective in any way, the tribe shall contact the manufacturer and arrange for immediate replacement or repair.
(3) Whenever, a faulty piece of equipment or reagent is replaced, the tribe shall create a new Water Quality Test Kit Inspection Form and keep the form in their office file.
(4) The project personnel shall maintain an adequate supply of expendable needs of the project (e.g., reagents, parts, tools, etc) located at the (fill in blank) office. The quantity of reagent maintained in the office shall be carefully estimated to assure that replenishments are received before exhaustion of the supply and that stored supplies do not exceed expiration dates.
(5) Reagent stocks are to be rotated out upon expiration.

B7. INSTRUMENT CALIBRATION AND FREQUENCY

All of the field instruments and equipment shall be calibrated before use following the calibration procedures described in each method SOP and the manufacturer's manual. Meters will be calibrated each day prior to use.

All commercial laboratory instrumentation and equipment used in the analysis for this project shall be calibrated prior to sample analysis in accordance with the technical specifications and procedures specified in the analytical method used.

B8. INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES

Monitoring equipment and supplies are ordered from various manufacturers (see each method's SOP for manufacturers' name and contact information) and are inspected upon arrival by project personnel. Broken bottles, incomplete kits and reagents or instruments that do not meet standards are shipped back to the manufacturer for replacement.

B9. DATA ACQUISITION REQUIREMENTS

Required longitude and latitude information for monitoring sites is derived by using USGS topographic maps at 1:63,360 and confirmed using GPS coordinates taken at the site by the project personnel. Sites may be plotted and spatially checked using a Geographic Information System (GIS) computer-mapping program (e.g., ArcView). This information is used to identify monitoring sites and assign site numbers for entry into the monitoring data system.

Historical water quality data on the sites will be collected and summarized. This data will be used in the site selection process. Additional water quality, fish and wildlife habitat, physical river characteristics and other data pertaining to the watershed will be gathered and utilized in writing the annual report. Historical data will be analyzed to assess direct comparability and may be qualified or excluded from trend analyses in annual reports.

Water quality data will be evaluated by comparison to state and federal water quality standards as applicable.

B10. DATA MANAGEMENT

Monitoring personnel shall collect and report data on the datasheet(s) (Appendix E) provided for this project. All observational data, water quality data and field measurements are recorded at the time of sampling and analysis. All personnel sign and date the datasheets. The data sheets are kept and maintained in an organized file in the (name of tribe) office.

Field datasheets and other sample documentation shall be initially reviewed by the monitor or sample collector and peer reviewed by the Project Manager prior to data entry to the project database. Another review for transcription errors, precision, completeness, anomalous data, and other general problems shall be conducted after data entry to the database. The project personnel shall ensure that data generated are accurately entered into the Microsoft 2000 Access or Excel database which is compatible with the schema format required for the EPA's Storage and Retrieval Data Warehouse (STORET) now called the Water Quality Exchange (WQX). The tribes can submit their water quality data to the Seldovia Village Tribe (SVT) for posting to the WQX. SVT receives grant funds from EPA through the National Environmental Information Exchange Network (NEIN) to develop the capability and implementation of a WQX network data exchange and expand SVT's WQX network Node to include geospatial data collected by SVT personnel as well as water quality data from other local environmental organizations. The Currently, SVT's database is still under testing stages and when completed shall be used to export environmental data through the Internet to the EPA WQX database. Once in the WQX database, the data will be available for sharing through the Internet at the Alaska's Cooperatively Implemented Information Management System (CIIMMS) website.

Data are reviewed regularly by the project personnel, and will be presented each Name of Project in an annual report (see Section C2).

C. ASSESSMENT AND OVERSIGHT

C1. ASSESSMENT AND RESPONSE ACTIONS

C1.1 Project Level Assessments (Internal Project Assessments)

- All project personnel shall undergo a certification and/or re-certification training and workshop which includes the analysis of blind performance evaluation (PE) samples per water quality parameter re-certified as an overall check of performance and proficiency of the monitor or sample collector.

- Depending on the frequency of the sample collection and measurement activities, split samples shall be collected and analyzed by a laboratory. Split confirmatory samples shall also be sent to the laboratory in case questionable/anomalous high results were obtained in the field.

- Three levels of data verification shall be employed, i.e., during sample collection, data documentation and data entry and generation processes. Data that did not meet the DQO of the project are appropriately flagged or qualified in the database during the data validation process.

- The Technical Advisory Committee will review this QAPP and the overall project design annually and may suggest procedural refinements or additional testing procedures. This may include new parameters to be measured or changes to procedures currently in use. Any such changes will be subject to EPA approval. The project is open to EPA management or technical system audits at their discretion.

- An internal QA assessment and technical system review (TSR) shall be conducted by the project, chemical, habitat and biological QA officers for the project to assess the progress and effectiveness of the project annually.

C1.2 Program Level Assessments (External Project Assessments)

- A TSR of the project shall be conducted by EPA, State or contactor to assess the progress and effectiveness of the project annually, or as requested by the program.

- In addition to the PE samples analyzed during re-certification, depending on funding and availability, additional performance evaluation sample may be submitted blind to the project personnel for field measurement analysis at least once per year. A performance evaluation sample may be submitted blind to the contract laboratory to test proficiency.

C2. RESPONSE AND CORRECTIVE ACTIONS

Problems encountered during sample collection and data generation shall be documented and handled accordingly and as soon as possible in a Corrective Action Form (see Attachment 1 & Attachment 2). No measurements will be generated by an instrument or piece of equipment that did not meet the technical specifications of the manufacturer or the method SOP. Problems that may have a big impact on data quality shall be properly documented and resulting data will be flagged accordingly.

Any failure to meet data quality objectives will be evaluated. If the cause is found to be equipment failure, calibration and maintenance procedures will be reassessed and improved. If the problem is found to be personnel error, personnel will work with the Project QA Officer to resolve the problem. If accuracy and precision goals are frequently not being met, QC sessions will be scheduled more often.

If failure to meet program specifications is found to be unrelated to equipment, methods, or personnel error, the QAPP may be revised. Revisions and subsequent modifications and amendments to this QAPP shall be submitted to the EPA, Region 10 Quality Assurance Manager for review and approval.

C3. REPORTS

Annual reports will be produced each year and will describe activities during the previous calendar year. These reports will consist of data results, interpretation of data, information on project status, project highlights, accomplishments and results of audits and internal assessments.

The PM is responsible for the preparation of Annual Report. The project personnel shall be responsible for the Annual report production and distribution. Annual reports will be forwarded to ADEC (optional), the regional office of EPA and all other parties listed in Section A3 of this document as well as the Technical Advisory Committee. Summaries of all reports highlighting the assessment results, project status and achievements will be distributed to the Name of Tribe Tribal Council.

D. DATA VALIDATION AND USABILITY

D1. DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

All data collected by project personnel is subject to review by the Chemical and Habitat QA Officer; Biological QA Officer; Project QA Officer; Project Manager; Field/Sampling Leader; and the Laboratory Manager/Leader to determine if the data meet QAPP objectives. Decisions to reject or qualify data are made by the Project QA Officer.

D2. VALIDATION AND VERIFICATION METHODS

D2.1 Data Verification

For Field Measurements: Data sheets and/or chain-of custody forms must be filled out completely and signed by the samplers at the time of sampling and analysis. There will be at least three levels of data verification for this project, (1) field data sheet and data generation documentation review by the sample collector, (2) peer review by a project staff other than the sample collector and (3) data review and evaluation by the project QA Officer or Project Manager. During this process, datasheets for calibration and measurements and chain-of-custody records shall be checked and evaluated for precision, accuracy, missing or illegible information, errors in transcription and calculation and values outside of the expected range.

When review is completed and any concern addressed, each datasheet is signed and dated by the Project QA Officer/Project Manager. If data quality questions cannot be adequately resolved, data will not be entered into the data system and the Project QA Officer will arrange for corrective measures (i.e. re-training, equipment re-calibration, etc.). Any changes made to data are documented, initialed and dated, and any action taken as a result of the data review is specifically recorded on the datasheet below with the reviewers' signatures and dates of signatures.

D2.2 Data Validation

Data validation shall be conducted on all environmental data generated for this project by the Chemistry, Habitat and Biological Monitoring Quality Assurance Officers in accordance with the specifications and QC acceptance criteria set forth by the analytical methods and SOPs used for each environmental measurement. Data that did not meet the DQO of the project are appropriately flagged or qualified in the database during the data validation process.

On a quarterly basis, the Project QA officers print the data and proof read it against the original data

sheets. Errors in data entry are corrected and inconsistencies are flagged for further review. Data shall be presented annually using graph and report formats to document baseline water quality, identify trends and detect deficiencies in data collection or program design.

Annual reports will include discussion of any data quality problems and will be distributed to all data users (see Section C). Members of the Technical Advisory Committee will be asked to review these reports and offer suggestions for improving the Name of Project.

D3. RECONCILIATION WITH DATA QUALITY OBJECTIVES

Data generated by this project shall be evaluated and assessed in accordance with the DQO requirements listed in Table 3 and the technical specifications and QC acceptance criteria set forth by the analytical methods and SOPs used for each environmental measurement. All of the data generated shall be reported in the database. Data that were slightly outside the DQO goals of the project shall be appropriately flagged or qualified in the database with a short narrative defining the qualifier and its effect to the quality of the data.

REFERENCES:

- U.S. Environmental Protection Agency (EPA). 1986. Test Methods for the Evaluation of Solid Waste: Physical/Chemical Methods, 3rd Edition. EPA SW-846, 1986.
- EPA. 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. U.S. Environmental Protection Agency, Office of Emergency Response. EPA 540/R-99/008. October.
- EPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. EPA600/R-99/064. March 2000.
- EPA. 2001. EPA Requirements for Quality Assurance Project Plans (QA/R2). EPA/240/B-01/003. March 2001.
- EPA. 2002a. Guidance for Quality Assurance Project Plans (QA/G-5). EPA/240/R-02/009. December 2002.
- EPA. 2002b. Guidance on Environmental Data Verification and Data Validation (QA/G-8). EPA/240/R-02/004, November 2002.
- EPA. 2011. Forum on Environmental Measurements (FEM) Policy to Assure Competency of Laboratories, Field Sampling and Other Organizations Generating Environmental Measurement Data Under Agency-Funded Acquisitions, http://www.epa.gov/fem/pdfs/fem-lab-competency-policy.pdf

ATTACHMENT 1 - SAMPLE ALTERATION FORM

Project Name and Number: _____
Sample Matrix: _____
Measurement Parameter: _____

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

_____
_____

Reason for Change in Field Procedure or Analysis Variation:

_____
_____

Variation from Field or Analytical Procedure:

_____
_____

Special Equipment, Materials or Personnel Required:

_____
_____
_____
_____

Initiators Name: _____ Date: _____

Quality Staff: _____ Date: _____

ATTACHMENT 2 - CORRECTIVE ACTION FORM

Project Name and Number: _____

Sample Dates Involved: _____

Measurement Parameter: _____

Acceptable Data Range: _____

Problem Areas Requiring Corrective Action: _____
_____
_____
_____

Measures Required to Resolve Problem(s): _____
_____
_____
_____

Means of Detecting Problems and Verifying Correction: _____
_____
_____
_____

Initiators Name: _____ Date: _____

Quality Staff: _____ Date: _____

APPENDIX A – FEM POLICY COMPETENCY RECORDS

1. Personnel training records and certificate
2. Laboratory QA Manual
3. Laboratory certificate of accreditation or certification
4. Most recent Laboratory Assessment Report (if available)

APPENDIX B – METHODS REFERENCE TABLE