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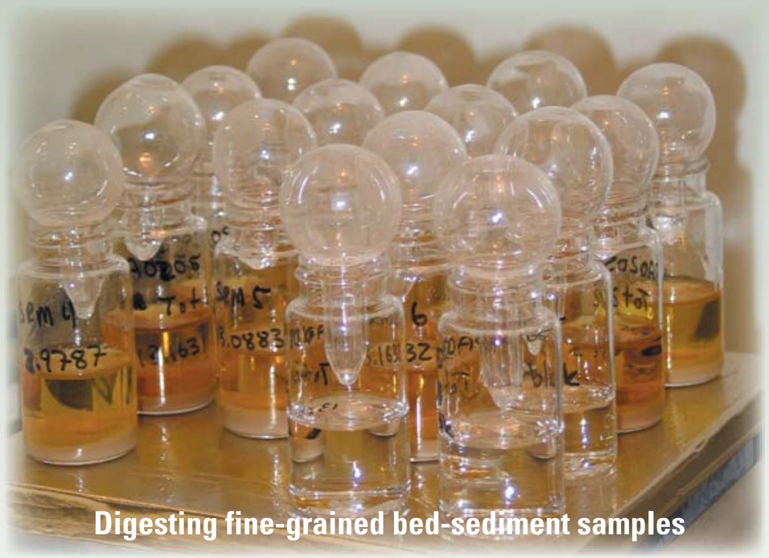
Water-Quality, Bed-Sediment, and Biological Data (October 2003 through September 2004) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

Identifying aquatic insects

Processing suspended-sediment sample



Digesting fine-grained bed-sediment samples

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Dodge and others - Water-Quality, Bed-Sediment, and Biological Data (October 2003 through September 2004) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

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COVER PHOTOGRAPHS: Banner: Digesting bulk bed-sediment samples in concentrated nitric acid to liberate adsorbed trace elements for analysis. Photograph by Michelle I. Hornberger, U.S. Geological Survey, taken March 11, 2005.

Left: Identifying aquatic insects to the lowest taxonomic level (usually to species) under a microscope. Photograph by Michelle I. Hornberger, U.S. Geological Survey, taken May 11, 2005.

Top right: Processing suspended-sediment sample through a sieve to determine the percentage of sediment mass finer than 0.062-millimeter diameter (silt size and smaller). Photograph by Kent A. Dodge, U.S. Geological Survey, taken January 11, 2002.

Bottom right: Digesting fine-grained bed-sediment samples in concentrated nitric acid to liberate adsorbed trace elements for analysis. Photograph by Michelle I. Hornberger, U.S. Geological Survey, taken May 11, 2005.

Water-Quality, Bed-Sediment, and Biological Data (October 2003 through September 2004) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

By Kent A. Dodge, Michelle I. Hornberger, and Jessica L. Dyke

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Suggested citation:
Dodge, K.A., Hornberger, M.I., and Dyke, J.L., 2005, Water-quality, bed-sediment, and biological data (October 2003 through September 2004) and statistical summaries of data for streams in the upper Clark Fork basin, Montana: U.S. Geological Survey Open-File Report 2005-1356, 124 p.

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Conversion Factors, Datum, Abbreviated Water-Quality Units, and Acronyms

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
foot (ft)	0.3048	meter (m)
gallon (gal)	3.785	liter (L)
gallon (gal)	3,785	milliliter (mL)
inch (in.)	25.4	millimeter (mm)
inch (in.)	25,400	micrometer (µm)
mile (mi)	1.609	kilometer (km)
ounce (oz)	28.35	gram (g)
part per million	1	microgram per gram (µg/g)
square mile (mi^2)	2.59	square kilometer (km^2)
ton per day (ton/d)	907.2	kilogram per day (kg/d)

Temperature in degrees Celsius (˚C) may be converted to degrees Fahrenheit (˚F) as follows:

$$^\circ F = (1.8 \times {^\circ C}) + 32$$

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Abbreviated water-quality units used in this report:

µg/g micrograms per gram
µg/L micrograms per liter
µg/mL micrograms per milliliter
µm micrometer
µS/cm microsiemens per centimeter at 25 degrees Celsius
mg/L milligrams per liter

Water-year definition:

A water year is the 12-month period from October 1 through September 30. It is designated by the calendar year in which it ends.

Acronyms used in the report:

ICAPES	inductively coupled argon plasma-emission spectroscopy
LRL	laboratory reporting level
LT-MDL	long-term method detection level
NWQL	USGS National Water Quality Laboratory, Denver, Colo.
RSD	relative standard deviation
SRM	standard reference material
USGS	U.S. Geological Survey

Water-Quality, Bed-Sediment, and Biological Data (October 2003 through September 2004) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

By Kent A. Dodge, Michelle I. Hornberger[1], and Jessica L. Dyke[1]

Abstract

Water, bed sediment, and biota were sampled in streams from Butte to below Missoula as part of a program, conducted in cooperation with the U.S. Environmental Protection Agency, to characterize aquatic resources in the upper Clark Fork basin of western Montana. Sampling sites were located on the Clark Fork, five major tributaries, and three smaller tributaries. Water-quality samples were collected periodically at 17 sites during October 2003 through September 2004 (water year 2004). Bed-sediment and biological samples were collected one time in August 2004. The primary constituents analyzed were trace elements associated with tailings from historical mining and smelting activities. This report summarizes the results of water-quality, bed-sediment, and biota samples collected in water year 2004 and provides statistical summaries of data collected since 1985.

Water-quality data for samples collected periodically from streams include concentrations of selected major ions, trace elements, and suspended sediment. Daily values of suspended-sediment concentration and suspended-sediment discharge were determined for three sites. Bed-sediment data include trace-element concentrations in the fine-grained and bulk fractions. Biological data include trace-element concentrations in whole-body tissue of aquatic benthic insects. Quality-assurance data are reported for analytical results of water, bed sediment, and biota. Statistical summaries of water-quality, bed-sediment, and biological data are provided for the period of record since 1985 for each site.

Introduction

The Clark Fork originates near Warm Springs in western Montana at the confluence of Silver Bow and Warm Springs Creeks (fig. 1). Along the 148-mi reach of stream from Silver Bow Creek in Butte to the Clark Fork at Milltown Reservoir, five major tributaries enter: Warm Springs Creek, Little Blackfoot River, Flint Creek, Rock Creek, and Blackfoot River. Principal surface-water uses in the 6,000-mi^2 Clark Fork basin above Missoula include irrigation, stock watering, light industry, hydroelectric power generation, and habitat for trout fisheries. Current land uses primarily are cattle production, logging, mining, residential development, and recreation. Large-scale mining and smelting were prevalent land uses in the upper basin for more than one hundred years, but are now largely discontinued.

Deposits of copper, gold, silver, and lead ores were extensively mined, milled, and smelted in the drainages of Silver Bow and Warm Springs Creeks from about 1870 to 1980. Moderate- and small-scale mining also occurred in the basins of most of the major tributaries to the upper Clark Fork. Tailings derived from past mineral processing commonly contain large quantities of trace elements such as arsenic, cadmium, copper, lead, and zinc. Tailings have been eroded, mixed with stream sediment, transported downstream, and deposited in stream channels, on flood plains, and in the Warm Springs Ponds and Milltown Reservoir. The widely dispersed tailings continue to be re-eroded, transported, and redeposited along the stream channel and flood plain, especially during high flows. The occurrence of elevated trace-element concentrations in water and bed sediment can pose a potential risk to aquatic biota and human health.

Concern about the potential toxicity of trace elements to aquatic biota and human health has resulted in a comprehensive effort by State, Federal, and private entities to characterize the aquatic resources in the upper Clark Fork basin to guide and monitor remedial cleanup activities. A long-term data base was considered necessary to detect trends over time in order to evaluate the effectiveness of remediation. Water-quality data have been collected by the U.S. Geological Survey (USGS) at selected sites in the upper Clark Fork basin since 1985 (Lambing, 1987, 1988, 1989, 1990, 1991; Lambing and others, 1994, 1995; and Dodge and others, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004). Trace-element data for bed sediment and biota (aquatic benthic insects) have been collected intermittently since 1986 at selected sites as part of studies on bed-sediment contamination and bioaccumulation of metals conducted by the USGS National Research Program (Axtmann and

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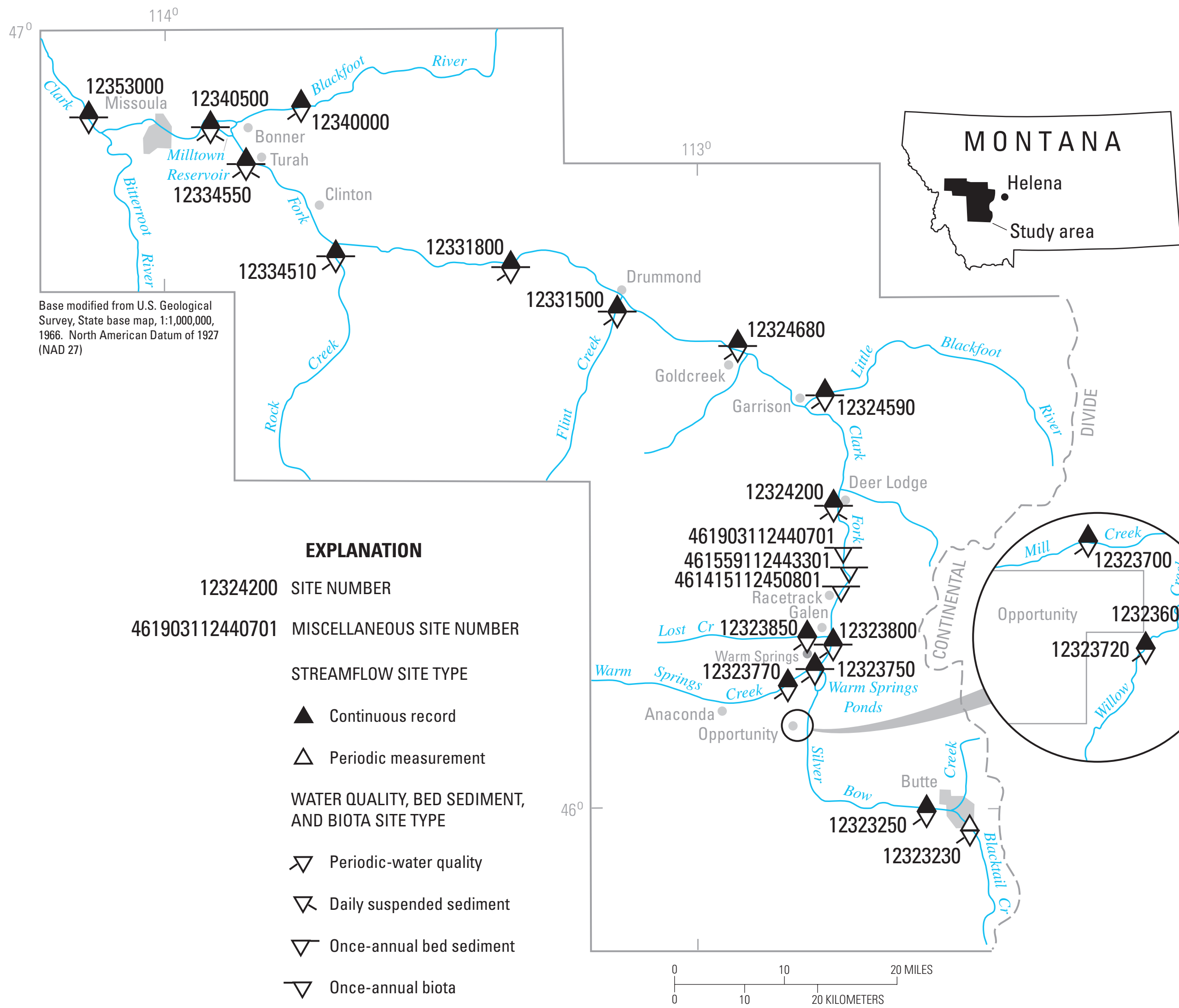

Figure 1. Location of study area.

Luoma, 1991; Cain and others, 1992, 1995; Axtmann and others, 1997; Hornberger and others, 1997). In March 1993, an expanded sampling program for water, bed sediment, and biota was implemented by the USGS in cooperation with the U.S. Environmental Protection Agency to provide systematic, long-term monitoring to better quantify the seasonal and annual variability in selected constituents.

The purpose of this report is to present water-quality data for 17 sites and trace-element data for 15 bed-sediment and 15 biological sites in the upper Clark Fork basin collected from October 2003 through September 2004 (water year 2004). Quality-assurance data are presented for water-quality, bed-sediment, and biota samples. Statistical summaries also are provided for water-quality, bed-sediment, and biological data collected since 1985.

Sampling Locations and Types of Data

Sampling sites in the upper Clark Fork basin from Butte to below Missoula (fig. 1) are located on the Clark Fork mainstem, five major tributaries (Warm Springs Creek, Little Blackfoot River, Flint Creek, Rock Creek, and Blackfoot River), and three smaller tributaries (Mill Creek, Willow Creek, and Lost Creek). The sites, types of data collected, and period of record for each data type are listed in table 1. Mainstem sampling sites were selected to divide the upper Clark Fork into reaches of relatively uniform length, with each reach encompassing either a major tributary or depositional environment (Warm Springs Ponds and Milltown Reservoir). Major tributaries were sampled to describe water-quality, bed-sediment, and biological characteristics of important hydrologic sources in the upper basin and to provide reference comparisons to the mainstem. The three smaller tributaries were sampled to gain better spatial resolution on sources of metals entering the Clark Fork in an area of historical metal-processing activities near Anaconda. Water-quality data were obtained periodically at 17 sites; daily suspended-sediment data were obtained at 3 of these sites. Trace-element data for 15 bed-sediment and 15 biological sites were obtained once-annually. Continuous streamflow data were collected at 18 sites.

A list of properties measured onsite and constituents analyzed in samples of water, bed sediment, and biota is given in table 2. Onsite measurements of properties, laboratory analyses of water, bed-sediment, and biota samples, and associated quality-assurance data for water year 2004 are listed in tables 4 through 20 at the back of the report. Statistical summaries of water-quality, bed-sediment, and biological data collected between March 1985 and September 2004 are given in tables 21-24 at the back of the report.

Quality assurance of data was maintained through the use of documented procedures designed to provide environmentally representative data. Acceptable performance of the procedures was verified with quality-control samples that were collected systematically to provide a measure of the accuracy, precision, and bias of the environmental data and to identify problems associated with sampling, processing, or analysis.

Water-Quality Data

Water-quality data consist of onsite measurements of selected stream properties and concentrations of chemical and physical constituents analyzed in periodically collected stream samples. At the 12 sites on the Clark Fork mainstem and smaller tributaries, samples were collected 8 times per year on a schedule designed to describe seasonal and hydrologic variability. At the five sites on the major tributaries, samples were collected 6 times during the water year. At the three daily suspended-sediment sites sampled during water year 2004 (table 1), suspended-sediment samples were collected 2 to 9 times per week.

Methods

Water samples were collected from multiple verticals across the stream using depth- and width-integration methods described by Ward and Harr (1990), Edwards and Glysson (1999), and the USGS National Field Manual for the Collection of Water-Quality Data (variously dated). These methods provide a vertically and laterally discharge-weighted composite sample that is representative of the entire flow passing through the cross section of a stream. Sampling equipment consisted of standard USGS depth-integrating suspended-sediment samplers (DH-48, DH-81, and D-74TM), which were either constructed of plastic or coated with a non-metallic epoxy paint, and equipped with nylon or Teflon nozzles.

Instantaneous streamflow at the time of water sampling was determined at all sites, either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982). Onsite measurements of specific conductance, pH, and water temperature were made during collection of periodic water-quality samples. Onsite sample processing, including filtration and preservation, was performed according to procedures described by Ward and Harr (1990), Horowitz and others (1994), and USGS (variously dated).

Water samples were analyzed for the constituents listed in table 2. The terms “filtered” and “unfiltered recoverable” replace the terms “dissolved” and “total recoverable,” respectively, which were used in the past. The trace elements (arsenic, cadmium, copper, iron, lead, manganese, and zinc) were analyzed for filtered (0.45-μm pore size) and unfiltered recoverable concentrations by the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. Calcium and magnesium also were determined in filtered samples to enable calculation of hardness. Filtered concentrations of arsenic, cadmium, copper, lead, manganese, and zinc were analyzed by inductively coupled plasma-mass spectrometry (Faires, 1993; Garbarino, 1999). Filtered concentrations of calcium, magnesium, and iron were analyzed by inductively coupled plasma-atomic emission

Table 1. Type and period of data collection at sampling sites in the upper Clark Fork basin, Montana.

[Abbreviations: P, present. Symbol: --, no data]

Site number (fig. 1)	Site name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Once annual		
					Fine-grained bed sediment[2]	Bulk bed sediment[2]	Biota[2]
12323230	Blacktail Creek at Harrison Avenue, at Butte	--	03/93-08/95, 12/96-08/03	--	--	--	--
12323250	Silver Bow Creek below Blacktail Creek, at Butte	10/83-P	03/93-08/95, 12/96-P	--	--	--	--
12323600	Silver Bow Creek at Opportunity	07/88-P	03/93-08/95, 12/96-P	03/93-09/95	07/92-P	08/93-08/95, 08/97-P	07/92, 08/94, 08/95, 08/97-P
12323700	Mill Creek at Opportunity	04/03-P	03/03-P	--	--	--	--
12323720	Willow Creek at Opportunity	04/03-P	03/03-P	--	--	--	--
12323750	Silver Bow Creek at Warm Springs	03/72-09/79, 04/93-P	03/93-P	04/93-09/95	07/92-P	08/93, 08/95-P	07/92-P
12323770	Warm Springs Creek at Warm Springs	10/83-P	03/93-P	--	08/95, 08/97, 08/99, 08/02	08/95, 08/97, 08/99, 08/02	08/95, 08/97, 08/99, 08/02
12323800	Clark Fork near Galen	07/88-P	07/88-P	--	08/87, 08/91-P	08/93-P	08/87, 08/91-P
12323850	Lost Creek near Galen	04/03-P	03/03-P	--	--	--	--
461415112450801	Clark Fork below Lost Creek, near Galen	--	--	--	08/96-P	08/96-P	08/96-P
461559112443301	Clark Fork near Racetrack	--	--	--	08/96-P	08/96-P	08/96-P
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	--	--	--	08/96-P	08/96-P	08/96-P
12324200	Clark Fork at Deer Lodge	10/78-P	03/85-P	03/85-08/86, 04/87-03/03, 08/03-P	08/86, 08/87, 08/90-P	08/93-P	08/86, 08/87, 08/90-P
12324590	Little Blackfoot River near Garrison	10/72-P	03/85-P	--	08/86, 08/87, 08/94, 08/98, 08/01, 08/04	08/94, 08/98, 08/01, 08/04	08/87, 08/94, 08/98, 08/01, 08/04
12324680	Clark Fork at Goldcreek	10/77-P	03/93-P	--	07/92-P	08/93-P	07/92-P
12331500	Flint Creek near Drummond	08/90-04/03, 08/03-P	03/85-P	--	08/86, 08/89, 07/92-P	08/93-P	08/86, 07/92-P
12331800	Clark Fork near Drummond	04/93-P	03/93-P	--	08/86, 08/87, 08/91-P	08/93-P	08/86, 08/91-P
12334510	Rock Creek near Clinton	10/72-P	03/85-P	--	08/86, 08/87, 08/89, 08/91-99, 08/01-P	08/93-99, 08/01-P	08/87, 08/91-99, 08/01-P
12334550	Clark Fork at Turah Bridge, near Bonner	03/85-P	03/85-P	03/85-03/03, 08/03-P	08/86, 08/91-P	08/93-P	08/86, 08/91-P
12340000	Blackfoot River near Bonner	10/39-P	03/85-P	07/86-04/87, 06/88-09/95	08/86, 08/87, 08/91, 08/93-96, 08/98-01, 09/03	08/93, 08/94, 08/99-01, 09/03	08/86, 08/87, 08/91, 08/93, 08/96, 08/98, 09/00, 09/03
12340500	Clark Fork above Missoula	03/29-P	07/86-P[3]	07/86-04/87, 06/88-01/96, 03/96-03/03, 08/03-P	08/97-P	08/97-P	08/97-P
12353000	Clark Fork below Missoula[4]	10/29-P	03/85-09/95	--	08/86, 08/90-P	08/93-P	08/86, 08/90-P

[1]Onsite measurements of stream properties and laboratory analyses of selected major ions, trace elements, and suspended sediment. Prior to March 1993, laboratory analyses included only trace elements and suspended sediment, with the exception of Clark Fork below Missoula.

[2]Laboratory analyses of trace elements.

[3]Prior to October 1989, water-quality data for Clark Fork above Missoula only included suspended-sediment data.

[4]Bed sediment and biota sampled about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 2. Properties measured onsite and constituents analyzed in samples of water, bed sediment, and biota from the upper Clark Fork basin, Montana.

Water		Bed Sediment	Biota
Property	Constituent	Constituent	Constituent
Streamflow	Hardness (calculated)	Arsenic	Arsenic
Specific conductance	Calcium	Cadmium	Cadmium
pH	Magnesium	Chromium	Chromium
Temperature	Arsenic	Copper	Copper
	Cadmium	Iron	Iron
	Copper	Lead	Lead
	Iron	Manganese	Manganese
	Lead	Nickel	Nickel
	Manganese	Silver	Zinc
	Zinc	Zinc	
	Suspended sediment		

spectrometry (Fishman, 1993). Unfiltered recoverable concentrations of trace elements were determined from unfiltered samples that were first digested with dilute hydrochloric acid (Hoffman and others, 1996) and then analyzed for arsenic by graphite furnace-atomic absorption spectrometry (Jones and Garbarino, 1999) and for cadmium, copper, iron, lead, manganese, and zinc by inductively coupled plasma-mass spectrometry (Garbarino and Struzeski, 1998).

Water samples also were collected from multiple verticals for analysis of suspended sediment whenever periodic water-quality samples were collected. These samples were analyzed for suspended-sediment concentration and the percentage of suspended-sediment mass finer than 0.062-mm diameter (silt size and smaller) by the USGS Montana Water Science Center sediment laboratory in Helena, Mont., according to methods described by Guy (1969) and Lambing and Dodge (1993).

Suspended-sediment samples for the three daily suspended sediment sites were collected by local contract observers using the depth-integration method at a single vertical near mid-stream. The samples were analyzed for suspended-sediment concentration and were used to determine daily mean suspended-sediment concentrations according to methods described by Porterfield (1972).

Results

Water-quality data for samples collected periodically during water year 2004 are presented in table 4. Daily mean streamflow, daily mean suspended-sediment concentration, and daily suspended-sediment discharge for water year 2004 at the three daily suspended-sediment stations are reported in tables 5 through 7, along with monthly summary statistics and annual totals for streamflow and sediment load.

Quality Assurance

Quality-assurance procedures used for the collection and field processing of water-quality samples are described by Ward and Harr (1990), Knapton and Nimick (1991), Horowitz and others (1994), Edwards and Glysson (1999), and USGS (variously dated). Standard procedures used by the NWQL for internal sample handling and quality assurance are described by Friedman and Erdmann (1982), Jones (1987), and Pritt and Raese (1995). Quality-assurance procedures used by the Science Center sediment laboratory are described by Lambing and Dodge (1993).

The quality of analytical results reported for water-quality samples was evaluated by quality-control samples that were submitted from the field and analyzed concurrently in the laboratory with routine samples. These quality-control samples consisted of replicates, spikes, and blanks which provide quantitative information on the precision and bias of the overall field and laboratory process. Each type of quality-control sample was submitted at a proportion equivalent to about 5 percent of the total number of water-quality samples. Therefore, the total number of quality-control samples represented about 15 percent of the total number of water-quality samples.

In addition to quality-control samples submitted from the field, internal quality-assurance practices at the NWQL are performed systematically to provide quality control of analytical procedures (Pritt and Raese, 1995). These internal practices include analyses of quality-control samples such as calibration standards, standard reference water samples, replicate samples, deionized-water blanks, or spiked samples at a proportion equivalent to at least 10 percent of the sample load. The NWQL participates in a blind-sample program where standard reference water samples prepared by the USGS Branch of Quality Systems are routinely inserted into the sample line for each analytical method at a frequency proportional to the sample load. The laboratory also participates in external evaluation studies twice-yearly with the U.S. Environmental Protection Agency, the Canadian Center for Inland Water, and the USGS Branch of Quality Systems to assess analytical performance.

Replicate data can be obtained in different ways to provide an assessment of precision (reproducibility) of analytical results. Replicate samples are two or more samples considered to be essentially identical in composition. Replicate samples can be obtained in the field (field replicate) by either repeating the collection process to obtain two or more independent composite samples, or by splitting a single composite sample into two or more subsamples. The individual replicate samples are then analyzed separately. Likewise, a single sample can be analyzed two or more times in the laboratory to obtain a measure of analytical variability (laboratory replicate).

Precision of analytical results for field replicates is affected by numerous sources of variability within the field and laboratory environments, including sample collection, sample processing, and sample analysis. To provide data on precision for samples exposed to all sources of variability, replicate stream samples for chemical analysis were obtained in the field by splitting a composite stream sample, and replicate stream samples for suspended-sediment analysis were obtained in the field by concurrently collecting two independent cross-sectional samples. Analyses of these field replicates indicate the reproducibility of environmental data that are affected by the combined variability potentially introduced by field and laboratory processes.

Analytical precision was evaluated with laboratory replicates, which exclude field sources of variability. Two independent analyses were made of an individual sample selected randomly in the laboratory from the group of samples comprising each analytical run. A separate analysis of the sample was made at the beginning and end of each analytical run to provide information on the reproducibility of laboratory analytical results independent of possible variability caused by field collection and processing of samples.

Spiked samples are used to evaluate bias, which measures the ability of an analytical method to accurately quantify a known amount of analyte added to a sample. Because some constituents in stream water can potentially interfere with the analysis of a targeted analyte, it is important to determine whether such effects are causing biased (consistently high or low) results. Deionized-water blanks and aliquots of stream samples were spiked in the laboratory with known amounts of the same trace elements analyzed in water samples. Analyses of spiked blanks indicate if the spiking procedure and analytical method are within control for a water matrix that is presumably free of chemical interference. Analyses of spiked aliquots of stream samples indicate if the chemical matrix of the stream water interferes with the analytical measurement and whether these interferences could contribute significant bias to reported trace-element concentrations for stream samples.

Blank samples of deionized water were routinely analyzed to identify the presence and magnitude of contamination that potentially could bias analytical results. The particular type of blank sample routinely tested was a “field” blank. Field blanks are aliquots of deionized water that are certified as trace-element free and are processed through the sampling equipment used to collect stream samples. These blanks are then subjected to the same processing (sample splitting, filtration, preservation, transportation, and laboratory handling) as stream samples. Blank samples are analyzed for the same constituents as those of stream samples to identify whether any detectable concentrations exist.

All water samples were handled in accordance with chain-of-custody procedures that provide documentation of sample identity, shipment, receipt, and laboratory handling. All routine and quality-control samples submitted from a sampling episode were stored in a secure area of the NWQL and analyzed as a discrete sample group, independent of other samples submitted to the NWQL. Therefore, the quality-control data apply solely to the analytical results for stream samples reported herein and provide a direct measure of data quality for this monitoring program.

Data-quality objectives (table 3) were established for water-quality data as part of the study plan for the expanded long-term monitoring program that was initiated in 1993. The objectives identify analytical requirements of detectability and serve as a guide for identifying questionable data by establishing acceptable limits for precision and bias of laboratory results. Comparisons of quality-control data to data-quality objectives are used to evaluate whether sampling and analytical procedures are producing environmentally representative data in a consistent manner. Data that did not meet the objectives were evaluated for acceptability. If necessary, additional quality-control samples were submitted and corrective action was taken.

The NWQL uses a statistically based convention for establishing minimum laboratory reporting levels for analytical results and for reporting low-concentration data (Childress and others, 1999). Quality-control data are collected by the NWQL on a continuing basis to determine long-term method detection levels (LT-MDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year and, consequently, can change from year to year. The methods are designed to limit the possible occurrence of a false positive or false negative error to 1 percent or less. Accordingly, concentrations are reported as less than the LRL for samples in which the analyte was either not detected or did not pass identification criteria. Analytes that are detected at concentrations between the LT-MDL and LRL and that pass identification criteria are estimated. Estimated concentrations are noted with a remark code of "E." These data need to be used with the understanding that their uncertainty is greater than that of data reported without the "E" remark code.

The precision of analytical results for a constituent can be determined by estimating a standard deviation of the differences between replicate measurements for several sets of samples. These replicate measurements may consist either of individual analyses of a pair of samples considered to be essentially identical (field replicates) or multiple analyses of an individual sample (laboratory replicates). The differences in concentration between replicate analyses can be used to estimate a standard deviation according to the following equation (Taylor, 1987):

$$S = \sqrt{\frac{\Sigma d^2}{2k}} \qquad (1)$$

where

S = standard deviation of the difference in concentration between replicate analyses,

d = difference in concentration between each pair of replicate analyses, and

k = number of pairs of replicate analyses.

Precision also can be expressed as a relative standard deviation (RSD), in percent, which is computed from the standard deviation and the mean concentration for all the replicate analyses. Expressing precision relative to a mean concentration standardizes comparison of precision among individual constituents. The RSD, in percent, is calculated according to the following equation (Taylor, 1987):

$$RSD = \frac{S}{\bar{x}} \times 100 \qquad (2)$$

where

RSD = relative standard deviation,

S = standard deviation, and

$\bar{x}$ = mean of all replicate concentrations.

Paired analyses of field replicates are presented in table 8. The precision estimated for each constituent based on these

Table 3. Data-quality objectives for analyses of water-quality samples collected in the upper Clark Fork basin, Montana.

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: --, not determined]

Constituent	Data-quality objectives		
	Detectability	Precision	Bias
	Laboratory reporting level	Maximum relative standard deviation of laboratory replicate analyses, in percent	Maximum deviation of spike recovery, in percent
Calcium, filtered	0.01 mg/L	20	--
Magnesium, filtered	.008 mg/L	20	--
Arsenic, filtered	.2 µg/L	20	25
Arsenic, unfiltered recoverable	2 µg/L	20	25
Cadmium, filtered	.04 µg/L	20	25
Cadmium, unfiltered recoverable	.04 µg/L	20	25
Copper, filtered	.4 µg/L	20	25
Copper, unfiltered recoverable	.6 µg/L	20	25
Iron, filtered	6 µg/L	20	25
Iron, unfiltered recoverable	9 µg/L	20	25
Lead, filtered	.08 µg/L	20	25
Lead, unfiltered recoverable	.06 µg/L	20	25
Manganese, filtered	.2 µg/L	20	25
Manganese, unfiltered recoverable	.2 µg/L	20	25
Zinc, filtered	.6 µg/L	20	25
Zinc, unfiltered recoverable	2 µg/L	20	25
Sediment, suspended, percent finer than 0.062 mm	1 percent	--	--
Sediment, suspended	1 mg/L	--	--

paired results, which include both field and laboratory sources of variability, is reported in table 9. Data-quality objectives for precision are not directly applicable to field replicates because of the inability to determine whether the variability results from field sample collection and processing, or laboratory handling and analysis. However, the precision for field replicate analyses is calculated to illustrate overall reproducibility of environmental data that incorporates both field and laboratory sources of variability. The data-quality objective used to indicate acceptable precision of results for field replicates was a maximum relative standard deviation of 20 percent (table 3). Precision estimates for field replicate analyses were within the 20-percent relative standard deviation limit for all constituents (table 9).

Analytical precision for chemical constituents based on laboratory replicate analyses of individual samples, which includes only laboratory sources of variability, is reported in table 10. Statistics for analytical precision of laboratory-replicate analyses are based on unrounded values stored in laboratory data files. The data-quality objective for analytical precision of laboratory-replicate analyses was a maximum relative standard deviation of 20 percent (table 3). Precision estimates for laboratory-replicate analyses were less than the 20-percent relative standard deviation limit for all constituents (table 10); thus, the data-quality objectives for precision were met. Recovery efficiency for analyses of constituents is determined by analyses of an unspiked sample and a spiked aliquot of the same sample. The data-quality objective for acceptable spike recovery of trace elements in water samples was a maximum deviation of 25 percent from a theoretical 100-percent recovery of added constituent (table 3). At the laboratory, a spiked deionized-water blank and a spiked aliquot of a stream sample were prepared and analyzed along with the original unspiked sample. The differences between the spiked and unspiked sample concentrations were determined and used to compute recovery, in percent, according to equation 3 below.

If the spike recovery for a trace element was outside a range of 75 to 125 percent, the instrument was recalibrated and the entire sample set and spiked samples were reanalyzed for that particular trace element until recoveries were improved to the extent possible. Results of recovery efficiency for individual trace elements in spiked deionized-water blanks and spiked stream samples are presented in tables 11 and 12, respectively. The mean spike recovery for deionized-water samples spiked with trace elements (table 11) ranged from 96.0 to 102 percent. The 95-percent confidence intervals (Taylor, 1987) for the mean spike recovery for each constituent analyzed in deionized-water samples (table 11) did not exceed a 25-percent deviation from an expected 100-percent recovery, except for filtered arsenic (75.0-127). No adjustments were made to filtered arsenic analytical results because this minor exceedance was only 2 percent over the 25-percent spike recovery limit and the mean spike recovery (101 percent) was very good. The mean spike recovery for spiked stream samples (table 12) ranged from 93.8 to 112 percent. The 95-percent confidence intervals for the mean of spike recovery for each constituent analyzed in stream samples (table 12) did not exceed a 25-percent deviation from an expected 100-percent recovery, except for filtered iron (91.2-130 percent). No adjustments were made to the analytical results for filtered iron because this minor exceedance was only 5 percent over the 25-percent spike recovery limit and the mean spike recovery (111 percent) was acceptable.

High or low bias is indicated if the confidence interval does not include 100 percent recovery, thereby indicating a consistent deviation in one direction. All laboratory-spiked deionized-water blank samples (table 11) had confidence intervals for percent recovery that included 100 percent, except filtered cadmium (95.6-99.2 percent). The 95-percent confidence intervals for percent recovery in all laboratory-spiked stream samples (table 12) included 100 percent, except unfiltered recoverable arsenic (106-118), filtered copper (93.8-97.0), unfiltered recoverable copper (89.5-98.1), and unfiltered recoverable zinc (91.0-97.8) percent. In most instances, the indicated biases for these four constituents were small. Both the 95-percent confidence interval (106-118) and mean (112) percent recoveries for unfiltered recoverable arsenic in laboratory-spiked stream samples indicate a persistent, moderate bias. In contrast, the 95-percent confidence interval (93.6-110) and mean (102) percent recoveries for unfiltered recoverable arsenic in laboratory-spiked deionized water blanks indicate no bias. Thus, it appears that the moderate bias is not necessarily caused by the analytical method, but might be a result of analytical interference from the chemical matrix of the stream samples. Because the mean spike recoveries for all constituents met data-quality objectives, no adjustments were made to analytical results for stream samples on the basis of spike recoveries.

Analytical results for field blanks are presented in table 13. A field blank with constituent concentrations equal to or less than the LRL for the analytical method indicates that the entire process of sample collection, field processing, and laboratory analysis is presumably free of significant contamination. If detectable concentrations in field blanks were equal to or greater than twice the LRL (which has a measurement precision generally equal to twice the LT-MDL), the concentrations were noted during data review. Analytical results from the field blank for the next sample set were evaluated for a consistent trend that may indicate systematic contamination. Sporadic, infrequent exceedances of twice the LRL probably represent random contamination or instrument calibration error that is not persistent in the process and which is not likely to cause significant positive bias in a long-term record of analytical results. However, if concentrations for a particular constituent

$$\text{Spike recovery, in percent} = \frac{\text{spiked sample concentration} - \text{unspiked sample concentration}}{\text{spike concentration}} \times 100 \qquad (3)$$

exceeded twice the LRL in field blanks from two consecutive field trips, blank samples were collected from individual components of the processing sequence and were submitted for analysis in order to identify the source of contamination.

Trace-element concentrations in field blanks were almost always less than the LRL. Only one blank had a concentration of filtered cadmium (0.07 μg/L) that was greater than the LRL of 0.04 μg/L. This sample was collected through a D-74TM sampler, which produced results less than the LRL for all of the other trace elements. No adjustments were made to water-quality sample results based on this single minor detection.

Bed-Sediment Data

Bed-sediment data consist of analyses of trace-element concentrations in the fine-grained and bulk (fine-grained plus coarse-grained) fractions of the bed-sediment sample. Bed-sediment samples were collected once-annually during low, stable flow conditions and the same season (typically August) as previous samples to facilitate data comparisons among years.

Methods

Bed-sediment samples were collected in August 2004 using protocols described by E.V. Axtmann (U.S. Geological Survey, written commun., 1994). Samples were collected from the surfaces of streambed deposits in low-velocity areas near the edge of the stream using an acid-washed polypropylene scoop. Whenever possible, samples were collected from both sides of the stream. Three composite samples of fine-grained bed sediment and one composite sample of bulk bed sediment were collected at each site.

Individual samples of fine-grained bed sediment were collected by scooping material from the surfaces of three to five randomly selected deposits along pool or low-velocity areas. The three to five individual samples were combined to form a single composite sample. This collection process was repeated three times to obtain three composite samples. Each composite sample was wet-sieved onsite through a 0.064-mm nylon-mesh sieve using ambient stream water. The fraction of bed sediment in each composite sample that was finer than 0.064 mm was transferred to an acid-washed 500-mL polyethylene bottle and transported to the laboratory on ice.

Individual samples of bulk bed sediment also were collected by scooping material from the surfaces of three to five randomly selected deposits along pool or low-velocity areas. The individual unsieved samples were composited into an acid-washed polyethylene bottle to form a single composite sample, each of which were then transported to the laboratory on ice. Because the streambed at most sampling locations is predominantly gravel and cobble, deposits were selected where gravel and cobble could be excluded from the samples. Generally, bulk bed-sediment samples were composed of particles smaller than about 10 mm in diameter.

Bed-sediment samples were processed and analyzed at the USGS National Research Program laboratory in Menlo Park, Calif. Fine-grained and bulk bed-sediment samples were oven-dried at 60°C and ground using an acid-washed ceramic mortar and pestle. Single aliquots of approximately 0.6 g of sediment from each of the three composite fine-grained bed-sediment samples were digested using a hot, concentrated, nitric acid reflux according to methods described by Luoma and Bryan (1981). An additional aliquot was analyzed from one of the sieved replicate samples at each station. A single aliquot was similarly digested from the composite bulk sediment sample. After a digestion period of up to two weeks, the aliquots were evaporated to dryness on a hot plate. The dry residue was reconstituted in 10 mL of 0.6N (normal) hydrochloric acid. The reconstituted aliquots then were filtered through a 0.45-μm filter using a syringe and in-line disposable filter cartridge. The filtrate was diluted to a 1:5, 1:10, or 1:20 ratio with 0.6N hydrochloric acid. These final solutions were analyzed for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc using inductively coupled argon plasma-emission spectroscopy (ICAPES). The smallest concentration of a constituent that can be reliably reported for a given analytical method is termed the minimum reporting level.

Results

Concentrations of trace elements measured in samples of fine-grained and bulk bed sediment collected during August 2004 are summarized in tables 14 and 15, respectively. Liquid-phase concentrations, in μg/mL, that were analyzed in the reconstituted aliquots of digested bed sediment were converted to solid-phase concentrations, in μg/g, using the following equation:

$$\mu g/g = \frac{\mu g/mL \times \text{volume of digested sample, in mL}}{\text{dry weight of sample, in g} \times \text{dilution ratio}} \quad (4)$$

The reported solid-phase concentrations in tables 14 and 15 are the mean of all analyses for replicate aliquots from each composite sample collected at the site. Because the conversion from liquid-phase to solid-phase concentration is dependent on both the dilution ratio and the dry weight of the sample, minimum reporting levels for some trace elements might differ among stations and among years.

Quality Assurance

The protocols for field collection and processing of bed-sediment samples are designed to prevent contamination from metal sources. Non-metallic sampling and processing equipment was acid-washed and rinsed with deionized water prior to the first sample collection. Nylon-mesh sieves were washed in a laboratory-grade detergent and rinsed with deionized water. All equipment received a final rinse onsite with stream water.

Sampling equipment used at more than one site was rinsed between sites with 10-percent nitric acid, deionized water, and stream water. Separate sieves were used at each site and, therefore, did not require between-site cleaning. Bed-sediment samples were collected sequentially at sites along an increasing concentration gradient to minimize effects from potential site-to-site carryover contamination.

Quality assurance of analytical results for bed-sediment samples included laboratory instrument calibration with standard solutions and analysis of quality-control samples designed to identify the presence and magnitude of bias (E.V. Axtmann, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference materials and procedural blanks. Each type of quality-control sample was analyzed in a proportion equivalent to about 10 percent of the total number of bed-sediment samples.

Standard reference materials (SRMs) are commercially prepared materials that have certified concentrations of trace elements. Analyses of SRMs are used to indicate the ability of the method to accurately measure a known quantity of a constituent. Multiple analyses of the SRMs are made to derive a mean and 95-percent confidence interval for recovery. Recovery efficiency for trace-element analyses of SRMs for bed sediment is summarized in table 16. Two SRMs consisting of agricultural soils representing low and high concentrations of trace elements were analyzed to test recovery efficiency for a range of concentrations generally similar to those occurring in the bed sediment of streams in the upper Clark Fork basin. The digestion process used to analyze bed-sediment samples is not a “total” digestion (does not liberate elements associated with crystalline lattices); therefore, 100-percent recovery may not be achieved for elements strongly bound to the sediment. The percent recovery of trace elements for SRM analyses that use less than a total digestion is useful to indicate which trace elements display strong sediment-binding characteristics in the SRM and whether analytical recovery is consistent between multiple sets of analyses.

Although data-quality objectives have not been established for bed sediment, percent recoveries for individual trace elements shown in table 16 illustrate analytical performance. Mean SRM recoveries for the low-concentration standard (SRM 2709) ranged from 83.7 to 98.6 percent of the certified concentrations for cadmium, iron, lead, manganese, nickel, and zinc. Mean recoveries were lower for arsenic, chromium, and copper (63.0, 66.7, and 71.2 percent, respectively). Percent recoveries for arsenic, cadmium, copper, iron, lead, manganese, and zinc in the high-concentration standard (SRM 2711) ranged from 83.3 to 95.9 percent of the certified concentration. Chromium and nickel had lower recoveries (56.5 and 75.7 percent, respectively) for the high-concentration SRM, possibly due to the strong binding nature of these elements to sediment. The generally small range of variation (less than 10 percent for most constituents) for the 95-percent confidence interval indicates good reproducibility of multiple analyses of the SRMs. No adjustments were made to trace-element concentrations in bed-sediment samples on the basis of recovery efficiencies.

Procedural blanks for bed-sediment samples consisted of the same reagents used for sample digestion and reconstitution. Concentrated nitric acid used for sample digestion was heated and evaporated to dryness. After evaporation, 0.6N hydrochloric acid was added to the dry residue. Procedural blanks, therefore, represent the same chemical matrix and exposure to analytical materials and handling as the reagents used to digest and reconstitute bed-sediment samples. Analytical results of procedural blanks for bed sediment (table 17) are reported as a liquid-phase concentration, in µg/mL, which is equivalent to parts per million. A procedural blank was prepared and analyzed concurrently with bed-sediment samples for each site. Concentrations of trace elements in all procedural blanks were below the minimum reporting level; thus, no contamination bias was indicated and no adjustments to the data were necessary.

Biological Data

Biological data consist of analyses of trace-element concentrations in the whole-body tissue of aquatic benthic insects. Insect samples were collected once-annually at the same sites and dates as bed-sediment samples (table 1), allowing for a direct comparison of biological data with bed-sediment data among the years.

Methods

Insect samples were collected using protocols described in Hornberger and others (1997). Immature stages of benthic insects were collected using a large nylon-mesh kick net. A single riffle at each station was sampled repeatedly until an adequate number of individual insects were collected to provide sufficient mass for analysis. Targeted taxa for collection were the Order Trichoptera (caddisflies) and the Order Plecoptera (stoneflies).

Two caddisfly species of the genus *Hydropsyche* were targeted for collection in this study due to their occurrence at most, but not all, sites: *Hydropsyche cockerelli* and *Hydropsyche occidentalis*. In a few instances, *Hydropsyche tana* were collected. *Hydropsyche* species that could not be positively identified were considered to belong to the *morosa* group and are categorized as *Hydropsyche* spp. or *Hydropsyche morosa* group (in previous reports). The caddisfly *Arctopsyche grandis* and the stonefly *Claasenia sabulosa* were collected where available to represent additional insect taxa that are commonly distributed in the upper Clark Fork basin. In addition, the caddisfly group *Brachycentrus* spp. was sometimes collected when targeted taxa were not available.

Samples of each taxon were sorted by genus in the field and placed in acid-washed plastic containers. Samples were frozen on dry ice within 30 minutes of collection in a small amount of ambient stream water. Between 1986 and 1998, macroinvertebrate containers were kept on ice to allow the insects to evacuate their gut contents for a period of 6 to 8 hours.

Excess water was drained and insects were frozen for transport to the laboratory. In order to reduce the possibility of metal loss through intracellular breakdown during depuration, samples were frozen on dry ice in the field between 1999 and 2004. A comparison of immediately frozen versus depurated samples showed that while no significant difference occurred for most metals, concentrations of copper in the depurated macroinvertebrate samples were about 20 percent lower than those which were immediately frozen. The data were not adjusted for this difference.

Insect samples were processed and analyzed at the USGS National Research Program laboratory in Menlo Park, Calif. Insects were thawed and rinsed with ultra-pure deionized water to remove particulate matter and then sorted to their lowest possible taxonomic level. If large numbers of specimens had been collected at a site, similar-sized individuals were composited into replicate subsamples. Subsamples were placed in tared scintillation vials and oven-dried at 70°C. Subsamples were weighed to obtain a final dry weight and digested by reflux using concentrated nitric acid (Cain and others, 1992). After digestion, insect samples were evaporated to dryness on a hot plate. The dry residue was reconstituted in 0.6N hydrochloric acid, filtered through a 0.45-µm filter, and analyzed undiluted by ICAPES for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc. The smallest concentration of a constituent that can be reliably reported for a given analytical method is termed the minimum reporting level.

Results

Concentrations of trace elements in whole-body tissue of aquatic insects collected during August 2004 are summarized in table 18. The variability in the number of composite samples among species and among sites reflects differences in insect abundance, with the number of composite samples increasing with the relative abundance of insects. Liquid-phase concentrations analyzed in the reconstituted samples were converted to solid-phase concentrations using equation 4. As with bed sediment, minimum reporting levels may differ among sites as a result of variable sample weights. In general, the smaller the biological sample weight (a function of insect abundance), the higher the minimum reporting level. Therefore, higher minimum reporting levels do not necessarily imply a higher trace-element concentration in tissue.

Quality Assurance

The protocols for field collection and processing of biota samples are designed to prevent contamination from metal sources. Non-metallic nets, sampling equipment, and processing equipment were employed in all sample collection. Equipment was acid-washed and rinsed in ultra-pure deionized water prior to the first sample collection. Nets and equipment were thoroughly rinsed in ambient stream water at each new main-stem site. New nets were used for all tributary sites. Biota samples were collected sequentially at sites along an increasing concentration gradient to minimize effects from potential site-to-site carryover contamination.

Quality assurance of analytical results for biota samples included laboratory instrument calibration with standard solutions and analyses of quality-control samples designed to quantify precision and to identify the presence and magnitude of bias. Quality-control samples consisted of a SRM and procedural blanks. Each type of quality-control sample was analyzed in a proportion equivalent to about 10 to 20 percent of the total number of biota samples.

Recovery efficiency for trace-element analyses of the SRM for biota is summarized in table 19. The reference material tested was lobster hepatopancreas. Data-quality objectives have not been established for analytical recovery in biota, but percent recoveries are shown to illustrate analytical performance. Mean SRM recoveries ranged from 92.1 to 106 percent of the certified concentrations for arsenic, cadmium, chromium, copper, iron, manganese, and zinc. Lower mean recoveries were measured for nickel (82.5 percent) and lead (70.4 percent). The low mean recovery for lead was attributed to the low certified concentration in the SRM, resulting in 6 of the 12 analyses having concentrations less than the minimum reporting level. With the exception of chromium and lead, both of which had low certified concentrations in the SRM, the range of variation generally was small (less than about 10 percent) for the 95-percent confidence interval, thereby indicating good reproducibility of multiple analyses of the SRM. No adjustments were made to trace-element concentrations in biota samples on the basis of recovery efficiencies.

Procedural blanks for biota consisted of the same reagents used to digest and reconstitute tissue of aquatic insects and were analyzed undiluted. Analytical results of procedural blanks for biota (table 20) are reported as a liquid-phase concentration, in µg/mL, which is equivalent to parts per million. A procedural blank was prepared and analyzed concurrently with biota samples for each site. Concentrations of trace elements in all procedural blanks were less than the minimum reporting level; thus, no contamination bias was indicated and no adjustments to the data were necessary.

Statistical Summaries of Data

Statistical summaries of water-quality, bed-sediment, and biological data are provided in tables 21-24 for the period of record at each site since 1985. The summaries include the period of record, number of samples, and maximum, minimum, mean, and median concentrations.

Statistical summaries of water-quality data (table 21) are based on results of cross-sectional samples collected periodically by the USGS during the period of record for each site. The summaries do not include data for supplemental single-vertical samples collected during several years by a contract observer at Clark Fork at Turah Bridge, near Bonner; Blackfoot River near

Bonner; and Clark Fork above Missoula. Inclusion of results for supplemental samples that targeted high-flow conditions or maintenance drawdowns of Milltown Reservoir would disproportionately skew the long-term statistics at these three sites relative to the other sites in the network. Statistical summaries of fine-grained and bulk bed-sediment (tables 22 and 23, respectively) and biological data (table 24) are based on results of samples collected once-annually during the indicated years. Because not all sites were sampled for bed sediment and biota every year, the data for some sites do not represent a consecutive annual record.

Statistics for bed-sediment data (tables 22 and 23) are based on the mean trace-element concentrations determined for each year from the averaged results of analyses of composite samples. Therefore, the number of samples for bed sediment represents the number of years that the constituent was analyzed. In contrast, statistics for biological data (table 24) are based on individual analyses for each composite sample collected, rather than on a single mean concentration for each year. Also, the number of samples for arsenic for both bed sediment and biota is smaller than the other trace elements because it was only recently (2003) included for analysis.

Differences in the number of biota composite samples among species reflect differences in species abundance, both within and between sites and among years. As a result, the statistics for biota describe a wider range of variation in trace-element concentrations than would be evident if results from individual composite samples were averaged. The abundance of aquatic insects at a particular site in a given year limits the biomass of the sample which, in turn, may result in variable minimum reporting levels. Where minimum reporting levels vary among years, differences in concentration over time are difficult to determine, especially when a large percentage of the samples have concentrations less than minimum reporting levels.

The presence or absence of insect species at a given site can vary among years and may result in different taxa being analyzed in the long-term period of record. Because *Hydropsyche* insects were not sorted to the species level during 1986-89, statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics for the *Hydropsyche morosa* group are based on the combined results for two or more species because these samples could not be clearly identified to the species level, but the individual insects had *morosa* characteristics.

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DATA

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level; --, no data]

12323250--SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	0955	18	7.6	614	9.0	200	55.0	14.6	3.8
MAR 2004									
17...	0725	18	7.6	578	3.5	200	56.7	13.6	3.7
APR									
20...	0825	18	7.5	535	5.5	170	47.9	12.0	4.7
MAY									
17...	0915	18	7.6	526	9.5	180	50.6	12.2	3.4
JUN									
01...	1525	17	7.7	571	18.0	190	54.7	13.4	4.6
13...	0755	15	7.7	609	20.0	220	62.7	14.6	3.3
JUL									
19...	0845	15	7.6	612	14.5	200	56.9	13.8	4.9
AUG									
20...	0815	15	7.6	580	13.5	200	59.0	13.4	4.6

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	5	0.46	1.02	3.2	25.5	20	490	0.20
MAR 2004								
17...	6	1.06	1.29	8.8	29.9	61	390	.30
APR								
20...	5	1.07	1.13	15.7	26.3	46	430	.23
MAY								
17...	4	1.02	1.19	18.3	35.3	32	430	.22
JUN								
01...	6	.87	1.07	12.4	21.2	14	320	.13
13...	5	1.54	1.78	15.0	29.1	17	370	.12
JUL								
19...	5	1.27	1.29	15.1	24.7	22	130	.22
AUG								
20...	5	2.02	1.90	23.9	27.8	26	130	.18

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323250--SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	4.68	286	319	182	227	94	15	0.73
MAR 2004								
17...	2.69	495	505	268	278	81	8	.39
APR								
20...	2.29	427	445	242	247	88	11	.53
MAY								
17...	2.01	388	436	227	245	92	8	.39
JUN								
01...	1.72	383	404	162	186	84	6	.28
13...	1.33	505	555	326	346	82	5	.20
JUL								
19...	.85	352	326	314	308	92	3	.12
AUG								
20...	.74	365	350	478	473	75	3	.12

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1220	E25	8.4	566	.5	210	60.1	13.9	9.9
MAR 2004									
16...	1540	35	8.8	518	7.0	190	55.0	12.0	12.1
APR									
20...	1110	43	8.7	485	6.5	180	52.7	11.5	15.6
MAY									
17...	1140	38	8.4	483	9.5	180	54.0	11.6	10.8
JUN									
01...	1325	35	8.8	463	15.0	170	51.9	10.8	12.2
13...	1040	30	8.6	499	12.0	180	54.3	11.1	12.1
JUL									
19...	1205	21	9.1	583	20.5	210	62.3	13.7	20.7
AUG									
20...	1100	16	8.7	633	17.0	240	71.6	15.0	16.0

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	17	.76	1.49	25.1	130	7	900	.20
MAR 2004								
16...	15	.85	1.18	46.2	107	15	500	.33
APR								
20...	16	.57	1.04	25.4	78.0	12	600	.22
MAY								
17...	17	.42	1.08	22.1	94.5	14	840	.30
JUN								
01...	18	.28	.75	20.0	70.1	20	470	.24
13...	17	.27	.80	18.5	68.4	12	450	.29
JUL								
19...	22	.47	1.12	35.5	103	11	360	.31
AUG								
20...	24	1.57	3.04	67.2	216	7	460	.27

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	26.9	286	446	237	392	91	23	E1.6
MAR 2004								
16...	13.1	423	446	129	228	83	10	.95
APR								
20...	14.5	451	548	123	256	85	18	2.1
MAY								
17...	19.4	428	644	115	283	90	21	2.2
JUN								
01...	12.5	266	342	50.9	169	89	12	1.1
13...	12.2	264	342	81.8	203	88	13	1.1
JUL								
19...	9.81	239	288	49.7	201	70	8	.45
AUG								
20...	14.7	594	633	204	517	57	12	.52

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323700--MILL CREEK AT OPPORTUNITY, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1055	3.6	8.1	219	1.0	97	26.8	7.31	18.5
MAR 2004									
16...	1435	2.9	8.2	221	4.5	100	27.9	7.68	16.2
APR									
20...	0930	1.8	8.0	184	5.5	79	22.3	5.64	13.9
MAY									
17...	1015	4.6	7.9	133	7.0	55	15.4	3.94	18.5
JUN									
01...	1250	15	7.8	110	10.0	48	14.0	3.18	18.0
13...	0920	34	7.8	88	8.5	39	11.6	2.44	16.2
JUL									
19...	1045	3.8	7.9	136	16.0	59	17.1	3.93	30.5
AUG									
20...	0935	1.9	7.9	167	14.5	75	21.4	5.11	28.9

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	20	.10	.13	1.8	2.8	44	110	E.08
MAR 2004								
16...	16	.08	.08	2.0	3.0	17	70	E.05
APR								
20...	16	.08	.09	2.3	3.5	36	80	E.04
MAY								
17...	22	.07	.10	3.0	4.2	48	130	.13
JUN								
01...	22	.06	.11	3.1	4.9	38	150	.13
13...	21	.07	.12	3.0	5.3	35	160	.14
JUL								
19...	30	.07	.08	2.8	4.1	74	130	.19
AUG								
20...	31	.07	.10	2.7	3.1	84	150	.15

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323700--MILL CREEK AT OPPORTUNITY, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	.26	7.3	8	7.7	8	82	2	.02
MAR 2004								
16...	.19	5.0	6	3.2	2	80	1	.01
APR								
20...	.14	10.6	10	4.4	4	83	1	.00
MAY								
17...	.41	7.7	11	4.5	5	90	2	.02
JUN								
01...	.73	5.5	11	3.5	5	84	5	.20
13...	.93	4.9	12	3.9	5	73	5	.46
JUL								
19...	.43	11.7	13	2.2	2	80	1	.01
AUG								
20...	.29	12.9	14	3.3	3	90	1	.01

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323720--WILLOW CREEK AT OPPORTUNITY, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1135	5.7	8.1	308	5.0	130	38.9	9.03	12.0
MAR 2004									
16...	1515	6.6	8.2	292	7.0	130	38.0	9.00	13.5
APR									
20...	1015	5.7	8.1	280	5.0	120	36.1	7.59	13.3
MAY									
17...	1050	16	8.0	371	8.5	170	47.4	12.0	89.0
JUN									
01...	1410	20	8.4	314	16.0	140	41.2	10.1	81.0
13...	0950	21	8.1	321	10.0	150	44.4	10.5	75.7
JUL									
19...	1115	8.3	8.1	320	13.5	140	40.7	9.11	21.8
AUG									
20...	1010	6.3	7.9	308	12.0	140	40.6	9.04	15.6

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	13	.08	.06	2.0	5.7	16	140	.09
MAR 2004								
16...	12	.09	.05	2.7	4.2	18	100	.13
APR								
20...	16	E.03	.06	2.6	5.0	29	130	E.07
MAY								
17...	96	.09	.16	11.5	18.9	65	330	.21
JUN								
01...	87	.05	.07	6.9	10.0	22	130	.12
13...	79	.05	.07	5.8	7.8	35	100	.11
JUL								
19...	21	E.04	.04	2.9	3.6	7	30	<.08
AUG								
20...	16	E.03	E.03	2.4	2.8	7	40	E.04

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323720--WILLOW CREEK AT OPPORTUNITY, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	1.43	20.2	26	3.4	7	96	4	.06
MAR 2004								
16...	.69	44.6	46	4.0	4	92	3	.05
APR								
20...	1.02	45.5	43	3.8	7	78	4	.06
MAY								
17...	2.86	39.9	60	19.8	30	85	13	.56
JUN								
01...	1.14	16.7	23	5.8	10	92	5	.27
13...	.68	16.6	20	5.0	7	87	3	.17
JUL								
19...	.27	4.1	5	1.8	2	82	1	.02
AUG								
20...	.29	15.9	15	2.3	3	80	1	.02

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1325	42	9.1	626	4.0	270	75.2	18.8	26.5
MAR 2004									
16...	1700	44	8.8	586	5.0	250	72.8	16.8	12.5
APR									
20...	1200	50	8.8	600	9.5	250	73.8	17.1	12.2
MAY									
17...	1245	62	9.1	493	10.5	220	64.5	15.2	24.1
JUN									
01...	1145	77	9.0	454	12.5	190	55.5	13.6	34.5
13...	1125	76	8.7	354	12.5	150	43.9	10.5	34.1
JUL									
19...	1330	30	9.2	540	22.5	240	70.4	16.2	32.4
AUG									
20...	1205	27	9.1	568	18.5	260	75.3	17.1	32.3

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	27	E.04	.07	3.7	6.6	E6	110	E.04
MAR 2004								
16...	13	.11	.14	5.2	6.9	7	180	<.08
APR								
20...	16	E.04	.10	3.3	5.9	11	200	E.05
MAY								
17...	30	E.03	.13	4.9	10.4	35	370	.11
JUN								
01...	43	E.04	.13	4.9	8.3	24	260	E.07
13...	44	E.03	.10	4.1	7.9	34	220	.12
JUL								
19...	35	E.03	.08	3.5	5.7	8	150	<.08
AUG								
20...	35	E.03	.07	3.4	5.5	11	170	E.04

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	.49	65.7	95	3.5	7	64	3	.34
MAR 2004								
16...	.96	164	178	5.9	9	90	2	.24
APR								
20...	.88	247	304	3.5	9	90	4	.54
MAY								
17...	1.73	88.9	265	2.2	15	90	8	1.3
JUN								
01...	1.10	125	214	2.0	11	84	6	1.2
13...	1.17	104	173	2.9	10	86	6	1.2
JUL								
19...	.62	39.6	102	.9	5	79	4	.32
AUG								
20...	.71	58.5	104	2.2	6	78	3	.22

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1305	17	8.6	431	2.0	220	66.1	12.6	5.4
APR 2004									
20...	1220	42	8.6	340	7.0	170	51.5	10.3	3.9
MAY									
17...	1220	27	8.5	339	8.0	180	53.7	10.1	5.3
JUN									
01...	1125	32	8.4	312	10.0	150	47.2	8.02	5.3
JUL									
19...	1255	26	8.5	311	18.0	150	45.8	7.61	8.8
AUG									
20...	1140	22	8.4	362	14.5	180	58.2	8.98	7.6

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	6	E.03	.04	2.3	7.8	E5	100	<.08
APR 2004								
20...	5	<.04	E.03	2.6	5.6	10	60	<.08
MAY								
17...	7	E.03	E.03	3.0	6.1	14	70	<.08
JUN								
01...	6	E.03	E.04	3.2	8.1	11	90	<.08
JUL								
19...	9	E.03	E.04	3.3	7.5	10	80	<.08
AUG								
20...	8	E.04	.06	3.7	7.7	7	80	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	.36	229	235	1.5	3	71	10	.46
APR 2004								
20...	.29	84.0	94	1.1	2	62	2	.23
MAY								
17...	.28	71.2	95	1.2	E2	78	2	.15
JUN								
01...	.43	42.2	83	1.1	2	72	4	.35
JUL								
19...	.41	23.3	67	.9	E2	67	2	.14
AUG								
20...	.43	83.9	147	1.7	3	81	2	.12

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323800--CLARK FORK NEAR GALEN, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1420	59	8.9	575	4.0	260	74.2	17.1	19.6
MAR 2004									
17...	0835	87	8.3	514	3.5	230	67.9	14.0	7.9
APR									
20...	1320	93	8.7	486	8.0	220	64.5	14.0	12.9
MAY									
17...	1405	89	8.9	451	10.5	210	62.1	13.8	17.5
JUN									
01...	1035	116	8.7	428	10.5	190	54.2	12.4	23.9
13...	1310	143	8.6	307	12.5	140	41.0	8.03	21.2
JUL									
19...	1440	49	8.7	442	20.5	210	61.2	12.8	19.4
AUG									
20...	1310	39	8.7	495	18.5	240	70.9	14.4	20.2

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	20	.04	.06	3.9	8.2	E6	110	<.08
MAR 2004								
17...	8	.07	.12	4.0	11.9	7	290	<.08
APR								
20...	11	E.04	.07	3.5	7.0	8	130	<.08
MAY								
17...	21	E.03	.09	4.7	9.3	23	220	E.07
JUN								
01...	31	.04	.09	4.8	10.2	20	230	E.06
13...	26	E.03	.08	4.2	10.4	21	200	E.07
JUL								
19...	20	E.03	.07	4.3	7.7	7	100	<.08
AUG								
20...	21	E.03	.07	4.9	7.9	E5	110	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323800--CLARK FORK NEAR GALEN, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	.61	82.2	107	3.0	8	75	2	.32
MAR 2004								
17...	2.19	181	228	6.7	13	77	9	2.1
APR								
20...	.66	131	149	3.5	8	78	4	1.0
MAY								
17...	1.01	67.1	151	1.8	8	86	6	1.4
JUN								
01...	1.04	90.0	172	2.4	10	82	6	1.9
13...	1.06	51.9	123	1.7	9	81	7	2.7
JUL								
19...	.55	48.1	85	.9	4	82	3	.40
AUG								
20...	.62	54.2	90	1.9	5	83	3	.32

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323850--LOST CREEK NEAR GALEN, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (μS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (μg/L)
NOV 2003									
17...	1450	49	8.6	585	4.5	300	86.0	19.6	8.3
MAR 2004									
17...	0900	47	8.4	633	4.5	320	91.5	21.1	15.5
APR									
20...	1355	20	8.5	607	8.5	300	87.1	19.7	9.9
MAY									
17...	1335	2.0	8.5	707	14.0	300	78.9	24.7	11.7
JUN									
01...	1005	1.8	8.4	682	11.5	280	73.5	23.5	8.8
13...	1245	1.5	8.5	623	15.5	250	64.3	22.3	7.7
JUL									
19...	1420	1.7	8.4	576	24.5	220	54.8	20.4	8.2
AUG									
20...	1250	1.8	8.4	608	19.5	260	67.3	21.3	6.6

Date	Arsenic, unfiltered recoverable (μg/L)	Cadmium, filtered (μg/L)	Cadmium, unfiltered recoverable (μg/L)	Copper, filtered (μg/L)	Copper, unfiltered recoverable (μg/L)	Iron, filtered (μg/L)	Iron, unfiltered recoverable (μg/L)	Lead, filtered (μg/L)
NOV 2003								
17...	8	<.04	.05	1.5	6.7	8	170	<.08
MAR 2004								
17...	16	E.03	.08	2.5	12.1	9	280	E.04
APR								
20...	12	E.03	.06	2.6	7.8	E5	160	<.08
MAY								
17...	12	E.03	E.03	3.3	4.4	11	70	<.08
JUN								
01...	9	E.03	E.03	2.9	4.1	13	50	<.08
13...	8	E.02	E.02	2.8	3.9	E6	40	<.08
JUL								
19...	8	E.02	.04	2.6	4.0	<6	40	<.08
AUG								
20...	6	<.04	E.03	--	4.3	11	20	.19

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12323850--LOST CREEK NEAR GALEN, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	.59	7.5	13	1.7	5	32	22	2.9
MAR 2004								
17...	1.18	17.1	25	2.4	5	83	13	1.6
APR								
20...	.69	14.8	19	2.4	5	51	34	1.8
MAY								
17...	.13	10.2	12	1.1	E1	61	17	.09
JUN								
01...	.10	10.9	12	1.2	E1	48	24	.12
13...	.08	4.1	6	.8	<2	19	14	.06
JUL								
19...	.12	2.7	5	E.4	E1	60	4	.02
AUG								
20...	E.04	1.9	2	.9	E1	86	27	.13

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12324200--CLARK FORK AT DEER LODGE, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
17...	1540	182	8.6	533	3.5	240	71.3	16.0	11.5
MAR 2004									
17...	1005	204	8.4	533	5.0	240	71.7	15.9	11.3
APR									
20...	1505	179	8.6	520	9.0	240	69.9	15.3	15.4
MAY									
17...	1505	106	8.5	499	12.5	240	70.2	14.5	10.9
JUN									
01...	0855	146	8.2	497	10.5	220	65.0	14.5	17.7
13...	1415	155	8.6	385	15.5	170	51.4	10.8	18.1
JUL									
19...	1540	51	8.6	490	22.5	210	62.0	13.3	17.8
AUG									
20...	1415	40	8.4	535	20.0	240	73.4	13.9	14.7

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
17...	13	.04	.14	4.6	21.8	E5	350	<.08
MAR 2004								
17...	12	.06	.18	5.5	30.3	E6	470	E.06
APR								
20...	13	E.03	.09	5.4	15.8	8	230	E.04
MAY								
17...	13	E.04	.10	5.6	14.2	10	190	E.06
JUN								
01...	25	.06	.18	6.1	26.5	11	380	E.07
13...	23	E.03	.12	6.2	19.9	8	230	E.06
JUL								
19...	17	E.02	.14	7.0	10.9	E4	60	<.08
AUG								
20...	16	E.04	.10	6.6	14.2	<6	160	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12324200--CLARK FORK AT DEER LODGE, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
17...	2.48	38.9	81	6.1	25	77	15	7.4
MAR 2004								
17...	3.52	61.3	119	6.6	29	76	23	13
APR								
20...	1.86	41.2	66	4.1	16	76	12	5.8
MAY								
17...	1.32	37.3	70	4.9	14	88	8	2.3
JUN								
01...	2.97	36.4	126	4.9	26	88	16	6.3
13...	1.97	25.0	85	2.4	16	87	11	4.6
JUL								
19...	.52	8.1	21	.9	7	92	10	1.4
AUG								
20...	1.35	34.1	116	2.6	13	66	19	2.1

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
19...	0810	61	8.2	286	3.5	140	40.0	8.87	4.4
APR 2004									
20...	1605	168	8.3	213	7.5	96	28.3	6.06	6.2
MAY									
17...	1615	141	8.4	246	12.0	110	34.0	7.11	4.6
JUN									
01...	1700	249	8.3	231	15.0	110	31.4	6.51	4.9
JUL									
19...	1645	73	8.7	281	23.0	130	38.8	8.01	6.5
AUG									
20...	1520	20	8.6	332	22.0	160	47.4	10.4	6.5

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
19...	4	<.04	<.04	.6	1.1	E5	120	<.08
APR 2004								
20...	5	<.04	<.04	1.2	1.9	20	240	E.05
MAY								
17...	5	<.04	<.04	1.1	1.6	14	200	<.08
JUN								
01...	5	<.04	E.03	1.1	1.7	18	220	<.08
JUL								
19...	7	<.04	<.04	.9	1.2	7	60	<.08
AUG								
20...	6	<.04	<.04	1.1	1.6	E5	80	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
19...	.20	7.8	24	E.5	E1	79	4	.66
APR 2004								
20...	.56	8.0	22	.9	3	85	8	3.6
MAY								
17...	.43	8.7	22	.8	2	86	8	3.0
JUN								
01...	.46	8.2	22	1.1	3	73	10	6.7
JUL								
19...	.08	9.6	16	<.6	<2	88	2	.39
AUG								
20...	.08	12.7	31	E.5	<2	84	3	.16

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12324680--CLARK FORK AT GOLDCREEK, MONT.

Date	Time	Streamflow, instan-taneous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magne-sium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	0815	317	8.3	474	2.0	220	64.7	14.2	8.6
MAR 2004									
17...	1145	432	8.6	445	5.5	210	61.0	12.8	8.8
APR									
20...	1710	360	8.6	394	8.5	180	52.7	11.7	7.3
MAY									
18...	0720	286	8.3	398	10.0	190	54.7	12.0	8.9
JUN									
02...	1140	507	8.5	351	12.5	150	46.8	9.05	8.8
13...	1535	607	8.7	298	15.5	130	40.6	7.64	9.8
JUL									
20...	1355	206	8.6	425	20.5	200	58.7	12.1	12.0
AUG									
20...	1555	100	8.8	459	23.0	210	64.0	13.2	13.6

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	10	E.03	.12	3.0	17.3	E4	290	<.08
MAR 2004								
17...	9	.04	.14	4.6	23.2	8	450	E.05
APR								
20...	10	E.02	.07	4.1	11.5	E6	240	<.08
MAY								
18...	10	E.03	.05	4.3	6.5	8	80	<.08
JUN								
02...	10	E.02	.07	3.6	10.4	10	270	E.04
13...	12	<.04	.09	3.9	12.9	10	280	E.05
JUL								
20...	12	E.02	.06	4.2	8.1	8	130	<.08
AUG								
20...	14	<.04	.04	4.7	6.8	<6	70	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12324680--CLARK FORK AT GOLDCREEK, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	2.07	21.0	79	5.6	21	86	13	11
MAR 2004								
17...	2.81	23.4	80	3.4	23	81	23	27
APR								
20...	1.30	14.4	46	2.3	12	87	11	11
MAY								
18...	.38	18.3	27	2.9	6	83	2	1.5
JUN								
02...	1.24	17.5	61	2.1	11	94	12	16
13...	1.57	11.5	59	1.5	15	86	15	25
JUL								
20...	.72	15.0	45	1.4	7	69	7	3.9
AUG								
20...	.41	7.7	44	.7	5	72	7	1.9

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12331500--FLINT CREEK NEAR DRUMMOND, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	0910	111	8.4	345	2.5	160	44.1	13.2	6.2
APR 2004									
21...	0735	88	8.4	305	3.0	140	38.6	11.4	10.9
MAY									
18...	0810	8.3	8.3	398	9.0	200	54.9	14.4	9.7
JUN									
02...	1235	39	8.5	403	13.5	190	53.1	12.8	9.0
14...	1125	134	8.4	288	11.0	140	38.3	10.4	8.1
AUG									
23...	0955	57	8.2	501	12.5	240	64.6	18.7	12.3

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	7	<.04	E.03	.7	1.9	E6	180	E.05
APR 2004								
21...	10	<.04	.04	1.2	4.7	9	250	.09
MAY								
18...	11	<.04	E.02	1.1	1.4	15	90	.09
JUN								
02...	11	<.04	E.02	1.3	1.8	14	130	.11
14...	13	<.04	.05	1.2	3.0	17	270	.21
AUG								
23...	15	<.04	.07	1.7	2.8	42	480	.12

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	2.56	22.2	64	1.3	8	93	8	2.4
APR 2004								
21...	3.17	33.0	77	1.8	10	88	12	2.9
MAY								
18...	.80	78.6	97	1.6	4	90	4	.09
JUN								
02...	1.60	55.8	85	1.2	5	87	7	.74
14...	5.28	30.0	101	1.7	14	84	15	5.4
AUG								
23...	4.27	75.0	269	1.7	14	89	26	4.0

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12331800--CLARK FORK NEAR DRUMMOND, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	1015	501	8.4	490	4.5	230	64.8	16.1	8.4
MAR 2004									
17...	1250	613	8.4	471	7.5	220	64.2	14.9	9.0
APR									
21...	0840	505	8.3	435	7.0	200	57.8	13.8	12.0
MAY									
18...	0900	308	8.4	484	12.5	240	68.8	15.8	9.2
JUN									
02...	1325	608	8.5	436	15.5	200	58.6	13.3	10.4
13...	1645	855	8.4	370	16.0	170	49.1	11.3	10.6
JUL									
20...	1250	298	8.4	525	20.5	250	70.4	17.1	12.8
AUG									
23...	1045	235	8.2	578	15.5	280	81.1	19.5	12.1

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	8	E.03	.10	2.6	11.1	<6	220	<.08
MAR 2004								
17...	9	E.04	.14	4.5	19.7	7	460	.09
APR								
21...	10	E.03	.12	4.1	13.7	E5	310	E.04
MAY								
18...	10	E.02	.04	4.4	5.8	E6	40	E.05
JUN								
02...	12	E.02	.08	4.7	10.4	E6	180	E.06
13...	14	<.04	.14	4.2	19.0	10	450	.10
JUL								
20...	12	E.02	.06	3.6	6.7	E4	100	E.05
AUG								
23...	12	E.03	.07	3.8	7.7	E3	130	E.04

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12331800--CLARK FORK NEAR DRUMMOND, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	1.63	12.9	63	4.1	17	86	11	15
MAR 2004								
17...	3.24	20.8	88	4.2	25	82	26	43
APR								
21...	2.04	14.2	62	9.1	18	89	14	19
MAY								
18...	.29	11.1	16	3.2	5	81	2	1.7
JUN								
02...	1.19	15.8	49	2.6	12	90	9	15
13...	3.45	15.6	97	2.9	26	89	23	53
JUL								
20...	.80	11.0	41	1.7	7	64	8	6.4
AUG								
23...	.98	6.8	45	2.9	11	86	7	4.4

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12334510--ROCK CREEK NEAR CLINTON, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	1140	197	8.2	144	2.5	66	17.1	5.76	.6
APR 2004									
21...	1005	432	7.8	106	4.5	47	12.4	3.84	.8
MAY									
18...	1035	748	7.9	87	8.0	37	9.52	3.18	.5
JUN									
02...	1515	1,020	8.2	83	12.5	35	9.37	2.85	.6
JUL									
20...	1140	455	8.3	133	16.5	60	16.4	4.71	.7
AUG									
23...	1110	279	8.4	139	14.0	63	16.7	5.07	.8

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	<2	<.04	<.04	E.2	<.6	E6	20	<.08
APR 2004								
21...	E1	<.04	<.04	.5	E.6	17	60	E.05
MAY								
18...	<2	<.04	<.04	E.4	E.5	28	100	<.08
JUN								
02...	<2	E.04	.06	.7	1.5	23	110	<.08
JUL								
20...	<2	<.04	<.04	E.4	E.5	10	60	<.08
AUG								
23...	<2	<.04	<.04	.7	<.6	13	90	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12334510--ROCK CREEK NEAR CLINTON, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	<.06	.6	1	<.6	<2	82	1	.53
APR 2004								
21...	<.06	1.0	2	E.4	<2	81	2	2.3
MAY								
18...	.08	1.1	5	E.4	<2	75	4	8.1
JUN								
02...	.14	1.3	5	.6	3	74	6	17
JUL								
20...	E.05	1.7	5	<.6	<2	57	4	4.9
AUG								
23...	E.05	2.9	9	<.6	<2	80	5	3.8

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.

Date	Time	Streamflow, instan-taneous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magne-sium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	1310	739	8.5	402	3.0	190	53.8	13.7	5.8
MAR 2004									
17...	1410	930	8.5	381	6.0	180	51.3	12.4	6.5
APR									
21...	1125	1,080	8.1	304	6.5	130	38.5	9.12	4.6
MAY									
18...	1145	1,110	8.4	224	10.0	99	28.2	6.93	3.1
JUN									
02...	1705	1,860	8.6	230	15.0	100	29.0	6.75	4.4
14...	0925	1,950	8.2	239	12.0	100	30.5	6.83	5.2
JUL									
20...	1020	768	8.4	301	18.0	140	37.9	10.6	4.9
AUG									
23...	1335	540	8.3	317	14.0	150	40.8	11.2	4.6

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	6	E.02	.06	2.0	6.5	E3	110	<.08
MAR 2004								
17...	6	E.02	.11	3.4	13.5	7	350	E.06
APR								
21...	6	<.04	.06	2.7	8.1	8	190	.09
MAY								
18...	3	<.04	E.03	1.7	3.1	15	110	<.08
JUN								
02...	4	<.04	.06	2.5	6.3	11	180	E.05
14...	6	<.04	.10	2.4	10.9	12	300	E.07
JUL								
20...	6	<.04	E.04	2.1	4.1	E6	80	<.08
AUG								
23...	4	<.04	.04	1.8	4.1	<6	120	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	.87	3.2	30	3.1	12	86	6	12
MAR 2004								
17...	2.33	8.4	65	5.0	20	86	21	53
APR								
21...	1.16	5.6	31	2.3	12	82	11	32
MAY								
18...	.32	3.5	11	1.8	4	68	6	18
JUN								
02...	.81	4.8	24	1.5	9	67	12	60
14...	1.90	6.7	54	2.7	19	75	18	95
JUL								
20...	.47	3.3	21	1.6	5	79	7	15
AUG								
23...	.58	4.4	24	3.1	8	77	8	12

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12340000--BLACKFOOT RIVER NEAR BONNER, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	1445	523	8.5	260	3.0	130	34.0	12.1	1.0
APR 2004									
21...	1340	2,350	8.2	175	7.0	86	22.9	7.04	1.1
MAY									
18...	1320	2,400	8.5	183	11.0	92	24.4	7.54	.8
JUN									
03...	0720	3,150	8.2	174	12.0	88	23.6	7.14	.8
JUL									
20...	0720	957	8.4	239	17.5	120	30.5	10.8	1.2
AUG									
23...	1445	694	8.7	246	14.5	130	31.1	11.7	1.3

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	<2	<.04	<.04	.6	.8	<6	30	<.08
APR 2004								
21...	<2	<.04	<.04	.7	1.0	10	90	E.05
MAY								
18...	<2	<.04	<.04	.6	.7	7	70	<.08
JUN								
03...	<2	<.04	<.04	.6	1.1	8	140	<.08
JUL								
20...	E2	<.04	E.02	.7	1.0	E4	70	<.08
AUG								
23...	E1	<.04	<.04	.4	E.3	<6	40	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12340000--BLACKFOOT RIVER NEAR BONNER, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	.07	.8	2	1.5	E2	95	2	2.8
APR 2004								
21...	.08	2.4	8	E.6	<2	85	6	38
MAY								
18...	.10	1.7	7	E.3	<2	81	5	32
JUN								
03...	.18	1.4	12	.8	E1	86	10	85
JUL								
20...	.13	1.4	8	E.3	E1	75	4	10
AUG								
23...	E.05	1.4	5	.7	<2	72	2	3.7

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12340500--CLARK FORK ABOVE MISSOULA, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
NOV 2003									
18...	1600	1,360	8.6	338	2.5	160	44.6	12.8	3.7
MAR 2004									
17...	1525	1,800	8.4	317	5.5	150	41.9	11.4	3.8
APR									
21...	1535	3,340	8.4	219	7.5	100	28.2	7.75	3.2
MAY									
18...	1505	3,360	8.3	196	10.5	94	25.7	7.31	1.6
JUN									
03...	0850	4,920	8.2	195	12.5	110	29.2	7.91	2.2
14...	0715	4,980	8.2	205	12.5	96	26.8	7.13	2.7
JUL									
20...	0850	1,660	8.3	263	19.5	130	32.9	10.5	3.5
AUG									
23...	1635	1,220	8.4	282	16.0	140	36.2	11.8	3.2

Date	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)
NOV 2003								
18...	4	<.04	.04	2.8	5.8	E4	100	<.08
MAR 2004								
17...	4	<.04	.07	4.2	9.8	19	230	.09
APR								
21...	3	<.04	E.04	2.1	5.7	11	130	E.05
MAY								
18...	E2	<.04	E.02	1.2	2.6	12	90	E.05
JUN								
03...	2	<.04	.05	1.7	5.8	16	200	E.04
14...	3	<.04	.06	1.5	6.6	12	230	E.05
JUL								
20...	5	<.04	.14	1.5	13.9	16	400	.10
AUG								
23...	4	<.04	.06	1.4	4.5	E3	140	<.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2003 through September 2004.—Continued

12340500--CLARK FORK ABOVE MISSOULA, MONT.—Continued

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
NOV 2003								
18...	.53	9.7	17	2.3	8	93	4	15
MAR 2004								
17...	1.16	31.6	48	7.7	15	93	12	58
APR								
21...	.55	17.1	22	1.0	6	93	7	63
MAY								
18...	.32	10.8	16	1.8	6	89	5	45
JUN								
03...	.82	14.2	27	2.1	9	87	14	186
14...	1.11	15.0	36	1.9	11	92	13	175
JUL								
20...	2.33	37.7	67	.8	25	91	24	108
AUG								
23...	.64	11.9	25	1.0	9	82	9	30

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2003 through September 2004.

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; mg/L, milligrams per liter; ton/d, tons per day. Symbol: --, no data or value computed]

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	133	21	7.5	e130	10	3.5	206	16	8.9
2	135	16	5.8	161	11	4.8	217	16	9.4
3	128	14	4.8	170	14	6.4	221	16	9.5
4	127	14	4.8	e160	16	6.9	209	16	9.0
5	131	14	5.0	e150	16	6.5	200	16	8.6
6	133	14	5.0	e150	17	6.9	214	17	9.8
7	129	13	4.5	e150	18	7.3	210	17	9.6
8	132	14	5.0	162	18	7.9	196	17	9.0
9	135	14	5.1	164	18	8.0	187	17	8.6
10	143	14	5.4	184	16	7.9	190	17	8.7
11	150	14	5.7	189	13	6.6	198	16	8.6
12	155	14	5.9	185	12	6.0	196	15	7.9
13	156	14	5.9	178	11	5.3	196	14	7.4
14	157	14	5.9	171	11	5.1	202	13	7.1
15	156	13	5.5	179	11	5.3	194	12	6.3
16	159	13	5.6	177	11	5.3	180	11	5.3
17	157	13	5.5	180	14	6.8	197	10	5.3
18	149	14	5.6	182	10	4.9	181	9	4.4
19	147	14	5.6	199	9	4.8	180	9	4.4
20	149	14	5.6	203	10	5.5	190	9	4.6
21	150	14	5.7	184	10	5.0	188	9	4.6
22	152	13	5.3	e170	10	4.6	e170	9	4.1
23	153	12	5.0	e160	11	4.8	e170	9	4.1
24	143	13	5.0	e170	11	5.0	178	9	4.3
25	142	13	5.0	e180	11	5.3	182	8	3.9
26	144	14	5.4	192	11	5.7	177	8	3.8
27	142	14	5.4	192	11	5.7	169	10	4.6
28	140	14	5.3	198	14	7.5	156	12	5.1
29	159	13	5.6	210	16	9.1	e150	12	4.9
30	180	11	5.3	212	16	9.2	e140	12	4.5
31	e130	10	3.5	--	--	--	e130	12	4.2
TOTAL	4,496	--	166.2	5,292	--	183.6	5,774	--	200.5
MEAN	145	14	5.4	176	13	6.1	186	13	6.5
MAX	180	21	7.5	212	18	9.2	221	17	9.8
MIN	127	10	3.5	130	9	3.5	130	8	3.8

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concen- tration (mg/L)	Discharge (ton/d)		Mean concen- tration (mg/L)	Discharge (ton/d)		Mean concen- tration (mg/L)	Discharge (ton/d)
	JANUARY			FEBRUARY			MARCH		
1	e150	11	4.5	182	36	18	199	18	9.7
2	e150	12	4.9	189	29	15	198	16	8.6
3	e140	12	4.5	184	24	12	193	17	8.9
4	e120	12	3.9	182	22	11	199	20	11
5	e110	13	3.9	184	21	10	198	18	9.6
6	e120	14	4.5	172	20	9.3	198	20	11
7	e130	15	5.3	183	18	8.9	198	20	11
8	e140	17	6.4	179	17	8.2	233	36	23
9	e150	18	7.3	179	17	8.2	267	64	46
10	165	19	8.5	178	18	8.7	265	47	34
11	166	20	9.0	179	22	11	235	28	18
12	e160	19	8.2	164	24	11	224	27	16
13	e160	18	7.8	171	24	11	225	24	15
14	165	17	7.6	183	24	12	215	20	12
15	e180	16	7.8	183	24	12	212	22	13
16	175	14	6.6	177	24	11	210	26	15
17	e170	12	5.5	178	24	12	206	24	13
18	e170	10	4.6	195	34	18	211	29	17
19	176	9	4.3	204	43	24	208	23	13
20	181	8	3.9	195	38	20	190	24	12
21	e170	8	3.7	189	34	17	185	23	11
22	e190	8	4.1	181	29	14	185	25	12
23	185	9	4.5	186	25	13	182	23	11
24	192	12	6.2	195	23	12	186	20	10
25	189	22	11	210	22	12	188	20	10
26	180	36	17	205	22	12	188	16	8.1
27	181	46	22	203	22	12	185	14	7.0
28	187	48	24	201	21	11	181	18	8.8
29	191	49	25	197	21	11	179	19	9.2
30	209	48	27	--	--	--	176	20	9.5
31	193	43	22	--	--	--	181	24	12
TOTAL	5,145	--	285.5	5,408	--	365.3	6,300	--	425.4
MEAN	166	20	9.2	186	25	13	203	24	14
MAX	209	49	27	210	43	24	267	64	46
MIN	110	8	3.7	164	17	8.2	176	14	7.0

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
		APRIL			MAY			JUNE	
1	201	25	14	152	11	4.5	144	15	5.8
2	233	32	20	145	12	4.7	128	11	3.8
3	219	27	16	131	10	3.5	115	10	3.1
4	216	26	15	128	10	3.5	111	11	3.3
5	211	22	13	108	8	2.3	135	12	4.4
6	209	23	13	119	10	3.2	157	17	7.2
7	217	22	13	128	10	3.5	187	21	11
8	209	23	13	112	7	2.1	175	18	8.5
9	223	23	14	108	7	2.0	168	19	8.6
10	212	20	11	104	8	2.2	160	23	9.9
11	197	15	8.0	114	8	2.5	232	37	23
12	188	18	9.1	119	8	2.6	196	22	12
13	182	15	7.4	114	8	2.5	159	11	4.7
14	181	14	6.8	101	7	1.9	144	9	3.5
15	177	15	7.2	87	15	3.5	136	9	3.3
16	173	12	5.6	84	8	1.8	138	9	3.4
17	172	10	4.6	100	9	2.4	135	8	2.9
18	175	10	4.7	107	8	2.3	124	7	2.3
19	176	10	4.8	121	9	2.9	120	7	2.3
20	179	12	5.8	114	9	2.8	126	7	2.4
21	179	11	5.3	112	11	3.3	120	6	1.9
22	172	11	5.1	146	19	7.5	105	7	2.0
23	167	11	5.0	180	42	20	97	8	2.1
24	161	10	4.3	180	35	17	93	7	1.8
25	159	10	4.3	162	22	9.6	95	9	2.3
26	157	10	4.2	148	13	5.2	102	14	3.9
27	152	20	8.2	143	11	4.2	110	14	4.2
28	164	12	5.3	147	12	4.8	139	14	5.3
29	177	9	4.3	172	26	12	122	12	4.0
30	162	7	3.1	166	21	9.4	120	11	3.6
31	--	--	--	156	24	10	--	--	--
TOTAL	5,600	--	255.1	4,008	--	159.7	4,093	--	156.5
MEAN	187	16	8.5	129	13	5.2	136	13	5.2
MAX	233	32	20	180	42	20	232	37	23
MIN	152	7	3.1	84	7	1.8	93	6	1.8

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
		JULY			AUGUST			SEPTEMBER	
1	142	12	4.6	37	22	2.2	75	20	4.0
2	103	12	3.3	38	19	1.9	77	19	4.0
3	93	12	3.0	39	18	1.9	81	20	4.4
4	92	12	3.0	33	20	1.8	76	20	4.1
5	93	13	3.3	34	20	1.8	83	21	4.7
6	86	12	2.8	35	20	1.9	87	22	5.2
7	82	12	2.7	33	19	1.7	90	22	5.3
8	82	13	2.9	32	16	1.4	90	23	5.6
9	83	12	2.7	30	14	1.1	89	23	5.5
10	80	10	2.2	30	15	1.2	89	23	5.5
11	77	7	1.5	29	20	1.6	85	23	5.3
12	70	5	.95	33	26	2.3	92	22	5.5
13	68	5	.92	29	29	2.3	113	20	6.1
14	66	4	.71	28	30	2.3	119	19	6.1
15	61	4	.66	27	28	2.0	113	18	5.5
16	57	3	.46	28	22	1.7	111	18	5.4
17	48	3	.39	31	18	1.5	111	18	5.4
18	46	7	.87	34	17	1.6	112	18	5.4
19	48	11	1.4	38	18	1.8	128	20	6.9
20	47	8	1.0	41	21	2.3	149	23	9.3
21	53	6	.86	42	24	2.7	152	23	9.4
22	48	4	.52	40	29	3.1	143	17	6.6
23	47	3	.38	59	29	4.6	142	13	5.0
24	45	4	.49	73	24	4.7	139	12	4.5
25	45	6	.73	83	20	4.5	138	11	4.1
26	38	14	1.4	90	18	4.4	135	11	4.0
27	47	22	2.8	94	19	4.8	134	11	4.0
28	38	25	2.6	88	20	4.8	133	12	4.3
29	39	26	2.7	83	20	4.5	129	11	3.8
30	39	26	2.7	81	21	4.6	128	11	3.8
31	37	26	2.6	81	21	4.6	--	--	--
TOTAL	2,000	--	57.14	1,473	--	83.6	3,343	--	158.7
MEAN	64.5	11	1.8	47.5	21	2.7	111	18	5.3
MAX	142	26	4.6	94	30	4.8	152	23	9.4
MIN	37	3	.38	27	14	1.1	75	11	3.8

TOTAL FOR WATER YEAR 2004:

STREAMFLOW--52,932 ft^3/s
SEDIMENT LOAD--2,497.24 tons

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2003 through September 2004.

[Abbreviations: ft³/s, cubic feet per second; e, estimated; mg/L, milligrams per liter; ton/d, tons per day. Symbol: --, no data or value not computed]

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	516	6	8.4	e660	9	16	760	10	21
2	538	6	8.7	686	9	17	755	10	20
3	543	7	10	752	9	18	769	10	21
4	580	9	14	761	8	16	766	8	17
5	612	10	17	e680	8	15	715	6	12
6	618	11	18	e650	8	14	756	7	14
7	621	12	20	e650	8	14	779	7	15
8	615	11	18	e660	9	16	766	7	14
9	619	9	15	e700	11	21	734	7	14
10	626	7	12	782	11	23	703	6	11
11	635	6	10	822	10	22	718	9	17
12	650	6	11	811	9	20	721	8	16
13	673	7	13	767	8	17	726	8	16
14	678	7	13	732	8	16	740	7	14
15	688	8	15	724	8	16	730	6	12
16	710	8	15	742	7	14	677	5	9.1
17	730	8	16	774	7	15	679	5	9.2
18	706	8	15	747	7	14	e660	6	11
19	682	8	15	755	7	14	e560	8	12
20	669	8	14	791	8	17	e600	9	15
21	682	8	15	781	8	17	e700	9	17
22	690	9	17	e700	8	15	e680	7	13
23	697	9	17	e630	8	14	e600	6	9.7
24	707	9	17	e700	8	15	e610	6	9.9
25	690	9	17	710	8	15	e720	7	14
26	709	8	15	709	8	15	686	8	15
27	711	8	15	725	8	16	656	8	14
28	723	8	16	694	9	17	e600	6	9.7
29	809	9	20	755	9	18	e520	6	8.4
30	876	9	21	766	10	21	e460	6	7.5
31	777	9	19	--	--	--	e420	6	6.8
TOTAL	20,780	--	467.1	21,816	--	498	20,966	--	415.3
MEAN	670	8	15	727	8	17	676	7	13
MAX	876	12	21	822	11	23	779	10	21
MIN	516	6	8.4	630	7	14	420	5	6.8

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
		JANUARY			FEBRUARY			MARCH	
1	e450	6	7.3	659	7	12	686	17	31
2	e500	5	6.8	621	7	12	688	16	30
3	e460	5	6.2	603	7	11	682	15	28
4	e440	6	7.1	614	7	12	662	13	23
5	e350	6	5.7	639	6	10	675	10	18
6	e230	7	4.3	624	6	10	671	10	18
7	e240	11	7.1	613	6	9.9	653	10	18
8	e300	14	11	629	6	10	770	24	50
9	e400	14	15	642	6	10	1,610	330	1,430
10	e550	13	19	633	6	10	1,580	198	845
11	e580	11	17	625	6	10	1,460	98	386
12	e600	9	15	e580	6	9.4	1,190	53	170
13	e600	9	15	e520	7	9.8	1,190	44	141
14	e620	8	13	e530	7	10	1,130	38	116
15	e640	8	14	569	8	12	987	26	69
16	648	8	14	619	8	13	943	25	64
17	e650	8	14	635	8	14	935	23	58
18	e630	8	14	659	8	14	992	26	70
19	631	15	26	697	10	19	1,090	31	91
20	652	16	28	731	16	32	1,070	27	78
21	656	13	23	710	14	27	938	20	51
22	645	10	17	671	14	25	912	21	52
23	636	9	15	654	14	25	936	23	58
24	650	8	14	662	15	27	998	24	65
25	666	7	13	710	15	29	1,050	24	68
26	643	6	10	763	15	31	1,050	23	65
27	636	5	8.6	735	16	32	1,010	19	52
28	639	6	10	710	16	31	957	17	44
29	652	7	12	695	16	30	911	17	42
30	685	7	13	--	--	--	895	16	39
31	695	7	13	--	--	--	910	18	44
TOTAL	17,374	--	408.1	18,752	--	507.1	30,231	--	4,314
MEAN	560	9	13	647	10	17	975	41	139
MAX	695	16	28	763	16	32	1,610	330	1,430
MIN	230	5	4.3	520	6	9.4	653	10	18

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)
		APRIL			MAY			JUNE	
1	997	19	51	1,120	11	33	2,010	16	87
2	1,060	19	54	1,100	11	33	1,900	12	62
3	1,040	21	59	1,180	10	32	1,810	12	59
4	1,010	22	60	1,300	16	56	1,780	14	67
5	1,070	25	72	1,420	25	96	1,830	17	84
6	1,120	28	85	1,510	24	98	1,950	25	132
7	1,200	31	100	1,520	22	90	2,020	21	115
8	1,230	32	106	1,540	19	79	1,900	15	77
9	1,300	32	112	1,530	17	70	1,830	13	64
10	1,300	31	109	1,440	12	47	1,930	25	130
11	1,230	24	80	1,410	8	30	2,430	57	374
12	1,160	23	72	1,360	8	29	2,450	51	337
13	1,160	21	66	1,250	5	17	2,120	27	155
14	1,220	25	82	1,170	5	16	1,930	19	99
15	1,290	23	80	1,090	5	15	1,750	16	76
16	1,250	18	61	1,040	5	14	1,610	14	61
17	1,190	20	64	1,140	8	25	1,480	12	48
18	1,150	18	56	1,150	7	22	1,390	10	38
19	1,110	16	48	1,350	9	33	1,400	11	42
20	1,080	15	44	1,400	10	38	1,400	13	49
21	1,070	12	35	1,380	10	37	1,310	12	42
22	1,030	12	33	1,420	11	42	1,220	11	36
23	963	12	31	1,670	18	81	1,140	10	31
24	933	13	33	1,770	20	96	1,090	9	26
25	936	12	30	1,690	14	64	1,030	8	22
26	932	10	25	1,610	11	48	1,000	8	22
27	923	10	25	1,690	13	59	1,020	8	22
28	1,090	15	44	1,850	19	95	1,170	12	38
29	1,280	18	62	2,130	31	178	1,160	10	31
30	1,180	12	38	2,180	27	159	1,120	8	24
31	--	--	--	2,100	22	125	--	--	--
TOTAL	33,504	--	1,817	45,510	--	1,857	48,180	--	2,450
MEAN	1,117	20	61	1,468	14	60	1,606	17	82
MAX	1,300	32	112	2,180	31	178	2,450	57	374
MIN	923	10	25	1,040	5	14	1,000	8	22

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
		JULY			AUGUST			SEPTEMBER	
1	1,040	7	20	506	7	9.6	571	8	12
2	996	7	19	490	7	9.3	599	8	13
3	949	6	15	490	7	9.3	595	7	11
4	923	6	15	511	8	11	585	7	11
5	942	5	13	511	9	12	582	6	9.4
6	918	4	9.9	534	10	14	576	6	9.3
7	905	4	9.8	530	9	13	569	6	9.2
8	884	4	9.5	513	8	11	573	6	9.3
9	855	3	6.9	491	7	9.3	568	6	9.2
10	830	3	6.7	465	6	7.5	553	6	9.0
11	845	5	11	445	6	7.2	543	6	8.8
12	834	5	11	434	5	5.9	592	7	11
13	809	4	8.7	412	5	5.6	770	12	25
14	784	4	8.5	395	6	6.4	831	12	27
15	749	5	10	386	7	7.3	793	9	19
16	717	5	9.7	374	7	7.1	767	8	17
17	691	4	7.5	374	7	7.1	749	8	16
18	692	5	9.3	419	8	9.1	753	8	16
19	713	6	12	451	8	9.7	808	9	20
20	762	7	14	452	8	9.8	980	17	45
21	776	8	17	436	7	8.2	999	17	46
22	705	9	17	438	7	8.3	983	16	42
23	669	8	14	527	10	14	946	15	38
24	659	8	14	620	12	20	971	14	37
25	643	9	16	631	12	20	969	12	31
26	623	9	15	668	11	20	931	10	25
27	605	9	15	694	10	19	904	10	24
28	565	8	12	681	10	18	887	10	24
29	540	8	12	655	9	16	891	10	24
30	529	8	11	614	8	13	882	10	24
31	520	6	8.4	586	8	13	--	--	--
TOTAL	23,672	--	377.9	15,733	--	350.7	22,720	--	622.2
MEAN	764	6	12	508	8	11	757	10	21
MAX	1,040	9	20	694	12	20	999	17	46
MIN	520	3	6.7	374	5	5.6	543	6	8.8

TOTAL FOR WATER YEAR 2004:

STREAMFLOW--319,238 ft^3/s
SEDIMENT LOAD--14,084.4 tons

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2003 through September 2004.

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; mg/L, milligrams per liter; ton/d, tons per day. Symbol: --, no data or value not computed]

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	994	7	19	1,070	5	14	1,270	5	17
2	1,010	7	19	1,140	5	15	1,270	5	17
3	1,020	7	19	1,250	4	14	1,290	7	24
4	1,030	7	19	1,190	4	13	1,290	7	24
5	1,060	7	20	1,160	4	13	1,250	6	20
6	1,060	7	20	1,060	4	11	1,250	5	17
7	1,070	6	17	1,100	4	12	1,280	6	21
8	1,050	6	17	1,150	5	16	1,270	7	24
9	1,040	6	17	1,280	6	21	1,260	7	24
10	1,040	6	17	1,390	6	23	1,170	6	19
11	1,060	6	17	1,430	7	27	1,180	7	22
12	1,100	6	18	1,370	7	26	1,240	8	27
13	1,130	6	18	1,330	7	25	1,230	8	27
14	1,120	7	21	1,260	6	20	1,220	10	33
15	1,150	7	22	1,220	4	13	1,240	10	33
16	1,190	7	22	1,220	4	13	1,170	11	35
17	1,180	7	22	1,270	4	14	1,120	10	30
18	1,170	7	22	1,310	4	14	1,140	8	25
19	1,130	7	21	1,260	4	14	e1,000	5	14
20	1,130	7	21	1,280	6	21	e950	4	10
21	1,120	6	18	1,330	8	29	e1,000	4	11
22	1,100	6	18	1,270	5	17	e1,200	4	13
23	1,110	6	18	1,110	4	12	e1,100	4	12
24	1,110	6	18	1,160	3	9.4	e1,000	4	11
25	1,110	5	15	1,240	3	10	e1,100	4	12
26	1,110	5	15	1,230	3	10	1,220	4	13
27	1,130	5	15	1,230	3	10	1,130	4	12
28	1,150	5	16	1,190	3	9.6	1,020	4	11
29	1,320	5	18	1,220	4	13	e950	5	13
30	1,390	5	19	1,350	5	18	e900	6	15
31	1,270	5	17	--	--	--	e800	6	13
TOTAL	34,654	--	575	37,070	--	477	35,510	--	599
MEAN	1,118	6	19	1,236	5	16	1,145	6	19
MAX	1,390	7	22	1,430	8	29	1,290	11	35
MIN	994	5	15	1,060	3	9.4	800	4	10

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)		Mean concen-tration (mg/L)	Discharge (ton/d)
	JANUARY			FEBRUARY			MARCH		
1	e850	6	14	1,140	4	12	1,150	5	16
2	e950	6	15	1,080	4	12	1,130	5	15
3	e1,000	6	16	1,040	4	11	1,140	4	12
4	e850	6	14	1,050	4	11	1,120	5	15
5	e700	6	11	1,090	4	12	1,080	10	29
6	e600	7	11	1,050	4	11	1,140	4	12
7	e500	7	9.4	1,070	4	12	1,100	6	18
8	e700	7	13	1,070	4	12	1,180	9	29
9	e800	7	15	1,090	4	12	2,100	46	261
10	e900	6	15	1,070	4	12	2,360	49	312
11	e1,000	6	16	1,060	4	11	2,520	38	259
12	e1,100	6	18	1,010	4	11	2,000	31	167
13	e1,050	6	17	938	4	10	2,020	23	125
14	e1,050	5	14	818	4	8.8	2,070	16	89
15	e1,050	5	14	1,000	3	8.1	1,810	12	59
16	e1,100	5	15	1,110	4	12	1,780	12	58
17	e1,100	5	15	1,080	5	15	1,780	12	58
18	e1,100	5	15	1,110	5	15	1,890	13	66
19	e1,100	5	15	1,160	6	19	2,160	14	82
20	e1,100	4	12	1,200	6	19	2,190	15	89
21	e1,150	5	16	1,170	6	19	2,000	11	59
22	e1,150	5	16	1,130	6	18	1,900	10	51
23	e1,150	5	16	1,100	7	21	2,030	11	60
24	e1,150	5	16	1,100	7	21	2,250	12	73
25	1,140	5	15	1,150	7	22	2,420	12	78
26	1,090	5	15	1,220	8	26	2,460	12	80
27	1,060	5	14	1,230	9	30	2,460	11	73
28	1,070	6	17	1,200	9	29	2,400	10	65
29	1,140	6	18	1,160	8	25	2,330	11	69
30	1,200	5	16	--	--	--	2,260	12	73
31	1,190	4	13	--	--	--	2,280	12	74
TOTAL	31,090	--	456.4	31,696	--	456.9	58,510	--	2,526
MEAN	1,003	6	15	1,093	5	16	1,887	15	81
MAX	1,200	7	18	1,230	9	30	2,520	49	312
MIN	500	4	9.4	818	3	8.1	1,080	4	12

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
		APRIL			MAY			JUNE	
1	2,560	12	83	3,940	12	128	5,350	13	188
2	2,690	12	87	3,940	10	106	5,080	12	165
3	2,650	12	86	4,240	10	114	4,900	12	159
4	2,610	12	85	4,780	15	194	4,950	11	147
5	2,770	11	82	5,260	20	284	5,290	13	186
6	3,020	12	98	5,710	27	416	5,820	19	299
7	3,360	13	118	5,780	28	437	6,050	18	294
8	3,720	14	141	5,850	27	426	5,580	14	211
9	4,000	17	184	5,910	26	415	5,160	16	223
10	3,920	15	159	5,630	23	350	5,130	16	222
11	3,740	14	141	5,400	18	262	5,730	23	356
12	3,660	12	119	4,940	14	187	5,710	21	324
13	3,710	11	110	4,480	11	133	5,280	16	228
14	4,060	12	132	4,070	9	99	4,880	12	158
15	4,310	14	163	3,780	7	71	4,550	10	123
16	4,270	16	184	3,530	6	57	4,270	8	92
17	4,080	16	176	3,520	6	57	3,960	7	75
18	3,830	11	114	3,450	5	47	3,750	6	61
19	3,650	10	99	3,740	6	61	3,710	5	50
20	3,440	11	102	3,950	7	75	3,680	5	50
21	3,360	10	91	4,010	7	76	3,410	5	46
22	3,230	9	78	4,450	9	108	3,270	5	44
23	2,990	10	81	5,110	12	166	3,180	5	43
24	3,020	9	73	5,240	12	170	3,040	6	49
25	3,110	8	67	4,930	10	133	3,100	8	67
26	3,130	8	68	4,700	9	114	3,130	7	59
27	3,310	7	63	4,750	10	128	3,170	5	43
28	3,890	11	116	5,080	12	165	3,370	10	91
29	4,360	13	153	5,600	14	212	3,270	11	97
30	4,210	14	159	5,750	18	279	3,200	8	69
31	--	--	--	5,560	15	225	--	--	--
TOTAL	104,660	--	3,412	147,080	--	5,695	130,970	--	4,219
MEAN	3,489	12	114	4,745	13	184	4,366	11	141
MAX	4,360	17	184	5,910	28	437	6,050	23	356
MIN	2,560	7	63	3,450	5	47	3,040	5	43

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2003 through September 2004.—Continued

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
	JULY			AUGUST			SEPTEMBER		
1	3,010	6	49	1,180	28	89	1,190	4	13
2	2,860	6	46	1,150	25	78	1,190	3	9.6
3	2,660	5	36	1,130	22	67	1,220	4	13
4	2,570	4	28	1,140	21	65	1,170	3	9.5
5	2,580	4	28	1,150	20	62	1,190	4	13
6	2,510	4	27	1,150	22	68	1,160	3	9.4
7	2,400	4	26	1,160	20	63	1,140	3	9.2
8	2,360	4	25	1,130	17	52	1,130	4	12
9	2,200	4	24	1,110	16	48	1,130	3	9.2
10	2,160	4	23	1,070	17	49	1,140	5	15
11	2,140	4	23	1,010	17	46	1,080	4	12
12	2,100	6	34	993	15	40	1,130	4	12
13	1,990	6	32	958	14	36	1,310	5	18
14	1,880	7	36	917	12	30	1,530	7	29
15	1,830	7	35	867	10	23	1,470	6	24
16	1,790	7	34	826	7	16	1,430	6	23
17	1,790	7	34	832	5	11	1,370	6	22
18	1,720	9	42	830	4	9.0	1,360	6	22
19	1,690	16	73	864	4	9.3	1,420	7	27
20	1,690	24	110	1,020	6	17	1,660	7	31
21	1,700	30	138	987	6	16	1,790	7	34
22	1,600	33	143	960	6	16	1,700	7	32
23	1,530	36	149	1,130	7	21	1,660	7	31
24	1,470	41	163	1,270	7	24	e1,660	7	31
25	1,430	42	162	1,350	7	26	e1,650	6	27
26	1,390	41	154	1,350	8	29	e1,600	6	26
27	1,360	40	147	1,380	6	22	e1,570	6	25
28	1,310	42	149	1,370	6	22	e1,550	5	21
29	1,260	43	146	1,330	5	18	1,550	5	21
30	1,210	36	118	1,280	4	14	1,540	5	21
31	1,190	29	93	1,220	4	13	--	--	--
TOTAL	59,380	--	2,327	34,114	--	1,099.3	41,690	--	601.9
MEAN	1,915	18	75	1,100	12	35	1,390	5	20
MAX	3,010	43	163	1,380	28	89	1,790	7	34
MIN	1,190	4	23	826	4	9.0	1,080	3	9.2

TOTAL FOR WATER YEAR 2004:

STREAMFLOW--746,424 ft^3/s
SEDIMENT LOAD--22,444.5 tons

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: E, estimated; µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: <, less than laboratory reporting level]

Site number (fig. 1)	Site name	Date	Time	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)
12340500	Clark Fork above Missoula	11/18/03	1600	160	44.6	12.8	3.7	4
	Clark Fork above Missoula	11/18/03	1605	170	45.0	13.0	3.8	4
12323600	Silver Bow Creek at Opportunity	03/16/04	1540	190	55.0	12.0	12.1	15
	Silver Bow Creek at Opportunity	03/16/04	1545	180	53.9	12.1	12.1	14
12323750	Silver Bow Creek at Warm Springs	04/20/04	1200	250	73.8	17.1	12.2	16
	Silver Bow Creek at Warm Springs	04/20/04	1205	260	73.9	17.4	12.1	15
12324200	Clark Fork at Deer Lodge	05/17/04	1505	240	70.2	14.5	10.9	13
	Clark Fork at Deer Lodge	05/17/04	1510	240	71.2	14.7	11.0	14
12334550	Clark Fork at Turah Bridge, near Bonner	06/02/04	1705	100	29.0	6.75	4.4	4
	Clark Fork at Turah Bridge, near Bonner	06/02/04	1710	100	28.9	6.91	4.5	5
12331800	Clark Fork near Drummond	06/13/04	1645	170	49.1	11.3	10.6	14
	Clark Fork near Drummond	06/13/04	1650	170	49.5	11.5	10.8	14
12323700	Mill Creek at Opportunity	07/19/04	1045	59	17.1	3.93	30.5	30
	Mill Creek at Opportunity	07/19/04	1050	60	17.4	4.00	30.7	31
12334510	Rock Creek near Clinton	08/23/04	1110	63	16.7	5.07	.8	<2
	Rock Creek near Clinton	08/23/04	1115	63	16.8	5.06	.7	<2

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.—Continued

Station number	Date	Cadmium, filtered (µg/L)	Cad-mium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
12340500	11/18/03	<0.04	0.04	2.8	5.8	E4	100	<0.08	0.53
	11/18/03	<.04	.04	2.9	5.8	<6	80	<.08	.54
12323600	03/16/04	.85	1.18	46.2	107	15	500	.33	13.1
	03/16/04	.87	1.20	46.9	96.0	16	510	.32	13.2
12323750	04/20/04	E.04	.10	3.3	5.9	11	200	E.05	.88
	04/20/04	E.04	.10	3.4	6.2	12	200	E.05	.90
12324200	05/17/04	E.04	.10	5.6	14.2	10	190	E.06	1.32
	05/17/04	.04	.10	5.7	14.1	11	190	E.07	1.33
12334550	06/02/04	<.04	.06	2.5	6.3	11	180	E.05	.81
	06/02/04	<.04	.06	2.5	7.9	10	180	E.05	.84
12331800	06/13/04	<.04	.14	4.2	19.0	10	450	.10	3.45
	06/13/04	E.02	.14	4.3	18.8	10	440	.10	3.52
12323700	07/19/04	.07	.08	2.8	4.1	74	130	.19	.43
	07/19/04	.06	.09	2.8	4.0	74	130	.18	.39
12334510	08/23/04	<.04	<.04	.7	<.6	13	90	<.08	E.05
	08/23/04	<.04	<.04	E.3	<.6	14	100	<.08	.07

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.—Continued

Station number	Date	Manganese, filtered (μg/L)	Manganese, unfiltered recoverable (μg/L)	Zinc, filtered (μg/L)	Zinc, unfiltered recoverable (μg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)
12340500	11/18/03	9.7	17	2.3	8	93	4
	11/18/03	9.9	18	2.5	8	90	4
12323600	03/16/04	423	446	129	228	83	10
	03/16/04	428	449	130	228	81	10
12323750	04/20/04	247	304	3.5	9	90	4
	04/20/04	246	307	3.5	10	93	3
12324200	05/17/04	37.3	70	4.9	14	88	8
	05/17/04	37.4	69	4.7	14	91	10
12334550	06/02/04	4.8	24	1.5	9	67	12
	06/02/04	4.8	24	2.4	9	67	12
12331800	06/13/04	15.6	97	2.9	26	89	23
	06/13/04	15.7	97	3.0	26	89	23
12323700	07/19/04	11.7	13	2.2	2	80	1
	07/19/04	11.6	13	2.1	3	83	1
12334510	08/23/04	2.9	9	<.6	<2	80	5
	08/23/04	2.7	9	<.6	E1	79	5

Table 9. Precision of analyses of field replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation[1], in listed units	Relative standard deviation, in percent
Calcium, filtered, mg/L	8	0.41	0.91
Magnesium, filtered, mg/L	8	.13	1.2
Arsenic, filtered, µg/L	8	.09	.84
Arsenic, unfiltered recoverable, µg/L	8	.56	4.6
Cadmium, filtered, µg/L	8	.01	4.1
Cadmium, unfiltered recoverable, µg/L	8	.01	2.6
Copper, filtered, µg/L	8	.21	2.4
Copper, unfiltered recoverable, µg/L	8	2.8	14
Iron, filtered, µg/L	8	.61	3.3
Iron, unfiltered recoverable, µg/L	8	6.6	2.9
Lead, filtered, µg/L	8	.00	4.1
Lead, unfiltered recoverable, µg/L	8	.03	1.3
Manganese, filtered, µg/L	8	1.3	1.4
Manganese, unfiltered recoverable, µg/L	8	1.1	.91
Zinc, filtered, µg/L	8	.35	1.9
Zinc, unfiltered recoverable, µg/L	8	.35	.95
Sediment, suspended, percent finer than 0.062 mm	8	1.6	1.9
Sediment, suspended, mg/L	8	.56	6.6

[1]Standard deviation is calculated using one-half the laboratory reporting level for censored values.

Table 10. Precision of analyses of laboratory replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation[1], in listed units	Relative standard deviation, in percent	Within limits[2] of data-quality objective
Calcium, filtered, mg/L	7	0.21	0.61	Yes
Magnesium, filtered, mg/L	7	.15	1.7	Yes
Arsenic, filtered, µg/L	7	.19	1.8	Yes
Arsenic, unfiltered recoverable, µg/L	7	1.2	10	Yes
Cadmium, filtered, µg/L	7	.01	2.6	Yes
Cadmium, unfiltered recoverable, µg/L	7	.02	3.7	Yes
Copper, filtered, µg/L	7	.07	.55	Yes
Copper, unfiltered recoverable, µg/L	7	.12	.36	Yes
Iron, filtered, µg/L	7	.22	1.2	Yes
Iron, unfiltered recoverable, µg/L	7	2.6	1.2	Yes
Lead, filtered, µg/L	7	.00	3.2	Yes
Lead, unfiltered recoverable, µg/L	7	.03	.72	Yes
Manganese, filtered, µg/L	7	1.3	1.3	Yes
Manganese, unfiltered recoverable, µg/L	7	1.5	.92	Yes
Zinc, filtered, µg/L	7	.48	1.8	Yes
Zinc, unfiltered recoverable, µg/L	7	1.2	1.3	Yes

[1]Standard deviation is calculated using laboratory reporting level for censored values.

[2]Data-quality objective for an acceptable level of precision is a maximum relative standard deviation of 20 percent for laboratory replicate analyses (table 3).

Table 11. Recovery efficiency for analyses of laboratory-spiked deionized-water blanks.

[Abbreviation: µg/L, micrograms per liter]

Constituent and reporting unit	Number of samples	95-percent confidence interval for spike recovery, in percent	Mean spike recovery, in percent	Within limits[1] of data-quality objective
Arsenic, filtered, µg/L	5	75.0-127	101	Yes
Arsenic, unfiltered recoverable, µg/L	5	93.6-110	102	Yes
Cadmium, filtered, µg/L	5	95.6-99.2	97.4	Yes
Cadmium, unfiltered recoverable, µg/L	5	98.6-101	100	Yes
Copper, filtered, µg/L	5	92.7-105	98.9	Yes
Copper, unfiltered recoverable, µg/L	5	95.4-104	99.6	Yes
Iron, filtered, µg/L	5	88.8-103	96.1	Yes
Iron, unfiltered recoverable, µg/L	5	96.3-106	101	Yes
Lead, filtered, µg/L	5	91.9-100	96.0	Yes
Lead, unfiltered recoverable, µg/L	5	97.3-100	98.9	Yes
Manganese, filtered, µg/L	5	90.6-107	98.6	Yes
Manganese, unfiltered recoverable, µg/L	5	92.3-106	99.1	Yes
Zinc, filtered, µg/L	5	91.7-112	102	Yes
Zinc, unfiltered recoverable, µg/L	5	96.3-104	100	Yes

[1]Data-quality objective for acceptable bias is a maximum deviation of 25 percent from a theoretical 100-percent recovery (table 3).

Table 12. Recovery efficiency for analyses of laboratory-spiked stream samples, upper Clark Fork basin, Montana.

[Abbreviation: µg/L, micrograms per liter]

Constituent and reporting unit	Number of samples	95-percent confidence interval for spike recovery, in percent	Mean spike recovery, in percent	Within limits[1] of data-quality objective
Arsenic, filtered, µg/L	5	86.9-108	97.3	Yes
Arsenic, unfiltered recoverable, µg/L	5	106-118	112	Yes
Cadmium, filtered, µg/L	5	94.2-108	101	Yes
Cadmium, unfiltered recoverable, µg/L	5	100-103	101	Yes
Copper, filtered, µg/L	5	93.8-97.0	95.4	Yes
Copper, unfiltered recoverable, µg/L	5	89.5-98.1	93.8	Yes
Iron, filtered, µg/L	5	91.2-130	111	Yes
Iron, unfiltered recoverable, µg/L	5	99.5-108	104	Yes
Lead, filtered, µg/L	5	93.0-104	98.7	Yes
Lead, unfiltered recoverable, µg/L	5	98.6-102	100	Yes
Manganese, filtered, µg/L	5	91.8-100	96.0	Yes
Manganese, unfiltered recoverable, µg/L	5	89.8-117	103	Yes
Zinc, filtered, µg/L	5	95.3-105	100	Yes
Zinc, unfiltered recoverable, µg/L	5	91.0-97.8	94.4	Yes

[1]Data-quality objective for acceptable bias is a maximum deviation of 25 percent from a theoretical 100-percent recovery (table 3).

Table 13. Analyses of field blanks for water samples.

[Abbreviations; ^{o}C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at $25^{o}C$; mg/L, milligrams per liter. Symbol: <, less than laboratory reporting level]

Date	Time	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Calcium, filtered (mg/L)	Magne-sium, filtered (mg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recov-erable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered (µg/L)
NOV 2003									
18...	0915	5.6	2	E0.01	<0.008	<0.2	<2	<0.04	<0.04
MAR 2004									
15...	1100	5.6	2	.02	<.008	<.2	<2	.07	<.04
APR									
21...	1500	5.5	2	E.01	<.008	<.2	<2	<.04	<.04
MAY									
17...	1900	5.6	1	.01	<.008	<.2	<2	<.04	<.04
JUN									
01...	0600	5.6	2	E.01	<.008	<.2	<2	<.04	<.04
13...	1200	5.5	1	.01	<.008	<.2	<2	<.04	<.04
JUL									
19...	1200	5.7	1	.01	<.008	<.2	<2	<.04	<.04
AUG									
23...	0600	5.5	2	E.01	<.008	<.2	<2	<.04	<.04

Date	Copper, filtered (µg/L)	Copper, unfiltered recov-erable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recov-erable (µg/L)	Manga-nese, filtered (µg/L)	Manga-nese, unfiltered (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recov-erable (µg/L)
NOV 2003										
18...	<0.4	<0.6	<6	<9	<0.08	<0.06	<0.2	<0.2	<0.6	<2
MAR 2004										
15...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	E.4	<2
APR										
21...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	<.6	<2
MAY										
17...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	<.6	<2
JUN										
01...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	E.4	<2
13...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	E.5	<2
JUL										
19...	<.4	<.6	<6	<9	<.08	<.06	<.2	<.2	<.6	<2
AUG										
23...	<.4	<.6	<6	<9	E.07	<.06	<.2	<.2	<.6	<2

Table 14. Analyses of fine-grained bed sediment, upper Clark Fork basin, Montana, August 2004.

[Fine-grained bed sediment is material less than 0.064 millimeter in diameter. Reported concentrations are the mean of all analyses for replicate aliquots from each composite sample. Abbreviation: µg/g, micrograms per gram of dry sample weight. Symbol: <, less than minimum reporting level]

Site number (fig. 1)	Site name	Number of composite samples	Concentration, in µg/g								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	3	163	43.9	20.8	4,510	31,200	481	7,620	14.9	10,100
12323750	Silver Bow Creek at Warm Springs	3	177	11.4	15.9	346	31,700	75	12,900	18.5	1,100
12323800	Clark Fork near Galen	3	119	5.2	19.5	838	24,000	92	11,900	13.9	999
461415112450801	Clark Fork below Lost Creek, near Galen	3	92	5.8	20.5	1,150	24,400	127	5,570	11.7	1,160
461559112443301	Clark Fork near Racetrack	3	56	5.2	19.0	940	21,200	103	3,990	10.3	999
461903112440701	Clark Fork at Demspey Creek diversion, near Racetrack	3	58	4.4	17.8	721	20,600	92	3,990	8.7	902
12324200	Clark Fork at Deer Lodge	3	49	3.8	20.2	683	21,100	103	2,460	11.5	846
12324590	Little Blackfoot River near Garrison	3	12	1.0	33.1	33	24,500	39	1,120	17.2	177
12324680	Clark Fork at Goldcreek	3	24	3.1	22.1	432	20,200	70	2,560	11.5	669
12331500	Flint Creek near Drummond	3	102	1.6	17.4	44	22,300	143	5,140	10.2	561
12331800	Clark Fork near Drummond	3	31	3.7	20.3	395	20,400	76	1,890	11.5	849
12334510	Rock Creek near Clinton	3	6	<.1	16.4	7	15,500	12	361	8.7	31
12334550	Clark Fork at Turah Bridge, near Bonner	3	22	2.3	17.8	250	16,700	57	1,570	10.3	647
12340500	Clark Fork above Missoula	3	29	3.4	20.4	411	20,700	62	970	13.0	872
12353000	Clark Fork below Missoula[1]	3	14	1.8	17.0	183	18,700	41	1,840	11.4	469

[1]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 15. Analyses of bulk bed sediment, upper Clark Fork basin, Montana, August 2004.

[Bulk bed sediment is material less than about 10 millimeters in diameter. Reported concentrations are the mean of all analyses for replicate aliquots from each composite sample. Abbreviation: µg/g, micrograms per gram of dry sample weight. Symbol: <, less than minimum reporting level]

Site number (fig. 1)	Site name	Number of composite samples	Concentration, in µg/g								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1	60	5.4	11.3	615	18,300	138	1,620	6.1	1,720
12323750	Silver Bow Creek at Warm Springs	1	15	1.3	8.1	27	8,060	13	711	5.8	125
12323800	Clark Fork near Galen	1	76	1.0	9.3	291	21,400	56	2,850	5.5	768
461415112450801	Clark Fork below Lost Creek, near Galen	1	87	1.2	11.0	330	17,800	70	1,790	5.6	431
461559112443301	Clark Fork near Racetrack	1	46	1.0	9.4	296	15,800	52	2,040	5.0	520
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1	18	.4	11.5	128	15,800	57	825	4.2	245
12324200	Clark Fork at Deer Lodge	1	37	2.7	19.3	523	21,500	81	873	9.8	679
12324590	Little Blackfoot River near Garrison	1	12	.4	20.7	14	19,700	19	716	11.7	82
12324680	Clark Fork at Goldcreek	1	16	.7	10.2	135	11,600	26	402	6.9	260
12331500	Flint Creek near Drummond	1	30	.3	6.9	7	9,230	38	2,610	4.4	170
12331800	Clark Fork near Drummond	1	16	1.7	13.0	195	14,000	41	615	8.0	472
12334510	Rock Creek near Clinton	1	4	<.1	10.6	7	10,600	8	240	6.9	17
12334550	Clark Fork at Turah Bridge, near Bonner	1	9	.9	11.7	114	11,600	28	510	7.6	326
12340500	Clark Fork above Missoula	1	17	1.6	9.8	176	14,500	31	1,170	9.0	416
12353000	Clark Fork below Missoula[1]	1	6	.3	13.2	36	18,700	9	601	12.0	124

[1]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 16. Recovery efficiency for analyses of standard reference materials for bed sediment.

[Abbreviations: µg/g, micrograms per gram of dry sample weight; SRM, standard reference material (agricultural soils). Dilution ratio is the proportion of initial volume of concentrated nitric acid used as a digesting reagent to final volume of solution after addition of 0.6N (normal) hydrochloric acid used for reconstituting dried residue]

Constituent	Number of analyses	Dilution ratio	Certified concentration (µg/g)	Mean SRM recovery, in percent	95-percent confidence interval for SRM recovery, in percent
			SRM sample 2709		
Arsenic	9	1:10	17.7	63.0	60.8 - 65.1
Cadmium	9	1:10	.4	83.7	82.1 - 85.3
Chromium	9	1:10	130	66.7	63.6 - 69.8
Copper	9	1:10	35	71.2	64.3 - 78.1
Iron	9	1:10	35,000	92.4	91.0 - 93.9
Lead	9	1:10	19	98.6	95.0 - 102
Manganese	9	1:10	538	93.4	92.3 - 94.5
Nickel	9	1:10	88	83.7	82.2 - 85.2
Zinc	9	1:10	106	84.1	82.4 - 85.8
			SRM sample 2711		
Arsenic	9	1:10	105	83.5	82.1 - 84.9
Cadmium	9	1:10	41.7	95.9	94.4 - 97.4
Chromium	9	1:10	47	56.5	52.4 - 60.5
Copper	9	1:10	114	88.1	85.9 - 90.2
Iron	9	1:10	28,900	85.8	84.4 - 87.2
Lead	9	1:10	1,160	90.1	88.7 - 91.6
Manganese	9	1:10	638	83.3	82.4 - 84.1
Nickel	9	1:10	20.6	75.7	74.8 - 76.6
Zinc	9	1:10	350	92.5	91.7 - 93.4

Table 17. Analyses of procedural blanks for bed sediment.

[Abbreviation: µg/mL, micrograms per milliliter. Dilution ratio is the proportion of initial volume of concentrated nitric acid used as a digesting reagent to final volume of solution after addition of 0.6N (normal) hydrochloric acid used for reconstituting dried residue. Symbol: <, less than minimum reporting level]

Site number (fig. 1)	Site name	Dilution ratio	Trace element concentration, in µg/mL								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:10	<0.01	<0.001	<0.004	<0.01	<0.02	<0.01	<0.002	<0.003	<0.01
12323750	Silver Bow Creek at Warm Springs	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12323800	Clark Fork near Galen	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
461415112450801	Clark Fork below Lost Creek, near Galen	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
461559112443301	Clark Fork near Racetrack	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12324200	Clark Fork at Deer Lodge	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12324590	Little Blackfoot River near Garrison	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12324680	Clark Fork at Goldcreek	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12331500	Flint Creek near Drummond	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12331800	Clark Fork near Drummond	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12334510	Rock Creek near Clinton	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12334550	Clark Fork at Turah Bridge, near Bonner	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12340500	Clark Fork above Missoula	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01
12353000	Clark Fork below Missoula	1:10	<.01	<.001	<.004	<.01	<.02	<.01	<.002	<.003	<.01

Table 18. Analyses of biota, upper Clark Fork basin, Montana, August 2004.

[Analyses are for the whole-body tissue of aquatic insects. Composite samples are made by combining similar-sized insects of the same species into a sample of sufficient mass for analysis. Concentrations for biota samples composed of two or more composite samples are the means of all analyses. Abbreviations: µg/g, micrograms per gram of dry sample weight; spp., one or more similar species. Symbol: <, less than minimum reporting level]

Taxon	Number of composite samples	Concentration, in µg/g								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600 Silver Bow Creek at Opportunity										
Hydropsyche cockerelli	2	10.4	5.1	1.2	348	1,220	21.8	1,180	1.3	825
Hydropsyche spp.	1	10.7	4.6	1.1	312	1,050	21.8	1,180	.7	834
12323750 Silver Bow Creek at Warm Springs										
Hydropsyche cockerelli	1	23.6	<.5	2.2	26.3	1,590	<5.0	3,890	<1.0	198
Hydropsyche occidentalis	1	31.0	.2	3.3	38.5	2,360	6.4	6,940	2.6	220
12323800 Clark Fork near Galen										
Hydropsyche cockerelli	1	15.8	.9	1.8	123	1,460	7.3	2,500	1.8	212
Hydropsyche spp.	2	15.1	.8	2.3	80.9	1,260	6.9	4,580	1.6	223
461415112450801 Clark Fork below Lost Creek, near Galen										
Hydropsyche cockerelli	2	11.6	1.5	1.1	125	1,050	7.3	1,300	.9	220
Hydropsyche occidentalis	1	15.6	<.5	1.2	97.3	1,420	8.0	3,870	<1.0	275
461559112443301 Clark Fork near Racetrack										
Hydropsyche cockerelli	1	14.3	.8	1.2	84.3	871	5.5	2,020	.9	187
461903112440701 Clark Fork at Dempsey Creek diversion, near Racetrack										
Hydropsyche cockerelli	2	9.4	1.0	1.0	90.2	738	3.8	1,950	.7	221
12324200 Clark Fork at Deer Lodge										
Hydropsyche cockerelli	2	5.9	.7	1.1	76.2	578	3.9	1,050	.6	179
Hydropsyche occidentalis	1	6.6	.6	1.4	78.6	730	4.6	2,060	1.2	213
12324590 Little Blackfoot River near Garrison										
Arctopsyche grandis	3	3.6	<.1	1.0	10.6	592	.6	970	1.2	148
Claassenia sabulosa	1	1.3	<.1	.5	37.2	201	<.4	149	.4	271
Hydropsyche spp.	1	3.7	<.2	1.8	11.1	1,000	<2.4	1,200	.9	151
12324680 Clark Fork at Goldcreek										
Arctopsyche grandis	3	2.3	.9	.7	21.0	310	1.3	905	.3	191
Claassenia sabulosa	3	1.6	.2	.5	56.6	215	.6	260	.4	270
Hydropsyche cockerelli	2	4.3	.5	1.3	38.6	736	2.8	1,300	.8	187
Hydropsyche occidentalis	1	4.7	.4	1.8	41.1	975	4.3	2,120	.8	215

Table 18. Analyses of biota, upper Clark Fork basin, Montana, August 2004.—Continued

Taxon	Number of composite samples	Concentration, in µg/g								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12331500 Flint Creek near Drummond										
Arctopsyche grandis	3	3.2	<.1	.9	11.4	708	4.5	1,460	.7	171
Hydropsyche cockerelli	1	6.4	<.2	1.7	11.6	1,610	10.1	2,480	.7	186
Hydropsyche occidentalis	1	6.1	<.3	2.1	11.5	1,430	10.2	3,330	<.5	166
12331800 Clark Fork near Drummond										
Arctopsyche grandis	3	2.5	.6	.8	22.3	384	3.1	1,080	.5	195
Claassenia sabulosa	2	1.3	.1	.5	44.5	182	1.0	259	.2	278
Hydropsyche cockerelli	3	4.0	.4	1.2	38.9	875	5.7	1,360	.9	200
Hydropsyche occidentalis	1	4.5	.4	1.8	41.3	1,260	10.0	2,800	1.2	248
12334510 Rock Creek near Clinton										
Arctopsyche grandis	2	2.4	<.1	.4	8.2	586	<.4	260	.9	130
Claassenia sabulosa	2	1.0	.1	.4	27.3	99	<.3	46	.2	174
Hydropsyche spp.	1	.7	<.5	<2.4	6.1	789	<4.9	377	<.9	112
12334550 Clark Fork at Turah Bridge, near Bonner										
Arctopsyche grandis	4	4.1	.5	.6	25.4	500	2.7	845	.8	199
Claassenia sabulosa	2	1.1	.1	.3	58.6	127	.5	132	.3	264
Hydropsyche cockerelli	2	5.0	.4	1.5	41.3	1,070	4.5	799	1.2	210
Hydropsyche occidentalis	2	4.1	.4	.7	36.7	1,010	4.7	1,040	1.2	230
12340500 Clark Fork above Missoula										
Arctopsyche grandis	3	3.4	.2	1.2	36.1	884	4.9	1,100	1.0	184
Hydropsyche cockerelli	2	5.3	<.1	2.1	57.1	1,770	9.1	1,370	1.5	209
12353000 Clark Fork below Missoula[1]										
Arctopsyche grandis	1	2.1	.4	.8	19.2	602	1.6	862	.6	158
Claassenia sabulosa	1	1.1	.3	.5	75.1	227	.3	275	.2	324
Hydropsyche cockerelli	3	2.8	.5	1.4	35.1	1,190	2.7	977	1.2	167

[1]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 19. Recovery efficiency for analyses of standard reference material for biota.

[Abbreviations: µg/g, micrograms per gram of dry sample weight; µg/mL, micrograms per milliliter; SRM, standard reference material (lobster hepatopancreas)]

Constituent	Number of analyses	Certified concentration (µg/g)	Mean SRM recovery, in percent	95-percent confidence interval for SRM recovery, in percent
SRM sample TORT-2				
Arsenic	12	21.6	99.7	98.9 - 100
Cadmium	12	26.7	92.1	90.5 - 93.6
Chromium	12	.77	106	96.5 - 115
Copper	12	106	97.9	92.6 - 103
Iron	12	105	96.7	94.4 - 99.0
Lead	[1]12	.35	70.4	33.4 - 107
Manganese	12	13.6	100	98.5 - 102
Nickel	12	2.5	82.5	79.6 - 85.3
Zinc	12	180	102	101 - 103

[1]Lead concentrations in six analyses were less than the minimum reporting level (0.01 µg/mL).

Table 20. Analyses of procedural blanks for biota.

[Procedural blanks were not diluted prior to analyses. Abbreviation: µg/mL, micrograms per milliliter. Symbol: <, less than minimum reporting level]

Site number	Site name	Dilution ratio	Trace-element concentration, in µg/mL								
			Arsenic	Cad-mium	Chro-mium	Cop-per	Iron	Lead	Man-ganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:1	<0.008	<0.001	<0.005	<0.02	<0.005	<0.01	<0.002	<0.002	<0.01
12323750	Silver Bow Creek at Warm Springs	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12323800	Clark Fork near Galen	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
461415112450801	Clark Fork below Lost Creek, near Galen	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
461559112443301	Clark Fork near Racetrack	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12324200	Clark Fork at Deer Lodge	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12324590	Little Blackfoot River near Garrison	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12324680	Clark Fork at Goldcreek	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12331500	Flint Creek near Drummond	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12331800	Clark Fork near Drummond	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12334510	Rock Creek near Clinton	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12334550	Clark Fork at Turah Bridge, near Bonner	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12340500	Clark Fork above Missoula	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01
12353000	Clark Fork below Missoula	1:1	<.008	<.001	<.005	<.02	<.005	<.01	<.002	<.002	<.01

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.

[Abbreviations: ft^3/s, cubic feet per second; ^{o}C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at $25^{o}C$; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323230--BLACKTAIL CREEK AT HARRISON AVENUE, AT BUTTE, MONT.					
Period of record for water-quality data: March 1993-August 1995, December 1996-August 2003					
Streamflow, instantaneous (ft^3/s)	83	156	1.9	14	7.9
pH, onsite (standard units)	83	8.4	7.3	7.8	7.8
Specific conductance, onsite (µS/cm)	83	412	116	267	271
Temperature, water (^{o}C)	83	17.5	1.5	8.2	8.0
Hardness, filtered (mg/L as $CaCO_3$)	83	150	38	105	110
Calcium, filtered (mg/L)	83	41.8	10.6	30	31
Magnesium, filtered (mg/L)	83	11.0	2.71	7.3	7.4
Arsenic, filtered (µg/L)	83	13	1	4	3
Arsenic, unfiltered (µg/L)	83	18	<2	[2]5	4
Cadmium, filtered (µg/L)	83	.5	<.1	[2]<.1	<.1
Cadmium, unfiltered (µg/L)	83	.11	<.04	[2]<.1	<1
Copper, filtered (µg/L)	83	10	E.8	[2]4	3
Copper, unfiltered (µg/L)	83	52	1.5	7	6
Iron, filtered (µg/L)	83	478	15	163	157
Iron, unfiltered (µg/L)	83	4,220	140	700	550
Lead, filtered (µg/L)	83	1	<.08	[2].2	<.5
Lead, unfiltered (µg/L)	83	47	<1	[2]2	1
Manganese, filtered (µg/L)	83	144	17	44	39
Manganese, unfiltered (µg/L)	83	240	24	62	53
Zinc, filtered (µg/L)	83	11	<1	[2]4	3
Zinc, unfiltered (µg/L)	83	130	<10	[2]11	3
Sediment, suspended (percent finer than 0.062 mm)	83	97	50	83	84
Sediment, suspended concentration (mg/L)	83	139	2	15	7
Sediment, suspended discharge (ton/d)	83	59	.02	1.4	.14

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323250--SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MONT.					
Period of record for water-quality data: March 1993-August 1995, December 1996-September 2004					
Streamflow, instantaneous (ft^3/s)	91	134	13	28	23
pH, onsite (standard units)	91	8.1	7.2	7.6	7.6
Specific conductance, onsite (µS/cm)	91	691	226	479	485
Temperature, water (°C)	91	20.0	1.0	10.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	91	220	66	152	160
Calcium, filtered (mg/L)	91	62.7	19.0	43.2	44.0
Magnesium, filtered (mg/L)	91	14.6	4.51	10.7	11.0
Arsenic, filtered (µg/L)	91	13	3.3	7	7
Arsenic, unfiltered (µg/L)	91	45	4	12	10
Cadmium, filtered (µg/L)	91	6.2	.09	1.5	1.2
Cadmium, unfiltered (µg/L)	91	6	.11	1.9	1.7
Copper, filtered (µg/L)	91	303	3.2	46	22
Copper, unfiltered (µg/L)	91	550	13.5	108	73
Iron, filtered (µg/L)	91	270	E10	[2]81	61
Iron, unfiltered (µg/L)	91	7,400	90	1,030	650
Lead, filtered (µg/L)	91	2.4	<.5	[2].6	.17
Lead, unfiltered (µg/L)	91	250	.65	17	7
Manganese, filtered (µg/L)	91	1,700	21.4	458	392
Manganese, unfiltered (µg/L)	91	1,600	26	506	440
Zinc, filtered (µg/L)	91	2,200	34	477	328
Zinc, unfiltered (µg/L)	91	2,200	45	574	419
Sediment, suspended (percent finer than 0.062 mm)	90	98	42	84	86
Sediment, suspended concentration (mg/L)	90	405	2	27	12
Sediment, suspended discharge (ton/d)	90	70	.09	3.2	.86

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for water-quality data: March 1993-August 1995, December 1996-September 2004					
Streamflow, instantaneous (ft^3/s)	94	361	13	73	51
pH, onsite (standard units)	93	9.5	7.2	8.4	8.4
Specific conductance, onsite (µS/cm)	93	633	202	411	400
Temperature, water (°C)	93	22.5	0.0	9.5	9.5
Hardness, filtered (mg/L as $CaCO_3$)	93	240	60	147	140
Calcium, filtered (mg/L)	93	71.6	18.5	43.6	43.0
Magnesium, filtered (mg/L)	93	15.0	3.42	9.4	9.0
Arsenic, filtered (µg/L)	93	34	1	11	10
Arsenic, unfiltered (µg/L)	93	235	11	29	18
Cadmium, filtered (µg/L)	93	41	.1	1.4	.9
Cadmium, unfiltered (µg/L)	93	49	.52	[2]2.5	1.7
Copper, filtered (µg/L)	93	450	18.5	53.5	42.1
Copper, unfiltered (µg/L)	93	3,900	54.3	245	138
Iron, filtered (µg/L)	93	307	3	[2]45	24
Iron, unfiltered (µg/L)	93	24,100	260	1,670	800
Lead, filtered (µg/L)	93	5.1	<.5	[2].8	.2
Lead, unfiltered (µg/L)	93	650	5.38	44	16
Manganese, filtered (µg/L)	93	9,300	68	530	421
Manganese, unfiltered (µg/L)	93	10,000	117	653	490
Zinc, filtered (µg/L)	93	13,000	27	372	202
Zinc, unfiltered (µg/L)	93	15,000	97	637	410
Sediment, suspended (percent finer than 0.062 mm)	94	95	37	78	82
Sediment, suspended concentration (mg/L)	94	801	5	54	17
Sediment, suspended discharge (ton/d)	94	781	.18	24	2.4

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323700--MILL CREEK AT OPPORTUNITY, MONT.					
Period of record for water-quality data: March 2003-September 2004					
Streamflow, instantaneous (ft^3/s)	16	261	1.8	35	7.1
pH, onsite (standard units)	16	8.2	7.8	8.0	8.0
Specific conductance, onsite (µS/cm)	16	221	59	148	152
Temperature, water (^{o}C)	16	18.5	1.0	8.9	8.8
Hardness, filtered (mg/L as $CaCO_3$)	16	100	24	63	66
Calcium, filtered (mg/L)	16	27.9	7.01	17.8	18.6
Magnesium, filtered (mg/L)	16	7.68	1.57	4.58	4.52
Arsenic, filtered (µg/L)	16	37.0	13.9	24.9	26.0
Arsenic, unfiltered (µg/L)	16	50	16	29	30
Cadmium, filtered (µg/L)	16	.10	.05	.07	.08
Cadmium, unfiltered (µg/L)	16	.85	.06	.17	.11
Copper, filtered (µg/L)	16	6.0	1.8	3.4	3.0
Copper, unfiltered (µg/L)	16	38.8	2.8	8.0	4.6
Iron, filtered (µg/L)	16	84	17	47	44
Iron, unfiltered (µg/L)	16	1,960	70	331	140
Lead, filtered (µg/L)	16	.32	.04	.16	.14
Lead, unfiltered (µg/L)	16	12.7	.14	1.82	.46
Manganese, filtered (µg/L)	16	15.7	3.6	8.0	7.2
Manganese, unfiltered (µg/L)	16	113	6	21	12
Zinc, filtered (µg/L)	16	8	2	4	3
Zinc, unfiltered (µg/L)	16	41	2	8	5
Sediment, suspended (percent finer than 0.062 mm)	16	90	49	77	80
Sediment, suspended concentration (mg/L)	16	107	1	14	2
Sediment, suspended discharge (ton/d)	16	55	<.01	[2]5.7	.02

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323720--WILLOW CREEK AT OPPORTUNITY, MONT.					
Period of record for water-quality data: March 2003-September 2004					
Streamflow, instantaneous (ft^3/s)	16	46	5.7	15	12
pH, onsite (standard units)	16	8.4	7.9	8.1	8.1
Specific conductance, onsite (µS/cm)	16	371	181	292	308
Temperature, water (^oC)	16	17.0	3.5	10.0	10.8
Hardness, filtered (mg/L as $CaCO_3$)	16	170	73	128	130
Calcium, filtered (mg/L)	16	47.4	22.0	37.1	38.5
Magnesium, filtered (mg/L)	16	12.0	4.37	8.71	9.08
Arsenic, filtered (µg/L)	16	101	12.0	43.0	29.6
Arsenic, unfiltered (µg/L)	16	104	12	45	31
Cadmium, filtered (µg/L)	16	.09	E.03	.05	.05
Cadmium, unfiltered (µg/L)	16	.30	.03	.09	.07
Copper, filtered (µg/L)	16	14.1	2.0	5.5	4.4
Copper, unfiltered (µg/L)	16	36.9	2.8	10.6	8.6
Iron, filtered (µg/L)	16	87	7	35	32
Iron, unfiltered (µg/L)	16	840	30	212	135
Lead, filtered (µg/L)	16	.50	<.08	[2].18	.13
Lead, unfiltered (µg/L)	16	8.41	.27	1.83	1.28
Manganese, filtered (µg/L)	16	49.3	4.1	25.6	19.6
Manganese, unfiltered (µg/L)	16	70	5	34	28
Zinc, filtered (µg/L)	16	20	2	6	5
Zinc, unfiltered (µg/L)	16	41	2	12	8
Sediment, suspended (percent finer than 0.062 mm)	16	96	76	87	88
Sediment, suspended concentration (mg/L)	16	51	1	9	4
Sediment, suspended discharge (ton/d)	16	6.3	.02	.66	.15

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Period of record for water-quality data: March 1993-September 2004					
Streamflow, instantaneous (ft^3/s)	100	662	16	140	88
pH, onsite (standard units)	98	9.3	8.0	8.8	8.8
Specific conductance, onsite (µS/cm)	98	783	249	465	474
Temperature, water (°C)	99	25.0	.5	11.3	11.5
Hardness, filtered (mg/L as $CaCO_3$)	98	310	97	193	190
Calcium, filtered (mg/L)	98	90.4	27.9	56	57
Magnesium, filtered (mg/L)	98	21.4	5.94	13	13
Arsenic, filtered (µg/L)	98	60	6.8	22.2	21.5
Arsenic, unfiltered (µg/L)	98	94	10	27	25
Cadmium, filtered (µg/L)	98	.31	<.1	[2].07	<.1
Cadmium, unfiltered (µg/L)	98	.56	<.1	[2].12	<1
Copper, filtered (µg/L)	98	40	1.9	9.6	7.8
Copper, unfiltered (µg/L)	98	96.8	3.4	19.3	13.4
Iron, filtered (µg/L)	98	93	<5	[2]17	14
Iron, unfiltered (µg/L)	98	3,000	70	362	280
Lead, filtered (µg/L)	98	1.0	<.08	[2].12	<.5
Lead, unfiltered (µg/L)	98	41.8	<1	[2]2.7	1.4
Manganese, filtered (µg/L)	98	875	11.8	125	85
Manganese, unfiltered (µg/L)	98	899	55	192	155
Zinc, filtered (µg/L)	98	73	<1	[2]10	6
Zinc, unfiltered (µg/L)	98	180	<10	[2]39	26
Sediment, suspended (percent finer than 0.062 mm)	99	97	43	82	85
Sediment, suspended concentration (mg/L)	100	229	1	12	7
Sediment, suspended discharge (ton/d)	100	279	.11	8.0	1.6

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.					
Period of record for water-quality data: March 1993-September 2004					
Streamflow, instantaneous (ft^3/s)	72	420	2.8	95	54
pH, onsite (standard units)	71	8.7	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	71	795	139	301	311
Temperature, water (°C)	72	20.0	.5	9.3	9.2
Hardness, filtered (mg/L as $CaCO_3$)	71	420	40	146	150
Calcium, filtered (mg/L)	71	130	10.5	45	46
Magnesium, filtered (mg/L)	71	22.0	3.29	8.4	8.1
Arsenic, filtered (µg/L)	71	14	2	5	5
Arsenic, unfiltered (µg/L)	71	27	3	8	6
Cadmium, filtered (µg/L)	71	E.1	<.04	[2].04	<.1
Cadmium, unfiltered (µg/L)	71	.36	<.1	[2].07	<1
Copper, filtered (µg/L)	71	16	1	4	3
Copper, unfiltered (µg/L)	71	96.7	2.3	19.6	8.6
Iron, filtered (µg/L)	71	30	<5	[2]11	9
Iron, unfiltered (µg/L)	71	1,670	40	305	110
Lead, filtered (µg/L)	71	1.8	<.08	[2].1	<.5
Lead, unfiltered (µg/L)	71	14	<1	[2]2	.4
Manganese, filtered (µg/L)	71	570	22.6	131	96.2
Manganese, unfiltered (µg/L)	71	1,400	57	219	183
Zinc, filtered (µg/L)	71	10	<1	[2]2	.9
Zinc, unfiltered (µg/L)	71	60	<10	[2]10	3
Sediment, suspended (percent finer than 0.062 mm)	72	88	55	73	74
Sediment, suspended concentration (mg/L)	72	100	2	18	8
Sediment, suspended discharge (ton/d)	72	87	.05	9.3	1.0

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323800--CLARK FORK NEAR GALEN, MONT. **Period of record for water-quality data: July 1988-September 2004**					
Streamflow, instantaneous (ft^3/s)	141	1,050	14	207	124
pH, onsite (standard units)	128	9.0	7.5	8.5	8.6
Specific conductance, onsite (µS/cm)	129	720	197	427	442
Temperature, water (^oC)	140	22.5	0.0	10.0	10.0
Hardness, filtered (mg/L as $CaCO_3$)	127	370	81	186	190
Calcium, filtered (mg/L)	127	110	24.2	55	57
Magnesium, filtered (mg/L)	127	22.0	5.08	12	12
Arsenic, filtered (µg/L)	127	53	4	15	13
Arsenic, unfiltered (µg/L)	127	78	3	20	17
Cadmium, filtered (µg/L)	127	1	<.1	[2].07	<.1
Cadmium, unfiltered (µg/L)	127	3	<.1	[2].2	<1
Copper, filtered (µg/L)	127	50	2.3	9	7
Copper, unfiltered (µg/L)	126	240	4.8	31	17
Iron, filtered (µg/L)	127	110	<3	[2]16	10
Iron, unfiltered (µg/L)	127	9,200	60	525	270
Lead, filtered (µg/L)	127	3	<.08	[2].2	<.6
Lead, unfiltered (µg/L)	127	31.0	<1	[2]4	2
Manganese, filtered (µg/L)	127	460	25.2	114	82
Manganese, unfiltered (µg/L)	127	1,400	47	246	183
Zinc, filtered (µg/L)	127	110	<1	[2]12	6
Zinc, unfiltered (µg/L)	127	360	<10	[2]45	30
Sediment, suspended (percent finer than 0.062 mm)	140	97	41	78	78
Sediment, suspended concentration (mg/L)	141	338	2	19	8
Sediment, suspended discharge (ton/d)	141	459	.12	22	2.3

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323850--LOST CREEK NEAR GALEN, MONT.					
Period of record for water-quality data: March 2003-September 2004					
Streamflow, instantaneous (ft^3/s)	16	59	1.3	18	9.0
pH, onsite (standard units)	16	8.7	8.4	8.5	8.5
Specific conductance, onsite (µS/cm)	16	861	540	630	624
Temperature, water (°C)	16	26.5	4.5	14.2	13.8
Hardness, filtered (mg/L as $CaCO_3$)	16	420	200	288	290
Calcium, filtered (mg/L)	16	117	48.5	79.3	79.3
Magnesium, filtered (mg/L)	16	32.3	18.0	21.6	21.0
Arsenic, filtered (µg/L)	16	41.8	6.6	13.4	11.1
Arsenic, unfiltered (µg/L)	16	43	6	14	12
Cadmium, filtered (µg/L)	16	.05	<.04	[2].03	.03
Cadmium, unfiltered (µg/L)	16	.11	E.02	.04	.04
Copper, filtered (µg/L)	16	6.7	1.5	3.3	2.9
Copper, unfiltered (µg/L)	16	22.5	3.9	7.3	5.2
Iron, filtered (µg/L)	16	18	<6	[2]8	6
Iron, unfiltered (µg/L)	16	280	10	104	70
Lead, filtered (µg/L)	16	.33	<.08	[2].08	<.08
Lead, unfiltered (µg/L)	16	1.30	E.04	.41	.22
Manganese, filtered (µg/L)	16	23.6	1.9	9.6	8.6
Manganese, unfiltered (µg/L)	16	33	2	13	12
Zinc, filtered (µg/L)	16	2	<1	[2]1	1
Zinc, unfiltered (µg/L)	16	9	<2	[2]3	2
Sediment, suspended (percent finer than 0.062 mm)	16	86	18	54	55
Sediment, suspended concentration (mg/L)	16	34	2	15	15
Sediment, suspended discharge (ton/d)	16	3.8	.01	.87	.23

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324200--CLARK FORK AT DEER LODGE, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	193	1,920	23	290	217
pH, onsite (standard units)	141	8.9	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	176	642	234	485	506
Temperature, water (°C)	192	23.0	0.0	9.9	10.0
Hardness, filtered (mg/L as $CaCO_3$)	133	270	95	205	220
Calcium, filtered (mg/L)	133	81.0	28.2	60	64
Magnesium, filtered (mg/L)	133	18	5.9	13	14
Arsenic, filtered (µg/L)	143	39	6	14	13
Arsenic, unfiltered (µg/L)	143	215	8	25	17
Cadmium, filtered (µg/L)	143	2	<.1	[2].08	<1
Cadmium, unfiltered (µg/L)	143	5	<.1	[2].5	<1
Copper, filtered (µg/L)	143	120	3.2	12	9
Copper, unfiltered (µg/L)	142	1,500	8.2	90	39
Iron, filtered (µg/L)	143	190	<3	[2]15	9
Iron, unfiltered (µg/L)	143	29,000	30	1,690	590
Lead, filtered (µg/L)	143	6	<.08	[2].4	<1
Lead, unfiltered (µg/L)	143	200	<1	[2]12	5
Manganese, filtered (µg/L)	143	400	1	43	34
Manganese, unfiltered (µg/L)	143	4,600	12	266	156
Zinc, filtered (µg/L)	143	230	<10	[2]13	10
Zinc, unfiltered (µg/L)	143	1,700	4	99	50
Sediment, suspended (percent finer than 0.062 mm)	184	99	40	71	72
Sediment, suspended concentration (mg/L)	193	2,250	2	76	23
Sediment, suspended discharge (ton/d)	193	8,690	.29	168	12

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	110	2,080	15	274	169
pH, onsite (standard units)	97	8.7	7.0	8.1	8.1
Specific conductance, onsite (µS/cm)	98	347	120	233	231
Temperature, water (°C)	109	23.0	0.0	8.8	9.0
Hardness, filtered (mg/L as $CaCO_3$)	92	170	51	107	105
Calcium, filtered (mg/L)	92	49.3	14.0	31	31
Magnesium, filtered (mg/L)	92	11.9	3.30	7.2	7.1
Arsenic, filtered (µg/L)	97	7	3	5	5
Arsenic, unfiltered (µg/L)	97	17	4	6	6
Cadmium, filtered (µg/L)	97	.2	<.04	--	<.1
Cadmium, unfiltered (µg/L)	97	2	<.04	[2].1	<1
Copper, filtered (µg/L)	97	7	<1	[2]2	1
Copper, unfiltered (µg/L)	96	45	<1	[2]4	2
Iron, filtered (µg/L)	97	120	<3	[2]33	21
Iron, unfiltered (µg/L)	97	25,000	20	1,030	220
Lead, filtered (µg/L)	96	6	<.08	[2].3	<1
Lead, unfiltered (µg/L)	97	25	<1	[2]2	<5
Manganese, filtered (µg/L)	97	45.2	1.0	9	8
Manganese, unfiltered (µg/L)	97	1,100	<10	[2]65	28
Zinc, filtered (µg/L)	97	24	<.6	[2]3	.8
Zinc, unfiltered (µg/L)	97	140	<1	[2]11	<40
Sediment, suspended (percent finer than 0.062 mm)	110	97	32	76	80
Sediment, suspended concentration (mg/L)	110	1,410	1	47	8
Sediment, suspended discharge (ton/d)	110	7,920	.08	126	3.8

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK, MONT.					
Period of record for water-quality data: March 1993-September 2004					
Streamflow, instantaneous (ft^3/s)	99	3,920	87	739	513
pH, onsite (standard units)	98	8.8	7.9	8.4	8.3
Specific conductance, onsite (µS/cm)	98	510	206	373	394
Temperature, water (°C)	99	23.0	0.0	9.9	10.0
Hardness, filtered (mg/L as $CaCO_3$)	98	230	86	164	170
Calcium, filtered (mg/L)	98	68.0	25.9	48	51
Magnesium, filtered (mg/L)	98	15.0	5.15	11	11
Arsenic, filtered (µg/L)	98	20	5.8	10	10
Arsenic, unfiltered (µg/L)	98	75	7	15	13
Cadmium, filtered (µg/L)	98	.2	<.04	[2].04	<.1
Cadmium, unfiltered (µg/L)	98	2	<.1	[2].2	<1
Copper, filtered (µg/L)	97	36	2.1	7	6
Copper, unfiltered (µg/L)	97	440	5.2	44	25
Iron, filtered (µg/L)	98	100	<3	[2]19	12
Iron, unfiltered (µg/L)	98	12,000	30	936	470
Lead, filtered (µg/L)	97	.8	<.08	[2].1	<.5
Lead, unfiltered (µg/L)	97	73	<1	[2]6	3
Manganese, filtered (µg/L)	98	57.3	4.0	20	18
Manganese, unfiltered (µg/L)	98	1,100	10	133	90
Zinc, filtered (µg/L)	98	26	<1	[2]6	4
Zinc, unfiltered (µg/L)	98	510	2	50	30
Sediment, suspended (percent finer than 0.062 mm)	99	94	43	76	78
Sediment, suspended concentration (mg/L)	99	752	2	54	23
Sediment, suspended discharge (ton/d)	99	7,960	.94	241	33

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331500--FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	139	892	2.8	175	114
pH, onsite (standard units)	125	8.8	7.5	8.3	8.3
Specific conductance, onsite (µS/cm)	128	529	134	310	306
Temperature, water (°C)	137	21.0	0.0	9.0	9.5
Hardness, filtered (mg/L as $CaCO_3$)	118	260	59	146	140
Calcium, filtered (mg/L)	118	73.0	16.4	40	39
Magnesium, filtered (mg/L)	118	20	4.3	11	12
Arsenic, filtered (µg/L)	125	20	5	9	9
Arsenic, unfiltered (µg/L)	125	57	7	17	13
Cadmium, filtered (µg/L)	125	.1	<.04	--	<.1
Cadmium, unfiltered (µg/L)	125	3	<.04	[2].2	<1
Copper, filtered (µg/L)	125	7	<1	[2]2	1
Copper, unfiltered (µg/L)	124	32	1	6	4
Iron, filtered (µg/L)	125	240	<3	[2]37	19
Iron, unfiltered (µg/L)	125	7,200	60	842	420
Lead, filtered (µg/L)	125	7	<.5	[2].6	<1
Lead, unfiltered (µg/L)	125	87	<1	[2]11	6
Manganese, filtered (µg/L)	125	139	14	43	37
Manganese, unfiltered (µg/L)	125	1,600	50	203	130
Zinc, filtered (µg/L)	125	27	<1	[2]5	2
Zinc, unfiltered (µg/L)	125	290	<10	[2]36	20
Sediment, suspended (percent finer than 0.062 mm)	139	98	28	80	84
Sediment, suspended concentration (mg/L)	139	556	3	48	26
Sediment, suspended discharge (ton/d)	139	904	.02	42	7.3

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331800--CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for water-quality data: March 1993-September 2004					
Streamflow, instantaneous (ft^3/s)	99	3,860	149	1,040	758
pH, onsite (standard units)	98	8.5	7.8	8.3	8.3
Specific conductance, onsite (µS/cm)	98	630	189	412	430
Temperature, water (^{o}C)	99	22.5	.5	10.8	11.0
Hardness, filtered (mg/L as $CaCO_3$)	98	300	74	186	190
Calcium, filtered (mg/L)	98	83	21	53	55
Magnesium, filtered (mg/L)	98	22	5.2	13	13
Arsenic, filtered (µg/L)	98	20	6.6	11	10
Arsenic, unfiltered (µg/L)	98	62	8	17	13
Cadmium, filtered (µg/L)	98	.2	<.04	[2]<.1	<.1
Cadmium, unfiltered (µg/L)	98	2	<.1	[2].2	<1
Copper, filtered (µg/L)	96	21	1	7	5
Copper, unfiltered (µg/L)	96	360	4.6	46	22
Iron, filtered (µg/L)	98	150	<3	[2]19	8
Iron, unfiltered (µg/L)	97	8,800	20	1,070	460
Lead, filtered (µg/L)	94	1.2	<.08	[2].2	<.5
Lead, unfiltered (µg/L)	94	56	<1	[2]8	4
Manganese, filtered (µg/L)	98	60.7	4.5	17	15
Manganese, unfiltered (µg/L)	98	880	8	156	98
Zinc, filtered (µg/L)	98	21	<3	[2]7	5
Zinc, unfiltered (µg/L)	98	490	3	68	39
Sediment, suspended (percent finer than 0.062 mm)	99	92	38	74	75
Sediment, suspended concentration (mg/L)	99	530	2	69	26
Sediment, suspended discharge (ton/d)	99	4,720	1.7	351	53

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	109	5,060	113	945	521
pH, onsite (standard units)	99	8.8	6.9	8.0	8.0
Specific conductance, onsite (µS/cm)	100	160	53	108	104
Temperature, water (°C)	109	18.0	0.0	8.4	8.5
Hardness, filtered (mg/L as $CaCO_3$)	91	90	22	50	50
Calcium, filtered (mg/L)	91	23.0	5.92	13	13
Magnesium, filtered (mg/L)	91	8.00	1.86	4.3	4.3
Arsenic, filtered (µg/L)	97	1	<1	[2].6	<1
Arsenic, unfiltered (µg/L)	97	5	<1	[2].9	<2
Cadmium, filtered (µg/L)	97	1	<.04	[2].03	<.1
Cadmium, unfiltered (µg/L)	97	3	<.04	[2].1	<1
Copper, filtered (µg/L)	96	6	<1	[2]1	<1
Copper, unfiltered (µg/L)	95	41	<.6	[2]3	1
Iron, filtered (µg/L)	97	163	5	[2]33	23
Iron, unfiltered (µg/L)	97	2,100	20	284	120
Lead, filtered (µg/L)	95	5	<.08	[2].4	<.6
Lead, unfiltered (µg/L)	95	19	<.06	[2]1	<1
Manganese, filtered (µg/L)	97	8	<1	[2]2	2
Manganese, unfiltered (µg/L)	97	90	<10	[2]15	7
Zinc, filtered (µg/L)	97	15	<.6	[2]2	<3
Zinc, unfiltered (µg/L)	97	60	<1	[2]5	<10
Sediment, suspended (percent finer than 0.062 mm)	109	95	35	70	72
Sediment, suspended concentration (mg/L)	109	223	1	20	5
Sediment, suspended discharge (ton/d)	109	3,050	.31	134	8.9

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	196	9,560	296	1,860	1,120
pH, onsite (standard units)	142	8.8	7.4	8.2	8.3
Specific conductance, onsite (µS/cm)	171	483	139	304	316
Temperature, water (°C)	195	22.0	0.0	9.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	132	210	54	132	130
Calcium, filtered (mg/L)	132	59.0	14.9	37	38
Magnesium, filtered (mg/L)	132	14.0	3.94	9.5	9.4
Arsenic, filtered (µg/L)	141	17	2.7	6	5
Arsenic, unfiltered (µg/L)	141	110	3	10	7
Cadmium, filtered (µg/L)	141	.11	<.04	[2].03	<.1
Cadmium, unfiltered (µg/L)	141	4	<.1	[2].3	<1
Copper, filtered (µg/L)	140	25	E1.1	5	4
Copper, unfiltered (µg/L)	139	500	3	39	18
Iron, filtered (µg/L)	141	190	<3	[2]25	14
Iron, unfiltered (µg/L)	141	19,000	40	1,160	390
Lead, filtered (µg/L)	137	7	<.08	[2].4	<1
Lead, unfiltered (µg/L)	137	100	<1	[2]8	3
Manganese, filtered (µg/L)	141	37.4	1.0	8	7
Manganese, unfiltered (µg/L)	141	2,000	10	136	70
Zinc, filtered (µg/L)	140	39	<3	[2]7	4
Zinc, unfiltered (µg/L)	141	1,100	<10	[2]68	30
Sediment, suspended (percent finer than 0.062 mm)	185	98	27	73	75
Sediment, suspended concentration (mg/L)	196	1,370	2	61	19
Sediment, suspended discharge (ton/d)	196	34,700	3.5	677	61

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340000--BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for water-quality data: March 1985-September 2004					
Streamflow, instantaneous (ft^3/s)	140	13,400	344	2,680	1,310
pH, onsite (standard units)	100	8.7	7.5	8.3	8.3
Specific conductance, onsite (µS/cm)	117	294	131	207	205
Temperature, water (^oC)	140	21.0	0.0	9.2	9.8
Hardness, filtered (mg/L as $CaCO_3$)	93	140	55	102	97
Calcium, filtered (mg/L)	93	37	14	26	25
Magnesium, filtered (mg/L)	93	13	4.9	9.0	8.6
Arsenic, filtered (µg/L)	100	2	<1	[2].9	1
Arsenic, unfiltered (µg/L)	100	4	<1	[2]1	1
Cadmium, filtered (µg/L)	100	1	<.04	--	<.1
Cadmium, unfiltered (µg/L)	100	2	<.04	[2].1	<1
Copper, filtered (µg/L)	98	7	<1	[2]2	1
Copper, unfiltered (µg/L)	97	34	<1	[2]6	3
Iron, filtered (µg/L)	100	100	<3	[2]18	10
Iron, unfiltered (µg/L)	100	3,600	10	477	210
Lead, filtered (µg/L)	96	8	<.08	[2].5	<1
Lead, unfiltered (µg/L)	96	25	<.06	[2]3	<5
Manganese, filtered (µg/L)	100	11	<1	[2]2	2
Manganese, unfiltered (µg/L)	100	180	<10	[2]32	20
Zinc, filtered (µg/L)	100	15	<1	[2]3	<10
Zinc, unfiltered (µg/L)	100	60	<1	[2]7	<10
Sediment, suspended (percent finer than 0.062 mm)	138	98	42	80	82
Sediment, suspended concentration (mg/L)	140	271	1	31	9
Sediment, suspended discharge (ton/d)	140	7,670	1.1	551	31

Table 21. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2004.—Continued

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT.					
Period of record for water-quality data: July 1986-September 2004					
Streamflow, instantaneous (ft^3/s)	162	21,600	720	4,430	2,400
pH, onsite (standard units)	119	8.7	7.9	8.3	8.3
Specific conductance, onsite (µS/cm)	139	399	142	253	261
Temperature, water (°C)	159	21.0	0.0	9.3	9.0
Hardness, filtered (mg/L as $CaCO_3$)	119	170	61	117	120
Calcium, filtered (mg/L)	119	46	14	31	32
Magnesium, filtered (mg/L)	119	13.0	5.28	9.2	9.2
Arsenic, filtered (µg/L)	119	9	1	3	3
Arsenic, unfiltered (µg/L)	119	69	1	5	4
Cadmium, filtered (µg/L)	119	.2	<.04	[2].03	<.1
Cadmium, unfiltered (µg/L)	119	5	<.1	[2].1	<1
Copper, filtered (µg/L)	118	12.6	.7	3	2
Copper, unfiltered (µg/L)	117	400	2	17	8
Iron, filtered (µg/L)	119	200	<3	[2]22	15
Iron, unfiltered (µg/L)	119	13,000	40	613	230
Lead, filtered (µg/L)	114	1.2	<.08	[2].2	<.6
Lead, unfiltered (µg/L)	114	78	<1	[2]3	1
Manganese, filtered (µg/L)	119	230	6.2	18	14
Manganese, unfiltered (µg/L)	119	1,100	10	65	40
Zinc, filtered (µg/L)	119	16	<1	[2]4	2
Zinc, unfiltered (µg/L)	119	1,100	<10	[2]32	13
Sediment, suspended (percent finer than 0.062 mm)	157	99	44	87	90
Sediment, suspended concentration (mg/L)	162	824	2	38	12
Sediment, suspended discharge (ton/d)	162	21,900	5.8	968	74

[1]Differing less-than (<) values for an individual constituent are the result of changes in the laboratory reporting level during the period of record.

[2]Value is estimated by using a log-probability regression to predict the values of data less than the laboratory reporting level (Helsel and Cohn, 1988).

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.

[Fine-grained bed sediment is material less than 0.064 millimeter in diameter. Reported concentrations are in micrograms per gram dry weight. Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic or element not analyzed]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for fine-grained bed-sediment data: 1992-2004					
Arsenic	2	186	163	174	--
Cadmium	13	43.9	23.7	33.9	34.7
Chromium	11	32.4	16.8	25.3	24.8
Copper	13	9,020	3,390	5,040	4,670
Iron	13	41,200	28,200	35,900	37,400
Lead	13	1,030	381	740	797
Manganese	13	9,220	1,690	3,750	2,770
Nickel	12	21.4	12.7	15.6	15.4
Silver	12	20.0	8.3	15.5	15.8
Zinc	13	13,400	5,620	8,580	8,010
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Period of record for fine-grained bed-sediment data: 1992-2004					
Arsenic	2	178	103	140	--
Cadmium	13	12.2	4.2	7.8	7.4
Chromium	11	34.1	12.3	20.4	19.5
Copper	13	769	169	365	286
Iron	13	31,700	15,400	21,800	20,800
Lead	13	100	49	72	73
Manganese	13	17,700	1,470	8,270	8,150
Nickel	12	19.1	9.2	14.9	15.0
Silver	12	4.4	.3	[1]1.9	[1]1.8
Zinc	13	2,220	620	1,060	845
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.					
Period of record for fine-grained bed-sediment data: 1995,1997,1999, 2002					
Arsenic	0	--	--	--	--
Cadmium	4	5.8	1.3	3.4	3.2
Chromium	4	33.4	27.5	30.8	31.1
Copper	4	892	779	850	864
Iron	4	22,400	16,800	20,400	21,200
Lead	4	86	67	81	85
Manganese	4	11,000	2,020	6,950	7,410
Nickel	4	21.9	17.6	19.2	18.6
Silver	4	5.1	3.1	3.8	3.5
Zinc	4	421	372	391	385

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323800--CLARK FORK NEAR GALEN, MONT.					
Period of record for fine-grained bed-sediment data: 1987,1991-2004					
Arsenic	2	119	111	115	--
Cadmium	15	20.1	4.0	9.7	9.3
Chromium	11	33.9	19.1	26.3	26.4
Copper	15	2,300	838	1,250	1,140
Iron	15	39,800	22,600	28,000	27,000
Lead	15	235	92	142	136
Manganese	15	15,600	2,780	9,040	8,540
Nickel	12	23.2	13.9	18.3	18.3
Silver	14	7.3	<3.2	[1]4.4	[1]4.5
Zinc	15	3,560	999	1,650	1,230
461415112450801--CLARK FORK BELOW LOST CREEK, NEAR GALEN, MONT.					
Period of record for fine-grained bed-sediment data: 1996-2004					
Arsenic	2	204	92	148	--
Cadmium	9	10.5	5.8	8.0	8.1
Chromium	8	34.5	20.5	28.4	29.7
Copper	9	2,050	1,150	1,530	1,440
Iron	9	32,800	24,400	29,900	30,800
Lead	9	218	127	180	182
Manganese	9	9,670	3,540	5,550	5,570
Nickel	9	19.9	11.7	16.5	16.5
Silver	8	7.8	4.2	6.5	6.7
Zinc	9	1,680	1,120	1,390	1,450
461559112443301--CLARK FORK NEAR RACETRACK, MONT.					
Period of record for fine-grained bed-sediment data: 1996-2004					
Arsenic	2	101	56	79	--
Cadmium	9	8.7	5.0	7.1	7.5
Chromium	8	33.3	19.0	25.7	27.1
Copper	9	1,610	933	1,200	1,240
Iron	9	31,700	21,200	26,600	28,100
Lead	9	186	103	146	143
Manganese	9	6,310	2,100	3,520	3,130
Nickel	9	18.4	10.3	14.2	15.6
Silver	8	6.1	<3.3	[1]5.0	[1]5.4
Zinc	9	1,550	999	1,220	1,170

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
461903112440701--CLARK FORK AT DEMPSEY CREEK DIVERSION, NEAR RACETRACK, MONT.					
Period of record for fine-grained bed-sediment data: 1996-2004					
Arsenic	2	80	58	69	--
Cadmium	9	10.3	4.3	6.9	6.9
Chromium	8	34.1	16.0	25.2	26.0
Copper	9	1,550	721	1,030	1,030
Iron	9	33,700	20,600	26,400	25,300
Lead	9	155	92	130	130
Manganese	9	8,370	1,810	3,880	2,680
Nickel	9	16.9	8.7	13.0	12.9
Silver	8	6.2	2.7	4.9	5.0
Zinc	9	1,570	900	1,140	1,070
12324200--CLARK FORK AT DEER LODGE, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1987, 1990-2004					
Arsenic	2	77	49	63	--
Cadmium	17	10.0	3.8	6.7	6.3
Chromium	11	43.9	19.5	30.9	32.5
Copper	17	4,180	683	1,340	1,070
Iron	17	35,300	21,100	27,500	26,800
Lead	17	242	103	152	150
Manganese	17	6,020	1,460	2,830	2,440
Nickel	12	21.1	11.5	15.7	15.2
Silver	16	7.9	2.4	4.7	4.5
Zinc	17	1,730	846	1,260	1,260
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1987, 1994, 1998, 2001, 2004					
Arsenic	1	--	--	12	--
Cadmium	6	2.3	.2	1.1	.9
Chromium	4	54.4	22.1	40.6	43.0
Copper	6	85	33	52	40
Iron	6	30,700	16,100	24,300	24,400
Lead	6	53	36	40	38
Manganese	6	2,700	905	1,370	1,080
Nickel	4	21.9	13.6	17.6	17.4
Silver	5	.9	<.5	[1].6	[1]<1.5
Zinc	6	204	161	176	174

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK, MONT.					
Period of record for fine-grained bed-sediment data: 1992-2004					
Arsenic	2	32	24	28	--
Cadmium	13	8.1	3.1	5.2	5.5
Chromium	11	48.9	22.1	32.7	31.9
Copper	13	1,080	393	704	748
Iron	13	30,600	19,500	23,900	24,300
Lead	13	152	61	99	105
Manganese	13	2,610	1,160	1,900	1,840
Nickel	12	18.6	10.9	14.9	15.5
Silver	12	4.8	2.3	3.3	3.2
Zinc	13	1,320	590	995	1,090
12331500--FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1989, 1992-2004					
Arsenic	2	113	102	108	--
Cadmium	15	7.0	<.2	[1]3.3	[1]3.1
Chromium	11	29.2	17.5	24.3	24.3
Copper	15	73	44	59	59
Iron	15	28,100	19,800	23,300	23,200
Lead	15	240	126	171	168
Manganese	15	5,720	2,370	4,010	4,180
Nickel	12	14.9	10.2	12.2	11.7
Silver	13	7.8	5.0	6.4	6.4
Zinc	15	777	503	630	644
12331800--CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1987, 1991-2004					
Arsenic	2	33	31	32	--
Cadmium	16	7.7	2.6	4.8	4.8
Chromium	11	35.4	17.0	29.2	31.6
Copper	16	747	321	504	495
Iron	16	27,000	16,500	21,700	21,800
Lead	16	135	68	93	93
Manganese	16	3,090	1,150	1,860	1,810
Nickel	12	16.8	10.8	14.0	14.5
Silver	15	4.7	<3.2	[1]3.0	[1]2.9
Zinc	16	1,230	761	1,010	1,010

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1987, 1989, 1991-1999, 2001-2004					
Arsenic	2	6	5	6	--
Cadmium	16	3.7	<.1	[1].8	[1]<.8
Chromium	10	27.9	16.4	21.6	20.9
Copper	16	16	3	11	12
Iron	16	21,400	13,100	17,500	17,400
Lead	16	16	<3	9	10
Manganese	16	724	126	381	372
Nickel	11	14.8	8.7	11.8	11.6
Silver	14	1.9	<.3	[1].5	[1]<.6
Zinc	16	58	23	43	46
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1991-2004					
Arsenic	2	22	19	21	--
Cadmium	15	7.3	2.3	4.1	3.9
Chromium	11	34.7	15.3	25.3	27.7
Copper	15	635	211	367	323
Iron	15	24,400	12,600	18,800	17,300
Lead	15	115	47	72	66
Manganese	15	2,270	671	1,230	1,130
Nickel	12	19.1	8.7	13.0	11.8
Silver	14	3.9	<1.9	[1]2.1	[1]1.9
Zinc	15	1,160	586	859	842
12340000--BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1987, 1991, 1993-1996, 1998-2001, 2003					
Arsenic	1	--	--	2	--
Cadmium	12	2.0	<.2	[1].7	[1]<1.0
Chromium	8	25.8	15.1	20.5	21.8
Copper	12	27	11	20	21
Iron	12	20,200	12,400	16,800	16,800
Lead	12	20	<13	[1]13	[1]12
Manganese	12	683	298	531	538
Nickel	9	14.3	9.4	11.9	12.5
Silver	12	1.0	<.3	[1].5	[1]<.6
Zinc	12	73	35	58	61

Table 22. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT.					
Period of record for fine-grained bed-sediment data: 1997-2004					
Arsenic	2	29	23	26	--
Cadmium	8	5.8	1.5	3.5	3.6
Chromium	7	30.6	19.0	25.7	28.5
Copper	8	543	166	337	304
Iron	8	24,300	18,100	20,600	20,500
Lead	8	78	37	56	57
Manganese	8	1,420	477	1,030	1,060
Nickel	8	15.8	11.8	13.5	13.1
Silver	7	2.9	.8	[1]2.0	[1]2.1
Zinc	8	1,090	438	724	706
12353000--CLARK FORK BELOW MISSOULA, MONT.[2]					
Period of record for fine-grained bed-sediment data: 1986, 1990-2004					
Arsenic	2	14	6	10	--
Cadmium	16	6.0	1.1	2.3	1.9
Chromium	11	27.6	12.3	21.4	21.5
Copper	16	293	69	150	140
Iron	16	21,100	13,100	18,100	18,600
Lead	16	58	12	36	36
Manganese	16	2,530	446	1,360	1,270
Nickel	12	14.1	8.4	12.0	12.5
Silver	15	3.0	.4	[1]1.3	[1]1.2
Zinc	16	675	239	396	395

[1]Value determined by substituting one-half of the minimum reporting level for censored (<) values when both uncensored and censored values were used to determine the mean and (or) median. When all data were less than the minimum reporting level, the median was determined by ranking the censored values by order of magnitude.

[2]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.

[Bulk bed sediment is material smaller than about 10 millimeters in diameter. Reported concentrations are in micrograms per gram dry weight. Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic or element not analyzed]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for bulk bed-sediment data: 1993-1995, 1997-2004					
Arsenic	2	148	60	104	--
Cadmium	11	30.2	4.2	12.9	8.5
Chromium	10	18.1	9.6	13.3	12.4
Copper	11	3,800	615	1,490	976
Iron	11	29,300	18,300	23,000	20,800
Lead	11	398	138	275	263
Manganese	11	5,480	504	1,850	1,620
Nickel	11	12.7	6.0	7.9	6.8
Silver	10	8.0	3.2	5.1	4.4
Zinc	11	5,930	1,720	3,170	2,270
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Period of record for bulk bed-sediment data: 1993, 1995-2004					
Arsenic	2	36	15	26	--
Cadmium	11	3.4	<.9	[1]1.3	[1]1.3
Chromium	10	11.8	5.2	8.6	9.2
Copper	11	111	9	46	32
Iron	11	13,200	6,100	9,580	9,600
Lead	11	33	<10	[1]15	[1]12
Manganese	11	2,100	209	974	830
Nickel	11	10.3	4.8	6.4	5.5
Silver	10	1.3	<.3	[1].7	[1].8
Zinc	11	303	93	157	131
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.					
Period of record for bulk bed-sediment data: 1995, 1997, 1999, 2002					
Arsenic	0	--	--	--	--
Cadmium	4	1.5	<.8	[1].8	[1].7
Chromium	4	12.0	7.4	10.2	10.7
Copper	4	238	127	193	204
Iron	4	12,700	8,010	10,200	9,960
Lead	4	38	18	29	29
Manganese	4	4,240	1,220	2,640	2,540
Nickel	4	8.5	5.7	7.2	7.4
Silver	4	1.3	<.8	[1].9	[1]1.0
Zinc	4	275	146	183	155

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323800--CLARK FORK NEAR GALEN, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	97	76	86	--
Cadmium	12	8.2	<.9	[1]4.0	[1]4.0
Chromium	11	23.7	4.2	14.9	15.0
Copper	12	902	223	483	475
Iron	12	31,300	9,930	20,000	20,000
Lead	12	158	41	80	79
Manganese	12	9,490	899	3,400	2,380
Nickel	12	15.2	4.9	8.6	8.0
Silver	11	5.2	.7	[1]2.1	[1]<3.2
Zinc	12	1,280	417	711	665
461415112450801--CLARK FORK BELOW LOST CREEK, NEAR GALEN, MONT.					
Period of record for bulk bed-sediment data: 1996-2004					
Arsenic	2	87	82	85	--
Cadmium	9	5.2	<.9	[1]2.6	[1]2.5
Chromium	8	17.5	6.8	11.6	11.5
Copper	9	763	238	417	398
Iron	9	21,000	12,300	16,700	17,300
Lead	9	104	41	70	71
Manganese	9	3,720	1,260	1,750	1,440
Nickel	9	8.4	4.2	6.4	6.7
Silver	8	2.8	.8	[1]1.7	[1]1.6
Zinc	9	787	339	516	522
461559112443301--CLARK FORK NEAR RACETRACK, MONT.					
Period of record for bulk bed-sediment data: 1996-2004					
Arsenic	2	90	46	68	--
Cadmium	9	10.5	<.9	[1]3.8	[1]2.7
Chromium	8	19.7	9.4	14.3	13.7
Copper	9	757	296	500	475
Iron	9	25,900	15,700	18,700	18,200
Lead	9	101	52	77	78
Manganese	9	4,170	759	1,720	1,500
Nickel	9	9.9	5.0	7.5	7.3
Silver	8	3.3	1.4	[1]2.4	[1]2.6
Zinc	9	997	472	661	626

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
461903112440701--CLARK FORK AT DEMPSEY CREEK DIVERSION, NEAR RACETRACK, MONT.					
Period of record for bulk bed-sediment data: 1996-2004					
Arsenic	2	82	18	50	--
Cadmium	9	9.2	.4	3.9	3.0
Chromium	8	21.1	11.5	16.5	16.8
Copper	9	1,000	128	506	577
Iron	9	25,400	15,800	20,900	20,900
Lead	9	115	47	78	88
Manganese	9	4,930	825	1,900	1,630
Nickel	9	12.8	4.2	8.1	7.9
Silver	8	4.4	<.8	[1]2.4	[1]2.5
Zinc	9	1,240	245	612	604
12324200--CLARK FORK AT DEER LODGE, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	84	37	60	--
Cadmium	12	8.3	1.0	[1]3.5	[1]2.5
Chromium	11	29.2	12.1	19.1	19.6
Copper	12	906	281	525	445
Iron	12	25,000	13,200	20,000	20,900
Lead	12	122	45	81	82
Manganese	12	3,560	607	1,380	1,040
Nickel	12	12.3	7.7	10.1	10.1
Silver	11	3.9	<.7	[1]2.0	[1]<3.2
Zinc	12	1,060	456	666	609
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for bulk bed-sediment data: 1994, 1998, 2001, 2004					
Arsenic	1	--	--	12	--
Cadmium	4	<1.5	.4	[1].6	[1].6
Chromium	4	33.2	14.7	25.2	26.4
Copper	4	20	12	16	16
Iron	4	21,000	15,600	18,400	18,500
Lead	4	19	12	16	16
Manganese	4	716	308	444	377
Nickel	4	15.2	8.6	11.8	11.7
Silver	3	<1.6	<.7	--	[1]<1.5
Zinc	4	86	65	76	77

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	16	15	16	--
Cadmium	12	7.6	.7	[1]3.1	[1]2.8
Chromium	11	33.2	10.2	21.0	21.1
Copper	12	858	135	395	280
Iron	12	24,900	11,600	17,900	18,100
Lead	12	92	26	59	55
Manganese	12	2,930	377	1,160	840
Nickel	12	15.9	6.9	11.0	10.4
Silver	11	3.7	<.7	[1]1.8	[1]1.5
Zinc	12	1,020	260	616	586
12331500--FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	80	30	55	--
Cadmium	12	3.8	<.2	[1]1.8	[1]1.6
Chromium	11	13.9	4.9	9.5	10.7
Copper	12	40	7	23	22
Iron	12	15,700	8,630	12,700	13,400
Lead	12	120	38	76	80
Manganese	12	3,200	1,150	2,250	2,350
Nickel	12	8.0	4.4	5.8	5.9
Silver	11	5.8	2.5	4.3	4.3
Zinc	12	429	170	275	279
12331800--CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	31	16	24	--
Cadmium	12	5.1	<1.6	[1]2.6	[1]2.1
Chromium	11	29.5	6.9	17.9	16.9
Copper	12	605	114	259	210
Iron	12	21,800	12,100	15,900	15,500
Lead	12	78	31	48	46
Manganese	12	3,280	409	1,140	964
Nickel	12	14.2	7.7	10.1	9.8
Silver	11	3.5	.5	[1]1.7	[1]<3.2
Zinc	12	939	381	576	506

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT.					
Period of record for bulk bed-sediment data: 1993-1999, 2001-2004					
Arsenic	2	4	1	2	--
Cadmium	11	3.0	<.1	[1].7	[1].5
Chromium	10	22.6	6.4	10.5	8.9
Copper	11	10	.6	[1]5	[1]5
Iron	11	14,800	5,290	8,560	7,410
Lead	11	12	1	[1]5	[1]5
Manganese	11	265	60	157	145
Nickel	11	10.2	3.6	5.8	5.1
Silver	10	<1.6	.1	[1].4	[1].4
Zinc	11	37	.3	17	17
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	18	9	14	--
Cadmium	12	5.5	.4	[1]2.3	[1]2.1
Chromium	11	23.8	6.9	15.0	15.5
Copper	12	336	75	186	184
Iron	12	19,100	9,270	13,300	13,000
Lead	12	67	21	38	37
Manganese	12	2,620	234	829	576
Nickel	12	14.0	6.4	9.1	8.6
Silver	11	2.9	<.3	[1]1.3	[1]1.2
Zinc	12	769	271	469	493
12340000--BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for bulk bed-sediment data: 1993, 1994, 1999-2001, 2003					
Arsenic	1	--	--	<.5	--
Cadmium	6	2.5	<.2	[1].9	[1]<1.5
Chromium	5	19.2	6.7	13.0	12.5
Copper	6	19	6	14	15
Iron	6	17,000	10,300	13,800	13,800
Lead	6	11	5	9	9
Manganese	6	650	179	340	316
Nickel	6	9.8	7.5	8.8	9.0
Silver	6	<1.9	<.4	[1].5	[1]<1.1
Zinc	6	58	23	38	35

Table 23. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 2004.—Continued

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT. Period of record for bulk bed-sediment data: 1997-2004					
Arsenic	2	17	4	10	--
Cadmium	8	5.2	<.8	[1]1.9	[1]1.2
Chromium	7	31.5	9.7	15.9	15.0
Copper	8	633	43	166	106
Iron	8	21,500	11,100	15,200	15,300
Lead	8	84	7	30	24
Manganese	8	1,170	228	647	570
Nickel	8	14.4	8.1	9.9	9.1
Silver	7	3.4	<.4	[1]1.2	[1]<1.7
Zinc	8	1,210	145	409	315
12353000--CLARK FORK BELOW MISSOULA, MONT.[2] Period of record for bulk bed-sediment data: 1993-2004					
Arsenic	2	6	1	4	--
Cadmium	12	3.0	<.2	[1].9	[1]<1.2
Chromium	11	13.2	4.4	8.2	7.4
Copper	12	77	9	38	31
Iron	12	18,700	5,830	9,730	8,840
Lead	12	23	5	[1]10	[1]8
Manganese	12	601	150	360	366
Nickel	12	12.0	3.5	5.9	5.2
Silver	11	<1.9	<.3	[1].5	[1].4
Zinc	12	183	39	111	111

[1]Value determined by arbitrarily substituting one-half of the minimum reporting level for censored (<) values when both uncensored and censored values were used in determining the mean and (or) median. When all data were less than the minimum reporting level, the median was determined by ranking the censored values in order of magnitude.

[2]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.

[Concentrations are in micrograms per gram dry weight. Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for single samples are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986-89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics for the *Hydropsyche morosa* group are based on the combined results for two or more species. Insects collected during 1986-98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for biological data: 1992, 1994, 1995, 1997-2004					
Brachycentrus spp.					
Arsenic	0	--	--	--	--
Cadmium	5	12.5	5.8	10.1	11.6
Chromium	5	5.9	.7	2.1	.9
Copper	5	846	235	587	592
Iron	5	1,190	335	617	469
Lead	5	21.5	7.4	13.7	13.8
Manganese	5	817	231	515	503
Nickel	5	2.1	<.1	[1]1.3	[1]1.6
Zinc	5	995	629	803	815
Hydropsyche cockerelli					
Arsenic	3	20.4	9.5	13.6	10.9
Cadmium	9	9.7	4.1	5.9	5.2
Chromium	9	8.0	1.0	3.1	1.9
Copper	9	1,090	269	458	373
Iron	9	2,660	689	1,310	1,070
Lead	9	47.2	19.0	25.7	21.0
Manganese	9	3,030	180	986	718
Nickel	9	3.6	.7	2.0	1.6
Zinc	9	1,590	749	967	871
Hydropsyche spp.					
Arsenic	4	23.1	10.7	17.8	18.7
Cadmium	9	10.9	4.6	7.1	5.7
Chromium	9	4.7	.6	2.1	1.5
Copper	9	930	312	617	472
Iron	9	2,290	1,050	1,780	1,880
Lead	9	50.8	21.8	37.5	36.5
Manganese	9	1,340	712	1,090	1,070
Nickel	9	2.5	.7	2.1	2.4
Zinc	9	1,290	834	1,090	1,090
Hydropsyche tana					
Arsenic	0	--	--	--	--
Cadmium	6	9.2	4.8	6.8	6.9
Chromium	6	11.5	.9	4.5	1.8
Copper	6	456	10.5	236	298
Iron	6	1,520	875	1,100	1,050
Lead	6	21.0	15.6	18.6	18.3
Manganese	6	969	307	634	675
Nickel	6	1.8	.7	1.4	1.6
Zinc	6	1,070	760	961	1,020

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Period of record for biological data: 1992-2004					
Hydropsyche cockerelli					
Arsenic	3	23.6	17.4	19.8	18.2
Cadmium	29	2.1	.2	.7	.6
Chromium	29	4.3	.4	1.0	.8
Copper	29	97.0	22.4	40.5	37.8
Iron	29	1,590	351	764	754
Lead	29	5.7	.3	3.0	2.8
Manganese	29	3,890	491	1,290	928
Nickel	29	1.8	.3	.9	.8
Zinc	29	276	115	179	169
Hydropsyche occidentalis					
Arsenic	3	31.0	25.6	27.8	26.8
Cadmium	18	1.6	.2	.6	.4
Chromium	18	6.8	.3	1.7	1.0
Copper	18	48.9	11.0	33.2	32.0
Iron	18	2,960	372	1,220	989
Lead	18	8.2	<1.7	[1]4.1	[1]3.7
Manganese	18	6,940	1,200	2,650	2,210
Nickel	18	2.7	.7	1.6	1.5
Zinc	18	220	141	182	182
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	4	2.3	.4	1.1	.9
Chromium	4	1.4	.5	1.0	1.2
Copper	4	47.6	34.9	40.9	40.6
Iron	4	773	561	680	693
Lead	4	5.1	1.9	3.9	4.7
Manganese	4	1,100	443	725	678
Nickel	4	1.9	<.4	[1].8	[1].5
Zinc	4	285	141	195	177
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.					
Period of record for biological data: 1995, 1997, 1999, 2002					
Arctopsyche grandis					
Arsenic	0	--	--	--	--
Cadmium	4	3.0	1.9	2.4	2.2
Chromium	4	2.9	.8	1.7	1.6
Copper	4	102	78.3	93.7	97.2
Iron	4	1,040	684	839	815
Lead	4	5.6	3.0	[1]4.3	[1]4.3
Manganese	4	3,560	1,340	2,250	2,040
Nickel	4	2.3	1.8	[1]2.1	[1]2.2
Zinc	4	222	181	196	190

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT.—Continued					
Period of record for biological data: 1995, 1997, 1999, 2002					
Hydropsyche occidentalis					
Arsenic	0	--	--	--	--
Cadmium	2	.8	.7	.8	--
Chromium	2	3.2	3.2	3.2	--
Copper	2	183	181	182	--
Iron	2	2,070	1,950	2,010	--
Lead	2	8.2	6.7	7.4	--
Manganese	2	2,480	2,400	2,440	--
Nickel	2	3.3	3.0	3.2	--
Zinc	2	172	166	169	--
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.1	.6	.9	--
Chromium	2	1.6	1.4	1.5	--
Copper	2	95.9	94.8	95.3	--
Iron	2	1,220	1,150	1,190	--
Lead	2	5.9	5.2	5.6	--
Manganese	2	3,390	956	2,170	--
Nickel	2	2.0	1.8	1.9	--
Zinc	2	129	125	127	--
12323800--CLARK FORK NEAR GALEN, MONT.					
Period of record for biological data: 1987, 1991-2004					
Hydropsyche cockerelli					
Arsenic	2	15.8	13.6	14.7	--
Cadmium	27	2.7	.7	1.5	1.5
Chromium	27	4.4	.8	1.8	1.6
Copper	27	181	48.7	98.9	97.5
Iron	27	2,460	816	1,390	1,340
Lead	27	11.7	1.2	7.5	7.6
Manganese	27	3,620	1,070	2,250	2,290
Nickel	27	3.1	.9	1.6	1.4
Zinc	27	299	136	211	211
Hydropsyche morosa group					
Arsenic	0	--	--	--	--
Cadmium	5	3.2	2.4	2.5	2.4
Chromium	5	4.6	1.8	2.6	2.2
Copper	5	185	156	173	175
Iron	5	1,890	1,360	1,510	1,430
Lead	5	12.4	7.1	8.5	7.9
Manganese	5	3,960	2,360	3,500	3,860
Nickel	5	3.6	1.9	2.3	2.1
Zinc	5	349	292	309	303

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323800--CLARK FORK NEAR GALEN, MONT.—Continued					
Period of record for biological data: 1987, 1991-2004					
Hydropsyche occidentalis					
Arsenic	3	16.5	15.9	16.1	16.1
Cadmium	35	1.7	.6	1.1	1.0
Chromium	35	6.6	.4	2.0	1.5
Copper	35	121	49.2	82.0	80.8
Iron	35	1,920	642	1,260	1,200
Lead	35	13.5	1.6	7.0	6.5
Manganese	35	6,170	1,220	2,560	2,240
Nickel	35	3.5	.8	1.6	1.5
Zinc	35	286	168	199	191
Hydropsyche tana					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.5	--
Chromium	1	--	--	1.4	--
Copper	1	--	--	92.9	--
Iron	1	--	--	1,340	--
Lead	1	--	--	9.0	--
Manganese	1	--	--	2,160	--
Nickel	1	--	--	2.1	--
Zinc	1	--	--	206	--
Hydropsyche spp.					
Arsenic	2	15.7	14.5	15.1	--
Cadmium	6	3.5	.8	2.3	2.8
Chromium	2	2.4	2.2	2.3	--
Copper	6	154	78.4	126	143
Iron	6	1,540	1,190	1,360	1,360
Lead	6	13.5	5.9	10.4	10.9
Manganese	2	4,760	4,400	4,580	--
Nickel	2	1.8	1.5	1.6	--
Zinc	6	329	218	280	291
461415112450801--CLARK FORK BELOW LOST CREEK, NEAR GALEN, MONT.					
Period of record for biological data: 1996-2004					
Claassenia sabulosa					
Arsenic	1	--	--	1.5	--
Cadmium	2	.4	.3	.4	--
Chromium	2	1.9	.4	1.2	--
Copper	2	70.1	67.1	68.6	--
Iron	2	209	189	199	--
Lead	2	1.2	.7	1.0	--
Manganese	2	238	90.4	164	--
Nickel	2	.2	<.2	[1].1	--
Zinc	2	245	208	226	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461415112450801--CLARK FORK BELOW LOST CREEK, NEAR GALEN, MONT.—Continued					
Period of record for biological data: 1996-2004					
Hydropsyche cockerelli					
Arsenic	5	11.8	11.2	11.6	11.6
Cadmium	16	2.8	1.1	1.8	1.6
Chromium	16	2.7	.8	1.9	2.0
Copper	16	147	48.8	106	97.8
Iron	16	2,570	691	1,290	1,130
Lead	16	15.2	4.5	9.9	9.0
Manganese	16	3,160	1,230	1,810	1,630
Nickel	16	1.9	.9	1.2	1.1
Zinc	16	321	151	215	223
Hydropsyche occidentalis					
Arsenic	3	15.6	12.7	13.7	12.9
Cadmium	17	1.8	.9	1.3	1.3
Chromium	17	3.3	1.2	2.0	1.8
Copper	17	157	52.1	103	107
Iron	17	1,920	963	1,380	1,360
Lead	17	12.4	6.6	9.5	9.5
Manganese	17	3,870	1,220	2,250	2,150
Nickel	17	1.7	.9	1.3	1.4
Zinc	17	283	174	227	236
Hydropsyche spp.					
Arsenic	1	--	--	12.0	--
Cadmium	5	1.8	1.2	1.5	1.4
Chromium	5	2.4	.9	1.5	1.5
Copper	5	122	45.1	91.8	103
Iron	5	1,410	533	1,110	1,200
Lead	5	20.5	4.1	10.0	8.7
Manganese	5	1,980	799	1,440	1,230
Nickel	5	2.8	1.0	1.6	1.4
Zinc	5	225	143	179	179
461559112443301--CLARK FORK NEAR RACETRACK, MONT.					
Period of record for biological data: 1996-2004					
Claassenia sabulosa					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	.4	--
Chromium	1	--	--	.3	--
Copper	1	--	--	40.3	--
Iron	1	--	--	113	--
Lead	1	--	--	.8	--
Manganese	1	--	--	172	--
Nickel	1	--	--	.2	--
Zinc	1	--	--	213	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461559112443301--CLARK FORK NEAR RACETRACK, MONT.—Continued					
Period of record for biological data: 1996-2004					
Hydropsyche cockerelli					
Arsenic	3	14.3	11.5	12.5	11.7
Cadmium	14	1.9	.8	1.4	1.3
Chromium	14	2.7	.6	1.6	1.3
Copper	14	109	50.0	78.6	78.4
Iron	14	1,370	657	949	926
Lead	14	10.5	3.7	6.6	6.1
Manganese	14	2,020	646	1,430	1,550
Nickel	14	1.4	.7	1.0	.9
Zinc	14	199	139	173	172
Hydropsyche occidentalis					
Arsenic	2	14.3	13.7	14.0	--
Cadmium	15	2.2	.7	1.4	1.4
Chromium	15	3.7	1.1	2.1	2.0
Copper	15	160	59.5	107	107
Iron	15	1,880	1,030	1,510	1,520
Lead	15	11.7	4.3	9.6	10.1
Manganese	15	3,770	1,090	2,070	2,050
Nickel	15	1.9	1.1	1.3	1.3
Zinc	15	255	181	225	220
Hydropsyche spp.					
Arsenic	1	--	--	11.9	--
Cadmium	3	2.4	1.0	1.6	1.5
Chromium	3	1.7	.7	1.2	1.1
Copper	3	113	82.9	93.7	85.2
Iron	3	1,290	1,140	1,210	1,200
Lead	3	9.6	5.7	7.5	7.4
Manganese	3	1,600	910	1,210	1,130
Nickel	3	1.4	1.1	1.3	1.3
Zinc	3	208	151	180	181
461903112440701--CLARK FORK AT DEMPSEY CREEK DIVERSION, NEAR RACETRACK, MONT.					
Period of record for biological data: 1996-2004					
Arctopsyche grandis					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.7	--
Chromium	1	--	--	<2.4	--
Copper	1	--	--	30.8	--
Iron	1	--	--	340	--
Lead	1	--	--	<14.5	--
Manganese	1	--	--	510	--
Nickel	1	--	--	1.0	--
Zinc	1	--	--	87	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461903112440701--CLARK FORK AT DEMPSEY CREEK DIVERSION, NEAR RACETRACK, MONT.—Continued					
Period of record for biological data: 1996-2004					
Hydropsyche cockerelli					
Arsenic	3	18.8	9.2	12.6	9.7
Cadmium	12	1.6	.7	1.2	1.3
Chromium	12	4.0	.4	1.3	1.0
Copper	12	190	60.7	91.1	78.1
Iron	12	2,310	552	934	794
Lead	12	17.7	3.5	6.5	4.7
Manganese	12	2,070	487	1,170	1,160
Nickel	12	1.9	.5	1.0	.7
Zinc	12	275	162	193	180
Hydropsyche occidentalis					
Arsenic	1	--	--	24.0	--
Cadmium	18	1.8	.7	1.2	1.1
Chromium	18	6.2	.8	2.1	1.8
Copper	18	238	74.9	103	88.3
Iron	18	3,390	940	1,520	1,500
Lead	18	21.8	6.1	11.6	11.4
Manganese	18	3,990	826	2,420	2,280
Nickel	18	2.4	1.2	1.5	1.4
Zinc	18	355	222	252	236
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.7	1.6	1.6	--
Chromium	2	2.1	1.4	1.8	--
Copper	2	140	104	122	--
Iron	2	1,610	1,070	1,340	--
Lead	2	13.2	10.5	11.8	--
Manganese	2	1,150	638	892	--
Nickel	2	1.6	1.6	1.6	--
Zinc	2	212	191	202	--
12324200--CLARK FORK AT DEER LODGE, MONT.					
Period of record for biological data: 1986, 1987, 1990-2004					
Arctopsyche grandis					
Arsenic	0	--	--	--	--
Cadmium	2	2.4	<4.2	[1]2.2	--
Chromium	2	1.0	<1.3	[1].8	--
Copper	2	69.1	34.9	52.0	--
Iron	2	676	537	606	--
Lead	2	<7.8	3.8	[1]3.8	--
Manganese	2	727	380	554	--
Nickel	2	<1.7	<1.3	[1]--	--
Zinc	2	178	140	159	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324200--CLARK FORK AT DEER LODGE, MONT.—Continued					
Period of record for biological data: 1986, 1987, 1990-2004					
Hydropsyche cockerelli					
Arsenic	3	10.1	5.8	7.3	6.1
Cadmium	26	2.3	.6	1.3	1.3
Chromium	26	3.2	.4	1.6	1.6
Copper	26	136	54.7	93.1	92.5
Iron	26	3,340	490	1,100	1,040
Lead	26	18.2	3.8	9.2	8.9
Manganese	26	1,490	396	838	747
Nickel	26	2.4	.3	1.1	1.0
Zinc	26	391	132	186	184
Hydropsyche occidentalis					
Arsenic	3	12.4	6.6	10.1	11.3
Cadmium	40	2.7	.6	1.3	1.2
Chromium	40	3.6	.6	1.9	1.9
Copper	40	162	49.4	112	110
Iron	40	2,060	557	1,400	1,420
Lead	40	18.6	3.5	10.9	10.8
Manganese	40	2,850	649	1,680	1,720
Nickel	40	12.9	1.0	1.8	1.4
Zinc	40	329	166	237	230
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	3	2.6	2.0	2.4	2.5
Chromium	0	--	--	--	--
Copper	3	222	175	191	177
Iron	3	2,220	1,850	2,010	1,950
Lead	3	16.7	15.0	16.1	16.7
Manganese	0	--	--	--	--
Nickel	0	--	--	--	--
Zinc	3	298	197	257	276
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for biological data: 1987, 1994, 1998, 2001, 2004					
Arctopsyche grandis					
Arsenic	3	4.2	3.2	3.6	3.3
Cadmium	18	.7	.2	.4	.4
Chromium	18	1.6	.6	.9	.8
Copper	18	14.2	9.0	11.9	11.9
Iron	18	716	177	419	414
Lead	18	1.3	.5	.8	.8
Manganese	18	1,140	318	733	719
Nickel	18	1.4	.4	.8	.8
Zinc	18	214	113	162	160

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.—Continued					
Period of record for biological data: 1987, 1994, 1998, 2001, 2004					
Claassenia sabulosa					
Arsenic	1	--	--	1.3	--
Cadmium	8	.5	.1	.2	.2
Chromium	8	.9	.3	.6	.7
Copper	8	37.2	20.0	30.4	30.9
Iron	8	319	98.4	178	178
Lead	8	<.8	<.1	[1].4	[1].3
Manganese	8	149	46.7	75.9	62.1
Nickel	8	.7	.4	.5	.5
Zinc	8	271	172	211	206
Hydropsyche cockerelli					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	.6	--
Chromium	1	--	--	1.6	--
Copper	1	--	--	28.4	--
Iron	1	--	--	478	--
Lead	1	--	--	3.6	--
Manganese	1	--	--	399	--
Nickel	1	--	--	1.2	--
Zinc	1	--	--	123	--
Hydropsyche occidentalis					
Arsenic	0	--	--	--	--
Cadmium	2	<.7	.3	[1].3	--
Chromium	2	2.3	1.3	1.8	--
Copper	2	15.2	15.1	15.2	--
Iron	2	1,340	426	883	--
Lead	2	2.3	<3.7	[1]2.1	--
Manganese	2	554	434	494	--
Nickel	2	1.1	.8	.9	--
Zinc	2	137	110	124	--
Hydropsyche spp.					
Arsenic	1	--	--	3.7	--
Cadmium	1	--	--	<.2	--
Chromium	1	--	--	1.8	--
Copper	1	--	--	11.1	--
Iron	1	--	--	1,000	--
Lead	1	--	--	<2.4	--
Manganese	1	--	--	1,200	--
Nickel	1	--	--	.9	--
Zinc	1	--	--	151	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK, MONT.					
Period of record for biological data: 1992-2004					
Arctopsyche grandis					
Arsenic	9	6.4	2.2	4.8	5.9
Cadmium	38	6.6	.6	2.1	1.9
Chromium	38	3.3	.4	1.4	1.1
Copper	38	129	19.9	45.8	39.7
Iron	38	2,360	275	732	586
Lead	38	10.9	1.1	3.8	3.5
Manganese	38	1,580	592	855	812
Nickel	38	1.8	.2	.8	.7
Zinc	38	326	149	203	186
Claassenia sabulosa					
Arsenic	6	1.6	.7	1.2	1.2
Cadmium	26	3.5	.1	1.1	.7
Chromium	26	1.6	.2	.6	.5
Copper	26	81.7	33.0	56.7	56.3
Iron	26	567	63.0	194	190
Lead	26	1.8	.4	.9	1.0
Manganese	26	320	50.6	139	108
Nickel	26	.7	.1	.3	.3
Zinc	26	351	166	263	260
Hydropsyche cockerelli					
Arsenic	6	6.1	4.1	5.4	5.8
Cadmium	25	2.6	.5	1.3	1.2
Chromium	25	4.7	.5	2.1	2.0
Copper	25	188	17.1	70.7	55.5
Iron	25	3,250	522	1,180	954
Lead	25	16.2	2.4	6.9	5.4
Manganese	25	1,670	538	897	902
Nickel	25	2.3	.3	1.2	1.2
Zinc	25	249	106	183	186
Hydropsyche morosa group					
Arsenic	0	--	--	--	--
Cadmium	4	1.7	1.1	1.4	1.4
Chromium	4	1.4	1.3	1.4	1.4
Copper	4	72.9	43.8	60.5	62.7
Iron	4	1,320	612	1,050	1,130
Lead	4	6.9	2.4	4.6	4.6
Manganese	4	1,030	538	804	822
Nickel	4	1.4	.9	1.2	1.2
Zinc	4	190	137	167	170

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK, MONT.—Continued					
Period of record for biological data: 1992-2004					
Hydropsyche occidentalis					
Arsenic	2	5.8	4.7	5.3	--
Cadmium	17	1.7	.4	1.2	1.3
Chromium	17	3.9	.4	1.6	1.7
Copper	17	156	26.4	63.1	58.3
Iron	17	2,720	466	1,130	1,040
Lead	17	15.7	2.9	7.1	6.0
Manganese	17	2,210	530	1,200	1,030
Nickel	17	2.5	.8	1.2	1.1
Zinc	17	277	97	194	192
12331500--FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for biological data: 1986, 1992-2004					
Arctopsyche grandis					
Arsenic	6	9.0	2.8	5.6	5.4
Cadmium	45	.8	.1	.3	.3
Chromium	45	7.1	.3	2.0	1.7
Copper	45	22.2	8.9	14.9	15.2
Iron	45	2,460	412	1,320	1,300
Lead	45	17.5	3.7	8.6	7.8
Manganese	45	3,160	424	1,560	1,440
Nickel	45	2.7	.3	1.3	1.3
Zinc	45	275	93.3	197	192
Hydropsyche cockerelli					
Arsenic	3	17.1	6.4	13.5	16.8
Cadmium	14	.9	.1	.4	.3
Chromium	14	9.1	.9	2.8	1.9
Copper	14	28.3	9.5	17.8	18.1
Iron	14	4,400	996	2,390	2,100
Lead	14	28.4	3.1	15.1	16.2
Manganese	14	3,020	401	1,650	1,330
Nickel	14	4.0	.7	2.1	2.2
Zinc	14	224	85.3	178	185
Hydropsyche occidentalis					
Arsenic	1	--	--	6.1	--
Cadmium	8	1.1	.2	.6	.6
Chromium	8	17.6	.7	4.2	2.1
Copper	8	27.3	11.5	19.3	18.0
Iron	8	2,990	912	1,840	1,780
Lead	8	29.8	5.8	18.2	19.3
Manganese	8	4,790	1,400	2,410	1,910
Nickel	8	6.9	.8	3.0	2.4
Zinc	8	243	128	183	185

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331500--FLINT CREEK NEAR DRUMMOND, MONT.—Continued					
Period of record for biological data: 1986, 1992-2004					
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	<.3	--
Chromium	1	--	--	1.4	--
Copper	1	--	--	12.5	--
Iron	1	--	--	1,440	--
Lead	1	--	--	4.5	--
Manganese	1	--	--	1,320	--
Nickel	1	--	--	1.3	--
Zinc	1	--	--	130	--
Hydropsyche tana					
Arsenic	0	--	--	--	--
Cadmium	2	<1.2	<.1	[1]--	--
Chromium	2	10.3	.6	5.4	--
Copper	2	16.0	5.4	10.7	--
Iron	2	1,320	729	1,020	--
Lead	2	15.3	5.0	10.2	--
Manganese	2	1,400	1,180	1,290	--
Nickel	2	3.1	.5	1.8	--
Zinc	2	139	107	123	--
12331800--CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for biological data: 1986, 1991-2004					
Arctopsyche grandis					
Arsenic	6	3.6	2.4	2.9	2.9
Cadmium	38	3.8	.4	1.4	1.2
Chromium	38	2.5	.2	1.0	1.0
Copper	38	89.2	16.9	32.9	28.0
Iron	38	1,660	240	586	529
Lead	38	11.8	2.1	4.5	3.9
Manganese	38	2,010	462	860	737
Nickel	38	1.9	.2	.7	.6
Zinc	38	308	140	191	188
Claassenia sabulosa					
Arsenic	4	1.3	.7	1.0	1.0
Cadmium	40	2.8	.1	1.1	1.0
Chromium	40	3.3	.1	.7	.5
Copper	40	165	18.0	63.9	53.8
Iron	40	387	45.4	160	135
Lead	40	2.9	.2	.9	.8
Manganese	40	410	33.1	162	140
Nickel	40	1.1	.1	.3	.2
Zinc	40	567	103	273	253

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331800--CLARK FORK NEAR DRUMMOND, MONT.—Continued					
Period of record for biological data: 1986, 1991-2004					
Hydropsyche cockerelli					
Arsenic	5	4.5	3.9	4.2	4.1
Cadmium	34	2.3	.3	1.1	.8
Chromium	34	3.5	.4	1.6	1.5
Copper	34	156	30.0	58.0	47.7
Iron	34	2,500	506	1,150	940
Lead	34	15.0	5.1	8.3	7.5
Manganese	34	1,680	549	982	914
Nickel	34	2.0	.5	1.1	1.0
Zinc	34	248	134	192	187
Hydropsyche morosa group					
Arsenic	0	--	--	--	--
Cadmium	6	1.3	1.1	1.2	1.2
Chromium	6	2.8	1.9	2.3	2.2
Copper	6	57.4	50.2	55.2	55.8
Iron	6	1,730	1,370	1,570	1,600
Lead	6	10.8	7.0	8.9	9.0
Manganese	6	1,940	1,260	1,610	1,610
Nickel	6	1.7	1.3	1.5	1.5
Zinc	6	250	227	239	240
Hydropsyche occidentalis					
Arsenic	3	4.5	4.3	4.4	4.3
Cadmium	19	2.0	.4	1.0	1.0
Chromium	19	8.1	.4	2.3	2.2
Copper	19	118	13.3	53.9	53.1
Iron	19	2,060	424	1,270	1,190
Lead	19	14.0	2.9	9.0	9.1
Manganese	19	2,920	619	1,550	1,220
Nickel	19	2.4	.5	1.4	1.3
Zinc	19	293	157	222	223
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	2.6	--
Chromium	0	--	--	--	--
Copper	1	--	--	85.0	--
Iron	1	--	--	913	--
Lead	1	--	--	9.1	--
Manganese	0	--	--	--	--
Nickel	0	--	--	--	--
Zinc	1	--	--	260	--

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT.					
Period of record for biological data: 1987, 1991-99, 2001-04					
Arctopsyche grandis					
Arsenic	6	2.5	1.9	2.2	2.1
Cadmium	44	.4	<.1	[1].2	[1].2
Chromium	44	2.9	.4	1.1	1.0
Copper	44	15.7	4.7	8.6	8.4
Iron	44	1,090	191	582	527
Lead	44	1.1	<.1	[1].4	[1].4
Manganese	44	454	113	250	239
Nickel	44	1.8	.2	.9	.9
Zinc	44	189	83.9	127	130
Claassenia sabulosa					
Arsenic	3	1.1	1.0	1.0	1.1
Cadmium	22	.3	<.1	[1].2	[1].1
Chromium	22	1.8	.1	.6	.5
Copper	22	40.7	18.1	28.3	27.9
Iron	22	129	49.8	93.7	102
Lead	22	1.0	.1	.4	.3
Manganese	22	76.3	15.7	36.0	34.6
Nickel	22	.9	.1	.3	.3
Zinc	22	264	139	193	187
Hydropsyche cockerelli					
Arsenic	1	--	--	2.4	--
Cadmium	4	.3	<.2	[1].2	[1]<.2
Chromium	4	1.0	.3	.8	.9
Copper	4	13.1	6.0	8.5	7.4
Iron	4	825	485	604	553
Lead	4	<1.1	.4	[1].5	[1]<1.1
Manganese	4	266	192	231	233
Nickel	4	1.0	.4	.6	.6
Zinc	4	98.8	82.2	90.8	91.0
Hydropsyche occidentalis					
Arsenic	1	--	--	2.2	--
Cadmium	5	.4	<.3	[1].2	[1].1
Chromium	5	2.4	.9	1.6	1.6
Copper	5	17.6	5.1	10.6	10.2
Iron	5	973	520	709	652
Lead	5	6.0	1.2	3.0	1.8
Manganese	5	295	169	242	262
Nickel	5	1.7	.6	1.2	1.4
Zinc	5	144	99.2	116	117

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT.—Continued					
Period of record for biological data: 1987, 1991-99, 2001-04					
Hydropsyche spp.					
Arsenic	1	--	--	.7	--
Cadmium	4	.3	<.5	[1].2	[1].2
Chromium	4	2.1	1.1	1.6	1.7
Copper	4	16.2	6.1	12.2	13.3
Iron	4	1,140	789	949	932
Lead	4	<4.9	<1.8	[1]--	[1]<2.9
Manganese	4	462	299	394	407
Nickel	4	1.3	.8	1.1	1.1
Zinc	4	135	112	123	121
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for biological data: 1986, 1991-2004					
Arctopsyche grandis					
Arsenic	8	5.0	4.0	4.4	4.4
Cadmium	50	2.7	.3	1.1	.8
Chromium	50	4.1	.5	1.6	1.4
Copper	50	125	20.1	37.7	29.3
Iron	50	2,870	372	941	789
Lead	50	13.2	1.6	4.3	3.5
Manganese	50	902	324	633	637
Nickel	50	2.7	.4	1.1	.9
Zinc	50	276	111	197	196
Claassenia sabulosa					
Arsenic	4	1.2	.8	1.0	.9
Cadmium	30	2.5	.1	1.0	.7
Chromium	30	2.0	.2	.7	.6
Copper	30	79.2	37.5	55.9	52.5
Iron	30	181	58.6	104	101
Lead	30	1.6	.2	.6	.6
Manganese	30	174	37.2	79.9	69.7
Nickel	30	.6	.1	.2	.2
Zinc	30	283	144	221	226
Hydropsyche cockerelli					
Arsenic	5	5.1	3.7	4.3	4.1
Cadmium	33	1.8	.3	.8	.7
Chromium	33	8.0	.2	1.9	1.6
Copper	33	118	26.4	47.3	42.3
Iron	33	2,530	566	1,200	1,080
Lead	33	12.1	2.2	5.2	4.9
Manganese	33	805	426	608	581
Nickel	33	2.6	.6	1.2	1.2
Zinc	33	228	119	183	182

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.—Continued					
Period of record for biological data: 1986, 1991-2004					
Hydropsyche morosa group					
Arsenic	0	--	--	--	--
Cadmium	2	1.3	1.1	1.2	--
Chromium	2	4.6	2.4	3.5	--
Copper	2	84.1	26.8	55.4	--
Iron	2	1,800	986	1,390	--
Lead	2	6.6	<7.8	[1]5.2	--
Manganese	2	1,320	537	928	--
Nickel	2	1.7	1.3	1.5	--
Zinc	2	231	171	201	--
Hydropsyche occidentalis					
Arsenic	3	4.1	3.6	3.9	4.0
Cadmium	23	1.8	.3	.8	.8
Chromium	23	3.2	.6	1.8	1.6
Copper	23	102	27.4	47.9	41.8
Iron	23	2,310	472	1,180	1,050
Lead	23	14.2	3.0	6.4	5.4
Manganese	23	1,600	454	828	728
Nickel	23	3.2	.6	1.2	1.1
Zinc	23	416	145	208	200
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.3	--
Chromium	1	--	--	2.4	--
Copper	1	--	--	84.1	--
Iron	1	--	--	1,800	--
Lead	1	--	--	<7.8	--
Manganese	1	--	--	537	--
Nickel	1	--	--	1.3	--
Zinc	1	--	--	171	--
12340000--BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for biological data: 1986, 1987, 1991, 1993,1996, 1998, 2000, 2003					
Arctopsyche grandis					
Arsenic	1	--	--	2.8	--
Cadmium	11	.4	<.1	[1].2	[1].2
Chromium	6	1.8	.8	1.2	1.2
Copper	11	13.4	9.9	12.0	12.0
Iron	11	1,230	108	606	617
Lead	11	2.3	.5	1.0	.6
Manganese	6	517	286	404	393
Nickel	6	1.2	.7	.9	.9
Zinc	11	143	123	135	136

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340000--BLACKFOOT RIVER NEAR BONNER, MONT.—Continued					
Period of record for biological data: 1986, 1987, 1991, 1993, 1996, 1998, 2000, 2003					
Claassenia sabulosa					
Arsenic	0	--	--	--	--
Cadmium	11	.2	.1	.1	.1
Chromium	6	.9	.3	.5	.5
Copper	11	88.5	19.0	45.2	44.0
Iron	11	158	46.2	100	99.0
Lead	11	.6	.4	.5	.6
Manganese	6	127	26.3	57.1	44.7
Nickel	6	.3	.1	.2	.2
Zinc	11	329	117	209	194
Hydropsyche occidentalis					
Arsenic	1	--	--	3.2	--
Cadmium	13	.5	.1	.2	.2
Chromium	13	2.7	.8	1.8	1.7
Copper	13	20.6	12.0	14.4	14.4
Iron	13	1,930	1,060	1,410	1,470
Lead	13	1.9	.8	1.3	1.3
Manganese	13	577	414	480	466
Nickel	13	1.8	.9	1.3	1.2
Zinc	13	150	116	135	130
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	.6	--
Chromium	1	--	--	1.6	--
Copper	1	--	--	13.9	--
Iron	1	--	--	1,140	--
Lead	1	--	--	2.9	--
Manganese	1	--	--	525	--
Nickel	1	--	--	2.8	--
Zinc	1	--	--	132	--
12340500--CLARK FORK ABOVE MISSOULA, MONT.					
Period of record for biological data: 1997-2004					
Arctopsyche grandis					
Arsenic	6	4.5	3.1	3.8	3.8
Cadmium	25	1.8	.1	.7	.6
Chromium	25	3.4	.6	1.6	1.4
Copper	25	77.6	19.5	34.6	30.2
Iron	25	2,340	476	1,020	908
Lead	25	6.8	1.2	3.9	3.8
Manganese	25	1,410	476	926	924
Nickel	25	2.0	.5	1.1	1.0
Zinc	25	260	133	188	192

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT.—Continued					
Period of record for biological data: 1997-2004					
Claassenia sabulosa					
Arsenic	2	1.1	.7	.9	--
Cadmium	11	2.0	.2	.7	.4
Chromium	11	1.1	.3	.7	.7
Copper	11	71.7	33.0	48.9	46.0
Iron	11	402	95.3	247	246
Lead	11	3.1	.5	1.3	1.2
Manganese	11	683	75.2	261	270
Nickel	11	<.4	<.3	[1].4	[1].4
Zinc	11	363	191	268	250
Hydropsyche cockerelli					
Arsenic	4	6.5	5.2	5.9	5.9
Cadmium	13	1.3	.4	.8	.8
Chromium	13	6.0	1.8	3.1	3.1
Copper	13	96.1	29.9	57.2	56.3
Iron	13	3,590	1,400	2,100	2,040
Lead	13	10.0	4.2	6.7	6.0
Manganese	13	1,890	781	1,210	1,170
Nickel	13	2.4	1.4	1.8	1.6
Zinc	13	237	156	199	207
Hydropsyche occidentalis					
Arsenic	2	6.2	6.1	6.2	--
Cadmium	8	1.1	.4	.7	.6
Chromium	8	5.5	2.1	3.4	3.0
Copper	8	76.5	30.3	51.4	52.9
Iron	8	2,400	1,450	2,060	2,220
Lead	8	10.2	4.0	6.8	6.6
Manganese	8	2,450	939	1,840	1,950
Nickel	8	2.4	1.6	2.0	2.2
Zinc	8	257	192	227	230
12353000--CLARK FORK BELOW MISSOULA, MONT.[2]					
Period of record for biological data: 1986, 1990-2004					
Arctopsyche grandis					
Arsenic	4	2.6	2.1	2.4	2.4
Cadmium	29	1.5	.2	.6	.6
Chromium	29	2.7	.5	1.3	1.4
Copper	29	38.0	9.4	21.1	19.2
Iron	29	1,590	343	797	682
Lead	29	3.9	.9	1.9	1.7
Manganese	29	1,090	511	707	692
Nickel	29	1.6	.4	.9	.9
Zinc	29	217	106	152	148

Table 24. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2004.—Continued

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12353000--CLARK FORK BELOW MISSOULA, MONT.[2]—Continued					
Period of record for biological data: 1986, 1990-2004					
Claassenia sabulosa					
Arsenic	3	1.1	.8	.9	.8
Cadmium	42	1.3	.1	.5	.4
Chromium	42	1.2	<.1	.5	.5
Copper	42	75.1	31.1	48.8	47.0
Iron	42	239	66.6	114	108
Lead	42	1.3	.1	.4	.3
Manganese	42	275	48.9	107	99
Nickel	42	.3	.1	.2	.2
Zinc	42	324	146	218	211
Hydropsyche cockerelli					
Arsenic	8	2.9	2.2	2.5	2.4
Cadmium	46	1.1	.2	.5	.5
Chromium	46	3.4	.3	1.7	1.7
Copper	46	54.1	12.4	30.4	29.5
Iron	46	2,220	584	1,290	1,270
Lead	46	6.6	1.2	2.5	2.4
Manganese	46	1,210	353	768	690
Nickel	46	1.9	.5	1.2	1.3
Zinc	46	187	77.4	144	151
Hydropsyche occidentalis					
Arsenic	1	--	--	2.5	--
Cadmium	17	1.1	.1	.4	.3
Chromium	17	3.5	.1	1.4	1.5
Copper	17	38.2	13.5	23.8	20.9
Iron	17	1,420	482	941	907
Lead	17	4.2	.7	2.1	1.9
Manganese	17	1,460	491	841	812
Nickel	17	2.2	.5	1.0	.9
Zinc	17	193	112	143	144
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	.5	--
Chromium	1	--	--	.8	--
Copper	1	--	--	20.8	--
Iron	1	--	--	894	--
Lead	1	--	--	1.1	--
Manganese	1	--	--	756	--
Nickel	1	--	--	1.1	--
Zinc	1	--	--	124	--

[1]Values determined by substituting one-half of the minimum reporting level for censored (<) values when both uncensored and censored values were used in determining the mean and median. When all data were less than the minimum reporting level, the median was determined by ranking the censored values in order of detection. No mean is reported when all values were below the minimum reporting level.

[2]Samples collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.