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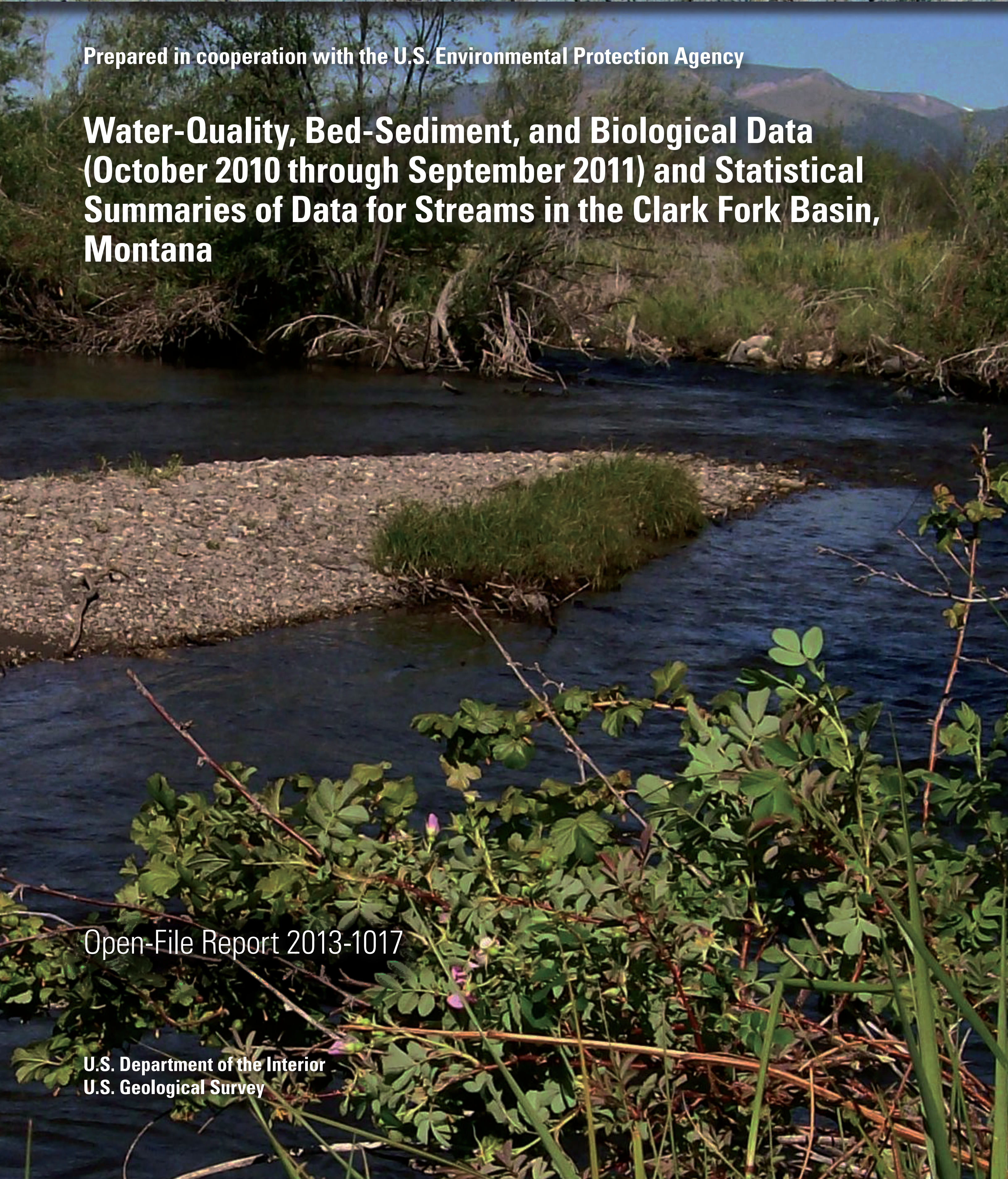
Water-Quality, Bed-Sediment, and Biological Data (October 2010 through September 2011) and Statistical Summaries of Data for Streams in the Clark Fork Basin, Montana



Open-File Report 2013-1017

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Banner: Metal salts on the surface of tailings deposit near Silver Bow at Opportunity (12323600) gage (photograph by Kent A. Dodge, U.S. Geological Survey, taken May 2012).

Cover: Looking upstream at the confluence of Silver Bow Creek and Warm Springs Creek, which form the Clark Fork near Warm Springs, Montana (photograph by Kent A. Dodge, U.S. Geological Survey, taken May 2012).

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

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U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
SALLY JEWELL, Secretary

U.S. Geological Survey
Suzette M. Kimball, Acting Director

U.S. Geological Survey, Reston, Virginia: 2013

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

Multiply	By	To obtain
acre-foot (acre-ft)	1,233	cubic meter (m^3)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
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 (ppm)	1	microgram per gram (µg/g)
square mile (mi^2)	2.59	square kilometer (km^2)
ton	907.2	kilogram
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:

$$°F = (1.8 \times °C) + 32$$

Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Water-year definition:

Water year is the 12-month period from October 1 through September 30 of the following calendar year. The water year is designated by the calendar year in which it ends. For example, water year 2011 is the period from October 1, 2010, through September 30, 2011.

Abbreviated water-quality units used in this report:

µg/g	microgram per gram
µg/L	microgram per liter
µg/mL	microgram per milliliter
µm	micrometer
µS/cm	microsiemens per centimeter at 25 degrees Celsius
mg/L	milligrams per liter
mm	millimeter
ppm	part per million

Acronyms used in the report:

FNU	formazin nephelometric units
ICP–AES	inductively coupled plasma–atomic emission spectrometry
ICP–MS	inductively coupled plasma–mass spectrometry
LRL	laboratory reporting level
LT–MDL	long-term method detection level
MRL	minimum reporting level
NTRU	nephelometric turbidity ratio unit
NWQL	USGS National Water Quality Laboratory, Denver, Colo.
PTFE	polytetrafluoroethylene
RSD	relative standard deviation
spp.	species
SRM	standard reference material
USGS	U.S. Geological Survey
YSI	Yellow Springs Instruments Company

Water-Quality, Bed-Sediment, and Biological Data (October 2010 through September 2011) and Statistical Summaries of Data for Streams in the Clark Fork Basin, Montana

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

Abstract

Water, bed sediment, and biota were sampled in streams from Butte to near Missoula, Montana, as part of a monitoring program in the upper Clark Fork basin of western Montana; additional water samples were collected from near Galen to near Missoula at select sites as part of a supplemental sampling program. The sampling program was conducted by the U.S. Geological Survey in cooperation with the U.S. Environmental Protection Agency to characterize aquatic resources in the Clark Fork basin, with emphasis on trace elements associated with historic mining and smelting activities. Sampling sites were located on the Clark Fork and selected tributaries. Water samples were collected periodically at 20 sites from October 2010 through September 2011. Bed-sediment and biota samples were collected once at 14 sites during August 2011.

This report presents the analytical results and quality-assurance data for water-quality, bed-sediment, and biota samples collected at sites from October 2010 through September 2011. Water-quality data include concentrations of selected major ions, trace elements, and suspended sediment. Turbidity was analyzed for water samples collected at the four sites where seasonal daily values of turbidity were being determined. Daily values of suspended-sediment concentration and suspended-sediment discharge were determined for four sites. Bed-sediment data include trace-element concentrations in the fine-grained fraction. Biological data include trace-element concentrations in whole-body tissue of aquatic benthic insects. Statistical summaries of water-quality, bed-sediment, and biological data for sites in the upper Clark Fork basin are provided for the period of record since 1985.

Introduction

The Clark Fork originates near the town of Warm Springs in western Montana at the confluence of Silver Bow and Warm Springs Creeks (fig. 1). Along the 148-mile (mi) reach of stream from Silver Bow Creek in Butte to the Clark Fork near Missoula, six major tributaries enter: Blacktail Creek, Warm Springs Creek, Little Blackfoot River, Flint Creek, Rock Creek, and Blackfoot River. Principal surface-water uses in the 6,000-square-mile (mi^2) upper Clark Fork basin above Missoula include irrigation, stock watering, small-scale industry, and habitat for trout fisheries. Primary current land uses 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 100 years but are now either discontinued or substantially reduced in scale.

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 the 1860s to the 1980s (U.S. Environmental Protection Agency, 2004). Moderate- and small-scale mining also occurred in the basins of most of the major tributaries to the upper Clark Fork. Tailings produced during past mineral processing commonly contain large quantities of trace elements such as arsenic, cadmium, copper, lead, and zinc. Eroded tailings mix with stream sediment and get deposited further downstream in stream channels, on flood plains, in the Warm Springs Ponds, and at the location of the former Milltown Reservoir (Milltown Dam was removed on March 28, 2008) (Andrews, 1987), especially during times of increased flow. The occurrence of elevated trace-element concentrations in water and bed sediment can pose a potential risk to aquatic biota and human health (U.S. Environmental Protection Agency, 2004).

Concern about the potential toxicity of trace elements to aquatic biota and human health has resulted in a comprehensive effort by State, Federal, Tribal, and private entities to characterize the aquatic resources in the upper Clark Fork basin in order to guide and monitor remedial cleanup activities. A long-term database 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 through 1991; Lambing and others, 1994, 1995; Dodge and others, 1996 through 2010, 2012). Trace-element data for bed sediment and biota (aquatic benthic insects) have been collected intermittently at selected sites since 1986 as part of studies on the contamination of bed-sediment quality and bioaccumulation of metals conducted by the USGS National Research Program (Axtmann and Luoma, 1991; Cain and others, 1992, 1995; Axtmann and others, 1997; Hornberger and others, 1997). In March 1993, an expanded monitoring program for water, bed sediment, and biota in the upper basin was implemented by the USGS in cooperation with the U.S. Environmental Protection Agency to systematically quantify the seasonal and annual variability in selected constituents.

The purpose of this report is to present water-quality data from samples collected at 20 sites and bed-sediment and biological data from samples collected at 14 sites in the Clark Fork basin from October 2010 through September 2011. Quality-assurance data are presented for water-quality, bed-sediment, and biota samples collected during the same time period. Statistical summaries also are provided for water-quality, bed-sediment, and biological data collected at the sites since 1985.

Sampling Locations and Types of Data

Sampling sites for the monitoring program in the upper Clark Fork basin from Butte to near Missoula (fig. 1) are located on the Clark Fork main stem (including Silver Bow Creek), three major tributaries (Blacktail Creek, Warm Springs 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 type of data are listed in table 1. Main-stem 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 the former 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 main stem. 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, Mont. Water-quality samples were collected periodically at 20 sites. Daily suspended-sediment samples were collected at 4 sites, and daily turbidity values were computed using data collected by continuous turbidity monitors at 4 sites. Bed-sediment and biological samples were collected once annually at 14 sites. Continuous streamflow data were collected at 19 sites.

Properties measured onsite and constituents for which water, bed-sediment, and biota samples were analyzed are listed in table 2. Data-quality objectives for analyses of water samples are listed in table 3. Results of onsite measurements of stream properties; laboratory analyses of water-quality, bed-sediment, and biota samples; and quality-assurance data for water year 2011 are listed in tables 4 through 24 at the back of the report. Statistical summaries of water-quality, bed-sediment, and biological data collected between March 1985 and September 2011 are listed in tables 25 through 27 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. Routine water samples for the monitoring program were collected at 20 sites in the upper Clark Fork basin 6–8 times per year on a schedule designed to describe seasonal and hydrologic variability. Supplemental water samples were collected 4 additional times at 7 sites. At the 4 daily suspended-sediment sites, suspended-sediment samples were collected by an observer 1–11 times per week, depending on season and flow conditions. Continuous turbidity monitors operated seasonally (April or May to September 2011) at 4 sites near Anaconda collected turbidity values every 15 minutes that were used to compute daily turbidity values (table 1).

Methods

Water samples were collected and composited from vertical transits throughout the entire stream depth at multiple locations across the stream by using depth- and width-integration methods described by Ward and Harr (1990), Edwards and Glysson (1999), and the U.S. Geological Survey (variously dated). These methods provide a vertically and laterally discharge-weighted composite sample that is intended to be representative of the entire flow passing through the cross section of a stream. Samplers consisted of depth-integrating water-quality samplers (Davis, 2005) that were constructed of plastic or coated with a nonmetallic rubber-coating paint and equipped with nylon or polytetrafluoroethylene (PTFE) nozzles.

Instantaneous streamflow was determined at the time of water sampling either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982). Daily mean streamflow values during ice periods were estimated

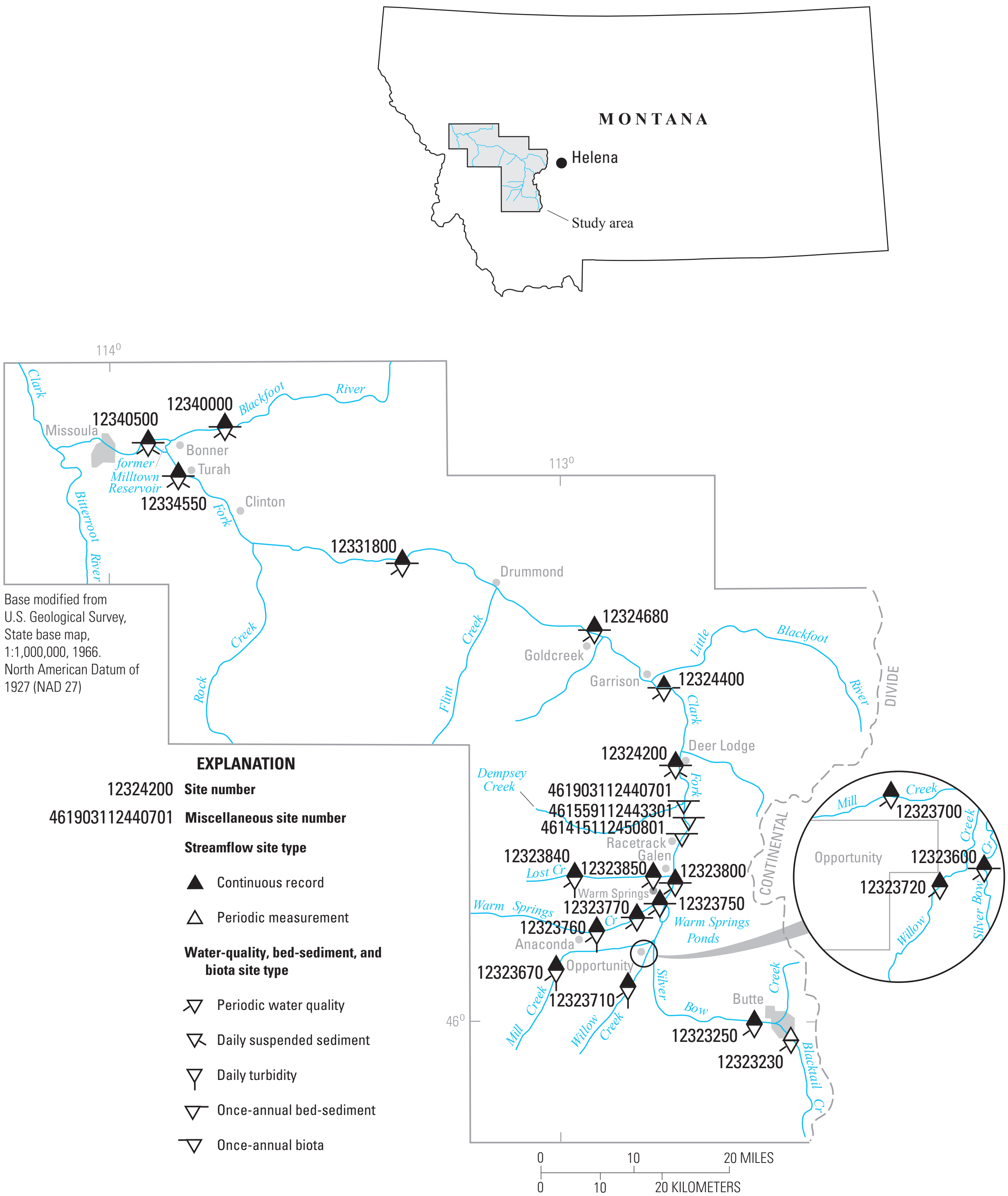

Figure 1. Location of study area in the Clark Fork basin, Montana.

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

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

Station number (fig. 1)	Station name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Daily turbidity (seasonal)	Fine-grained bed sediment[2]	Bulk bed sediment[2,3]	Biota[2]
12323230	Blacktail Creek at Harrison Avenue, at Butte	--	03/93–08/95, 12/96–08/03, 12/04–P	--	--	--	--	--
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, D	--	07/92–P	08/93–08/95, 08/97–08/04, D	07/92, 08/94–08/95, 08/97–P
12323670	Mill Creek near Anaconda	10/04–P	12/04–P	--	06/06–P	--	--	--
12323700	Mill Creek at Opportunity	04/03–P	03/03–P	--	--	--	--	--
12323710	Willow Creek near Anaconda	03/05–P	12/04–P	--	06/06–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, D	--	07/92–P	08/93, 08/95–08/04, D	07/92–P
12323760	Warm Springs Creek near Anaconda	10/97–P	10/05–P	--	05/06–P	--	--	--
12323770	Warm Springs Creek at Warm Springs	10/83–P	03/93–P	--	--	08/95, 08/97, 08/99, 08/02, 08/05, 08/08, 08/11	08/95, 08/97, 08/99, 08/02, D	08/95, 08/97, 08/99, 08/02, 08/05, 08/08, 08/11
12323800	Clark Fork near Galen	07/88–P	07/88–P	--	--	08/87, 08/91–P	08/93–08/04, D	08/87, 08/91–P
12323840	Lost Creek near Anaconda	10/04–P	12/04–P	--	05/06–P	--	--	--
12323850	Lost Creek near Galen	04/03–P	03/03–P	--	--	--	--	--
461415112450801	Clark Fork below Lost Creek, near Galen	--	--	--	--	08/96–P	08/96–08/04, D	08/96–P
461559112443301	Clark Fork at county bridge, near Racetrack	--	--	--	--	08/96–P	08/96–08/04, D	08/96–P
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	--	--	--	--	08/96–P	08/96–08/04, D	08/96–P

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

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

Station number (fig. 1)	Station name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Daily turbidity (seasonal)	Fine-grained bed sediment[2]	Bulk bed sediment[2,3]	Biota[2]
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	08/93–08/04, D	08/86–08/87, 08/90–P
12324400	Clark Fork above Little Blackfoot River, near Garrison	02/09–P	03/09–P	--	--	08/09–P	--	08/09–P
12324680	Clark Fork at Goldcreek	10/77–P	03/93–P	--	--	07/92–P	08/93–08/04, D	07/92–P
12331800	Clark Fork near Drummond	04/93–P	03/93–P	--	--	08/86, 08/87, 08/91–P	08/93–08/04, D	08/86, 08/91–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	08/93–08/04, D	08/86, 08/91–P
12340000	Blackfoot River near Bonner	10/39–P	03/85–P	07/86–04/87, 06/88–09/95, 10/05–P	--	08/86–08/87, 08/91, 08/93–08/96, 08/98-08/01, 09/03, 08/06–P	08/93, 08/94, 08/99–01, 09/03, D	08/86–08/87, 08/91, 08/93, 08/96, 08/98, 09/00, 09/03, 08/06–P
12340500	Clark Fork above Missoula	03/29–P	07/86–P[4]	07/86–04/87, 06/88–01/96, 03/96–03/03, 08/03–P	04/07–09/07	08/97–P	08/97–08/04, D	08/97–P

[1]Onsite measurements of physical properties and laboratory analyses for selected major ions, trace elements, and suspended sediment. Prior to March 1993, laboratory analyses included only trace elements and suspended sediment.

[2]Laboratory analyses for trace elements.

[3]Bulk bed-sediment sampling was discontinued in 2005.

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

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

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

Table 3. Data-quality objectives for analyses of water samples collected in the 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 replicate analyses (percent)	Maximum deviation of spike recovery (percent)
Calcium, filtered	0.02 mg/L	20	--
Magnesium, filtered	.008 mg/L	20	--
Arsenic, filtered	.02 µg/L	20	25
Arsenic, unfiltered recoverable	.09 µg/L	20	25
Cadmium, filtered	.02 µg/L	20	25
Cadmium, unfiltered recoverable	.05 µg/L	20	25
Copper, filtered	.50 µg/L	20	25
Copper, unfiltered recoverable	.70 µg/L	20	25
Iron, filtered	3 µg/L	20	25
Iron, unfiltered recoverable	5 µg/L	20	25
Lead, filtered	.01 µg/L	20	25
Lead, unfiltered recoverable	.04 µg/L	20	25
Manganese, filtered	.1 µg/L	20	25
Manganese, unfiltered recoverable	.4 µg/L	20	25
Zinc, filtered	1.4 µg/L	20	25
Zinc, unfiltered recoverable	2.4 µg/L	20	25
Sediment, suspended, percent finer than 0.062 mm	1 percent	20	--
Sediment, suspended	1 mg/L	20	--

because backwater affected the stage-discharge relation. Onsite measurements of pH, specific conductance, and water temperature were made during collection of periodic water samples. Onsite sample processing, including filtration and preservation, was performed according to procedures described by Ward and Harr (1990), Horowitz and others (1994), and the U.S. Geological Survey (variously dated).

Composite 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 past reports from this project. Filtered [0.45-micrometer (µm) pore size] and unfiltered recoverable concentrations of the trace elements (arsenic, cadmium, copper, iron, lead, manganese, and zinc) and filtered concentrations of calcium and magnesium were measured by the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. Concentrations of calcium and magnesium were used in the calculation of water hardness.

Filtered concentrations of arsenic, cadmium, copper, lead, manganese, and zinc were measured using inductively coupled plasma-mass spectrometry (ICP–MS) (Faires, 1993; Garbarino and others, 2006). Filtered concentrations of calcium, magnesium, and iron were measured using inductively coupled plasma-atomic emission spectrometry (ICP–AES) (Fishman, 1993). Unfiltered recoverable concentrations of trace elements were measured in unfiltered samples that were first digested with dilute hydrochloric acid (Hoffman and others, 1996). For cadmium, iron, lead, and manganese, the digested samples were analyzed by ICP–MS as described by Garbarino and Struzeski (1998). For arsenic, copper, and zinc, the digested samples were analyzed by ICP–MS as described by Garbarino and others (2006).

Water samples for analysis of suspended-sediment also were collected from multiple vertical transits when periodic water samples were collected. These samples were analyzed for suspended-sediment concentration and the percentage of suspended-sediment mass finer than 0.062-millimeter (mm) diameter (silt size and smaller) by the USGS Montana Water Science Center sediment laboratory (hereinafter referred to as the Montana Sediment Laboratory) in Helena, Mont., according to methods described by Guy (1969) and Dodge and Lambing (2006).

Suspended-sediment samples for the four daily suspended-sediment sites (table 1) were collected by local contract observers using the depth-integration method at a single vertical transit near midstream. The samples were analyzed for suspended-sediment concentration and used to calculate daily mean suspended-sediment concentrations according to methods described by Porterfield (1972).

Suspended-sediment discharge is determined according to the following equation (Porterfield, 1972):

$$Q_s = Q_w \times C_s \times k, \tag{1}$$

where

Q_s is suspended-sediment discharge, in tons per day;

Q_w is streamflow, in cubic feet per second;

C_s is suspended-sediment concentration, in milligrams per liter; and

k is a units-conversion constant (0.0027) to convert instantaneous suspended-sediment discharge to an equivalent daily suspended-sediment discharge.

Turbidity data were measured using continuous turbidity monitors [Yellow Springs Instruments Company (YSI) 6136 turbidity sensor] at four tributary sites in the upper Clark Fork basin near Anaconda (table 1). The monitors were installed in May–June 2006 to provide supporting information on runoff conditions in an area where remediation activities are being conducted. They are operated seasonally, generally from early spring (after ice breakup) to early fall (before stream freeze-up). Turbidity values are recorded at 15-minute intervals and can be viewed in real-time on the Web at *http://waterdata.usgs.gov/mt/nwis/current?type=quality*. Continuous recordings enable the determination of the minimum and maximum values for each day as well as a daily mean turbidity, which is based on the average of all values in a 24-hour period. Procedures for the operation of continuous turbidity monitors and for daily record computations are described by Wagner and others (2006).

Results

Water-quality data from samples collected periodically during water year 2011 are listed in table 4. Daily mean streamflow, daily mean suspended-sediment concentration, and daily suspended-sediment discharge for water year 2011 at the four daily suspended-sediment sites are listed in tables 5 through 8 along with monthly summary statistics and annual totals for streamflow and suspended-sediment discharge. Daily maximum, minimum, and mean turbidity at four sites are listed in tables 9 through 12 along with monthly summary statistics.

Quality Assurance

Quality-assurance procedures used for the collection and field processing of water samples are described by Ward and Harr (1990), Horowitz and others (1994), Edwards and Glysson (1999), Lambing (2006), and the U.S. Geological Survey (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 Montana Sediment Laboratory are described by

Dodge and Lambing (2006). Standard procedures used for the calibration, measurement, and quality assurance of turbidity monitors are described by Anderson (2005).

The quality of analytical results reported for water samples was evaluated using 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 that provided 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 samples. Therefore, the total number of quality-control samples represented about 15 percent of the total number of water samples.

In addition to the use of quality-control samples submitted from the field, internal quality-assurance practices are performed systematically by the NWQL to provide quality control of analytical procedures (D.L. Stevenson, U.S. Geological Survey, written commun., 2012). These internal practices include analyses of quality-control samples such as calibration standard samples, standard reference water samples, replicate samples, deionized-water blank samples, or spiked samples at a proportion equivalent to at least 10 percent of the sample load. The NWQL participates in a blind-sample program in which 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 (*http://bqs.usgs.gov*). The laboratory also participates in external evaluation studies and audits with the National Environmental Laboratory Accreditation Program, the U.S. Environmental Protection Agency, Environment Canada, and the USGS Branch of Quality Systems, to assess analytical performance.

Replicate data can be collected 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 collected in the field (field replicate) either by 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 precision (laboratory replicate).

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

Precision of analytical results for laboratory replicates, which exclude field sources of variability, was determined using two independent chemical analyses of aliquots from a single sample selected from the group of samples constituting 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 sample collection and processing. Laboratory replicates are not obtainable for suspended-sediment samples because the samples are consumed during the analysis.

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 sample for a targeted analyte, it is important to determine whether such effects are causing biased (consistently high or low) results. Deionized-water blank samples and aliquots of stream samples were spiked in the laboratory with known amounts of the same trace elements for which water samples were being analyzed. 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 substantial bias to reported trace-element concentrations for stream samples.

Deionized-water blank samples were submitted for every field trip and analyzed to identify the presence and magnitude of contamination that could potentially bias analytical results. The 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 in the field through the sampling equipment used to collect stream samples. These blanks then are 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 stream samples in order 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 initiated in 1993. The objectives identify the 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 were used to evaluate whether sampling and analytical procedures produced 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 (LRLs) 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 LRLs. These values are reevaluated each year and, consequently, can change from year to year. The methods used to determine the LRLs are designed to limit the likelihood of a 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 the LRL and that pass identification criteria are reported as estimated concentrations. 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 in concentrations between replicate analyses for several sets of samples. These replicate analyses may consist either of individual analyses of a pair of samples considered to be essentially identical (field replicates) or of 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):

$$S = \sqrt{\frac{\sum d^2}{2k}}\,, \tag{2}$$

where

- S is the standard deviation of the difference in concentration between replicate analyses;
- d is the difference in concentration between each pair of replicate analyses; and
- k is the 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 the comparison of precision among individual constituents. The *RSD* is calculated according to the following equation (Taylor, 1987):

$$RSD = \frac{S}{\bar{x}} \times 100\,, \tag{3}$$

where

- RSD is the relative standard deviation;
- S is the standard deviation; and
- $\bar{x}$ is the mean concentration for all replicate analyses.

Paired analyses of field replicates are listed in table 13. The overall precision for each constituent estimated from analyses of field replicates, which include both field and laboratory sources of variability, is listed in table 14. The data-quality objective used to indicate acceptable precision of results for field replicates was a maximum *RSD* of 20 percent (table 3). Precision estimates for the analytical results of field replicates were within the 20-percent *RSD* limit for all constituents (table 14).

The precision for each constituent estimated from laboratory replicate analyses, which include only laboratory sources of variability, is listed in table 15. Statistics for the precision of analytical results for laboratory replicates are calculated by using unrounded values stored in laboratory data files. The data-quality objective used to indicate acceptable precision of results for laboratory replicates was a maximum *RSD* of 20 percent (table 3). Precision estimates for the laboratory replicates were within the 20-percent *RSD* limit for all constituents (table 15). No adjustments were made to analytical data on the basis of replicate analyses precision.

Recovery efficiency for analyses of constituents is determined by comparison of a 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 sample 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 4:

$$R = \frac{D}{C} \times 100\,, \tag{4}$$

where

- R is the spike recovery, in percent;
- D is the difference between the spiked and unspiked sample concentrations; and
- C is the concentration of material used to spike the sample.

If the spike recovery of a trace element was outside a range of 75 to 125 percent, the instrument was recalibrated and the entire sample set and all spiked samples were reanalyzed for that particular trace element until recoveries were improved to the extent possible. Recovery efficiency for individual trace elements in laboratory-spiked deionized-water blank samples and in laboratory-spiked stream samples is listed in tables 16 and 17, respectively. The mean spike recovery for deionized-water blank samples spiked with trace elements (table 16) ranged from 93.9 to 111 percent. The 95-percent confidence intervals (Taylor, 1987) for the mean spike recovery for each constituent for which deionized-water blank samples were analyzed (table 16) did not exceed a 25-percent deviation from an expected 100-percent recovery, except for filtered iron (89.3–132 percent), which was caused by one sample with a 138 percent recovery. When the data from this one sample is removed from the data set, filtered iron falls within the data-quality objective limit (88.9–119 percent) for the 95-percent confidence interval. The mean spike recovery for spiked stream samples (table 17) ranged from 86.7 to 108 percent. The 95-percent confidence intervals for the mean spike recovery for each constituent for which stream water samples were analyzed (table 17) did not exceed a 25-percent deviation from an expected 100-percent recovery. No adjustments were made to analytical data on the basis of the mean spike recovery.

High or low bias is indicated if the 95-percent confidence interval does not include 100-percent recovery, thereby indicating a consistent deviation or bias, either high or low. Confidence intervals for percent recovery include 100 percent for all laboratory-spiked deionized-water blank samples (table 16) except for filtered arsenic (102–109 percent), unfiltered arsenic (90.2–99.3 percent), unfiltered cadmium (92.4–99.0 percent), and unfiltered copper (91.6–96.2 percent). Confidence intervals for percent recovery include 100 percent for all laboratory-spiked stream samples (table 17) except for filter arsenic (101–111 percent), unfiltered arsenic (90.5–99.0 percent), unfiltered cadmium (91.5–96.3 percent), unfiltered copper (85.4–91.2 percent), unfiltered lead (94.5–98.4 percent), unfiltered manganese (88.3–94.2 percent), and unfiltered zinc (80.7–92.7). Because the mean spike recoveries for all constituents of laboratory-spiked stream samples met data-quality objectives (less than a 25-percent deviation from 100-percent recovery), no adjustments were made to analytical results for stream samples on the basis of spike recoveries.

Analytical results for field blanks are listed in table 18. 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 contamination. If detectable concentrations of trace elements in field blanks were equal to or greater than twice the LRL, the concentrations were noted during data review. Analytical results from the field blank collected as part of the subsequent sample set were evaluated for evidence of a consistent trend that could indicate systematic contamination. Sporadic, infrequent exceedances of twice the LRL probably represented random contamination or instrument calibration error that was not persistent in the process and was not likely to cause positive bias in a long-term record of analytical results. However, if concentrations for a particular constituent exceeded twice the LRL in field blanks from two consecutive field trips, additional blank samples were collected from individual components of the processing sequence and were submitted for analysis to identify the source of contamination.

Trace-element concentrations in field blanks (table 18) were almost always less than the LRL. Two concentrations of filtered calcium [0.03 and 0.02 milligrams per liter (mg/L)] were equal to or exceeded the LRL of 0.02 mg/L; one concentration of filtered cadmium [0.06 micrograms per liter (µg/L)] exceeded the LRL of 0.02 µg/L; one concentration of filtered copper (0.61 µg/L) exceeded the LRL of 0.50 µg/L; two concentrations of filtered lead (both 0.02 µg/L) exceeded the LRL of 0.01 µg/L; one concentration of unfiltered lead (0.05 µg/L) exceeded the LRL of 0.04 µg/L; two concentrations of filtered manganese (both 0.3 µg/L) exceeded the LRL of 0.1 µg/L; and two concentrations of filtered zinc (1.9 and 1.6 µg/L) exceeded the LRL of 1.4 µg/L. Because no trends were indicated in subsequent sampling trips or follow-up office equipment blanks, no adjustments were made to water-quality sample results on the basis of these detections.

Bed-Sediment Data

Bed-sediment data for the long-term monitoring program in the Clark Fork basin consist of trace-element concentrations in the fine-grained (less than 0.063 mm) fraction of bed-sediment samples. Collection of bulk bed sediment (fine-grained plus coarse-grained fractions) was discontinued in 2005; therefore, no bulk bed-sediment analytical results or statistical summaries are presented in this report. Bed-sediment samples are collected once annually at 14 sites (fig. 1 and table 1) during low, stable flow conditions at about the same time of year as previous samples (typically August), to facilitate data comparisons among years. Warm Springs Creek at Warm Springs is sampled once every 3 years rather than once annually.

Methods

Fine-grained bed-sediment samples were collected in August 2011 using protocols described by Axtmann and Luoma (1991). Samples were collected from the surfaces of streambed deposits in areas near the edge of the stream using an acid-washed polypropylene scoop. Whenever possible, samples were collected from both sides of the stream.

Individual samples of bed sediment were collected by scooping material from the surfaces of three to five randomly selected deposits along pools 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 0.063-mm polyester-mesh sieve using ambient stream water. The fraction of bed sediment in each composite sample that was finer than 0.063

mm was collected in an acid-washed 500-milliliter (mL) polyethylene bottle and transported to the laboratory on ice.

Bed-sediment samples were processed and analyzed at the USGS National Research Program Ecology and Contaminants Project laboratory in Menlo Park, Calif. Bed-sediment samples were oven-dried at 60°C and ground into smaller particle sizes using an acid-washed, ceramic mortar and pestle. Single aliquots of approximately 0.5–0.6 grams (g) of sediment from each of the three composite bed-sediment samples were digested using a hot, concentrated, nitric acid reflux according to methods described by Luoma and Bryan (1981). Lab replicates were analyzed by taking an aliquot from one of the three sieved replicate samples at each station. After a 2-week digestion period, 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 were then filtered through a 0.45-µm pore-size filter by using a syringe and in-line disposable filter cartridge. The filtrate was diluted to a 1:10 ratio with 0.6N hydrochloric acid. These final solutions were analyzed for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc by using inductively coupled plasma-atomic emission spectrometry (ICP–AES). The smallest concentration of a constituent that can be reliably reported for analyses of bed sediment is termed the minimum reporting level (MRL).

Results

Concentrations of trace elements measured in samples of fine-grained bed sediment collected during August 2011 are listed in table 19. Liquid-phase concentrations, in micrograms per milliliter (µg/mL) (which is equivalent to parts per million; ppm), that were analyzed in the reconstituted aliquots of digested bed sediment were converted to solid-phase concentrations, in micrograms per gram (µg/g), by using the following equation:

$$\mu g/g = \frac{\left(\mu g/mL\right)\left(volume\ of\ digested\ sample,\ in\ mL\right)}{\left(dry\ weight\ of\ sample,\ in\ grams\right)\left(dilution\ ratio\right)}. \quad (5)$$

The reported solid-phase concentrations (table 19) are the means of all analyses for replicate aliquots from each composite bed-sediment 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, MRLs for some trace elements might differ among stations and among years.

Quality Assurance

The USGS protocols for field collection and processing of bed-sediment samples are designed to prevent contamination from metal sources. Non-metallic sampling and processing equipment (white plastic scoop, funnel-frame apparatus, and 500-mL sample bottles) were acid-washed and rinsed with deionized water prior to the collection of the first sample. Polyester-mesh sieves were washed in laboratory-grade detergent and rinsed with deionized water. All equipment received a final rinse onsite with native stream water. Sampling equipment used at more than one site was rinsed thoroughly between sites with native 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 (EllenV. Axtmann, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference materials (SRMs) and procedural blanks. Sixteen procedural blanks, a set of ten low-concentration SRMs, and a set of ten high-concentration SRMs were analyzed.

Standard reference materials 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 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 listed in table 20. 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 similar to those occurring in the bed sediment in 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 (table 20) illustrate analytical performance. For copper, iron, manganese, nickel, and zinc, mean SRM recoveries for the low concentration standard (SRM 2709a) ranged from 85.7 to 98.1 percent of the certified concentrations. Mean recoveries for cadmium and chromium were 70.7 and 77.8 percent, respectively; and for arsenic and lead 54.0 and 54.4 percent, respectively. The small range of variation (less than 9 percent) in the 95-percent confidence interval indicates good reproducibility of multiple analyses of SRM 2709a. For arsenic, cadmium, copper, iron, lead, manganese, nickel, and zinc, mean SRM recoveries for the high concentration standard (SRM 2711a) ranged from 82.6 to

104 percent of the certified concentrations. Mean recovery for chromium is 75.3 percent for SRM 2711a. The small range of variation (less than 10 percent) for the 95-percent confidence interval indicates good reproducibility of multiple analyses of SRM 2711a. 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 reconstitute 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 21) are reported as a liquid-phase concentration, in micrograms per milliliter. A procedural blank was prepared and analyzed concurrently with bed-sediment samples for each site. Concentrations of trace elements in all procedural blanks were less than the MRL indicating no contamination bias, so no adjustments to the data were necessary.

Biological Data

Biological data for the long-term monitoring program in the Clark Fork basin consist of analyses of trace-element concentrations in the whole-body tissue of aquatic benthic insects. Insect samples are collected once annually at the same 14 sites and on the same dates as bed-sediment samples (fig. 1 and table 1), allowing for a direct comparison of biological data with bed-sediment data among the years. Warm Springs Creek at Warm Springs is sampled once every 3 years rather than once annually.

Methods

Insect samples were collected using protocols described in Hornberger and others (1997). Benthic insects at immature stages were collected with a large nylon-mesh kick net. A single riffle at each site 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* (*Hydropsyche cockerelli* and *Hydropsyche occidentalis)* were targeted for collection in this study because of their occurrence at most sites. *Hydropsyche* species (spp.) that could not be positively identified were categorized as *Hydropsyche* spp. or *Hydropsyche morosa* group (in previous reports). When *Hydropsyche* could not be found, another caddisfly, *Rhyacophila* spp., was collected (specifically, at Clark Fork below Lost Creek, near Galen). The caddisfly *Arctopsyche grandis* and the stoneflies *Claassenia sabulosa* and *Hesperoperla* spp. were collected where available to represent additional insect taxa that are commonly distributed in the Clark Fork basin. In addition, specimens from the caddisfly group *Brachycentrus* spp. were collected in previous years 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 in a small amount of ambient stream water on dry ice within 30 minutes of collection. Between 1986 and 1998, macroinvertebrate containers were kept on ice to allow the insects to evacuate their gut contents (depurate) for a period of 6 to 8 hours. Excess water was drained and insects were frozen for transport to the laboratory. Since 1999, samples were immediately frozen on dry ice in the field to reduce the possibility of metal loss through intracellular breakdown during depuration. A comparison of immediately frozen to depurated samples showed that although no substantial difference occurred for most metals, concentrations of copper were about 20 percent lower in the depurated samples than in the samples that were immediately frozen. The data were not adjusted for this difference.

Insect samples were processed and analyzed at the USGS National Research Program Ecology and Contaminants Project laboratory in Menlo Park, Calif. Insects were thawed and rinsed with ultrapure deionized water to remove particulate matter and then sorted to their lowest possible taxonomic level. If large numbers of specimens were 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 pore-size filter, and analyzed undiluted by ICP–AES for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc. The smallest concentration of a constituent that can be reliably reported for analyses of biota is termed the MRL.

Results

Concentrations of trace elements in whole-body tissue of aquatic insects collected during August 2011 are listed in table 22. 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, in µg/mL, analyzed in the reconstituted samples were converted to solid-phase concentrations, in µg/g, by using equation 5. All tissue samples were analyzed undiluted (dilution ratio 1:1). As with MRLs for trace elements in bed sediment, MRLs for trace elements in insects may differ among sites as a result of varied sample weights. In general, the smaller the biological-sample weight (primarily a function of insect abundance), the higher the MRL. Therefore, higher MRLs 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. Nonmetallic nets, sampling equipment, and processing equipment were used in all sample collection. Equipment was acid-washed and rinsed in ultrapure deionized water prior to the first sample collection. Nets and equipment were thoroughly rinsed in ambient stream water at each 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 (Hornberger and others, 1997).

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 12 replicates of the tissue SRM (lobster hepatopancreas) and 14 procedural blanks (one at each site). Quality-control samples were analyzed in a proportion equivalent to about 20 percent of the total number of biota samples.

Recovery efficiency for trace-element analyses of the SRM for biota is listed in table 23. 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 71.6 to 129 percent for all constituents. The small range of variation (less than 7 percent) for the 95-percent confidence interval indicates good reproducibility of multiple analyses of TORT-2 for arsenic, cadmium, copper, iron, manganese, nickel, and zinc. However, chromium and lead had a slightly higher variation (13 percent or less). The mean SRM recovery and small range of variation for the 95-percent confidence interval represent a reasonable range of recoveries. No adjustments were made to trace-element concentrations in biota samples on the basis of recovery efficiencies.

Procedural blanks for biota consisted of undiluted aliquots of the same reagents used to digest and reconstitute tissue of aquatic insects. Analytical results of procedural blanks for biota (table 24) are reported as a liquid-phase concentration, in µg/mL. 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 MRL; therefore, no adjustments to the data were necessary.

Statistical Summaries of Data

Statistical summaries of long-term water-quality, bed-sediment, and biological data for the Clark Fork basin are listed in tables 25 through 27 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 25) are based on results of cross-section samples collected periodically by the USGS for the long-term monitoring program in the Clark Fork basin during the period of record for each site. The summaries do not include data for supplemental samples collected at selected sites that targeted high-flow conditions or maintenance drawdowns of Milltown Reservoir, which might disproportionately skew the long-term statistics relative to the other sites in the network. Statistical summaries of bed-sediment (table 26) and biological data (table 27) 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. Sampling of bulk bed sediment has been discontinued; therefore, a statistical summary is not presented. Statistical summaries are not presented for discontinued sites.

Statistics for bed-sediment data (table 26) are based on the mean trace-element concentrations determined for each year from the mean of the 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 27) 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 number for other trace elements because sampling for arsenic began in September 2003. In addition, the number of samples analyzed for silver in bed sediment is smaller because analysis for this constituent was discontinued in 2004.

Differences in the number of composited biota 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 varied MRLs. When MRLs vary among years, differences in concentration with time are difficult to determine, especially when a large percentage of the samples have concentrations less than MRLs.

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 Clark Fork basin, Montana, October 2010 through September 2011.

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323230--Blacktail Creek at Harrison Avenue, at Butte

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)
11/15/2010	0840	16	7.6	261	2.0	106	28.8	8.28
03/14/2011	0920	15	7.3	276	1.0	104	28.0	8.39
04/11/2011	0925	24	7.7	250	3.5	98.4	27.6	7.16
05/16/2011	0915	55	7.5	181	7.5	75.2	21.3	5.34
05/31/2011	0845	E80	7.6	168	5.0	66.2	18.4	4.91
06/13/2011	0900	E150	7.5	156	10.0	63.2	17.9	4.49
07/12/2011	0845	21	7.6	240	12.5	99.9	28.5	7.00
08/15/2011	0840	10	7.6	291	12.0	115	32.3	8.27

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	2.4	3.3	0.04	<0.05	2.2	4.9	171	611
03/14/2011	3.6	4.9	.05	.05	4.0	4.9	294	640
04/11/2011	3.9	5.1	.02	<.05	2.6	4.1	372	793
05/16/2011	6.3	8.3	.03	.07	5.9	11.0	319	1,190
05/31/2011	6.6	7.9	.03	<.05	5.6	8.8	219	695
06/13/2011	12.3	13.7	.03	<.05	7.0	11.1	296	835
07/12/2011	8.9	11.9	.03	<.05	2.6	4.9	528	1,310
08/15/2011	5.4	6.9	.04	<.05	1.8	2.5	236	713

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.07	1.15	43.6	57.9	4.0	8.8	92	10	0.43
03/14/2011	.16	.50	109	119	4.9	5.5	69	8	.32
04/11/2011	.15	.61	60.1	79.0	<1.4	4.2	74	5	.32
05/16/2011	.29	1.76	35.7	69.9	2.1	6.6	66	25	3.7
05/31/2011	.19	.86	21.5	38.9	3.6	5.1	70	12	E2.6
06/13/2011	.29	1.21	27.1	46.6	4.0	7.3	62	17	E6.9
07/12/2011	.20	.95	74.8	136	2.1	4.4	89	11	.62
08/15/2011	.11	.42	58.6	74.0	1.8	2.6	90	6	.16

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323250--Silver Bow Creek below Blacktail Creek, at Butte

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)
11/15/2010	1025	32	7.6	452	4.0	150	42.3	10.8
03/14/2011	1115	29	7.5	430	7.0	139	39.0	10.0
04/11/2011	1050	38	7.7	405	4.5	138	38.7	10.0
05/16/2011	1025	65	7.6	262	9.0	93.0	26.4	6.58
05/31/2011	1030	114	7.6	234	6.5	85.2	23.8	6.23
06/13/2011	0945	202	7.6	209	11.0	78.1	22.2	5.52
07/12/2011	1030	37	8.2	358	14.5	139	39.4	9.81
08/15/2011	1030	32	7.7	465	14.0	153	43.0	11.1

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	3.1	4.0	0.07	0.13	3.4	9.4	61	335
03/14/2011	3.9	5.2	.08	.13	5.3	9.2	171	418
04/11/2011	4.1	5.1	.05	.10	5.7	8.9	198	546
05/16/2011	6.0	8.8	.05	.13	6.3	17.8	212	1,040
05/31/2011	6.9	8.7	.04	.09	6.3	15.3	177	713
06/13/2011	13.4	14.8	.06	.10	8.4	15.1	216	597
07/12/2011	8.0	11.8	.04	.14	3.8	10.7	292	1,140
08/15/2011	5.3	9.6	.07	.24	3.2	19.6	47	1,390

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.15	1.47	68.7	87.9	43.6	48.9	82	6	0.52
03/14/2011	.25	1.24	107	122	32.7	38.4	84	5	.39
04/11/2011	.16	1.27	86.3	103	23.0	32.2	81	5	.51
05/16/2011	.32	3.74	47.9	97.6	10.9	28.3	84	21	3.7
05/31/2011	.29	2.73	32.8	73.0	12.1	22.6	64	15	4.6
06/13/2011	.44	2.17	29.8	50.9	20.0	31.5	44	13	7.1
07/12/2011	.24	3.28	68.2	134	5.3	21.2	90	14	1.4
08/15/2011	.11	6.21	69.5	289	19.1	58.8	85	25	2.2

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323600--Silver Bow Creek at Opportunity

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)
11/15/2010	1610	51	8.3	453	3.5	160	47.3	10.2
03/15/2011	0820	E45	8.1	431	1.0	152	44.1	10.2
04/12/2011	1050	71	8.0	439	5.0	154	44.3	10.5
05/17/2011	0800	241	7.9	237	7.0	88.3	25.8	5.79
*05/25/2011	1030	505	7.8	260	8.5	99.7	29.6	6.26
06/01/2011	0805	329	7.8	231	7.0	88.2	26.3	5.46
*06/08/2011	1010	546	7.8	233	9.0	86.6	25.9	5.32
06/13/2011	1550	648	7.9	224	11.0	83.7	25.0	5.16
*06/24/2011	0900	352	8.0	233	9.0	90.6	27.1	5.58
*06/29/2011	1000	239	8.2	249	12.0	97.5	29.1	6.02
07/13/2011	0810	99	8.0	324	11.5	125	37.3	7.83
08/15/2011	1635	39	8.8	435	20.0	153	44.3	10.2

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	6.5	9.3	0.34	0.77	15.1	54.8	27	733
03/15/2011	9.1	12.0	.56	.78	27.6	51.5	96	910
04/12/2011	6.8	11.1	.47	.79	19.5	52.4	47	1,010
05/17/2011	12.4	29.1	.21	1.27	23.2	150	194	5,650
*05/25/2011	14.9	46.7	.74	2.29	68.9	310	182	7,220
06/01/2011	10.4	15.8	.24	.55	19.3	58.7	146	1,600
*06/08/2011	14.2	40.9	.52	1.57	57.2	228	104	5,780
06/13/2011	16.4	38.7	.39	1.19	48.7	190	159	4,330
*06/24/2011	12.9	18.2	.28	.58	22.2	61.9	126	1,890
*06/29/2011	11.2	15.6	.26	.50	17.1	54.1	146	1,520
07/13/2011	10.2	12.6	.31	.48	16.5	37.5	44	625
08/15/2011	13.1	13.7	.23	.34	16.6	26.9	25	253

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323600--Silver Bow Creek at Opportunity

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.46	15.2	76.8	140	90.1	156	75	25	3.4
03/15/2011	.60	9.41	165	224	129	169	47	51	E6.2
04/12/2011	.27	12.0	211	310	120	192	65	40	7.7
05/17/2011	1.26	48.8	73.0	404	44.4	260	49	206	134
*05/25/2011	1.47	101	158	519	148	463	57	347	473
06/01/2011	.73	15.7	43.4	131	57.2	114	50	69	61
*06/08/2011	1.08	76.0	100	358	106	337	56	268	395
06/13/2011	1.21	60.7	72.2	332	75.0	259	51	187	327
*06/24/2011	.84	18.9	72.8	152	61.6	113	54	71	67
*06/29/2011	.76	14.6	66.6	135	43.3	97.3	61	53	34
07/13/2011	.46	8.22	83.4	124	57.0	97.8	54	28	7.5
08/15/2011	.28	3.27	45.0	69.8	19.2	52.5	90	5	.53

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323670--Mill Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft^3/s)	Turbidity, unfiltered, lab (NTRU)	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)
11/15/2010	1255	14	<2.0	8.0	171	4.0	74.9	20.7	5.66
03/14/2011	1340	11	<2.0	7.7	193	3.5	89.5	24.4	6.93
04/11/2011	1400	15	<2.0	7.9	185	7.5	77.2	20.8	6.16
05/16/2011	1300	124	E8.0	7.8	88	6.0	34.7	9.85	2.46
05/31/2011	1315	137	E4.1	7.7	96	8.0	39.6	11.2	2.81
06/13/2011	1250	309	E4.9	7.7	74	7.0	30.0	8.65	2.04
07/12/2011	1500	169	E2.8	7.5	69	11.0	29.3	8.49	1.96
08/15/2011	1255	33	<2.0	7.9	136	13.0	56.0	15.3	4.29

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	12.7	13.0	0.06	0.08	1.1	1.6	38	86
03/14/2011	13.2	14.1	.05	.08	1.2	1.6	29	90
04/11/2011	28.2	27.3	.04	.07	1.9	2.9	32	133
05/16/2011	24.2	27.6	.05	.15	4.3	9.3	46	511
05/31/2011	32.3	32.1	.06	.09	4.0	6.7	64	261
06/13/2011	26.0	27.5	.04	.11	3.2	7.3	49	309
07/12/2011	10.5	12.4	.02	.09	1.6	4.5	25	530
08/15/2011	14.3	15.4	.03	.05	1.2	2.4	42	140

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.07	0.22	5.2	7.8	1.9	2.6	55	1	0.04
03/14/2011	.05	.28	7.0	9.1	1.8	<2.4	80	1	.03
04/11/2011	.14	.42	4.9	8.6	<1.4	<2.4	83	1	.04
05/16/2011	.17	2.39	5.6	22.1	1.8	7.0	60	21	7.0
05/31/2011	.20	1.08	4.0	10.9	2.8	4.9	56	9	3.3
06/13/2011	.15	1.77	3.1	13.1	2.1	5.2	32	15	13
07/12/2011	.07	1.23	4.4	20.4	<1.4	6.2	35	26	12
08/15/2011	.10	.65	9.7	15.3	<1.4	<2.4	61	4	.36

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323700--Mill Creek at Opportunity

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)
11/15/2010	1505	9.3	7.9	196	3.5	85.8	24.0	6.31
03/14/2011	1600	7.1	7.8	222	3.0	99.4	27.7	7.36
04/12/2011	0820	11	7.9	205	2.5	87.6	23.9	6.81
05/16/2011	1520	87	7.7	97	9.0	38.5	11.0	2.70
05/31/2011	1620	113	7.9	104	10.0	41.2	11.6	2.95
06/13/2011	1425	210	7.7	80	7.5	32.6	9.35	2.25
07/12/2011	1855	159	7.5	78	11.0	32.5	9.37	2.20
08/15/2011	1520	13	8.0	155	15.0	64.5	17.8	4.85

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	17.8	17.3	0.09	0.10	1.5	2.0	38	74
03/14/2011	17.0	18.1	.06	.08	1.7	2.1	19	59
04/12/2011	21.9	24.8	.06	.09	2.2	3.3	23	107
05/16/2011	29.3	36.1	.07	.30	5.8	16.4	90	930
05/31/2011	33.9	35.8	.07	.16	4.5	10.0	60	477
06/13/2011	30.5	34.1	.06	.18	4.1	12.9	49	1,100
07/12/2011	15.3	17.8	.04	.12	2.3	7.2	28	595
08/15/2011	19.3	19.8	.05	.06	1.6	2.3	38	106

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.11	0.17	2.8	4.0	4.5	4.9	67	1	0.03
03/14/2011	.06	.20	2.4	3.2	3.1	3.2	88	1	.02
04/12/2011	.07	.39	2.1	4.9	2.9	4.4	87	2	.06
05/16/2011	.35	5.77	4.8	39.3	3.1	14.6	53	40	9.4
05/31/2011	.22	2.16	4.1	17.4	2.8	8.1	55	18	5.5
06/13/2011	.19	3.97	2.8	26.0	3.0	12.4	31	56	32
07/12/2011	.11	2.04	4.5	21.6	2.0	6.3	45	38	16
08/15/2011	.11	.32	7.5	11.0	<1.4	<2.4	80	2	.07

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323710--Willow Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft^3/s)	Turbidity, unfiltered, lab (NTRU)	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)
11/15/2010	1200	1.6	<2.0	7.7	133	1.5	50.4	16.5	2.21
04/11/2011	1245	4.0	E4.0	7.7	151	5.0	56.3	18.3	2.60
05/16/2011	1145	55	20	7.6	83	5.0	30.0	10.0	1.22
05/31/2011	1205	78	E11	7.6	81	5.0	30.5	10.1	1.29
06/13/2011	1150	114	E16	7.7	72	6.0	27.0	8.91	1.14
07/12/2011	1355	15	E2.1	7.7	109	12.0	42.7	14.1	1.83
08/15/2011	1200	4.1	E2.1	7.7	129	11.0	45.3	14.8	2.06

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	11.8	11.7	0.04	<0.05	1.3	1.7	55	119
04/11/2011	16.7	16.5	.02	.05	2.0	2.5	86	307
05/16/2011	23.5	26.1	.04	.15	4.2	7.7	136	1,050
05/31/2011	19.1	21.1	.05	.12	3.5	7.4	124	879
06/13/2011	19.5	23.7	.04	.22	3.3	10.8	267	2,210
07/12/2011	20.4	20.8	.03	.05	2.4	3.4	56	174
08/15/2011	23.8	23.9	.03	.05	2.4	3.4	82	203

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.10	0.19	19.9	24.2	1.6	<2.4	80	2	0.01
04/11/2011	.25	.50	17.8	27.4	<1.4	<2.4	93	3	.03
05/16/2011	.36	2.72	9.1	42.5	2.6	8.3	64	41	6.1
05/31/2011	.26	2.45	7.6	40.2	2.7	6.8	46	39	8.2
06/13/2011	.26	5.72	8.8	72.1	2.2	14.0	30	161	50
07/12/2011	.14	.48	24.4	30.0	1.6	<2.4	58	8	.32
08/15/2011	.18	.49	28.2	34.7	<1.4	6.2	79	5	.06

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323720--Willow Creek at Opportunity

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)
11/15/2010	1550	8.0	8.0	302	5.5	128	37.6	8.38
03/14/2011	1700	6.8	8.1	285	5.5	124	36.3	7.99
04/12/2011	0935	8.7	7.9	287	3.5	123	35.8	8.12
05/16/2011	1550	40	7.7	146	11.0	58.5	18.1	3.24
05/31/2011	1650	62	7.7	156	11.0	62.7	19.1	3.62
06/13/2011	1505	116	7.7	167	10.0	67.8	20.5	4.03
07/12/2011	1930	17	7.8	219	14.5	91.9	27.4	5.73
08/15/2011	1555	6.5	8.1	285	16.0	117	33.2	8.25

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	19.3	23.0	0.03	0.06	1.8	6.1	25	228
03/14/2011	15.9	19.2	.03	.08	2.0	5.6	46	283
04/12/2011	16.9	21.1	.03	.06	2.3	5.8	54	284
05/16/2011	38.9	49.4	.04	.45	9.5	43.4	127	1,670
05/31/2011	47.5	49.2	.05	.16	9.1	21.1	111	594
06/13/2011	73.7	70.6	.07	.14	11.3	20.4	100	387
07/12/2011	46.6	55.1	.05	.17	3.4	8.8	274	796
08/15/2011	20.9	21.7	.03	<.05	2.3	3.4	17	139

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.16	1.74	25.6	33.1	2.3	9.4	81	12	0.26
03/14/2011	.17	2.03	53.5	68.8	3.4	8.7	72	9	.17
04/12/2011	.13	1.51	57.5	70.5	4.1	9.6	80	6	.14
05/16/2011	.61	14.4	50.3	114	5.4	54.9	73	87	9.4
05/31/2011	.37	4.49	15.4	37.1	8.3	23.4	54	33	5.5
06/13/2011	.33	2.88	13.6	25.7	10.2	19.1	57	18	5.6
07/12/2011	.89	2.74	50.6	84.4	5.7	10.5	97	13	.60
08/15/2011	.11	.68	10.3	15.5	<1.4	2.9	94	3	.05

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323750--Silver Bow Creek at Warm Springs

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)
11/16/2010	0830	72	8.5	527	2.0	226	65.7	15.0
03/15/2011	0925	95	9.0	525	2.0	217	62.4	14.9
04/12/2011	1300	87	8.5	495	7.0	204	59.1	13.7
05/17/2011	0905	299	8.8	366	8.5	150	44.4	9.40
06/01/2011	0935	486	9.3	319	9.0	136	43.0	6.92
06/14/2011	0825	1,030	9.0	283	10.0	113	35.6	5.86
07/13/2011	1010	216	8.7	182	12.0	74.9	22.5	4.52
08/16/2011	0800	89	9.3	370	15.5	154	45.6	9.86

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	17.5	19.6	0.05	0.08	3.0	5.5	8	187
03/15/2011	11.3	13.6	.07	.11	4.5	6.6	8	168
04/12/2011	12.3	17.3	.03	.23	2.3	15.9	15	422
05/17/2011	24.4	26.7	.05	.13	5.3	11.3	39	331
06/01/2011	31.7	32.4	.10	.19	12.4	22.1	42	313
06/14/2011	34.2	34.7	.09	.22	21.4	35.2	57	437
07/13/2011	21.4	24.1	.03	.09	3.7	7.4	45	272
08/16/2011	38.0	37.9	.04	.05	3.7	5.6	14	89

Date	Lead, filtered (µg/L)	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)
11/16/2010	0.05	0.85	87.6	138	3.0	9.7	88	4	0.78
03/15/2011	.06	1.18	67.4	106	4.3	11.8	85	3	.77
04/12/2011	.10	4.13	133	205	2.3	29.0	98	9	2.1
05/17/2011	.19	1.98	60.6	98.9	2.6	14.1	87	9	7.3
06/01/2011	.33	2.68	31.5	64.9	4.3	26.2	93	5	6.6
06/14/2011	.57	4.92	38.5	77.3	6.1	34.4	86	9	25
07/13/2011	.18	1.27	34.3	62.8	2.1	7.1	91	7	4.1
08/16/2011	.08	.55	42.3	60.3	<1.4	4.0	60	2	.48

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323760--Warm Springs Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft^3/s)	Turbidity, unfiltered, lab (NTRU)	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)
11/15/2010	1425	85	<2.0	8.4	253	4.0	124	37.0	7.79
04/11/2011	1640	64	<2.0	8.8	268	9.0	134	38.8	9.07
05/16/2011	1415	153	E5.1	8.4	202	8.0	105	32.0	6.18
05/31/2011	1515	221	<2.0	8.2	213	9.0	98.7	29.9	5.86
07/12/2011	1720	495	E2.2	7.8	147	11.0	68.5	21.1	3.87
08/15/2011	1415	186	<2.0	8.6	220	11.0	102	30.3	6.41

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	2.0	2.1	0.02	<.05	0.58	1.1	4	27
04/11/2011	2.6	3.0	<.02	<.05	.56	1.3	6	36
05/16/2011	2.5	3.7	.02	.06	2.0	7.7	22	366
05/31/2011	3.5	4.3	.02	<.05	1.5	3.5	11	140
07/12/2011	3.9	4.5	.05	.06	6.4	10.3	8	109
08/15/2011	3.1	3.2	.03	<.05	.85	2.5	4	80

Date	Lead, filtered (µg/L)	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)
11/15/2010	<.01	0.07	0.5	1.3	<1.4	<2.4	69	1	0.23
04/11/2011	<.01	.12	<.1	2.0	<1.4	<2.4	42	17	2.9
05/16/2011	.04	1.00	2.0	14.9	<1.4	6.9	66	19	7.8
05/31/2011	.03	.38	1.4	6.0	<1.4	3.1	61	7	4.2
07/12/2011	.03	.42	2.3	7.3	5.6	7.5	65	6	8.0
08/15/2011	.02	.20	1.5	4.2	<1.4	<2.4	67	3	1.5

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323770--Warm Springs Creek at Warm Springs

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)
11/16/2010	0805	76	8.2	299	3.0	145	43.8	8.66
04/12/2011	1205	56	8.3	328	5.0	165	48.6	10.5
05/17/2011	0830	145	8.1	234	5.0	114	34.8	6.59
06/01/2011	0845	193	8.1	227	6.0	111	33.6	6.51
07/13/2011	0915	414	7.9	172	10.0	79.0	24.3	4.43
08/16/2011	0735	134	8.0	255	9.0	117	34.9	7.16

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	2.8	3.5	0.04	<.05	1.2	6.0	9	119
04/12/2011	3.0	3.7	.03	<.05	1.3	4.1	9	67
05/17/2011	3.3	6.0	.03	.10	2.6	23.8	20	562
06/01/2011	3.8	6.1	.03	.05	2.4	13.2	13	259
07/13/2011	10.8	13.1	.05	.09	6.6	22.0	14	453
08/16/2011	4.7	5.8	.04	.06	1.9	13.7	10	219

Date	Lead, filtered (µg/L)	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)
11/16/2010	0.03	0.56	57.1	76.8	1.6	3.4	63	6	1.2
04/12/2011	.02	.32	64.7	78.2	<1.4	<2.4	63	2	.30
05/17/2011	.05	2.60	25.8	88.3	<1.4	11.9	55	34	13
06/01/2011	.03	1.29	18.8	39.2	<1.4	5.9	59	14	7.3
07/13/2011	.05	1.61	23.3	42.4	4.5	9.8	70	22	25
08/16/2011	.03	1.01	42.5	58.6	1.5	5.8	60	14	5.1

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323800--Clark Fork near Galen

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)
11/16/2010	1000	162	8.3	417	2.5	190	56.3	12.0
03/15/2011	1110	172	8.7	452	2.5	197	57.7	13.0
04/12/2011	1450	155	8.6	435	8.0	198	58.2	12.8
05/17/2011	1045	445	8.6	323	9.5	143	42.7	8.82
*05/25/2011	1230	873	8.9	300	10.5	133	40.1	7.92
06/01/2011	1105	664	9.1	294	10.0	129	40.5	6.87
*06/08/2011	1145	1,110	8.8	249	9.0	106	32.6	5.83
06/14/2011	1020	1,380	8.7	278	10.5	115	36.0	6.19
*06/24/2011	1030	1,210	8.9	227	10.0	99.3	30.8	5.44
*06/29/2011	1100	1,130	8.9	228	13.5	103	32.1	5.52
07/13/2011	1240	628	8.2	182	12.0	76.4	23.2	4.44
08/16/2011	0935	215	8.7	305	12.0	136	40.5	8.49

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	9.8	11.1	0.04	0.08	2.5	6.4	10	153
03/15/2011	8.2	10.8	.05	.11	3.7	10.4	8	210
04/12/2011	8.7	12.6	.03	.16	2.5	15.3	9	330
05/17/2011	18.1	23.5	.05	.23	5.1	33.6	28	728
*05/25/2011	29.5	39.0	.08	.36	11.2	75.2	60	1,480
06/01/2011	23.8	26.8	.07	.20	9.7	32.0	29	493
*06/08/2011	28.2	36.1	.13	.38	20.7	82.1	47	1,120
06/14/2011	27.5	31.5	.11	.29	19.8	51.6	41	629
*06/24/2011	26.6	27.7	.10	.21	18.0	40.0	38	576
*06/29/2011	24.7	25.5	.09	.20	12.9	32.2	33	461
07/13/2011	14.9	17.8	.04	.10	5.9	21.9	22	415
08/16/2011	18.2	18.9	.04	.07	3.6	11.2	11	160

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323800--Clark Fork near Galen

Date	Lead, filtered (µg/L)	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)
11/16/2010	0.04	0.79	60.9	93.5	2.5	7.1	35	11	4.8
03/15/2011	.04	1.45	55.8	99.8	3.2	11.9	75	9	4.2
04/12/2011	.07	3.01	86.3	150	2.6	20.3	87	8	3.3
05/17/2011	.13	4.56	42.0	123	1.9	27.9	53	37	44
*05/25/2011	.36	10.3	47.6	173	11.0	55.8	55	74	174
06/01/2011	.23	3.92	26.5	85.8	3.1	29.6	51	19	34
*06/08/2011	.30	9.10	31.9	121	13.7	60.9	48	59	177
06/14/2011	.39	6.33	30.7	81.2	9.4	45.1	32	40	149
*06/24/2011	.33	4.00	31.1	74.2	10.4	30.5	69	24	78
*06/29/2011	.25	3.23	29.8	64.9	5.8	25.6	66	19	58
07/13/2011	.10	2.09	27.7	60.5	2.6	12.6	67	20	34
08/16/2011	.06	1.11	39.8	59.4	<1.4	7.9	76	6	3.5

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323840--Lost Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft^3/s)	Turbidity, unfiltered, lab (NTRU)	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)
11/15/2010	1335	8.0	<2.0	8.2	214	3.0	105	31.5	6.29
03/14/2011	1450	6.4	E3.5	7.8	223	4.0	109	32.6	6.77
04/11/2011	1510	6.9	<2.0	8.3	226	7.0	111	32.6	7.09
05/16/2011	1345	26	E7.0	7.9	153	7.5	78.2	24.0	4.42
05/31/2011	1400	31	E3.5	8.1	170	7.0	82.2	25.3	4.61
06/13/2011	1330	73	E7.1	7.8	133	6.0	63.8	19.8	3.46
07/12/2011	1600	46	E3.4	8.0	160	11.0	71.4	22.0	4.01
08/15/2011	1330	25	<2.0	8.1	210	10.0	96.4	28.9	5.87

Date	Arsenic, filtered (µg/L)	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)
11/15/2010	2.1	2.3	0.02	<0.05	0.80	1.3	6	28
03/14/2011	3.1	4.8	.03	.06	2.5	8.2	7	205
04/11/2011	2.6	3.3	.02	<.05	1.4	4.6	7	115
05/16/2011	3.6	5.9	.02	.11	2.9	22.8	27	772
05/31/2011	2.9	4.6	.02	.05	1.7	8.7	12	434
06/13/2011	4.3	6.0	.02	.08	2.2	12.8	23	637
07/12/2011	4.0	5.3	<.02	.05	1.5	9.3	11	466
08/15/2011	2.8	2.9	.02	<.05	.86	2.6	10	116

Date	Lead, filtered (µg/L)	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)
11/15/2010	0.02	0.08	0.5	1.2	<1.4	<2.4	50	1	0.02
03/14/2011	.03	.86	.8	5.9	<1.4	3.2	86	9	.16
04/11/2011	.02	.48	.8	3.9	<1.4	<2.4	80	6	.11
05/16/2011	.08	3.10	1.8	22.2	1.5	11.3	51	47	3.3
05/31/2011	.04	2.12	1.4	14.2	<1.4	5.5	24	33	2.8
06/13/2011	.06	2.42	1.8	17.3	<1.4	7.0	39	45	8.9
07/12/2011	.03	1.71	2.2	13.0	<1.4	5.1	40	26	3.2
08/15/2011	.02	.36	2.1	5.4	--	--	49	7	.47

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12323850--Lost Creek near Galen

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)
11/16/2010	0925	46	8.2	626	3.5	304	89.0	19.8
03/15/2011	1030	48	8.2	574	2.0	289	84.6	18.9
04/12/2011	1405	52	8.3	598	8.0	294	85.3	19.8
05/17/2011	1005	18	8.2	677	8.0	362	106	23.6
06/01/2011	1030	34	8.3	556	9.0	272	79.0	18.2
06/14/2011	0925	59	8.1	645	9.0	311	88.9	21.6
07/13/2011	1135	18	8.3	652	15.5	306	87.7	21.0
08/16/2011	0910	8.9	8.0	632	11.0	299	85.3	20.8

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	11.9	12.9	0.02	<0.05	1.3	2.8	7	67
03/15/2011	10.1	12.3	.02	.05	1.4	4.3	10	138
04/12/2011	10.5	13.1	.02	<.05	1.3	5.5	8	159
05/17/2011	11.1	12.6	.02	<.05	1.1	3.7	10	119
06/01/2011	12.7	14.4	.02	<.05	1.4	4.1	12	99
06/14/2011	30.8	30.2	.03	<.05	2.9	5.7	25	89
07/13/2011	23.1	25.3	.02	<.05	2.0	4.1	15	80
08/16/2011	19.0	18.8	.03	<.05	1.7	3.2	7	49

Date	Lead, filtered (µg/L)	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)
11/16/2010	0.03	0.24	5.7	8.9	2.0	3.2	44	25	3.1
03/15/2011	.05	.57	16.4	23.1	2.6	3.8	75	19	2.5
04/12/2011	.03	.66	16.1	27.1	<1.4	3.8	70	9	1.3
05/17/2011	.03	.41	24.1	34.1	<1.4	2.6	51	14	.68
06/01/2011	.03	.36	14.2	20.3	<1.4	2.5	81	8	.73
06/14/2011	.05	.31	17.1	21.4	2.1	2.9	80	3	.48
07/13/2011	.02	.22	11.0	17.9	<1.4	<2.4	75	17	.83
08/16/2011	.02	.15	8.5	10.7	<1.4	<2.4	41	23	.55

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12324200--Clark Fork at Deer Lodge

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)
11/16/2010	1110	316	8.2	461	3.0	205	60.7	13.0
03/15/2011	1335	282	8.4	462	4.0	211	61.9	13.6
04/13/2011	0835	286	8.1	470	6.0	208	60.9	13.6
05/17/2011	1225	619	8.1	331	12.0	138	41.1	8.53
*05/25/2011	1430	1,290	8.1	330	11.0	142	42.2	8.80
06/01/2011	1250	907	8.5	327	10.0	141	43.1	8.09
*06/08/2011	1330	1,480	7.9	299	10.0	126	37.8	7.55
06/14/2011	1235	2,000	7.9	357	10.0	145	43.6	8.88
*06/24/2011	1130	1,570	8.2	269	12.0	115	34.9	6.69
*06/29/2011	1245	1,500	8.2	261	15.0	115	35.3	6.55
07/13/2011	1600	1,020	7.9	228	15.0	97.1	29.1	5.92
08/16/2011	1135	250	8.1	373	10.0	159	47.1	10.1

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	8.7	10.8	0.05	0.10	4.4	15.2	7	294
03/15/2011	8.8	13.4	.07	.17	6.2	32.2	8	555
04/13/2011	9.3	15.0	.07	.20	5.2	36.5	13	600
05/17/2011	16.8	35.6	.07	.62	10.2	136	27	2,620
*05/25/2011	25.7	73.2	.14	1.28	29.2	377	56	5,780
06/01/2011	23.4	34.7	.09	.39	14.7	97.6	27	1,440
*06/08/2011	25.8	51.6	.21	.88	44.1	232	67	3,340
06/14/2011	36.6	46.6	.28	.50	45.9	120	46	1,220
*06/24/2011	32.9	37.8	.22	.36	35.6	87.6	36	976
*06/29/2011	29.3	33.7	.18	.31	25.4	70.9	58	920
07/13/2011	19.4	33.3	.10	.36	14.4	103	34	1,780
08/16/2011	18.7	20.0	.09	.12	7.4	21.0	9	244

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12324200--Clark Fork at Deer Lodge									
Date	Lead, filtered (µg/L)	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)
11/16/2010	0.04	2.60	25.6	57.9	6.6	17.7	80	10	8.5
03/15/2011	.06	4.88	36.2	82.6	5.5	27.2	75	25	19
04/13/2011	.08	5.40	38.5	111	7.4	34.2	81	23	18
05/17/2011	.23	20.0	22.8	263	5.7	107	49	162	271
*05/25/2011	.55	54.1	63.0	430	16.6	254	42	440	1,530
06/01/2011	.25	12.5	21.9	146	5.5	70.3	39	92	225
*06/08/2011	.41	30.5	65.4	266	36.6	183	52	186	743
06/14/2011	.37	12.4	39.1	107	50.6	107	62	53	286
*06/24/2011	.40	8.98	54.9	102	36.3	71.1	36	70	297
*06/29/2011	.47	7.51	49.6	95.2	20.2	54.5	53	51	207
07/13/2011	.23	13.7	46.1	141	8.7	66.6	70	77	212
08/16/2011	.08	1.95	31.1	59.1	6.6	17.8	84	9	6.1

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12324400--Clark Fork above Little Blackfoot River, near Garrison

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)
11/16/2010	1240	353	8.3	459	3.0	210	61.9	13.5
03/15/2011	1500	322	8.8	455	4.0	206	60.5	13.2
04/13/2011	1010	315	8.2	471	6.5	202	58.8	13.5
05/17/2011	1435	726	8.1	320	12.0	135	40.1	8.54
*05/25/2011	1600	1,400	8.1	312	10.0	136	40.5	8.59
06/01/2011	1440	973	8.4	331	11.0	141	42.7	8.26
*06/08/2011	1515	2,110	7.8	276	9.0	114	33.7	7.34
06/14/2011	1430	2,310	7.9	361	14.5	148	43.5	9.47
*06/24/2011	1330	1,930	8.1	279	14.5	119	35.4	7.37
*06/29/2011	1450	1,710	8.1	272	14.0	118	35.8	7.00
07/13/2011	1815	1,130	8.0	249	16.0	107	31.9	6.65
08/16/2011	1345	284	8.3	386	17.5	160	46.9	10.4

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	9.2	11.7	0.04	0.22	4.2	24.3	5	414
03/15/2011	9.3	13.3	.06	.17	6.8	31.9	6	586
04/13/2011	9.3	15.8	.07	.23	6.1	46.2	11	731
05/17/2011	16.9	39.5	.08	.73	11.5	187	28	3,200
*05/25/2011	24.1	78.9	.15	1.51	29.4	448	49	6,360
06/01/2011	23.1	37.8	.10	.52	16.4	129	26	1,990
*06/08/2011	24.8	52.6	.17	.86	38.8	227	210	4,770
06/14/2011	36.7	46.0	.23	.45	40.6	103	43	1,330
*06/24/2011	34.4	50.9	.20	.39	36.2	103	46	1,400
*06/29/2011	30.6	38.7	.19	.42	27.7	94.2	38	1,230
07/13/2011	20.4	30.8	.12	.34	14.8	83.5	30	1,310
08/16/2011	19.4	20.7	.10	.14	9.1	21.8	8	241

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12324400--Clark Fork above Little Blackfoot River, near Garrison									
Date	Lead, filtered (µg/L)	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)
11/16/2010	0.05	3.03	22.6	82.3	5.8	26.7	80	17	16
03/15/2011	.07	4.16	35.3	81.5	3.7	28.8	74	30	26
04/13/2011	.08	6.42	35.6	117	6.7	41.2	85	30	26
05/17/2011	.28	26.7	21.0	298	7.0	148	72	152	298
*05/25/2011	.58	63.0	49.4	458	20.1	311	60	365	1,380
06/01/2011	.30	17.9	18.5	191	7.1	99.5	46	108	284
*06/08/2011	1.19	33.7	46.0	310	24.9	198	49	244	1,390
06/14/2011	.34	10.8	28.1	99.0	37.1	93.9	55	65	405
*06/24/2011	.40	10.8	51.5	120	28.0	78.6	51	74	386
*06/29/2011	.35	10.8	49.9	126	20.6	77.1	57	59	272
07/13/2011	.27	10.7	45.4	129	9.6	63.7	67	56	171
08/16/2011	.07	1.90	29.6	66.6	5.4	18.2	75	10	7.7

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12324680--Clark Fork at Goldcreek

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)
11/16/2010	1345	549	8.4	410	3.0	185	55.1	11.4
03/16/2011	0840	723	8.1	379	2.5	166	49.4	10.4
04/13/2011	1110	622	8.3	392	6.0	176	51.6	11.5
05/17/2011	1610	2,240	8.0	224	10.5	104	30.6	6.62
06/01/2011	1550	2,400	8.1	250	12.0	106	31.9	6.53
06/14/2011	1545	4,450	7.9	285	13.0	121	35.7	7.66
07/14/2011	0810	1,890	7.9	253	14.0	110	32.8	6.77
08/16/2011	1450	464	8.3	366	12.5	153	45.3	9.71

Date	Arsenic, filtered (µg/L)	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)
11/16/2010	7.2	8.9	0.03	0.14	3.0	15.2	4	273
03/16/2011	7.1	14.0	.06	.28	7.1	53.2	17	1,290
04/13/2011	6.9	10.8	.04	.14	4.6	28.2	17	594
05/17/2011	8.9	22.9	.04	.38	6.8	78.6	94	2,850
06/01/2011	12.7	20.2	.06	.45	9.8	78.9	52	1,400
06/14/2011	22.5	28.4	.12	.32	23.3	64.8	62	1,620
07/14/2011	16.1	26.8	.10	.33	14.1	79.9	33	1,490
08/16/2011	14.0	14.5	.07	.09	6.4	13.2	<3	160

Date	Lead, filtered (µg/L)	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)
11/16/2010	0.03	1.89	12.6	58.9	3.5	17.0	85	11	16
03/16/2011	.08	7.70	32.8	127	7.3	54.1	74	77	150
04/13/2011	.07	3.93	19.3	82.2	3.8	26.5	77	26	44
05/17/2011	.40	15.0	14.0	197	4.9	79.0	59	162	980
06/01/2011	.27	8.26	16.3	149	6.0	66.5	63	69	447
06/14/2011	.30	8.81	24.0	121	17.7	69.0	63	84	1,010
07/14/2011	.20	10.5	35.1	134	10.2	63.0	56	80	408
08/16/2011	.04	1.08	17.3	45.3	3.7	11.1	83	8	10

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12331800--Clark Fork near Drummond

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)
11/17/2010	0940	799	8.2	419	2.0	189	54.4	13.0
03/16/2011	1020	887	8.2	419	4.5	193	56.3	12.8
04/13/2011	1250	951	8.3	415	8.0	192	55.1	13.3
05/18/2011	0830	2,540	8.0	244	9.5	112	32.8	7.41
06/02/2011	0825	2,830	8.0	276	11.0	121	35.6	7.85
06/15/2011	0820	5,540	8.0	299	11.5	129	37.9	8.34
07/14/2011	1015	2,350	8.0	280	14.0	124	36.4	8.05
08/17/2011	0800	633	8.1	436	15.0	190	54.2	13.3

Date	Arsenic, filtered (µg/L)	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)
11/17/2010	6.7	8.8	0.04	0.10	2.5	13.6	4	318
03/16/2011	7.8	13.1	.06	.23	6.0	35.0	10	938
04/13/2011	7.2	10.9	.04	.13	4.4	23.1	8	527
05/18/2011	9.8	23.4	.06	.54	9.0	107	89	3,170
06/02/2011	12.4	21.5	.08	.38	10.2	77.9	50	1,930
06/15/2011	23.9	30.7	.10	.36	19.8	72.0	58	1,790
07/14/2011	15.7	24.7	.08	.34	9.6	63.0	23	1,360
08/17/2011	14.0	14.2	.07	.08	5.4	10.2	6	141

Date	Lead, filtered (µg/L)	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)
11/17/2010	0.05	2.45	8.8	69.2	4.2	18.6	86	15	32
03/16/2011	.08	6.11	21.8	107	6.2	45.3	64	58	139
04/13/2011	.07	3.79	15.0	74.5	3.1	27.4	70	29	74
05/18/2011	.59	19.1	10.7	294	7.9	134	55	216	1,480
06/02/2011	.30	11.3	20.0	184	8.4	85.9	58	111	848
06/15/2011	.43	9.52	27.2	153	13.2	86.1	75	99	1,480
07/14/2011	.20	9.60	36.8	186	6.7	64.9	63	80	508
08/17/2011	.05	1.08	17.8	49.8	5.3	11.8	86	7	12

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12334550--Clark Fork at Turah Bridge, near Bonner

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)
11/17/2010	1130	1,100	8.3	357	2.5	159	45.4	11.0
03/16/2011	1230	1,200	8.4	351	4.5	157	44.9	10.9
04/14/2011	0755	1,590	8.1	330	5.5	150	42.1	10.9
*05/13/2011	1030	4,300	7.9	178	10.0	79.3	22.4	5.69
05/18/2011	1010	5,710	7.8	170	9.0	78.5	22.3	5.55
*05/26/2011	0845	8,750	7.8	149	9.5	68.3	19.4	4.79
06/02/2011	1035	7,200	8.0	188	10.0	81.0	23.0	5.71
*06/09/2011	1000	11,100	7.7	158	7.5	70.3	20.1	4.88
06/15/2011	1025	10,600	7.9	213	11.0	90.5	26.0	6.18
*06/30/2011	1100	8,440	8.1	191	12.0	86.1	24.8	5.89
07/14/2011	1235	4,420	8.0	227	14.5	98.1	28.0	6.82
08/17/2011	0945	1,110	8.1	321	14.0	139	38.8	10.3

Date	Arsenic, filtered (µg/L)	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)
11/17/2010	5.0	6.2	0.03	0.08	2.5	9.0	<3	206
03/16/2011	5.6	8.1	.05	.12	4.5	16.0	7	411
04/14/2011	4.9	7.6	.03	.11	3.4	19.1	13	496
*05/13/2011	5.4	12.4	.03	.32	5.3	54.1	94	2,130
05/18/2011	5.8	12.5	.05	.31	6.3	56.0	81	2,010
*05/26/2011	8.0	16.5	.05	.49	9.4	77.0	106	3,060
06/02/2011	7.1	12.8	.06	.29	6.5	53.9	54	2,140
*06/09/2011	11.6	27.6	.07	1.03	11.2	147	63	5,970
06/15/2011	14.2	21.0	.07	.40	11.9	61.9	63	2,450
*06/30/2011	12.3	14.3	.08	.18	9.1	30.5	41	956
07/14/2011	10.4	13.8	.06	.18	6.3	30.8	20	665
08/17/2011	8.7	8.7	.05	<.05	3.4	6.0	3	92

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12334550--Clark Fork at Turah Bridge, near Bonner									
Date	Lead, filtered (µg/L)	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)
11/17/2010	0.05	1.55	3.0	48.1	3.3	13.4	89	10	30
03/16/2011	.06	2.59	8.9	50.7	3.9	21.8	78	22	71
04/14/2011	.06	3.14	8.6	64.2	3.7	26.2	81	24	103
*05/13/2011	.37	11.5	13.2	192	5.0	79.7	62	152	1,760
05/18/2011	.40	10.4	9.0	166	5.7	78.0	59	118	1,820
*05/26/2011	.41	14.2	17.2	245	9.0	117	55	245	5,790
06/02/2011	.22	8.39	13.6	148	6.4	70.0	44	186	3,620
*06/09/2011	.33	27.1	32.0	525	13.2	258	63	404	12,100
06/15/2011	.29	11.9	24.5	212	9.4	109	56	182	5,210
*06/30/2011	.19	4.23	31.7	102	7.7	41.1	62	71	1,620
07/14/2011	.13	3.89	22.5	95.9	4.9	34.5	60	40	477
08/17/2011	.03	.51	9.2	26.1	3.8	7.5	73	5	15

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12340000--Blackfoot River near Bonner

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)
11/17/2010	1345	654	8.4	249	2.0	126	32.4	10.9
04/14/2011	1015	2,460	8.2	200	5.0	96.6	24.6	8.53
*05/13/2011	1200	8,060	7.8	150	9.0	74.5	19.6	6.20
05/18/2011	1410	11,300	8.0	156	8.5	81.8	21.2	7.01
*05/26/2011	1200	13,400	8.1	158	8.3	81.7	21.1	7.02
06/02/2011	1240	8,880	8.1	171	9.0	84.6	21.9	7.27
*06/09/2011	1230	17,000	8.0	157	8.0	80.1	21.0	6.72
06/15/2011	1225	13,100	8.0	168	9.5	81.4	21.4	6.81
*06/30/2011	0945	10,100	8.2	158	11.0	79.0	20.5	6.76
07/14/2011	1450	5,340	8.3	187	14.0	91.5	23.5	7.94
08/17/2011	1150	1,210	8.4	255	15.5	122	30.1	11.4

Date	Arsenic, filtered (µg/L)	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)
11/17/2010	0.88	1.1	<0.02	<0.05	0.90	1.6	5	54
04/14/2011	.88	1.3	<.02	<.05	1.1	2.2	55	265
*05/13/2011	.90	1.9	<.02	<.05	1.1	4.2	32	1,140
05/18/2011	.89	1.7	<.02	<.05	1.1	3.9	50	915
*05/26/2011	1.0	2.1	<.02	<.05	.88	3.6	44	1,240
06/02/2011	.87	1.7	<.02	<.05	1.6	6.2	27	604
*06/09/2011	1.1	2.8	<.02	<.05	1.0	6.5	26	2,120
06/15/2011	1.1	2.1	<.02	<.05	.78	3.6	36	1,180
*06/30/2011	1.1	1.5	<.02	<.05	.61	2.5	35	685
07/14/2011	1.1	1.5	<.02	<.05	.55	1.3	15	280
08/17/2011	1.4	1.4	<.02	<.05	.51	.70	<3	41

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12340000--Blackfoot River near Bonner

Date	Lead, filtered (µg/L)	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)
11/17/2010	0.02	0.08	1.2	5.2	<1.4	<2.4	78	4	7.1
04/14/2011	.06	.33	2.8	19.9	<1.4	<2.4	86	11	73
*05/13/2011	.04	1.65	3.8	85.0	1.4	6.7	77	103	2,240
05/18/2011	.06	1.23	3.8	56.1	<1.4	4.9	72	83	2,530
*05/26/2011	.05	1.50	4.0	71.1	<1.4	5.2	73	124	4,490
06/02/2011	.04	.78	2.9	36.2	<1.4	3.9	71	56	1,340
*06/09/2011	.03	2.68	3.3	116	1.6	10	68	239	11,000
06/15/2011	.04	1.28	3.7	57.9	<1.4	4.6	72	108	3,820
*06/30/2011	.05	.83	5.1	45.1	<1.4	3.1	69	74	2,020
07/14/2011	.02	.36	2.9	22.1	<1.4	<2.4	81	21	303
08/17/2011	<.01	.06	1.4	6.5	<1.4	<2.4	81	3	9.8

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12340500--Clark Fork above Missoula

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)
11/17/2010	1600	1,690	8.4	314	2.5	146	40.6	10.8
03/16/2011	1635	2,160	8.7	301	5.0	138	38.1	10.4
04/14/2011	1330	4,270	8.3	247	6.0	113	30.3	9.08
*05/13/2011	1345	11,900	7.9	159	9.5	76.2	20.6	6.01
05/18/2011	1230	17,200	8.0	162	9.5	80.2	21.3	6.54
*05/26/2011	1415	22,200	8.1	155	9.2	75.2	20.3	5.95
06/02/2011	1435	15,500	8.1	177	9.0	83.4	22.6	6.57
*06/09/2011	1400	28,200	7.9	149	7.5	75.4	20.6	5.85
06/15/2011	1350	22,900	8.0	189	10.5	85.8	23.5	6.56
*06/30/2011	0754	17,400	7.9	173	13.0	82.2	22.4	6.41
07/14/2011	1720	9,510	8.2	208	15.0	96.5	26.1	7.61
08/17/2011	1430	2,410	8.3	283	16.0	128	33.6	10.8

Date	Arsenic, filtered (µg/L)	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)
11/17/2010	3.6	4.9	0.03	0.09	1.6	9.3	22	275
03/16/2011	3.8	5.3	.03	.08	3.2	10.1	22	347
04/14/2011	2.5	3.9	.02	<.05	2.1	8.4	41	343
*05/13/2011	2.7	7.4	.02	.20	3.5	33.1	72	1,860
05/18/2011	2.8	6.4	.03	.24	4.0	49.9	60	1,640
*05/26/2011	4.4	14.6	.06	.53	8.4	90.6	47	2,840
06/02/2011	3.5	6.7	.03	.17	3.5	29.5	42	1,270
*06/09/2011	6.3	23.1	.06	.83	10.2	145	43	4,960
06/15/2011	7.1	13.2	.05	.35	7.0	53.1	54	2,030
*06/30/2011	6.0	8.0	.04	.14	4.6	24.1	32	1,030
07/14/2011	5.6	7.1	.03	.08	3.6	14.2	18	466
08/17/2011	4.8	4.9	.03	<.05	2.0	3.7	4	70

Table 4. Water-quality data for the Clark Fork basin, Montana, October 2010 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; lab, laboratory; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; NTRU, nephelometric turbidity ratio unit; ton/d, tons per day. Symbols: <, less than laboratory reporting level; --, no data]

12340500--Clark Fork above Missoula									
Date	Lead, filtered (µg/L)	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)
11/17/2010	0.03	1.60	6.6	38.7	2.7	17.1	71	17	78
03/16/2011	.06	1.64	12.5	40.8	2.4	13.9	82	17	99
04/14/2011	.08	1.46	8.4	36.7	<1.4	11.1	74	18	208
*05/13/2011	.19	6.96	11.8	141	3.4	47.7	50	206	6,620
05/18/2011	.21	7.48	9.1	109	3.4	46.3	64	128	5,940
*05/26/2011	.21	14.6	18.3	190	14.1	131	57	270	16,200
06/02/2011	.12	4.31	10.4	87.8	3.6	38.8	61	108	4,520
*06/09/2011	.22	23.0	26.9	349	11.9	210	60	427	32,500
06/15/2011	.21	8.04	20.0	155	5.5	84.4	62	176	10,900
*06/30/2011	.10	3.52	18.4	88.5	3.6	32.0	58	102	4,790
07/14/2011	.08	2.02	15.8	52.5	2.4	16.0	65	33	847
08/17/2011	.03	.30	9.2	20.7	1.5	4.1	85	4	26

*Sample collected as part of a supplemental sampling program.

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2010 through September 2011.

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	228	7	4.3	277	21	16	268	36	26
2	227	7	4.3	277	23	17	286	39	30
3	229	6	3.7	269	25	18	288	29	23
4	227	5	3.1	270	25	18	e270	20	15
5	270	8	5.8	275	25	19	e250	17	11
6	274	10	7.4	279	24	18	e250	18	12
7	258	9	6.3	279	23	17	e260	20	14
8	256	10	6.9	290	24	19	e270	22	16
9	256	10	6.9	303	24	20	275	25	19
10	256	10	6.9	285	16	12	276	21	16
11	278	11	8.3	281	12	9.1	e270	17	12
12	302	13	11	282	13	9.9	276	16	12
13	294	7	5.6	283	13	9.9	315	18	15
14	294	7	5.6	286	15	12	324	19	17
15	290	8	6.3	297	25	20	293	22	17
16	283	8	6.1	319	11	9.5	262	28	20
17	281	8	6.1	324	12	10	e240	32	21
18	277	8	6.0	334	14	13	e210	32	18
19	276	8	6.0	321	16	14	e230	31	19
20	277	8	6.0	315	19	16	257	30	21
21	278	8	6.0	282	21	16	271	28	20
22	280	8	6.0	e250	25	17	262	25	18
23	288	9	7.0	e200	27	15	263	20	14
24	292	9	7.1	e150	20	8.1	263	17	12
25	298	10	8.0	e160	12	5.2	238	15	9.6
26	297	11	8.8	e180	13	6.3	219	15	8.9
27	290	12	9.4	206	16	8.9	220	16	9.5
28	288	13	10	228	20	12	213	26	15
29	288	14	11	e240	25	16	e200	35	19
30	289	16	12	e260	31	22	e190	37	19
31	276	18	13	--	--	--	e180	36	17
TOTAL	**8,497**	**--**	**220.9**	**8,002**	**--**	**423.9**	**7,889**	**--**	**516**
MEAN	**274**	**10**	**7.1**	**267**	**20**	**14**	**254**	**25**	**17**
MAX	**302**	**18**	**13**	**334**	**31**	**22**	**324**	**39**	**30**
MIN	**227**	**5**	**3.1**	**150**	**11**	**5.2**	**180**	**15**	**8.9**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2010 through September 2011.—Continued

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		JANUARY			FEBRUARY			MARCH	
1	e180	36	17	e150	28	11	190	40	21
2	e190	37	19	e150	28	11	195	32	17
3	e200	39	21	e160	30	13	228	33	20
4	214	42	24	e170	48	22	233	35	22
5	224	44	27	217	73	43	235	36	23
6	243	40	26	e210	56	32	243	40	26
7	256	42	29	e200	49	26	248	35	23
8	242	41	27	e190	48	25	248	30	20
9	e220	45	27	194	49	26	249	30	20
10	e210	44	25	236	49	31	263	31	22
11	e200	40	22	219	50	30	288	30	23
12	e220	36	21	215	51	30	268	28	20
13	238	35	22	227	50	31	277	27	20
14	243	35	23	232	48	30	285	23	18
15	251	35	24	241	47	31	290	36	28
16	254	37	25	248	45	30	339	35	32
17	386	65	68	225	45	27	333	23	21
18	306	40	33	224	45	27	304	29	24
19	253	37	25	220	44	26	297	24	19
20	222	36	22	221	43	26	286	21	16
21	246	40	27	239	34	22	286	25	19
22	249	45	30	260	24	17	294	22	17
23	232	37	23	236	20	13	291	21	16
24	228	30	18	e200	18	9.7	288	21	16
25	231	28	17	e150	19	7.7	288	22	17
26	223	28	17	e160	21	9.1	286	23	18
27	220	28	17	179	28	14	290	20	16
28	221	28	17	192	49	25	301	21	17
29	224	28	17	--	--	--	296	32	26
30	218	28	16	--	--	--	284	27	21
31	e180	28	14	--	--	--	296	23	18
TOTAL	**7,224**	**--**	**740**	**5,765**	**--**	**645.5**	**8,499**	**--**	**636**
MEAN	**233**	**37**	**24**	**206**	**41**	**23**	**274**	**28**	**21**
MAX	**386**	**65**	**68**	**260**	**73**	**43**	**339**	**40**	**32**
MIN	**180**	**28**	**14**	**150**	**18**	**7.7**	**190**	**20**	**16**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		APRIL			MAY			JUNE	
1	318	22	19	299	26	21	878	148	351
2	312	21	18	289	27	21	924	226	564
3	311	25	21	289	24	19	963	294	764
4	313	30	25	291	21	16	879	240	570
5	321	29	25	295	19	15	819	177	391
6	326	28	25	313	19	16	856	133	307
7	317	24	21	319	23	20	1,120	126	381
8	304	20	16	342	47	43	1,470	97	385
9	302	18	15	398	63	68	1,760	96	456
10	302	19	15	448	170	206	1,920	138	715
11	297	19	15	410	157	174	1,910	102	526
12	293	24	19	397	176	189	1,900	95	487
13	294	23	18	420	185	210	1,920	55	285
14	318	22	19	516	153	213	1,960	23	122
15	298	22	18	573	109	169	1,870	11	56
16	300	25	20	608	81	133	1,800	9	44
17	306	25	21	614	136	225	1,680	9	41
18	307	25	21	601	112	182	1,580	10	43
19	313	32	27	564	239	364	1,510	6	24
20	307	38	31	546	432	637	1,500	6	24
21	328	29	26	586	281	445	1,490	5	20
22	360	22	21	580	236	370	1,470	5	20
23	341	23	21	660	166	296	1,510	9	37
24	327	23	20	894	117	282	1,580	61	260
25	317	30	26	1,210	204	666	1,680	51	231
26	329	24	21	1,220	114	376	1,690	51	233
27	327	60	53	1,190	121	389	1,600	43	186
28	318	77	66	1,100	103	306	1,490	45	181
29	311	68	57	1,020	88	242	1,510	51	208
30	304	35	29	1,010	85	232	1,630	48	211
31	--	--	--	981	132	350	--	--	--
TOTAL	**9,421**	**--**	**749**	**18,983**	**--**	**6,895**	**44,869**	**--**	**8,123**
MEAN	**314**	**29**	**25**	**612**	**125**	**222**	**1,496**	**79**	**271**
MAX	**360**	**77**	**66**	**1,220**	**432**	**666**	**1,960**	**294**	**764**
MIN	**293**	**18**	**15**	**289**	**19**	**15**	**819**	**5**	**20**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2010 through September 2011.—Continued

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/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	1,720	59	274	347	44	41	217	8	4.7
2	1,720	62	288	372	46	46	215	7	4.1
3	1,630	48	211	336	38	34	208	7	3.9
4	1,560	40	168	328	36	32	211	6	3.4
5	1,590	50	215	331	34	30	207	5	2.8
6	1,590	50	215	343	31	29	206	5	2.8
7	1,560	43	181	351	29	27	201	4	2.2
8	1,490	40	161	328	28	25	201	4	2.2
9	1,360	41	151	300	27	22	205	4	2.2
10	1,230	36	120	277	26	19	204	4	2.2
11	1,120	32	97	298	25	20	202	4	2.2
12	1,030	31	86	285	24	18	201	5	2.7
13	1,030	50	139	274	21	16	205	5	2.8
14	1,240	43	144	269	17	12	205	4	2.2
15	1,320	29	103	243	13	8.5	208	4	2.2
16	1,150	28	87	249	8	5.4	220	4	2.4
17	1,060	27	77	236	4	2.5	221	4	2.4
18	968	28	73	229	5	3.1	216	3	1.7
19	863	30	70	223	5	3.0	214	3	1.7
20	804	33	72	208	6	3.4	213	4	2.3
21	711	35	67	197	5	2.7	214	4	2.3
22	627	36	61	193	5	2.6	216	4	2.3
23	560	37	56	181	4	2.0	210	4	2.3
24	501	38	51	177	4	1.9	204	4	2.2
25	465	37	46	181	5	2.4	199	4	2.1
26	441	41	49	195	5	2.6	193	4	2.1
27	415	51	57	193	4	2.1	195	4	2.1
28	385	65	68	186	4	2.0	192	5	2.6
29	356	89	86	192	4	2.1	192	5	2.6
30	326	63	55	196	4	2.1	193	5	2.6
31	307	41	34	204	6	3.3	--	--	--
TOTAL	**31,129**	**--**	**3,562**	**7,922**	**--**	**422.7**	**6,188**	**--**	**76.3**
MEAN	**1,004**	**43**	**115**	**256**	**17**	**14**	**206**	**5**	**2.5**
MAX	**1,720**	**89**	**288**	**372**	**46**	**46**	**221**	**8**	**4.7**
MIN	**307**	**27**	**34**	**177**	**4**	**1.9**	**192**	**3**	**1.7**

Total for water year 2011 (unrounded sum of daily values): streamflow–164,388 ft³/s (annual runoff–326,100 acre-ft); suspended-sediment discharge–23,010.3 tons.

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2010 through September 2011.

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	910	4	9.8	1,010	6	16	871	5	12
2	909	4	9.8	1,000	7	19	e985	5	13
3	905	5	12	1,000	7	19	1,000	5	14
4	916	5	12	1,000	7	19	962	6	16
5	964	10	26	1,000	7	19	903	6	15
6	1,060	17	49	1,000	7	19	945	7	18
7	1,070	16	46	1,020	7	19	983	8	21
8	1,030	12	33	1,030	8	22	898	10	24
9	1,040	12	34	1,050	8	23	1,010	11	30
10	1,050	12	34	1,040	7	20	1,060	10	29
11	1,060	12	34	1,010	6	16	980	9	24
12	1,090	11	32	1,010	6	16	956	9	23
13	1,090	10	29	1,000	5	14	995	8	21
14	1,070	10	29	1,010	6	16	1,080	7	20
15	1,060	9	26	1,010	6	16	1,090	6	18
16	1,050	9	26	1,080	8	23	1,010	5	14
17	1,040	8	22	1,110	10	30	971	4	10
18	1,030	8	22	1,080	9	26	e920	3	7.5
19	1,030	7	19	1,070	8	23	e920	4	9.9
20	1,030	7	19	1,020	7	19	e880	4	9.5
21	1,020	7	19	1,000	6	16	e820	5	11
22	1,020	8	22	870	4	9.4	e840	4	9.1
23	1,020	9	25	803	4	8.7	e800	4	8.6
24	1,020	9	25	578	4	6.2	e820	3	6.6
25	1,040	10	28	655	4	7.1	e880	4	9.5
26	1,060	10	29	647	5	8.7	e840	5	11
27	1,050	8	23	773	6	13	e830	5	11
28	1,030	7	19	917	6	15	e880	6	14
29	1,020	7	19	924	6	15	e910	6	15
30	1,010	7	19	915	7	17	e915	6	15
31	1,010	6	16	--	--	--	e820	5	11
TOTAL	**31,704**	**--**	**767.6**	**28,632**	**--**	**510.1**	**28,774**	**--**	**470.7**
MEAN	**1,023**	**9**	**25**	**954**	**6**	**17**	**928**	**6**	**15**
MAX	**1,090**	**17**	**49**	**1,110**	**10**	**30**	**1,090**	**11**	**30**
MIN	**905**	**4**	**9.8**	**578**	**4**	**6.2**	**800**	**3**	**6.6**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		JANUARY			FEBRUARY			MARCH	
1	e635	5	8.6	766	25	52	863	10	23
2	e755	6	12	710	24	46	879	9	21
3	e790	6	13	790	24	51	916	10	25
4	e820	7	15	809	25	55	941	10	25
5	e850	7	16	984	39	104	962	12	31
6	e810	8	17	963	34	88	959	11	28
7	943	11	28	963	27	70	975	9	24
8	974	14	37	928	20	50	992	10	27
9	937	13	33	843	14	32	990	11	29
10	874	10	24	781	11	23	1,010	12	33
11	856	8	18	827	11	25	1,160	46	144
12	969	7	18	940	16	41	1,120	42	127
13	956	8	21	1,070	32	92	1,090	27	79
14	894	8	19	1,250	45	152	1,160	27	85
15	1,060	10	29	1,240	42	141	1,200	27	87
16	1,130	23	70	1,500	59	239	1,250	31	105
17	1,580	115	491	1,300	52	183	1,410	52	198
18	2,130	137	788	1,110	39	117	1,280	34	118
19	1,820	86	423	1,030	26	72	1,200	22	71
20	1,300	43	151	943	18	46	1,150	18	56
21	1,140	18	55	782	15	32	1,110	17	51
22	1,190	14	45	865	16	37	1,150	19	59
23	1,170	15	47	961	24	62	1,150	17	53
24	1,090	15	44	896	20	48	1,120	17	51
25	1,070	16	46	717	15	29	1,140	17	52
26	1,080	20	58	705	14	27	1,160	17	53
27	1,050	24	68	763	15	31	1,140	18	55
28	1,040	28	79	789	13	28	1,150	17	53
29	1,030	31	86	--	--	--	1,140	18	55
30	1,040	33	93	--	--	--	1,160	20	63
31	919	30	74	--	--	--	1,250	29	98
TOTAL	**32,902**	**--**	**2,926.6**	**26,225**	**--**	**1,973**	**34,177**	**--**	**1,979**
MEAN	**1,061**	**25**	**94**	**937**	**26**	**70**	**1,102**	**21**	**64**
MAX	**2,130**	**137**	**788**	**1,500**	**59**	**239**	**1,410**	**52**	**198**
MIN	**635**	**5**	**8.6**	**705**	**11**	**23**	**863**	**9**	**21**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		APRIL			MAY			JUNE	
1	1,810	131	640	1,620	19	83	6,830	142	2,620
2	2,110	132	752	1,610	20	87	7,320	190	3,760
3	2,110	86	490	1,660	24	108	8,890	215	5,160
4	1,890	55	281	1,730	28	131	8,930	191	4,610
5	1,750	42	198	1,770	29	139	8,760	154	3,640
6	1,710	36	166	1,940	40	210	8,870	159	3,810
7	1,640	31	137	2,180	64	377	9,340	224	5,650
8	1,560	28	118	2,490	99	666	10,500	372	10,500
9	1,500	26	105	3,020	155	1,260	11,600	386	12,100
10	1,470	23	91	3,550	198	1,900	12,100	304	9,930
11	1,460	23	91	3,820	174	1,790	12,700	301	10,300
12	1,480	23	92	4,000	179	1,930	12,400	234	7,830
13	1,510	24	98	4,380	186	2,200	12,300	196	6,510
14	1,590	26	112	5,190	286	4,010	11,900	194	6,230
15	1,600	26	112	5,860	281	4,450	10,800	184	5,370
16	1,560	27	114	6,040	212	3,460	10,400	164	4,610
17	1,620	27	118	6,040	164	2,670	9,720	145	3,810
18	1,730	33	154	5,720	116	1,790	9,240	138	3,440
19	1,720	30	139	5,460	89	1,310	8,740	128	3,020
20	1,670	24	108	5,470	77	1,140	8,710	117	2,750
21	1,620	22	96	5,640	75	1,140	8,510	101	2,320
22	1,630	19	84	5,940	89	1,430	8,700	92	2,160
23	1,600	18	78	6,420	109	1,890	8,930	111	2,680
24	1,570	20	85	7,300	172	3,390	9,860	130	3,460
25	1,600	23	99	8,770	297	7,030	9,580	133	3,440
26	1,660	23	103	8,730	224	5,280	9,280	87	2,180
27	1,670	25	113	8,580	172	3,980	8,690	77	1,810
28	1,680	26	118	7,820	121	2,550	8,160	72	1,590
29	1,700	23	106	7,380	113	2,250	8,310	76	1,710
30	1,650	17	76	7,190	161	3,130	8,500	76	1,740
31	--	--	--	7,250	155	3,030	--	--	--
TOTAL	**49,870**	**--**	**5,074**	**154,570**	**--**	**64,811**	**288,570**	**--**	**138,740**
MEAN	**1,662**	**36**	**169**	**4,986**	**133**	**2,090**	**9,619**	**170**	**4,620**
MAX	**2,110**	**132**	**752**	**8,770**	**297**	**7,030**	**12,700**	**386**	**12,100**
MIN	**1,460**	**17**	**76**	**1,610**	**19**	**83**	**6,830**	**72**	**1,590**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2010 through September 2011.—Continued

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/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	8,380	65	1,470	1,730	14	65	894	6	14
2	7,840	58	1,230	1,760	13	62	896	6	15
3	7,430	57	1,140	1,740	12	56	893	5	12
4	7,090	56	1,070	1,680	11	50	885	5	12
5	6,800	53	973	1,660	11	49	890	5	12
6	6,440	53	922	1,620	11	48	867	5	12
7	6,090	51	839	1,570	11	47	851	4	9.2
8	5,940	50	802	1,520	11	45	849	4	9.2
9	5,630	49	745	1,440	10	39	848	5	11
10	5,050	49	668	1,350	9	33	844	5	11
11	4,570	47	580	1,330	9	32	835	5	11
12	4,220	39	444	1,300	8	28	839	5	11
13	4,200	37	420	1,260	9	31	827	5	11
14	4,370	40	472	1,210	8	26	821	6	13
15	4,630	51	638	1,180	7	22	827	6	13
16	4,390	43	510	1,120	7	21	863	7	16
17	4,140	37	414	1,100	5	15	903	7	17
18	3,720	34	341	1,060	5	14	924	8	20
19	3,400	31	285	1,030	5	14	928	8	20
20	3,210	28	243	986	5	13	941	9	23
21	3,050	25	206	967	5	13	948	9	23
22	2,920	23	181	943	5	13	938	9	23
23	2,780	22	165	913	5	12	922	8	20
24	2,580	20	139	876	5	12	906	8	20
25	2,410	18	117	863	5	12	885	8	19
26	2,290	19	117	862	5	12	880	7	17
27	2,170	19	111	861	5	12	864	7	16
28	2,080	17	95	851	5	11	846	6	14
29	1,980	15	80	856	5	12	832	7	16
30	1,860	14	70	849	5	11	838	7	16
31	1,770	13	62	862	6	14	--	--	--
TOTAL	**133,430**	**--**	**15,549**	**37,349**	**--**	**844**	**26,284**	**--**	**456.4**
MEAN	**4,304**	**37**	**502**	**1,205**	**8**	**27**	**876**	**6**	**15**
MAX	**8,380**	**65**	**1,470**	**1,760**	**14**	**65**	**948**	**9**	**23**
MIN	**1,770**	**13**	**62**	**849**	**5**	**11**	**821**	**4**	**9.2**

Total for water year 2011 (unrounded sum of daily values): streamflow–872,487 ft³/s (annual runoff–1,731,000 acre-ft); suspended-sediment discharge–234,101.4 tons.

Table 7. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 2010 through September 2011.

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	547	4	5.9	e550	3	4.5	733	1	2.0
2	545	5	7.4	e550	3	4.5	699	2	3.8
3	541	5	7.3	e540	3	4.4	688	2	3.7
4	546	4	5.9	e540	3	4.4	697	2	3.8
5	555	5	7.5	540	3	4.4	e600	2	3.2
6	559	5	7.5	541	3	4.4	e500	1	1.4
7	575	5	7.8	541	3	4.4	e530	1	1.4
8	579	5	7.8	541	2	2.9	e675	2	3.6
9	584	5	7.9	541	2	2.9	e640	2	3.5
10	582	5	7.9	540	3	4.4	e620	2	3.3
11	586	5	7.9	537	3	4.3	e585	3	4.7
12	581	4	6.3	533	3	4.3	e590	3	4.8
13	582	4	6.3	536	3	4.3	e648	3	5.2
14	583	3	4.7	542	2	2.9	e700	3	5.7
15	582	3	4.7	548	2	3	e710	3	5.8
16	574	3	4.6	629	3	5.1	e605	4	6.5
17	571	3	4.6	665	6	11	e450	4	4.9
18	565	3	4.6	634	3	5.1	e435	3	3.5
19	561	2	3.0	590	3	4.8	e430	2	2.3
20	553	2	3.0	575	3	4.7	e475	1	1.3
21	552	2	3.0	538	3	4.4	e500	2	2.7
22	547	2	3.0	476	3	3.9	e470	2	2.5
23	542	2	2.9	434	1	1.2	e500	2	2.7
24	551	2	3.0	333	1	0.9	e500	2	2.7
25	553	3	4.5	419	1	1.1	e510	2	2.8
26	564	3	4.6	557	1	1.5	e530	1	1.4
27	560	2	3.0	628	1	1.7	e485	1	1.3
28	554	2	3.0	672	5	9.1	e495	1	1.3
29	554	3	4.5	627	1	1.7	e480	1	1.3
30	554	3	4.5	688	1	1.9	e475	1	1.3
31	549	3	4.4	--	--	--	e430	1	1.2
TOTAL	**17,431**	**--**	**163**	**16,585**	**--**	**118.1**	**17,385**	**--**	**95.6**
MEAN	**562**	**3**	**5.3**	**553**	**3**	**3.9**	**561**	**2**	**3.1**
MAX	**586**	**5**	**7.9**	**688**	**6**	**11**	**733**	**4**	**6.5**
MIN	**541**	**2**	**2.9**	**333**	**1**	**.9**	**430**	**1**	**1.2**

Table 7. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		JANUARY			**FEBRUARY**			**MARCH**	
1	e345	1	0.93	521	16	23	691	3	5.6
2	e395	1	1.1	529	9	13	681	3	5.5
3	e430	1	1.2	629	6	10	670	5	9.0
4	e465	1	1.3	745	6	12	654	6	11
5	e480	2	2.6	807	6	13	638	9	16
6	e500	2	2.7	789	6	13	634	10	17
7	e450	2	2.4	792	6	13	624	9	15
8	e500	2	2.7	749	6	12	621	5	8.4
9	e490	2	2.6	666	5	9.0	620	3	5.0
10	e480	2	2.6	755	5	10	621	5	8.4
11	e455	2	2.5	740	6	12	649	6	11
12	e450	2	2.4	742	7	14	648	5	8.7
13	e490	2	2.6	775	7	15	667	5	9.0
14	e500	3	4.0	781	7	15	730	8	16
15	e890	6	14	785	7	15	788	12	26
16	e965	12	31	854	12	28	835	13	29
17	1,340	28	101	862	16	37	868	14	33
18	1,280	20	69	846	9	21	894	15	36
19	1,290	18	63	776	7	15	887	14	34
20	1,110	10	30	717	5	9.7	852	10	23
21	1,060	6	17	660	4	7.1	816	8	18
22	1,050	6	17	721	5	9.7	824	6	13
23	1,010	6	16	738	6	12	839	6	14
24	953	5	13	643	5	8.7	863	9	21
25	944	5	13	538	4	5.8	921	10	25
26	921	5	12	516	4	5.6	953	15	39
27	887	5	12	639	4	6.9	972	18	47
28	862	5	12	688	4	7.4	1,000	16	43
29	857	14	32	--	--	--	1,030	15	42
30	855	20	46	--	--	--	1,110	16	48
31	660	10	18	--	--	--	1,550	33	138
TOTAL	**23,364**	**--**	**547.63**	**20,003**	**--**	**372.9**	**25,150**	**--**	**774.6**
MEAN	**754**	**7**	**18**	**714**	**7**	**13**	**811**	**10**	**25**
MAX	**1,340**	**28**	**101**	**862**	**16**	**37**	**1,550**	**33**	**138**
MIN	**345**	**1**	**.93**	**516**	**4**	**5.6**	**620**	**3**	**5.0**

Table 7. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 2010 through September 2011.—Continued

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		APRIL			**MAY**			**JUNE**	
1	2,740	88	651	2,480	12	80	8,000	46	994
2	3,100	79	661	2,430	9	59	8,940	56	1,350
3	3,270	47	415	2,480	12	80	10,900	90	2,650
4	3,150	31	264	2,620	14	99	10,700	85	2,460
5	3,070	23	191	2,800	16	121	10,600	79	2,260
6	2,960	21	168	3,110	23	193	11,200	88	2,660
7	2,790	18	136	3,600	32	311	14,100	208	7,920
8	2,600	15	105	4,310	48	559	16,600	323	14,500
9	2,420	12	78	4,960	62	830	17,000	277	12,700
10	2,290	12	74	5,520	68	1,010	16,100	276	12,000
11	2,230	12	72	6,060	92	1,510	15,100	208	8,480
12	2,230	11	66	7,010	94	1,780	14,400	165	6,420
13	2,250	10	61	7,950	103	2,210	13,900	149	5,590
14	2,430	11	72	9,560	126	3,250	13,300	126	4,520
15	2,490	12	81	10,900	161	4,740	12,900	113	3,940
16	2,460	12	80	11,900	154	4,950	12,200	106	3,490
17	2,540	11	75	12,100	131	4,280	11,200	80	2,420
18	2,620	12	85	11,300	90	2,750	10,200	65	1,790
19	2,630	15	107	10,600	77	2,200	9,660	62	1,620
20	2,560	9	62	10,300	68	1,890	9,310	54	1,360
21	2,480	9	60	10,200	64	1,760	9,270	54	1,350
22	2,390	7	45	10,500	78	2,210	9,700	64	1,680
23	2,310	10	62	11,700	118	3,730	10,600	84	2,400
24	2,250	8	49	12,800	148	5,110	11,800	125	3,980
25	2,290	9	56	13,300	155	5,570	11,600	121	3,790
26	2,410	9	59	13,400	133	4,810	10,200	77	2,120
27	2,480	12	80	13,400	135	4,880	9,100	56	1,380
28	2,550	11	76	12,100	109	3,560	8,580	49	1,140
29	2,590	11	77	10,500	93	2,640	9,190	61	1,510
30	2,550	10	69	9,360	60	1,520	10,100	78	2,130
31	--	--	--	8,350	46	1,040	--	--	--
TOTAL	**77,130**	**--**	**4,137**	**257,600**	**--**	**69,732**	**346,450**	**--**	**120,604**
MEAN	**2,571**	**19**	**138**	**8,310**	**82**	**2,250**	**11,550**	**114**	**4,020**
MAX	**3,270**	**88**	**661**	**13,400**	**161**	**5,570**	**17,000**	**323**	**14,500**
MIN	**2,230**	**7**	**45**	**2,430**	**9**	**59**	**8,000**	**46**	**994**

Table 7. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 2010 through September 2011.—Continued

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

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/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	9,850	67	1,780	1,830	5	25	934	4	10
2	8,890	49	1,180	1,790	5	24	943	3	7.6
3	8,210	43	953	1,770	4	19	919	3	7.4
4	8,020	43	931	1,710	4	18	905	2	4.9
5	7,800	39	821	1,650	4	18	888	2	4.8
6	7,430	37	742	1,610	5	22	869	2	4.7
7	7,080	34	650	1,580	5	21	844	2	4.6
8	6,780	30	549	1,520	4	16	836	3	6.8
9	6,380	27	465	1,460	4	16	836	3	6.8
10	5,800	26	407	1,410	4	15	829	3	6.7
11	5,300	26	372	1,380	3	11	809	3	6.6
12	5,080	24	329	1,370	3	11	794	3	6.4
13	5,240	25	354	1,320	3	11	792	3	6.4
14	5,270	21	299	1,290	3	10	781	3	6.3
15	4,960	19	254	1,260	4	14	771	2	4.2
16	4,560	16	197	1,230	4	13	786	2	4.2
17	4,310	14	163	1,200	3	9.7	787	2	4.2
18	4,040	13	142	1,150	3	9.3	785	2	4.2
19	3,800	11	113	1,130	3	9.2	797	3	6.5
20	3,630	10	98	1,110	3	9	814	3	6.6
21	3,440	8	74	1,110	3	9	804	3	6.5
22	3,200	8	69	1,090	3	8.8	785	3	6.4
23	3,030	8	65	1,070	3	8.7	760	3	6.2
24	2,800	7	53	1,030	3	8.3	734	3	5.9
25	2,630	7	50	998	3	8.1	720	3	5.8
26	2,490	7	47	976	3	7.9	711	3	5.8
27	2,360	8	51	951	3	7.7	704	4	7.6
28	2,240	7	42	938	4	10	697	4	7.5
29	2,130	6	35	932	3	7.5	686	3	5.6
30	2,020	6	33	926	3	7.5	685	3	5.5
31	1,940	5	26	929	3	7.5	--	--	--
TOTAL	**150,710**	**--**	**11,344**	**39,720**	**--**	**392.2**	**24,005**	**--**	**182.7**
MEAN	**4,862**	**21**	**366**	**1,281**	**4**	**13**	**800**	**3**	**6.1**
MAX	**9,850**	**67**	**1,780**	**1,830**	**5**	**25**	**943**	**4**	**10**
MIN	**1,940**	**5**	**26**	**926**	**3**	**7.5**	**685**	**2**	**4.2**

Total for water year 2011 (unrounded sum of daily values): streamflow–1,015,533 ft³/s (annual runoff–2,014,000 acre-ft); suspended-sediment discharge–208,463.7 tons.

Table 8. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2010 through September 2011.

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
	OCTOBER			NOVEMBER			DECEMBER		
1	1,470	8	32	1,470	13	52	1,470	22	87
2	1,460	9	35	1,470	13	52	1,560	17	72
3	1,440	9	35	1,460	12	47	1,560	12	51
4	1,440	9	35	1,450	11	43	1,460	11	43
5	1,480	9	36	1,460	11	43	1,360	11	40
6	1,580	11	47	1,450	10	39	1,310	11	39
7	1,610	11	48	1,480	12	48	1,400	12	45
8	1,570	10	42	1,490	16	64	1,560	13	55
9	1,580	10	43	1,510	20	82	1,630	14	62
10	1,580	11	47	1,510	24	98	1,680	12	54
11	1,580	11	47	1,470	18	71	1,560	10	42
12	1,610	10	43	1,460	13	51	1,540	9	37
13	1,610	9	39	1,460	9	35	1,650	9	40
14	1,590	8	34	1,470	7	28	1,820	15	74
15	1,580	8	34	1,490	8	32	1,870	15	76
16	1,550	7	29	1,630	13	57	1,730	146	682
17	1,540	7	29	1,700	17	78	1,540	63	262
18	1,520	7	29	1,650	16	71	1,430	7	27
19	1,500	6	24	1,620	15	66	e1,400	9	34
20	1,500	6	24	1,490	15	60	e1,400	10	38
21	1,480	6	24	1,390	14	53	e1,350	7	26
22	1,480	6	24	1,150	21	65	e1,350	10	36
23	1,480	7	28	1,030	23	64	e1,350	15	55
24	1,480	7	28	758	20	41	e1,350	9	33
25	1,500	9	36	808	20	44	e1,400	4	15
26	1,540	20	83	1,060	25	72	e1,400	13	49
27	1,520	21	86	1,350	21	77	e1,350	28	102
28	1,500	21	85	1,620	22	96	e1,400	26	98
29	1,490	20	80	1,580	13	55	e1,400	16	60
30	1,480	17	68	1,450	9	35	e1,400	26	98
31	1,480	15	60	--	--	--	e1,300	73	256
TOTAL	**47,220**	**--**	**1,334**	**42,386**	**--**	**1,719**	**45,980**	**--**	**2,688**
MEAN	**1,523**	**10**	**43**	**1,413**	**15**	**57**	**1,483**	**21**	**87**
MAX	**1,610**	**21**	**86**	**1,700**	**25**	**98**	**1,870**	**146**	**682**
MIN	**1,440**	**6**	**24**	**758**	**7**	**28**	**1,300**	**4**	**15**

Table 8. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		JANUARY			**FEBRUARY**			**MARCH**	
1	e1,100	161	478	1,290	16	56	1,570	7	30
2	e1,200	179	580	1,270	22	75	1,580	7	30
3	e1,300	111	390	1,400	40	151	1,630	8	35
4	e1,350	53	193	1,640	74	328	1,620	8	35
5	e1,400	25	95	1,900	98	503	1,630	7	31
6	e1,400	41	155	1,850	83	415	1,620	7	31
7	e1,450	80	313	1,880	67	340	1,620	6	26
8	e1,500	113	458	1,740	52	244	1,640	6	27
9	e1,500	132	535	1,540	36	150	1,620	6	26
10	e1,450	134	525	1,610	20	87	1,640	12	53
11	e1,400	128	484	1,620	9	39	1,820	25	123
12	e1,450	189	740	1,780	13	62	1,810	19	93
13	e1,500	221	895	1,950	16	84	1,780	16	77
14	e1,600	118	510	2,190	23	136	1,910	18	93
15	e2,000	48	259	2,180	26	153	2,040	19	105
16	e2,100	54	306	2,560	49	339	2,130	18	104
17	2,980	116	933	2,410	44	286	2,370	32	205
18	3,850	132	1,370	2,130	27	155	2,270	25	153
19	3,630	85	833	1,970	18	96	2,160	19	111
20	2,730	38	280	1,760	12	57	2,080	15	84
21	2,420	15	98	1,490	11	44	1,980	12	64
22	2,440	13	86	1,640	15	66	2,020	13	71
23	2,380	11	71	1,790	20	97	2,030	13	71
24	2,220	10	60	1,580	12	51	2,020	13	71
25	2,190	9	53	1,230	3	10	2,100	15	85
26	2,170	11	64	1,130	3	9.2	2,160	17	99
27	2,090	13	73	1,350	8	29	2,150	16	93
28	2,040	15	83	1,500	6	24	2,180	17	100
29	2,030	17	93	--	--	--	2,210	18	107
30	2,050	21	116	--	--	--	2,300	26	161
31	1,690	17	78	--	--	--	2,800	73	552
TOTAL	**60,610**	**--**	**11,207**	**48,380**	**--**	**4,086.2**	**60,490**	**--**	**2,946**
MEAN	**1,955**	**75**	**362**	**1,728**	**29**	**146**	**1,951**	**17**	**95**
MAX	**3,850**	**221**	**1,370**	**2,560**	**98**	**503**	**2,800**	**73**	**552**
MIN	**1,100**	**9**	**53**	**1,130**	**3**	**9.2**	**1,570**	**6**	**26**

Table 8. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		APRIL			MAY			JUNE	
1	4,610	166	2,070	4,310	14	163	14,100	84	3,200
2	5,290	146	2,090	4,250	15	172	15,200	108	4,430
3	5,510	99	1,470	4,320	17	198	18,600	160	8,040
4	5,210	60	844	4,520	19	232	18,400	139	6,910
5	5,000	41	554	4,700	24	305	18,000	117	5,690
6	4,860	33	433	5,080	36	494	18,600	120	6,030
7	4,650	28	352	5,700	58	893	21,800	224	13,200
8	4,420	23	274	6,530	97	1,710	25,900	399	27,900
9	4,180	18	203	7,470	137	2,760	28,000	478	36,100
10	4,010	18	195	8,480	151	3,460	28,100	385	29,200
11	3,910	18	190	9,380	155	3,930	27,300	358	26,400
12	3,910	18	190	10,400	151	4,240	25,900	287	20,100
13	3,980	22	236	11,700	187	5,910	24,800	266	17,800
14	4,200	19	215	13,900	283	10,600	23,700	225	14,400
15	4,290	19	220	16,100	264	11,500	22,900	187	11,600
16	4,240	19	218	17,500	225	10,600	21,800	167	9,830
17	4,340	19	223	18,100	186	9,090	20,300	145	7,950
18	4,520	20	244	17,100	129	5,960	18,700	134	6,770
19	4,550	19	233	16,000	103	4,450	17,700	125	5,970
20	4,440	15	180	15,500	90	3,770	17,300	119	5,560
21	4,310	14	163	15,400	83	3,450	17,100	108	4,990
22	4,250	12	138	15,900	94	4,040	17,400	110	5,170
23	4,130	12	134	17,300	129	6,030	18,300	131	6,470
24	4,050	12	131	19,100	209	10,800	19,900	167	8,970
25	4,110	13	144	21,300	358	20,600	20,000	153	8,260
26	4,280	14	162	22,300	295	17,800	18,300	121	5,980
27	4,360	17	200	22,300	236	14,200	16,800	100	4,540
28	4,430	18	215	20,400	164	9,030	15,800	87	3,710
29	4,490	16	194	18,200	124	6,090	16,300	96	4,220
30	4,420	13	155	16,300	107	4,710	17,600	111	5,270
31	--	--	--	15,000	90	3,640	--	--	--
TOTAL	**132,950**	**--**	**12,270**	**404,540**	**--**	**180,827**	**604,600**	**--**	**324,660**
MEAN	**4,432**	**32**	**409**	**13,050**	**136**	**5,853**	**20,150**	**180**	**10,800**
MAX	**5,510**	**166**	**2,090**	**22,300**	**358**	**20,600**	**28,100**	**478**	**36,100**
MIN	**3,910**	**12**	**131**	**4,250**	**14**	**163**	**14,100**	**84**	**3,200**

Table 8. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2010 through September 2011.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; 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 concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		JULY			**AUGUST**			**SEPTEMBER**	
1	17,300	95	4,440	3,650	8	79	1,960	4	21
2	15,900	80	3,430	3,630	8	78	1,970	4	21
3	14,800	70	2,800	3,590	8	78	1,950	3	16
4	14,300	67	2,590	3,490	7	66	1,930	3	16
5	13,900	66	2,480	3,400	7	64	1,910	3	15
6	13,300	58	2,080	3,300	7	62	1,880	3	15
7	12,700	54	1,850	3,220	7	61	1,840	3	15
8	12,200	49	1,610	3,120	6	51	1,830	3	15
9	11,600	44	1,380	2,990	6	48	1,830	3	15
10	10,600	42	1,200	2,870	6	46	1,820	3	15
11	9,670	40	1,040	2,810	5	38	1,790	4	19
12	9,140	39	962	2,770	5	37	1,780	4	19
13	9,250	38	949	2,680	5	36	1,760	4	19
14	9,430	35	891	2,610	5	35	1,750	4	19
15	9,400	45	1,140	2,550	4	28	1,740	5	23
16	8,910	38	914	2,480	4	27	1,780	5	24
17	8,480	31	710	2,420	4	26	1,820	5	25
18	7,890	27	575	2,340	4	25	1,840	5	25
19	7,370	24	478	2,280	4	25	1,860	5	25
20	7,050	21	400	2,230	4	24	1,890	5	26
21	6,720	18	327	2,210	4	24	1,890	5	26
22	6,340	15	257	2,170	4	23	1,860	5	25
23	6,020	13	211	2,120	4	23	1,820	5	25
24	5,540	12	179	2,050	4	22	1,770	5	24
25	5,170	12	168	2,000	4	22	1,740	5	23
26	4,880	11	145	1,970	4	21	1,720	6	28
27	4,640	10	125	1,950	4	21	1,700	6	28
28	4,410	9	107	1,930	4	21	1,680	7	32
29	4,200	8	91	1,930	4	21	1,660	7	31
30	3,980	8	86	1,920	4	21	1,660	7	31
31	3,800	9	92	1,930	4	21	--	--	--
TOTAL	**278,890**	**--**	**33,707**	**80,610**	**--**	**1,174**	**54,430**	**--**	**661**
MEAN	**8,996**	**35**	**1,090**	**2,600**	**5**	**38**	**1,814**	**5**	**22**
MAX	**17,300**	**95**	**4,440**	**3,650**	**8**	**79**	**1,970**	**7**	**32**
MIN	**3,800**	**8**	**86**	**1,920**	**4**	**21**	**1,660**	**3**	**15**

Total for water year 2011 (unrounded sum of daily values): streamflow–1,861,086 ft³/s (annual runoff–3,691,000acre-ft); suspended-sediment discharge–577,279.2 tons.

Table 9. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Mill Creek near Anaconda, Montana, April through September 2011.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbol: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
		APRIL			MAY			JUNE	
1	--	--	--	5.5	3.5	4.0	7.5	6.0	6.5
2	--	--	--	6.5	3.5	4.5	8.5	6.0	7.0
3	--	--	--	7.0	4.0	5.5	7.5	5.5	6.0
4	--	--	--	9.0	4.5	6.0	6.5	5.0	5.5
5	--	--	--	13	5.0	7.5	9.0	4.5	5.5
6	--	--	--	13	6.0	8.5	12	6.0	7.0
7	--	--	--	25	7.5	13	28	7.5	20
8	--	--	--	30	14	20	26	13	16
9	--	--	--	29	18	21	23	10	14
10	--	--	--	20	16	18	13	8.0	9.0
11	3.5	2.5	3.0	23	16	18	9.0	7.0	8.0
12	4.5	2.5	3.0	29	18	23	9.5	6.5	7.5
13	5.0	3.0	3.5	26	17	20	8.0	5.5	6.5
14	4.0	3.0	3.5	29	12	16	7.5	5.0	6.0
15	4.0	3.0	3.5	15	10	12	7.0	5.0	5.5
16	5.5	2.5	3.5	15	10	12	7.0	5.0	5.5
17	7.5	4.0	4.5	12	8.5	9.5	6.5	4.5	5.0
18	7.5	4.5	5.5	10	7.5	8.5	5.5	4.0	4.5
19	6.5	4.0	4.5	9.0	7.0	8.0	5.0	3.5	4.5
20	6.5	4.0	4.5	12	7.5	8.0	6.0	3.5	4.5
21	4.5	3.5	4.0	10	6.5	8.0	8.0	3.5	5.0
22	4.5	3.5	3.5	23	7.0	10	14	4.5	7.0
23	5.0	3.0	3.5	25	9.5	14	60	8.5	18
24	4.5	3.0	3.5	30	25	27	67	30	44
25	5.0	3.0	4.0	29	18	22	38	15	21
26	5.5	3.5	4.0	21	13	16	20	11	14
27	5.5	3.5	4.0	15	10	12	20	9.5	12
28	6.5	4.0	4.5	13	8.5	9.5	31	8.5	15
29	5.0	4.0	4.5	9.5	7.0	8.0	45	18	29
30	5.0	3.5	4.0	12	7.0	7.5	40	14	23
31	--	--	--	8.0	6.5	7.0	--	--	--
MONTH[1]	**7.5**	**2.5**	**3.9**	**30**	**3.5**	**12**	**67**	**3.5**	**11**

Table 9. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Mill Creek near Anaconda, Montana, April through September 2011.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbol: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	JULY			AUGUST			SEPTEMBER		
1	17	9.0	12	5.0	1.5	2.5	--	--	--
2	12	7.0	8.5	3.5	1.5	2.0	2.5	0.5	1.5
3	21	6.5	9.5	3.5	1.5	2.0	3.0	.5	1.5
4	26	8.0	13	3.5	1.5	2.0	3.0	.5	1.0
5	14	8.0	11	3.0	1.5	2.0	2.0	.5	1.0
6	14	7.0	10	3.0	1.0	2.0	2.0	.5	1.0
7	13	6.0	7.5	3.0	1.0	2.0	2.5	.5	1.5
8	12	6.0	7.5	3.5	1.0	2.0	2.0	.5	1.0
9	11	7.0	9.0	3.5	1.0	2.0	2.0	.5	1.0
10	7.5	5.5	6.5	3.5	1.0	2.0	2.5	.5	1.0
11	8.5	4.5	6.0	4.0	1.0	2.0	2.0	.5	1.0
12	9.5	4.5	6.0	3.0	1.0	2.0	2.0	.5	1.0
13	16	4.5	7.5	3.5	1.0	1.5	2.5	.5	1.0
14	16	6.0	10	3.0	1.0	2.0	2.5	.5	1.5
15	7.0	4.5	5.5	3.0	1.0	2.0	2.0	.5	1.0
16	6.0	4.0	4.5	3.5	1.0	2.0	3.0	1.0	1.5
17	5.5	4.0	4.5	3.0	1.0	2.0	2.0	.5	1.5
18	6.0	3.5	4.5	3.5	1.0	2.0	2.0	.5	1.0
19	6.0	3.0	4.0	3.5	1.0	2.0	2.0	.5	1.0
20	5.0	3.0	4.0	3.0	1.0	2.0	3.5	.5	1.5
21	5.5	3.0	4.0	3.5	1.0	1.5	2.5	.5	1.5
22	5.5	2.5	3.5	3.5	.5	1.5	3.0	.5	1.5
23	5.0	2.5	3.5	3.5	.5	1.5	2.5	.5	1.5
24	5.0	2.5	3.5	3.0	.5	1.5	2.5	.5	1.5
25	4.5	2.0	3.0	2.5	1.0	1.5	2.5	.5	1.0
26	4.0	2.0	3.0	2.5	.5	1.5	2.0	.5	1.0
27	4.0	2.0	2.5	2.5	.5	1.0	2.5	.5	1.0
28	4.0	2.0	2.5	2.0	.5	1.0	3.0	1.0	1.5
29	3.5	1.5	2.5	2.0	1.0	1.5	--	--	--
30	3.5	1.5	2.5	2.5	.5	1.0	--	--	--
31	3.5	1.5	2.5	3.0	.5	1.5	--	--	--
MONTH[1]	**26**	**1.5**	**5.9**	**5.0**	**.5**	**1.8**	**3.5**	**.5**	**1.2**

[1]For months with missing daily values, the means are calculated using available values.

Table 10. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Willow Creek near Anaconda, Montana, May through September 2011.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
		MAY			JUNE			JULY	
1	--	--	--	30	14	17	8.0	5.0	6.0
2	--	--	--	29	20	22	8.0	5.0	6.0
3	--	--	--	26	18	21	8.0	5.0	6.0
4	--	--	--	29	16	20	7.0	4.5	5.5
5	--	--	--	--	--	--	7.5	4.5	5.5
6	28	17	21	110	8.0	46	7.0	4.5	5.5
7	44	18	26	120	32	67	7.5	4.5	5.5
8	64	22	31	45	18	26	7.0	4.0	5.0
9	64	28	35	42	30	37	6.5	4.0	4.5
10	38	25	30	110	9.0	40	6.0	4.0	4.5
11	48	21	27	110	18	48	7.5	3.5	5.0
12	56	27	38	39	23	31	7.5	3.5	4.5
13	90	35	49	36	23	28	--	--	--
14	67	33	48	37	21	25	--	--	--
15	37	26	30	41	17	22	--	--	--
16	33	24	27	23	14	17	--	--	--
17	32	18	21	20	13	15	--	--	--
18	19	16	17	17	11	13	--	--	--
19	17	15	16	23	11	13	--	--	--
20	19	14	15	13	9.5	11	8.0	5.5	6.0
21	16	14	15	13	9.5	10	10	5.0	6.5
22	57	14	18	10	8.0	9.0	11	5.0	6.5
23	62	29	42	11	8.0	8.5	8.0	5.0	6.0
24	290	62	150	9.5	7.0	8.0	32	6.0	9.0
25	300	62	170	10	7.0	8.0	14	5.5	7.0
26	87	33	65	9.5	7.0	7.5	11	5.5	7.0
27	59	27	38	8.5	6.5	7.5	14	5.0	7.0
28	35	22	27	8.5	6.0	7.0	9.5	5.0	6.5
29	46	17	26	8.5	5.5	6.5	11	4.5	6.5
30	25	16	19	8.5	5.5	6.0	11	4.5	6.0
31	20	15	16	--	--	--	10	4.5	6.5
MONTH[1]	**300**	**14**	**39**	**120**	**5.5**	**21**	**32**	**3.5**	**6.0**

Table 10. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Willow Creek near Anaconda, Montana, May through September 2011.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	AUGUST			SEPTEMBER		
1	10	4.0	6.0	8.0	3.5	4.5
2	9.5	4.0	6.0	7.5	3.5	4.5
3	10	4.0	6.0	8.0	3.0	4.5
4	9.5	4.0	5.5	7.0	3.0	4.5
5	9.5	4.0	6.0	7.0	3.5	5.0
6	7.5	4.0	5.0	6.5	3.0	4.5
7	8.5	4.0	5.0	7.0	3.5	5.0
8	8.5	4.0	5.0	7.0	3.5	4.5
9	8.5	3.5	5.0	7.5	3.0	4.5
10	9.5	3.5	5.0	7.5	3.0	4.5
11	8.5	3.5	5.0	6.5	3.0	4.0
12	8.5	3.5	5.0	8.5	3.0	4.5
13	8.5	3.5	5.0	8.5	2.5	4.0
14	7.0	3.0	4.5	6.5	2.5	4.0
15	9.0	3.0	4.5	13	3.5	5.5
16	8.0	3.0	4.5	17	3.5	6.0
17	9.5	3.0	5.5	11	4.0	6.0
18	9.0	4.0	5.5	13	5.0	8.5
19	9.0	4.0	5.5	22	7.0	13
20	9.0	4.5	6.0	--	--	--
21	10	4.0	5.5	--	--	--
22	10	4.0	6.0	--	--	--
23	8.0	4.0	5.0	--	--	--
24	11	4.0	5.5	--	--	--
25	9.0	4.5	6.5	--	--	--
26	6.0	4.0	5.0	--	--	--
27	8.5	4.0	5.5	--	--	--
28	8.5	3.5	5.0	--	--	--
29	7.0	3.5	4.5	--	--	--
30	8.0	3.5	5.0	--	--	--
31	9.5	3.5	5.0	--	--	--
MONTH[1]	**11**	**3.0**	**5.3**	**22**	**2.5**	**5.3**

[1]For months with missing daily values, the means are calculated using available values.

Table 11. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Warm Springs Creek near Anaconda, Montana, April through September 2011.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
		APRIL			MAY			JUNE	
1	--	--	--	5.0	2.5	3.0	5.0	3.5	4.5
2	--	--	--	3.5	3.0	3.0	26	4.0	6.0
3	--	--	--	4.0	2.5	3.0	5.0	3.5	4.0
4	--	--	--	4.0	2.5	3.0	4.5	3.0	4.0
5	--	--	--	6.5	2.5	3.5	5.0	3.5	4.0
6	--	--	--	5.0	3.0	3.5	8.0	4.5	5.5
7	--	--	--	5.5	3.0	4.0	54	8.0	29
8	--	--	--	10	3.5	5.0	54	18	30
9	--	--	--	20	5.5	8.5	20	11	15
10	--	--	--	14	4.0	5.5	16	9.0	11
11	4.0	2.5	3.0	7.5	4.0	5.0	16	8.0	9.5
12	3.5	2.5	3.0	6.5	4.0	5.0	9.5	6.0	7.0
13	32	3.0	4.0	16	5.0	7.0	7.5	5.0	6.0
14	5.0	3.0	3.0	18	7.0	11	6.5	5.0	6.0
15	3.5	2.5	3.0	18	6.5	10	9.0	5.5	6.5
16	4.5	2.5	3.0	21	5.5	12	6.5	4.5	5.5
17	4.5	3.0	3.0	11	5.5	7.0	5.5	4.5	5.0
18	3.5	3.0	3.0	6.0	4.5	5.0	6.0	4.0	4.5
19	4.0	2.5	3.0	6.0	4.0	5.0	5.5	4.0	4.5
20	8.0	2.5	3.5	6.5	4.5	5.5	6.5	4.0	5.0
21	6.0	3.0	3.5	7.0	4.5	5.5	8.5	5.0	6.0
22	4.0	2.5	3.0	10	5.5	6.5	15	8.0	10
23	5.0	2.5	3.0	--	--	--	30	11	17
24	4.0	2.5	3.0	--	--	--	39	16	28
25	4.0	2.5	3.0	--	--	--	19	9.5	14
26	5.0	2.5	3.0	--	--	--	12	6.5	8.5
27	5.5	2.5	3.0	10	6.5	7.5	9.5	5.5	6.5
28	3.5	3.0	3.0	8.0	5.0	6.0	16	5.5	7.0
29	3.5	3.0	3.0	9.0	4.5	5.0	18	9.5	13
30	3.5	2.5	3.0	26	4.5	6.0	14	9.5	12
31	--	--	--	5.5	4.0	4.5	--	--	--
MONTH[1]	**32**	**2.5**	**3.1**	**26**	**2.5**	**5.8**	**54**	**3.0**	**9.8**

Table 11. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Warm Springs Creek near Anaconda, Montana, April through September 2011.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
		JULY			AUGUST			SEPTEMBER	
1	12	7.0	9.5	3.0	2.5	2.5	4.0	2.5	2.5
2	12	6.5	7.5	2.5	2.0	2.5	4.0	2.5	2.5
3	10	5.5	7.5	4.0	2.0	2.5	4.5	2.5	2.5
4	13	6.5	9.0	3.0	2.0	2.5	3.5	2.5	2.5
5	16	5.5	8.5	3.0	2.0	2.5	5.0	2.0	2.5
6	24	5.0	8.0	4.0	2.0	2.5	3.0	2.0	2.5
7	8.0	5.0	6.0	3.0	2.0	2.5	3.5	2.0	2.5
8	7.0	4.5	5.5	3.0	2.0	2.5	4.5	2.5	2.5
9	8.5	5.0	6.0	3.0	2.0	2.5	3.0	2.0	2.5
10	11	4.5	5.5	3.0	2.0	2.5	4.0	2.5	2.5
11	9.5	3.5	4.5	3.0	2.5	2.5	3.0	2.5	3.0
12	6.0	3.5	4.5	3.0	2.0	2.5	3.5	2.5	2.5
13	7.0	4.0	4.5	3.0	2.0	2.5	3.5	2.0	2.5
14	6.5	4.0	5.0	3.0	2.0	2.5	3.0	2.0	2.5
15	5.0	3.5	4.0	3.0	2.0	2.5	4.5	2.0	2.5
16	4.5	3.0	3.5	3.0	2.0	2.5	3.5	2.5	3.0
17	5.0	3.0	3.5	3.0	2.5	2.5	3.5	2.5	2.5
18	4.0	3.0	3.5	--	--	--	3.0	2.0	2.5
19	5.0	3.0	3.5	3.5	2.5	2.5	3.0	2.5	2.5
20	4.5	3.0	3.0	3.5	2.5	3.0	3.0	2.0	2.5
21	4.0	3.0	3.0	3.0	2.5	2.5	3.0	2.0	2.5
22	4.0	2.5	3.0	3.5	2.5	3.0	3.0	2.0	2.5
23	4.0	2.5	3.0	4.0	2.5	2.5	3.5	2.0	2.5
24	4.5	2.5	3.0	4.0	2.5	2.5	3.0	2.0	2.5
25	3.5	2.5	3.0	4.5	2.5	3.0	3.0	2.0	2.5
26	3.5	2.5	3.0	3.5	2.5	3.0	3.0	2.0	2.5
27	4.0	2.5	2.5	3.5	2.5	3.0	3.0	2.0	2.5
28	3.5	2.5	2.5	3.5	2.5	3.0	3.0	2.0	2.5
29	3.5	2.5	3.0	81	2.5	7.0	3.0	2.0	2.5
30	3.5	2.5	2.5	3.5	2.5	3.0	2.5	2.0	2.5
31	5.0	2.5	2.5	3.5	2.5	3.0	--	--	--
MONTH[1]	**24**	**2.5**	**4.6**	**81**	**2.0**	**2.8**	**5.0**	**2.0**	**2.5**

[1]For months with missing daily values, the means are calculated using available values.

Table 12. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Lost Creek near Anaconda, Montana, April through September 2011.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: <, less than; --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
		APRIL			MAY			JUNE	
1	--	--	--	4.5	2.5	3.0	14	4.5	6.5
2	--	--	--	6.0	2.5	3.0	13	5.0	8.0
3	--	--	--	6.0	3.0	3.5	8.0	4.5	6.0
4	--	--	--	6.0	2.5	3.5	19	5.0	7.0
5	--	--	--	6.0	3.0	3.5	15	5.5	8.5
6	--	--	--	7.5	3.0	4.5	27	8.5	14
7	--	--	--	8.5	3.5	4.5	87	26	48
8	--	--	--	18	5.0	8.5	86	31	46
9	--	--	--	33	9.5	15	57	25	33
10	--	--	--	15	6.5	9.5	95	19	30
11	7.0	3.0	4.5	13	7.5	10	25	16	19
12	4.5	2.0	3.0	20	9.0	13	25	13	16
13	5.5	2.0	3.0	40	17	23	18	11	14
14	4.0	2.0	2.5	44	20	30	18	9.5	12
15	5.0	2.0	2.5	58	12	21	18	9.5	12
16	4.5	2.0	2.5	96	13	21	13	9.0	10
17	6.0	2.0	3.0	18	9.5	13	19	8.0	9.5
18	5.5	2.0	3.0	15	7.0	9.0	12	7.5	9.0
19	3.5	2.0	2.5	15	6.5	8.0	13	7.0	9.0
20	7.5	2.0	3.5	11	6.0	7.5	15	6.5	9.0
21	5.5	2.0	3.0	23	6.0	7.5	20	7.5	11
22	6.0	2.0	2.5	20	5.5	8.5	38	9.5	16
23	5.0	2.0	2.5	33	15	20	41	18	27
24	7.0	2.0	3.5	80	33	56	73	27	43
25	7.0	2.5	3.5	56	22	36	41	21	26
26	5.5	2.5	3.5	28	15	21	24	16	19
27	6.0	2.5	3.0	20	12	15	19	14	16
28	5.0	2.5	3.0	16	8.5	11	30	11	15
29	6.5	2.5	3.5	14	7.0	9.0	28	13	18
30	4.5	2.5	3.0	14	5.5	8.0	22	14	17
31	--	--	--	9.5	6.0	7.5	--	--	--
MONTH[1]	**7.5**	**2.0**	**3.0**	**96**	**2.5**	**13**	**95**	**4.5**	**18**

Table 12. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Lost Creek near Anaconda, Montana, April through September 2011.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 +/- 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). Symbols: <, less than; --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	JULY			AUGUST			SEPTEMBER		
1	20	12	15	5.5	2.5	3.5	5.0	1.5	2.0
2	16	9.5	12	6.5	3.0	3.5	3.0	1.5	2.0
3	16	8.5	11	14	3.0	5.0	2.5	1.5	2.0
4	15	8.0	10	10	3.5	5.5	2.0	1.5	1.5
5	12	7.0	9.0	6.5	3.0	4.0	2.0	1.5	1.5
6	12	7.0	8.5	7.0	3.0	4.0	2.0	1.5	1.5
7	16	7.0	9.0	8.5	3.0	4.0	2.0	1.5	1.5
8	17	7.0	9.0	6.5	2.0	3.5	2.0	1.5	1.5
9	11	6.5	8.5	6.5	2.5	4.0	2.0	1.5	1.5
10	23	6.0	8.5	6.5	2.0	3.5	2.0	1.5	1.5
11	10	6.0	7.5	6.5	2.0	3.5	2.0	1.5	1.5
12	14	5.5	7.0	6.5	2.0	3.0	2.0	1.5	1.5
13	150	5.0	13	7.5	2.0	3.0	2.5	1.5	1.5
14	15	5.0	7.0	5.0	2.5	3.5	2.0	1.5	1.5
15	7.5	4.5	5.5	4.5	2.5	3.5	2.0	1.5	1.5
16	8.0	4.5	5.5	5.5	2.5	3.0	2.0	1.5	1.5
17	9.5	4.0	5.5	4.5	2.5	3.0	2.0	1.5	1.5
18	15	4.0	5.5	4.5	2.0	3.0	1.5	1.5	1.5
19	17	4.5	7.0	6.0	2.5	3.5	2.0	1.5	1.5
20	6.5	4.0	5.0	13	2.5	4.5	2.0	1.5	1.5
21	8.0	3.5	5.0	8.0	2.5	3.5	2.0	1.5	1.5
22	9.0	3.5	5.0	5.5	2.0	2.5	2.0	1.5	1.5
23	8.0	3.5	4.5	5.5	1.5	2.5	2.0	1.0	1.5
24	12	3.5	5.5	5.0	2.0	2.5	2.0	1.0	1.5
25	8.0	4.0	5.5	4.5	2.0	2.5	1.5	1.0	1.5
26	11	4.0	6.0	4.0	2.0	2.5	2.0	1.0	1.5
27	7.0	3.5	5.0	3.0	1.5	2.0	2.5	1.0	2.0
28	11	3.5	6.0	3.0	1.5	2.0	2.5	1.0	1.5
29	9.0	3.0	5.0	2.5	1.5	2.0	4.0	1.5	1.5
30	7.5	3.0	4.0	4.0	1.5	2.0	4.5	1.5	1.5
31	6.5	2.5	3.5	7.5	1.5	2.0	--	--	--
MONTH[1]	**150**	**2.5**	**7.2**	**14**	**1.5**	**3.2**	**5.0**	**1.0**	**1.6**

[1]For months with missing daily values, the means are calculated using available values.

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.

[Abbreviations: $CaCO_3$, calcium carbonate; 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)	Cadmium, filtered (µg/L)
12323600	Silver Bow Creek at Opportunity	05/25/2011	1030	99.7	29.6	6.26	14.9	46.7	0.74
		05/25/2011	1040	98.1	29.1	6.16	14.5	47.6	.74
12323700	Mill Creek at Opportunity	08/15/2011	1520	64.5	17.8	4.85	19.3	19.8	.05
		08/15/2011	1525	66.3	18.3	5.00	19.6	19.6	.04
12323750	Silver Bow Creek at Warm Springs	07/13/2011	1010	74.9	22.5	4.52	21.4	24.1	.03
		07/13/2011	1015	76.7	23.1	4.65	22.4	24.3	.04
12323800	Clark Fork near Galen	06/08/2011	1145	106	32.6	5.83	28.2	36.1	.13
		06/08/2011	1155	106	32.9	5.85	28.2	35.7	.13
12323840	Lost Creek near Anaconda	04/11/2011	1510	111	32.6	7.09	2.6	3.3	.02
		04/11/2011	1515	115	33.8	7.32	2.3	3.3	.02
12324200	Clark Fork at Deer Lodge	05/17/2011	1225	138	41.1	8.53	16.8	35.6	.07
		05/17/2011	1230	146	43.1	9.37	16.9	35.5	.08
		06/24/2011	1130	115	34.9	6.69	32.9	37.8	.22
		06/24/2011	1135	115	35.1	6.73	32.4	37.0	.22
12324400	Clark Fork above Little Blackfoot, near Garrison	03/15/2011	1500	206	60.5	13.2	9.3	13.3	.06
		03/15/2011	1505	213	62.4	13.9	9.3	13.6	.07

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; 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	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)	Lead, unfiltered recoverable (µg/L)
12323600	Silver Bow Creek at Opportunity	05/25/2011	1030	2.29	68.9	310	182	7,220	1.47	101
		05/25/2011	1040	2.23	65.9	346	201	7,410	1.59	106
12323700	Mill Creek at Opportunity	08/15/2011	1520	.06	1.6	2.3	38	106	.11	.32
		08/15/2011	1525	.06	1.6	2.3	40	105	.11	.32
12323750	Silver Bow Creek at Warm Springs	07/13/2011	1010	.09	3.7	7.4	45	272	.18	1.27
		07/13/2011	1015	.09	3.8	7.5	48	279	.19	1.27
12323800	Clark Fork near Galen	06/08/2011	1145	.38	20.7	82.1	47	1,120	.30	9.10
		06/08/2011	1155	.37	20.1	79.0	44	1,100	.30	9.13
12323840	Lost Creek near Anaconda	04/11/2011	1510	<.05	1.4	4.6	7	115	.02	.48
		04/11/2011	1515	<.05	1.5	4.8	6	119	.02	.52
12324200	Clark Fork at Deer Lodge	05/17/2011	1225	.62	10.2	136	27	2,620	.23	20.0
		05/17/2011	1230	.56	10.4	143	31	2,640	.24	20.7
		06/24/2011	1130	.36	35.6	87.6	36	976	.40	8.98
		06/24/2011	1135	.38	35.4	82.1	43	920	.44	8.51
12324400	Clark Fork above Little Blackfoot, near Garrison	03/15/2011	1500	.17	6.8	31.9	6	586	.07	4.16
		03/15/2011	1505	.19	7.0	35.2	8	587	.08	4.03

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; 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	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)
12323600	Silver Bow Creek at Opportunity	05/25/2011	1030	158	519	148	463	57	347
		05/25/2011	1040	156	544	145	461	50	419
12323700	Mill Creek at Opportunity	08/15/2011	1520	7.5	11.0	<1.4	<2.4	80	2
		08/15/2011	1525	7.6	10.9	<1.4	<2.4	81	2
12323750	Silver Bow Creek at Warm Springs	07/13/2011	1010	34.3	62.8	2.1	7.1	91	7
		07/13/2011	1015	36.3	64.2	2.1	7.1	93	7
12323800	Clark Fork near Galen	06/08/2011	1145	31.9	121	13.7	60.9	48	59
		06/08/2011	1155	31.9	118	12.8	60.7	54	51
12323840	Lost Creek near Anaconda	04/11/2011	1510	.80	3.9	<1.4	<2.4	80	6
		04/11/2011	1515	.80	3.9	<1.4	<2.4	77	6
12324200	Clark Fork at Deer Lodge	05/17/2011	1225	22.8	263	5.7	107	49	162
		05/17/2011	1230	23.6	250	5.8	105	50	159
		06/24/2011	1130	54.9	102	36.3	71.1	36	70
		06/24/2011	1135	55.5	117	34.5	69.4	29	88
12324400	Clark Fork above Little Blackfoot, near Garrison	03/15/2011	1500	35.3	81.5	3.7	28.8	74	30
		03/15/2011	1505	36.2	84.4	4.5	29.1	78	27

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; 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)	Cadmium, filtered (µg/L)
12324680	Clark Fork at Goldcreek	11/16/2010	1345	185	55.1	11.4	7.2	8.9	0.03
		11/16/2010	1350	186	55.2	11.7	7.2	9.2	.04
12334550	Clark Fork at Turah Bridge, near Bonner	06/02/2011	1035	81.0	23.0	5.71	7.1	12.8	.06
		12334550	1040	1040	81.5	23.2	5.69	7.5	12.7
		06/30/2011	1100	86.1	24.8	5.89	12.3	14.3	.08
		06/30/2011	1110	84.3	24.2	5.81	12.6	14.0	.08
12340000	Blackfoot River near Bonner	05/26/2011	1200	81.7	21.1	7.02	1.0	2.1	<.02
		05/26/2011	1210	81.6	21.0	7.07	1.0	2.2	<.02
12340500	Clark Fork above Missoula	06/09/2011	1400	75.4	20.6	5.85	6.3	23.1	.06
		06/09/2011	1410	75.4	20.6	5.85	6.3	23.6	.06
		06/15/2011	1350	85.8	23.5	6.56	7.1	13.2	.05
		06/15/2011	1355	87.6	24.1	6.68	7.2	13.3	.04

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; 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	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)	Lead, unfiltered recoverable (µg/L)
12324680	Clark Fork at Goldcreek	11/16/2010	1345	0.14	3.0	15.2	4	273	0.03	1.89
		11/16/2010	1350	.12	3.0	15.3	5	270	.04	1.85
12334550	Clark Fork at Turah Bridge, near Bonner	06/02/2011	1035	.29	6.5	53.9	54	2,140	.22	8.39
		12334550	1040	.28	7.2	48.4	58	2,070	.23	8.09
		06/30/2011	1100	.18	9.1	30.5	41	956	.19	4.23
		06/30/2011	1110	.17	9.2	28.4	39	801	.18	3.65
12340000	Blackfoot River near Bonner	05/26/2011	1200	<.05	.88	3.6	44	1,240	.05	1.50
		05/26/2011	1210	<.05	.87	3.6	49	1,240	.05	1.52
12340500	Clark Fork above Missoula	06/09/2011	1400	.83	10.2	145	43	4,960	.22	23.0
		06/09/2011	1410	.84	10.0	148	39	5,020	.17	24.9
		06/15/2011	1350	.35	7.0	53.1	54	2,030	.21	8.04
		06/15/2011	1355	.32	7.0	52.8	53	1,990	.20	7.90

Table 13. Analyses of field replicates for water samples, Clark Fork basin, Montana.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; 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	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)
12324680	Clark Fork at Goldcreek	11/16/2010	1345	12.6	58.9	3.5	17.0	85	11
		11/16/2010	1350	12.6	59.8	3.5	16.4	81	12
12334550	Clark Fork at Turah Bridge, near Bonner	06/02/2011	1035	13.6	148	6.4	70.0	44	186
		12334550	1040	14.2	133	6.6	64.7	43	188
		06/30/2011	1100	31.7	102	7.7	41.1	62	71
		06/30/2011	1110	31.7	93.9	8.0	34.7	64	68
12340000	Blackfoot River near Bonner	05/26/2011	1200	4.0	71.1	<1.4	5.2	73	124
		05/26/2011	1210	4.6	71.9	<1.4	5.4	71	128
12340500	Clark Fork above Missoula	06/09/2011	1400	26.9	349	11.9	210	60	427
		06/09/2011	1410	26.5	347	9.3	215	60	433
		06/15/2011	1350	20.0	155	5.5	84.4	62	176
		06/15/2011	1355	20.3	151	5.8	84.0	64	172

Table 14. Precision of analyses of field replicates for water samples, 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] (listed units)	Relative standard deviation (percent)	Within limits[2] of data-quality objective
Calcium, filtered, mg/L	14	0.62	2.0	Yes
Magnesium, filtered, mg/L	14	.22	3.1	Yes
Arsenic, filtered, µg/L	14	.26	1.9	Yes
Arsenic, unfiltered recoverable, µg/L	14	.28	1.4	Yes
Cadmium, filtered, µg/L	14	.00	4.0	Yes
Cadmium, unfiltered recoverable, µg/L	14	.02	4.6	Yes
Copper, filtered, µg/L	14	.60	4.5	Yes
Copper, unfiltered recoverable, µg/L	14	7.2	10	Yes
Iron, filtered, µg/L	14	4.3	9.3	Yes
Iron, unfiltered recoverable, µg/L	14	51	2.9	Yes
Lead, filtered, µg/L	14	.03	9.7	Yes
Lead, unfiltered recoverable, µg/L	14	1.0	7.4	Yes
Manganese, filtered, µg/L	14	.62	1.9	Yes
Manganese, unfiltered recoverable, µg/L	14	6.9	4.7	Yes
Zinc, filtered, µg/L	14	.86	4.9	Yes
Zinc, unfiltered recoverable, µg/L	14	1.9	2.3	Yes
Sediment, suspended, percent finer than 0.062 mm	14	2.6	4.1	Yes
Sediment, suspended, mg/L	14	14	12	Yes

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

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

Table 15. Precision of analyses of laboratory replicates for water samples, 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	8	0.48	1.3	Yes
Magnesium, filtered, mg/L	8	.09	1.2	Yes
Arsenic, filtered, µg/L	8	.06	.50	Yes
Arsenic, unfiltered recoverable, µg/L	8	.32	1.9	Yes
Cadmium, filtered, µg/L	8	.00	9.0	Yes
Cadmium, unfiltered recoverable, µg/L	8	.00	2.4	Yes
Copper, filtered, µg/L	8	.02	.48	Yes
Copper, unfiltered recoverable, µg/L	8	1.6	4.2	Yes
Iron, filtered, µg/L	8	.90	2.9	Yes
Iron, unfiltered recoverable, µg/L	8	16	1.6	Yes
Lead, filtered, µg/L	8	.00	3.1	Yes
Lead, unfiltered recoverable, µg/L	8	.08	1.4	Yes
Manganese, filtered, µg/L	8	.09	.48	Yes
Manganese, unfiltered recoverable, µg/L	8	1.0	1.1	Yes
Zinc, filtered, µg/L	8	.46	12	Yes
Zinc, unfiltered recoverable, µg/L	8	1.2	3.2	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 16. Recovery efficiency for analyses of laboratory-spiked deionized-water blank samples.

[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	102–109	105	Yes
Arsenic, unfiltered recoverable, µg/L	5	90.2–99.3	94.7	Yes
Cadmium, filtered, µg/L	5	97.9–111	105	Yes
Cadmium, unfiltered recoverable, µg/L	5	92.4–99.0	95.7	Yes
Copper, filtered, µg/L	5	89.4–103	96.2	Yes
Copper, unfiltered recoverable, µg/L	5	91.6–96.2	93.9	Yes
Iron, filtered, µg/L	5	89.3–132	111	No[2]
Iron, unfiltered recoverable, µg/L	5	98.2–117	107	Yes
Lead, filtered, µg/L	5	98.8–113	106	Yes
Lead, unfiltered recoverable, µg/L	5	98.4–101	99.8	Yes
Manganese, filtered, µg/L	5	97.0–104	101	Yes
Manganese, unfiltered recoverable, µg/L	5	97.8–100	98.9	Yes
Zinc, filtered, µg/L	5	94.3–122	108	Yes
Zinc, unfiltered recoverable, µg/L	5	92.2–100	96.1	Yes

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

[2]Exceedance of data-quality objective resulted from one sample having a recovery of 138 percent. When data from this one spiked-sample set are removed from the 95-percent confidence interval calculation, filtered iron meets the data-quality objective limit (88.9–119 percent).

Table 17. Recovery efficiency for analyses of laboratory-spiked stream samples, 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	101–111	106	Yes
Arsenic, unfiltered recoverable, µg/L	5	90.5–99.0	94.7	Yes
Cadmium, filtered, µg/L	5	99.2–109	104	Yes
Cadmium, unfiltered recoverable, µg/L	5	91.5–96.3	93.9	Yes
Copper, filtered, µg/L	5	79.9–113	96.6	Yes
Copper, unfiltered recoverable, µg/L	5	85.4–91.2	88.3	Yes
Iron, filtered, µg/L	5	92.0–124	108	Yes
Iron, unfiltered recoverable, µg/L	5	85.2–117	101	Yes
Lead, filtered, µg/L	5	98.8–110	104	Yes
Lead, unfiltered recoverable, µg/L	5	94.5–98.4	96.5	Yes
Manganese, filtered, µg/L	5	92.2–104	98.2	Yes
Manganese, unfiltered recoverable, µg/L	5	88.3–94.2	91.3	Yes
Zinc, filtered, µg/L	5	90.2–114	102	Yes
Zinc, unfiltered recoverable, µg/L	5	80.7–92.7	86.7	Yes

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

Table 18. Analyses of field blanks for water samples.

[Abbreviations: µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter. Symbol: <, less than laboratory reporting level]

Date	Time	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
11/15/2010	1155	4.9	2	<0.02	<0.008	<0.02	<0.09	<0.02	<0.05
*03/07/2011	0800	5.6	2	.03	<.008	<.02	<.09	.06	<.05
04/14/2011	1255	5.3	2	<.02	<.008	<.02	<.09	<.02	<.05
*05/12/2011	0900	5.3	2	<.02	<.008	<.02	<.09	<.02	<.05
05/13/2011	0930	5.9	1	<.02	<.008	<.02	<.09	<.02	<.05
05/16/2011	1340	5.2	2	<.02	<.008	<.02	<.09	<.02	<.05
06/01/2011	1245	5.4	1	<.02	<.008	<.02	<.09	<.02	<.05
06/15/2011	0755	5.5	1	<.02	<.008	<.02	<.09	<.02	<.05
06/29/2011	1420	7.1	2	<.02	<.008	<.02	<.09	<.02	<.05
07/13/2011	1245	5.6	<1	.02	<.008	<.02	<.09	<.02	<.05
08/16/2011	0755	5.5	2	<.02	<.008	<.02	<.09	<.02	<.05

Date	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)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)
11/15/2010	<0.50	<0.70	<3	<5	<0.01	<0.04	<0.1	<0.4	<1.4	<2.4
*03/07/2011	.61	<.70	<3	<5	<.01	<.04	<.1	<.4	1.9	<2.4
04/14/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4
*05/12/2011	<.50	<.70	<3	<5	.02	.05	<.1	<.4	<1.5	<2.4
05/13/2011	<.50	<.70	<3	<5	.02	<.04	.3	<.4	1.6	<2.4
05/16/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4
06/01/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4
06/15/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4
06/29/2011	<.50	<.70	<3	<5	<.01	<.04	.3	<.4	<1.4	<2.4
07/13/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4
08/16/2011	<.50	<.70	<3	<5	<.01	<.04	<.1	<.4	<1.4	<2.4

[*] Annual office equipment blank collected before any equipment was used in the field.

Table 19. Bed-sediment data for the Clark Fork basin, Montana, August 2011.

[Trace-element concentrations in bed sediment were determined for the fine-grained fraction (material less than 0.063 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]

Site number (fig. 1)	Site name	Number of composite samples	Concentration (µg/g)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	3	73	7.9	42.6	1,080	34,300	279	1,720	12.7	2,000
12323750	Silver Bow Creek at Warm Springs	3	68	4.9	33.9	296	23,800	61	2,440	14.7	625
12323770	Warm Springs Creek near Warm Springs	3	34	1.2	33.2	496	19,600	42	555	14.5	237
12323800	Clark Fork near Galen	3	95	3.8	38.8	1,110	26,700	110	1,530	15.9	741
461415112450801	Clark Fork below Lost Creek, near Galen	3	126	4.8	38.5	1,500	28,700	153	1,430	14.8	1,030
461559112443301	Clark Fork at county bridge, near Racetrack	3	132	5.4	39.2	1,490	29,000	149	1,600	16.0	1,050
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	3	90	4.1	38.0	1,190	30,100	141	1,200	12.7	961
12324200	Clark Fork at Deer Lodge	3	95	3.9	45.8	1,200	31,500	142	1,260	15.8	990
12324400	Clark Fork above Little Blackfoot River, near Garrison	3	91	4.2	46.4	1,260	29,100	144	1,150	14.9	1,100
12324680	Clark Fork at Goldcreek	3	62	3.0	46.5	843	27,300	118	977	14.1	880
12331800	Clark Fork near Drummond	3	41	1.7	36.0	405	36,800	75	832	12.2	637
12334550	Clark Fork at Turah Bridge, near Bonner	3	35	2.0	37.4	405	24,100	69	1,060	13.6	724
12340000	Blackfoot River near Bonner	3	4	.05	23.7	21	18,300	12	564	10.2	57
12340500	Clark Fork above Missoula	3	30	1.2	29.5	281	20,400	43	763	11.4	452

Table 20. Recovery efficiency for analyses of standard reference materials for bed-sediment samples.

[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. Abbreviations: µg/g, micrograms per gram of dry sample weight; SRM, standard reference material (agricultural soils)]

Constituent	Number of analyses	Dilution ratio	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
SRM sample 2709a					
Arsenic	10	1:10	10.5	54.0	51.4–56.5
Cadmium	10	1:10	.371	70.7	67.4–74.1
Chromium	10	1:10	130	77.8	73.9–81.7
Copper	10	1:10	33.9	85.7	81.2–90.1
Iron	10	1:10	33,600	95.1	90.8–99.4
Lead	10	1:10	17.3	54.4	52.1–56.8
Manganese	10	1:10	529	93.4	89.2–97.6
Nickel	10	1:10	85	86.6	83.6–89.7
Zinc	10	1:10	103	98.1	94.9–101
SRM sample 2711a					
Arsenic	10	1:10	107	84.6	82.1–87.1
Cadmium	10	1:10	54.1	96.5	93.5–99.6
Chromium	10	1:10	52	75.3	70.9–79.8
Copper	10	1:10	1,410	104	99.0–109
Iron	10	1:10	28,200	88.5	84.4–92.7
Lead	10	1:10	1,400	88.5	86.1–90.8
Manganese	10	1:10	675	82.6	78.9–86.3
Nickel	10	1:10	21.7	86.0	83.5–88.5
Zinc	10	1:10	414	98.8	95.4–102

Table 21. Analyses of procedural blanks for bed-sediment samples.

[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. Abbreviation: µg/mL, micrograms per milliliter. Symbol: <, less than minimum reporting level for liquid-phase concentration, in µg/mL]

Site number (fig. 1)	Site name	Dilution ratio	Trace-element concentration (µg/mL)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:10	<0.004	<0.0002	<0.003	<0.003	<0.03	<0.003	<0.001	<0.002	<0.02
12323750	Silver Bow Creek at Warm Springs	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12323770	Warm Springs Creek at Warm Springs	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12323800	Clark Fork near Galen	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
461415112450801	Clark Fork below Lost Creek, near Galen	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
461559112443301	Clark Fork at county bridge, near Racetrack	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12324200	Clark Fork at Deer Lodge	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12324400	Clark Fork above Little Blackfoot River, near Garrison	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12324680	Clark Fork at Goldcreek	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12331800	Clark Fork near Drummond	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12334550	Clark Fork at Turah Bridge, near Bonner	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12340000	Blackfoot River near Bonner	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02
12340500	Clark Fork above Missoula	1:10	<.004	<.0002	<.003	<.003	<.03	<.003	<.001	<.002	<.02

Table 22. Biological data for the Clark Fork basin, Montana, August 2011.

[Analyses are for the whole-body tissue of aquatic insects. Composite samples were 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., species. Symbol: <, less than minimum reporting level for solid-phase concentration, in µg/g]

Taxon	Number of composite samples	Concentration (µg/g)								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga-nese	Nickel	Zinc
12323600--Silver Bow Creek at Opportunity										
Hydropsyche cockerelli	1	21.4	9.3	25.5	522	6,150	74.3	1,500	3.6	1,470
Hydropsyche spp.	2	9.0	2.7	3.8	214	2,910	27.7	697	1.4	571
12323750--Silver Bow Creek at Warm Springs										
Hydropsyche cockerelli	1	16.7	0.9	2.2	45.3	1,650	6.0	1,010	1.4	169
Hydropsyche occidentalis	1	14.3	.9	2.2	46.9	1,610	5.6	996	1.3	170
12323770--Warm Springs Creek at Warm Springs										
Arctopsyche grandis	1	7.9	0.4	4.2	53.2	897	4.9	738	1.1	192
Hesperoperla spp.	1	1.2	1.0	2.0	64.9	456	1.9	202	.6	573
12323800--Clark Fork near Galen										
Hydropsyche cockerelli	1	16.9	2.0	9.6	119	1,580	17.1	3,360	3.3	363
Hydropsyche occidentalis	3	11.2	1.2	3.0	131	2,310	9.4	705	2.2	212
461415112450801--Clark Fork below Lost Creek, near Galen										
Rhyacophila spp.	2	4.3	4.1	1.1	83.4	335	5.4	256	0.3	356
461559112443301--Clark Fork at county bridge, near Racetrack										
Hydropsyche occidentalis	3	10.2	1.0	2.0	122	1,500	9.8	709	1.3	199
461903112440701--Clark Fork at Dempsey Creek diversion, near Racetrack										
Hydropsyche occidentalis	3	18.9	1.4	3.2	257	3,100	17.5	904	2.0	249
12324200--Clark Fork at Deer Lodge										
Hydropsyche occidentalis	3	18.7	1.3	3.4	199	2,930	18.2	777	2.0	271
12324400--Clark Fork above Little Blackfoot River, near Garrison										
Arctopsyche grandis	1	16.6	3.2	4.6	209	2,580	18.0	972	2.2	378
Hydropsyche occidentalis	2	13.0	1.5	3.5	165	2,370	15.5	1,080	1.7	275
Hydropsyche spp.	1	13.6	1.7	4.3	187	2,570	18.5	919	1.8	296
12324680--Clark Fork at Goldcreek										
Arctopsyche grandis	3	14.1	2.6	4.9	201	2,850	15.2	1,020	2.7	299
Claassenia sabulosa	2	2.0	1.4	1.3	74.5	532	2.3	132	.3	275
Hydropsyche occidentalis	2	11.4	1.1	3.6	159	2,380	13.1	734	1.7	216

Table 22. Biological data for the Clark Fork basin, Montana, August 2011.—Continued

[Analyses are for the whole-body tissue of aquatic insects. Composite samples were 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., species. Symbol: <, less than minimum reporting level for solid-phase concentration, in µg/g]

Taxon	Number of composite samples	Concentration (µg/g)								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga-nese	Nickel	Zinc
12331800--Clark Fork near Drummond										
Arctopsyche grandis	2	8.0	3.4	3.8	102	1,710	11.6	1,010	1.5	307
Claassenia sabulosa	2	1.8	2.0	1.0	74.2	438	1.9	143	.3	345
Hydropsyche occidentalis	2	7.5	1.0	2.6	92.9	1,670	10.6	890	1.2	218
12334550--Clark Fork at Turah Bridge, near Bonner										
Arctopsyche grandis	2	6.6	2.6	3.8	80.2	1,990	9.6	813	1.6	271
Claassenia sabulosa	2	.9	1.6	1.1	63.8	279	1.2	178	.2	250
Hydropsyche cockerelli	1	9.8	2.2	14.2	126	3,180	19.7	848	2.7	332
Hydropsyche occidentalis	2	7.1	1.4	3.7	89.0	2,320	10.1	934	1.8	236
12340000--Blackfoot River near Bonner										
Arctopsyche grandis	1	1.9	0.5	5.6	18.0	1,880	1.9	624	2.4	152
Claassenia sabulosa	2	<.12	.2	.8	49.5	237	.1	77	.3	232
Hydropsyche occidentalis	3	1.5	.3	2.3	17.9	1,800	1.4	435	1.5	124
12340500--Clark Fork above Missoula										
Arctopsyche grandis	1	4.9	1.6	3.4	60.5	2,050	5.9	751	1.6	215
Claassenia sabulosa	2	1.1	.6	.8	51.8	247	.7	129	.2	225
Hydropsyche occidentalis	2	5.2	.9	3.3	66.2	2,200	6.3	769	1.6	195

Table 23. Recovery efficiency for analyses of standard reference material for biota samples.

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

Constituent	Number of analyses	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
SRM sample TORT-2				
Arsenic	12	21.6	95.5	94.5–96.6
Cadmium	12	26.7	77.4	74.2–80.6
Chromium	12	.77	129	123–136
Copper	12	106	92.7	90.6–94.8
Iron	12	105	90.0	86.9–92.6
Lead	12	.35	78.1	72.0–84.2
Manganese	12	13.6	89.8	86.9–92.8
Nickel	12	2.5	71.6	69.1–74.1
Zinc	12	180	91.4	88.1–94.8

Table 24. Analyses of procedural blanks for biota samples.

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

Site number (fig. 1)	Site name	Dilution ratio	Trace-element concentration (µg/mL)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:1	<0.0013	<0.0002	<0.0009	<0.0014	<0.01	<0.002	<0.0012	<0.001	<0.003
12323750	Silver Bow Creek at Warm Springs	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12323770	Warm Springs Creek at Warm Springs	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12323800	Clark Fork near Galen	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
461415112450801	Clark Fork below Lost Creek, near Galen	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
461559112443301	Clark Fork at county bridge, near Racetrack	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12324200	Clark Fork at Deer Lodge	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12324400	Clark Fork above Little Blackfoot River, near Garrison	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12324680	Clark Fork at Goldcreek	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12331800	Clark Fork near Drummond	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12334550	Clark Fork at Turah Bridge, near Bonner	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12340000	Blackfoot River near Bonner	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.001	<.003
12340500	Clark Fork above Missoula	1:1	<.0013	<.0002	<.0009	<.0014	<.01	<.002	<.0012	<.04	<.003

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323230--Blacktail Creek at Harrison Avenue, at Butte					
Period of record for water-quality data: March 1993–August 1995, December 1996–August 2003, December 2004–September 2011					
Streamflow, instantaneous (ft^3/s)	139	156	1.9	16	9.2
pH, onsite (standard units)	139	8.4	7.3	7.8	7.7
Specific conductance, onsite (µS/cm)	139	412	116	261	259
Temperature, water (°C)	139	17.5	1.0	8.1	8.5
Hardness, filtered (mg/L as $CaCO_3$)	139	146	37.7	103	104
Calcium, filtered (mg/L)	139	41.8	10.6	29.4	29.8
Magnesium, filtered (mg/L)	139	11.0	2.71	7.14	7.16
Arsenic, filtered (µg/L)	138	13.0	1.0	4.2	3.6
Arsenic, unfiltered recoverable (µg/L)	139	18.0	1.0	[2]5.6	4.9
Cadmium, filtered (µg/L)	137	.50	<.04	[2].05	.02
Cadmium, unfiltered recoverable (µg/L)	139	.11	<.01	[2].04	<1
Copper, filtered (µg/L)	138	10.0	<1.0	[2]3.7	3.2
Copper, unfiltered recoverable (µg/L)	139	52.0	1.5	6.7	5.2
Iron, filtered (µg/L)	139	640	15	188	171
Iron, unfiltered recoverable (µg/L)	139	4,220	139	674	590
Lead, filtered (µg/L)	139	2.80	<.08	[2].20	<1.00
Lead, unfiltered recoverable (µg/L)	139	47.0	<1.00	[2]1.78	.72
Manganese, filtered (µg/L)	139	144	14.2	42.1	37.5
Manganese, unfiltered recoverable (µg/L)	139	240	23.5	59.5	51.3
Zinc, filtered (µg/L)	137	11	<1.0	[2]3.5	2.8
Zinc, unfiltered recoverable (µg/L)	139	130	<10	[2]8.5	4.0
Sediment, suspended (percent finer than 0.062 mm)	139	97	50	82	83
Sediment, suspended concentration (mg/L)	139	139	1	12	7
Sediment, suspended discharge (ton/d)	139	59	.01	1.1	.18

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323250--Silver Bow Creek below Blacktail Creek, at Butte					
Period of record for water-quality data: March 1993–August 1995, December 1996–August 2003, December 2004–September 2011					
Streamflow, instantaneous (ft^3/s)	147	202	13	31	25
pH, onsite (standard units)	147	8.2	7.2	7.6	7.6
Specific conductance, onsite (µS/cm)	147	691	209	458	468
Temperature, water (°C)	147	20.0	1.0	10.3	9.5
Hardness, filtered (mg/L as $CaCO_3$)	147	217	66.0	146	150
Calcium, filtered (mg/L)	147	62.7	19.0	41.7	42.4
Magnesium, filtered (mg/L)	147	14.6	4.51	10.3	10.5
Arsenic, filtered (µg/L)	147	13.4	2.3	6.3	6.0
Arsenic, unfiltered recoverable (µg/L)	147	45.0	3.0	10.3	9.0
Cadmium, filtered (µg/L)	147	6.2	.04	.95	.50
Cadmium, unfiltered recoverable (µg/L)	147	6.0	.09	1.29	.90
Copper, filtered (µg/L)	147	303	3.2	32.3	13.2
Copper, unfiltered recoverable (µg/L)	147	550	8.9	74.5	27.1
Iron, filtered (µg/L)	147	292	10	94.5	76.0
Iron, unfiltered recoverable (µg/L)	147	7,400	85	842	570
Lead, filtered (µg/L)	147	2.4	<.5	[2].44	.24
Lead, unfiltered recoverable (µg/L)	147	250	.64	11.5	3.00
Manganese, filtered (µg/L)	147	1,700	21.4	317	236
Manganese, unfiltered recoverable (µg/L)	147	1,600	25.9	360	289
Zinc, filtered (µg/L)	147	2,200	5.3	311	182
Zinc, unfiltered recoverable (µg/L)	147	2,200	21.2	377	230
Sediment, suspended (percent finer than 0.062 mm)	146	98	42	84	85
Sediment, suspended concentration (mg/L)	146	405	2	21	10
Sediment, suspended discharge (ton/d)	146	70	.08	2.5	.68

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323600--Silver Bow Creek at Opportunity Period of record for water-quality data: March 1993–August 1995, December 1996–September 2011					
Streamflow, instantaneous (ft^3/s)	149	648	13	81	52
pH, onsite (standard units)	149	9.5	7.2	8.4	8.3
Specific conductance, onsite (µS/cm)	149	633	202	410	400
Temperature, water (°C)	149	22.5	0.0	9.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	149	240	60.2	147	143
Calcium, filtered (mg/L)	149	71.6	18.5	43.5	43.0
Magnesium, filtered (mg/L)	149	15.0	3.42	9.31	9.01
Arsenic, filtered (µg/L)	149	34.0	1.0	10.9	10.3
Arsenic, unfiltered recoverable (µg/L)	149	235	9.1	24.6	17.0
Cadmium, filtered (µg/L)	148	41.0	<.1	[2]1.05	.58
Cadmium, unfiltered recoverable (µg/L)	149	49.0	.34	[2]1.90	1.18
Copper, filtered (µg/L)	147	450	12.0	43.0	32.7
Copper, unfiltered recoverable (µg/L)	149	3,900	26.9	188	100
Iron, filtered (µg/L)	149	307	<3	[2]49	27
Iron, unfiltered recoverable (µg/L)	148	24,100	240	1,540	780
Lead, filtered (µg/L)	149	5.1	<.5	[2].70	.33
Lead, unfiltered recoverable (µg/L)	149	650	3.27	35.4	14.9
Manganese, filtered (µg/L)	149	9,300	30.3	394	302
Manganese, unfiltered recoverable (µg/L)	149	10,000	69.8	512	404
Zinc, filtered (µg/L)	148	13,000	11.2	271	137
Zinc, unfiltered recoverable (µg/L)	149	15,000	52.5	478	260
Sediment, suspended (percent finer than 0.062 mm)	150	95	37	78	82
Sediment, suspended concentration (mg/L)	150	801	5	50	20
Sediment, suspended discharge (ton/d)	149	781	.18	23	2.7

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323670--Mill Creek near Anaconda Period of record for water-quality data: December 2004–September 2011					
Streamflow, instantaneous (ft^3/s)	56	309	7.4	65	30
pH, onsite (standard units)	56	8.6	7.5	8.0	8.0
Specific conductance, onsite (µS/cm)	56	213	56	131	132
Temperature, water (°C)	56	17.0	0.0	8.3	8.0
Hardness, filtered (mg/L as $CaCO_3$)	56	97.5	23.7	56.6	57.1
Calcium, filtered (mg/L)	56	25.9	7.00	15.7	16.0
Magnesium, filtered (mg/L)	56	8.01	1.45	4.24	4.18
Arsenic, filtered (µg/L)	56	32.9	7.3	16.9	15.3
Arsenic, unfiltered recoverable (µg/L)	56	34.8	8.6	18.4	16.9
Cadmium, filtered (µg/L)	55	.11	.02	[2].04	.04
Cadmium, unfiltered recoverable (µg/L)	56	.19	.03	.08	.07
Copper, filtered (µg/L)	56	5.1	.72	2.3	2.1
Copper, unfiltered recoverable (µg/L)	56	10.6	1.3	4.0	3.5
Iron, filtered (µg/L)	56	125	21	46	40
Iron, unfiltered recoverable (µg/L)	56	619	78	201	162
Lead, filtered (µg/L)	56	.24	<.08	[2].12	.11
Lead, unfiltered recoverable (µg/L)	56	3.12	.15	.79	.59
Manganese, filtered (µg/L)	56	11.9	3.1	5.8	5.6
Manganese, unfiltered recoverable (µg/L)	56	36.6	7.4	14.1	12.6
Zinc, filtered (µg/L)	56	4.0	<1.4	[2]1.6	1.3
Zinc, unfiltered recoverable (µg/L)	56	9.2	1.0	[2]3.1	2.6
Sediment, suspended (percent finer than 0.062 mm)	56	83	28	63	66
Sediment, suspended concentration (mg/L)	56	29	1	7	4
Sediment, suspended discharge (ton/d)	56	13	.02	2.1	.28

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323700--Mill Creek at Opportunity Period of record for water-quality data: March 2003–September 2011					
Streamflow, instantaneous (ft^3/s)	72	261	0.43	39	12
pH, onsite (standard units)	72	8.2	7.5	8.0	8.0
Specific conductance, onsite (µS/cm)	72	230	59	147	152
Temperature, water (°C)	72	20.0	0.0	9.2	9.0
Hardness, filtered (mg/L as $CaCO_3$)	72	102	24.0	62.5	65.0
Calcium, filtered (mg/L)	72	28.0	7.01	17.5	18.2
Magnesium, filtered (mg/L)	72	7.83	1.56	4.54	4.67
Arsenic, filtered (µg/L)	72	55.1	9.0	22.4	20.6
Arsenic, unfiltered recoverable (µg/L)	72	53.5	10.0	25.7	24.5
Cadmium, filtered (µg/L)	72	.13	.02	.06	.06
Cadmium, unfiltered recoverable (µg/L)	72	.85	.04	.14	.10
Copper, filtered (µg/L)	72	6.1	1.0	3.0	2.6
Copper, unfiltered recoverable (µg/L)	72	38.8	1.5	6.8	4.4
Iron, filtered (µg/L)	72	94	16	47	42
Iron, unfiltered recoverable (µg/L)	72	1,960	44	314	145
Lead, filtered (µg/L)	72	.35	<.08	[2].14	.13
Lead, unfiltered recoverable (µg/L)	72	12.7	.07	1.54	.44
Manganese, filtered (µg/L)	72	32.8	2.1	7.3	5.5
Manganese, unfiltered recoverable (µg/L)	72	113	3.2	19.4	13.0
Zinc, filtered (µg/L)	71	7.7	1.3	3.0	2.8
Zinc, unfiltered recoverable (µg/L)	72	41	1.7	6.8	5.0
Sediment, suspended (percent finer than 0.062 mm)	72	90	26	68	72
Sediment, suspended concentration (mg/L)	72	107	1	13	2
Sediment, suspended discharge (ton/d)	72	55	<.01	[2]3.8	.06

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323710--Willow Creek near Anaconda Period of record for water-quality data: December 2004–September 2011					
Streamflow, instantaneous (ft^3/s)	51	114	1.0	17	7.7
pH, onsite (standard units)	51	8.2	7.5	7.7	7.7
Specific conductance, onsite (µS/cm)	51	151	66	103	108
Temperature, water (°C)	51	15.5	.5	7.0	6.5
Hardness, filtered (mg/L as $CaCO_3$)	51	56.3	22.1	37.4	38.5
Calcium, filtered (mg/L)	51	18.3	7.56	12.5	13.0
Magnesium, filtered (mg/L)	51	2.60	.78	1.48	1.44
Arsenic, filtered (µg/L)	51	24.9	9.9	15.8	14.7
Arsenic, unfiltered recoverable (µg/L)	51	27.0	9.8	16.9	15.6
Cadmium, filtered (µg/L)	49	.05	<.04	[2].03	.03
Cadmium, unfiltered recoverable (µg/L)	51	.33	<.04	[2].07	.05
Copper, filtered (µg/L)	51	4.2	.90	2.1	2.0
Copper, unfiltered recoverable (µg/L)	51	16.8	1.0	4.0	3.2
Iron, filtered (µg/L)	51	277	28	84	66
Iron, unfiltered recoverable (µg/L)	51	2,380	86	392	226
Lead, filtered (µg/L)	51	.37	.03	[2].15	.14
Lead, unfiltered recoverable (µg/L)	51	7.96	.10	1.00	.49
Manganese, filtered (µg/L)	51	34.5	6.0	14.6	13.2
Manganese, unfiltered recoverable (µg/L)	51	99.9	14.0	28.1	24.2
Zinc, filtered (µg/L)	51	3.3	.65	[2]1.7	1.6
Zinc, unfiltered recoverable (µg/L)	51	17.8	<2.0	[2]3.5	2.2
Sediment, suspended (percent finer than 0.062 mm)	51	94	25	72	78
Sediment, suspended concentration (mg/L)	51	195	1	19	6
Sediment, suspended discharge (ton/d)	51	50	<.01	[2]2.8	.14

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323720--Willow Creek at Opportunity Period of record for water-quality data: March 2003–September 2011					
Streamflow, instantaneous (ft^3/s)	72	116	4.5	18	9.1
pH, onsite (standard units)	72	9.0	7.7	8.1	8.1
Specific conductance, onsite (µS/cm)	72	371	116	271	291
Temperature, water (°C)	72	20.5	1.5	11.2	11.2
Hardness, filtered (mg/L as $CaCO_3$)	72	169	58.5	117	126
Calcium, filtered (mg/L)	72	47.4	18.1	34.1	36.4
Magnesium, filtered (mg/L)	72	12.3	3.24	7.78	8.24
Arsenic, filtered (µg/L)	72	164	10.9	41.1	32.0
Arsenic, unfiltered recoverable (µg/L)	72	164	12.0	44.0	33.2
Cadmium, filtered (µg/L)	72	.12	<.04	[2].04	.04
Cadmium, unfiltered recoverable (µg/L)	72	.52	.02	.11	.07
Copper, filtered (µg/L)	72	21.4	1.1	5.5	3.4
Copper, unfiltered recoverable (µg/L)	72	48.8	2.8	11.9	8.0
Iron, filtered (µg/L)	72	274	7.0	50	42
Iron, unfiltered recoverable (µg/L)	72	1,670	27	303	216
Lead, filtered (µg/L)	72	.89	.04	[2].23	.18
Lead, unfiltered recoverable (µg/L)	72	14.4	.27	2.45	1.62
Manganese, filtered (µg/L)	72	200	3.3	32.1	24.0
Manganese, unfiltered recoverable (µg/L)	72	228	4.7	46.0	36.4
Zinc, filtered (µg/L)	72	19.8	<1.4	[2]5.2	4.0
Zinc, unfiltered recoverable (µg/L)	72	68	1.1	13.2	9.8
Sediment, suspended (percent finer than 0.062 mm)	72	97	54	84	86
Sediment, suspended concentration (mg/L)	72	87	1	12	6
Sediment, suspended discharge (ton/d)	72	11	.02	1.1	.16

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323750--Silver Bow Creek at Warm Springs Period of record for water-quality data: March 1993–September 2011					
Streamflow, instantaneous (ft^3/s)	156	1,030	16	145	88
pH, onsite (standard units)	154	9.6	8.0	8.8	8.8
Specific conductance, onsite (µS/cm)	154	783	182	464	476
Temperature, water (°C)	155	25.0	.5	10.6	10.5
Hardness, filtered (mg/L as $CaCO_3$)	154	314	74.9	192	196
Calcium, filtered (mg/L)	154	90.4	22.5	56.1	57.3
Magnesium, filtered (mg/L)	154	21.4	4.52	12.7	13.0
Arsenic, filtered (µg/L)	154	60.0	6.8	23.1	23.4
Arsenic, unfiltered recoverable (µg/L)	154	94.0	10.0	26.9	26.4
Cadmium, filtered (µg/L)	154	.31	<.04	[2].06	.03
Cadmium, unfiltered recoverable (µg/L)	154	.56	<.1	[2].12	.06
Copper, filtered (µg/L)	154	40.0	1.7	7.9	5.8
Copper, unfiltered recoverable (µg/L)	154	96.8	2.4	15.8	11.3
Iron, filtered (µg/L)	154	93	<5	[2]18	15
Iron, unfiltered recoverable (µg/L)	154	3,000	36	321	247
Lead, filtered (µg/L)	154	1.0	<.08	[2].12	<1.0
Lead, unfiltered recoverable (µg/L)	154	41.8	<1	[2]2.30	1.24
Manganese, filtered (µg/L)	154	875	11.8	118	78.6
Manganese, unfiltered recoverable (µg/L)	154	899	24.0	178	140
Zinc, filtered (µg/L)	154	73	<1.0	[2]7.4	4.0
Zinc, unfiltered recoverable (µg/L)	154	180	2.0	[2]30.2	18.0
Sediment, suspended (percent finer than 0.062 mm)	155	98	43	82	85
Sediment, suspended concentration (mg/L)	156	229	1	10	6
Sediment, suspended discharge (ton/d)	156	279	.07	6.4	1.4

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323760--Warm Springs Creek near Anaconda Period of record for water-quality data: October 2005–September 2011					
Streamflow, instantaneous (ft^3/s)	36	573	41	148	88
pH, onsite (standard units)	36	8.8	7.8	8.5	8.5
Specific conductance, onsite (µS/cm)	36	271	125	217	230
Temperature, water (°C)	36	16.0	4.0	8.9	8.5
Hardness, filtered (mg/L as $CaCO_3$)	36	134	58.5	105	110
Calcium, filtered (mg/L)	36	39.2	18.5	31.6	33.2
Magnesium, filtered (mg/L)	36	9.07	2.96	6.39	6.72
Arsenic, filtered (µg/L)	36	3.9	1.8	2.3	2.2
Arsenic, unfiltered recoverable (µg/L)	36	5.6	2.0	2.8	2.6
Cadmium, filtered (µg/L)	36	.05	<.02	[2].02	.02
Cadmium, unfiltered recoverable (µg/L)	36	.14	<.04	[2].04	.03
Copper, filtered (µg/L)	36	6.4	<1.0	[2]1.2	.88
Copper, unfiltered recoverable (µg/L)	36	28.0	1.1	[2]3.9	2.1
Iron, filtered (µg/L)	36	22	<6	[2]8	6
Iron, unfiltered recoverable (µg/L)	36	1,000	27	141	76
Lead, filtered (µg/L)	36	.11	<.01	[2].03	<.12
Lead, unfiltered recoverable (µg/L)	36	3.51	.07	.50	.26
Manganese, filtered (µg/L)	36	2.9	<.1	[2]1.2	1.0
Manganese, unfiltered recoverable (µg/L)	36	45.2	1.2	6.7	4.2
Zinc, filtered (µg/L)	36	5.6	<1.4	[2]1.1	<2.8
Zinc, unfiltered recoverable (µg/L)	36	20.1	<2	[2]3.6	2.0
Sediment, suspended (percent finer than 0.062 mm)	36	83	32	64	66
Sediment, suspended concentration (mg/L)	36	65	1	9	4
Sediment, suspended discharge (ton/d)	36	68	.13	5.3	1.3

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323770--Warm Springs Creek at Warm Springs Period of record for water-quality data: March 1993–September 2011					
Streamflow, instantaneous (ft^3/s)	115	420	2.8	99	57
pH, onsite (standard units)	114	8.7	7.4	8.3	8.2
Specific conductance, onsite (µS/cm)	114	795	139	291	296
Temperature, water (°C)	115	20.0	0.0	8.5	8.0
Hardness, filtered (mg/L as $CaCO_3$)	114	415	39.8	141	144
Calcium, filtered (mg/L)	114	130	10.5	43.1	43.7
Magnesium, filtered (mg/L)	114	22.0	3.29	8.13	8.06
Arsenic, filtered (µg/L)	114	14.0	2.0	5.0	4.4
Arsenic, unfiltered recoverable (µg/L)	114	27.0	3.0	7.4	6.0
Cadmium, filtered (µg/L)	114	.1	<.04	[2].04	<.1
Cadmium, unfiltered recoverable (µg/L)	114	.41	<.05	[2].08	.03
Copper, filtered (µg/L)	114	16.0	1.0	3.3	2.9
Copper, unfiltered recoverable (µg/L)	114	147	2.3	19.6	9.0
Iron, filtered (µg/L)	114	30	<5	[2]11	10
Iron, unfiltered recoverable (µg/L)	114	2,110	39	311	121
Lead, filtered (µg/L)	114	1.8	<.08	[2].08	<.6
Lead, unfiltered recoverable (µg/L)	114	14.0	<1.00	[2]1.92	.56
Manganese, filtered (µg/L)	114	570	18.8	116	85.6
Manganese, unfiltered recoverable (µg/L)	114	1,400	37.0	202	158
Zinc, filtered (µg/L)	113	10	<1.0	[2]2.1	1.4
Zinc, unfiltered recoverable (µg/L)	114	60	<2.4	[2]9.2	3.0
Sediment, suspended (percent finer than 0.062 mm)	115	88	43	70	71
Sediment, suspended concentration (mg/L)	115	127	1	18	8
Sediment, suspended discharge (ton/d)	115	87	.05	8.5	1.1

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323800--Clark Fork near Galen Period of record for water-quality data: July 1988–September 2011					
Streamflow, instantaneous (ft^3/s)	197	1,380	14	226	136
pH, onsite (standard units)	184	9.2	7.5	8.5	8.6
Specific conductance, onsite (µS/cm)	185	720	182	413	420
Temperature, water (°C)	196	23.5	0.0	9.8	10.0
Hardness, filtered (mg/L as $CaCO_3$)	183	365	76.4	180	188
Calcium, filtered (mg/L)	183	110	23.2	53.4	55.3
Magnesium, filtered (mg/L)	183	22.0	4.44	11.4	11.8
Arsenic, filtered (µg/L)	183	53.0	4.0	15.2	14.8
Arsenic, unfiltered recoverable (µg/L)	183	78.0	3.0	19.5	17.0
Cadmium, filtered (µg/L)	183	1.0	<.04	[2].06	<1
Cadmium, unfiltered recoverable (µg/L)	183	3.0	<.1	[2].19	.05
Copper, filtered (µg/L)	183	50.0	1.7	7.8	6.0
Copper, unfiltered recoverable (µg/L)	182	240	4.1	27.5	15.5
Iron, filtered (µg/L)	183	110	<3	[2]16	11
Iron, unfiltered recoverable (µg/L)	183	9,200	56	477	270
Lead, filtered (µg/L)	183	3.00	<.08	[2].15	<1.00
Lead, unfiltered recoverable (µg/L)	183	31.0	<1.00	[2]3.42	1.86
Manganese, filtered (µg/L)	183	460	24.0	105	76.0
Manganese, unfiltered recoverable (µg/L)	183	1,400	47.3	221	170
Zinc, filtered (µg/L)	183	110	<1.0	[2]8.9	4.4
Zinc, unfiltered recoverable (µg/L)	183	360	<10.0	[2]36.4	20.0
Sediment, suspended (percent finer than 0.062 mm)	196	97	32	76	77
Sediment, suspended concentration (mg/L)	197	338	1	18	8
Sediment, suspended discharge (ton/d)	197	459	.12	21	2.8

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323840--Lost Creek near Anaconda Period of record for water-quality data: December 2004–September 2011					
Streamflow, instantaneous (ft^3/s)	55	73	0.37	13	8.2
pH, onsite (standard units)	55	8.6	7.4	8.2	8.2
Specific conductance, onsite (µS/cm)	55	253	121	197	210
Temperature, water (°C)	55	17.0	1.0	8.0	8.0
Hardness, filtered (mg/L as $CaCO_3$)	55	122	50.4	93.3	98.6
Calcium, filtered (mg/L)	55	37.1	15.7	28.3	29.3
Magnesium, filtered (mg/L)	55	7.22	2.71	5.47	5.78
Arsenic, filtered (µg/L)	55	156	1.8	7.2	3.2
Arsenic, unfiltered recoverable (µg/L)	55	3,860	2.0	75.2	3.8
Cadmium, filtered (µg/L)	54	.90	<.02	[2].04	.02
Cadmium, unfiltered recoverable (µg/L)	55	147	.01	[2]2.7	.04
Copper, filtered (µg/L)	55	90.5	.80	3.6	1.7
Copper, unfiltered recoverable (µg/L)	55	29,100	1.3	536	4.5
Iron, filtered (µg/L)	55	27	<6	[2]10	9
Iron, unfiltered recoverable (µg/L)	55	99,700	22	2,020	110
Lead, filtered (µg/L)	55	.18	<.03	[2].04	.02
Lead, unfiltered recoverable (µg/L)	55	1,290	.08	24.4	.46
Manganese, filtered (µg/L)	55	42.4	<.2	[2]2.0	1.1
Manganese, unfiltered recoverable (µg/L)	55	8,830	1.2	168	4.6
Zinc, filtered (µg/L)	54	30.0	<1.4	[2]1.8	1.0
Zinc, unfiltered recoverable (µg/L)	54	7,780	<2	[2]148	2.5
Sediment, suspended (percent finer than 0.062 mm)	55	97	22	58	59
Sediment, suspended concentration (mg/L)	55	58,900	1	1,080	6
Sediment, suspended discharge (ton/d)	55	1,320	<.01	[2]25	.11

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323850--Lost Creek near Galen Period of record for water-quality data: March 2003–September 2011					
Streamflow, instantaneous (ft^3/s)	72	71	1.3	23	16
pH, onsite (standard units)	72	8.7	8.0	8.3	8.3
Specific conductance, onsite (µS/cm)	72	934	540	645	630
Temperature, water (°C)	72	26.5	0.0	10.5	9.8
Hardness, filtered (mg/L as $CaCO_3$)	72	451	203	301	299
Calcium, filtered (mg/L)	72	122	48.5	85.1	85.3
Magnesium, filtered (mg/L)	72	35.7	17.3	21.6	20.8
Arsenic, filtered (µg/L)	72	41.8	6.0	14.4	12.6
Arsenic, unfiltered recoverable (µg/L)	72	43.0	6.0	15.2	14.0
Cadmium, filtered (µg/L)	71	.05	<.04	[2].03	.02
Cadmium, unfiltered recoverable (µg/L)	72	.11	.01	[2].04	.04
Copper, filtered (µg/L)	72	6.7	.99	2.3	2.2
Copper, unfiltered recoverable (µg/L)	72	22.5	1.6	5.4	4.4
Iron, filtered (µg/L)	72	61	<6	[2]13	10
Iron, unfiltered recoverable (µg/L)	72	293	14	99	78
Lead, filtered (µg/L)	71	.33	<.06	[2].05	<.02
Lead, unfiltered recoverable (µg/L)	72	1.30	.04	.35	.26
Manganese, filtered (µg/L)	72	54.0	1.9	15.3	13.6
Manganese, unfiltered recoverable (µg/L)	72	56.5	2.2	20.5	18.4
Zinc, filtered (µg/L)	71	3.8	<1.0	[2]1.5	1.3
Zinc, unfiltered recoverable (µg/L)	72	9.0	<2	[2]2.8	2.0
Sediment, suspended (percent finer than 0.062 mm)	72	86	18	58	60
Sediment, suspended concentration (mg/L)	72	79	2	16	15
Sediment, suspended discharge (ton/d)	72	4.2	.01	1.0	.52

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324200--Clark Fork at Deer Lodge Period of record for water-quality data: March 1985–September 2011					
Streamflow, instantaneous (ft^3/s)	249	2,000	23	310	227
pH, onsite (standard units)	197	8.9	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	232	642	228	471	498
Temperature, water (°C)	248	23.0	0.0	9.9	10.0
Hardness, filtered (mg/L as $CaCO_3$)	189	282	94.9	199	208
Calcium, filtered (mg/L)	189	82.0	28.2	58.8	61.0
Magnesium, filtered (mg/L)	189	18.7	5.53	12.6	13.2
Arsenic, filtered (µg/L)	199	39.0	6.0	14.6	13.7
Arsenic, unfiltered recoverable (µg/L)	198	215	4.8	24.0	18.0
Cadmium, filtered (µg/L)	198	2.0	<.10	[2].08	<1.0
Cadmium, unfiltered recoverable (µg/L)	198	5.0	<.10	[2].40	.10
Copper, filtered (µg/L)	199	120	3.2	10.9	8.0
Copper, unfiltered recoverable (µg/L)	197	1,500	8.2	80.2	37.0
Iron, filtered (µg/L)	199	190	<3	[2]15	9
Iron, unfiltered recoverable (µg/L)	199	29,000	27	1,450	520
Lead, filtered (µg/L)	199	6.00	<.08	[2].31	<1.00
Lead, unfiltered recoverable (µg/L)	199	200	.33	[2]10.6	4.70
Manganese, filtered (µg/L)	199	400	1.0	41.3	33.4
Manganese, unfiltered recoverable (µg/L)	199	4,600	11.9	231	132
Zinc, filtered (µg/L)	199	230	<10.0	[2]11.7	8.0
Zinc, unfiltered recoverable (µg/L)	197	1,700	4	84.2	40.0
Sediment, suspended (percent finer than 0.062 mm)	240	99	31	71	72
Sediment, suspended concentration (mg/L)	249	2,250	1	69	22
Sediment, suspended discharge (ton/d)	249	8,690	.18	145	12

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324400--Clark Fork above Little Blackfoot River, near Garrison Period of record for water-quality data: March 2009–September 2011					
Streamflow, instantaneous (ft^3/s)	23	2,310	186	626	353
pH, onsite (standard units)	23	8.8	7.9	8.3	8.3
Specific conductance, onsite (µS/cm)	23	494	249	390	386
Temperature, water (°C)	23	19.0	3.0	10.7	12.0
Hardness, filtered (mg/L as $CaCO_3$)	23	221	104	169	160
Calcium, filtered (mg/L)	23	64.0	31.8	49.8	46.9
Magnesium, filtered (mg/L)	23	14.8	5.93	10.8	10.4
Arsenic, filtered (µg/L)	23	36.7	9.2	16.3	16.4
Arsenic, unfiltered recoverable (µg/L)	23	46.0	11.7	24.8	20.7
Cadmium, filtered (µg/L)	23	.23	.04	.08	.08
Cadmium, unfiltered recoverable (µg/L)	23	.75	.08	.34	.25
Copper, filtered (µg/L)	23	40.6	4.2	11.4	9.1
Copper, unfiltered recoverable (µg/L)	23	197	12.4	76.3	59.4
Iron, filtered (µg/L)	23	43	5	16	11
Iron, unfiltered recoverable (µg/L)	23	3,200	119	1,140	731
Lead, filtered (µg/L)	23	.39	.04	.15	.11
Lead, unfiltered recoverable (µg/L)	23	29.4	.90	10.2	7.75
Manganese, filtered (µg/L)	23	45.4	15.6	27.3	23.6
Manganese, unfiltered recoverable (µg/L)	23	309	40.5	144	129
Zinc, filtered (µg/L)	23	37.1	2.9	7.6	6.0
Zinc, unfiltered recoverable (µg/L)	23	152	10.1	62.9	41.2
Sediment, suspended (percent finer than 0.062 mm)	23	85	42	66	66
Sediment, suspended concentration (mg/L)	23	179	5	59	30
Sediment, suspended discharge (ton/d)	23	428	2.5	131	42

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324680--Clark Fork at Goldcreek Period of record for water-quality data: March 1993–September 2011					
Streamflow, instantaneous (ft^3/s)	155	4,450	87	799	529
pH, onsite (standard units)	154	8.9	7.9	8.4	8.3
Specific conductance, onsite (µS/cm)	154	510	206	367	380
Temperature, water (°C)	155	23.0	0.0	10.0	10.5
Hardness, filtered (mg/L as $CaCO_3$)	154	232	85.8	161	169
Calcium, filtered (mg/L)	154	68.0	25.9	47.5	49.7
Magnesium, filtered (mg/L)	154	15.0	5.15	10.3	10.6
Arsenic, filtered (µg/L)	154	22.5	5.8	10.2	10.0
Arsenic, unfiltered recoverable (µg/L)	154	75.0	7.0	15.0	12.6
Cadmium, filtered (µg/L)	154	.2	<.04	[2].04	<.10
Cadmium, unfiltered recoverable (µg/L)	154	2	<.10	[2].18	.06
Copper, filtered (µg/L)	153	36.0	2.1	6.8	5.4
Copper, unfiltered recoverable (µg/L)	153	440	5.2	40.4	24.5
Iron, filtered (µg/L)	154	100	<3	[2]19	12
Iron, unfiltered recoverable (µg/L)	154	12,000	27	868	433
Lead, filtered (µg/L)	152	.6	<.08	[2].11	<.6
Lead, unfiltered recoverable (µg/L)	153	73.0	.14	[2]5.64	3.00
Manganese, filtered (µg/L)	154	57.3	4.0	18.9	17.0
Manganese, unfiltered recoverable (µg/L)	154	1,100	10.5	120	87.7
Zinc, filtered (µg/L)	154	26	<1.0	[2]5.6	4.0
Zinc, unfiltered recoverable (µg/L)	154	510	2	43.7	30.0
Sediment, suspended (percent finer than 0.062 mm)	155	94	43	74	77
Sediment, suspended concentration (mg/L)	155	752	1	49	22
Sediment, suspended discharge (ton/d)	155	7,960	.55	215	33

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331800--Clark Fork near Drummond Period of record for water-quality data: March 1993–September 2011					
Streamflow, instantaneous (ft^3/s)	155	5,540	149	1,100	799
pH, onsite (standard units)	154	8.7	7.8	8.3	8.3
Specific conductance, onsite (µS/cm)	154	630	189	405	417
Temperature, water (°C)	155	22.5	.5	10.9	11.0
Hardness, filtered (mg/L as $CaCO_3$)	154	298	73.9	182	189
Calcium, filtered (mg/L)	154	83.0	21.0	52.2	54.3
Magnesium, filtered (mg/L)	154	22.0	5.2	12.5	12.8
Arsenic, filtered (µg/L)	154	23.9	3.2	10.6	10.0
Arsenic, unfiltered recoverable (µg/L)	154	62	8	16.3	13.0
Cadmium, filtered (µg/L)	153	.30	<.04	[2].05	.02
Cadmium, unfiltered recoverable (µg/L)	154	2.0	<.10	[2].24	.08
Copper, filtered (µg/L)	151	21.0	1.0	6.6	5.0
Copper, unfiltered recoverable (µg/L)	152	360	4.6	43.3	23.0
Iron, filtered (µg/L)	154	150	<3	[2]19	9
Iron, unfiltered recoverable (µg/L)	153	8,800	20	1,010	490
Lead, filtered (µg/L)	150	1.2	<.08	[2].17	<1.0
Lead, unfiltered recoverable (µg/L)	150	56.0	<1.00	[2]7.76	3.61
Manganese, filtered (µg/L)	153	60.7	3.3	16.5	14.4
Manganese, unfiltered recoverable (µg/L)	154	880	8.0	146	96.0
Zinc, filtered (µg/L)	154	21.0	<3	[2]6.0	4.4
Zinc, unfiltered recoverable (µg/L)	154	490	2.9	60.0	31.9
Sediment, suspended (percent finer than 0.062 mm)	155	92	38	73	74
Sediment, suspended concentration (mg/L)	155	530	2	64	27
Sediment, suspended discharge (ton/d)	155	4,720	1.7	333	53

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334550--Clark Fork at Turah Bridge, near Bonner Period of record for water-quality data: March 1985–September 2011					
Streamflow, instantaneous (ft^3/s)	252	10,600	296	1,980	1,160
pH, onsite (standard units)	198	8.8	7.4	8.2	8.2
Specific conductance, onsite (µS/cm)	227	483	139	299	313
Temperature, water (°C)	251	22.0	0.0	9.5	10.0
Hardness, filtered (mg/L as $CaCO_3$)	188	205	53.6	130	132
Calcium, filtered (mg/L)	188	59.0	14.9	36.8	37.2
Magnesium, filtered (mg/L)	188	14.0	3.94	9.36	9.39
Arsenic, filtered (µg/L)	197	17.0	2.7	6.1	5.6
Arsenic, unfiltered recoverable (µg/L)	197	110	3.0	9.8	7.0
Cadmium, filtered (µg/L)	196	.10	<.04	[2].04	<.1
Cadmium, unfiltered recoverable (µg/L)	197	4.00	<.01	[2].25	<1.00
Copper, filtered (µg/L)	196	25.0	1.1	4.8	3.9
Copper, unfiltered recoverable (µg/L)	195	500	2.7	33.8	16.0
Iron, filtered (µg/L)	197	190	<3	[2]24	13
Iron, unfiltered recoverable (µg/L)	197	19,000	33	1,000	389
Lead, filtered (µg/L)	193	7.00	<.08	[2].28	<1.00
Lead, unfiltered recoverable (µg/L)	193	100	<1.00	[2]6.87	3.00
Manganese, filtered (µg/L)	197	37.4	<1.0	[2]8.4	7.0
Manganese, unfiltered recoverable (µg/L)	197	2,000	8.9	120	62.8
Zinc, filtered (µg/L)	195	39	<3.0	[2]5.9	4.0
Zinc, unfiltered recoverable (µg/L)	197	1,100	<10.0	[2]57.2	29.0
Sediment, suspended (percent finer than 0.062 mm)	241	98	27	73	75
Sediment, suspended concentration (mg/L)	252	1,370	2	56	18
Sediment, suspended discharge (ton/d)	252	34,700	3.0	640	61

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340000--Blackfoot River near Bonner Period of record for water-quality data: March 1985–September 2011					
Streamflow, instantaneous (ft^3/s)	184	13,400	344	2,790	1,340
pH, onsite (standard units)	144	8.7	7.5	8.3	8.3
Specific conductance, onsite (µS/cm)	161	294	131	208	204
Temperature, water (°C)	184	22.5	0.0	9.5	9.5
Hardness, filtered (mg/L as $CaCO_3$)	136	146	55.1	104	98.4
Calcium, filtered (mg/L)	136	37.7	14.0	26.4	25.2
Magnesium, filtered (mg/L)	136	13.2	4.90	9.12	8.66
Arsenic, filtered (µg/L)	143	2.0	<1.0	[2].97	.96
Arsenic, unfiltered recoverable (µg/L)	144	4.0	<1.0	[2]1.3	1.0
Cadmium, filtered (µg/L)	142	1.00	<.02	[2].02	<.10
Cadmium, unfiltered recoverable (µg/L)	144	2.00	<.01	[2].09	<1.00
Copper, filtered (µg/L)	140	7.0	<1.0	[2]1.3	.8
Copper, unfiltered recoverable (µg/L)	141	34.0	<1.0	[2]4.6	2.0
Iron, filtered (µg/L)	143	100	<3	[2]17	10
Iron, unfiltered recoverable (µg/L)	144	3,600	14	420	195
Lead, filtered (µg/L)	138	8.00	<.01	[2].33	<.60
Lead, unfiltered recoverable (µg/L)	140	25.0	<.60	[2]2.21	.08
Manganese, filtered (µg/L)	143	11.0	<1.0	[2]2.4	2.0
Manganese, unfiltered recoverable (µg/L)	144	180	<10.0	[2]28.9	18.6
Zinc, filtered (µg/L)	142	15.0	<.60	[2]2.0	<10.0
Zinc, unfiltered recoverable (µg/L)	144	60.0	<1.0	[2]5.3	<10.0
Sediment, suspended (percent finer than 0.062 mm)	182	98	42	80	82
Sediment, suspended concentration (mg/L)	184	271	1	29	8
Sediment, suspended discharge (ton/d)	184	7,670	1.1	533	31

Table 25. Statistical summary of long-term water-quality data for the Clark Fork basin, Montana, March 1985 through September 2011.—Continued

[Abbreviations: $CaCO_3$, calcium carbonate; ft^3/s, cubic feet per second; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340500--Clark Fork above Missoula Period of record for water-quality data: July 1986–September 2011					
Streamflow, instantaneous (ft^3/s)	218	22,900	720	4,630	2,430
pH, onsite (standard units)	175	8.8	7.9	8.3	8.3
Specific conductance, onsite (µS/cm)	195	399	142	253	261
Temperature, water (°C)	215	22.0	0.0	9.6	9.5
Hardness, filtered (mg/L as $CaCO_3$)	175	168	60.5	116	118
Calcium, filtered (mg/L)	175	46.0	14.0	31.4	31.7
Magnesium, filtered (mg/L)	175	13.4	5.28	9.19	9.20
Arsenic, filtered (µg/L)	175	9.0	1.0	3.5	3.2
Arsenic, unfiltered recoverable (µg/L)	175	69.0	1.0	5.5	4.0
Cadmium, filtered (µg/L)	174	.20	<.04	[2].03	<.10
Cadmium, unfiltered recoverable (µg/L)	175	5.0	<.01	[2].16	<1.0
Copper, filtered (µg/L)	174	12.6	.7	2.9	2.2
Copper, unfiltered recoverable (µg/L)	173	400	2.0	20.1	8.8
Iron, filtered (µg/L)	175	200	<3	[2]22	15
Iron, unfiltered recoverable (µg/L)	175	13,000	43	647	260
Lead, filtered (µg/L)	168	1.20	<.08	[2].15	<1.00
Lead, unfiltered recoverable (µg/L)	170	78.0	<1.00	[2]3.57	1.64
Manganese, filtered (µg/L)	175	230	5.9	16.2	13.8
Manganese, unfiltered recoverable (µg/L)	175	1,100	10.0	66.9	40.0
Zinc, filtered (µg/L)	174	16.0	<1.0	[2]3.6	2.4
Zinc, unfiltered recoverable (µg/L)	175	1,100	<10.0	[2]34.4	15
Sediment, suspended (percent finer than 0.062 mm)	213	99	14	83	88
Sediment, suspended concentration (mg/L)	218	950	2	45	12
Sediment, suspended discharge (ton/d)	218	21,900	5.8	1,140	91

[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 for the mean is estimated by using a log-probability regression to predict the values of data less than the laboratory reporting level (Helsel and Cohn, 1988). Minimum values that are not censored when the mean indicates that a censored value was used in the mean calculation, are a result of changes in the laboratory reporting level during the period of record.

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork basin, Montana, August 1986 through August 2011.

[Reported concentrations are in micrograms per gram dry weight (µg/g). 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 was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600--Silver Bow Creek at Opportunity Period of record for bed-sediment data: 1992–2011					
Arsenic	9	186	34	120	123
Cadmium	20	43.9	6.8	28.6	28.2
Chromium	18	50.7	16.8	29.5	26.7
Copper	20	9,020	837	4,030	4,360
Iron	20	45,300	28,200	35,500	34,300
Lead	20	1,030	181	616	572
Manganese	20	9,220	1,160	3,270	2,680
Nickel	19	21.4	12.0	14.8	14.5
Silver	12	20.0	8.3	15.5	15.8
Zinc	20	13,400	1,610	6,980	6,940
12323750--Silver Bow Creek at Warm Springs Period of record for bed-sediment data: 1992–2011					
Arsenic	9	177	67	112	103
Cadmium	20	12.2	4.2	7.1	6.5
Chromium	18	46.8	<15.7	[1]23.9	[1]23.2
Copper	20	769	169	349	295
Iron	20	32,500	15,400	23,400	22,100
Lead	20	100	49	71	72
Manganese	20	17,700	1,470	7,660	7,690
Nickel	19	20.0	9.2	15.0	14.7
Silver	12	4.4	.3	[1]1.9	[1]1.8
Zinc	20	2,220	554	929	727
12323770--Warm Springs Creek at Warm Springs Period of record for bed-sediment data: 1995, 1997, 1999, 2002, 2005, 2008, 2011					
Arsenic	3	66	34	51	52
Cadmium	7	5.8	1.2	3.2	3.3
Chromium	7	39.3	27.5	32.1	31.5
Copper	7	1,060	496	849	881
Iron	7	26,600	16,800	21,400	21,900
Lead	7	86	42	75	82
Manganese	7	12,100	555	6,890	7,780
Nickel	7	25.5	14.5	19.4	19.2
Silver	4	5.1	3.1	3.8	3.5
Zinc	7	453	237	381	396

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Reported concentrations are in micrograms per gram dry weight (µg/g). 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 was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323800--Clark Fork near Galen Period of record for bed-sediment data: 1987, 1991–2011					
Arsenic	9	119	73	99	95
Cadmium	22	20.1	3.8	8.2	7.3
Chromium	18	44.6	19.1	29.4	28.3
Copper	22	2,300	838	1,190	1,110
Iron	22	39,800	22,600	27,700	26,900
Lead	22	235	92	132	128
Manganese	22	17,300	1,530	9,160	9,780
Nickel	19	23.2	13.9	18.6	18.3
Silver	14	7.3	<3.2	[1]4.4	[1]4.5
Zinc	22	3,560	721	1,420	1,140
461415112450801--Clark Fork below Lost Creek, near Galen Period of record for bed-sediment data: 1996–2011					
Arsenic	9	204	92	119	109
Cadmium	16	10.0	4.8	6.9	6.7
Chromium	15	42.4	20.5	30.4	31.8
Copper	16	2,050	1,150	1,500	1,440
Iron	16	32,800	24,400	29,300	29,900
Lead	16	218	127	165	168
Manganese	16	9,820	1,430	5,470	5,660
Nickel	16	19.9	11.7	16.1	16.4
Silver	8	7.8	4.2	6.5	6.7
Zinc	16	1,680	930	1,300	1,290
461559112443301--Clark Fork at county bridge, near Racetrack Period of record for bed-sediment data: 1996–2011					
Arsenic	9	132	56	91	90
Cadmium	16	8.7	5.0	6.6	6.4
Chromium	15	45.2	19.0	29.2	29.2
Copper	16	1,810	933	1,290	1,320
Iron	16	31,700	21,200	27,500	28,400
Lead	16	186	103	145	143
Manganese	16	6,310	1,600	3,280	3,020
Nickel	16	18.4	10.3	14.5	15.2
Silver	8	6.1	<3.3	[1]5.0	[1]5.4
Zinc	16	1,550	999	1,200	1,180

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Reported concentrations are in micrograms per gram dry weight (µg/g). 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 was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
461903112440701--Clark Fork at Dempsey Creek diversion, near Racetrack Period of record for bed-sediment data: 1996–2011					
Arsenic	9	100	58	79	80
Cadmium	16	10.3	4.1	6.2	5.8
Chromium	15	39.2	16.0	27.7	26.4
Copper	16	1,580	721	1,110	1,100
Iron	16	33,700	20,600	27,000	26,600
Lead	16	155	92	131	134
Manganese	16	8,370	1,200	3,850	3,210
Nickel	16	16.9	8.7	13.0	12.7
Silver	8	6.2	2.7	4.9	5.0
Zinc	16	1,570	900	1,130	1,080
12324200--Clark Fork at Deer Lodge Period of record for bed-sediment data: 1986–87, 1990–2011					
Arsenic	9	102	49	73	70
Cadmium	24	10.0	3.5	6.0	5.3
Chromium	18	50.7	19.5	32.3	30.4
Copper	24	4,180	683	1,260	1,070
Iron	24	35,300	21,100	27,400	26,300
Lead	24	242	103	145	142
Manganese	24	6,020	1,070	2,640	2,450
Nickel	19	21.1	11.5	14.9	14.3
Silver	16	7.9	2.4	4.7	4.5
Zinc	24	1,730	844	1,190	1,140
12324400--Clark Fork above Little Blackfoot River, near Garrison Period of record for bed-sediment data: 2009-2011					
Arsenic	3	91	81	85	83
Cadmium	3	5.5	4.2	4.8	4.8
Chromium	3	52.8	45.5	48.3	46.4
Copper	3	1,290	1,260	1,270	1,270
Iron	3	32,400	27,300	29,600	29,100
Lead	3	145	140	143	144
Manganese	3	2,950	1,150	1,890	1,560
Nickel	3	17.2	13.9	15.3	14.9
Silver	0	--	--	--	--
Zinc	3	1,240	1,100	1,150	1,100

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Reported concentrations are in micrograms per gram dry weight (µg/g). 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 was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324680--Clark Fork at Goldcreek Period of record for bed-sediment data: 1992–2011					
Arsenic	9	62	23	43	39
Cadmium	20	8.1	2.6	4.6	4.1
Chromium	18	55.3	21.3	34.1	32.6
Copper	20	1,080	338	698	738
Iron	20	32,100	15,500	24,000	24,400
Lead	20	152	52	97	99
Manganese	20	2,610	977	1,800	1,810
Nickel	19	18.6	9.0	14.3	14.4
Silver	12	4.8	2.3	3.3	3.2
Zinc	20	1,320	584	929	944
12331800--Clark Fork near Drummond Period of record for bed-sediment data: 1986–87, 1991–2011					
Arsenic	9	66	31	41	34
Cadmium	23	7.7	1.7	4.3	4.3
Chromium	18	41.9	17.0	29.8	31.4
Copper	23	747	303	481	469
Iron	23	43,700	16,500	24,900	23,200
Lead	23	135	59	88	85
Manganese	23	4,820	832	2,080	1,890
Nickel	19	16.8	9.3	13.4	13.7
Silver	15	4.7	<3.2	[1]3.0	[1]2.9
Zinc	23	1,230	637	946	948
12334550--Clark Fork at Turah Bridge, near Bonner Period of record for bed-sediment data: 1986, 1991–2011					
Arsenic	9	43	19	29	30
Cadmium	22	7.3	1.9	3.5	3.5
Chromium	18	42.5	15.3	27.2	28.4
Copper	22	635	211	357	334
Iron	22	25,900	12,600	19,500	17,400
Lead	22	115	47	68	66
Manganese	22	2,340	671	1,310	1,250
Nickel	19	19.1	6.9	12.6	11.6
Silver	14	3.9	<1.9	[1]2.1	[1]1.9
Zinc	22	1,160	584	808	786

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Reported concentrations are in micrograms per gram dry weight (µg/g). 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 was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12340000--Blackfoot River near Bonner Period of record for bed-sediment data: 1986–87, 1991, 1993–96, 1998–2001, 2003, 2006–11					
Arsenic	7	6	<0.2	[1]3	[1]3
Cadmium	18	2.0	.05	[1].5	[1].3
Chromium	14	35.2	15.1	23.0	23.7
Copper	18	27	11	20	21
Iron	18	23,000	12,400	17,700	18,100
Lead	18	20	<13	[1]13	[1]12
Manganese	18	746	298	530	543
Nickel	15	14.3	6.0	11.3	11.7
Silver	12	<1.9	<.3	[1].5	[1]<.6
Zinc	18	82	35	61	62
12340500--Clark Fork above Missoula Period of record for bed-sediment data: 1997–2011					
Arsenic	9	54	17	34	30
Cadmium	15	5.8	1.2	3.1	2.8
Chromium	14	40.7	19.0	27.7	29.0
Copper	15	551	166	369	353
Iron	15	27,000	18,100	21,100	20,500
Lead	15	78	37	56	57
Manganese	15	2,250	477	1,080	1,020
Nickel	15	15.8	7.6	12.8	13.0
Silver	7	2.9	.8	[1]2.0	[1]2.1
Zinc	15	1,090	438	740	716

[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.

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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 Period of record for biological data: 1992, 1994–95, 1997–2011					
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	14	33.3	9.5	15.7	13.6
Cadmium	20	9.7	3.1	5.8	5.4
Chromium	20	25.5	1.0	4.4	3.1
Copper	20	1,090	232	426	378
Iron	20	6,150	689	2,650	2,110
Lead	20	74.3	19.0	40.3	39.8
Manganese	20	3,030	180	1,050	1,120
Nickel	20	3.6	.7	2.4	2.5
Zinc	20	1,590	619	920	835
Hydropsyche spp.					
Arsenic	13	23.1	6.1	12.6	10.7
Cadmium	18	11.0	2.0	5.5	5.1
Chromium	18	4.7	.6	2.5	2.9
Copper	18	930	80.7	443	385
Iron	18	3,250	1,050	2,180	2,170
Lead	18	237	19.3	46.5	36.5
Manganese	18	1,340	612	1,000	1,040
Nickel	18	2.7	.7	2.0	2.3
Zinc	18	1,290	388	879	893
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 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12323750--Silver Bow Creek at Warm Springs Period of record for biological data: 1992–2011					
Claassenia sabulosa					
Arsenic	1	--	--	1.8	--
Cadmium	1	--	--	1.1	--
Chromium	1	--	--	2.8	--
Copper	1	--	--	47.6	--
Iron	1	--	--	151	--
Lead	1	--	--	.6	--
Manganese	1	--	--	98.1	--
Nickel	1	--	--	.5	--
Zinc	1	--	--	400	--
Hydropsyche cockerelli					
Arsenic	15	23.6	7.9	12.9	10.4
Cadmium	41	2.1	.2	.6	.5
Chromium	41	4.3	.4	1.1	.8
Copper	41	97.0	16.7	36.9	29.9
Iron	41	1,650	351	809	762
Lead	41	6.0	.3	3.1	2.9
Manganese	41	3,890	491	1,270	1,010
Nickel	41	1.8	.3	.9	.8
Zinc	41	276	115	175	168
Hydropsyche occidentalis					
Arsenic	8	31.0	10.5	19.1	16.8
Cadmium	23	1.6	.2	.6	.4
Chromium	23	6.8	.3	1.7	1.0
Copper	23	48.9	11.0	33.4	32.8
Iron	23	2,960	372	1,230	998
Lead	23	8.2	<1.7	[1]4.1	[1]3.8
Manganese	23	6,940	996	2,420	1,940
Nickel	23	2.7	.7	1.5	1.4
Zinc	23	220	140	180	181
Hydropsyche spp.					
Arsenic	1	--	--	14.0	--
Cadmium	5	2.3	0.4	1.0	0.6
Chromium	5	2.5	.5	1.4	1.3
Copper	5	47.6	34.9	39.9	40.4
Iron	5	1,100	561	763	767
Lead	5	5.1	1.9	4.0	4.5
Manganese	5	1,190	443	817	804
Nickel	5	1.9	<.4	[1]1.0	[1].8
Zinc	5	284	141	188	162

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12323770--Warm Springs Creek at Warm Springs					
Period of record for biological data: 1995, 1997, 1999, 2002, 2005, 2008, 2011					
Arctopsyche grandis					
Arsenic	4	9.8	7.9	9.2	9.5
Cadmium	8	3.6	.4	2.5	2.7
Chromium	8	4.2	.8	2.3	2.4
Copper	8	133	53.2	102	100
Iron	8	1,350	684	970	969
Lead	8	7.2	3.0	[1]5.2	[1]5.2
Manganese	8	3,560	738	2,320	2,380
Nickel	8	3.5	1.1	[1]2.3	[1]2.3
Zinc	8	267	181	205	196
Hesperoperla spp.					
Arsenic	1	--	--	1.2	--
Cadmium	1	--	--	1.0	--
Chromium	1	--	--	2.0	--
Copper	1	--	--	64.9	--
Iron	1	--	--	456	--
Lead	1	--	--	1.9	--
Manganese	1	--	--	202	--
Nickel	1	--	--	.6	--
Zinc	1	--	--	573	--
Hydropsyche occidentalis					
Arsenic	3	13.6	12.7	13.2	13.3
Cadmium	5	1.3	.7	1.0	1.2
Chromium	5	8.6	.3	3.8	3.2
Copper	5	183	125	158	165
Iron	5	2,360	1,590	1,940	1,950
Lead	5	12.6	6.7	8.5	7.7
Manganese	5	3,190	2,400	2,800	2,880
Nickel	5	4.5	2.0	3.0	3.0
Zinc	5	204	148	169	166
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.1	0.6	0.8	--
Chromium	2	1.6	1.4	1.5	--
Copper	2	95.9	94.8	95.4	--
Iron	2	1,220	1,150	1,180	--
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	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12323800--Clark Fork near Galen Period of record for biological data: 1987, 1991–2011					
Claassenia sabulosa					
Arsenic	1	--	--	2.0	--
Cadmium	1	--	--	.2	--
Chromium	1	--	--	1.5	--
Copper	1	--	--	54.7	--
Iron	1	--	--	242	--
Lead	1	--	--	1.0	--
Manganese	1	--	--	323	--
Nickel	1	--	--	.5	--
Zinc	1	--	--	237	--
Hydropsyche cockerelli					
Arsenic	9	16.9	13.2	14.4	14.0
Cadmium	34	2.7	.7	1.5	1.5
Chromium	34	9.6	.8	2.2	1.7
Copper	34	181	48.7	105	104
Iron	34	2,660	816	1,470	1,430
Lead	34	17.1	1.2	8.3	7.9
Manganese	34	3,620	1,070	2,290	2,250
Nickel	34	6.5	.9	1.8	1.6
Zinc	34	363	136	214	208
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 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12323800--Clark Fork near Galen—Continued Period of record for biological data: 1987, 1991–2011					
Hydropsyche occidentalis					
Arsenic	15	17.0	9.1	14.0	14.7
Cadmium	47	1.6	.6	1.1	1.2
Chromium	47	6.6	.4	2.1	1.7
Copper	47	151	49.2	90.2	84.3
Iron	47	2,590	642	1,450	1,390
Lead	47	13.5	1.6	7.7	7.5
Manganese	47	6,170	653	2,530	2,110
Nickel	47	3.5	.8	1.8	1.6
Zinc	47	286	168	204	198
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	5	15.7	5.5	11.1	14.2
Cadmium	9	3.5	.7	1.8	1.3
Chromium	5	2.4	1.1	1.8	1.9
Copper	9	154	55.3	110	126
Iron	9	2,110	914	1,350	1,300
Lead	9	13.5	3.8	9.0	10.5
Manganese	5	4,760	668	2,410	1,520
Nickel	5	2.7	.9	1.6	1.5
Zinc	9	329	132	239	228

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
461415112450801--Clark Fork below Lost Creek, near Galen Period of record for biological data: 1996–2011					
Claassenia sabulosa					
Arsenic	1	--	--	1.5	--
Cadmium	2	0.4	0.3	.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].2	--
Zinc	2	245	208	226	--
Hydropsyche cockerelli					
Arsenic	11	27.8	8.8	14.3	11.6
Cadmium	22	2.8	1.1	1.8	1.6
Chromium	22	3.6	.8	2.0	2.0
Copper	22	338	48.8	134	113
Iron	22	4,080	691	1,530	1,180
Lead	22	28.6	4.5	11.6	9.0
Manganese	22	3,160	1,230	1,850	1,720
Nickel	22	2.8	.9	1.4	1.2
Zinc	22	339	151	228	223
Hydropsyche occidentalis					
Arsenic	9	20.9	12.7	15.8	15.0
Cadmium	23	1.9	.9	1.4	1.4
Chromium	23	3.6	1.2	2.1	2.0
Copper	23	219	52.1	117	119
Iron	23	2,830	963	1,650	1,510
Lead	23	19.4	6.6	11.0	10.7
Manganese	23	4,150	1,220	2,540	2,190
Nickel	23	3.0	.9	1.6	1.5
Zinc	23	308	174	243	245

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
461415112450801--Clark Fork below Lost Creek, near Galen—Continued Period of record for biological data: 1996–2011					
Hydropsyche spp.					
Arsenic	4	14.5	7.0	10.2	9.7
Cadmium	8	1.8	1.0	1.3	1.3
Chromium	8	2.4	.9	1.4	1.2
Copper	8	153	45.1	96.4	93.0
Iron	8	1,810	533	1,160	1,130
Lead	8	20.5	4.1	9.5	8.0
Manganese	8	1,980	775	1,270	1,230
Nickel	8	2.8	.9	1.6	1.4
Zinc	8	228	143	182	173
Rhyacophila spp.					
Arsenic	2	5.2	3.5	4.4	--
Cadmium	2	4.3	3.9	4.1	--
Chromium	2	1.1	1.0	1.0	--
Copper	2	93.1	73.7	83.4	--
Iron	2	346	324	335	--
Lead	2	5.9	4.8	5.4	--
Manganese	2	320	192	256	--
Nickel	2	.3	.3	.3	--
Zinc	2	411	301	356	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
461559112443301--Clark Fork at county bridge, near Racetrack Period of record for biological data: 1996–2011					
Claassenia sabulosa					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.4	--
Chromium	1	--	--	.3	--
Copper	1	--	--	40.3	--
Iron	1	--	--	113	--
Lead	1	--	--	.8	--
Manganese	1	--	--	172	--
Nickel	1	--	--	.2	--
Zinc	1	--	--	213	--
Hydropsyche cockerelli					
Arsenic	10	20.2	11.1	14.1	13.1
Cadmium	21	2.0	.8	1.5	1.5
Chromium	21	2.8	.6	1.7	1.4
Copper	21	198	50.0	102	98.2
Iron	21	3,330	657	1,270	992
Lead	21	17.2	3.7	8.7	7.5
Manganese	21	2,360	646	1,630	1,900
Nickel	21	2.0	.7	1.2	1.0
Zinc	21	302	139	193	186
Hydropsyche occidentalis					
Arsenic	12	16.8	9.2	13.3	14.0
Cadmium	25	2.3	.7	1.5	1.4
Chromium	25	3.7	1.1	2.2	2.0
Copper	25	164	59.5	118	129
Iron	25	3,690	1,030	1,700	1,600
Lead	25	15.7	4.3	10.9	10.7
Manganese	25	3,770	660	1,990	2,020
Nickel	25	2.3	1.1	1.5	1.3
Zinc	25	361	181	233	229
Hydropsyche spp.					
Arsenic	5	12.8	6.5	10.3	11.9
Cadmium	7	2.4	1.0	1.5	1.5
Chromium	7	3.9	.7	1.7	1.1
Copper	7	144	74.0	101	85.2
Iron	7	1,880	847	1,280	1,200
Lead	7	15.0	5.7	9.1	7.4
Manganese	7	2,370	886	1,340	1,130
Nickel	7	2.0	.7	1.3	1.3
Zinc	7	228	151	188	181

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
461903112440701--Clark Fork at Dempsey Creek diversion, near Racetrack					
Period of record for biological data: 1996–2011					
Arctopsyche grandis					
Arsenic	1	--	--	11.8	--
Cadmium	2	7.1	1.7	4.4	--
Chromium	2	12.9	<2.4	[1]7.0	--
Copper	2	151	30.8	90.9	--
Iron	2	1,500	340	920	--
Lead	2	12.4	<14.5	[1]9.8	--
Manganese	2	1,190	510	850	--
Nickel	2	2.3	1.0	1.6	--
Zinc	2	489	86.8	288	--
Claassenia sabulosa					
Arsenic	1	--	--	3.1	--
Cadmium	1	--	--	2.4	--
Chromium	1	--	--	1.7	--
Copper	1	--	--	73.4	--
Iron	1	--	--	297	--
Lead	1	--	--	1.9	--
Manganese	1	--	--	115	--
Nickel	1	--	--	.4	--
Zinc	1	--	--	330	--
Hydropsyche cockerelli					
Arsenic	9	18.8	8.0	13.0	10.4
Cadmium	18	2.0	.7	1.3	1.3
Chromium	18	4.0	.5	1.6	1.3
Copper	18	247	60.7	113	90.2
Iron	18	3,010	552	1,200	923
Lead	18	21.9	3.5	8.7	7.3
Manganese	18	2,650	487	1,370	1,230
Nickel	18	2.5	.5	1.2	1.0
Zinc	18	279	162	208	190

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
461903112440701--Clark Fork at Dempsey Creek diversion, near Racetrack—Continued					
Period of record for biological data: 1996–2011					
Hydropsyche occidentalis					
Arsenic	15	24.0	10.2	15.6	15.9
Cadmium	32	2.4	.7	1.4	1.3
Chromium	32	6.2	.8	2.2	1.9
Copper	32	345	74.9	130	112
Iron	32	3,390	940	1,780	1,550
Lead	32	21.8	6.1	12.9	11.8
Manganese	32	4,460	826	2,410	2,290
Nickel	32	2.4	1.1	1.6	1.5
Zinc	32	386	211	266	245
Hydropsyche spp.					
Arsenic	2	6.5	6.4	6.4	--
Cadmium	4	1.7	.9	1.3	1.3
Chromium	4	2.1	.8	1.4	1.2
Copper	4	140	65.5	94.1	85.4
Iron	4	1,610	875	1,120	987
Lead	4	13.2	7.3	9.7	9.1
Manganese	4	1,150	638	824	756
Nickel	4	1.6	.6	1.1	1.1
Zinc	4	212	162	184	180

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12324200--Clark Fork at Deer Lodge Period of record for biological data: 1986–87, 1990–2011					
Arctopsyche grandis					
Arsenic	2	8.3	5.8	7.0	--
Cadmium	4	4.7	<4.2	[1]3.4	[1]3.1
Chromium	4	4.7	1.0	[1]2.8	[1]2.8
Copper	4	90.5	34.9	68.0	73.2
Iron	4	1,090	537	788	760
Lead	4	11.2	3.8	[1]8.2	[1]<9.5
Manganese	4	1,010	380	766	837
Nickel	4	1.2	<1.3	[1]1.1	11.1
Zinc	4	369	140	250	246
Hydropsyche cockerelli					
Arsenic	6	11.4	5.8	8.2	7.8
Cadmium	29	3.5	.6	1.4	1.3
Chromium	29	3.2	.4	1.6	1.7
Copper	29	180	54.7	98.2	98.2
Iron	29	3,340	490	1,120	1,040
Lead	29	18.1	3.8	9.5	8.9
Manganese	29	1,570	396	879	815
Nickel	29	2.4	.3	1.1	1.0
Zinc	29	391	132	190	185
Hydropsyche occidentalis					
Arsenic	18	21.1	6.6	11.6	11.0
Cadmium	55	3.4	.6	1.4	1.3
Chromium	55	3.7	.6	2.0	1.9
Copper	55	222	49.4	124	118
Iron	55	3,240	558	1,510	1,480
Lead	55	20.1	3.5	11.9	11.7
Manganese	55	2,850	649	1,630	1,680
Nickel	55	12.9	1.0	1.7	1.4
Zinc	55	346	166	246	238
Hydropsyche spp.					
Arsenic	1	--	--	6.0	--
Cadmium	4	2.6	1.6	2.2	2.3
Chromium	1	--	--	.8	--
Copper	4	222	91	166	176
Iron	4	2,220	1,070	1,770	1,900
Lead	4	16.7	9.0	14.4	15.9
Manganese	1	--	--	837	--
Nickel	1	--	--	.9	--
Zinc	4	298	196	242	237

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12324400--Clark Fork above Little Blackfoot River, near Garrison Period of record for biological data: 2009-11					
Arctopsyche grandis					
Arsenic	3	16.6	5.5	9.4	6.0
Cadmium	3	4.9	3.2	3.8	3.2
Chromium	3	4.6	<2.2	[1]3.2	3.2
Copper	3	209	65.7	120	83.6
Iron	3	2,580	694	1,370	826
Lead	3	18.0	6.6	10.9	8.1
Manganese	3	990	940	967	972
Nickel	3	2.2	.7	1.2	.8
Zinc	3	378	253	304	282
Hydropsyche cockerelli					
Arsenic	1	--	--	11.1	--
Cadmium	1	--	--	4.0	--
Chromium	1	--	--	3.4	--
Copper	1	--	--	158	--
Iron	1	--	--	2,150	--
Lead	1	--	--	18.8	--
Manganese	1	--	--	1,500	--
Nickel	1	--	--	1.7	--
Zinc	1	--	--	284	--
Hydropsyche occidentalis					
Arsenic	6	14.7	7.9	11.3	11.7
Cadmium	6	2.5	1.3	2.1	2.4
Chromium	6	3.6	.7	2.2	2.1
Copper	6	182	98.2	135	141
Iron	6	2,390	1,290	1,870	1,940
Lead	6	17.9	11.1	14.8	15.5
Manganese	6	1,610	975	1,300	1,230
Nickel	6	1.9	1.0	1.4	1.6
Zinc	6	299	223	257	258
Hydropsyche spp.					
Arsenic	1	--	--	13.6	--
Cadmium	1	--	--	1.7	--
Chromium	1	--	--	4.3	--
Copper	1	--	--	187	--
Iron	1	--	--	2,570	--
Lead	1	--	--	18.5	--
Manganese	1	--	--	919	--
Nickel	1	--	--	1.8	--
Zinc	1	--	--	296	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
		12324680--Clark Fork at Goldcreek Period of record for biological data: 1992–2011			
		Arctopsyche grandis			
Arsenic	31	17.0	1.8	5.1	4.7
Cadmium	60	6.6	.6	2.0	1.8
Chromium	60	5.3	.1	1.4	1.1
Copper	60	232	19.9	52.2	39.3
Iron	60	3,070	195	783	540
Lead	60	16.9	1.0	4.2	3.4
Manganese	60	1,580	436	870	870
Nickel	60	3.1	.2	.8	.7
Zinc	60	326	146	205	186
		Claassenia sabulosa			
Arsenic	23	2.5	0.4	1.5	1.5
Cadmium	43	3.5	.1	1.1	.7
Chromium	43	1.6	.2	.6	.5
Copper	43	84.9	33.0	59.3	58.3
Iron	43	640	63.0	201	171
Lead	43	2.8	.4	1.0	.8
Manganese	43	320	50.6	151	129
Nickel	43	.7	.1	.3	.3
Zinc	43	364	166	266	261
		Hydropsyche cockerelli			
Arsenic	16	9.8	4.1	5.9	5.6
Cadmium	35	4.2	.5	1.5	1.3
Chromium	35	4.7	.5	2.0	1.9
Copper	35	188	17.1	73.6	58.4
Iron	35	3,250	522	1,160	930
Lead	35	17.6	2.4	6.7	5.3
Manganese	35	1,710	538	1,000	963
Nickel	35	3.5	.3	1.2	1.0
Zinc	35	359	106	193	186

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12324680--Clark Fork at Goldcreek—Continued Period of record for biological data: 1992–2011					
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
Hydropsyche occidentalis					
Arsenic	12	11.5	4.7	7.0	6.3
Cadmium	27	2.3	.4	1.3	1.3
Chromium	27	3.9	.4	1.8	1.7
Copper	27	170	26.4	74.1	62.6
Iron	27	2,720	466	1,250	1,160
Lead	27	15.7	2.9	7.6	6.0
Manganese	27	2,210	530	1,220	1,140
Nickel	27	2.5	.8	1.2	1.1
Zinc	27	276	97.0	202	204
Hydropsyche spp.					
Arsenic	2	5.9	5.7	5.8	--
Cadmium	2	1.8	1.7	1.8	--
Chromium	2	1.6	1.6	1.6	--
Copper	2	83.5	73.6	78.6	--
Iron	2	1,150	1,110	1,130	--
Lead	2	9.2	8.0	8.6	--
Manganese	2	1,180	1,130	1,160	--
Nickel	2	.8	.8	.8	--
Zinc	2	210	196	203	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12331800--Clark Fork near Drummond Period of record for biological data: 1986, 1991–2011					
Arctopsyche grandis					
Arsenic	23	8.2	2.3	4.1	3.9
Cadmium	55	3.8	.4	1.5	1.3
Chromium	55	4.2	.2	1.1	1.0
Copper	55	103	16.9	35.6	29.6
Iron	55	1,720	193	644	547
Lead	55	11.8	1.6	4.9	4.2
Manganese	55	2,010	456	850	775
Nickel	55	1.9	.2	.7	.6
Zinc	55	314	140	201	190
Claassenia sabulosa					
Arsenic	19	1.9	0.7	1.3	1.2
Cadmium	55	2.8	.1	1.1	1.1
Chromium	55	3.3	.2	.7	.6
Copper	55	165	18.0	65.3	61.3
Iron	55	449	45.4	176	148
Lead	55	2.9	.2	1.0	.9
Manganese	55	748	33.1	186	150
Nickel	55	1.1	.1	[1].3	[1].2
Zinc	55	567	103	276	265
Hydropsyche cockerelli					
Arsenic	13	7.1	3.9	5.4	5.3
Cadmium	42	4.5	.3	1.2	1.0
Chromium	42	3.5	.4	1.6	1.5
Copper	42	156	30.0	59.5	52.6
Iron	42	2,500	506	1,190	987
Lead	42	15.0	4.7	8.5	7.7
Manganese	42	1,680	549	1,010	934
Nickel	42	2.0	.5	1.1	1.1
Zinc	42	322	134	197	190

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12331800--Clark Fork near Drummond—Continued Period of record for biological data: 1986, 1991–2011					
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	15	7.7	4.3	5.6	5.4
Cadmium	31	2.0	.4	1.1	1.0
Chromium	31	8.1	.4	2.2	2.1
Copper	31	118	13.3	58.5	55.8
Iron	31	2,060	424	1,260	1,190
Lead	31	14.0	3.0	8.8	9.1
Manganese	31	2,920	619	1,430	1,220
Nickel	31	2.4	.5	1.3	1.2
Zinc	31	293	157	221	222
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 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12334550--Clark Fork at Turah Bridge, near Bonner Period of record for biological data: 1986, 1991–2011					
Arctopsyche grandis					
Arsenic	27	7.2	3.1	4.6	4.5
Cadmium	69	2.7	.4	1.2	1.0
Chromium	69	4.1	.5	1.6	1.5
Copper	69	125	20.1	38.4	32.2
Iron	69	2,870	372	942	793
Lead	69	13.2	1.6	4.4	3.7
Manganese	69	902	324	650	662
Nickel	69	2.6	.4	1.1	.9
Zinc	69	282	111	201	198
Claassenia sabulosa					
Arsenic	19	1.9	0.5	1.1	1.1
Cadmium	45	2.5	.1	1.1	.8
Chromium	45	2.0	.2	.7	.6
Copper	45	95.1	37.5	60.3	60.2
Iron	45	378	58.6	134	114
Lead	45	1.6	.2	.7	.6
Manganese	45	229	37.2	102	90.2
Nickel	45	.6	.04	.2	.2
Zinc	45	342	144	230	235
Hydropsyche cockerelli					
Arsenic	19	9.8	3.7	5.0	4.9
Cadmium	47	2.2	.3	.9	.7
Chromium	47	14.2	.2	2.2	1.7
Copper	47	126	26.4	50.5	44.4
Iron	47	3,180	566	1,260	1,160
Lead	47	19.7	2.2	5.7	5.2
Manganese	47	848	426	646	661
Nickel	47	2.7	.6	1.3	1.3
Zinc	47	332	119	190	195

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12334550--Clark Fork at Turah Bridge, near Bonner—Continued Period of record for biological data: 1986, 1991–2011					
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	16	7.3	3.6	4.8	4.3
Cadmium	36	1.8	.3	1.0	.9
Chromium	36	5.0	.6	2.0	1.7
Copper	36	102	27.4	50.5	45.8
Iron	36	2,590	472	1,290	1,170
Lead	36	14.2	3.0	6.6	5.7
Manganese	36	1,600	454	867	821
Nickel	36	3.2	.6	1.3	1.2
Zinc	36	416	145	214	222
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	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12340000--Blackfoot River near Bonner Period of record for biological data: 1986–87, 1991, 1993, 1996, 1998, 2000, 2003, 2006–11					
Arctopsyche grandis					
Arsenic	7	4.6	1.6	2.8	2.2
Cadmium	17	.5	.1	.3	.2
Chromium	12	6.9	.5	2.4	1.3
Copper	17	18.0	9.9	13.1	12.5
Iron	17	1,880	108	740	759
Lead	17	2.3	.5	1.1	.9
Manganese	12	633	286	485	496
Nickel	12	3.7	.7	1.4	1.2
Zinc	17	156	123	141	139
Claassenia sabulosa					
Arsenic	10	3.0	0.3	1.0	0.7
Cadmium	21	.2	.1	.1	.2
Chromium	16	5.2	.3	1.0	.7
Copper	21	88.5	19.0	43.8	44.0
Iron	21	317	46.2	147	138
Lead	21	.8	.1	.3	.2
Manganese	16	133	26.3	81.5	76.6
Nickel	16	1.1	.1	.3	.3
Zinc	21	328	117	222	205
Hydropsyche cockerelli					
Arsenic	5	4.2	2.4	3.2	3.1
Cadmium	5	.6	<.1	[1].4	[1].4
Chromium	5	3.8	2.4	3.2	3.6
Copper	5	16.2	5.6	13.3	14.8
Iron	5	2,390	1,550	1,910	1,970
Lead	5	2.3	1.9	2.1	2.1
Manganese	5	814	428	642	637
Nickel	5	4.6	1.8	2.7	2.2
Zinc	5	162	140	146	142

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12340000--Blackfoot River near Bonner—Continued Period of record for biological data: 1986–87, 1991, 1993, 1996, 1998, 2000, 2003, 2006–11					
Hydropsyche occidentalis					
Arsenic	10	3.8	1.2	2.4	2.2
Cadmium	22	.5	.1	.2	.2
Chromium	22	5.8	.8	2.2	1.9
Copper	22	20.6	12.0	15.7	15.1
Iron	22	2,090	1,010	1,530	1,500
Lead	22	2.0	.8	1.5	1.6
Manganese	22	798	414	529	470
Nickel	22	4.9	.9	1.6	1.4
Zinc	22	163	116	138	142
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.6	--
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	--

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12340500--Clark Fork above Missoula Period of record for biological data: 1997–2011					
Arctopsyche grandis					
Arsenic	23	7.2	2.1	4.1	4.1
Cadmium	42	2.3	.1	.9	.7
Chromium	42	4.2	.6	1.8	1.6
Copper	42	81.2	19.5	41.4	37.5
Iron	42	2,340	476	1,100	994
Lead	42	8.8	1.2	4.4	4.2
Manganese	42	1,410	476	910	891
Nickel	42	2.1	.5	1.2	1.1
Zinc	42	272	133	200	200
Claassenia sabulosa					
Arsenic	15	1.9	0.5	1.3	1.4
Cadmium	24	2.0	.2	.8	.5
Chromium	24	1.4	.3	.8	.8
Copper	24	81.1	33.0	53.8	51.2
Iron	24	402	95.3	235	233
Lead	24	3.1	.4	1.0	1.0
Manganese	24	683	57.8	206	156
Nickel	24	.5	<.3	[1].4	[1].4
Zinc	24	363	191	274	271
Hydropsyche cockerelli					
Arsenic	16	8.9	3.7	6.5	6.6
Cadmium	25	2.0	.4	1.0	1.0
Chromium	25	6.0	1.8	3.1	3.3
Copper	25	99.7	29.9	68.5	75.9
Iron	25	3,590	1,400	2,170	2,160
Lead	25	12.1	4.2	8.1	7.6
Manganese	25	1,910	764	1,250	1,220
Nickel	25	2.4	1.4	1.9	1.9
Zinc	25	266	156	223	226

Table 27. Statistical summary of long-term biological data for the Clark Fork basin, Montana, August 1986 through August 2011.—Continued

[Concentrations are in micrograms per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample 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 of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated prior to analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. 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
12340500--Clark Fork above Missoula—Continued Period of record for biological data: 1997–2011					
Hydropsyche occidentalis					
Arsenic	9	7.4	3.9	5.8	6.2
Cadmium	15	1.5	.4	.9	.8
Chromium	15	5.5	1.5	3.2	3.1
Copper	15	80.7	30.3	59.2	59.5
Iron	15	2,540	1,450	2,080	2,210
Lead	15	11.4	4.0	7.4	7.1
Manganese	15	2,470	718	1,620	1,600
Nickel	15	2.4	1.4	1.9	1.9
Zinc	15	278	192	233	230

[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.

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