WATER-QUALITY, BED-SEDIMENT, AND BIOLOGICAL DATA (OCTOBER 1993 THROUGH SEPTEMBER 1994) AND STATISTICAL SUMMARIES OF DATA FOR STREAMS IN THE UPPER CLARK FORK BASIN, MONTANA

By John H. Lambing, Michelle I. Hornberger, Ellen V. Axtmann, and Kent A. Dodge

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CONVERSION FACTORS AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
cubic foot per second (ft3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter (m)
gallon (gal)	3.785	liter (L)
inch (in.)	25.4	millimeter (mm)
inch (in.)	25,400	micrometer (μm)
mile (mi)	1.609	kilometer
ounce (oz)	28.35	gram (g)
part per million	1	microgram per gram (μg/g)
square mile (mi^2)	2.59	square kilometer
ton per day (ton/d)	907.2	kilogram per day

Temperature can be converted from degrees Celsius (°C) to degrees Fahrenheit (°F) by the equation:

$$°F = 9/5\ (°C) + 32$$

Abbreviated water-quality units used in this report:

μg/g micrograms per gram
μg/L micrograms per liter
μg/mL micrograms per milliliter
μS/cm microsiemens per centimeter at 25 °C
mg/L milligrams per liter

Water-year definition:

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

Water-Quality, Bed-Sediment, and Biological Data (October 1993 through September 1994) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

By John H. Lambing, Michelle I. Hornberger, Ellen V. Axtmann, *and* Kent A. Dodge

Abstract

Water, bed sediment, and biota were sampled in streams from Butte to below Missoula as part of a program to characterize aquatic resources in the upper Clark Fork basin of western Montana. Sampling stations were located on the Clark Fork and major tributaries. Water-quality data were obtained periodically at 16 stations during October 1993 through September 1994 (water year 1994). Bed-sediment and biological data were obtained at 11 of the 16 stations in August 1994. The primary constituents analyzed were trace elements associated with mine tailings from historical mining and smelting activities.

Water-quality data include concentrations of major ions, trace elements, and suspended sediment in samples collected periodically during water year 1994. Daily values of streamflow, suspended-sediment concentration, and suspended-sediment discharge are given for six stations. Bed-sediment data include trace-element concentrations in the fine-grained and bulk fractions. Biological data include trace-element concentrations in whole-body tissue of aquatic benthic insects. Quality-assurance data are reported for analytical results of water, bed sediment, and biota. Statistical summaries of water-quality, bed-sediment, and biological data are provided for the period of record at each station since 1985.

INTRODUCTION

The Clark Fork originates near Warm Springs in western Montana at the confluence of Silver Bow and Warm Springs Creeks (fig. 1). Along the 148-mi reach of stream from Silver Bow Creek in Butte to the Clark Fork at Milltown Reservoir, 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-mi^2 Clark Fork basin above Missoula include irrigation, stock watering, light industry, hydroelectric power generation, and habitat for trout fisheries. Current land uses primarily are cattle production, logging, mining, and recreation. Large-scale mining and smelting had been prevalent land uses in the upper basin for more than one hundred years, but are now largely discontinued.

Deposits of copper, gold, silver, and lead ores were extensively mined, milled, and smelted in the drainages of Silver Bow and Warm Springs Creeks from about 1860 to 1980. Moderate- and small-scale mining also occurred in the basins of most of the major tributaries to the upper Clark Fork. Tailings derived from mineral processing commonly contain large quantities of trace elements such as cadmium, copper, lead, and zinc that can accumulate to potentially toxic levels in aquatic organisms. Tailings have been eroded and transported downstream since the late 1800's and redeposited in stream channels, on flood plains, and in Warm Springs Ponds and Milltown Reservoir. The river continues to erode, transport, and redeposit tailings-laden sediment along the river and flood plain corridor, especially during high flows.

Concern about the potential toxicity of tailings to aquatic biota and human health has resulted in a comprehensive effort by State, Federal, and private entities to characterize the aquatic resources in the upper Clark Fork basin to guide and monitor remedial cleanup activities. Establishment of a long-term data base was considered necessary to statistically detect trends over time in order to evaluate the effectiveness of remediation. Water-quality data have been collected by the U.S. Geological Survey (USGS) at selected sites in the upper Clark Fork basin since 1985 (Lambing, 1987,1988,1989,1990, and 1991; Lambing and others, 1994). Trace-element data for bed sediment and biota (aquatic benthic insects) have been collected annually since 1986 at selected sites as part of studies on bed-sediment contamination and bioaccumulation of metals

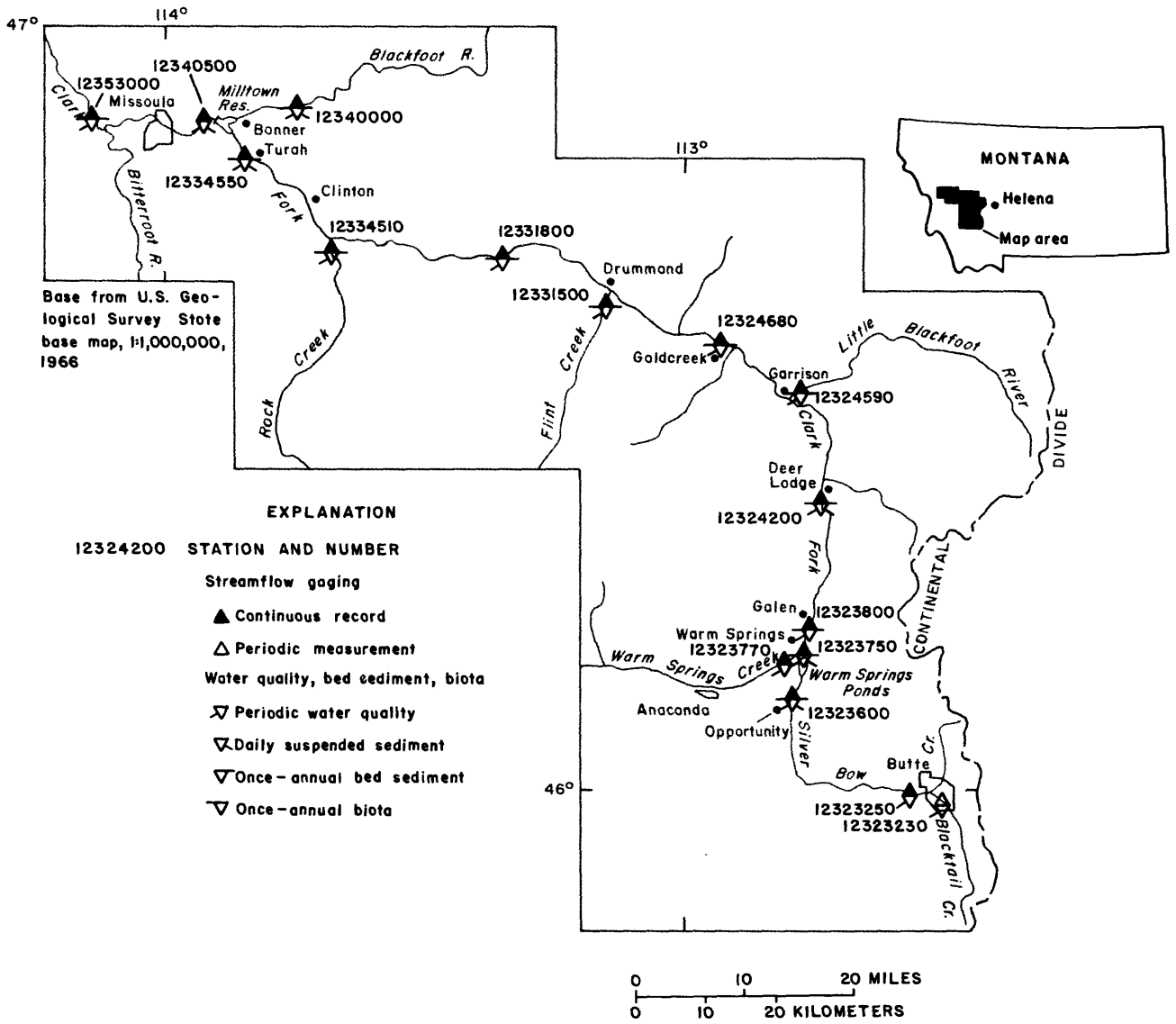

Figure 1. Location of study area.

conducted by the USGS National Research Program (Axtmann and Luoma, 1991; Cain and others, 1992; Lambing and others, 1994). In March 1993, an expanded sampling program for water, bed sediment, and biota was implemented in cooperation with the U.S. Environmental Protection Agency.

The purpose of this report is to present water-quality data for 16 stations and trace-element data for bed sediment and biota at 11 stations in the upper Clark Fork basin collected from October 1993 through September 1994 (water year 1994). Quality-assurance data are presented for water quality, bed sediment, and biota. Statistical summaries also are provided for water-quality, bed-sediment, and biological data collected since 1985.

SAMPLING LOCATIONS AND TYPES OF DATA

Sampling stations in the upper Clark Fork basin are located on both the Clark Fork mainstem and major tributaries from Butte to below Missoula (fig. 1). Mainstem sites were selected to divide the upper Clark Fork into reaches of relatively uniform length, with each reach encompassing either a major tributary or

depositional environment (Warm Springs Ponds and Milltown Reservoir). Tributaries were sampled to describe water-quality characteristics for major hydrologic sources in the upper basin and to provide reference comparisons to the mainstem for bed sediment and biota. Water-quality data were obtained periodically at 16 stations; daily suspended-sediment data were obtained at 6 of these stations. Bed-sediment and biological data were obtained once-annually at 11 of these stations (table 1).

A list of properties and constituents analyzed in samples of water, bed sediment, and biota is given in table 2. Results of analyses for water, bed sediment, and biota for water year 1994 are listed in tables 4 through 23 at the back of the report. Statistical summaries of water-quality, bed-sediment, and biological data collected since 1985 are given in tables 24-27 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 measurements of physical properties and concentrations of chemical and physical constituents analyzed in stream samples. Samples were collected 6 to 10 times per year at a schedule designed to adequately describe seasonal and hydrologic variability.

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

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

Station number (fig. 1)	Station name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Fine-grained bed sediment[2]	Bulk bed sediment[2]	Biota[2]
12323230	Blacktail Creek at Harrison Avenue, at Butte	--	03/93-P	--	--	--	--
12323250	Silver Bow Creek below Blacktail Creek, at Butte	10/83-P	03/93-P	--	--	--	--
12323600	Silver Bow Creek at Opportunity	07/88-P	03/93-P	03/93-P	07/92-P	08/93	08/94
12323750	Silver Bow Creek at Warm Springs	03/72-09/79, 04/93-P	03/93-P	04/93-P	08/93	08/93	08/93
12323770	Warm Springs Creek at Warm Springs	10/83-P	03/93-P	--	--	--	--
12323800	Clark Fork near Galen	07/88-P	07/88-P	--	08/87-P	08/93	08/87-P
12324200	Clark Fork at Deer Lodge	10/78-P	03/85-P	03/85-09/86, 04/87-P	08/86-P	08/93	08/86-P
12324590	Little Blackfoot River near Garrison	10/72-P	03/85-P	--	08/86-P	08/94	08/87-P
12324680	Clark Fork at Goldcreek	10/77-P	03/93-P	--	07/92-P	08/93	07/92-P
12331500	Flint Creek near Drummond	08/90-P	03/85-P	--	08/86-P	08/93	08/86-P
12331800	Clark Fork near Drummond	04/93-P	03/93-P	--	08/86-P	08/93	08/86-P
12334510	Rock Creek near Clinton	10/72-P	03/85-P	--	08/87-P	08/93	08/87-P
12334550	Clark Fork at Turah Bridge, near Bonner	05/86-P	03/85-P	03/85-P	08/86-P	08/93	08/86-P
12340000	Blackfoot River near Bonner	10/39-P	03/85-P	07/86-04/87, 06/88-P	08/86-P	08/93	08/86-P
12340500	Clark Fork above Missoula	03/29-P	10/89-P	07/86-04/87, 06/88-P	--	--	--
12353000	Clark Fork below Missoula[3]	10/29-P	10/78-P	--	08/86-P	08/93	08/86-P

[1]Onsite measurements of physical properties and laboratory analyses of major ions, trace elements, and suspended sediment. Prior to March 1993, laboratory analyses included only trace elements and suspended sediment, with the exception of Clark Fork below Missoula.
[2]Laboratory analyses of trace elements.
[3]Bed sediment and biota sampled about 30 miles downstream from water-quality station to conform to previous sampling location.

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

Water		Bed sediment	Biota
Property	**Constituent**	**Constituent**	**Constituent**
Streamflow	Hardness	Cadmium	Cadmium
Specific conductance	Calcium	Chromium	Chromium
pH	Magnesium	Copper	Copper
Temperature	Sodium	Iron	Iron
	Potassium	Lead	Lead
	Alkalinity	Manganese	Manganese
	Sulfate	Nickel	Nickel
	Chloride	Silver	Zinc
	Fluoride	Zinc	
	Silica		
	Dissolved solids		
	Arsenic		
	Cadmium		
	Copper		
	Iron		
	Lead		
	Manganese		
	Zinc		
	Suspended sediment		

Methods

Cross-sectional water samples were collected from multiple verticals across the stream using depth-integration methods described by Guy and Norman (1970), USGS (1977), and Knapton (1985). These methods provide a vertically and laterally discharge-weighted sample that is representative of the entire flow through the cross section of a stream. Sampling equipment consisted of standard USGS depth-integrating suspended-sediment samplers (DH-81 and D-74TM) which are either constructed of plastic or equipped with nylon nozzles and coated with a non-metallic epoxy paint.

Onsite measurements of water temperature, specific conductance, and pH were made during collection of periodic water-quality samples. Onsite sample processing, including filtration and acidification, was performed according to procedures described by Horowitz and others (1994), Ward and Harr (1990), USGS (1977), and Knapton (1985). Instantaneous streamflow at the time of water sampling was determined at all stations, either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982).

Water samples were analyzed for the constituents listed in table 2 by the USGS National Water Quality Laboratory (NWQL) in Arvada, Colo. The trace elements arsenic, cadmium, copper, iron, lead, manganese, and zinc were analyzed for both dissolved and total-recoverable concentrations. Analytical methods are described by Fishman and Friedman (1989) and Fishman (1993).

Cross-sectional water samples also were collected for analysis of suspended sediment whenever periodic water-quality samples were collected. These samples were analyzed for suspended-sediment concentration and sand-silt distribution (percent less than 0.062 mm diameter) by the USGS sediment laboratory in Helena, Mont., according to methods described by Guy (1969) and Lambing and Dodge (1993).

At the six daily suspended-sediment stations (table 1), suspended-sediment samples were collected 2 to 7 times per week. These samples were collected by local contracted observers using the depth-integration method at a single vertical near mid-stream. The samples were analyzed for suspended-sediment concentration and were used to determine daily mean suspended-sediment concentrations according to methods described by Porterfield (1972).

Results

Water-quality data for samples collected periodically during October 1993 through September 1994 (water year 1994) are presented in table 4. The types of data include instantaneous streamflow, onsite measurements of water-quality properties, and analytical results for chemical constituents and suspended sediment.

Daily streamflow and suspended-sediment data for water year 1994 at the six daily suspended-sediment stations are given in tables 5 to 10. Monthly descriptive statistics for each parameter are provided along with totals for the annual discharge of water and suspended sediment.

Quality Assurance

Quality-assurance procedures used for the collection and field processing of water-quality samples are described by Horowitz and others (1994), Ward and Harr (1990), Edwards and Glysson (1988), Knapton and Nimick (1991), and Knapton (1985). 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 (1992). Quality-assurance procedures used by the Montana District sediment laboratory are described by Lambing and Dodge (1993).

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

In addition to quality-control samples submitted from the field, internal quality-assurance practices within the laboratory are performed systematically to provide quality control of analytical procedures (Pritt and Raese, 1992). These internal practices include analyses of quality-control samples such as calibration standards, standard reference water samples, replicate samples, deionized-water blanks, or spiked samples at a proportion equivalent to at least 10 percent of the sample load. The NWQL participates in a blind-sample program where standard reference water samples prepared by the USGS Branch of Quality Assurance are routinely inserted into the sample line for each analytical method at a frequency proportional to the sample load. The NWQL also participates in external evaluation studies twice-yearly with the U.S. Environmental Protection Agency, the Canadian Center for Inland Water, and the Quality Assurance Section of the USGS Branch of Technical Development and Quality Systems to assess analytical performance.

Replicate samples are two or more samples considered to be essentially identical in composition. Analyses of replicate samples indicate the precision (reproducibility) of results. Precision is affected by numerous sources of variability within the field and laboratory environments, including sample collection, sample processing, and sample analysis. To provide data on overall precision, replicate samples were obtained in the field by splitting a composite stream sample. Analyses of these field replicates indicate the reproducibility of environmental data, which is affected by the combined variability of field and laboratory processes to which the sample is exposed.

Analytical precision was evaluated by making replicate analyses of an individual sample selected randomly in the laboratory from the group of samples comprising each analytical run. A separate analysis of the sample was made at the beginning and end of each analytical run to provide information on laboratory analytical precision independent of possible effects on precision caused by field collection and processing of samples.

Spiked samples are used to evaluate the ability of an analytical method to accurately measure a known amount of analyte added to a sample. Deionized-water blanks and aliquots of stream samples were spiked in the laboratory with known amounts of the trace elements analyzed in water samples. Analyses of spiked blanks indicate if the spiking procedure and analytical method are within control for a water matrix that is presumably free of chemical interference. Analyses of spiked aliquots of stream samples indicate if the chemical matrix of ambient stream water interferes with the analytical measurement and whether these interferences could contribute significant bias to reported trace-element concentrations for stream samples.

Blank samples of deionized water were routinely analyzed to identify the presence and magnitude of contamination that potentially could bias analytical results. The particular type of blank sample routinely tested was a "field" blank. Field

blanks are aliquots of deionized water that are certified as trace-element free and are processed through the sampling equipment used to collect stream samples. These blanks are then subjected to the same processing (sample splitting, filtration, preservation, transportation, and laboratory handling) as stream samples. Blank samples are analyzed for the same constituents as those of stream samples to identify whether any detectable concentrations exist.

All water samples were handled in accordance with chain-of-custody procedures that provide documentation of sample identity, shipment, receipt, and laboratory handling. All samples submitted from a sampling episode were stored and analyzed as a group independent of other samples submitted to the NWQL. Therefore, statistical descriptions of quality-control data generated for this program are directly applicable to the analytical results for stream samples reported herein. In addition, internal laboratory quality-control data provide ongoing maintenance of accuracy and precision for the analytical process.

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

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

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

where:

S = standard deviation of the difference in concentration between replicate analyses,
d = difference in concentration between each pair of replicate analyses, and
k = number of pairs of replicate analyses.

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

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

where:

RSD = relative standard deviation,
S = standard deviation, and
$\bar{x}$ = mean of all replicate concentrations.

Paired chemical analyses of field replicates are presented in table 11. The overall precision estimated for each constituent based on these paired results is reported in table 12. Statistics for precision of field-replicate analyses were based on the values reported in table 11 which are rounded to standard USGS reporting levels for the particular constituent and its analytical method (Timme, 1994). Analytical precision for constituents based on laboratory-replicate analyses of individual samples randomly selected by the laboratory is reported in table 13. Statistics for analytical precision of laboratory-replicate analyses are based on unrounded values stored in laboratory data files. Concentrations less than the minimum reporting level (censored values) were included in the calculations by arbitrarily substituting a value of one-half the reporting level.

The data-quality objective for analytical precision, based on laboratory-replicate analyses, is a maximum relative standard deviation of 20 percent. Precision estimates for laboratory-replicate analyses were within the 20-percent relative standard deviation limits for all constituents (table 13). The precision data, therefore, indicate acceptable reproducibility of analytical results.

Although the data-quality objectives for precision are not directly applicable to field replicates owing to the additional potential for

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

[Abbreviations: µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter. Symbol: --, not determined]

Property or constituent	Data-quality objectives			
	Detectability		Precision	Bias
	Minimum reporting level, in units		Maximum relative standard deviation of laboratory replicate analyses, in percent	Maximum deviation of spike recovery, in percent
Specific conductance	1	µS/cm	2	--
pH	.1	units	5	--
Hardness	1	mg/L as $CaCO_3$	20	--
Calcium, dissolved	.1	mg/L	20	--
Magnesium, dissolved	.1	mg/L	20	--
Sodium, dissolved	.1	mg/L	20	--
Potassium, dissolved	.1	mg/L	20	--
Alkalinity, dissolved	1	mg/L as $CaCO_3$	20	--
Sulfate, dissolved	.1	mg/L	20	--
Chloride, dissolved	.1	mg/L	20	--
Fluoride, dissolved	.1	mg/L	20	--
Silica, dissolved	.1	mg/L	20	--
Arsenic, total recoverable	1	µg/L	20	25
Arsenic, dissolved	1	µg/L	20	25
Cadmium, total recoverable	1	µg/L	20	25
Cadmium, dissolved	.1	µg/L	20	25
Copper, total recoverable	1	µg/L	20	25
Copper, dissolved	1	µg/L	20	25
Iron, total recoverable	10	µg/L	20	25
Iron, dissolved	3	µg/L	20	25
Lead, total recoverable	1	µg/L	20	25
Lead, dissolved	.5	µg/L	20	25
Manganese, total recoverable	10	µg/L	20	25
Manganese, dissolved	1	µg/L	20	25
Zinc, total recoverable	10	µg/L	20	25
Zinc, dissolved	3	µg/L	20	25
Sediment, suspended	1	mg/L	--	--
Sediment, suspended, (percent finer than 0.062 mm)	1	percent	--	--

variability resulting from field sampling and processing, relative standard deviations estimated from differences between analytical results of field replicates also were within 20 percent for all constituents except dissolved iron and dissolved lead (table 12). The large deviation in concentrations of dissolved iron was the result of filtration of replicate samples through two different types of filters as part of a test of new USGS protocols. Apparently, colloidal iron is retained more effectively on flat membrane filters compared to the convoluted surface of capsule filters recommended in new protocols. Other elements displayed no discernible difference between filters. Because detection of long-term trends could be affected by converting to new equipment having different sampling characteristics, it was decided to continue usage of the flat membrane filters.

Replicate data for dissolved lead also exceeded the 20-percent precision limit for analyses of field replicates. This exceedance resulted from a predominance of low concentrations which produced several pairs where the concentration of one sample was at or slightly greater than the minimum reporting level and the concentration of the other sample was less than the reporting level. Arbitrarily substituting one-half the minimum reporting level for the censored values in these cases produced relatively large relative standard deviations. Replacing one-half the value with the actual minimum reporting level for those sample pairs resulted in an acceptable relative standard deviation of 19 percent for dissolved lead.

Analyses of paired spiked and unspiked samples enable calculation of the spike recovery for each trace element and thereby provide a measure of the recovery efficiency for the analytical method. Spike recovery, in percent, was calculated using the following equation:

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

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. At the laboratory, a spiked deionized-water blank and one spiked aliquot of stream sample were prepared and analyzed with the sample set. If the spike recovery for a trace element was outside a range of 75 to 125 percent, the sample set for the analytical run was reanalyzed for the trace element. Results of spike recoveries of individual trace elements in spiked deionized-water blanks and spiked stream samples are presented in tables 14 and 15, respectively.

The mean spike recovery for deionized-water samples spiked with trace elements ranged from 94.6 to 109.3 percent. The mean spike recovery for spiked stream samples ranged from 96.6 to 106.9 percent. The 95-percent confidence intervals for the mean (Taylor, 1987) of spike recovery for each constituent did not exceed a 25-percent deviation from an expected 100-percent recovery. Consequently, spike recoveries for each trace element were within the limits of data-quality objectives and indicate acceptable analytical performance. However, bias is indicated if the confidence interval does not include 100 percent. Confidence intervals for analytical recoveries of total-recoverable arsenic, dissolved copper, and dissolved lead in stream samples did not include 100 percent. For these elements, the bias was slightly low for dissolved copper (93.3-99.8 percent) and slightly high for total-recoverable arsenic (101-113 percent) and dissolved lead (101-105 percent). Because all identified bias was small and mean spike recoveries met data-quality objectives, no adjustments were made to analytical results for stream samples on the basis of spike recoveries.

Analytical results for field blanks are presented in table 16. A field blank with

constituent concentrations equal to or less than the minimum reporting level for the analytical method indicates that the entire sample collection, processing, and analytical process is presumably free of significant contamination. If detectable concentrations in field blanks were equal to or greater than twice the minimum reporting level (typical measurement precision at the detection level), the concentrations were noted. Sporadic, infrequent exceedances of twice the minimum reporting level probably represent random contamination or instrument calibration error that is not persistent in the process and which is not likely to cause significant positive bias in analytical results. However, the field blank for the next sample set is evaluated for a consistent trend that may indicate systematic contamination. If concentrations for a particular constituent exceed twice the minimum reporting level in field blanks from two consecutive field trips, archived blank samples collected from individual components of the processing sequence are submitted for analysis in order to identify the source of contamination.

Constituent concentrations in field-blanks were almost always less than the minimum reporting level. Exceedances of twice the minimum reporting level generally were infrequent and random, thereby indicating no systematic positive bias of reported water-quality data. There were no occurrences of concentrations greater than the minimum reporting level in two consecutive blank samples.

Values for lead in four samples (and copper in one of those samples) collected between October and December 1993 were deleted as a result of field contamination identified and described in Lambing and others (1994). These samples represent the last set of data affected by acid-rinsing of the D-74TM sampler. The deleted lead and copper values are indicated as dashes in table 4.

BED-SEDIMENT DATA

Bed-sediment data consist of analyses of solid-phase concentrations of trace elements in the fine-grained and bulk fractions. Bed-sediment samples are collected once-annually during low, stable flow conditions to facilitate data comparisons between years.

Methods

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

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

Individual samples of bulk sediment also were collected from the surfaces of three to five randomly selected deposits. Because the streambed at most sampling locations is predominantly gravel and cobble, deposits were selected where cobbles and gravel could be visually avoided and excluded from the samples. Therefore, bulk samples generally are composed of particles smaller than about 10 mm in diameter. The individual unsieved samples were composited and stored in acid-washed polyethylene bottles that were transported to the laboratory on ice.

Bed-sediment samples were processed at the USGS National Research Program laboratory in Boulder, Colo. Fine-grained and bulk bed-sediment samples were oven-dried at 60 °C and ground using an acid-washed ceramic mortar and pestle. Duplicate aliquots of approximately 0.6 g of sediment from each composite fine-grained bed sediment sample were digested using a hot, concentrated nitric acid reflux according to methods described by Luoma and Bryan (1981). Triplicate aliquots were analyzed from each composite sample of bulk bed sediment. After a digestion period of up to several weeks, the aliquots were evaporated to dryness on a hot plate. The dry residue was redissolved with 20 mL of 0.6 N (normal) hydrochloric acid. The reconstituted aliquots then were filtered through a 0.45-μm filter using a syringe and in-line disposable filter cartridge. The filtrate was subsequently diluted to either a 1:5 or 1:10 ratio with 0.6 N hydrochloric acid. These final solutions then were analyzed for cadmium, chromium, copper, iron, manganese, nickel, silver, and zinc using Inductively Coupled Argon Plasma Emission Spectroscopy (ICAPES) at the USGS

National Research Program laboratory in Menlo Park, Calif. Lead was analyzed by flame atomic absorption (AA) at the USGS National Research Program laboratory in Boulder, Colo.

Results

Solid-phase concentrations of trace elements measured in samples of fine-grained bed sediment and bulk bed sediment collected during August 1994 are summarized in tables 17 and 18, respectively. Liquid-phase concentrations, in µg/mL, that were analyzed in the reconstituted aliquots of digested bed sediment were converted to solid-phase concentrations, in µg/g, using the following equation:

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

The reported solid-phase concentrations in table 17 and 18 represent the means of all analyses of replicate aliquots from each composite sample collected at the site. Because the conversion from liquid-phase to solid-phase concentration is dependent on both the dilution ratio and the dry weight of the sample, minimum reporting levels for some trace elements may differ between stations.

Quality Assurance

The protocols for field collection and processing of bed-sediment samples are designed to prevent contamination from metal sources. Non-metallic sampling and processing equipment was acid-washed and rinsed with deionized water prior to the first sample collection. Nylon-mesh sieves were washed in a laboratory-grade detergent and rinsed with deionized water. All equipment was given a final rinse onsite with stream water. Sampling equipment that was reused at each site was rinsed between sites with 10-percent nitric acid, deionized water, and stream water. Separate sieves were used at each site and therefore did not require between-site cleaning. Samples were collected along an increasing concentration gradient from the downstream tributaries and mainstem to the upstream tributaries and mainstem to minimize any effects from potential station-to-station carryover contamination.

Quality assurance of analytical results for bed sediment included laboratory instrument calibration with standard solutions and analysis of quality-control samples designed to identify the presence and magnitude of bias (E.V. Axtmann, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference materials and procedural blanks. Each type of sample was analyzed in a proportion equivalent to about 10 to 20 percent of the total number of bed-sediment samples.

Standard reference materials (SRM) have certified concentrations of trace elements. Replicate analyses of standard reference materials are used to indicate the repeatability of measurements and the ability of the method to accurately measure a known quantity of a constituent. Recovery efficiency of trace-element analyses of standard reference materials for bed sediment is summarized in table 19. Two standard reference materials consisting of agricultural soils representing low and high concentrations of trace elements were analyzed to test recovery efficiency for a range of concentrations generally similar to those occurring in the 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 in standard reference materials under such conditions serve to indicate which trace elements display strong sediment-binding characteristics and whether analytical recovery is consistent between multiple sets of analyses. Although data-quality objectives have not been established for bed sediment, elements with mean recoveries outside a 25-percent deviation from complete recovery were chromium and lead for the low-concentration range (SRM 2709), and chromium and silver for the high-concentration range (SRM 2711). Mean recoveries were low for these elements, indicating that the digestion during sample preparation did not release all of the element from the solid-phase matrix.

Procedural blanks for bed-sediment samples consisted of the reagents used for sample digestion and reconstitution. Concentrated nitric acid used for sample digestion was heated and evaporated to dryness. After evaporation, 0.6 N hydrochloric acid was added quantitatively to the dry residue to obtain the same dilution ratio as that used in the analysis of bed sediment. Procedural blanks, therefore, represent the same chemical matrix as the solution used to process bed-sediment samples. Analytical results for procedural blanks indicate the presence and magnitude of potential contamination associated with sample handling

and analysis in the laboratory environment. Results of trace-element analyses of procedural blanks for bed sediment are in table 20.

Analytical results of procedural blanks are reported as a liquid-phase concentration, in µg/mL, which is equivalent to parts per million. Determination of the significance of a detectable blank concentration is based on the magnitude of the equivalent solid-phase concentration, in µg/g, relative to the ambient concentration of the trace element in bed-sediment samples. Because sample weights of individual aliquots may vary, the relative significance of blank concentrations may differ among samples. If a detectable blank concentration, after conversion to a solid-phase concentration, represents 10 percent or more of the ambient solid-phase concentration, then the blank concentration is subtracted to remove potential contamination bias. Almost all procedural blanks had concentrations less than analytical detection levels, with only one blank for lead having a detectable concentration near the minimum reporting level. Therefore, no adjustments were made to trace-element concentrations in bed-sediment samples on the basis of procedural blanks.

BIOLOGICAL DATA

Biological data consist of analyses of solid-phase concentrations of trace elements in the whole-body tissue of aquatic benthic insects. Biota samples were collected once-annually at the same stations where bed sediment was sampled (table 1). Samples of insects were collected concurrently with bed-sediment samples to facilitate comparisons of results between years and between the accumulation patterns in physical and biological matrices.

Methods

Biota samples were collected using protocols described by M.I. Hornberger (U.S. Geological Survey, written commun., 1994). Immature stages of aquatic benthic insects were collected using a large nylon-mesh kick net. A single riffle at each station was sampled repeatedly until an adequate number of individuals was collected to provide sufficient mass for analysis. Targeted taxa for collection were *Hydropsyche* spp., Family Trichoptera; *Arctopsyche grandis*, Family Trichoptera; and *Claassenia sabulosa*, Family Plecoptera. Samples of each taxon were stored separately, by genus, in acid-washed plastic containers. Containers were kept on ice in the field while the insects were allowed to evacuate the gut contents in ambient stream water for a period of six to eight hours. Excess water then was drained and insects were frozen for transport to the laboratory.

Biota samples were processed and analyzed at the USGS National Research Program laboratory in Menlo Park, Calif. Insects were thawed and rinsed with ultra-pure deionized water to remove particulate matter. The insects then were sorted to their lowest possible taxonomic level. When large numbers of specimens were collected from a station, 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 0.6 N hydrochloric acid, filtered through a 0.45-µm filter, and analyzed undiluted by ICAPES for cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc.

Results

Solid-phase concentrations of trace elements in whole-body tissue of aquatic insects collected during August 1994 are summarized in table 21. The variability in the number of composite samples between species and between sites reflects the difference in insect abundance, with number of composite samples increasing with abundance of insects. Liquid-phase concentrations analyzed in the reconstituted samples were converted to solid-phase concentrations using equation 4. As in bed sediment, minimum reporting levels may differ between sites as a result of variable sample weights. In general, the smaller the biological sample weight (a function of insect abundance), the higher the minimum reporting level. Therefore, higher minimum reporting levels do not necessarily imply a higher trace-element concentration in tissue.

Two genera of *Hydropsyche* were collected--*Hydropsyche morosa* group and *Hydropsyche occidentalis*. Within the *morosa* group, two species (*H. cockerelli* and *H. tana*) were identified. Results of analyses are listed for the individual species within the *morosa* group where positive identification was possible. At some sites, sampled insects were not clearly identifiable as a specific species but could be sufficiently identified as belonging to the *morosa* group. Therefore, results listed for the *morosa*

group are considered to represent concentrations in a sample that may consist of both *Hydropsyche cockerelli* and *Hydropsyche tana*. In addition, an additional *Hydropsyche* species (*H.* spp.) has been identified as distinct from the other species, but having characteristics that would place it in the *morosa* group.

Quality Assurance

The protocols for field collection and processing of biota samples are designed to prevent contamination from metal sources. Non-metallic nets, sampling, and processing equipment was employed in all sample collection. Equipment was acid-washed and rinsed in ultra-pure deionized water prior to the first sample collection. Biota samples were collected concurrently with bed sediment samples along an increasing concentration gradient to prevent station-to-station carryover contamination. Nets and equipment were thoroughly rinsed in ambient stream water at each new mainstem station. New nets and depuration chambers were used for the tributary stations.

Quality assurance of analytical results for biota included laboratory instrument calibration with standard solutions and analyses of quality-control samples designed to identify the presence and magnitude of bias (M.I. Hornberger, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference material and procedural blanks. Each type of sample was analyzed in a proportion equivalent to about 10 to 20 percent of the total number of biota samples.

Recovery efficiency for trace-element analyses of standard reference material for biota is summarized in table 22. The reference material tested was oyster tissue. Data-quality objectives have not been established for analytical recovery in biota, but mean recoveries were within 11 percent of complete recovery for all trace elements, with the exception of lead (mean recovery within 21 percent). A low bias is indicated for iron, lead, manganese, and zinc (confidence interval does not include 100 percent). The cause of this minor bias is unknown, but no adjustments to insect data were warranted.

Results of trace-element analyses of procedural blanks for biota are in table 23. Procedural blanks for biota consisted of the same reagents used to digest and reconstitute tissue of aquatic insects. The blanks were analyzed undiluted at a proportion of one blank per site. No adjustments for procedural blanks were necessary because all blanks had concentrations less than 10 percent of ambient solid-phase trace-element concentrations in insects.

STATISTICAL SUMMARIES OF DATA

Statistical summaries of water-quality, bed-sediment, and biological data are provided in tables 24-27 for the period of record at each station since 1985. The summaries include the period of record, number of samples, range, mean, and median of concentrations.

Statistical summaries of water-quality data (table 24) are based on results of samples collected periodically during the station's period of record. Statistical summaries of bed-sediment (table 25 and 26) and biological data (table 27) are based on results of samples collected once-annually during the indicated years. Because not all stations were sampled for bed sediment and biota every year, these data may not represent a consecutive annual record. Also, 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.

Sample sizes and statistics for bed sediment are based on the annual mean concentrations determined from the combined results of composite samples for a given year. Sample sizes and statistics for biological samples are based on the results for each individual composite sample collected in individual years rather than the annual mean concentration in order to describe the full range of variability in trace-element assimilation among species and to indicate the differences in species abundance. The abundance of biological taxa at a particular site in a given year may result in different taxa analyzed between years or in limited biomass which can affect analytical detection limits. Where minimum reporting levels vary between years, statistical summaries are provided only as a general indication of the range of detection.

SELECTED REFERENCES

Axtmann, E.V., and Luoma, S.N., 1991, Large scale distribution of metal contamination in the fine-grained sediment of the Clark Fork River, Montana: Applied Geochemistry, v. 6, p. 75-88.

Cain, D.J., Luoma, S.N., Carter, J.L., and Ferd, S.V., 1992, Aquatic insects as bioindicators of trace element contamination in cobble-bottom rivers and streams: Canadian Journal of Fisheries and Aquatic Sciences, v. 49, no. 10, p. 2,141-2,154.

Edwards, T.K., and Glysson, G.D., eds., 1988, Field methods for measurement of fluvial sediment: U.S. Geological Survey Open-File Report 86-531, 118 p.

Fishman, M.J., 1993, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of inorganic and organic constituents in water and fluvial sediments: U.S. Geological Survey Open-File Report 93-125, 217 p.

Fishman, M.J., and Friedman, L.C., 1989, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chap. A1, 709 p.

Friedman, L.C., and Erdman, D.E., 1982, Quality assurance practices for the chemical and biological analyses of water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chap. A6, 181 p.

Guy, H.P., 1969, Laboratory theory and methods for sediment analysis: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chap. C1, 58 p.

Guy, H.P., and Norman, V.W., 1970, Field methods for measurement of fluvial sediment: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chap. C1, 58 p.

Helsel, D.R., and Cohn, T.A., 1988, Estimation of descriptive statistics for multiply censored water quality data: Water Resources Research, v. 24, no. 12, p. 1,997-2,004.

Horowitz, A.J., Demas, C.R., Fitzgerald, K.K., Miller, T.L., and Rickert, D.A., 1994, U.S. Geological Survey protocol for the collection and processing of surface-water samples for the subsequent determination of inorganic constituents in filtered water: U.S. Geological Survey Open-File Report 94-539, 57 p.

Jones, B.E., 1987, Quality control manual of the U.S. Geological Survey's National Water Quality Laboratory: U.S. Geological Survey Open-File Report 87-457, 17 p.

Knapton, J.R., 1985, Field guidelines for collection, treatment, and analysis of water samples, Montana District: U.S. Geological Survey Open-File Report 85-409, 86 p.

Knapton, J.R., and Nimick, D.A., 1991, Quality assurance for water-quality activities of the U.S. Geological Survey in Montana: U.S. Geological Survey Open-File Report 91-216, 41 p.

Lambing, J.H., 1987, Water-quality data for the Clark Fork and selected tributaries from Deer Lodge to Milltown, Montana, March 1985 through June 1986: U.S. Geological Survey Open-File Report 87-110, 48 p.

_____1988, Water-quality data (July 1986 through September 1987) and statistical summaries (March 1985 through September 1987) for the Clark Fork and selected tributaries from Deer Lodge to Missoula, Montana: U.S. Geological Survey Open-File Report 88-308, 55 p.

_____1989, Water-quality data (July 1987 through September 1988) and statistical summaries (March 1985 through September 1988) for the Clark Fork and selected tributaries from Galen to Missoula, Montana: U.S. Geological Survey Open-File Report 89-229, 51 p.

_____1990, Water-quality data (July 1988 through September 1989) and statistical summaries (March 1985 through September 1989) for the Clark Fork and selected tributaries from Galen to Missoula, Montana: U.S. Geological Survey Open-File Report 90-168, 68 p.

_____1991, Water-quality and transport characteristics of suspended sediment and trace elements in streamflow of the upper Clark Fork basin from Galen to Missoula, Montana, 1985-90: U.S. Geological Survey Water-Resources Investigations Report 91-4139, 73 p.

Lambing, J.H., and Dodge, K.A., 1993, Quality assurance for laboratory analysis of suspended-sediment samples by the U.S. Geological Survey in Montana: U.S. Geological Survey Open-File Report 93-131, 34 p.

Lambing, J.H., Hornberger, M.I., Axtmann, E.V., and Pope, D.A., 1994, Water-quality, bed-sediment, and biological data (October 1992 through September 1993) and statistical summaries of water-quality data (March 1985 through September 1993) for streams in the upper Clark Fork basin, Montana: U.S. Geological Survey Open-File Report 94-375, 85 p.

Luoma, S.N., and Bryan, G.W., 1981, A statistical assessment of the form of trace metals in oxidized estuarine sediments employing chemical extractants: Science of the Total Environment, v. 17, p. 167-196.

Maddy, D.V., Lopp, L.E., Jackson, D.L., Coupe, R.H., and Schertz, T.L., 1989, National Water Information System user's manual, volume 2, chapter 2, Water-quality system: U.S. Geological Survey Open-File Report 89-617 [variously paged].

Porterfield, George, 1972, Computation of fluvial-sediment discharge: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chap. C3, 66 p.

Pritt, J.W., and Raese, J.W., eds., 1992, Quality assurance/quality control manual--National Water Quality Laboratory: U.S. Geological Survey Open-File Report 92-495, 33 p.

Rantz, S.E., and others, 1982, Computation of discharge: U.S. Geological Survey Water-Supply Paper 2175 (2 v.), 631 p.

Taylor, J. K., 1987, Quality assurance of chemical measurements: Chelsea, Mich., Lewis Publishers, 328 p.

Timme, P.J., 1994, National Water Quality Laboratory 1994 Services Catalog: U.S. Geological Survey Open-File Report 94-304, 103 p.

U.S. Geological Survey, 1977, National handbook of recommended methods for water-data acquisition--Chapter 5, Chemical and physical quality of water and sediment: 193 p.

Ward, J.R., and Harr, C.A., eds., 1990, Methods for collection and processing of surface-water and bed-material samples for physical and chemical analyses: U.S. Geological Survey Open-File Report 90-140, 71 p.

DATA

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994

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

12323230--BLACKTAIL CREEK AT HARRISON AVENUE, AT BUTTE, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
28...	1045	9.3	262	7.7	5.0	110	31	7.0	9.8	3.3	90
Feb 1994											
15...	1045	5.8	322	7.7	3.0	130	36	8.7	12	2.6	108
Mar											
08...	1010	6.3	292	7.6	2.5	120	33	8.0	11	4.2	99
Apr											
11...	1015	8.5	259	7.7	4.5	100	30	7.3	10	2.7	89
25...	1155	30	184	7.7	5.5	71	20	5.0	7.2	2.5	64
May											
12...	1310	11	214	8.0	17.0	87	25	5.9	7.8	2.2	78
20...	1120	20	193	7.7	7.0	80	23	5.5	7.8	2.6	70
Jun											
13...	0945	9.3	227	7.7	12.5	96	28	6.4	8.4	2.0	86
Jul											
11...	0950	7.3	283	7.7	10.5	110	32	7.8	11	2.5	102
Aug											
17...	0845	5.7	340	7.8	9.5	140	39	9.7	14	2.8	117

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Oct 1993											
28...	28	5.8	0.5	23	163	4	3	<1	<0.1	10	5
Feb 1994											
15...	36	8.0	.2	32	200	2	2	<1	<.1	2	<1
Mar											
08...	31	7.5	.3	28	183	4	3	<1	<.1	6	3
Apr											
11...	26	7.4	.3	24	161	4	3	<1	<.1	5	3
25...	18	4.4	.3	20	116	7	5	<1	<.1	13	6
May											
12...	19	4.1	.3	23	134	8	7	<1	<.1	7	5
20...	18	3.6	.3	24	127	8	5	<1	<.1	11	7
Jun											
13...	19	4.0	.4	25	145	8	6	<1	<.1	9	5
Jul											
11...	25	5.3	.3	28	173	6	5	<1	<.1	5	3
Aug											
17...	36	7.5	.3	28	208	3	3	<1	<.1	3	1

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	660	95	5	0.5	70	40	30	7	14	0.35	95
Feb 1994											
15...	260	42	<1	<.5	60	52	10	7	4	.06	76
Mar											
08...	600	170	1	<.5	90	74	<10	7	8	.14	92
Apr											
11...	550	240	<1	<.5	50	41	<10	6	4	.09	84
25...	1,200	360	5	<.5	60	34	20	4	21	1.7	80
May											
12...	700	240	1	<.5	60	41	<10	<3	9	.27	85
20...	1,300	270	3	<.5	60	31	10	3	29	1.6	70
Jun											
13...	650	250	2	<.5	40	26	10	5	7	.18	87
Jul											
11...	390	150	<1	<.5	40	31	<10	<3	3	.06	94
Aug											
17...	310	24	1	<.5	100	99	<10	<3	4	.06	87

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

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

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
28...	1215	29	473	7.4	9.0	160	47	11	20	5.9	88
Feb 1994											
15...	1200	15	510	7.5	1.5	140	41	10	32	5.5	95
Mar											
08...	1130	19	468	7.5	6.0	140	40	9.8	28	6.0	91
Apr											
11...	1205	26	456	7.5	9.0	140	41	10	25	5.3	89
25...	1400	52	315	7.5	7.0	100	30	7.1	16	4.0	66
May											
12...	1115	28	492	7.6	14.0	150	42	11	23	17	94
20...	1030	41	388	7.6	9.0	120	35	8.7	18	17	89
Jun											
13...	1105	26	451	7.5	8.5	130	37	8.6	21	18	94
Jul											
11...	1110	22	534	7.4	15.0	160	45	11	28	20	113
Aug											
17...	1015	17	631	7.3	16.0	160	45	12	34	35	133

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Oct 1993											
28...	87	18	0.6	23	267	18	9	3	2.8	250	120
Feb 1994											
15...	70	28	.4	28	273	22	6	4	1.5	320	47
Mar											
08...	68	20	.3	26	254	10	5	2	1.6	100	60
Apr											
11...	75	21	.4	23	255	11	8	2	1.4	100	54
25...	46	13	.5	20	177	20	8	2	1.3	210	70
May											
12...	82	18	.4	22	273	14	10	2	1.3	93	53
20...	58	14	.4	24	230	15	8	2	1.3	140	75
Jun											
13...	63	19	.7	23	248	13	8	2	1.6	130	67
Jul											
11...	83	21	.4	24	302	18	7	2	2.4	130	93
Aug											
17...	96	25	.5	22	353	10	6	6	6.2	85	47

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	1,400	87	31	1.0	830	810	1,100	1,000	29	2.3	85
Feb 1994											
15...	2,000	120	42	.8	660	580	940	590	37	1.5	71
Mar											
08...	760	170	10	1.0	590	590	730	610	16	.82	86
Apr											
11...	600	84	4	<.5	730	690	550	490	6	.42	93
25...	2,300	120	62	1.9	670	500	700	460	49	6.9	93
May											
12...	700	110	6	.5	660	630	650	540	8	.60	87
20...	1,200	220	12	1.1	540	490	570	460	19	2.1	85
Jun											
13...	880	110	18	.6	680	630	660	550	17	1.2	91
Jul											
11...	640	75	4	<.5	940	880	900	810	6	.36	86
Aug											
17...	310	54	7	<.5	1,600	1,700	2,200	2,200	3	.14	91

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Oct 1993											
28...	1325	52	407	8.7	4.0	150	44	9.8	20	4.2	99
Feb 1994											
18...	0900	E47	444	7.9	0.0	150	45	9.5	25	4.3	100
Mar											
08...	1255	37	444	8.1	5.0	150	45	9.8	22	5.4	101
Apr											
11...	1315	58	383	8.7	10.0	140	41	9.1	19	4.1	98
25...	1525	133	270	8.1	4.5	100	31	6.3	11	3.1	74
May											
12...	0955	107	272	8.2	11.0	100	31	6.0	10	4.0	79
20...	0845	143	299	7.9	6.0	110	34	6.8	13	6.8	82
Jun											
13...	1255	52	359	8.6	13.5	130	39	8.1	15	8.1	99
Jul											
05...	2130	51	593	7.2	13.0	200	54	15	20	8.6	60
11...	1240	56	368	8.3	17.0	130	40	8.4	16	8.8	101
Aug											
17...	1145	26	509	8.7	16.5	170	50	12	26	16	117

Date	Sulfate, dissolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoversble (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, totsl recoverable (µg/L)	Csdmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993											
28...	76	12	.5	25	252	12	7	2	1.4	140	51
Feb 1994											
18...	80	19	.6	28	273	14	8	3	2.3	120	60
Mar											
08...	77	15	.5	26	262	18	10	2	1.5	140	60
Apr											
11...	68	12	.4	23	236	19	9	2	.9	140	47
25...	43	6.7	.3	21	168	24	10	2	1.1	210	70
May											
12...	38	6.4	.2	18	161	15	7	<1	.5	79	28
20...	48	7.1	.4	21	187	29	11	2	1.1	220	75
Jun											
13...	59	10	.4	20	220	16	8	1	.9	140	57
Jul											
05...	190	12	.8	15	374	170	1	49	41	3,900	450
11...	61	11	.4	21	228	15	7	1	1.1	96	48
Aug											
17...	100	18	.6	21	315	13	11	1	.8	85	35

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Msngsnese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	640	37	12	.7	480	470	590	440	12	1.7	85
Feb 1994											
19...	490	25	10	.6	680	700	680	580	6	.76	61
Mar											
08...	860	30	18	.7	630	620	520	380	12	1.2	87
Apr											
11...	830	33	17	<.5	600	510	410	170	14	2.2	80
25...	1,700	150	36	1.2	540	440	480	310	37	13	67
May											
12...	770	46	11	<.5	330	270	230	110	21	6.1	72
20...	1,900	110	41	.7	620	500	580	320	51	20	60
Jun											
13...	660	44	10	<.5	490	440	360	160	10	1.4	61
Jul											
05...	8,600	<3	260	<.5	10,000	9,300	15,000	13,000	183	25	91
11...	610	30	13	<.5	680	630	370	200	10	1.5	85
Aug											
17...	290	14	7	<.5	580	590	260	140	6	.42	88

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

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

Date	Time	Streamflow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Oct 1993											
28...	1420	77	545	8.7	5.5	240	71	15	17	5.5	112
Feb 1994											
15...	1350	51	614	8.9	4.0	260	78	17	21	4.6	120
Mar											
08...	1440	84	526	9.2	5.5	220	63	15	19	3.9	107
Apr											
11...	1515	94	477	8.9	9.0	200	57	14	19	4.3	84
25...	1630	183	429	8.7	11.0	170	47	12	18	4.1	91
May											
12...	0800	181	397	8.9	16.0	160	47	11	15	3.8	96
20...	0800	E182	--	--	--	--	--	--	--	--	--
25...	1430	181	365	8.8	17.0	160	47	9.5	13	4.3	100
Jun											
13...	1410	88	436	8.8	17.0	190	58	12	13	4.0	109
Jul											
11...	1350	88	433	8.7	20.0	180	54	12	14	4.6	101
Aug											
17...	1355	24	585	9.2	22.0	260	74	19	18	5.6	81

Date	Sulfate, dissolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993											
28...	150	7.6	.8	8.6	343	20	16	<1	<.1	23	11
Feb 1994											
15...	180	1.3	1.0	20	395	14	10	<1	.1	21	10
Mar											
08...	140	11	.8	16	333	12	10	<1	.1	25	12
Apr											
11...	140	11	.9	12	309	13	11	<1	<.1	21	10
25...	110	10	.7	16	273	20	17	<1	<.1	35	10
May											
12...	86	7.4	.6	12	241	25	19	<1	<.1	34	15
20...	--	--	--	--	--	--	--	--	--	--	--
25...	75	6.2	.5	11	227	27	25	<1	.1	20	17
Jun											
13...	100	5.6	.7	9.5	268	22	21	<1	<.1	19	15
Jul											
11...	110	6.5	.8	11	274	19	19	<1	<.1	15	11
Aug											
17...	210	7.6	1.2	12	396	27	27	<1	<.1	10	8

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	660	20	2	<.5	200	130	70	16	E4	.83	--
Feb 1994											
15...	630	5	<1	<.5	570	500	100	23	6	.83	79
Mar											
08...	490	8	1	<.5	350	250	100	11	8	1.8	85
Apr											
11...	340	10	1	<.5	240	75	60	9	7	1.8	83
25...	610	19	3	<.5	340	170	170	10	22	11	69
May											
12...	590	12	4	<.5	220	92	180	4	16	7.8	67
20...	--	--	--	--	--	--	--	--	22	11	70
25...	180	10	<1	<.5	90	52	30	4	2	.98	80
Jun											
13...	180	6	<1	<.5	90	40	20	<3	3	.71	88
Jul											
11...	200	5	<1	<.5	90	36	30	6	2	.48	94
Aug											
17...	130	3	1	<.5	80	34	20	3	4	.26	88

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

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

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite ($\mu S/cm$)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
28...	1515	77	316	8.5	4.0	160	49	9.5	3.5	1.4	120
Feb 1994											
16...	0820	E47	399	7.8	.5	190	58	12	4.2	1.7	132
Apr											
25...	1805	99	262	8.3	5.0	130	39	7.3	2.7	1.1	98
May											
12...	0905	202	180	8.0	9.0	83	26	4.4	1.8	.9	68
25...	1340	92	255	8.2	13.0	120	38	6.9	2.7	1.3	91
Aug											
17...	1245	2.8	795	8.3	16.0	420	130	22	7.4	2.5	146

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable ($\mu g/L$)	Arsenic, dis-solved ($\mu g/L$)	Cad-mium, total recov-erable ($\mu g/L$)	Cad-mium, dis-solved ($\mu g/L$)	Copper, total recov-erable ($\mu g/L$)	Copper, dis-solved ($\mu g/L$)
Oct 1993											
28...	43	1.0	.4	12	192	4	3	<1	<.1	5	2
Feb 1994											
16...	69	1.3	.4	13	239	5	4	<1	<.1	7	2
Apr											
25...	35	.9	.3	10	155	7	4	<1	<.1	32	3
May											
12...	20	.5	.3	8.7	103	13	4	<1	<.1	72	4
29...	35	1.0	.4	10	150	6	3	<1	<.1	14	3
Aug											
17...	270	3.2	.6	12	536	6	7	<1	<.1	4	2

Date	Iron, total recov-erable ($\mu g/L$)	Iron, dis-solved ($\mu g/L$)	Lead, total recov-erable ($\mu g/L$)	Lead, dis-solved ($\mu g/L$)	Manga-nese, total recov-erable ($\mu g/L$)	Manga-nese, dis-solved ($\mu g/L$)	Zinc, total recov-erable ($\mu g/L$)	Zinc, dis-solved ($\mu g/L$)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	120	12	<1	<.5	120	110	10	4	4	.83	77
Feb 1994											
16...	110	8	<1	<.5	170	120	<10	7	6	.76	63
Apr											
25...	590	10	5	<.5	200	81	20	<3	31	8.3	72
May											
12...	1,400	14	9	<.5	400	94	40	<3	90	49	57
29...	230	6	1	<.5	230	170	10	<3	12	3.0	66
Aug											
17...	40	5	<1	<.5	540	570	<10	<3	18	.14	83

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12323800--CLARK FORK NEAR GALEN, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
28...	1615	155	442	8.9	5.0	200	62	12	3.6	3.4	116
Feb 1994											
15...	1445	85	536	8.6	3.0	240	71	15	14	3.3	130
Mar											
08...	1600	117	501	8.9	6.0	220	63	14	15	3.3	118
Apr											
11...	1640	136	469	8.7	11.0	210	59	14	14	3.3	102
26...	0820	290	394	8.3	6.0	160	47	11	13	3.2	97
May											
12...	0645	375	304	8.5	13.0	130	38	7.7	8.5	2.3	84
25...	1255	278	343	8.7	15.5	150	46	9.0	9.9	3.6	98
Jun											
13...	1555	138	423	8.6	15.0	190	57	11	11	3.1	110
Jul											
11...	1545	106	427	8.8	22.0	190	57	12	13	4.3	105
Aug											
17...	1525	22	635	8.8	21.0	290	84	19	18	5.3	100

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Oct 1993											
28...	100	4.8	.6	9.7	266	12	11	<1	<.1	12	7
Feb 1994											
15...	130	7.7	.8	17	337	10	8	<1	.1	19	7
Mar											
08...	120	8.2	.7	15	310	11	8	<1	.2	21	9
Apr											
11...	120	8.5	.7	12	293	10	7	<1	<.1	20	8
26...	88	6.9	.6	14	242	16	12	<1	<.1	35	7
May											
12...	56	4.2	.5	11	179	20	12	<1	<.1	65	9
25...	65	4.6	.5	11	208	20	18	<1	<.1	24	12
Jun											
13...	96	5.1	.6	10	260	16	14	<1	<.1	17	10
Jul											
11...	110	5.9	.7	11	277	18	17	<1	<.1	15	10
Aug											
17...	220	8.2	1.1	12	428	23	25	<1	<.1	10	8

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	170	8	<1	<.5	120	100	30	5	4	1.7	80
Feb 1994											
15...	400	4	<1	<.5	340	260	60	17	5	1.1	86
Mar											
08...	400	7	1	<.5	300	210	70	13	7	2.2	80
Apr											
11...	330	6	2	<.5	260	95	50	9	9	3.3	80
26...	580	23	3	<.5	330	160	100	10	18	14	75
May											
12...	1,200	14	7	<.5	410	81	110	<3	47	48	73
25...	320	8	1	<.5	180	93	40	6	11	8.3	71
Jun											
13...	190	6	<1	<.5	180	120	20	5	6	2.2	74
Jul											
11...	150	6	<1	<.5	100	46	20	26	3	.86	88
Aug											
17...	100	20	<1	<.5	80	46	10	6	2	.12	89

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12324200--CLARK FORK AT DEER LODGE, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Oct 1993											
28...	1740	292	489	8.6	5.0	230	68	14	14	3.7	149
Feb 1994											
15...	1610	219	498	8.2	1.0	220	67	14	14	3.0	148
Mar											
08...	1715	247	515	8.4	5.0	230	66	15	16	3.1	144
Apr											
12...	0735	247	487	8.2	7.0	240	71	16	17	3.6	146
26...	0930	408	441	8.2	5.0	190	54	13	14	3.2	119
May											
11...	1720	390	355	8.4	17.0	150	45	9.6	11	2.7	102
25...	1120	297	406	8.2	14.0	180	53	11	13	4.1	121
Jun											
13...	1710	168	461	8.5	14.5	210	61	13	14	3.3	142
Jul											
11...	1825	133	478	8.5	22.0	210	62	13	16	4.1	141
Aug											
17...	1645	27	524	8.4	21.0	220	64	14	25	4.9	182

Date	Sulfate, dissolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993											
28...	98	6.3	.7	15	309	11	10	<1	<.1	15	6
Feb 1994											
15...	100	6.3	.7	21	315	13	7	<1	<.1	43	5
Mar											
08...	110	7.5	.7	19	324	13	9	<1	<.1	40	7
Apr											
12...	120	8.4	.7	17	341	18	11	<1	<.1	71	7
26...	92	7.1	.6	17	272	23	13	<1	<.1	92	8
May											
11...	67	5.0	.5	13	215	25	15	<1	<.1	93	11
25...	75	5.8	.6	16	251	23	17	<1	<.1	51	11
Jun											
13...	86	6.5	.6	16	286	14	13	<1	<.1	19	9
Jul											
11...	98	7.2	.7	17	303	17	15	<1	<.1	25	13
Aug											
17...	75	12	.1	34	338	12	13	<1	<.1	11	7

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
28...	210	4	1	<.5	40	32	30	10	8	6.3	65
Feb 1994											
15...	730	6	5	<.5	160	56	60	17	32	19	71
Mar											
08...	710	9	4	<.5	180	71	60	17	28	19	70
Apr											
12...	910	10	7	<.5	250	54	80	19	37	25	78
26...	1,400	13	10	<.5	310	30	120	16	66	73	53
May											
11...	1,400	10	11	<.5	300	22	120	5	57	60	68
25...	700	9	5	<.5	180	31	60	11	24	19	79
Jun											
13...	250	5	2	<.5	80	46	30	5	10	4.5	80
Jul											
11...	240	5	2	<.5	90	28	30	8	10	3.6	87
Aug											
17...	70	9	1	<.5	50	27	10	6	8	.58	90

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsita ($\mu S/cm$)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
29...	1315	99	245	8.3	1.5	110	32	7.7	5.3	1.7	114
Feb 1994											
15...	1725	E60	256	8.0	.5	120	35	8.0	5.5	1.8	122
Apr											
26...	1135	645	155	8.0	2.5	73	21	5.0	3.7	1.3	68
May											
11...	1550	387	165	8.1	14.0	73	21	5.1	3.6	1.3	72
25...	0955	283	206	8.1	10.5	94	27	6.5	4.9	2.0	92
Aug											
17...	1820	21	293	8.5	22.0	140	40	9.4	7.3	2.4	141

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable ($\mu g/L$)	Arsenic, dis-solved ($\mu g/L$)	Cad-mium, total recov-erable ($\mu g/L$)	Cad-mium, dis-solved ($\mu g/L$)	Copper, total recov-erable ($\mu g/L$)	Copper, dis-solved ($\mu g/L$)
Oct 1993											
29...	14	1.3	.2	21	152	6	5	<1	0.2	<1	<1
Feb 1994											
15...	14	1.5	.2	22	161	5	4	<1	<.1	<1	<1
Apr											
26...	10	1.0	.1	17	100	6	4	<1	<.1	3	1
May											
11...	9.8	.8	.2	18	103	6	5	<1	.1	2	2
25...	13	1.1	.1	20	130	7	5	<1	<.1	2	1
Aug											
17...	14	1.6	.2	23	182	7	7	<1	<.1	1	<1

Date	Iron, total recov-erable ($\mu g/L$)	Iron, dis-solved ($\mu g/L$)	Lead, total recov-erable ($\mu g/L$)	Lead, dis-solved ($\mu g/L$)	Manga-nese, total recov-erable ($\mu g/L$)	Manga-nese, dis-solved ($\mu g/L$)	Zinc, total recov-erable ($\mu g/L$)	Zinc, dis-solved ($\mu g/L$)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
29...	110	8	<1	<.5	<10	4	<10	4	2	.53	83
Feb 1994											
15...	60	5	<1	<.5	<10	6	<10	3	2	.32	84
Apr											
26...	920	69	2	<.5	60	8	10	4	40	70	56
May											
11...	360	37	1	<.5	30	9	<10	<3	15	16	67
25...	230	22	<1	<.5	30	10	<10	<3	17	13	79
Aug											
17...	60	6	<1	<.5	20	13	<10	<3	3	.17	86

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12324680--CLARK FORK AT GOLDCREEK, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Oct 1993											
29...	1215	529	422	8.4	2.0	190	56	12	12	3.2	147
Feb 1994											
16...	1045	E380	437	8.2	0.0	200	59	12	12	2.8	114
Mar											
09...	0830	403	436	8.3	1.0	190	57	12	12	3.1	140
Apr											
12...	0945	505	419	8.3	7.0	190	55	13	13	2.9	132
26...	1330	1,130	284	8.2	4.5	120	36	8.3	8.3	2.1	95
May											
11...	1410	816	283	8.3	14.0	120	36	7.8	7.9	2.2	95
25...	0855	721	337	8.2	12.5	150	44	9.4	10	3.3	121
Jun											
13...	1840	464	381	8.5	14.0	170	50	11	11	2.6	148
Jul											
12...	0730	285	411	8.2	14.0	180	54	11	12	3.1	157
Aug											
17...	1935	87	450	8.6	20.0	190	56	13	19	4.1	172

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-soived (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Oct 1993											
29...	68	4.6	.5	18	262	8	7	<1	<.1	13	4
Feb 1994											
16...	80	5.2	.6	22	262	9	6	<1	<.1	15	4
Mar											
09...	77	5.7	.5	19	270	10	7	<1	<.1	33	5
Apr											
12...	75	5.6	.5	18	264	13	8	<1	<.1	49	6
26...	43	3.5	.3	18	177	14	8	<1	<.1	49	6
May											
11...	40	3.1	.3	16	170	16	10	<1	<.1	63	7
25...	45	3.7	.4	19	207	15	11	<1	<.1	26	7
Jun											
13...	48	3.8	.4	21	237	10	10	<1	<.1	13	5
Jul											
12...	52	4.4	.5	22	253	12	10	<1	<.1	23	7
Aug											
17...	58	7.2	.6	25	286	14	15	<1	<.1	8	6

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
29...	230	4	1	<.5	50	20	30	9	6	8.6	90
Feb 1994											
16...	260	7	2	<.5	60	23	30	12	10	10	74
Mar											
09...	630	12	4	<.5	100	26	50	14	22	24	82
Apr											
12...	890	14	6	<.5	160	22	70	9	39	53	77
26...	1,700	43	9	<.5	230	14	90	9	74	226	52
May											
11...	1,200	16	8	<.5	190	15	80	<3	52	115	70
25...	540	11	3	<.5	100	15	40	4	23	45	82
Jun											
13...	200	8	1	<.5	60	20	20	<3	10	13	82
Jul											
12...	410	6	2	<.5	130	19	30	6	17	13	88
Aug											
17...	60	5	<1	<.5	30	11	10	3	4	.94	89

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12331500--FLINT CREEK NEAR DRUMMOND, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Oct 1993											
29...	1045	151	312	8.3	1.0	150	39	12	7.8	2.9	147
Feb 1994											
16...	1150	E120	286	8.4	0.0	140	36	11	6.3	2.2	140
Mar											
09...	1000	105	294	8.4	1.0	140	36	11	6.0	2.7	139
Apr											
12...	1110	130	284	8.6	6.0	140	36	11	6.8	2.5	134
27...	0945	288	196	8.2	2.5	90	24	7.2	5.0	1.0	87
May											
11...	1300	197	177	8.2	12.5	79	22	5.9	3.8	1.5	79
25...	0715	63	338	8.2	10.0	160	44	13	7.7	4.3	158
Jun											
14...	1650	205	330	8.3	11.0	150	41	12	8.2	2.9	159
Jul											
12...	0905	80	393	8.2	12.0	180	50	14	9.2	3.7	191
Aug											
18...	1630	15	507	8.5	21.0	240	65	19	15	6.2	237

Date	Sulfate, dissolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993											
29...	17	3.2	.2	21	191	12	7	<1	<.1	3	<1
Feb 1994											
16...	14	2.5	.2	20	176	10	6	<1	<.1	3	1
Mar											
09...	13	2.9	.2	19	174	15	6	<1	<.1	4	<1
Apr											
12...	14	3.1	.1	17	171	15	7	<1	<.1	7	<1
27...	11	2.1	.1	17	120	15	7	<1	<.1	7	3
May											
11...	7.9	1.5	.1	13	103	14	7	<1	<.1	6	2
25...	16	3.6	.2	22	206	12	10	<1	<.1	3	1
Jun											
14...	14	3.1	.2	22	199	19	10	<1	<.1	5	1
Jul											
12...	17	4.1	.2	25	238	12	10	<1	<.1	3	2
Aug											
18...	32	6.5	.2	32	318	14	15	<1	<.1	2	1

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
29...	420	14	7	<.5	120	49	30	<3	18	7.3	90
Feb 1994											
16...	310	8	5	<.5	100	15	20	5	24	7.8	68
Mar											
09...	550	13	10	<.5	150	35	30	4	30	8.5	84
Apr											
12...	790	25	8	<.5	160	32	30	9	39	14	88
27...	930	80	11	.5	190	22	30	7	56	44	64
May											
11...	620	32	10	<.5	180	26	40	<3	38	20	65
25...	250	27	3	<.5	120	71	20	<3	12	2.0	93
Jun											
14...	860	29	13	<.5	250	39	40	<3	61	34	61
Jul											
12...	220	11	3	<.5	120	49	20	<3	12	2.6	86
Aug											
18...	110	10	1	<.5	80	56	<10	<3	11	.45	85

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12331800--CLARK FORK NEAR DRUMMOND, MONT.

Date	Time	Streamflow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)
Oct 1993											
29...	0900	774	441	8.1	3.0	200	57	13	11	3.4	153
Feb 1994											
16...	1310	495	450	8.3	2.0	210	59	14	11	2.6	152
Mar											
09...	1200	566	442	8.3	4.0	200	58	14	12	3.4	148
Apr											
12...	1220	671	439	8.4	9.0	200	58	14	12	3.0	146
27...	1120	1,540	304	8.2	3.0	140	39	9.3	8.4	2.1	103
May											
11...	1120	1,110	313	8.2	12.5	140	40	9.2	8.5	2.4	105
24...	1945	942	381	8.4	18.0	180	51	12	12	4.0	136
Jun											
14...	1515	846	437	8.4	12.0	200	56	14	12	3.4	169
Jul											
12...	1020	424	501	8.2	17.0	230	66	16	14	4.2	186
Aug											
18...	1520	149	630	8.5	21.0	300	83	22	20	5.0	199

Date	Sulfate, dissolved (mg/L)	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993											
29...	69	4.4	.4	19	269	8	8	<1	<.1	10	3
Feb 1994											
16...	81	4.7	.5	22	286	9	7	<1	.2	16	4
Mar											
09...	75	5.2	.4	19	276	11	7	<1	<.1	25	4
Apr											
12...	75	5.3	.4	18	273	14	9	<1	<.1	38	5
27...	46	3.4	.3	18	188	16	8	<1	<.1	42	6
May											
11...	46	3.3	.3	17	190	17	10	<1	<.1	53	1
24...	57	4.1	.4	20	242	15	12	<1	<.1	33	7
Jun											
14...	57	4.4	.4	23	272	12	10	<1	<.1	18	5
Jul											
12...	76	5.3	.4	24	317	13	11	<1	<.1	17	5
Aug											
18...	130	7.8	.5	22	410	11	12	<1	<.1	5	4

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Oct 1993											
29...	220	4	--	--	50	13	30	5	7	15	90
Feb 1994											
16...	340	6	2	<.5	60	11	30	10	17	23	70
Mar											
09...	600	9	4	<.5	90	15	50	11	28	43	71
Apr											
12...	850	10	6	<.5	140	13	60	9	45	82	73
27...	1,700	42	18	<.5	240	12	100	9	90	374	55
May											
11...	1,300	18	9	<.5	180	11	80	6	64	190	65
24...	700	9	4	<.5	100	11	50	4	30	76	75
Jun											
14...	490	10	5	<.5	100	19	40	3	24	55	90
Jul											
12...	370	<3	2	<.5	110	14	30	4	19	22	81
Aug											
18...	50	<3	<1	<.5	20	8	<10	<3	19	7.6	53

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12334510--ROCK CREEK NEAR CLINTON, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Nov 1993											
01...	0800	273	136	8.0	3.0	62	16	5.4	2.9	1.2	68
Feb 1994											
17...	1020	181	146	8.2	1.0	70	18	6.2	3.1	1.1	72
Apr											
27...	1305	1,150	76	7.8	5.0	34	8.8	3.0	2.1	.8	35
May											
10...	1715	1,590	70	7.9	12.5	31	8.0	2.6	1.8	.8	32
24...	1750	1,120	85	8.1	13.5	39	10	3.3	2.0	1.1	40
Aug											
18...	1310	169	153	8.5	16.5	73	19	6.3	3.4	1.2	75

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Nov 1993											
01...	4.2	.6	.2	12	83	<1	<1	<1	.1	<1	<1
Feb 1994											
17...	5.1	.6	.1	13	90	<1	<1	<1	<.1	<1	<1
Apr											
27...	3.1	.5	<.1	12	51	<1	<1	<1	<.1	<1	<1
May											
10...	2.4	.3	<.1	10	45	1	<1	<1	<.1	1	<1
24...	2.7	.4	<.1	11	55	<1	<1	<1	<.1	1	<1
Aug											
18...	4.2	.6	.1	10	90	<1	1	<1	<.1	<1	<1

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1993											
01...	80	12	<1	<.5	<10	<1	<10	<3	2	1.5	69
Feb 1994											
17...	40	5	<1	<.5	<10	<1	<10	3	2	.98	74
Apr											
27...	220	62	<1	<.5	10	1	<10	<3	8	25	80
May											
10...	370	36	<1	<.5	20	2	<10	<3	24	103	65
24...	140	29	<1	<.5	<10	2	<10	<3	6	18	71
Aug											
18...	50	9	<1	<.5	<10	1	<10	<3	2	.91	89

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

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

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Nov 1993											
01...	0945	1,110	369	8.4	3.0	160	46	11	9.2	2.5	133
Feb 1994											
17...	1145	728	371	8.4	1.5	170	49	12	9.5	2.4	133
Mar											
10...	1030	802	379	8.3	3.0	170	48	12	9.6	2.6	131
Apr											
12...	1440	988	371	8.5	10.0	170	47	12	9.9	2.5	128
27...	1515	2,850	221	8.1	6.0	96	27	7.0	5.8	1.7	80
May											
10...	1450	2,580	200	8.2	14.0	89	25	6.4	5.3	1.6	73
24...	1520	2,200	244	8.4	15.5	110	31	7.9	6.6	2.5	90
Jun											
14...	1015	1,760	275	8.3	10.5	120	34	8.8	7.2	2.0	107
Jul											
12...	1245	904	327	8.5	17.5	150	42	11	8.4	2.7	128
Aug											
18...	1120	328	356	8.4	16.0	160	44	13	9.3	2.6	127

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Nov 1993											
01...	55	3.3	.4	17	224	6	5	<1	<.1	7	3
Feb 1994											
17...	60	3.5	.4	19	236	7	5	<1	<.1	13	3
Mar											
10...	58	3.9	.4	17	230	9	5	<1	<.1	19	3
Apr											
12...	59	4.2	.4	16	228	9	7	<1	<.1	23	4
27...	28	2.2	.2	15	135	9	5	<1	<.1	42	5
May											
10...	25	1.8	.2	13	122	5	5	<1	<.1	27	4
24...	30	2.2	.2	15	149	8	6	<1	<.1	18	5
Jun											
14...	30	2.3	.2	16	165	6	5	<1	<.1	12	3
Jul											
12...	41	2.9	.3	15	200	6	6	<1	<.1	8	3
Aug											
18...	53	3.1	.3	12	213	5	5	<1	<.1	3	2

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1993											
01...	140	<3	--	--	20	4	20	5	4	12	91
Feb 1994											
17...	280	5	2	<.5	50	6	30	8	14	28	80
Mar											
10...	450	8	3	<.5	70	9	30	11	21	45	83
Apr											
12...	530	7	4	<.5	90	7	40	9	26	69	80
27...	1,100	41	10	.6	160	10	70	12	58	446	57
May											
10...	800	22	5	<.5	100	7	50	<3	60	418	52
24...	500	16	3	<.5	70	6	30	5	26	154	57
Jun											
14...	390	16	2	<.5	50	4	30	<3	24	114	62
Jul											
12...	150	6	1	<.5	30	5	30	<3	8	20	88
Aug											
18...	60	6	<1	<.5	20	5	<10	3	4	3.5	85

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12340000--BLACKFOOT RIVER NEAR BONNER, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Nov 1993											
01...	1140	729	263	8.6	4.0	140	35	12	3.4	1.0	140
Feb 1994											
17...	1330	E500	261	8.5	0.0	130	34	12	3.2	.9	139
Apr											
28...	0830	4,250	168	8.3	4.5	85	22	7.4	1.8	.6	86
May											
10...	1305	4,570	159	8.2	12.0	81	21	7.0	1.4	.5	83
24...	1040	3,160	189	8.3	13.0	94	24	8.3	2.1	.8	95
Aug											
18...	0930	419	262	8.4	15.5	130	32	13	3.1	1.0	135

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Nov 1993											
01...	6.6	.6	.1	11	154	<1	1	<1	<.1	--	--
Feb 1994											
17...	6.1	.7	<.1	12	152	1	1	<1	<.1	1	<1
Apr											
28...	4.2	.4	<.1	8.6	97	<1	<1	<1	<.1	3	1
May											
10...	1.1	.3	<.1	7.0	88	1	<1	<1	<.1	4	<1
24...	4.6	.4	<.1	8.1	105	1	<1	<1	<.1	2	<1
Aug											
18...	5.2	.6	<.1	9.5	145	<1	1	<1	<.1	<1	<1

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1993											
01...	80	4	--	--	<10	1	20	<3	2	3.9	79
Feb 1994											
17...	50	5	<1	<.5	<10	<1	<10	<3	2	2.7	80
Apr											
28...	410	22	1	<.5	30	3	<10	<3	24	275	82
May											
10...	550	14	2	<.5	40	3	<10	<3	45	555	81
24...	180	10	<1	<.5	10	2	<10	<3	10	85	87
Aug											
18...	20	<3	<1	<.5	<10	1	<10	<3	2	2.3	81

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12340500--CLARK FORK ABOVE MISSOULA, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Nov 1993											
01...	1315	1,800	332	8.4	4.0	160	43	12	7.2	2.3	136
Feb 1994											
17...	1620	1,260	330	8.4	0.0	160	43	12	7.2	1.8	134
Mar											
10...	1220	1,330	325	8.5	3.5	150	42	12	7.3	2.3	131
Apr											
13...	0830	2,190	281	8.3	7.0	130	35	10	6.0	1.6	115
28...	1020	6,150	189	8.2	5.5	90	24	7.2	3.3	1.0	84
May											
10...	1100	6,790	177	8.1	12.0	86	23	7.0	2.9	.9	80
24...	1330	5,220	213	8.2	13.0	100	27	8.1	4.0	1.5	94
Jun											
14...	0750	3,680	239	8.3	12.0	110	31	9.1	4.4	1.2	107
Jul											
12...	1450	1,710	287	8.3	18.0	140	36	11	5.7	1.8	128
Aug											
18...	0725	817	299	8.5	17.5	150	37	13	6.0	1.7	128

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Nov 1993											
01...	35	2.2	.3	15	199	4	4	<1	<.1	4	2
Feb 1994											
17...	39	2.4	.3	16	202	5	4	<1	<.1	6	2
Mar											
10...	37	2.8	.3	14	196	6	4	<1	<.1	8	2
Apr											
13...	28	2.2	.2	12	164	4	3	<1	<.1	10	2
28...	13	1.1	.1	11	111	3	2	<1	<.1	11	2
May											
10...	11	.9	<.1	9.4	103	3	2	<1	<.1	14	2
24...	15	1.2	.1	11	124	4	3	<1	<.1	8	2
Jun											
14...	16	1.3	.1	11	138	3	3	<1	<.1	7	2
Jul											
12...	23	1.8	.2	12	168	4	3	<1	<.1	7	2
Aug											
18...	25	1.8	.2	11	172	3	3	<1	<.1	5	2

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1993											
01...	110	3	1	<.5	10	7	20	<3	3	15	90
Feb 1994											
17...	110	5	<1	<.5	30	13	20	12	4	14	90
Mar											
10...	220	11	1	<.5	50	29	10	9	7	25	96
Apr											
13...	270	19	2	<.5	50	25	20	8	10	59	97
28...	520	40	2	<.5	60	11	20	7	28	465	93
May											
10...	560	21	3	<.5	60	18	20	<3	34	623	89
24...	310	16	1	<.5	40	15	20	<3	14	197	92
Jun											
14...	220	14	1	<.5	30	13	10	<3	12	119	93
Jul											
12...	150	10	<1	<.5	30	19	40	<3	6	28	98
Aug											
18...	120	8	1	<.5	30	13	<10	<3	6	13	88

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1993 through September 1994 (Continued)

12353000--CLARK FORK BELOW MISSOULA, MONT.

Date	Time	Stream-flow, instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L)	Magne-sium, dis-solved (mg/L)	Sodium, dis-solved (mg/L)	Potas-sium, dis-solved (mg/L)	Alka-linity (mg/L as $CaCO_3$)
Dec 1993											
01...	1230	2,400	276	8.2	1.0	130	35	9.2	7.1	1.7	116
Mar 1994											
03...	1000	2,780	263	8.2	4.0	110	32	8.5	6.6	3.4	103
30...	1030	2,090	252	8.3	7.5	120	33	8.7	6.4	1.6	105
May											
11...	1030	13,800	109	8.1	11.0	48	13	3.7	2.2	.7	49
Jun											
08...	1000	7,950	150	8.2	11.5	69	19	5.1	3.5	1.1	68
Sep											
13...	1100	1,190	274	8.2	13.0	120	34	9.6	6.9	1.9	121

Date	Sulfate, dis-solved (mg/L)	Chloride, dis-solved (mg/L)	Fluo-ride, dis-solved (mg/L)	Silica, dis-solved (mg/L)	Solids, sum of constit-uents, dissolved (mg/L)	Arsenic, total recov-erable (µg/L)	Arsenic, dis-solved (µg/L)	Cad-mium, total recov-erable (µg/L)	Cad-mium, dis-solved (µg/L)	Copper, total recov-erable (µg/L)	Copper, dis-solved (µg/L)
Dec 1993											
01...	28	2.6	.2	14	177	3	3	<1	<1	5	2
Mar 1994											
03...	25	3.6	.2	13	150	--	--	--	--	--	--
30...	22	2.4	.2	11	143	3	2	<1	<1	5	2
May											
11...	6.3	.7	<.1	8.5	63	--	--	--	--	--	--
Jun											
08...	8.7	1.2	.1	9.6	90	2	1	<1	.1	8	3
Sep											
13...	18	2.7	.2	10	157	2	3	<1	<1	2	2

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lead, dis-solved (µg/L)	Manga-nese, total recov-erable (µg/L)	Manga-nese, dis-solved (µg/L)	Zinc, total recov-erable (µg/L)	Zinc, dis-solved (µg/L)	Sedi-ment, sus-pended (mg/L)	Sedi-ment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Dec 1993											
01...	140	17	--	--	20	9	30	<10	5	32	85
Mar 1994											
03...	--	--	--	--	--	--	--	--	37	278	89
30...	150	21	<1	<.5	30	13	10	<10	6	34	89
May											
11...	--	--	--	--	--	--	--	--	40	1,490	70
Jun											
08...	1,980	29	2	<.5	20	5	10	<10	8	172	79
Sep											
13...	90	16	<1	<.5	20	5	<10	<10	4	13	84

Table 5. Daily streamflow and suspended-sediment data for Silver Bow Creek at Opportunity, Montana, October 1993 through September 1994

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

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)
	1993								
	October			November			December		
1	48	8	1.0	48	6	.78	24	17	1.1
2	48	8	1.0	45	7	.85	25	21	1.4
3	48	8	1.0	47	7	.89	25	26	1.8
4	48	7	.91	46	7	.87	24	31	2.0
5	47	8	1.0	39	8	.84	24	39	2.5
6	48	10	1.3	37	9	.90	22	59	3.5
7	54	13	1.9	48	10	1.3	20	66	3.6
8	57	14	2.2	48	11	1.4	20	70	3.8
9	58	12	1.9	46	12	1.5	21	80	4.5
10	55	11	1.6	54	13	1.9	22	120	7.1
11	55	10	1.5	50	14	1.9	23	90	5.6
12	56	9	1.4	46	15	1.9	24	45	2.9
13	56	8	1.2	46	14	1.7	25	37	2.5
14	56	8	1.2	47	13	1.6	26	36	2.5
15	56	9	1.4	48	11	1.4	27	36	2.6
16	58	9	1.4	48	10	1.3	26	36	2.5
17	55	9	1.3	45	11	1.3	26	36	2.5
18	53	8	1.1	44	14	1.7	25	42	2.8
19	51	7	.96	43	16	1.9	24	44	2.9
20	53	9	1.3	45	17	2.1	24	40	2.6
21	52	8	1.1	45	15	1.8	24	39	2.5
22	50	7	.95	40	12	1.3	23	38	2.4
23	51	7	.96	30	10	.81	22	33	2.0
24	51	7	.96	20	7	.38	22	25	1.5
25	49	6	.79	15	6	.24	22	18	1.1
26	48	6	.78	16	9	.39	23	16	.99
27	44	5	.59	18	12	.58	23	16	.99
28	49	8	1.1	20	16	.86	23	17	1.1
29	45	6	.73	22	16	.95	25	18	1.2
30	44	6	.71	24	14	.91	27	18	1.3
31	46	6	.75	---	---	---	30	20	1.6
TOTAL	1,589	---	35.99	1,170	---	36.25	741	---	77.38
MEAN	51.3	8	1.2	39.0	11	1.2	23.9	40	2.5
MAX	58	14	2.2	54	17	2.1	30	120	7.1
MIN	44	5	.59	15	6	.24	20	16	.99

Table 5. Daily streamflow and suspended-sediment data for Silver Bow Creek at Opportunity, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	33	22	2.0	25	20	1.4	50	160	22
2	35	24	2.3	25	4	.27	58	185	29
3	37	24	2.4	25	3	.20	70	100	19
4	38	21	2.2	24	3	19	59	34	5.4
5	40	17	1.8	23	3	.19	52	22	3.1
6	37	14	1.4	23	3	.19	46	16	2.0
7	35	14	1.3	23	3	.19	44	15	1.8
8	30	16	1.3	24	4	.26	43	14	1.6
9	27	19	1.4	27	4	.29	41	15	1.7
10	28	22	1.7	30	5	.41	40	10	1.1
11	30	26	2.1	32	6	.52	39	7	.74
12	30	29	2.3	34	7	.64	42	6	.68
13	29	32	2.5	35	7	.66	44	9	1.1
14	29	35	2.7	38	8	.82	47	13	1.6
15	35	35	3.3	40	8	.86	50	15	2.0
16	32	30	2.6	45	9	1.1	58	30	4.7
17	32	24	2.1	50	8	1.1	55	18	2.7
18	33	19	1.7	47	6	.76	51	12	1.7
19	34	16	1.5	44	8	.95	49	8	1.1
20	33	14	1.2	42	10	1.1	43	9	1.0
21	30	14	1.1	40	11	1.2	47	10	1.3
22	32	14	1.2	40	11	1.2	44	8	.95
23	32	15	1.3	40	11	1.2	43	12	1.4
24	32	14	1.2	38	11	1.1	40	21	2.3
25	32	12	1.0	36	11	1.1	42	8	.91
26	32	11	.95	36	11	1.1	43	10	1.2
27	32	10	.86	40	11	1.2	43	7	.81
28	31	10	.84	45	11	1.3	44	5	.59
29	27	10	.73	---	---	---	42	6	.68
30	26	10	.70	---	---	---	43	6	.70
31	25	26	1.8	---	---	---	46	10	1.2
TOTAL	988	---	51.48	971	---	21.50	1,458	---	116.06
MEAN	31.9	19	1.7	34.7	8	.77	47.0	26	3.7
MAX	40	35	3.3	50	20	1.4	70	185	29
MIN	25	10	.70	23	3	.19	39	5	.59

Table 5. Daily streamflow and suspended-sediment data for Silver Bow Creek at Opportunity, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	51	18	2.5	100	18	4.9	76	14	2.9
2	57	24	3.7	95	13	3.3	75	13	2.6
3	60	27	4.4	91	12	2.9	68	12	2.2
4	62	27	4.5	88	12	2.9	68	12	2.2
5	56	14	2.1	87	10	2.3	61	13	2.1
6	56	14	2.1	89	13	3.1	57	13	2.0
7	54	12	1.7	92	11	2.7	64	16	2.8
8	54	13	1.9	95	13	3.3	67	13	2.4
9	54	13	1.9	100	17	4.6	64	11	1.9
10	57	16	2.5	106	18	5.2	59	9	1.4
11	60	19	3.1	103	14	3.9	52	7	.98
12	62	23	3.9	105	17	4.8	55	11	1.6
13	64	26	4.5	112	15	4.5	54	11	1.6
14	63	18	3.1	103	15	4.2	68	19	3.5
15	59	14	2.2	98	11	2.9	61	10	1.6
16	63	18	3.1	98	13	3.4	69	13	2.4
17	80	61	13	105	18	5.1	64	13	2.2
18	100	86	23	114	20	6.2	58	10	1.6
19	109	78	23	135	57	21	51	8	1.1
20	117	74	23	139	49	18	43	8	.93
21	120	62	20	116	25	7.8	42	7	.79
22	133	71	25	109	19	5.6	43	7	.81
23	143	66	25	110	20	5.9	40	7	.76
24	135	50	18	100	17	4.6	45	7	.85
25	139	38	14	92	15	3.7	44	8	.95
26	128	32	11	89	17	4.1	43	8	.93
27	116	28	8.8	88	17	4.0	42	8	.91
28	103	22	6.1	107	24	6.9	42	7	.79
29	96	23	6.0	93	16	4.0	39	6	.63
30	97	20	5.2	84	13	2.9	38	8	.82
31	---	---	---	74	12	2.4	---	---	---
MEAN	84.9	34	8.9	101	18	5.2	55.1	10	1.6
MAX	143	86	25	139	57	21	76	19	3.5
MIN	51	12	1.7	74	10	2.3	38	6	.63
TOTAL	2,548	---	268.3	3,117	---	161.1	1,652	---	48.25

Table 5. Daily streamflow and suspended-sediment data for Silver Bow Creek at Opportunity, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment		Mean streamflow (ft^3/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
				1994					
	July			August			September		
1	41	9	1.0	28	6	.45	27	11	.80
2	38	7	.72	28	6	.45	24	14	.91
3	37	6	.60	28	7	.53	22	16	.95
4	37	5	.50	27	8	.58	22	13	.77
5	41	40	4.4	26	10	.70	23	10	.62
6	159	239	103	25	11	.74	23	7	.43
7	93	43	11	24	11	.71	22	5	.30
8	73	18	3.5	25	11	.74	20	5	.27
9	63	13	2.2	25	11	.74	24	7	.45
10	62	14	2.3	24	10	.65	22	9	.53
11	55	11	1.6	22	9	.53	22	9	.53
12	52	8	1.1	27	7	.51	24	7	.45
13	48	6	.78	26	5	.35	24	6	.39
14	41	6	.66	23	4	.25	25	5	.34
15	41	6	.66	23	4	.25	24	5	.32
16	40	5	.54	24	5	.32	24	7	.45
17	38	5	.51	25	7	.47	22	11	.65
18	36	4	.39	22	10	.59	22	13	.77
19	33	4	.36	23	8	.50	24	15	.97
20	30	4	.32	23	6	.37	26	15	1.1
21	26	4	.28	23	6	.37	25	11	.74
22	29	3	.23	23	6	.37	27	8	.58
23	29	4	.31	27	9	.66	28	8	.60
24	33	6	.53	23	6	.37	25	8	.54
25	32	7	.60	24	6	.39	27	10	.73
26	30	7	.57	23	6	.37	28	12	.91
27	33	8	.71	22	6	.36	28	12	.91
28	36	7	.68	23	6	.37	27	12	.87
29	30	5	.41	24	6	.39	27	13	.95
30	29	5	.39	28	6	.45	30	13	1.1
31	34	7	.64	25	7	.47	---	---	---
TOTAL	1,399	---	141.49	763	---	15.00	738	---	19.93
MEAN	45.1	17	4.6	24.6	7	.48	24.6	10	.66
MAX	159	239	103	28	11	.74	30	16	1.1
MIN	26	3	.23	22	4	.25	20	5	.27

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--17,134 ft^3/s
SEDIMENT DISCHARGE--992.73 tons

Table 6. Daily streamflow and suspended-sediment data for Silver Bow Creek at Warm Springs, Montana, October 1993 through September 1994

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

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)
	1993								
	October			November			December		
1	80	2	.43	68	6	1.1	67	4	.72
2	74	2	.40	78	6	1.3	70	5	.95
3	70	1	.19	83	7	1.6	72	8	1.6
4	69	1	.19	80	7	1.5	70	3	.57
5	69	1	.19	80	6	1.3	70	8	1.5
6	66	1	.18	79	6	1.3	70	7	1.3
7	63	2	.34	78	5	1.1	69	6	1.1
8	65	2	.35	78	4	.84	66	5	.89
9	70	1	.19	80	4	.86	66	4	.71
10	72	1	.19	81	3	.66	68	4	.73
11	53	3	.43	81	3	.66	70	4	.76
12	49	4	.53	82	3	.66	72	4	.78
13	57	5	.77	82	2	.44	73	5	.99
14	62	5	.84	81	3	.66	72	5	.97
15	58	5	.78	82	3	.66	70	4	.76
16	69	5	.93	79	7	1.5	69	4	.75
17	75	4	.81	80	4	.86	68	5	.92
18	79	5	1.1	81	3	.66	66	5	.89
19	79	8	1.7	80	3	.65	65	6	1.1
20	78	8	1.7	79	4	.85	64	6	1.0
21	78	7	1.5	78	3	.63	63	6	1.0
22	78	6	1.3	76	4	.82	67	5	.90
23	78	7	1.5	78	16	3.4	74	6	1.2
24	75	7	1.4	70	11	2.1	79	6	1.3
25	74	7	1.4	64	7	1.2	76	6	1.2
26	74	8	1.6	60	5	.81	73	5	.99
27	74	8	1.6	58	6	.94	72	7	1.4
28	74	20	4.0	57	4	.62	77	8	1.7
29	77	6	1.2	58	6	.94	82	7	1.5
30	76	4	.82	61	5	.82	80	6	1.3
31	76	5	1.0	---	---	---	75	7	1.4
TOTAL	2,191	---	29.56	2,252	---	31.44	2,195	---	32.88
MEAN	70.7	5	.95	75.1	5	1.1	70.8	6	1.1
MAX	80	20	4.0	83	16	3.4	82	8	1.7
MIN	49	1	.18	57	2	.44	63	3	.57

Table 6. Daily streamflow and suspended-sediment data for Silver Bow Creek at Warm Springs, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	71	5	.96	61	6	.99	65	7	1.2
2	70	5	.95	60	6	.97	73	8	1.6
3	69	6	1.1	59	6	.96	88	11	2.6
4	70	7	1.3	58	6	.94	97	14	3.7
5	69	6	1.1	58	6	.94	99	14	3.7
6	69	6	1.1	57	6	.92	96	8	2.1
7	68	6	1.1	57	8	1.2	89	8	1.9
8	64	6	1.0	57	6	.92	84	7	1.6
9	64	6	1.0	56	7	1.1	79	7	1.5
10	65	6	1.1	52	8	1.1	76	7	1.4
11	65	8	1.4	51	7	.96	73	7	1.4
12	65	13	2.3	51	7	.96	71	6	1.2
13	65	7	1.2	51	6	.83	71	5	.96
14	67	6	1.1	49	5	.66	68	5	.92
15	69	6	1.1	51	6	.83	69	6	1.1
16	69	6	1.1	51	6	.83	71	7	1.3
17	68	7	1.3	52	5	.70	67	11	2.0
18	68	7	1.3	55	6	.89	70	8	1.5
19	66	7	1.2	57	8	1.2	67	7	1.3
20	66	7	1.2	57	6	.92	70	6	1.1
21	67	10	1.8	58	5	.78	68	8	1.5
22	66	8	1.4	59	7	1.1	69	7	1.3
23	65	7	1.2	61	8	1.3	71	8	1.5
24	64	7	1.2	59	7	1.1	72	6	1.2
25	65	7	1.2	61	7	1.2	71	7	1.3
26	66	8	1.4	61	7	1.2	70	6	1.1
27	66	8	1.4	62	6	1.0	70	7	1.3
28	66	8	1.4	64	6	1.0	72	7	1.4
29	65	8	1.4	---	---	---	73	7	1.4
30	66	8	1.4	---	---	---	72	7	1.4
31	63	7	1.2	---	---	---	72	8	1.6
TOTAL	2,066	---	38.91	1,585	---	27.50	2,323	---	49.08
MEAN	66.6	7	1.3	56.6	6	.98	74.9	8	1.6
MAX	71	13	2.3	64	8	1.3	99	14	3.7
MIN	63	5	.95	49	5	.66	65	5	.92

Table 6. Daily streamflow and suspended-sediment data for Silver Bow Creek at Warm Springs, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	71	8	1.5	186	11	5.5	185	4	2.0
2	73	7	1.4	187	10	5.0	180	4	1.9
3	80	8	1.7	185	10	5.0	168	4	1.8
4	92	9	2.2	185	9	4.5	148	4	1.6
5	95	8	2.1	189	11	5.6	128	4	1.4
6	96	9	2.3	182	13	6.4	119	4	1.3
7	106	10	2.9	172	13	6.0	112	4	1.2
8	105	9	2.6	166	12	5.4	97	4	1.0
9	98	7	1.9	165	11	4.9	82	4	.89
10	95	8	2.1	168	10	4.5	69	4	.75
11	94	7	1.8	173	10	4.7	71	4	.77
12	97	8	2.1	186	12	6.0	76	4	.82
13	94	9	2.3	185	11	5.5	83	4	.90
14	94	8	2.0	182	14	6.9	90	4	.97
15	94	6	1.5	183	10	4.9	92	5	1.2
16	94	6	1.5	182	20	9.8	95	8	2.1
17	94	6	1.5	182	42	21	96	9	2.3
18	99	7	1.9	182	66	32	94	5	1.3
19	114	10	3.1	182	50	25	88	3	.71
20	134	14	5.1	182	20	9.8	83	4	.90
21	145	16	6.3	182	12	5.9	79	3	.64
22	159	30	13	182	9	4.4	77	3	.62
23	179	34	16	182	10	4.9	75	2	.41
24	184	26	13	182	9	4.4	69	2	.37
25	184	20	9.9	180	6	2.9	67	2	.36
26	186	17	8.5	190	9	4.6	65	4	.70
27	186	15	7.5	199	8	4.3	61	4	.66
28	186	14	7.0	198	5	2.7	58	4	.63
29	188	11	5.6	191	5	2.6	56	4	.60
30	187	11	5.6	185	3	1.5	56	4	.60
31	---	---	---	183	3	1.5	---	---	---
TOTAL	3,703	---	135.9	5,658	---	218.1	2,819	---	31.40
MEAN	123	12	4.5	183	14	7.0	94.0	4	1.1
MAX	188	34	16	199	66	32	185	9	2.3
MIN	71	6	1.4	165	3	1.5	56	2	.36

Table 6. Daily streamflow and suspended-sediment data for Silver Bow Creek at Warm Springs, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	July			August			September		
1	58	4	.63	41	4	.44	22	3	.18
2	55	4	.59	40	4	.43	23	5	.31
3	53	4	.57	37	4	.40	23	10	.62
4	53	4	.57	36	5	.49	23	8	.50
5	55	4	.59	32	4	.35	22	7	.42
6	73	7	1.4	30	4	.32	22	7	.42
7	97	8	2.1	29	4	.31	22	9	.53
8	112	6	1.8	28	4	.30	22	10	.59
9	106	4	1.1	28	3	.23	21	9	.51
10	96	4	1.0	28	3	.23	20	9	.49
11	89	4	.96	27	3	.22	18	9	.44
12	84	4	.91	26	3	.21	18	9	.44
13	81	3	.66	26	2	.14	19	10	.51
14	79	3	.64	26	2	.14	18	9	.44
15	74	3	.60	26	2	.14	18	9	.44
16	67	3	.54	25	2	.14	20	8	.43
17	65	2	.35	24	3	.19	21	8	.45
18	61	2	.33	23	2	.12	21	10	.57
19	57	2	.31	23	2	.12	21	13	.74
20	54	2	.29	24	4	.26	21	13	.74
21	53	2	.29	24	4	.26	21	12	.68
22	47	2	.25	23	2	.12	22	11	.65
23	46	4	.50	23	2	.12	22	10	.59
24	45	4	.49	22	3	.18	22	9	.53
25	46	4	.50	22	4	.24	23	8	.50
26	46	4	.50	21	5	.28	23	7	.43
27	44	5	.59	22	4	.24	23	7	.43
28	46	4	.50	21	3	.17	28	7	.53
29	46	5	.62	21	3	.17	29	6	.47
30	45	5	.61	22	2	.12	28	6	.45
31	43	4	.46	22	2	.12	---	---	---
TOTAL	1,976	---	21.25	822	---	7.20	656	---	15.03
MEAN	63.7	4	.69	26.5	3	.23	21.9	9	.50
MAX	112	8	2.1	41	5	.49	29	13	.74
MIN	43	2	.25	21	2	.12	18	3	.18

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--28,246 ft^3/s
SEDIMENT DISCHARGE--638.25 tons

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1993 through September 1994

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

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1993					
	October			November			December		
1	271	5	3.7	300	7	5.7	272	25	18
2	253	5	3.4	297	8	6.4	286	23	18
3	245	5	3.3	311	8	6.7	280	23	17
4	246	5	3.3	317	8	6.8	282	24	18
5	244	5	3.3	309	8	6.7	266	27	19
6	240	5	3.2	296	8	6.4	260	33	23
7	252	5	3.4	303	8	6.5	261	33	23
8	290	6	4.7	302	8	6.5	275	32	24
9	292	6	4.7	297	8	6.4	283	32	24
10	293	6	4.7	293	8	6.3	282	30	23
11	289	6	4.7	287	8	6.2	282	29	22
12	264	6	4.3	275	8	5.9	279	27	20
13	276	6	4.5	283	9	6.9	260	26	18
14	290	6	4.7	277	10	7.5	268	27	20
15	282	7	5.3	281	11	8.3	263	33	23
16	294	7	5.6	289	10	7.8	261	24	17
17	304	7	5.7	283	10	7.6	257	14	9.7
18	305	7	5.8	285	9	6.9	230	12	7.5
19	302	7	5.7	277	9	6.7	220	10	5.9
20	301	7	5.7	277	9	6.7	220	11	6.5
21	293	6	4.7	280	9	6.8	220	15	8.9
22	294	6	4.8	230	9	5.6	230	17	11
23	293	6	4.7	120	9	2.9	230	17	11
24	286	6	4.6	110	9	2.7	240	17	11
25	278	7	5.3	100	9	2.4	250	18	12
26	276	8	6.0	120	10	3.2	250	20	13
27	280	9	6.8	150	11	4.5	240	39	25
28	291	10	7.9	190	14	7.2	240	43	28
29	291	9	7.1	213	18	10	250	40	27
30	284	8	6.1	242	25	16	260	37	26
31	295	7	5.6	---	---	---	252	31	21
TOTAL	8,694	---	153.3	7,594	---	196.2	7,949	---	550.5
MEAN	280	6	5.0	253	10	6.5	256	25	18
MAX	305	10	7.9	317	25	16	286	43	28
MIN	240	5	3.2	100	7	2.4	220	10	5.9

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	251	25	17	190	23	12	253	38	26
2	248	23	15	200	18	9.7	291	60	47
3	248	23	15	210	13	7.4	282	46	35
4	250	24	16	210	11	6.2	281	34	26
5	248	25	17	200	12	6.5	276	40	30
6	238	25	16	180	15	7.3	261	30	21
7	216	25	15	130	18	6.3	250	26	18
8	242	24	16	100	20	5.4	245	27	18
9	236	23	15	110	20	5.9	239	23	15
10	233	21	13	130	21	7.4	233	21	13
11	231	20	12	140	21	7.9	233	20	13
12	231	20	12	160	22	9.5	228	20	12
13	233	21	13	190	22	11	230	19	12
14	239	23	15	204	22	12	237	26	17
15	243	21	14	216	30	17	231	23	14
16	243	20	13	227	34	21	243	25	16
17	243	19	12	238	29	19	238	22	14
18	242	18	12	238	28	18	235	21	13
19	243	18	12	239	58	37	222	18	11
20	239	18	12	219	35	21	209	20	11
21	237	18	12	223	26	16	213	18	10
22	236	19	12	224	24	15	207	21	12
23	235	20	13	223	20	12	209	20	11
24	238	20	13	228	16	9.8	208	22	12
25	232	21	13	222	14	8.4	214	26	15
26	230	21	13	232	26	16	219	22	13
27	240	21	14	228	25	15	219	23	14
28	227	22	13	228	25	15	221	20	12
29	228	22	14	---	---	---	222	20	12
30	221	23	14	---	---	---	219	22	13
31	202	23	13	---	---	---	217	23	13
TOTAL	7,323	---	426	5,539	---	354.7	7,285	---	519
MEAN	236	21	14	198	23	13	235	26	17
MAX	251	25	17	239	58	37	291	60	47
MIN	202	18	12	100	11	5.4	207	18	10

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	215	23	13	361	41	40	277	18	13
2	224	23	14	352	44	42	300	18	15
3	233	25	16	353	45	43	306	16	13
4	256	30	21	347	38	36	290	15	12
5	255	31	21	354	34	32	265	14	10
6	254	29	20	357	33	32	245	22	15
7	267	36	26	343	42	39	221	14	8.4
8	277	37	28	339	37	34	204	7	3.9
9	269	35	25	346	39	36	192	6	3.1
10	256	27	19	360	48	47	161	5	2.2
11	254	35	24	377	55	56	143	5	1.9
12	252	32	22	399	66	71	139	5	1.9
13	254	25	17	445	75	90	154	7	2.9
14	244	21	14	396	60	64	210	17	9.6
15	238	22	14	337	41	37	231	16	10
16	238	24	15	320	32	28	246	14	9.3
17	239	26	17	321	38	33	235	12	7.6
18	244	27	18	346	62	58	214	10	5.8
19	264	42	30	373	71	72	195	9	4.7
20	298	57	46	405	37	40	180	8	3.9
21	322	75	65	376	34	35	156	8	3.4
22	357	125	120	354	30	29	154	10	4.2
23	398	148	159	362	27	26	158	7	3.0
24	418	116	131	324	26	23	142	6	2.3
25	431	100	116	304	25	21	124	9	3.0
26	412	69	77	313	23	19	115	22	6.8
27	388	53	56	329	25	22	99	32	8.6
28	381	47	48	349	25	24	93	38	9.5
29	382	48	50	302	22	18	83	41	9.2
30	376	45	46	293	17	13	82	43	9.5
31	---	---	---	274	17	13	---	---	---
TOTAL	8,896	---	1,288	10,811	---	1,173	5,614	---	212.7
MEAN	297	48	43	349	39	38	187	15	7.1
MAX	431	148	159	445	75	90	306	43	15
MIN	215	21	13	274	17	13	82	5	1.9

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	July			August			September		
1	80	39	8.4	36	29	2.8	50	9	1.2
2	78	35	7.4	36	25	2.4	50	7	.95
3	74	33	6.6	35	22	2.1	65	6	1.1
4	70	33	6.2	32	22	1.9	73	6	1.2
5	71	35	6.7	30	22	1.8	76	6	1.2
6	114	42	13	30	22	1.8	76	8	1.6
7	169	33	15	38	28	2.9	73	20	3.9
8	167	20	9.0	37	31	3.1	71	17	3.3
9	169	17	7.8	30	27	2.2	62	11	1.8
10	159	16	6.9	26	23	1.6	62	9	1.5
11	128	13	4.5	27	21	1.5	71	8	1.5
12	121	9	2.9	29	19	1.5	73	8	1.6
13	112	9	2.7	30	16	1.3	68	7	1.3
14	100	9	2.4	31	14	1.2	67	7	1.3
15	97	9	2.4	29	12	.94	72	7	1.4
16	88	8	1.9	28	10	.76	74	6	1.2
17	79	7	1.5	27	21	1.5	74	7	1.4
18	67	7	1.3	36	36	3.5	75	9	1.8
19	61	6	.99	33	32	2.9	80	13	2.8
20	57	5	.77	39	34	3.6	94	13	3.3
21	54	6	.87	40	32	3.5	93	13	3.3
22	50	7	.95	43	25	2.9	95	12	3.1
23	42	9	1.0	45	20	2.4	100	11	3.0
24	32	10	.86	45	17	2.1	105	10	2.8
25	29	11	.86	46	16	2.0	106	8	2.3
26	26	16	1.1	47	15	1.9	96	7	1.8
27	29	18	1.4	45	13	1.6	96	8	2.1
28	33	19	1.7	47	14	1.8	91	7	1.7
29	36	21	2.0	42	19	2.2	112	8	2.4
30	37	20	2.0	41	16	1.8	117	8	2.5
31	38	24	2.5	45	11	1.3	---	---	---
TOTAL	2,467	---	123.60	1,125	---	64.80	2,417	---	60.35
MEAN	79.6	18	4.0	36.3	21	2.1	80.6	9	2.0
MAX	169	42	15	47	36	3.6	117	20	3.9
MIN	26	5	.77	26	10	.76	50	6	.95

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--75,714 ft^3/s
SEDIMENT DISCHARGE--5,122.15 tons

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1993 through September 1994

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

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1993					
	October			November			December		
1	1,140	4	12	1,110	4	12	1,000	21	57
2	1,130	4	12	1,100	4	12	1,000	14	38
3	1,090	5	15	1,090	5	15	1,000	11	30
4	1,070	5	14	1,110	5	15	1,000	10	27
5	1,050	5	14	1,110	5	15	989	9	24
6	1,040	6	17	1,060	5	14	916	8	20
7	1,100	6	18	1,040	5	14	797	8	17
8	1,200	5	16	1,070	5	14	878	9	21
9	1,200	5	16	1,050	4	11	1,000	10	27
10	1,170	4	13	1,020	4	11	962	9	23
11	1,180	4	13	1,030	5	14	960	8	21
12	1,190	4	13	989	5	13	979	8	21
13	1,150	4	12	967	5	13	916	8	20
14	1,160	4	13	971	5	13	853	8	18
15	1,210	5	16	935	5	13	865	8	19
16	1,210	6	20	977	5	13	892	8	19
17	1,200	5	16	988	5	13	880	8	19
18	1,200	5	16	976	4	11	826	8	18
19	1,190	5	16	970	4	10	784	13	28
20	1,180	5	16	932	5	13	773	10	21
21	1,180	4	13	933	6	15	755	7	14
22	1,160	4	13	960	6	16	791	10	21
23	1,140	4	12	600	5	8.1	750	11	22
24	1,110	4	12	450	10	12	700	11	21
25	1,100	4	12	450	32	39	650	11	19
26	1,070	4	12	450	19	23	700	11	21
27	1,060	5	14	500	14	19	750	11	22
28	1,090	5	15	600	12	19	750	10	20
29	1,140	5	15	800	13	28	700	11	21
30	1,080	4	12	950	21	54	750	13	26
31	1,060	4	11	---	---	---	820	17	38
TOTAL	35,250	---	439	27,188	---	492.1	26,386	---	733
MEAN	1,137	5	14	906	8	16	851	10	24
MAX	1,210	6	20	1,110	32	54	1,000	21	57
MIN	1,040	4	11	450	4	8.1	650	7	14

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	875	19	45	550	7	10	813	44	97
2	858	16	37	550	8	12	1,210	150	490
3	845	14	32	600	9	15	1,370	180	666
4	850	11	25	650	8	14	1,240	130	435
5	867	9	21	600	5	8.1	1,130	65	198
6	849	7	16	600	3	4.9	1,010	38	104
7	750	6	12	550	2	3.0	910	25	61
8	770	7	15	450	3	3.6	862	22	51
9	844	10	23	500	6	8.1	838	21	48
10	838	13	29	550	9	13	817	21	46
11	826	17	38	650	12	21	823	20	44
12	831	21	47	700	15	28	812	20	44
13	833	23	52	700	18	34	803	21	46
14	848	24	55	700	19	36	823	19	42
15	893	25	60	700	18	34	847	19	43
16	886	25	60	720	16	31	865	24	56
17	849	23	53	729	13	26	880	28	67
18	840	20	45	774	12	25	870	25	59
19	842	17	39	739	12	24	852	21	48
20	840	13	29	727	11	22	839	18	41
21	809	11	24	716	12	23	808	16	35
22	786	10	21	723	13	25	811	15	33
23	804	9	20	707	13	25	784	13	28
24	809	10	22	706	11	21	777	9	19
25	801	13	28	596	9	14	745	8	16
26	764	14	29	538	9	13	766	10	21
27	787	14	30	671	15	27	778	13	27
28	786	12	25	750	25	51	780	12	25
29	736	10	20	---	---	---	780	12	25
30	700	7	13	---	---	---	763	13	27
31	650	6	11	---	---	---	765	14	29
TOTAL	25,266	---	976	18,146	---	571.7	27,171	---	2,971
MEAN	815	14	31	648	11	20	876	34	96
MAX	893	25	60	774	25	51	1,370	180	666
MIN	650	6	11	450	2	3.0	745	8	16

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	785	16	34	2,240	45	272	1,990	17	91
2	813	21	46	2,130	44	253	2,000	19	103
3	839	28	63	2,020	39	213	1,910	19	98
4	923	42	105	1,930	37	193	1,850	16	80
5	962	53	138	1,990	40	215	1,780	14	67
6	968	44	115	2,100	44	249	1,660	13	58
7	989	48	128	2,080	46	258	1,640	12	53
8	1,000	44	119	2,170	50	293	1,620	11	48
9	991	41	110	2,350	54	343	1,540	9	37
10	977	37	98	2,520	60	408	1,460	8	32
11	973	32	84	2,610	63	444	1,360	8	29
12	990	31	83	2,670	63	454	1,320	9	32
13	1,040	38	107	2,820	68	518	1,400	10	38
14	1,060	44	126	2,590	67	469	1,780	26	125
15	1,040	32	90	2,290	46	284	1,860	24	121
16	1,020	32	88	2,110	29	165	1,720	12	56
17	1,070	43	124	2,010	28	152	1,730	10	47
18	1,190	58	186	2,170	34	199	1,630	9	40
19	1,390	110	413	2,310	42	262	1,500	8	32
20	1,650	155	691	2,610	54	381	1,380	6	22
21	1,970	185	984	2,530	45	307	1,270	6	21
22	2,400	195	1,260	2,360	38	242	1,200	7	23
23	2,870	195	1,510	2,320	32	200	1,160	8	25
24	3,030	162	1,330	2,220	26	156	1,110	7	21
25	3,370	160	1,460	2,050	24	133	1,050	7	20
26	3,200	100	864	1,970	24	128	1,000	8	22
27	2,880	64	498	2,050	25	138	969	7	18
28	2,650	60	429	2,390	39	252	927	6	15
29	2,430	54	354	2,340	37	234	883	6	14
30	2,290	46	284	2,250	25	152	843	7	16
31	---	---	---	2,080	18	101	---	---	---
TOTAL	47,760	---	11,921	70,280	---	8,068	43,542	---	1,404
MEAN	1,592	72	397	2,267	41	260	1,451	11	47
MAX	3,370	195	1,510	2,820	68	518	2,000	26	125
MIN	785	16	34	1,930	18	101	843	6	14

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	July			August			September		
1	790	6	13	521	6	8.4	307	4	3.3
2	762	5	10	502	6	8.1	309	3	2.5
3	754	5	10	472	6	7.6	304	2	1.6
4	728	5	9.8	459	6	7.4	320	3	2.6
5	715	5	9.7	471	7	8.9	344	5	4.6
6	813	6	13	461	7	8.7	356	6	5.8
7	1,070	16	46	445	7	8.4	363	6	5.9
8	1,020	15	41	432	6	7.0	351	5	4.7
9	955	14	36	424	5	5.7	328	4	3.5
10	939	12	30	406	5	5.5	321	3	2.6
11	905	9	22	387	4	4.2	324	3	2.6
12	895	8	19	395	4	4.3	345	4	3.7
13	885	9	22	385	4	4.2	355	5	4.8
14	847	8	18	367	4	4.0	352	6	5.7
15	817	7	15	351	4	3.8	346	6	5.6
16	784	7	15	339	4	3.7	354	6	5.7
17	743	7	14	337	4	3.6	361	5	4.9
18	707	7	13	329	4	3.6	363	6	5.9
19	679	7	13	321	3	2.6	370	6	6.0
20	646	7	12	316	3	2.6	384	7	7.3
21	613	7	12	315	4	3.4	382	7	7.2
22	577	7	11	312	4	3.4	382	7	7.2
23	554	7	10	315	4	3.4	384	7	7.3
24	563	7	11	317	4	3.4	397	7	7.5
25	584	6	9.5	320	4	3.5	391	7	7.4
26	585	7	11	316	4	3.4	390	8	8.4
27	562	6	9.1	315	3	2.6	392	8	8.5
28	543	5	7.3	302	3	2.4	396	8	8.6
29	529	5	7.1	308	4	3.3	394	9	9.6
30	525	6	8.5	310	5	4.2	421	9	10
31	523	7	9.9	308	5	4.2	---	---	---
TOTAL	22,612	---	487.9	11,558	---	149.5	10,786	---	171.0
MEAN	729	8	16	373	5	4.8	360	6	5.7
MAX	1,070	16	46	521	7	8.9	421	9	10
MIN	523	5	7.1	302	3	2.4	304	2	1.6

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--365,945 ft^3/s
SEDIMENT DISCHARGE--28,384.2 tons

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1993 through September 1994

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

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1993					
	October			November			December		
1	775	3	6.3	726	2	3.9	550	3	4.5
2	768	3	6.2	721	2	3.9	550	2	3.0
3	767	3	6.2	721	2	3.9	550	2	3.0
4	763	2	4.1	733	2	4.0	550	2	3.0
5	757	2	4.1	722	2	3.9	520	3	4.2
6	759	3	6.1	698	1	1.9	500	3	4.1
7	826	4	8.9	704	1	1.9	480	3	3.9
8	828	2	4.5	703	2	3.8	500	3	4.1
9	808	1	2.2	698	2	3.8	560	2	3.0
10	789	2	4.3	692	2	3.7	540	2	2.9
11	777	2	4.2	682	2	3.7	520	2	2.8
12	762	2	4.1	665	2	3.6	520	2	2.8
13	751	2	4.1	670	2	3.6	500	2	2.7
14	744	2	4.0	657	2	3.5	480	3	3.9
15	744	2	4.0	663	2	3.6	450	3	3.6
16	739	2	4.0	663	2	3.6	470	3	3.8
17	731	2	3.9	669	2	3.6	500	3	4.1
18	721	2	3.9	680	2	3.7	480	3	3.9
19	719	3	5.8	663	2	3.6	450	3	3.6
20	722	3	5.8	636	2	3.4	450	3	3.6
21	714	3	5.8	640	2	3.5	430	4	4.6
22	708	3	5.7	621	2	3.4	420	6	6.8
23	707	3	5.7	363	2	2.0	400	7	7.6
24	705	3	5.7	250	2	1.4	390	7	7.4
25	701	3	5.7	250	2	1.4	380	6	6.2
26	703	3	5.7	250	2	1.4	380	3	3.1
27	707	3	5.7	300	2	1.6	400	2	2.2
28	720	2	3.9	400	2	2.2	400	1	1.1
29	734	2	4.0	450	3	3.6	400	1	1.1
30	714	2	3.9	500	3	4.1	420	1	1.1
31	709	1	1.9	---	---	---	450	1	1.2
TOTAL	23,072	---	150.4	17,790	---	95.2	14,590	---	112.9
MEAN	744	2	4.9	593	2	3.2	471	3	3.6
MAX	828	4	8.9	733	3	4.1	560	7	7.6
MIN	701	1	1.9	250	1	1.4	380	1	1.1

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	480	1	1.3	350	1	.95	520	4	5.6
2	480	1	1.3	370	1	1.0	601	11	18
3	480	2	2.6	400	1	1.1	657	7	12
4	480	2	2.6	400	1	1.1	703	11	21
5	470	2	2.5	380	1	1.0	713	13	25
6	450	2	2.4	350	1	.95	664	10	18
7	430	2	2.3	250	1	.68	593	5	8.0
8	450	2	2.4	200	1	.54	549	3	4.4
9	480	1	1.3	220	1	.59	520	2	2.8
10	480	1	1.3	250	1	.68	516	2	2.8
11	480	1	1.3	300	1	.81	517	3	4.2
12	480	2	2.6	350	1	.95	534	2	2.9
13	500	2	2.7	400	1	1.1	543	2	2.9
14	520	2	2.8	450	1	1.2	564	3	4.6
15	550	3	4.5	470	1	1.3	609	5	8.2
16	520	2	2.8	480	1	1.3	643	6	10
17	500	2	2.7	500	1	1.4	662	4	7.1
18	480	1	1.3	520	1	1.4	661	4	7.1
19	480	1	1.3	500	1	1.4	672	7	13
20	470	1	1.3	490	1	1.3	661	6	11
21	450	1	1.2	480	1	1.3	660	5	8.9
22	450	1	1.2	480	1	1.3	647	4	7.0
23	450	1	1.2	470	1	1.3	642	4	6.9
24	450	1	1.2	470	1	1.3	630	4	6.8
25	450	1	1.2	450	1	1.2	614	3	5.0
26	440	1	1.2	450	1	1.2	605	3	4.9
27	440	1	1.2	470	1	1.3	605	3	4.9
28	430	1	1.2	500	1	1.4	607	3	4.9
29	420	1	1.1	---	---	---	608	3	4.9
30	400	1	1.1	---	---	---	604	4	6.5
31	380	1	1.0	---	---	---	619	4	6.7
TOTAL	14,420	---	56.1	11,400	---	31.05	18,943	---	256.0
MEAN	465	1	1.8	407	1	1.1	611	5	8.3
MAX	550	3	4.5	520	1	1.4	713	13	25
MIN	380	1	1.0	200	1	.54	516	2	2.8

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	647	4	7.0	3,200	16	138	2,850	11	85
2	686	6	11	3,000	15	121	2,790	10	75
3	764	10	21	2,870	12	93	2,680	10	72
4	913	17	42	2,790	10	75	2,670	10	72
5	986	19	51	2,780	11	83	2,650	10	72
6	1,020	17	47	2,870	13	101	2,570	10	69
7	1,060	16	46	3,110	14	118	2,620	10	71
8	1,070	12	35	3,510	21	199	2,530	9	61
9	1,050	10	28	4,000	31	335	2,380	8	51
10	1,040	10	28	4,470	42	507	2,190	7	41
11	1,060	10	29	4,780	45	581	2,050	6	33
12	1,110	11	33	5,000	47	634	1,960	6	32
13	1,210	13	42	5,200	48	674	1,990	7	38
14	1,270	13	45	4,850	42	550	2,160	8	47
15	1,290	10	35	4,360	32	377	2,140	8	46
16	1,320	11	39	4,090	23	254	2,020	7	38
17	1,430	17	66	3,880	20	210	1,960	6	32
18	1,850	26	130	3,730	16	161	1,890	6	31
19	2,500	48	324	3,610	16	156	1,780	6	29
20	3,330	68	611	3,600	16	156	1,690	5	23
21	4,060	76	833	3,590	14	136	1,590	5	21
22	4,890	100	1,320	3,440	12	111	1,510	6	24
23	5,520	96	1,430	3,280	11	97	1,450	6	23
24	5,800	96	1,500	3,160	11	94	1,380	6	22
25	5,830	72	1,130	3,140	12	102	1,310	5	18
26	5,360	42	608	3,180	12	103	1,270	5	17
27	4,740	30	384	3,410	15	138	1,250	4	13
28	4,190	23	260	3,620	20	195	1,210	3	9.8
29	3,750	20	202	3,490	17	160	1,140	3	9.2
30	3,420	18	166	3,340	14	126	1,090	3	8.8
31	---	---	---	3,030	13	106	---	---	---
TOTAL	73,166	---	9,503.0	112,380	---	6,891	58,770	---	1,183.8
MEAN	2,439	31	317	3,625	21	222	1,959	7	39
MAX	5,830	100	1,500	5,200	48	674	2,850	11	85
MIN	647	4	7.0	2,780	10	75	1,090	3	8.8

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	July			August			September		
1	1,040	5	14	545	3	4.4	404	2	2.2
2	1,010	5	14	539	3	4.4	404	2	2.2
3	999	5	13	530	3	4.3	403	2	2.2
4	1,000	4	11	532	3	4.3	416	2	2.2
5	984	4	11	524	2	2.8	418	2	2.3
6	1,000	4	11	515	2	2.8	419	2	2.3
7	999	4	11	507	2	2.7	419	2	2.3
8	974	4	11	509	2	2.7	408	2	2.2
9	911	4	9.8	498	2	2.7	394	2	2.1
10	877	4	9.5	481	2	2.6	389	2	2.1
11	841	4	9.1	475	2	2.6	392	2	2.1
12	811	4	8.8	468	2	2.5	394	2	2.1
13	789	3	6.4	468	2	2.5	391	2	2.1
14	768	3	6.2	462	2	2.5	385	2	2.1
15	750	3	6.1	452	2	2.4	388	2	2.1
16	743	3	6.0	438	2	2.4	385	2	2.1
17	723	3	5.9	429	2	2.3	388	2	2.1
18	700	3	5.7	420	2	2.3	387	2	2.1
19	683	3	5.5	417	2	2.3	385	2	2.1
20	664	3	5.4	415	2	2.2	388	2	2.1
21	642	3	5.2	414	1	1.1	387	2	2.1
22	603	3	4.9	419	2	2.3	379	2	2.0
23	598	3	4.8	422	2	2.3	380	2	2.1
24	592	3	4.8	410	2	2.2	382	2	2.1
25	601	3	4.9	402	2	2.2	383	3	3.1
26	596	3	4.8	397	2	2.1	379	3	3.1
27	588	2	3.2	391	2	2.1	378	3	3.1
28	582	2	3.1	387	2	2.1	375	3	3.0
29	564	2	3.0	391	2	2.1	373	3	3.0
30	556	2	3.0	394	2	2.1	375	3	3.0
31	544	3	4.4	412	2	2.2	---	---	---
TOTAL	23,732	---	226.5	14,063	---	80.5	11,748	---	69.7
MEAN	766	3	7.3	454	2	2.6	392	2	2.3
MAX	1,040	5	14	545	3	4.4	419	3	3.1
MIN	544	2	3.0	387	1	1.1	373	2	2.0

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--394,074 ft^3/s
SEDIMENT DISCHARGE--18,656 tons

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1993 through September 1994

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

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)
				1993					
	October			November			December		
1	1,820	6	29	1,770	3	14	1,600	4	17
2	1,800	6	29	1,770	3	14	1,600	4	17
3	1,780	6	29	1,740	4	19	1,600	4	17
4	1,760	6	29	1,790	4	19	1,600	5	22
5	1,700	6	28	1,780	4	19	1,590	4	17
6	1,730	7	33	1,730	4	19	1,430	3	12
7	1,830	7	35	1,670	4	18	1,340	3	11
8	1,930	5	26	1,730	4	19	1,390	4	15
9	1,930	4	21	1,710	3	14	1,640	4	18
10	1,890	3	15	1,670	3	14	1,550	4	17
11	1,860	3	15	1,660	3	13	1,490	4	16
12	1,870	4	20	1,650	3	13	1,540	4	17
13	1,830	4	20	1,600	2	8.6	1,460	4	16
14	1,800	5	24	1,610	3	13	1,370	4	15
15	1,910	5	26	1,540	3	12	1,320	4	14
16	1,890	6	31	1,610	3	13	1,410	5	19
17	1,850	6	30	1,610	3	13	1,440	6	23
18	1,850	5	25	1,640	3	13	1,380	7	26
19	1,830	4	20	1,580	3	13	1,300	11	39
20	1,840	4	20	1,540	3	12	1,300	6	21
21	1,820	4	20	1,550	3	13	1,230	4	13
22	1,800	4	19	1,510	3	12	1,240	3	10
23	1,760	3	14	900	4	9.7	1,200	4	13
24	1,740	3	14	700	4	7.6	1,150	5	16
25	1,710	3	14	700	4	7.6	1,100	7	21
26	1,700	3	14	700	4	7.6	1,100	5	15
27	1,740	4	19	800	6	13	1,200	3	9.7
28	1,730	3	14	1,000	7	19	1,200	3	9.7
29	1,800	3	15	1,200	6	19	1,150	4	12
30	1,750	3	14	1,500	5	20	1,200	4	13
31	1,710	3	14	---	---	---	1,300	4	14
TOTAL	55,960	---	676	43,960	---	421.1	42,420	---	515.4
MEAN	1,805	4	22	1,465	4	14	1,368	5	17
MAX	1,930	7	35	1,790	7	20	1,640	11	39
MIN	1,700	3	14	700	2	7.6	1,100	3	9.7

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	January			February			March		
1	1,400	5	19	950	3	7.7	1,300	6	21
2	1,360	5	18	950	3	7.7	1,800	10	49
3	1390	5	19	1,000	3	8.1	2,080	50	281
4	1,370	4	15	1,100	3	8.9	2,020	44	240
5	1,410	4	15	1,000	3	8.1	1,940	22	115
6	1,370	4	15	1,000	3	8.1	1,740	14	66
7	1,270	4	14	800	3	6.5	1,570	10	42
8	1,260	4	14	650	4	7.0	1,430	8	31
9	1,390	5	19	700	5	9.5	1,400	8	30
10	1,360	6	22	800	6	13	1,360	8	29
11	1,360	6	22	900	5	12	1,370	8	30
12	1,370	7	26	1,100	4	12	1,380	8	30
13	1,370	7	26	1,150	4	12	1,360	7	26
14	1,400	8	30	1,200	4	13	1,400	8	30
15	1,490	9	36	1,200	4	13	1,490	8	32
16	1,460	10	39	1,200	4	13	1,490	9	36
17	1,420	8	31	1,250	4	13	1,580	10	43
18	1,370	6	22	1,330	6	22	1,560	10	42
19	1,380	5	19	1,260	7	24	1,540	9	37
20	1,380	4	15	1,220	7	23	1,520	8	33
21	1,330	4	14	1,180	6	19	1,500	8	32
22	1,270	3	10	1,180	5	16	1,490	8	32
23	1,270	4	14	1,150	5	16	1,460	8	32
24	1,300	5	18	1,150	5	16	1,430	7	27
25	1,300	6	21	1,000	7	19	1,360	7	26
26	1,270	6	21	1,000	7	19	1,380	8	30
27	1,260	5	17	1,110	7	21	1,390	8	30
28	1,270	5	17	1,220	7	23	1,430	8	31
29	1,220	5	16	---	---	---	1,400	6	23
30	1,190	4	13	---	---	---	1,380	6	22
31	1,090	4	12	---	---	---	1,370	8	30
TOTAL	41,350	---	609	29,750	---	390.6	46,920	---	1,558
MEAN	1,334	5	20	1,063	5	14	1,514	11	50
MAX	1,490	10	39	1,330	7	24	2,080	50	281
MIN	1,090	3	10	650	3	6.5	1,300	6	21

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	April			May			June		
1	1,440	12	47	5,370	23	333	4,810	14	182
2	1,500	11	45	5,060	23	314	4,750	13	167
3	1,590	10	43	4,840	21	274	4,560	13	160
4	1,850	12	60	4,670	20	252	4,480	12	145
5	1,960	15	79	4,670	20	252	4,410	12	143
6	2,010	12	65	4,860	20	262	4,210	12	136
7	2,050	12	66	5,070	21	287	4,230	12	137
8	2,070	12	67	5,550	24	360	4,150	11	123
9	2,050	12	66	6,200	28	469	3,910	11	116
10	2,030	15	82	6,820	34	626	3,640	10	98
11	2,030	14	77	7,280	39	767	3,400	10	92
12	2,080	12	67	7,510	42	852	3,250	10	88
13	2,210	10	60	7,880	45	957	3,360	10	91
14	2,340	12	76	7,420	40	801	3,890	11	116
15	2,330	11	69	6,590	31	552	3,990	15	162
16	2,320	12	75	6,200	24	402	3,720	14	141
17	2,460	14	93	5,840	23	363	3,680	12	119
18	2,920	16	126	5,860	20	316	3,510	10	95
19	3,800	33	339	5,830	19	299	3,290	9	80
20	4,870	38	500	6,120	23	380	3,040	9	74
21	5,920	54	863	6,040	22	359	2,840	9	69
22	7,180	68	1,320	5,740	19	294	2,680	10	72
23	8,290	88	1,970	5,510	16	238	2,560	10	69
24	8,760	90	2,130	5,310	16	229	2,460	10	66
25	9,060	76	1,860	5,120	14	194	2,330	9	57
26	8,490	56	1,280	5,070	13	178	2,220	8	48
27	7,550	36	734	5,330	14	201	2,190	8	47
28	6,730	28	509	5,920	20	320	2,130	8	46
29	6,140	26	431	5,780	19	297	2,000	9	49
30	5,610	25	379	5,530	15	224	1,920	9	47
31	--	---	---	5,080	14	192	---	---	---
TOTAL	119,640	---	13,578	180,070	---	11,844	101,610	---	3,035
MEAN	3,988	28	453	5,809	23	382	3,387	11	101
MAX	9,060	90	2,130	7,880	45	957	4,810	15	182
MIN	1,440	10	43	4,670	13	178	1,920	8	46

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1993 through September 1994 (Continued)

Day	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
				1994					
	July			August			September		
1	1,830	9	44	1,070	5	14	760	3	6.2
2	1,740	8	38	1,060	5	14	754	3	6.1
3	1,720	8	37	1,030	5	14	754	3	6.1
4	1,720	8	37	1,020	5	14	799	4	8.6
5	1,700	7	32	1,010	5	14	809	3	6.6
6	1,760	7	33	1,000	5	13	826	3	6.7
7	2,030	9	49	940	5	13	833	3	6.7
8	2,000	9	49	932	5	13	813	3	6.6
9	1,870	9	45	940	5	13	773	3	6.3
10	1,800	8	39	937	5	13	752	3	6.1
11	1,730	8	37	906	5	12	745	3	6.0
12	1,690	7	32	891	5	12	781	3	6.3
13	1,640	9	40	891	5	12	799	3	6.5
14	1,610	9	39	867	5	12	779	4	8.4
15	1,550	8	33	845	5	11	764	3	6.2
16	1,510	7	29	820	5	11	779	3	6.3
17	1,480	7	28	808	5	11	793	3	6.4
18	1,410	7	27	808	6	13	791	3	6.4
19	1,370	9	33	782	5	11	785	3	6.4
20	1,300	8	28	777	5	10	805	3	6.5
21	1,270	7	24	757	5	10	814	3	6.6
22	1,200	6	19	769	4	8.3	800	3	6.5
23	1,150	6	19	778	5	11	796	3	6.4
24	1,150	6	19	774	5	10	816	3	6.6
25	1,180	6	19	768	4	8.3	806	3	6.5
26	1,190	7	22	763	4	8.2	805	3	6.5
27	1,160	7	22	742	4	8.0	806	3	6.5
28	1,130	7	21	738	4	8.0	805	3	6.5
29	1,110	7	21	740	4	8.0	808	3	6.5
30	1,090	7	21	753	3	6.1	827	3	6.7
31	1,070	6	17	764	3	6.2	---	---	---
TOTAL	46,160	---	953	26,680	---	342.1	23,777	---	196.7
MEAN	1,489	8	31	861	5	11	793	3	6.6
MAX	2,030	9	49	1,070	6	14	833	4	8.6
MIN	1,070	6	17	738	3	6.1	745	3	6.0

TOTAL FOR WATER YEAR 1994:
STREAMFLOW--758,297 ft^3/s
SEDIMENT DISCHARGE--34,118.9 tons

Table 11. Chemical analyses of field replicates for water samples, upper Clark Fork basin, Montana

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter. Symbols: <, less than minimum reporting level; --, no data. Note--dissolved constituents processed through two different types of filters to evaluate differences in analytical results]

Station number	Station name	Date	Time	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity, (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L)
12323230	Blacktail Creek at Harrison Avenue, at Butte	08-17-94	0845	39	9.7	14	2.8	117	36
		08-17-94	0850	38	8.5	14	2.8	116	35
12323600	Silver Bow Creek at Opportunity	03-08-94	1255	45	9.8	22	5.4	101	77
		03-08-94	1300	45	9.7	22	5.6	99	79
12323770	Warm Springs Creek at Warm Springs	02-16-94	0820	58	12	4.2	1.7	132	69
		02-16-94	0825	58	12	4.2	1.6	136	69
12323800	Clark Fork near Galen	07-11-94	1545	57	12	13	4.3	105	110
		07-11-94	1550	56	12	13	4.0	105	110
12324200	Clark Fork at Deer Lodge	05-11-94	1720	45	9.6	11	2.7	102	67
		05-11-94	1725	46	9.8	11	2.7	102	67
12324680	Clark Fork at Goldcreek	04-26-94	1330	36	8.3	8.3	2.1	95	43
		04-26-94	1335	36	8.4	8.4	2.2	95	43
12331500	Flint Creek near Drummond	10-29-93	1045	39	12	7.8	2.9	147	17
		10-29-93	1045	38	11	7.6	2.7	146	17
12331800	Clark Fork near Drummond	05-24-94	1945	51	12	12	4.0	136	57
		05-24-94	1950	51	12	11	4.0	136	57
12334550	Clark Fork at Turah Bridge, near Bonner	06-14-94	1015	34	8.8	7.2	2.0	107	30
		06-14-94	1020	34	8.9	7.1	2.1	107	30
12340500	Clark Fork above Missoula	04-13-94	0830	35	10	6.0	1.6	115	28
		04-13-94	0835	36	10	6.0	1.6	116	28

Table 11. Chemical analyses of field replicates for water samples, upper Clark Fork basin, Montana (Continued)

Station number	Date	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
12323230	08-17-94	7.5	0.3	28	208	3	3	<1	<0.1	3	1
	08-17-94	7.6	.3	28	205	3	3	<1	<.1	5	5
12323600	03-08-94	15	.5	26	262	18	10	2	1.5	140	60
	03-08-94	17	.5	25	264	18	9	2	1.5	140	54
12323770	02-16-94	1.3	.4	13	239	5	4	<1	<.1	7	2
	02-16-94	1.3	.4	13	241	5	4	<1	<.1	7	2
12323800	07-11-94	5.9	.7	11	277	18	17	<1	<.1	15	10
	07-11-94	5.9	.7	11	276	18	17	<1	<.1	15	10
12324200	05-11-94	5.0	.5	13	215	25	15	<1	<.1	93	11
	05-11-94	4.9	.5	13	216	25	15	<1	<.1	100	13
12324680	04-26-94	3.5	.3	18	177	14	8	<1	<.1	49	6
	04-26-94	3.5	.3	18	177	14	8	<1	<.1	49	6
12331500	10-29-93	3.2	.2	21	191	12	7	<1	<.1	3	<1
	10-29-93	3.2	.2	21	188	12	7	<1	<.1	3	<1
12331800	05-24-94	4.1	.4	20	242	15	12	<1	<.1	33	7
	05-24-94	4.1	.4	20	241	15	11	<1	<.1	31	7
12334550	06-14-94	2.3	.2	16	165	6	5	<1	<.1	12	3
	06-14-94	2.3	.2	16	165	6	5	<1	<.1	12	4
12340500	04-13-94	2.2	.2	12	164	4	3	<1	<.1	10	2
	04-13-94	2.2	.2	12	166	4	3	<1	<.1	9	2

Table 11. Chemical analyses of field replicates for water samples, upper Clark Fork basin, Montana (Continued)

Station number	Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)
12323230	08-17-94	310	24	1	<0.5	100	99	<10	<3
	08-17-94	300	65	2	<.5	100	97	<10	4
12323600	03-08-94	860	30	18	.7	630	620	520	380
	03-08-94	840	13	18	.7	630	620	520	380
12323770	02-16-94	110	8	<1	<.5	170	120	<10	7
	02-16-94	120	7	<1	<.5	180	120	<10	<3
12323800	07-11-94	150	6	<1	<.5	100	46	20	26
	07-11-94	170	53	<1	<.5	100	51	20	5
12324200	05-11-94	1,400	10	11	<.5	300	22	120	5
	05-11-94	1,500	49	12	.8	300	27	120	10
12324680	04-26-94	1,700	43	9	<.5	230	14	90	9
	04-26-94	1,600	86	8	.5	210	16	80	9
12331500	10-29-93	420	14	7	<.5	120	49	30	6
	10-29-93	420	24	7	<.5	110	48	30	4
12331800	05-24-94	700	9	4	<.5	100	11	50	4
	05-24-94	690	28	4	<.5	110	12	50	6
12334550	06-14-94	390	16	2	<.5	50	4	30	<3
	06-14-94	380	18	2	<.5	50	4	30	<3
12340500	04-13-94	270	19	2	<.5	50	25	20	8
	04-13-94	260	38	1	<.5	50	25	20	5

Table 12. Precision of chemical analyses of field replicates for water samples, upper Clark Fork basin, Montana

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

Constituent and reporting unit	Number of replicate pairs	Standard deviation, in units (+/-)	Relative standard deviation, in percent (+/-)
Calcium, dissolved, mg/L	10	0.50	1.1
Magnesium, dissolved, mg/L	10	.24	2.3
Sodium, dissolved, mg/L	10	.23	2.2
Potassium, dissolved, mg/L	10	.10	3.4
Alkalinity, mg/L as $CaCO_3$	10	1.1	1.0
Sulfate, dissolved, mg/L	10	.50	.9
Chloride, dissolved, mg/L	10	.45	8.8
Fluoride, dissolved, mg/L	10	.0	.0
Silica, dissolved, mg/L	10	.22	1.2
Arsenic, total recoverable, µg/L	10	.0	.0
Arsenic, dissolved, µg/L	10	.32	3.9
Cadmium, total recoverable, µg/L	10	.0	.0
Cadmium, dissolved, µg/L	10	.0	.0
Copper, total recoverable, µg/L	10	1.7	4.8
Copper, dissolved, µg/L	10	1.7	16
Iron, total recoverable, µg/L	10	33	5.2
Iron, dissolved, µg/L	10	20	71
Lead, total recoverable, µg/L	10	.45	8.2
Lead, dissolved, µg/L	10	.43	39
Manganese, total recoverable, µg/L	10	5.9	3.2
Manganese, dissolved, µg/L	10	1.7	1.7
Zinc, total recoverable, µg/L	10	2.2	2.5
Zinc, dissolved, µg/L	10	5.1	12

Table 13. Precision of chemical analyses of laboratory replicates for water samples, upper Clark Fork basin, Montana

[Abbreviations: µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter

Property or constituent and reporting unit	Number of replicate pairs	Standard deviation, in units (+/-)	Relative standard deviation, in percent (+/-)	Within limits of data-quality objective
Specific conductance, µS/cm	10	7.2	2.4	Yes
pH, units	10	.09	1.2	Yes
Calcium, dissolved, mg/L	10	.63	1.7	Yes
Magnesium, dissolved, mg/L	10	.12	1.4	Yes
Sodium, dissolved, mg/L	10	.28	2.3	Yes
Potassium, dissolved, mg/L	5	.10	2.8	Yes
Alkalinity, mg/L as $CaCO_3$	5	.32	.4	Yes
Sulfate, dissolved, mg/L	11	.37	1.0	Yes
Chloride, dissolved, mg/L	12	.20	3.6	Yes
Fluoride, dissolved, mg/L	8	.05	6.2	Yes
Silica, dissolved, mg/L	3	.22	2.0	Yes
Arsenic, total recoverable, µg/L	10	.17	1.9	Yes
Arsenic, dissolved, µg/L	10	.34	5.3	Yes
Cadmium, total recoverable, µg/L	10	.04	12	Yes
Cadmium, dissolved, µg/L	10	.0	.0	Yes
Copper, total recoverable, µg/L	10	.97	3.2	Yes
Copper, dissolved, µg/L	10	.28	2.6	Yes
Iron, total recoverable, µg/L	10	12	2.4	Yes
Iron, dissolved, µg/L	10	1.5	2.5	Yes
Lead, total recoverable, µg/L	10	.18	3.1	Yes
Lead, dissolved, µg/L	10	.02	6.2	Yes
Manganese, total recoverable, µg/L	9	2.8	1.6	Yes
Manganese, dissolved, µg/L	10	6.2	2.4	Yes
Zinc, total recoverable, µg/L	10	1.8	1.7	Yes
Zinc, dissolved, µg/L	10	11	5.1	Yes

Table 14. Recovery efficiency for trace-element analyses of laboratory-spiked deionized-water blanks

[Abbreviation: µg/L, micrograms per liter]

Constituent and reporting unit	Number of samples	Mean spike recovery, in percent	95-percent confidence interval for spike recovery, in percent	Within limits of data-quality objective
Arsenic, total recoverable, µg/L	7	109.3	104-114	Yes
Arsenic, dissolved, µg/L	7	100.6	95.6-106	Yes
Cadmium, total recoverable, µg/L	7	98.8	90.6-107	Yes
Cadmium, dissolved, µg/L	6	97.5	89.1-106	Yes
Copper, total recoverable, µg/L	6	99.7	94.3-105	Yes
Copper, dissolved, µg/L	7	101.1	98.4-104	Yes
Iron, total recoverable, µg/L	6	100.0	93.0-107	Yes
Iron, dissolved, µg/L	7	94.6	84.2-105	Yes
Lead, total recoverable, µg/L	6	99.1	94.3-104	Yes
Lead, dissolved, µg/L	6	100.5	98.5-102	Yes
Manganese, total recoverable, µg/L	6	95.7	90.8-100	Yes
Manganese, dissolved, µg/L	7	101.5	96.2-107	Yes
Zinc, total recoverable, µg/L	5	102.6	91.5-114	Yes
Zinc, dissolved, µg/L	7	106.5	95.8-117	Yes

Table 15. Recovery efficiency for trace-element analyses of laboratory-spiked stream samples, upper Clark Fork basin, Montana

[Abbreviation: µg/L, micrograms per liter]

Constituent	Number of samples	Mean spike recovery, in percent	95-percent confidence interval for spike recovery, in percent	Within limits of data-quality objective
Arsenic, total recoverable, µg/L	7	106.9	101-113	Yes
Arsenic, dissolved, µg/L	7	97.3	90.4-104	Yes
Cadmium, total recoverable, µg/L	8	97.9	94.4-101	Yes
Cadmium, dissolved, µg/L	7	101.3	97.5-105	Yes
Copper, total recoverable, µg/L	7	98.4	91.1-106	Yes
Copper, dissolved, µg/L	7	96.6	93.3-99.8	Yes
Iron, total recoverable, µg/L	7	98.2	94.8-102	Yes
Iron, dissolved, µg/L	7	99.3	90.6-108	Yes
Lead, total recoverable, µg/L	7	99.3	95.6-103	Yes
Lead, dissolved, µg/L	6	103.0	101-105	Yes
Manganese, total recoverable, µg/L	7	98.1	95.4-101	Yes
Manganese, dissolved, µg/L	7	100.4	95.4-105	Yes
Zinc, total recoverable, µg/L	6	106.0	95.4-117	Yes
Zinc, dissolved, µg/L	7	97.5	92.4-102	Yes

Table 16. Chemical analyses of field blanks for water samples

[Abbreviations: °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25 °C; mg/L, milligrams per liter. Symbols: <, less than minimum reporting level; --, no data]

Date	Time	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Calcium, dissolved (mg/L)	Magnesium, dissolved (mg/L)	Sodium, dissolved (mg/L)	Potassium, dissolved (mg/L)	Alkalinity (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L)
Oct 1993									
27...	1000	1	5.5	0.02	<0.01	--	--	--	--
Dec 1993									
15...	1200	1	--	<.02	<.01	--	--	--	--
Feb 1994									
17...	1500	2	5.7	<.02	<.01	<0.2	<0.1	1.4	<0.1
Mar 1994									
9...	1110	1	5.4	<.02	<.01	<.2	<.1	1.2	<.1
Apr 1994									
12...	0845	2	5.4	<.02	<.01	<.2	<.1	3.5	<.1
25...	1730	1	5.5	.03	<.01	<.2	<.1	<1.0	<.1
May 1994									
24...	1130	1	5.4	.03	<.01	<.2	<.1	1.2	<.1
Jun 1994									
14...	1245	1	5.7	<.02	<.01	<.2	<.1	1.2	<.1
Jul 1994									
12...	1115	1	5.6	<.02	<.01	<.2	<.1	1.1	<.1
Aug 1994									
18...	1350	2	5.8	<.02	<.01	<.2	<.1	1.6	<.1

Table 16. Chemical analyses of field blanks for water samples (Continued)

Date	Chloride, dissolved (mg/L)	Fluoride, dissolved (mg/L)	Silica, dissolved (mg/L)	Arsenic, total recoverable (µg/L)	Arsenic, dissolved (µg/L)	Cadmium, total recoverable (µg/L)	Cadmium, dissolved (µg/L)	Copper, total recoverable (µg/L)	Copper, dissolved (µg/L)
Oct 1993									
27...	--	--	--	--	<1	--	<0.1	--	<1
Dec 1993									
15...	--	--	--	--	<1	--	<.1	--	<1
Feb 1994									
17...	<0.1	<0.1	<0.1	<1	<1	<1	<.1	<1	<1
Mar 1994									
9...	<.1	<.1	.1	<1	<1	<1	<.1	<1	<1
Apr 1994									
12...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
25...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
May 1994									
24...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
Jun 1994									
14...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
Jul 1994									
12...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
Aug 1994									
18...	<.1	<.1	.2	<1	<1	<1	<.1	1	<1

Table 16. Chemical analyses of field blanks for water samples (Continued)

Date	Iron, total recoverable (µg/L)	Iron, dissolved (µg/L)	Lead, total recoverable (µg/L)	Lead, dissolved (µg/L)	Manganese, total recoverable (µg/L)	Manganese, dissolved (µg/L)	Zinc, total recoverable (µg/L)	Zinc, dissolved (µg/L)
Oct 1993								
27...	--	<3	--	<0.5	--	<1	--	<3
Dec 1993								
15...	--	<3	--	<.5	--	<1	--	<3
Feb 1994								
17...	<10	<3	<1	<.5	<10	<1	<10	<3
Mar 1994								
9...	<10	<3	<1	<.5	<10	<1	<10	4
Apr 1994								
12...	20	<3	<1	<.5	<10	<1	<10	<3
25...	<10	<3	<1	<.5	<10	<1	<10	<3
May 1994								
24...	<10	<3	<1	<.5	<10	<1	<10	<3
Jun 1994								
14...	10	<3	<1	<.5	<10	<1	<10	<3
Jul 1994								
12...	<10	<3	<1	<.5	<10	<1	<10	<3
Aug 1994								
18...	<10	<3	<1	<.5	<10	<1	<10	<3

Table 17. Trace-element analyses of fine-grained bed sediment, upper Clark Fork basin, Montana, August 1994

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

Station number (fig. 1)	Station name	Number of composite samples	Concentration, in µg/g								
			Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Silver	Zinc
12323600	Silver Bow Creek at Opportunity	3	38.2	27.6	5,020	39,700	752	3,200	16.0	14.4	8,680
12323750	Silver Bow Creek at Warm Springs	3	10.6	16.7	716	26,000	74	8,590	15.8	.3	2,220
12323800	Clark Fork near Galen	3	11.9	23.3	1,230	27,700	116	15,600	21.8	2.8	2,330
12324200	Clark Fork at Deer Lodge	3	6.3	28.4	882	22,600	121	4,480	15.3	2.4	1,260
12324590	Little Blackfoot River near Garrison	3	<1.2	22.1	85	16,100	37	907	13.6	<.7	170
12324680	Clark Fork at Goldcreek	3	5.4	31.9	653	23,700	93	2,610	15.0	2.3	1,120
12331500	Flint Creek near Drummond	3	3.2	24.3	55	23,600	151	5,510	12.5	5.0	610
12331800	Clark Fork near Drummond	3	4.8	17.0	469	19,000	93	2,360	14.0	2.4	1,030
12334510	Rock Creek near Clinton	3	<1.2	16.5	12	15,000	7	278	10.8	<.7	48
12334550	Clark Fork at Turah Bridge, near Bonner	3	3.6	15.3	300	15,400	63	699	12.0	1.3	842
12340000	Blackfoot River near Bonner	3	<1.2	15.1	21	14,900	10	497	11.7	<.7	64
12353000	Clark Fork below Missoula[1]	3	1.7	21.5	138	18,600	38	1,340	13.3	.4	409

[1]Samples collected about 30 miles downstream of water-quality station to conform to previous sampling location.

Table 18. Trace-element analyses of bulk bed sediment, upper Clark Fork basin, Montana, August 1994

[Bulk bed sediment collected in this study generally is material smaller than about 10 millimeters in diameter. Concentrations are the mean of all analyses for triplicate aliquots for each composite sample. Abbreviation: µg/g, micrograms per gram of dry sample weight. Symbol: <, less than]

Station number (fig. 1)	Station name	Number of composite samples	Concentration, in µg/g								
			Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Silver	Zinc
12323600	Silver Bow Creek at Opportunity	1	12.7	14.9	1,550	27,200	300	1,670	8.9	4.8	3,420
12323800	Clark Fork near Galen	1	6.0	18.4	685	25,900	87	5,410	12.5	1.6	1,280
12324200	Clark Fork at Deer Lodge	1	2.0	13.3	281	13,200	45	2,060	7.7	<.7	456
12324590	Little Blackfoot River near Garrison	1	<1.2	14.7	19	15,600	12	420	8.6	<.7	73
12324680	Clark Fork at Goldcreek	1	2.3	17.6	282	15,500	46	1,190	9.1	<.7	549
12331500	Flint Creek near Drummond	1	1.7	10.3	25	13,400	79	3,200	6.0	3.3	284
12331800	Clark Fork near Drummond	1	1.5	13.8	173	14,100	35	711	9.0	.7	434
12334510	Rock Creek near Clinton	1	<1.2	10.8	7	9,840	5	195	6.2	<.7	29
12334550	Clark Fork at Turah Bridge, near Bonner	1	1.8	15.5	182	13,200	37	414	8.8	<.7	510
12340000	Blackfoot River near Bonner	1	<1.2	17.7	19	16,600	10	305	9.8	<.7	58
12353000	Clark Fork below Missoula[1]	1	<1.2	4.4	22	6,160	8	223	3.5	<.7	88

[1]Samples collected about 30 miles downstream of water-quality station to conform to previous sampling location.

Table 19. Recovery efficiency for trace-element analyses of standard reference materials for bed sediment

[Abbreviations: µg/g, micrograms per gram of dry sample weight; SRM, standard reference material. Symbol: --, recovery could not be determined because all analyses were less than the analytical detection limit of 0.8 µg/g for cadmium and 0.5 µg/g for silver]

Constituent	Number of measurements	Dilution ratio	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
			SRM sample 2709		
Cadmium	7	1:5	0.38	--	--
Chromium	7	1:5	130	72.2	67.4-77.0
Copper	7	1:5	35	83.3	78.8-87.8
Iron	7	1:5	35,000	94.0	92.0-96.0
Lead	7	1:1	19	58.7	57.1-60.3
Manganese	7	1:5	538	99.5	96.8-102
Nickel	7	1:5	88	94.3	93.1-95.5
Silver	7	1:5	.41	--	--
Zinc	7	1:5	106	98.7	95.8-102
			SRM sample 2711		
Cadmium	8	1:10	41.7	106	105-107
Chromium	8	1:10	47.0	58.8	50.2-67.4
Copper	8	1:10	114	98.1	96.7-99.5
Iron	8	1:10	28,900	81.9	77.7-86.1
Lead	8	1:5	1,160	100	99.1-101
Manganese	8	1:10	638	86.0	84.6-87.4
Nickel	8	1:10	20.6	88.4	84.1-92.7
Silver	8	1:10	4.63	67.7	63.0-73.0
Zinc	8	1:10	350.4	103	101-105

Table 20. Trace-element analyses of procedural blanks for bed sediment

[Abbreviation: µg/mL, micrograms per milliliter. Dilution ratio is the proportion of initial volume of concentrated nitric acid digestion aliquot to final volume of solution after addition of 0.6 N hydrochloric acid. Symbols: <, less than; --, no data]

Sample identification	Dilution ratio	Trace-element concentration, in µg/mL								
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Silver	Zinc
A	1:5	<0.007	<0.009	<0.020	<0.161	<0.01	<0.007	<0.019	<0.004	<0.039
A	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
B	1:5	<.007	<.009	<.020	<.161	<.01	<.007	<.019	<.004	<.039
B	1:10	<.076	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
C	1:5	<.007	<.009	<.020	<.161	<.01	<.007	<.019	<.004	<.039
C	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
D	1:5	<.007	<.009	<.020	<.161	<.01	<.007	<.019	<.004	<.039
D	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
E	1:5	<.007	<.009	<.020	<.161	<.01	<.007	<.019	<.004	<.039
E	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
F	1:5	<.007	<.009	<.020	<.161	<.01	<.007	<.019	<.004	<.039
F	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039
G	1:5	<.007	<.009	<.020	<.161	.02	<.007	<.019	<.004	<.039
G	1:10	<.007	<.009	<.020	<.161	--	<.007	<.019	<.004	<.039

Table 21. Trace-element analyses of aquatic insects, upper Clark Fork basin, Montana, August 1994

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

Taxon	Number of composite samples	Concentration, in µg/g							
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600 Silver Bow Creek at Opportunity									
Hydropsyche morosa group	2	4.6	1.5	295	893	19.8	655	1.8	831
Hydropsyche tana	3	7.1	1.4	311	1,060	19.1	815	1.6	1,040
12323750 Silver Bow Creek at Warm Springs									
Hydropsyche cockerelli	2	1.5	.8	51.9	1,120	1.4	2,380	1.7	211
Hydropsyche occidentalis	2	1.0	.8	43.0	1,020	<3.0	2,200	1.2	202
12323800 Clark Fork near Galen									
Hydropsyche cockerelli	3	1.7	1.2	100	1,160	4.0	2,660	1.8	223
Hydropsyche occidentalis	4	1.4	1.3	74	1,070	5.2	3,020	1.8	210
12324200 Clark Fork at Deer Lodge									
Hydropsyche cockerelli	3	1.4	1.8	113	1,810	14.1	966	1.7	261
Hydropsyche occidentalis	3	1.4	2.2	117	1,380	10.8	1,760	1.9	245
12324590 Little Blackfoot River near Garrison									
Hydropsyche cockerelli	1	.6	1.6	28.4	478	3.6	399	1.2	123
Hydropsyche occidentalis	1	<.7	1.3	15.1	426	<3.7	434	.8	110
Arctopsyche grandis	7	.2	.7	11.0	221	.7	471	.5	139
Claassenia sabulosa	3	.2	.8	25.8	117	.4	53.4	.6	197
12324680 Clark Fork at Goldcreek									
Hydropsyche morosa group	3	1.3	1.4	66.1	1,180	3.8	893	1.2	177
Hydropsyche occidentalis	1	1.1	1.7	55.5	1,190	5.4	1,350	1.0	188
Arctopsyche grandis	2	1.5	1.0	31.8	474	2.9	1,070	.6	185
Claassenia sabulosa	2	1.0	.8	54.6	204	1.1	137	.5	258
12331500 Flint Creek near Drummond									
Hydropsyche cockerelli	2	.4	1.1	17.8	1,180	4.4	992	1.8	126
Hydropsyche occidentalis	1	<.9	1.6	15.1	1,690	7.5	1,400	3.5	155
Arctopsyche grandis	7	.3	1.5	13.0	953	6.3	2,160	1.1	170
12331800 Clark Fork near Drummond									
Hydropsyche morosa group	6	1.2	2.3	55.2	1,570	8.9	1,610	1.5	239
Hydropsyche occidentalis	3	1.3	2.7	56.8	1,720	12.2	2,820	1.9	278
Arctopsyche grandis	3	.9	1.0	22.2	548	3.9	1,350	.7	194
Claassenia sabulosa	4	.6	.8	45.2	149	1.1	119	.4	295

Table 21. Trace-element analyses of aquatic insects, upper Clark Fork basin, Montana, August 1994 (Continued)

Taxon	Number of composite samples	Concentration, in µg/g							
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12334510 Rock Creek near Clinton									
Hydropsyche cockerelli	2	<.2	.9	6.3	491	<1.1	200	.4	84
Hydropsyche occidentalis	1	<.6	2.4	10.2	648	<3.0	268	1.7	122
Arctopsyche grandis	6	.1	.9	6.8	429	<.7	202	.5	109
Claassenia sabulosa	2	.1	.6	29.6	83.9	<.5	38.1	.2	229
12334550 Clark Fork at Turah Bridge, near Bonner									
Hydropsyche cockerelli	5	.7	1.6	38.9	1,040	2.6	535	1.1	178
Hydropsyche occidentalis	1	.6	1.5	34.9	974	3.0	646	1.0	179
Arctopsyche grandis	5	.7	1.2	25.5	679	2.6	561	.8	176
Claassenia sabulosa	2	.5	.6	49.1	94.0	<.5	60.7	.3	222
12353000 Clark Fork below Missoula[1]									
Hydropsyche cockerelli	3	.6	1.9	28.8	1,330	1.4	1,160	1.4	165
Hydropsyche occidentalis	1	.9	2.3	30.1	1,420	2.4	1,460	2.2	193
Arctopsyche grandis	2	.5	1.0	16.9	454	1.2	1,060	.8	147
Claassenia sabulosa	4	.3	.6	49.5	72.0	<.5	116	.2	237
Chematopsyche sp.	1	1.0	3.1	31.6	2,490	<3.3	1,390	2.9	144

[1]Samples collected about 30 miles downstream of water-quality station to conform to previous sampling location.

Table 22. Recovery efficiency for trace-element analyses of standard reference material for biota

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

Constituent	Number of measurements	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
		SRM sample 1566 a		
Cadmium	7	4.15	102	102-103
Chromium	7	1.43	105	97.5-112
Copper	7	66.3	101	98.9-103
Iron	7	539	93.8	92.2-95.4
Lead	7	.37	79.1	63.0-95.2
Manganese	7	12.3	94.9	92.7-97.1
Nickel	7	2.25	111	88.1-134
Zinc	7	830	95.1	93.7-96.5

Table 23. Trace-element analyses of procedural blanks for biota

[Abbreviation: µg/mL, micrograms per milliliter. Blanks were not diluted prior to analysis. Symbol: <, less than]

Sample identification	Dilution ratio	Trace-element concentration, in µg/mL							
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
A	1:1	<0.004	0.007	<0.002	<0.03	<0.01	0.006	<0.005	<0.002
B	1:1	<.004	.005	<.002	<.03	<.01	<.002	<.005	<.002
C	1:1	<.004	.029	<.002	<.03	<.01	.004	.011	<.002
D	1:1	<.004	.013	<.002	<.03	<.01	.010	.006	<.002
E	1:1	<.004	.017	<.002	.03	<.01	<.002	<.005	.25
F	1:1	<.004	.015	<.002	<.03	<.01	<.002	<.005	.021
G	1:1	<.004	.016	<.002	<.03	<.01	.030	<.005	<.002
H	1:1	<.004	.012	<.002	<.03	<.01	<.002	<.005	<.002
I	1:1	<.004	.017	<.002	.13	<.01	<.002	<.005	<.002
J	1:1	<.004	.014	<.002	.06	<.01	<.002	<.005	.010

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994

[Abbreviations: 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 minimum reporting level[1]; --, indicates insufficient data greater than minimum reporting level to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323230--BLACKTAIL CREEK AT HARRISON AVENUE, AT BUTTE, MONT.					
Period of record for water-quality data: March 1993-September 1994					
Streamflow, instantaneous (ft^3/s)	18	30	3.1	9.5	7.7
Specific conductance, onsite (µS/cm)	18	340	184	258	258
Temperature, water (°C)	18	17.0	2.5	8.7	8.8
pH, onsite (standard units)	18	8.2	7.6	7.8	7.7
Hardness, total (mg/L as $CaCO_3$)	18	140	71	103	105
Calcium, dissolved (mg/L)	18	39	20	30	30
Magnesium, dissolved (mg/L)	18	9.7	5.0	7.1	7.2
Sodium, dissolved (mg/L)	18	16	7.2	10	11
Potassium, dissolved (mg/L)	18	4.2	2.0	2.6	2.5
Alkalinity (mg/L as $CaCO_3$)	18	117	62	89	89
Sulfate, dissolved (mg/L)	18	36	18	26	28
Chloride, dissolved (mg/L)	18	8.9	3.6	6.0	5.6
Fluoride, dissolved (mg/L)	18	.6	.2	.3	.3
Silica, dissolved (mg/L)	18	32	14	25	24
Dissolved solids, calculated (mg/L)	18	208	116	160	162
Arsenic, total recoverable (µg/L)	18	10	2	6	6
Arsenic, dissolved (µg/L)	18	8	2	4	4
Cadmium, total recoverable (µg/L)	18	<1	<1	--	<1
Cadmium, dissolved (µg/L)	18	.1	<.1	--	<.1
Copper, total recoverable (µg/L)	18	52	2	10	7
Copper, dissolved (µg/L)	18	9	<1	[2]4	4
Iron, total recoverable (µg/L)	18	3,800	260	832	570
Iron, dissolved (µg/L)	18	360	24	161	165
Lead, total recoverable (µg/L)	18	47	<1	[2]6	1
Lead, dissolved (µg/L)	18	1	<.5	--	<.5
Manganese, total recoverable (µg/L)	18	190	30	69	60
Manganese, dissolved (µg/L)	18	99	17	42	40
Zinc, total recoverable (µg/L)	18	130	<10	[2]20	10
Zinc, dissolved (µg/L)	18	11	<3	[2]5	5
Sediment, suspended concentration (mg/L)	18	123	3	19	7
Sediment, suspended discharge (ton/d)	18	3	.05	.55	.12
Sediment, suspended (percent finer than 0.062 mm)	18	95	61	86	88

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323250–SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MONT. **Period of record for water-quality data: March 1993-September 1994**					
Streamflow, instantaneous (ft^3/s)	18	52	15	27	25
Specific conductance, onsite (µS/cm)	18	631	315	470	466
Temperature, water (°C)	18	16.0	1.5	10.5	9.0
pH, onsite (standard units)	18	7.8	7.3	7.5	7.5
Hardness, total (mg/L as $CaCO_3$)	18	170	100	144	145
Calcium, dissolved (mg/L)	18	48	30	42	42
Magnesium, dissolved (mg/L)	18	12	7.1	10	10
Sodium, dissolved (mg/L)	18	34	16	24	24
Potassium, dissolved (mg/L)	18	35	4.0	9.9	5.7
Alkalinity (mg/L as $CaCO_3$)	17	133	65	89	89
Sulfate, dissolved (mg/L)	17	96	46	75	76
Chloride, dissolved (mg/L)	17	28	13	20	20
Fluoride, dissolved (mg/L)	17	.8	.3	.5	.5
Silica, dissolved (mg/L)	17	28	17	23	23
Dissolved solids, calculated (mg/L)	17	353	177	259	255
Arsenic, total recoverable (µg/L)	18	39	10	16	15
Arsenic, dissolved (µg/L)	18	10	5	8	8
Cadmium, total recoverable (µg/L)	18	6	2	3	2
Cadmium, dissolved (µg/L)	18	6.2	1.3	2.2	2.1
Copper, total recoverable (µg/L)	18	550	85	199	145
Copper, dissolved (µg/L)	18	120	47	80	78
Iron, total recoverable (µg/L)	18	7,400	310	1,530	810
Iron, dissolved (µg/L)	18	220	26	93	86
Lead, total recoverable (µg/L)	18	250	3	34	12
Lead, dissolved (µg/L)	18	2.4	<.5	[2].9	.8
Manganese, total recoverable (µg/L)	18	1,600	540	825	705
Manganese, dissolved (µg/L)	18	1,700	490	754	690
Zinc, total recoverable (µg/L)	18	2,200	550	972	920
Zinc, dissolved (µg/L)	18	2,200	460	794	765
Sediment, suspended concentration (mg/L)	18	162	3	29	16
Sediment, suspended discharge (ton/d)	18	16	.14	2.5	.90
Sediment, suspended (percent finer than 0.062 mm)	18	93	71	88	88

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT. **Period of record for water-quality data: March 1993-September 1994**					
Streamflow, instantaneous (ft^3/s)	20	143	26	69	54
Specific conductance, onsite (µS/cm)	19	593	270	373	370
Temperature, water (°C)	19	17.0	0.0	9.5	10.0
pH, onsite (standard units)	19	8.9	7.2	8.3	8.3
Hardness, total (mg/L as $CaCO_3$)	19	200	98	131	130
Calcium, dissolved (mg/L)	19	54	30	39	40
Magnesium, dissolved (mg/L)	19	15	5.7	8.4	8.4
Sodium, dissolved (mg/L)	19	26	10	17	16
Potassium, dissolved (mg/L)	19	16	2.9	5.5	4.2
Alkalinity (mg/L as $CaCO_3$)	18	117	60	89	89
Sulfate, dissolved (mg/L)	18	190	38	70	63
Chloride, dissolved (mg/L)	18	19	6.4	11	11
Fluoride, dissolved (mg/L)	18	.8	.2	.4	.4
Silica, dissolved (mg/L)	18	28	15	21	21
Dissolved solids, calculated (mg/L)	18	374	161	229	228
Arsenic, total recoverable (µg/L)	19	170	11	32	16
Arsenic, dissolved (µg/L)	19	34	1	10	8
Cadmium, total recoverable (µg/L)	19	49	<1	[2]4	2
Cadmium, dissolved (µg/L)	19	41	.5	3.3	1.1
Copper, total recoverable (µg/L)	19	3,900	79	387	140
Copper, dissolved (µg/L)	19	450	28	86	57
Iron, total recoverable (µg/L)	19	8,600	290	1,650	830
Iron, dissolved (µg/L)	19	150	<3	[2]52	44
Lead, total recoverable (µg/L)	19	260	7	39	13
Lead, dissolved (µg/L)	19	2.3	<.5	[2].6	<.5
Manganese, total recoverable (µg/L)	19	10,000	330	1,090	600
Manganese, dissolved (µg/L)	19	9,300	270	985	510
Zinc, total recoverable (µg/L)	19	15,000	230	1,260	470
Zinc, dissolved (µg/L)	19	13,000	110	951	220
Sediment, suspended concentration (mg/L)	20	384	6	53	13
Sediment, suspended discharge (ton/d)	20	52	.42	9.2	2.0
Sediment, suspended (percent finer than 0.062 mm)	20	92	60	76	79

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323750–SILVER BOW CREEK AT WARM SPRINGS, MONT. **Period of record for water-quality data: March 1993-September 1994**					
Streamflow, instantaneous (ft^3/s)	20	347	24	133	91
Specific conductance, onsite (µS/cm)	18	614	361	469	475
Temperature, water (°C)	19	22.0	2.0	13.0	15.0
pH, onsite (standard units)	18	9.3	8.0	8.8	8.8
Hardness, total (mg/L as $CaCO_3$)	18	260	150	198	190
Calcium, dissolved (mg/L)	18	78	44	58	56
Magnesium, dissolved (mg/L)	18	19	9.1	13	12
Sodium, dissolved (mg/L)	18	23	11	16	16
Potassium, dissolved (mg/L)	18	5.6	3.4	4.4	4.3
Alkalinity (mg/L as $CaCO_3$)	18	120	69	95	96
Sulfate, dissolved (mg/L)	18	210	75	127	135
Chloride, dissolved (mg/L)	18	15	1.3	7.7	7.2
Fluoride, dissolved (mg/L)	18	1.2	.5	.8	.7
Silica, dissolved (mg/L)	18	20	7.6	13	12
Dissolved solids, calculated (mg/L)	18	396	227	297	298
Arsenic, total recoverable (µg/L)	18	29	12	20	20
Arsenic, dissolved (µg/L)	18	27	10	18	18
Cadmium, total recoverable (µg/L)	18	<1	<1	--	<1
Cadmium, dissolved (µg/L)	18	.2	<.1	[2].1	.1
Copper, total recoverable (µg/L)	18	60	10	29	24
Copper, dissolved (µg/L)	18	32	8	15	14
Iron, total recoverable (µg/L)	18	660	130	349	320
Iron, dissolved (µg/L)	18	27	3	12	11
Lead, total recoverable (µg/L)	18	5	<1	[2]2	1
Lead, dissolved (µg/L)	18	<.5	<.5	--	<.5
Manganese, total recoverable (µg/L)	18	570	80	254	220
Manganese, dissolved (µg/L)	18	500	34	164	135
Zinc, total recoverable (µg/L)	18	180	20	81	70
Zinc, dissolved (µg/L)	18	73	<3	[2]17	11
Sediment, suspended concentration (mg/L)	20	22	2	8	7
Sediment, suspended discharge (ton/d)	20	12	.26	3.4	1.8
Sediment, suspended (percent finer than 0.062 mm)	19	97	67	82	82

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323770–WARM SPRINGS CREEK AT WARM SPRINGS, MONT. **Period of record for water quality data: March 1993-September 1994**					
Streamflow, instantaneous (ft^3/s)	12	206	2.8	96	92
Specific conductance, onsite (µS/cm)	11	795	180	349	262
Temperature, water (°C)	12	16.0	.5	8.7	9.2
pH, onsite (standard units)	11	8.6	7.8	8.2	8.2
Hardness, total (mg/L as $CaCO_3$)	11	420	83	172	130
Calcium, dissolved (mg/L)	11	130	26	53	39
Magnesium, dissolved (mg/L)	11	22	4.4	9.8	7.3
Sodium, dissolved (mg/L)	11	7.4	1.8	3.6	2.7
Potassium, dissolved (mg/L)	11	4.7	.9	1.7	1.3
Alkalinity (mg/L as $CaCO_3$)	11	146	68	105	98
Sulfate, dissolved (mg/L)	11	270	20	72	37
Chloride, dissolved (mg/L)	11	3.2	.5	1.2	1.0
Fluoride, dissolved (mg/L)	11	.6	.3	.4	.4
Silica, dissolved (mg/L)	11	13	8.7	11	10
Dissolved solids, calculated (mg/L)	11	536	103	215	155
Arsenic, total recoverable (µg/L)	11	16	4	8	6
Arsenic, dissolved (µg/L)	11	14	3	5	4
Cadmium, total recoverable (µg/L)	11	<1	<1	--	<1
Cadmium, dissolved (µg/L)	11	<.1	<.1	--	<.1
Copper, total recoverable (µg/L)	11	75	4	24	10
Copper, dissolved (µg/L)	11	16	2	4	3
Iron, total recoverable (µg/L)	11	1,400	40	395	160
Iron, dissolved (µg/L)	11	30	5	13	12
Lead, total recoverable (µg/L)	11	9	<1	[2]3	<1
Lead, dissolved (µg/L)	11	1.8	<.5	--	<.5
Manganese, total recoverable (µg/L)	11	1,400	120	385	200
Manganese, dissolved (µg/L)	11	570	74	171	110
Zinc, total recoverable (µg/L)	11	60	<10	[2]17	10
Zinc, dissolved (µg/L)	11	10	<3	[2]4	3
Sediment, suspended concentration (mg/L)	12	90	4	24	12
Sediment, suspended discharge (ton/d)	12	49	.14	8.5	2.0
Sediment, suspended (percent finer than 0.062 mm)	12	88	57	75	76

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323800—CLARK FORK NEAR GALEN, MONT. **Period of record for water-quality data: July 1988-September 1994**					
Streamflow, instantaneous (ft^3/s)	60	626	14	167	97
Specific conductance, onsite (µS/cm)	48	720	220	463	474
Temperature, water (°C)	59	22.5	.0	9.7	10.0
pH, onsite (standard units)	47	8.9	7.5	8.4	8.4
Hardness, total (mg/L as $CaCO_3$)	46	370	96	206	205
Calcium, dissolved (mg/L)	46	110	29	61	61
Magnesium, dissolved (mg/L)	46	22	5.7	13	14
Sodium, dissolved (mg/L)	18	18	7.5	12	12
Potassium, dissolved (mg/L)	18	5.3	2.2	3.5	3.3
Alkalinity (mg/L as $CaCO_3$)	18	130	82	101	98
Sulfate, dissolved (mg/L)	18	220	56	106	98
Chloride, dissolved (mg/L)	18	11	3.2	6.3	6.2
Fluoride, dissolved (mg/L)	18	1.1	.5	.6	.6
Silica, dissolved (mg/L)	18	17	8.7	12	12
Dissolved solids, calculated (mg/L)	18	428	179	268	267
Arsenic, total recoverable (µg/L)	46	60	3	17	15
Arsenic, dissolved (µg/L)	46	30	4	12	12
Cadmium, total recoverable (µg/L)	46	3	<1	[2].4	<1
Cadmium, dissolved (µg/L)	46	1	<.1	[2].1	<1
Copper, total recoverable (µg/L)	45	240	10	41	29
Copper, dissolved (µg/L)	46	50	3	12	10
Iron, total recoverable (µg/L)	46	9,200	90	708	320
Iron, dissolved (µg/L)	46	110	<3	18	10
Lead, total recoverable (µg/L)	46	28	<1	[2]5	2
Lead, dissolved (µg/L)	46	3	<.5	[2].5	<1
Manganese, total recoverable (µg/L)	46	1,400	80	342	285
Manganese, dissolved (µg/L)	46	360	33	139	115
Zinc, total recoverable (µg/L)	46	360	10	73	55
Zinc, dissolved (µg/L)	46	110	<3	21	13
Sediment, suspended concentration (mg/L)	60	338	2	21	8
Sediment, suspended discharge (ton/d)	60	338	.12	18	2.2
Sediment, suspended (percent finer than 0.062 mm)	59	97	64	80	80

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324200–CLARK FORK AT DEER LODGE, MONT. **Period of record for water-quality data: March 1985-September 1994**					
Streamflow, instantaneous (ft^3/s)	113	1,920	23	261	209
Specific conductance, onsite (µS/cm)	96	642	262	514	538
Temperature, water (°C)	112	23.0	.0	9.4	10.0
pH, onsite (standard units)	61	8.6	7.4	8.1	8.2
Hardness, total (mg/L as $CaCO_3$)	53	270	120	218	230
Calcium, dissolved (mg/L)	53	81	37	64	66
Magnesium, dissolved (mg/L)	53	18	7.2	14	14
Sodium, dissolved (mg/L)	18	25	10	15	14
Potassium, dissolved (mg/L)	18	6.3	2.6	3.7	3.4
Alkalinity (mg/L as $CaCO_3$)	19	182	102	133	141
Sulfate, dissolved (mg/L)	18	140	66	98	95
Chloride, dissolved (mg/L)	18	12	1.2	6.9	6.8
Fluoride, dissolved (mg/L)	18	.7	.1	.6	.6
Silica, dissolved (mg/L)	18	34	13	18	17
Dissolved solids, calculated (mg/L)	18	374	209	298	306
Arsenic, total recoverable (µg/L)	63	200	8	25	17
Arsenic, dissolved (µg/L)	63	39	7	14	12
Cadmium, total recoverable (µg/L)	63	5	<1	[2].7	<1
Cadmium, dissolved (µg/L)	63	2	<.1	--	<1
Copper, total recoverable (µg/L)	62	1,500	11	113	50
Copper, dissolved (µg/L)	63	120	4	13	9
Iron, total recoverable (µg/L)	63	29,000	60	2,480	730
Iron, dissolved (µg/L)	63	150	<3	[2]16	10
Lead, total recoverable (µg/L)	63	200	<1	[2]15	5
Lead, dissolved (µg/L)	63	6	<.5	[2].8	<1
Manganese, total recoverable (µg/L)	63	4,600	30	373	210
Manganese, dissolved (µg/L)	63	400	1	47	31
Zinc, total recoverable (µg/L)	63	1,700	10	140	70
Zinc, dissolved (µg/L)	63	230	3	19	14
Sediment, suspended concentration (mg/L)	113	2,250	2	89	23
Sediment, suspended discharge (ton/d)	113	8,690	.29	210	11
Sediment, suspended (percent finer than 0.062 mm)	104	99	40	72	74

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324590–LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT. **Period of record for water-quality data: March 1985-September 1994**					
Streamflow, instantaneous (ft^3/s)	56	2,080	21	297	184
Specific conductance, onsite (µS/cm)	44	300	120	219	215
Temperature, water (°C)	55	22	.0	7.3	7.0
pH, onsite (standard units)	43	8.5	7.0	7.9	7.9
Hardness, total (mg/L as $CaCO_3$)	38	140	51	101	99
Calcium, dissolved (mg/L)	38	43	14	29	28
Magnesium, dissolved (mg/L)	38	9.4	3.3	6.8	6.8
Sodium, dissolved (mg/L)	12	7.3	3.4	5.1	5.3
Potassium, dissolved (mg/L)	11	4.5	1.3	2.0	1.8
Alkalinity (mg/L as $CaCO_3$)	11	141	52	95	93
Sulfate, dissolved (mg/L)	11	20	9.8	13	14
Chloride, dissolved (mg/L)	11	3.4	.8	1.4	1.3
Fluoride, dissolved (mg/L)	11	.2	.1	.2	.2
Silica, dissolved (mg/L)	12	23	17	19	19
Dissolved solids, calculated (mg/L)	11	182	96	134	133
Arsenic, total recoverable (µg/L)	43	17	4	7	6
Arsenic, dissolved (µg/L)	43	7	3	5	5
Cadmium, total recoverable (µg/L)	43	2	<1	[2].4	<1
Cadmium, dissolved (µg/L)	43	1	<.1	--	<1
Copper, total recoverable (µg/L)	42	45	<1	[2]6	3
Copper, dissolved (µg/L)	43	7	<1	[2]2	2
Iron, total recoverable (µg/L)	43	25,000	20	1,790	330
Iron, dissolved (µg/L)	43	120	<3	[2]34	23
Lead, total recoverable (µg/L)	43	25	<1	[2]4	1
Lead, dissolved (µg/L)	42	6	<.5	[2].7	<1
Manganese, total recoverable (µg/L)	43	1,100	<10	[2]102	30
Manganese, dissolved (µg/L)	43	30	1	8	6
Zinc, total recoverable (µg/L)	43	140	<10	[2]20	10
Zinc, dissolved (µg/L)	43	24	<3	[2]5	4
Sediment, suspended concentration (mg/L)	56	1,410	1	70	10
Sediment, suspended discharge (ton/d)	56	7,920	.08	213	4.4
Sediment, suspended (percent finer than 0.062 mm)	56	95	49	74	79

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324680–CLARK FORK AT GOLDCREEK MONT. **Period of record for water-quality data: March 1993-September 1994**					
Streamflow, instantaneous (ft^3/s)	19	1,410	87	649	529
Specific conductance, onsite (µS/cm)	18	450	280	379	396
Temperature, water (°C)	19	20.0	.0	9.6	11.0
pH, onsite (standard units)	18	8.6	8.1	8.3	8.3
Hardness, total (mg/L as $CaCO_3$)	18	200	120	166	175
Calcium, dissolved (mg/L)	18	59	36	49	51
Magnesium, dissolved (mg/L)	18	13	7.8	11	11
Sodium, dissolved (mg/L)	18	19	7.8	11	12
Potassium, dissolved (mg/L)	18	6.9	2.1	3.1	2.8
Alkalinity (mg/L as $CaCO_3$)	18	172	89	127	131
Sulfate, dissolved (mg/L)	18	84	40	59	52
Chloride, dissolved (mg/L)	18	7.2	3.1	4.6	4.1
Fluoride, dissolved (mg/L)	18	.6	.3	.4	.4
Silica, dissolved (mg/L)	18	25	16	19	18
Dissolved solids, calculated (mg/L)	18	286	170	234	245
Arsenic, total recoverable (µg/L)	18	31	8	14	13
Arsenic, dissolved (µg/L)	18	18	6	10	10
Cadmium, total recoverable (µg/L)	18	<1	<1	--	<1
Cadmium, dissolved (µg/L)	18	<.1	<.1	--	<.1
Copper, total recoverable (µg/L)	17	150	8	40	33
Copper, dissolved (µg/L)	17	20	4	7	6
Iron, total recoverable (µg/L)	18	2,700	60	802	520
Iron, dissolved (µg/L)	18	58	4	18	13
Lead, total recoverable (µg/L)	17	18	<1	[2]5	4
Lead, dissolved (µg/L)	17	<.5	<.5	--	<.5
Manganese, total recoverable (µg/L)	18	470	30	141	115
Manganese, dissolved (µg/L)	18	35	11	22	22
Zinc, total recoverable (µg/L)	18	180	10	56	45
Zinc, dissolved (µg/L)	18	22	<3	[2]10	9
Sediment, suspended concentration (mg/L)	19	152	4	40	22
Sediment, suspended discharge (ton/d)	19	392	.94	89	38
Sediment, suspended (percent finer than 0.062 mm)	19	90	52	79	81

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331500--FLINT CREEK NEAR DRUMMOND, MONT. **Period of record for water-quality data: March 1985-September 1994**					
Streamflow, instantaneous (ft^3/s)	68	892	4.2	160	111
Specific conductance, onsite (µS/cm)	57	507	135	311	307
Temperature, water (°C)	66	21.0	.0	8.9	9.5
pH, onsite (standard units)	54	8.8	7.5	8.2	8.3
Hardness, total (mg/L as $CaCO_3$)	47	260	60	151	150
Calcium, dissolved (mg/L)	47	73	17	41	39
Magnesium, dissolved (mg/L)	47	20	4.3	12	12
Sodium, dissolved (mg/L)	19	15	3.8	7.8	7.8
Potassium, dissolved (mg/L)	18	7.8	1.0	3.3	2.9
Alkalinity (mg/L as $CaCO_3$)	18	237	65	138	143
Sulfate, dissolved (mg/L)	18	32	7.9	16	14
Chloride, dissolved (mg/L)	18	6.5	1.5	3.6	3.2
Fluoride, dissolved (mg/L)	18	.4	.1	.2	.2
Silica, dissolved (mg/L)	19	32	13	20	20
Dissolved solids, calculated (mg/L)	18	318	94	184	186
Arsenic, total recoverable (µg/L)	54	50	7	18	14
Arsenic, dissolved (µg/L)	54	20	5	9	9
Cadmium, total recoverable (µg/L)	54	3	<1	[2].3	<1
Cadmium, dissolved (µg/L)	54	<1	<.1	--	<1
Copper, total recoverable (µg/L)	53	32	1	8	7
Copper, dissolved (µg/L)	54	7	<1	[2]2	2
Iron, total recoverable (µg/L)	54	7,200	70	1,160	565
Iron, dissolved (µg/L)	54	190	4	33	26
Lead, total recoverable (µg/L)	54	87	<1	[2]13	8
Lead, dissolved (µg/L)	54	7	<.5	[2]1	<5
Manganese, total recoverable (µg/L)	54	1,600	50	251	145
Manganese, dissolved (µg/L)	54	120	15	45	40
Zinc, total recoverable (µg/L)	54	290	<10	[2]49	30
Zinc, dissolved (µg/L)	54	27	<3	[2]7	5
Sediment, suspended concentration (mg/L)	68	556	3	55	26
Sediment, suspended discharge (ton/d)	68	904	.03	47	8.6
Sediment, suspended (percent finer than 0.062 mm)	68	98	28	81	85

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331800—CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for water-quality data: March 1993-September 1994					
Streamflow, instantaneous (ft^3/s)	19	1,710	149	880	846
Specific conductance, onsite (µS/cm)	18	630	278	421	436
Temperature, water (°C)	19	21.0	1.0	10.8	12.0
pH, onsite (standard units)	18	8.5	8.0	8.3	8.3
Hardness, total (mg/L as $CaCO_3$)	18	300	120	192	195
Calcium, dissolved (mg/L)	18	83	36	55	56
Magnesium, dissolved (mg/L)	18	22	8.3	13	13
Sodium, dissolved (mg/L)	18	20	7.8	12	12
Potassium, dissolved (mg/L)	18	7.3	2.1	3.5	3.4
Alkalinity (mg/L as $CaCO_3$)	18	199	93	144	147
Sulfate, dissolved (mg/L)	18	130	38	68	65
Chloride, dissolved (mg/L)	18	7.8	3.3	4.9	4.6
Fluoride, dissolved (mg/L)	18	.5	.2	.4	.4
Silica, dissolved (mg/L)	18	24	17	20	19
Dissolved solids, calculated (mg/L)	18	410	176	263	270
Arsenic, total recoverable (µg/L)	18	30	8	15	12
Arsenic, dissolved (µg/L)	18	13	7	10	10
Cadmium, total recoverable (µg/L)	18	1	<1	--	<1
Cadmium, dissolved (µg/L)	18	.2	<.1	--	<.1
Copper, total recoverable (µg/L)	16	140	5	37	24
Copper, dissolved (µg/L)	16	17	1	6	5
Iron, total recoverable (µg/L)	18	4,000	50	924	580
Iron, dissolved (µg/L)	18	45	<3	[2]15	10
Lead, total recoverable (µg/L)	14	40	<1	[2]9	4
Lead, dissolved (µg/L)	14	1.2	<.5	--	<.5
Manganese, total recoverable (µg/L)	18	490	20	156	115
Manganese, dissolved (µg/L)	18	29	8	16	15
Zinc, total recoverable (µg/L)	18	260	<10	[2]68	50
Zinc, dissolved (µg/L)	18	21	<3	[2]9	9
Sediment, suspended concentration (mg/L)	19	270	7	56	28
Sediment, suspended discharge (ton/d)	19	1,200	7.6	177	56
Sediment, suspended (percent finer than 0.062 mm)	19	90	53	75	75

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334510–ROCK CREEK NEAR CLINTON, MONT.					
Period of record for water-quality data: March 1985-September 1994					
Streamflow, instantaneous (ft^3/s)	55	3,010	113	839	548
Specific conductance, onsite (µS/cm)	46	155	55	106	98
Temperature, water (°C)	55	18	.0	7.9	9.0
pH, onsite (standard units)	45	8.6	6.9	7.8	7.8
Hardness, total (mg/L as $CaCO_3$)	37	90	25	51	50
Calcium, dissolved (mg/L)	37	23	6.5	13	13
Magnesium, dissolved (mg/L)	37	8.0	2.2	4.4	4.3
Sodium, dissolved (mg/L)	11	3.5	1.7	2.6	2.5
Potassium, dissolved (mg/L)	11	1.3	.8	1.0	1.1
Alkalinity (mg/L as $CaCO_3$)	11	75	26	52	57
Sulfate, dissolved (mg/L)	11	5.2	2.0	3.5	3.1
Chloride, dissolved (mg/L)	11	1.0	.3	.6	.6
Fluoride, dissolved (mg/L)	11	.2	<.1	[2].1	.1
Silica, dissolved (mg/L)	11	13	10	11	11
Dissolved solids, calculated (mg/L)	11	90	40	67	70
Arsenic, total recoverable (µg/L)	43	2	<1	[2].9	<1
Arsenic, dissolved (µg/L)	43	1	<1	[2]1	<1
Cadmium, total recoverable (µg/L)	43	3	<1	[2].5	<1
Cadmium, dissolved (µg/L)	43	1	<.1	--	<1
Copper, total recoverable (µg/L)	41	41	<1	[2]5	3
Copper, dissolved (µg/L)	42	6	<1	[2]2	1
Iron, total recoverable (µg/L)	43	2,100	40	365	200
Iron, dissolved (µg/L)	43	110	5	34	34
Lead, total recoverable (µg/L)	41	19	<1	[2]3	1
Lead, dissolved (µg/L)	41	5	<.5	[2].9	<1
Manganese, total recoverable (µg/L)	43	90	<10	[2]19	10
Manganese, dissolved (µg/L)	43	8	<1	[2]2	1
Zinc, total recoverable (µg/L)	43	60	<10	[2]12	<10
Zinc, dissolved (µg/L)	43	15	<3	[2]3	<3
Sediment, suspended concentration (mg/L)	55	157	1	19	6
Sediment, suspended discharge (ton/d)	55	1,280	.31	91	9.8
Sediment, suspended (percent finer than 0.062 mm)	55	95	35	70	72

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334550–CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT. **Period of record for water-quality data: March 1985-September 1994**					
Streamflow, instantaneous (ft^3/s)	116	9,370	296	1,620	999
Specific conductance, onsite (µS/cm)	91	483	160	322	340
Temperature, water (°C)	115	22.0	.0	9.2	10.0
pH, onsite (standard units)	62	8.7	7.4	8.1	8.2
Hardness, total (mg/L as $CaCO_3$)	52	210	67	143	150
Calcium, dissolved (mg/L)	52	59	19	40	42
Magnesium, dissolved (mg/L)	52	14	4.8	10	11
Sodium, dissolved (mg/L)	18	12	4.3	8.0	8.4
Potassium, dissolved (mg/L)	18	5.7	1.6	2.5	2.4
Alkalinity (mg/L as $CaCO_3$)	19	133	65	107	116
Sulfate, dissolved (mg/L)	18	68	21	43	41
Chloride, dissolved (mg/L)	18	5.6	1.7	3.0	3.0
Fluoride, dissolved (mg/L)	18	.4	.2	.3	.3
Silica, dissolved (mg/L)	18	19	12	15	15
Dissolved solids, calculated (mg/L)	18	236	108	186	196
Arsenic, total recoverable (µg/L)	61	110	5	11	8
Arsenic, dissolved (µg/L)	61	17	4	6	5
Cadmium, total recoverable (µg/L)	61	4	<1	[2].6	<1
Cadmium, dissolved (µg/L)	61	1	<.1	--	<1
Copper, total recoverable (µg/L)	59	500	3	53	23
Copper, dissolved (µg/L)	60	25	2	6	5
Iron, total recoverable (µg/L)	61	19,000	60	1,690	530
Iron, dissolved (µg/L)	61	190	<3	[2]25	14
Lead, total recoverable (µg/L)	57	100	<1	[2]13	6
Lead, dissolved (µg/L)	57	7	<.5	[2].7	<1
Manganese, total recoverable (µg/L)	61	2,000	10	189	80
Manganese, dissolved (µg/L)	61	31	1	8	7
Zinc, total recoverable (µg/L)	61	1,100	<10	[2]100	40
Zinc, dissolved (µg/L)	61	39	<3	[2]9	8
Sediment, suspended concentration (mg/L)	116	1,370	3	68	20
Sediment, suspended discharge (ton/d)	116	34,700	.80	745	58
Sediment, suspended (percent finer than 0.062 mm)	105	98	27	71	72

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340000--BLACKFOOT RIVER NEAR BONNER, MONT. **Period of record for water-quality data: March 1985-September 1994**					
Streamflow, instantaneous (ft^3/s)	86	10,300	344	2,440	1,020
Specific conductance, onsite (µS/cm)	63	294	131	206	205
Temperature, water (°C)	86	20.5	.0	8.7	8.5
pH, onsite (standard units)	46	8.7	7.5	8.2	8.2
Hardness, total (mg/L as $CaCO_3$)	39	140	55	101	95
Calcium, dissolved (mg/L)	39	37	14	26	24
Magnesium, dissolved (mg/L)	39	13	4.9	8.9	8.4
Sodium, dissolved (mg/L)	11	3.4	1.2	2.4	2.3
Potassium, dissolved (mg/L)	11	2.8	.5	1	.8
Alkalinity (mg/L as $CaCO_3$)	11	140	76	109	96
Sulfate, dissolved (mg/L)	11	6.6	1.1	4.5	4.6
Chloride, dissolved (mg/L)	11	1.6	.3	.6	.5
Fluoride, dissolved (mg/L)	11	.1	<.1	--	<.1
Silica, dissolved (mg/L)	11	12	6.8	8.9	8.6
Dissolved solids, calculated (mg/L)	11	154	82	120	106
Arsenic, total recoverable (µg/L)	46	4	<1	[2]1	1
Arsenic, dissolved (µg/L)	46	2	<1	[2].9	<1
Cadmium, total recoverable (µg/L)	46	2	<1	[2].5	<1
Cadmium, dissolved (µg/L)	46	1	<.1	--	<1
Copper, total recoverable (µg/L)	43	34	1	9	7
Copper, dissolved (µg/L)	44	7	<1	[2]2	2
Iron, total recoverable (µg/L)	46	3,600	20	635	250
Iron, dissolved (µg/L)	46	100	<3	[2]21	14
Lead, total recoverable (µg/L)	42	25	<1	[2]6	2
Lead, dissolved (µg/L)	42	8	<.5	[2]1	<1
Manganese, total recoverable (µg/L)	46	180	<10	[2]40	20
Manganese, dissolved (µg/L)	46	11	<1	[2]3	2
Zinc, total recoverable (µg/L)	46	60	<10	[2]14	10
Zinc, dissolved (µg/L)	46	15	<3	[2]4	3
Sediment, suspended concentration (mg/L)	86	271	1	30	8
Sediment, suspended discharge (ton/d)	86	7,540	1.1	501	22
Sediment, suspended (percent finer than 0.062 mm)	84	98	42	77	80

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT. **Period of record for water-quality data: October 1989-September 1994**					
Streamflow, instantaneous (ft^3/s)	82	15,100	720	3,760	1,920
Specific conductance, onsite (µS/cm)	59	399	145	265	280
Temperature, water (°C)	79	19.5	.0	9.2	9.0
pH, onsite (standard units)	39	8.6	7.9	8.2	8.3
Hardness, total (mg/L as $CaCO_3$)	39	170	61	124	130
Calcium, dissolved (mg/L)	39	46	14	33	35
Magnesium, dissolved (mg/L)	39	13	5.6	9.7	9.7
Sodium, dissolved (mg/L)	18	7.7	2.4	5.2	5.5
Potassium, dissolved (mg/L)	18	4.5	.9	1.7	1.5
Alkalinity (mg/L as $CaCO_3$)	18	136	71	109	111
Sulfate, dissolved (mg/L)	18	43	9.3	23	24
Chloride, dissolved (mg/L)	18	4.2	.9	1.8	1.8
Fluoride, dissolved (mg/L)	18	.3	<.1	[2].2	.2
Silica, dissolved (mg/L)	18	16	9.4	12	11
Dissolved solids, calculated (mg/L)	18	202	90	152	154
Arsenic, total recoverable (µg/L)	39	10	2	4	4
Arsenic, dissolved (µg/L)	39	7	1	3	3
Cadmium, total recoverable (µg/L)	39	<1	<1	--	<1
Cadmium, dissolved (µg/L)	39	.1	<.1	--	<1
Copper, total recoverable (µg/L)	37	31	2	10	8
Copper, dissolved (µg/L)	38	10	1	3	2
Iron, total recoverable (µg/L)	39	3,000	70	479	230
Iron, dissolved (µg/L)	39	44	<3	[2]18	16
Lead, total recoverable (µg/L)	34	15	<1	[2]3	2
Lead, dissolved (µg/L)	34	1	<.5	[2].7	<1
Manganese, total recoverable (µg/L)	39	170	10	52	40
Manganese, dissolved (µg/L)	39	29	7	14	14
Zinc, total recoverable (µg/L)	39	60	<10	[2]19	20
Zinc, dissolved (µg/L)	39	16	<3	[2]6	5
Sediment, suspended concentration (mg/L)	82	297	2	29	10
Sediment, suspended discharge (ton/d)	82	7,670	6.1	645	52
Sediment, suspended (percent finer than 0.062 mm)	77	98	44	87	89

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1994 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12353000–CLARK FORK BELOW MISSOULA, MONT.					
Period of record for water-quality data: March 1985–September 1994					
Streamflow, instantaneous (ft^3/s)	58	19,800	869	4,580	2,680
Specific conductance, onsite (µS/cm)	58	320	108	224	244
Temperature, water (°C)	58	20.5	.0	8.5	8.2
pH, onsite (standard units)	58	8.8	7.1	8.0	8.1
Hardness, total (mg/L as $CaCO_3$)	58	150	48	105	115
Calcium, dissolved (mg/L)	58	42	13	29	32
Magnesium, dissolved (mg/L)	58	11	3.7	7.8	8.6
Sodium, dissolved (mg/L)	58	8.5	2.2	5.7	6.2
Potassium, dissolved (mg/L)	58	3.4	.6	1.6	1.8
Alkalinity (mg/L as $CaCO_3$)	57	135	47	95	103
Sulfate, dissolved (mg/L)	58	34	6	20	19
Chloride, dissolved (mg/L)	58	4.7	.3	2.4	2.5
Fluoride, dissolved (mg/L)	58	.3	<.1	[2].2	.2
Silica, dissolved (mg/L)	58	15	5.8	12	12
Dissolved solids, calculated (mg/L)	58	194	63	135	146
Arsenic, total recoverable (µg/L)	7	6	2	3	3
Arsenic, dissolved (µg/L)	33	6	1	2	2
Cadmium, total recoverable (µg/L)	7	<1	<1	--	<1
Cadmium, dissolved (µg/L)	33	2	<.1	--	<1
Copper, total recoverable (µg/L)	7	18	2	8	7
Copper, dissolved (µg/L)	33	9	1	3	3
Iron, total recoverable (µg/L)	7	860	90	299	150
Iron, dissolved (µg/L)	38	34	4	16	16
Lead, total recoverable (µg/L)	6	4	<1	--	<1
Lead, dissolved (µg/L)	31	5	<.5	[2].7	<5
Manganese, total recoverable (µg/L)	7	120	20	39	20
Manganese, dissolved (µg/L)	38	18	3	8	6
Zinc, total recoverable (µg/L)	7	30	<10	16	10
Zinc, dissolved (µg/L)	33	24	<3	[2]7	4
Sediment, suspended concentration (mg/L)	58	85	1	15	9
Sediment, suspended discharge (ton/d)	58	4,540	4.3	316	70
Sediment, suspended (percent finer than 0.062 mm)	57	93	35	74	78

[1]Multiple minimum reporting levels during the period of record may result in varying values identified with a less-than (<) symbol.

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

Table 25. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 1994

[Fine-grained sediment is material less than 0.064 millimeter in diameter. Concentrations are in micrograms per gram dry weight. Symbols: <, less than minimum reporting level; --, indicates either too few samples or insufficient data greater than the minimum reporting level to compute statistic. 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. Values for single samples are arbitrarily listed in the "Mean" column]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600-SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for fine-grained bed-sediment data: 1992-94					
Cadmium	3	38.2	27.1	31.5	29.3
Chromium	2	27.6	24.2	25.9	--
Copper	3	5,020	4,560	4,710	4,570
Iron	3	39,700	34,400	37,200	37,500
Lead	3	1,030	752	872	833
Manganese	3	3,200	1,680	2,430	2,410
Nickel	2	16.3	16.0	16.2	--
Silver	3	19.6	13.7	15.9	14.4
Zinc	3	8,680	6,850	7,850	8,010
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Period of record for fine-grained bed-sediment data: 1992-94					
Cadmium	3	12.2	8.2	10.3	10.6
Chromium	2	16.7	12.8	14.8	--
Copper	3	769	536	674	716
Iron	3	26,000	20,400	22,400	20,800
Lead	3	99	74	85	83
Manganese	3	17,700	8,150	11,500	8,590
Nickel	2	16.5	15.8	16.2	--
Silver	3	1.3	.3	.8	.9
Zinc	3	2,220	1,450	1,890	2,010
12323800--CLARK FORK NEAR GALEN, MONT.					
Period of record for fine-grained bed-sediment data: 1987, 1991-94					
Cadmium	5	20.1	10.5	14.2	13.2
Chromium	2	23.3	22.1	22.7	--
Copper	5	2,300	1,220	1,510	1,270
Iron	5	39,800	22,600	29,400	27,700
Lead	5	235	116	163	145
Manganese	5	15,600	8,540	12,200	12,400
Nickel	2	23.2	21.8	22.5	--
Silver	5	5.5	2.8	3.8	3.7
Zinc	5	3,560	1,820	2,580	2,580
12324200--CLARK FORK AT DEER LODGE, MONT.					
Period of record for fine-grained bed-sediment data: 1986-87, 1990-94					
Cadmium	7	8.3	5.1	6.9	7.4
Chromium	2	28.4	19.5	24.0	--
Copper	7	4,180	837	1,700	1,040
Iron	7	30,100	22,600	26,700	26,800
Lead	7	242	121	164	159
Manganese	7	6,020	1,460	2,880	2,320
Nickel	2	15.3	15.0	15.2	--
Silver	7	7.9	2.4	4.4	4.1
Zinc	7	1,730	977	1,360	1,380

Table 25. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324590–LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for fine-grained bed-sediment data: 1986-87, 1994					
Cadmium	3	.9	.2	.6	.7
Chromium	1	--	--	22.1	--
Copper	3	85	38	54	40
Iron	3	26,400	16,100	22,100	23,800
Lead	3	53	37	43	40
Manganese	3	2,700	907	1,550	1,040
Nickel	1	--	--	13.6	--
Silver	3	.9	<.5	.4	<.5
Zinc	3	180	161	170	170
12324680–CLARK FORK AT GOLDCREEK, MONT.					
Period of record for fine-grained bed-sediment data: 1992-94					
Cadmium	3	6.2	5.4	5.8	5.8
Chromium	2	31.9	31.6	31.8	--
Copper	3	1,030	653	804	729
Iron	3	26,400	20,500	23,500	23,700
Lead	3	152	93	117	107
Manganese	3	2,610	1,180	2,080	2,450
Nickel	2	17.0	15.0	16.0	--
Silver	3	3.7	2.3	2.9	2.8
Zinc	3	1,320	1,120	1,210	1,210
12331500–FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1989, 1992-94					
Cadmium	5	3.2	<1.0	2.2	2.3
Chromium	2	24.3	21.1	22.7	--
Copper	5	73	55	61	57
Iron	5	28,100	21,100	23,600	22,900
Lead	5	240	151	193	189
Manganese	5	5,510	2,710	3,850	3,560
Nickel	2	12.5	11.7	12.1	--
Silver	4	7.8	5.0	6.4	6.5
Zinc	5	727	610	667	672
12331800–CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for fine-grained bed-sediment data: 1986-87, 1991-94					
Cadmium	6	5.4	4.1	4.7	4.6
Chromium	2	30.1	17.0	23.6	--
Copper	6	614	469	544	551
Iron	6	24,700	16,500	21,200	21,600
Lead	6	135	85	103	100
Manganese	6	2,360	1,220	1,840	1,910
Nickel	2	15.7	14.0	14.9	--
Silver	6	3.5	2.1	2.8	2.8
Zinc	6	1,230	1,030	1,110	1,110

Table 25. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12334510–ROCK CREEK NEAR CLINTON, MONT.					
Period of record for fine-grained bed-sediment data: 1986-89, 1991-94					
Cadmium	7	<1.2	<.3	<.5	<.5
Chromium	2	19.3	16.5	17.9	--
Copper	7	15	3	11	13
Iron	7	21,400	13,100	17,200	17,600
Lead	7	16	<3	8	9
Manganese	7	598	126	316	278
Nickel	2	12.7	10.8	11.8	--
Silver	6	<.7	<.5	<.5	<.5
Zinc	7	58	36	47	48
12334550–CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for fine-grained bed-sediment data: 1986, 1991-94					
Cadmium	5	5.2	3.1	3.8	3.6
Chromium	2	26.7	15.3	21.0	--
Copper	5	561	300	401	323
Iron	5	23,200	15,100	18,700	17,300
Lead	5	115	63	82	74
Manganese	5	1,670	671	1,140	1,260
Nickel	2	15.9	12.0	14.0	--
Silver	5	2.9	1.3	2.1	2.1
Zinc	5	1,160	775	934	880
12340000–BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for fine-grained bed-sediment data: 1986-87, 1991, 1993-94					
Cadmium	5	<1.2	<.3	<1.2	<.5
Chromium	2	15.3	15.1	15.2	--
Copper	5	25	16	21	21
Iron	5	18,100	12,400	15,300	15,200
Lead	5	20	10	12	11
Manganese	5	535	298	454	486
Nickel	2	12.7	11.7	12.2	--
Silver	5	<.7	<.5	<.5	<.5
Zinc	5	71	54	61	60
12353000–CLARK FORK BELOW MISSOULA, MONT.[1]					
Period of record for fine-grained bed-sediment data: 1986, 1990-94					
Cadmium	6	2.6	1.1	1.6	1.5
Chromium	2	21.5	18.8	20.2	--
Copper	6	293	96	162	124
Iron	6	21,000	14,500	18,200	19,100
Lead	6	58	33	42	37
Manganese	6	2,530	752	1,500	1,214
Nickel	2	14.1	13.3	13.7	--
Silver	6	2.1	.4	1.1	1.0
Zinc	6	675	319	427	380

[1]Samples collected about 30 miles downstream of water-quality stations to conform to previous sampling location.

Table 26. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 1994

[Concentrations are in micrograms per gram dry weight. Symbols: <, less than minimum reporting level; --, indicates too few samples to compute statistic. 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. Values for single samples are arbitrarily listed in the "Mean" column]

Constituent	Number of samples	Maximum	Minimum	Mean
12323600–SILVER BOW CREEK AT OPPORTUNITY, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	12.7	6.7	9.7
Chromium	2	14.9	9.6	12.2
Copper	2	1,550	831	1,190
Iron	2	27,200	18,600	22,900
Lead	2	300	248	274
Manganese	2	1,670	671	1,170
Nickel	2	8.9	6.0	7.4
Silver	2	4.8	3.9	4.3
Zinc	2	3,420	2,050	2,730
12323750–SILVER BOW CREEK AT WARM SPRINGS, MONT.				
Period of record for bulk bed-sediment data: 1993				
Cadmium	1	--	--	1.2
Chromium	1	--	--	9.9
Copper	1	--	--	111
Iron	1	--	--	9,160
Lead	1	--	--	33
Manganese	1	--	--	543
Nickel	1	--	--	8.1
Silver	1	--	--	<.5
Zinc	1	--	--	303
12323800–CLARK FORK NEAR GALEN, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	6.0	1.5	3.7
Chromium	2	18.4	4.2	11.3
Copper	2	685	223	454
Iron	2	25,900	9,930	17,900
Lead	2	87	41	64
Manganese	2	5,410	1,280	3,350
Nickel	2	12.5	4.9	8.7
Silver	2	1.6	.7	1.1
Zinc	2	1,280	498	890
12324200–CLARK FORK AT DEER LODGE, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	2.4	2.0	2.2
Chromium	2	16.1	13.3	14.7
Copper	2	383	281	332
Iron	2	17,900	13,200	15,500
Lead	2	85	45	65
Manganese	2	2,060	998	1,530
Nickel	2	10.2	7.7	8.9
Silver	2	1.6	<.7	<1.2
Zinc	2	599	456	528

Table 26. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 1994 (Continued)

Constituent	Number of samples	Maximum	Minimum	Mean
12324590–LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.				
Period of record for bulk bed-sediment data: 1994				
Cadmium	1	--	--	<1.2
Chromium	1	--	--	14.7
Copper	1	--	--	19
Iron	1	--	--	15,600
Lead	1	--	--	12
Manganese	1	--	--	420
Nickel	1	--	--	8.6
Silver	1	--	--	<.7
Zinc	1	--	--	73
12324680–CLARK FORK AT GOLDCREEK, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	2.4	2.3	2.4
Chromium	2	23.4	17.6	20.5
Copper	2	370	282	326
Iron	2	18,600	15,500	17,100
Lead	2	72	46	59
Manganese	2	1,190	649	920
Nickel	2	12.4	9.1	10.7
Silver	2	1.6	<.7	<1.2
Zinc	2	676	549	613
12331500–FLINT CREEK NEAR DRUMMOND, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	1.7	.3	1.0
Chromium	2	10.3	4.9	7.6
Copper	2	25	19	22
Iron	2	13,400	8,630	11,000
Lead	2	79	51	65
Manganese	2	3,200	1,150	2,170
Nickel	2	6.0	5.8	5.9
Silver	2	3.9	3.3	3.6
Zinc	2	284	190	237
12331800–CLARK FORK NEAR DRUMMOND, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	1.8	1.5	1.6
Chromium	2	16.9	13.8	15.4
Copper	2	276	173	225
Iron	2	15,900	14,100	15,000
Lead	2	61	35	48
Manganese	2	820	711	766
Nickel	2	11.0	9.0	10.0
Silver	2	1.7	.7	1.2
Zinc	2	621	434	527

Table 26. Statistical summary of bulk bed-sediment data for the upper Clark Fork basin, Montana, August 1993 through August 1994 (Continued)

Constituent	Number of samples	Maximum	Minimum	Mean
12334510–ROCK CREEK NEAR CLINTON, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	<1.2	<.8	<1.2
Chromium	2	10.8	6.6	8.7
Copper	2	7	4	6
Iron	2	9,840	6,380	8,110
Lead	2	5	5	5
Manganese	2	195	91	143
Nickel	2	6.2	4.9	5.5
Silver	2	<.7	.1	<.7
Zinc	2	29	16	22
12334550–CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	1.8	.5	1.2
Chromium	2	15.5	6.9	11.2
Copper	2	182	122	152
Iron	2	13,200	10,700	11,900
Lead	2	37	30	34
Manganese	2	487	414	451
Nickel	2	8.8	6.4	7.6
Silver	2	<.7	.3	<.7
Zinc	2	510	345	428
12340000–BLACKFOOT RIVER NEAR BONNER MONT.				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	<1.2	<.8	<1.2
Chromium	2	17.7	6.7	12.2
Copper	2	19	14	16
Iron	2	16,600	10,300	13,400
Lead	2	10	8	9
Manganese	2	305	179	242
Nickel	2	9.8	7.6	8.7
Silver	2	<.7	<.5	<.7
Zinc	2	58	33	46
12353000–CLARK FORK BELOW MISSOULA, MONT.[1]				
Period of record for bulk bed-sediment data: 1993-94				
Cadmium	2	<1.2	.5	<1.2
Chromium	2	8.7	4.4	6.5
Copper	2	77	22	50
Iron	2	10,200	6,160	8,180
Lead	2	19	8	14
Manganese	2	351	223	287
Nickel	2	7.1	3.5	5.3
Silver	2	<.7	.5	<.7
Zinc	2	172	88	130

[1]Samples collected about 30 miles downstream of water-quality station to conform to previous sampling location.

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994

[Concentrations are in micrograms per gram dry weight. Symbols: <, less than minimum reporting level; --, indicates either too few samples or insufficient data greater than the minimum reporting level to compute statistic, or element not analyzed. Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for single samples are arbitrarily listed in the "Mean" column. Statistical summary not presented for Silver Bow Creek at Warm Springs which has been sampled only one time in 1994]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323600–SILVER BOW CREEK AT OPPORTUNITY, MONT.					
Period of record for biological data: 1992, 94					
		***Hydropsyche morosa* group**			
Cadmium	4	5.2	4.1	4.6	4.6
Chromium	4	8.0	1.0	3.9	3.3
Copper	4	462	269	347	328
Iron	4	1,180	834	992	978
Lead	4	21.0	19.5	19.9	19.8
Manganese	4	718	375	530	615
Nickel	4	2.1	1.6	1.8	1.8
Zinc	4	989	749	804	785
		Hydropsyche tana			
Cadmium	5	7.5	4.8	6.4	6.9
Chromium	5	11.5	.9	5.0	1.6
Copper	5	339	10.5	192	289
Iron	5	1,520	1,000	1,140	1,080
Lead	5	20.8	15.6	18.1	17.6
Manganese	5	969	415	700	710
Nickel	5	1.8	1.4	1.6	1.7
Zinc	5	1,070	760	951	1,030
12323800–CLARK FORK NEAR GALEN, MONT.					
Period of record for biological data: 1987, 1991-94					
		***Hydropsyche* spp.**			
Cadmium	4	3.5	2.6	3.0	3.0
Chromium	4	--	--	--	--
Copper	4	154	135	148	152
Iron	4	1,540	1,190	1,400	1,450
Lead	4	13.5	10.5	12.2	12.4
Manganese	4	--	--	--	--
Nickel	4	--	--	--	--
Zinc	4	329	279	308	313
		***Hydropsyche morosa* group**[2]			
Cadmium	13	2.7	1.3	2.1	2.0
Chromium	13	3.3	.8	1.7	1.7
Copper	13	184	85	135	118
Iron	13	1,500	901	1,250	1,280
Lead	13	9.3	2.8	7.1	7.2
Manganese	13	3,960	1,690	2,700	2,360
Nickel	13	3.1	1.0	1.8	1.9
Zinc	13	312	190	259	251

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323800–CLARK FORK NEAR GALEN, MONT.–Continued					
Period of record for biological data: 1987, 1991-94					
		Hydropsyche occidentalis			
Cadmium	8	1.6	1.0	1.3	1.2
Chromium	8	6.6	.7	1.9	1.4
Copper	8	84.1	68.5	77.4	77.2
Iron	8	1,190	642	888	878
Lead	8	7.3	3.7	4.7	4.0
Manganese	8	4,070	2,590	3,310	3,250
Nickel	8	3.5	1.2	1.9	1.9
Zinc	8	278	188	227	228
12324200–CLARK FORK AT DEER LODGE, MONT.					
Period of record for biological data: 1986-87, 1990-94					
		***Hydropsyche* spp.**			
Cadmium	3	2.0	1.2	1.6	1.6
Chromium	3	--	--	--	--
Copper	3	222	103	145	111
Iron	3	2,220	1,110	1,520	1,240
Lead	3	15.0	5.6	8.8	5.7
Manganese	3	--	--	--	--
Nickel	3	--	--	--	--
Zinc	3	203	185	195	197
		***Hydropsyche morosa* group**[2]			
Cadmium	14	2.3	.8	1.5	1.5
Chromium	14	2.6	.4	1.5	1.8
Copper	14	136	55	95	92
Iron	14	1,880	98	792	573
Lead	14	18.2	4.3	8.6	8.4
Manganese	14	2,950	499	1,170	691
Nickel	14	1.8	.3	1.1	1.1
Zinc	14	391	132	188	180
		Hydropsyche occidentalis			
Cadmium	10	2.7	.8	1.4	1.3
Chromium	10	2.3	.6	1.7	1.9
Copper	10	134	49	102	111
Iron	10	1,580	557	1,280	1,310
Lead	10	13.4	6.3	10.1	9.9
Manganese	10	3,330	1,690	2,610	2,590
Nickel	10	2.5	1.1	1.6	1.6
Zinc	10	299	196	243	221
12324590–LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.					
Period of record for biological data: 1987, 1994					
		Hydropsyche cockerelli			
Cadmium	1	--	--	.6	--
Chromium	1	--	--	1.6	--
Copper	1	--	--	28.4	--
Iron	1	--	--	478	--
Lead	1	--	--	3.6	--
Manganese	1	--	--	399	--
Nickel	1	--	--	1.2	--
Zinc	1	--	--	123	--

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324590–LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.–Continued					
Period of record for biological data: 1987, 1994					
		Hydropsyche occidentalis			
Cadmium	1	--	--	<.7	--
Chromium	1	--	--	1.3	--
Copper	1	--	--	15.1	--
Iron	1	--	--	426	--
Lead	1	--	--	<3.7	--
Manganese	1	--	--	434	--
Nickel	1	--	--	.8	--
Zinc	1	--	--	110	--
		Arctopsyche grandis			
Cadmium	9	.4	.2	.3	.3
Chromium	9	.8	.6	.7	.8
Copper	9	14.0	9.1	11.5	11.8
Iron	9	325	177	242	230
Lead	9	1.3	.5	.8	.8
Manganese	9	596	318	471	492
Nickel	9	.6	.4	.5	.5
Zinc	9	179	113	146	145
		Claassenia sabulosa			
Cadmium	4	.3	.1	.2	.2
Chromium	4	.8	.7	.8	.8
Copper	4	34.0	20.0	27.9	28.8
Iron	4	200	98	138	127
Lead	4	<.7	<.4	<.6	<.6
Manganese	4	62.1	46.7	53.4	51.3
Nickel	4	.7	.5	.6	.5
Zinc	4	233	191	206	201
12324680–CLARK FORK AT GOLDCREEK, MONT.					
Period of record for biological data: 1992-94					
		***Hydropsyche morosa* group**[2]			
Cadmium	7	2.1	.6	1.5	1.5
Chromium	7	4.2	.7	2.1	1.4
Copper	7	72.9	33.5	61.7	66.6
Iron	7	1,320	589	868	655
Lead	7	6.0	2.4	4.6	4.8
Manganese	7	1,030	588	745	713
Nickel	7	1.5	.6	1.2	1.2
Zinc	7	201	152	182	188
		Hydropsyche occidentalis			
Cadmium	3	1.2	.7	.8	.7
Chromium	3	1.7	.4	.9	.5
Copper	3	55.5	32.9	42.0	37.6
Iron	3	1,180	585	820	690
Lead	3	6.0	5.4	5.7	5.6
Manganese	3	1,800	1,350	1,580	1,590
Nickel	3	1.0	.8	.9	.8
Zinc	3	207	184	193	188

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680–CLARK FORK AT GOLDCREEK, MONT.–Continued					
Period of record for biological data: 1992-94					
Arctopsyche grandis					
Cadmium	3	6.6	1.4	3.2	1.6
Chromium	3	2.3	1.0	1.4	1.0
Copper	3	39.9	31.5	34.5	32.0
Iron	3	476	387	445	473
Lead	3	3.8	2.9	3.2	3.0
Manganese	3	1,100	1,030	1,070	1,080
Nickel	3	1.0	.6	.7	.6
Zinc	3	309	175	226	195
Claassenia sabulosa					
Cadmium	5	1.0	.6	.8	.9
Chromium	5	1.6	.3	.8	.8
Copper	5	66.6	33.0	51.4	49.4
Iron	5	230	63.0	153	178
Lead	5	1.2	.8	.9	.9
Manganese	5	179	65.1	121	117
Nickel	5	.7	.2	.4	.3
Zinc	5	296	166	239	257
12331500–FLINT CREEK NEAR DRUMMOND, MONT.					
Period of record for biological data: 1986, 1992-94					
***Hydropsyche morosa* group**[2]					
Cadmium	3	.4	.4	.4	.4
Chromium	3	1.2	1.0	1.1	1.0
Copper	3	28.3	16.1	21.3	19.5
Iron	3	1,500	1,140	1,290	1,220
Lead	3	11.1	3.1	6.6	5.6
Manganese	3	1,440	912	1,140	1,070
Nickel	3	2.2	1.5	1.8	1.6
Zinc	3	193	113	148	139
Hydropsyche occidentalis					
Cadmium	3	<2.9	<.1	<1.3	<.9
Chromium	3	17.6	.7	6.6	1.6
Copper	3	19.2	15.1	17.2	17.2
Iron	3	1,690	912	1,350	1,450
Lead	3	24.0	5.8	12.4	7.5
Manganese	3	1,750	1,400	1,540	1,450
Nickel	3	6.9	.8	3.7	3.5
Zinc	3	195	128	159	155
Hydropsyche tana					
Cadmium	2	<1.2	<.1	<.7	<.7
Chromium	2	10.3	.6	5.4	5.4
Copper	2	16.0	5.4	10.7	10.7
Iron	2	1,320	729	1,020	1,020
Lead	2	15.3	5.0	10.2	10.2
Manganese	2	1,400	1,180	1,290	1,290
Nickel	2	3.1	.5	1.8	1.8
Zinc	2	139	107	123	123

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331500–FLINT CREEK NEAR DRUMMOND, MONT.–Continued					
Period of record for biological data: 1986, 1992-94					
		Arctopsyche grandis			
Cadmium	16	.6	.2	.4	.3
Chromium	16	4.7	.6	2.1	1.7
Copper	16	19.8	9.7	14.6	14.8
Iron	16	2,460	606	1,200	1,060
Lead	16	17.5	4.1	9.5	8.1
Manganese	16	2,480	1,140	1,720	1,480
Nickel	16	2.3	.6	1.2	1.1
Zinc	16	275	151	197	182
12331800–CLARK FORK NEAR DRUMMOND, MONT.					
Period of record for biological data: 1986, 1991-94					
		***Hydropsyche* spp.**			
Cadmium	1	--	--	2.6	--
Chromium	1	--	--	--	--
Copper	1	--	--	85.0	--
Iron	1	--	--	940	--
Lead	1	--	--	9.1	--
Manganese	1	--	--	--	--
Nickel	1	--	--	--	--
Zinc	1	--	--	260	--
		***Hydropsyche morosa* group**[2]			
Cadmium	10	1.4	.7	1.1	1.2
Chromium	10	2.8	.4	1.9	1.9
Copper	10	57.4	37.9	50.0	52.7
Iron	10	1,730	506	1,170	1,410
Lead	10	10.8	5.1	7.8	7.3
Manganese	10	1,940	549	1,230	1,280
Nickel	10	1.7	.5	1.1	1.4
Zinc	10	250	164	213	228
		Hydropsyche occidentalis			
Cadmium	7	1.4	.6	1.0	1.1
Chromium	7	8.1	.4	2.7	2.3
Copper	7	57.2	13.3	44.7	47.5
Iron	7	1,800	424	1,100	757
Lead	7	12.5	5.9	10.6	12.0
Manganese	7	2,920	619	1,810	1,240
Nickel	7	2.0	.5	1.3	1.3
Zinc	7	283	170	232	223
		Arctopsyche grandis			
Cadmium	8	1.4	.7	1.0	.9
Chromium	8	1.0	.4	.8	.9
Copper	8	44.3	18.2	26.6	22.7
Iron	8	931	240	543	529
Lead	8	11.8	2.1	6.1	4.6
Manganese	8	2,010	641	1,230	1,300
Nickel	8	.7	.3	.6	.6
Zinc	8	308	142	206	196

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331800–CLARK FORK NEAR DRUMMOND, MONT.–Continued					
Period of record for biological data: 1986, 1991-94					
Claassenia sabulosa					
Cadmium	16	2.1	.3	.9	.8
Chromium	16	3.3	.3	1.0	.8
Copper	16	130	18	58.4	50.0
Iron	16	4,880	76	475	149
Lead	16	41.6	.4	4.5	4.0
Manganese	16	270	45.9	132	144
Nickel	16	1.1	.2	.5	.3
Zinc	16	469	140	264	243
12334510–ROCK CREEK NEAR CLINTON, MONT.					
Period of record for biological data: 1987, 1991-94					
Hydropsyche cockerelli					
Cadmium	2	<.2	<.2	<.2	<.2
Chromium	2	1.0	.9	.9	.9
Copper	2	6.6	6.0	6.3	6.3
Iron	2	497	485	491	491
Lead	2	<1.1	<1.1	<1.1	<1.1
Manganese	2	208	192	200	200
Nickel	2	<.4	<.4	<.4	<.4
Zinc	2	86	82	84	84
Hydropsyche occidentalis					
Cadmium	3	<1.0	<.3	<.5	<.3
Chromium	3	2.4	.9	1.9	2.3
Copper	3	17.6	10.2	12.8	10.6
Iron	3	652	520	606	648
Lead	3	<1.6	.2	<1.6	<1.6
Manganese	3	268	169	217	215
Nickel	3	1.7	.6	1.2	1.4
Zinc	3	144	117	128	122
Arctopsyche grandis					
Cadmium	18	.3	.1	.2	.1
Chromium	18	2.9	.5	1.1	.9
Copper	18	12.3	4.7	7.6	7.3
Iron	18	571	191	372	351
Lead	18	.7	.4	.5	.5
Manganese	18	328	113	195	210
Nickel	18	1.6	.2	.6	.4
Zinc	18	189	84	119	118
Claassenia sabulosa					
Cadmium	9	.3	.1	.2	.2
Chromium	9	1.8	.5	1.0	.8
Copper	9	37.2	18.1	25.9	27.1
Iron	9	115	50.0	85.0	84.0
Lead	9	<.5	<.5	<.5	<.5
Manganese	9	43.0	16.0	27.0	27.0
Nickel	9	.9	.2	.5	.4
Zinc	9	242	156	201	211

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334550–CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.					
Period of record for biological data: 1991-94					
		***Hydropsyche morosa* group**[2]			
Cadmium	8	1.4	.6	.8	.7
Chromium	8	8.0	1.0	2.2	1.6
Copper	8	42.4	26.4	35.2	35.7
Iron	8	1,100	688	951	1,010
Lead	8	4.4	2.5	3.2	2.7
Manganese	8	788	426	540	529
Nickel	8	2.6	.7	1.2	1.1
Zinc	8	224	169	184	180
		Hydropsyche occidentalis			
Cadmium	6	.9	.3	.6	.6
Chromium	6	2.4	.6	1.6	1.5
Copper	6	41.8	34.1	36.5	35.0
Iron	6	1,130	472	849	869
Lead	6	8.2	3.0	5.1	3.8
Manganese	6	1,510	454	852	568
Nickel	6	1.1	.6	.9	.9
Zinc	6	231	145	193	188
		Arctopsyche grandis			
Cadmium	11	1.9	.6	.9	.7
Chromium	11	2.1	.6	1.3	1.2
Copper	11	28.9	20.1	23.9	23.5
Iron	11	794	420	574	509
Lead	11	3.9	2.1	2.9	2.9
Manganese	11	825	351	646	505
Nickel	11	.9	.4	.7	.6
Zinc	11	240	155	184	171
		Claassenia sabulosa			
Cadmium	10	1.7	.3	.7	.5
Chromium	10	2.0	.4	1.0	.9
Copper	10	72.0	43.0	54.0	53.0
Iron	10	181	59.0	99.0	96.0
Lead	10	1.1	.3	.6	.7
Manganese	10	96.0	42.0	65.0	63.0
Nickel	10	.6	.1	.3	.3
Zinc	10	268	166	216	212
12340000–BLACKFOOT RIVER NEAR BONNER, MONT.					
Period of record for biological data: 1986-87, 1991, 1993					
		Hydropsyche occidentalis			
Cadmium	7	2.2	.8	1.2	1.0
Chromium	7	2.1	1.2	1.7	1.6
Copper	7	20.6	13.2	15.4	14.7
Iron	7	1,530	1,060	1,300	1,300
Lead	7	1.9	1.1	1.5	1.6
Manganese	7	474	414	447	452
Nickel	7	1.7	.9	1.2	1.2
Zinc	7	150	130	142	145

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340000–BLACKFOOT RIVER NEAR BONNER, MONT.–Continued					
Period of record for biological data: 1986-87, 1991, 1993					
		Arctopsyche grandis			
Cadmium	6	<.4	<.1	<.3	<.3
Chromium	6	--	--	--	--
Copper	6	17.9	12.1	14.3	13.1
Iron	6	483	108	327	431
Lead	6	<2.1	<.6	<1.1	<1.5
Manganese	6	--	--	--	--
Nickel	6	--	--	--	--
Zinc	6	366	123	223	136
		Claassenia sabulosa			
Cadmium	9	.6	.1	.4	.5
Chromium	9	--	--	--	--
Copper	9	51.0	32.0	43.0	44.0
Iron	9	199	68.0	116	113
Lead	9	<.9	<.3	<.5	<.5
Manganese	9	--	--	--	--
Nickel	9	--	--	--	--
Zinc	9	233	184	203	197
12353000–CLARK FORK BELOW MISSOULA, MONT.[1]					
Period of record for biological data: 1986, 1990-94					
		***Hydropsyche morosa* group[2]**			
Cadmium	14	.7	.2	.5	.6
Chromium	14	3.4	.8	2.0	1.9
Copper	14	39.3	12.4	26.8	28.3
Iron	14	1,390	648	1,070	1,080
Lead	14	3.6	1.2	2.0	1.8
Manganese	14	1,180	580	778	664
Nickel	14	1.5	.5	1.1	1.2
Zinc	14	172	99	147	165
		Hydropsyche occidentalis			
Cadmium	7	.9	.2	.3	.2
Chromium	7	1.6	.2	.6	.4
Copper	7	30.5	18.9	22.8	20.5
Iron	7	1,420	482	793	731
Lead	7	2.4	.7	1.6	1.8
Manganese	7	1,460	667	974	959
Nickel	7	2.2	.5	1.0	1.7
Zinc	7	193	116	139	130
		Arctopsyche grandis			
Cadmium	6	.9	.3	.5	.4
Chromium	6	2.7	.5	1.1	1.0
Copper	6	22.0	9.4	15.8	16.7
Iron	6	525	343	435	432
Lead	6	1.9	1.0	1.4	1.3
Manganese	6	1,090	511	773	712
Nickel	6	1.0	.4	.7	.7
Zinc	6	169	106	139	140

Table 27. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 1994 (Continued)

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12353000–CLARK FORK BELOW MISSOULA, MONT.[1]–Continued					
Period of record for biological data: 1986, 1990-94					
		Claassenia sabulosa			
Cadmium	19	.7	.2	.4	.3
Chromium	19	1.2	.05	.6	.3
Copper	19	58.0	31.0	45.0	46.0
Iron	19	127	67.0	86.0	81.0
Lead	19	.6	.1	.3	.4
Manganese	19	168	49.0	100	75.0
Nickel	19	.3	.1	.2	.2
Zinc	19	286	146	202	200

[1]Samples collected about 30 miles downstream of water-quality station to conform to previous sampling location.

[2]Includes more than one species within the *Hydropsyche morosa* group.

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