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

By John H. Lambing, Michelle I. Hornberger, Ellen V. Axtmann, and Daryll A. Pope

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CONVERSION FACTORS AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.028317	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 in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by the following 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 October 1 through September 30. It is designated by the calendar year in which it ends.

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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. Water-quality data were obtained periodically at 16 stations during October 1992 through September 1993 (water year 1993); daily suspended-sediment data were obtained at six of these stations. Bed-sediment and biological data were obtained at 11 stations in August 1993. Sampling stations were located on the Clark Fork and major tributaries. The primary constituents analyzed were trace elements associated with mine tailings from historic mining and smelting activities.

Water-quality data include concentrations of major ions, trace elements, and suspended sediment in samples collected periodically during water year 1993. 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 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. A statistical summary of water-quality data is 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 upper 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 include 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. Since mining began in the basin, tailings have been eroded and transported downstream 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 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 remedia-

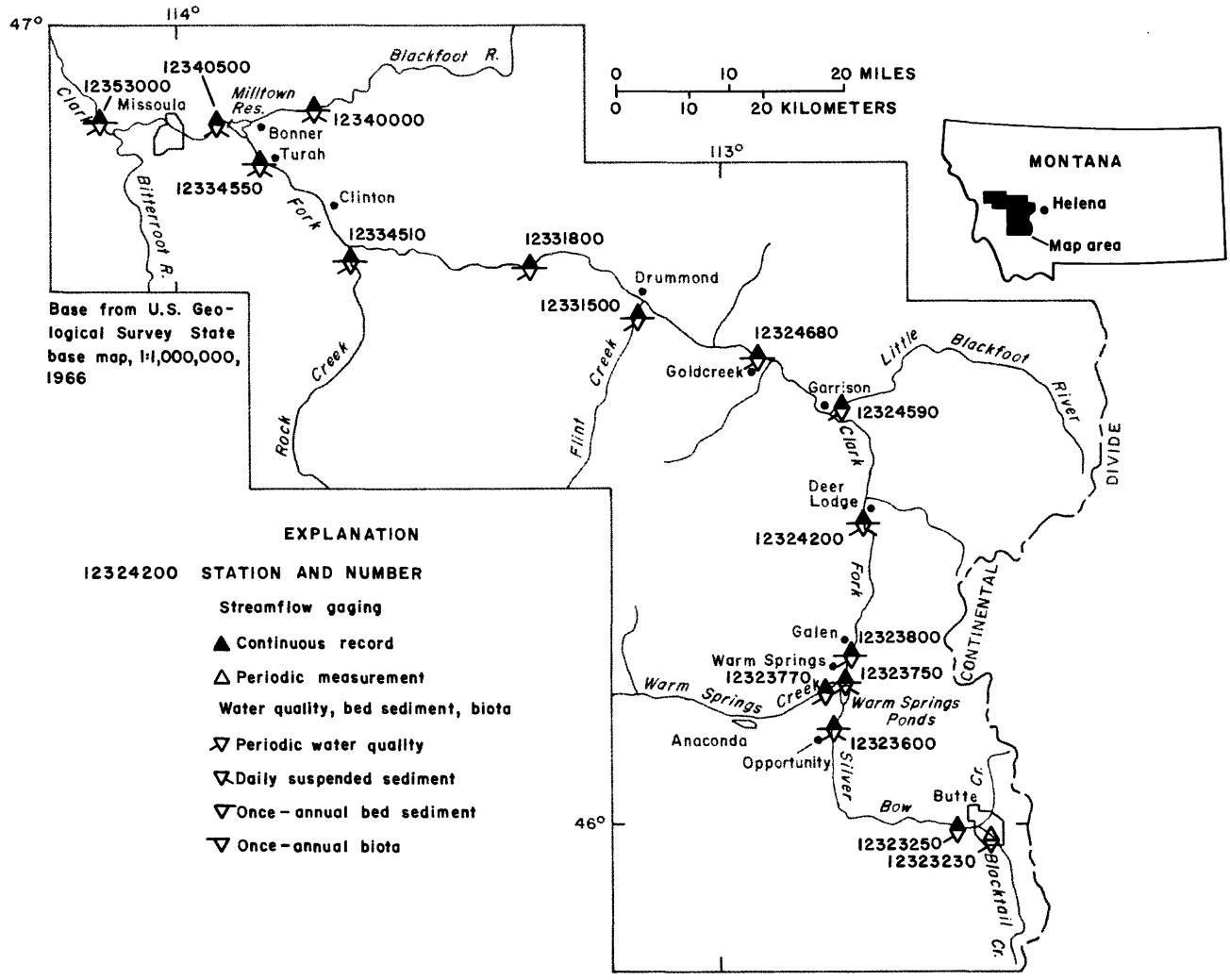

Figure 1. Location of study area.

tion. 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). Trace-element data have been collected annually since 1986 for bed sediment and biota (aquatic benthic insects) at selected sites as part of research studies on bed-sediment contamination and bioaccumulation of metals conducted by the USGS (Axtmann and Luoma, 1991; Cain and others, 1992). 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 1992 through September 1993 (water year 1993). Quality-assurance data are presented for water quality, bed sediment, and biota. Statistical summaries also are provided for water-quality 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 and to provide reference comparisons to the mainstem for bed sediment and biota from major hydrologic sources in the

upper basin. Water-quality data were obtained periodically at 16 stations; daily suspended-sediment data were obtained at six of these stations; bed-sediment and biological data were obtained once-annually at 11 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 1993 are listed in tables 4 through 23 at the back of the report. Statistical summaries of water-quality data collected since 1985 are given in table 24 at the back of the report.

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

WATER-QUALITY DATA

Water-quality data consist of 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.

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

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 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	--[3]
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	--	--	--	--
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[4]	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]Site sampled, but insufficient number of insects obtainable for analysis.
[4]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[1]**	**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		

[1]Prior to March 1993, water-quality constituents included only trace elements and suspended sediment.

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-48TM and D-74TM) which are 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 Ward and Harr (1990), USGS (1977), Knapton (1985), and internal agency memoranda (A.J. Horowitz, U.S. Geological Survey, written commun., 1993). 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 major ions and trace elements listed in table 2 by the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. Trace elements 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 particle-size 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 listed in table 1, suspended-sediment samples were collected 2 to 7 times per week. These samples were collected by local contracted observers using depth integration at a single vertical near mid-stream and were analyzed for suspended-sediment concentration. Suspended-sediment samples were collected by observers at a frequency sufficient to determine daily mean concentrations according to methods described by Porterfield (1972).

Results

Water-quality data for samples collected periodically during October 1992 through September 1993 (water year 1993) 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. Missing data for anions on March 8, 1993 at two stations (stations 12323250 and 12323600) were the result of incorrect sample preservation in the field. Other missing data are described under "Quality Assurance" later in this section.

Daily streamflow and suspended-sediment data for water year 1993 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 or partial-year 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 Ward and Harr (1990), Edwards and Glysson (1988), Knapton (1985), Knapton and Nimick (1991), and A.J. Horowitz (U.S. Geological Survey, written commun., 1993). 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 concurrently from the field. 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 train 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 USGS Branch of Quality Assurance 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 precision, replicate samples were obtained in the field by splitting a composite stream sample. The replicate samples were submitted concurrently for analysis. Analyses of field replicates document overall precision of environmental data, which is affected by the combined variability of field and laboratory processes to which the sample is exposed. Another means to evaluate precision is to make replicate analyses of an individual sample. Replicate analyses were made in the laboratory on a single stream sample selected randomly 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 field collection, processing, and exposure.

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.

Samples of deionized-water blanks 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

ultra-pure deionized water that are processed through the same sampling equipment used to collect stream samples and subjected to the same processing (sample splitting, filtration, preservation, transportation, and laboratory handling) as stream samples. Blank samples are shipped to the laboratory with stream samples and analyzed for the same constituents.

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, quality-control data generated to assure the quality of environmental data for this program are specific to the analytical results reported herein. Internal laboratory quality-control data provide additional evidence of the performance of 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 and the overall precision estimated for each constituent based on these results is reported in table 12. Analytical precision for constituents based on replicate analyses of individual samples by the laboratory is reported in table 13. 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). Statistics for 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 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 are not directly applicable to precision estimated from analyses of field replicates owing to the additional potential of variability in the field environment, relative standard deviations estimated from analyses of field replicates also were within 20 percent for all constituents except dissolved iron and dissolved lead (table 12). One replicate sample pair (Blacktail Creek at Harrison Avenue, August 1993) accounted for the exceedance of 20 percent for dissolved iron. Elimination of this replicate pair from the data set results in a relative standard deviation of 9.6 percent for dissolved iron. The other element that exceeded 20-percent precision for analyses of field replicates was dissolved lead. This exceedance resulted from substituting one-half the minimum

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	.02 mg/L	20	--
Magnesium, dissolved	.01 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 [1]	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 [1]	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	--	--

[1]Minimum reporting level prior to March 1993 was 1 µg/L.

reporting level for several censored values where the concentration for the paired replicate sample was at or slightly greater than the minimum reporting level. Replacing one-half the value with the actual minimum reporting level results in a relative standard deviation of 8.0 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. If the spike recovery for a trace element is outside a range of 75 to 125 percent, the sample set for the analytical run is 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 all deionized-water and stream samples spiked with trace elements ranged from 93.4 to 106.5 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 dissolved arsenic, dissolved copper, total recoverable lead, total recoverable manganese, and total recoverable zinc did not include 100 percent. For these elements, the bias was slightly low in every instance, with mean spike recovery ranging from 94.0 to 97.4 percent of complete recovery. 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 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. When concentrations for a particular constituent exceeded twice the minimum reporting level in field blanks from two consecutive field trips, archived blank samples collected for individual components of the processing sequence were 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. However, exceedances of twice the minimum reporting level for lead occurred in two consecutive blank samples, which warranted testing for a potential source of contamination. Although the two consecutive field blanks indicated only low-level lead contamination, unusually high concentrations of lead and moderately high concentrations of copper relative to historic data were noted sporadically in several stream samples collected during water year 1993. This potential contamination was investigated with a series of blank samples collected during several field tests to verify if elevated concentrations measured in stream samples represented actual environmental conditions or were an artifact of contamination. On the basis of field notes, all elevated lead concentrations were determined to have occurred in samples collected with the D-74TM sampler. The results of tests conducted on sampling equipment, field processing, and laboratory analyses indicated that elevated concentrations of lead and copper resulted from random field contamination. The specific source of contamination was determined to be the interior metal surface in the vent portal of the D-74TM sampler. Leaching of lead and copper apparently occurred during between-site rinsing of the D-74TM sampler with 5-percent hydrochloric acid. Acid-rinsing of D-74TM samplers was discontinued immediately upon confirmation of the source of contamination.

Review of lead and copper data relative to previous baseline concentrations, hydrologic conditions at the time of sampling, and results for samples collected from nearby stations identified 17 samples for lead and 7 samples for copper collected from March through September 1993 that were potentially affected by contamination. These lead and copper values were deleted from the data base and 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 and bulk fractions. Bed-sediment samples were collected once-annually during low, stable flow conditions to facilitate data comparisons between years.

Methods

Bed-sediment samples were collected 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 exposed streambed deposits 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 3 to 5 randomly selected deposits along pool or low-velocity areas. The 3 to 5 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 3 to 5 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 excluded from the samples. The individual samples were composited and, where possible, the collection process was repeated to obtain multiple composite samples. The material in each composite sample was homogenized by stirring in a 1-L, acid-washed, polyethylene beaker. The unsieved, mixed material was split into two subsamples using a stainless-steel sediment splitter pre-rinsed with ambient stream water. One subsample was archived for grain-size analysis. The other subsample was stored in an acid-washed polyethylene bottle and transported to the laboratory on ice.

Bed-sediment samples were processed at the USGS National Research Program laboratory in Boulder, Colo. 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 sample were digested using a hot, concentrated nitric acid reflux according to methods described by Luoma and Bryan (1981). After a digestion period of up to several weeks, the duplicate 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 duplicate solutions then were analyzed for cadmium, chromium, copper, iron, lead, manganese, nickel, silver, and zinc using Inductively Coupled Argon Plasma Emission Spectroscopy (ICAPES) at the USGS National Research Program laboratory in Menlo Park, Calif.

Results

Solid-phase concentrations of trace elements measured in samples of fine bed sediment and bulk bed sediment collected during August 1993 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 duplicate 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 were acid-washed and rinsed with deionized water prior to the first sample collection. Stainless-steel equipment and 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. Samples were collected along an increasing contamination gradient from the least contaminated sites (downstream tributaries and mainstem) to the most contaminated sites (upstream mainstem) to minimize any effects from potential station-to-station carryover contamination. 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.

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 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 bed-sediment samples.

Standard reference materials 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 material samples of agricultural soil were analyzed to test recovery efficiency for a range of trace-element concentrations 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, only chromium had a mean recovery (53 percent) that was outside a 25-percent deviation from complete recovery.

Procedural blanks for bed-sediment samples consisted of 0.6 N hydrochloric-acid samples that were processed using the same digestion method as that used for analysis of bed-sediment samples. After digestion, 0.6 N hydrochloric acid was added quantitatively 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 reconstitute 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. The maximum solid-phase bias identified by blank samples represented less than 3 percent of the lowest ambient trace-element concentration in bed-sediment samples. 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). Biota samples were collected concurrently with bed-sediment samples to facilitate comparisons of results between years and between the two media.

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. Similar-sized individuals within each taxon were composited into one to six replicate subsamples, depending on the total number of specimens collected at the station. Each subsample

consisted of a minimum total dry weight of 50 mg. 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 calcium, 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 1993 are summarized in table 21. An insufficient number of insects of the targeted taxa were found for analysis at Silver Bow Creek at Opportunity during the 1993 sampling visit. 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.

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 were 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 contamination gradient to prevent station-to-station carryover contamination. Nets and any reused equipment were thoroughly rinsed in ambient stream water at each new station.

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 of 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 percent recoveries were within 12 percent of complete recovery for all trace elements, with the exception of lead (mean recovery within 26 percent). A low bias is indicated for iron, manganese, nickel, 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 were analyzed undiluted at a proportion of one blank per site. Analytical results for blanks indicated no significant contamination bias, with one exception. It was determined that a correction was warranted for lead concentrations in biota samples from Rock Creek because of the low ambient trace-element concentrations in insects relative to the potential contamination bias. Therefore, the blank concentrations for lead were subtracted from the original analytical values for Rock Creek insect samples, resulting in a decrease in solid-phase lead concentrations of 1.2 µg/g for *Hydropsyche*, 0.2 µg/g for *Arctopsyche*, and 0.5 µg/g for *Claassenia*. The adjusted values are reported in table 21. No other adjustments for procedural blanks were necessary because all other blanks had concentrations less than 10 percent of ambient solid-phase trace-element concentrations in insects.

STATISTICAL SUMMARIES OF WATER-QUALITY DATA

Statistical summaries of water-quality data are provided in table 24 for the period of record at each station since 1985. The summaries include the range, mean, and median of concentrations and were calculated using standard computer programs within the USGS National Water Information System. Documentation of the programs is provided in Maddy and others (1989).

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DATA

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; e, instantaneous streamflow estimated from daily mean streamflow; 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	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 $CaCO_3$)
Mar 1993											
08...	1040	3.1	320	7.7	5.0	120	35	8.4	16	3.0	100
Apr											
12...	1215	7.5	245	7.9	4.0	92	26	6.6	11	2.3	79
26...	1115	9.0	206	7.9	8.0	73	21	5.1	11	2.1	62
May											
14...	1440	7.9	240	7.8	17.0	100	29	6.7	9.4	2.5	79
24...	1125	6.6	252	7.9	11.0	110	31	7.3	11	2.3	86
Jun											
06..	1415	7.1	259	7.9	10.0	110	31	7.4	11	2.5	89
Jul											
12...	1215	6.6	282	8.2	12.0	110	33	7.8	11	2.4	100
Aug											
16..	1100	9.3	257	7.7	12.0	100	30	6.7	9.1	2.5	98

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)
Mar 1993											
08...	34	8.4	0.2	27	192	3	2	<1	<0.1	7	4
Apr											
12...	28	8.7	.3	20	150	6	2	<1	.1	28	4
26...	21	8.9	.6	14	121	10	3	<1	<.1	52	9
May											
14....	30	5.4	.3	24	155	7	5	<1	<.1	6	5
24...	29	5.7	.3	24	162	6	4	<1	<.1	6	3
Jun											
06...	29	5.3	.4	25	165	5	4	<1	<.1	7	4
Jul											
12..	28	3.8	.3	25	171	7	5	<1	<.1	4	3
Aug											
16...	20	4.8	.4	28	161	10	8	<1	<.1	7	5

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)
Mar 1993											
08...	300	59	1	<0.5	60	51	20	5	7	0.06	61
Apr											
12...	1,700	51	33	1.0	130	41	80	9	91	1.8	93
26...	3,800	44	47	.5	190	50	130	11	123	3.0	95
May											
14...	470	150	1	<.5	50	33	20	5	6	.13	92
24...	530	170	<1	<.5	60	40	<10	<3	7	.12	85
Jun											
06...	520	160	1	<.5	60	36	10	<3	5	.10	90
Jul											
12...	450	200	<1	<.5	30	17	10	9	3	.05	90
Aug											
16...	590	230	1	<.5	30	22	<10	5	4	.10	92

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 $CaCO_3$)
Mar 1993											
08...	1340	21	535	7.5	9.0	160	47	11	33	7.1	--
Apr											
12...	1430	30	440	7.5	3.0	130	36	8.9	23	5.1	71
26...	1245	37	402	7.4	9.0	130	37	8.3	18	4.5	65
May											
14...	1300	24	435	7.4	15.0	150	45	10	25	5.4	79
24...	1355	20	460	7.8	15.5	150	44	10	27	5.1	78
Jun											
06...	1545	21	465	7.6	12.5	140	42	9.7	22	6.3	78
Jul											
12...	1315	22	526	7.6	15.0	170	48	12	26	5.5	89
Aug											
16...	1225	30	485	7.5	14.5	160	45	11	22	5.2	96

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, dis-solved (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)
Mar 1993											
08...	--	--	--	--	--	17	10	3	2.4	200	80
Apr											
12...	70	26	.7	20	234	21	5	4	2.4	360	85
26...	76	16	.8	17	218	39	6	6	2.1	550	65
May											
14...	83	20	.5	22	260	17	7	4	2.4	300	120
24...	75	21	.4	24	255	12	8	2	1.9	130	85
Jun											
06...	77	20	.5	22	248	11	7	3	2.1	150	90
Jul											
12...	92	23	.4	23	285	14	9	2	2.3	140	110
Aug											
16...	81	21	.5	24	269	15	9	3	2.6	190	120

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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Mar 1993											
08...	860	120	18	1.2	910	910	1,000	900	16	.91	82
Apr											
12...	3,900	31	84	.8	860	690	1,200	780	104	8.4	89
26...	7,400	26	250	2.4	1,500	810	1,600	750	162	16	93
May											
14...	2,100	65	35	.9	880	870	1,100	930	28	1.8	88
24...	650	76	7	<.5	680	670	790	710	7	.38	91
Jun											
06...	700	56	7	<.5	680	660	950	790	6	.34	87
Jul											
12...	500	55	3	<.5	620	690	850	800	5	.30	86
Aug											
16...	710	93	13	1.4	820	780	1,000	930	11	.89	91

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 $CaCO_3$)
Mar 1993											
08...	1530	e56	370	7.6	.5	98	30	5.7	23	5.8	--
16...	1100	e50	--	--	--	--	--	--	--	--	--
Apr											
12...	1645	51	395	8.3	5.0	140	41	8.9	17	4.2	85
26...	1430	49	388	8.7	9.0	140	41	8.7	18	4.6	84
May											
14...	0745	108	290	8.0	10.0	110	34	6.5	12	3.6	78
24...	1530	92	282	8.5	15.5	110	33	6.3	13	2.9	79
Jun											
07...	0635	104	301	8.0	8.5	110	34	6.7	13	3.5	78
Jul											
12...	1430	64	339	8.9	16.0	130	40	8.1	15	3.1	93
Aug											
16...	1340	50	377	8.6	15.5	130	40	8.4	16	3.8	98

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)
Mar 1993											
08...	--	--	--	--	--	140	34	6	2.0	980	180
16...	--	--	--	--	--	--	--	--	--	--	--
Apr											
12...	79	12	.4	22	237	17	6	2	1.7	150	46
26...	77	13	.5	21	235	16	7	2	.9	140	46
May											
14...	49	7.3	.3	20	180	26	13	2	.7	190	49
24...	46	7.4	.3	19	176	11	9	1	1.0	100	45
Jun											
07...	50	7.7	.4	19	182	16	7	2	1.4	180	70
Jul											
12...	58	9.0	.4	19	209	12	8	1	.9	140	60
Aug											
16...	65	11	.4	23	227	18	9	2	1.4	210	160

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)
Mar 1993											
08...	7,600	100	200	2.3	1,200	750	1,400	620	215	33	82
16...	--	--	--	--	--	--	--	--	384	52	77
Apr											
12...	1,100	19	15	<.5	710	670	610	370	10	1.4	92
26...	890	25	11	2.2	610	570	470	190	10	1.3	84
May											
14...	1,400	81	26	<.5	450	350	400	220	40	12	65
24...	780	51	12	.8	340	270	260	110	16	4.0	70
Jun											
07...	1,000	87	15	<.5	530	500	600	430	16	4.5	78
Jul											
12...	570	45	8	<.5	430	400	370	130	10	1.7	60
Aug											
16...	630	49	10	.6	810	730	420	180	6	.81	80

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12323750--SILVER BOW CREEK AT WARM SPRINGS, 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 $CaCO_3$)
Mar 1993											
09...	0830	32	580	9.0	2.0	250	74	17	23	5.0	96
Apr											
12...	1800	78	480	9.1	6.5	190	56	13	16	5.1	87
26...	1620	75	474	9.3	12.0	190	53	14	17	5.4	69
May											
14...	0930	174	495	8.4	15.0	210	60	14	18	5.3	90
19...	1250	347	--	--	17.5	--	--	--	--	--	--
24...	1740	289	361	8.5	17.5	150	44	9.1	14	3.9	90
Jun											
07...	0745	198	382	8.0	14.0	160	48	9.1	11	3.7	89
Jul											
12...	1535	149	392	8.6	17.0	170	52	9.7	12	3.5	95
Aug											
16...	1440	84	476	8.4	18.5	200	59	12	13	3.4	99

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, dis-solved (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)
Mar 1993											
09...	170	15	.8	16	379	13	11	<1	.1	24	12
Apr											
12...	140	10	.7	14	307	19	14	<1	.2	60	23
26...	150	6.6	.7	15	303	17	14	<1	.1	35	18
May											
14...	140	10	.9	14	317	17	14	<1	.2	60	32
19...	--	--	--	--	--	--	--	--	--	--	--
24...	81	7.0	.6	13	227	29	27	<1	.2	40	21
Jun											
07...	87	5.4	.6	11	229	23	19	<1	.2	32	21
Jul											
12...	93	4.9	.6	7.6	240	24	23	<1	.1	27	20
Aug											
16...	130	5.5	.7	8.7	292	20	18	<1	<.1	23	10

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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Mar 1993											
09...	390	11	3	<.5	490	370	90	18	8	.69	73
Apr											
12...	420	14	5	<.5	360	180	130	17	13	2.7	97
26...	300	5	3	<.5	270	150	70	9	10	2.0	92
May											
14...	300	14	2	<.5	440	330	140	73	8	3.8	80
19...	--	--	--	--	--	--	--	--	13	12	76
24...	340	27	2	<.5	220	160	90	31	7	5.5	86
Jun											
07...	220	25	<1	<.5	190	140	70	37	4	2.1	82
Jul											
12...	140	15	<1	<.5	150	110	40	17	3	1.2	82
Aug											
16...	170	11	1	<.5	190	130	50	16	4	.91	85

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12323770--WARM SPRINGS CREEK AT WARM SPRINGS, 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, onsite (mg/L as $CaCO_3$)
Mar 1993											
09...	1020	26	455	8.2	2.5	230	70	13	5.2	4.7	97
Apr											
26...	1720	24	476	8.6	12.0	230	70	14	5.1	1.8	139
May											
13...	1450	93	251	8.2	13.0	120	38	7.0	2.5	1.3	90
19...	1225	206	--	--	9.5	--	--	--	--	--	--
Jun											
06...	1750	190	194	8.1	8.5	94	29	5.2	2.1	1.0	71
Aug											
18...	1200	97	257	8.3	11.0	120	36	6.6	2.6	1.2	106

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, dis-solvsd (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)
Mar 1993											
09...	110	.98	.4	11	274	16	14	<1	<.1	27	16
Apr											
26...	110	1.7	.4	9.4	296	5	4	<1	<.1	6	3
May											
13...	37	.80	.4	9.9	151	16	7	<1	<.1	75	4
19...	--	--	--	--	--	--	--	--	--	--	--
Jun											
06...	25	.50	.4	9.2	115	4	4	<1	<.1	10	4
Aug											
18...	33	.80	.4	11	155	5	3	<1	<.1	7	2

Date	Iron, total recov-erable (µg/L)	Iron, dis-solved (µg/L)	Lead, total recov-erable (µg/L)	Lsad, 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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Mar 1993											
09...	230	30	2	<.5	440	350	20	4	10	.70	88
Apr											
26...	70	9	<1	<.5	190	110	<10	3	11	.71	76
May											
13...	1,300	18	9	1.8	1,400	110	60	10	68	17	82
19...	--	--	--	--	--	--	--	--	32	18	75
Jun											
06...	160	13	<1	<.5	120	74	10	7	6	3.1	80
Aug											
18...	100	13	<1	<.5	130	94	<10	<3	4	1.0	83

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 $CaCO_3$)
Nov 1992											
16...	1110	54	629	8.4	3.0	270	80	18	--	--	--
Mar 1993											
09...	1200	62	555	8.7	3.5	250	75	16	18	5.0	123
Apr											
13...	0800	98	480	8.7	3.5	200	60	13	14	4.3	98
27...	0810	93	484	8.7	1.0	200	58	14	15	4.3	92
May											
14...	1120	312	390	8.1	12.0	170	50	11	12	3.6	91
19...	1320	541	--	--	15.0	--	--	--	--	--	--
24...	1850	400	327	8.2	16.0	140	42	8.2	11	3.0	84
Jun											
07...	0905	369	309	8.1	11.0	130	41	7.8	7.5	2.4	82
Jul											
12...	1635	263	329	8.4	16.0	140	43	7.9	7.7	2.3	90
Aug											
18...	1250	197	354	8.4	15.0	150	46	9.1	8.3	2.2	98

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, dis-solved (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 1992											
16...	--	--	--	--	--	8	5	<1	<1	18	6
Mar 1993											
09...	160	11	.7	14	364	15	12	<1	.1	31	14
Apr											
13...	130	9.0	.6	10	300	15	11	<1	.2	47	19
27...	140	8.7	.6	13	309	13	12	<1	<.1	30	13
May											
14...	97	6.4	.6	12	247	23	12	<1	<.1	120	14
19...	--	--	--	--	--	--	--	--	--	--	--
24...	67	5.1	.5	12	199	22	17	<1	.1	42	17
Jun											
07...	62	3.2	.5	10	184	15	13	<1	<.1	24	12
Jul											
12...	67	3.3	.5	8.7	194	16	13	<1	<.1	17	11
Aug											
18...	75	3.3	.6	10	213	13	13	<1	<.1	13	8

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12323800--CLARK FORK NEAR GALEN, MONT.--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)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1992											
16...	260	3	3	<1	270	74	40	18	3	.44	82
Mar 1993											
09...	350	11	3	<.5	420	230	70	14	8	1.3	79
Apr											
13...	370	13	4	<.5	330	150	100	27	13	3.4	91
27...	280	7	2	<.5	300	130	70	16	7	1.8	64
May											
14...	1,600	16	11	<.5	1,200	210	170	39	75	63	74
19...	--	--	--	--	--	--	--	--	25	37	66
24...	410	20	3	<.5	270	120	80	19	13	14	76
Jun											
07...	220	21	1	<.5	170	100	40	25	5	5.0	75
Jul											
12...	120	12	<1	<.5	120	74	20	13	3	2.1	84
Aug											
18...	120	14	1	<.5	130	71	20	11	4	2.1	78

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12324200--CLARK FORK AT DEER LODGE, 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 1992											
16...	1220	164	603	8.4	4.0	270	80	18	--	--	--
Mar 1993											
09...	1345	229	570	8.3	4.5	260	77	17	19	6.3	143
Apr											
13...	0930	215	562	8.3	5.0	240	71	16	16	3.8	149
27...	0910	193	591	8.3	2.0	260	75	18	18	4.2	144
May											
13...	1830	313	506	8.5	18.0	230	66	15	17	4.5	120
19...	1435	572	--	--	16.0	--	--	--	--	--	--
25...	0735	425	384	8.0	13.0	170	50	10	14	3.3	104
Jun											
07...	1030	456	353	8.1	11.0	150	45	9.1	10	2.6	103
Jul											
12...	1800	396	403	8.6	16.0	180	54	11	12	2.7	125
Aug											
18...	1400	297	447	8.4	16.0	200	59	12	13	2.8	136

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, dis-solved (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 1992											
16...	--	--	--	--	--	11	8	<1	<1	21	4
Mar 1993											
09...	140	8.9	.6	19	374	25	19	<1	<.1	67	17
Apr											
13...	130	8.5	.6	18	353	17	11	<1	<.1	69	10
27...	140	8.8	.6	19	370	16	12	<1	<.1	39	8
May											
13...	130	8.4	.7	16	330	20	14	<1	<.1	75	14
19...	--	--	--	--	--	--	--	--	--	--	--
25...	79	6.1	.6	14	239	28	17	<1	<.1	85	16
Jun											
07...	66	1.2	.5	13	209	18	12	<1	<.1	52	12
Jul											
12...	74	4.8	.6	14	248	17	15	<1	<.1	23	11
Aug											
18...	90	5.1	.6	17	281	16	13	<1	<.1	20	9

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12324200--CLARK FORK AT DEER LODGE, MONT.--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)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1992											
16...	190	6	4	1	70	28	30	18	8	3.5	82
Mar 1993											
09...	1,100	34	7	<.5	210	62	90	19	52	32	65
Apr											
13...	790	9	7	<.5	260	59	100	22	40	23	68
27...	500	6	4	<.5	190	51	60	21	20	10	82
May											
13...	900	<3	8	<.5	280	26	110	11	40	34	62
19...	--	--	--	--	--	--	--	--	126	195	54
25...	1,100	21	9	<.5	310	28	110	15	46	53	67
Jun											
07...	780	21	6	<.5	180	31	80	31	35	43	55
Jul											
12...	210	11	2	.6	80	27	30	10	7	7.5	82
Aug											
18...	280	10	2	<.5	80	22	20	8	12	9.6	63

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, 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 1992											
16...	0930	61	271	8.2	2.0	130	37	8.5	--	--	--
Mar 1993											
11...	1200	71	255	8.1	1.0	110	33	7.3	6.6	4.5	52
Apr											
27...	1045	173	218	8.2	7.0	98	28	6.7	4.8	1.6	93
May											
13...	1115	682	152	7.9	10.0	70	20	4.8	3.4	1.6	64
19...	1130	637	--	--	11.5	--	--	--	--	--	--
Jun											
06...	1915	213	231	8.3	12.5	100	30	7.0	5.4	1.8	104
Aug											
17...	0735	184	248	8.1	12.0	110	32	7.7	5.5	1.9	118

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, dis-solved (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 1992											
16...	--	--	--	--	--	5	4	<1	<1	<1	<1
Mar 1993											
11...	20	3.4	.2	18	124	7	6	<1	<.1	3	2
Apr											
27...	16	1.5	.2	18	133	4	3	<1	<.1	2	<1
May											
13...	10	1.0	.1	17	96	14	5	<1	<.1	8	3
19...	--	--	--	--	--	--	--	--	--	--	--
Jun											
06...	14	1.2	.2	20	142	6	5	<1	<.1	2	<1
Aug											
17...	11	1.3	.2	21	151	8	6	<1	<.1	2	<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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Nov 1992											
16...	60	4	<1	<1	20	3	<10	<3	2	.33	83
Mar 1993											
11...	160	40	<1	.6	30	12	20	4	4	.77	78
Apr											
27...	260	19	<1	<.5	40	6	<10	4	8	3.7	88
May											
13...	3,200	69	13	--	200	14	30	4	166	306	63
19...	--	--	--	--	--	--	--	--	37	64	58
Jun											
06...	160	14	<1	<.5	30	11	<10	5	5	2.9	85
Aug											
17...	330	26	<1	<.5	40	5	<10	4	13	6.5	85

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 $CaCO_3$)
Mar 1993											
09...	1600	e400	410	8.1	1.0	180	52	11	13	6.9	118
Apr											
13...	1115	398	447	8.5	6.0	190	56	12	13	3.3	137
27...	1230	436	430	8.5	8.0	190	55	13	13	3.1	128
May											
13...	1630	1,080	280	8.3	15.0	120	36	8.1	7.8	2.5	89
19...	1610	1,410	--	--	16.0	--	--	--	--	--	--
25...	0950	1,020	305	8.2	11.0	130	40	8.3	9.9	2.5	103
Jun											
08...	0945	832	346	8.3	10.0	150	45	9.3	10	2.6	121
Jul											
13...	1045	824	368	8.3	13.5	160	49	10	11	2.5	134
Aug											
17...	0850	605	375	8.2	13.0	160	49	10	11	2.7	138

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, dis-solved (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)
Mar 1993											
09...	78	6.8	.4	16	255	31	18	<1	<.1	150	20
Apr											
13...	84	6.1	.5	18	275	11	8	<1	<.1	34	6
27...	82	5.9	.4	18	267	11	9	<1	<.1	21	4
May											
13...	47	3.5	.3	17	176	19	9	<1	<.1	63	8
19...	--	--	--	--	--	--	--	--	--	--	--
25...	44	3.6	.4	18	189	18	11	<1	<.1	50	12
Jun											
08...	51	3.5	.4	17	211	13	11	<1	<.1	40	10
Jul											
13...	44	3.4	.4	18	219	13	10	<1	<.1	--	--
Aug											
17...	53	3.6	.4	21	234	14	10	<1	<.1	25	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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Mar 1993											
09...	2,700	58	18	<.5	470	35	180	21	152	164	74
Apr											
13...	470	7	4	<.5	130	31	50	13	21	23	86
27...	380	5	2	<.5	100	26	40	7	15	18	89
May											
13...	2,500	36	12	<.5	250	24	110	7	125	365	78
19...	--	--	--	--	--	--	--	--	103	392	67
25...	920	22	7	<.5	190	28	60	17	39	107	78
Jun											
08...	540	18	5	<.5	130	21	50	14	21	47	82
Jul											
13...	310	34	--	--	70	26	30	15	10	22	81
Aug											
17...	500	15	3	<.5	90	16	30	22	23	38	78

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12331500--FLINT CREEK NEAR DRUMMOND, 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 1992											
16...	1425	93	351	8.6	4.0	170	45	13	--	--	--
Mar 1993											
11...	0940	81	340	8.3	.5	150	41	12	11	7.8	74
Apr											
13...	1300	110	319	8.7	--	140	38	11	9.1	2.9	141
27...	1400	63	238	8.6	9.0	160	42	13	9.8	3.1	150
May											
15...	0830	374	148	7.9	8.0	68	19	4.9	4.0	2.0	65
19...	1715	189	--	--	15.0	--	--	--	--	--	--
25...	1140	53	329	8.4	11.0	160	43	12	8.6	3.6	149
Jun											
08...	1115	148	307	8.3	9.5	140	38	11	7.8	3.1	140
Jul											
13...	1225	224	302	8.5	13.0	140	39	11	7.5	2.8	145
Aug											
17...	1010	174	313	8.2	12.0	140	39	11	7.8	3.4	148

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, dis-solved (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 1992											
16...	--	--	--	--	--	10	7	<1	<1	2	<1
Mar 1993											
11...	22	5.9	.2	21	165	16	10	<1	<.1	5	2
Apr											
13...	20	5.2	.2	20	191	13	8	<1	<.1	3	<1
27...	22	5.0	.2	20	205	11	10	<1	<.1	2	<1
May											
15...	8.8	1.9	.1	14	94	30	8	<1	<.1	11	3
19...	--	--	--	--	--	--	--	--	--	--	--
25...	19	4.1	.2	20	200	11	8	<1	<.1	3	2
Jun											
08...	15	4.1	.2	19	182	12	8	<1	<.1	3	1
Jul											
13...	12	2.8	.4	19	182	13	9	<1	<.1	10	1
Aug											
17...	14	3.1	.2	22	189	26	10	<1	<.1	28	3

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12331500--FLINT CREEK NEAR DRUMMOND, MONT.--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)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1992											
16...	240	7	8	3	70	20	10	10	11	2.8	92
Mar 1993											
11...	580	58	9	.7	180	57	40	5	34	7.4	85
Apr											
13...	530	19	7	.6	120	34	20	3	27	8.0	93
27...	300	10	3	<.5	110	40	20	3	13	2.2	93
May											
15...	1,900	77	36	1.0	480	74	110	8	120	121	78
19...	--	--	--	--	--	--	--	--	49	25	84
25...	250	29	3	<.5	120	58	10	3	11	1.6	91
Jun											
08...	330	28	5	<.5	130	37	20	5	16	6.4	87
Jul											
13...	330	17	4	<.5	200	32	50	4	15	9.1	85
Aug											
17	2,500	40	16	.6	350	34	150	7	159	75	97

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12331800--CLARK FORK NEAR DRUMMOND, 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)	Potae-sium, dis-solved (mg/L)	Alka-linity, (mg/L as $CaCO_3$)
Mar 1993											
09...	1820	e660	435	8.2	1.0	190	55	13	13	7.3	130
Apr											
14...	0945	587	470	8.4	8.0	210	59	14	13	3.5	150
28...	0930	550	462	8.4	8.0	210	61	15	13	3.3	142
May											
15...	1025	1,650	278	8.0	13.0	120	36	8.3	7.8	2.7	93
19...	1815	1,710	--	--	17.0	--	--	--	--	--	--
26...	1145	992	371	8.2	16.0	170	50	11	13	3.1	125
Jun											
08...	1245	985	403	8.3	11.0	180	53	12	12	3.4	141
Jul											
13...	1350	1,170	399	8.4	15.0	180	52	12	11	2.9	150
Aug											
17...	1200	907	429	8.2	14.0	190	55	13	13	3.6	156

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, dis-solved (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)
Mar 1993											
09...	87	7.1	.4	17	278	26	13	<1	<.1	100	17
Apr											
14...	86	6.2	.4	18	290	12	9	<1	<.1	28	6
28...	90	5.7	.4	17	291	12	10	<1	<.1	22	4
May											
15...	45	3.4	.3	17	176	30	11	1	<.1	140	9
19...	--	--	--	--	--	--	--	--	--	--	--
26...	58	4.6	.4	20	235	18	13	<1	.1	--	--
Jun											
08...	61	4.2	.4	19	250	12	10	<1	<.1	--	--
Jul											
13...	54	4.1	.4	20	246	12	11	<1	<.1	18	9
Aug											
17...	38	4.5	.2	23	244	16	12	<1	<.1	23	5

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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Mar 1993											
09...	2,500	45	19	<.5	490	29	200	21	166	296	72
Apr											
14...	560	7	4	<.5	130	15	50	11	28	44	85
28...	400	4	3	<.5	110	15	40	10	19	28	90
May											
15...	4,000	41	40	1.2	490	16	260	10	270	1,200	56
19...	--	--	--	--	--	--	--	--	132	609	62
26...	890	15	--	--	170	22	70	18	40	107	80
Jun											
08...	490	14	--	--	120	16	50	14	21	56	79
Jul											
13...	280	10	--	--	80	23	30	7	12	38	86
Aug											
17...	900	17	6	.8	130	16	40	8	42	103	85

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 1992											
16...	1605	165	154	8.1	4.0	70	18	6.2	--	--	--
Mar 1993											
10...	1110	162	145	7.8	1.5	68	17	6.1	3.5	1.3	67
Apr											
28...	1100	290	123	8.0	6.0	55	14	4.9	3.1	1.1	58
May											
15...	1300	2,420	57	7.6	10.0	25	6.5	2.2	1.7	.80	26
20...	1110	2,200	--	--	9.0	--	--	--	--	--	--
Jun											
08...	1430	1,340	88	7.9	9.5	41	11	3.4	2.0	.90	41
Aug											
17...	1340	548	115	8.3	13.5	50	13	4.3	2.5	1.0	57

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, dis-solved (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 1992											
16...	--	--	--	--	--	<1	<1	<1	<1	<1	<1
Mar 1993											
10...	5.2	1.0	.1	11	85	1	<1	<1	<.1	<1	<1
Apr											
28...	4.6	.70	.1	11	74	<1	<1	<1	<.1	<1	<1
May											
15...	2.0	.50	.1	11	40	2	<1	<1	<.1	12	6
20...	--	--	--	--	--	--	--	--	--	--	--
Jun											
08...	2.3	.40	<.1	10	55	<1	<1	<1	<.1	--	--
Aug											
17...	2.9	.60	<.1	11	70	2	<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-nsse, 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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Nov 1992											
16...	40	6	2	2	10	<1	<10	<3	2	.89	70
Mar 1993											
10...	60	6	<1	<.5	<10	<1	20	<3	1	.44	67
Apr											
28...	90	13	<1	<.5	<10	1	<10	3	3	2.3	67
May											
15...	1,200	58	--	--	70	5	20	<3	108	706	56
20...	--	--	--	--	--	--	--	--	22	131	53
Jun											
08...	160	41	--	--	20	2	10	8	5	18	72
Aug											
17...	130	33	<1	<.5	<10	2	<10	4	6	8.9	79

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 1992											
17...	0815	645	430	8.2	4.0	200	55	14	--	--	--
Mar 1993											
10...	0900	941	380	8.2	.5	170	50	12	12	5.7	111
Apr											
14...	1200	988	364	8.5	7.5	160	45	11	9.3	2.5	124
28...	1245	980	354	8.5	8.5	160	45	12	9.6	2.4	117
May											
15...	1510	4,010	168	7.9	13.0	73	21	5.1	4.3	1.7	65
20...	1300	4,100	--	--	12.0	--	--	--	--	--	--
26...	1415	2,810	216	8.1	15.0	98	28	6.7	5.8	1.8	77
Jun											
08...	1615	2,680	254	8.4	11.0	110	32	7.9	6.4	2.0	91
Jul											
13...	1555	2,110	303	8.6	16.5	140	39	9.4	8.1	2.3	116
Aug											
17...	1535	1,520	315	8.4	15.0	140	39	9.6	8.5	2.7	119

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, dis-solved (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 1992											
17...	--	--	--	--	--	12	5	<1	<1	6	2
Mar 1993											
10...	68	5.6	.3	16	236	15	10	<1	<.1	50	12
Apr											
14...	58	4.2	.3	15	220	7	5	<1	<.1	15	4
28...	57	3.8	.3	15	215	6	5	<1	<.1	12	3
May											
15...	21	1.7	.2	14	108	15	5	<1	<.1	76	7
20...	--	--	--	--	--	--	--	--	--	--	--
26...	28	2.3	.2	14	133	8	6	<1	<.1	--	--
Jun											
08...	32	2.2	.2	14	151	6	5	<1	<.1	16	6
Jul											
13...	36	2.6	.3	16	183	7	7	<1	<.1	9	5
Aug											
17...	41	3.0	.3	18	193	10	8	<1	<.1	22	6

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT.--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)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1992											
17...	110	<3	3	1	50	3	10	6	6	10	87
Mar 1993											
10...	1,100	34	8	<.5	210	13	100	15	62	158	80
Apr											
14...	260	6	3	<.5	70	8	30	4	14	37	84
28...	240	5	1	<.5	50	6	20	8	12	32	85
May											
15...	2,500	46	27	.9	280	13	150	8	171	1,850	64
20...	--	--	--	--	--	--	--	--	60	664	64
26...	480	190	--	--	90	15	40	9	26	197	72
Jun											
08...	290	26	2	<.5	70	9	30	8	14	101	73
Jul											
13...	170	12	--	--	40	8	10	6	5	28	86
Aug											
17...	590	14	--	--	90	9	40	6	31	127	88

Table 4. Water-quality data the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 1992											
17...	1145	500	260	8.3	4.5	130	33	12	--	--	--
Mar 1993											
10...	1630	565	240	7.8	3.0	110	29	10	3.2	2.8	120
Apr											
28...	1445	1,390	190	8.4	9.5	95	24	8.4	2.3	.80	95
May											
15...	1720	7,180	140	8.1	10.5	72	19	5.9	1.2	.60	76
20...	1430	6,230	--	--	11.0	--	--	--	--	--	--
Jun											
09...	0730	2,780	191	8.3	10.5	100	26	8.5	1.8	.60	96
Aug											
18...	0730	1,060	246	8.3	13.0	120	31	11	2.5	.90	129

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, dis-solved (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 1992											
17...	--	--	--	--	--	1	1	<1	<1	<1	<1
Mar 1993											
10...	5.6	1.6	.1	9.5	134	3	2	<1	<.1	9	7
Apr											
28...	4.5	.50	<.1	8.1	106	<1	<1	<1	.1	1	<1
May											
15...	2.2	.30	<.1	6.8	82	4	<1	<1	<.1	12	3
20...	--	--	--	--	--	--	--	--	--	--	--
Jun											
09...	4.1	.30	<.1	7.4	106	1	<1	<1	<.1	--	--
Aug											
18...	5.0	.60	<.1	10	138	2	<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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Nov 1992											
17...	50	<3	<1	<1	10	<1	<10	<3	1	1.4	76
Mar 1993											
10...	230	30	--	--	20	6	20	6	13	20	68
Apr											
28...	140	10	<1	<.5	30	2	<10	3	8	30	82
May											
15...	2,600	30	25	2	180	5	40	<3	230	4,460	83
20...	--	--	--	--	--	--	--	--	62	1,040	84
Jun											
09...	140	11	--	--	20	2	<10	4	8	60	90
Aug											
18...	160	7	--	--	10	1	<10	4	10	29	91

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12340500--CLARK FORK ABOVE MISSOULA, MONT.

Date	Time	Stream-flow, instan-tangous (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 1992											
17...	0950	1,130	354	8.2	4.0	170	45	13	--	--	--
Mar 1993											
10...	1345	1,500	325	8.3	2.5	150	42	12	7.7	4.5	119
Apr											
14...	1445	2,350	261	8.4	7.0	120	32	9.2	5.3	1.5	105
29...	0830	2,400	259	8.3	9.0	120	33	9.7	5.3	1.4	104
May											
16...	0830	11,400	153	8.1	11.0	71	19	5.6	2.4	1.0	71
20...	1600	10,400	--	--	12.0	--	--	--	--	--	--
26...	1630	6,600	187	8.4	16.5	95	26	7.3	3.4	1.1	83
Jun											
09...	0925	4,850	221	8.3	10.5	110	29	8.3	4.1	1.2	95
Jul											
14...	0750	3,610	270	8.3	15.0	130	35	9.7	5.7	1.5	116
Aug											
18...	0910	2,550	294	8.3	14.5	130	36	10	6.1	2.0	124

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, dis-solved (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 1992											
17...	--	--	--	--	--	4	4	<1	<1	3	1
Mar 1993											
10...	43	4.2	.2	13	198	10	7	<1	<.1	20	10
Apr											
14...	24	2.1	.2	11	148	4	3	<1	.1	8	4
29...	26	1.9	.2	11	151	3	2	<1	<.1	7	2
May											
16...	9.3	.90	.1	9.4	90	7	3	<1	<.1	23	3
20...	--	--	--	--	--	--	--	--	--	--	--
26...	13	1.4	.1	10	112	4	3	<1	<.1	19	9
Jun											
09...	17	1.2	.2	11	129	4	3	<1	<.1	--	--
Jul											
14...	21	1.7	.2	12	156	5	5	<1	<.1	8	2
Aug											
18...	26	2.1	.2	15	172	6	5	<1	<.1	8	2

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (Continued)

12340500--CLARK FORK ABOVE MISSOULA, MONT.--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)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1992											
17...	80	3	<1	<1	30	7	<10	<3	2	6.1	88
Mar 1993											
10...	350	29	--	--	60	19	40	7	15	61	91
Apr											
14...	170	13	--	--	60	24	10	7	8	51	89
29...	220	27	--	--	60	23	20	6	9	58	96
May											
16...	1,800	35	15	.7	170	9	60	7	132	4,060	85
20...	--	--	--	--	--	--	--	--	73	2,050	86
26...	440	16	--	--	60	19	20	<3	26	463	89
Jun											
09...	230	18	--	--	50	15	20	7	11	144	93
Jul											
14...	200	11	<1	<.5	40	14	20	5	10	97	92
Aug											
18...	270	14	2	<.5	40	14	10	<3	12	83	95

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 1992 through September 1993 (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 1992											
02...	1115	1,580	268	7.8	1.0	120	34	8.7	7.0	1.8	115
Feb 1993											
03...	1300	1,540	235	8.3	1.0	130	36	9.5	7.7	1.9	116
Mar											
25...	1200	3,880	207	8.2	8.0	93	26	6.7	6.1	2.0	87
May											
04...	0930	5,060	176	8.2	10.0	84	23	6.4	4.1	1.2	76
25...	1000	14,440	125	8.0	11.5	57	16	4.2	2.8	1.0	57
Aug											
25...	0800	3,970	243	8.2	13.5	110	31	8.1	6.1	1.9	108

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, dis-solved (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 1992											
02...	27	2.9	.2	12	163	--	--	--	--	--	--
Feb 1993											
03...	30	3.2	.2	14	171	--	--	--	--	--	--
Mar											
25...	19	2.5	.2	11	126	6	3	<1	<.1	18	3
May											
04...	14	1.5	.2	9.6	105	--	--	--	--	--	--
25...	7.5	4.2	.1	9.8	77	3	2	<1	<.1	9	2
Aug											
25...	18	1.7	.2	14	145	4	4	<1	<.1	7	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)	Sedi-ment, sus-pended (percent finer than 0.062 mm)
Dec 1992											
02...	--	5	--	--	--	6	--	--	1	4.3	93
Feb 1993											
03...	--	--	--	--	--	--	--	--	3	12	85
Mar											
25...	860	18	4	<.5	120	9	30	3	44	461	84
May											
04...	--	--	--	--	--	--	--	--	18	246	78
25...	510	28	2	<.5	40	11	20	<3	34	1,320	70
Aug											
25...	150	17	<1	<.5	20	5	<10	<3	8	86	88

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

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; 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)	Mean streamflow (ft^3/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
						1993						
	March			April			May			June		
1	e30	16	1.3	58	24	3.8	58	18	2.8	84	30	6.8
2	e32	16	1.4	56	21	3.2	56	15	2.3	91	24	5.9
3	e32	17	1.5	53	18	2.6	59	14	2.2	86	15	3.5
4	e34	22	2.0	57	21	3.2	100	94	25	76	10	2.1
5	e36	29	2.8	62	30	5.0	94	54	14	87	28	6.6
6	e40	185	20	57	22	3.4	105	115	33	101	23	6.3
7	e50	305	41	53	14	2.0	115	122	38	102	18	5.0
8	e56	274	41	51	15	2.1	99	44	12	94	14	3.6
9	e60	181	29	51	11	1.5	85	26	6.0	84	9	2.0
10	e56	183	28	49	11	1.5	79	20	4.3	85	10	2.3
11	e50	140	19	50	10	1.4	80	18	3.9	103	33	9.2
12	e45	54	6.6	51	11	1.5	93	30	7.5	111	45	13
13	e50	43	5.8	54	21	3.1	97	22	5.8	97	17	4.5
14	e56	140	21	50	14	1.9	104	32	9.0	83	10	2.2
15	e56	429	65	48	13	1.7	112	37	11	77	11	2.3
16	e50	427	58	50	12	1.6	111	27	8.1	150	124	50
17	e56	83	13	50	10	1.4	109	22	6.5	151	85	35
18	84	195	44	53	13	1.9	103	20	5.6	129	41	14
19	122	122	40	53	17	2.4	100	17	4.6	109	29	8.5
20	82	80	18	47	12	1.5	100	21	5.7	97	20	5.2
21	61	62	10	47	10	1.3	113	32	9.8	93	18	4.5
22	66	88	16	46	11	1.4	108	21	6.1	113	46	14
23	91	130	32	52	15	2.1	100	14	3.8	98	18	4.8
24	102	140	39	51	11	1.5	95	15	3.8	93	12	3.0
25	76	59	12	45	9	1.1	81	13	2.8	86	11	2.6
26	83	74	17	49	10	1.3	79	11	2.3	81	10	2.2
27	81	63	14	51	13	1.8	78	12	2.5	84	17	3.9
28	70	35	6.6	48	11	1.4	81	12	2.6	83	18	4.0
29	65	31	5.4	50	11	1.5	85	19	4.4	84	18	4.1
30	65	28	4.9	59	22	3.5	78	15	3.2	76	9	1.8
31	61	26	4.3	---	---	---	71	10	1.9	---	---	---
TOTAL	1,898	---	619.6	1,551	---	63.6	2,828	---	250.5	2,888	---	232.9
MEAN	61.2	119	20	51.7	15	2.1	91.2	30	8.1	96.3	26	7.8
MAX	122	429	65	62	30	5.0	115	122	38	151	124	50
MIN	30	16	1.3	45	9	1.1	56	10	1.9	76	9	1.8

Table 5. Daily streamflow and suspended-sediment data for Silver Bow Creek at Opportunity, Montana, March through September 1993 (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)
				1993					
	July			August			September		
1	74	7	1.4	65	4	.70	77	9	1.9
2	74	6	1.2	65	4	.70	78	9	1.9
3	100	32	8.6	61	5	.82	76	8	1.6
4	84	12	2.7	57	6	.92	71	7	1.3
5	76	6	1.2	62	7	1.2	67	7	1.3
6	71	6	1.2	62	7	1.2	65	7	1.2
7	84	18	4.1	60	8	1.3	66	7	1.2
8	77	11	2.3	59	8	1.3	60	7	1.1
9	72	9	1.7	55	7	1.0	55	6	.89
10	69	8	1.5	51	6	.83	59	5	.80
11	66	8	1.4	49	6	.79	57	5	.77
12	66	8	1.4	57	40	6.2	60	5	.81
13	62	7	1.2	88	57	14	63	5	.85
14	61	11	1.8	61	15	2.5	63	5	.85
15	60	10	1.6	55	8	1.2	62	4	.67
16	57	8	1.2	51	6	.83	61	3	.49
17	70	19	3.6	52	14	2.0	59	4	.64
18	70	21	4.0	45	10	1.2	57	5	.77
19	62	7	1.2	50	8	1.1	58	6	.94
20	63	9	1.5	65	16	2.8	58	6	.94
21	58	7	1.1	74	24	4.8	58	6	.94
22	57	6	.92	114	80	25	57	5	.77
23	61	7	1.2	80	17	3.7	55	5	.74
24	59	6	.96	61	13	2.1	54	5	.73
25	78	51	11	54	13	1.9	52	6	.84
26	107	82	24	109	91	27	51	6	.83
27	115	14	4.3	129	113	39	51	6	.83
28	96	28	7.3	94	27	6.9	49	6	.79
29	80	14	3.0	98	23	6.1	49	6	.79
30	72	10	1.9	91	13	3.2	47	6	.76
31	68	7	1.3	82	11	2.4	---	---	---
TOTAL	2,269	---	101.78	2,156	---	164.69	1,795	---	28.94
MEAN	73.2	15	3.3	69.5	22	5.3	59.8	6	.96
MAX	115	82	24	129	113	39	78	9	1.9
MIN	57	6	.92	45	4	.70	47	3	.49

TOTAL FOR MARCH-SEPTEMBER 1993:
STREAMFLOW -- 15,385 ft^3/s
SEDIMENT DISCHARGE -- 1,462.01 tons

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

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; 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					
	April			May			June		
1	e97	14	3.7	81	8	1.7	247	4	2.7
2	82	14	3.1	78	6	1.3	247	4	2.7
3	73	14	2.8	86	8	1.9	240	4	2.6
4	73	13	2.6	110	14	4.2	206	3	1.7
5	77	13	2.7	126	11	3.7	185	3	1.5
6	73	13	2.6	148	10	4.0	190	3	1.5
7	80	12	2.6	156	9	3.8	196	3	1.6
8	65	13	2.3	159	9	3.9	197	2	1.1
9	62	12	2.0	160	9	3.9	198	1	.53
10	67	12	2.2	167	13	5.9	197	2	1.1
11	66	10	1.8	156	8	3.4	200	3	1.6
12	72	11	2.1	147	7	2.8	197	3	1.6
13	77	12	2.5	152	8	3.3	194	2	1.0
14	78	11	2.3	183	12	5.9	194	2	1.0
15	78	10	2.1	228	14	8.6	197	2	1.1
16	77	9	1.9	261	15	11	207	2	1.1
17	78	9	1.9	315	27	23	260	5	3.5
18	78	10	2.1	371	24	24	313	6	5.1
19	79	10	2.1	354	13	12	300	5	4.1
20	79	7	1.5	338	10	9.1	283	4	3.1
21	76	8	1.6	337	9	8.2	272	3	2.2
22	76	9	1.8	333	8	7.2	269	3	2.2
23	75	8	1.6	317	7	6.0	261	3	2.1
24	75	9	1.8	299	7	5.7	250	3	2.0
25	75	9	1.8	278	6	4.5	238	2	1.3
26	78	9	1.9	253	6	4.1	224	2	1.2
27	78	8	1.7	236	6	3.8	217	2	1.2
28	73	8	1.6	249	6	4.0	224	2	1.2
29	73	9	1.8	266	5	3.6	209	2	1.1
30	76	7	1.4	266	6	4.3	194	2	1.0
31	---	---	---	255	5	3.4	---	---	---
TOTAL	2,266	---	63.9	6,865	---	192.2	6,806	---	55.73
MEAN	75.5	10	2.1	221	10	6.2	227	3	1.9
MAX	97	14	3.7	371	27	24	313	6	5.1
MIN	62	7	1.4	78	5	1.3	185	1	.53

Table 6. Daily streamflow and suspended-sediment data for Silver Bow Creek at Warm Springs, Montana, April through September 1993 (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)
				1993					
	July			August			September		
1	185	2	1.0	165	1	0.45	180	2	0.97
2	153	2	.83	147	1	.40	170	2	.92
3	152	2	.82	135	1	.36	152	2	.82
4	165	2	.89	129	1	.35	136	1	.37
5	171	2	.92	126	1	.34	124	2	.67
6	174	1	.47	120	1	.32	117	2	.63
7	173	1	.47	117	1	.32	112	2	.60
8	171	1	.46	91	1	.25	105	2	.57
9	163	1	.44	87	1	.23	94	1	.25
10	159	1	.43	93	1	.25	83	1	.22
11	155	2	.84	87	1	.23	73	1	.20
12	150	2	.81	101	1	.27	71	1	.19
13	146	2	.79	117	1	.32	70	1	.19
14	142	2	.77	108	1	.29	79	1	.21
15	135	1	.36	100	2	.54	84	2	.45
16	133	1	.36	93	3	.75	88	2	.48
17	134	1	.36	103	2	.56	88	2	.48
18	130	1	.35	100	2	.54	87	2	.47
19	130	1	.35	101	2	.55	86	1	.23
20	129	1	.35	108	1	.29	84	1	.23
21	124	1	.33	109	1	.29	83	1	.22
22	122	1	.33	113	1	.31	78	1	.21
23	122	1	.33	122	1	.33	77	1	.21
24	122	2	.66	120	1	.32	79	1	.21
25	132	2	.71	117	2	.63	78	1	.21
26	139	2	.75	133	2	.72	78	1	.21
27	158	2	.85	143	2	.77	78	1	.21
28	174	2	.94	155	2	.84	79	1	.21
29	178	2	.96	166	1	.45	77	1	.21
30	174	2	.94	169	1	.46	82	1	.22
31	172	2	.93	182	2	.98	---	---	---
TOTAL	4,667	---	19.80	3,757	---	13.71	2,872	---	11.27
MEAN	151	2	.64	121	1	.44	95.7	1	.38
MAX	185	2	1.0	182	3	.98	180	2	.97
MIN	122	1	.33	87	1	.23	70	1	.19

TOTAL FOR APRIL-SEPTEMBER, 1993:
STREAMFLOW -- 27,233 ft^3/s
SEDIMENT DISCHARGE -- 356.61 tons

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1992 through September 1993

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; 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)
				1992					
	October			November			December		
1	92	20	5.0	168	24	11	e130	29	10
2	88	22	5.2	162	26	11	e120	30	9.7
3	93	22	5.5	167	27	12	e120	32	10
4	111	24	7.2	166	28	13	e110	31	9.2
5	127	24	8.2	169	31	14	e100	30	8.1
6	138	22	8.2	173	34	16	e100	29	7.8
7	144	20	7.8	180	30	15	e110	29	8.6
8	157	19	8.1	174	28	13	e120	31	10
9	150	20	8.1	168	28	13	e130	39	14
10	137	23	8.5	164	28	12	e130	31	11
11	140	22	8.3	154	30	12	e130	25	8.8
12	137	22	8.1	172	34	16	e130	24	8.4
13	136	25	9.2	172	23	11	e120	26	8.4
14	138	25	9.3	172	17	7.9	e120	29	9.4
15	139	22	8.3	167	18	8.1	e130	31	11
16	144	21	8.2	164	10	4.4	e130	32	11
17	146	22	8.7	166	11	4.9	e120	32	10
18	137	23	8.5	168	20	9.1	e120	32	10
19	135	24	8.7	164	22	9.7	e120	31	10
20	133	25	9.0	160	21	9.1	e120	30	9.7
21	131	25	8.8	158	20	8.5	e130	28	9.8
22	131	25	8.8	158	20	8.5	e130	27	9.5
23	133	26	9.3	161	21	9.1	e130	24	8.4
24	135	28	10	148	21	8.4	e140	22	8.3
25	137	29	11	e120	19	6.2	e140	22	8.3
26	136	30	11	e120	18	5.8	e130	21	7.4
27	137	30	11	e130	19	6.7	e130	19	6.7
28	138	30	11	e130	21	7.4	e120	18	5.8
29	143	25	9.7	e130	24	8.4	e110	26	7.7
30	178	22	11	e130	27	9.5	e110	34	10
31	182	23	11	---	---	---	e110	34	10
TOTAL	4,203	---	270.7	4,735	---	300.7	3,790	---	287.0
MEAN	136	24	8.7	158	23	10	122	28	9.3
MAX	182	30	11	180	34	16	140	39	14
MIN	88	19	5.0	120	10	4.4	100	18	5.8

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1992 through September 1993 (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)
				1993					
	January			February			March		
1	e120	35	11	e160	43	19	e140	48	18
2	e130	37	13	e150	43	17	e140	34	13
3	e140	34	13	e150	42	17	e150	38	15
4	e130	26	9.1	e150	42	17	e160	30	13
5	e120	20	6.5	e150	41	17	166	25	11
6	e120	18	5.8	e150	40	16	204	95	52
7	e120	19	6.2	e150	41	17	287	300	232
8	e130	20	7.0	e160	41	18	264	177	126
9	e130	20	7.0	e160	39	17	245	68	45
10	e120	20	6.5	e150	36	15	202	37	20
11	e120	20	6.5	e140	31	12	180	30	15
12	e120	20	6.5	e140	24	9.1	168	33	15
13	e120	20	6.5	e150	21	8.5	183	34	17
14	e120	20	6.5	e150	20	8.1	202	32	17
15	e130	20	7.0	e120	20	6.5	221	37	22
16	e140	21	7.9	e110	26	7.7	229	45	28
17	e140	22	8.3	e120	28	9.1	225	47	29
18	e140	21	7.9	e130	22	7.7	237	49	31
19	e140	20	7.6	e140	17	6.4	242	39	25
20	e150	21	8.5	e140	18	6.8	245	37	24
21	e160	24	10	e130	22	7.7	252	41	28
22	e160	25	11	e130	29	10	257	46	32
23	e160	28	12	e140	29	11	271	52	38
24	e150	29	12	e140	25	9.5	257	48	33
25	e160	27	12	e130	21	7.4	261	43	30
26	e170	26	12	e130	29	10	270	51	37
27	e170	26	12	e130	34	12	278	53	40
28	e170	26	12	e140	43	16	263	41	29
29	e170	26	12	---	---	---	254	38	26
30	e160	28	12	---	---	---	240	37	24
31	e160	37	16	---	---	---	238	37	24
TOTAL	4,370	---	291.3	3,940	---	335.5	6,931	---	1,109
MEAN	141	24	9.4	141	31	12	224	56	36
MAX	170	37	16	160	43	19	287	300	232
MIN	120	18	5.8	110	17	6.4	140	25	11

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1992 through September 1993 (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)
				1993					
	April			May			June		
1	228	32	20	195	16	8.4	473	47	60
2	221	37	22	192	14	7.3	554	66	99
3	200	27	15	189	13	6.6	521	47	66
4	197	24	13	222	35	21	460	33	41
5	217	30	18	281	59	45	403	30	33
6	204	28	15	274	35	26	406	30	33
7	200	28	15	304	61	50	444	37	44
8	186	23	12	301	48	39	425	28	32
9	178	21	10	297	36	29	397	20	21
10	178	20	9.6	283	31	24	366	18	18
11	178	19	9.1	282	30	23	408	19	21
12	187	20	10	278	32	24	422	20	23
13	209	33	19	294	36	29	403	18	20
14	207	30	17	348	80	75	372	16	16
15	203	26	14	426	149	171	349	14	13
16	199	24	13	469	158	200	455	36	44
17	198	23	12	498	151	203	575	86	134
18	207	25	14	560	190	287	596	83	134
19	211	23	13	566	154	235	543	63	92
20	208	28	16	554	115	172	503	48	65
21	205	23	13	575	128	199	466	38	48
22	194	21	11	594	116	186	489	33	44
23	205	19	11	545	72	106	470	26	33
24	197	17	9.0	481	55	71	429	18	21
25	190	14	7.2	427	47	54	405	15	16
26	191	17	8.8	407	37	41	373	14	14
27	194	17	8.9	419	42	48	371	14	14
28	189	12	6.1	449	61	74	383	14	14
29	183	13	6.4	500	68	92	398	15	16
30	187	15	7.6	552	67	100	357	16	15
31	---	---	---	495	52	69	---	---	---
TOTAL	5,951	---	375.7	12,257	---	2,715.3	13,216	---	1,244
MEAN	198	23	13	395	71	88	441	32	41
MAX	228	37	22	594	190	287	596	86	134
MIN	178	12	6.1	189	13	6.6	349	14	13

Table 7. Daily streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 1992 through September 1993 (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)
				1993					
	July			August			September		
1	347	13	12	368	22	22	426	18	21
2	323	10	8.7	336	22	20	435	15	18
3	362	10	9.8	323	22	19	424	13	15
4	392	12	13	338	23	21	409	12	13
5	408	13	14	340	135	124	387	12	13
6	408	13	14	289	22	17	374	11	11
7	401	14	15	257	19	13	356	10	9.6
8	405	14	15	240	18	12	346	10	9.3
9	394	13	14	220	16	9.5	323	10	8.7
10	397	11	12	207	14	7.8	309	10	8.3
11	402	9	9.8	204	14	7.7	287	9	7.0
12	394	7	7.4	212	14	8.0	269	8	5.8
13	385	8	8.3	255	19	13	287	6	4.6
14	353	10	9.5	261	17	12	280	6	4.5
15	339	12	11	245	15	9.9	290	7	5.5
16	340	13	12	246	14	9.3	291	7	5.5
17	368	15	15	278	12	9.0	292	7	5.5
18	376	16	16	291	11	8.6	294	6	4.8
19	351	14	13	267	12	8.7	302	6	4.9
20	361	12	12	280	19	14	300	5	4.1
21	347	10	9.4	308	16	13	296	5	4.0
22	344	10	9.3	388	20	21	289	4	3.1
23	345	11	10	367	18	18	280	4	3.0
24	332	11	9.9	332	14	13	280	4	3.0
25	343	13	12	310	13	11	285	4	3.1
26	415	22	25	344	22	20	277	4	3.0
27	507	35	48	415	28	31	275	4	3.0
28	491	34	45	400	26	28	268	4	2.9
29	441	29	35	447	32	39	265	4	2.9
30	407	25	27	457	28	35	264	4	2.9
31	390	23	24	437	22	26	---	---	---
TOTAL	11,868	---	496.1	9,662	---	620.5	9,460	---	210.0
MEAN	383	15	16	312	23	20	315	8	7.0
MAX	507	35	48	457	135	124	435	18	21
MIN	323	7	7.4	204	11	7.7	264	4	2.9

TOTAL FOR WATER YEAR 1993:
STREAMFLOW--90,383 ft^3/s
SEDIMENT DISCHARGE--8,255.8 tons

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1992 through September 1993

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; 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)
				1992					
	October			November			December		
1	444	6	7.2	698	12	23	535	6	8.7
2	447	6	7.2	684	9	17	526	6	8.5
3	444	7	8.4	684	7	13	e470	7	8.9
4	439	7	8.3	673	6	11	e400	7	7.6
5	456	8	9.8	663	7	13	e320	7	6.0
6	523	9	13	665	7	13	e280	8	6.0
7	548	10	15	664	7	13	e330	8	7.1
8	551	10	15	681	7	13	e400	8	8.6
9	563	9	14	674	6	11	e500	8	11
10	568	8	12	659	6	11	e530	8	11
11	574	8	12	649	6	11	e550	8	12
12	570	9	14	637	6	10	e550	7	10
13	574	9	14	649	6	11	e520	7	9.8
14	584	10	16	658	6	11	e540	7	10
15	631	11	19	657	6	11	e560	7	11
16	659	12	21	653	6	11	578	7	11
17	674	12	22	648	6	10	550	6	8.9
18	680	13	24	645	7	12	530	5	7.2
19	672	14	25	646	7	12	e500	4	5.4
20	667	14	25	632	7	12	509	4	5.5
21	657	14	25	628	12	20	561	5	7.6
22	646	14	24	617	23	38	567	12	18
23	637	12	21	633	12	21	568	6	9.2
24	634	10	17	556	5	7.5	588	4	6.4
25	630	8	14	511	5	6.9	578	4	6.2
26	627	7	12	e420	6	6.8	534	4	5.8
27	625	6	10	e400	7	7.6	563	5	7.6
28	629	5	8.5	462	8	10	e500	5	6.8
29	629	6	10	543	8	12	e400	4	4.3
30	664	10	18	496	7	9.4	e350	5	4.7
31	698	13	24	---	---	---	e370	8	8.0
TOTAL	18,344	---	485.4	18,485	---	388.2	15,257	---	258.8
MEAN	592	10	16	616	8	13	492	6	8.3
MAX	698	14	25	698	23	38	588	12	18
MIN	439	5	7.2	400	5	6.8	280	4	4.3

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	January			February			March		
1	e400	18	19	534	7	10	e450	10	12
2	e450	10	12	532	7	10	e460	8	9.9
3	e500	3	4.1	530	7	10	e480	5	6.5
4	e500	3	4.1	523	7	9.9	506	6	8.2
5	e450	3	3.6	511	6	8.3	524	11	16
6	e400	3	3.2	506	7	9.6	574	17	26
7	e370	3	3.0	516	9	13	751	55	112
8	e350	3	2.8	532	9	13	886	69	165
9	e370	3	3.0	547	9	13	957	67	173
10	e400	3	3.2	548	9	13	940	53	135
11	e410	3	3.3	540	9	13	880	42	100
12	e420	3	3.4	537	10	14	755	25	51
13	e420	3	3.4	547	12	18	701	20	38
14	e430	4	4.6	556	11	17	730	26	51
15	e450	5	6.1	e500	10	13	796	49	105
16	e450	6	7.3	e400	8	8.6	1,000	116	313
17	e460	9	11	e350	7	6.6	983	83	220
18	e470	11	14	e380	8	8.2	915	47	116
19	e480	12	16	e420	9	10	1,090	88	259
20	e500	12	16	e450	9	11	1,130	138	421
21	e520	12	17	e470	9	11	986	55	146
22	e550	11	16	e480	9	12	971	42	110
23	e520	13	18	e480	9	12	1,090	72	212
24	e500	20	27	e470	10	13	1,440	182	708
25	e520	22	31	e450	10	12	1,330	157	564
26	e550	18	27	e430	8	9.3	1,270	79	271
27	e570	16	25	e420	6	6.8	1,290	74	258
28	586	16	25	e440	5	5.9	1,290	67	233
29	584	14	22	---	---	---	1,180	43	137
30	572	11	17	---	---	---	1,160	39	122
31	549	8	12	---	---	---	1,120	33	100
TOTAL	14,701	---	380.1	13,599	---	311.2	28,635	---	5,198.6
MEAN	474	9	12	486	8	11	924	57	168
MAX	586	22	31	556	12	18	1,440	182	708
MIN	350	3	2.8	350	5	5.9	450	5	6.5

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	April			May			June		
1	1,080	33	96	1,010	16	44	2,920	26	205
2	1,090	31	91	1,020	16	44	3,330	36	324
3	1,110	26	78	1,050	18	51	3,100	30	251
4	1,090	27	79	1,280	40	138	2,700	23	168
5	1,200	33	107	1,710	94	434	2,550	16	110
6	1,200	29	94	1,830	98	484	2,420	11	72
7	1,130	21	64	1,930	68	354	2,530	16	109
8	1,070	15	43	2,100	84	476	2,660	18	129
9	1,050	16	45	1,960	64	339	2,460	14	93
10	1,040	18	51	1,820	42	206	2,280	13	80
11	1,020	16	44	1,760	36	171	2,420	14	91
12	998	12	32	2,000	43	232	2,670	18	130
13	1,010	11	30	2,520	91	619	2,600	16	112
14	993	14	38	3,240	130	1,140	2,340	13	82
15	976	15	40	3,900	159	1,670	2,150	11	64
16	954	14	36	4,300	136	1,580	2,260	12	73
17	923	14	35	4,440	112	1,340	3,140	39	331
18	954	17	44	4,300	77	894	3,150	32	272
19	1,030	18	50	4230	66	754	2,850	22	169
20	1,010	16	44	4,180	59	666	2,540	17	117
21	976	18	47	4,270	59	680	2,370	13	83
22	975	18	47	4,400	67	796	2,380	11	71
23	1,000	19	51	3,970	45	482	2,480	11	74
24	1,030	17	47	3,530	38	362	2,390	9	58
25	1,010	19	52	3,050	31	255	2,250	8	49
26	991	19	51	2,840	28	215	2,070	7	39
27	986	16	43	2,860	28	216	1,890	7	36
28	974	13	34	2,840	24	184	1,820	7	34
29	964	17	44	2,930	27	214	1,900	6	31
30	984	16	43	3,080	32	266	1,870	5	25
31	---	---	---	2,940	31	246	---	---	---
TOTAL	30,818	---	1,600	87,290	---	15,552	74,490	---	3,482
MEAN	1,027	19	53	2,816	60	502	2,483	16	116
MAX	1,200	33	1,07	4,440	159	1,670	3,330	39	331
MIN	923	11	30	1,010	16	44	1,820	5	25

Table 8. Daily streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	July			August			September		
1	1,720	5	23	1,590	6	26	1,730	22	103
2	1,680	5	23	1,520	5	21	1,680	20	91
3	1,830	5	25	1,450	5	20	1,690	17	78
4	2,030	5	27	1,390	4	15	1,640	16	71
5	2,130	5	29	1,410	9	34	1,600	15	65
6	2,130	5	29	1,460	12	47	1,560	14	59
7	2,140	6	35	1,370	10	37	1,520	13	53
8	2,270	6	37	1,310	10	35	1,480	12	48
9	2,190	5	30	1,270	9	31	1,440	10	39
10	2,140	5	29	1,170	6	19	1,400	9	34
11	2,080	6	34	1,100	7	21	1,350	9	33
12	2,070	6	34	1,090	7	21	1,340	8	29
13	2,090	6	34	1,130	7	21	1,400	8	30
14	2,080	5	28	1,170	8	25	1,430	8	31
15	2,080	5	28	1,210	9	29	1,420	7	27
16	2,030	4	22	1,330	21	75	1,440	7	27
17	1,990	4	21	1,500	34	138	1,430	7	27
18	2,060	4	22	1,480	22	88	1,410	7	27
19	2,040	4	22	1,400	12	45	1,390	7	26
20	1,920	4	21	1,340	10	36	1,380	6	22
21	1,880	4	20	1,380	11	41	1,400	6	23
22	1,790	4	19	1,540	25	104	1,410	5	19
23	1,820	4	20	1,660	37	166	1,370	5	18
24	1,760	4	19	1,530	19	78	1,340	5	18
25	1,690	4	18	1,430	14	54	1,320	6	21
26	1,790	5	24	1,380	15	56	1,280	5	17
27	2,120	13	74	1,560	25	105	1,250	5	17
28	2,200	15	89	1,640	26	115	1,210	5	16
29	1,990	14	75	1,670	26	117	1,190	5	16
30	1,780	11	53	1,820	30	147	1,180	5	16
31	1,690	7	32	1,820	27	133	---	---	---
TOTAL	61,210	---	996	44,120	---	1,900	42,680	---	1,101
MEAN	1,975	6	32	1,423	15	61	1,423	9	37
MAX	2,270	15	89	1,820	37	166	1,730	22	103
MIN	1,680	4	18	1,090	4	15	1,180	5	16

TOTAL FOR WATER YEAR 1993:
STREAMFLOW-- 449,629 ft^3/s
SEDIMENT DISCHARGE-- 31,653.3 tons

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1992 through September 1993

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

Day	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Dis-charge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Dis-charge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Dis-charge (ton/d)
				1992					
	October			November			December		
1	454	2	2.5	534	2	2.9	e430	2	2.3
2	455	2	2.5	536	2	2.9	e400	2	2.2
3	467	2	2.5	522	1	1.4	e370	2	2.0
4	456	3	3.7	513	1	1.4	e300	2	1.6
5	470	2	2.5	517	2	2.8	e270	2	1.5
6	499	2	2.7	511	2	2.8	e250	2	1.4
7	494	2	2.7	519	2	2.8	e300	2	1.6
8	488	2	2.6	549	2	3.0	e350	2	1.9
9	487	2	2.6	550	2	3.0	e400	2	2.2
10	488	2	2.6	529	2	2.9	e420	2	2.3
11	486	2	2.6	524	2	2.8	e450	2	2.4
12	486	2	2.6	520	2	2.8	e450	1	1.2
13	497	2	2.7	513	2	2.8	e420	1	1.1
14	519	1	1.4	511	2	2.8	e420	1	1.1
15	523	1	1.4	508	2	2.7	e450	2	2.4
16	518	1	1.4	501	2	2.7	e450	2	2.4
17	520	2	2.8	499	1	1.3	e420	2	2.3
18	516	2	2.8	505	1	1.4	e400	1	1.1
19	511	2	2.8	506	2	2.7	e380	1	1.0
20	506	2	2.7	498	2	2.7	e400	2	2.2
21	503	2	2.7	489	4	5.3	e420	3	3.4
22	498	2	2.7	491	13	17	e450	3	3.6
23	494	2	2.7	487	5	6.6	e470	3	3.8
24	489	2	2.6	425	3	3.4	e470	3	3.8
25	488	1	1.3	e350	3	2.8	e450	3	3.6
26	484	1	1.3	e320	4	3.5	e440	3	3.6
27	483	1	1.3	e300	4	3.2	e420	3	3.4
28	484	1	1.3	e370	3	3.0	e400	3	3.2
29	494	1	1.3	e450	3	3.6	e320	3	2.6
30	534	2	2.9	e450	2	2.4	e280	2	1.5
31	543	2	2.9	---	---	---	e300	2	1.6
TOTAL	15,334	---	73.1	14,497	---	101.4	12,150	---	70.3
MEAN	495	2	2.4	483	3	3.4	392	2	2.3
MAX	543	3	3.7	550	13	17	470	3	3.8
MIN	454	1	1.3	300	1	1.3	250	1	1.0

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	January			February			March		
1	e320	2	1.7	e430	3	3.5	e350	3	2.8
2	e350	2	1.9	e420	4	4.5	e360	4	3.9
3	e380	2	2.1	e410	5	5.5	e370	5	5.0
4	e370	2	2.0	e400	6	6.5	e370	6	6.0
5	e350	2	1.9	e400	5	5.4	e380	8	8.2
6	e300	3	2.4	e390	5	5.3	e400	9	9.7
7	e280	3	2.3	e390	4	4.2	e430	9	10
8	e270	3	2.2	e390	4	4.2	e480	10	13
9	e300	3	2.4	e380	3	3.1	e500	10	13
10	e310	3	2.5	e380	3	3.1	521	12	17
11	e320	4	3.5	e380	3	3.1	509	14	19
12	e330	4	3.6	e370	3	3.0	450	12	15
13	e350	5	4.7	e370	3	3.0	432	8	9.3
14	e360	5	4.9	e360	3	2.9	422	6	6.8
15	e370	6	6.0	e330	4	3.6	428	7	8.1
16	e380	14	14	e300	4	3.2	469	10	13
17	e390	19	20	e280	4	3.0	469	10	13
18	e400	17	18	e290	4	3.1	500	14	19
19	e400	14	15	e300	4	3.2	551	24	36
20	e410	7	7.7	e330	4	3.6	588	16	25
21	e420	3	3.4	e350	4	3.8	577	16	25
22	e440	3	3.6	e360	3	2.9	576	19	30
23	e430	3	3.5	e360	3	2.9	613	23	38
24	e420	3	3.4	e350	2	1.9	735	33	65
25	e420	4	4.5	e350	2	1.9	806	28	61
26	e450	4	4.9	e330	3	2.7	849	26	60
27	e480	4	5.2	e320	4	3.5	1,040	40	112
28	e480	4	5.2	e330	4	3.6	1,130	30	92
29	e470	4	5.1	---	---	---	1,120	18	54
30	e460	5	6.2	---	---	---	1,130	17	52
31	e450	5	6.1	---	---	---	1,110	13	39
TOTAL	11,860	---	169.9	10,050	---	100.2	18,665	---	880.8
MEAN	383	5	5.5	359	4	3.6	602	15	28
MAX	480	19	20	430	6	6.5	1,130	40	112
MIN	270	2	1.7	280	2	1.9	350	3	2.8

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	April			May			June		
1	1,100	11	33	1,440	8	31	3,900	20	211
2	1,130	11	34	1,490	9	36	4,390	39	462
3	1,170	11	35	1,640	11	49	4,020	28	304
4	1,210	13	42	1,910	25	129	3,600	20	194
5	1,350	14	51	2,330	43	271	3,290	13	115
6	e1,500	11	45	2,500	35	236	3,040	9	74
7	e1,500	10	40	2,780	35	263	2,940	8	64
8	1,420	8	31	2,950	34	271	2,860	8	62
9	1,430	10	39	2,880	35	272	2,760	9	67
10	1,440	10	39	2,740	27	200	2,590	8	56
11	1,430	9	35	2,840	25	192	2,480	8	54
12	1,400	8	30	3,570	51	492	2,510	8	54
13	1,360	7	26	4,840	125	1,630	2,510	8	54
14	1,320	7	25	5,980	175	2,830	2,350	7	44
15	1,270	6	21	6,870	210	3,900	2,170	7	41
16	1,230	6	20	7,180	158	3,060	2,080	7	39
17	1,200	7	23	7,020	124	2,350	2,110	7	40
18	1,230	8	27	6,680	86	1,550	2,280	11	68
19	1,320	7	25	6,350	76	1,300	2,410	21	137
20	1,340	6	22	6,140	65	1,080	2,270	20	123
21	1,330	7	25	6,100	57	939	2,140	18	104
22	1,340	9	33	5,980	52	840	2,130	15	86
23	1,390	11	41	5,410	44	643	2,090	12	68
24	1,440	10	39	4,720	34	433	2,070	10	56
25	1,440	9	35	4,140	30	335	2,010	9	49
26	1,440	9	35	3,930	24	255	1,890	8	41
27	1,420	9	35	3,940	24	255	1,820	9	44
28	1,400	8	30	3,880	20	210	1,820	9	44
29	1,390	9	34	3,980	20	215	1,810	9	44
30	1,410	8	30	3,990	21	226	1,770	8	38
31	---	---	---	3,730	18	181	---	---	---
TOTAL	40,350	---	980	129,930	---	24,674	76,110	---	2,837
MEAN	1,345	9	33	4,191	55	796	2,537	12	95
MAX	1,500	14	51	7,180	210	3,900	4,390	39	462
MIN	1,100	6	20	1,440	8	31	1,770	7	38

Table 9. Daily streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana, October 1992 through September 1993 (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)
				1993					
	July			August			Ssptember		
1	1,700	6	28	1,060	3	8.6	940	3	7.6
2	1,630	6	26	1,030	4	11	938	3	7.6
3	1,640	6	27	1,010	4	11	971	3	7.9
4	1,720	6	28	981	4	11	947	3	7.7
5	1,720	6	28	959	4	10	935	3	7.6
6	1,670	5	23	987	4	11	941	3	7.6
7	1,620	5	22	993	4	11	929	3	7.5
8	1,580	5	21	978	4	11	899	3	7.3
9	1,550	6	25	943	5	13	865	2	4.7
10	1,550	6	25	903	4	9.8	841	2	4.5
11	1,530	6	25	885	4	9.6	825	2	4.5
12	1,540	6	25	856	4	9.2	829	1	2.2
13	1,610	6	26	846	3	6.9	887	1	2.4
14	1,590	5	21	844	3	6.8	912	2	4.9
15	1,600	5	22	857	4	9.3	914	3	7.4
16	1,590	4	17	933	5	13	938	3	7.6
17	1,600	4	17	1,070	16	46	942	3	7.6
18	1,590	4	17	1,070	9	26	930	2	5.0
19	1,560	4	17	1,040	5	14	919	2	5.0
20	1,520	4	16	1,010	4	11	915	2	4.9
21	1,510	4	16	1,000	5	13	915	2	4.9
22	1,460	4	16	1,020	6	17	924	1	2.5
23	1,410	4	15	1,030	4	11	912	1	2.5
24	1,360	4	15	989	2	5.3	901	1	2.4
25	1,330	4	14	940	2	5.1	885	1	2.4
26	1,330	4	14	911	2	4.9	859	1	2.3
27	1,350	4	15	879	3	7.1	844	1	2.3
28	1,320	4	14	862	3	7.0	831	1	2.2
29	1,250	5	17	907	2	4.9	815	1	2.2
30	1,170	4	13	950	2	5.1	795	1	2.1
31	1,110	4	12	960	2	5.2	---	---	---
TOTAL	46,710	---	617	29,703	---	344.8	26,898	---	147.3
MEAN	1,507	5	20	958	4	11	897	2	4.9
MAX	1,720	6	28	1,070	16	46	971	3	7.9
MIN	1,110	4	12	844	2	4.9	795	1	2.1

TOTAL FOR WATER YEAR 1993:
STREAMFLOW-- 432,257 ft^3/s
SEDIMENT DISCHARGE-- 30,995.8 tons

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1992 through September 1993

[Abbreviations: ft^3/s, cubic feet per second; e, estimated; 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)
				1992					
	October			November			December		
1	901	2	4.9	1,240	3	10	995	1	2.7
2	902	2	4.9	1,230	4	13	951	2	5.1
3	907	3	7.3	1,220	4	13	e850	2	4.6
4	908	3	7.4	1,180	4	13	e700	2	3.8
5	911	3	7.4	1,210	4	13	e600	2	3.2
6	1,020	2	5.5	1,190	3	9.6	e550	2	3.0
7	1,050	2	5.7	1,180	2	6.4	e600	1	1.6
8	1,060	2	5.7	1,220	2	6.6	e700	2	3.8
9	1,060	2	5.7	1,230	2	6.6	e900	2	4.9
10	1,070	2	5.8	1,210	2	6.5	e950	2	5.1
11	1,080	3	8.7	1,190	2	6.4	e1,000	2	5.4
12	1,070	3	8.7	1,170	2	6.3	e1,000	2	5.4
13	1,070	3	8.7	1,160	2	6.3	e950	2	5.1
14	1,100	3	8.9	1,180	2	6.4	e950	2	5.1
15	1,140	3	9.2	1,180	2	6.4	e1,000	2	5.4
16	1,180	3	9.6	1,160	2	6.3	e1,000	2	5.4
17	1,200	3	9.7	1,140	2	6.2	e950	2	5.1
18	1,210	3	9.8	1,150	2	6.2	e900	2	4.9
19	1,190	3	9.6	1,150	2	6.2	e850	2	4.6
20	1,170	4	13	1,140	2	6.2	e900	2	4.9
21	1,170	4	13	1,120	7	21	e950	3	7.7
22	1,140	3	9.2	1,110	18	54	e1,000	3	8.1
23	1,130	3	9.2	1,120	8	24	e1,050	3	8.5
24	1,120	3	9.1	985	2	5.3	e1,050	2	5.7
25	1,120	3	9.1	877	2	4.7	1,010	2	5.5
26	1,120	2	6.0	e750	2	4.1	1,010	2	5.5
27	1,110	2	6.0	e700	2	3.8	1,020	3	8.3
28	1,100	2	5.9	851	2	4.6	e900	3	7.3
29	1,120	3	9.1	1,060	2	5.7	e700	4	7.6
30	1,190	3	9.6	1,050	1	2.8	e600	5	8.1
31	1,240	3	10	---	---	---	e650	6	11
TOTAL	33,759	---	252.4	33,353	---	290.6	27,236	---	172.4
MEAN	1,089	3	8.1	1,112	3	9.7	879	2	5.6
MAX	1,240	4	13	1,240	18	54	1,050	6	11
MIN	901	2	4.9	700	1	2.8	550	1	1.6

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1992 through September 1993 (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)
				1993					
	January			February			March		
1	e700	5	9.5	e1,050	4	11	e900	3	7.3
2	e800	5	11	e1,000	4	11	e950	3	7.7
3	e850	4	9.2	e950	5	13	e950	3	7.7
4	e850	3	6.9	955	6	15	e950	3	7.7
5	e800	3	6.5	952	5	13	979	3	7.9
6	e700	4	7.6	939	4	10	1,020	4	11
7	e650	4	7.0	947	3	7.7	1,200	5	16
8	e600	4	6.5	932	3	7.5	1,330	12	43
9	e650	3	5.3	949	4	10	1,460	17	67
10	e700	3	5.7	947	4	10	1,490	16	64
11	e700	3	5.7	927	4	10	1,470	15	60
12	e750	2	4.1	920	4	9.9	1,300	10	35
13	e800	1	2.2	924	4	10	1,200	9	29
14	e850	1	2.3	941	5	13	1,230	9	30
15	e900	1	2.4	809	5	11	1,280	9	31
16	e900	1	2.4	e700	5	9.5	1,490	10	40
17	e900	2	4.9	e600	6	9.7	1,540	20	83
18	e950	2	5.1	e650	8	14	1,460	29	114
19	e950	3	7.7	e700	8	15	1,620	25	109
20	e950	3	7.7	e800	7	15	1,860	31	156
21	e1,000	3	8.1	e850	6	14	1,680	15	68
22	e1,050	3	8.5	e900	5	12	1,610	12	52
23	e1,050	3	8.5	e900	4	9.7	1,710	12	55
24	e1,000	4	11	e900	3	7.3	2,280	35	215
25	e1,000	4	11	e900	3	7.3	2,270	51	313
26	e1,100	4	12	e850	3	6.9	2,250	30	182
27	e1,200	4	13	e800	3	6.5	2,380	19	122
28	e1,200	4	13	e850	3	6.9	2,570	18	125
29	e1,200	4	13	---	---	---	2,430	15	98
30	e1,150	4	12	---	---	---	2,420	15	98
31	e1,100	3	8.9	---	---	---	2,350	11	70
TOTAL	28,000	---	238.7	24,542	---	295.9	49,629	---	2,324.3
MEAN	903	3	7.7	876	5	11	1,601	15	75
MAX	1,200	5	13	1,050	8	15	2,570	51	313
MIN	600	1	2.2	600	3	6.5	900	3	7.3

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1992 through September 1993 (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)
				1993					
	April			May			June		
1	2,300	10	62	2,500	6	40	6,630	24	430
2	2,350	11	70	2,560	7	48	7,500	35	709
3	2,430	9	59	2,710	8	59	6,980	30	565
4	2,410	9	59	3,230	13	113	6,190	23	384
5	2,700	12	87	4,080	18	198	5,740	16	248
6	2,810	11	83	4,420	19	227	5,380	12	174
7	2,690	8	58	4,800	21	272	5,410	11	161
8	2,600	7	49	5,180	24	336	5,400	11	160
9	2,580	8	56	4,960	27	362	5,140	11	153
10	2,570	7	49	4,680	22	278	4,810	10	130
11	2,530	6	41	4,680	19	240	4,820	9	117
12	2,480	5	33	5,610	27	409	5,020	10	136
13	2,450	4	26	7,410	68	1,360	5,000	11	148
14	2,390	7	45	9,200	104	2,580	4,640	10	125
15	2,320	6	38	10,800	134	3,910	4,310	10	116
16	2,260	7	43	11,600	129	4,040	4,250	9	103
17	2,190	6	35	11,600	116	3,630	4,980	18	242
18	2,240	6	36	11,100	98	2,940	5,180	22	308
19	2,420	7	46	10,600	82	2,350	5,050	18	245
20	2,420	7	46	10,300	72	2,000	4,700	16	203
21	2,360	6	38	10,300	64	1,780	4,450	15	180
22	2,350	5	32	10,400	63	1,770	4,460	15	181
23	2,430	7	46	9,400	56	1,420	4,510	15	183
24	2,530	7	48	8,240	48	1,070	4,400	13	154
25	2,500	7	47	7,210	36	701	4,240	10	114
26	2,490	5	34	6,690	28	506	3,950	10	107
27	2,460	7	46	6,770	25	457	3,720	12	121
28	2,440	6	40	6,630	25	448	3,660	13	128
29	2,400	7	45	6,770	26	475	3,700	12	120
30	2,440	7	46	6,950	27	507	3,650	11	108
31	---	---	---	6,570	26	461	---	---	---
TOTAL	73,540	---	1,443	217,950	---	34,987	147,870	---	6,253
MEAN	2,451	7	48	7,031	46	1,130	4,929	15	208
MAX	2,810	12	87	11,600	134	4,040	7,500	35	709
MIN	2,190	4	26	2,500	6	40	3,650	9	103

Table 10. Daily streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 1992 through September 1993 (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)
				1993					
	July			August			September		
1	3,460	10	93	2,640	7	50	2,620	11	78
2	3,330	10	90	2,550	6	41	2,560	10	69
3	3,450	10	93	2,450	6	40	2,600	10	70
4	3,660	10	99	2,370	7	45	2,520	9	61
5	3,800	11	113	2,370	8	51	2,460	9	60
6	3,700	13	130	2,450	10	66	2,420	10	65
7	3,700	13	130	2,390	10	65	2,390	10	65
8	3,780	13	133	2,300	8	50	2,270	10	61
9	3,690	12	120	2,260	6	37	2,240	9	54
10	3,550	11	105	2,100	7	40	2,160	9	52
11	3,530	10	95	2,030	8	44	2,100	8	45
12	3,500	10	94	1,980	8	43	2,090	7	40
13	3,640	9	88	1,990	8	43	2,190	6	35
14	3,590	10	97	2,010	8	43	2,260	6	37
15	3,590	9	87	2,070	8	45	2,260	7	43
16	3,510	9	85	2,220	8	48	2,280	7	43
17	3,510	9	85	2,580	10	70	2,280	7	43
18	3,540	8	76	2,580	12	84	2,250	7	43
19	3,540	8	76	2,430	8	52	2,220	6	36
20	3,360	8	73	2,350	6	38	2,190	6	35
21	3,300	8	71	2,360	7	45	2,210	6	36
22	3,180	8	69	2,490	12	81	2,240	5	30
23	3,100	9	75	2,670	14	101	2,200	6	36
24	3,070	9	75	2,520	12	82	2,150	6	35
25	2,910	10	79	2,330	10	63	2,110	6	34
26	3,050	11	91	2,270	9	55	2,040	7	39
27	3,360	12	109	2,330	10	63	2,010	7	38
28	3,470	13	122	2,460	11	73	1,940	7	37
29	3,180	12	103	2,500	11	74	1,930	7	36
30	2,920	11	87	2,690	11	80	1,890	7	36
31	2,750	9	67	2,710	11	80	---	---	---
TOTAL	105,720	---	2,910	73,450	---	1,792	67,080	---	1,392
MEAN	3,410	10	94	2,369	9	58	2,236	8	46
MAX	3,800	13	133	2,710	14	101	2,620	11	78
MIN	3,460	10	93	2,640	7	50	2,620	11	78

TOTAL FOR WATER YEAR 1993:
STREAMFLOW-- 882,129 ft^3/s
SEDIMENT DISCHARGE-- 52,351.3 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]

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	08-16-93	1100	30	6.7	9.1	2.5	98	20
		08-16-93	1101	30	6.8	9.5	2.5	100	20
12323250	Silver Bow Creek below Blacktail Creek at Butte	05-14-93	1300	45	10	25	5.4	79	83
		05-14-93	1300	44	10	25	5.4	80	81
12323600	Silver Bow Creek at Opportunity	03-08-93	1530	30	5.7	23	5.8	--	--
		03-08-93	1530	30	5.6	22	5.9	49	69
12323750	Silver Bow Creek at Warm Springs	04-12-93	1800	56	13	16	5.1	87	140
		04-12-93	1800	56	13	16	5.2	86	140
		06-07-93	0745	48	9.1	11	3.7	89	87
		06-07-93	0745	49	9.3	12	3.6	89	87
12324680	Clark Fork at Goldcreek	04-27-93	1230	55	13	13	3.1	128	82
		04-27-93	1230	55	12	13	3.2	128	84
12331800	Clark Fork near Drummond	05-26-93	1145	50	11	13	3.1	125	58
		05-26-93	1145	50	11	12	3.2	126	60

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	08-16-93	4.8	0.4	28	161	10	8	<1	<0.1	7	5
	08-16-93	4.8	.4	28	162	10	8	<1	<.1	7	6
12323250	05-14-93	20	.5	22	260	17	7	4	2.4	300	120
	05-14-93	19	.5	22	257	17	7	4	2.1	300	110
12323600	03-08-93	--	--	--	--	140	34	6	2.0	980	180
	03-08-93	29	.7	14	207	130	34	6	2.2	1,000	180
12323750	04-12-93	10	.7	14	307	19	14	<1	.2	60	23
	04-12-93	10	.7	14	307	18	16	<1	.2	57	22
	06-07-93	5.4	.6	11	229	23	19	<1	.2	32	21
	06-07-93	5.2	.6	11	231	23	19	<1	.2	31	21
12324680	04-27-93	5.9	.4	18	267	11	9	<1	<.1	21	4
	04-27-93	5.7	.5	17	267	10	8	<1	<.1	21	5
12331800	05-26-93	4.6	.4	20	235	18	13	<1	.1	--	--
	05-26-93	4.5	.4	18	235	18	12	<1	.1	--	--

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

Station Number	Date	Iron, total recov-erable (ug/L)	Iron, dissolved (ug/L)	Lead, total recov-erable (ug/L)	Lead, dissolved (ug/L)	Manga-nese, total recov-erable (ug/L)	Manga-nese, dissolved (ug/L)	Zinc, total recov-erable (ug/L)	Zinc, dissolved (ug/L)
12323230	08-16-93	590	230	1	<0.5	30	22	<10	5
	08-16-93	600	300	1	.6	20	22	<10	7
12323250	05-14-93	2,100	65	35	.9	880	870	1,100	930
	05-14-93	2,100	60	35	.8	880	830	1,100	890
12323600	03-08-93	7,600	100	200	2.3	1,200	750	1,400	620
	03-08-93	7,400	110	210	2.3	1,200	750	1,400	620
12323750	04-12-93	420	14	5	<.5	360	180	130	17
	04-12-93	450	10	5	<.5	360	170	130	17
	06-07-93	220	25	<1	<.5	190	140	70	37
	06-07-93	200	24	<1	<.5	200	140	70	41
12324680	04-27-93	380	5	2	<.5	100	26	40	7
	04-27-93	340	5	3	.7	100	25	30	9
12331800	05-26-93	890	15	--	--	170	22	70	18
	05-26-93	880	19	--	--	160	23	80	13

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, mg/L	7	0.38	0.84
Magnesium, mg/L	7	.28	2.8
Sodium, mg/L	7	.48	3.0
Potassium, mg/L	7	.06	1.4
Alkalinity, mg/L as calcium carbonate	6	.76	.78
Sulfate, mg/L	6	1.0	1.3
Chloride, mg/L	6	.30	3.1
Fluoride, µg/L	6	.03	5.5
Silica, µg/L	6	.64	3.5
Arsenic, total recoverable, µg/L	7	2.7	8.1
Arsenic, dissolved, µg/L	7	.65	4.4
Cadmium, total recoverable, µg/L	7	.0	.0
Cadmium, dissolved, µg/L	7	.10	14
Copper, total recoverable, µg/L	6	5.8	2.5
Copper, dissolved, µg/L	6	2.9	5.0
Iron, total recoverable, µg/L	7	55	3.2
Iron, dissolved, µg/L	7	19	27
Lead, total recoverable, µg/L	6	2.9	6.9
Lead, dissolved, µg/L	6	.17	22
Manganese, total recoverable, µg/L	7	4.6	1.1
Manganese, dissolved, µg/L	7	11	3.9
Zinc, total recoverable, µg/L	7	3.8	.94
Zinc, dissolved, µg/L	7	11	4.7

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	7	0.71	0.2	Yes
pH, units	8	.07	1.0	Yes
Calcium, mg/L	8	.43	1.5	Yes
Magnesium, mg/L	8	.12	1.7	Yes
Sodium, mg/L	8	.18	2.1	Yes
Potassium, mg/L	7	.05	1.5	Yes
Alkalinity, mg/L as calcium carbonate	6	.65	.7	Yes
Sulfate, mg/L	13	.34	1.2	Yes
Chloride, mg/L	11	.40	2.9	Yes
Fluoride, µg/L	8	.02	6.7	Yes
Silica, µg/L	6	.00	.0	Yes
Arsenic, total recoverable, µg/L	8	.39	4.2	Yes
Arsenic, dissolved, µg/L	8	.49	9.4	Yes
Cadmium, total recoverable, µg/L	8	.02	2.5	Yes
Cadmium, dissolved, µg/L	8	.08	9.6	Yes
Copper, total recoverable, µg/L	8	.18	2.5	Yes
Copper, dissolved, µg/L	8	.93	9.6	Yes
Iron, total recoverable, µg/L	8	22	2.4	Yes
Iron, dissolved, µg/L	8	2.2	2.6	Yes
Lead, total recoverable, µg/L	8	.19	3.0	Yes
Lead, dissolved, µg/L	7	.49	6.4	Yes
Manganese, total recoverable, µg/L	8	4.9	2.9	Yes
Manganese, dissolved, µg/L	8	1.1	1.4	Yes
Zinc, total recoverable, µg/L	8	3.2	1.1	Yes
Zinc, dissolved, µg/L	8	3.5	9.8	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	8	102.6	95.8-109	Yes
Arsenic, dissolved, µg/L	7	94.0	89.6-98.4	Yes
Cadmium, total recoverable, µg/L	7	97.0	93.5-101	Yes
Cadmium, dissolved, µg/L	7	93.4	85.9-101	Yes
Copper, total recoverable, µg/L	6	101.7	94.4-109	Yes
Copper, dissolved, µg/L	6	99.5	95.9-103	Yes
Iron, total recoverable, µg/L	7	94.0	90.0-98.0	Yes
Iron, dissolved, µg/L	7	103.3	92.4-114	Yes
Lead, total recoverable, µg/L	6	100.5	95.2-106	Yes
Lead, dissolved, µg/L	6	105.8	99.5-112	Yes
Manganese, total recoverable, µg/L	7	96.9	96.3-97.5	Yes
Manganese, dissolved, µg/L	7	95.6	82.2-109	Yes
Zinc, total recoverable, µg/L	7	96.3	94.1-98.5	Yes
Zinc, dissolved, µg/L	7	106.5	99.7-113	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	8	99.9	96.5-103	Yes
Arsenic, dissolved, µg/L	7	95.2	92.0-98.3	Yes
Cadmium, total recoverable, µg/L	8	98.1	95.2-101	Yes
Cadmium, dissolved, µg/L	7	97.1	92.3-102	Yes
Copper, total recoverable, µg/L	8	97.2	92.3-102	Yes
Copper, dissolved, µg/L	8	97.4	95.8-99.0	Yes
Iron, total recoverable, µg/L	7	94.6	86.7-103	Yes
Iron, dissolved, µg/L	7	102.2	94.4-110	Yes
Lead, total recoverable, µg/L	8	96.0	93.0-99.0	Yes
Lead, dissolved, µg/L	7	104.7	98.5-111	Yes
Manganese, total recoverable, µg/L	7	95.7	92.1-99.3	Yes
Manganese, dissolved, µg/L	7	100.2	96.4-104	Yes
Zinc, total recoverable, µg/L	7	95.7	92.2-99.2	Yes
Zinc, dissolved, µg/L	7	105.7	93.4-118	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)
Nov 1992									
16...	1305	--	--	<0.10	<0.10	--	--	--	--
Mar 1993									
08...	1000	1	6.8	<.02	<.01	<0.2	<0.1	<1.0	0.3
Apr									
12...	0800	4	5.4	.03	<.01	<.2	<.1	2.5	<.1
Jun									
08...	0600	1	5.2	<.02	<.01	<.2	<.1	1.1	<.1
Jul									
12...	0730	1	4.4	<.02	<.01	<.2	<.1	1.3	<.1
Aug									
16...	0730	1	5.5	<.02	<.01	<.2	<.1	2.8	<.1

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)
Nov 1992									
16...	--	--	--	<1	<1	<1	<1	<1	<1
Mar 1993									
08...	0.2	<0.1	0.1	<1	<1	<1	<.1	<1	<1
Apr									
12...	<.1	<.1	<.1	<1	<1	<1	<.1	2	2
Jun									
08...	<.1	<.1	<.1	<1	<1	<1	<.1	<1	<1
Jul									
12...	.2	<.1	<.1	<1	<1	<1	<.1	<1	<1
Aug									
16...	.3	<.1	<.1	<1	<1	<1	<.1	<1	<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)
Nov 1992								
16...	<10	<10	<1	<1	<10	<10	<10	<10
Mar 1993								
08...	10	<3	<1	<.5	<10	<1	<10	<3
Apr								
12...	10	<3	<1	<.5	10	<1	<10	<3
Jun								
08...	20	<3	<1	<.5	10	<1	<10	<3
Jul								
12...	20	<3	2	2.4	<10	<1	<10	4
Aug								
16...	<10	<3	2	1.4	<10	<1	<10	9

Table 17. Trace-element analyses of fine bed sediment, upper Clark Fork basin, Montana, August 1993

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

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	29.3	24.2	4,570	37,500	1,030	1,680	16.3	19.6	6,850
12323750	Silver Bow Creek at Warm Springs	3	12.2	12.8	769	20,800	99	8,150	16.5	.9	2,010
12323800	Clark Fork near Galen	3	13.2	22.1	1,520	29,900	191	12,200	23.2	4.2	2,580
12324200	Clark Fork at Deer Lodge	3	5.6	19.5	992	26,800	177	1,480	15.0	4.1	1,230
12324680	Clark Fork at Goldcreek	3	6.2	31.6	1,030	26,400	152	1,180	17.0	3.7	1,320
12331500	Flint Creek near Drummond	3	3.2	21.1	73	22,400	240	3,050	11.6	7.8	727
12331800	Clark Fork near Drummond	3	4.2	30.8	614	24,700	135	1,940	15.7	3.5	1,100
12334510	Rock Creek near Clinton	3	<.8	19.3	15	18,000	16	423	12.7	<.5	58
12334550	Clark Fork at Turah Bridge, near Bonner	3	3.9	26.7	498	22,400	115	1,410	15.9	2.9	1,010
12340000	Blackfoot River near Bonner	3	<.8	15.3	25	15,800	20	535	12.7	<.5	71
12353000	Clark Fork below Missoula[1]	3	1.9	18.8	225	21,040	58	991	14.1	1.5	486

[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 1993

[Abbreviations: µg/g, micrograms per gram of dry sample weight. Concentrations are the mean of all analyses for duplicate aliquots for each composite sample]

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	6.7	9.6	831	18,700	248	671	6.0	3.9	2,050
12323750	Silver Bow Creek at Warm Springs	3	1.2	9.9	111	9,160	33	543	8.0	<.5	303
12323800	Clark Fork near Galen	1	1.5	4.2	223	9,930	41	1,280	4.9	.7	498
12324200	Clark Fork at Deer Lodge	3	2.4	16.1	383	17,900	85	998	10.2	1.6	599
12324680	Clark Fork at Goldcreek	1	2.4	23.4	370	18,600	72	649	12.4	1.6	676
12331500	Flint Creek near Drummond	1	.3	4.9	19	8,630	51	1,150	5.8	3.9	190
12331800	Clark Fork near Drummond	1	1.8	16.9	276	15,900	61	820	11.0	1.7	621
12334510	Rock Creek near Clinton	1	<.8	6.6	4	6,380	5	91	4.8	.1	16
12334550	Clark Fork at Turah Bridge, near Bonner	3	.5	6.9	122	10,700	30	487	6.4	.3	345
12340000	Blackfoot River near Bonner	1	<.8	6.7	14	10,300	8	179	7.6	<.5	33
12353000	Clark Fork below Missoula[1]	3	.5	8.6	77	10,200	19	351	7.1	.4	172

[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	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
		SRM sample 2709		
Cadmium	5	0.38	--	--
Chromium	5	130	54.8	49.0-60.6
Copper	5	34.6	76.9	70.9-82.9
Iron	5	35,000	79.1	75.9-82.3
Lead	5	18.9	97.3	94.0-101
Manganese	5	538	87.1	85.5-88.7
Nickel	5	88	84.9	83.1-86.7
Silver	5	.41	--	--
Zinc	5	106	90.0	87.0-93.0
		SRM sample 2711		
Cadmium	9	41.7	96.9	95.2-98.6
Chromium	9	47.0	51.6	46.3-56.9
Copper	9	114	88.2	85.5-90.9
Iron	9	28,900	75.4	71.2-79.6
Lead	9	1,160	101	99.1-103
Manganese	9	638	80.2	78.2-82.2
Nickel	9	20.6	80.6	77.8-83.4
Silver	9	4.63	77.5	72.5-82.5
Zinc	9	350	93.1	90.9-95.3

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 digested sample aliquot to final volume of solution after addition of 0.6 N hydrochloric acid. Symbol: <, less than]

Sample designation	Dilution ratio	Trace-element concentration, in µg/mL								
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Silver	Zinc
A	1:5	<0.006	<0.004	0.014	0.060	<0.011	<0.023	<0.005	<0.003	<0.003
A	1:10	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
B	1:5	<.006	<.004	.012	<.055	<.011	<.023	<.005	<.003	<.003
B	1:10	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
C	1:5	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
C	1:10	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
D	1:5	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
D	1:10	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
E	1:5	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
E	1:10	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003
F	1:1	<.006	<.004	.021	<.055	<.011	<.023	<.005	<.003	.037
F	1:5	<.006	.006	<.006	.175	<.011	<.023	<.005	<.003	.025
G	1:1	<.006	<.004	.014	<.055	<.011	<.023	<.005	<.003	.032
G	1:5	<.006	<.004	<.006	.106	<.011	<.023	<.005	<.003	<.003
H	1:1	<.006	<.004	.010	<.055	<.011	<.023	<.005	<.003	.023
H	1:5	<.006	<.004	<.006	.072	<.011	<.023	<.005	<.003	<.003
I	1:1	<.006	<.004	.023	<.055	<.011	<.023	<.005	<.003	.026
I	1:5	<.006	<.004	<.006	<.055	<.011	<.023	<.005	<.003	<.003

Table 21. Trace-element analyses of aquatic insects, upper Clark Fork basin, Montana, August 1993

[Abbreviations: µg/g, micrograms per gram of dry sample weight. 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]

Taxon	Number of composite samples	Concentration, in µg/g							
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600 Silver Bow Creek at Opportunity (insufficient number of insects obtainable for analysis)									
12323750 Silver Bow Creek at Warm Springs									
Hydropsyche cockerelli	2	2.0	0.7	96.9	784	5.2	1,160	0.7	261
Hydropsyche morosa group	1	2.3	1.4	47.6	619	5.1	1,100	<.4	284
Chematopsyche sp.	1	3.6	.9	117	725	5.0	1,110	.9	242
12323800 Clark Fork near Galen									
Hydropsyche cockerelli	2	2.6	3.1	176	1,390	8.0	1,760	2.9	285
Hydropsyche occidentalis	1	1.5	6.6	82.4	786	4.0	2,860	3.5	278
Hydropsyche tana	1	3.2	4.6	156	1,890	12.4	2,360	3.6	349
12324200 Clark Fork at Deer Lodge									
Hydropsyche cockerelli	3	1.6	2.1	81.8	568	6.1	632	.9	168
Hydropsyche occidentalis	1	2.7	16.5	49.4	1,030	<4.6	1,960	12.9	297
12324680 Clark Fork at Goldcreek									
Hydropsyche cockerelli	3	2.0	3.2	66.8	636	5.3	608	1.3	196
Arctopsyche grandis	1	6.6	2.3	39.9	387	3.8	1,080	1.0	309
Claassenia sabulosa	1	.6	1.6	66.6	209	1.0	179	.4	166
12331500 Flint Creek near Drummond									
Hydropsyche occidentalis	1	1.0	17.6	<1.7	1,940	24.0	1,450	6.8	195
Hydropsyche tana	1	.3	10.3	5.4	1,320	15.3	1,180	3.1	139
Arctopsyche grandis	6	.5	3.1	16.3	1,740	13.5	1,280	1.6	240
12331800 Clark Fork near Drummond									
Hydropsyche cockerelli	2	1.2	1.6	44.4	513	6.9	549	.6	175
Hydropsyche occidentalis	1	1.0	8.1	13.3	424	3.0	619	1.7	173
Claassenia sabulosa	1	1.2	3.3	45.5	252	1.3	156	1.1	211
12334510 Rock Creek near Clinton									
Hydropsyche cockerelli	1	.3	2.3	17.6	652	.6	215	1.4	144
Arctopsyche grandis	2	.3	2.4	10.5	513	<.3	277	1.4	161
Claassenia sabulosa	3	.2	1.5	28.5	94.6	.07	24.4	.6	255
12334550 Clark Fork at Turah Bridge, near Bonner									
Hydropsyche cockerelli	1	1.4	8.0	26.4	905	4.4	788	2.6	224
Hydropsyche occidentalis	2	.9	2.4	40.5	1,090	7.9	1,440	1.0	230
Hydropsyche morosa group	1	1.1	4.6	26.8	986	6.6	1,320	1.7	231
Arctopsyche grandis	2	1.7	1.9	23.2	569	3.5	722	.6	236
Claassenia sabulosa	2	1.4	1.7	45.1	113	.9	79.6	.4	217
12340000 Blackfoot River near Bonner									
Hydropsyche occidentalis	1	.1	1.5	20.6	1,060	1.2	452	1.1	150
Hydropsyche morosa group	1	.3	1.9	10.2	948	1.1	496	1.6	167
Arctopsyche grandis	1	.1	1.1	13.4	483	1.5	360	.7	136
Claassenia sabulosa	1	.05	.7	48.3	113	.6	45.2	.3	197
12353000 Clark Fork below Missoula[1]									
Hydropsyche cockerelli	5	.6	3.1	35.8	1,150	2.8	627	1.3	169
Hydropsyche occidentalis	1	.5	3.5	30.5	731	1.9	667	1.3	159
Arctopsyche grandis	1	.9	2.7	17.1	343	1.8	525	.8	169
Claassenia sabulosa	2	.7	1.1	51.9	112	.4	52.4	.3	203

[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	94.9	88.9-101
Chromium	7	1.43	93.1	67.8-118
Copper	7	66.3	100	96.5-103
Iron	7	539	89.7	86.9-92.5
Lead	7	12.3	126	81.1-171
Manganese	7	2.25	90.9	87.1-94.7
Nickel	7	.37	88.6	78.0-99.2
Zinc	7	830	92.1	89.0-95.2

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

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

Sample designation	Dilution ratio	Trace-element concentration, in µg/mL							
		Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
A	1:1	<0.006	0.047	0.022	<0.055	0.038	<0.023	0.019	0.033
B	1:1	<.006	.060	.025	.151	.011	<.023	.016	<.003
C	1:1	<.006	.063	.014	.146	<.011	<.023	.009	.004
D	1:1	<.006	.092	<.006	.279	<.011	<.023	.026	.020
E	1:1	<.006	.053	<.006	.161	<.011	<.023	.014	<.003
F	1:1	<.006	.068	<.006	.252	<.011	<.023	.018	.034
G	1:1	<.006	.057	<.006	.226	<.011	<.023	.017	<.003
H	1:1	<.006	.078	<.006	.348	<.011	<.023	.024	<.003
I	1:1	<.006	.006	.013	.079	.012	<.023	<.005	.019
J	1:1	<.006	.007	<.006	<.055	.036	<.023	<.005	<.003

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993

[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.					
Water-quality period of record: March 1993-September 1993					
Streamflow, instantaneous (ft^3/s)	8	9.3	3.1	7.4	7.8
Specific conductance, onsite (µS/cm)	8	320	206	258	254
Temperature, water (°C)	8	17	4	9.9	10.5
pH, onsite (standard units)	8	8.2	7.7	7.9	7.9
Hardness, total (mg/L as $CaCO_3$)	8	120	73	102	105
Calcium, dissolved (mg/L)	8	35	21	30	30
Magnesium, dissolved (mg/L)	8	8.4	5.1	7.0	7.0
Sodium, dissolved (mg/L)	8	16	9.1	11	11
Potassium, dissolved (mg/L)	8	3	2.1	2.4	2.4
Alkalinity (mg/L as $CaCO_3$)	8	100	62	87	87
Sulfate, dissolved (mg/L as SO_4)	8	34	20	27	28
Chloride, dissolved (mg/L)	8	8.9	3.8	6.4	5.5
Fluoride, dissolved (mg/L)	8	.6	.2	.4	.3
Silica, dissolved (mg/L)	8	28	14	23	24
Dissolved solids, calculated (mg/L)	8	192	121	160	161
Arsenic, total recoverable (µg/L)	8	10	3	7	6
Arsenic, dissolved (µg/L)	8	8	2	4	4
Cadmium, total recoverable (µg/L)	8	<1	<1	--	<1
Cadmium, dissolved (µg/L)	8	.1	<.1	--	<.1
Copper, total recoverable (µg/L)	8	52	4	15	7
Copper, dissolved (µg/L)	8	9	3	5	4
Iron, total recoverable (µg/L)	8	3,800	300	1,040	525
Iron, dissolved (µg/L)	8	230	44	133	155
Lead, total recoverable (µg/L)	8	47	<1	[2]11	1
Lead, dissolved (µg/L)	8	1.0	<.5	--	<.5
Manganese, total recoverable (µg/L)	8	190	30	76	60
Manganese, dissolved (µg/L)	8	51	17	36	38
Zinc, total recoverable (µg/L)	8	130	<10	[2]34	10
Zinc, dissolved (µg/L)	8	11	<3	[2]6	5
Sediment, suspended concentration (mg/L)	8	123	3	31	6
Sediment, suspended discharge (ton/d)	8	3	.05	.67	.12
Sediment, suspended (percent finer than 0.062 mm)	8	95	61	87	91

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323250--SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MONT. **Water-quality period of record: March 1993-September 1993**					
Streamflow, instantaneous (ft^3/s)	8	37	20	26	23
Specific conductance, onsite (µS/cm)	8	535	402	468	462
Temperature, water (°C)	8	15.5	3.0	11.7	13.5
pH, onsite (standard units)	8	7.8	7.4	7.5	7.5
Hardness, total (mg/L as $CaCO_3$)	8	170	130	149	150
Calcium, dissolved (mg/L)	8	48	36	43	44
Magnesium, dissolved (mg/L)	8	12	8.3	10	10
Sodium, dissolved (mg/L)	8	33	18	24	24
Potassium, dissolved (mg/L)	8	7.1	4.5	5.5	5.3
Alkalinity (mg/L as $CaCO_3$)	7	96	65	79	78
Sulfate, dissolved (mg/L as $S0_4$)	7	92	70	79	77
Chloride, dissolved (mg/L)	7	26	16	21	21
Fluoride, dissolved (mg/L)	7	.8	.4	.5	.5
Silica, dissolved (mg/L)	7	24	17	22	22
Dissolved solids, calculated (mg/L)	7	285	218	253	255
Arsenic, total recoverable (µg/L)	8	39	11	18	16
Arsenic, dissolved (µg/L)	8	10	5	8	8
Cadmium, total recoverable (µg/L)	8	6	2	3	3
Cadmium, dissolved (µg/L)	8	2.6	1.9	2.3	2.3
Copper, total recoverable (µg/L)	8	550	130	252	195
Copper, dissolved (µg/L)	8	120	65	94	87
Iron, total recoverable (µg/L)	8	7,400	500	2,100	785
Iron, dissolved (µg/L)	8	120	26	65	60
Lead, total recoverable (µg/L)	8	250	3	52	16
Lead, dissolved (µg/L)	8	2.4	<.5	[2].1	.8
Manganese, total recoverable (µg/L)	8	1,500	620	869	840
Manganese, dissolved (µg/L)	8	910	660	760	735
Zinc, total recoverable (µg/L)	8	1,600	790	1,060	1,000
Zinc, dissolved (µg/L)	8	930	710	824	795
Sediment, suspended concentration (mg/L)	8	162	5	42	13
Sediment, suspended discharge (ton/d)	8	16	.30	3.6	.90
Sediment, suspended (percent finer than 0.062 mm)	8	93	82	88	88

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323600--SILVER BOW CREEK AT OPPORTUNITY, MONT. **Water-quality period of record: March 1993-September 1993**					
Streamflow, instantaneous (ft^3/s)	7	108	49	74	64
Specific conductance, onsite (µS/cm)	8	395	282	343	354
Temperature, water (°C)	8	16.0	.5	10	9.5
pH, onsite (standard units)	8	8.9	7.6	8.3	8.4
Hardness, total (mg/L as $CaCO_3$)	8	140	98	121	120
Calcium, dissolved (mg/L)	8	41	30	37	37
Magnesium, dissolved (mg/L)	8	8.9	5.7	7.4	7.4
Sodium, dissolved (mg/L)	8	23	12	16	15
Potassium, dissolved (mg/L)	8	5.8	2.9	3.9	3.7
Alkalinity (mg/L as $CaCO_3$)	7	98	78	85	84
Sulfate, dissolved (mg/L as $S0_4$)	7	79	46	60	58
Chloride, dissolved (mg/L)	7	13	7.3	9.6	9.0
Fluoride, dissolved (mg/L)	7	.5	.3	.4	.4
Silica, dissolved (mg/L)	7	23	19	20	20
Dissolved solids, calculated (mg/L)	7	237	176	206	209
Arsenic, total recoverable (µg/L)	8	140	11	32	16
Arsenic, dissolved (µg/L)	8	34	6	12	8
Cadmium, total recoverable (µg/L)	8	6	1	2	2
Cadmium, dissolved (µg/L)	8	2.0	.7	1.2	1.2
Copper, total recoverable (µg/L)	8	980	100	261	165
Copper, dissolved (µg/L)	8	180	45	82	54
Iron, total recoverable (µg/L)	8	7,600	570	1,750	945
Iron, dissolved (µg/L)	8	100	19	57	50
Lead, total recoverable (µg/L)	8	200	8	37	13
Lead, dissolved (µg/L)	8	2.3	<.5	--	<.5
Manganese, total recoverable (µg/L)	8	1,200	340	635	570
Manganese, dissolved (µg/L)	8	750	270	530	535
Zinc, total recoverable (µg/L)	8	1,400	260	566	445
Zinc, dissolved (µg/L)	8	620	110	281	205
Sediment, suspended concentration (mg/L)	9	384	6	78	16
Sediment, suspended discharge (ton/d)	9	52	.81	12	4.0
Sediment, suspended (percent finer than 0.062 mm)	9	92	60	76	78

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323750--SILVER BOW CREEK AT WARM SPRINGS, MONT.					
Water-quality period of record: March 1993-September 1993					
Streamflow, instantaneous (ft^3/s)	9	347	32	158	149
Specific conductance, onsite (µS/cm)	8	580	361	455	475
Temperature, water (°C)	9	18.5	2.0	13.3	15.0
pH, onsite (standard units)	8	9.3	8.0	8.7	8.5
Hardness, total (mg/L as $CaCO_3$)	8	250	150	190	190
Calcium, dissolved (mg/L)	8	74	44	56	54
Magnesium, dissolved (mg/L)	8	17	9.1	12	12
Sodium, dissolved (mg/L)	8	23	11	15	15
Potassium, dissolved (mg/L)	8	5.4	3.4	4.4	4.4
Alkalinity (mg/L as $CaCO_3$)	8	99	69	89	90
Sulfate, dissolved (mg/L as $S0_4$)	8	170	81	124	135
Chloride, dissolved (mg/L)	8	15	4.9	8.0	6.8
Fluoride, dissolved (mg/L)	8	.9	.6	.7	.7
Silica, dissolved (mg/L)	8	16	7.6	12	13
Dissolved solids, calculated (mg/L)	8	379	227	286	297
Arsenic, total recoverable (µg/L)	8	29	13	20	20
Arsenic, dissolved (µg/L)	8	27	11	18	16
Cadmium, total recoverable (µg/L)	8	<1	<1	--	<1
Cadmium, dissolved (µg/L)	8	.2	<.1	[2].1	.1
Copper, total recoverable (µg/L)	8	60	23	38	33
Copper, dissolved (µg/L)	8	32	10	20	20
Iron, total recoverable (µg/L)	8	420	140	285	300
Iron, dissolved (µg/L)	8	27	5	15	14
Lead, total recoverable (µg/L)	8	5	<1	[2]2	2
Lead, dissolved (µg/L)	8	<.5	<.5	--	<.5
Manganese, total recoverable (µg/L)	8	490	150	289	245
Manganese, dissolved (µg/L)	8	370	110	196	155
Zinc, total recoverable (µg/L)	8	140	40	85	80
Zinc, dissolved (µg/L)	8	73	9	27	17
Sediment, suspended concentration (mg/L)	9	13	3	8	8
Sediment, suspended discharge (ton/d)	9	12	.69	3.4	2.1
Sediment, suspended (percent finer than 0.062 mm)	9	97	73	84	82

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323770--WARM SPRINGS CREEK AT WARM SPRINGS, MONT. **Water-quality period of record: March 1993-September 1993**					
Streamflow, instantaneous (ft^3/s)	6	206	24	106	95
Specific conductance, onsite (µS/cm)	5	476	194	--	--
Temperature, water (°C)	6	13.0	2.5	9.4	10.2
pH, onsite (standard units)	5	8.6	8.1	--	--
Hardness, total (mg/L as $CaCO_3$)	5	230	94	--	--
Calcium, dissolved (mg/L)	5	70	29	--	--
Magnesium, dissolved (mg/L)	5	14	5.2	--	--
Sodium, dissolved (mg/L)	5	5.2	2.1	--	--
Potassium, dissolved (mg/L)	5	4.7	1.0	--	--
Alkalinity (mg/L as $CaCO_3$)	5	139	71	--	--
Sulfate, dissolved (mg/L as $S0_4$)	5	110	25	--	--
Chloride, dissolved (mg/L)	5	1.7	.5	--	--
Fluoride, dissolved (mg/L)	5	.4	.4	--	--
Silica, dissolved (mg/L)	5	11	9.2	--	--
Dissolved solids, calculated (mg/L)	5	296	115	--	--
Arsenic, total recoverable (µg/L)	5	16	4	--	--
Arsenic, dissolved (µg/L)	5	14	3	--	--
Cadmium, total recoverable (µg/L)	5	<1	<1	--	--
Cadmium, dissolved (µg/L)	5	<.1	<.1	--	--
Copper, total recoverable (µg/L)	5	75	6	--	--
Copper, dissolved (µg/L)	5	16	2	--	--
Iron, total recoverable (µg/L)	5	1,300	70	--	--
Iron, dissolved (µg/L)	5	30	9	--	--
Lead, total recoverable (µg/L)	5	9	<1	--	--
Lead, dissolved (µg/L)	5	1.8	<.5	--	--
Manganese, total recoverable (µg/L)	5	1,400	120	--	--
Manganese, dissolved (µg/L)	5	350	74	--	--
Zinc, total recoverable (µg/L)	5	60	<10	--	--
Zinc, dissolved (µg/L)	5	10	<3	--	--
Sediment, suspended concentration (mg/L)	6	68	4	21	10
Sediment, suspended discharge (ton/d)	6	18	.71	6.8	2.0
Sediment, suspended (percent finer than 0.062 mm)	6	88	75	81	81

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323800--CLARK FORK NEAR GALEN, MONT. **Water-quality period of record: July 1988-September 1993**					
Streamflow, instantaneous (ft^3/s)	48	626	14	170	94
Specific conductance, onsite (µS/cm)	38	720	220	467	482
Temperature, water (°C)	49	22.5	.0	9.2	9.0
pH, onsite (standard units)	37	8.8	7.5	8.3	8.2
Hardness, total (mg/L as $CaCO_3$)	36	370	96	208	215
Calcium, dissolved (mg/L)	36	110	29	62	61
Magnesium, dissolved (mg/L)	36	22	5.7	13	14
Sodium, dissolved (mg/L)	8	18	7.5	12	12
Potassium, dissolved (mg/L)	8	5.0	2.2	3.4	3.3
Alkalinity (mg/L as $CaCO_3$)	8	123	82	95	91
Sulfate, dissolved (mg/L as $S0_4$)	8	160	62	100	86
Chloride, dissolved (mg/L)	8	11	3.2	5.9	5.8
Fluoride, dissolved (mg/L)	8	.7	.5	.6	.6
Silica, dissolved (mg/L)	8	14	8.7	11	11
Dissolved solids, calculated (mg/L)	8	364	184	251	230
Arsenic, total recoverable (µg/L)	36	60	3	18	15
Arsenic, dissolved (µg/L)	36	30	4	12	12
Cadmium, total recoverable (µg/L)	36	3	<1	[2].5	<1
Cadmium, dissolved (µg/L)	36	1	<.1	--	<1
Copper, total recoverable (µg/L)	35	240	11	46	31
Copper, dissolved (µg/L)	36	50	3	13	10
Iron, total recoverable (µg/L)	36	9,200	90	799	315
Iron, dissolved (µg/L)	36	110	3	20	11
Lead, total recoverable (µg/L)	36	28	<1	[2]6	3
Lead, dissolved (µg/L)	36	3	<.5	[2].5	<1
Manganese, total recoverable (µg/L)	36	1,400	80	373	300
Manganese, dissolved (µg/L)	36	360	33	144	125
Zinc, total recoverable (µg/L)	36	360	20	79	60
Zinc, dissolved (µg/L)	36	110	3	24	15
Sediment, suspended concentration (mg/L)	50	338	2	23	8
Sediment, suspended discharge (ton/d)	50	338	.15	20	2.1
Sediment, suspended (percent finer than 0.062 mm)	49	97	64	80	79

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324200--CLARK FORK AT DEER LODGE, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	102	1,920	23	264	196
Specific conductance, onsite (µS/cm)	86	642	262	519	547
Temperature, water (°C)	102	23.0	.0	9.2	10
pH, onsite (standard units)	51	8.6	7.4	8.1	8.1
Hardness, total (mg/L as $CaCO_3$)	43	270	120	220	230
Calcium, dissolved (mg/L)	43	81	37	65	69
Magnesium, dissolved (mg/L)	43	18	7.2	14	14
Sodium, dissolved (mg/L)	8	19	10	15	15
Potassium, dissolved (mg/L)	8	6.3	2.6	3.8	3.5
Alkalinity (mg/L as $CaCO_3$)	9	149	103	126	125
Sulfate, dissolved (mg/L as $S0_4$)	8	140	66	106	110
Chloride, dissolved (mg/L)	8	8.9	1.2	6.5	7.2
Fluoride, dissolved (mg/L)	8	.7	.5	.6	.6
Silica, dissolved (mg/L)	8	19	13	16	16
Dissolved solids, calculated (mg/L)	8	374	209	300	305
Arsenic, total recoverable (µg/L)	53	200	8	26	17
Arsenic, dissolved (µg/L)	53	39	7	14	12
Cadmium, total recoverable (µg/L)	53	5	<1	[2].8	<1
Cadmium, dissolved (µg/L)	53	2	<.1	--	<1
Copper, total recoverable (µg/L)	52	1,500	12	125	51
Copper, dissolved (µg/L)	53	120	4	14	10
Iron, total recoverable (µg/L)	53	29,000	60	2,830	790
Iron, dissolved (µg/L)	53	150	<3	[2]17	10
Lead, total recoverable (µg/L)	53	200	<1	[2]17	6
Lead, dissolved (µg/L)	53	6	<.5	[2]1	<1
Manganese, total recoverable (µg/L)	53	4,600	30	413	210
Manganese, dissolved (µg/L)	53	400	1	49	31
Zinc, total recoverable (µg/L)	53	1,700	10	155	70
Zinc, dissolved (µg/L)	53	230	3	21	15
Sediment, suspended concentration (mg/L)	103	2,250	2	95	22
Sediment, suspended discharge (ton/d)	103	8,690	.29	228	11
Sediment, suspended (percent finer than 0.062 mm)	94	99	40	72	74

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	48	2,080	28	313	186
Specific conductance, onsite (µS/cm)	38	300	120	219	215
Temperature, water (°C)	49	16.0	.0	7.1	7.0
pH, onsite (standard units)	37	8.5	7.0	7.9	7.9
Hardness, total (mg/L as $CaCO_3$)	32	140	51	100	99
Calcium, dissolved (mg/L)	32	43	14	29	28
Magnesium, dissolved (mg/L)	32	9.2	3.3	6.8	6.8
Sodium, dissolved (mg/L)	6	6.6	3.4	5.1	5.3
Potassium, dissolved (mg/L)	5	4.5	1.6	--	--
Alkalinity (mg/L as $CaCO_3$)	5	118	52	--	--
Sulfate, dissolved (mg/L as $S0_4$)	5	20	10	--	--
Chloride, dissolved (mg/L)	5	3.4	1.0	--	--
Fluoride, dissolved (mg/L)	5	.2	.1	--	--
Silica, dissolved (mg/L)	6	21	17	18	18
Dissolved solids, calculated (mg/L)	5	151	96	--	--
Arsenic, total recoverable (µg/L)	37	17	4	7	6
Arsenic, dissolved (µg/L)	37	7	3	5	5
Cadmium, total recoverable (µg/L)	37	2	<1	[2].4	<1
Cadmium, dissolved (µg/L)	37	1	<.1	--	<1
Copper, total recoverable (µg/L)	36	45	1	7	6
Copper, dissolved (µg/L)	37	7	<1	[2]2	2
Iron, total recoverable (µg/L)	37	25,000	20	2,040	330
Iron, dissolved (µg/L)	37	120	<3	[2]36	26
Lead, total recoverable (µg/L)	37	25	<1	[2]5	1
Lead, dissolved (µg/L)	37	6	<.5	[2].8	<1
Manganese, total recoverable (µg/L)	37	1,100	<10	[2]115	30
Manganese, dissolved (µg/L)	37	30	1	8	6
Zinc, total recoverable (µg/L)	37	140	<10	[2]23	10
Zinc, dissolved (µg/L)	37	24	<3	[2]5	4
Sediment, suspended concentration (mg/L)	50	1,410	1	76	10
Sediment, suspended discharge (ton/d)	50	7,920	.08	237	4.4
Sediment, suspended (percent finer than 0.062 mm)	50	95	49	74	78

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324680--CLARK FORK AT GOLDCREEK MONT. **Water-quality period of record: March 1993-September 1993**					
Streamflow, instantaneous (ft^3/s)	9	1,410	398	826	828
Specific conductance, onsite (µS/cm)	8	447	280	370	371
Temperature, water (°C)	9	16.0	1.0	10.3	11.0
pH, onsite (standard units)	8	8.5	8.1	8.3	8.3
Hardness, total (mg/L as $CaCO_3$)	8	190	120	160	160
Calcium, dissolved (mg/L)	8	56	36	48	49
Magnesium, dissolved (mg/L)	8	13	8.1	10	10
Sodium, dissolved (mg/L)	8	13	7.8	11	11
Potassium, dissolved (mg/L)	8	6.9	2.5	3.2	2.6
Alkalinity (mg/L as $CaCO_3$)	8	138	89	121	124
Sulfate, dissolved (mg/L as SO_4)	8	84	44	60	52
Chloride, dissolved (mg/L)	8	6.8	3.4	4.5	3.6
Fluoride, dissolved (mg/L)	8	.5	.3	.4	.4
Silica, dissolved (mg/L)	8	21	16	18	18
Dissolved solids, calculated (mg/L)	8	275	176	228	226
Arsenic, total recoverable (µg/L)	8	31	11	16	13
Arsenic, dissolved (µg/L)	8	18	8	11	10
Cadmium, total recoverable (µg/L)	8	<1	<1	--	<1
Cadmium, dissolved (µg/L)	8	<.1	<.1	--	<.1
Copper, total recoverable (µg/L)	7	150	21	55	40
Copper, dissolved (µg/L)	7	20	4	9	8
Iron, total recoverable (µg/L)	8	2,700	310	1,040	520
Iron, dissolved (µg/L)	8	58	5	24	20
Lead, total recoverable (µg/L)	7	18	2	7	5
Lead, dissolved (µg/L)	7	<.5	<.5	--	<.5
Manganese, total recoverable (µg/L)	8	470	70	179	130
Manganese, dissolved (µg/L)	8	35	16	26	26
Zinc, total recoverable (µg/L)	8	180	30	69	50
Zinc, dissolved (µg/L)	8	22	7	13	14
Sediment, suspended concentration (mg/L)	9	152	10	57	23
Sediment, suspended discharge (ton/d)	9	392	18	131	47
Sediment, suspended (percent finer than 0.062 mm)	9	89	67	79	78

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331500--FLINT CREEK NEAR DRUMMOND, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	56	892	4.2	167	111
Specific conductance, onsite (µS/cm)	47	501	135	311	307
Temperature, water (°C)	56	19.0	.0	9.1	9.5
pH, onsite (standard units)	44	8.8	7.5	8.2	8.2
Hardness, total (mg/L as $CaCO_3$)	37	260	60	152	150
Calcium, dissolved (mg/L)	37	73	17	41	39
Magnesium, dissolved (mg/L)	37	20	4.3	12	12
Sodium, dissolved (mg/L)	9	11	4.0	8.1	7.8
Potassium, dissolved (mg/L)	8	7.8	2.0	3.6	3.1
Alkalinity (mg/L as $CaCO_3$)	8	150	65	126	143
Sulfate, dissolved (mg/L as $S0_4$)	8	22	8.8	17	17
Chloride, dissolved (mg/L)	8	5.9	1.9	4.0	4.1
Fluoride, dissolved (mg/L)	8	.4	.1	.2	.2
Silica, dissolved (mg/L)	9	22	14	19	20
Dissolved solids, calculated (mg/L)	8	205	94	176	185
Arsenic, total recoverable (µg/L)	44	50	7	19	16
Arsenic, dissolved (µg/L)	44	20	5	10	9
Cadmium, total recoverable (µg/L)	44	3	<1	[2].4	<1
Cadmium, dissolved (µg/L)	44	<1	<.1	--	<1
Copper, total recoverable (µg/L)	43	32	1	9	7
Copper, dissolved (µg/L)	44	7	<1	[2]2	2
Iron, total recoverable (µg/L)	44	7,200	70	1,310	580
Iron, dissolved (µg/L)	44	190	4	35	26
Lead, total recoverable (µg/L)	44	87	<1	[2]14	9
Lead, dissolved (µg/L)	44	7	<.5	[2]1	<1
Manganese, total recoverable (µg/L)	44	1,600	50	274	150
Manganese, dissolved (µg/L)	44	120	19	46	40
Zinc, total recoverable (µg/L)	44	290	<10	[2]54	30
Zinc, dissolved (µg/L)	44	27	<3	[2]8	6
Sediment, suspended concentration (mg/L)	58	556	3	59	26
Sediment, suspended discharge (ton/d)	58	904	.03	52	8.8
Sediment, suspended (percent finer than 0.062 mm)	58	98	28	82	85

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331800--CLARK FORK NEAR DRUMMOND, MONT. **Water-quality period of record: March 1993-September 1993**					
Streamflow, instantaneous (ft^3/s)	9	1,710	550	1,020	985
Specific conductance, onsite (µS/cm)	8	470	278	406	416
Temperature, water (°C)	9	17.0	1.0	11.4	13.0
pH, onsite (standard units)	8	8.4	8.0	8.3	8.2
Hardness, total (mg/L as $CaCO_3$)	8	210	120	181	185
Calcium, dissolved (mg/L)	8	61	36	52	54
Magnesium, dissolved (mg/L)	8	15	8.3	12	12
Sodium, dissolved (mg/L)	8	13	7.8	12	13
Potassium, dissolved (mg/L)	8	7.3	2.7	3.7	3.4
Alkalinity (mg/L as $CaCO_3$)	8	156	93	136	142
Sulfate, dissolved (mg/L as $S0_4$)	8	90	38	65	60
Chloride, dissolved (mg/L)	8	7.1	3.4	5.0	4.5
Fluoride, dissolved (mg/L)	8	.4	.2	.4	.4
Silica, dissolved (mg/L)	8	23	17	19	18
Dissolved solids, calculated (mg/L)	8	291	176	251	248
Arsenic, total recoverable (µg/L)	8	30	12	17	14
Arsenic, dissolved (µg/L)	8	13	9	11	11
Cadmium, total recoverable (µg/L)	8	1	<1	--	<1
Cadmium, dissolved (µg/L)	8	.1	<.1	--	<.1
Copper, total recoverable (µg/L)	6	140	18	55	26
Copper, dissolved (µg/L)	6	17	4	8	8
Iron, total recoverable (µg/L)	8	4,000	280	1,250	725
Iron, dissolved (µg/L)	8	45	4	19	14
Lead, total recoverable (µg/L)	5	40	3	--	--
Lead, dissolved (µg/L)	5	1.2	<.5	--	--
Manganese, total recoverable (µg/L)	8	490	80	215	130
Manganese, dissolved (µg/L)	8	29	15	19	16
Zinc, total recoverable (µg/L)	8	260	30	92	50
Zinc, dissolved (µg/L)	8	21	7	12	10
Sediment, suspended concentration (mg/L)	9	270	12	81	40
Sediment, suspended discharge (ton/d)	9	1,200	28	276	103
Sediment, suspended (percent finer than 0.062 mm)	9	90	56	77	80

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334510--ROCK CREEK NEAR CLINTON, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	49	3,010	113	850	521
Specific conductance, onsite (µS/cm)	40	155	55	105	97
Temperature, water (°C)	49	18.0	.0	7.9	9.0
pH, onsite (standard units)	39	8.6	6.9	7.8	7.8
Hardness, total (mg/L as $CaCO_3$)	31	90	25	51	50
Calcium, dissolved (mg/L)	31	23	6.5	13	13
Magnesium, dissolved (mg/L)	31	8.0	2.2	4	4
Sodium, dissolved (mg/L)	5	3.5	1.7	--	--
Potassium, dissolved (mg/L)	5	1.3	.8	--	--
Alkalinity (mg/L as $CaCO_3$)	5	67	26	--	--
Sulfate, dissolved (mg/L as SO_4)	5	5.2	2.0	--	--
Chloride, dissolved (mg/L)	5	1.0	.4	--	--
Fluoride, dissolved (mg/L)	5	.1	<.1	--	--
Silica, dissolved (mg/L)	5	11	10	--	--
Dissolved solids, calculated (mg/L)	5	85	40	--	--
Arsenic, total recoverable (µg/L)	37	2	<1	[2].9	<1
Arsenic, dissolved (µg/L)	37	1.0	<1	--	<1
Cadmium, total recoverable (µg/L)	37	3	<1	[2].6	<1
Cadmium, dissolved (µg/L)	37	1	<.1	--	<1
Copper, total recoverable (µg/L)	35	41	<1	[2]6	4
Copper, dissolved (µg/L)	36	6	<1	[1]2	1
Iron, total recoverable (µg/L)	37	2,100	40	400	200
Iron, dissolved (µg/L)	37	110	5	35	35
Lead, total recoverable (µg/L)	35	19	<1	[2]4	2
Lead, dissolved (µg/L)	35	5	<.5	[2]2	<1
Manganese, total recoverable (µg/L)	37	90	<10	[2]21	20
Manganese, dissolved (µg/L)	37	8	<1	[2]2	1
Zinc, total recoverable (µg/L)	37	60	<10	[2]13	<10
Zinc, dissolved (µg/L)	37	15	<3	[2]3	<3
Sediment, suspended concentration (mg/L)	49	157	1	21	6
Sediment, suspended discharge (ton/d)	49	1,280	.31	100	9.8
Sediment, suspended (percent finer than 0.062 mm)	49	95	35	70	72

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334550--CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	106	9,370	37	1,630	999
Specific conductance, onsite (µS/cm)	81	483	160	323	340
Temperature, water (°C)	105	22.0	.0	9.1	9.5
pH, onsite (standard units)	52	8.7	7.4	8.1	8.1
Hardness, total (mg/L as $CaCO_3$)	42	210	67	144	145
Calcium, dissolved (mg/L)	42	59	19	41	42
Magnesium, dissolved (mg/L)	42	14	4.8	10	10
Sodium, dissolved (mg/L)	8	12	4.3	8.0	8.3
Potassium, dissolved (mg/L)	8	5.7	1.7	2.6	2.3
Alkalinity (mg/L as $CaCO_3$)	9	124	65	100	111
Sulfate, dissolved (mg/L as $S0_4$)	8	68	21	42	38
Chloride, dissolved (mg/L)	8	5.6	1.7	3.2	2.8
Fluoride, dissolved (mg/L)	8	.3	.2	.2	.3
Silica, dissolved (mg/L)	8	18	14	15	15
Dissolved solids, calculated (mg/L)	8	236	108	180	188
Arsenic, total recoverable (µg/L)	51	110	5	12	8
Arsenic, dissolved (µg/L)	51	17	4	6	5
Cadmium, total recoverable (µg/L)	51	4	<1	[2].6	<1
Cadmium, dissolved (µg/L)	51	1	<.1	--	<1
Copper, total recoverable (µg/L)	49	500	3	60	24
Copper, dissolved (µg/L)	50	25	2	6	5
Iron, total recoverable (µg/L)	51	19,000	70	1,940	550
Iron, dissolved (µg/L)	51	190	<3	[2]27	14
Lead, total recoverable (µg/L)	48	100	<1	[2]15	7
Lead, dissolved (µg/L)	48	7	<.5	[2].9	<1
Manganese, total recoverable (µg/L)	51	2,000	10	213	90
Manganese, dissolved (µg/L)	51	31	1	8	7
Zinc, total recoverable (µg/L)	51	1,100	<10	[2]113	40
Zinc, dissolved (µg/L)	51	39	<3	[2]10	8
Sediment, suspended concentration (mg/L)	106	1,370	3	72	20
Sediment, suspended discharge (ton/d)	106	34,700	.80	803	57
Sediment, suspended (percent finer than 0.062 mm)	95	98	27	71	72

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340000--BLACKFOOT RIVER NEAR BONNER, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	80	10,300	344	2,450	1,020
Specific conductance, onsite (µS/cm)	57	294	131	205	205
Temperature, water (°C)	80	20.5	.0	8.8	8.5
pH, onsite (standard units)	40	8.7	7.5	8.1	8.2
Hardness, total (mg/L as $CaCO_3$)	33	140	55	99	95
Calcium, dissolved (mg/L)	33	37	14	25	24
Magnesium, dissolved (mg/L)	33	13	4.9	8.7	8.4
Sodium, dissolved (mg/L)	5	3.2	1.2	--	--
Potassium, dissolved (mg/L)	5	2.8	.6	--	--
Alkalinity (mg/L as $CaCO_3$)	5	129	76	--	--
Sulfate, dissolved (mg/L as $S0_4$)	5	5.6	2.2	--	--
Chloride, dissolved (mg/L)	5	1.6	.3	--	--
Fluoride, dissolved (mg/L)	5	.1	<.1	--	--
Silica, dissolved (mg/L)	5	10	6.8	--	--
Dissolved solids, calculated (mg/L)	5	138	82	--	--
Arsenic, total recoverable (µg/L)	40	4	<1	2 1	1
Arsenic, dissolved (µg/L)	40	2	<1	2 .8	<1
Cadmium, total recoverable (µg/L)	40	2	<1	2 .5	<1
Cadmium, dissolved (µg/L)	40	1	<.1	--	<1
Copper, total recoverable (µg/L)	38	34	1	10	8
Copper, dissolved (µg/L)	39	7	<1	2 2	2
Iron, total recoverable (µg/L)	40	3,600	40	698	270
Iron, dissolved (µg/L)	40	100	<3	2 22	15
Lead, total recoverable (µg/L)	37	25	<1	2 7	4
Lead, dissolved (µg/L)	37	8	<.5	2 1	<1
Manganese, total recoverable (µg/L)	40	180	<10	2 43	20
Manganese, dissolved (µg/L)	40	11	<1	2 3	2
Zinc, total recoverable (µg/L)	40	60	<10	2 15	10
Zinc, dissolved (µg/L)	40	15	<3	2 5	3
Sediment, suspended concentration (mg/L)	80	271	1	32	8
Sediment, suspended discharge (ton/d)	80	7,540	1.1	527	22
Sediment, suspended (percent finer than 0.062 mm)	78	98	42	77	80

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340500--CLARK FORK ABOVE MISSOULA, MONT.					
Water-quality period of record: October 1989-September 1993					
Streamflow, instantaneous (ft^3/s)	49	13,100	798	4,110	2,110
Specific conductance, onsite (µS/cm)	40	399	152	262	270
Temperature, water (°C)	50	19.5	.0	8.7	8.2
pH, onsite (standard units)	29	8.6	7.9	8.2	8.2
Hardness, total (mg/L as $CaCO_3$)	29	170	61	122	120
Calcium, dissolved (mg/L)	29	46	14	33	33
Magnesium, dissolved (mg/L)	29	13	5.6	9.5	9.7
Sodium, dissolved (mg/L)	8	7.7	2.4	5.0	5.3
Potassium, dissolved (mg/L)	8	4.5	1.0	1.8	1.4
Alkalinity (mg/L as $CaCO_3$)	8	124	71	102	104
Sulfate, dissolved (mg/L as $S0_4$)	8	43	9.3	22	22
Chloride, dissolved (mg/L)	8	4.2	.9	1.9	1.8
Fluoride, dissolved (mg/L)	8	.2	.1	.2	.2
Silica, dissolved (mg/L)	8	15	9.4	12	11
Dissolved solids, calculated (mg/L)	8	198	90	144	149
Arsenic, total recoverable (µg/L)	29	10	2	4	4
Arsenic, dissolved (µg/L)	29	7	1	3	3
Cadmium, total recoverable (µg/L)	29	<1	<1	--	<1
Cadmium, dissolved (µg/L)	29	.1	<.1	--	<1
Copper, total recoverable (µg/L)	27	31	2	10	8
Copper, dissolved (µg/L)	28	10	1	3	2
Iron, total recoverable (µg/L)	29	3,000	70	555	250
Iron, dissolved (µg/L)	29	44	<3	[2]19	16
Lead, total recoverable (µg/L)	24	15	<1	[2]3	2
Lead, dissolved (µg/L)	24	1	<.5	[2].7	<1
Manganese, total recoverable (µg/L)	29	170	20	56	40
Manganese, dissolved (µg/L)	29	24	7	14	14
Zinc, total recoverable (µg/L)	29	60	<10	[2]20	20
Zinc, dissolved (µg/L)	29	16	<3	[2]6	6
Sediment, suspended concentration (mg/L)	50	144	2	24	9
Sediment, suspended discharge (ton/d)	50	4,740	6.1	600	51
Sediment, suspended (percent finer than 0.062 mm)	50	98	76	89	89

Table 24. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 1993 (Continued)

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12353000--CLARK FORK BELOW MISSOULA, MONT. **Water-quality period of record: March 1985-September 1993**					
Streamflow, instantaneous (ft^3/s)	52	19,800	869	4,530	2,680
Specific conductance, onsite (µS/cm)	52	320	108	225	242
Temperature, water (°C)	52	20.5	.0	8.5	8.2
pH, onsite (standard units)	52	8.8	7.1	8.0	8.0
Hardness, total (mg/L as $CaCO_3$)	52	150	48	106	115
Calcium, dissolved (mg/L)	52	42	13	29	32
Magnesium, dissolved (mg/L)	52	11	3.7	7.9	8.6
Sodium, dissolved (mg/L)	52	8.5	2.2	5.7	6.2
Potassium, dissolved (mg/L)	52	2.5	.6	1.6	1.8
Alkalinity (mg/L as $CaCO_3$)	51	135	47	95	101
Sulfate, dissolved (mg/L as $S0_4$)	52	34	6	20	19
Chloride, dissolved (mg/L)	52	4.7	.3	2.4	2.5
Fluoride, dissolved (mg/L)	52	.3	<.1	[2].2	.2
Silica, dissolved (mg/L)	52	15	5.8	12	12
Dissolved solids, calculated (mg/L)	52	194	63	135	146
Arsenic, total recoverable (µg/L)	3	6	3	--	--
Arsenic, dissolved (µg/L)	29	6	1	2	2
Cadmium, total recoverable (µg/L)	3	<1	<1	--	--
Cadmium, dissolved (µg/L)	29	2	<.1	--	<1
Copper, total recoverable (µg/L)	3	18	7	--	--
Copper, dissolved (µg/L)	29	9	1	4	3
Iron, total recoverable (µg/L)	3	860	150	--	--
Iron, dissolved (µg/L)	34	34	4	15	15
Lead, total recoverable (µg/L)	3	4	<1	--	--
Lead, dissolved (µg/L)	29	5	<.5	[2].8	<1
Manganese, total recoverable (µg/L)	3	120	20	--	--
Manganese, dissolved (µg/L)	34	18	3	7	6
Zinc, total recoverable (µg/L)	3	30	<10	--	--
Zinc, dissolved (µg/L)	29	24	<3	[2]7	6
Sediment, suspended concentration (mg/L)	52	85	1	15	10
Sediment, suspended discharge (ton/d)	52	4,540	4.3	313	70
Sediment, suspended (percent finer than 0.062 mm)	51	93	35	73	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).

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