WATER-QUALITY DATA (OCTOBER 1988 THROUGH SEPTEMBER 1989) AND STATISTICAL SUMMARIES (MARCH 1985 THROUGH SEPTEMBER 1989) FOR THE CLARK FORK AND SELECTED TRIBUTARIES FROM GALEN TO MISSOULA, MONTANA

By John H. Lambing

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CONVERSION FACTORS

The following factors can be used to convert inch-pound units in this report to metric (International System) units.

Multiply inch-pound unit	By	To obtain metric unit
cubic foot per second (ft^3/s)	0.028317	cubic meter per second
inch	25,400	micrometer
inch	25.4	millimeter (mm)
mile	1.609	kilometer
part per million	1	microgram per gram
ton per day (ton/d)	907.2	kilogram per day

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

$$°F = 9/5\ (°C) + 32$$

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ABSTRACT

Water-quality sampling was conducted at eight stations on the Clark Fork and selected tributaries from Galen to Missoula, Montana, from October 1988 through September 1989. This report presents tabulations and statistical summaries of the water-quality data.

Included in this report are tabulations of streamflow, onsite water quality, and concentrations of trace elements and suspended sediment for periodic samples. Also included are tables and hydrographs of daily mean values for streamflow, suspended-sediment concentration, and suspended-sediment discharge at three mainstem stations and one tributary station.

Statistical summaries are presented for periodic water-quality data collected from March 1985 through September 1989. Selected data are illustrated by graphs showing median concentrations of trace elements in water, relation of trace-element concentrations to suspended-sediment concentrations, and median concentrations of trace elements in suspended sediment.

INTRODUCTION

The Clark Fork originates south of Deer Lodge in west-central Montana at the confluence of Silver Bow Creek and Warm Springs Creek (fig. 1). Along the reach of the Clark Fork from Galen to Milltown Dam at Milltown, a distance of about 118 river miles, four major tributaries enter the river: Little Blackfoot River, Flint Creek, Rock Creek, and Blackfoot River. Principal surface-water uses in the upper Clark Fork basin include habitat for trout fisheries, irrigation, stock watering, light industry, and hydroelectric power generation. Major land uses include agriculture, logging, mining, and recreation.

During the past 125 years, deposits of copper, gold, silver, and lead ores have been extensively mined, milled, and smelted in the drainages of Silver Bow and Warm Springs Creeks. Moderate- and small-scale mining has also occurred in the basins of the major tributaries to the Clark Fork. Tailings derived from mineral processing commonly contain large quantities of trace elements that may be toxic in stream and riparian habitats. Since mining began in the basin, floods have transported large quantities of tailings down the Clark Fork and deposited the material along the stream channel, on flood plains, and in Milltown Reservoir. The river continues to periodically erode, transport, and redeposit tailings-laden sediments along the river corridor, especially during high streamflows.

Concern about the effects of tailings distributed throughout the Clark Fork valley has resulted in a comprehensive effort by State, Federal, and private agencies to determine various water-quality conditions in the Clark Fork basin. Establishment of a water-quality data base for the river and its major tributaries has been a priority objective. During this study, water-quality data were collected by the U.S. Geological Survey, in cooperation with the U.S. Environmental Protection Agency and the Montana Power Company. The data collected during this study supplement water-quality data collected during previous studies (Lambing 1987, 1988, 1989).

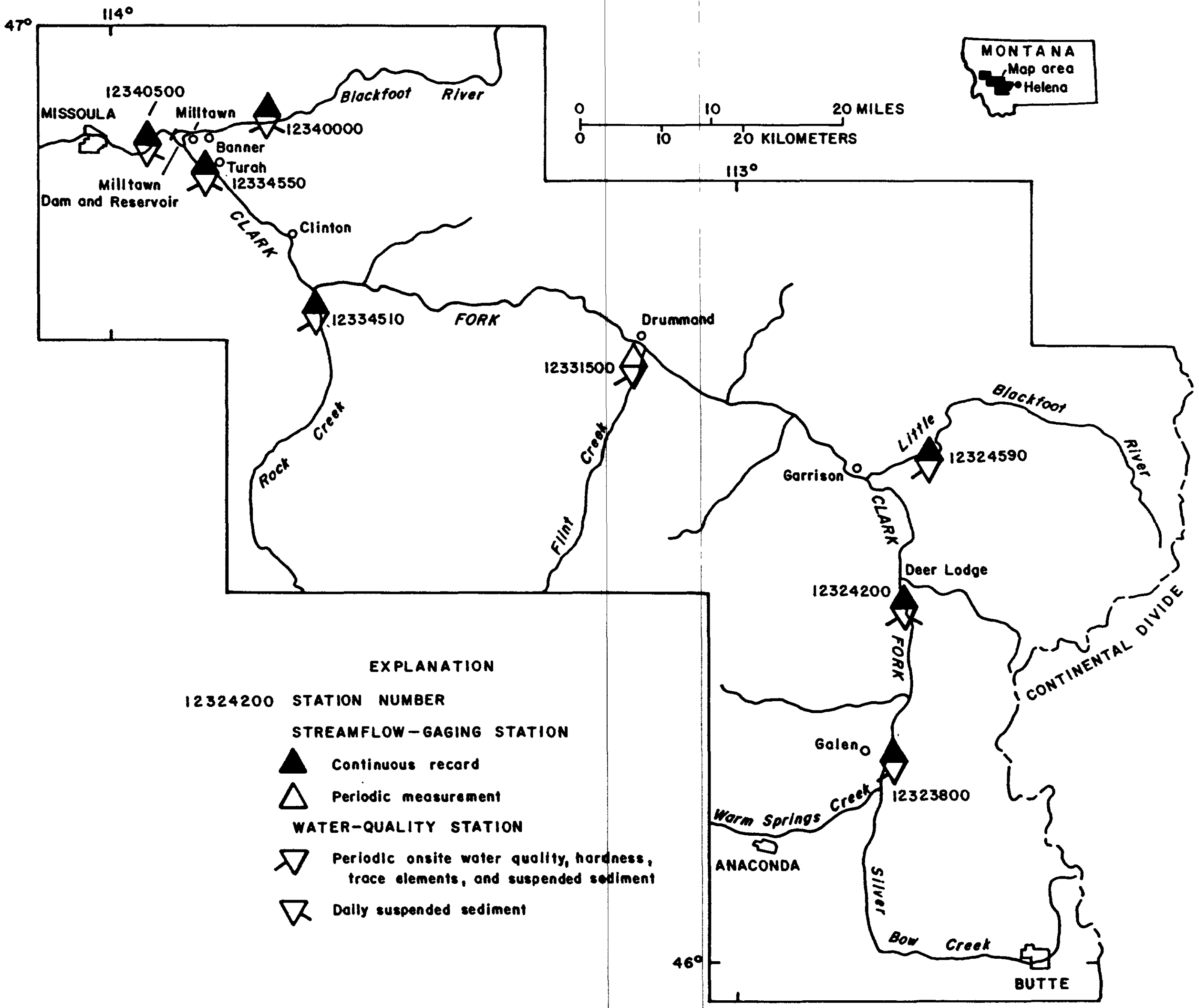


Figure 1.--Location of study area.

The purpose of this report is to present tabulations and statistical summaries of water-quality data for four sampling stations on the Clark Fork between Galen and Missoula and for four stations near the mouths of major tributaries entering this reach. The data include tabulations of streamflow, onsite water quality, and laboratory analyses of hardness, selected trace elements, and suspended sediment for seven water-quality stations upstream from Milltown Reservoir. Daily suspended-sediment samples were collected at one additional station on the Clark Fork downstream from Milltown Reservoir. The data were collected from October 1988 through September 1989. Statistical summaries, in the form of a table and graphs, describe selected water-quality data for the period March 1985 through September 1989.

SAMPLING LOCATIONS

Data in this report were collected at various stations as part of two investigations, each with different sampling objectives. Information about the type of data collected at each of the sampling stations is given in table 1.

Table 1.--*Types of data collected at sampling stations*

[--, no data]

Station number (fig. 1)	Station name	Type of data collection: Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment
12323800	Clark Fork near Galen	X	X	--
12324200	Clark Fork at Deer Lodge	X	X	X
12324590	Little Blackfoot River near Garrison	X	X	--
12331500	Flint Creek near Drummond	--	X	--
12334510	Rock Creek near Clinton	X	X	--
12334550	Clark Fork at Turah Bridge, near Bonner	X	X	X
12340000	Blackfoot River near Bonner	X	X	X
12340500	Clark Fork above Missoula	X	--	X

[1] Onsite water quality; laboratory analyses of hardness, trace elements, and suspended sediment.

In one investigation, periodic samples for trace elements and suspended sediment were collected at seven water-quality stations upstream from Milltown Reservoir; six of the seven stations had been sampled since March 1985 (Lambing 1987, 1988, 1989). The seventh water-quality station (Clark Fork near Galen) was established on the upper mainstem in the summer of 1988. At two stations (Clark Fork at Deer Lodge and Clark Fork at Turah Bridge, near Bonner), daily suspended-sediment discharge was determined in addition to periodic water-quality sampling. This sampling was conducted in cooperation with the U.S. Environmental Protection Agency as part of the effort to characterize water quality in the upper basin.

In the other investigation, daily suspended-sediment discharge was determined from October 1988 to September 1989 at two stations upstream from Milltown Reservoir (Clark Fork at Turah Bridge, near Bonner and Blackfoot River near Bonner) and at one station downstream from the reservoir (Clark Fork above Missoula). The daily sediment discharges determined at these three stations document the sediment loads entering and leaving Milltown Reservoir during repair construction on Milltown Dam by the Montana Power Company. Daily sediment sampling upstream and downstream from Milltown Reservoir was conducted in cooperation with the Montana Power Company.

METHODS OF DATA COLLECTION, PROCESSING, AND ANALYSIS

Periodic water-quality samples were collected from multiple verticals across the stream using standard U.S. Geological Survey depth-integration methods described by Guy and Norman (1970), U.S. Geological Survey (1977), and Knapton (1985). Daily suspended-sediment samples were collected by depth integration at a single vertical near mid-stream at the daily suspended-sediment stations listed in table 1.

The frequency of sample collection was designed to identify concentrations throughout a wide range of hydrologic conditions. Because of the infrequent occurrence of medium to high streamflows, a routine sampling schedule at fixed time intervals was not adequate to describe water quality during runoff events of short duration. To document maximum concentrations of suspended constituents, efforts were made to sample during runoff conditions.

Onsite sample processing, including filtration and acidification, was performed according to U.S. Geological Survey standards as described by U.S. Geological Survey (1977) and Knapton (1985). Quality-assurance practices for data collection and processing were those used by the Montana District of the U.S. Geological Survey (J.R. Knapton, written commun., 1983). Quality-assurance practices for laboratory analysis are described by Friedman and Erdmann (1982).

Results of laboratory analyses of water-quality constituents are reported in terms of dissolved, total, total recoverable, or suspended concentrations. These terms are based on the onsite processing and analytical methods used. Operational definitions as used by the U.S. Geological Survey (Fishman and Friedman, 1985; Guy, 1969) are:

<u>Dissolved</u>.--Pertains to the constituents in a representative water sample that pass through a membrane filter with pore diameters of 0.45 micrometer.

<u>Total</u>.--Pertains to the constituents in a representative water-sediment mixture (unfiltered sample), regardless of the physical or chemical form of the constituent. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and the suspended phases of the sample. In this report, only arsenic is reported as "total."

<u>Total recoverable</u>.--Pertains to the constituents in a solution after a representative water-sediment mixture is digested (generally with a dilute acid solution). Complete dissolution of all particulate matter commonly is not achieved by the digestion treatment; thus, the determination represents something less than the "total" quantity (that is, less than 95 percent) of the constituent present in both the dissolved and the suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses, because different digestion procedures are likely to produce different analytical results.

<u>Suspended</u>.--For water-quality samples, pertains to the chemical constituents that are retained on a 0.45-micrometer membrane filter and subsequently brought into solution by a dilute acid-digestion procedure for analysis. A more common method for estimating suspended concentrations is to subtract the dissolved concentration from the total or total recoverable concentration, which was the method used in this study. Where trace-element concentrations are reported as less than (<) the analytical detection limit, a value midway between zero and the analytical detection limit was used to calculate the suspended trace-element concentration.

For suspended-sediment samples, pertains to the particulate matter in a water-sediment mixture (regardless of chemical composition) that either is retained on a glass-fiber filter or is recovered from solution by evaporation. A correction for the weight of dissolved solids is required when using the evaporation method.

Streamflow

Instantaneous streamflow at the time of periodic cross-sectional sampling was determined at all stations, either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982). A continuous record of streamflow was available (Shields and others, 1990) for all stations except Flint Creek near Drummond (table 1).

Onsite Water Quality

At times of periodic cross-sectional sampling, specific conductance, pH, water temperature, bicarbonate, carbonate, and alkalinity were measured onsite. Measurements were made according to procedures described by Knapton (1985).

Hardness

Samples were analyzed for concentrations of dissolved calcium and magnesium to enable calculation of hardness. Hardness was determined because of its effect on the toxicity of some trace elements. Samples for calcium and magnesium were analyzed at the U.S. Geological Survey water-quality laboratory in Denver, Colo. Samples were analyzed and hardness was calculated according to procedures described by Fishman and Friedman (1985).

Trace Elements

Periodic cross-sectional samples were analyzed for dissolved arsenic, cadmium, copper, iron, lead, manganese, and zinc; total arsenic; and total recoverable cadmium, copper, iron, lead, manganese, and zinc. Samples were analyzed at the U.S. Geological Survey water-quality laboratory in Denver, Colo. Analytical methods used are described by Fishman and Friedman (1985).

Suspended Sediment

Periodic cross-sectional samples were analyzed for concentration and particle-size distribution. Single-vertical samples at the four daily suspended-sediment stations (table 1) were analyzed only for concentration. Suspended-sediment samples were analyzed for concentration and particle size (percent less than 0.062 millimeter diameter) at the U.S. Geological Survey sediment laboratory in Helena, Mont. Particle-size analyses for size classes other than 0.062 millimeter were done at the U.S. Geological Survey sedimentation laboratory in Iowa City, Iowa. Analytical methods used are described by Guy (1969).

DATA

Streamflow

Values of instantaneous streamflow at times of periodic cross-sectional sampling for the current sampling period are listed in table 2 at the back of the report. Values of daily mean streamflow at the four daily suspended-sediment stations are presented in tables 3 to 6, also at the back of the report.

Hydrographs comparing streamflow for October 1988 through September 1989 with long-term minimum, maximum, and median streamflow are presented for selected stations in figures 2 to 4. Stations were selected to represent streamflow conditions in areas with intensive irrigation (Clark Fork at Deer Lodge), minor irrigation withdrawals (Blackfoot River near Bonner), and multiple water-use development (Clark Fork above Missoula). All three stations have at least 10 years of continuous streamflow data for computing flow statistics.

Onsite Water Quality

Results of onsite measurements of water quality for periodic samples at all sampling stations are given in table 2.

Hardness

Concentrations of dissolved and noncarbonate hardness are presented in table 2 for the seven stations upstream from Milltown Reservoir. Calcium and magnesium concentrations used to calculate hardness are also in table 2.

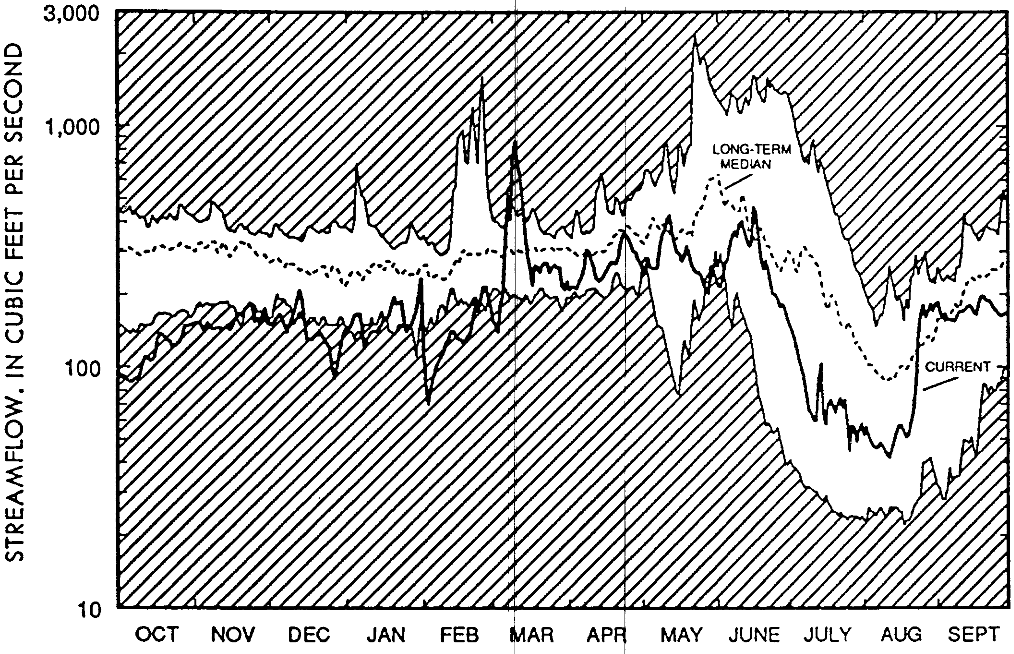


Figure 2.--Relation of current (October 1988 through September 1989) daily mean streamflow to long-term minimum, maximum, and median daily mean streamflow for the Clark Fork at Deer Lodge. Long-term minimum and maximum streamflow is represented by the upper and lower edges of the shaded areas. Long-term period of record is October 1978 through September 1988.

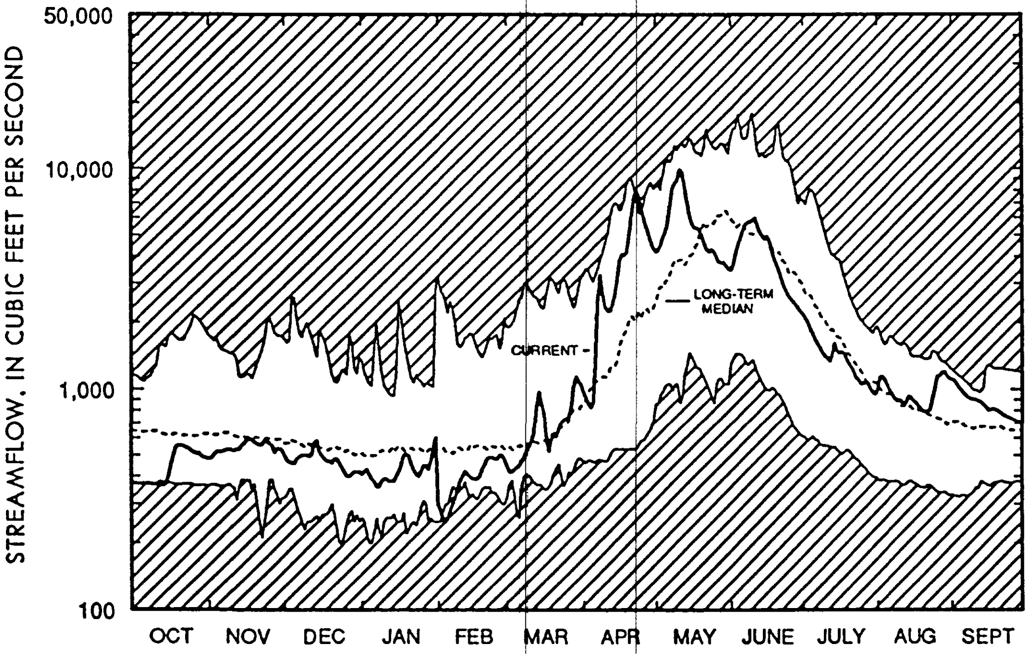


Figure 3.--Relation of current (October 1988 through September 1989) daily mean streamflow to long-term minimum, maximum, and median daily mean streamflow for the Blackfoot River near Bonner. Long-term minimum and maximum streamflow is represented by the upper and lower edges of the shaded areas. Long-term period of record is October 1939 through September 1988.

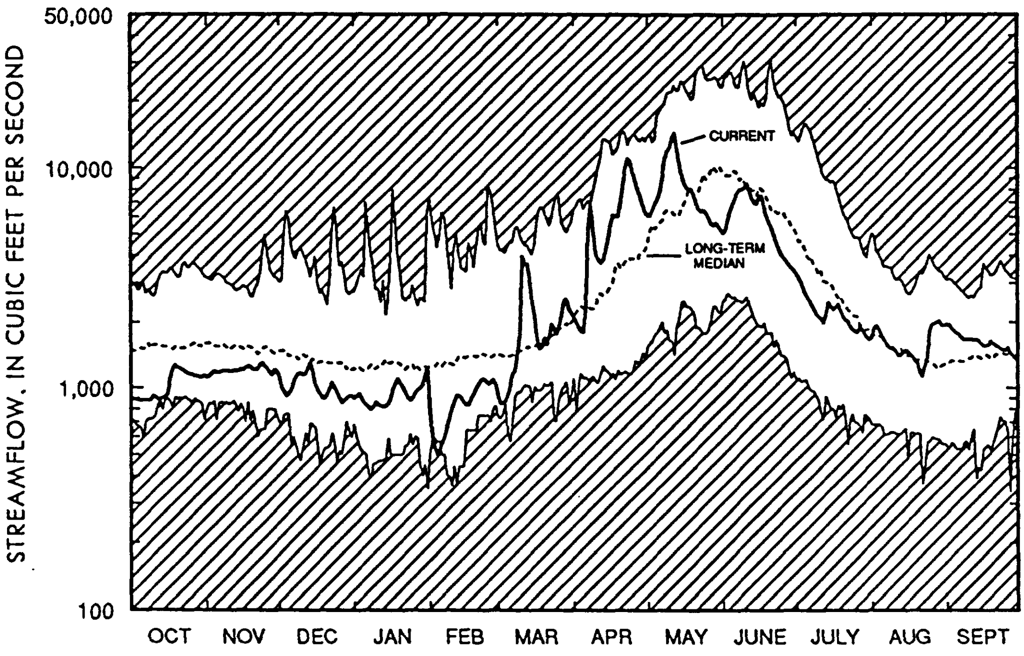


Figure 4.--Relation of current (October 1988 through September 1989) daily mean streamflow to long-term minimum, maximum, and median daily mean streamflow for the Clark Fork above Missoula. Long-term minimum and maximum streamflow is represented by the upper and lower edges of the shaded areas. Long-term period of record is October 1929 through September 1988.

Trace Elements

Trace-element concentrations analyzed from periodic samples are listed in table 2 for the seven stations upstream from Milltown Reservoir.

Suspended Sediment

Concentrations and particle-size distributions of periodic suspended-sediment samples at all sampling stations are listed in table 2. Daily values for concentration and discharge of suspended sediment at the four daily sediment stations are presented in tables 3 to 6. Daily mean suspended-sediment concentrations were computed according to procedures described by Porterfield (1972). Daily mean streamflow and daily mean suspended-sediment concentration were used to calculate daily suspended-sediment discharge according to the equation:

$$Q_s = Q \times C \times K \ , \qquad (1)$$

where:

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

Q = streamflow, in cubic feet per second;

C = suspended-sediment concentration, in milligrams per liter; and

K = conversion constant (0.0027 for concentrations reported in milligrams per liter).

Hydrographs of daily mean streamflow and suspended-sediment concentration at the four daily sediment stations are shown in figures 5 to 8. Hydrographs of daily

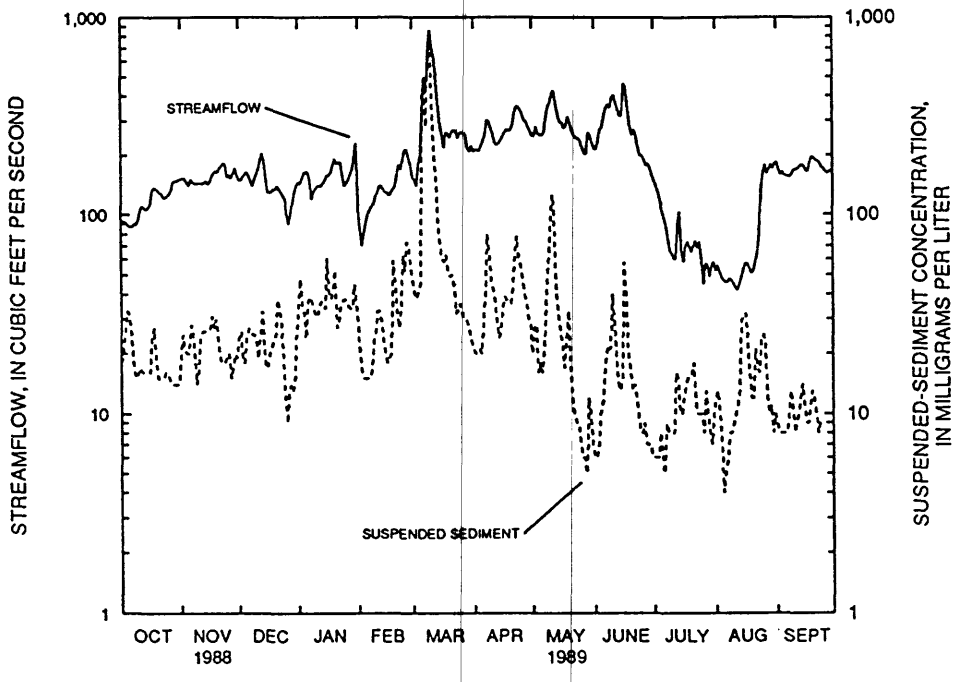


Figure 5.--Relation of daily mean streamflow to daily mean suspended-sediment concentration for the Clark Fork at Deer Lodge, October 1988 through September 1989.

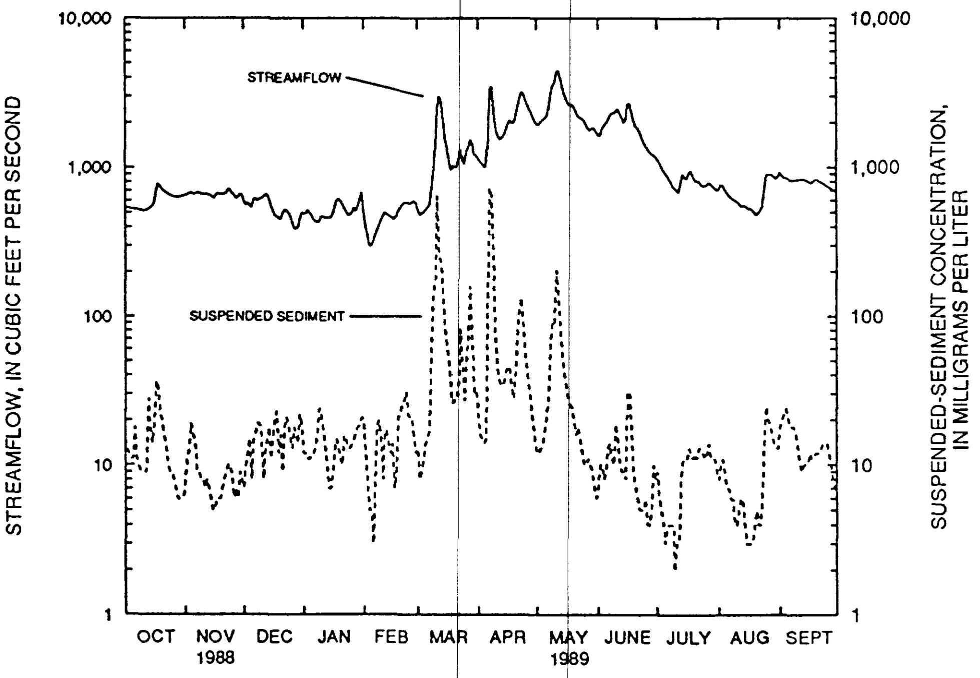


Figure 6.--Relation of daily mean streamflow to daily mean suspended-sediment concentration for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989.

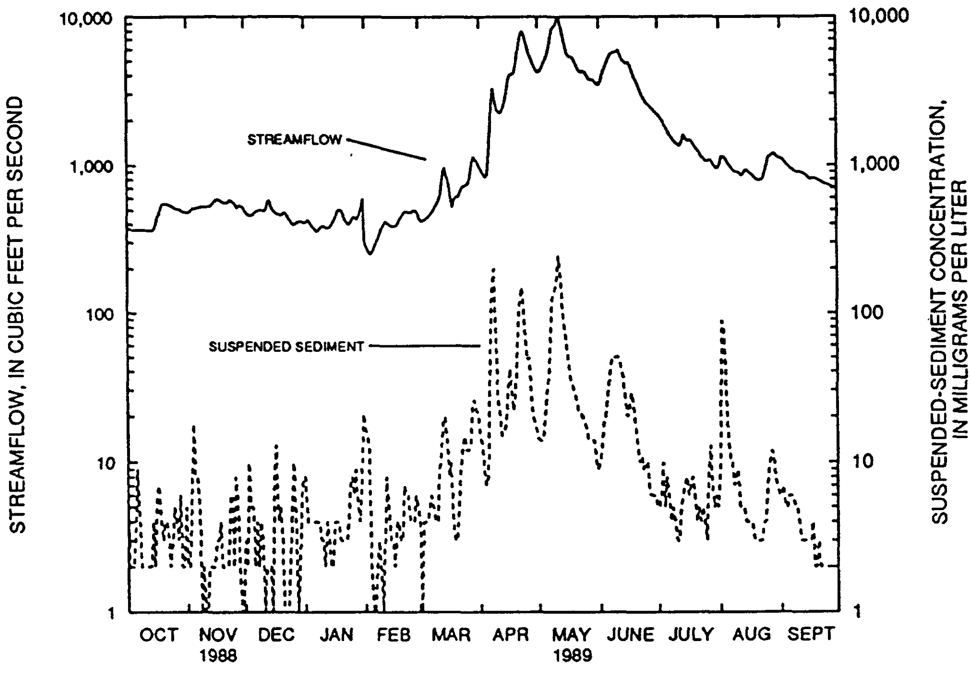


Figure 7.--Relation of daily mean streamflow to daily mean suspended-sediment concentration for the Blackfoot River near Bonner, October 1988 through September 1989.

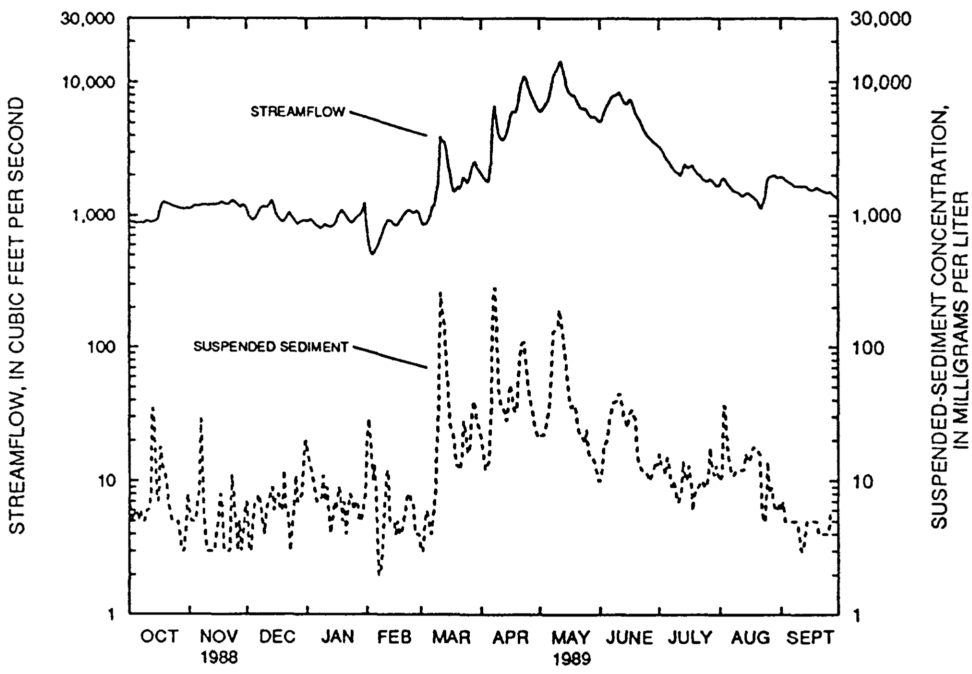


Figure 8.--Relation of daily mean streamflow to daily mean suspended-sediment concentration for the Clark Fork above Missoula, October 1988 through September 1989.

suspended-sediment discharge (fig. 9) for the Clark Fork at Deer Lodge and the Clark Fork at Turah Bridge, near Bonner from October 1988 through September 1989 illustrate daily variations at each station and differences between the quantities of sediment transported at the stations. Hydrographs of the combined daily suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner plus the Blackfoot River near Bonner are plotted with daily suspended-sediment discharge for the Clark Fork above Missoula for October 1988 to September 1989 (fig. 10) to permit comparison of suspended-sediment loads entering and leaving Milltown Reservoir.

The statistical distribution of daily mean suspended-sediment concentration and suspended-sediment discharge for October 1988 to September 1989 at the four daily sediment stations is shown in figures 11 and 12. The statistical distribution includes the minimum and maximum values plus selected percentile values.

STATISTICAL SUMMARIES

A statistical summary of water-quality data for all periodic samples collected from March 1985 through September 1989 is given in table 7 at the back of the report. Statistics in table 7 were calculated by standard computer programs within the U.S. Geological Survey's National Water Information System. Documentations of the programs are available on the U.S. Geological Survey PRIME computer (D.V. Maddy and others, written commun., 1988).

Graphical presentations of water-quality statistics illustrate the variation of selected constituent concentrations among the sampling stations. Statistical values shown in the graphs represent all periodic samples collected from March 1985 through September 1989.

Median concentrations of trace elements in water at seven of the water-quality stations are shown in figures 13 to 18. The graphs illustrate the dissolved and total (or total recoverable) concentrations of the trace elements. The difference in bar heights indicates the proportion of element occurring in the suspended phase. Median concentrations less than the analytical detection limit were arbitrarily plotted midway between zero and the detection limit. Cadmium was not plotted because median concentrations at all sites were less than the analytical detection limit of 1 microgram per liter.

The relations between total or total recoverable trace-element concentrations and suspended-sediment concentrations for seven water-quality stations are shown in figures 19 to 25. Values less than the analytical detection limit are plotted midway between zero and the analytical detection limit.

Median concentrations of trace elements in suspended sediment for seven water-quality stations are shown in figures 26 to 31. The concentrations in the sediment are derived indirectly by a calculation using the suspended concentration of the element and the concentration of suspended sediment in the water sample. Presenting trace-element concentrations in the sediment excludes the diluting or concentrating effects of flow volumes, and indicates the trace-element content of fluvial sediments derived from areas upstream from the sampling site. To calculate trace-element concentrations in the suspended sediment, the value for suspended trace-element concentration in each sample was divided by the suspended-sediment concentration in the water and multiplied by 1,000 to give a mass-ratio concentration in micrograms of trace element per gram of suspended sediment (parts per million). Cadmium was not plotted because the median concentrations of suspended cadmium at all sites were less than the analytical detection limit of 1 microgram per liter.

Median suspended-sediment concentrations for periodic samples at all eight water-quality stations are presented in figure 32.

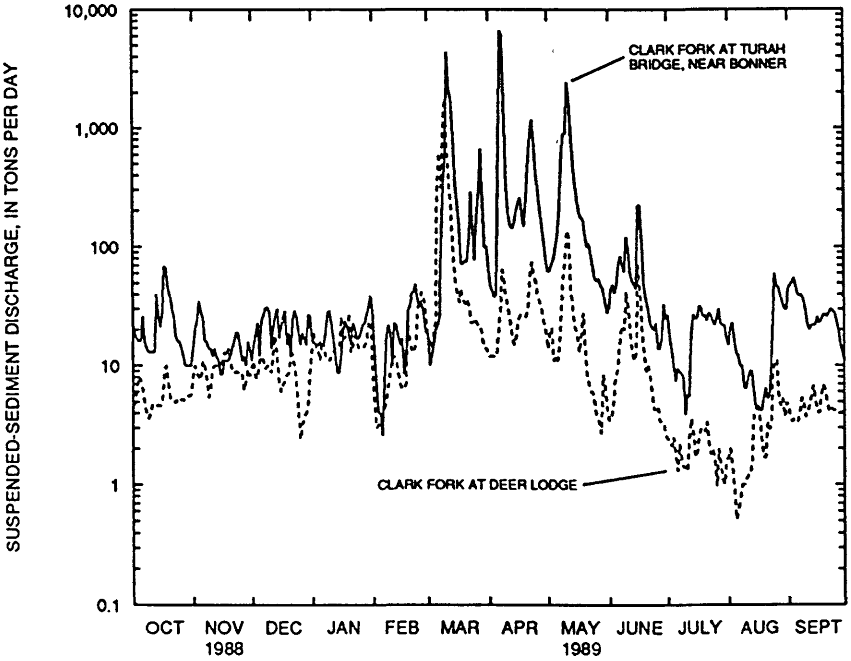


Figure 9.--Relation of daily suspended-sediment discharge for the Clark Fork at Deer Lodge to daily suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989.

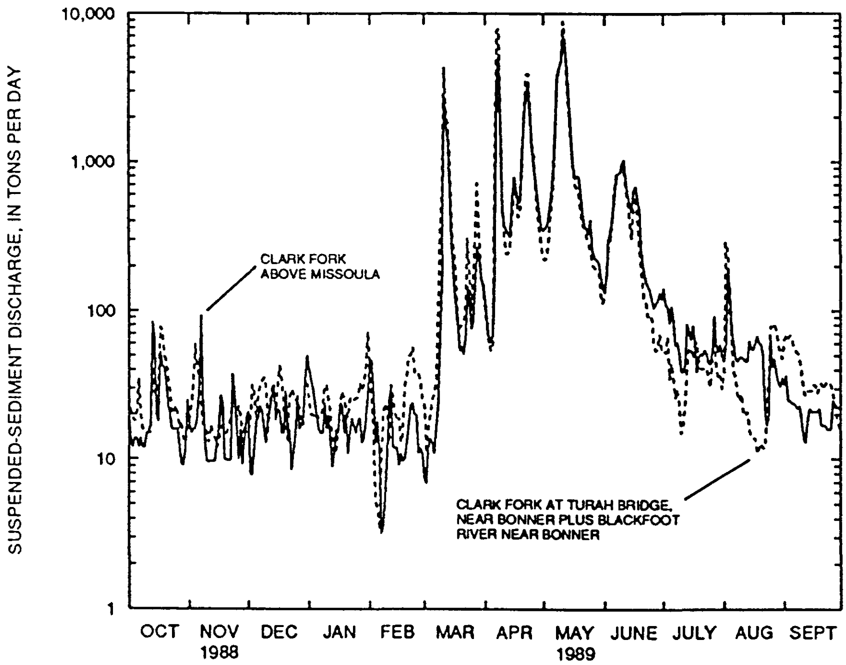


Figure 10.--Relation of daily suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner plus the Blackfoot River near Bonner to daily suspended-sediment discharge for the Clark Fork above Missoula, October 1988 through September 1989.

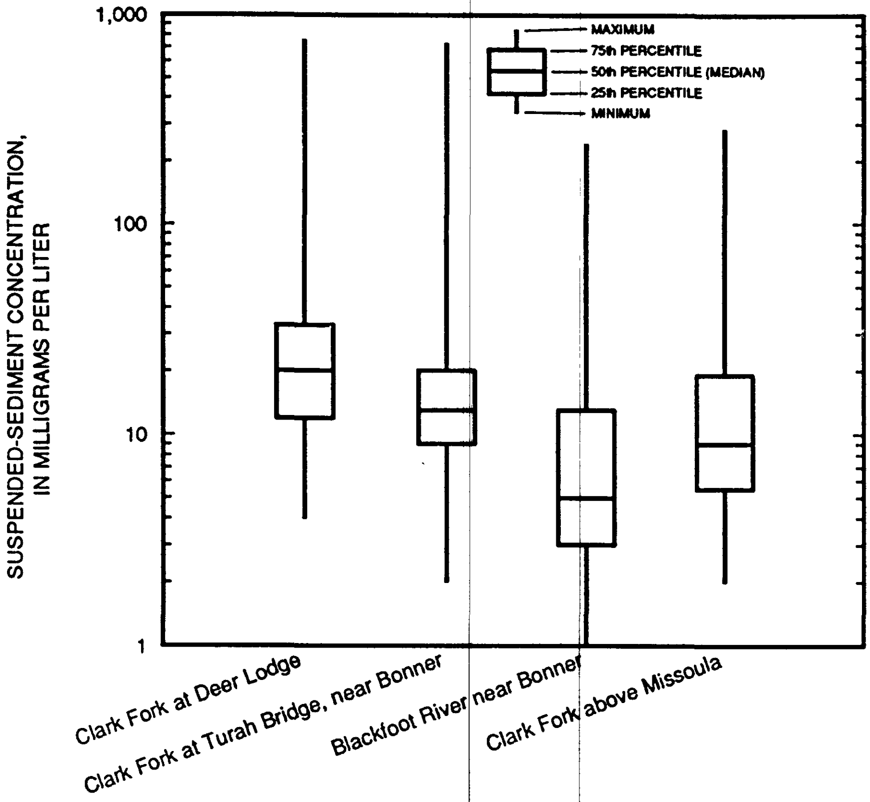


Figure 11.--Statistical distribution of daily mean suspended-sediment concentration at four sediment stations, October 1988 through September 1989.

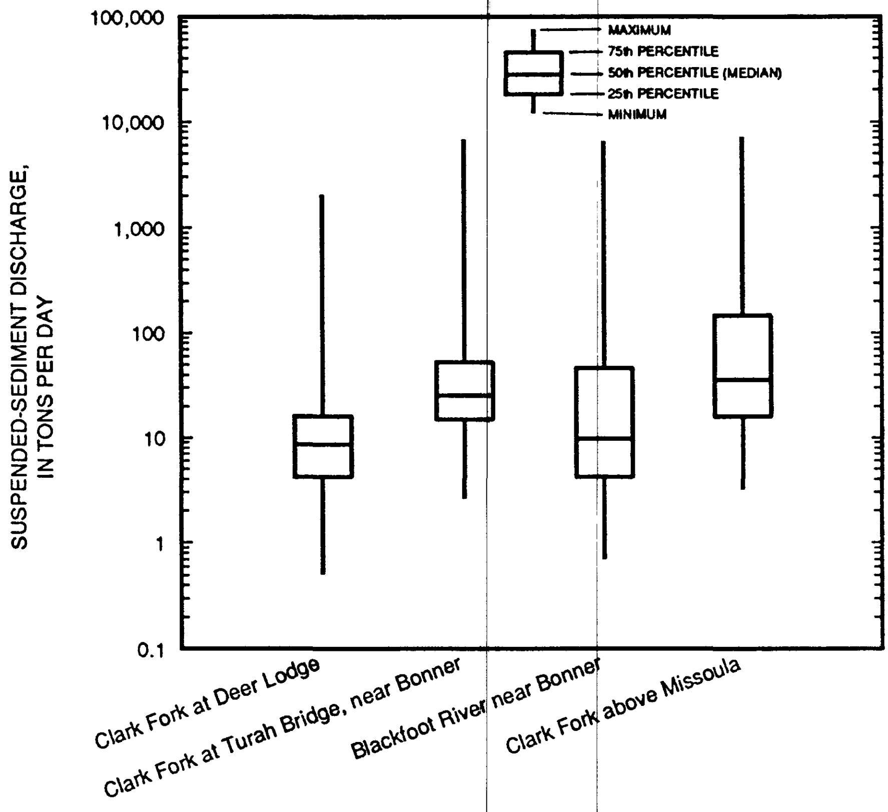


Figure 12.--Statistical distribution of daily suspended-sediment discharge at four sediment stations, October 1988 through September 1989.

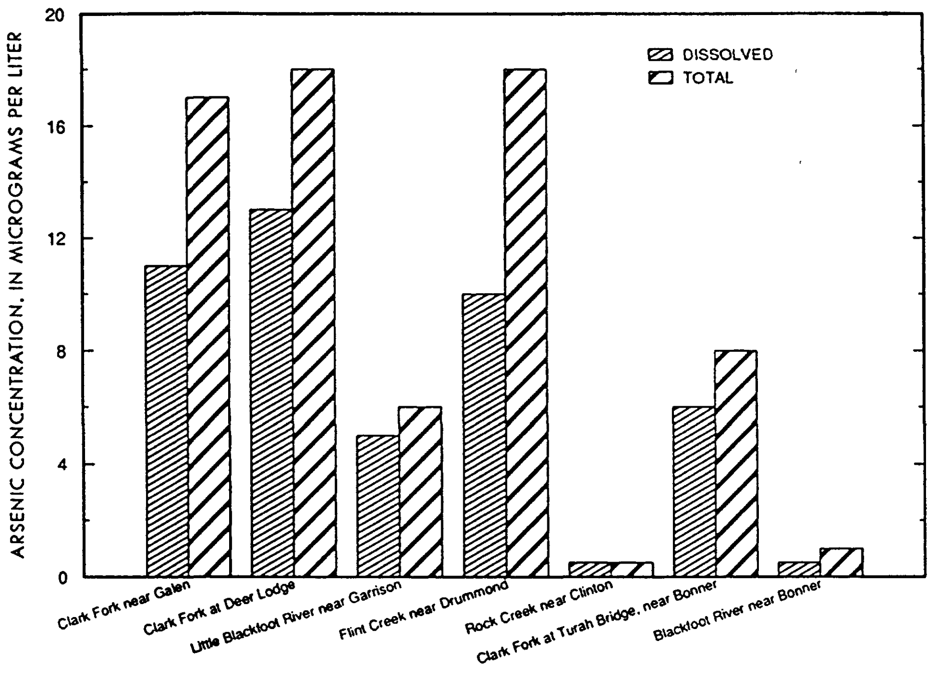


Figure 13.--Median concentrations of dissolved and total arsenic in water, March 1985 through September 1989.

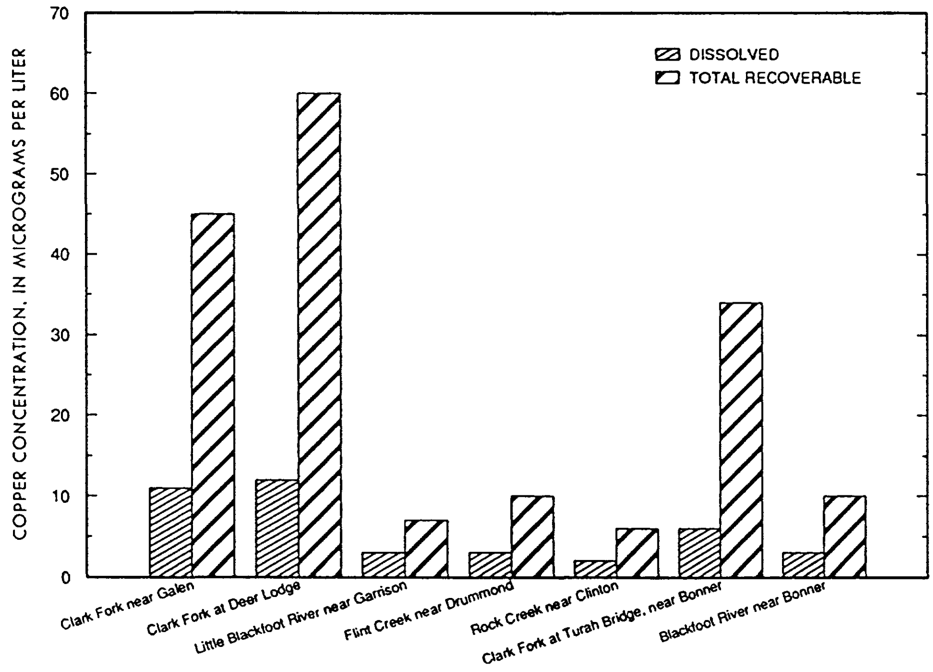


Figure 14.--Median concentrations of dissolved and total recoverable copper in water, March 1985 through September 1989.

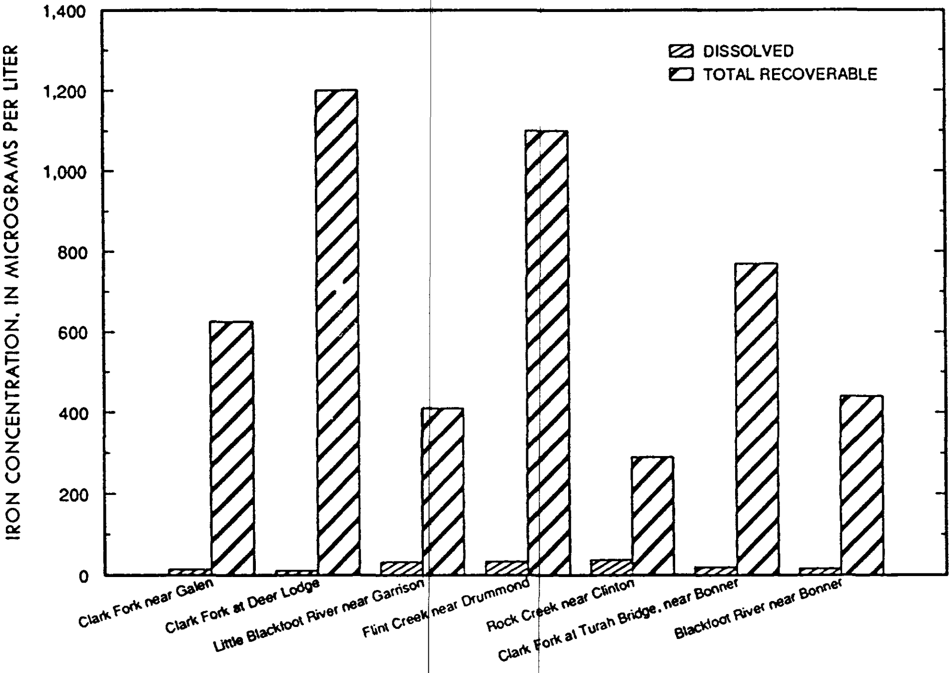


Figure 15.--Median concentrations of dissolved and total recoverable iron in water, March 1985 through September 1989.

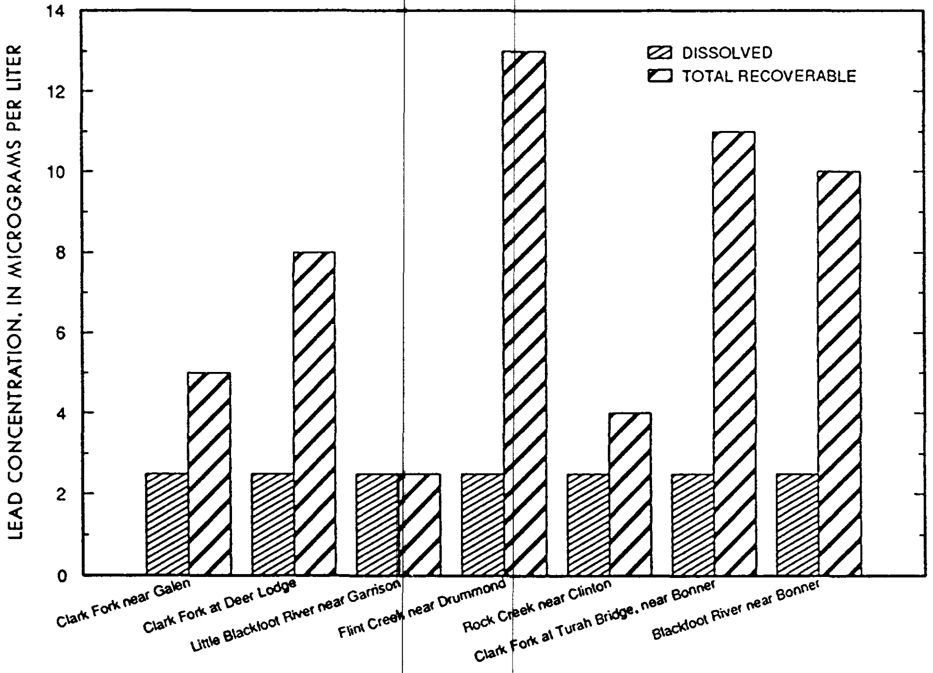


Figure 16.--Median concentrations of dissolved and total recoverable lead in water, March 1985 through September 1989.

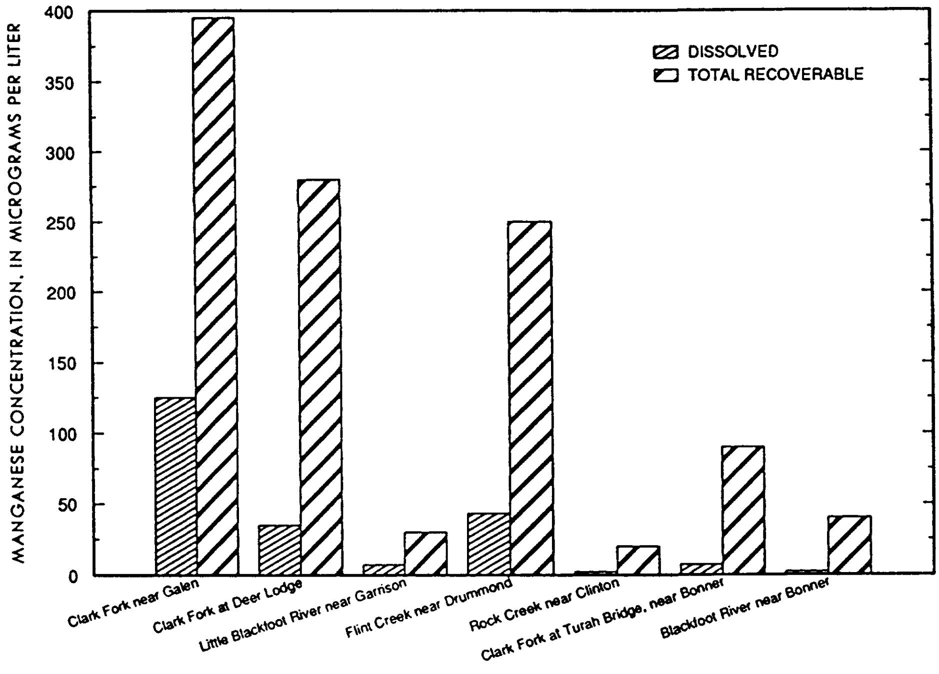


Figure 17.--Median concentrations of dissolved and total recoverable manganese in water, March 1985 through September 1989.

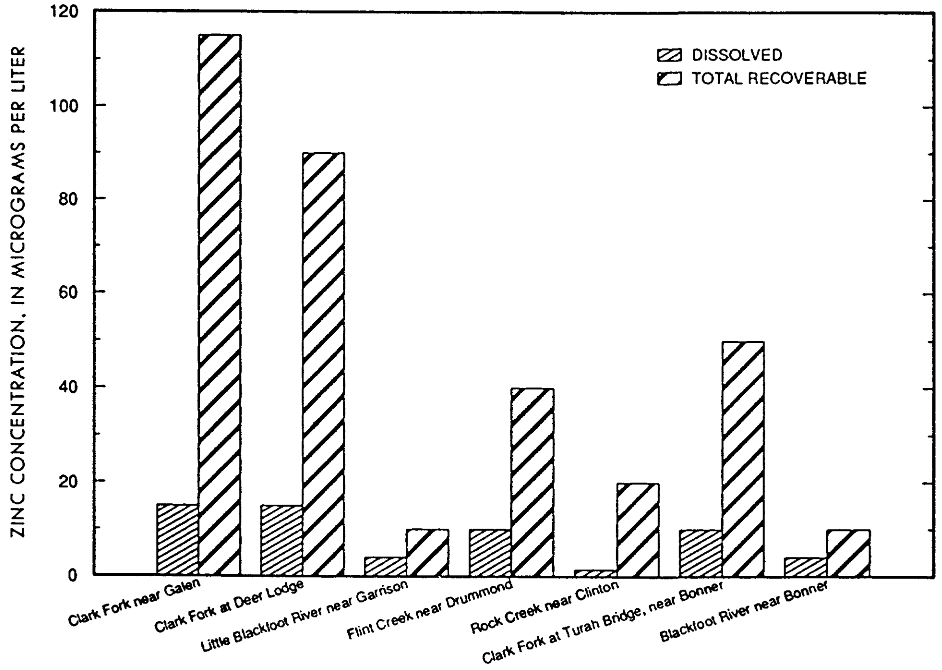


Figure 18.--Median concentrations of dissolved and total recoverable zinc in water, March 1985 through September 1989.

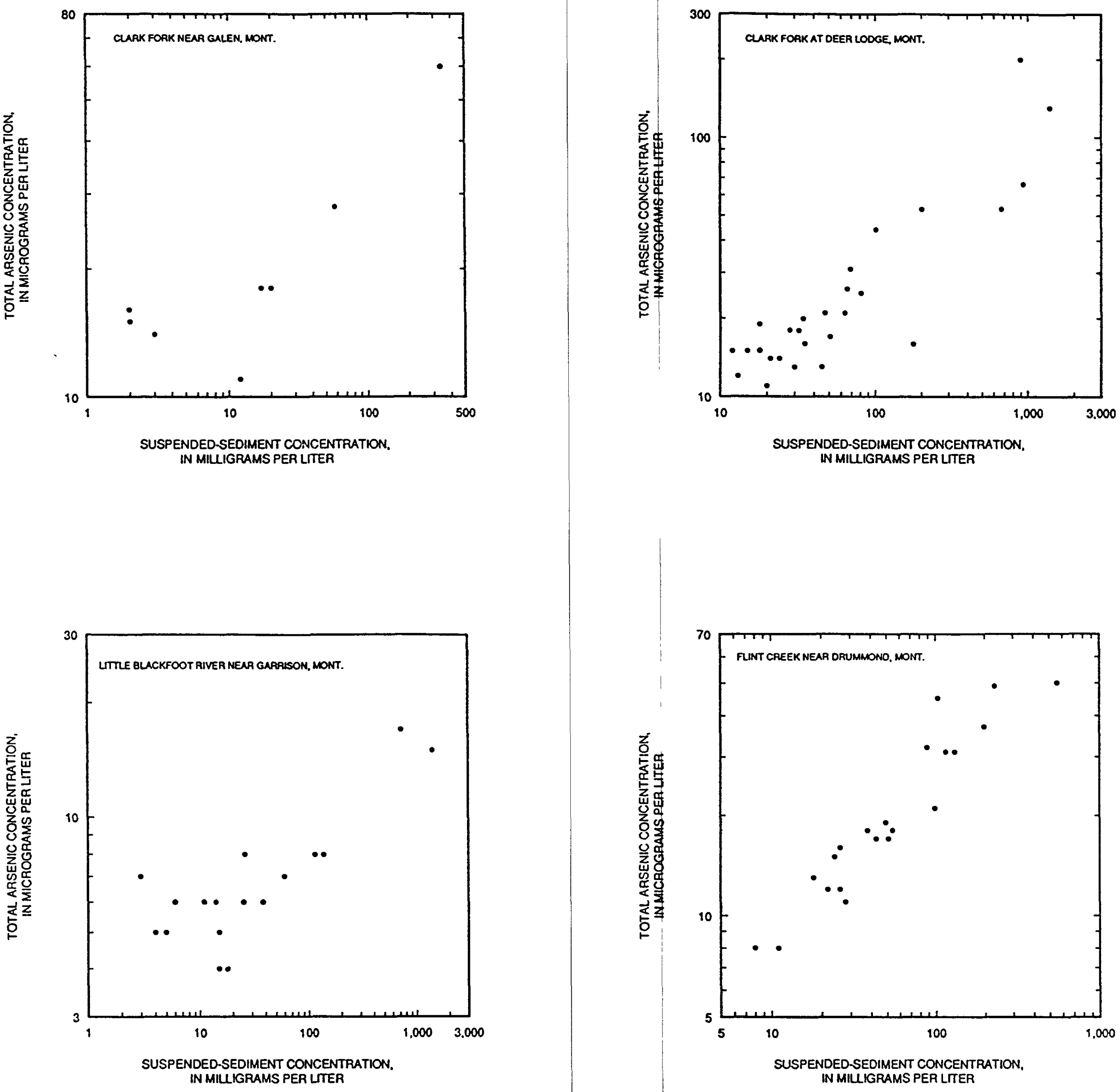
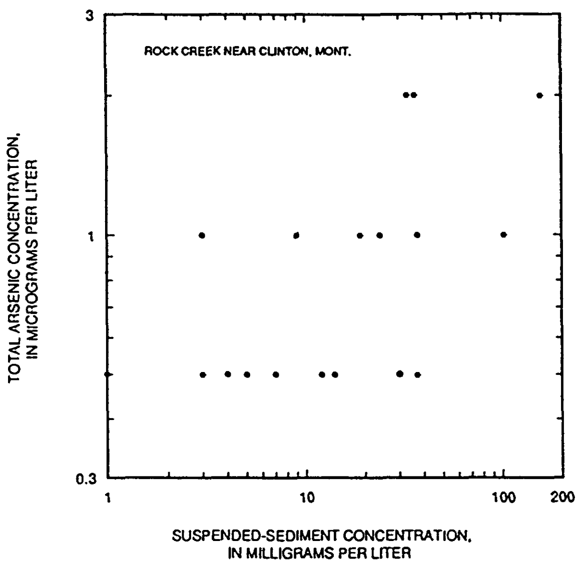
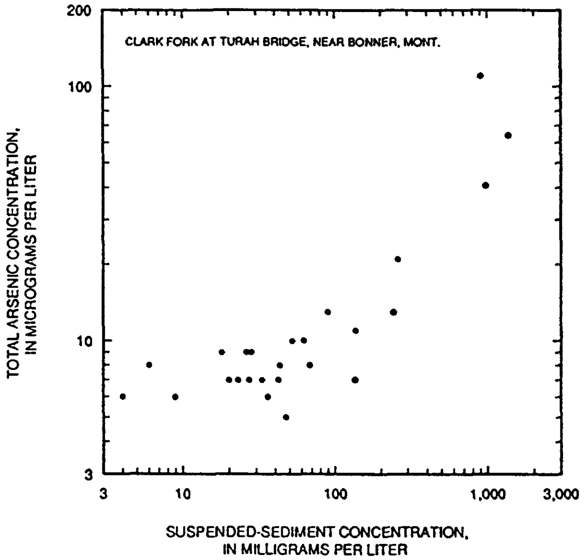


Figure 19.--Relation of concentrations of total arsenic to suspended sediment, March 1985 through September 1989.





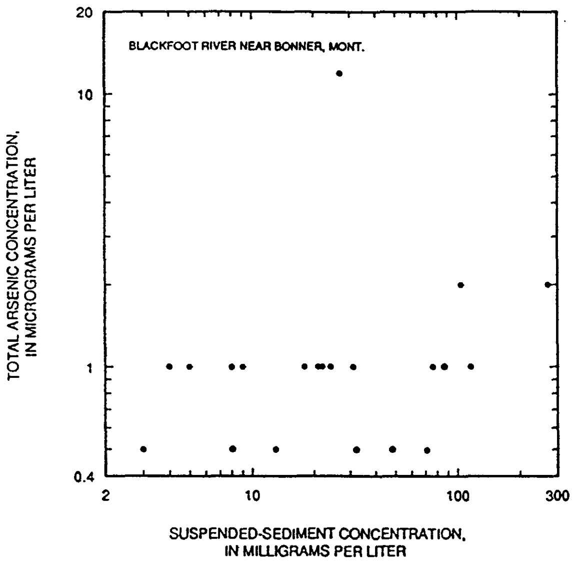


Figure 19.--Relation of concentrations of total arsenic to suspended sediment, March 1985 through September 1989--Continued.

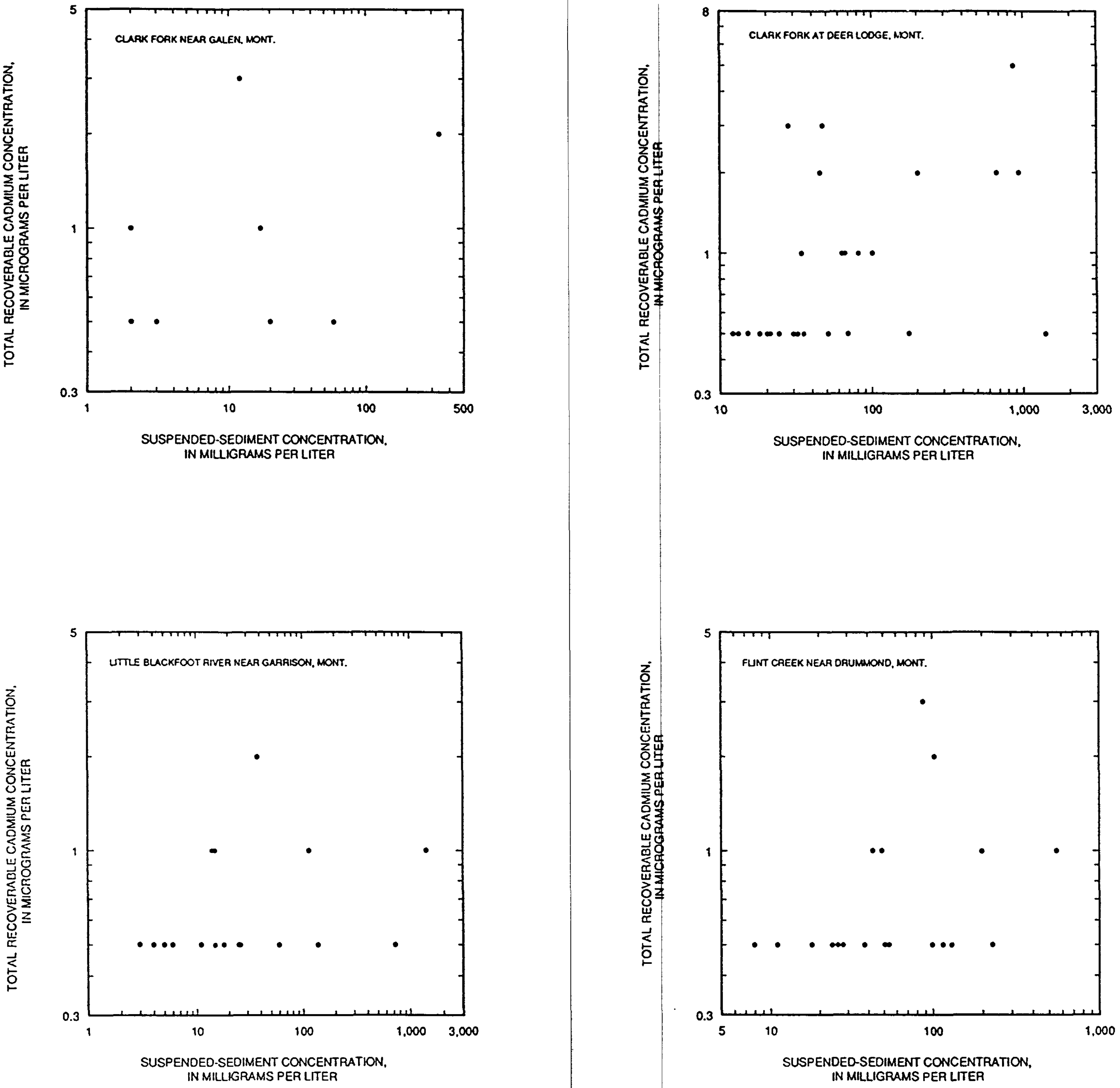
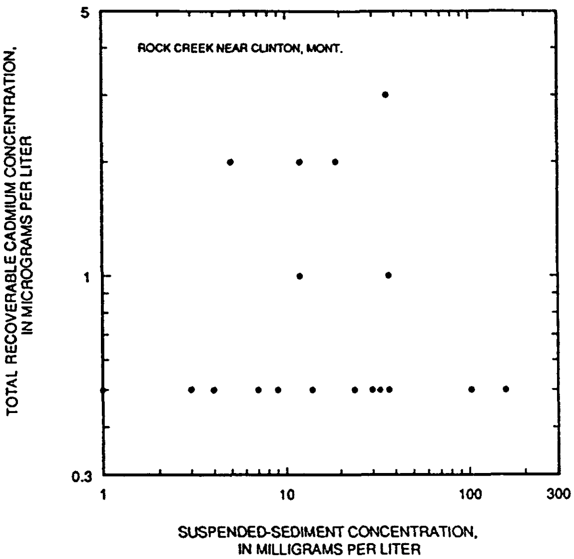
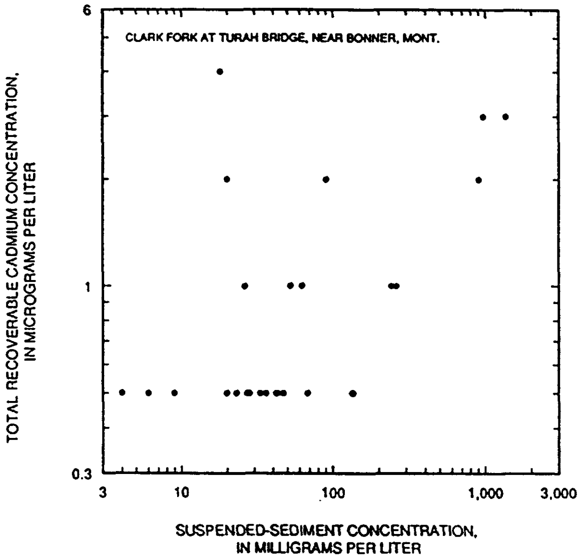


Figure 20.--Relation of concentrations of total recoverable cadmium to suspended sediment, March 1985 through September 1989.





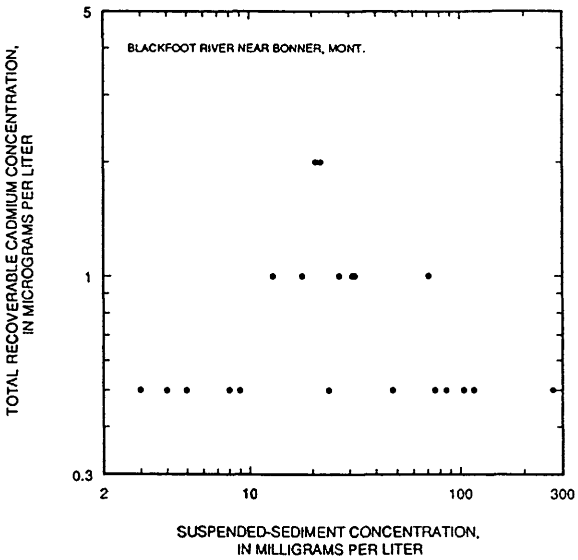


Figure 20.--Relation of concentrations of total recoverable cadmium to suspended sediment, March 1985 through September 1989--Continued.

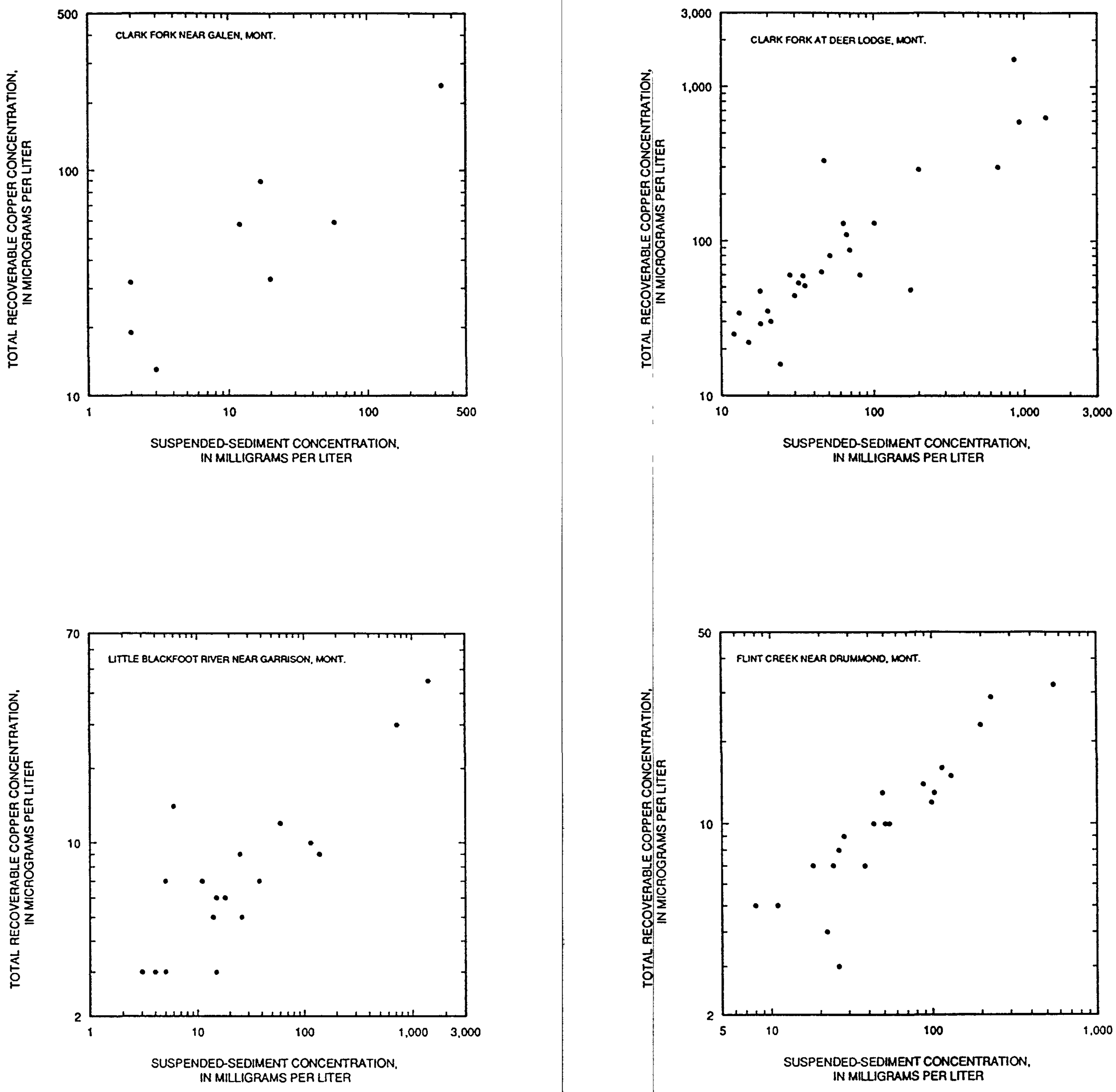


Figure 21.--Relation of concentrations of total recoverable copper to suspended sediment, March 1985 through September 1989.

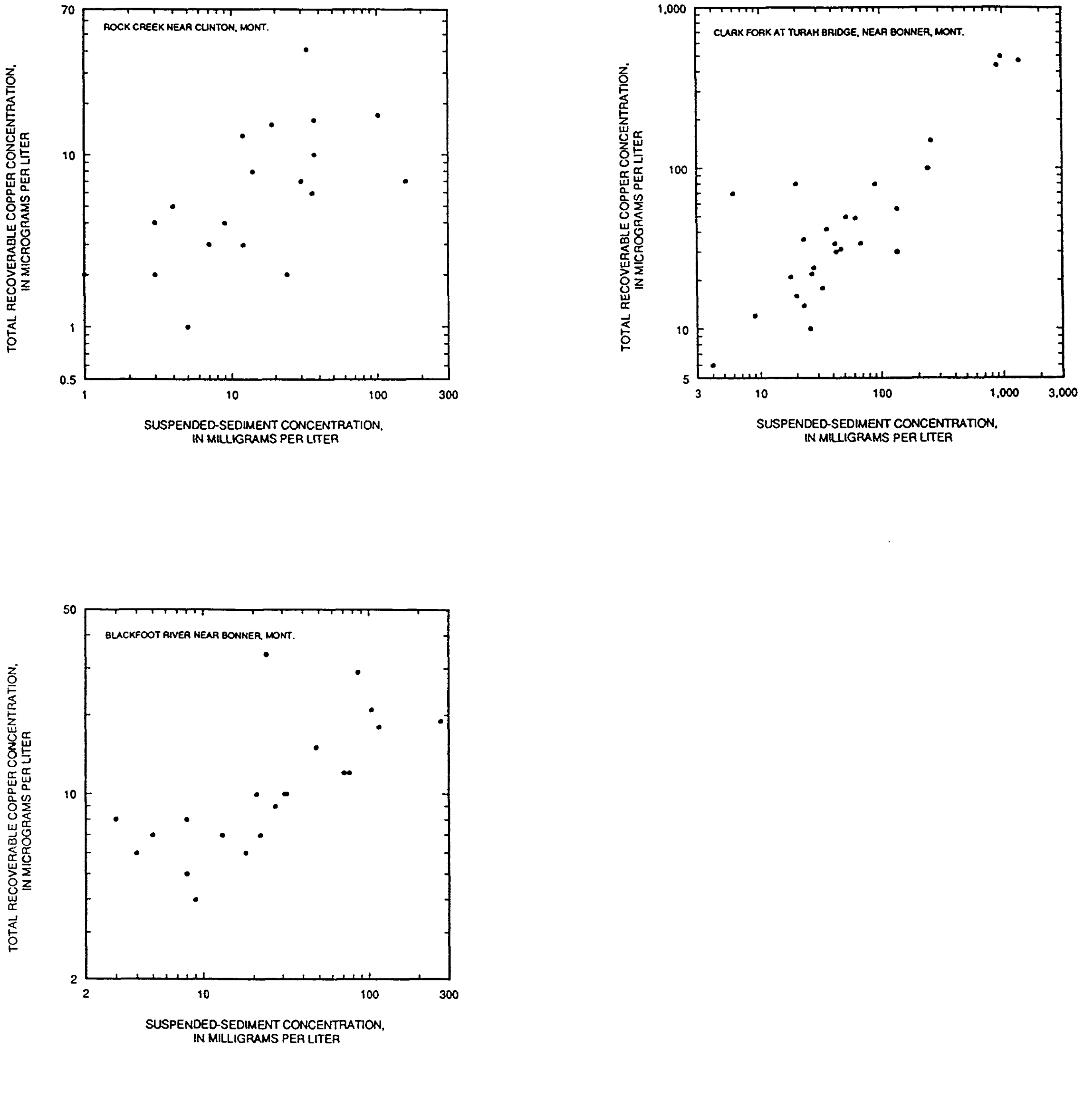


Figure 21.--Relation of concentrations of total recoverable copper to suspended sediment, March 1985 through September 1989--Continued.

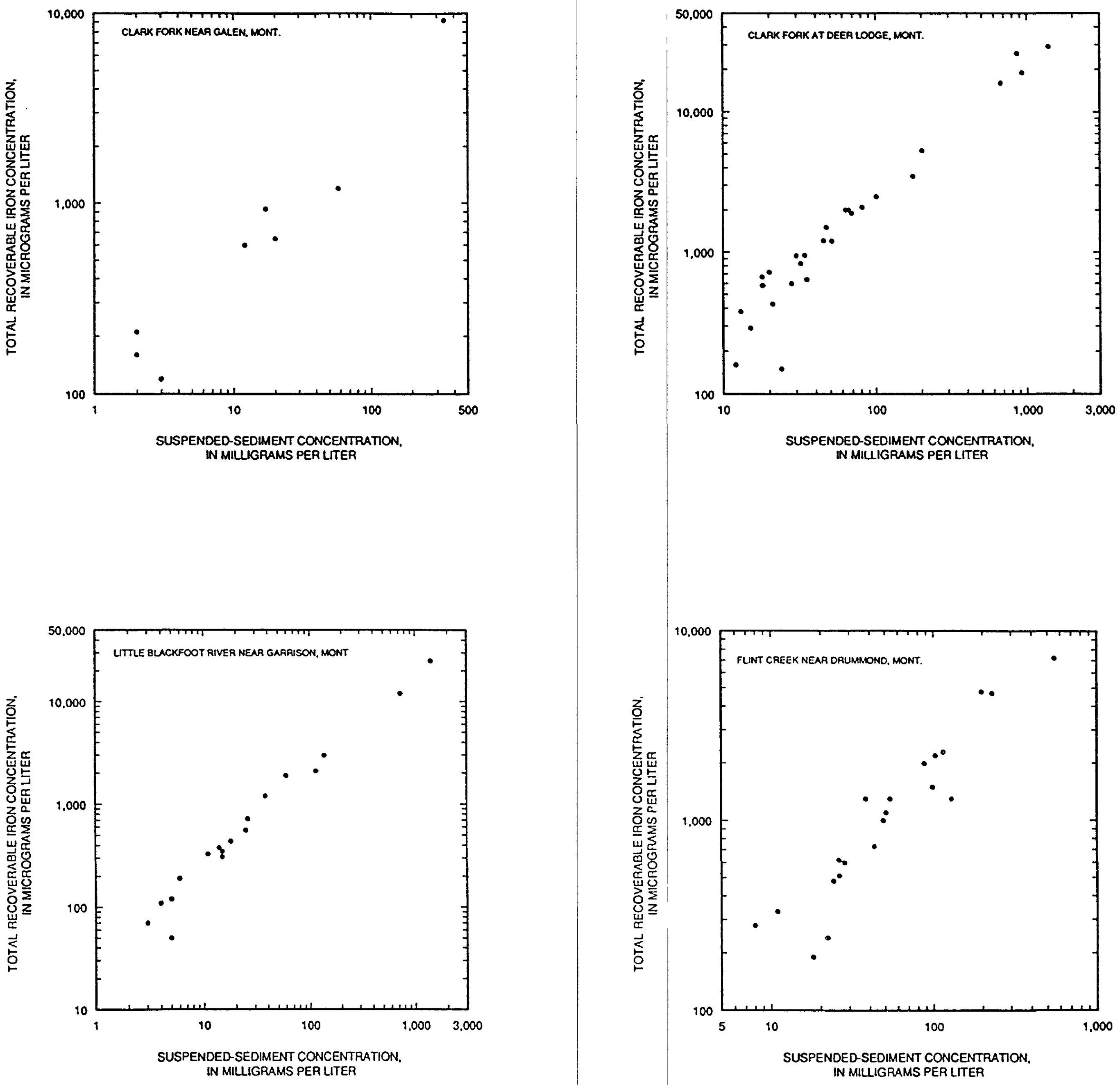


Figure 22.--Relation of concentrations of total recoverable iron to suspended sediment, March 1985 through September 1989.

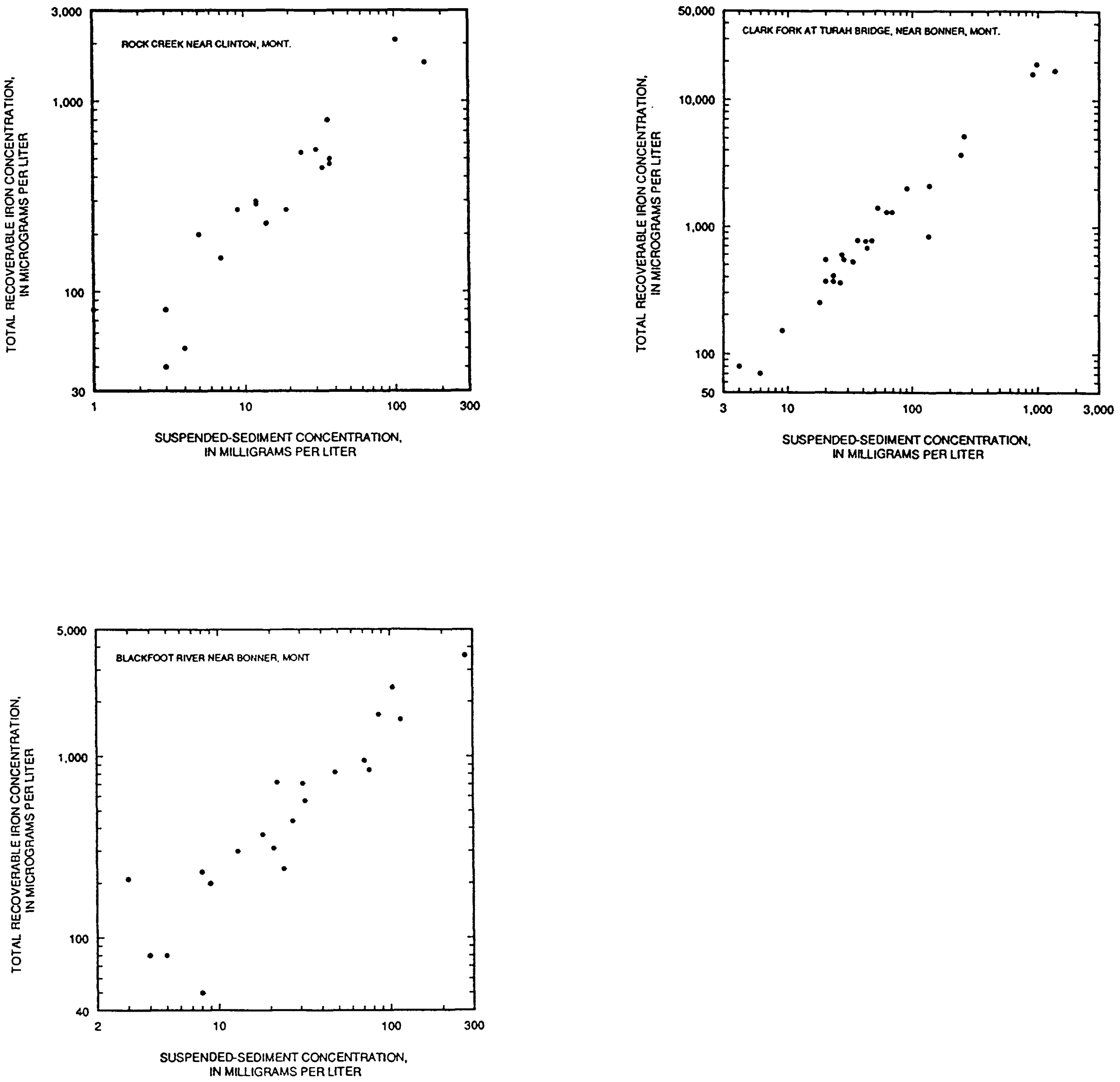


Figure 22.--Relation of concentrations of total recoverable iron to suspended sediment, March 1985 through September 1989--Continued.

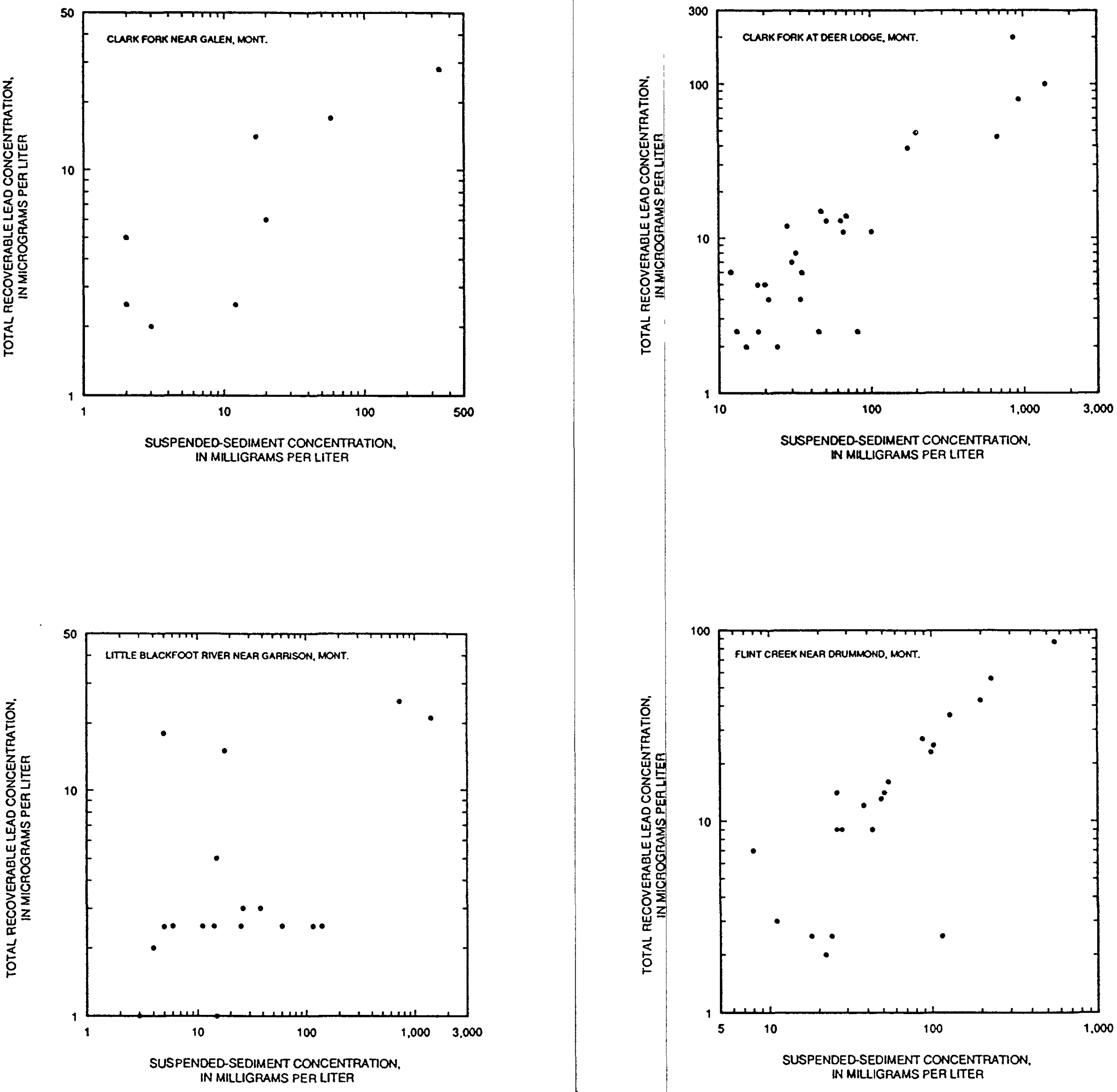
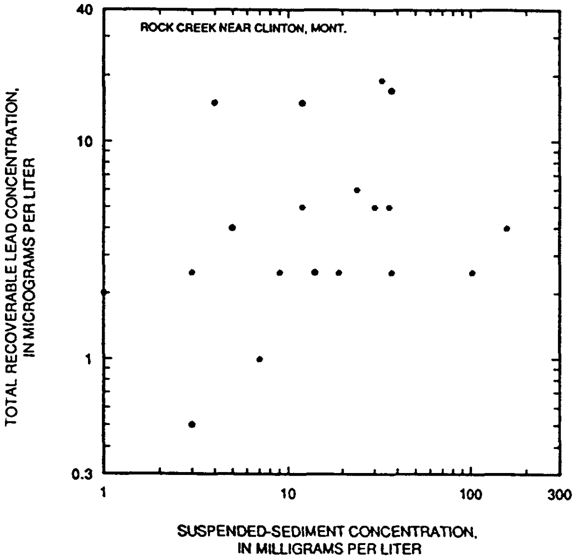
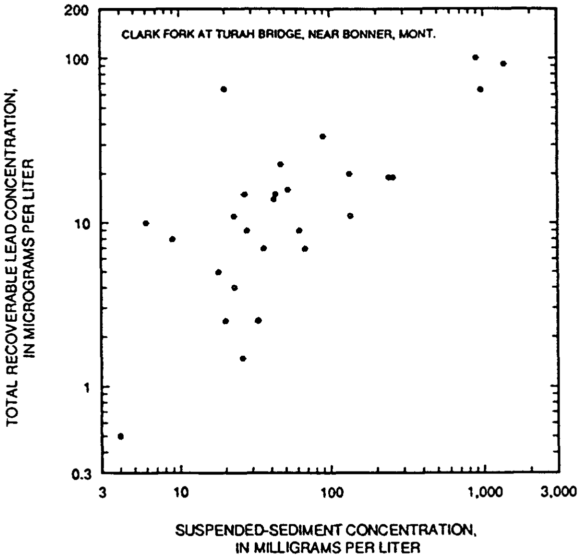


Figure 23.--Relation of concentrations of total recoverable lead to suspended sediment, March 1985 through September 1989.





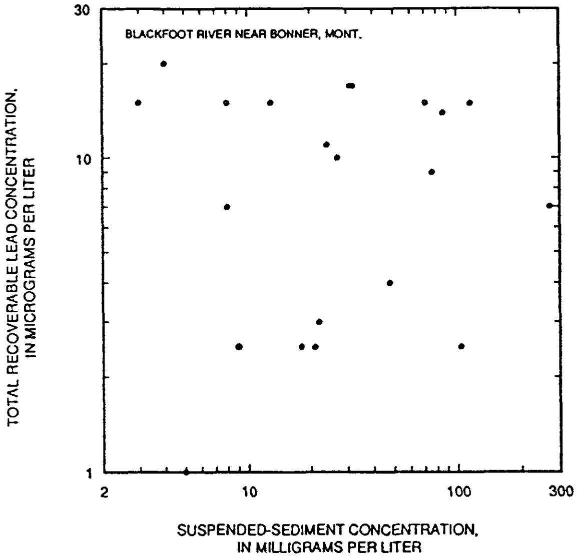


Figure 23.--Relation of concentrations of total recoverable lead to suspended sediment, March 1985 through September 1989--Continued.

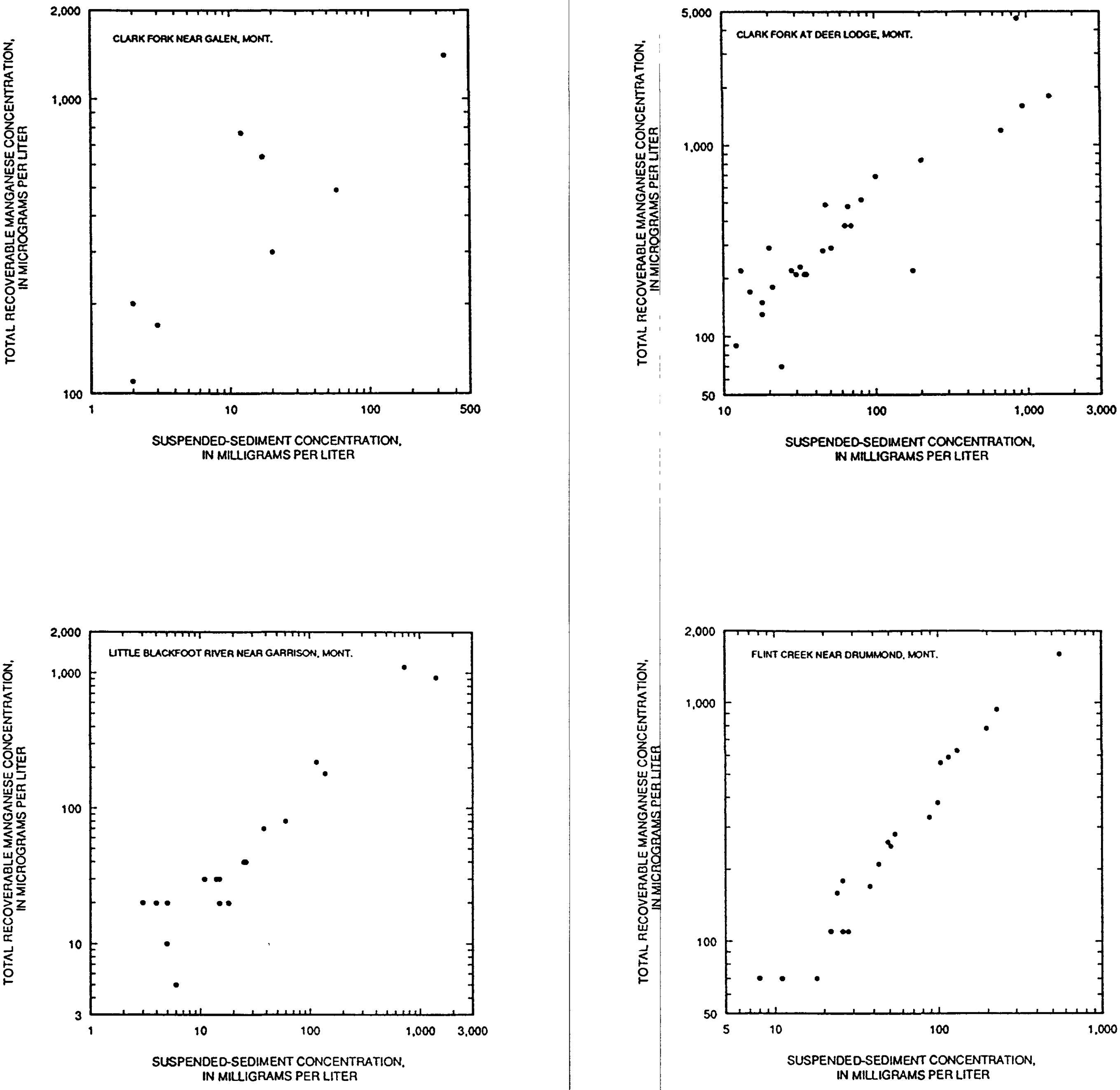
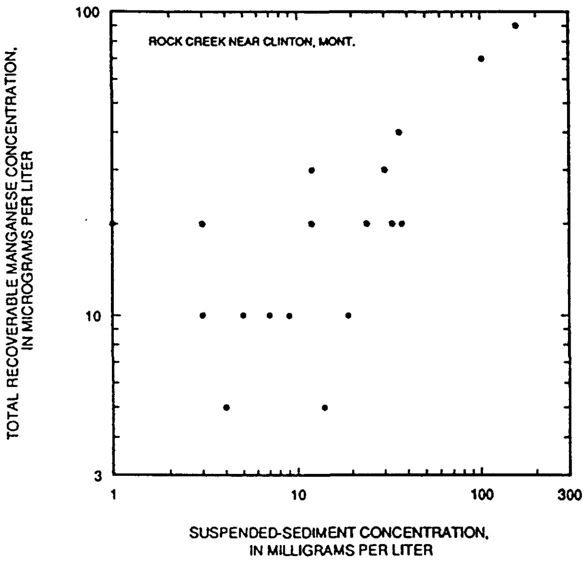
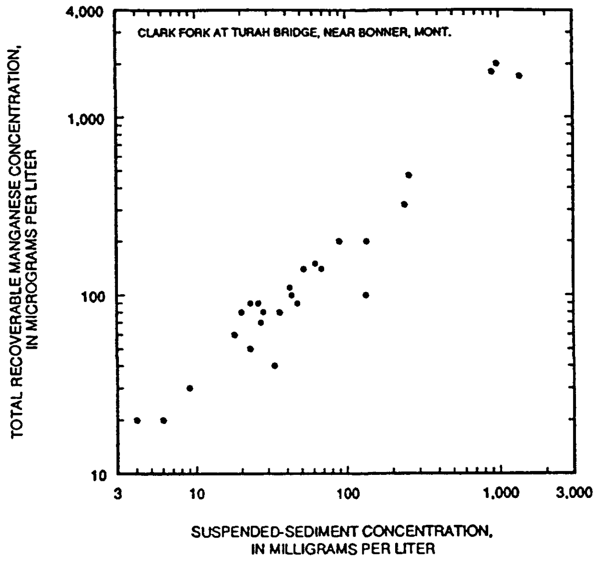


Figure 24.--Relation of concentrations of total recoverable manganese to suspended sediment, March 1985 through September 1989.





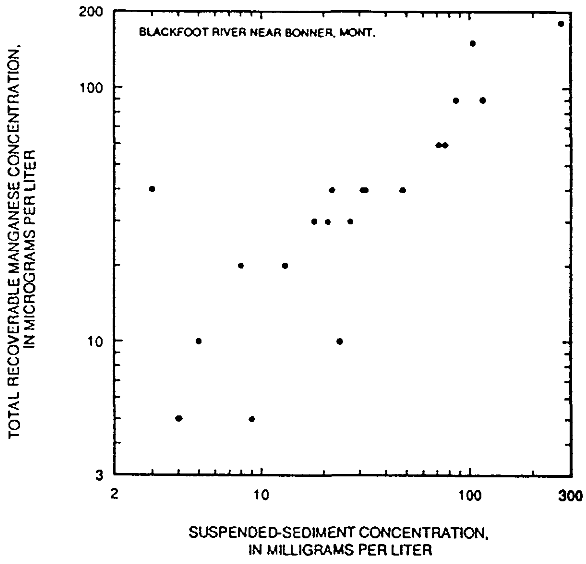


Figure 24.--Relation of concentrations of total recoverable manganese to suspended sediment, March 1985 through September 1989--Continued.

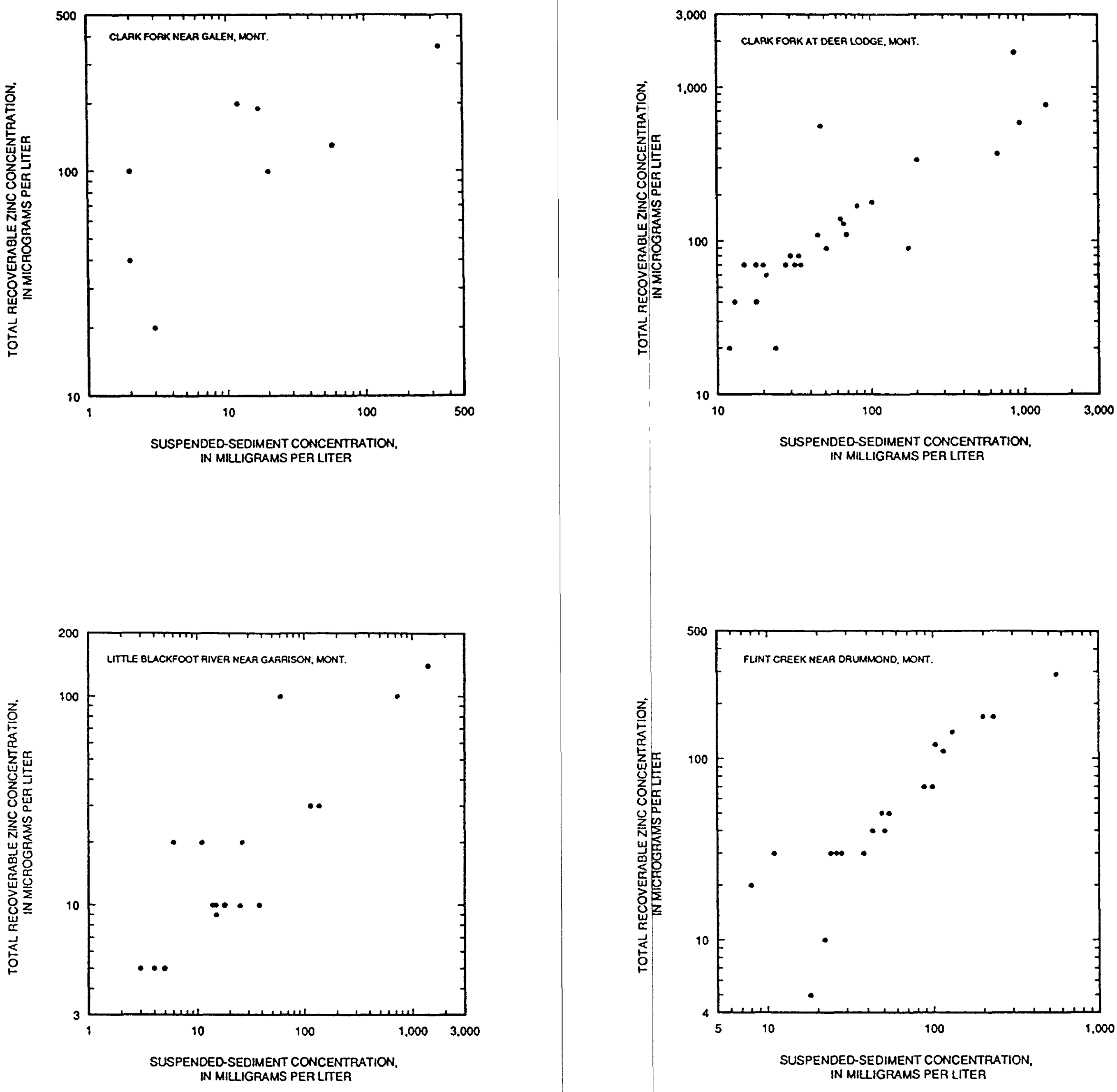
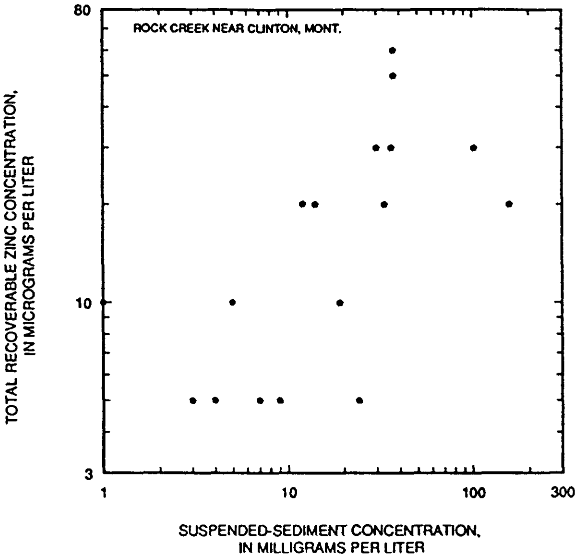
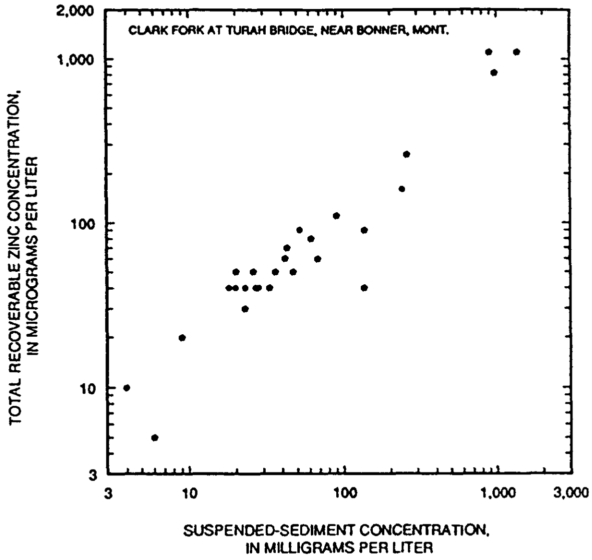


Figure 25.--Relation of concentrations of total recoverable zinc to suspended sediment, March 1985 through September 1989.





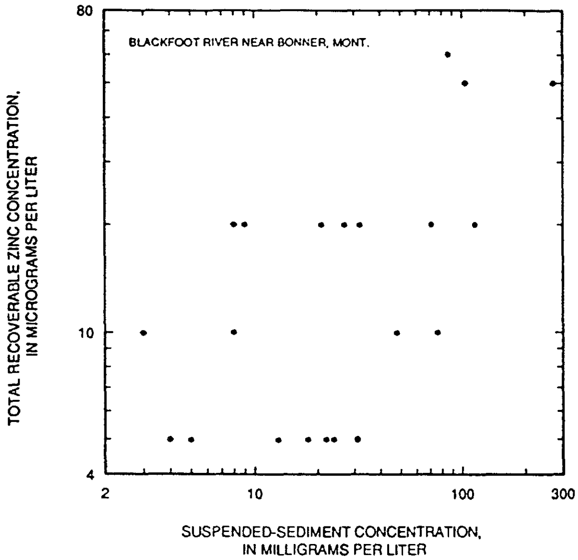


Figure 25.--Relation of concentrations of total recoverable zinc to suspended sediment, March 1985 through September 1989--Continued.

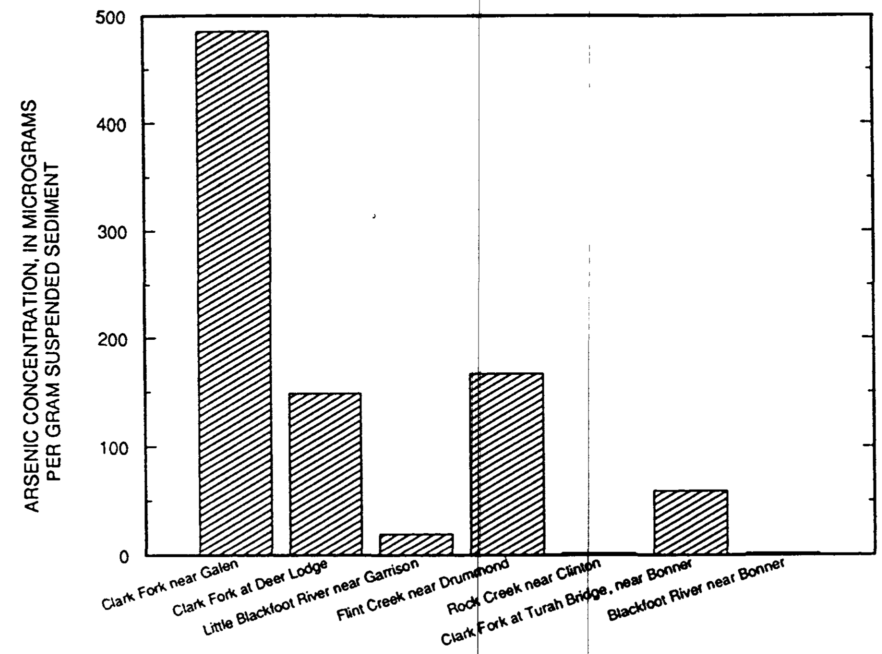


Figure 26.--Median concentrations of arsenic in suspended sediment, March 1985 through September 1989.

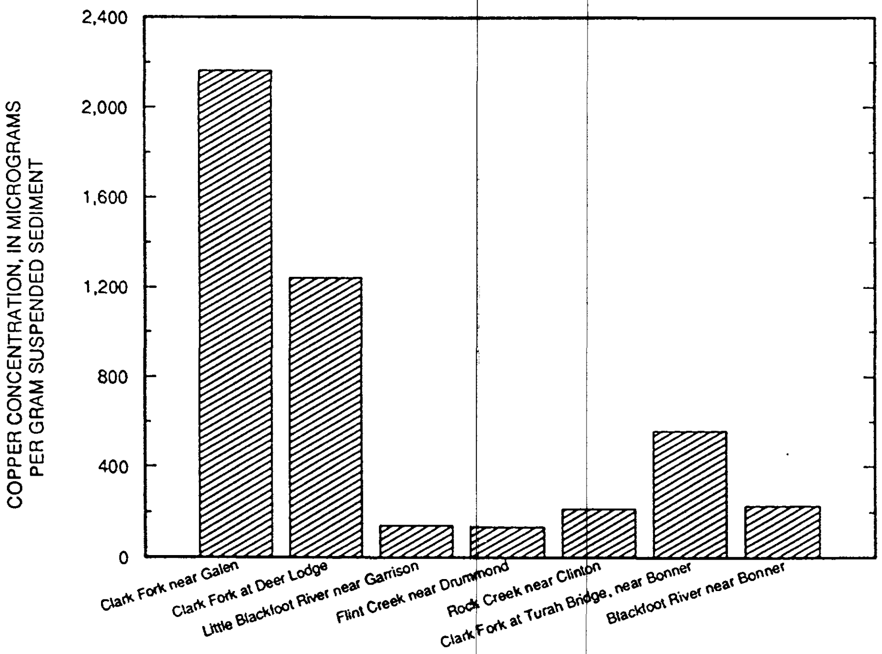


Figure 27.--Median concentrations of copper in suspended sediment, March 1985 through September 1989.

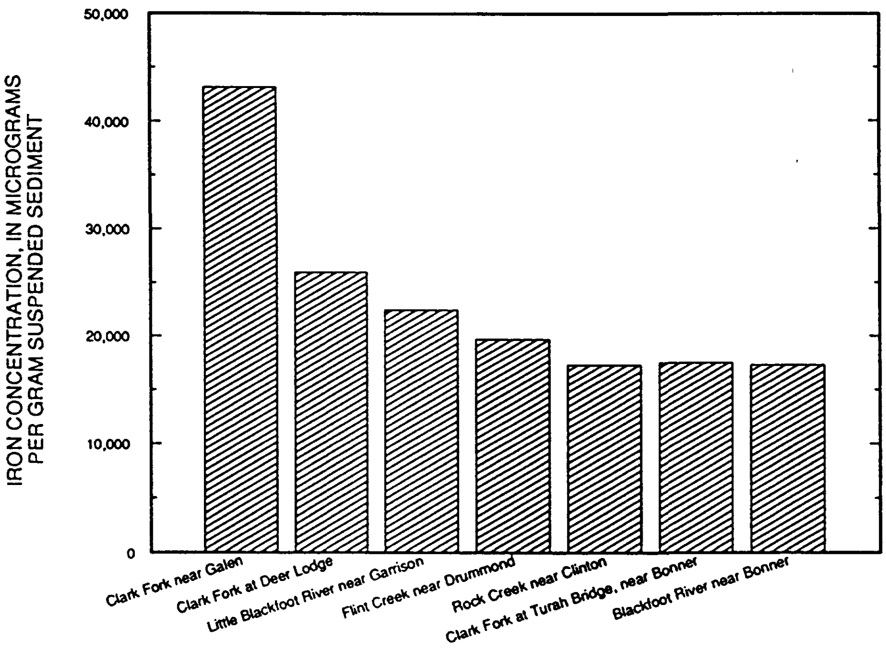


Figure 28.--Median concentrations of iron in suspended sediment, March 1985 through September 1989.

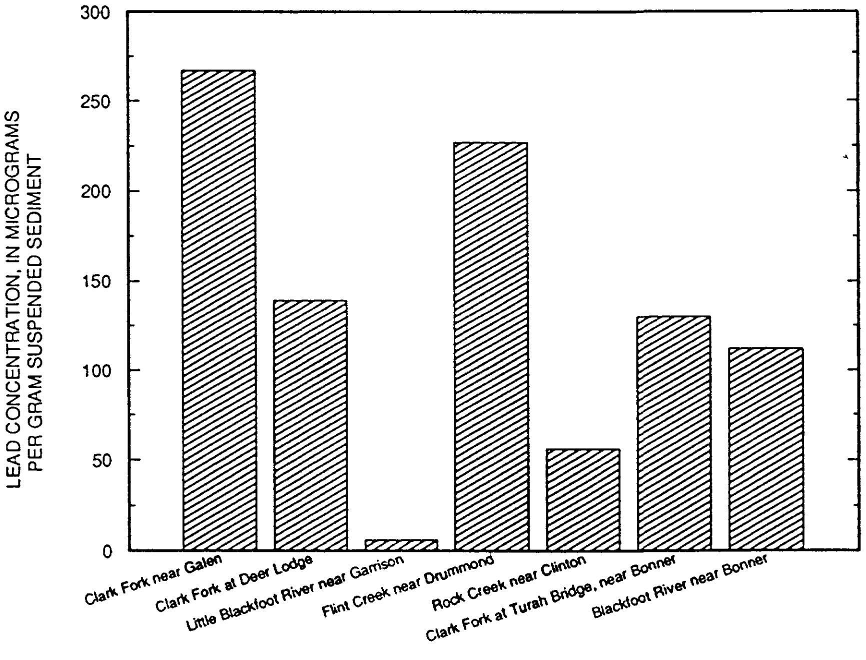


Figure 29.--Median concentrations of lead in suspended sediment, March 1985 through September 1989.

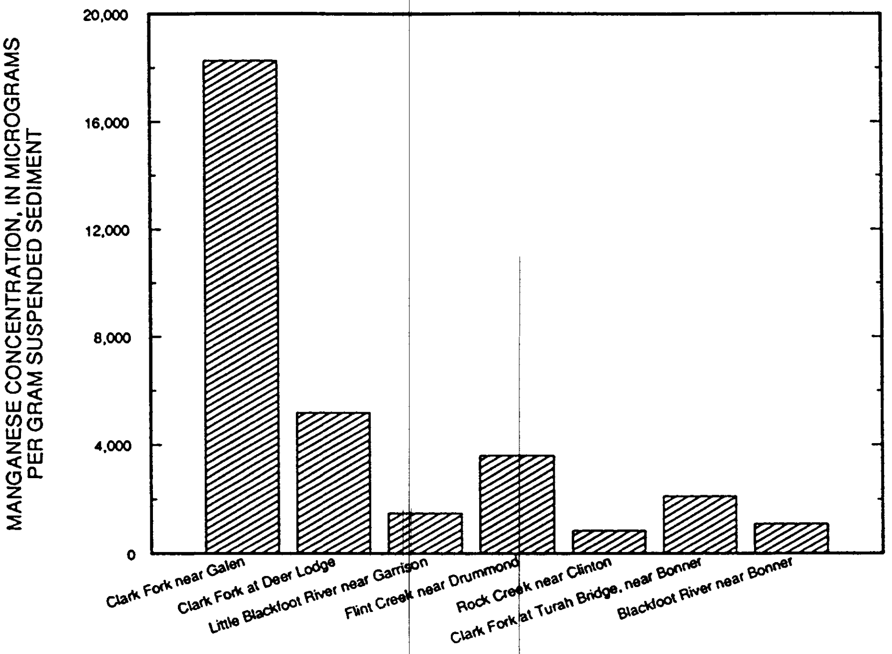


Figure 30.--Median concentrations of manganese in suspended sediment, March 1985 through September 1989.

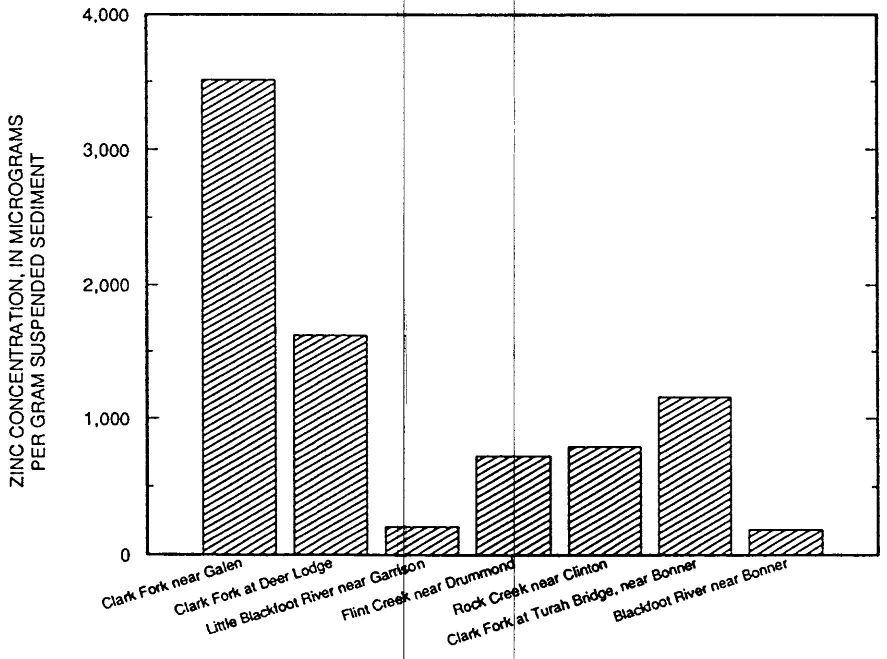


Figure 31.--Median concentrations of zinc in suspended sediment, March 1985 through September 1989.

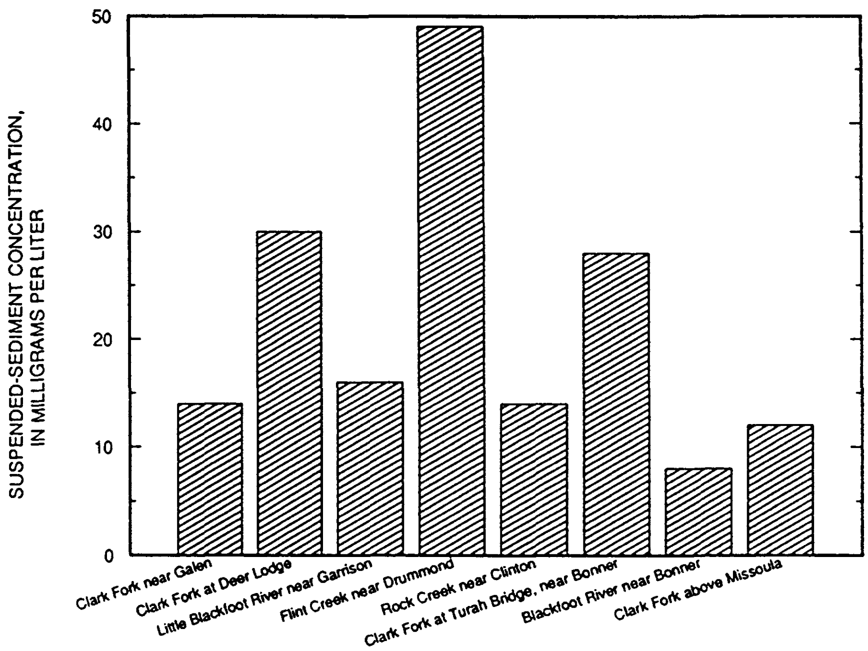


Figure 32.--Median concentrations of suspended sediment in water from periodic samples, March 1985 through September 1989.

SELECTED REFERENCES

Fishman, M.J., and Friedman, L.C., 1985, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A1, 709 p.

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

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

Guy, H.P., and Norman, V.W., 1970, Field methods for measurement of fluvial sediment: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter C2, 59 p.

Helsel, D.R., and Cohn, T.A., 1988, Estimation of descriptive statistics for multiply censored water quality data: Water Resources Research, v. 24, no. 12, p. 1997-2004.

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

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

______1988, Water-quality data (July 1986 through September 1987) and statistical summaries (March 1985 through September 1987) for the Clark Fork and selected tributaries from Deer Lodge to Missoula, Montana: U.S. Geological Survey Open-File Report 88-308, 55 p.

______1989, Water-quality data (October 1987 through September 1988) and statistical summaries (March 1985 through September 1988) for the Clark Fork and selected tributaries from Galen to Missoula, Montana: U.S. Geological Survey Open-File Report 89-229, 51 p.

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

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

Shields, R.R., Knapton, J.R., White, M.K., Brosten, T.M., and Lambing, J.H., 1990, Water resources data, Montana, water year 1989: U.S. Geological Survey Water Data Report MT-89-1, 562 p.

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

DATA TABLES

Table 2.--*Water-quality data, October 1988 through September 1989*

[Analyses by U.S. Geological Survey. Abbreviations: ft³/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 °C; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; ton/d, tons per day; mm, millimeter; <, less than analytical detection limit; --, no data]

12323800--CLARK FORK NEAR GALEN, MONT.

Date	Time	Stream-flow,-instan-taneous (ft³/s)	Specific conduct-ance, onsite (µS/cm)	pH, onsite (stand-ard units)	Temper-ature, air (°C)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Hardness, noncar-bonate (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)
Feb 1989										
23...	1345	64	670	7.9	5.0	0.5	300	160	90	18
Mar										
07...	1440	88	620	7.9	7.0	2.5	280	150	84	17
10...	1520	370	445	7.5	9.5	5.0	170	83	51	11
May										
10...	1140	299	320	8.1	16.0	13.0	140	64	41	8.3
Jun										
09...	1040	318	225	7.7	20.0	12.0	96	47	29	5.7
Jul										
13...	2015	62	450	7.9	24.0	22.5	200	110	61	12
Aug										
17...	1100	21	670	8.0	15.5	15.5	300	190	87	19

Date	Bicar-bonate, onsite (mg/L as HCO_3)	Car-bonate, onsite (mg/L as CO_3)	Alka-linity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dis-solved (µg/L as As)	Cadmium, total recov-erable (µg/L as Cd)	Cadmium, dis-solved (µg/L as Cd)	Copper, total recov-erable (µg/L as Cu)	Copper, dis-solved (µg/L as Cu)	Iron, total recov-erable (µg/L as Fe)
Feb 1989										
23...	180	0	143	11	5	3	<1	58	9	600
Mar										
07...	158	0	128	18	10	1	<1	90	39	930
10...	115	0	90	60	28	2	1	240	50	9,200
May										
10...	89	0	73	28	19	<1	<1	59	12	1,200
Jun										
09...	61	0	49	18	12	<1	<1	33	11	650
Jul										
13...	116	0	91	15	10	1	<1	32	15	210
Aug										
17...	129	0	102	14	10	<1	<1	13	9	120

Date	Iron, dis-solved (µg/L as Fe)	Lead, total recov-erable (µg/L as Pb)	Lead, dis-solved (µg/L as Pb)	Manga-nese, total recov-erable (µg/L as Mn)	Manga-nese, dis-solved (µg/L as Mn)	Zinc, total recov-erable (µg/L as Zn)	Zinc, dis-solved (µg/L as Zn)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Feb 1989										
23...	9	<5	<5	770	360	200	110	12	2.1	--
Mar										
07...	45	14	<5	640	360	190	110	17	4.0	65
10...	110	28	<5	1,400	340	360	86	338	338	73
May										
10...	18	17	<1	490	81	130	12	58	47	71
Jun										
09...	25	6	1	300	79	100	9	20	17	68
Jul										
13...	11	5	1	200	140	40	17	2	.33	88
Aug										
17...	9	2	1	170	110	20	13	3	.17	72

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

12324200--CLARK FORK AT DEER LODGE, MONT.

Date	Time	Stream-flow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, air (°C)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
Oct 1988										
04...	1200	93	--	--	10.0	10.0	--	--	--	--
Nov										
17...	1010	160	642	--	-3.0	1.0	--	--	--	--
Jan 1989										
05...	1155	165	608	--	3.5	0.0	--	--	--	--
Feb										
21...	1205	161	594	--	5.0	1.0	--	--	--	--
23...	1200	179	--	--	--	2.0	--	--	--	--
23...	1630	196	600	7.8	3.0	1.5	270	120	81	17
Mar										
07...	1345	476	--	--	--	2.0	--	--	--	--
07...	1700	615	480	7.4	5.0	2.5	190	100	56	13
07...	1845	643	--	--	--	--	--	--	--	--
09...	0935	374	--	--	--	2.0	--	--	--	--
09...	1840	1,430	350	--	--	--	--	--	--	--
10...	0820	865	--	--	--	2.0	--	--	--	--
10...	1200	890	400	7.4	8.0	2.0	160	87	47	9.7
10...	1430	801	--	--	--	4.5	--	--	--	--
Apr										
04...	1340	210	607	--	8.5	6.5	--	--	--	--
08...	1300	309	--	--	--	7.0	--	--	--	--
May										
10...	1400	369	410	8.3	22.0	16.5	180	75	53	11
16...	1125	299	432	--	15.0	11.0	--	--	--	--
Jul										
06...	1230	97	456	--	24.0	19.0	--	--	--	--
12...	1930	65	475	7.9	--	20.0	200	64	59	12
13...	1745	88	510	--	--	23.0	--	--	--	--
Aug										
14...	1945	62	450	7.9	--	16.5	190	61	56	11
17...	1330	58	578	8.1	26.5	17.5	250	77	76	15

Date	Bicarbonate, onsite (mg/L as HCO_3)	Carbonate, onsite (mg/L as CO_3)	Alkalinity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)
Oct 1988										
04...	--	--	--	--	--	--	--	--	--	--
Nov										
17...	--	--	--	--	--	--	--	--	--	--
Jan 1989										
05...	--	--	--	--	--	--	--	--	--	--
Feb										
21...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	196	0	156	13	7	2	<1	63	7	1,200
Mar										
07...	--	--	--	--	--	--	--	--	--	--
07...	116	0	92	66	30	2	<1	590	47	19,000
07...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--
10...	88	0	71	200	21	5	<1	1,500	34	26,000
10...	--	--	--	--	--	--	--	--	--	--
Apr										
04...	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--
May										
10...	126	0	103	31	17	<1	<1	87	13	1,900
16...	--	--	--	--	--	--	--	--	--	--
Jul										
06...	--	--	--	--	--	--	--	--	--	--
12...	168	0	133	21	14	3	2	330	120	1,500
13...	--	--	--	--	--	--	--	--	--	--
Aug										
14...	155	0	124	16	12	<1	<1	48	9	3,500
17...	216	0	175	14	13	<1	<1	16	9	150

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Iron, dis-solved (µg/L as Fe)	Lead, total recov-erable (µg/L as Pb)	Lead, dis-solved (µg/L as Pb)	Manga-nese, total recov-erable (µg/L as Mn)	Manga-nese, dis-solved (µg/L as Mn)	Zinc, total recov-erable (µg/L as Zn)	Zinc, dis-solved (µg/L as Zn)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)
Oct 1988									
04...	--	--	--	--	--	--	--	35	8.8
Nov									
17...	--	--	--	--	--	--	--	36	16
Jan 1989									
05...	--	--	--	--	--	--	--	22	9.8
Feb									
21...	--	--	--	--	--	--	--	26	11
23...	--	--	--	--	--	--	--	30	14
23...	7	<5	<5	280	44	110	39	45	24
Mar									
07...	--	--	--	--	--	--	--	350	450
07...	120	80	<5	1,600	93	590	43	931	1,550
07...	--	--	--	--	--	--	--	762	1,320
09...	--	--	--	--	--	--	--	152	153
09...	--	--	--	--	--	--	--	2,250	8,690
10...	--	--	--	--	--	--	--	770	1,800
10...	150	200	<5	4,600	120	1,700	50	862	2,070
10...	--	--	--	--	--	--	--	576	1,250
Apr									
04...	--	--	--	--	--	--	--	26	15
08...	--	--	--	--	--	--	--	89	74
May									
10...	13	14	2	380	22	110	6	69	69
16...	--	--	--	--	--	--	--	28	23
Jul									
06...	--	--	--	--	--	--	--	2	.52
12...	10	15	<1	490	400	560	230	47	8.2
13...	--	--	--	--	--	--	--	8	1.9
Aug									
14...	7	39	1	220	<1	90	9	176	29
17...	6	2	2	70	31	20	7	24	3.8

Date	Sediment, suspended (percent finer than 0.002 mm)	Sediment, suspended (percent finer than 0.004 mm)	Sediment, suspended (percent finer than 0.008 mm)	Sediment, suspended (percent finer than 0.016 mm)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (percent finer than 0.125 mm)	Sediment, suspended (percent finer than 0.250 mm)	Sediment, suspended (percent finer than 0.500 mm)
Oct 1988								
04...	--	--	--	--	61	--	--	--
Nov								
17...	--	--	--	--	65	--	--	--
Jan 1989								
05...	--	--	--	--	77	--	--	--
Feb								
21...	--	--	--	--	68	--	--	--
23...	--	--	--	--	--	--	--	--
23...	--	--	--	--	68	--	--	--
Mar								
07...	--	--	--	--	--	--	--	--
07...	27	34	42	52	77	87	97	100
07...	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--
10...	27	38	49	61	84	90	96	100
10...	--	--	--	--	--	--	--	--
Apr								
04...	--	--	--	--	81	--	--	--
08...	--	--	--	--	--	--	--	--
May								
10...	--	--	--	--	58	--	--	--
16...	--	--	--	--	--	--	--	--
Jul								
06...	--	--	--	--	81	--	--	--
12...	--	--	--	--	99	--	--	--
13...	--	--	--	--	--	--	--	--
Aug								
14...	--	--	--	--	95	--	--	--
17...	--	--	--	--	45	--	--	--

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

12324590--LITTLE BLACKFOOT RIVER NEAR GARRISON, MONT.

Date	Time	Stream-flow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, air (°C)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
Mar 1989										
11...	1630	495	160	7.4	9.0	0.5	63	9	18	4.5
Apr										
06...	1200	562	150	7.4	16.0	3.0	63	7	18	4.4
07...	1945	2,080	120	7.0	12.0	6.5	51	15	15	3.3
20...	1145	433	190	7.8	18.0	7.0	90	15	26	6.0
May										
07...	1320	485	160	7.7	20.0	10.0	70	5	20	4.9
Aug										
15...	1215	35	280	8.1	18.0	15.5	130	8	40	8.5

Date	Bicarbonate, onsite (mg/L as HCO_3)	Carbonate, onsite (mg/L as CO_3)	Alkalinity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)
Mar 1989										
11...	68	0	55	8	6	1	<1	10	5	2,100
Apr										
06...	71	0	56	8	5	<1	<1	9	2	3,000
07...	47	0	36	15	6	1	<1	45	3	25,000
20...	93	0	75	7	5	<1	<1	12	3	1,900
May										
07...	82	0	65	8	5	<1	<1	5	2	720
Aug										
15...	160	0	127	7	7	<1	<1	3	1	70

Date	Iron, dissolved (µg/L as Fe)	Lead, total recoverable (µg/L as Pb)	Lead, dissolved (µg/L as Pb)	Manganese, total recoverable (µg/L as Mn)	Manganese, dissolved (µg/L as Mn)	Zinc, total recoverable (µg/L as Zn)	Zinc, dissolved (µg/L as Zn)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Mar 1989										
11...	77	<5	<5	220	30	30	10	115	154	54
Apr										
06...	73	<5	<5	180	21	30	15	138	209	54
07...	120	21	<5	920	9	140	11	1,410	7,920	52
20...	55	<5	<5	80	8	100	<3	60	70	61
May										
07...	32	3	<1	40	8	20	<3	26	34	49
Aug										
15...	6	1	2	20	5	<10	<3	3	.28	91

Table 2.--*Water-quality data, October 1988 through September 1989*--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, air (°C)	Temper-ature, water (°C)	Hard-ness, total (mg/L as $CaCO_3$)	Hardness, noncar-bonate (mg/L as $CaCO_3$)	Calcium, dis-solved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)
Mar 1989										
11...	1230	602	210	7.5	5.0	2.0	75	5	19	6.6
Apr										
06...	1500	295	250	7.7	18.0	7.0	110	24	30	9.6
20...	1530	208	260	8.4	23.0	13.0	130	6	34	9.9
May										
07...	1645	256	220	8.1	19.5	12.0	97	10	26	7.7
11...	1045	457	135	8.0	11.0	8.0	73	8	20	5.6
Aug										
15...	1500	31	500	8.4	24.0	19.0	240	6	65	18

Date	Bicar-bonate, onsite (mg/L as HCO_3)	Car-bonate, onsite (mg/L as CO_3)	Alka-linity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dis-solved (µg/L as As)	Cadmium, total recov-erable (µg/L as Cd)	Cadmium, dis-solved (µg/L as Cd)	Copper, total recov-erable (µg/L as Cu)	Copper, dis-solved (µg/L as Cu)	Iron, total recov-erable (µg/L as Fe)
Mar 1989										
11...	90	0	70	50	13	1	<1	32	4	7,200
Apr										
06...	114	0	91	37	12	1	<1	23	4	4,800
20...	139	5	120	18	9	<1	<1	7	2	1,300
May										
07...	108	0	87	17	8	<1	<1	10	3	1,100
11...	80	0	65	21	7	<1	<1	12	3	1,500
Aug										
15...	281	2	231	12	11	<1	<1	4	1	240

Date	Iron, dis-solved (µg/L as Fe)	Lead, total recov-erable (µg/L as Pb)	Lead, dis-solved (µg/L as Pb)	Manga-nese, total recov-erable (µg/L as Mn)	Manga-nese, dis-solved (µg/L as Mn)	Zinc, total recov-erable (µg/L as Zn)	Zinc, dis-solved (µg/L as Zn)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Mar 1989										
11...	190	87	<5	1,600	120	290	27	556	904	28
Apr										
06...	44	43	<5	780	77	170	25	198	158	84
20...	35	12	<5	170	33	30	11	38	21	75
May										
07...	38	14	1	250	43	40	14	51	35	60
11...	60	23	7	380	41	70	6	99	122	58
Aug										
15...	12	2	<1	110	43	10	3	22	1.8	57

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

12334510--ROCK CREEK NEAR CLINTON, MONT.

Date	Time	Stream-flow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, air (°C)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
Apr 1989										
07...	1620	515	120	7.4	13.0	6.5	55	5	14	4.9
20...	1815	897	90	8.3	23.0	11.0	40	0	10	3.7
May										
07...	1945	1,260	75	7.5	18.0	10.0	30	0	7.7	2.7
11...	1340	3,010	55	7.5	12.5	7.0	26	4	6.6	2.2
Aug										
16...	1040	258	145	7.9	15.5	13.5	66	0	17	5.7

Date	Bicarbonate, onsite (mg/L as HCO_3)	Carbonate, onsite (mg/L as CO_3)	Alkalinity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)
Apr 1989										
07...	64	0	50	1	<1	<1	<1	17	1	2,100
20...	51	0	42	1	<1	<1	<1	2	2	540
May										
07...	39	0	31	<1	<1	<1	<1	7	2	560
11...	26	0	22	2	<1	<1	<1	7	2	1,600
Aug										
16...	86	0	70	1	<1	<1	<1	2	1	80

Date	Iron, dissolved (µg/L as Fe)	Lead, total recoverable (µg/L as Pb)	Lead, dissolved (µg/L as Pb)	Manganese, total recoverable (µg/L as Mn)	Manganese, dissolved (µg/L as Mn)	Zinc, total recoverable (µg/L as Zn)	Zinc, dissolved (µg/L as Zn)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Apr 1989										
07...	38	<5	<5	70	3	30	5	102	142	95
20...	54	6	<5	20	2	<10	<3	24	58	55
May										
07...	42	5	1	30	4	30	<3	30	102	48
11...	66	4	1	90	4	20	6	157	1,280	40
Aug										
16...	15	<1	<1	20	2	<10	5	3	2.1	74

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Time	Stream-flow,-instantaneous (ft^3/s)	Specific conductance, onsite (μS/cm)	pH, onsite (standard units)	Temperature, air (°C)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
Nov 1988										
08...	1230	657	--	--	5.0	4.0	--	--	--	--
Dec										
19...	1430	456	483	--	-7.0	1.0	--	--	--	--
Jan 1989										
31...	1130	672	425	--	0.0	2.0	--	--	--	--
Feb										
23...	0945	603	--	--	--	2.0	--	--	--	--
24...	1515	591	440	8.2	3.0	3.0	200	56	58	14
Mar										
08...	0800	702	--	--	--	2.5	--	--	--	--
08...	1400	795	445	8.0	4.5	3.0	200	67	58	14
08...	1715	838	--	--	--	3.5	--	--	--	--
09...	0740	985	--	--	--	3.0	--	--	--	--
10...	1840	1,380	350	--	--	4.0	--	--	--	--
11...	0745	4,090	260	7.4	3.0	1.0	98	30	28	6.8
11...	1010	3,850	260	--	--	1.5	--	--	--	--
14...	1300	2,080	348	--	5.0	2.5	--	--	--	--
29...	1455	1,420	--	--	--	--	--	--	--	--
Apr										
06...	1820	1,930	420	8.0	18.0	9.5	190	58	53	13
06...	2000	2,000	420	--	--	9.5	--	--	--	--
07...	1315	3,810	225	7.5	15.0	7.0	94	29	27	6.4
07...	1450	3,750	225	--	--	7.0	--	--	--	--
21...	1110	2,450	--	--	--	11.0	--	--	--	--
May										
02...	1430	1,930	270	--	15.0	10.5	--	--	--	--
08...	1220	3,130	205	8.0	17.0	13.0	89	23	25	6.5
11...	1600	4,500	160	--	--	10.5	--	--	--	--
12...	1115	4,460	160	7.6	10.0	8.0	76	24	22	5.2
Jun										
06...	1045	2,000	216	--	28.0	14.0	--	--	--	--
09...	1705	2,240	--	--	--	17.5	--	--	--	--
Jul										
18...	1315	957	327	--	23.5	16.5	--	--	--	--
Aug										
16...	1300	535	375	8.5	18.0	16.5	170	39	48	12
Sept										
15...	1230	827	--	--	22.0	11.0	--	--	--	--

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Bicarbonate, onsite (mg/L as HCO_3)	Carbonate, onsite (mg/L as CO_3)	Alkalinity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)
Nov 1988										
08...	--	--	--	--	--	--	--	--	--	--
Dec										
19...	--	--	--	--	--	--	--	--	--	--
Jan 1989										
31...	--	--	--	--	--	--	--	--	--	--
Feb										
23...	--	--	--	--	--	--	--	--	--	--
24...	183	0	147	7	5	<1	<1	16	3	370
Mar										
08...	--	--	--	--	--	--	--	--	--	--
08...	170	0	136	8	6	<1	<1	30	6	680
08...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--
11...	86	0	68	110	17	2	<1	440	23	16,000
11...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--
Apr										
06...	162	0	128	21	8	1	<1	150	5	5,200
06...	--	--	--	--	--	--	--	--	--	--
07...	83	0	65	41	9	3	<1	500	11	19,000
07...	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--
May										
02...	--	--	--	--	--	--	--	--	--	--
08...	83	0	66	8	4	<1	<1	34	4	1,300
11...	--	--	--	--	--	--	--	--	--	--
12...	67	0	52	11	5	<1	<1	56	6	2,100
Jun										
06...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
Jul										
18...	--	--	--	--	--	--	--	--	--	--
Aug										
16...	154	4	131	6	5	<1	<1	6	7	80
Sept										
15...	--	--	--	--	--	--	--	--	--	--

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Iron, dis-solved (µg/L as Fe)	Lead, total recov-erable (µg/L as Pb)	Lead, dis-solved (µg/L as Pb)	Manga-nese, total recov-erable (µg/L as Mn)	Manga-nese, dis-solved (µg/L as Mn)	Zinc, total recov-erable (µg/L as Zn)	Zinc, dis-solved (µg/L as Zn)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)
Nov 1988									
08...	--	--	--	--	--	--	--	12	21
Dec									
19...	--	--	--	--	--	--	--	11	14
Jan 1989									
31...	--	--	--	--	--	--	--	22	40
Feb									
23...	--	--	--	--	--	--	--	34	55
24...	6	<5	<5	80	5	40	10	20	32
Mar									
08...	--	--	--	--	--	--	--	25	47
08...	7	15	<5	100	9	70	16	43	92
08...	--	--	--	--	--	--	--	108	244
09...	--	--	--	--	--	--	--	132	351
10...	--	--	--	--	--	--	--	190	708
11...	170	100	<5	1,800	28	1,100	30	902	9,960
11...	--	--	--	--	--	--	--	730	7,590
14...	--	--	--	--	--	--	--	144	809
29...	--	--	--	--	--	--	--	60	230
Apr									
06...	15	19	<5	470	13	260	13	258	1,340
06...	--	--	--	--	--	--	--	334	1,800
07...	47	64	<5	2,000	4	820	15	971	9,990
07...	--	--	--	--	--	--	--	924	9,360
21...	--	--	--	--	--	--	--	72	476
May									
02...	--	--	--	--	--	--	--	12	63
08...	17	7	<1	140	8	60	4	68	575
11...	--	--	--	--	--	--	--	250	3,040
12...	44	11	1	200	12	90	21	136	1,640
Jun									
06...	--	--	--	--	--	--	--	12	65
09...	--	--	--	--	--	--	--	9	54
Jul									
18...	--	--	--	--	--	--	--	11	28
Aug									
16...	6	<1	1	20	6	10	3	4	5.8
Sept									
15...	--	--	--	--	--	--	--	11	25

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Sediment, suspended (percent finer than 0.002 mm)	Sediment, suspended (percent finer than 0.004 mm)	Sediment, suspended (percent finer than 0.008 mm)	Sediment, suspended (percent finer than 0.016 mm)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (percent finer than 0.125 mm)	Sediment, suspended (percent finer than 0.250 mm)	Sediment, suspended (percent finer than 0.500 mm)
Nov 1988								
08...	--	--	--	--	86	--	--	--
Dec								
19...	--	--	--	--	85	--	--	--
Jan 1989								
31...	--	--	--	--	68	--	--	--
Feb								
23...	--	--	--	--	--	--	--	--
24...	--	--	--	--	63	--	--	--
Mar								
08...	--	--	--	--	--	--	--	--
08...	--	--	--	--	55	--	--	--
08...	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--
11...	28	34	41	58	76	87	96	100
11...	--	--	--	--	--	--	--	--
14...	--	--	--	--	71	--	--	--
29...	--	--	--	--	--	--	--	--
Apr								
06...	--	--	--	--	72	--	--	--
06...	--	--	--	--	--	--	--	--
07...	28	39	--	63	86	92	98	100
07...	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--
May								
02...	--	--	--	--	60	--	--	--
08...	--	--	--	--	56	--	--	--
11...	--	--	--	--	--	--	--	--
12...	--	--	--	--	46	--	--	--
Jun								
06...	--	--	--	--	68	--	--	--
09...	--	--	--	--	--	--	--	--
Jul								
18...	--	--	--	--	73	--	--	--
Aug								
16...	--	--	--	--	60	--	--	--
Sept								
15...	--	--	--	--	71	--	--	--

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

12340000--BLACKFOOT RIVER NEAR BONNER, MONT.

Date	Time	Stream-flow, instantaneous (ft^3/s)	Specific conductance, onsite (µS/cm)	pH, onsite (standard units)	Temperature, air (°C)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
Nov 1988										
07...	1430	523	--	--	5.0	6.5	--	--	--	--
Dec										
20...	0930	454	258	--	-7.0	0.5	--	--	--	--
Jan 1989										
30...	1315	530	240	--	10.0	3.0	--	--	--	--
Mar										
13...	1330	822	227	--	2.0	1.0	--	--	--	--
Apr										
07...	0935	2,370	190	7.7	13.0	5.0	92	9	23	8.3
21...	0900	5,990	150	7.7	10.5	7.0	83	13	22	6.9
26...	1600	5,930	--	--	--	--	--	--	--	--
May										
08...	0900	8,060	145	7.8	13.0	8.5	73	6	19	6.2
11...	1710	10,300	140	7.8	12.0	8.0	75	11	20	6.2
12...	0945	9,760	--	--	--	7.0	--	--	--	--
Jun										
05...	1415	4,960	175	--	26.0	14.0	--	--	--	--
09...	1500	5,880	150	8.1	22.0	13.0	73	1	19	6.3
Jul										
18...	1530	1,430	231	--	24.0	20.5	--	--	--	--
Aug										
16...	1500	885	250	8.5	18.5	17.0	140	7	35	12
Sept										
18...	1415	816	--	--	18.0	13.5	--	--	--	--

Date	Bicarbonate, onsite (mg/L as HCO_3)	Carbonate, onsite (mg/L as CO_3)	Alkalinity, onsite (mg/L as $CaCO_3$)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)
Nov 1988										
07...	--	--	--	--	--	--	--	--	--	--
Dec										
20...	--	--	--	--	--	--	--	--	--	--
Jan 1989										
30...	--	--	--	--	--	--	--	--	--	--
Mar										
13...	--	--	--	--	--	--	--	--	--	--
Apr										
07...	106	0	83	2	1	<1	<1	21	2	2,400
21...	88	0	70	1	<1	<1	<1	29	5	1,700
26...	--	--	--	--	--	--	--	--	--	--
May										
08...	84	0	67	1	<1	<1	2	18	3	1,600
11...	82	0	65	2	1	<1	<1	19	6	3,600
12...	--	--	--	--	--	--	--	--	--	--
Jun										
05...	--	--	--	--	--	--	--	--	--	--
09...	88	0	72	<1	<1	<1	<1	15	2	820
Jul										
18...	--	--	--	--	--	--	--	--	--	--
Aug										
16...	156	3	130	1	2	<1	<1	7	4	80
Sept										
18...	--	--	--	--	--	--	--	--	--	--

Table 2.--*Water-quality data, October 1988 through September 1989*--Continued

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

Date	Iron, dis-solved (µg/L as Fe)	Lead, total recov-erable (µg/L as Pb)	Lead, dis-solved (µg/L as Pb)	Manga-nese, total recov-erable (µg/L as Mn)	Manga-nese, dis-solved (µg/L as Mn)	Zinc, total recov-erable (µg/L as Zn)	Zinc, dis-solved (µg/L as Zn)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1988										
07...	--	--	--	--	--	--	--	4	5.6	73
Dec										
20...	--	--	--	--	--	--	--	5	6.1	75
Jan 1989										
30...	--	--	--	--	--	--	--	6	8.6	82
Mar										
13...	--	--	--	--	--	--	--	20	44	72
Apr										
07...	66	<5	<5	150	11	50	15	104	665	82
21...	50	14	<5	90	4	60	10	86	1,390	60
26...	--	--	--	--	--	--	--	34	544	--
May										
08...	28	15	2	90	5	20	3	116	2,520	62
11...	42	7	3	180	6	50	7	271	7,540	67
12...	--	--	--	--	--	--	--	176	4,640	--
Jun										
05...	--	--	--	--	--	--	--	31	415	71
09...	16	4	<1	40	4	10	<3	48	762	74
Jul										
18...	--	--	--	--	--	--	--	4	15	80
Aug										
16...	7	1	<1	10	2	<10	3	5	12	77
Sept										
18...	--	--	--	--	--	--	--	2	4.4	78

Table 2.--*Water-quality data, October 1988 through September, 1989*--Continued

12340500--CLARK FORK ABOVE MISSOULA, MONT.

Date	Time	Stream-flow,-instan-taneous (ft^3/s)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, air (°C)	Temper-ature, water (°C)	Sedi-ment, sus-pended (mg/L)	Sediment dis-charge, sus-pended (ton/d)	Sediment, suspended (percent finer than 0.062 mm)
Nov 1988								
09...	1245	1,210	--	6.0	5.0	5	16	93
Dec								
22...	0845	1,040	365	-5.0	0.5	6	17	76
Jan 1989								
31...	0845	1,260	348	5.0	2.0	6	20	79
Mar								
08...	0915	1,140	--	--	1.5	5	15	--
14...	0915	3,150	308	4.0	2.0	80	680	91
29...	1245	2,560	--	--	--	32	221	--
Apr								
07...	1135	6,170	230	--	--	297	4,950	--
May								
11...	1945	14,500	145	--	--	196	7,670	--
12...	0830	15,100	--	7.0	7.0	157	6,400	62
Jun								
06...	1300	7,000	177	28.0	14.0	29	548	66
Jul								
19...	0830	2,290	275	17.0	17.5	6	37	97
Sept								
14...	1645	1,650	--	28.0	12.0	5	22	83

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1988 through September 1989*

[ft³/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; ---, no data]

Day	October Mean streamflow (ft^3/s)	October Suspended sediment Mean concentration (mg/L)	October Suspended sediment Discharge (ton/d)	November Mean streamflow (ft^3/s)	November Suspended sediment Mean concentration (mg/L)	November Suspended sediment Discharge (ton/d)	December Mean streamflow (ft^3/s)	December Suspended sediment Mean concentration (mg/L)	December Suspended sediment Discharge (ton/d)
	1988								
1	94	18	4.6	152	20	8.2	150	24	9.7
2	93	19	4.8	153	25	10	150	26	11
3	92	24	6.0	153	21	8.7	155	19	8.0
4	91	33	8.1	146	20	7.9	160	18	7.8
5	88	32	7.6	140	20	7.6	165	24	11
6	87	27	6.3	152	28	11	160	27	12
7	87	21	4.9	147	26	10	150	26	11
8	90	16	3.9	144	20	7.8	140	25	9.5
9	89	15	3.6	144	14	5.4	150	25	10
10	94	16	4.1	145	16	6.3	160	23	9.9
11	104	17	4.8	145	24	9.4	170	19	8.7
12	110	16	4.8	144	26	10	188	25	13
13	109	16	4.7	145	26	10	206	33	18
14	106	16	4.6	149	26	10	191	23	12
15	107	16	4.6	143	26	10	155	17	7.1
16	111	16	4.8	147	27	11	130	17	6.0
17	130	24	8.4	157	31	13	130	20	7.0
18	137	27	10	163	27	12	130	21	7.4
19	136	20	7.3	167	30	14	135	23	8.4
20	133	15	5.4	164	25	11	135	24	8.7
21	129	15	5.2	173	20	9.3	140	38	14
22	128	15	5.2	177	18	8.6	135	34	12
23	121	15	4.9	183	18	8.9	130	28	9.8
24	122	16	5.3	181	18	8.8	125	20	6.8
25	125	16	5.4	155	20	8.4	120	12	3.9
26	128	15	5.2	160	20	8.6	100	9	2.4
27	134	14	5.1	153	15	6.2	90	13	3.2
28	148	14	5.6	162	17	7.4	100	14	3.8
29	148	14	5.6	173	20	9.3	115	13	4.0
30	149	14	5.6	160	19	8.2	130	14	4.9
31	151	14	5.7	---	---	---	141	25	9.5
TOTAL	3,571	---	172.1	4,677	---	277.0	4,436	---	270.5

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1988 through September 1989*--Continued

Day	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
	1989								
	January			February			March		
1	146	36	14	110	27	8.0	155	46	19
2	144	48	19	85	20	4.6	150	40	16
3	153	35	14	70	16	3.0	140	38	14
4	163	32	14	80	15	3.2	180	42	20
5	165	24	11	90	15	3.6	199	45	24
6	165	37	16	100	15	4.1	326	398	529
7	150	39	16	105	15	4.3	496	460	616
8	120	37	12	110	17	5.0	410	280	310
9	130	34	12	115	22	6.8	734	641	2,030
10	135	31	11	125	27	9.1	858	760	1,760
11	140	31	12	130	33	12	706	370	705
12	140	35	13	140	33	12	624	200	337
13	140	37	14	140	29	11	496	150	201
14	145	35	14	135	24	8.7	372	90	90
15	150	34	14	130	20	7.0	293	70	55
16	158	61	26	130	18	6.3	258	60	42
17	159	40	17	125	19	6.4	219	58	34
18	164	38	17	130	20	7.0	262	63	45
19	178	42	20	135	59	22	259	51	36
20	193	53	28	140	46	17	246	49	33
21	182	27	13	160	31	13	263	50	36
22	184	29	14	180	27	13	269	43	31
23	186	35	18	170	35	16	268	32	23
24	160	37	16	190	63	32	246	34	23
25	140	38	14	213	52	30	258	36	25
26	145	37	14	214	73	42	264	32	23
27	150	35	14	196	70	37	257	30	21
28	160	34	15	179	55	27	257	30	21
29	170	34	16	---	---	---	217	28	16
30	198	45	24	---	---	---	209	25	14
31	231	36	22	---	---	---	225	23	14
TOTAL	4,944	---	494	3,827	---	371.1	10,116	---	7,163

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1988 through September 1989*--Continued

		Suspended sediment			Suspended sediment			Suspended sediment	
Day	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)
					1989				
		April			May			June	
1	209	21	12	251	20	14	216	6	3.5
2	215	20	12	251	28	19	215	6	3.5
3	213	20	12	280	28	21	235	7	4.4
4	211	21	12	259	16	11	270	10	7.3
5	225	20	12	255	18	12	278	11	8.3
6	236	30	19	254	16	11	314	15	13
7	256	41	28	260	22	15	346	20	19
8	303	80	65	311	38	32	363	22	22
9	298	66	53	353	57	54	349	21	20
10	275	47	35	369	78	78	389	40	42
11	257	42	29	410	126	139	401	29	31
12	232	36	23	424	104	119	370	19	19
13	227	27	17	365	42	41	340	14	13
14	231	24	15	325	31	27	317	13	11
15	239	28	18	297	26	21	321	15	13
16	250	35	24	295	23	18	459	58	72
17	261	39	27	275	17	13	440	40	48
18	271	37	27	285	24	18	349	20	19
19	268	36	26	314	33	28	286	17	13
20	269	36	26	294	18	14	254	13	8.9
21	285	43	33	267	11	7.9	272	14	10
22	32	62	55	253	10	6.8	253	12	8.2
23	354	78	75	246	9	6.0	221	10	6.0
24	353	61	58	245	9	6.0	201	8	4.3
25	341	56	52	239	7	4.5	200	8	4.3
26	323	47	41	220	6	3.6	191	9	4.6
27	301	40	33	207	6	3.4	178	7	3.4
28	298	36	29	202	5	2.7	182	7	3.4
29	279	30	23	260	12	8.4	173	7	3.3
30	267	28	20	253	10	6.8	159	6	2.6
31	---	---	---	234	7	4.4	---	---	---
TOTAL	8,075	---	911	8,753	---	765.5	8,542	---	441.0

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1988 through September 1989*--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)
	1989								
	July			August			September		
1	149	6	2.4	52	12	1.7	184	9	4.5
2	140	6	2.3	56	13	2.0	169	8	3.7
3	130	6	2.1	52	10	1.4	159	8	3.4
4	118	8	2.5	49	7	.93	165	8	3.6
5	105	6	1.7	47	4	.51	158	8	3.4
6	97	5	1.3	46	5	.62	157	8	3.4
7	89	9	2.2	46	6	.75	156	10	4.2
8	77	8	1.7	48	8	1.0	155	13	5.4
9	66	8	1.4	47	8	1.0	162	11	4.8
10	64	8	1.4	45	9	1.1	169	8	3.7
11	60	8	1.3	43	10	1.2	169	9	4.1
12	60	16	2.6	42	11	1.2	171	10	4.6
13	90	15	3.6	45	13	1.6	176	12	5.7
14	103	10	2.8	49	30	4.0	179	14	6.8
15	64	10	1.7	53	30	4.3	176	11	5.2
16	58	12	1.9	57	32	4.9	167	9	4.1
17	70	14	2.6	57	24	3.7	165	9	4.0
18	73	15	3.0	54	16	2.3	184	11	5.5
19	69	15	2.8	51	12	1.7	196	13	6.9
20	65	16	2.8	52	12	1.7	195	12	6.3
21	70	18	3.4	58	21	3.3	188	10	5.1
22	74	11	2.2	64	17	2.9	188	8	4.1
23	68	10	1.8	79	16	3.4	183	9	4.4
24	73	10	2.0	134	24	8.7	175	9	4.3
25	60	10	1.6	164	25	11	171	9	4.2
26	45	8	.97	179	23	11	166	9	4.0
27	57	13	2.0	161	12	5.2	162	9	3.9
28	56	10	1.5	169	10	4.6	164	9	4.0
29	49	8	1.1	180	11	5.3	167	9	4.1
30	55	7	1.0	171	8	3.7	166	9	4.0
31	58	10	1.6	182	10	4.9	---	---	---
TOTAL	2,412	---	63.27	2,532	---	101.61	5,142	---	135.4
WATER YEAR	67,027		11,165.48						

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989*

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; ---, 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)
	1988								
	October			November			December		
1	540	15	22	651	8	14	598	7	11
2	541	13	19	658	11	20	560	10	15
3	537	12	17	670	13	24	580	12	19
4	532	11	16	677	19	35	560	15	23
5	528	11	16	665	16	29	540	8	12
6	531	18	26	666	14	25	600	15	24
7	525	11	16	676	9	16	620	16	27
8	522	10	14	678	9	16	600	19	31
9	518	9	13	668	8	14	610	19	31
10	518	9	13	660	8	14	620	17	28
11	515	9	13	658	7	12	630	8	14
12	520	9	13	662	8	14	650	12	21
13	529	28	40	656	7	12	660	15	27
14	540	18	26	650	6	11	620	18	30
15	551	14	21	633	5	8.5	560	11	17
16	578	18	28	621	5	8.4	520	15	21
17	688	37	69	662	6	11	480	20	26
18	778	32	67	668	6	11	470	23	29
19	753	23	47	660	6	11	460	12	15
20	716	20	39	656	7	12	450	16	19
21	695	16	30	665	8	14	490	9	12
22	681	14	26	665	9	16	520	18	25
23	670	10	18	710	10	19	520	21	29
24	654	9	16	709	10	19	500	19	26
25	645	9	16	673	8	15	470	15	19
26	638	8	14	656	6	11	430	13	15
27	635	7	12	620	7	12	390	18	19
28	631	6	10	627	6	10	390	16	17
29	635	6	10	661	9	16	400	14	15
30	640	6	10	658	8	14	450	22	27
31	645	6	10	---	---	---	500	19	26
TOTAL	18,629	---	707	19,839	---	463.9	16,448	---	670

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989*--Continued

Day	Mean stream-flow (ft^3/s)	Suspended sediment Mean concen-tration (mg/L)	Suspended sediment Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment Mean concen-tration (mg/L)	Suspended sediment Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment Mean concen-tration (mg/L)	Suspended sediment Discharge (ton/d)
				1989					
	January			February			March		
1	490	12	16	500	20	27	530	13	19
2	490	12	16	400	12	13	480	8	10
3	520	11	15	350	7	6.6	490	9	12
4	500	11	15	300	5	4.1	500	11	15
5	480	12	16	300	5	4.1	520	14	20
6	450	12	15	320	3	2.6	540	15	22
7	440	13	15	350	8	7.6	560	17	26
8	430	16	19	380	18	18	700	60	113
9	430	24	28	410	20	22	900	130	316
10	470	23	29	440	16	19	1,300	175	614
11	470	18	23	470	8	10	2,500	645	4,350
12	460	14	17	500	17	23	3,000	260	2,110
13	460	10	12	490	17	22	2,810	230	1,750
14	460	7	8.7	480	14	18	2,080	155	870
15	460	7	8.7	470	12	15	1,550	85	356
16	490	9	12	460	14	17	1,350	64	233
17	540	13	19	450	7	8.5	1,150	50	155
18	600	15	24	470	9	11	960	28	73
19	620	13	22	510	21	29	1,020	26	72
20	600	11	18	540	22	32	1,010	28	76
21	570	10	15	560	27	41	995	28	75
22	540	16	23	580	27	42	1,100	39	116
23	510	15	21	580	31	49	1,310	81	286
24	480	13	17	580	22	34	1,170	45	142
25	480	13	17	570	21	32	1,050	27	77
26	500	14	19	580	21	33	1,230	53	176
27	540	15	22	600	16	26	1,390	76	285
28	510	17	23	580	12	19	1,530	160	661
29	550	18	27	---	---	---	1,420	65	249
30	620	19	32	---	---	---	1,220	30	99
31	680	21	39	---	---	---	1,210	31	101
TOTAL	15,840	---	603.4	13,220	---	585.5	37,575	---	13,479

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989*--Continued

Day	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)
				1989					
	April			May			June		
1	1,150	22	68	1,940	12	63	1,640	7	31
2	1,100	16	48	1,940	12	63	1,630	10	44
3	1,060	15	43	2,030	13	71	1,810	10	49
4	1,010	14	38	2,090	14	79	1,900	8	41
5	1,000	15	40	2,130	17	98	1,970	9	48
6	1,470	133	689	2,230	21	126	2,070	13	73
7	3,340	734	6,800	2,490	31	208	2,230	14	84
8	3,480	650	6,110	3,090	65	542	2,310	11	69
9	2,300	230	1,430	3,530	93	886	2,310	10	62
10	1,810	65	318	3,670	90	892	2,380	19	122
11	1,620	43	188	4,370	205	2,420	2,460	15	100
12	1,540	36	150	4,460	150	1,810	2,290	10	62
13	1,570	34	144	3,940	83	883	2,160	9	52
14	1,650	35	156	3,450	54	503	2,000	9	49
15	1,750	42	198	3,080	40	333	2,080	8	45
16	1,930	45	234	2,830	32	245	2,650	31	222
17	2,070	46	257	2,660	27	194	2,680	31	224
18	2,010	34	185	2,590	25	175	2,350	18	114
19	1,970	28	149	2,640	24	171	2,070	9	50
20	2,180	42	247	2,510	19	129	1,880	7	36
21	2,510	73	495	2,320	16	100	1,830	6	30
22	2,880	112	871	2,200	18	107	1,730	5	23
23	3,200	134	1,160	2,150	15	87	1,590	5	21
24	3,150	92	782	2,130	12	69	1,480	5	20
25	2,850	55	423	2,040	10	55	1,390	6	23
26	2,640	43	307	1,930	10	52	1,340	4	14
27	2,460	32	213	1,810	11	54	1,280	4	14
28	2,340	25	158	1,770	10	48	1,230	5	17
29	2,170	20	117	1,850	9	45	1,220	10	33
30	2,030	15	82	1,820	7	34	1,180	8	25
31	---	---	---	1,730	6	28	---	---	---
TOTAL	62,240	---	22,100	79,420	---	10,570	57,140	---	1,797

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1988 through September 1989*--Continued

		Suspended sediment			Suspended sediment			Suspended sediment	
Day	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)	Mean streamflow (ft^3/s)	Mean concentration (mg/L)	Discharge (ton/d)
					1989				
		July			August			September	
1	1,130	9	27	705	8	15	920	18	45
2	1,090	6	18	764	10	21	885	20	48
3	1,020	5	14	768	11	23	853	22	51
4	959	4	10	718	9	17	849	24	55
5	917	3	7.4	680	7	13	838	21	48
6	883	4	9.5	656	7	12	825	18	40
7	832	4	9.0	631	6	10	811	18	39
8	794	4	8.6	614	6	9.9	817	18	40
9	745	4	8.0	605	4	6.5	820	16	35
10	719	2	3.9	593	4	6.4	820	13	29
11	703	3	5.7	578	5	7.8	827	10	22
12	681	3	5.5	555	6	9.0	826	9	20
13	795	8	17	551	6	8.9	832	10	22
14	899	11	27	557	4	6.0	823	10	22
15	854	11	25	544	3	4.4	809	10	22
16	830	11	25	529	3	4.3	795	12	26
17	918	13	32	534	3	4.3	783	11	23
18	947	12	31	519	3	4.2	809	11	24
19	882	11	26	497	4	5.4	826	12	27
20	827	12	27	481	5	6.5	825	12	27
21	807	11	24	493	4	5.3	808	12	26
22	811	13	28	517	4	5.6	794	13	28
23	777	13	27	551	7	10	784	14	30
24	748	12	24	701	15	28	772	14	29
25	754	11	22	883	25	60	750	14	28
26	757	12	25	893	20	48	737	12	24
27	792	14	30	890	19	46	725	10	20
28	776	11	23	894	16	39	707	8	15
29	755	11	22	862	14	33	691	7	13
30	724	11	22	841	13	30	686	6	11
31	708	9	17	868	13	30	---	---	---
TOTAL	25,834	---	600.6	20,472	---	529.5	24,047	---	889
WATER YEAR	390,704		52,994.9						

Table 5.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Blackfoot River near Bonner, October 1988 through September 1989*

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; ---, 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)
	1988								
	October			November			December		
1	375	4	4.1	483	2	2.6	501	3	4.1
2	373	2	2.0	485	2	2.6	476	2	2.6
3	369	2	2.0	502	6	8.1	465	10	13
4	369	2	2.0	517	18	25	460	5	6.2
5	369	4	4.0	517	8	11	460	5	6.2
6	369	9	9.0	519	8	11	480	2	2.6
7	369	4	4.0	523	5	7.1	490	4	5.3
8	369	2	2.0	529	1	1.4	499	2	2.7
9	369	2	2.0	529	2	2.9	501	4	5.4
10	368	2	2.0	528	1	1.4	501	3	4.1
11	368	2	2.0	527	1	1.4	494	1	1.3
12	365	2	2.0	534	2	2.9	505	2	2.7
13	364	2	2.0	534	2	2.9	569	2	3.1
14	364	4	3.9	555	2	3.0	581	2	3.1
15	370	2	2.0	569	2	3.1	521	1	1.4
16	402	6	6.5	585	3	4.7	498	8	11
17	456	7	8.6	595	3	4.8	483	13	17
18	501	4	5.4	590	4	6.4	470	4	5.1
19	548	3	4.4	575	2	3.1	470	5	6.3
20	553	4	6.0	565	2	3.1	460	3	3.7
21	553	4	6.0	559	2	3.0	480	1	1.3
22	550	3	4.5	559	2	3.0	480	1	1.3
23	542	2	2.9	584	6	9.5	460	1	1.2
24	538	3	4.4	582	6	9.4	440	2	2.4
25	525	5	7.1	566	2	3.1	420	5	5.7
26	515	4	5.6	555	8	12	400	10	11
27	510	3	4.1	516	6	8.4	400	4	4.3
28	512	6	8.3	537	2	2.9	410	1	1.1
29	496	2	2.7	537	1	1.4	420	2	2.3
30	489	2	2.6	527	1	1.4	420	6	6.8
31	485	5	6.5	---	---	---	420	8	9.1
TOTAL	13,705	---	130.6	16,283	---	162.6	14,634	---	153.4

Table 5.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Blackfoot River near Bonner, October 1988 through September 1989*--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)
	1989								
	January			February			March		
1	410	8	8.9	300	17	14	450	4	4.9
2	420	4	4.5	280	15	11	420	1	1.1
3	430	4	4.6	260	12	8.4	420	4	4.5
4	410	4	4.4	250	2	1.4	430	4	4.6
5	390	4	4.2	260	1	.70	440	4	4.8
6	380	4	4.1	280	1	.76	450	5	6.1
7	360	4	3.9	300	2	1.6	470	6	7.6
8	360	4	3.9	320	3	2.6	490	5	6.6
9	380	3	3.1	350	2	1.9	520	4	5.6
10	390	3	3.2	380	1	1.0	550	4	5.9
11	390	2	2.1	400	3	3.2	580	8	13
12	380	4	4.1	420	8	9.1	638	12	21
13	380	3	3.1	410	5	5.5	839	19	43
14	380	2	2.1	400	3	3.2	969	20	52
15	400	2	2.2	390	3	3.2	855	14	32
16	420	4	4.5	390	2	2.1	776	8	17
17	450	4	4.9	390	4	4.2	620	10	17
18	500	4	5.4	400	4	4.3	524	4	5.7
19	505	3	4.1	430	3	3.5	591	3	4.8
20	500	3	4.1	450	3	3.6	618	3	5.0
21	460	3	3.7	480	7	9.1	609	5	8.2
22	430	3	3.5	490	6	7.9	659	9	16
23	410	4	4.4	490	6	7.9	704	13	25
24	400	7	7.6	480	4	5.2	727	15	29
25	420	8	9.1	480	4	5.2	736	12	24
26	450	6	7.3	500	4	5.4	750	12	24
27	450	9	11	500	6	8.1	827	13	29
28	430	5	5.8	480	5	6.5	1,030	23	64
29	470	4	5.1	---	---	---	1,140	26	80
30	530	7	10	---	---	---	1,090	22	65
31	600	21	34	---	---	---	1,050	21	60
TOTAL	13,285	---	182.9	10,960	---	140.56	20,972	---	686.4

Table 5.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Blackfoot River near Bonner, October 1988 through September 1989*--Continued

Day	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean stream-flow (ft^3/s)	Suspended sediment: Mean concen-tration (mg/L)	Suspended sediment: Discharge (ton/d)
					1989				
		April			May			June	
1	971	15	39	4,210	14	159	3,470	10	94
2	920	13	32	4,260	14	161	3,680	13	129
3	864	9	21	4,500	14	170	4,140	19	212
4	829	7	16	4,850	19	249	4,480	21	254
5	874	8	19	5,150	28	389	4,830	27	352
6	1,290	40	139	5,630	38	578	5,200	39	548
7	2,510	150	1,020	6,700	74	1,340	5,560	49	736
8	3,280	200	1,770	8,090	135	2,950	5,700	51	785
9	2,730	80	590	8,590	142	3,290	5,750	50	776
10	2,350	27	171	8,850	170	4,060	5,840	51	804
11	2,260	21	128	9,880	243	6,480	5,950	48	771
12	2,250	15	91	9,600	175	4,540	5,550	41	614
13	2,400	16	104	8,370	110	2,490	5,160	35	488
14	2,650	17	122	7,160	78	1,510	4,960	26	348
15	3,090	26	217	6,210	61	1,020	4,810	20	260
16	3,770	42	428	5,670	46	704	4,930	23	306
17	4,080	31	341	5,430	35	513	4,730	29	370
18	4,060	22	241	5,380	33	479	4,280	24	277
19	4,180	27	305	5,330	30	432	3,920	17	180
20	4,860	56	735	4,960	26	348	3,670	13	129
21	6,040	106	1,730	4,620	22	274	3,440	10	93
22	7,410	150	3,000	4,310	22	256	3,150	11	94
23	8,000	128	2,760	4,210	20	227	2,920	9	71
24	7,590	76	1,560	4,300	19	221	2,770	10	75
25	6,690	48	867	4,220	17	194	2,630	10	71
26	6,040	50	815	4,000	14	151	2,550	7	48
27	5,520	30	447	3,780	14	143	2,470	6	40
28	5,110	20	276	3,750	14	142	2,400	6	39
29	4,700	18	228	3,760	14	142	2,310	6	37
30	4,380	16	189	3,630	10	98	2,230	5	30
31	---	---	---	3,510	9	85	---	---	---
TOTAL	111,698	---	18,401	172,910	---	33,795	123,480	---	9,031

Table 5.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Blackfoot River near Bonner, October 1988 through September 1989*--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)
	1989								
	July			August			September		
1	2,170	5	29	991	9	24	1,110	6	18
2	2,080	6	34	1,130	89	272	1,100	7	21
3	1,990	10	54	1,140	77	237	1,060	5	14
4	1,860	5	25	1,110	33	99	1,020	5	14
5	1,780	8	38	1,050	15	43	989	6	16
6	1,670	6	27	999	10	27	959	6	16
7	1,600	4	17	961	10	26	935	6	15
8	1,530	5	21	918	7	17	915	5	12
9	1,460	4	16	900	8	19	903	5	12
10	1,410	3	11	896	9	22	903	4	9.8
11	1,380	3	11	888	5	12	899	3	7.3
12	1,340	5	18	849	5	11	887	3	7.2
13	1,420	6	23	867	5	12	874	3	7.1
14	1,600	7	30	925	4	10	855	3	6.9
15	1,500	8	32	920	4	9.9	832	3	6.7
16	1,450	6	23	890	4	9.6	804	3	6.5
17	1,470	7	28	870	4	9.4	810	4	8.7
18	1,450	8	31	845	3	6.8	813	2	4.4
19	1,370	6	22	816	3	6.6	808	2	4.4
20	1,310	4	14	797	3	6.5	798	3	6.5
21	1,260	5	17	792	3	6.4	784	2	4.2
22	1,210	4	13	794	3	6.4	769	2	4.2
23	1,130	5	15	808	4	8.7	757	2	4.1
24	1,110	4	12	899	4	9.7	747	2	4.0
25	1,060	3	8.6	1,000	7	19	739	2	4.0
26	1,060	8	23	1,140	10	31	731	2	3.9
27	1,080	13	38	1,150	12	37	721	2	3.9
28	1,070	7	20	1,190	11	35	713	2	3.9
29	1,010	5	14	1,200	8	26	706	2	3.8
30	968	6	16	1,150	7	22	701	2	3.8
31	951	5	13	1,120	6	18	---	---	---
TOTAL	43,749	---	693.6	30,005	---	1,099.0	25,642	---	253.3
WATER YEAR	597,323		64,729.36						

Table 6.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork above Missoula, October 1988 through September 1989*

[ft^3/s, cubic feet per second; mg/L, milligrams per liter; ton/d, tons per day; ---, 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)
	1988								
	October			November			December		
1	892	8	19	1,120	6	18	1,130	7	21
2	891	6	14	1,130	5	15	997	3	8.1
3	883	5	12	1,160	5	16	960	3	7.8
4	879	6	14	1,190	5	16	920	5	12
5	874	6	14	1,180	6	19	940	7	18
6	882	5	12	1,180	10	32	980	7	19
7	879	6	14	1,190	29	93	1,050	8	23
8	879	5	12	1,200	8	26	1,120	7	21
9	874	5	12	1,200	4	13	1,160	5	16
10	915	6	15	1,200	3	9.7	1,170	4	13
11	909	6	15	1,190	3	9.6	1,150	6	19
12	887	7	17	1,200	3	9.7	1,160	7	22
13	892	35	84	1,200	3	9.7	1,230	8	27
14	901	27	66	1,200	3	9.7	1,300	9	32
15	909	8	20	1,220	4	13	1,200	6	19
16	945	7	18	1,210	5	16	1,040	8	22
17	1,100	18	53	1,240	8	27	980	8	21
18	1,220	13	43	1,260	7	24	940	6	15
19	1,270	12	41	1,250	3	10	900	6	15
20	1,240	10	33	1,220	3	9.9	900	12	29
21	1,230	7	23	1,220	3	9.9	940	6	15
22	1,210	6	20	1,220	3	9.9	1,000	6	16
23	1,190	5	16	1,280	11	38	1,050	3	8.5
24	1,170	5	16	1,300	8	28	1,000	4	11
25	1,160	5	16	1,260	5	17	950	6	15
26	1,150	5	16	1,230	3	10	900	11	27
27	1,130	4	12	1,180	5	16	860	7	16
28	1,130	3	9.2	1,150	3	9.3	880	7	17
29	1,120	3	9.1	1,210	4	13	900	8	19
30	1,120	4	12	1,190	6	19	920	14	35
31	1,140	8	25	---	---	---	920	20	50
TOTAL	31,871	---	702.3	36,180	---	566.4	31,547	---	609.4

Table 6.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork above Missoula, October 1988 through September 1989*--Continued

Day	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)	Mean streamflow (ft³/s)	Suspended sediment: Mean concentration (mg/L)	Suspended sediment: Discharge (ton/d)
	1989								
	January			February			March		
1	900	17	41	800	21	45	925	3	7.5
2	920	14	35	600	29	47	851	3	6.9
3	940	12	30	540	19	28	855	5	12
4	900	10	24	500	10	13	871	6	14
5	860	8	19	520	13	18	929	5	13
6	840	7	16	560	7	11	1,020	4	11
7	820	7	15	600	2	3.2	1,160	5	16
8	800	7	15	660	2	3.6	1,200	7	23
9	820	11	24	720	3	5.8	1,470	16	64
10	860	7	16	800	5	11	1,730	37	173
11	840	9	20	860	11	26	3,950	260	2,770
12	830	6	13	920	12	30	3,670	182	1,800
13	820	4	8.9	920	5	12	3,650	145	1,430
14	830	5	11	900	5	12	3,150	78	663
15	850	7	16	860	5	12	2,440	40	264
16	900	6	15	840	4	9.1	2,140	26	150
17	1,000	9	24	840	5	11	1,720	24	111
18	1,050	8	23	900	4	9.7	1,510	20	82
19	1,100	5	15	940	4	10	1,540	13	54
20	1,050	7	20	1,000	5	13	1,660	13	58
21	1,000	4	11	1,040	6	17	1,580	12	51
22	950	6	15	1,080	8	23	1,700	15	69
23	900	8	19	1,100	8	24	1,950	28	147
24	880	7	17	1,080	7	20	1,880	23	117
25	900	6	15	1,040	7	20	1,760	16	76
26	950	7	18	1,060	4	11	1,890	17	87
27	982	7	19	1,090	4	12	2,150	28	163
28	1,000	5	13	1,040	4	11	2,490	40	269
29	1,030	5	14	---	---	---	2,540	34	233
30	1,130	6	18	---	---	---	2,300	27	168
31	1,240	8	27	---	---	---	2,200	25	148
TOTAL	28,892	---	586.9	23,810	---	468.4	58,881	---	9,250.4

Table 6.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork above Missoula, October 1988 through September 1989*--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)
	1989								
	April			May			June		
1	2,090	21	119	6,090	21	345	5,070	10	137
2	1,990	16	86	6,080	22	361	5,230	12	169
3	1,890	12	61	6,410	22	381	5,850	19	300
4	1,810	13	64	6,830	25	461	6,340	19	325
5	1,800	14	68	7,160	30	580	6,800	22	404
6	2,430	33	217	7,730	39	814	7,200	29	564
7	5,380	235	3,410	8,950	67	1,620	7,710	36	749
8	6,670	285	5,130	10,900	131	3,860	7,960	39	838
9	5,100	120	1,650	11,900	135	4,340	7,990	39	841
10	4,110	43	477	12,300	142	4,720	8,150	44	968
11	3,820	36	371	13,700	194	7,180	8,470	45	1,030
12	3,710	35	351	14,300	154	5,950	7,870	36	765
13	3,820	32	330	12,400	121	4,050	7,320	30	593
14	4,140	28	313	10,700	87	2,510	6,980	28	528
15	4,680	45	569	9,390	59	1,500	6,870	25	464
16	5,520	53	790	8,570	42	972	7,480	32	646
17	6,090	40	658	8,180	35	773	7,470	34	686
18	6,010	33	535	8,020	37	801	6,700	31	561
19	6,030	33	537	8,030	37	802	6,000	29	470
20	6,830	60	1,110	7,520	30	609	5,630	15	228
21	8,330	88	1,980	6,960	24	451	5,320	13	187
22	10,000	107	2,890	6,510	21	369	4,940	12	160
23	11,000	109	3,240	6,350	21	360	4,570	12	148
24	10,700	75	2,170	6,420	19	329	4,280	12	139
25	9,590	50	1,290	6,290	24	408	4,040	11	120
26	8,700	40	940	5,950	16	257	3,890	10	105
27	7,980	34	733	5,610	15	227	3,760	11	112
28	7,450	28	563	5,490	15	222	3,620	12	117
29	6,860	24	445	5,610	14	212	3,530	14	133
30	6,370	21	361	5,480	12	178	3,430	13	120
31	---	---	---	5,250	10	142	---	---	---
TOTAL	170,900	---	31,458	251,080	---	45,784	180,470	---	12,607

Table 6.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork above Missoula, October 1988 through September 1989*--Continued

Day	July: Mean streamflow (ft^3/s)	July: Suspended sediment: Mean concentration (mg/L)	July: Suspended sediment: Discharge (ton/d)	August: Mean streamflow (ft^3/s)	August: Suspended sediment: Mean concentration (mg/L)	August: Suspended sediment: Discharge (ton/d)	September: Mean streamflow (ft^3/s)	September: Suspended sediment: Mean concentration (mg/L)	September: Suspended sediment: Discharge (ton/d)
				1989					
1	3,310	16	143	1,690	10	46	1,960	6	32
2	3,170	13	111	1,880	11	56	1,940	7	37
3	3,020	13	106	1,920	37	192	1,870	5	25
4	2,800	11	83	1,850	29	145	1,820	5	25
5	2,660	15	108	1,740	16	75	1,780	5	24
6	2,540	13	89	1,670	13	59	1,750	5	24
7	2,410	9	59	1,600	11	48	1,700	5	23
8	2,310	10	62	1,540	11	46	1,660	5	22
9	2,190	9	53	1,520	12	49	1,670	5	23
10	2,130	7	40	1,510	12	49	1,670	4	18
11	2,080	7	39	1,480	12	48	1,670	3	14
12	2,000	8	43	1,410	12	46	1,660	3	13
13	2,160	14	82	1,410	12	46	1,660	4	18
14	2,450	11	73	1,460	16	63	1,650	5	22
15	2,360	10	64	1,490	14	56	1,590	5	21
16	2,290	13	80	1,460	14	55	1,560	5	21
17	2,350	10	63	1,420	16	61	1,560	5	21
18	2,410	6	39	1,390	18	68	1,570	5	21
19	2,260	8	49	1,330	17	61	1,630	5	22
20	2,140	9	52	1,300	17	60	1,590	4	17
21	2,050	9	50	1,180	16	51	1,560	4	17
22	2,030	10	55	1,130	7	21	1,540	4	17
23	1,920	10	52	1,260	5	17	1,510	4	16
24	1,860	9	45	1,380	5	19	1,490	4	16
25	1,820	9	44	1,810	14	68	1,490	4	16
26	1,800	11	53	1,950	8	42	1,520	6	25
27	1,890	18	92	1,970	9	48	1,450	6	23
28	1,860	12	60	2,000	7	38	1,410	6	23
29	1,780	11	53	2,020	6	33	1,370	6	22
30	1,700	13	60	1,930	6	31	1,360	6	22
31	1,670	11	50	1,930	7	36	---	---	---
TOTAL	69,420	---	2,052	49,630	---	1,733	48,660	---	640
WATER YEAR	981,341		106,457.8						

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1989*

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 °C; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; ton/d, tons per day; mm, millimeter; <, less than analytical detection limit[1]; --, indicates insufficient data greater than detection limit to compute statistic]

Parameter and unit of measure	Descriptive statistics				Percent of samples in which values were less than or equal to those shown				
	Number of samples	Maximum	Minimum	Mean	95	75	Median 50	25	5
12323800--Clark Fork near Galen, Mont. Period of record: July 1988-September 1989									
Streamflow, instantaneous (ft^3/s)	8	370	21	157	370	313	76	41	21
Specific conductance, onsite (µS/cm)	8	670	225	498	670	657	517	351	225
pH, onsite (standard units)	8	8.2	7.5	7.9	8.2	8.0	7.9	7.7	7.5
Temperature, water (°C)	8	22.5	.5	11.0	22.5	17.0	12.5	3.1	.5
Hardness, total (mg/L as $CaCO_3$)	8	300	96	217	300	295	225	147	96
Alkalinity, onsite (mg/L as $CaCO_3$)	8	143	49	95	143	121	90	76	49
Arsenic, total (µg/L as As)	8	60	11	22	60	25	17	14	11
Arsenic, dissolved (µg/L as As)	8	28	5	13	28	18	11	10	5
Cadmium, total recoverable (µg/L as Cd)	8	3	<1	--	3	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	8	1	<1	--	1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	8	240	13	68	240	82	45	22	13
Copper, dissolved (µg/L as Cu)	8	50	9	19	50	33	11	9	9
Iron, total recoverable (µg/L as Fe)	8	9,200	120	1,630	9,200	1,130	625	172	120
Iron, dissolved (µg/L as Fe)	8	110	7	29	110	40	14	9	7
Lead, total recoverable (µg/L as Pb)	8	28	<5	[2]9	28	14	5	<5	<5
Lead, dissolved (µg/L as Pb)	8	1	<1	--	1	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	8	1,400	110	510	1,400	737	395	177	110
Manganese, dissolved (µg/L as Mn)	8	360	40	188	360	355	125	79	40
Zinc, total recoverable (µg/L as Zn)	8	360	20	142	360	197	115	55	20
Zinc, dissolved (µg/L as Zn)	8	110	9	46	110	104	15	12	9
Sediment[3] concentration (mg/L)	8	338	2	56	338	48	14	2	2
Sediment[3] discharge (ton/d)	8	338	.17	51	338	39	3.0	.21	.17
Sediment[3] (percent finer than 0.062 mm)	7	88	65	72	88	73	71	68	65
12324200--Clark Fork at Deer Lodge, Mont. Period of record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	54	1,920	23	320	1,020	359	211	109	53
Specific conductance, onsite (µS/cm)	43	642	262	516	637	594	530	456	306
pH, onsite (standard units)	25	8.3	7.4	7.9	8.2	8.1	7.9	7.7	7.4
Temperature, water (°C)	52	23.0	0.0	9.0	20.0	13.0	9.2	2.6	0.0
Hardness, total (mg/L as $CaCO_3$)	17	270	120	212	270	245	210	190	120
Alkalinity, onsite (mg/L as $CaCO_3$)	23	196	71	130	193	156	128	113	72
Arsenic, total (µg/L as As)	27	200	11	33	172	31	18	15	11
Arsenic, dissolved (µg/L as As)	27	39	7	15	35	17	13	12	7
Cadmium, total recoverable (µg/L as Cd)	27	5	<1	[2]1	3	2	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	27	2	<1	--	1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	27	1,500	16	179	1,150	130	60	35	18
Copper, dissolved (µg/L as Cu)	27	120	5	18	90	18	12	9	5
Iron, total recoverable (µg/L as Fe)	27	29,000	150	4,460	27,800	2,500	1,200	600	154
Iron, dissolved (µg/L as Fe)	27	150	3	23	138	19	11	7	3
Lead, total recoverable (µg/L as Pb)	27	200	<2	[2]24	100	15	8	4	<5
Lead, dissolved (µg/L as Pb)	27	6	<1	[2]1	5	2	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	27	4,600	70	598	3,480	520	280	210	78
Manganese, dissolved (µg/L as Mn)	27	400	<1	[2]60	210	64	35	20	<10
Zinc, total recoverable (µg/L as Zn)	27	1,700	20	226	1,330	180	90	70	20
Zinc, dissolved (µg/L as Zn)	27	230	6	26	158	26	15	10	6
Sediment[3] concentration (mg/L)	54	2,250	2	191	1,040	92	30	18	3
Sediment[3] discharge (ton/d)	54	8,690	.52	487	3,360	70	16	5.0	.86
Sediment[3] (percent finer than 0.062 mm)	39	99	41	66	95	76	68	58	45

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1989*--Continued

Parameter and unit of measure	Descriptive statistics: Number of samples	Maximum	Minimum	Mean	Percent of samples in which values were less than or equal to those shown: 95	75	50 (Median)	25	5
12324590--Little Blackfoot River near Garrison, Mont. Period of record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	18	2,080	35	384	2,080	487	304	141	35
Specific conductance, onsite (µS/cm)	18	300	120	203	300	236	199	160	120
pH, onsite (standard units)	18	8.3	7.0	7.7	8.3	7.9	7.7	7.4	7.0
Temperature, water (°C)	18	15.5	.5	7.5	15.5	10.5	7.0	4.6	.5
Hardness, total (mg/L as $CaCO_3$)	13	140	51	93	140	120	90	66	51
Alkalinity, onsite (mg/L as $CaCO_3$)	16	127	36	82	127	99	80	58	36
Arsenic, total (µg/L as As)	18	17	4	7	17	8	6	5	4
Arsenic, dissolved (µg/L as As)	18	7	4	5	7	5	5	4	4
Cadmium, total recoverable (µg/L as Cd)	18	2	<1	[2].6	2	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	18	<1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	18	45	3	10	45	10	7	4	3
Copper, dissolved (µg/L as Cu)	18	7	1	2	7	3	3	2	1
Iron, total recoverable (µg/L as Fe)	18	25,000	50	2,710	25,000	1,950	410	172	50
Iron, dissolved (µg/L as Fe)	18	120	<3	[2]40	120	71	32	10	6
Lead, total recoverable (µg/L as Pb)	18	25	<5	[2]6	25	5	<5	<5	<5
Lead, dissolved (µg/L as Pb)	18	6	<1	[2]1	6	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	18	1,100	<10	[2]158	1,100	80	30	20	10
Manganese, dissolved (µg/L as Mn)	18	30	1	8	30	10	7	4	1
Zinc, total recoverable (µg/L as Zn)	18	140	<10	[2]28	140	30	10	<10	<10
Zinc, dissolved (µg/L as Zn)	18	15	<3	[2]5	15	8	4	<3	<3
Sediment[3] concentration (mg/L)	18	1,410	3	146	1,410	73	16	5	3
Sediment[3] discharge (ton/d)	17	7,920	.28	499	7,920	52	13	1.9	.28
Sediment[3] (percent finer than 0.062 mm)	18	94	49	67	94	83	63	54	49
12331500--Flint Creek near Drummond, Mont. Period of record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	21	892	7.6	227	863	275	166	101	9.9
Specific conductance, onsite (µS/cm)	21	501	135	294	500	380	260	215	135
pH, onsite (standard units)	21	8.8	7.5	8.0	8.7	8.2	8.1	7.7	7.5
Temperature, water (°C)	21	19.0	.5	10.2	18.8	13.2	11.5	6.7	.6
Hardness, total (mg/L as $CaCO_3$)	14	260	60	140	260	202	120	87	60
Alkalinity, onsite (mg/L as $CaCO_3$)	18	238	60	131	238	191	117	82	60
Arsenic, total (µg/L as As)	21	50	8	22	49	31	18	12	8
Arsenic, dissolved (µg/L as As)	21	20	5	10	19	12	10	8	5
Cadmium, total recoverable (µg/L as Cd)	21	3	<1	[2].6	2	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	21	1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	21	32	3	12	31	14	10	7	3
Copper, dissolved (µg/L as Cu)	21	7	1	3	6	4	3	2	1
Iron, total recoverable (µg/L as Fe)	21	7,200	190	1,650	6,960	2,100	1,100	495	195
Iron, dissolved (µg/L as Fe)	21	190	4	41	189	45	33	11	4
Lead, total recoverable (µg/L as Pb)	21	87	<5	[2]19	56	25	13	7	<5
Lead, dissolved (µg/L as Pb)	21	7	<1	[2]1	7	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	21	1,600	70	374	1,530	575	250	110	70
Manganese, dissolved (µg/L as Mn)	21	120	19	48	117	60	43	33	19
Zinc, total recoverable (µg/L as Zn)	21	290	10	73	278	115	40	30	10
Zinc, dissolved (µg/L as Zn)	21	27	<3	[2]10	25	15	10	4	<3
Sediment[3] concentration (mg/L)	21	556	8	91	523	109	49	25	8
Sediment[3] discharge (ton/d)	21	904	.37	102	869	85	16	8.1	.51
Sediment[3] (percent finer than 0.062 mm)	21	98	28	72	97	93	75	59	30

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1989*--Continued

Parameter and unit of measure	Descriptive statistics				Percent of samples in which values were less than or equal to those shown				
	Number of samples	Maximum	Minimum	Mean	95	75	Median 50	25	5
12334510--Rock Creek near Clinton, Mont. Period of Record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	19	3,010	175	989	3,010	1,380	816	515	175
Specific conductance, onsite (µS/cm)	19	154	55	98	154	120	90	70	55
pH, onsite (standard units)	19	8.4	6.9	7.6	8.4	7.7	7.6	7.5	6.9
Temperature, water (°C)	19	13.5	.5	8.7	13.5	11.0	9.5	6.5	.5
Hardness, total (mg/L as $CaCO_3$)	13	78	26	45	78	60	39	32	26
Alkalinity, onsite (mg/L as $CaCO_3$)	17	82	22	43	82	49	42	31	22
Arsenic, total (µg/L as As)	19	2	<1	[2].9	2	1	<1	<1	<1
Arsenic, dissolved (µg/L as As)	19	1	<1	--	1	<1	<1	<1	<1
Cadmium, total recoverable (µg/L as Cd)	19	3	<1	[2].8	3	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	19	<1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	19	41	1	8	41	13	6	3	1
Copper, dissolved (µg/L as Cu)	19	5	<1	[2]2	5	3	2	1	1
Iron, total recoverable (µg/L as Fe)	19	2,100	40	472	2,100	540	290	150	40
Iron, dissolved (µg/L as Fe)	19	110	7	40	110	50	38	30	7
Lead, total recoverable (µg/L as Pb)	19	19	<1	[2]5	19	6	4	<5	<5
Lead, dissolved (µg/L as Pb)	19	5	<1	[2]1	5	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	19	90	<10	[2]24	90	30	20	10	<10
Manganese, dissolved (µg/L as Mn)	19	8	<1	[2]2	8	4	2	<1	<1
Zinc, total recoverable (µg/L as Zn)	19	60	<10	[2]19	60	30	20	<10	<10
Zinc, dissolved (µg/L as Zn)	19	15	<3	[2]4	15	6	<3	<3	<3
Sediment[3] concentration (mg/L)	19	157	1	28	157	35	14	5	1
Sediment[3] discharge (ton/d)	19	1,280	.53	122	1,280	119	45	8.9	.53
Sediment[3] (percent finer than 0.062 mm)	19	95	35	63	95	75	63	51	35
12334550--Clark Fork at Turah Bridge, near Bonner, Mont. Period of Record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	63	9,370	296	1,740	4,490	2,240	1,230	795	468
Specific conductance, onsite (µS/cm)	45	483	160	311	443	388	327	225	161
pH, onsite (standard units)	26	8.7	7.4	7.9	8.6	8.1	7.9	7.6	7.4
Temperature, water (°C)	62	17.5	.5	8.9	16.9	13.0	9.5	4.0	1.0
Hardness, total (mg/L as $CaCO_3$)	18	200	67	134	200	175	130	93	67
Alkalinity, onsite (mg/L as $CaCO_3$)	24	147	52	97	144	129	92	67	53
Arsenic, total (µg/L as As)	27	110	5	15	91	11	8	7	5
Arsenic, dissolved (µg/L as As)	27	17	4	6	16	7	6	5	4
Cadmium, total recoverable (µg/L as Cd)	27	4	<1	[2]1	3	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	27	<1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	27	500	6	89	488	80	34	21	7
Copper, dissolved (µg/L as Cu)	27	25	2	7	24	8	6	4	2
Iron, total recoverable (µg/L as Fe)	27	19,000	70	2,860	18,200	2,000	770	370	74
Iron, dissolved (µg/L as Fe)	27	170	3	31	170	31	19	8	3
Lead, total recoverable (µg/L as Pb)	27	100	<1	[2]21	92	20	11	7	<3
Lead, dissolved (µg/L as Pb)	27	7	<1	[2]1	5	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	27	2,000	20	307	1,920	200	90	70	20
Manganese, dissolved (µg/L as Mn)	27	31	<1	[2]8	28	10	7	5	<10
Zinc, total recoverable (µg/L as Zn)	27	1,100	10	168	1,100	90	50	40	10
Zinc, dissolved (µg/L as Zn)	27	39	<3	[2]12	30	16	10	5	<3
Sediment[3] concentration (mg/L)	63	1,370	4	128	919	90	28	12	6
Sediment[3] discharge (ton/d)	63	34,700	4.8	1,440	9,840	442	88	28	8
Sediment[3] (percent finer than 0.062 mm)	47	86	27	62	85	72	63	53	38

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1989*--Continued

Parameter and unit of measure	Descriptive statistics: Number of samples	Maximum	Minimum	Mean	Percent of samples in which values were less than or equal to those shown: 95	75	50 (Median)	25	5
12340000--Blackfoot River near Bonner, Mont. Period of Record: March 1985-September 1989									
Streamflow, instantaneous (ft^3/s)	40	10,300	344	2,600	9,670	4,250	1,360	566	386
Specific conductance, onsite (µS/cm)	28	264	131	192	263	237	180	150	135
pH, onsite (standard units)	21	8.5	7.5	7.9	8.4	8.2	8.0	7.8	7.5
Temperature, water (°C)	39	20.5	0.0	9.6	20.0	13.5	10.0	5.5	.5
Hardness, total (mg/L as $CaCO_3$)	14	140	68	92	140	107	80	73	68
Alkalinity, onsite (mg/L as $CaCO_3$)	18	138	65	86	138	92	82	70	65
Arsenic, total (µg/L as As)	21	12	<1	[2]1	2	1	1	<1	<1
Arsenic, dissolved (µg/L as As)	21	2	<1	[2].7	1	1	<1	<1	<1
Cadmium, total recoverable (µg/L as Cd)	21	2	<1	[2].7	2	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	21	2	<1	--	1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	21	34	4	12	33	16	10	7	4
Copper, dissolved (µg/L as Cu)	21	6	1	3	6	4	3	2	1
Iron, total recoverable (µg/L as Fe)	21	3,600	50	781	3,480	895	440	220	53
Iron, dissolved (µg/L as Fe)	21	100	3	26	96	37	16	10	3
Lead, total recoverable (µg/L as Pb)	21	20	<5	[2]9	17	15	10	3	<5
Lead, dissolved (µg/L as Pb)	21	8	<1	[2]2	7	3	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	21	180	<10	[2]48	150	60	40	20	<10
Manganese, dissolved (µg/L as Mn)	21	11	<1	[2]3	6	5	2	1	<1
Zinc, total recoverable (µg/L as Zn)	21	60	<10	[2]17	50	20	10	<10	<10
Zinc, dissolved (µg/L as Zn)	21	15	<3	[2]6	15	8	4	<3	<3
Sediment[3] concentration (mg/L)	40	271	1	32	173	31	8	4	1
Sediment[3] discharge (ton/d)	40	7,540	1.1	552	4,530	404	43	6.2	1.5
Sediment[3] (percent finer than 0.062 mm)	38	89	42	69	89	80	72	62	45
12340500--Clark Fork above Missoula, Mont. Period of record: July 1986-September 1989									
Streamflow, instantaneous (ft^3/s)	22	15,100	720	3,380	15,000	3,350	1,720	1,190	741
Specific conductance, onsite (µS/cm)	9	365	145	277	365	356	283	203	145
Temperature, water (°C)	19	19.5	.5	10.3	19.5	15.0	12.0	5.0	.5
Sediment[3] concentration (mg/L)	22	297	5	45	281	32	12	6	5
Sediment[3] discharge (ton/d)	22	7,670	15	968	7,480	302	53	21	15
Sediment[3] (percent finer than 0.062 mm)	17	97	44	75	97	90	79	61	44

[1]Multiple detection limits during the period of record may result in varying values flagged with a less than (<) symbol.
[2]Value is estimated by using a log-probability regression to predict the values of data less than the detection limit (Helsel and Cohn, 1988).
[3]Suspended sediment.