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

By John H. Lambing

U.S. GEOLOGICAL SURVEY

Open-File Report 89-229

Prepared in cooperation with the

U.S. ENVIRONMENTAL PROTECTION AGENCY

and the

MONTANA POWER COMPANY

Helena, Montana
June 1989

DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information
write to:

District Chief
U.S. Geological Survey
428 Federal Building
301 South Park, Drawer 10076
Helena, MT 59626-0076

Copies of this report can be
purchased from:

U.S. Geological Survey
Books and Open-File Reports Section
Federal Center, Bldg. 810
Box 25425
Denver, CO 80225-0425

CONTENTS

ILLUSTRATIONS

TABLES

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:

$$°F = 9/5\ (°C) + 32$$

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

By

John H. Lambing

ABSTRACT

Water-quality sampling was conducted at eight sites on the Clark Fork and selected tributaries from Galen to Missoula, Montana, from October 1987 through September 1988. 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.

Statistical summaries are presented for periodic water-quality data collected at six of the sites from March 1985 through September 1988. 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 Deer Lodge to Milltown Dam at Milltown, a distance of about 97 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 century, 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 potentially toxic in stream and riparian habitats. Since mining began in the basin, overland runoff and 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 processes of channel and overland erosion continue to

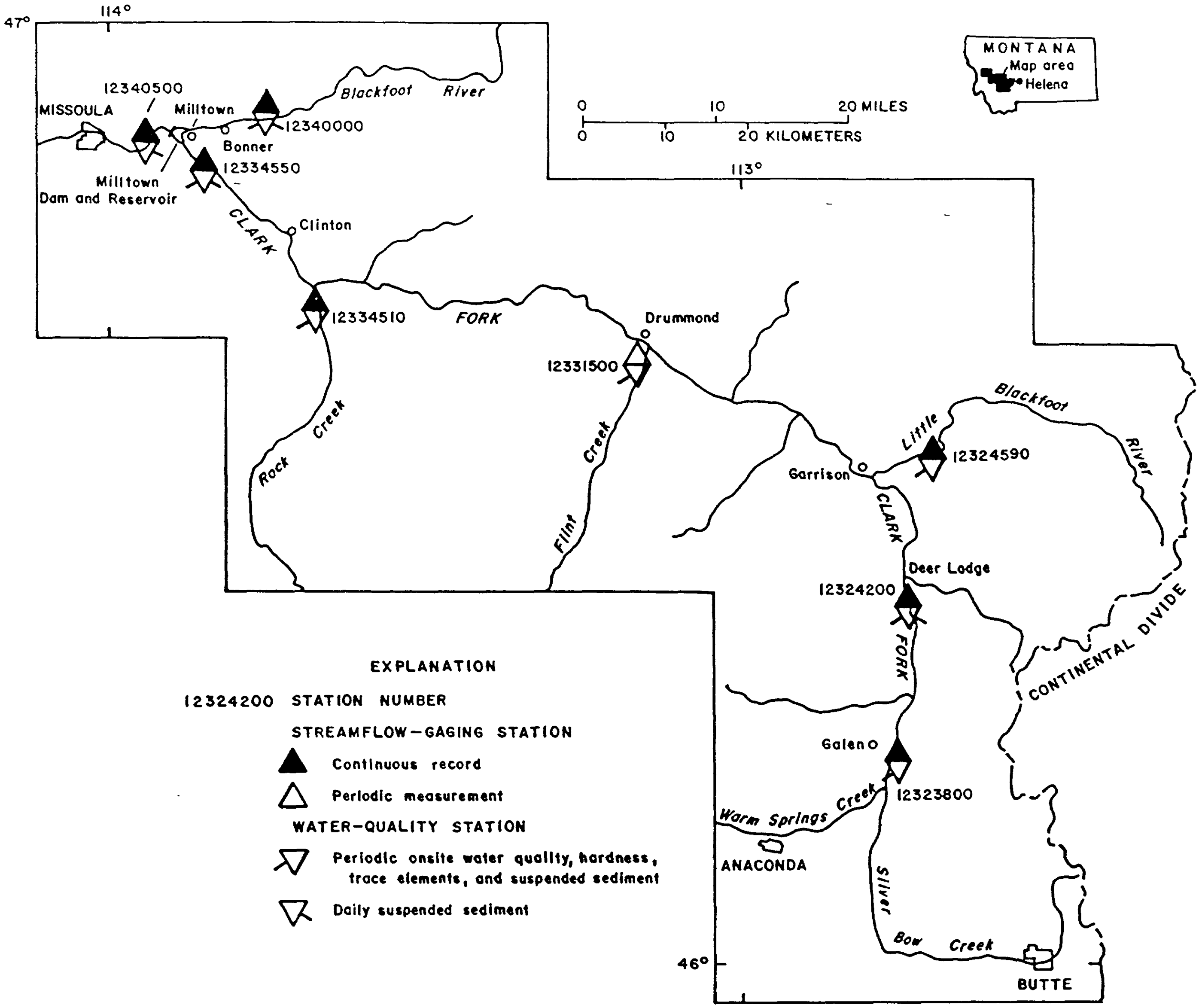

Figure 1.--Location of study area.

periodically transport unstable tailings-laden sediments from instream and flood-plain sources, especially during high streamflows. The transported sediments are eventually redeposited farther downstream and may be subject to future resuspension and transport. The chemical characteristics of the stream sediments and their relation to water quality are of primary interest to several studies being conducted in the basin.

Large-scale mining operations in Butte ceased in 1983, but subsequent public concern about the effects of tailings distributed throughout the Clark Fork valley has resulted in several studies being conducted to establish a water-quality data base for the Clark Fork and its major tributaries. The data presented in this report, which were collected by the U.S. Geological Survey in cooperation with the

U.S. Environmental Protection Agency and the Montana Power Company, are part of a comprehensive effort by State, Federal, and private agencies to determine various water-quality conditions in the Clark Fork basin.

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, hardness, and laboratory analyses of 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 1987 through September 1988. Statistical summaries, in the form of a table and graphs, describe selected water-quality data for the period March 1985 through September 1988. The data in this report can be used as a basis for resource management by documenting the geographic and hydrologic variability of current water-quality conditions and sediment-transport characteristics of the upper Clark Fork basin.

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 cross-sectional water quality[1]	Daily single-vertical 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, 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 previously from March 1985 through September 1987 (Lambing, 1988). 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.

In the other investigation, daily suspended-sediment discharge was determined from June to September 1988 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 trace-element and suspended-sediment samples were collected by cross-sectional, depth-integration methods according to standard U.S. Geological Survey procedures 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.

Sampling frequency for periodic cross-sectional samples 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. However, few samples were collected at medium streamflows and no samples were obtained at high streamflows because of a lack of substantial runoff during the current sampling period (October 1987 through September 1988).

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) are:

Dissolved.--Pertains to the constituents in a representative water sample that passes through a membrane filter with pore diameters of 0.45 micrometer.

Total.--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."

Total recoverable.--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.

Suspended.--For chemical-constituent samples, pertains to the 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.

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 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 for trace elements 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 of suspended sediment were analyzed for concentration and particle-size distribution (percent less than 0.062 millimeter diameter). Single-vertical samples at the four daily suspended-sediment stations (table 1) were analyzed only for concentration. Suspended-sediment samples were analyzed at the U.S. Geological Survey sediment laboratory in Helena. Analytical methods used are described by Guy (1969).

DATA

Streamflow

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

Hydrographs comparing streamflow for October 1987 through September 1988 with long-term median and minimum 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 9 years of continuous streamflow data for computing flow statistics.

Onsite Water Quality

Results of onsite measurements of water quality for periodic samples are given in table 2.

Hardness

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

Trace Elements

Trace-element concentrations analyzed from periodic cross-sectional samples are listed in table 2.

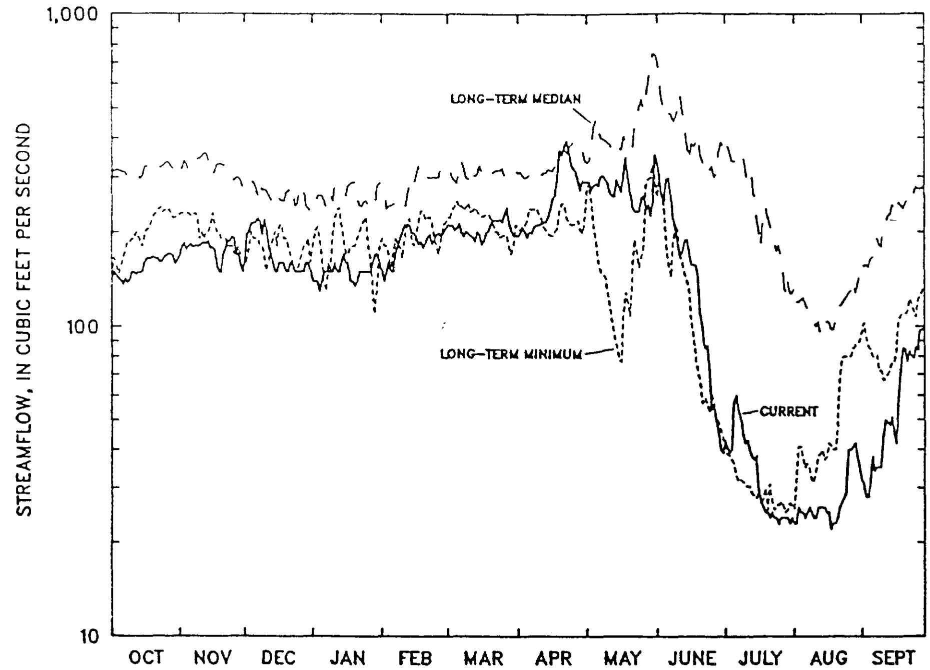

Figure 2.--Relation of current (October 1987 through September 1988) daily mean streamflow to long-term median and minimum daily mean streamflow for the Clark Fork at Deer Lodge. Long-term period of record is October 1978 through September 1987.

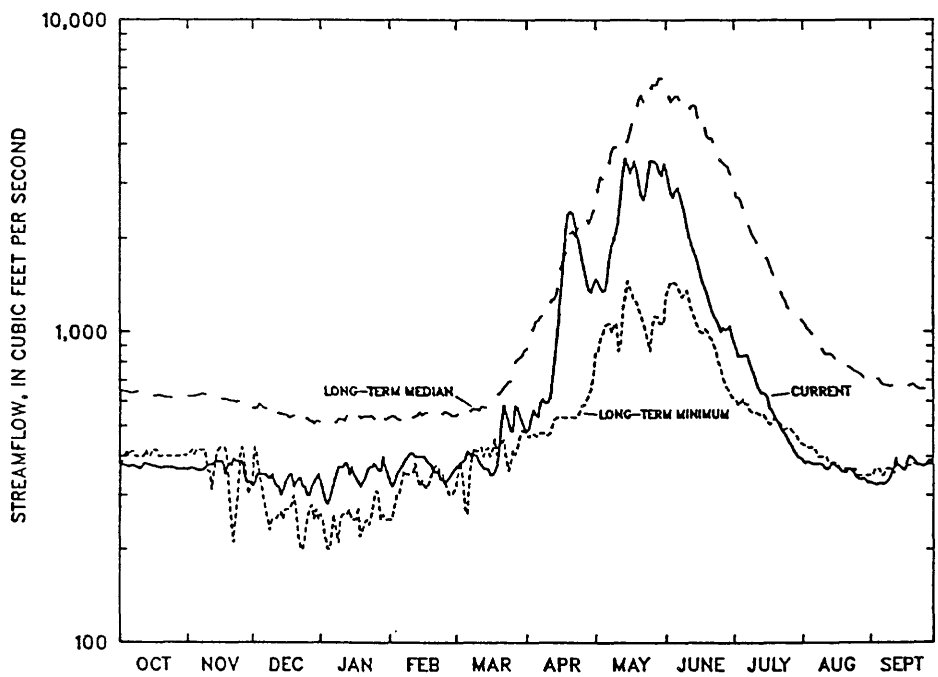

Figure 3.--Relation of current (October 1987 through September 1988) daily mean streamflow to long-term median and minimum daily mean streamflow for the Blackfoot River near Bonner. Long-term period of record is October 1939 through September 1987.

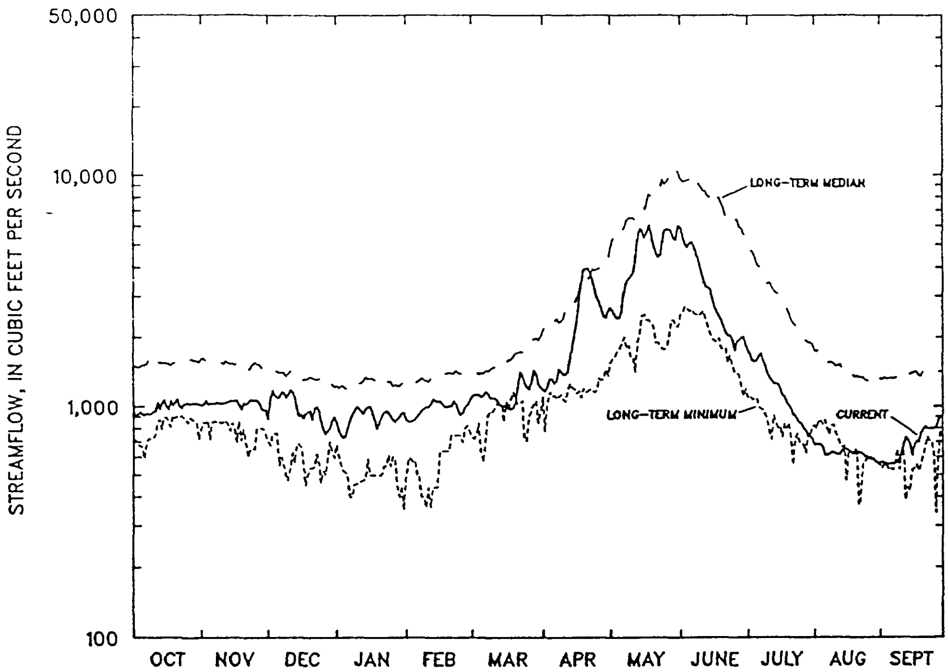

Figure 4.--Relation of current (October 1987 through September 1988) daily mean streamflow to long-term median and minimum daily mean streamflow for the Clark Fork above Missoula. Long-term period of record is October 1929 through September 1987.

Suspended Sediment

Suspended-sediment cross-sectional samples were collected periodically from October 1987 through September 1988. Concentrations and particle-size distribution of 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 streamflows and daily mean suspended-sediment concentrations were used to calculate daily suspended-sediment discharges 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 suspended-sediment discharge (fig. 9) for the Clark Fork at Deer Lodge and the Clark Fork at Turah Bridge, near Bonner from October 1987 through September 1988 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 June to September 1988 (fig. 10) to permit comparison of suspended-sediment loads entering and leaving Milltown Reservoir.

STATISTICAL SUMMARIES

A statistical summary of water-quality data for samples collected from March 1985 through September 1988 at six water-quality stations upstream from Milltown Reservoir is given in table 7 at the back of the report. A statistical summary is also given for suspended-sediment data collected downstream from Milltown Reservoir at the station Clark Fork above Missoula. No summary is presented for the Clark Fork near Galen, where only one sample was collected during 1988. 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 six sampling stations. Statistical values shown in the graphs represent all samples collected from March 1985 through September 1988.

Median concentrations of trace elements at each of the six water-quality stations are shown in figures 11 to 16. 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 graphs can be used to compare the geographic variation among the sites and between the dissolved and suspended phases of the trace elements.

The relations between total or total recoverable trace-element concentrations and suspended-sediment concentrations for the six water-quality stations are shown in logarithmic plots of the data in figures 17 to 23. Values less than the analytical detection limit are plotted midway between zero and the analytical detection limit.

Median trace-element concentrations in suspended sediment for each of the six water-quality stations are shown in figures 24 to 29. 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 first determined by subtraction of the dissolved from the total or total-recoverable concentration. Where dissolved or total recoverable trace-element concentrations were reported as less than (<) the analytical detection limit, a value midway between zero and the analytical detection limit was assumed

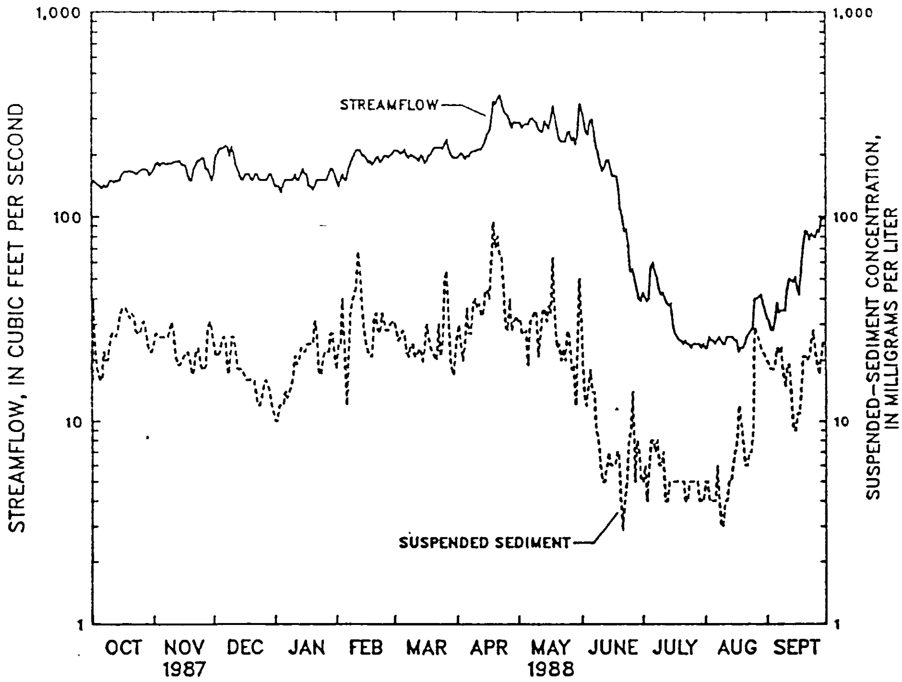

Figure 5.--Daily mean streamflow and suspended-sediment concentration for the Clark Fork at Deer Lodge, October 1987 through September 1988.

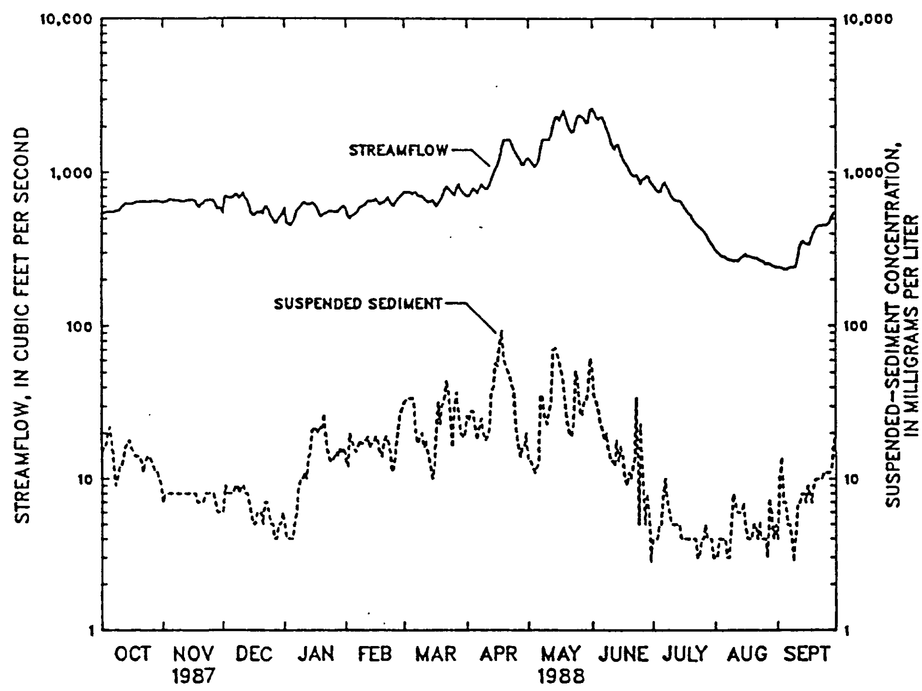

Figure 6.--Daily mean streamflow and suspended-sediment concentration for the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988.

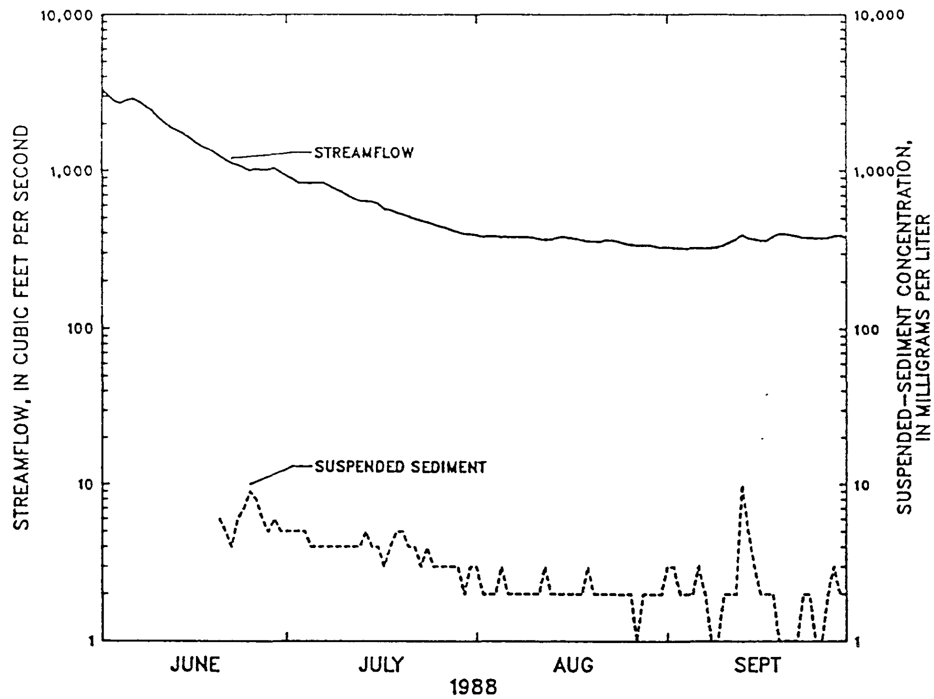

Figure 7.--Daily mean streamflow and suspended-sediment concentration for the Blackfoot River near Bonner, June through September 1988.

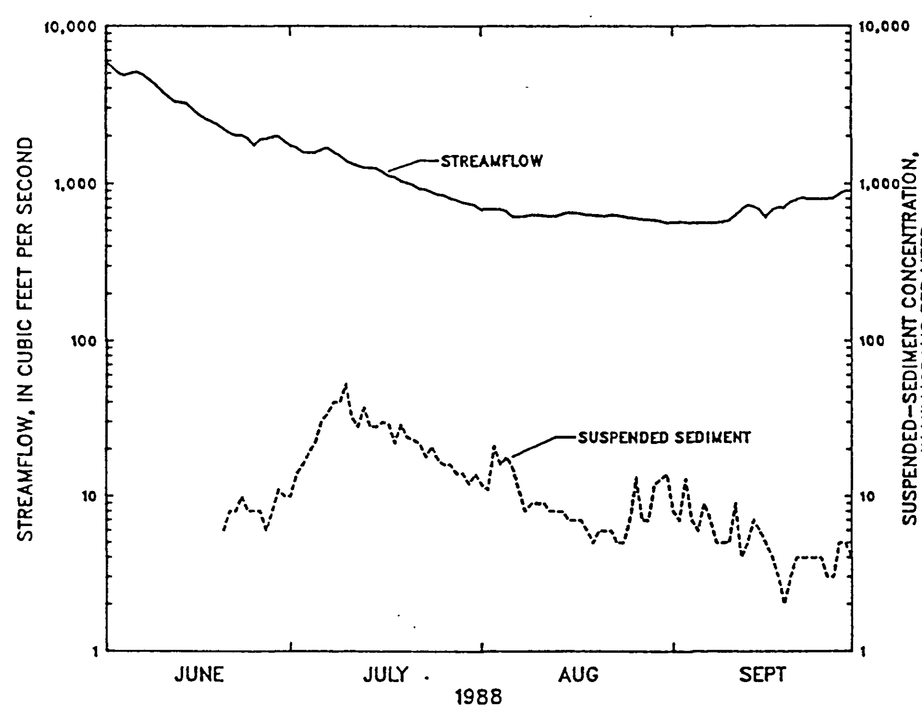

Figure 8.--Daily mean streamflow and suspended-sediment concentration for the Clark Fork above Missoula, June through September 1988.

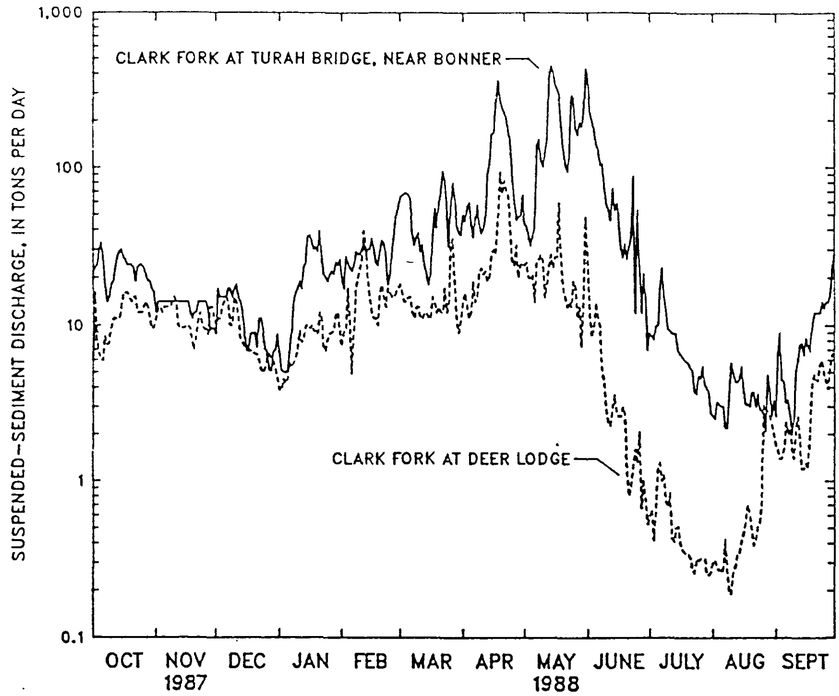

Figure 9.--Daily suspended-sediment discharge for the Clark Fork at Deer Lodge and the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988.

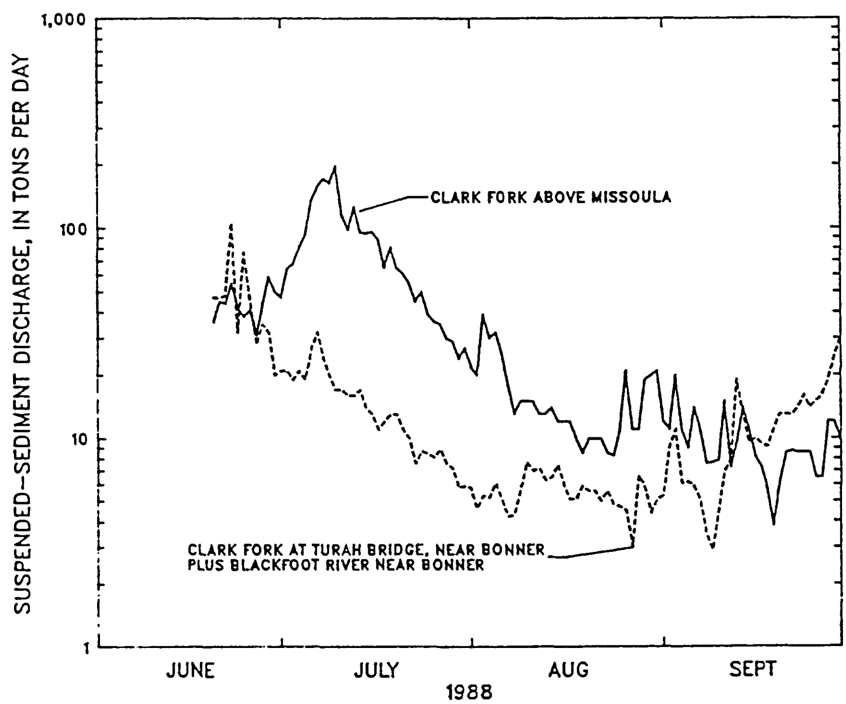

Figure 10.--Daily suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner plus the Blackfoot River near Bonner compared to the Clark Fork above Missoula, June through September 1988.

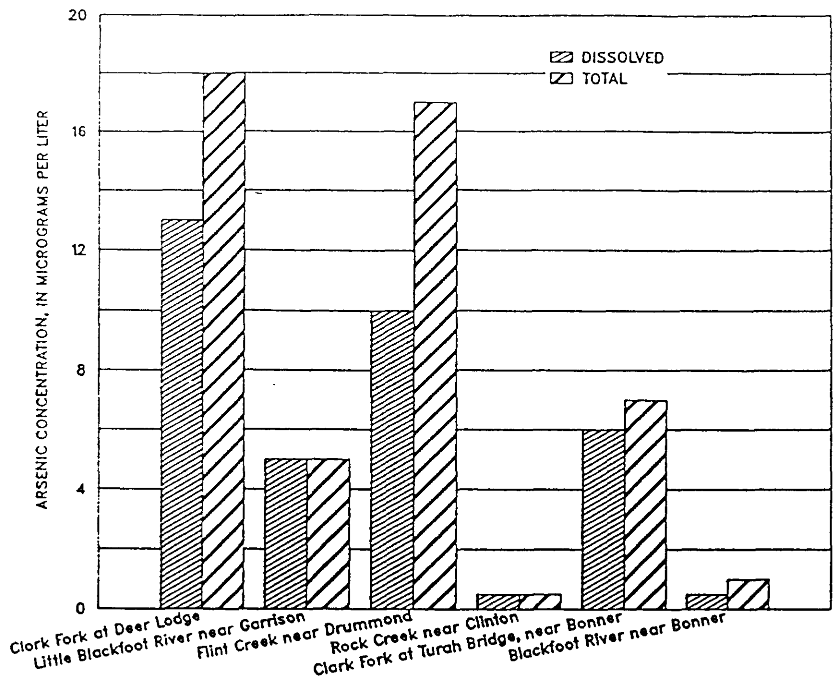

Figure 11.--Median concentrations of dissolved and total arsenic in water, March 1985 through September 1988.

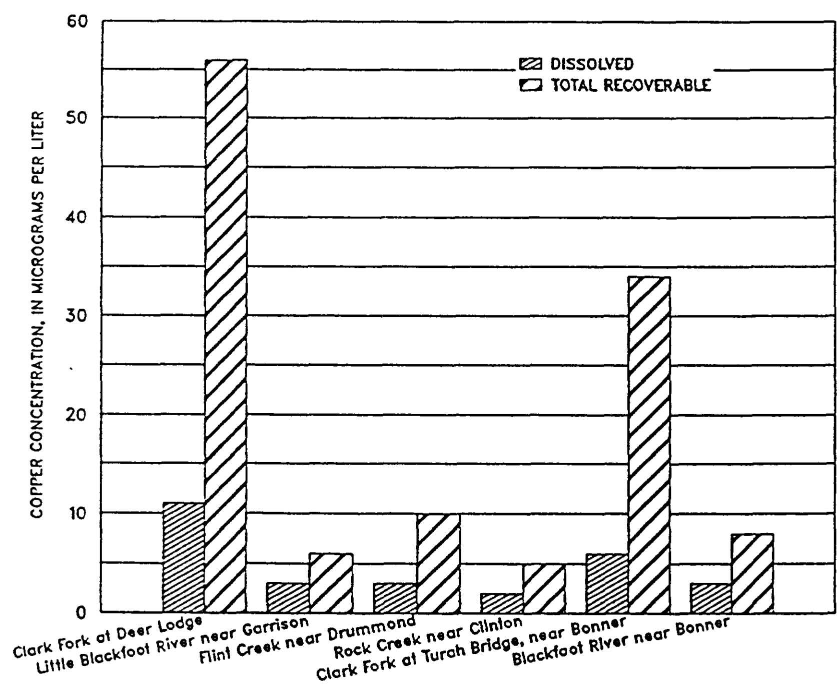

Figure 12.--Median concentrations of dissolved and total recoverable copper in water, March 1985 through September 1988.

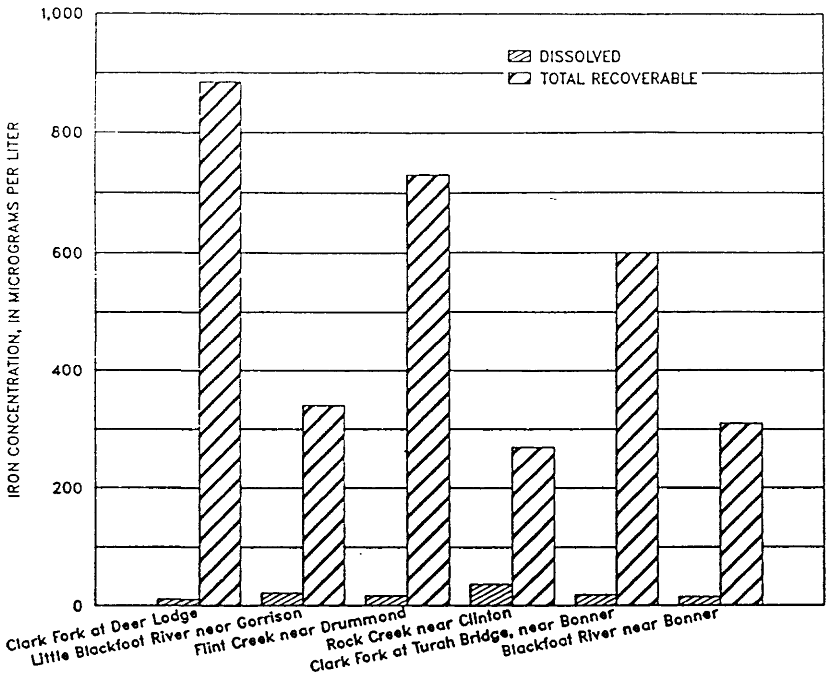

Figure 13.--Median concentrations of dissolved and total recoverable iron in water, March 1985 through September 1988.

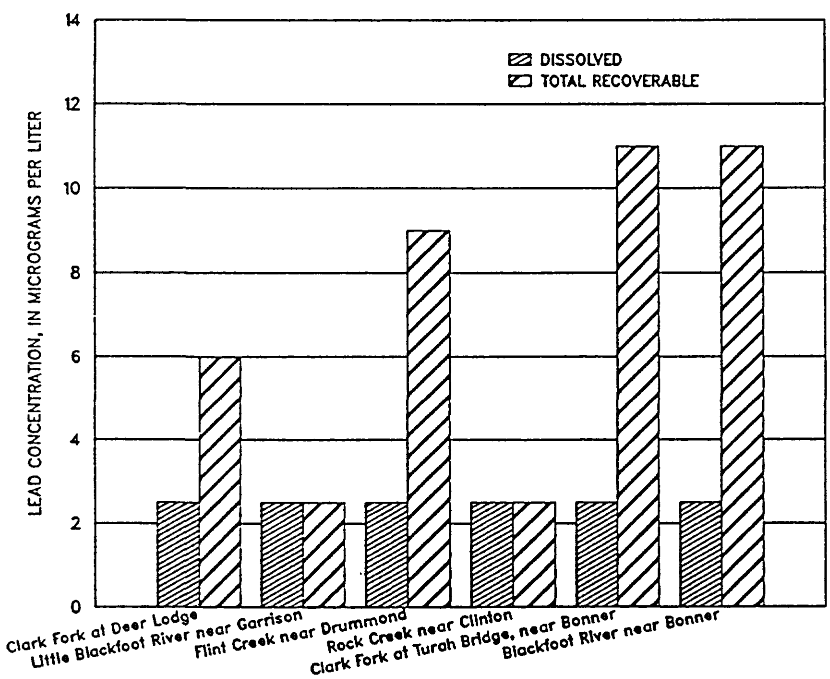

Figure 14.--Median concentrations of dissolved and total recoverable lead in water, March 1985 through September 1988.

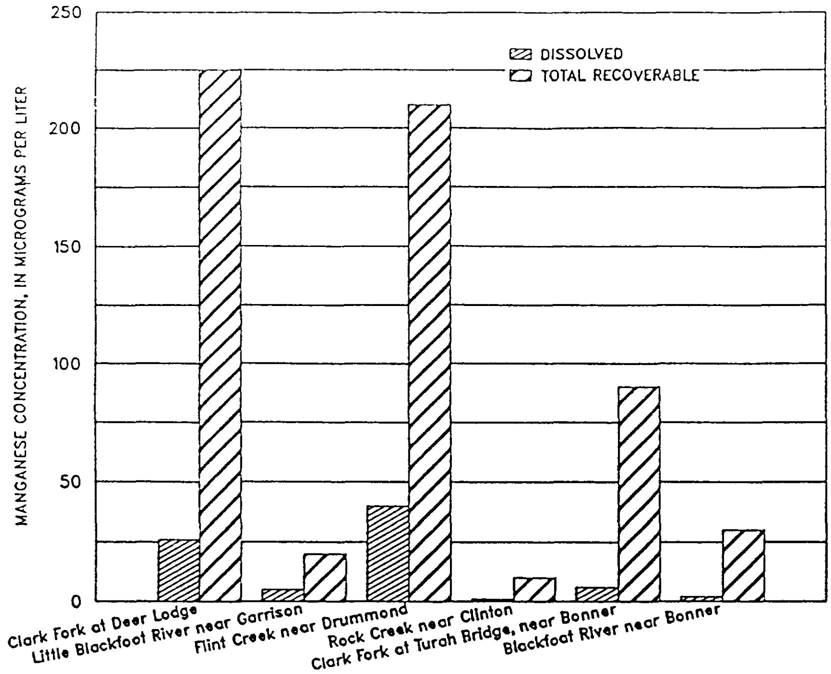

Figure 15.--Median concentrations of dissolved and total recoverable manganese in water, March 1985 through September 1988.

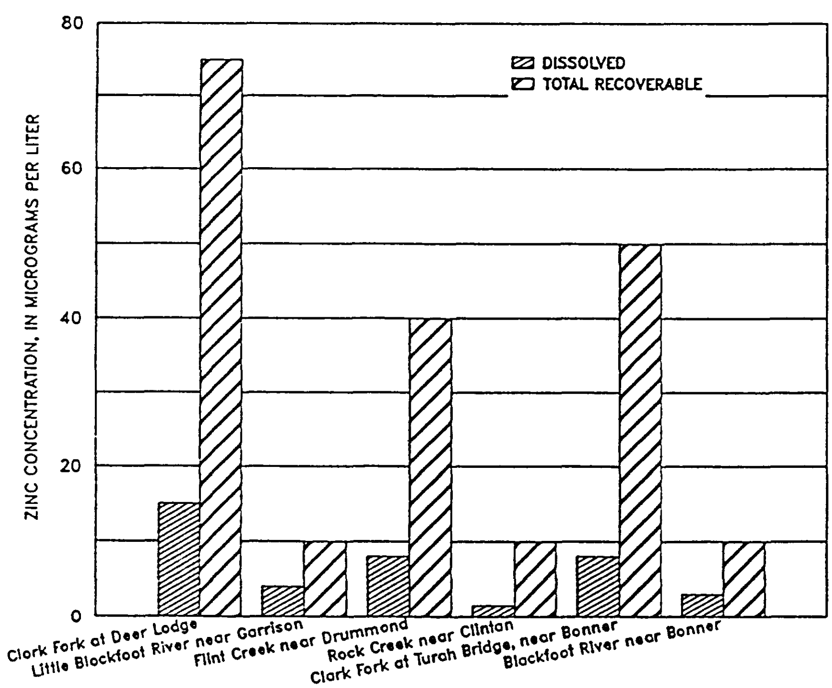

Figure 16.--Median concentrations of dissolved and total recoverable zinc in water, March 1985 through September 1988.

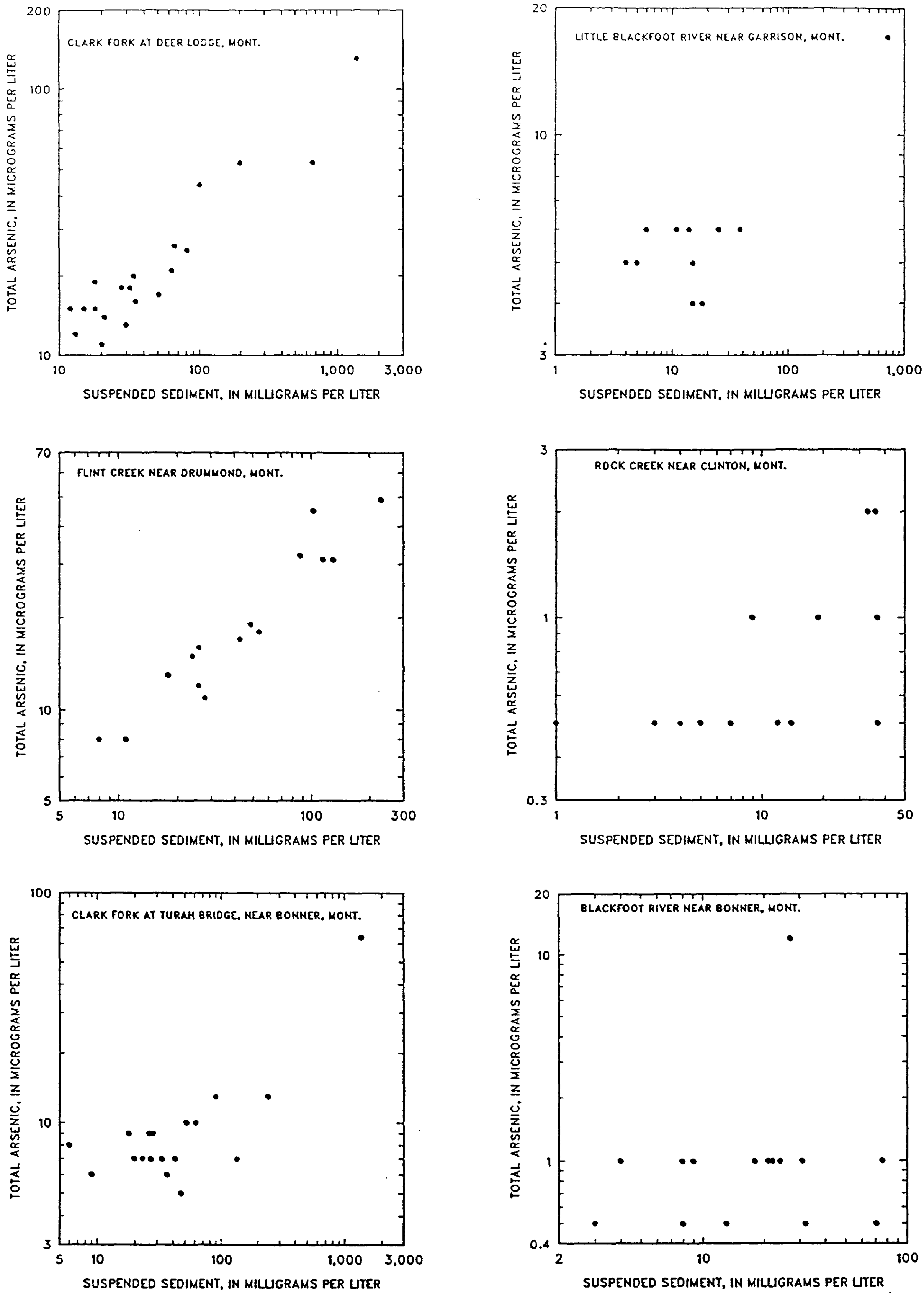

Figure 17.--Relation of concentrations of total arsenic to suspended sediment, March 1985 through September 1988.

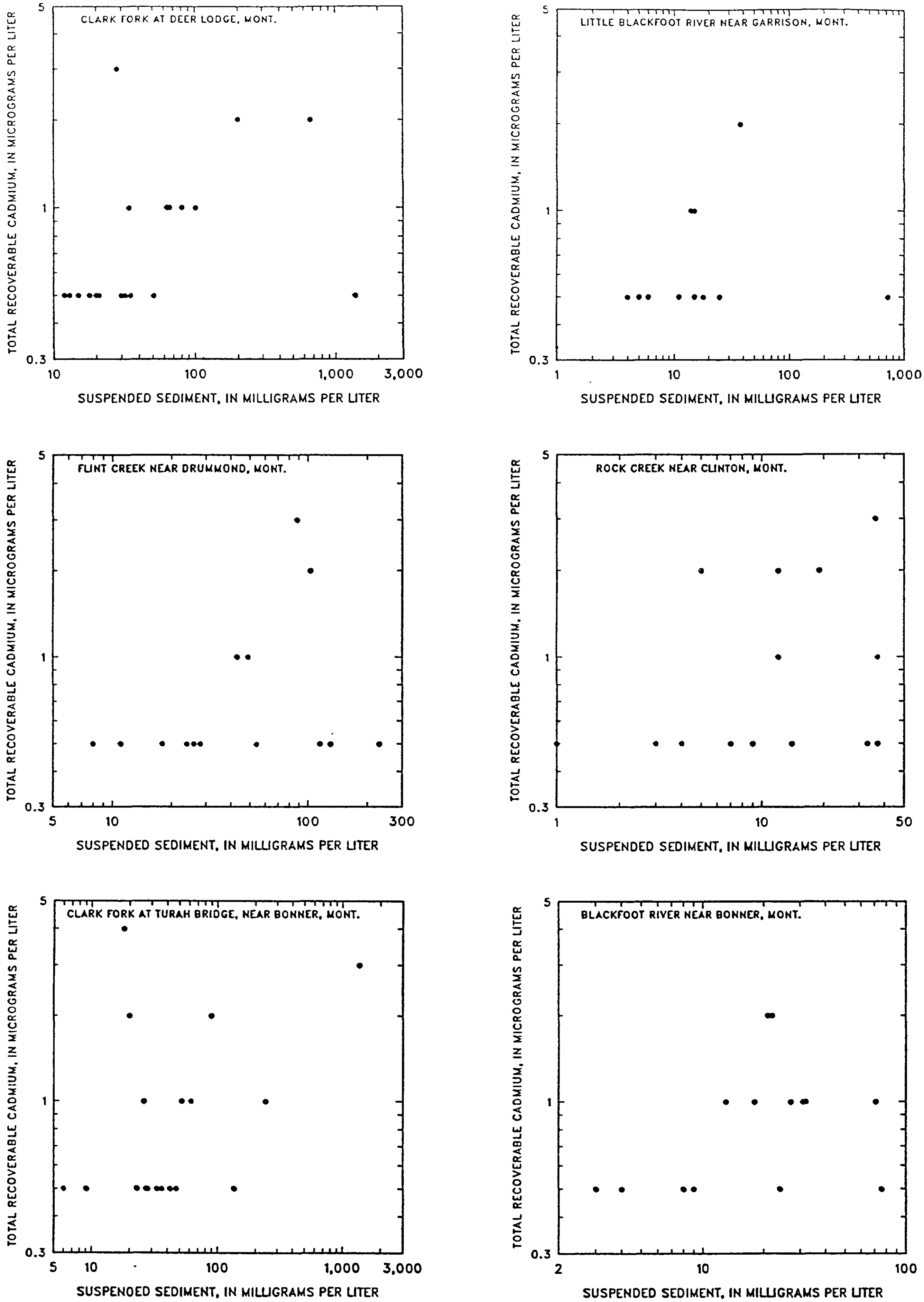

Figure 18.--Relation of concentrations of total recoverable cadmium to suspended sediment, March 1985 through September 1988.

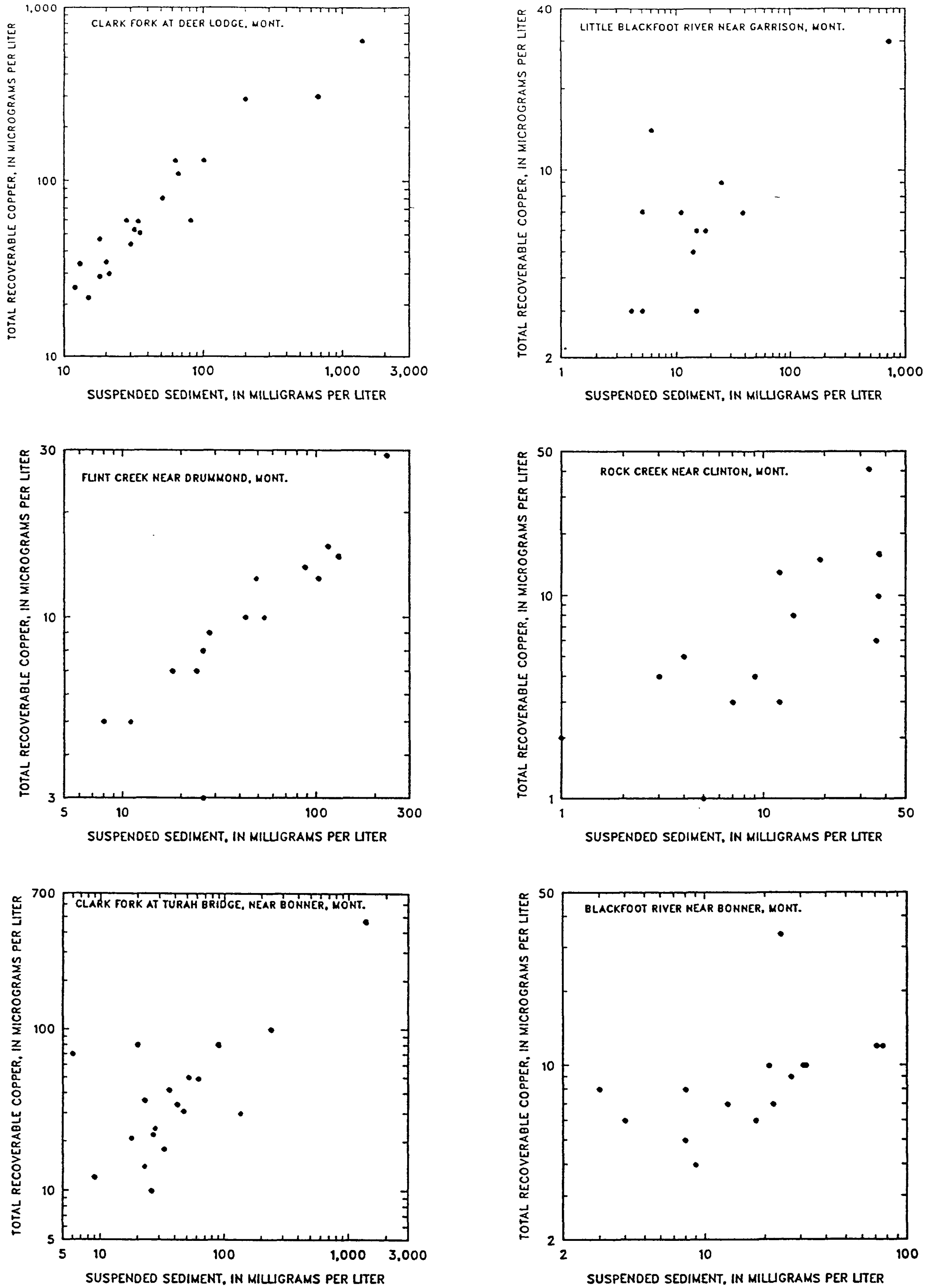

Figure 19.--Relation of concentrations of total recoverable copper to suspended sediment, March 1985 through September 1988.

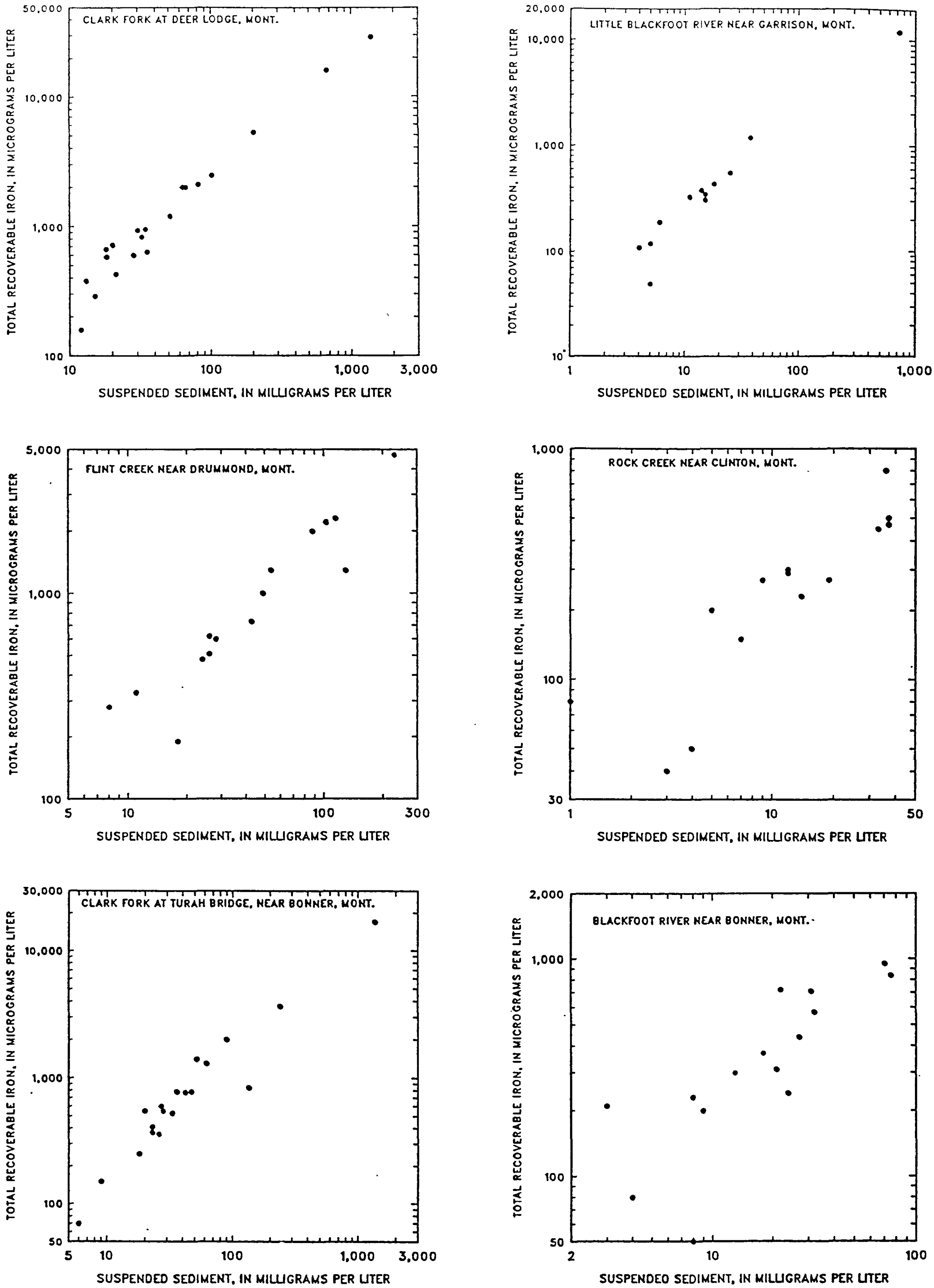

Figure 20.--Relation of concentrations of total recoverable iron to suspended sediment, March 1985 through September 1988.

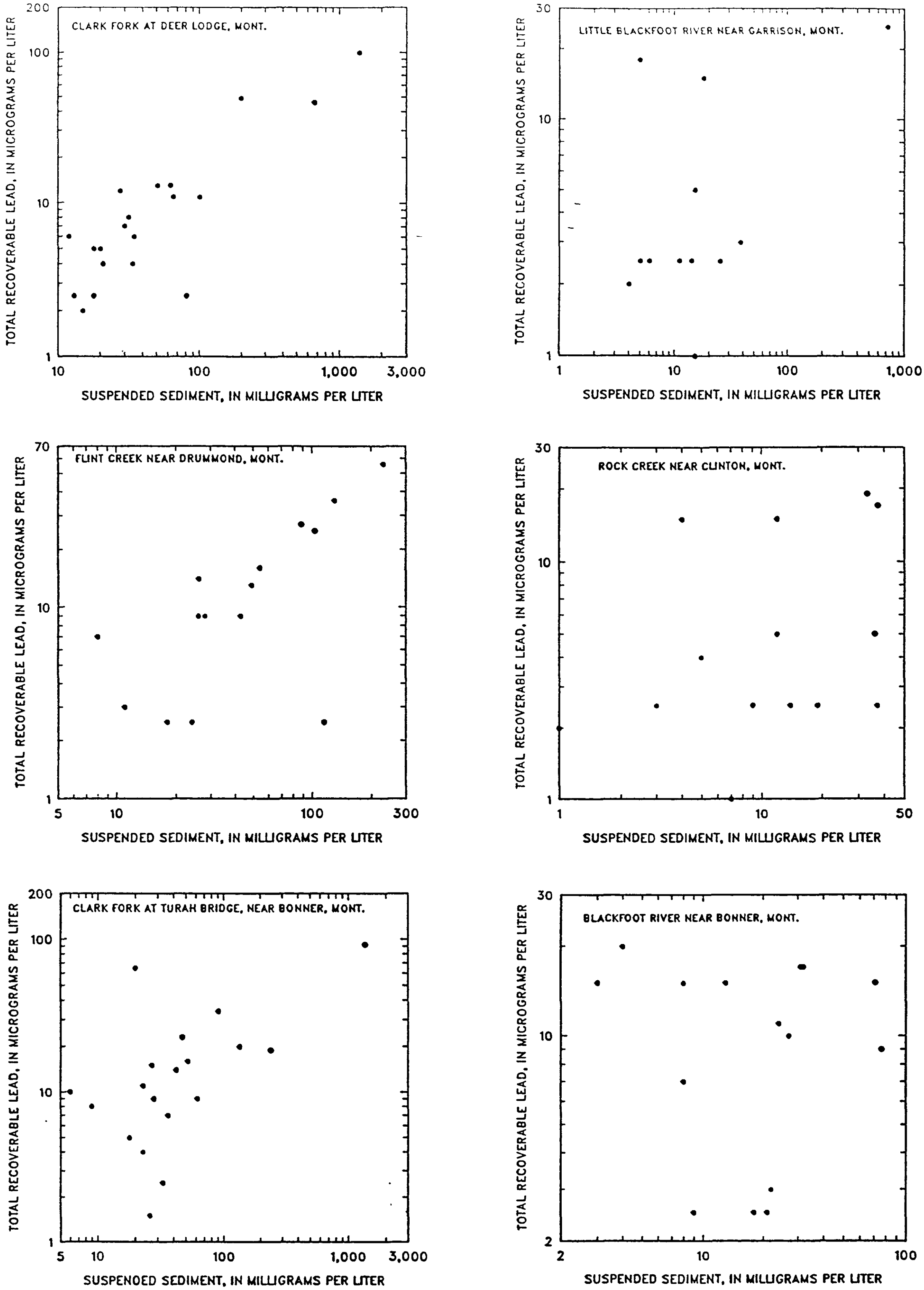

Figure 21.--Relation of concentrations of total recoverable lead to suspended sediment, March 1985 through September 1988.

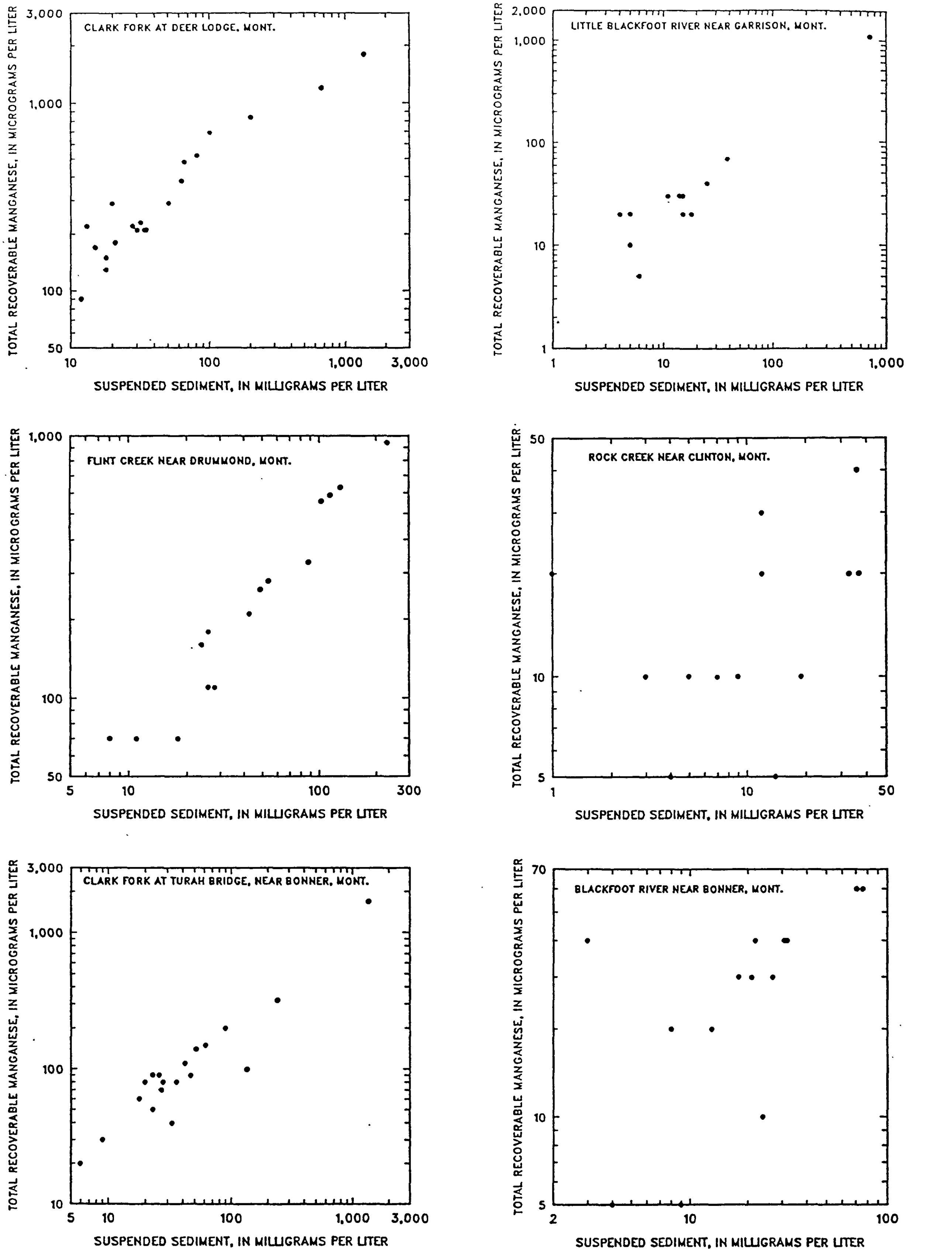

Figure 22.--Relation of concentrations of total recoverable manganese to suspended sediment, March 1985 through September 1988.

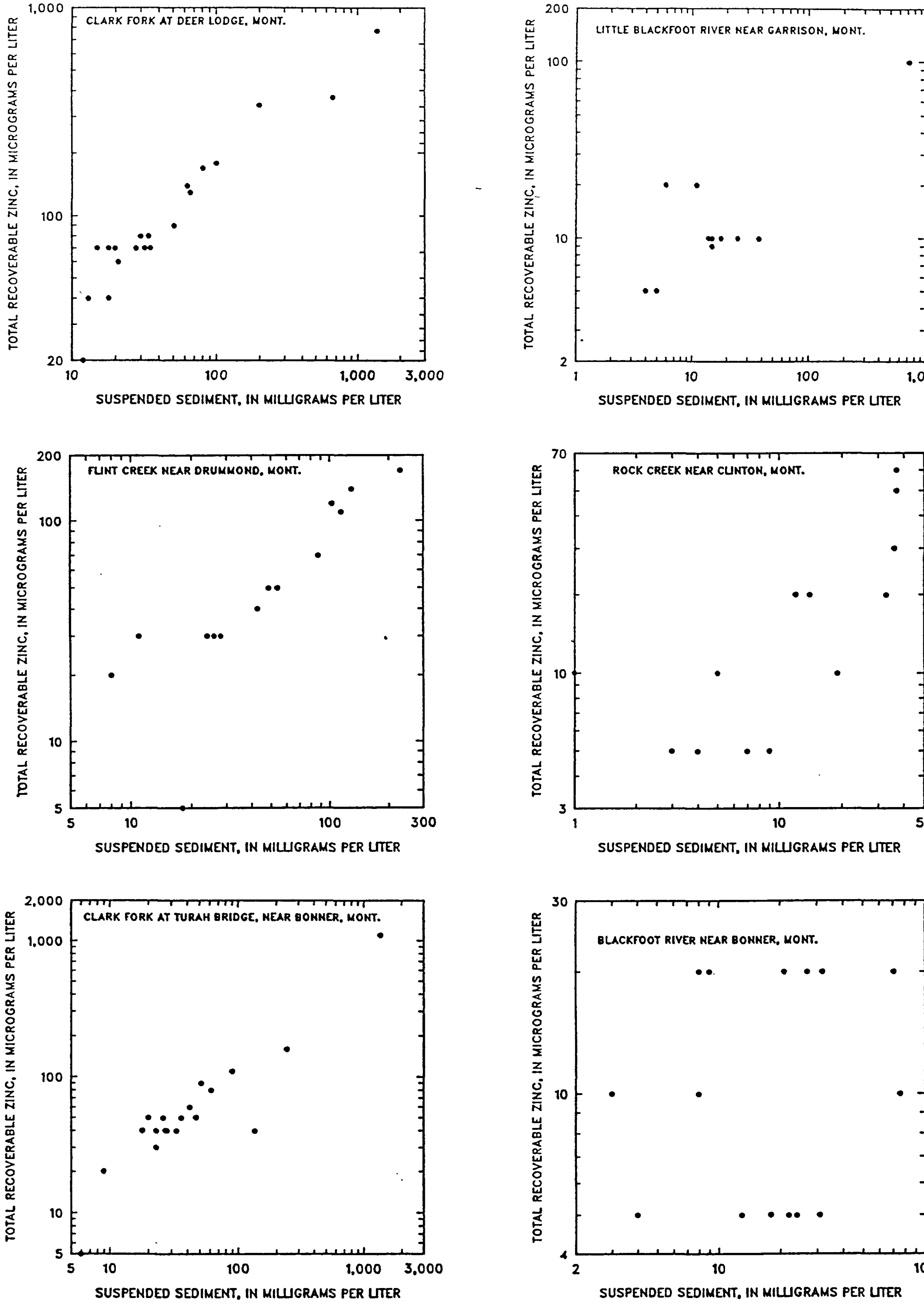

Figure 23.--Relation of concentrations of total recoverable zinc to suspended sediment, March 1985 through September 1988.

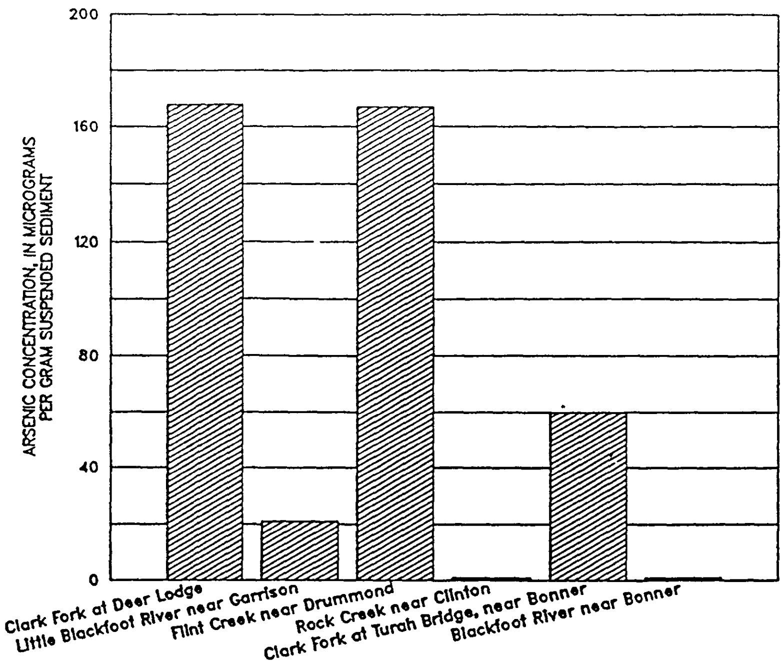

Figure 24.--Median concentrations of arsenic in suspended sediment, March 1985 through September 1988.

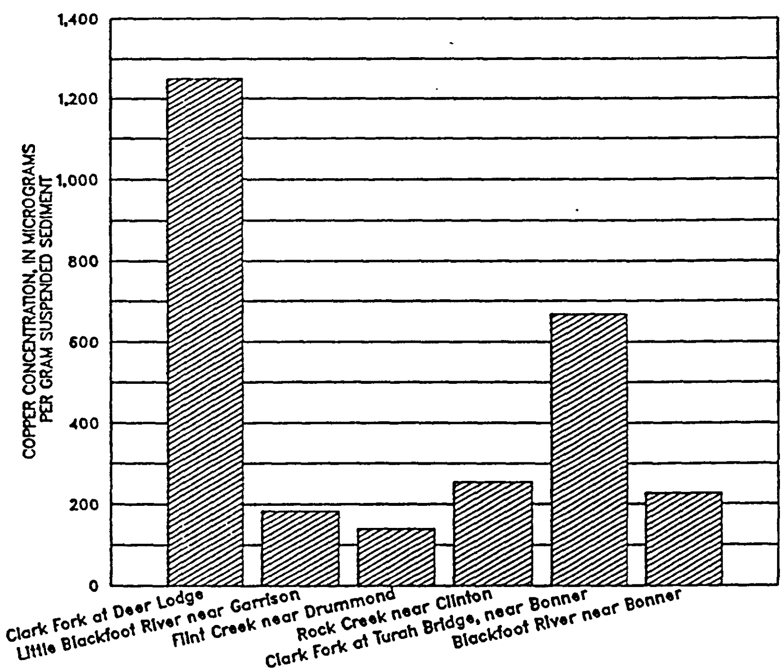

Figure 25.--Median concentrations of copper in suspended sediment, March 1985 through September 1988.

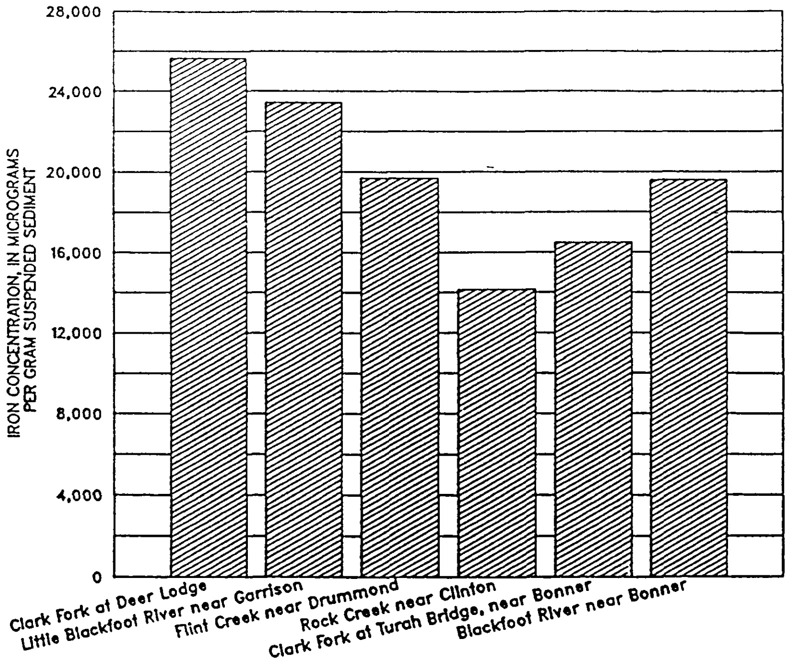

Figure 26.--Median concentrations of iron in suspended sediment, March 1985 through September 1988.

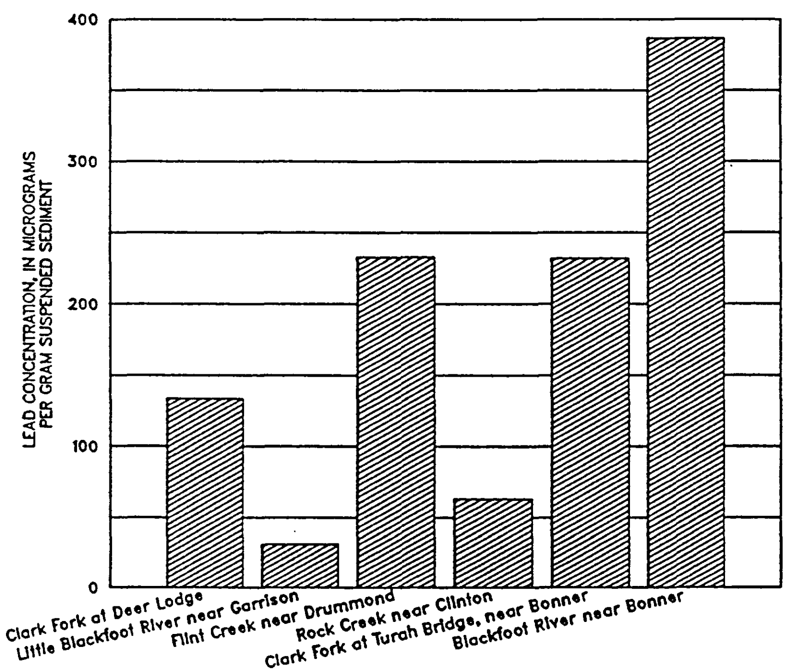

Figure 27.--Median concentrations of lead in suspended sediment, March 1985 through September 1988.

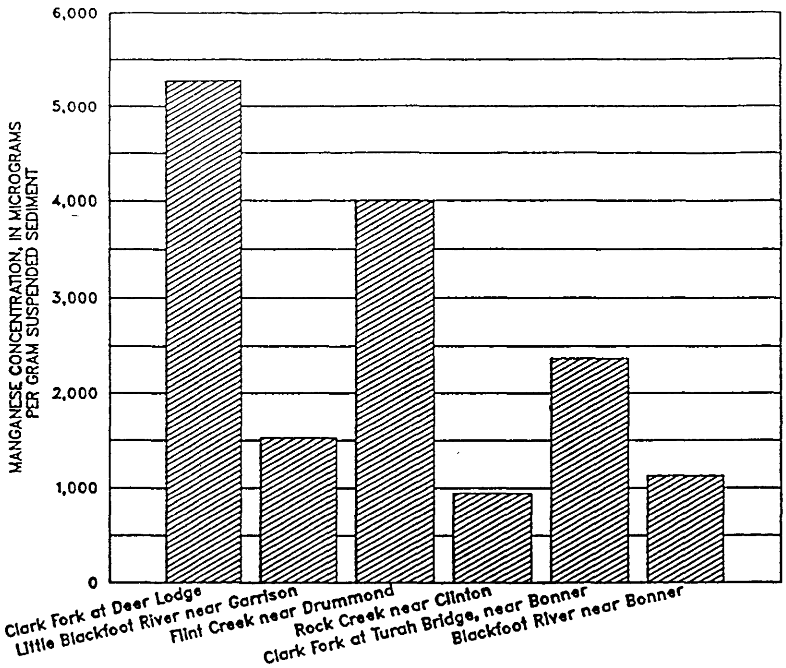

Figure 28.--Median concentrations of manganese in suspended sediment, March 1985 through September 1988.

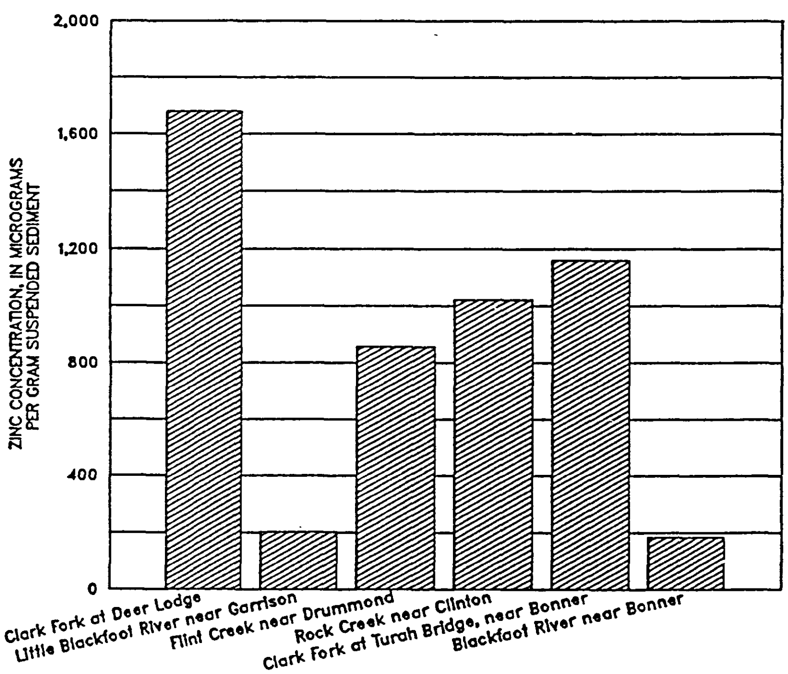

Figure 29.--Median concentrations of zinc in suspended sediment, March 1985 through September 1988.

for calculation of the suspended trace-element concentration. The suspended trace-element concentration for each sample then 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.

The statistical distribution of suspended-sediment concentrations for periodic cross-sectional samples is presented in figure 30. The statistical distribution for each of the six water-quality stations includes the range and selected percentile values for suspended-sediment samples collected from March 1985 through September 1988. The statistical distribution is also shown for the station Clark Fork above Missoula for suspended-sediment samples collected from July 1986 through September 1988.

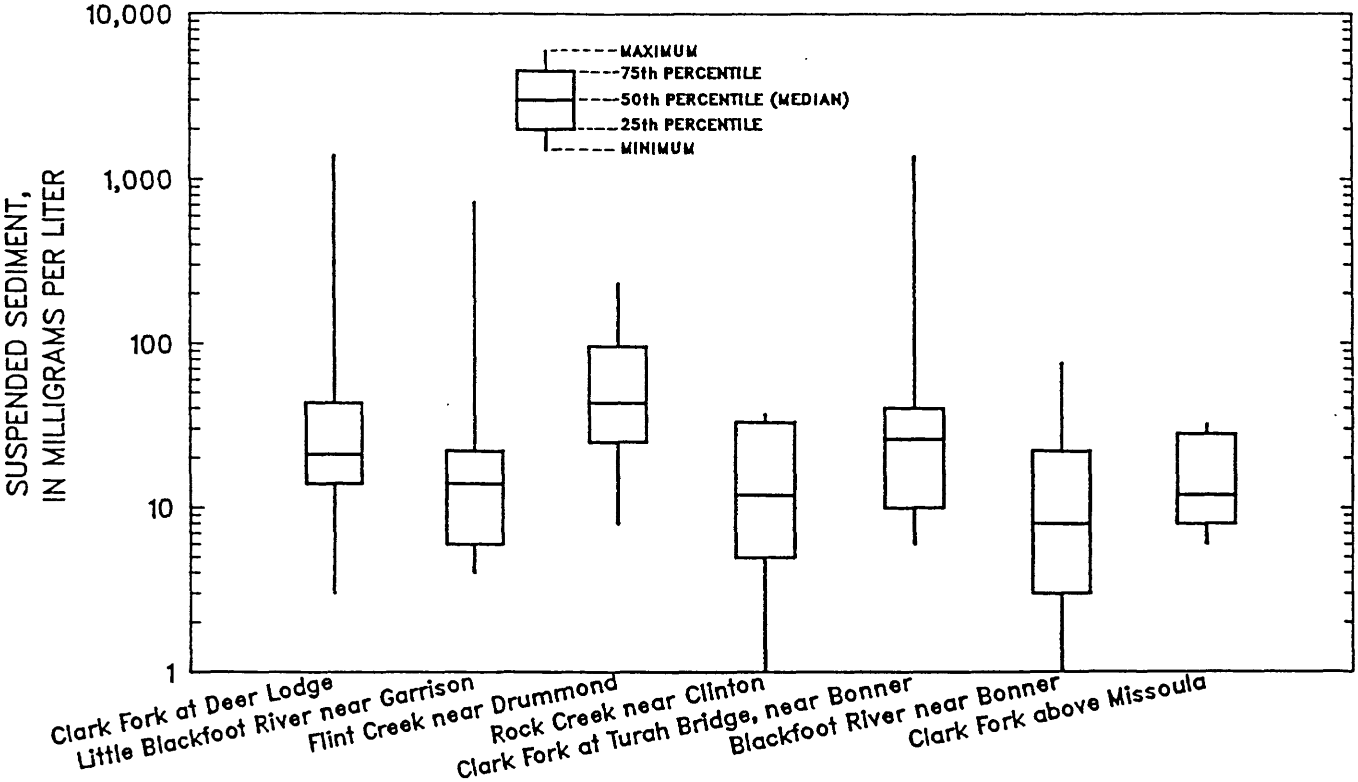

Figure 30.--Statistical distribution of suspended-sediment concentrations from periodic samples, March 1985 through September 1988. The statistical distribution for the Clark Fork above Missoula is for July 1986 through September 1988.

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.

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.

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.

Table 2.--*Water-quality data, October 1987 through September 1988*

[Analyses by U.S. Geological Survey. Abbreviations: 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; --, no data]

12323800--CLARK FORK NEAR GALEN, MONT.

Date	Time	Streamflow, 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)
July 1988 06...	1400	34	585	8.2	22.0	17.5	250	160	70	18

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)
July 1988 06...	110	0	88	16	15	<1	<1	19	9	160

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)
July 1988 06...	7	<5	<5	110	40	100	12	2	0.18	71

12324200--CLARK FORK AT DEER LODGE, 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, dis-solved (mg/L as Mg)
Oct 1987										
01...	1220	148	620	--	14.0	10.0	--	0	--	--
Nov										
18...	1330	156	606	--	-4.0	.0	--	0	--	--
Jan 1988										
07...	1250	147	642	--	-4.0	.0	--	0	--	--
Feb										
18...	1155	193	581	--	3.0	1.0	--	0	--	--
Apr										
07...	1210	190	601	--	3.0	5.0	--	0	--	--
20...	1350	363	550	7.9	8.0	9.5	240	110	71	16
May										
17...	1630	320	450	8.2	8.0	9.5	200	83	58	13
June										
01...	1510	320	500	8.1	17.0	11.0	210	90	62	14
July										
06...	1150	59	561	--	12.0	12.5	--	0	--	--
Aug										
18...	1235	23	553	--	19.0	17.0	--	0	--	--

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)
Oct 1987										
01...	--	--	--	--	--	--	--	--	--	--
Nov										
18...	--	--	--	--	--	--	--	--	--	--
Jan 1988										
07...	--	--	--	--	--	--	--	--	--	--
Feb										
18...	--	--	--	--	--	--	--	--	--	--
Apr										
07...	--	--	--	--	--	--	--	--	--	--
20...	163	0	136	26	13	1	<1	110	19	2,000
May										
17...	142	0	116	18	14	<1	<1	53	18	830
June										
01...	150	0	123	19	14	<1	<1	47	14	670
July										
06...	--	--	--	--	--	--	--	--	--	--
Aug										
18...	--	--	--	--	--	--	--	--	--	--

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)
Oct 1987										
01...	--	--	--	--	--	--	--	10	4.0	58
Nov										
18...	--	--	--	--	--	--	--	21	8.8	57
Jan 1988										
07...	--	--	--	--	--	--	--	10	4.0	75
Feb										
18...	--	--	--	--	--	--	--	16	8.3	72
Apr										
07...	--	--	--	--	--	--	--	22	11	56
20...	8	11	<5	480	20	130	14	66	65	58
May										
17...	18	8	<5	230	2	70	9	32	28	58
June										
01...	27	<5	<5	150	35	70	11	18	16	70
July										
06...	--	--	--	--	--	--	--	6	.96	64
Aug										
18...	--	--	--	--	--	--	--	21	1.3	65

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)
Apr 1988										
21...	1850	160	220	8.0	10.0	7.0	100	12	29	6.9
May										
16...	1645	348	190	7.7	21.0	14.0	86	7	25	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 1988										
21...	108	0	89	6	5	<1	<1	7	2	330
May										
16...	97	0	79	6	5	1	<1	5	7	380

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 1988										
21...	33	<5	<5	30	4	20	<3	11	4.8	86
May										
16...	22	<5	<5	30	6	<10	10	14	13	60

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, dis-solved (mg/L as Mg)
Apr 1988 20...	1845	114	260	7.9	7.0	6.5	130	11	35	9.7

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)
Apr 1988 20...	145	0	117	19	10	1	<1	13	5	1,000

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)
Apr 1988 20...	34	13	<5	260	34	50	15	49	15	78

Table 2.--*Water-quality data, October 1987 through September 1988*--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 1988										
21...	1600	741	85	7.6	10.0	6.0	39	1	10	3.5
May										
17...	1250	1,570	70	7.2	11.5	9.5	32	3	8.4	2.6
26...	1130	1,590	68	7.6	26.0	11.0	33	3	8.8	2.6

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 1988										
21...	47	0	38	1	<1	<1	<1	4	2	270
May										
17...	37	0	29	1	<1	1	<1	16	5	500
26...	37	0	30	1	1	2	<1	15	2	270

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 1988										
21...	69	<5	<5	10	<1	<10	<3	9	18	78
May										
17...	39	<5	<5	20	3	60	12	37	157	39
26...	35	<5	<5	10	3	10	7	19	82	63

Table 2.--*Water-quality data, October 1987 through September 1988*--Continued

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

Date	Time	Streamflow, 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)
Jan 1988										
13...	1430	591	432	--	-3.0	.5	--	0	--	--
Mar										
02...	1210	734	408	--	7.0	4.0	--	0	--	--
Apr										
14...	1030	928	352	--	15.0	10.0	--	0	--	--
21...	1300	1,630	275	7.8	9.0	7.0	130	41	37	8.8
May										
17...	0915	2,240	205	7.4	10.0	11.0	92	7	26	6.5
25...	1650	2,540	189	--	29.0	15.0	--	0	--	--
June										
01...	1130	2,640	260	7.9	15.0	9.0	120	27	33	8.4
July										
06...	0945	830	--	--	--	13.0	--	0	--	--
Aug										
03...	0845	296	335	--	19.0	15.0	--	0	--	--
Sept										
26...	1600	460	417	--	16.0	12.0	--	0	--	--

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)
Jan 1988										
13...	--	--	--	--	--	--	--	--	--	--
Mar										
02...	--	--	--	--	--	--	--	--	--	--
Apr										
14...	--	--	--	--	--	--	--	--	--	--
21...	110	0	88	10	6	1	<1	50	5	1,400
May										
17...	105	0	85	6	9	<1	<1	42	10	780
25...	--	--	--	--	--	--	--	--	--	--
June										
01...	110	0	90	10	7	1	<1	49	7	1,300
July										
06...	--	--	--	--	--	--	--	--	--	--
Aug										
03...	--	--	--	--	--	--	--	--	--	--
Sept										
26...	--	--	--	--	--	--	--	--	--	--

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)
Jan 1988										
13...	--	--	--	--	--	--	--	11	18	71
Mar										
02...	--	--	--	--	--	--	--	34	67	83
Apr										
14...	--	--	--	--	--	--	--	39	98	71
21...	31	16	<5	140	8	90	39	52	229	73
May										
17...	22	7	<5	80	5	50	7	36	218	58
25...	--	--	--	--	--	--	--	46	315	49
June										
01...	23	9	<5	150	10	80	8	62	442	63
July										
06...	--	--	--	--	--	--	--	7	16	51
Aug										
03...	--	--	--	--	--	--	--	6	4.8	43
Sept										
26...	--	--	--	--	--	--	--	12	15	65

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)
Apr 1988										
21...	0945	2,420	145	7.8	7.0	6.5	73	2	19	6.3
May										
16...	2000	3,200	155	8.0	20.0	11.5	77	0	20	6.6
26...	1445	3,570	150	8.2	27.0	14.0	76	4	20	6.4
June										
27...	1300	1,310	--	--	--	20.0	--	0	--	--
July										
06...	1100	838	--	--	15.0	15.0	--	0	--	--
Aug										
19...	0945	344	258	--	12.0	15.0	--	0	--	--
Sept										
28...	1500	385	264	--	16.0	10.0	--	0	--	--

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 1988										
21...	87	0	71	<1	<1	1	<1	7	3	300
May										
16...	112	0	91	1	1	1	<1	6	1	370
26...	88	0	72	1	1	2	<1	10	2	310
June										
27...	--	--	--	--	--	--	--	--	--	--
July										
06...	--	--	--	--	--	--	--	--	--	--
Aug										
19...	--	--	--	--	--	--	--	--	--	--
Sept										
28...	--	--	--	--	--	--	--	--	--	--

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 1988										
21...	22	15	<5	20	<1	<10	<3	13	85	74
May										
16...	10	<5	<5	30	2	<10	<3	18	156	77
26...	12	<5	<5	30	4	20	8	21	202	65
June										
27...	--	--	--	--	--	--	--	6	21	82
July										
06...	--	--	--	--	--	--	--	3	6.8	50
Aug										
19...	--	--	--	--	--	--	--	3	2.8	68
Sept										
28...	--	--	--	--	--	--	--	3	3.1	88

Table 2.--*Water-quality data, October 1987 through September 1988*--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)
June 1988								
10...	0830	3,950	--	16.0	13.0	10	107	79
27...	1530	1,920	--	--	19.5	6	31	81
July								
06...	1330	1,660	--	15.0	15.0	32	143	--
Aug								
03...	1330	720	283	25.0	18.0	30	58	90
Sept								
28...	1800	866	365	16.0	11.0	7	16	92

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1987 through September 1988*

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

		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)
	1987								
	October			November			December		
1	146	16	6.3	169	24	11	160	24	10
2	150	39	16	180	27	13	196	21	11
3	146	21	8.3	184	27	13	202	21	11
4	143	17	6.6	176	26	12	213	22	13
5	141	16	6.1	181	26	13	213	25	14
6	137	16	5.9	183	26	13	215	26	15
7	143	22	8.5	179	26	13	220	24	14
8	139	20	7.5	181	26	13	215	17	9.9
9	141	20	7.6	181	28	14	196	19	10
10	150	24	9.7	181	31	15	218	26	15
11	150	27	11	184	28	14	203	26	14
12	147	27	11	185	21	10	180	22	11
13	150	26	11	184	19	9.4	170	18	8.3
14	149	28	11	187	19	9.6	160	18	7.8
15	151	33	13	178	20	9.6	150	18	7.3
16	160	36	16	179	21	10	150	17	6.9
17	165	36	16	176	22	10	160	16	6.9
18	166	36	16	160	22	9.5	160	16	6.9
19	165	34	15	150	20	8.1	160	16	6.9
20	167	32	14	150	17	6.9	150	16	6.5
21	165	34	15	170	18	8.3	150	16	6.5
22	165	33	15	178	22	11	160	14	6.0
23	161	28	12	187	23	12	160	12	5.2
24	162	27	12	187	20	10	150	12	4.9
25	167	27	12	193	18	9.4	150	13	5.3
26	169	29	13	191	18	9.3	150	15	6.1
27	171	31	14	170	19	8.7	150	16	6.5
28	170	29	13	170	29	13	150	15	6.1
29	168	24	11	160	31	13	160	14	6.0
30	159	22	9.4	150	28	11	160	12	5.2
31	163	22	9.7	---	---	---	150	11	4.5
TOTAL	4,826	---	352.6	5,284	---	332.8	5,381	---	267.7

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1987 through September 1988*--Continued

		Suspended sediment			Suspended sediment			Suspended sediment	
Day	Mean stream-flow (ft3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)	Mean stream-flow (ft3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)	Mean stream-flow (ft3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)
				1988					
	January			February			March		
1	140	10	3.8	150	18	7.3	210	31	18
2	140	10	3.8	140	24	9.1	210	28	16
3	140	12	4.5	150	24	9.7	208	25	14
4	130	12	4.2	160	40	17	202	26	14
5	140	12	4.5	150	24	9.7	205	28	15
6	150	14	5.7	150	12	4.9	212	27	15
7	150	13	5.3	170	20	9.2	199	22	12
8	150	14	5.7	180	34	17	193	21	11
9	150	15	6.1	190	39	20	200	24	13
10	150	17	6.9	200	42	23	197	24	13
11	160	21	9.1	210	46	26	194	21	11
12	150	19	7.7	210	68	39	192	21	11
13	150	20	8.1	210	56	32	186	23	12
14	160	23	9.9	198	37	20	199	22	12
15	170	22	10	197	28	15	195	20	11
16	160	22	9.5	192	24	12	182	23	11
17	160	24	10	182	22	11	186	30	15
18	140	24	9.1	186	21	11	198	26	14
19	140	24	9.1	178	21	10	201	23	12
20	135	24	8.7	183	32	16	211	22	13
21	140	31	12	192	34	18	217	21	12
22	150	28	11	195	28	15	217	20	12
23	150	17	6.9	183	27	13	216	30	17
24	150	17	6.9	187	34	17	218	21	12
25	150	20	8.1	196	31	16	214	24	14
26	150	22	8.9	198	28	15	227	50	31
27	150	22	8.9	193	28	15	237	55	35
28	160	22	9.5	198	30	16	213	31	18
29	170	27	12	202	31	17	202	19	10
30	170	27	12	---	---	---	194	17	8.9
31	160	21	9.1	---	---	---	195	20	11
TOTAL	4,665	---	247.0	5,330	---	460.9	6,330	---	443.9

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1987 through September 1988*--Continued

		Suspended sediment			Suspended sediment			Suspended sediment	
Day	Mean stream-flow (ft^3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)	Mean stream-flow (ft^3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)	Mean stream-flow (ft^3/s)	Mean concen-tration (mg/L)	Discharge (ton/d)
	1988								
	April			May			June		
1	193	26	14	288	31	24	333	30	27
2	198	30	16	287	32	25	294	14	11
3	205	24	13	271	27	20	258	12	8.4
4	200	20	11	281	27	20	251	15	10
5	191	24	12	284	28	21	294	18	14
6	199	36	19	280	19	14	297	14	11
7	197	27	14	299	31	25	259	14	9.8
8	207	27	15	302	32	26	220	9	5.3
9	209	38	21	293	35	28	204	8	4.4
10	210	40	23	287	34	26	181	6	2.9
11	212	36	21	268	21	15	167	5	2.3
12	214	38	22	259	26	18	173	5	2.3
13	214	33	19	259	35	24	188	6	3.0
14	222	34	20	292	36	28	189	7	3.6
15	235	44	28	280	31	23	173	6	2.8
16	254	44	30	268	37	27	158	6	2.6
17	261	40	28	299	34	27	158	6	2.6
18	290	59	46	346	63	59	157	7	3.0
19	364	95	93	305	33	27	141	7	2.7
20	351	71	67	269	23	17	109	4	1.2
21	375	81	82	239	24	15	99	3	.80
22	391	66	70	232	20	13	85	4	.92
23	363	65	64	232	23	14	87	5	1.2
24	330	47	42	232	20	13	73	8	1.6
25	317	29	25	257	28	19	54	9	1.3
26	311	28	24	260	26	18	56	14	2.1
27	293	40	32	235	18	11	50	5	.68
28	271	28	20	244	19	13	45	8	.97
29	290	31	24	225	12	7.3	40	7	.76
30	286	33	25	250	23	16	39	5	.53
31	---	---	---	354	50	48	---	---	---
TOTAL	7,853	---	940	8,477	---	681.3	4,832	---	140.76

Table 3.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Deer Lodge, October 1987 through September 1988*--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)
				1988					
	July			August			September		
1	43	5	0.58	23	5	0.31	32	20	1.7
2	41	6	.66	23	5	.31	31	19	1.6
3	39	4	.42	26	4	.28	28	18	1.4
4	40	6	.65	25	4	.27	28	18	1.4
5	57	8	1.2	25	4	.27	31	19	1.6
6	60	8	1.3	24	4	.26	38	23	2.4
7	54	7	1.0	25	6	.41	34	22	2.0
8	51	8	1.1	26	4	.28	35	23	2.2
9	45	6	.73	25	3	.20	35	17	1.6
10	42	6	.68	24	3	.19	35	15	1.4
11	43	7	.81	24	4	.26	44	19	2.3
12	40	4	.43	26	4	.28	50	19	2.6
13	38	4	.41	26	5	.35	49	13	1.7
14	37	5	.50	26	5	.35	48	9	1.2
15	38	5	.51	26	6	.42	51	9	1.2
16	30	5	.41	25	7	.47	45	11	1.3
17	27	5	.36	25	8	.54	42	11	1.2
18	26	5	.35	22	12	.71	55	15	2.2
19	25	5	.34	23	10	.62	71	21	4.0
20	25	5	.34	23	8	.50	85	21	4.8
21	24	5	.32	24	6	.39	84	20	4.5
22	25	4	.27	26	6	.42	77	21	4.4
23	24	4	.26	27	7	.51	83	25	5.6
24	24	5	.32	28	7	.53	80	28	6.0
25	23	5	.31	29	9	.70	79	23	4.9
26	24	5	.32	40	29	3.1	86	19	4.4
27	24	5	.32	40	27	2.9	84	17	3.9
28	24	5	.32	41	25	2.8	97	21	5.5
29	24	4	.26	42	23	2.6	98	25	6.6
30	23	4	.25	38	22	2.3	98	25	6.6
31	24	4	.26	35	21	2.0	---	---	---
TOTAL	1,064	---	15.99	862	---	25.53	1,733	---	92.2

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988*

[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)
	1987								
	October			November			December		
1	539	15	22	638	7	12	543	6	8.8
2	543	16	23	651	8	14	698	9	17
3	552	16	24	652	8	14	692	8	15
4	555	20	30	670	8	14	681	8	15
5	556	22	33	665	8	14	687	8	15
6	553	18	27	661	8	14	688	8	15
7	552	12	18	658	8	14	720	9	17
8	562	9	14	657	8	14	713	9	17
9	564	10	15	656	8	14	681	8	15
10	569	12	18	648	8	14	700	9	17
11	592	12	19	652	8	14	737	9	18
12	613	14	23	653	8	14	686	8	15
13	628	16	27	663	8	14	661	8	14
14	625	17	29	662	8	14	615	7	12
15	626	18	30	666	8	14	549	6	8.9
16	626	16	27	660	8	14	527	5	7.1
17	630	15	26	652	8	14	524	5	7.1
18	642	14	24	614	7	12	550	6	8.9
19	647	14	24	596	7	11	542	6	8.8
20	647	14	24	626	7	12	557	6	9.0
21	648	13	23	629	7	12	535	5	7.2
22	649	11	19	662	8	14	596	7	11
23	648	13	23	659	8	14	601	7	11
24	643	14	24	661	8	14	564	6	9.1
25	647	14	24	657	8	14	520	5	7.0
26	651	13	23	658	8	14	500	5	6.8
27	650	12	21	628	7	12	470	4	5.1
28	653	11	19	577	6	9.3	470	4	5.1
29	655	11	19	591	6	9.6	500	5	6.8
30	648	10	17	578	6	9.4	520	5	7.0
31	641	9	16	---	---	---	540	6	8.7
TOTAL	18,954	---	705	19,300	---	393.3	18,567	---	345.4

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988*--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)
				1988					
	January			February			March		
1	500	5	6.8	577	13	20	743	32	64
2	470	4	5.1	520	12	17	736	33	66
3	460	4	5.0	500	20	27	746	34	68
4	450	4	4.9	520	18	25	741	34	68
5	470	4	5.1	530	16	23	722	34	66
6	500	5	6.8	540	15	22	743	31	62
7	560	6	9.1	557	16	24	739	19	38
8	580	9	14	591	18	29	704	17	32
9	600	10	16	600	17	28	697	19	36
10	630	10	17	611	17	28	705	20	38
11	640	11	19	622	18	30	677	16	29
12	620	10	17	653	19	33	656	18	32
13	620	14	23	648	16	28	641	14	24
14	620	15	25	656	17	30	647	12	21
15	640	21	36	652	17	30	662	10	18
16	620	22	37	675	19	35	635	12	21
17	600	21	34	647	18	31	602	20	33
18	560	20	30	624	15	25	626	32	54
19	520	22	31	635	14	24	663	23	41
20	520	21	29	640	17	29	699	31	59
21	540	27	39	661	19	34	764	34	70
22	540	19	28	688	18	33	812	43	94
23	553	14	21	652	16	28	783	39	82
24	562	13	20	615	11	18	756	25	51
25	554	13	19	604	12	20	729	16	31
26	553	14	21	644	16	28	712	31	60
27	554	15	22	671	20	36	794	37	79
28	553	14	21	696	26	49	841	27	61
29	578	16	25	715	29	56	774	20	42
30	597	15	24	---	---	---	739	19	38
31	604	16	26	---	---	---	717	19	37
TOTAL	17,368	---	636.8	17,944	---	840	22,205	---	1,515

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988*--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)
				1988					
	April			May			June		
1	700	26	49	1,240	13	44	2,620	52	368
2	698	24	45	1,190	13	42	2,480	34	228
3	735	28	56	1,140	12	37	2,300	32	199
4	786	28	59	1,090	11	32	2,230	29	175
5	764	22	45	1,120	12	36	2,300	23	143
6	733	18	36	1,190	13	42	2,290	21	130
7	778	22	46	1,420	36	138	2,150	18	104
8	838	25	57	1,640	34	151	1,960	20	106
9	807	20	44	1,640	25	111	1,820	15	74
10	782	18	38	1,630	23	101	1,640	13	58
11	785	19	40	1,640	28	124	1,500	13	53
12	833	21	47	1,750	32	151	1,410	12	46
13	901	38	92	2,030	70	384	1,510	18	73
14	975	40	105	2,290	72	445	1,510	13	53
15	1050	57	162	2,320	65	407	1,370	16	59
16	1120	55	166	2,190	57	337	1,250	14	47
17	1220	78	257	2,350	50	317	1,170	10	32
18	1430	93	359	2,530	42	287	1,120	9	27
19	1630	62	273	2,330	30	189	1,070	11	32
20	1620	55	241	2,090	23	130	1,000	10	27
21	1640	51	226	1,930	20	104	954	12	31
22	1630	47	207	1,830	19	94	942	14	36
23	1530	41	169	1,860	24	121	964	34	88
24	1420	38	146	2,100	51	289	910	5	12
25	1340	23	83	2,330	44	277	849	23	53
26	1270	17	58	2,360	28	178	903	10	24
27	1210	14	46	2,300	26	161	910	5	12
28	1120	16	48	2,250	32	194	950	8	21
29	1130	16	49	2,110	32	182	926	6	15
30	1220	20	66	2,130	39	224	860	3	7.0
31	---	---	---	2,570	62	430	---	---	---
TOTAL	32,695	---	3,315	58,590	---	5,759	43,868	---	2,333.0

Table 4.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork at Turah Bridge, near Bonner, October 1987 through September 1988*--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)
	1988								
	July			August			September		
1	830	4	9.0	315	3	2.6	240	4	2.6
2	798	4	8.6	304	3	2.5	241	10	6.5
3	761	4	8.2	296	4	3.2	238	14	9.0
4	744	5	10	286	4	3.1	234	7	4.4
5	752	5	10	282	4	3.0	233	7	4.4
6	834	8	18	281	4	3.0	234	5	3.2
7	860	10	23	273	3	2.2	241	5	3.3
8	808	7	15	269	3	2.2	239	4	2.6
9	762	6	12	270	5	3.6	243	3	2.0
10	706	5	9.5	265	8	5.7	241	4	2.6
11	680	5	9.2	267	7	5.0	271	7	5.1
12	659	5	8.9	266	6	4.3	319	7	6.0
13	655	5	8.8	267	6	4.3	352	8	7.6
14	656	5	8.9	279	6	4.5	356	8	7.7
15	643	4	6.9	284	7	5.4	343	7	6.5
16	614	4	6.6	293	5	4.0	340	9	8.3
17	586	4	6.3	284	4	3.1	341	8	7.4
18	559	4	6.0	283	4	3.1	372	7	7.0
19	537	4	5.8	281	4	3.0	404	9	9.8
20	524	4	5.7	277	5	3.7	430	10	12
21	491	4	5.3	276	5	3.7	446	10	12
22	472	4	5.1	275	4	3.0	452	10	12
23	455	3	3.7	269	5	3.6	450	10	12
24	442	3	3.6	265	4	2.9	456	11	14
25	432	4	4.7	263	4	2.8	454	11	13
26	418	4	4.5	254	4	2.7	458	11	14
27	403	5	5.4	256	3	2.1	470	11	14
28	386	4	4.2	254	7	4.8	509	12	16
29	363	4	3.9	249	6	4.0	540	16	23
30	346	4	3.7	244	4	2.6	549	19	28
31	331	3	2.7	242	5	3.3	---	---	---
TOTAL	18,507	---	243.2	8,469	---	107.0	10,696	---	276.0

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

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

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)
	June			July		
1	3,300	---	---	921	5	12
2	3,040	---	---	883	5	12
3	2,790	---	---	832	5	11
4	2,700	---	---	839	5	11
5	2,840	---	---	833	4	9.0
6	2,900	---	---	842	4	9.1
7	2,760	---	---	842	4	9.1
8	2,590	---	---	801	4	8.7
9	2,440	---	---	763	4	8.2
10	2,220	---	---	733	4	7.9
11	2,050	---	---	696	4	7.5
12	1,910	---	---	665	4	7.2
13	1,820	---	---	641	4	6.9
14	1,750	---	---	638	5	8.6
15	1,650	---	---	633	4	6.8
16	1,540	---	---	615	4	6.6
17	1,450	---	---	571	3	4.6
18	1,390	---	---	562	4	6.1
19	1,330	---	---	542	5	7.3
20	1,250	6	20	527	5	7.1
21	1,180	5	16	512	4	5.5
22	1,120	4	12	496	4	5.4
23	1,090	6	18	482	3	3.9
24	1,050	7	20	473	4	5.1
25	1,000	9	24	459	3	3.7
26	1,030	8	22	444	3	3.6
27	1,010	6	16	435	3	3.5
28	1,020	5	14	419	3	3.4
29	1,040	6	17	409	3	3.3
30	974	5	13	398	2	2.1
31	---	---	---	397	3	3.2
TOTAL	54,234	---	192	19,303	---	209.4

Table 5.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Blackfoot River near Bonner, June through September 1988*--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)
	August			September		
1	392	3	3.2	332	3	2.7
2	381	2	2.1	327	3	2.6
3	386	2	2.1	326	2	1.8
4	385	2	2.1	324	2	1.7
5	379	3	3.1	328	2	1.8
6	380	2	2.1	329	3	2.7
7	378	2	2.0	325	2	1.8
8	380	2	2.1	329	1	.89
9	379	2	2.0	333	1	.90
10	378	2	2.0	341	2	1.8
11	368	2	2.0	357	2	1.9
12	364	3	2.9	372	2	2.0
13	368	2	2.0	395	10	11
14	378	2	2.0	374	5	5.0
15	383	2	2.1	370	3	3.0
16	374	2	2.0	363	2	2.0
17	371	2	2.0	362	2	2.0
18	365	2	2.0	384	2	2.1
19	357	3	2.9	401	1	1.1
20	357	2	1.9	399	1	1.1
21	355	2	1.9	392	1	1.1
22	367	2	2.0	385	1	1.0
23	364	2	2.0	377	2	2.0
24	358	2	1.9	376	2	2.0
25	348	2	1.9	374	1	1.0
26	341	2	1.8	374	1	1.0
27	338	1	.91	378	2	2.0
28	338	2	1.8	388	3	3.1
29	341	2	1.8	391	2	2.1
30	334	2	1.8	380	2	2.1
31	328	2	1.8	---	---	---
TOTAL	11,315	---	64.21	10,886	---	67.29

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

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

Day	June: Mean streamflow (ft^3/s)	June: Suspended sediment Mean concentration (mg/L)	June: Suspended sediment Discharge (ton/d)	July: Mean streamflow (ft^3/s)	July: Suspended sediment Mean concentration (mg/L)	July: Suspended sediment Discharge (ton/d)
1	5,870	---	---	1,740	10	47
2	5,450	---	---	1,690	14	64
3	5,010	---	---	1,580	16	68
4	4,830	---	---	1,570	19	81
5	5,030	---	---	1,580	22	94
6	5,110	---	---	1,650	30	134
7	4,870	---	---	1,700	34	156
8	4,530	---	---	1,590	40	172
9	4,210	---	---	1,510	40	163
10	3,850	---	---	1,400	52	197
11	3,540	---	---	1,340	32	116
12	3,290	---	---	1,300	28	98
13	3,250	---	---	1,260	37	126
14	3,200	---	---	1,260	28	95
15	2,950	---	---	1,250	28	94
16	2,720	---	---	1,190	30	96
17	2,570	---	---	1,120	29	88
18	2,470	---	---	1,100	22	65
19	2,370	---	---	1,040	29	81
20	2,230	6	36	1,010	24	65
21	2,100	8	45	981	23	61
22	2,020	8	44	926	22	55
23	2,020	10	55	918	18	45
24	1,940	8	42	883	21	50
25	1,750	8	38	851	17	39
26	1,910	8	41	842	16	36
27	1,940	6	31	804	16	35
28	1,990	8	43	785	14	30
29	2,000	11	59	757	14	29
30	1,850	10	50	741	12	24
31	---	---	---	726	14	27
TOTAL	96,870	---	484	37,094	---	2,531

Table 6.--*Daily mean streamflow, suspended-sediment concentration, and suspended-sediment discharge for the Clark Fork above Missoula, June through September 1988*--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)
	August			September		
1	681	12	22	568	8	12
2	684	11	20	570	7	11
3	684	21	39	565	13	20
4	684	16	30	558	7	11
5	667	18	32	558	6	9.0
6	614	15	25	562	9	14
7	616	11	18	561	7	11
8	619	8	13	564	5	7.6
9	632	9	15	572	5	7.7
10	629	9	15	583	5	7.9
11	622	9	15	628	9	15
12	617	8	13	678	4	7.3
13	620	8	13	729	5	9.8
14	641	8	14	715	7	14
15	655	7	12	681	6	11
16	652	7	12	610	5	8.2
17	642	7	12	674	4	7.3
18	631	6	10	706	3	5.7
19	626	5	8.5	698	2	3.8
20	623	6	10	761	3	6.2
21	618	6	10	787	4	8.5
22	633	6	10	816	4	8.8
23	626	5	8.5	798	4	8.6
24	616	5	8.3	796	4	8.6
25	605	7	11	799	4	8.6
26	600	13	21	800	3	6.5
27	590	7	11	808	3	6.5
28	587	7	11	857	5	12
29	584	12	19	901	5	12
30	575	13	20	903	4	9.8
31	561	14	21	---	---	---
TOTAL	19,434	---	499.3	20,806	---	289.4

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1988*

[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[1]; --, indicates insufficient data greater than detection limit to compute statistic; ---, indicates insufficient sample size to compute statistic]

Parameter and unit of measure	Descriptive statistics: Number of samples	Descriptive statistics: Maximum	Descriptive statistics: Minimum	Descriptive statistics: Mean	Percent of samples in which values were less than or equal to those shown: 95	75	50 (Median)	25	5
12324200--Clark Fork at Deer Lodge, Mont.									
Streamflow, instantaneous (ft³/s)	31	1,920	23	280	1,100	345	213	109	33
Specific conductance, onsite (µS/cm)	28	642	262	522	632	578	543	500	276
pH, onsite (standard units)	18	8.2	7.5	7.9	8.2	8.1	8.0	7.7	7.5
Temperature, water (°C)	31	20.0	.0	9.6	19.4	13.0	10.0	5.0	.0
Hardness, total (mg/L as $CaCO_3$)	10	260	120	218	260	242	225	207	120
Alkalinity, onsite (mg/L as $CaCO_3$)	16	196	79	134	196	155	131	115	79
Arsenic, total (µg/L as As)	20	130	11	27	126	25	18	15	11
Arsenic, dissolved (µg/L as As)	20	39	7	14	38	14	13	11	7
Cadmium, total recoverable (µg/L as Cd)	20	3	<1	[2].8	2	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	20	1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	20	630	22	110	613	125	56	34	22
Copper, dissolved (µg/L as Cu)	20	33	5	13	32	16	11	8	5
Iron, total recoverable (µg/L as Fe)	20	29,000	160	3,360	28,400	2,080	885	585	166
Iron, dissolved (µg/L as Fe)	20	65	<3	[2]15	27	19	11	5	<3
Lead, total recoverable (µg/L as Pb)	20	100	<2	[2]15	49	12	6	4	<2
Lead, dissolved (µg/L as Pb)	20	6	<1	[2]2	5	2	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	20	1,800	90	425	1,770	510	225	187	92
Manganese, dissolved (µg/L as Mn)	20	210	<10	[2]45	130	50	26	18	<10
Zinc, total recoverable (µg/L as Zn)	20	770	20	146	750	162	75	70	21
Zinc, dissolved (µg/L as Zn)	20	34	9	17	33	20	15	11	9
Sediment[3] concentration (mg/L)	31	1,390	3	97	958	51	21	13	3
Sediment[3] discharge (ton/d)	31	7,210	.83	281	3,260	55	11	4.0	.86
Sediment[3] (percent finer than 0.062 mm)	28	87	41	64	84	72	64	57	43
12324590--Little Blackfoot River near Garrison, Mont.									
Streamflow, instantaneous (ft³/s)	12	550	37	236	550	312	243	103	37
Specific conductance, onsite (µS/cm)	12	300	125	216	300	240	215	190	125
pH, onsite (standard units)	12	8.3	7.4	7.7	8.3	8.0	7.7	7.6	7.4
Temperature, water (°C)	12	14.0	.5	7.7	14.0	11.5	7.2	5.0	.5
Hardness, total (mg/L as $CaCO_3$)	7	140	81	106	140	130	100	86	81
Alkalinity, onsite (mg/L as $CaCO_3$)	10	127	41	90	127	107	89	78	41
Arsenic, total (µg/L as As)	12	17	4	6	17	6	5	5	4
Arsenic, dissolved (µg/L as As)	12	6	4	5	6	5	5	4	4
Cadmium, total recoverable (µg/L as Cd)	12	2	<1	--	2	<1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	12	<1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	12	30	3	8	30	8	6	4	3
Copper, dissolved (µg/L as Cu)	12	7	1	3	7	4	3	2	1
Iron, total recoverable (µg/L as Fe)	12	12,000	50	1,340	12,000	530	340	137	50
Iron, dissolved (µg/L as Fe)	12	85	<3	[2]30	85	33	22	9	<3
Lead, total recoverable (µg/L as Pb)	12	25	<5	[2]7	25	5	<5	<5	<5
Lead, dissolved (µg/L as Pb)	12	6	<1	--	6	1	<5	<1	<1
Manganese, total recoverable (µg/L as Mn)	12	1,100	<10	[2]116	1,100	30	20	20	<10
Manganese, dissolved (µg/L as Mn)	12	13	1	6	13	9	5	4	1
Zinc, total recoverable (µg/L as Zn)	12	100	<10	[2]15	100	10	10	<10	<10
Zinc, dissolved (µg/L as Zn)	12	10	<3	[2]4	10	5	4	<3	<3
Sediment[3] concentration (mg/L)	12	728	4	73	728	23	14	5	4
Sediment[3] discharge (ton/d)	12	1,080	.50	99	1,080	15	12	1.5	.50
Sediment[3] (percent finer than 0.062 mm)	12	94	49	71	94	85	72	56	49

Table 7.--*Statistical summary of water-quality data, March 1985 through September 1988*--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
12331500--Flint Creek near Drummond, Mont.									
Streamflow, instantaneous (ft^3/s)	15	892	7.6	195	892	201	130	101	7.6
Specific conductance, onsite (µS/cm)	15	501	140	307	501	395	275	255	140
pH, onsite (standard units)	15	8.8	7.5	8.0	8.8	8.2	8.1	7.8	7.5
Temperature, water (°C)	15	17.0	.5	10.2	17.0	13.5	11.5	6.5	.5
Hardness, total (mg/L as $CaCO_3$)	8	260	60	155	260	207	155	96	60
Alkalinity, onsite (mg/L as $CaCO_3$)	12	238	60	141	238	193	120	102	60
Arsenic, total (µg/L as As)	15	49	8	21	49	31	17	12	8
Arsenic, dissolved (µg/L as As)	15	20	5	10	20	13	10	8	5
Cadmium, total recoverable (µg/L as Cd)	15	3	<1	--	3	1	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	15	1	<1	--	1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	15	29	3	11	29	14	10	7	3
Copper, dissolved (µg/L as Cu)	15	7	1	3	7	4	3	2	1
Iron, total recoverable (µg/L as Fe)	15	4,700	190	1,240	4,700	2,000	730	480	190
Iron, dissolved (µg/L as Fe)	15	180	4	33	180	39	17	9	4
Lead, total recoverable (µg/L as Pb)	15	56	<5	[2]15	56	25	9	3	<5
Lead, dissolved (µg/L as Pb)	15	7	<1	[2]2	7	2	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	15	940	70	304	940	560	210	110	70
Manganese, dissolved (µg/L as Mn)	15	97	19	44	97	58	40	29	19
Zinc, total recoverable (µg/L as Zn)	15	170	<10	[2]61	170	110	40	30	<10
Zinc, dissolved (µg/L as Zn)	15	20	<3	[2]9	20	15	9	4	<3
Sediment[3] concentration (mg/L)	15	230	8	63	230	103	43	24	8
Sediment[3] discharge (ton/d)	15	554	.37	60	554	48	15	6.5	.37
Sediment[3] (percent finer than 0.062 mm)	15	98	55	77	98	93	78	65	55
12334510--Rock Creek near Clinton, Mont.									
Streamflow, instantaneous (ft^3/s)	14	1,650	175	906	1,650	1,427	778	495	175
Specific conductance, onsite (µS/cm)	14	154	68	98	154	124	92	70	68
pH, onsite (standard units)	14	8.4	6.9	7.6	8.4	7.7	7.6	7.4	6.9
Temperature, water (°C)	14	12.5	.5	8.4	12.5	11.2	9.5	5.8	.5
Hardness, total (mg/L as $CaCO_3$)	8	78	32	46	78	65	39	33	32
Alkalinity, onsite (mg/L as $CaCO_3$)	12	82	29	43	82	48	40	31	29
Arsenic, total (µg/L as As)	14	2	<1	[2].7	2	1	<1	<1	<1
Arsenic, dissolved (µg/L as As)	14	1	<1	--	1	<1	<1	<1	<1
Cadmium, total recoverable (µg/L as Cd)	14	3	<1	[2]1	3	2	<1	<1	<1
Cadmium, dissolved (µg/L as Cd)	14	<1	<1	--	<1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	14	41	1	9	41	13	5	3	1
Copper, dissolved (µg/L as Cu)	14	5	<1	[2]2	5	4	2	1	<1
Iron, total recoverable (µg/L as Fe)	14	800	40	292	800	455	270	132	40
Iron, dissolved (µg/L as Fe)	14	110	7	39	110	45	37	24	7
Lead, total recoverable (µg/L as Pb)	14	19	<5	[2]6	19	15	<5	<5	<5
Lead, dissolved (µg/L as Pb)	14	5	<1	[2]2	5	3	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	14	40	<10	[2]16	40	20	10	10	<10
Manganese, dissolved (µg/L as Mn)	14	8	<1	[2]2	8	3	<1	<1	<1
Zinc, total recoverable (µg/L as Zn)	14	60	<10	[2]19	60	20	10	<10	<10
Zinc, dissolved (µg/L as Zn)	14	15	<3	[2]4	15	7	<3	<3	<3
Sediment[3] concentration (mg/L)	14	37	1	16	37	33	12	4	1
Sediment[3] discharge (ton/d)	14	157	.53	52	157	91	28	7.8	.53
Sediment[3] (percent finer than 0.062 mm)	14	88	35	64	88	75	64	54	35

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
12334550--Clark Fork at Turah Bridge, near Bonner, Mont.									
Streamflow, instantaneous (ft^3/s)	35	9,370	296	1,600	5,730	1,920	1,160	809	427
Specific conductance, onsite (µS/cm)	26	432	165	307	426	379	322	236	165
pH, onsite (standard units)	18	8.7	7.4	7.9	8.7	8.1	7.8	7.6	7.4
Temperature, water (°C)	35	17.0	.5	10.3	17.0	15.0	11.5	7.0	.5
Hardness, total (mg/L as $CaCO_3$)	10	200	67	130	200	170	130	96	67
Alkalinity, onsite (mg/L as $CaCO_3$)	16	138	57	96	138	126	92	75	57
Arsenic, total (µg/L as As)	19	64	5	11	64	10	7	7	5
Arsenic, dissolved (µg/L as As)	19	15	4	6	15	7	6	5	4
Cadmium, total recoverable (µg/L as Cd)	19	4	<1	[2]1	4	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	470	10	62	470	70	34	21	10
Copper, dissolved (µg/L as Cu)	19	25	2	7	25	8	6	4	2
Iron, total recoverable (µg/L as Fe)	19	17,000	70	1,710	17,000	1,300	600	370	70
Iron, dissolved (µg/L as Fe)	19	170	<3	[2]27	170	25	19	10	<3
Lead, total recoverable (µg/L as Pb)	19	92	<3	[2]19	92	20	11	7	<3
Lead, dissolved (µg/L as Pb)	19	7	<1	[2]2	7	1	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	19	1,700	20	184	1,700	140	90	60	20
Manganese, dissolved (µg/L as Mn)	19	31	<1	[2]8	31	10	6	5	<1
Zinc, total recoverable (µg/L as Zn)	19	1,100	<10	[2]110	1,100	80	50	40	<10
Zinc, dissolved (µg/L as Zn)	19	39	<3	[2]11	39	14	8	5	<3
Sediment[3] concentration (mg/L)	35	1,370	6	73	467	42	26	10	6
Sediment[3] discharge (ton/d)	35	34,700	4.8	1,200	9,460	229	67	21	7.4
Sediment[3] (percent finer than 0.062 mm)	33	86	27	60	83	71	63	50	34
12340000--Blackfoot River near Bonner, Mont.									
Streamflow, instantaneous (ft^3/s)	25	5,150	344	1,810	5,020	3,020	1,200	559	356
Specific conductance, onsite (µS/cm)	17	264	131	190	264	237	172	152	131
pH, onsite (standard units)	15	8.4	7.5	8.0	8.4	8.2	8.0	7.8	7.5
Temperature, water (°C)	25	20.0	.0	10.0	19.7	13.2	11.0	6.0	.1
Hardness, total (mg/L as $CaCO_3$)	8	140	68	94	140	122	83	73	68
Alkalinity, onsite (mg/L as $CaCO_3$)	12	138	65	88	138	95	83	73	65
Arsenic, total (µg/L as As)	15	12	<1	[2]1	12	1	1	<1	<1
Arsenic, dissolved (µg/L as As)	15	1	<1	--	1	1	<1	<1	<1
Cadmium, total recoverable (µg/L as Cd)	15	2	<1	[2]1	2	1	1	<1	<1
Cadmium, dissolved (µg/L as Cd)	15	1	<1	--	1	<1	<1	<1	<1
Copper, total recoverable (µg/L as Cu)	15	34	4	10	34	10	8	6	4
Copper, dissolved (µg/L as Cu)	15	6	1	3	6	4	3	2	1
Iron, total recoverable (µg/L as Fe)	15	950	50	414	950	710	310	210	50
Iron, dissolved (µg/L as Fe)	15	100	<3	[2]22	100	22	15	10	<3
Lead, total recoverable (µg/L as Pb)	15	20	<5	[2]11	20	15	11	3	<5
Lead, dissolved (µg/L as Pb)	15	8	<1	[2]3	8	4	<5	<5	<1
Manganese, total recoverable (µg/L as Mn)	15	60	<10	[2]30	60	40	30	20	<10
Manganese, dissolved (µg/L as Mn)	15	6	<1	[2]2	6	4	2	<1	<1
Zinc, total recoverable (µg/L as Zn)	15	20	<10	[2]13	20	20	10	<10	<10
Zinc, dissolved (µg/L as Zn)	15	15	<3	[2]5	15	8	4	<3	<3
Sediment[3] concentration (mg/L)	25	76	1	16	74	23	8	3	1
Sediment[3] discharge (ton/d)	25	987	1.1	141	942	170	21	4.4	1.2
Sediment[3] (percent finer than 0.062 mm)	25	89	42	68	89	81	70	51	43

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
12340500--Clark Fork above Missoula, Mont.									
Streamflow, instantaneous (ft^3/s)	10	3,950	720	1,730	3,950	2,000	1,630	1,000	720
Specific conductance, onsite (μS/cm)	2	365	283	---	---	---	---	---	---
Temperature, water (°C)	10	19.5	5.0	13.5	19.5	18.2	14.0	10.0	5.0
Sediment[3] concentration (mg/L)	10	32	6	16	32	28	12	7	6
Sediment[3] discharge (ton/d)	10	143	16	70	143	113	53	34	16
Sediment[3] (percent finer than 0.062 mm)	9	92	44	70	92	85	76	56	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.