HYDROCHEMICAL AND SEDIMENT DATA FOR THE OLD LEAD BELT, SOUTHEASTERN MISSOURI--1988-89

U.S. GEOLOGICAL SURVEY

Open-File Report 91-211

Prepared in cooperation with the

MISSOURI DEPARTMENT OF NATURAL RESOURCES,

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By B.J. Smith and J.G. Schumacher

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Rolla, Missouri
1991

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March 3, 1849

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U.S. GEOLOGICAL SURVEY

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
acre	0.4047	hectare
mile	1.609	kilometer
square mile	2.590	square kilometer
foot	0.3048	meter
ton, short	0.9072	megagram
foot per second	0.3048	meter per second
gallon	3.785	liter
pound	0.4536	kilogram
cubic foot per second	0.02832	cubic meter per second

To convert degrees Celsius (°C) to Fahrenheit (°F), use the following:

$$°F = \frac{9}{5} °C + 32$$

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

HYDROCHEMICAL AND SEDIMENT DATA FOR THE OLD LEAD BELT, SOUTHEASTERN MISSOURI--1988-89

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ABSTRACT

This report presents hydrochemical and sediment data collected during an investigation of the Old Lead Belt in southeastern Missouri from 1988 to 1989. The data consist of water-quality analyses of samples collected from 12 sites, which includes 6 sites on the Big and Flat Rivers, 5 seepage sites related to tailings piles, and discharge from an abandoned exploration drill hole. Also included in this report are analyses of flood samples and the results of seepage runs on the Big and Flat Rivers. Analyses of bed sediment samples are included from all sites except discharge from the drill hole.

Specific conductance values in water samples from the Big River ranged from 209 to 690 microsiemens per centimeter at 25 degrees Celsius, from the Flat River--241 to 990 microsiemens per centimeter, and from seepage sites--478 to 1,540 microsiemens per centimeter. The largest dissolved sulfate concentration detected was 850 milligrams per liter at a seepage site. Most trace-element concentrations were largest at seepage sites, including dissolved zinc, 18,000 micrograms per liter, dissolved cobalt, 610 micrograms per liter, and dissolved lead, 80 micrograms per liter.

Total trace-element contents in bed sediment increased from the upstream reaches of the Big and Flat Rivers throughout the mining area and decreased downstream from the study area. The largest lead content detected was 38,000 micrograms per gram at a seepage site. The largest zinc content was more than 100,000 micrograms per gram at a seepage site. Most trace elements were associated with either the oxide or sulfide phase in the bed sediment.

INTRODUCTION

Lead was discovered in southeastern Missouri about 1700 (Kramer, 1976). Before the mid-1860's, lead mining consisted of individual, shallow workings scattered throughout the area. The St. Joseph Lead Co. acquired 964 acres in 1864 and began mining at Bonne Terre. In 1869 diamond-bit core drilling indicated lead deposits underlying Bonne Terre, Desloge, Flat River, Leadwood, and Elvins (fig. 1). From the late 1800's to the early 1900's as many as 15 companies operated mines in the area. By 1933 the St. Joseph Lead Co. had acquired the properties of the other mining companies in the area. The St. Joseph Lead Co. mined at Bonne Terre from 1864 to 1961, at Desloge from 1929 to 1958, and at Leadwood from 1915 to 1962 (U.S. Geological Survey and Missouri Division of Geology and Land Survey, 1967). The mines were gradually shut down during the late 1950's and early 1960's as the ore deposits were depleted and production from other mines in the State exceeded that of the Old Lead Belt. In October 1972, the Federal Division of the St. Joseph Lead Co., the last mining operation in the Old Lead Belt, closed (Kramer, 1976).

A Statewide assessment of water quality was completed in non-coal mining areas during 1988 to determine those areas where mining had affected water resources (Smith, 1988); therefore, a hydrologic investigation of the Old Lead Belt was begun by the U.S. Geological Survey in cooperation with the Missouri Department of Natural Resources, Land Reclamation Commission. This report contains data collected during the investigation from 1988 to 1989. Samples were collected and analyzed to assess the effects of mining on the quality of surface water in the area, including dissolved trace-element concentrations, and to determine the particle-size distribution, total-element content, and mineralogy of suspended and bed sediment.

Support of this study by the U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement is acknowledged. However, the contents of this publication do not necessarily reflect the views and policies of this agency.

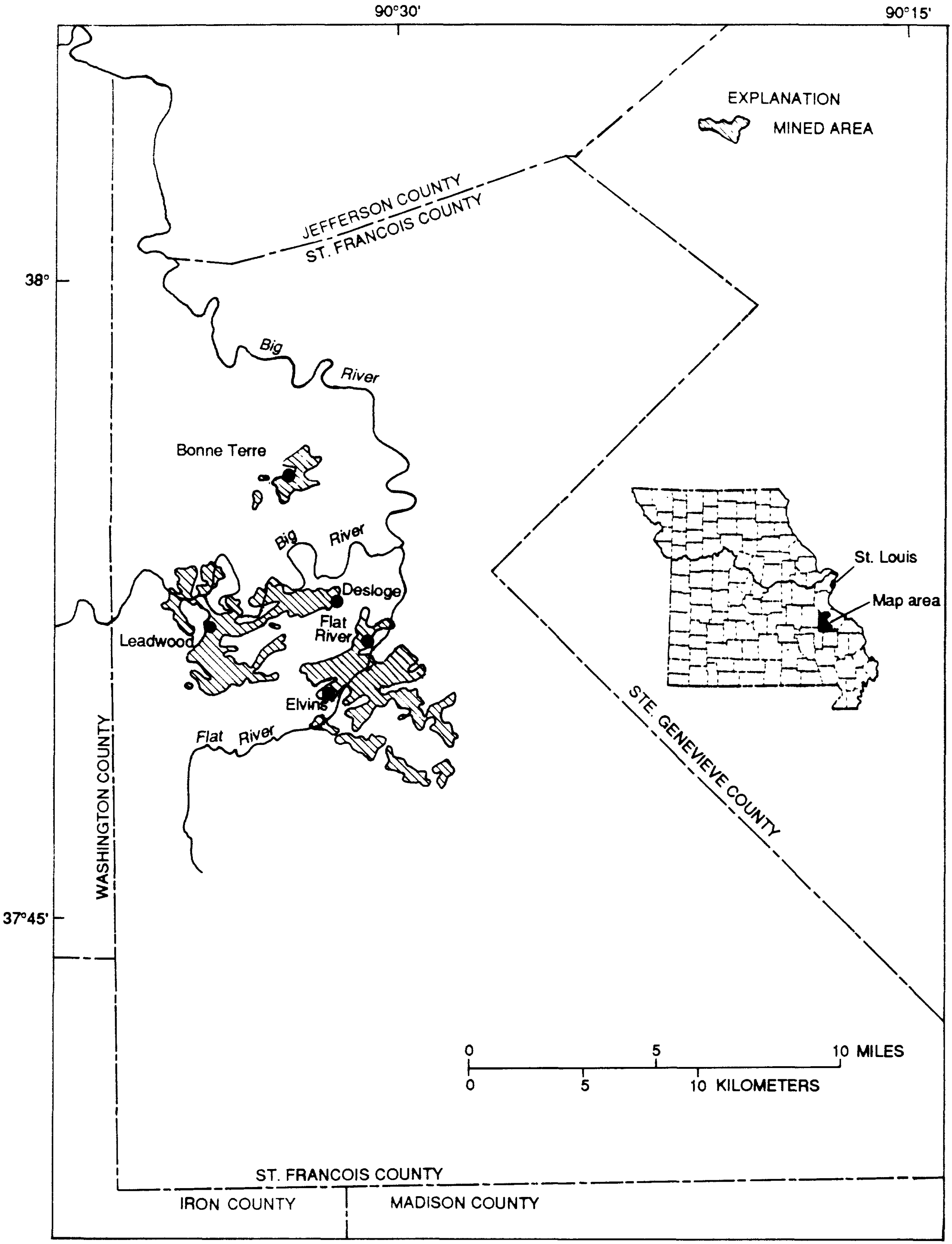


Figure 1.--Mined areas in the Old Lead Belt (modified from Association of Missouri Geologists, 1969).

STUDY AREA

The Old Lead Belt is in southeastern Missouri, about 70 miles south of St. Louis (fig. 1). It encompasses about 110 square miles located entirely within St. Francois County.

The Old Lead Belt is located within the Salem Plateau of the Ozark Plateaus physiographic province (Fenneman, 1938). The topography is hilly with several hundred feet of relief. Altitudes range from about 700 to 1,000 feet. The main stream in the area is the Big River, which flows eastward and northward through the study area. The largest tributary to the Big River is the Flat River. The Big River is a perennial, gaining stream, whereas Flat River is an intermittent stream (Kramer, 1976) that probably loses water to the ground-water system immediately after dry periods. The study area in this report (fig. 2) includes sampling sites (table 1, at the back of this report) on the Big and Flat Rivers both upstream and downstream from the mined areas in the Old Lead Belt.

About 250 million tons of tailings were produced in the Old Lead Belt and were placed directly on the land surface in large piles covering hundreds of acres (Kania and Nash, 1986). Some of the largest tailings areas are abandoned settling ponds that were formed by damming small stream valleys. Others were formed by construction and subsequent filling of ring-shaped dikes along streams. The Big River basin is estimated to contain 3,000 acres of tailings (Kania and Nash, 1986). There are six major tailings piles in the area that contain unremoved particles of ore minerals that contribute cadmium, iron, lead, sulfate, zinc, and possibly copper to the environment (Smith, 1988). Physical mechanisms of contamination are dispersal of tailings by wind and runoff and slumping of tailings into streams and subsequent transport downstream. Chemical mechanisms of contamination would include the oxidation and dissolution of sulfide minerals, and subsequent aqueous transport to the streams.

SURFACE-WATER DISCHARGE

Discharge was determined on the Big and Flat Rivers at sites 1, 6, 11, and 12 (fig. 2). Gages at sites 1 (07017200) and 12 (07018100) are long term, continuous-record gages operated by the U.S. Geological Survey. Gages at sites 6 (07017260) and 11 (07017350) were installed for this study. Stream stages (gage height) were continually recorded by digital recorders every 15 minutes. The stage-discharge relation for the gaged sites was developed by current-meter measurements made at varying stages and plotted on a log-log scale to create a rating table. When the stage-discharge relation changed because of a change in the physical features that form the control or changed temporarily because of debris on the control, the daily mean discharge was computed by the shifting-control method. Using this method, correction factors based on individual discharge measurements were applied to the gage height. Daily mean discharge data for sites 1 and 12 are available in Waite and others (1989, 1990) and for sites 6 and 11 are listed in tables 2 and 3, at the back of this report. Hydrographs for the four gaged sites are shown in figures 3 to 6.

HYDROCHEMICAL DATA

Water-quality samples were collected at 12 sites quarterly from January 1988 to September 1989 (fig. 2). The sites included those on the Big River (sites 1, 3, 6, and 12) and Flat River (sites 7 and 11), seeps from tailings piles (sites 2, 5, 9, and 10), discharge from an abandoned exploration drill hole (site 4), and a site at the base of a tailings pile (site 8). Locations of sampling sites are listed in table 1 and shown on figure 2. Water-quality data for all sites are listed in table 4 (at the back of this report).

Discharge measurements were made according to methods described by Buchanan and Somers (1969). Water-quality samples were collected according to methods described by Edwards and Glysson (1988).

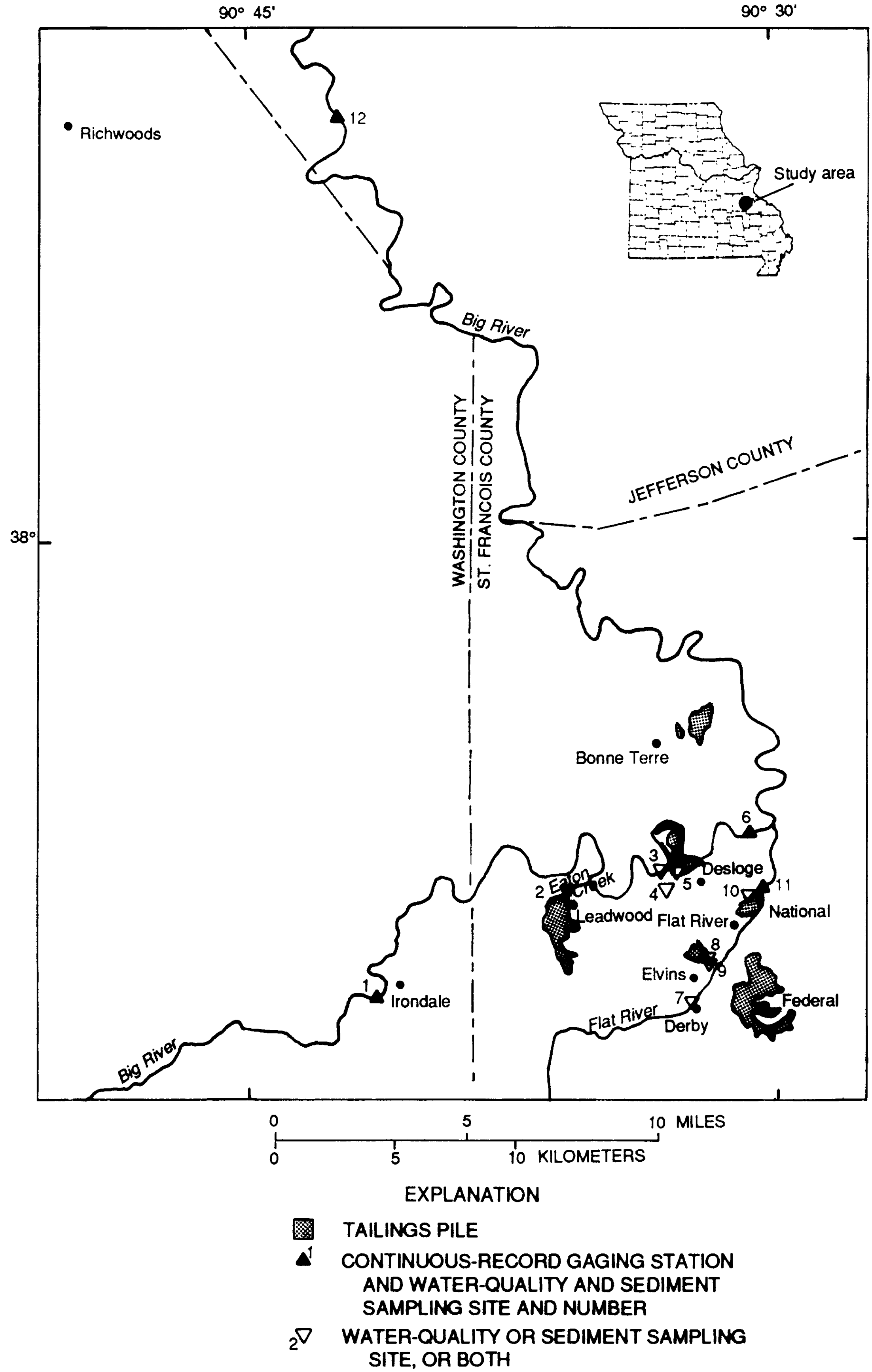


Figure 2.--Location of study area, continuous-record gaging stations, water-quality sampling sites, and sediment sampling sites.

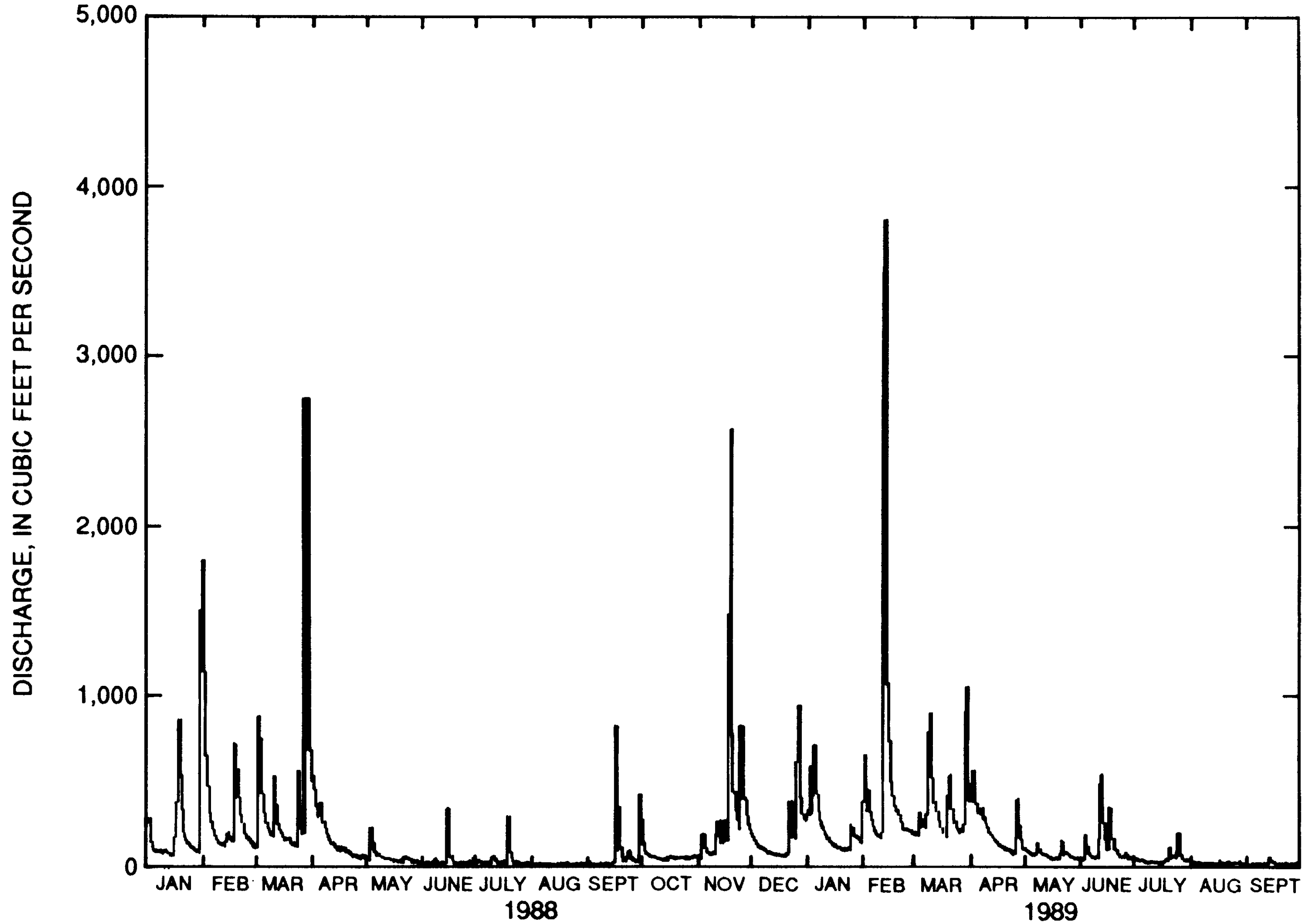


Figure 3.--Daily mean discharge for the Big River at Irondale.

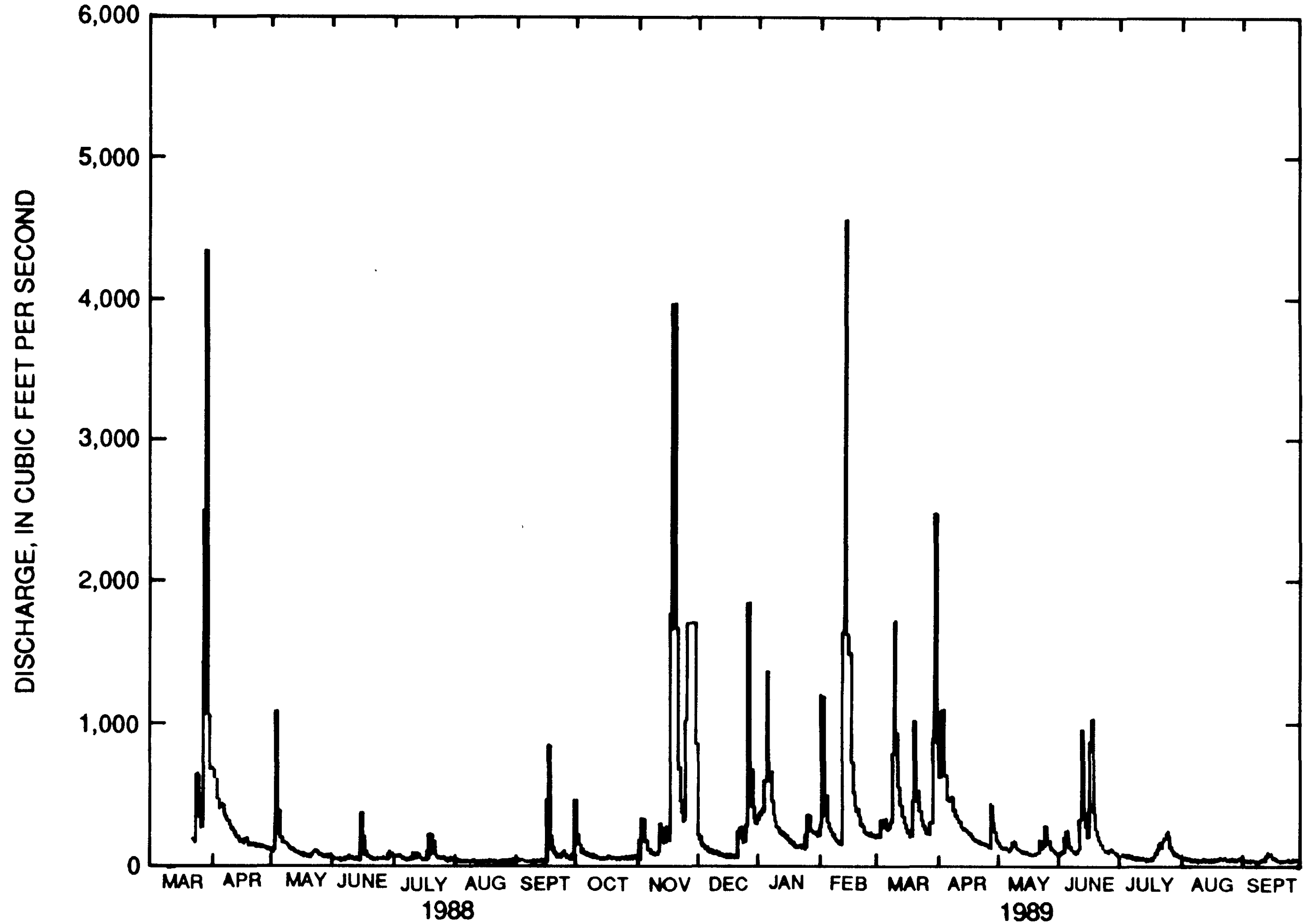


Figure 4.--Daily mean discharge for the Big River below Desloge.

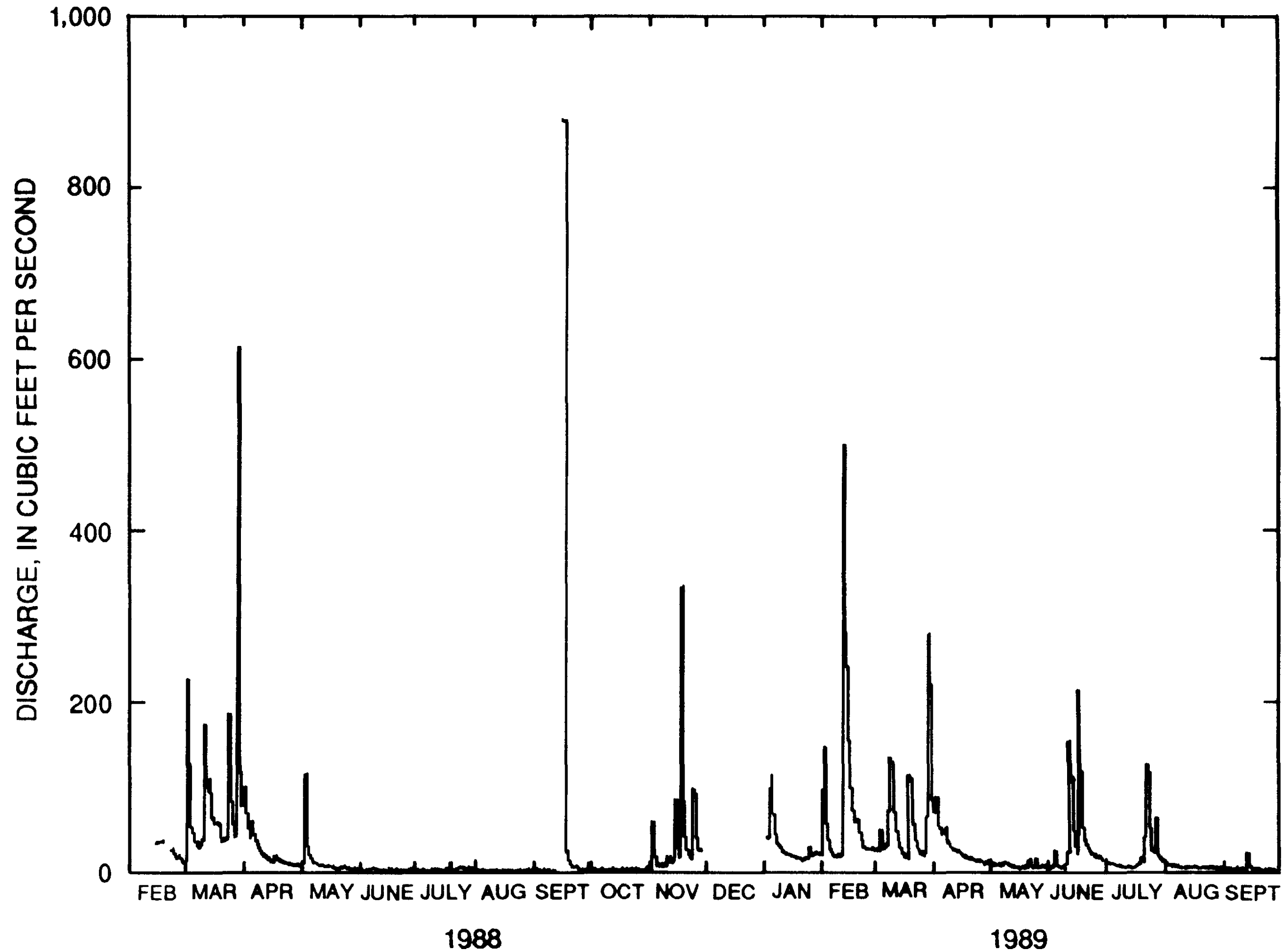


Figure 5.--Daily mean discharge for the Flat River at National tailings pile.

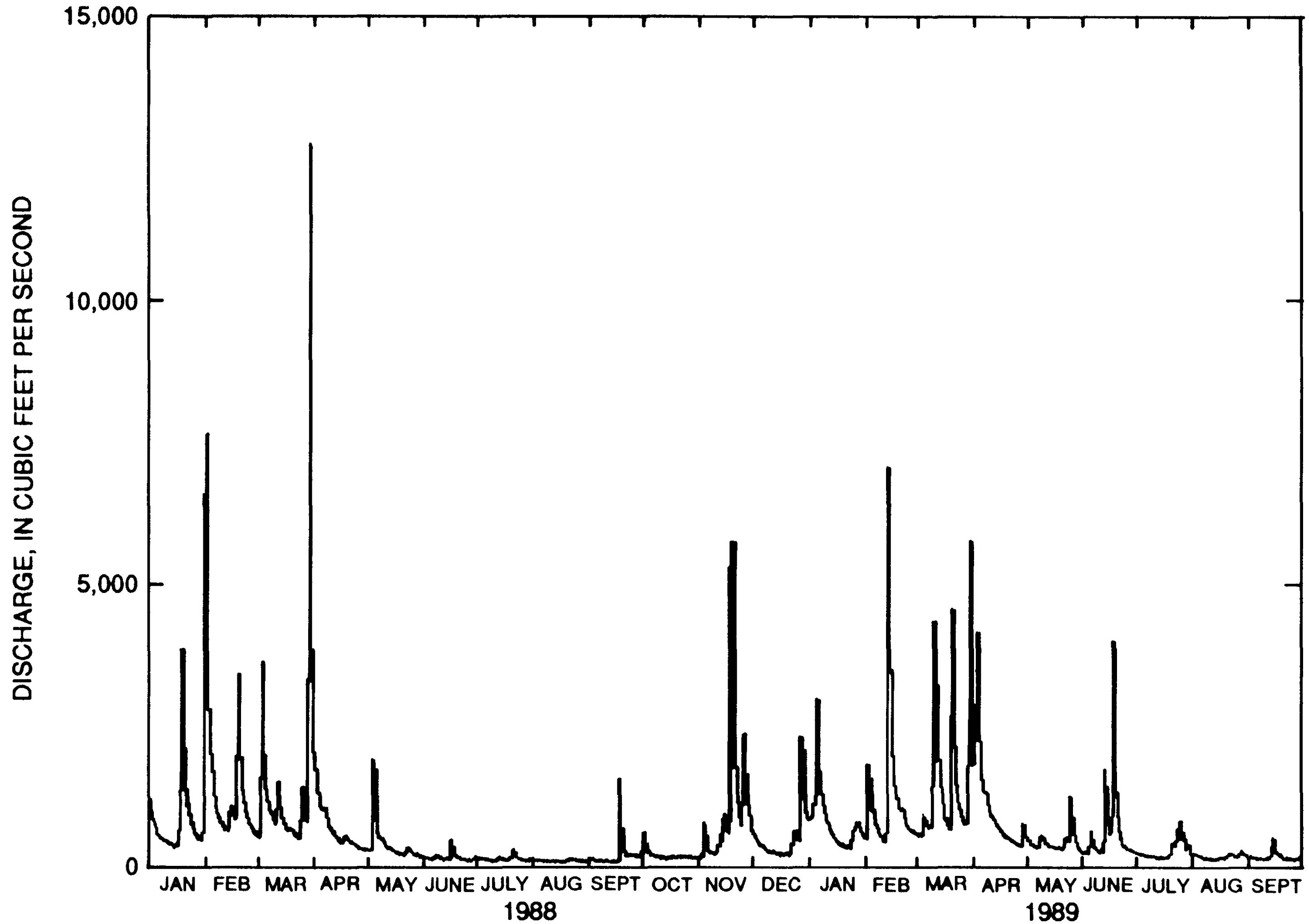


Figure 6.--Daily mean discharge for the Big River near Richwoods.

All samples were submitted to the U.S. Geological Survey national water-quality laboratory in Arvada, Colorado, for analysis. Samples were analyzed for inorganic constituents according to methods described by Fishman and Friedman (1989). Chemical constituents referred to as "dissolved" were determined from samples that were filtered at the time of sampling through a 0.1 micrometer membrane filter between leucite plates, using a peristaltic pump as the pressure source.

Values of specific conductance, pH, water temperature, and alkalinity were determined at the time of sampling. Specific conductance was measured using a portable conductivity meter with temperature compensation designed to express readings in microsiemens per centimeter at 25 degrees Celsius. The potentiometric method was used to determine the pH value and alkalinity. The pH values were measured using a portable pH meter calibrated with standard buffers bracketing the expected sample pH value. Alkalinity was determined by incremental titration with 0.16 normal sulfuric acid to the bicarbonate-carbonic acid end point of approximately pH 4.5. Water temperature was measured using a thermistor attached to the pH meter.

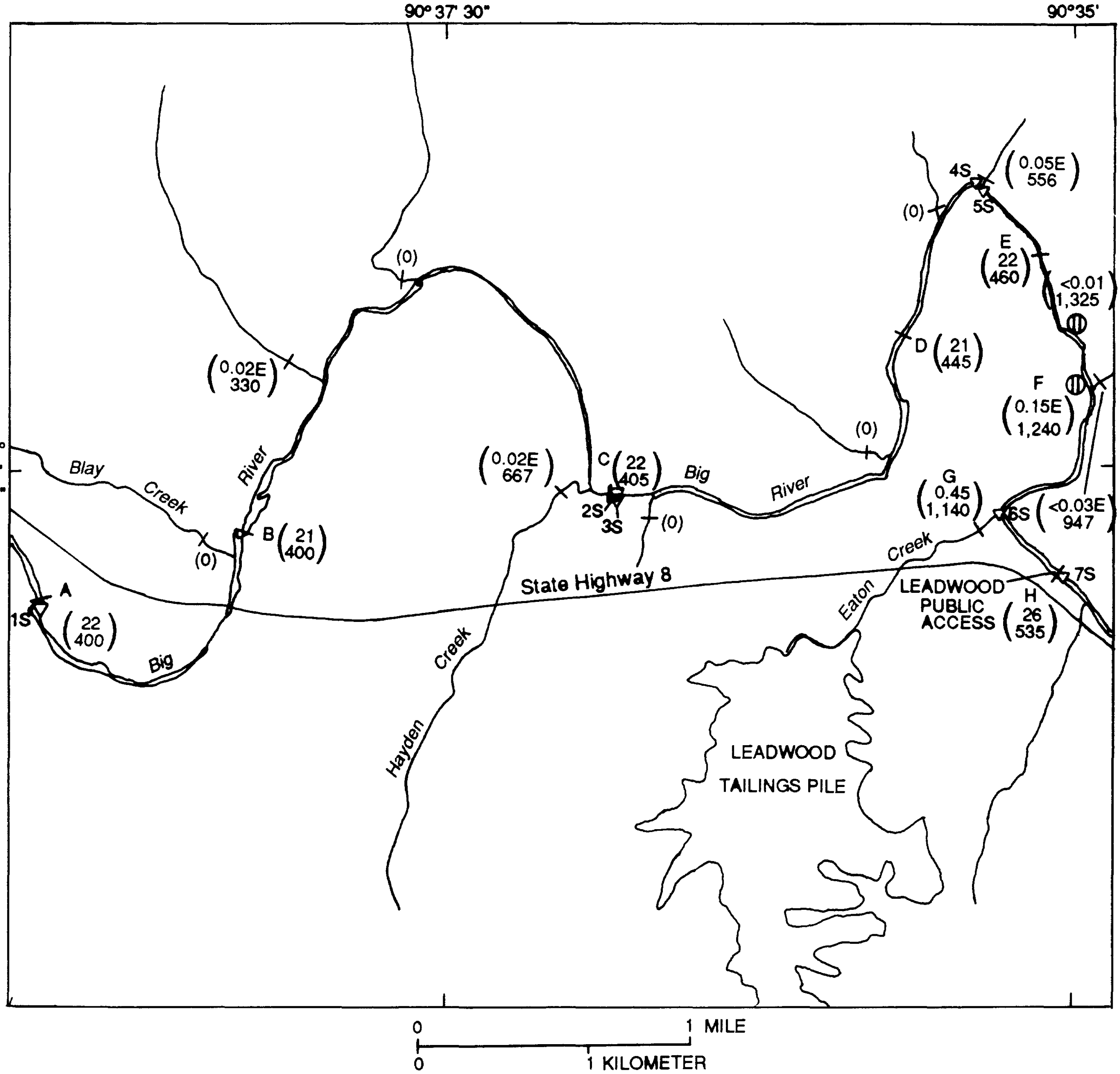
Flood Sampling

Water-quality and suspended-sediment samples were collected at high flow at sites 6 and 11 (fig. 2). Water-quality samples were collected using a U.S. Geological Survey DH-48-TM sampler if the stream could be waded or a U.S. Geological Survey D-74-TM sampler with cable-and-reel suspension if the stream could not be waded. Samples were composited from at least seven vertical sections. Suspended-sediment samples were collected according to methods described by Guy and Norman (1970). Results of water-quality analyses of flood samples, including suspended-sediment concentrations, are in table 5 (at the back of this report). Particle-size distribution of suspended-sediment samples is in table 6 (at the back of this report).

Additional suspended-sediment samples were collected and placed in 1-gallon polyethylene containers. The sediment was allowed to settle in a darkened environment at room temperature for about 2 weeks. The settling time was determined using Stokes law (Guy, 1969). Excess water was drawn off through an 18-gauge stainless steel needle with nylon tubing attached that had been inserted into the container 2 centimeters above the bottom of the container so as not to disturb any of the settled sediment. The container was then dried at 60 degrees Celsius until the remaining water evaporated and the sediment was completely dry. The dried sediment was digested by nitric, hydrofluoric, and perchloric acids, and then analyzed for total-element contents by inductively coupled plasma by the U.S. Geological Survey, geochemistry laboratory, Denver, Colorado. Analyses were done according to methods described in Fishman and Friedman (1989). The results are shown in table 7 (at the back of this report).

Seepage Studies

Two seepage runs were made in the study area. The first was on September 13, 1989, on the reach of the Big River upstream from State Highway 8 to the Leadwood Public Access (fig. 7) and also on the Flat River from Derby to the gaging station below the National tailings pile (fig. 8). The second seepage run was made November 6-8, 1989, on the Big River from the Leadwood Public Access to the Big River below Desloge (fig. 9). Discharge measurements were made to locate stream reaches where surface flow is lost to or gained from the subsurface and water-quality samples were collected to assess the effects of mining-related discharges, such as discharge from abandoned drill holes and tailings piles, on the river systems. No measurable precipitation had fallen 7 to 14 days before each seepage run. Location of seepage sites on the Big River where water-quality analyses are available is given in tables 1 and 8 (at the back of this report). Water-quality analyses for the September seepage run are in table 9 (at the back of this report) and analyses for the November seepage run are in table 10 (at the back of this report).



EXPLANATION

A — STREAM MEASUREMENT SITE-- Letter refers to table 8 and water-quality analysis in table 9

F — SEEP MEASUREMENT SITE--Letter refers to table 8 and water-quality analysis in table 9

(22 / 400) — Upper number is discharge, in cubic feet per second; lower number is specific conductance, in microsiemens per centimeter at 25 degrees Celsius; (0), no discharge present; E following discharge value, estimated; <, less than

1S — BED SEDIMENT SAMPLING SITE

Figure 7.--Results of seepage run in the Big River upstream from State Highway 8 to the Leadwood Public Access, September 13, 1989.

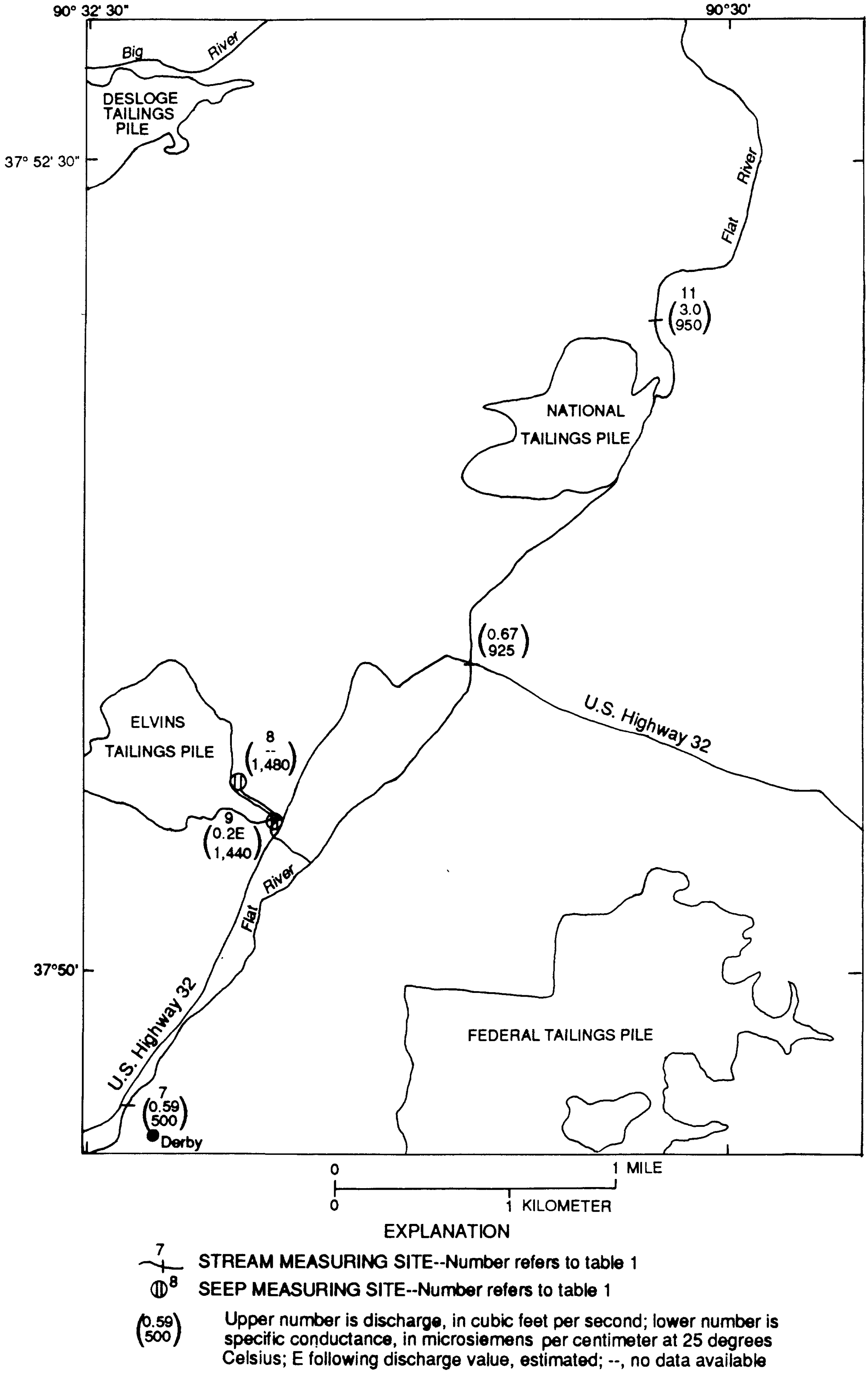
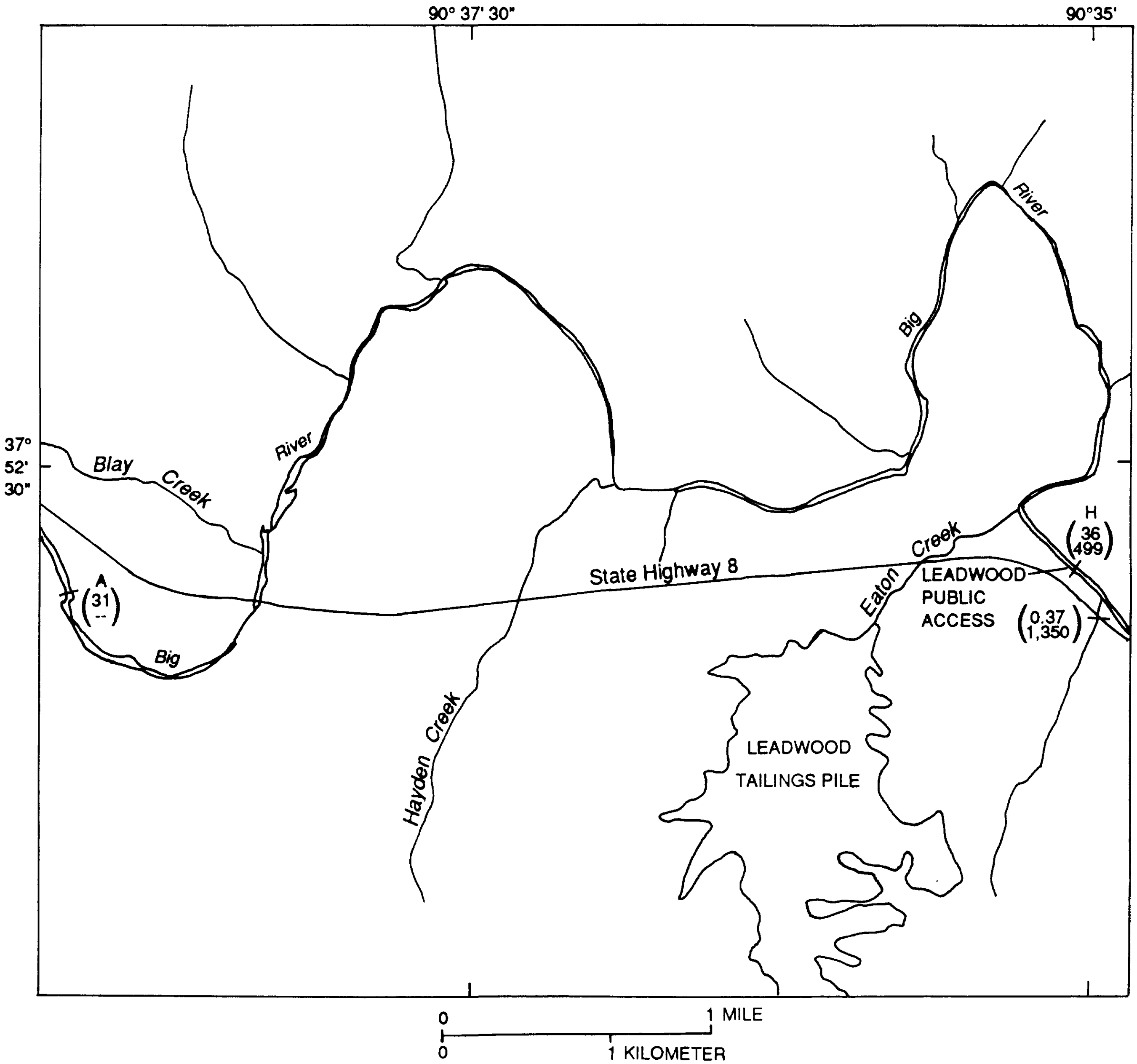


Figure 8.--Results of seepage run in the Flat River, September 13, 1989.



EXPLANATION

A — STREAM MEASUREMENT SITE-- Letter or number refers to table 8 and water-quality analysis in table 10

4 — SEEP MEASUREMENT SITE--Letter or number refers to table 8 and water-quality analysis in table 10

(36/499) — Upper number is discharge, in cubic feet per second; lower number is specific conductance, in microsiemens per centimeter at 25 degrees Celsius; (0), no discharge present; E following discharge value, estimated; --, no data available

Figure 9.--Results of seepage run in the Big River from the Leadwood Public Access to the Big River below Desloge, November 6-8, 1989.

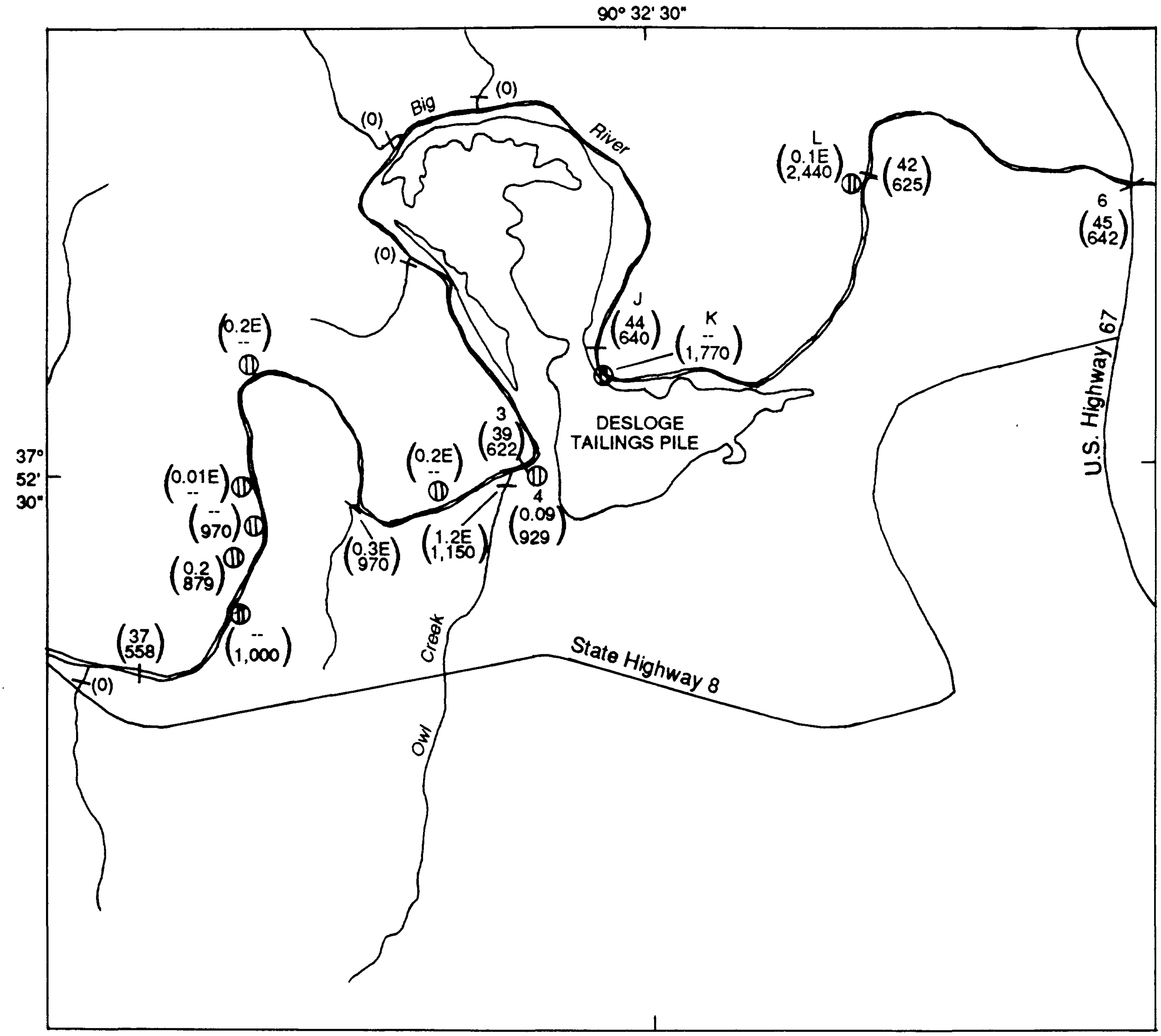


Figure 9.--Results of seepage run in the Big River from the Leadwood Public Access to the Big River below Desloge, November 6-8, 1989 -- Continued.

Summary

At sites on the Big River (sites 1, 3, 6, and 12, fig. 2), specific conductance values ranged from 209 to 690 microsiemens per centimeter and on the Flat River (sites 7 and 11) from 241 to 990 microsiemens per centimeter. Dissolved sulfate concentrations for both rivers were 140 milligrams per liter or less, except at site 11. Dissolved cadmium, cobalt, and copper concentrations generally were less than the detection limit for each element at all river sites. Dissolved iron concentrations generally were less than 10 micrograms per liter, and dissolved lead concentrations generally were less than or equal to 10 micrograms per liter at all river sites, except for one sample from site 11 that had a dissolved lead concentration of 50 micrograms per liter. Dissolved zinc concentrations were 160 micrograms per liter or less for all river sites except at site 11 where they ranged from 110 to 400 micrograms per liter.

At seepage sites related to tailings piles (sites 2, 5, 9, and 10, fig. 2) and at the site at the base of a tailings pile (site 8), specific conductance values ranged from 478 to 1,540 microsiemens per centimeter, and dissolved sulfate concentrations ranged from 130 to 850 milligrams per liter. Dissolved cadmium concentrations generally were above the detection limit of 1 microgram per liter at sites 2, 8, and 9, where they ranged to 28 micrograms per liter. Dissolved cobalt concentrations were less than 100 micrograms per liter, except at sites 8 and 9, where they ranged to 610 micrograms per liter. Dissolved copper concentrations generally were less than the detection limit of 10 micrograms per liter. The maximum dissolved iron concentration was 60 micrograms per liter at site 8. Dissolved lead concentrations were 80 micrograms per liter or less. Dissolved zinc concentrations ranged from about 50 to 18,000 micrograms per liter and were largest at site 8.

Discharge from the drill hole (site 4, fig. 2) had specific conductance values that ranged from 921 to 970 microsiemens per centimeter. Dissolved sulfate concentrations ranged from 250 to 270 milligrams per liter. Dissolved cadmium concentrations were 2 micrograms per liter or less. Dissolved cobalt concentrations ranged from 20 to 30 micrograms per liter. Dissolved copper concentrations were less than the detection limit of 10 micrograms per liter. Dissolved iron concentrations ranged from less than 3 to 19 micrograms per liter; dissolved lead concentrations ranged from 18 to 30 micrograms per liter. Dissolved zinc concentrations ranged from 170 to 310 micrograms per liter.

SEDIMENT DATA

Suspended Sediment

Suspended-sediment samples generally were collected quarterly at sites on the Big and Flat Rivers and at seepage sites 2, 9, and 10 beginning in September 1988. They were collected according to methods described by Guy and Norman (1970). Concentrations of suspended sediment were determined using methods described by Guy (1969) and are given in table 4.

Bed Sediment

Bed sediment was either collected quarterly from January 1988 to September 1989 or was collected three times during 1988 and 1989 at all sites shown in figure 2, with the exception of site 4. Samples consisted of the upper 2 centimeters of sediment, which was removed in a plastic scoop. At each site, 3 transects, spaced about 150 feet apart, were made and 10 subsamples were collected along each transect, composited, and mixed thoroughly before analysis. About 10 to 20 pounds of sediment were collected at each site.

Bed sediment also was collected during the seepage run on the Big River, September 13, 1989. Sample collection sites are shown in figure 7.

Particle-Size Distribution

Particle-size distribution of bed sediment was determined by sieve and pipet analysis by the U.S. Geological Survey sediment laboratory in Iowa City, Iowa. Size distributions were made according to methods described by Guy (1969). Results of these analyses for quarterly or triannual samples are listed in table 11 (at the back of this report). Results of analyses of samples from seepage run sites are listed in table 12 (at the back of this report).

Element Contents

Total element contents in bed sediment were determined by inductively coupled plasma at the U.S. Geological Survey geochemistry laboratory, Denver, Colorado. The samples underwent total digestion with hydrofluoric, nitric, and perchloric acids. Analyses were made according to methods described in Fishman and Friedman (1989). The analyses were made on the fine or clay/silt-size (less than 63 micrometers) and the coarse or sand-size (63 to 180 micrometers) fractions.

Results of the analyses for quarterly or triannual samples are listed in table 13 (at the back of this report). The results of the analyses for bed sediment collected during the seepage run are listed in table 14 (at the back of this report).

Mineralogy

Mineralogical analysis was done on bed sediment to confirm the presence of selected elements by semiquantitative emission spectrograph analyses by the U.S. Geological Survey, geochemistry laboratory, Denver, Colorado. Analyses were made according to methods described in Fishman and Friedman (1989). Analyses were made on the less than 45-micrometers and the less than 63-micrometers fractions. Results of the analyses for quarterly or triannual samples are listed in table 15 (at the back of this report). Results of the analyses for the seepage run samples are listed in table 16 (at the back of this report).

Semiquantitative mineralogical analyses of bed sediment were done using X-ray diffraction techniques by the U.S. Geological Survey, geochemistry laboratory. Samples were sieved and the bulk samples (less than 180 micrometers) were analyzed. Results for the quarterly or triannual samples are shown in table 17 (at the back of this report) and the results for the seepage run samples are listed in table 18 (at the back of this report).

Heavy mineral concentrates were obtained from the bed sediment. The bulk sample was passed through a modified Frantz Isodynamic Magnetic Separator[1] to produce three separate fractions based on their magnetic properties. The mineralogy for all three fractions was determined by optical techniques by the U.S. Geological Survey geochemistry laboratory. The C-1 fraction contains the highly magnetic minerals. Magnetite was the only mineral detected in this fraction. The C-2 fraction is the moderately to weakly magnetic, mostly non-ore minerals. The C-3 fraction contains the non-magnetic ore and non-ore minerals. The weight percentages of each of the fractions from the heavy mineral concentrates for the quarterly or triannual samples are given in table 19 (at the back of this report). Mineralogy of the C-2 fraction for quarterly or triannual samples is listed in table 20 (at the back of this report) and for the seepage run sample in table 21 (at the back of this report). Results of emission spectrograph analyses of the C-3 fraction for the quarterly or triannual samples are listed in table 22 (at the back of this report) and for the samples from the seepage run sites in table 23 (at the back of this report). The mineralogy of the C-3 fraction for quarterly or triannual samples is listed in table 24 (at the back of this report) and for the seepage run samples in table 25 (at the back of this report). Elemental composition of carbonate minerals in the C-3 fraction was determined by laser spectrometry.

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[1] Use of trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

To determine solid-phase association of trace elements, selected bed sediment samples also were analyzed by scanning electron microscope using energy dispersive and wavelength dispersive X-ray at the U.S. Bureau of Mines, Rolla, Missouri. Polished mounts were analyzed for the fine and the coarse fractions. Results of these analyses are listed in table 26 (at the back of this report).

Summary

The combined gravel- and sand-size component (larger than 0.062 millimeter) generally was the dominant fraction in bed sediment. Total element contents in both the fine and coarse fractions for lead and zinc in bed sediment increased downstream from site 1 on the Big River and downstream from site 7 on the Flat River. Lead and zinc contents decreased on the Big River from site 6 to site 12.

The largest lead content detected in the quarterly or triannual samples was at seepage site 8 (38,000 micrograms per gram). The largest zinc contents were at seepage sites 8 and 9 (78,000 and more than 100,000 micrograms per gram).

Quartz was the predominant mineral in the bulk sample (less than 180 micrometers) at sites 1, 7, and 12 and carbonate minerals were predominant at all other sites. For the heavy mineral concentrates, the C-2 fraction generally was the largest by weight percent. This fraction predominately was carbonate and oxidized minerals, with galena and pyrite as the sulfides most often present. Some C-3 fractions were as much as 80 percent sulfide minerals, but generally were less than 50 percent sulfide minerals. Galena, pyrite, and sphalerite were the most commonly detected sulfide minerals. Most trace elements generally were either in the oxide or sulfide phase in bed sediment; however, at seepage sites 8 and 9 zinc was associated predominantly with the carbonate phase.

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_____1990, Water resources data, Missouri, Water year 1989: U.S. Geological Survey Water-Data Report MO-89-1, 353 p. (published annually).

page 19 follows

Table 1.--*Water-quality and sediment sampling sites*

[DDMMSS, degrees minutes seconds; --, no downstream order number available]

Site no. (fig. 2)	Name	Site identification number: Downstream order number	Latitude DDMMSS	Longitude DDMMSS
1	Big River at Irondale	07017200	374948	0904127
2	Eaton Creek at Leadwood	--	375200	0903554
3	Big River at Bonehole	--	375232	0903258
4	Drill hole at Bonehole	--	375231	0903259
5	Tunnel seep at Desloge	--	375232	0903255
6	Big River below Desloge	07017260	375322	0903107
7	Flat River at Derby	07017270	374936	0903222
8	Elvins seep at pile	--	375032	0903158
9	Elvins seep at Highway 32	--	375028	0903146
10	National seep at railroad	--	375135	0903031
11	Flat River at National tailings pile	07017350	375201	0903019
12	Big River near Richwoods	07018100	380934	0904222

Table 2.--*Daily mean discharge for the Big River below Desloge*

[Site location-site 6, fig. 2; values, in cubic feet per second; --, no data available]

	1988									
DAY	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	--	675	104	51	82	36	23	85	40	260
2	--	667	100	48	67	35	25	446	39	231
3	--	609	112	45	69	33	32	210	38	203
4	--	466	1,080	45	72	32	33	135	178	176
5	--	403	382	43	60	31	34	101	308	153
6	--	428	237	42	52	30	31	83	158	139
7	--	412	186	40	47	29	28	72	110	126
8	--	353	159	42	44	28	26	65	87	115
9	--	318	152	55	41	27	25	60	74	105
10	--	290	140	59	39	26	24	56	70	98
11	--	265	121	48	39	25	24	52	69	92
12	--	245	110	43	77	25	25	48	84	87
13	--	224	103	41	89	25	26	44	289	82
14	--	207	97	38	63	25	26	42	216	81
15	--	190	90	35	51	24	24	40	158	78
16	--	173	84	361	44	24	22	40	263	73
17	--	157	76	203	39	24	22	41	258	70
18	--	171	73	96	37	23	471	43	179	67
19	--	176	70	65	36	31	841	44	1,760	66
20	--	156	67	53	90	32	187	45	3,970	66
21	--	142	65	47	215	25	111	44	1,680	66
22	--	139	67	43	110	26	75	42	681	66
23	172	137	88	40	73	28	63	44	462	254
24	161	133	108	39	57	27	62	45	368	291
25	639	129	95	41	49	26	81	45	312	224
26	489	131	80	43	44	26	96	43	912	184
27	332	125	70	39	41	24	70	42	740	273
28	262	118	65	36	39	24	57	42	600	1,840
29	2,500	114	61	44	37	24	51	43	440	679
30	4,330	109	58	85	36	25	47	42	350	414
31	1,060	--	53	--	37	24	--	41	--	327
TOTAL	--	7,862	4,353	1,910	1,876	844	2,662	2,225	14,893	6,986
MEAN	--	262	140	63.7	60.5	27.2	88.7	71.8	496	225
MAXIMUM	--	675	1,080	361	215	36	841	446	3,970	1,840
MINIMUM	--	109	53	35	36	23	22	40	38	66

Table 2.--*Daily mean discharge for the Big River below Desloge*--Continued

DAY	1989								
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	296	152	189	874	198	82	83	67	37
2	329	228	183	618	172	80	80	63	37
3	354	1,190	183	749	156	80	80	58	36
4	370	496	187	1,100	146	84	77	54	36
5	588	352	319	630	140	186	71	51	35
6	1,370	299	313	469	130	238	67	47	34
7	649	250	268	460	120	159	62	43	34
8	433	224	248	476	121	124	58	41	32
9	328	190	298	451	179	105	54	38	32
10	279	176	784	369	188	94	50	37	33
11	245	160	1,720	327	154	87	47	37	34
12	224	146	934	300	136	95	45	36	35
13	190	1,640	543	276	125	329	45	35	38
14	165	4,560	418	256	118	952	47	34	69
15	158	1,630	345	249	111	383	46	34	92
16	140	1,500	286	239	105	267	43	38	75
17	126	724	252	220	99	199	43	39	60
18	117	517	226	206	96	816	46	47	52
19	107	423	200	195	93	1,030	52	44	46
20	98	377	452	183	89	356	68	41	42
21	91	400	1,020	175	84	240	102	42	40
22	85	339	530	167	99	186	146	45	39
23	82	278	382	159	192	155	123	54	37
24	79	240	319	152	179	134	171	51	35
25	79	225	278	145	143	119	203	44	34
26	158	216	247	138	277	105	235	42	34
27	292	214	222	131	174	98	190	45	34
28	217	200	219	425	132	118	124	47	34
29	199	--	298	313	114	110	97	42	34
30	189	--	893	247	104	92	80	38	34
31	169	--	2,470	--	91	--	73	37	--
TOTAL	8,206	17,346	15,226	10,699	4,265	7,103	2,708	1,371	1,244
MEAN	265	619	491	357	138	237	87.4	44.2	41.5
MAXIMUM	1,370	4,560	2,470	1,100	277	1,030	235	67	92
MINIMUM	79	146	183	131	84	80	43	34	32

Table 3.--*Daily mean discharge for the Flat River at National tailings pile*

[Site location-site 11, fig. 2; values, in cubic feet per second; --, no data available]

	1988									
DAY	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	--	13	76	6.9	4.0	3.6	3.0	2.7	8.4	3.3
2	--	14	99	6.8	3.8	3.3	2.8	5.6	7.7	3.2
3	--	227	69	11	4.1	3.0	2.6	6.0	3.9	3.4
4	--	127	52	116	3.1	3.1	3.1	3.4	3.2	57
5	--	52	40	30	3.1	2.8	2.3	2.5	2.8	15
6	--	47	60	19	3.1	2.7	2.4	2.2	2.6	8.0
7	--	36	44	14	2.9	2.6	2.4	2.2	2.6	6.6
8	--	32	35	12	4.9	2.6	2.3	2.2	2.4	5.9
9	--	33	30	12	4.3	2.4	2.4	2.3	2.5	5.6
10	--	33	25	9.5	3.2	2.3	2.5	2.3	2.3	9.0
11	--	39	22	8.4	2.9	2.3	2.6	2.4	2.0	7.3
12	--	174	19	7.9	2.9	5.1	2.7	2.4	1.9	18
13	--	99	17	7.3	3.3	3.3	2.8	2.3	1.9	16
14	--	109	15	6.9	2.7	3.1	2.6	--	2.0	11
15	--	92	14	6.9	2.8	3.0	2.6	--	2.0	13
16	35	64	12	5.9	3.8	3.3	2.8	--	2.4	83
17	35	58	12	6.0	3.5	3.5	2.8	--	2.6	27
18	35	58	19	5.3	3.1	3.7	2.9	878	3.3	19
19	--	55	17	5.5	2.8	4.2	3.1	23		
20	--	41	14	4.9	3.3	12	2.4	11		
21	--	35	13	4.7	2.6	4.0	2.4	6.8	2.6	82
22	--	39	12	5.1	2.7	3.3	2.3	5.3	2.4	38
23	26	38	10	5.5	2.7	3.8	2.8	5.6	3.5	25
24	27	39	9.1	7.6	2.8	4.4	2.4	5.5	2.6	19
25	23	185	8.7	5.3	2.9	5.0	2.5	5.0	2.5	16
26	19	81	9.8	4.8	3.1	4.8	2.7	3.6	2.6	98
27	19	55	9.0	4.6	3.0	4.4	2.6	2.7	4.1	90
28	17	40	7.9	4.3	3.2	4.1	2.6	2.5	3.4	38
29	13	615	7.8	4.6	5.5	3.7	2.6	2.3	3.4	25
30	--	248	7.3	4.1	4.4	3.5	2.6	2.2	2.9	--
31	--	113	--	4.1	--	3.3	2.8	--	3.1	--
TOTAL	--	2,891	786	357	100	116	81.4	--	95.8	--
MEAN	--	93.3	26.2	11.5	3.35	3.75	2.63	--	3.09	--
MAXIMUM	--	615	99	116	5.5	12	3.1	--	8.4	--
MINIMUM	--	13	7.3	4.1	2.6	2.3	2.3	--	1.9	--

Table 3.--*Daily mean discharge for the Flat River at National tailings pile*--Continued

DAY	1988 Dec.	1989 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	--	19	26	82	8.9	3.7	13	11	3.7
2	--	--	94	24	69	8.1	3.4	14	9.9	3.4
3	--	--	146	24	86	7.8	3.2	11	8.9	3.2
4	--	39	55	24	87	7.8	4.9	9.9	8.0	3.1
5	--	95	36	48	51	7.4	25	8.9	7.0	3.1
6	--	114	26	31	43	6.7	9.0	9.2	6.2	2.9
7	--	66	21	26	45	6.4	6.2	8.9	5.4	2.9
8	--	44	19	29	50	8.7	5.4	8.0	5.0	2.7
9	--	33	16	71	38	11	4.9	7.2	5.0	2.9
10	--	29	16	133	32	9.7	4.0	6.8	4.6	3.1
11	--	26	18	128	28	7.4	9.2	6.3	4.5	3.2
12	--	24	17	68	26	7.0	23	6.8	4.4	2.9
13	--	21	500	46	24	6.2	154	6.3	4.2	4.4
14	--	20	278	35	23	5.8	108	5.7	4.2	
15	--	20	239	27	23	5.5	47	5.6	4.0	7.2
16	--	18	153	21	21	5.4	30	5.1	5.9	5.1
17	--	18	96	19	19	5.3	22	5.0	5.0	4.6
18	--	17	71	17	18	5.0	212	5.4	4.4	4.4
19	--	16	58	15	17	4.8	118	7.1	4.2	3.8
20	--	16	59	114	16	4.4	52	12	3.9	3.6
21	--	14	60	108	16	3.8	37	17	4.7	3.1
22	--	14	46	53	14	14	30	11	6.3	3.0
23	--	14	35	37	14	14	25	42	5.0	2.8
24	--	14	28	29	13	7.4	23	125	4.0	2.6
25	--	15	27	24	12	6.0	19	117	3.9	2.5
26	--	28	27	21	12	16	18	50	4.8	2.5
27	--	22	26	18	11	6.7	17	25	4.7	2.4
28	--	20	24	23	11	5.2	16	21	4.4	2.5
29	--	22	--	66	10	5.0	15	63	3.7	2.5
30	--	21	--	279	9.1	4.9	13	19	4.1	2.6
31	--	20	--	218	--	3.9	--	14	3.9	--
TOTAL	--	--	2,210	1,802	920.1	226.2	1,057.9	666.2	165.2	116.7
MEAN	--	--	78.9	58.1	30.7	7.30	35.3	21.5	5.33	3.89
MAXIMUM	--	--	500	279	87	16	212	125	11	20
MINIMUM	--	--	16	15	9.1	3.8	3.2	5.0	3.7	2.4

TABLES 4 AND 5

ABBREVIATIONS AND REPORTING UNITS FOR CHEMICAL CONSTITUENTS AND NOTATIONS USED IN TABLES

Q	Instantaneous discharge, in cubic feet per second
SC	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius
pH	In standard units
WT	Water temperature, in degrees Celsius
H	Total hardness, in milligrams per liter as $CaCO_3$
NH	Noncarbonate hardness, in milligrams per liter as $CaCO_3$
Ca	Dissolved calcium, in milligrams per liter
Mg	Dissolved magnesium, in milligrams per liter
Na	Dissolved sodium, in milligrams per liter
K	Dissolved potassium, in milligrams per liter
HCO_3	Bicarbonate, in milligrams per liter
CO_3	Carbonate, in milligrams per liter
Alk	Total alkalinity, in milligrams per liter as $CaCO_3$
SO_4	Dissolved sulfate, in milligrams per liter
Cl	Dissolved chloride, in milligrams per liter
SiO_2	Dissolved silica, in milligrams per liter
DS	Dissolved solids, residue at 180 degrees Celsius, in milligrams per liter
DSS	Dissolved solids, sum of constituents, in milligrams per liter
P	Dissolved phosphorous, in milligrams per liter
PO_4	Dissolved orthophosphate, in milligrams per liter
Al	Dissolved aluminum, in micrograms per liter
Ba	Dissolved barium, in micrograms per liter
Be	Dissolved beryllium, in micrograms per liter
Cd	Dissolved cadmium, in micrograms per liter
Cr	Dissolved chromium, in micrograms per liter
Co	Dissolved cobalt, in micrograms per liter
Cu	Dissolved copper, in micrograms per liter
Fe	Dissolved iron, in micrograms per liter
Pb	Dissolved lead, in micrograms per liter
Li	Dissolved lithium, in micrograms per liter
Mn	Dissolved manganese, in micrograms per liter
Mo	Dissolved molybdenum, in micrograms per liter
Ni	Dissolved nickel, in micrograms per liter
Ag	Dissolved silver, in micrograms per liter
Sr	Dissolved strontium, in micrograms per liter
V	Dissolved vanadium, in micrograms per liter
Zn	Dissolved zinc, in micrograms per liter
SS	Suspended sediment, in milligrams per liter
--	No data available
<	Less than
E	Estimated

Table 4.--*Water-quality data*

[Underline indicates a laboratory value that is questionable]

Site no. (fig. 2)	Date	Q	SC	pH	WT	H	NH	Ca	Mg	Na	K
1	2-23-88	234	245	7.97	10.0	130	18	26	15	2.5	1.3
	5-16-88	58	346	7.81	22.5	190	18	37	23	3.2	1.5
	9-26-88	75	331	8.05	22.0	180	13	35	23	3.3	1.9
	11-30-88	360	247	7.08	6.5	140	16	28	16	2.4	1.4
	3-02-89	264	293	7.20	6.0	160	20	33	19	2.9	1.2
	5-03-89	85	300	7.90	17.0	160	18	33	20	2.9	1.5
	9-13-89	8.5	378	6.32	17.5	210	1	41	26	3.6	1.6
2	2-24-88	.86	560	7.92	2.5	310	140	73	31	5.5	2.8
	5-16-88	.12	1,180	7.40	21.0	750	480	180	72	10	4.0
	9-26-88	E.35	1,250	7.84	20.0	730	500	180	67	7.9	5.0
	12-10-88	1.2	566	7.89	4.5	320	140	75	31	4.5	2.9
	3-02-89	1.3	694	7.52	6.5	370	180	87	37	5.7	3.1
	5-03-89	.24	1,210	7.67	17.5	690	430	170	65	8.5	5.0
	9-13-89	.30	1,220	7.21	16.5	690	410	170	65	9.8	5.8
3	2-24-88	285	317	8.01	7.0	170	49	34	20	3.1	1.4
	5-17-88	67	509	7.39	19.0	290	81	59	35	5.0	1.6
	9-27-88	63	453	8.20	14.5	240	45	48	29	4.1	1.9
	11-30-88	271	300	8.02	7.0	160	21	34	19	2.8	1.5
	3-02-89	185	377	7.89	6.5	200	33	41	24	3.6	1.3
	5-04-89	134	420	7.63	15.0	220	45	45	27	3.7	1.8
	9-14-89	52	608	6.66	16.5	330	100	65	40	6.1	2.2
4	2-24-88	.20	926	7.23	12.0	560	280	120	64	9.9	3.2
	5-17-88	.11	921	7.51	14.5	570	280	120	65	10	3.0
	8-04-88	--	970	7.09	21.5	--	--	--	--	--	--
	9-27-88	.10	955	7.28	14.5	540	250	110	64	9.9	2.7
	10-19-88	.07	944	7.19	14.0	--	--	--	--	--	--
	11-30-88	.11	945	7.12	12.5	540	260	110	65	11	2.8
	1-26-89	--	960	7.03	12.0	--	--	--	--	--	--
	3-02-89	.14	950	7.02	13.5	530	250	110	62	10	2.9
	5-04-89	.14	955	7.13	14.0	530	250	110	61	9.2	3.1
	9-14-89	.10	930	6.22	15.0	520	240	110	60	9.6	2.8

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	HCO_3	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS	P	PO_4
1	2-23-88	130	0	109	17	3.9	5.9	147	137	--	---
	5-16-88	210	0	169	24	3.6	5.7	180	199	--	--
	9-26-88	190	7	169	15	4.3	9.7	175	201	0.005	0.004
	11-30-88	150	0	120	15	2.9	7.9	145	146	.004	.005
	3-02-89	170	0	141	18	3.7	6.2	158	169	.003	<.001
	5-03-89	180	0	147	13	3.1	4.8	165	167	.005	.032
	9-13-89	250	0	209	12	4.2	11	222	225	.002	<.001
2	2-24-88	210	0	171	140	8.8	5.2	380	370	--	--
	5-16-88	320	0	265	460	7.0	11	958	907	--	--
	9-26-88	270	0	222	530	13	12	1,020	950	.003	.003
	12-01-88	210	0	176	130	5.4	6.5	363	362	<.002	<.001
	3-03-89	240	0	194	180	7.0	4.4	440	442	<.001	<.001
	5-03-89	320	0	262	450	8.8	8.4	929	876	<.002	<.001
	9-13-89	340	0	282	460	16	16	941	914	<.001	<.001
3	2-24-88	140	0	118	39	4.6	5.5	189	179	--	--
	5-17-88	260	0	211	77	5.3	4.8	307	314	--	--
	9-27-88	240	0	195	51	5.5	7.1	260	264	.008	.003
	11-30-88	170	0	142	38	3.4	7.8	191	192	.007	<.001
	3-02-89	200	0	168	41	4.4	5.5	217	222	.009	.002
	5-03-89	220	0	179	51	4.2	3.5	249	244	.004	.002
	9-14-89	270	0	226	110	6.6	9.8	375	375	.010	.006
4	2-24-88	350	0	284	260	11	9.9	683	649	--	--
	5-17-88	350	0	287	270	9.3	9.9	693	660	--	--
	8-04-88	340	0	280	--	--	--	--	--	--	--
	9-27-88	360	0	292	270	11	9.6	654	653	<.001	.003
	10-19-88	350	0	284	--	--	--	--	--	--	--
	11-10-88	350	0	284	260	11	9.9	667	641	<.002	<.001
	1-26-89	490	0	405	--	--	--	--	--	--	--
	3-02-89	350	0	284	250	11	9.7	657	627	<.001	<.001
	5-04-89	340	0	278	260	11	9.5	665	631	<.002	.002
	9-14-89	350	0	283	250	9.7	9.5	638	622	<.001	<.001

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Al	Ba	Be	Cd	Cr	Co	Cu	Fe	Pb
1	2-23-88	<10	50	<0.5	2	<5	<3	<10	7	<10
	5-16-88	<10	95	<.5	<1	<5	<3	<10	4	<10
	9-26-88	<10	97	<.5	<1	<5	<3	<10	6	<10
	11-30-88	<10	62	<.5	<1	<5	<3	<10	9	<10
	3-02-89	<10	62	<.5	<1	<5	<3	<10	8	<10
	5-03-89	<10	78	<.5	<1	<5	<3	<10	12	<10
	9-13-89	<10	120	<.5	<1	<5	<1	<10	6	<1
2	2-24-88	<10	34	<.5	2	<5	10	<10	9	<10
	5-16-88	<10	49	<.5	13	<5	10	<10	6	<10
	9-26-88	<10	58	<.5	3	<5	30	<10	13	10
	12-01-88	<10	35	<.5	<1	<5	8	<10	15	20
	3-03-89	<10	43	<.5	2	<5	10	<10	15	<10
	5-03-89	<10	38	<.5	8	<5	20	<10	5	<10
	9-13-89	<10	34	<.5	4	<5	10	<10	13	4
3	2-24-88	<10	57	<.5	<1	<5	<3	<10	<3	10
	5-17-88	<10	110	<.5	1	<5	<3	<10	<3	<10
	9-27-88	<10	100	<.5	<1	<5	3	<10	10	20
	11-30-88	<10	64	<.5	<1	<5	<3	<10	8	10
	3-02-89	<10	69	<.5	<1	<5	<3	<10	5	<10
	5-04-89	<10	81	<.5	<1	<5	<3	<10	8	<10
	9-14-89	<10	100	<.5	<1	<5	2	<10	8	2
4	2-24-88	<10	26	<.5	2	<5	30	<10	<3	20
	5-17-88	<10	27	<.5	1	<5	30	<10	4	20
	8-04-88	--	--	--	--	--	--	--	--	--
	9-27-88	<10	27	<.5	1	<5	20	<10	9	20
	10-19-88	--	--	--	--	--	--	--	--	--
	11-30-88	<10	28	<.5	<1	<5	30	<10	19	30
	1-26-89	--	--	--	--	--	--	--	--	--
	3-02-89	<10	26	<.5	<1	<5	30	<10	11	30
	5-04-89	<10	25	<.5	1	<5	20	<10	5	20
	9-14-89	<10	27	<.5	1	<5	20	<10	17	18

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Li	Mn	Mo	Ni	Ag	Sr	V	Zn	SS
1	2-23-88	<4	24	<10	<10	<1.0	29	<6	27	--
	5-16-88	5	43	<10	<10	1.0	41	<6	8	--
	9-26-88	5	24	<10	10	<1.0	61	<6	8	5
	11-30-88	<4	19	<10	<10	<1.0	30	<6	19	15
	3-02-89	<4	16	<10	<10	2.0	35	<6	18	4
	5-03-89	<4	41	<10	<10	1.0	37	<6	11	4
	9-13-89	<4	47	<10	<10	<1.0	43	<6	12	2
2	2-24-88	5	44	<10	20	<1.0	70	<6	820	--
	5-16-88	17	550	<10	40	1.0	210	<6	3,100	--
	9-26-88	19	310	<10	40	1.0	180	<6	1,200	9
	12-01-88	7	46	<10	10	<1.0	73	<6	550	15
	3-03-89	<4	44	10	20	<1.0	93	<6	720	4
	5-03-89	14	360	<10	40	<1.0	190	<6	2,200	4
	9-13-89	13	640	10	30	2.0	190	<6	1,800	8
3	2-24-88	<4	27	<10	<10	<1.0	34	<6	120	--
	5-17-88	6	92	<10	<10	<1.0	60	<6	98	--
	9-27-88	7	49	<10	<10	1.0	47	<6	83	6
	11-30-88	<4	24	<10	<10	2.0	34	<6	51	--
	3-02-89	<4	34	<10	<10	<1.0	41	<6	55	2
	5-04-89	4	54	<10	10	<1.0	46	<6	69	7
	9-14-89	5	73	10	10	<1.0	66	<6	95	8
4	2-24-88	17	30	<10	70	<1.0	99	<6	290	--
	5-17-88	11	22	<10	70	<1.0	100	<6	310	--
	8-04-88	--	--	--	--	--	--	--	--	--
	9-27-88	11	17	<10	80	<1.0	97	<6	200	--
	10-19-88	--	--	--	--	--	--	--	--	--
	11-30-88	10	23	<10	80	<1.0	99	<6	210	--
	1-26-89	--	--	--	--	--	--	--	--	--
	3-02-89	6	21	<10	70	1.0	100	<6	210	--
	5-04-89	10	19	<10	70	1.0	94	<6	310	--
	9-14-89	8	19	<10	70	<1.0	96	<6	170	--

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Q	SC	pH	WT	H	NH	Ca	Mg	Na	K
5	2-24-88	0.01	856	8.13	8.0	480	230	100	55	13	6.3
	5-17-88	E.01	1,230	8.61	12.5	780	490	160	93	17	7.5
	9-27-88	--	1,130	8.16	15.5	650	470	150	67	12	6.1
	12-01-88	E.01	1,070	7.99	4.5	630	340	140	67	13	6.9
	3-02-89	.15	1,010	7.95	7.0	560	270	120	64	16	7.8
	5-04-89	E.05	1,210	7.64	12.0	690	380	140	82	15	7.9
	9-14-89	.15	478	6.43	15.0	250	180	61	24	9.1	5.4
6	2-25-88	257	347	8.20	8.5	180	34	38	21	3.5	1.6
	4-20-88	155	--	7.60	14.0	--	--	--	--	--	--
	4-27-88	107	482	7.55	14.5	--	--	--	--	--	--
	5-16-88	79	522	8.33	24.5	300	96	61	36	5.2	1.9
	6-22-88	42	550	7.77	26.0	--	--	--	--	--	--
	6-30-88	70	640	7.58	23.0	--	--	--	--	--	--
	7-18-88	36	613	7.89	29.0	--	--	--	--	--	--
	8-04-88	29	654	7.94	30.0	---	--	--	--	--	--
	8-23-88	30	690	8.20	24.5	--	--	--	--	--	--
	9-27-88	69	485	8.28	22.0	260	63	51	31	4.5	2.2
	10-19-88	51	557	7.93	12.0	--	--	--	--	--	--
	10-27-88	46	576	7.91	12.0	--	--	--	--	--	--
	11-21-88	--	209	7.33	8.0	--	--	--	--	--	--
	12-01-88	254	331	8.21	6.5	180	30	37	21	3.3	1.7
	1-26-89	155	467	7.81	8.0	--	--	--	--	--	--
	3-03-89	192	423	7.67	8.0	220	51	47	26	3.9	1.6
	5-04-89	131	437	7.67	14.5	230	43	48	27	3.8	1.9
	7-21-89	--	269	7.89	23.5	--	--	--	--	--	--
	9-13-89	36	670	7.88	18.5	360	130	73	44	6.9	2.6
7	2-23-88	19	241	8.44	14.0	120	18	23	14	4.6	1.3
	5-16-88	3.4	347	7.99	24.5	180	27	36	22	8.6	1.9
	9-26-88	1.9	480	8.35	25.0	240	42	45	30	17	3.1
	11-30-88	16	267	7.29	8.0	140	30	28	17	5.4	1.4
	3-02-89	13	322	7.50	6.0	160	30	33	20	7.0	1.3
	5-03-89	2.6	409	8.13	19.0	210	26	41	25	10	1.9
	9-13-89	.18	500	7.56	17.5	240	24	46	30	19	3.1

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	HCO_3	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS	P	PO_4
5	2-24-88	290	0	242	220	15	7.2	607	563	--	--
	5-17-88	340	10	292	480	18	6.6	969	969	--	--
	9-27-88	220	0	184	460	14	6.4	870	826	<0.001	0.003
	12-01-88	310	22	290	350	15	8.5	814	799	<.002	<.001
	3-02-89	360	0	294	280	18	6.7	724	689	.003	<.001
	5-04-89	370	0	305	410	14	5.6	908	858	<.002	.002
	9-14-89	86	0	71	180	12	2.7	370	337	.002	.001
6	2-25-88	180	0	148	46	5.9	5.7	205	211	--	--
	4-20-88	--	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--	--
	5-16-88	250	2	205	85	5.6	4.4	324	324	--	--
	6-22-88	--	--	--	--	--	--	--	--	--	--
	6-30-88	270	0	222	--	--	--	--	--	--	--
	7-18-88	--	--	--	--	--	--	--	--	--	--
	8-04-88	--	--	--	--	--	--	--	--	--	--
	8-23-88	--	--	--	--	--	--	--	--	--	--
	9-29-88	230	0	192	63	6.1	7.3	273	280	.003	<.001
	10-19-88	--	--	212	--	--	--	--	--	--	--
	10-27-88	270	0	225	--	--	--	--	--	--	--
	11-21-88	110	0	88	--	--	--	--	--	--	--
	12-01-88	180	0	149	40	3.9	7.7	204	204	.005	.002
	1-26-89	330	0	269	--	--	--	--	--	--	--
	3-03-89	210	0	174	54	5.5	5.6	243	249	.002	.002
	5-04-89	230	0	188	57	4.6	3.5	254	259	.012	.001
	7-21-89	240	0	197	--	--	--	--	--	--	--
	9-13-89	280	0	232	140	8.1	9.4	415	424	.003	.001
7	7-23-88	120	0	97	34	5.5	6.3	167	147	--	--
	5-16-88	190	0	154	32	7.2	2.7	194	203	--	--
	9-26-88	230	5	194	49	16	5.5	280	306	.043	.048
	11-30-88	130	0	110	29	5.1	8.9	156	161	.036	.024
	3-02-89	160	0	135	36	7.1	5.2	181	191	.036	.004
	5-03-89	200	10	180	30	9.5	1.5	224	238	.034	.011
	9-13-89	260	0	215	39	18	11	293	295	.030	.012

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Al	Ba	Be	Cd	Cr	Co	Cu	Fe	Pb
5	5-24-88	<10	53	<0.5	1	<5	60	<10	8	10
	5-17-88	<10	74	<.5	1	<5	60	<10	5	<10
	9-27-88	<10	58	<.5	3	<5	20	<10	10	10
	12-01-88	<10	60	<.5	2	<5	90	<10	9	20
	3-02-89	<10	55	<.5	<1	<5	20	<10	4	<10
	5-04-89	<10	58	<.5	<1	<5	<3	<10	4	<10
	9-14-89	<10	25	<.5	1	<5	6	<10	9	18
6	2-15-88	<10	60	<.5	2	<5	<3	<10	10	<10
	4-20-88	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--
	5-16-88	<10	100	<.5	2	<5	<3	<10	<3	<10
	6-22-88	--	--	--	--	--	--	--	--	--
	6-30-88	--	--	--	--	--	--	--	--	--
	7-18-88	--	--	--	--	--	--	--	--	--
	8-04-88	--	--	--	--	--	--	--	--	--
	8-23-88	--	--	--	--	--	--	--	--	--
	9-27-88	<10	100	<.5	<1	<5	<3	<10	9	10
	10-19-88	--	--	--	--	--	--	--	--	--
	10-27-88	--	--	--	--	--	--	--	--	--
	11-21-88	--	--	--	--	--	--	--	--	--
	12-01-88	<10	68	<.5	<1	<5	<3	<10	8	<10
	1-26-89	--	--	--	--	--	--	--	--	--
	3-03-89	<10	70	<.5	<1	<5	3	<10	6	<10
	5-04-89	<10	81	<.5	<1	<5	<3	<10	5	<10
	7-21-89	--	--	--	--	--	--	--	--	--
	9-13-89	<10	100	<.5	1	<5	1	<10	6	8
7	2-13-88	<10	35	<.5	<1	<5	<3	<10	4	<10
	5-16-88	20	73	<.5	1	<5	<3	<10	8	<10
	9-26-88	<10	61	13	8	20	9	50	190	30
	11-30-88	<10	51	<.5	<1	<5	<3	<10	9	<10
	3-02-89	<10	46	<.5	<1	<5	<3	<10	6	<10
	5-03-89	<10	72	<.5	<1	<5	<3	<10	6	<10
	9-13-89	<10	96	<.5	<1	<5	1	<10	7	<1

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Li	Mn	Mo	Ni	Ag	Sr	V	Zn	SS
5	2-24-88	10	520	<10	20	<1.0	110	<6	250	--
	5-17-88	17	430	<10	40	<1.0	190	<6	250	--
	6-27-88	16	42	<10	40	<1.0	160	<6	420	1
	12-01-88	14	460	<10	60	2.0	140	<6	740	--
	3-02-89	6	150	<10	30	<1.0	130	<6	420	--
	5-04-89	12	25	<10	20	<1.0	170	<6	220	--
	9-14-89	6	67	<10	20	2.0	75	<6	120	--
6	2-25-88	<4	29	<10	<10	<1.0	38	<6	110	--
	4-20-88	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--
	5-16-88	7	37	<10	<10	<1.0	61	<6	140	--
	6-22-88	--	--	--	--	--	--	--	--	--
	6-30-88	--	--	--	--	--	--	--	--	--
	7-21-88	--	--	--	--	--	--	--	--	--
	8-04-88	--	--	--	--	--	--	--	--	--
	8-23-88	--	--	--	--	--	--	--	--	--
	9-27-88	5	37	<10	<10	<1.0	51	<6	130	2
	10-19-88	--	--	--	--	--	--	--	--	--
	10-27-88	--	--	--	--	--	--	--	--	--
	11-21-88	--	--	--	--	--	--	--	--	--
	12-01-88	<4	24	<10	<10	<1.0	38	<6	100	--
	1-26-89	--	--	--	--	--	--	--	--	31
	3-03-89	<4	33	<10	<10	2.0	44	<6	160	1
	5-04-89	4	36	<10	<10	<1.0	47	<6	140	9
	7-21-89	--	--	--	--	--	--	--	--	--
	9-13-89	5	32	20	10	<1.0	73	<6	160	2
7	2-23-88	<4	13	<10	<10	<1.0	32	<6	<3	--
	2-16-88	<4	22	<10	<10	2.0	51	<6	16	--
	9-26-88	<u>69</u>	<u>49</u>	<u>40</u>	<u>40</u>	<u>4.0</u>	<u>1,200</u>	<u>14</u>	<u>71</u>	3
	11-30-88	<4	18	<10	<10	<1.0	39	<6	11	8
	3-02-89	<4	12	<10	<10	<1.0	42	<6	14	6
	5-03-89	<4	7	<10	<10	1.0	56	<6	9	3
	9-13-89	<4	12	<10	<10	<1.0	64	<6	9	7

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Q	SC	pH	WT	H	NH	Ca	Mg	Na	K
8	2-23-88	E0.01	1,110	7.32	11.0	870	760	220	78	5.3	8.5
	9-26-88	--	1,420	7.08	22.0	860	710	220	76	5.7	10
	11-30-88	E.01	1,500	6.50	14.0	880	740	230	73	5.0	9.8
	3-02-89	--	1,220	6.41	14.5	700	580	180	60	4.6	9.6
	5-03-89	--	823	6.79	16.5	430	310	110	38	3.1	8.0
	9-14-89	.39	1,120	6.62	14.5	690	570	180	59	3.6	9.0
9	2-23-88	.56	1,400	7.72	7.5	630	480	160	55	4.0	8.1
	5-16-88	.24	1,290	7.61	26.5	800	670	210	68	5.6	10
	9-26-88	.24	1,540	7.71	26.5	940	790	240	82	6.8	11
	11-30-88	.34	1,510	7.09	10.5	920	760	240	79	6.3	10
	1-26-89	--	1,410	7.71	8.0	870	660	220	77	5.9	8.6
	3-02-89	.36	1,420	7.34	11.5	860	720	220	76	6.4	10
	5-03-89	--	1,320	7.23	21.0	750	610	190	67	5.2	10
	9-14-89	--	1,250	6.23	17.5	840	680	220	70	5.5	11
10	2-25-88	1.5	929	8.15	13.0	510	220	100	62	9.7	3.1
	5-16-88	1.3	900	7.79	26.0	540	270	110	64	11	2.7
	9-26-88	E.60	958	8.02	23.5	550	260	110	66	11	2.7
	11-30-88	1.1	960	7.70	18.5	530	260	110	63	12	2.8
	3-02-89	.86	955	7.97	17.0	540	270	110	65	10	2.8
	5-03-89	1.5	962	7.80	21.0	530	250	110	62	10	2.8
	9-14-89	--	930	7.05	19.0	520	240	110	60	12	2.8

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	HCO_3	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS	P	PO_4
8	2-23-88	140	0	112	570	5.4	5.1	914	971	--	--
	9-26-88	190	0	156	730	7.1	7.1	1,190	1,150	<0.001	0.003
	11-30-88	170	0	138	810	6.2	5.4	1,290	1,240	<.002	<.001
	3-02-89	150	0	121	590	6.7	5.1	1,000	945	<.001	<.001
	5-03-89	150	0	120	330	3.7	4.4	587	580	<.002	.002
	9-14-89	150	0	127	640	4.9	5.0	1,010	993	<.001	<.001
9	2-23-88	170	0	142	760	6.7	4.7	1,250	1,100	--	--
	5-16-88	170	0	136	540	4.2	5.5	912	931	--	--
	9-26-88	180	0	152	850	7.4	5.7	1,340	1,300	<.001	<.001
	11-30-88	200	0	164	800	6.8	5.6	1,310	1,260	.002	<.001
	1-26-89	260	0	212	730	6.4	5.3	1,210	1,190	--	---
	3-02-89	180	0	146	740	6.7	5.5	1,190	1,160	<.001	<.001
	5-03-89	170	0	139	650	5.8	5.5	1,060	1,020	<.002	.001
	9-14-89	190	0	154	740	5.9	5.6	1,180	1,160	<.001	<.001
10	2-25-88	340	0	281	240	11	9.9	621	605	--	--
	5-16-88	330	0	272	270	10	9.4	674	641	--	--
	9-26-88	350	0	284	280	11	9.8	662	661	.002	<.001
	11-30-88	340	0	279	280	11	10	677	657	.002	<.001
	3-02-89	340	0	275	260	11	10	669	634	.005	<.001
	5-03-89	340	0	279	270	11	9.5	669	643	<.002	.001
	9-14-89	340	0	282	250	11	9.9	594	626	<.001	.003

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Al	Ba	Be	Cd	Cr	Co	Cu	Fe	Pb
8	2-23-88	<10	18	<0.5	17	<5	480	<10	9	30
	9-26-88	<10	21	<.5	21	<5	610	<10	10	70
	11-30-88	<10	27	<.5	28	<5	550	<10	7	70
	3-02-89	<10	18	<1.5	26	<10	450	<30	60	80
	5-03-89	<10	12	<.5	15	<5	310	<10	5	30
	9-14-89	<10	16	<.5	21	<5	--	10	5	67
9	2-23-88	2,600	17	<.5	23	<5	400	<10	<3	50
	5-16-88	<10	25	<.5	15	<5	410	<10	6	20
	9-26-88	<10	22	<.5	15	<5	280	<10	15	50
	11-30-88	<10	21	<.5	19	<5	480	<10	7	60
	1-26-89	<10	19	<.5	14	<5	450	<10	14	20
	3-02-89	<10	20	<.5	15	<5	440	<10	8	10
	5-03-89	<10	23	<.5	14	<5	390	<10	6	20
	9-14-89	<10	20	<.5	20	<5	400	<10	6	44
10	2-25-88	<10	31	<.5	<1	<5	30	<10	6	<10
	5-16-88	<10	27	<.5	1	<5	30	<10	13	<10
	9-26-88	<10	27	<.5	<1	<5	20	<10	12	<10
	11-30-88	<10	28	<.5	<1	<5	20	<10	8	20
	3-02-89	<10	26	<.5	<1	<5	20	<10	<3	<10
	5-03-89	<10	26	<.5	<1	<5	20	<10	7	<10
	9-14-89	<10	29	<.5	<1	<5	20	<10	5	14

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Li	Mn	Mo	Ni	Ag	Sr	V	Zn	SS
8	2-23-88	17	45	<10	510	<1.0	130	<6	11,000	--
	9-26-88	19	2	<10	640	<1.0	1,400	<6	18,000	--
	11-30-88	21	5	<10	570	2.0	140	<6	17,000	--
	3-02-89	<12	8	<30	430	<3.0	110	<18	16,000	--
	5-03-89	10	1	<10	270	<1.0	70	<6	11,000	--
	9-14-89	14	<1	10	350	1.0	120	<6	15,000	--
9	2-23-88	12	7	<10	380	<1.0	95	<6	14,000	--
	5-16-88	20	63	<10	410	1.0	120	<6	5,600	--
	9-26-88	21	66	<10	280	<1.0	150	<6	3,500	--
	11-30-88	20	50	<10	520	<1.0	150	<6	12,000	12
	1-26-89	19	44	<10	480	<1.0	140	<6	10,000	5
	3-02-89	20	37	<10	470	<1.0	140	<6	9,100	3
	5-03-89	17	39	<10	400	<1.0	120	<6	6,400	2
	9-14-89	18	55	<10	420	<1.0	140	<6	8,400	--
10	2-25-88	13	22	<10	70	<1.0	100	<6	110	--
	5-16-88	12	20	<10	70	1.0	97	<6	140	--
	9-26-88	11	18	<10	80	<1.0	98	<6	120	--
	11-30-88	10	23	<10	60	<1.0	96	<6	150	49
	3-02-89	7	7	<10	60	1.0	99	<6	51	4
	5-03-89	9	9	<10	70	<1.0	94	<6	160	4
	9-14-89	8	11	10	60	<1.0	100	<6	86	95

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Q	SC	pH	WT	H	NH	Ca	Mg	Na	K
11	2-25-88	26	457	7.88	7.5	240	99	53	27	6.7	2.0
	4-20-88	13	--	7.32	12.5	--	--	--	--	--	--
	4-27-88	9.8	660	7.40	15.5	--	--	--	--	--	--
	5-16-88	6.3	686	7.71	24.5	380	170	80	44	9.4	2.6
	6-22-88	2.5	956	7.28	23.0	--	--	--	--	--	--
	7-20-88	12	628	7.97	23.5	--	--	--	--	--	--
	8-04-88	2.0	960	7.58	27.5	--	--	--	--	--	--
	8-23-88	2.5	990	7.65	22.5	--	--	--	--	--	--
	9-26-88	3.8	817	7.95	23.0	450	220	93	52	13	3.4
	10-19-88	3.4	928	7.69	12.5	--	--	--	--	--	--
	10-27-88	4.7	901	7.97	13.5	--	--	--	--	--	--
	11-30-88	22	475	7.33	10.5	250	93	54	28	6.9	2.0
	1-26-89	25	492	7.54	9.5	--	--	--	--	--	--
	3-02-89	24	524	7.64	10.5	270	88	57	31	8.2	1.9
	5-03-89	7.9	767	7.76	19.0	430	200	90	51	11	2.8
	9-13-89	3.0	950	7.17	18.0	520	270	110	60	11	3.5
12	2-24-88	948	348	8.04	7.0	190	48	40	22	4.0	1.4
	5-17-88	174	462	8.45	22.0	270	41	54	32	5.2	1.4
	9-27-89	73	475	8.20	26.5	250	40	49	30	5.9	2.2
	12-01-88	510	353	8.41	6.5	190	21	39	23	4.1	1.5
	3-03-89	445	443	7.83	10.0	240	52	49	28	5.3	1.4
	5-04-89	303	444	7.93	18.0	230	23	47	28	4.7	1.6
	9-14-89	354	455	8.50	--	280	51	55	34	6.9	1.8

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	HCO_3	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS	P	PO_4
11	2-25-88	180	0	145	88	8.2	6.4	289	279	--	--
	4-20-88	--	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--	--
	5-16-88	260	0	210	170	9.0	5.1	488	447	0.020	--
	6-22-88	--	--	--	--	--	--	--	--	--	--
	7-20-88	150	0	123	--	--	--	--	--	--	--
	8-04-88	320	0	260	--	--	--	--	--	--	--
	8-23-88	--	--	236	--	--	--	--	--	--	--
	9-26-88	280	0	226	230	14	9.0	569	551	.004	<0.001
	10-19-88	280	0	234	--	--	--	--	--	--	--
	10-27-88	290	0	235	--	--	--	--	--	--	--
	11-30-88	190	0	157	92	7.7	8.7	311	294	.019	.014
	1-26-89	310	0	257	--	--	--	--	--	--	--
	3-02-89	220	0	182	94	9.1	5.8	326	317	.016	.012
	5-03-89	280	0	232	180	11	6.1	532	492	.003	.002
	9-13-89	310	0	254	280	12	9.2	659	639	.003	<.001
12	2-24-88	170	0	143	39	6.2	6.9	228	206	--	--
	5-17-88	260	8	226	44	5.4	4.2	277	291	--	--
	9-27-88	250	0	206	46	7.6	7.9	268	272	.016	.008
	12-01-88	210	0	171	31	5.0	8.0	202	215	.025	.016
	3-03-89	230	0	186	41	6.7	5.5	253	248	.017	.012
	5-04-89	260	0	210	33	5.8	3.9	250	250	.004	.002
	9-14-89	270	5	227	48	8.0	8.8	307	305	.036	.020

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Al	Ba	Be	Cd	Cr	Co	Cu	Fe	Pb
11	2-25-88	<10	39	<0.5	1	<5	10	<10	3	<10
	4-20-88	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--
	5-16-88	<10	47	<.5	2	<5	10	<10	5	10
	6-22-88	--	--	--	--	--	--	--	--	--
	7-20-88	--	--	--	--	--	--	--	--	--
	8-04-88	--	--	--	--	--	--	--	--	--
	8-23-88	--	--	--	--	--	--	--	--	--
	9-26-88	<10	51	<.5	<1	<5	10	<10	5	50
	10-19-88	--	--	--	--	--	--	--	--	--
	10-27-88	--	--	--	--	--	--	--	--	--
	11-30-88	<10	47	<.5	1	<5	10	<10	5	20
	1-26-89	--	--	--	--	--	--	--	--	--
	3-02-89	10	43	<.5	<1	<5	10	<10	5	<10
	5-03-89	<10	50	<.5	<1	<5	9	<10	6	<10
	9-13-89	<10	46	<.5	1	<5	<10	<10	10	13
12	2-24-88	<10	180	<.5	<1	<5	<3	<10	6	<10
	5-17-88	<10	350	<.5	1	<5	<3	<10	4	<10
	9-27-88	<10	310	<.5	<1	<5	<3	<10	9	<10
	12-01-88	<10	180	<.5	<1	<5	<3	<10	9	<10
	3-03-89	<10	210	<.5	<1	<5	<3	<10	8	<10
	5-04-89	<10	270	<.5	<1	<5	<3	<10	6	<10
	9-14-89	<10	380	<.5	<1	<5	<1	<10	4	5

Table 4.--*Water-quality data*--Continued

Site no. (fig. 2)	Date	Li	Mn	Mo	Ni	Ag	Sr	V	Zn	SS
11	2-25-88	4	26	<10	20	<1.0	51	<6	310	--
	4-20-88	--	--	--	--	--	--	--	--	--
	4-27-88	--	--	--	--	--	--	--	--	--
	5-16-88	7	32	<10	30	1.0	75	<6	360	--
	6-22-88	--	--	--	--	--	--	--	--	--
	7-20-88	--	--	--	--	--	--	--	--	--
	8-04-88	--	--	--	--	--	--	--	--	--
	8-23-88	--	--	--	--	--	--	--	--	--
	9-26-88	9	49	<10	20	<1.0	87	<6	340	18
	10-19-88	--	--	--	--	--	--	--	--	--
	10-27-88	--	--	--	--	--	--	--	--	--
	11-30-88	6	26	<10	10	2.0	55	<6	330	11
	1-26-89	--	--	--	--	--	--	--	--	11
	3-02-89	<4	21	<10	10	<1.0	58	<6	310	22
	5-03-89	5	17	<10	30	<1.0	84	<6	400	3
	9-13-89	8	34	20	50	<1.0	99	<6	110	3
12	2-24-88	<4	27	<10	<10	<1.0	43	<6	48	--
	5-17-88	5	33	<10	<10	<1.0	59	<6	21	--
	9-27-88	5	44	<10	10	<1.0	53	<6	23	20
	12-01-88	<4	25	<10	<10	<1.0	42	<6	36	--
	3-03-89	<4	30	<10	<10	<1.0	53	<6	54	9
	5-04-89	4	42	<10	<10	<1.0	51	<6	28	7
	9-14-89	5	7	<10	<10	<1.0	61	<6	44	--

Table 5.--*Water-quality data for flood samples*

Site no. (fig. 2)	Date	Time	Q	SC	pH	WT	H	NH	Ca	Mg	Na	K	HCO_3
6	9-18-88	1945	540	390	7.76	24.0	170	52	35	21	3.4	2.6	150
	9-19-88	0830	720	185	7.57	23.0	88	18	19	9.8	1.9	3.9	85
	2-14-89	1230	3,190	142	8.16	7.5	72	4	15	8.3	1.7	1.7	83
		1430	2,670	152	8.02	7.5	63	0	13	7.3	1.5	1.2	87
	6-19-89	1145	944	261	7.68	23.5	130	25	28	15	2.3	1.9	130
11	9-18-88	1715	420	140	7.76	24.5	60	22	13	6.6	3.0	4.3	46
	3-20-89	1230	159	350	7.88	9.5	170	33	35	19	6.0	1.8	160
		1445	276	275	7.62	8.0	130	22	26	15	4.0	1.6	130

Site no. (fig. 2)	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS	P	PO_4	Al	Ba	Be	Cd
6	0	122	65	4.9	5.2	209	211	--	--	<10	56	<0.5	1
	0	70	17	3.6	5.7	109	103	--	--	<10	59	<.5	<1
	0	68	16	2.3	6.6	98	93	0.005	0.005	110	31	<.5	<1
	0	72	17	2.4	7.3	95	93	.004	.034	40	31	<.5	<1
	0	107	15	2.9	7.8	153	138	.010	.005	20	83	<.5	<1
11	0	38	20	4.2	4.9	86	79	--	--	10	36	<.5	4
	0	133	59	7.3	4.8	200	213	--	--	<10	38	<.5	<1
	0	105	39	5.5	5.9	161	160	--	--	20	32	<.5	<1

Site no. (fig. 2)	Cr	Co	Cu	Fe	Pb	Li	Mn	Mo	Ni	Ag	Sr	V	Zn	SS
6	<5	<3	<10	18	<10	<4	15	<10	<10	<1.0	36	<6	29	554
	<5	<3	<10	27	<10	<4	3	<10	<10	<1.0	21	<6	26	126
	<5	<3	<10	120	<10	<4	38	<10	<10	<1.0	22	<6	74	204
	<5	<3	<10	67	<10	<4	16	<10	<10	<1.0	19	<6	56	122
	<5	<3	<10	40	<10	<4	12	<10	<10	<1.0	33	<6	26	--
11	<5	<3	<10	65	10	<4	12	<10	<10	<1.0	16	<6	20	555
	<5	7	<10	17	20	<4	37	<10	<10	<1.0	38	<6	91	781
	<5	3	<10	36	30	<4	28	<10	<10	1.0	30	<6	63	342

Table 6.--*Particle-size distribution of suspended sediment for flood samples*

[--, no data available]

Site no. (fig. 2)	Date	Time	Percentage of sample smaller than particle diameter Particle diameter, in millimeters									
			1	0.5	0.25	0.125	0.062	0.031	0.016	0.008	0.004	0.002
6	9-18-88	1945	100	100	100	100	98	88	69	56	42	32
	9-19-88	0830	100	100	100	99	99	--	87	--	66	56
	2-14-89	1230	100	100	90	80	75	--	52	--	33	27
		1430	100	100	97	92	86	--	60	--	39	32
11	9-18-88	1715	100	99	97	94	84	67	52	40	29	21
	3-20-89	1230	100	100	100	100	98	86	66	48	34	24
		1445	100	100	100	99	94	75	57	43	34	24

TABLE 7

ABBREVIATIONS AND REPORTING UNITS FOR CHEMICAL CONSTITUENTS AND NOTATIONS USED IN TABLES

Q	Instantaneous discharge, in cubic feet per second
Al	Aluminum, percent
Ca	Calcium, percent
Fe	Iron, percent
K	Potassium, percent
Mg	Magnesium, percent
Na	Sodium, percent
P	Phosphorus, percent
Ti	Titanium, percent
As	Arsenic, in micrograms per gram
Ba	Barium, in micrograms per gram
Be	Beryllium, in micrograms per gram
Bi	Bismuth, in micrograms per gram
Cd	Cadmium, in micrograms per gram
Ce	Cesium, in micrograms per gram
Cr	Chromium, in micrograms per gram
Co	Cobalt, in micrograms per gram
Cu	Copper, in micrograms per gram
Eu	Europium, in micrograms per gram
Ga	Gallium, in micrograms per gram
Au	Gold, in micrograms per gram
Ho	Holmium, in micrograms per gram
La	Lanthanum, in micrograms per gram
Pb	Lead, in micrograms per gram
Li	Lithium, in micrograms per gram
Mn	Manganese, in micrograms per gram
Mo	Molybdenum, in micrograms per gram
Nd	Neodymium, in micrograms per gram
Ni	Nickel, in micrograms per gram
Nb	Niobium, in micrograms per gram
Sc	Scandium, in micrograms per gram
Ag	Silver, in micrograms per gram
Sr	Strontium, in micrograms per gram
Ta	Tantalum, in micrograms per gram
Th	Thorium, in micrograms per gram
Sn	Tin, in micrograms per gram
U	Uranium, in micrograms per gram
V	Vanadium, in micrograms per gram
Yb	Ytterbium, in micrograms per gram
Y	Yttrium, in micrograms per gram
Zn	Zinc, in micrograms per gram
<	Less than

Table 7.--*Total element contents of suspended sediment for flood samples (inductively coupled plasma)*

Site no. (fig. 2)	Date	Time	Q	Al	Ca	Fe	K	Mg	Na	P	Ti	As	Ba	Be	Bi
6	9-18-88	1945	540	4.2	8.7	2.8	2.3	3.8	0.26	0.06	0.20	10	390	2	<10
	9-19-88	0830	720	7.0	2.7	4.1	2.7	1.6	.28	.11	.32	30	630	2	<10
	2-14-89	1230	3,190	4.9	4.0	3.0	2.0	2.3	.28	.06	.24	20	521	2	<10
		1430	2,670	5.4	3.1	3.1	2.2	1.8	.30	.07	.24	20	545	2	<10
11	9-18-88	1715	420	3.8	11	3.7	2.0	5.6	.24	.09	.18	20	330	2	<10
	3-20-89	1230	159	2.9	14	3.8	2.4	7.8	.11	.06	.11	20	190	3	<10
		1445	276	3.1	13	3.7	1.8	7.2	.15	.06	.12	20	210	2	<10

Site no. (fig. 2)	Cd	Ce	Cr	Co	Cu	Eu	Ga	Au	Ho	La	Pb	Li	Mn	Mo
6	30	47	43	47	52	<2	12	<8	<4	24	2,100	21	2,900	<2
	21	81	85	36	150	<2	19	<8	<4	38	1,100	35	2,700	<2
	21	68	57	25	49	<2	13	<8	<4	32	2,300	23	2,600	<2
	24	74	64	27	53	<2	14	<8	<4	35	3,200	25	2,500	<2
11	4	61	37	72	130	<2	13	<8	<4	26	2,800	19	3,600	<2
	6	32	31	120	230	<2	12	<8	<4	16	5,200	13	3,800	<2
	5	37	35	91	160	<2	12	<8	<4	19	3,100	15	3,700	<2

Site no. (fig. 2)	Nd	Ni	Nb	Sc	Ag	Sr	Ta	Th	Sn	U	V	Yb	Y	Zn
6	26	52	6	6	2	71	<40	6	<10	<100	52	2	16	2,200
	39	54	10	12	<2	70	<40	13	30	<100	100	3	26	1,100
	31	33	7	7	2	65	<40	8	<10	<100	58	3	22	1,100
	33	36	8	8	2	68	<40	8	<10	<100	63	2	23	1,300
11	35	59	6	6	<2	64	<40	6	<10	<100	47	2	19	410
	16	110	<4	4	2	69	<40	<4	<10	<100	25	1	13	680
	19	76	<4	4	<2	66	<40	6	<10	<100	32	2	14	560

Table 8.--*Water-quality sampling sites for seepage runs in the Big River*

[DDDMMSS, degrees, minutes seconds]

Site no. (figs. 7 and 9)	Name	Latitude DDMMSS	Longitude DDDMMSS
A	Big River upstream from State Highway 8	375206	0903908
B	Big River below Blay Creek	375217	0903819
C	Big River below Hayden Creek	375225	0903652
D	Big River below Terre du Lac access	375255	0903542
E	Big River	375309	0903509
F	Seep K	375244	0903459
G	Eaton Creek at mouth	375219	0903518
H	Big River at Leadwood Public Access	375209	0903504
3	Big River at Bonehole	375232	0903258
4	Drill hole at Bonehole	375231	0903259
J	Big River at east side of Desloge tailings pile	375258	0903241
K	East seep	375253	0903243
L	Quarry seep	375322	0903141
6	Big River below Desloge	375322	0903107

TABLES 9 AND 10

ABBREVIATIONS AND REPORTING UNITS FOR CHEMICAL CONSTITUENTS AND NOTATIONS USED IN TABLES

Q	Instantaneous discharge, in cubic feet per second
SC	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius
pH	In standard units
WT	Water temperature, in degrees Celsius
H	Total hardness, in milligrams per liter as $CaCO_3$
Ca	Dissolved calcium, in milligrams per liter
Mg	Dissolved magnesium, in milligrams per liter
Na	Dissolved sodium, in milligrams per liter
K	Dissolved potassium, in milligrams per liter
HCO_3	Bicarbonate, in milligrams per liter
CO_3	Carbonate, in milligrams per liter
Alk	Alkalinity, total, in milligrams per liter as $CaCO_3$
SO_4	Dissolved sulfate, in milligrams per liter
Cl	Dissolved chloride, in milligrams per liter
SiO_2	Dissolved silica, in milligrams per liter
DS	Dissolved solids, residue at 180 degrees Celsius, in milligrams per liter
DSS	Dissolved solids, sum of constituents, in milligrams per liter
P	Dissolved phosphorous, in milligrams per liter
PO_4	Dissolved orthophosphate, in milligrams per liter
Al	Dissolved aluminum, in micrograms per liter
Ba	Dissolved barium, in micrograms per liter
Be	Dissolved beryllium, in micrograms per liter
Cd	Dissolved cadmium, in micrograms per liter
Cr	Dissolved chromium, in micrograms per liter
Co	Dissolved cadmium, in micrograms per liter
Cu	Dissolved copper, in micrograms per liter
Fe	Dissolved iron, in micrograms per liter
Pb	Dissolved lead, in micrograms per liter
Li	Dissolved lithium, in micrograms per liter
Mn	Dissolved manganese, in micrograms per liter
Mo	Dissolved molybdenum, in micrograms per liter
Ni	Dissolved nickel, in micrograms per liter
Ag	Dissolved silver, in micrograms per liter
Sr	Dissolved strontium, in micrograms per liter
V	Dissolved vanadium, in micrograms per liter
Zn	Dissolved zinc, in micrograms per liter
E	Estimated
<	Less than
--	No data available

Table 9.--*Water-quality data for seepage run sites in the Big River upstream from State Highway 8 to the Leadwood Public Access, September 13, 1989*

Site no. (fig. 7)	Q	SC	pH	WT	H	Ca	Mg	Na	K	HCO_3	CO_3	Alk	SO_4	Cl	SiO_2	DS	DSS
A	21.8	400	7.44	18.8	220	41	29	3.6	1.6	280	0	230	12	4.2	11	222	230
B	20.6	400	7.40	19.7	220	40	28	3.7	1.6	270	0	221	12	4.3	11	218	223
C	22.0	405	7.95	19.0	220	41	29	4.0	1.6	270	0	222	13	4.8	11	218	226
D	21.3	445	8.07	19.4	240	45	30	4.2	1.6	270	0	224	30	5.1	11	254	252
E	22.1	460	8.03	19.3	240	46	31	4.2	1.6	270	0	224	35	5.0	11	260	262
F	E.15	1,240	7.25	14.7	750	160	85	8.9	3.3	270	0	218	490	8.9	8.8	935	911
G	.45	1,140	7.62	16.4	680	160	69	11	4.6	350	0	284	410	13	12	897	846
H	26.3	535	7.98	16.6	290	58	36	5.0	1.8	280	0	227	71	5.4	12	339	320

Site no. (fig. 7)	Al	Ba	Be	Cd	Cr	Co	Cu	Fe	Pb	Li	Mn	Mo	Ni	Ag	Sr	V	Zn
A	<10	150	<0.5	<1	<5	<1	<10	6	<1	<4	11	<10	<10	<1.0	46	<6	33
B	<10	150	<.5	<1	<5	<1	<10	6	<1	<4	14	10	<10	<1.0	46	<6	14
C	<10	150	<.5	<1	<5	1	<10	12	<1	<4	11	<10	<10	<1.0	47	<6	16
D	<10	150	<.5	<1	<5	<1	<10	6	<1	<4	25	<10	<10	1.0	50	<6	8
E	10	150	<.5	<1	<5	<1	<10	5	<1	<4	23	10	<10	<1.0	50	<6	15
F	20	18	<.5	<1	<5	20	<10	1,400	<1	12	120	20	30	2.0	130	<6	55
G	20	39	<.5	12	<5	9	<10	6	3	13	460	10	20	<1.0	160	<6	2,000
H	<10	140	<.5	<1	<5	1	<10	7	<1	5	48	<10	<10	1.0	60	<6	31

Table 10.--*Water-quality data for seepage run sites in the Big River from the Leadwood Public Access to the Big River below Desloge, November 6-8, 1989*

Site no. (fig. 9)	Date	Q	SC	pH	WT	H	Ca	Mg	Na	K	HCO_3	CO_3
H	11-7-89	36.2	499	7.54	13.0	250	49	32	4.3	1.6	240	0
3	11-7-89	39.3	622	7.85	14.3	320	64	40	5.9	1.9	280	0
4	11-6-89	.09	929	7.16	15.9	540	110	65	9.9	2.7	340	0
J	11-7-89	44	640	8.07	15.2	330	65	40	5.5	2.0	290	0
K	11-7-89	--	1,770	6.97	13.0	780	230	50	62	17	910	0
L	11-7-89	E.1	2,440	9.05	14.3	1,100	280	100	56	110	37	8
6	11-8-89	44.7	642	8.05	12.7	340	70	40	6.2	2.2	290	0

Site no. (fig. 9)	Alk	SO_4	Cl	SiO_2	DSS	P	PO_4	Al	Ba	Be	Cd	Cr
H	200	52	5.7	5.4	282	--	--	<10	100	<0.5	<1	<5
3	231	93	7.0	5.4	356	--	--	<10	100	<.5	1	<5
4	276	240	10	9.9	611	--	--	<10	28	<.5	2	<5
J	235	100	7.0	5.4	364	--	--	<10	95	<.5	<1	<5
K	748	160	76	17	922	<0.010	0.021	20	130	<.5	<1	2
L	44	1,200	170	6.3	1,930	.010	<.010	20	25	<1	<2	<10
6	240	100	7.6	5.6	370	<.010	<.010	<10	99	<.5	<1	<5

Site no. (fig. 9)	Co	Cu	Fe	Pb	Li	Mn	Mo	Ni	Ag	Sr	V	Zn
H	4	<10	10	<1	<4	48	<10	<10	<1	49	<6	94
3	2	<10	4	2	5	60	<10	<10	<1	62	<6	100
4	20	<10	10	20	7	27	<10	70	2	100	<6	200
J	1	<10	5	4	6	43	<10	<10	<1	62	<6	150
K	6	<1	91	<1	15	570	<1	33	1	220	<1	67
L	1	<20	<6	<1	54	29	<20	<20	<2	310	<12	29
6	1	<10	3	3	6	43	<10	<10	1	67	<6	91

Table 11.--*Particle-size distribution of bed sediment*

[--, no data available]

Site no. (fig. 2)	Date	Percentage of sample smaller than particle diameter Particle diameter, in millimeters															
		64	32	16	8	4	2	1	0.5	0.25	0.125	0.062	0.031	0.016	0.008	0.004	0.002
1	5-16-88	100	100	93	76	51	35	31	24	10	4	2	2	1	1	1	1
	9-26-88	100	100	74	40	19	8	3	1	1	0	0	--	0	--	0	0
	11-30-88	100	100	100	83	55	43	36	28	16	5	2	--	--	--	0	--
	3-02-89	100	100	94	71	48	35	28	22	9	2	1	--	0	0	0	0
	5-03-89	100	100	65	44	27	15	7	4	1	0	0	--	0	--	0	0
	9-13-89	100	100	78	55	34	21	14	9	2	1	0	0	0	0	0	0
2	9-26-88	100	100	93	84	68	50	36	14	4	2	2	1	1	1	0	0
	12-01-88	100	100	100	95	81	58	39	17	6	4	2	--	--	--	1	--
	3-03-89	100	100	94	83	68	54	42	25	14	11	9	--	5	4	3	2
	5-03-89	100	100	89	66	50	36	28	18	10	7	5	--	2	2	1	1
	9-13-89	100	94	80	64	54	44	35	21	8	4	2	2	1	1	1	1
3	5-17-88	100	100	100	97	86	67	42	16	10	7	6	5	3	2	2	1
	9-27-88	100	100	95	90	76	53	24	3	1	0	0	--	0	--	0	0
	12-01-88	100	100	100	94	80	61	34	7	1	1	0	--	--	--	0	--
	3-02-89	100	100	95	84	66	46	22	4	1	1	0	--	0	0	0	0
	5-04-89	100	100	98	92	82	65	37	5	1	0	0	--	0	0	0	0
	9-14-89	100	100	98	92	79	58	29	5	2	1	1	1	0	0	0	0
5	12-01-88	100	100	100	98	95	92	83	58	25	17	12	--	--	--	1	--
	3-02-89	100	100	100	96	82	72	61	38	10	5	3	--	1	1	1	1
	5-04-89	100	100	100	93	72	61	51	37	24	20	15	--	2	1	1	1
	9-13-89	100	100	98	95	89	63	32	9	6	5	2	1	0	0	0	0
6	5-16-88	100	100	100	88	77	64	45	25	10	6	4	3	2	1	1	1
	12-01-88	100	100	97	89	71	56	38	18	4	1	0	--	--	--	0	--
	3-03-89	100	100	100	93	81	66	50	27	11	5	3	--	2	1	1	1
	5-04-89	100	100	97	82	61	42	27	14	3	1	1	--	0	0	0	0
	9-13-89	100	100	94	70	49	33	20	8	3	2	1	1	1	0	0	0

Table 11.--*Particle-size distribution of bed sediment*--Continued

Site no. (fig. 2)	Date	Percentage of sample smaller than particle diameter Particle diameter, in millimeters															
		64	32	16	8	4	2	1	0.5	0.25	0.125	0.062	0.031	0.016	0.008	0.004	0.002
7	5-16-88	100	100	100	93	80	59	28	5	1	1	1	1	0	0	0	0
	9-26-88	100	100	97	70	53	37	17	4	1	1	1	0	0	0	0	0
	11-30-88	100	100	100	91	71	48	13	2	1	1	0	--	--	--	0	--
	3-02-89	100	100	97	73	56	38	16	5	2	1	1	--	0	0	0	0
	5-03-89	100	100	81	62	47	33	15	3	1	0	0	--	0	0	0	0
	9-13-89	100	100	88	76	60	42	18	4	1	1	0	0	0	0	0	0
8	9-26-88	100	100	100	100	99	96	74	42	18	4	1	0	0	0	0	0
	11-30-88	100	100	100	100	99	93	67	34	14	3	1	--	--	--	0	--
	3-02-89	100	100	100	98	96	88	66	40	22	8	3	--	1	0	0	0
	5-03-89	100	100	100	100	98	93	71	43	20	5	1	--	0	0	0	0
9	9-26-88	100	100	100	98	89	78	56	30	9	3	1	1	1	0	0	0
	11-30-88	100	100	100	100	94	87	68	36	8	2	1	--	--	--	0	--
	3-02-89	100	100	100	100	91	80	60	34	8	2	1	--	1	0	0	0
	5-03-89	100	100	100	95	88	84	73	52	28	15	8	--	3	2	1	1
10	9-26-88	100	100	100	100	94	89	85	78	54	22	6	2	1	1	1	0
	11-30-88	100	100	100	100	97	89	78	68	55	33	15	--	--	--	1	--
	3-02-89	100	100	100	100	89	73	61	52	45	34	19	--	5	3	2	2
	5-03-89	100	100	100	100	85	62	48	39	32	20	10	--	2	1	1	1
	9-14-89	100	100	100	98	97	96	93	89	81	49	16	5	2	1	1	1
11	5-16-88	100	100	100	98	91	68	47	20	9	4	2	1	0	0	0	0
	9-26-88	100	100	100	98	87	53	25	6	2	2	1	1	1	0	0	0
	11-30-88	100	100	100	98	83	53	33	17	11	5	2	--	--	--	0	--
	3-02-89	100	100	97	91	82	57	33	14	7	4	2	--	1	0	0	0
	5-03-89	100	100	100	94	81	49	25	7	3	2	1	--	0	0	0	0
	9-13-89	100	100	100	100	96	91	80	57	19	6	4	3	2	1	1	0
12	5-17-88	100	100	96	89	79	72	68	59	27	6	3	2	1	1	1	1
	12-01-88	100	100	100	89	73	64	59	47	10	2	2	--	--	---	0	--
	3-03-89	100	100	90	79	72	68	64	56	17	4	2	--	1	0	0	0
	5-04-89	100	100	85	59	40	29	23	15	3	1	0	--	0	0	0	0
	9-14-89	100	83	61	44	30	20	14	8	2	1	0	0	0	0	0	0

Table 12.--*Particle-size distribution of bed sediment for seepage run sites in the Big River*

[--, no data available]

Site no. (fig. 7)	Date	Percentage of sample smaller than particle diameter Particle diameter, in millimeters														
		32	16	8	4	2	1	0.5	0.25	0.125	0.062	0.031	0.016	0.008	0.004	0.002
15	9-13-89	100	72	54	40	28	21	12	1	0	0	0	0	0	0	0
25	9-13-89	100	83	62	40	20	8	3	1	1	0	0	0	0	0	0
45	9-13-89	100	82	64	45	28	15	8	3	1	1	0	0	0	0	0
55	9-13-89	100	100	100	99	94	72	22	4	2	2	1	1	0	0	0
65	9-13-89	100	100	100	93	72	44	14	2	0	0	--	0	--	0	0
75	9-13-89	100	86	62	36	20	10	5	1	0	0	--	0	--	0	0

TABLES 13, 14, 15, and 16

ABBREVIATIONS AND REPORTING UNITS FOR CHEMICAL CONSTITUENTS AND NOTATIONS USED IN TABLES

Al	Aluminum, percent	Pb	Lead, in micrograms per gram
Ca	Calcium, percent	Li	Lithium, in micrograms per gram
Fe	Iron, percent	Mn	Manganese, in micrograms per gram
K	Potassium, percent	Mo	Molybdenum, in micrograms per gram
Mg	Magnesium, percent	Nd	Neodymium, in micrograms per gram
Na	Sodium, percent	Ni	Nickel, in micrograms per gram
P	Phosphorus, percent	Nb	Niobium, in micrograms per gram
Ti	Titanium, percent	Sc	Scandium, in micrograms per gram
Sb	Antimony, in micrograms per gram	Ag	Silver, in micrograms per gram
As	Arsenic, in micrograms per gram	Sr	Strontium, in micrograms per gram
B	Boron, in micrograms per gram	Ta	Tantalum, in micrograms per gram
Ba	Barium, in micrograms per gram	Th	Thorium, in micrograms per gram
Be	Beryllium, in micrograms per gram	Sn	Tin, in micrograms per gram
Bi	Bismuth, in micrograms per gram	W	Tungsten, in micrograms per gram
Cd	Cadmium, in micrograms per gram	U	Uranium, in micrograms per gram
Ce	Cesium, in micrograms per gram	V	Vanadium, in micrograms per gram
Cr	Chromium, in micrograms per gram	Yb	Ytterbium, in micrograms per gram
Co	Cobalt, in micrograms per gram	Y	Yttrium, in micrograms per gram
Cu	Copper, in micrograms per gram	Zn	Zinc, in micrograms per gram
Eu	Europium, in micrograms per gram	Zr	Zirconium, in micrograms per gram
Ga	Gallium, in micrograms per gram	<	Less than
Ge	Germanium, in micrograms per gram	--	No data available
Au	Gold, in micrograms per gram	>	Greater than
Ho	Holmium, in micrograms per gram	µm	Micrometer
La	Lanthanum, in micrograms per gram	t	Detected in trace quantities, but not quantifiable

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*

Site no. (fig. 2)	Date	Al Fine	Al Coarse	Ca Fine	Ca Coarse	Fe Fine	Fe Coarse	K Fine	K Coarse	Mg Fine	Mg Coarse	Na Fine	Na Coarse	P Fine	P Coarse	Ti Fine	Ti Coarse
1	2-23-88	3.7	1.7	0.7	1.0	1.7	1.0	2.4	1.3	0.42	0.56	0.33	0.07	0.04	0.01	0.21	0.09
	5-16-88	4.2	2.7	1.4	1.0	1.9	1.5	2.3	1.8	.43	.54	.36	.13	.04	.03	.23	.12
	9-26-88	1.8	1.0	1.1	.36	1.0	1.5	1.5	.80	.52	.13	.08	.06	.02	.02	.07	.03
	11-30-88	3.9	2.0	1.1	.85	2.0	1.1	2.5	1.6	.46	.47	.33	.10	.04	.02	.20	.08
	3-02-89	3.9	1.9	.76	.82	1.9	1.0	2.3	1.3	.44	.47	.34	.09	.04	.02	.23	.08
	5-03-89	4.3	--	1.2	--	2.1	--	2.2	--	.52	--	.36	--	.05	--	.25	--
	9-13-89	3.9	2.5	2.3	1.3	2.0	1.5	2.2	1.7	.50	.55	.36	.12	.04	.03	.22	.12
2	2-24-88	5.9	5.9	.78	1.5	2.6	2.9	3.3	3.6	.59	1.0	.48	.26	.05	.05	.27	.23
	9-26-88	3.9	5.1	7.7	4.5	2.3	2.5	3.5	3.9	3.5	1.8	.14	.37	.04	.05	.12	.20
	12-01-88	5.2	2.9	6.6	11	3.8	3.2	3.9	2.6	2.7	5.2	.24	.08	.07	.05	.20	.09
	3-03-89	5.8	4.7	2.7	5.3	3.1	2.9	3.5	3.3	1.4	2.5	.42	.19	.05	.04	.27	.18
	5-03-89	5.2	--	4.9	--	2.7	--	3.6	--	2.3	--	.33	--	.06	--	.24	--
	9-13-89	5.3	3.6	2.9	7.2	2.6	2.4	3.7	2.8	1.6	4.0	.39	.14	.05	.04	.23	.12
3	3-24-88	3.5	1.9	5.0	8.1	2.0	1.8	2.3	1.7	2.5	4.2	.31	.07	.04	.02	.19	.06
	5-17-88	4.3	2.6	4.5	8.3	2.3	2.0	2.3	1.8	2.2	4.3	.35	.12	.05	.03	.22	.11
	9-27-88	1.7	--	7.0	--	1.7	--	1.5	--	3.4	--	.07	--	.03	--	.05	--
	11-30-88	3.8	2.1	5.6	6.7	2.3	2.0	2.5	1.7	2.8	3.5	.24	.08	.04	.03	.17	.07
	3-02-89	4.0	2.4	3.0	5.7	2.1	1.7	2.3	1.7	1.5	2.9	.39	.10	.04	.03	.23	.09
	5-04-89	4.0	--	2.7	--	2.2	--	2.2	--	1.3	--	.39	--	.05	--	.25	--
	9-14-89	4.1	3.8	5.3	5.2	2.0	2.2	2.2	2.3	1.1	2.0	.35	.17	.06	.06	.21	.15
5	2-24-88	.79	.61	20	20	3.7	3.6	.75	.61	8.9	9.1	.05	.04	.03	.03	.03	.02
	9-27-88	.52	.59	21	20	3.8	3.9	.57	.60	11	11	.04	.03	.02	.02	.02	.03
	12-01-88	1.0	.68	19	20	3.8	4.0	1.0	.70	10	11	.04	.04	.03	.03	.04	.03
	3-02-89	4.0	1.7	4.9	13	2.6	3.1	1.8	1.3	2.5	6.5	.38	.08	.03	.02	.22	.06
	5-04-89	1.6	--	16	--	3.6	--	1.1	--	8.8	--	.11	--	.03	--	.08	--
	9-14-89	2.2	.82	15	18	3.0	3.8	1.7	.74	6.0	9.6	.15	.05	.04	.03	.10	.03

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	As		Ba		Be		Bi		Cd		Ce		Cr		Co	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1	<10	<10	620	320	1	<1	<10	<10	<2	<2	60	21	37	16	10	9
	<10	<10	640	430	1	<1	<10	<10	<2	<2	63	36	48	28	14	9
	<10	<10	370	250	<1	<1	<10	<10	<2	<2	18	12	18	26	8	8
	<10	<10	640	340	1	<1	<10	<10	<2	<2	55	19	36	17	13	6
	<10	<10	630	330	1	<1	<10	<10	<2	<2	56	21	37	16	13	6
	<10	--	650	--	1	--	<10	--	<2	--	59	--	49	--	15	--
	20	<10	840	510	1	<1	<10	<10	<2	<2	65	35	57	28	19	12
2	<10	<10	580	570	2	2	<10	<10	5	6	66	64	59	58	31	37
	<10	10	440	530	1	2	<10	<10	26	26	39	53	35	53	160	230
	20	10	540	350	2	2	<10	<10	42	65	83	54	56	31	140	71
	10	10	590	520	2	2	<10	<10	9	10	78	62	63	47	53	50
	10	--	500	--	2	--	<10	--	49	--	54	--	53	--	98	--
	10	10	540	390	2	1	<10	<10	31	27	68	41	57	29	280	140
3	<10	<10	530	310	1	<1	<10	<10	68	120	55	24	31	14	32	17
	<10	<10	480	320	1	1	<10	<10	52	59	60	36	41	26	31	21
	<10	--	280	--	<1	--	<10	--	97	--	18	--	15	--	18	--
	<10	<10	510	300	1	<1	<10	<10	90	110	50	25	38	19	35	23
	<10	<10	550	350	1	<1	<10	<10	44	80	56	28	39	21	37	20
	<10	--	530	--	1	--	<10	--	96	--	48	--	42	--	56	--
	<10	<10	630	540	1	1	<10	<10	50	74	59	44	46	39	98	86
5	<10	<10	64	41	2	1	<10	<10	12	12	27	25	8	5	28	20
	<10	10	61	50	1	1	<10	<10	26	18	21	22	5	8	22	38
	<10	<10	66	45	2	2	<10	<10	14	29	26	25	10	6	34	30
	<10	<10	460	220	2	1	<10	<10	13	31	57	29	37	15	48	31
	<10	--	160	--	2	--	<10	--	13	--	32	--	15	--	48	--
	<10	<10	420	93	2	1	<10	<10	22	30	36	24	22	6	110	35

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Cu		Eu		Ga		Au		Ho		La		Pb		Li	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1	64	9	<2	<2	8	4	<8	<8	<4	<4	27	10	58	91	14	6
	21	12	<2	<2	11	7	<8	<8	<4	<4	28	16	61	46	17	11
	9	12	<2	<2	5	<4	<8	<8	<4	<4	9	6	44	39	7	4
	34	6	<2	<2	10	4	<8	<8	<4	<4	27	10	57	25	15	7
	20	7	<2	<2	10	5	<8	<8	<4	<4	25	10	57	25	15	7
	23	--	<2	--	11	--	<8	--	<4	--	31	--	120	--	18	--
	20	12	<2	<2	12	7	<8	<8	<4	<4	33	17	89	89	17	10
2	30	35	<2	<2	13	13	<8	<8	<4	<4	33	31	400	520	22	21
	110	70	<2	<2	12	15	<8	<8	<4	<4	19	27	1,700	2,000	13	17
	110	200	<2	<2	17	11	<8	<8	<4	<4	34	20	2,900	3,500	17	10
	41	58	<2	<2	15	14	<8	<8	<4	<4	35	27	890	1,100	21	16
	59	--	<2	--	14	--	<8	--	<4	--	30	--	3,000	--	18	--
	80	170	<2	<2	17	13	<8	<8	<4	<4	36	22	1,700	1,200	19	13
3	52	22	<2	<2	9	5	<8	<8	<4	<4	24	11	5,800	4,700	14	7
	26	17	<2	<2	11	9	<8	<8	<4	<4	26	17	4,000	2,400	20	12
	18	--	<2	--	5	--	<8	--	<4	--	10	--	3,400	--	7	--
	27	32	<2	<2	11	6	<8	<8	<4	<4	24	12	4,900	4,500	14	8
	24	18	<2	<2	11	8	<8	<8	<4	<4	26	14	3,600	3,200	17	9
	28	--	<2	--	12	--	<8	--	<4	--	25	--	8,500	--	17	--
	28	27	<2	<2	12	10	<8	<8	<4	<4	31	23	4,500	4,000	17	15
5	82	74	<2	<2	6	7	<8	<8	<4	<4	11	10	2,400	870	4	4
	120	120	<2	<2	7	7	<8	<8	<4	<4	10	10	1,700	5,100	3	3
	62	220	<2	<2	9	8	<8	<8	<4	<4	11	10	1,900	5,400	6	4
	51	180	<2	<2	12	9	<8	<8	<4	<4	26	12	2,400	7,500	18	8
	72	--	<2	--	10	--	<8	--	<4	--	14	--	2,500	--	8	--
	210	280	<2	<2	11	8	<8	<8	<4	<4	18	11	3,300	3,400	11	4

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Mn		Mo		Nd		Ni		Nb		Sc		Ag		Sr	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1	1,000	630	<2	<2	24	9	16	13	4	<4	4	<2	<2	<2	64	26
	2,000	1,000	<2	<2	29	15	24	13	5	<4	6	3	<2	<2	67	38
	820	480	<2	<2	10	6	9	14	<4	<4	<2	<2	<2	<2	28	14
	1,600	690	<2	<2	25	10	17	8	<4	<4	5	2	<2	<2	74	33
	1,400	620	<2	<2	24	8	19	9	5	<4	5	<2	<2	<2	65	29
	2,500	--	<2	--	30	--	67	--	<4	--	6	--	<2	--	68	--
	3,200	1,700	<2	<2	30	16	29	14	<4	<4	5	3	<2	<2	73	38
2	860	1,100	<2	<2	31	29	38	39	6	4	8	8	<2	<2	90	80
	4,600	6,100	<2	<2	23	30	60	83	4	5	5	7	2	<2	85	97
	3,800	3,100	<2	<2	33	19	66	39	6	<4	8	5	4	6	100	88
	1,600	1,800	<2	<2	33	26	44	38	7	5	8	6	<2	<2	94	84
	2,400	--	<2	--	27	--	58	--	6	--	7	--	4	--	96	--
	9,700	5,800	<2	<2	31	20	82	52	<4	<4	7	5	<2	<2	92	74
3	2,300	2,000	<2	<2	23	13	27	15	<4	<4	4	2	9	11	70	49
	1,700	2,100	<2	<2	26	19	42	27	<4	<4	6	4	5	5	72	55
	2,000	--	<2	--	12	--	19	--	<4	--	2	--	11	--	44	--
	2,800	2,000	<2	<2	22	12	32	21	5	<4	5	3	10	10	71	48
	2,200	1,800	<2	<2	25	12	30	17	6	4	5	3	5	8	73	48
	3,700	--	<2	--	25	--	41	--	7	--	5	--	11	--	73	--
	4,000	3,400	<2	<2	28	20	120	110	<4	<4	6	5	4	6	80	66
5	4,800	5,100	<2	<2	21	20	21	14	<4	<4	2	<2	<2	<2	56	55
	5,100	5,000	<2	<2	25	23	15	25	4	<4	<2	2	3	3	53	55
	5,000	5,100	<2	<2	13	13	24	21	<4	<4	3	2	<2	4	59	57
	2,200	3,600	<2	<2	24	14	35	23	6	<4	6	3	<2	4	73	53
	4,600	--	<2	--	20	--	27	--	<4	--	3	--	<2	--	64	--
	5,500	5,100	<2	<2	18	14	70	28	<4	<4	3	<2	3	4	77	58

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Ta		Th		Sn		U		V		Yb		Y		Zn	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1	<40	<40	8	<4	<10	<10	<100	<100	41	19	2	<1	18	7	61	360
	<40	<40	9	5	80	<10	<100	<100	49	32	3	1	20	12	70	43
	<40	<40	<4	<4	<10	<10	<100	<100	19	27	1	<1	8	7	54	39
	<40	<40	8	<4	10	<10	<100	<100	43	19	2	1	19	8	78	29
	<40	<40	7	<4	<10	<10	<100	<100	45	20	2	1	19	8	64	28
	<40	--	10	--	<10	--	<100	--	52	--	2	--	21	--	120	--
	<40	<40	9	5	<10	<10	<100	<100	43	28	3	1	20	12	110	110
2	<40	<40	9	8	<10	<10	<100	<100	70	70	2	2	20	19	1,400	1,600
	<40	<40	5	9	<10	<10	<100	<100	37	51	1	2	13	18	5,400	6,900
	<40	<40	7	<4	20	<10	<100	<100	61	36	2	1	20	14	5,300	5,400
	<40	<40	10	7	<10	<10	<100	<100	70	56	3	2	21	16	1,900	1,700
	<40	--	8	--	<10	--	<100	--	55	--	2	--	18	--	9,000	--
	<40	<40	11	7	<10	<10	<100	<100	54	35	2	1	20	14	9,400	6,200
3	<40	<40	<4	<4	<10	<10	<100	<100	37	17	2	1	16	9	4,300	7,300
	<40	<40	6	<4	<10	<10	<100	<100	50	30	2	1	17	13	3,700	3,300
	<40	--	<4	--	20	--	<100	--	17	--	<1	--	8	--	6,000	--
	<40	<40	<4	<4	<10	<10	<100	<100	38	21	2	1	17	9	5,400	6,300
	<40	<40	6	<4	<10	<10	<100	<100	46	24	2	1	17	11	2,600	4,600
	<40	--	<4	--	<10	--	<100	--	46	--	2	--	16	--	5,500	--
	<40	<40	6	6	<10	<10	<100	<100	47	43	2	1	17	13	3,000	4,300
5	<40	<40	<4	<4	<10	<10	<100	<100	9	7	1	1	11	11	600	620
	<40	<40	<4	<4	<10	<10	<100	<100	6	7	1	1	11	11	1,600	1,100
	<40	<40	<4	<4	<10	<10	<100	<100	9	7	1	1	12	11	790	1,700
	<40	<40	6	<4	<10	<10	<100	<100	48	19	2	1	17	11	1,000	1,900
	<40	--	<4	--	<10	--	<100	--	17	--	1	--	13	--	860	--
	<40	<40	4	<4	<10	<10	<100	<100	21	9	1	1	13	11	1,500	1,700

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no. (fig. 2)	Date	Al		Ca		Fe		K		Mg		Na		P		Ti	
		Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
6	2-25-88	3.1	1.9	11	12	2.9	2.5	2.1	1.5	5.5	5.8	0.20	0.08	0.06	0.03	0.14	0.07
	5-16-88	3.6	1.9	7.6	11	2.4	2.4	2.1	1.6	3.3	5.9	.29	.08	.04	.03	.17	.07
	9-27-88	1.5	1.0	13	15	2.5	2.8	1.3	.80	6.6	8.5	.07	.04	.03	.02	.05	.03
	12-01-88	2.6	1.1	11	13	2.8	2.5	2.1	1.0	5.5	6.7	.18	.05	.03	.02	.11	.04
	3-03-89	3.4	1.6	9.0	11	2.8	2.4	1.8	1.3	4.2	5.8	.25	.07	.05	.03	.17	.06
	5-04-89	3.7	--	7.0	--	2.4	--	2.0	--	3.0	--	.28	--	.05	--	.19	--
	9-13-89	3.2	3.1	12	11	2.0	2.3	1.7	1.7	3.2	3.9	.22	.14	.06	.06	.13	.13
7	2-23-88	5.3	3.2	2.0	2.7	2.4	1.7	3.6	2.6	1.2	1.5	.39	.18	.06	.04	.26	.12
	5-16-88	4.8	3.5	2.0	3.1	2.3	2.1	3.1	2.7	1.0	1.6	.39	.22	.07	.06	.23	.14
	9-26-88	--	5.7	--	5.8	--	2.6	--	5.2	--	2.4	--	.23	--	.06	--	.22
	11-30-88	5.3	4.0	3.4	2.5	2.9	2.5	3.4	3.0	1.9	1.4	.33	.26	.06	.05	.19	.12
	3-02-89	5.4	3.7	2.3	2.7	2.3	1.9	3.9	2.8	1.3	1.5	.32	.17	.05	.04	.27	.14
	5-03-89	5.0	--	2.2	--	2.2	--	3.4	--	1.2	--	.32	--	.07	--	.25	--
	9-13-89	4.7	3.8	5.2	4.6	2.2	2.2	3.7	3.1	1.7	1.8	.32	.19	.06	.06	.21	.13
8	2-23-88	1.1	.56	18	20	2.7	2.7	1.1	.57	8.7	9.5	.04	.04	.03	.02	.04	.02
	9-26-88	.69	.53	19	20	3.2	2.8	.72	.57	11	12	.03	.03	.02	.02	.02	.03
	11-30-88	1.0	.55	17	19	2.9	2.8	1.0	.59	9.3	11	.04	.04	.02	.02	.03	.02
	3-02-89	.88	.52	17	19	3.0	2.7	.88	.54	9.3	11	.04	.03	.02	.02	.03	.02
	5-03-89	1.0	--	15	--	3.4	--	.91	--	8.5	--	.05	--	.03	--	.04	--
9	2-23-88	1.7	.7	15	18	2.9	2.7	1.4	.67	7.3	8.7	.09	.04	.03	.03	.06	.03
	9-26-88	1.2	2.7	13	6.9	2.4	2.3	1.0	2.0	6.8	3.4	.04	.16	.03	.04	.04	.11
	11-30-88	3.1	1.2	12	17	2.9	2.8	2.3	1.1	6.1	9.8	.17	.06	.03	.02	.11	.04
	3-02-89	4.7	1.5	6.9	17	3.0	2.8	2.5	1.0	3.5	9.5	.33	.07	.03	.03	.21	.05
	5-03-89	2.3	--	8.8	--	2.4	--	1.6	--	4.5	--	.09	--	.04	--	.11	--

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no. (fig. 2)	As Fine	As Coarse	Ba Fine	Ba Coarse	Be Fine	Be Coarse	Bi Fine	Bi Coarse	Cd Fine	Cd Coarse	Ce Fine	Ce Coarse	Cr Fine	Cr Coarse	Co Fine	Co Coarse
6	<10	<10	300	230	2	1	<10	<10	27	35	44	31	27	16	30	20
	<10	<10	440	260	1	1	<10	<10	41	39	50	30	36	18	37	19
	<10	<10	180	90	1	1	<10	<10	56	28	25	23	15	13	19	13
	<10	<10	360	140	1	1	<10	<10	50	53	39	20	25	9	30	16
	<10	<10	380	210	2	1	<10	<10	41	44	50	26	32	14	35	17
	<10	--	450	--	1	--	<10	--	65	--	49	--	37	--	111	--
	<10	<10	470	390	1	1	<10	<10	71	74	42	40	33	31	55	54
7	<10	<10	550	400	1	<1	<10	<10	<2	<2	70	42	55	27	19	12
	<10	<10	510	410	1	1	<10	<10	<2	<2	68	53	57	33	17	14
	--	10	--	530	--	1	--	<10	--	<2	--	58	--	78	--	28
	<10	<10	450	470	1	1	<10	<10	<2	<2	67	53	68	39	24	17
	<10	<10	530	380	1	1	<10	<10	<2	<2	63	44	63	38	20	14
	10	--	710	--	1	--	<10	--	<2	--	59	--	61	--	29	--
	10	<10	850	580	1	1	<10	<10	<2	<2	67	46	71	40	23	18
8	10	<10	83	30	2	1	<10	<10	91	71	26	23	11	6	250	79
	60	20	53	29	1	1	<10	<10	94	78	20	19	11	5	300	68
	50	20	70	30	2	1	<10	<10	98	74	22	20	9	5	620	220
	80	30	69	30	1	1	<10	<10	85	72	19	19	9	5	600	350
	150	--	73	--	2	--	<10	--	100	--	24	--	8	--	570	--
9	20	10	190	75	2	1	<10	<10	40	41	26	23	16	7	710	330
	<10	10	93	230	1	1	<10	<10	70	73	18	26	13	32	1,900	2,500
	10	<10	250	96	2	1	<10	<10	42	45	32	25	30	11	710	350
	20	<10	400	120	2	1	<10	<10	32	41	42	26	51	15	650	380
	20	--	170	--	2	--	<10	--	86	--	27	--	21	--	2,300	--

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Cu		Eu		Ga		Au		Ho		La		Pb		Li	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
6	42	41	<2	<2	10	7	<8	<8	<4	<4	20	13	3,800	2,500	16	9
	50	47	<2	<2	10	8	<8	<8	<4	<4	23	13	3,000	1,600	16	8
	40	14	<2	<2	6	8	<8	<8	<4	<4	12	9	1,700	2,200	7	4
	72	64	<2	<2	9	6	<8	<8	<4	<4	19	9	3,300	1,700	9	5
	36	37	<2	<2	12	8	<8	<8	<4	<4	22	11	3,300	2,300	16	7
	94	--	<2	--	11	--	<8	--	<4	--	25	--	5,300	--	16	--
	47	63	<2	<2	10	10	<8	<8	<4	<4	22	21	3,500	3,300	14	14
7	48	24	<2	<2	13	8	<8	<8	<4	<4	30	18	170	100	18	10
	44	36	<2	<2	12	10	<8	<8	<4	<4	29	22	150	96	17	11
	--	35	--	<2	--	14	--	<8	--	<4	--	28	--	180	--	15
	33	18	<2	<2	14	11	<8	<8	<4	<4	27	20	190	88	14	10
	32	24	<2	<2	15	11	<8	<8	<4	<4	29	19	130	100	17	11
	30	--	<2	--	14	--	<8	--	<4	--	30	--	230	--	16	--
	32	28	<2	<2	13	10	<8	<8	<4	<4	33	22	160	150	14	11
8	160	84	<2	<2	6	5	<8	<8	<4	<4	10	9	8,600	4,300	5	3
	150	69	<2	<2	5	6	<8	<8	<4	<4	10	9	15,000	2,800	4	3
	260	93	<2	<2	4	6	<8	<8	<4	<4	9	9	15,000	3,900	5	3
	210	120	<2	<2	5	7	<8	<8	<4	<4	8	8	6,400	5,600	4	3
	370	--	<2	--	5	--	<8	--	<4	--	9	--	38,000	--	5	--
9	380	170	<2	<2	5	5	<8	<8	<4	<4	12	9	6,800	6,300	7	3
	330	400	<2	<2	<4	6	<8	<8	<4	<4	10	14	17,000	5,900	5	10
	150	91	<2	<2	10	6	<8	<8	<4	<4	16	11	4,300	3,600	11	5
	180	110	<2	<2	13	8	<8	<8	<4	<4	21	11	3,500	4,200	17	6
	450	--	<2	--	4	--	<8	--	<4	--	14	--	6,600	--	9	--

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Mn		Mo		Nd		Ni		Nb		Sc		Ag		Sr	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
6	3,100	3,100	<2	<2	25	17	31	18	<4	<4	4	2	3	4	65	54
	2,500	2,900	<2	<2	22	15	33	17	<4	<4	5	3	4	4	70	53
	3,100	3,500	<2	<2	17	14	20	11	<4	<4	2	2	6	3	50	52
	3,200	3,200	<2	<2	18	10	26	12	4	<4	4	2	7	6	67	47
	2,900	2,900	<2	<2	22	12	30	14	6	<4	5	3	5	5	68	49
	3,400	--	<2	--	24	--	120	--	5	--	5	--	5	--	72	--
	3,700	3,800	<2	<2	19	18	61	60	<4	<4	4	4	2	4	78	67
7	1,600	1,100	<2	<2	27	17	26	15	5	<4	8	4	<2	<2	78	46
	1,600	1,300	<2	<2	28	21	29	18	<4	<4	7	4	<2	<2	71	50
	--	1,500	--	<2	--	30	--	46	--	6	--	14	--	<2	--	84
	1,900	1,200	<2	<2	25	19	32	26	5	<4	9	5	<2	<2	73	54
	1,700	1,000	<2	<2	25	18	29	19	5	4	9	5	<2	<2	77	50
	3,300	--	<2	--	27	--	36	--	6	--	8	--	<2	--	74	--
	2,100	1,600	<2	<2	30	19	33	20	<4	<4	9	5	<2	<2	88	63
8	3,600	4,200	<2	<2	17	20	310	110	<4	<4	2	<2	16	9	62	59
	3,600	4,100	<2	<2	21	21	480	95	<4	5	<2	2	19	12	57	57
	3,400	4,200	<2	<2	11	12	1,000	350	<4	<4	2	2	17	9	59	59
	3,300	3,900	<2	<2	9	13	1,200	700	<4	<4	2	<2	12	8	55	56
	3,000	--	<2	--	15	--	1,200	--	<4	--	2	--	20	--	57	--
9	3,400	3,900	<2	<2	19	19	860	440	<4	<4	3	<2	5	4	60	57
	3,000	2,100	<2	<2	18	16	2,600	3,300	<4	<4	2	4	5	3	44	53
	2,900	3,900	<2	<2	16	15	840	450	<4	<4	4	3	6	5	71	62
	1,900	3,800	<2	<2	18	13	880	500	5	<4	7	3	4	4	81	60
	2,900	--	<2	--	14	--	3,200	--	<4	--	3	--	4	--	<2	--

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Ta		Th		Sn		U		V		Yb		Y		Zn	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
6	<40	<40	<4	<4	<10	<10	<100	<100	33	19	2	1	16	11	1,800	2,100
	<40	<40	4	<4	<10	<10	<100	<100	42	20	2	1	16	11	2,800	2,300
	<40	<40	<4	<4	<10	<10	<100	<100	18	16	<1	1	10	10	3,600	1,800
	<40	<40	<4	<4	<10	<10	<100	<100	26	11	2	1	13	9	3,200	3,200
	<40	<40	5	<4	<10	<10	<100	<100	40	17	2	1	17	10	2,300	2,500
	<40	--	5	--	<10	--	<100	--	43	--	--	--	16	--	8,100	--
	<40	<40	5	5	<10	<10	<100	<100	37	36	1	1	13	13	4,900	4,700
7	<40	<40	9	6	<10	<10	<100	<100	56	32	3	3	21	19	110	61
	<40	<40	10	7	30	20	<100	<100	52	38	3	3	21	20	91	100
	--	<40	--	10	--	20	--	<100	--	51	--	2	--	17	--	900
	<40	<40	8	7	<10	<10	<100	<100	49	38	3	2	20	17	150	79
	<40	<40	10	6	<10	<10	<100	<100	53	36	3	2	20	17	120	80
	<40	--	10	--	<10	--	<100	--	52	--	3	--	20	--	300	--
	<40	<40	9	6	30	30	<100	<100	43	35	2	2	19	17	87	91
8	<40	<40	<4	<4	<10	<10	<100	<100	11	6	1	1	12	11	27,000	9,500
	<40	<40	<4	<4	<10	<10	<100	<100	7	6	<1	1	12	12	30,000	9,000
	<40	<40	<4	<4	50	<10	<100	<100	9	5	1	1	12	11	69,000	24,000
	<40	<40	<4	<4	<10	<10	<100	<100	8	5	<1	1	12	11	78,000	51,000
	<40	--	<4	--	<10	--	<100	--	8	--	1	--	12	--	76,000	--
9	<40	<40	<4	<4	<10	<10	<100	<100	17	8	1	1	12	11	52,000	28,000
	<40	<40	<4	<4	<10	<10	<100	<100	13	26	<1	1	11	12	67,000	63,000
	<40	<40	<4	<4	<10	<10	<100	<100	27	12	1	1	12	11	43,000	26,000
	<40	<40	6	<4	<10	<10	<100	<100	46	15	2	1	14	12	34,000	28,000
	<40	--	<4	--	<10	--	<100	--	21	--	1	--	12	--	>100,000	--

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.		Al		Ca		Fe		K		Mg		Na		P		Ti	
(fig. 2)	Date	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
10	2-24-88	1.1	0.61	19	20	3.8	4.4	1.1	0.60	8.7	9.1	0.09	0.06	0.02	0.01	0.04	0.02
	9-26-88	.46	.70	21	20	4.4	4.3	.51	.70	12	11	.03	.06	.01	.01	.02	.03
	11-30-88	.79	.54	20	20	4.1	4.1	.85	.58	11	11	.03	.03	.01	.01	.03	.02
	3-02-89	1.0	.55	20	20	3.9	4.5	1.1	.56	10	11	.04	.04	.02	.01	.04	.02
	5-03-89	1.0	--	19	--	4.1	--	.96	--	10	--	.05	--	.02	--	.04	--
	9-14-89	.68	.47	18	19	4.2	4.1	.72	.49	10	11	.03	.04	.01	.01	.02	.02
11	2-24-88	1.6	.87	17	19	3.7	3.8	1.3	.83	7.8	8.6	.10	.05	.03	.02	.06	.03
	5-16-88	1.6	.72	17	19	3.9	3.8	1.3	.69	7.7	10	.09	.04	.04	.02	.06	.02
	9-26-88	.82	1.5	20	18	3.9	3.9	.8	1.4	11	9.9	.04	.06	.02	.03	.04	.06
	11-30-88	1.1	.67	19	20	4.1	4.0	1.0	.69	9.9	10	.09	.05	.02	.02	.04	.02
	3-02-89	1.2	.70	19	20	3.8	3.8	1.1	.67	9.8	10	.06	.04	.02	.02	.05	.02
	5-03-89	2.7	--	18	--	3.5	--	1.1	--	8.4	--	.08	--	.03	--	.06	--
	9-13-89	.92	.84	18	20	3.8	4.0	.86	.80	9.5	11	.05	.04	.02	.02	.03	.03
12	2-24-88	3.2	1.6	4.4	3.7	2.0	1.4	1.9	1.1	2.2	1.9	.40	.07	.03	.02	.18	.07
	5-17-88	3.7	1.4	3.9	3.4	2.2	1.3	1.9	1.0	1.8	1.7	.41	.06	.04	.02	.19	.06
	9-27-88	3.3	1.2	4.2	2.9	1.1	1.8	1.9	.9	1.7	1.4	.44	.06	.04	.03	.19	.05
	12-01-88	3.5	1.4	4.6	3.3	2.0	1.3	1.7	1.0	2.1	1.6	.40	.07	.04	.02	.19	.06
	3-03-89	3.5	1.5	4.1	4.0	2.1	1.4	1.9	1.0	1.9	1.9	.42	.07	.04	.02	.22	.06
	5-04-89	3.1	--	4.5	--	1.8	--	1.9	--	2.1	--	.40	--	.04	--	.20	--
	9-14-89	3.6	1.6	4.1	2.9	1.9	1.3	1.9	1.0	1.8	1.4	.43	.08	.04	.02	.19	.08

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no. (fig. 2)	As Fine	As Coarse	Ba Fine	Ba Coarse	Be Fine	Be Coarse	Bi Fine	Bi Coarse	Cd Fine	Cd Coarse	Ce Fine	Ce Coarse	Cr Fine	Cr Coarse	Co Fine	Co Coarse
10	10	10	78	42	2	1	<10	<10	4	8	90	48	10	6	85	77
	10	20	29	53	1	1	<10	<10	10	4	21	62	4	8	81	100
	10	<10	48	31	2	1	<10	<10	4	6	29	21	6	5	83	61
	10	10	67	32	2	1	<10	<10	4	8	43	22	9	5	89	77
	20	--	65	--	2	--	<10	--	4	--	42	--	9	--	100	--
	10	10	53	30	2	1	<10	<10	3	5	28	20	4	4	95	56
11	10	<10	140	72	2	2	<10	<10	7	8	37	26	15	8	78	61
	10	<10	140	62	2	2	<10	<10	12	8	29	20	18	9	120	44
	10	10	160	110	2	2	20	<10	6	9	22	27	9	16	50	97
	<10	<10	80	45	2	2	<10	<10	6	6	26	21	9	6	74	45
	<10	<10	110	52	2	2	<10	<10	7	7	25	20	13	7	82	45
	10	--	130	--	2	--	<10	--	8	--	24	--	29	--	110	--
	<10	<10	81	62	2	2	<10	<10	7	6	18	23	9	12	120	81
12	<10	<10	2,900	3,000	1	<1	<10	<10	5	3	55	24	28	15	22	16
	<10	<10	2,800	2,300	1	<1	<10	<10	7	3	53	19	36	17	27	13
	<10	<10	2,100	2,900	1	<1	<10	<10	6	3	45	15	34	15	25	12
	<10	<10	2,000	4,300	1	<1	<10	<10	8	4	57	20	30	14	26	16
	<10	<10	1,800	2,400	1	<1	<10	<10	7	4	56	22	32	17	24	15
	<10	--	1,500	--	1	--	<10	--	9	--	44	--	31	--	30	--
	<10	<10	2,000	3,000	1	<1	<10	<10	9	5	59	27	38	18	33	20

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Cu		Eu		Ga		Au		Ho		La		Pb		Li	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
10	87	150	<2	<2	7	7	<8	<8	<4	<4	14	10	3,800	7,500	4	2
	180	120	<2	<2	5	7	<8	<8	<4	<4	8	12	3,900	3,200	2	3
	91	130	<2	<2	9	7	<8	<8	<4	<4	9	8	2,800	2,400	3	<2
	94	190	<2	<2	9	9	<8	<8	<4	<4	11	8	3,700	5,300	4	2
	130	--	<2	--	9	--	<8	--	<4	--	11	--	4,100	--	4	--
	94	150	<2	<2	8	7	<8	<8	<4	<4	9	8	2,600	1,600	3	<2
11	260	310	<2	<2	8	7	<8	<8	<4	<4	13	9	4,200	2,000	7	4
	500	380	<2	<2	7	7	<8	<8	<4	<4	12	8	5,500	2,600	7	4
	400	410	<2	<2	6	9	<8	<8	<4	<4	9	13	4,900	6,100	5	6
	250	230	<2	<2	8	8	<8	<8	<4	<4	10	9	4,200	1,700	4	3
	250	270	<2	<2	9	9	<8	<8	<4	<4	11	8	4,200	2,700	5	3
	540	--	<2	--	10	--	<8	--	<4	--	12	--	4,700	--	6	--
	440	360	<2	<2	8	8	<8	<8	<4	<4	9	10	3,100	2,100	4	4
12	64	26	<2	<2	8	<4	<8	<8	<4	<4	26	11	2,300	1,100	14	7
	66	19	<2	<2	8	<4	<8	<8	<4	<4	25	10	2,100	730	17	8
	45	13	<2	<2	7	4	<8	<8	<4	<4	23	9	1,400	570	15	7
	54	22	<2	<2	9	5	<8	<8	<4	<4	27	11	1,700	760	15	7
	58	27	<2	<2	10	5	<8	<8	<4	<4	27	11	1,900	890	15	7
	48	--	<2	--	9	--	<8	--	<4	--	25	--	1,800	--	13	--
	51	20	<2	<2	10	<4	<8	<8	<4	<4	31	13	1,800	850	16	8

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no. (fig. 2)	Mn		Mo		Nd		Ni		Nb		Sc		Ag		Sr	
	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
10	4,200	4,500	<2	<2	21	18	75	66	<4	<4	<2	<2	3	5	58	53
	4,500	4,400	<2	<2	22	23	65	80	<4	4	<2	<2	5	5	51	55
	4,600	4,800	<2	<2	12	11	60	45	<4	<4	<2	<2	3	3	56	55
	4,400	4,600	<2	<2	13	13	71	62	<4	<4	<2	<2	3	6	57	52
	4,200	--	<2	--	16	--	82	--	<4	--	<2	--	4	--	58	--
	4,500	4,700	<2	<2	12	14	70	45	<4	<4	<2	<2	4	3	54	54
11	4,100	4,600	<2	<2	20	19	61	51	<4	<4	2	<2	2	<2	58	53
	4,100	4,600	<2	<2	15	16	82	34	<4	<4	2	<2	4	<2	58	52
	4,600	4,400	<2	<2	20	27	42	78	<4	6	<2	2	3	3	53	58
	4,600	4,900	<2	<2	13	13	55	36	<4	<4	2	2	3	<2	56	54
	4,500	4,800	<2	<2	15	13	72	35	<4	<4	2	<2	3	2	57	52
	4,100	--	<2	--	30	--	23	--	<4	--	2	--	2	--	72	--
	4,600	5,200	<2	<2	13	16	76	55	<4	<4	<2	<2	2	<2	57	61
12	1,700	1,200	<2	<2	25	12	20	13	<4	<4	4	<2	<2	<2	91	59
	1,900	1,000	<2	<2	25	9	27	12	<4	<4	5	<2	<2	<2	91	49
	2,100	1,000	<2	<2	23	10	24	11	<4	<4	4	<2	<2	<2	88	51
	2,100	1,200	<2	<2	24	10	23	12	5	<4	5	2	<2	<2	88	72
	1,800	1,300	<2	<2	24	8	26	12	<4	<4	5	<2	<2	<2	86	53
	2,500	--	<2	--	23	--	29	--	4	--	4	--	<2	--	92	--
	3,200	1,700	<2	<2	28	9	33	17	<4	<4	4	2	<2	<2	89	60

Table 13.--*Total element contents of bed sediment (inductively coupled plasma)*--Continued

Site no.	Ta		Th		Sn		U		V		Yb		Y		Zn	
(fig. 2)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
10	<40	<40	<4	<4	<10	<10	<100	<100	9	7	1	<1	10	9	270	440
	<40	<40	<4	<4	<10	<10	<100	<100	5	7	<1	<1	9	10	630	350
	<40	<40	<4	<4	<10	<10	<100	<100	6	5	<1	<1	9	9	240	350
	<40	<40	<4	<4	<10	<10	<100	<100	8	5	<1	<1	10	9	320	470
	<40	--	<4	--	<10	--	<100	--	7	--	<1	--	10	--	470	--
	<40	<40	<4	<4	<10	<10	<100	<100	7	5	1	<1	10	9	190	280
11	<40	<40	<4	<4	<10	<10	<100	<100	16	9	1	1	12	11	610	800
	<40	<40	<4	<4	20	<10	<100	<100	17	8	1	<1	12	10	900	420
	<40	<40	<4	<4	<10	<10	<100	<100	9	14	1	1	11	12	470	710
	<40	<40	<4	<4	<10	<10	<100	<100	10	6	1	1	11	11	450	460
	<40	<40	<4	<4	<10	<10	<100	<100	11	7	1	<1	11	10	960	490
	<40	--	<4	--	<10	--	<100	--	7	--	1	--	11	--	830	--
	<40	<40	<4	<4	<10	<10	<100	<100	10	9	1	1	10	11	460	380
12	<40	<40	6	<4	<10	<10	<100	<100	37	19	2	<1	15	8	430	280
	<40	<40	6	<4	30	<10	<100	<100	45	19	2	<1	16	7	590	260
	<40	<40	5	<4	<10	<10	<100	<100	38	16	2	<1	15	6	610	300
	<40	<40	5	<4	<10	<10	<100	<100	37	17	2	<1	16	8	590	300
	<40	<40	6	<4	<10	<10	<100	<100	42	18	2	1	17	8	560	280
	<40	--	5	--	<10	--	<100	--	33	--	2	--	15	--	990	--
	<40	<40	8	<4	<10	<10	<100	<100	40	20	2	1	17	9	560	370

Table 14.--*Total element contents of bed sediment for seepage run sites (inductively coupled plasma)*

Site no.		Al		Ca		Fe		K		Mg		Na		P		Ti	
(fig. 7)	Date	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1S	9-13-89	3.2	2.0	3.8	2.9	1.8	1.4	2.2	1.6	1.1	1.3	0.28	0.09	0.04	0.02	0.15	0.07
2S	9-13-89	4.5	3.2	3.2	2.4	2.7	1.9	3.1	2.6	.84	.91	.27	.10	.06	.04	.19	.11
3S	9-13-89	5.1	3.6	.29	.18	2.4	1.8	2.4	2.2	.36	.24	.43	.19	.03	.02	.29	.17
4S	9-13-89	4.6	2.9	2.9	3.3	2.3	1.8	3.2	2.5	1.1	1.6	.31	.10	.04	.03	.21	.11
5S	9-13-89	4.7	3.3	2.6	5.4	2.2	2.2	3.4	2.8	1.3	2.8	.34	.10	.05	.04	.20	.10
6S	9-13-89	4.2	1.4	6.3	10	3.4	2.2	3.4	1.3	3.4	5.6	.24	.05	.07	.03	.17	.05
7S	9-13-89	4.0	1.8	3.2	2.0	3.0	1.6	2.3	1.5	1.2	1.0	.27	.08	.04	.02	.16	.08

Site no.	As		Ba		Be		Bi		Cd		Ce		Cr		Co	
(fig. 7)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1S	<10	<10	1,500	930	<1	<1	<10	<10	<2	<2	61	28	50	22	22	13
2S	10	<10	2,000	830	1	1	<10	<10	<2	<2	110	57	81	32	73	35
3S	<10	<10	600	480	2	1	<10	<10	<2	<2	78	46	56	28	15	10
4S	10	<10	1,000	560	1	<1	<10	<10	4	3	81	40	63	29	58	30
5S	<10	<10	720	470	1	1	<10	<10	4	4	64	44	60	32	30	24
6S	580	40	600	330	1	<1	<10	<10	220	180	58	23	44	17	370	70
7S	20	<10	640	350	1	<1	<10	<10	130	72	54	23	49	20	47	23

Site no.	Cu		Eu		Ga		Au		Ho		La		Pb		Li	
(fig. 7)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1S	27	18	<2	<2	13	8	<8	<8	<4	<4	31	14	170	100	12	7
2S	21	13	<2	<2	17	10	<8	<8	<4	<4	42	22	170	99	17	11
3S	20	13	<2	<2	12	9	<8	<8	<4	<4	42	26	50	37	23	15
4S	110	140	<2	<2	13	8	<8	<8	<4	<4	34	18	1,200	840	18	10
5S	120	230	<2	<2	11	9	<8	<8	<4	<4	31	19	1,400	1,200	16	11
6S	200	320	<2	<2	18	7	<8	<8	<4	<4	26	11	8,100	5,500	16	6
7S	48	27	<2	<2	10	5	<8	<8	<4	<4	27	10	22,000	13,000	13	7

Table 14.--*Total element contents of bed sediment for seepage run sites (inductively coupled plasma)*--Continued

Site no.	Mn		Mo		Nd		Ni		Nb		Sc		Ag		Sr	
(fig. 7)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1S	11,000	4,600	<2	<2	27	13	28	13	<4	<4	4	2	<2	<2	73	41
2S	14,000	6,500	3	<2	38	20	67	31	5	<4	6	4	<2	<2	51	55
3S	1,400	860	<2	<2	38	23	23	17	5	5	7	5	<2	<2	75	51
4S	4,200	2,200	<2	<2	30	15	52	29	<4	<4	6	3	<2	<2	80	54
5S	1,300	1,300	<2	<2	27	19	38	29	<4	<4	6	5	<2	<2	83	64
6S	8,400	3,100	2	<2	24	11	76	26	<4	<4	5	2	34	20	93	53
7S	3,300	1,300	<2	<2	24	8	45	23	5	<4	4	<2	20	8	67	33

Site no.	Ta		Th		Sn		U		V		Yb		Y		Zn	
(fig. 7)	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
1S	<40	<40	10	5	<10	<10	<100	<100	34	21	2	1	18	9	230	150
2S	<40	<40	14	7	20	<10	<100	<100	53	35	2	1	21	12	190	120
3S	<40	<40	10	6	<10	<10	<100	<100	61	41	3	2	25	17	98	71
4S	<40	<40	9	5	<10	<10	<100	<100	49	29	2	1	20	11	240	210
5S	<40	<40	8	5	<10	<10	<100	<100	46	32	2	1	17	11	260	280
6S	<40	<40	8	<4	<10	<10	<100	<100	41	14	2	<1	17	8	13,000	9,900
7S	<40	<40	<4	<4	<10	<10	<100	<100	41	21	2	<1	16	7	7,400	4,000

Table 15. --*Semiquantitative emission spectrograph analyses of bed sediment*

Site no.		Ca		Fe		Mg		Na		P		Ti		Sb		As	
(fig. 2)	Date	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1	3-02-89	0.2	0.3	0.5	0.7	0.2	0.5	0.3	0.2	<0.2	<0.2	0.20	0.20	<100	<100	<200	<200
	5-03-89	--	1.0	--	2.0	--	1.0	--	.3	--	<.2	--	.30	--	<100	--	<200
	9-13-89	.1	.1	1.0	2.0	.1	.1	<.2	<.2	<.2	<.2	.10	.05	<100	<100	<200	<200
2	3-02-89	.5	.7	1.0	1.5	.7	1.0	.3	.3	<.2	<.2	.30	.30	<100	<100	<200	<200
	5-03-89	--	2.0	--	2.0	--	3.0	--	.2	--	<.2	--	.30	--	<100	--	<200
	9-13-89	7.0	10	3.0	5.0	5.0	7.0	t	t	<.2	<.2	.20	.10	<100	<100	<200	<200
3	3-02-89	2.0	5.0	1.0	1.0	2.0	2.0	.2	.2	<.2	<.2	.20	.15	<100	<100	<200	<200
	5-03-89	--	2.0	--	2.0	--	2.0	--	.2	--	<.2	--	.20	--	<100	--	<200
	9-14-89	10	20	2.0	3.0	5.0	5.0	<.2	t	<.2	<.2	.07	.05	<100	<100	<200	<200
5	3-02-89	1.5	2.0	1.0	.7	1.5	2.0	.3	.2	<.2	<.2	.30	.15	<100	<100	<200	<200
	5-03-89	--	7.0	--	2.0	--	7.0	--	t	--	<.2	--	.05	--	<100	--	<200
	9-14-89	15	20	3.0	3.0	7.0	5.0	t	t	t	<.2	.05	.03	<100	<100	<200	<200
6	3-02-89	5.0	7.0	1.0	1.5	3.0	3.0	.2	.2	<.2	<.2	.20	.15	<100	<100	<200	<200
	5-04-89	--	3.0	--	2.0	--	3.0	--	t	--	<.2	--	.20	--	<100	--	<200
	9-13-89	7.0	15	2.0	3.0	5.0	7.0	t	.2	<.2	<.2	.07	.05	<100	<100	<200	<200
7	3-02-89	1.0	1.5	1.0	1.0	1.5	1.5	.3	.3	<.2	<.2	.20	.20	<100	<100	<200	<200
	5-04-89	--	2.0	--	3.0	--	2.0	--	.3	--	<.2	--	.30	--	<100	--	<200
	9-13-89	.2	.2	1.5	3.0	.2	.2	.2	.3	<.2	<.2	.10	.07	<100	<100	<200	<200
8	5-03-89	--	5.0	--	5.0	--	7.0	--	<.2	--	<.2	--	.05	--	<100	--	<200
9	3-02-89	2.0	5.0	1.0	1.0	2.0	3.0	.2	.2	<.2	<.2	.20	.20	<100	<100	<200	<200
	5-04-89	--	5.0	--	1.0	--	5.0	--	<.2	--	<.2	--	.15	--	<100	--	<200
10	3-02-89	10	15	2.0	2.0	7.0	5.0	<.2	<.2	<.2	<.2	.03	.02	<100	<100	<200	<200
	5-03-89	--	10	--	3.0	--	7.0	--	<.2	--	<.2	--	.05	--	<100	--	<200
	9-14-89	10	20	3.0	5.0	7.0	7.0	t	<.2	t	<.2	.02	.02	<100	<100	<200	<200
11	3-02-89	10	10	3.0	2.0	7.0	5.0	t	t	<.2	<.2	.03	.03	<100	<100	<200	<200
	5-03-89	--	15	--	5.0	--	7.0	--	t	--	<.2	--	.10	--	<100	--	<200
	9-13-89	10	10	3.0	5.0	5.0	7.0	t	t	t	<.2	.05	.02	<100	<100	<200	<200
12	3-03-89	2.0	5.0	.7	1.0	1.5	3.0	.2	.2	<.2	<.2	.20	.15	<100	<100	<200	<200
	5-04-89	--	3.0	--	2.0	--	3.0	--	.2	--	<.2	--	.20	--	<100	--	<200
	9-04-89	.5	.5	1.0	1.5	.2	.2	<.2	<.2	<.2	<.2	.05	.05	<100	<100	<200	<200

Table 15. --*Semiquantitative emission spectrograph analyses of bed sediment*--Continued

Site no.	B		Ba		Be		Bi		Cd		Cr		Co		Cu	
(fig. 2)	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1	30	20	500	700	t	t	<10	<10	<20	<20	50	30	10	10	10	7
	--	50	--	700	--	t	--	<10	--	<20	--	70	--	15	--	20
	15	20	200	300	t	t	<10	<10	<20	<20	30	20	10	t	5	5
2	50	20	500	700	t	t	<10	<10	<20	<20	70	70	20	20	15	20
	--	30	--	500	--	t	--	<10	--	30	--	70	--	100	--	30
	50	20	300	200	1	1	<10	<10	70	70	100	50	100	70	70	50
3	30	20	700	500	t	t	<10	<10	100	100	50	50	15	20	10	15
	--	20	--	500	--	t	--	<10	--	100	--	50	--	30	--	20
	20	20	150	100	t	1	<10	<10	100	100	50	20	20	30	15	10
5	30	20	500	500	t	t	<10	<10	t	t	50	15	20	30	20	30
	--	10	--	70	--	t	--	<10	--	20	--	t	--	20	--	30
	15	15	100	50	t	1	<10	<10	30	50	30	15	50	20	70	50
6	30	30	500	300	t	1	<10	<10	30	70	50	30	20	20	15	15
	--	20	--	300	--	t	--	<10	--	50	--	30	--	50	--	50
	20	20	150	150	t	t	<10	<10	70	50	30	30	30	20	15	15
7	70	50	500	500	1	1	<10	<10	<20	<20	70	70	20	20	20	20
	--	70	--	500	--	t	--	<10	--	<20	--	70	--	20	--	30
	15	15	300	300	1	1	<10	<10	<20	<20	30	30	15	10	7	5
8	--	20	--	50	--	t	--	<10	--	100	--	<10	--	500	--	150
9	50	50	500	500	1	t	<10	<10	20	30	70	70	500	500	70	70
	--	50	--	150	--	1	--	<10	--	50	--	15	--	2,000	--	200
10	10	10	50	50	1	1	<10	<10	<20	<20	10	10	50	70	30	20
	--	15	--	50	--	1	--	<10	--	<20	--	<10	--	100	--	70
	10	10	20	t	t	1	<10	<10	t	20	20	10	50	50	100	50
11	10	15	70	50	1	1	<10	<10	t	t	10	15	50	70	150	200
	--	15	--	100	--	t	--	<10	--	t	--	<10	--	150	--	150
	15	20	50	50	1	1	<10	<10	t	t	20	20	50	50	100	100
12	30	20	1,500	3,000	t	t	<10	<10	<20	<20	50	50	15	15	20	20
	--	30	--	1,500	--	t	--	<10	--	20	--	50	--	15	--	30
	15	15	500	500	t	t	<10	<10	<20	<20	20	15	10	t	10	5

Table 15. --*Semiquantitative emission spectrograph analyses of bed sediment*--Continued

Site no.	Ga		Ge		Au		La		Pb		Mn		Mo		Nb	
(fig. 2)	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1	10	10	<10	<10	<10	<10	50	50	50	50	1,000	1,000	<5	<5	t	<20
	--	10	--	<10	--	<10	--	t	--	100	--	2,000	--	<5	--	<20
	t	t	<10	<10	<10	<10	<50	<50	30	20	500	500	<5	<5	<20	<20
2	15	20	<10	<10	<10	<10	t	t	500	500	500	700	<5	<5	t	t
	--	15	--	<10	--	<10	--	50	--	2,000	--	2,000	--	<5	--	<20
	20	10	<10	<10	<10	<10	t	t	5,000	5,000	5,000	5,000	<5	t	<20	<20
3	7	10	<10	<10	<10	<10	<50	<50	5,000	5,000	2,000	1,500	<5	<5	<20	<20
	--	15	--	<10	--	<10	--	<50	--	5,000	--	2,000	--	<5	--	<20
	7	7	<10	<10	<10	<10	<50	<50	3,000	5,000	2,000	3,000	<5	<5	<20	<20
5	10	10	<10	<10	<10	<10	t	<50	1,000	2,000	1,000	1,000	<5	<5	t	<20
	--	5	--	<10	--	<10	--	<50	--	2,000	--	5,000	--	<5	--	<20
	7	5	<10	<10	<10	<10	<50	<50	3,000	3,000	5,000	5,000	<5	<5	<20	<20
6	10	10	<10	<10	<10	<10	50	<50	2,000	3,000	2,000	2,000	<5	<5	<20	<20
	--	10	--	<10	--	<10	--	<50	--	5,000	--	3,000	--	<5	--	<20
	10	10	<10	<10	<10	<10	<50	<50	5,000	5,000	3,000	5,000	<5	<5	<20	<20
7	20	20	<10	<10	<10	<10	50	t	100	100	1,500	1,000	<5	<5	t	t
	--	10	--	<10	--	<10	--	t	--	200	--	3,000	--	<5	--	<20
	15	15	<10	<10	<10	<10	<50	<50	200	500	1,000	700	<5	<5	<20	<20
8	--	7	--	<10	--	<10	--	<50	--	>20,000	--	3,000	--	<5	--	<20
9	10	15	<10	<10	<10	<10	t	t	2,000	3,000	1,000	1,500	<5	<5	<20	<20
	--	7	--	<10	--	<10	--	<50	--	5,000	--	5,000	--	<5	--	<20
10	5	7	<10	<10	<10	<10	<50	<50	3,000	3,000	3,000	5,000	<5	<5	<20	<20
	--	7	--	<10	--	<10	--	<50	--	3,000	--	5,000	--	<5	--	<20
	5	t	<10	<10	<10	<10	<50	<50	2,000	2,000	5,000	3,000	<5	<5	<20	<20
11	5	7	<10	<10	<10	<10	<50	<50	3,000	3,000	2,000	3,000	<5	<5	<20	<20
	--	5	--	<10	--	<10	--	<50	--	3,000	--	5,000	--	<5	--	<20
	10	5	<10	<10	<10	<10	<50	<50	3,000	3,000	3,000	5,000	<5	<5	<20	<20
12	7	7	<10	<10	<10	<10	t	<50	1,500	2,000	1,000	3,000	<5	<5	t	<20
	--	15	--	<10	--	<10	--	<50	--	3,000	--	5,000	--	<5	--	<20
	t	<5	<10	<10	<10	<10	<50	<50	300	150	300	300	<5	<5	<20	<20

Table 15. --*Semiquantitative emission spectrograph analyses of bed sediment*--Continued

Site no.	Ni		Sc		Ag		Sr		Th		Sn		W		V	
(fig. 2)	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1	10	10	t	5	<0.5	<0.5	t	<100	<100	<100	t	50	<20	<20	50	50
	--	20	--	5	--	t	--	<100	--	<100	--	15	--	<20	--	50
	10	5	<5	<5	.5	t	<100	<100	<100	<100	15	<100	<20	<20	30	30
2	20	20	7	7	.7	.7	100	t	<100	<100	t	<100	<20	<20	50	30
	--	50	--	7	--	1.5	--	<100	--	<100	--	t	--	<20	--	30
	100	30	7	5	5.0	5.0	t	<100	<100	<100	<100	<100	<20	<20	70	30
3	20	30	5	5	10	10	t	t	<100	<100	50	15	<20	<20	30	20
	--	20	--	t	--	15	--	t	--	<100	--	20	--	<20	--	20
	50	20	<5	t	7.0	7.0	<100	<100	<100	<100	<100	<100	<20	<20	30	20
5	20	20	5	t	1.5	1.5	t	t	<100	<100	t	t	<20	<20	50	20
	--	20	--	<5	--	1.0	--	<100	--	<100	--	<100	--	<20	--	t
	30	15	<5	t	2.0	1.5	<100	<100	<100	<100	t	<100	<20	<20	15	10
6	20	20	5	5	2.0	5.0	t	t	<100	<100	10	10	<20	<20	50	20
	--	50	--	5	--	3.0	--	<100	--	<100	--	15	--	<20	--	20
	30	20	t	t	3.0	3.0	<100	<100	<100	<100	<100	<100	<20	<20	20	15
7	50	50	10	10	<.5	t	t	t	<100	<100	30	15	<20	<20	70	70
	--	30	--	10	--	<.5	--	<100	--	<100	--	20	--	<20	--	50
	10	7	<5	5	.5	1	<100	<100	<100	<100	15	<100	<20	<20	50	30
8	--	500	--	t	--	20	--	<100	--	<100	--	10	--	<20	--	t
9	1,000	700	7	7	3.0	2.0	100	100	<100	<100	15	20	<20	<20	50	50
	--	3,000	--	t	--	7.0	--	<100	--	<100	--	<100	--	<20	--	10
10	50	70	t	t	2.0	3.0	t	<100	<100	<100	<100	<20	<20	t	t	
	--	70	--	<5	--	7.0	--	<100	--	<100	--	<100	--	<20	--	t
	50	30	<5	t	1.5	2.0	<100	<100	<100	<100	30	<100	<20	<20	t	t
11	70	50	t	t	3.0	2.0	t	<100	<100	<100	<100	<100	<20	<20	t	10
	--	100	--	<5	--	2.0	--	<100	--	<100	--	t	--	<20	--	10
	50	20	<5	t	1.0	1.0	<100	<100	<100	<100	<100	<100	<2	<20	10	1
12	15	15	t	t	.7	.7	t	100	<100	<100	t	t	<20	<20	50	20
	--	20	--	5	--	.5	--	100	--	<100	--	30	--	<20	--	20
	15	10	<5	<5	.7	.5	<100	<100	<100	<100	<100	<100	<20	<20	30	20

Table 15. --*Semiquantitative emission spectrograph analyses of bed sediment*--Continued

Site no. (fig. 2)	Y		Zn		Zr	
	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1	20	15	<200	<200	1,000	1,000
	--	20	--	<200	--	700
	15	t	<200	<200	70	70
2	20	20	1,000	1,000	500	300
	--	30	--	3,000	--	300
	20	20	5,000	5,000	100	50
3	20	15	2,000	2,000	500	500
	--	15	--	2,000	--	500
	10	10	5,000	5,000	50	20
5	20	15	500	500	500	300
	--	15	--	500	--	30
	15	10	700	700	20	20
6	20	20	1,000	1,500	500	300
	--	20	--	2,000	--	200
	15	15	2,000	2,000	70	50
7	20	20	<200	200	300	200
	--	20	--	<200	--	500
	20	15	<200	<200	100	100
8	--	10	--	10,000	--	100
9	20	20	10,000	>10,000	200	150
	--	15	--	>10,000	--	100
10	10	10	t	<200	50	50
	--	10	--	t	--	70
	10	10	200	200	20	20
11	10	15	t	t	50	20
	--	15	--	300	--	50
	15	10	200	t	20	30
12	20	15	200	300	700	300
	--	15	--	500	--	500
	10	<10	500	500	70	30

Table 16.--*Semiquantitative emission spectrograph analyses of bed sediment for seepage run sites*

Site no. (fig. 7)	Date	Ca <45µm	Ca <63µm	Fe <45µm	Fe <63µm	Mg <45µm	Mg <63µm	Na <45µm	Na <63µm	P <45µm	P <63µm	Ti <45µm	Ti <63µm	Sb <45µm	Sb <63µm	As <45µm	As <63µm	B <45µm	B <63µm
1S	9-13-89	0.2	0.2	1.0	1.5	0.1	0.1	<0.2	<0.2	<0.2	<0.2	0.05	0.03	<100	<100	<200	<200	10	15
2S	9-13-89	.3	.3	2.0	2.0	.2	.1	<.2	<.2	<.2	<.2	.10	.05	<100	<100	<200	<200	20	20
3S	9-13-89	.2	.1	1.5	2.0	.2	.1	.2	.2	<.2	<.2	.30	.20	<100	<100	<200	<200	20	20
4S	9-13-89	5.0	5.0	3.0	3.0	3.0	2.0	t	t	<.2	<.2	.20	.15	<100	<100	<200	<200	20	20
5S	9-13-89	7.0	10	5.0	3.0	5.0	3.0	t	.2	<.2	<.2	.20	.15	<100	<100	<200	<200	30	30
6S	9-13-89	10	10	2.0	3.0	7.0	7.0	t	t	<.2	<.2	.07	.05	<100	<100	<200	<200	20	15
7S	9-13-89	1.5	3.0	2.0	2.0	1.0	1.0	<.2	<.2	<.2	<.2	.05	.05	<100	<100	<200	<200	20	20

Site no. (fig. 7)	Ba <45µm	Ba <63µm	Be <45µm	Be <63µm	Bi <45µm	Bi <63µm	Cd <45µm	Cd <63µm	Cr <45µm	Cr <63µm	Co <45µm	Co <63µm	Cu <45µm	Cu <63µm	Ga <45µm	Ga <63µm	Ge <45µm	Ge <63µm
1S	300	200	t	t	<10	<10	<20	<20	30	15	t	t	7	5	t	<5	<10	<10
2S	500	200	t	1	<10	<10	<20	<20	50	30	20	20	10	7	5	t	<10	<10
3S	500	300	1	t	<10	<10	<20	<20	50	50	10	10	15	10	20	5	<10	<10
4S	300	200	t	1	<10	<10	t	t	50	30	30	20	30	20	10	5	<10	<10
5S	200	200	1	1	<10	<10	t	20	70	50	50	30	50	50	15	5	<10	<10
6S	100	50	t	t	<10	<10	150	100	30	30	50	50	20	15	10	5	<10	<10
7S	200	150	t	t	<10	<10	100	70	20	20	15	15	15	10	5	<5	<10	<10

Site no. (fig. 7)	Au <45µm	Au <63µm	La <45µm	La <63µm	Pb <45µm	Pb <63µm	Mn <45µm	Mn <63µm	Mo <45µm	Mo <63µm	Nb <45µm	Nb <63µm	Ni <45µm	Ni <63µm	Sc <45µm	Sc <63µm	Ag <45µm	Ag <63µm
1S	<10	<10	<50	<50	50	20	500	500	<5	<5	<20	<20	10	5	<5	<5	0.1	t
2S	<10	<10	<50	<50	100	70	2,000	1,500	<5	<5	<20	<20	20	15	<5	t	.7	0.5
3S	<10	<10	50	t	70	50	1,000	700	<5	<5	<20	<20	10	10	5	5	.5	t
4S	<10	<10	t	<50	1,500	1,000	3,000	2,000	t	<5	<20	<20	30	20	t	t	1.0	.7
5S	<10	<10	t	<50	3,000	2,000	5,000	3,000	<5	<5	<20	<20	50	30	5	5	1.0	1.0
6S	<10	<10	<50	<50	5,000	5,000	5,000	5,000	<5	<5	<20	<20	20	20	t	t	20	10
7S	<10	<10	<50	<50	20,000	10,000	1,000	1,000	<5	<5	<20	<20	15	15	<5	t	10	5.0

Table 16.-- *Semiquantitative emission spectrograph analyses of bed sediment for seepage run sites*--Continued

Site no.	Sr		Th		Sn		W		V		Y		Zn		Zr	
(fig. 7)	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm	<45µm	<63µm
1S	<100	<100	<100	<100	<10	<10	<20	<20	30	20	10	<10	<200	<200	70	30
2S	<100	<100	<100	<100	<10	<10	<20	<20	50	30	10	10	t	<200	100	50
3S	t	<100	<100	<100	<10	<10	<20	<20	50	30	20	20	<200	<200	500	200
4S	t	<100	<100	<100	<10	<10	<20	<20	50	30	10	10	300	500	70	50
5S	t	<100	<100	<100	<10	<10	<20	<20	50	30	15	10	500	500	70	50
6S	t	<100	<100	<100	10	<10	<20	<20	15	20	15	15	5,000	3,000	30	30
7S	<100	<100	<100	<100	<10	<10	<20	<20	50	20	10	10	5,000	3,000	50	50

Table 17.-- *Mineralogy of bulk samples from bed sediment*

[Bulk sample, less than 180 micrometers; numbers are approximate percentages; --, constituent not detected in sample; t, trace; <, less than]

Site no. (fig. 2)	Date	Carbonate: Dolomite and ankerite	Carbonate: Calcite	Quartz	Potassium feldspar	Sulfide	Remarks
1	3-02-89	5	--	85	10	--	
	5-03-89	1	t	95	4	--	Other carbonates (possible t)
	9-13-89	2	1	90	4	--	Plagioclase (1)
2	3-03-89	75	--	20	5	--	Other carbonates (t)
	5-03-89	78	1	14	6	t	Galena, sphalerite, and mica (t)
	9-13-89	80	<1	13	4	2	Plagioclase (<1); galena (1); sphalerite (1)
3	3-02-89	85	1	15	5	--	Mica and kutnahorite (t)
	5-04-89	90	2	6		t	Other carbonates (1); galena and sphalerite (t)
	9-14-89	86	1	10	2	1	Sphalerite (1)
5	3-02-89	95	1	3	1	--	
	5-04-89	95	--	2	1	t	Other carbonates (1); galena and sphalerite (t)
	9-14-89	95	1	2	1	--	
6	3-03-89	85	t	12	3	--	Other carbonates (t)
	5-04-89	88	1	9	1	t	Other carbonates and sphalerite (t)
	9-13-89	85	1	10	2	t	Other carbonates, sphalerite, and mica (t)
7	3-02-89	5	2	65	28	--	
	5-03-89	4	t	70	24	--	Other carbonates (t)
	9-13-89	4	--	65	25	--	Plagioclase (3); kaolinite, hematite, and other carbonates (t)
8	3-02-89	100	--	--	--	--	Fine coating -- dolomite (70) and hydrozincite (30)
	5-03-89	92	2	1	1	3	Galena (2); sphalerite (1)

Table 17.-- *Mineralogy of bulk samples from bed sediment*--Continued

Site no. (fig. 2)	Date	Carbonate: Dolomite and ankerite	Carbonate: Calcite	Quartz	Potassium feldspar	Sulfide	Remarks
9	3-02-89	95	1	2	1	--	
	5-03-89	93	--	--	1	1 - 2	Other carbonates (2); sphalerite (1 to 2)
10	3-02-89	95	1	1	2	--	
	5-03-89	95	1	1	1	1	Calcite and other carbonates (1); galena (1)
	9-14-89	95	1	1	1	--	Gypsum (2)
11	3-02-89	95	1	3	1	--	
	5-03-89	95	1	3	1	--	Calcite and other carbonates (1)
	9-13-89	92	1	4	1	--	Other carbonates (1); mica (t)
12	3-03-89	5	--	90	5	--	Other carbonates (t)
	5-04-89	4	--	93	3	--	
	9-14-89	7	--	90	2	--	

Table 18.-- *Mineralogy of bulk samples from bed sediment for seepage run sites*

[All numbers are approximate percentages; --, constituent not detected in sample; t, trace]

Site no. (fig. 7)	Date	Carbonate: Dolomite and ankerite	Carbonate: Calcite	Quartz	Potassium feldspar	Sulfide	Remarks
1S	9-13-89	3	--	87	8	--	Other carbonates and hematite (t)
2S	9-13-89	6	--	85	7	--	Other carbonates and hematite (t)
3S	9-13-89	1	--	80	15	--	Plagioclase (2); other carbonates, montmorillonite, and mica (t)
4S	9-13-89	55	1	34	8	t	Sphalerite and mica (t)
5S	9-13-89	73	1	15	10	--	Kaolinite and mica (t)
6S	9-13-89	93	1	2	1	1	Other carbonates, galena, and mica (t); sphalerite (1)
7S	9-13-89	34	--	50	4	4	Kutnahorite (7); galena (3); sphalerite (1)

Table 19.-- *Weight percentages of heavy mineral concentrates from bed sediment*

[C-1 fraction, highly magnetic minerals; C-2 fraction, slightly magnetic mostly non-ore minerals; C-3 fraction, non-magnetic ore and non-ore minerals; <, less than]

Site no. (fig. 2)	Date	Weight percentage of heavy mineral concentrate		
		C-1	C-2	C-3
1	3-02-89	4	86	10
	5-03-89	4	90	6
2	3-03-89	<1	79	21
	5-03-89	<1	46	53
3	3-02-89	2	36	62
	5-04-89	4	13	83
5	3-02-89	<1	100	<1
	5-04-89	<1	73	26
6	3-03-89	<1	98	2
	5-04-89	<1	81	18
7	3-02-89	5	91	4
	5-03-89	6	88	5
8	5-03-89	<1	53	47
9	3-02-89	<1	71	29
	5-03-89	<1	50	50
10	3-02-89	<1	74	26
	5-03-89	<1	62	38
11	3-02-89	<1	86	13
	5-03-89	<1	82	18
12	5-04-89	2	74	24

Table 20.--*Mineralogy of C-2 fraction from bed sediment*

[■, Major constituent of sample; +, constituent present in minor quantities; t, constituent present in trace quantities; --, constituent not detected in sample; number in parentheses is approximate percentage of constituent]

Site no. (fig. 2)	Date	Oxidized minerals	Carbonate	Galena	Pyrite	Sphalerite	Barite	Hematite	Mica (celadonite)	Remarks
1	3-02-89	■	+	--	t	--	--	--	--	Spinel (+)
	5-03-89	■	■	t	--	--	t	--	--	
	9-13-89	■	+	--	--	--	--	--	--	
2	3-03-89	--	■	--	--	--	--	--	t	
	5-03-89	--	■	+	+	--	--	--	--	
	9-13-89	+ (20)	■ (80)	--	t (2-3)	--	--	--	--	
3	3-02-89	■	■	--	--	--	--	--	t	
	5-04-89	--	■	t	t	t	--	--	--	
	9-14-89	+ (10)	■ (80)	t (2-3)	t (2-3)	t (1-2)	--	t (1-2)	--	
5	3-02-89	■	■	--	--	--	--	--	t	
	5-04-89	--	■	+	+	--	--	--	--	
	9-14-89	t (2-3)	■ (90)	--	t (2-3)	--	--	--	--	
6	3-03-89	■	■	--	--	--	--	--	t	
	5-04-89	--	■	+	+	--	--	--	--	
	9-13-89	+ (10)	■ (80-90)	--	--	--	--	--	--	
7	3-02-89	■	■	--	--	--	--	--	--	
	5-03-89	■	■	t	t	--	--	--	--	Iron-rich carbonate
	9-13-89	■ (60)	+ (10)	t (1-2)	t (1-2)	--	--	+ (20)	--	

Table 20.--*Mineralogy of C-2 fraction from bed sediment*--Continued

Site no. (fig. 2)	Date	Oxidized minerals	Carbonate	Galena	Pyrite	Sphalerite	Barite	Hematite	Mica (celadonite)	Remarks
8	5-03-89	+	■	t	t	--	--	--	--	
9	3-02-89	■	■	--	--	--	--	--	t	
	5-03-89	--	■	t	t	--	--	--		
10	3-02-89	--	■	--	--	--	--	--	--	
	5-03-89	--	■	t	t	--	--	--	--	
	9-14-89	--	■ (90)	--	+ (10)	--	--	--		
11	3-02-89	--	■	--	--	--	--	--	t	
	5-03-89	--	■	t	t	--	--	--	--	
	9-13-89	--	■ (95)	--	+ (5)	--	--	--	--	Dolomite and ankerite (90); calcite (5)
12	3-03-89	■	■	--	--	--	--	--	--	
	5-04-89	■	■	t	t	--	--	--	--	
	9-14-89	■ (40)	■ (60)	--	--	--	--	--	--	

Table 21.--*Mineralogy of C-2 fraction from bed sediment for seepage run sites*

[■, Major constituent of samples; +, constituent present in minor quantities; t, constituent present in trace quantities; --, constituent not detected in sample; number in parentheses is approximate percentage of constituent]

Site no. (fig. 7)	Date	Oxidized minerals	Carbonate	Galena	Pyrite	Hematite
1S	9-13-89	■ (70)	■ (25)	--	--	t (5)
2S	9-13-89	■ (60)	■ (40)	--	--	t (2-3)
3S	9-13-89	■ (80)	+ (20)	--	--	--
4S	9-13-89	+ (15)	■ (80)	--	--	t
5S	9-13-89	+ (20)	■ (80)	--	--	--
6S	9-13-89	+ (10)	■ (90)	--	t (1-2)	--
7S	9-13-89	+ (10)	■ (80)	t (2-3)	t (2-3)	--

TABLES 22 AND 23

ABBREVIATIONS AND REPORTING UNITS FOR CHEMICAL CONSTITUENTS AND NOTATIONS USED IN TABLES

Ca	Calcium, percent
Fe	Iron, percent
Mg	Magnesium, percent
Na	Sodium, percent
P	Phosphorus, percent
Ti	Titanium, percent
Sb	Antimony, in micrograms per gram
As	Arsenic, in micrograms per gram
B	Boron, in micrograms per gram
Ba	Barium, in micrograms per gram
Be	Beryllium, in micrograms per gram
Bi	Bismuth, in micrograms per gram
Cd	Cadmium, in micrograms per gram
Cr	Chromium, in micrograms per gram
Co	Cobalt, in micrograms per gram
Cu	Copper, in micrograms per gram
Ga	Gallium, in micrograms per gram
Ge	Germanium, in micrograms per gram
An	Gold, in micrograms per gram
La	Lanthanum, in micrograms per gram
Pb	Lead, in micrograms per gram
Mn	Manganese, in micrograms per gram
Mo	Molybdenum, in micrograms per gram
Ni	Nickel, in micrograms per gram
Nb	Niobium, in micrograms per gram
Sc	Scandium, in micrograms per gram
Ag	Silver, in micrograms per gram
Sr	Strontium, in micrograms per gram
Th	Thorium, in micrograms per gram
Sn	Tin, in micrograms per gram
W	Tungsten, in micrograms per gram
V	Vanadium, in micrograms per gram
Y	Yttrium, in micrograms per gram
Zn	Zinc, in micrograms per gram
Zr	Zirconium, in micrograms per gram
<	Less than
t	Detected in trace quantities, but not quantifiable
>	Greater than
>*	Much greater than

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*

Site no. (fig. 2)	Date	Ca	Fe	Mg	Na	P	Ti	Sb	As	B	Ba	Be	Bi
1	3-02-89	3.0	2.0	5.0	<0.5	0.5	2.0	200	<500	200	>10,000	t	<20
	5-03-89	5.0	3.0	3.0	<.5	t	2.0	500	<500	100	10,000	t	t
	9-13-89	2.0	10	2.0	<.5	<.5	1.5	t	<500	200	10,000	<2	<20
2	3-02-89	10	2.0	7.0	<.5	<.5	.02	<200	<500	20	500	t	<20
	5-03-89	7.0	5.0	7.0	<.5	<.5	.02	<200	<500	30	700	t	<20
	9-13-89	10	10	5.0	<.5	<.5	.02	<200	<500	t	200	t	<20
3	3-02-89	10	2.0	5.0	<.5	<.5	.02	<200	<500	20	500	<2	<20
	5-03-89	2.0	5.0	1.5	<.5	<.5	.02	<200	<500	20	1,000	<2	<20
	9-14-89	5.0	2.0	1.5	<.5	<.5	.02	<200	<500	t	500	t	<20
5	3-02-89	15	3.0	7.0	<.5	<.5	.03	<200	<500	20	3,000	t	<20
	5-03-89	5.0	7.0	7.0	<.5	<.5	.02	100	<500	20	100	<2	<20
	9-14-89	10	10	7.0	<.5	<.5	.03	<200	<500	t	500	<2	<20
6	3-02-89	15	2.0	10	<.5	<.5	.07	<200	<500	20	200	t	<20
	5-04-89	15	5.0	10	<.5	t	.02	<200	<500	30	100	t	<20
	9-13-89	15	5.0	5.0	<.5	.5	.03	<200	<500	20	200	<2	<20
7	3-02-89	5.0	10	3.0	<.5	.5	.70	<200	<500	20	>10,000	t	<20
	5-04-89	5.0	10	3.0	<.5	t	.50	<200	<500	20	3,000	<2	<20
	9-13-89	5.0	15	3.0	<.5	<.5	1.0	<200	<500	20	5,000	<3	<20
8	5-03-89	7.0	2.0	5.0	<.5	<.5	.02	<200	<500	20	50	<2	<20

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Cd	Cr	Co	Cu	Ga	Ge	Au	La	Pb	Mn	Mo	Ni	Nb
1	50	200	30	100	10	<20	<20	200	3,000	5,000	<10	70	100
	500	150	100	100	t	<20	<20	150	>50,000	5,000	<10	100	100
	200	150	30	70	20	<20	<20	200	2,000	5,000	<10	70	200
2	500	<20	50	200	<10	<20	<20	<100	>50,000	3,000	<10	70	<50
	>*1,000	<20	100	1,500	15	t	<20	<100	>*50,000	7,000	<10	70	<50
	>1,000	<20	150	5,000	t	t	<20	<100	>50,000	7,000	<10	100	<50
3	>1,000	<20	50	100	20	<20	<20	<100	50,000	2,000	<10	50	<50
	>*1,000	<20	100	200	20	20	<20	<100	50,000	1,000	<10	50	<50
	>*1,000	<20	100	200	20	t	<20	<100	50,000	1,500	<10	20	<50
5	1,000	<20	100	300	10	<20	<20	<100	30,000	3,000	<10	100	<50
	1,000	<20	200	1,500	10	<20	<20	<100	>*50,000	5,000	<10	200	<50
	1,000	<20	200	5,000	10	t	<20	<100	>50,000	5,000	<10	200	<50
6	>1,000	<20	70	70	7	<20	<20	<100	30,000	5,000	<10	100	<50
	>1,000	<20	50	300	15	<20	<20	<100	50,000	10,000	<10	50	<50
	>*1,000	<20	200	1,000	20	<20	<20	<100	>50,000	5,000	<10	100	<50
7	150	20	100	2,000	t	<20	<20	200	>50,000	2,000	<10	300	100
	700	20	200	500	t	<20	<20	t	20,000	3,000	<10	1,000	t
	100	70	100	1,000	20	<20	<20	200	>50,000	5,000	<10	200	150
8	1,000	<20	50	150	<10	<20	<20	<100	>*50,000	3,000	<10	100	<50

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Sc	Ag	Sr	Th	Sn	W	V	Y	Zn	Zr
1	20	<1.0	700	<200	50	t	100	200	1,500	>2,000
	20	30	500	<200	>2,000	<50	100	200	20,000	>2,000
	10	5.0	500	<200	50	<50	150	200	3,000	>2,000
2	<10	50	<200	<200	<20	<50	t	20	20,000	20
	<10	200	<200	<200	<20	<50	t	t	>*20,000	20
	<10	200	<200	<200	<20	<50	t	<20	>20,000	70
3	<10	150	<200	<200	20	<50	t	t	>20,000	20
	<10	200	<200	<200	<20	<50	t	<20	>*20,000	t
	<10	300	<200	<200	<20	<50	t	<20	>*20,000	100
5	<10	70	t	<200	<20	<50	t	30	>20,000	150
	<10	100	<200	<200	1,000	<50	t	<20	20,000	20
	<10	200	<200	<200	200	<50	t	<20	>20,000	200
6	<10	150	<200	<200	t	<50	t	20	>20,000	300
	<10	100	<200	<200	<20	<50	t	20	>*20,000	100
	<10	300	<200	<200	<20	<50	t	20	>*20,000	100
7	10	15	700	<200	700	<50	30	150	2,000	>2,000
	<10	50	300	<200	20	150	20	70	20,000	2,000
	10	7.0	500	<200	500	<50	150	200	1,000	>2,000
8	<10	100	<200	<200	150	<50	t	<20	20,000	<20

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Date	Ca	Fe	Mg	Na	P	Ti	Sb	As	B	Ba	Be	Bi
9	3-02-89	20	2.0	7.0	<0.5	<0.5	0.02	<200	<500	30	100	t	<20
	5-04-89	7.0	3.0	5.0	<.5	<.5	.02	<200	<500	20	150	t	<20
10	3-02-89	2.0	15	2.0	<.5	<.5	.01	<200	<500	t	100	<2	<20
	5-03-89	5.0	10	3.0	<.5	<.5	.01	<200	<500	t	100	<2	<20
	9-14-89	7.0	30	5.0	<.5	<.5	.02	<200	<500	<20	300	t	<20
11	3-02-89	10	7.0	5.0	<.5	<.5	.02	<200	<500	t	500	t	<20
	5-03-89	10	5.0	10	<.5	<.5	.02	<200	<500	30	150	t	<20
	9-13-89	10	7.0	7.0	<.5	<.5	.07	<200	<500	t	300	<2	<20
12	3-03-89	2.0	1.0	3.0	<.5	<.5	.30	<200	<500	30	>*10,000	<2	<20
	5-04-89	1.0	.2	1.0	<.5	t	.20	<200	<500	20	>*10,000	<2	t
	9-14-89	5.0	3.0	5.0	<.5	1	2.0	<200	<500	50	>*10,000	t	<20

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Cd	Cr	Co	Cu	Ga	Ge	Au	La	Pb	Mn	Mo	Ni	Nb
9	200	<20	100	50	<10	<20	<20	<100	50,000	3,000	<10	200	<50
	300	<20	200	200	t	<20	<20	<100	>50,000	5,000	<10	500	<50
10	300	<20	500	500	t	<20	<20	<100	>50,000	700	<10	700	<50
	300	<20	200	1,500	10	<20	<20	<100	>*50,000	2,000	<10	500	<50
	150	<20	1,000	2,000	<10	<20	<20	<100	>50,000	2,000	<10	1,500	<50
11	300	<20	300	1,500	t	<20	<20	<100	>50,000	2,000	<10	500	<50
	200	<20	100	2,000	t	<20	<20	<100	>50,000	7,000	<10	100	<50
	300	<20	1,000	10,000	t	t	<20	<100	>50,000	7,000	<10	1,500	<50
12	70	50	20	70	t	<20	<20	t	3,000	1,500	<10	100	<50
	150	<20	t	50	<10	<20	<20	<100	5,000	700	<10	<10	t
	150	200	20	200	10	<20	<20	100	10,000	5,000	<10	30	100

Table 22.-- *Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Sc	Ag	Sr	Th	Sn	W	V	Y	Zn	Zr
9	<10	20	<200	<200	<20	<50	t	20	10,000	30
	<10	50	<200	<200	<20	<50	t	<20	20,000	20
10	<10	100	<200	<200	<20	<50	t	<20	20,000	100
	<10	70	<200	<200	<20	<50	t	<20	20,000	t
	<10	100	<200	<200	<20	<50	<20	<20	10,000	70
11	<10	50	<200	<200	100	<50	t	20	20,000	100
	<10	30	<200	<200	200	<50	20	t	10,000	20
	<10	50	<200	<200	t	<50	<20	20	20,000	50
12	<10	2	2,000	<200	70	<50	t	100	5,000	>2,000
	<10	2	2,000	<200	70	<50	20	70	15,000	>2,000
	20	5	5,000	<200	50	<50	100	200	10,000	>2,000

Table 23.--*Semiquantitative emission spectrograph analyses of C-3 fraction from bed sediment for seepage run sites*

Site no. (fig. 7)	Date	Ca	Fe	Mg	Na	P	Ti	Sb	As	B	Ba	Be	Bi
1S	9-13-89	5.0	20	3.0	<0.5	t	1.0	<200	<500	50	>5,000	5	<20
2S	9-13-89	7.0	20	5.0	<.5	1.0	1.0	<200	<500	30	5,000	5	<20
3S	9-13-89	2.0	15	1.0	<.5	t	2.0	<200	<500	200	3,000	2	<20
4S	9-13-89	15	15	10	<.5	t	.70	t	<500	50	5,000	t	<20
5S	9-13-89	20	10	10	<.5	t	.10	<200	<500	30	1,500	2	<20
6S	9-13-89	20	5.0	5.0	<.5	<.5	.05	<200	<500	20	1,000	t	<20
7S	9-13-89	.7	1.0	.5	<.5	<.5	.01	<200	<500	<20	150	<2	<20

Site no. (fig. 7)	Cd	Cr	Co	Cu	Ga	Ge	Au	La	Pb	Mn	Mo	Ni	Nb
1S	150	700	100	2,000	50	<20	<20	100	30,000	10,000	<10	150	100
2S	200	150	100	100	20	<20	<20	150	50,000	>10,000	<10	150	70
3S	50	150	50	200	30	<20	<20	200	5,000	10,000	<10	100	100
4S	1,000	70	300	5,000	20	t	<20	100	>5,000	>10,000	<10	150	50
5S	700	20	200	1,500	15	<20	<20	t	>5,000	10,000	<10	200	<50
6S	>*1,000	<20	150	2,000	30	t	<20	<100	>5,000	7,000	<10	50	<50
7S	700	<20	20	50	t	<20	<20	<100	>*5,000	500	<10	<10	<50

Site no. (fig. 7)	Sc	Ag	Sr	Th	Sn	W	V	Y	Zn	Zr
1S	15	7	1,000	<200	1,500	<50	200	150	5,000	>2,000
2S	10	15	300	<200	20	<50	200	150	10,000	2,000
3S	20	2	200	<200	20	<50	200	200	2,000	>2,000
4S	t	100	t	<200	t	<50	100	100	>20,000	1,000
5S	<10	100	<200	<200	<20	<50	50	50	20,000	100
6S	<10	300	<200	<200	<20	<50	20	<20	>20,000	50
7S	<10	150	<200	<200	<20	<50	20	<20	20,000	70

Table 24.-- *Mineralogy of C-3 fraction from bed sediment*

[X indicates the presence of constituent; --, constituent not detected or percentage of constituent not given; number in parentheses is approximate percentage of constituent; <, less than; poss.f.g., possibly a few grains]

		Carbonate					Sulfide					
Site no. (fig. 2)	Date	Percentage	Dolomite and ankerite	Calcite	Zinc substitution	Zinc-rich carbonate	Percentage	Bornite	Chalcopyrite	Galena	Pyrite	Sphalerite
1	3-02-89	80-90	X	--	X	possibly	10-20	--	--	X	X	X(minor)
	5-03-89	--	X	X(2)	--	--	30	--	--	X	--	X
	9-13-89	--	--	--	--	--	--	--	--	X(2)	X(1)	--
2	3-03-89	60-70	--	--	X	possibly	30	--	--	X	X	X
	5-03-89	20	--	--	X	--	80	X	X	X(35)	X(20)	X(35)
	9-13-89	50	X	X	--	--	--	--	X(1-2)	X(15)	X(15)	X(15)
3	3-02-89	60-70	X	--	X	possibly	30-40	--	--	X	X	X
	5-04-89	30	--	--	X	--	70	--	--	X(30)	X(10)	X(60)
	9-14-89	25	X	X	--	--	--	--	--	X(25)	X(3-5)	X(50)
5	3-02-89	60-70	X	--	X	--	30	--	--	X	X	X
	5-04-89	50	--	--	X	--	50	X	X	X(70)	X(15)	X(10)
	9-14-89	50	X	X	--	--	--	--	X(2-3)	X(10)	X(20)	X(10
6	3-03-89	60-70	--	--	X	possibly	30	--	--	X	X	X
	5-04-89	60	--	--	X	--	40	X	X	X(30)	X(30)	X(40)
	9-13-89	40	X	X	--	--	--	--	X(<1)	X(10)	X(10)	X(40)
7	3-02-89	40-50	--	--	X	possibly	40-50	--	X(poss.f.g.)	X	X	possibly
	5-03-89	50	X	X	X	possibly	50	--	X(poss.f.g.)	X	X	X
	9-13-89	25	--	--	--	--	--	--	X(1-2)	X(20)	X(20)	X(<1)
8	5-03-89	40	--	--	X	--	60	--	--	X(60)	X(30)	X(10)
9	3-02-89	70-80	X	--	X	possibly	20-30	--	--	X(major)	X	X
	5-03-89	60	--	--	X	possibly	40	--	--	X(80)	X(10)	X(10)
10	3-02-89	50	X	--	X	possibly	50	--	X(possibly)	X	X	X
	5-03-89	40	--	--	X	--	60	X	X	X(70)	X(20)	X(5)
	9-14-89	40	X	X	--	--	--	--	X(2)	X(20)	X(40)	X(1-2)
11	3-02-89	60-70	X	X	X	possibly	30-40	--	X	X	X	X
	5-03-89	70-80	--	--	X	--	20	X(5)	X(5)	X(40)	X(50)	X
	9-13-89	60-70	X	X	--	--	30-40	X(poss.f.g.)	X(10)	X(10)	X(10-15)	X(5)
12	3-03-89	80-90	--	--	X	--	10	--	--	X	X	possibly
	5-04-89	10	--	--	X	--	10	--	--	X	X	X
	9-14-89	30	X	X	--	--	--	--	--	X(1)	X(1)	X(1)

Table 24.-- *Mineralogy of C-3 fraction from bed sediment*--Continued

Site no. (fig. 2)	Barite	Zircon	Remarks
1	X	X	Barite and zircon included in percentage of sulfides
	X	--	Possible cassiterite, but tin could be associated with sphalerite
	X(20)	X(10)	Oxidized grains (50); hematite (2-3); rutile (5)
2	--	--	
	--	--	Bornite and chalcopyrite (10)
	--	--	
3	--	--	Sulfide predominantly altered galena
	--	--	
	--	--	Few grains of lead
5	X	--	
	--	--	Bornite and chalcopyrite (5); tin possible in sphalerite or as stannite
	--	--	
6	--	--	
	--	--	Bornite and chalcopyrite (few percent)
	--	--	
7	X	X	Possibly chrysocolla
	--	--	Possible few grains of scheelite
	X(5)	X(10)	Oxidized material (10-15); rutile (5)
8	--	--	Possible tin substitution in sphalerite
9	--	--	
	--	--	
10	--	--	
	--	--	Bornite and chalcopyrite (5)
	--	--	
11	--	--	Some covellite
	--	--	
	--	--	
12	X	--	
	X(60-70)	X(10)	
	X(50)	--	Oxidized material (10); rutile (3-5)

Table 25.--*Mineralogy of C-3 fraction from bed sediment for seepage run sites*

[X, indicates presence of constituent; --, constituent not detected or percentage of constituent not given; number in parentheses is approximate percentage of constituent; f.g., few grains; <, less than]

Site no. (fig. 7)	Date	Carbonate			Sulfide						Remarks
		Percentage	Dolomite and ankerite	Calcite	Chalcopyrite	Galena	Pyrite	Sphalerite	Barite	Zircon	
1S	9-13-89	20	X	X	X(f.g.)	X(2-3)	X(10)	X(f.g.)	X(50)	--	Oxidized material (20)
2S	9-13-89	30	--	--	--	X(5)	X(5)	X(1)	X(5)	--	Oxidized material (50)
3S	9-13-89	20	--	--	--	X(f.g.)	--	X(f.g.)	X(2-3)	X(2-3)	Oxidized material (60); nondescript minerals (5)
4S	9-13-89	50	X	X	X(5)	X(20)	X(15)	X(10)	--	--	
5S	9-13-89	70	X	X	X(1)	X(10)	X(10)	X(5)	--	--	
6S	9-13-89	60	X	X	X(1)	X(10)	X(5)	X(20)	--	--	
7S	9-13-89	--	--	--	--	X(75)	X(<5)	X(20)	--	--	Galena finely coated with cerussite

Table 26.--*Phase associations of bed sediment (scanning electron microscope)*

[Ba, barium; Ca, calcium; Fe, iron; Pb, lead; Mn, manganese; Ti, titanium; Zn, zinc; number indicates total particles of element detected; --, not detected]

Site no. (fig. 2)	Date	Element	Phase: Carbonate Fine	Carbonate Coarse	Oxide Fine	Oxide Coarse	Phosphate Fine	Phosphate Coarse	Sulfate Fine	Sulfate Coarse	Sulfide Fine	Sulfide Coarse	Remarks
1	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	1	--	--	--	--	3	--	--	--	--	
		Fe	--	--	14	26	--	--	--	--	2	--	
		Pb	--	--	1	--	--	--	--	--	1	2	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	5	5	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	--	
2	9-26-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	8	--	--	--	--	--	--	--	--	--	
		Fe	--	5	9	26	--	--	1	--	4	2	
		Pb	--	--	--	--	--	--	--	2	6	7	
		Mn	--	--	3	--	--	--	--	--	--	--	
		Ti	--	--	12	--	--	--	--	--	--	--	
		Zn	--	1	--	--	--	--	--	--	7	2	
3	9-27-88	Ba	--	--	--	--	--	--	1	--	--	--	
		Ca	7	--	--	--	--	--	--	--	--	--	
		Fe	--	--	17	7	--	--	--	--	7	23	
		Pb	6	--	2	--	--	--	--	--	12	8	
		Mn	--	--	12	--	--	--	--	--	--	--	
		Ti	--	--	2	--	--	--	--	--	--	--	
		Zn	--	--	1	--	--	--	--	--	4	13	
5	9-27-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	--	--	--	--	2	1	--	--	--	--	
		Fe	2	--	1	7	--	--	1	--	13	58	
		Pb	1	--	1	--	--	--	--	1	7	3	
		Mn	--	--	1	--	--	--	--	--	--	--	
		Ti	--	--	--	--	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	3	2	

Table 26.--*Phase associations of bed sediment (scanning electron microscope)*--Continued

Site no. (fig. 2)	Date	Element	Phase: Carbonate Fine	Carbonate Coarse	Oxide Fine	Oxide Coarse	Phosphate Fine	Phosphate Coarse	Sulfate Fine	Sulfate Coarse	Sulfide Fine	Sulfide Coarse	Remarks
6	9-27-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	1	--	--	--	1	--	--	--	7	28	
		Fe	--	1	6	13	--	--	--	--	12	3	
		Pb	--	--	--	--	--	--	--	6	--	--	
		Mn	--	--	5	--	--	--	--	--	--	--	
		Ti	--	--	4	--	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	--	
7	9-26-88	Ba	--	--	--	--	--	--	2	--	--	--	Tin oxide - (1, fine)
		Ca	--	--	--	--	--	--	--	--	--	--	
		Fe	--	--	5	30	--	--	--	--	3	--	
		Pb	--	--	--	--	--	--	--	--	1	--	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	1	2	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	--	
	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	Organic - (1, fine)
		Ca	--	--	--	--	--	--	--	--	--	--	
		Fe	--	--	10	28	--	--	--	--	9	--	
		Pb	--	--	--	--	--	--	--	--	--	--	
		Mn	--	--	2	--	--	--	--	--	--	--	
		Ti	--	--	8	--	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	--	
8	9-26-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	2	--	--	--	--	--	--	--	--	--	
		Fe	--	--	8	1	--	--	--	--	4	24	
		Pb	--	--	--	--	--	--	--	--	14	12	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	--	1	--	--	--	--	--	--	
		Zn	31	54	18	2	--	--	--	--	3	--	
	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	1	--	--	--	--	--	--	--	--	--	
		Fe	--	--	7	--	--	--	--	--	2	12	
		Pb	--	--	--	--	--	--	--	--	9	8	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	--	1	--	--	--	--	--	--	
		Zn	27	42	11	--	--	--	--	--	3	2	

Table 26.--*Phase associations of bed sediment (scanning electron microscope)*--Continued

Site no. (fig. 2)	Date	Element	Phase										Remarks
			Carbonate		Oxide		Phosphate		Sulfate		Sulfide		
			Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	
9	9-26-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	2	--	--	--	--	--	--	--	--	--	
		Fe	--	--	3	5	--	--	--	--	9	16	
		Pb	--	--	--	--	--	--	--	--	6	8	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	--	--	--	--	--	--	--	--	
		Zn	74	27	47	14	--	--	--	--	--	3	
	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	2	--	--	--	--	--	--	--	--	--	
		Fe	--	--	5	1	--	--	--	--	--	--	
		Pb	--	--	--	--	--	--	--	--	--	15	
		Mn	--	--	1	--	--	--	--	--	5	4	
		Ti	--	--	--	--	--	--	--	--	--	--	
		Zn	27	26	8	7	--	--	--	--	--	3	
10	9-26-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	4	--	--	--	--	--	--	--	--	--	
		Fe	--	--	2	--	--	--	22	--	18	83	
		Pb	1	--	--	--	--	--	--	--	7	14	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	4	--	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	1	
	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	1	--	--	--	--	--	--	--	--	--	
		Fe	--	--	--	--	--	--	--	--	41	22	
		Pb	--	--	--	--	--	--	--	--	13	16	
		Mn	--	--	--	--	--	--	--	--	--	--	
		Ti	--	--	--	--	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	1	
11	9-26-88	Ba	--	--	--	--	--	--	--	--	--	--	Cu sulfide - (2, fine)
		Ca	5	--	--	--	--	2	--	--	--	--	
		Fe	--	--	4	--	--	--	--	--	20	39	
		Pb	--	--	--	--	--	--	--	--	27	8	
		Mn	--	--	1	--	--	--	--	1	--	--	
		Ti	--		1	--	--	--	--	--	--	--	
		Zn	2		--	--	--	--	--	1	1	--	

Table 26.--*Phase associations of bed sediment (scanning electron microscope)*--Continued

Site no. (fig. 2)	Date	Element	Phase										Remarks
			Carbonate		Oxide		Phosphate		Sulfate		Sulfide		
			Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	
12	9-27-88	Ba	--	--	--	--	--	--	7	--	--	--	
		Ca	--	--	--	--	--	1	--	--	--	--	
		Fe	--	--	2	24	--	--	--	2	--	--	
		Pb	--	--	--	--	--	--	--	1	--	--	
		Mn	--	--	3	--	--	--	--	--	--	--	
		Ti	--	--	13	--	--	--	--	--	--	--	
		Zn	--	--	1	--	--	--	--	--	--	--	
	11-30-88	Ba	--	--	--	--	--	--	--	--	--	--	
		Ca	9	--	--	--	--	--	--	--	--	--	
		Fe	--	--	7	8	--	1	--	1	--	--	
		Pb	--	--	--	--	--	--	--	--	--	--	
		Mn	--	--	1	--	--	--	--	--	--	--	
		Ti	--	--	11	3	--	--	--	--	--	--	
		Zn	--	--	--	--	--	--	--	--	--	--	
	11-30-88 (duplicate)	Ba	--	--	--	--	--	3	--	--	--	--	
		Ca	1	--	--	--	--	--	--	--	--	--	
		Fe	--	--	7	13	--	--	--	2	3	--	
		Pb	--	--	--	--	--	--	--	4	3	--	
		Mn	--	--	1	--	--	--	--	--	--	--	
		Ti	--	--	5	--	--	--	--	--	--	--	
		Zn	--	--	--	2	--	--	--	--	1	--	

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