Assessment of Metal Transport Into and Out of Terrace Reservoir, Conejos County, Colorado, April 1994 Through March 1995

by Sheryl Ferguson and Patrick Edelmann

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
pound (lb)	0.4536	kilogram
ton, short	0.9072	megagram

The following terms and abbreviations also are used in this report:

milligram per liter (mg/L)
micrometer (μm)

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

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Abstract

Terrace Reservoir is the primary source of water for crops and livestock in the southwestern part of the San Luis Valley in southern Colorado. Mining activities have occurred in the basin for more than 100 years, and substantial mining of gold has occurred intermittently at the Summitville Mine. Historically, the Summitville Mine site has produced highly acidic, metal-enriched water that drained from the mine site into Wightman Fork and flowed to the Alamosa River and Terrace Reservoir. In 1994, a study was begun as part of risk-assessment and remediation efforts and to evaluate metal transport into and out of Terrace Reservoir.

During the study period, the pH immediately upstream from Terrace Reservoir ranged from 4.3 to 7.8. The highest pH occurred during the pre-peak snowmelt period; the lowest pH occurred during storm runoff during summer. Downstream from Terrace Reservoir, the pH ranged from 4.6 to 7.6. The highest pH occurred during the pre-peak snowmelt period, and the lowest pH occurred during summer in mid-July. A comparison of the streamflow hydrographs upstream and downstream from Terrace Reservoir indicated that there was only a small difference between the annual volume of water that entered the reservoir and the annual volume of water that was released from the reservoir.

Large spatial and temporal variations in concentrations of the metals of concern occurred during the study. The median and maximum concentrations of dissolved and total aluminum, iron, copper, cadmium, manganese, and zinc were larger upstream from the reservoir than downstream from the reservoir. The largest concentrations of dissolved aluminum, iron, copper, cadmium, manganese, and zinc generally occurred between mid-June and November. Throughout the study, aluminum was transported into the reservoir predominantly in the particulate or suspended form. Downstream from the reservoir, the suspended-aluminum fraction was predominant only during the pre-peak snowmelt and peak snowmelt periods. The temporal variations in the percentage of dissolved and suspended fraction of iron and copper downstream from Terrace Reservoir were similar to the temporal variations that occurred upstream from the reservoir. During the study period, cadmium, manganese, and zinc generally were transported into and out of the reservoir predominantly in the dissolved form.

Metal loads varied considerably as a result of changes in streamflow or changes in metal concentrations, or both. The largest daily loads of aluminum, iron, and manganese were transported into and out of Terrace Reservoir during the peak snowmelt period. The reservoir was a sink for an estimated 294 tons of aluminum and 596 tons of iron. However, about 68.5 tons of total aluminum and about 194 tons of total iron were transported out of the reservoir during the study period. During the study period, about 22 tons of total copper remained in the reservoir, and 39 tons was transported downstream from the reservoir. About 47 tons of total manganese and 18 tons of total-zinc loads were transported out of the reservoir; the reservoir was a sink for only a small fraction of total-manganese and -zinc loads.

INTRODUCTION

Terrace Reservoir is a small irrigation reservoir located on the Alamosa River at an elevation of about 8,550 ft above sea level in the San Juan Mountains in Conejos County, Colorado (fig. 1). The Alamosa River and Terrace Reservoir are the primary sources of water for crops and livestock in the southwestern part of the San Luis Valley. Irrigation ponds filled with Alamosa River water are stocked with fish for private use. The Alamosa River is important to the local economy and is a substantial component of the agricultural community (Posey and others, 1995).

Much of the drainage basin upstream from Terrace Reservoir contains extensive areas of mineralized rocks that in some places have been mined and that contribute a substantial metal load to the Alamosa River and Terrace Reservoir. Gold, silver, copper, and lead have been mined in the basin for more than 100 years, and extensive gold-mining activities have occurred intermittently at the Summitville Mine (fig. 1) from 1873 to 1894, from 1926 to 1942, and from 1986 to 1992 (U.S. Environmental Protection Agency, 1993). In December 1992, the operator of the Summitville Mine declared bankruptcy. The U.S. Environmental Protection Agency immediately took over the Summitville Mine site under the U.S. Environmental Protection Agency Superfund Emergency Response authority. Preliminary ecological and human-health risk assessments indicated that concentrations of dissolved and total aluminum, cadmium, copper, iron, manganese, and zinc were large enough to be of environmental concern, and copper was determined to be the primary constituent of concern (Morrison and Knudsen Corporation and ICF Keiser Engineers, 1994).

As part of risk-assessment and remediation efforts, the U.S. Geological Survey began a study on Terrace Reservoir in 1994, in cooperation with the U.S. Environmental Protection Agency, to: (1) Evaluate metal transport into and out of the reservoir; (2) assess the physical and chemical characteristics of the reservoir, including an evaluation of the spatial and temporal distribution of metals in the

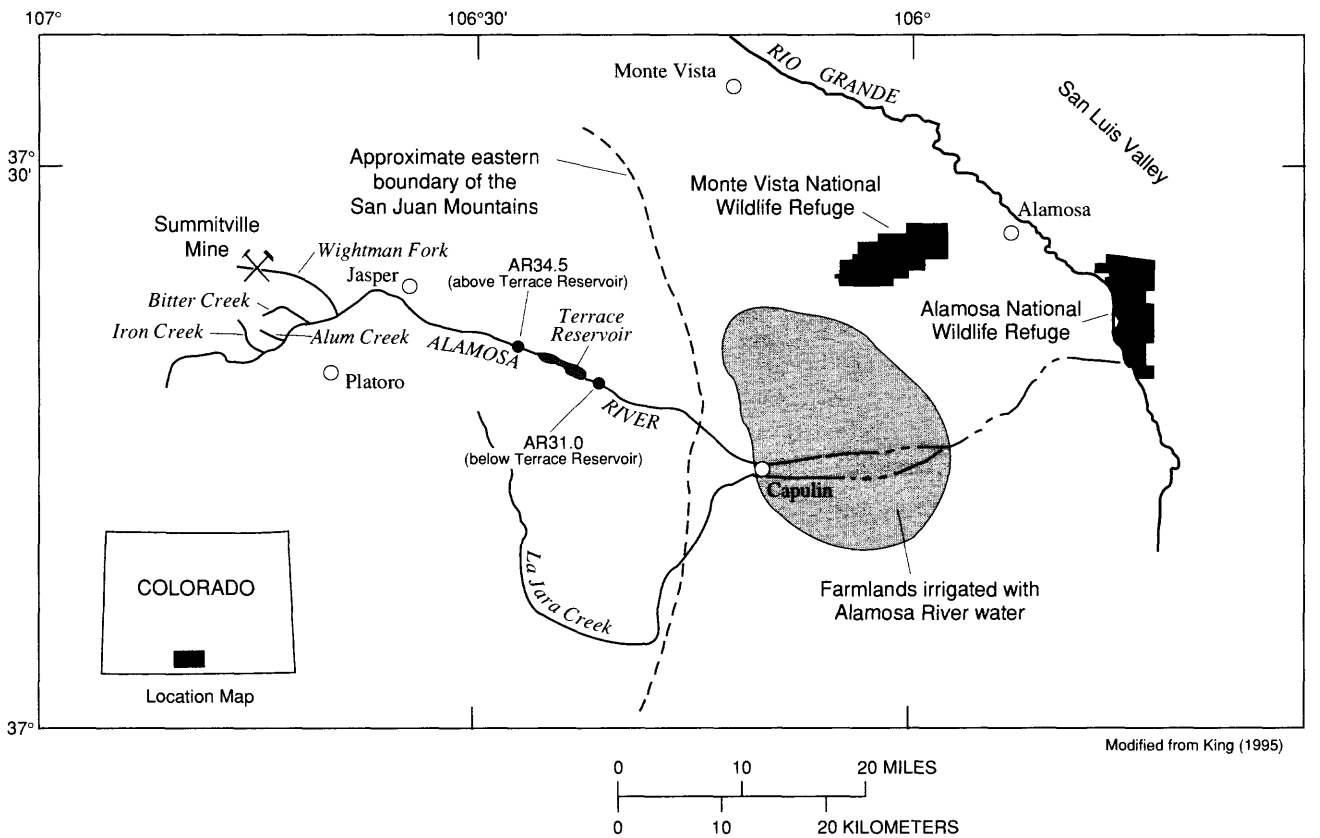

Figure 1. Location of Terrace Reservoir and location of sampling sites upstream and downstream from Terrace Reservoir.

reservoir; (3) determine the mass of metals in the surficial reservoir sediments and the depth of metal-enriched sediments; (4) evaluate the potential for remobilization of metals from the sediments; and (5) assess the exchange of metals between the sediments and the overlying water column.

Purpose and Scope

This report describes the metals transported into and out of Terrace Reservoir between April 1994 and March 1995. Specifically, it describes the spatial and temporal variations in metal concentrations in the Alamosa River immediately upstream and downstream from Terrace Reservoir and provides estimates of loads into and out of Terrace Reservoir during the study period. A summary of the percentage of dissolved-metal concentrations relative to total-metal concentrations is presented; correlations of concentrations of the metals of concern, streamflow, specific conductance, and pH also are presented. The primary metals of concern in the Alamosa River were identified as aluminum, cadmium, copper, iron, manganese, and zinc (Morrison and Knudsen Corporation and ICF Keiser Engineers, 1994). Therefore, this report is limited to extensive discussion of these metals, but additionally provides a summary of concentrations for total arsenic, dissolved and total barium, dissolved and total cobalt, total lead, dissolved and total nickel, and total vanadium.

Water Quality of the Upper Alamosa River Basin

From 1985 through 1992, the Summitville Mine site produced highly acidic, metal-enriched water that drained from the mine site into Wightman Fork and flowed to the Alamosa River and Terrace Reservoir (King, 1995). Acid drainage forms during chemical weathering when sulfide minerals react with water and oxygen to generate large amounts of sulfuric acid. Metals are released into solution when the sulfuric acid comes in contact with rocks, and heavy metals are leached out, resulting in water high in metal content and low in pH. The Summitville Mine drainage water has been among the most acidic and metal-bearing water in Colorado; the drainage water has had a pH generally less than 3 and has contained high concentrations of aluminum, copper, iron, zinc, and other metals (King, 1995).

In addition to mining as a source of contamination, natural degradation of the water quality of the Alamosa River has occurred from tributaries and springs with low pH (Moran and Wentz, 1974; Hamilton, 1989; Miller and McHugh, 1994; Kirkham and others, 1995; Walton-Day and others, 1995). Previous studies of water quality indicated that Wightman Fork has been the predominant source of aluminum, copper, iron, manganese, and zinc during peak snowmelt and the post-peak snowmelt periods and has been the source of most of the copper, manganese, and zinc discharged annually into the Alamosa River (Walton-Day and others, 1995). Other metal-enriched sources downstream from Wightman Fork might include tributaries, material stored in the streambed, and ground water. The Alamosa River upstream from Iron Creek contains only moderate concentrations of iron and aluminum and very minor amounts of copper, zinc, and manganese (Walton-Day and others, 1995).

Water quality in the Alamosa River Basin is variable. The pH has varied from about 3.5 to greater than 7, hardness has varied from about 40 to almost 200 mg/L, and the alkalinity generally has ranged from 2 to about 40 mg/L (Mueller and Mueller, 1995). During 1994, pH in Wightman Fork ranged from about 5 to 7.5 during the early spring snowmelt period, subsequently decreased to between 3.5 and 5 during the peak snowmelt period, and remained low throughout the summer and winter (Mueller and Mueller, 1995). During 1994, pH in the Alamosa River upstream from Wightman Fork ranged from 3.8 during the early spring snowmelt period to 7.5 during summer (Mueller and Mueller, 1995).

Methods of Investigation

Two water-quality sampling sites, AR34.5 (station 08236000, Alamosa River above Terrace Reservoir) and AR31.0 (station 08236500, Alamosa River below Terrace Reservoir) were selected to describe the metal chemistry and to evaluate metal transport into and out of Terrace Reservoir (fig. 1). These sites were selected because of their proximity to the reservoir and because continuous streamflow data, which are required for load computations, are available for these sites. Both sites currently are operated as streamflow-gaging stations by the Colorado Division of Water Resources. The streamflow data used in this report were collected by the Colorado Division of Water Resources.

Prior to collection of water-quality samples, all sampling equipment was thoroughly cleaned with a laboratory-grade detergent, rinsed sequentially with tap water, a dilute hydrochloric acid solution, and deionized water. The cleaned sampling equipment was placed into two clean, clear plastic bags between sampling events to avoid environmental contamination. Sampling equipment was thoroughly rinsed with river water prior to sampling. All personnel involved in sampling-equipment preparation and sample collection and processing wore latex gloves to minimize sample contamination.

Water-quality samples generally were collected using the equal-width increment method (Edwards and Glysson, 1988). The equal-width increment method provides a sample that is discharge weighted both vertically and laterally and whose volume is proportional to the discharge in the sampled zone. The equal-width increment method results in a representative constituent concentration for the entire river cross section. A US–DH–81 water-quality sampler was used when the river was wadable, and a US–D–77 water-quality sampler was used from the cableway when the river was not wadable (Edwards and Glysson, 1988). Both of these samplers use plastic components in their design; therefore, the potential of trace-element contamination resulting from sample contact with metal surfaces is minimized. After the samples were collected, aliquots of raw water for total or total-recoverable (whole-water) analyses were collected into a clean plastic bottle and acidified, using nitric acid, to a pH less than 2; additional aliquots were collected for dissolved-constituent analyses. These aliquots were filtered through a 0.45-µm filter into a clean plastic bottle and acidified using nitric acid to a pH less than 2. After the samples were collected, preserved, and processed, the samples were sent using chain-of-custody procedures to a U.S. Environmental Protection Agency contract laboratory. The samples were analyzed for dissolved (filterable through 0.45-µm filter) and total aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, sodium, titanium, vanadium, and zinc by using either inductively coupled plasma (ICP) or graphite furnace atomic absorption (GFAA) methods.

Quality-control/quality-assurance samples represented about 10 percent of the total samples. These included replicate samples and equipment blanks. Quality-control/quality-assurance samples were analyzed for concentrations of dissolved and total metals. Results from quality-control sample analyses indicated that cleaning procedures were acceptable and that cross contamination was not a problem.

Transport of metals entering Terrace Reservoir was evaluated using data collected at site AR34.5, Alamosa River above Terrace Reservoir (fig. 1; table 1). From late April 1994 through March 1995, 52 water samples were collected at site AR34.5 for total-metal analyses, and 34 water samples were collected for dissolved-metal analyses. Because previous investigations (Ortiz and others, 1995) indicated that substantial metal transport occurred in the Alamosa River Basin during rainfall runoff, samples were collected using an automatic sampler at a single point within the river cross section at site AR34.5 during a few rainfall-runoff events (table 1). These samples were analyzed for total or total-recoverable (whole-water) concentration of trace elements. In general, discrete samples collected during a runoff event were flow weighted the following day into a single composite sample by using guidelines described by the U.S. Environmental Protection Agency (1991) so an event-mean concentration could be determined. Additionally, selected discrete samples collected during a few runoff events were analyzed separately to provide information on the variability of metal concentrations that occurs during a rainfall-runoff event. To relate the metal concentration of point samples to a concentration that is representative of the entire cross section, an additional 22 point samples were collected concurrently with equal-width increment samples collected at various streamflows.

Transport of metals out of Terrace Reservoir was evaluated using data collected at site AR31.0, Alamosa River below Terrace Reservoir (fig. 1; table 1). From late April 1994 through March 1995, 25 water samples were collected at site AR31.0 for dissolved- and total-metal analyses. Four samples collected from November 1994 through March 1995 were collected at this site during the period when the reservoir outlet was closed.

Table 1. Sample dates and analyses for sites AR34.5 and AR31.0, April 1994 through March 1995

[X, sample collected and analyzed; --, no specific sample time because sample was composited from several discrete samples collected during a storm; NS, sample not analyzed for dissolved metals]

Sample date	Sample time	Total-metal analyses	Dissolved-metal analyses	Sample date	Sample time	Total-metal analyses	Dissolved-metal analyses
			SITE AR34.5				
			Pre-peak snowmelt runoff:				
04/28/94	1250	X	X	05/12/94	1245	X	X
05/05/94	1320	X	X				
			Peak snowmelt runoff:				
05/17/94	1255	X	X	05/26/94	1030	X	X
05/20/94	0740	X	X	06/01/94	1035	X	X
05/24/94	0835	X	X	06/02/94	2345	X	X
			Post-peak snowmelt runoff:				
06/09/94	1340	X	X	06/27/94	1320	X	X
06/14/94	1030	X	X	07/08/94	1415	X	X
06/22/94	1355	X	X				
			Summer flow:				
07/20/94	0825	X	X	08/26/94	1000	X	X
07/27/94	1015	X	X	08/31/94	1400	X	X
08/02/94	1105	X	X	09/09/94	1240	X	X
08/10/94	1220	X	X	09/14/94	1200	X	X
08/15/94	0930	X	X	09/26/94	1415	X	X
			Storm runoff:				
07/31/94	--	X	NS	09/14/94	0230	X	NS
08/01/94	--	X	NS	09/14/94	0500	X	NS
08/01/94	1930	X	NS	09/14/94	0800	X	NS
08/01/94	2330	X	NS	09/14/94	1301	X	NS
08/02/94	0530	X	NS	09/14/94	1500	X	NS
08/11/94	--	X	NS	09/14/94	2100	X	NS
08/14/94	--	X	NS	09/15/94	0500	X	NS
08/14/94	2400	X	NS	09/15/94	--	X	NS
08/15/94	2000	X	NS				
09/14/94	--	X	NS				
			Base flow:				
10/04/94	1710	X	X	11/21/94	1235	X	X
10/12/94	0945	X	X	11/21/94	1330	X	X
10/21/94	1020	X	X	01/24/95	1310	X	X
10/26/94	0855	X	X	02/22/95	1630	X	X
10/26/94	0910	X	X	03/16/95	0930	X	X
			SITE AR31.0				
			Pre-peak snowmelt runoff:				
04/28/94	1440	X	X	05/12/94	1220	X	X
05/05/94	1130	X	X				
			Peak snowmelt runoff:				
05/17/94	1045	X	X	05/26/94	1300	X	X
05/20/94	1025	X	X	06/01/94	1330	X	X
05/24/94	1130	X	X				

Table 1. Sample dates and analyses for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[X, sample collected and analyzed; --, no specific sample time because sample was composited from several discrete samples collected during a storm; NS, sample not analyzed for dissolved metals]

Sample date	Sample time	Total-metal analyses	Dissolved-metal analyses	Sample date	Sample time	Total-metal analyses	Dissolved-metal analyses
			SITE AR31.0—Continued				
			Post-peak snowmelt runoff:				
06/09/94	1020	X	X	06/22/94	1005	X	X
06/16/94	0710	X	X	06/27/94	1440	X	X
			Summer flow:				
07/21/94	0915	X	X	08/26/94	1200	X	X
07/27/94	1425	X	X	09/09/94	0845	X	X
08/10/94	1005	X	X	09/26/94	1600	X	X
08/16/94	0915	X	X				
			Base flow:				
10/12/94	1120	X	X	01/24/95	0930	X	X
10/26/94	1030	X	X	02/22/95	1420	X	X
11/21/94	1430	X	X	03/14/95	1030	X	X

Instantaneous streamflow, water-temperature, pH, dissolved-oxygen, and specific-conductance data collected during the study are available from the U.S. Geological Survey; results of analyses of the metal and trace-element data collected during the study are available from the U.S. Environmental Protection Agency. The mean daily streamflow data used in this report are available from the Colorado Division of Water Resources.

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STREAMFLOW CHARACTERISTICS AND pH

Streamflow in the upper Alamosa River Basin predominantly is derived from melting of snow that accumulates in the mountains between October and May. The largest streamflows occur between April and July during snowmelt runoff. Frequent summer rainstorms contribute substantially to summer flows. Downstream from Terrace Reservoir, streamflow is largely controlled by the quantity of water released from the reservoir to meet downstream irrigation demands. The streamflow hydrographs for the study period for sites AR34.5 and AR31.0 are shown in figure 2. The annual streamflow hydrographs were divided into discrete flow periods. The flow periods were defined as follows: April 1, 1994, through April 14, 1994, was defined as the early spring snowmelt period; April 15, 1994, through May 14, 1994, was defined as the pre-peak snowmelt period; May 15, 1994, through June 8, 1994, was defined as the peak snowmelt period; June 9, 1994, through July 14, 1994, was defined as the post-peak snowmelt period; July 15, 1994, through September 30, 1994, was defined as the summer-flow and storm-runoff periods; and, upstream from the reservoir, October 1, 1994, through January 31, 1995, was defined as the base-flow period.

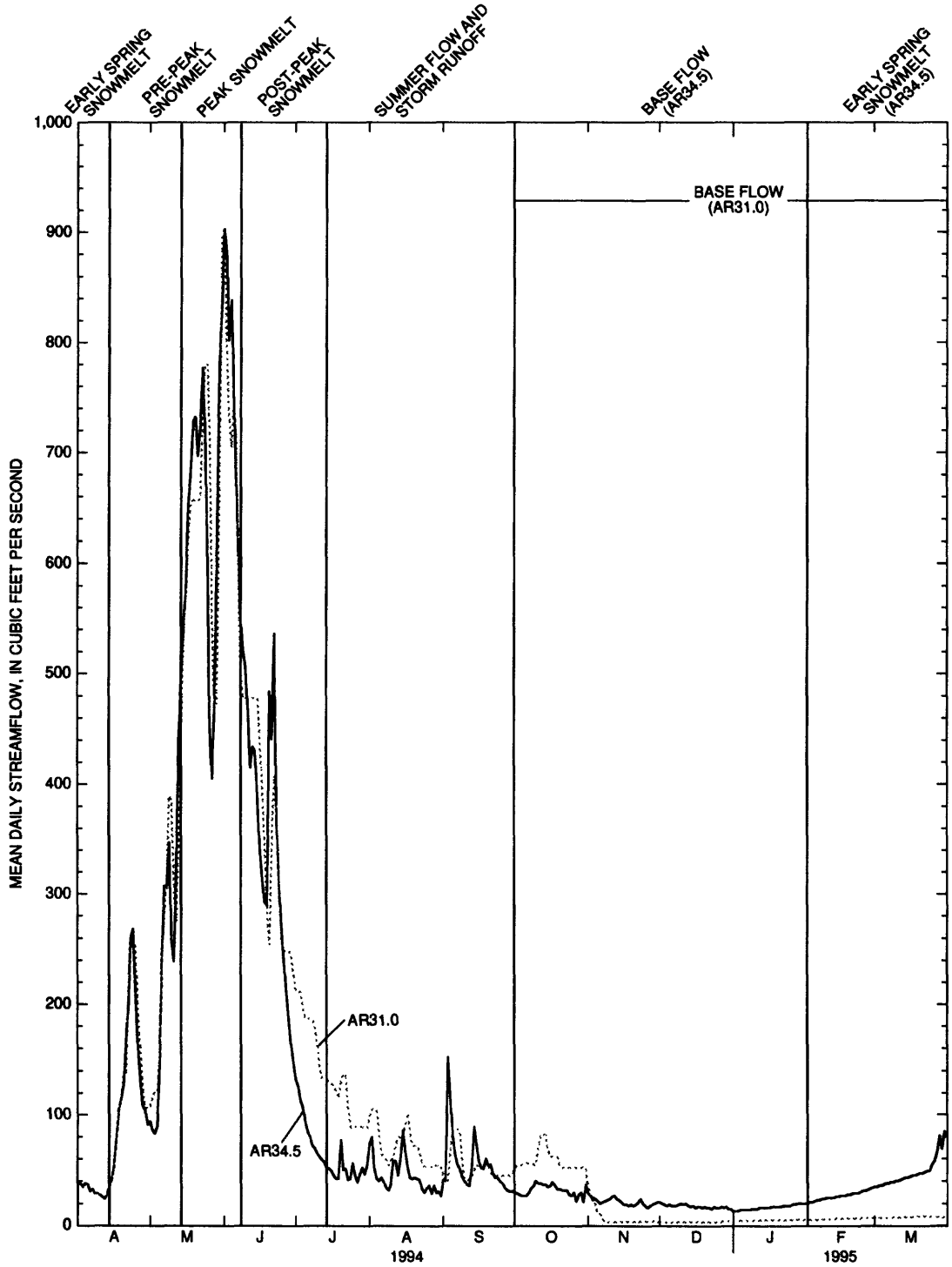


Figure 2. Streamflow hydrographs for sites AR34.5 and AR31.0, April 1994 through March 1995.

Because the hydrograph at site AR34.5 showed a slight increase above the base flow from February 1, 1995, through March 31, 1995, this period was defined as the early spring snowmelt period upstream from the reservoir. Downstream from Terrace Reservoir, the entire period from October 1, 1994, through March 31, 1995, was defined as the base-flow period. These flow periods are used in describing the temporal variations in metal chemistry and metal loads.

A comparison of the streamflow hydrographs indicates that, from April 1 through June 8, 1994 (the early spring snowmelt, pre-peak snowmelt, and peak snowmelt periods), the volume of water released from Terrace Reservoir was within 5 percent of the volume of water that entered the reservoir. During the post-peak snowmelt period from June 9 through July 14, 1994, 14 percent more water was released from the reservoir than entered the reservoir due to downstream irrigation demand. During the summer period from July 15 through September 30, 1994, 31 percent more water was released from the reservoir than entered the reservoir due to downstream irrigation demand. As irrigation demand for water decreased and the reservoir outlet was closed in early November, water was stored in the reservoir during fall and winter. During the base-flow and early spring snowmelt periods from October 1, 1994, through March 31, 1995, 46 percent more water entered the reservoir than was released from the reservoir. Over the entire study period, there was only a minor difference between the volume of water that entered the reservoir and the volume of water that was released from the reservoir. Streamflow varies from year to year, depending on precipitation and temperature conditions in the upper basin. However, historical discharge data indicate that peak flow during the study period was consistent with amount and timing of streamflow in previous years.

Stogner and Edelmann (1996) indicated that reservoir residence times during periods of stratification generally were shortened by 40 to 75 percent of the theoretical (well-mixed) residence time. The shortest estimated residence times of 3 to 5 days occurred during late May to early June, a period corresponding to peak snowmelt runoff and strong thermal stratification. The short residence times during late May to early June are important in that they decrease the amount of time for physical or chemical processes to occur that might decrease concentrations of metals before water is released from the reservoir.

During the study period (April 1994 through March 1995), pH was measured concurrently with the collection of water-quality samples. The instantaneous pH measured at site AR34.5 (upstream from Terrace Reservoir) (fig. 1) ranged from 4.3 to 7.8 (fig. 3). The highest pH occurred during the pre-peak snowmelt period; the lowest pH occurred during storm runoff during the summer. At site AR31.0 (downstream from Terrace Reservoir) (fig. 1), pH ranged from 4.6 to 7.6. The highest pH occurred during the pre-peak snowmelt period, and the lowest pH occurred during summer in mid-July (fig. 3).

METAL CHEMISTRY

Preliminary ecological and human-health risk assessments indicated that concentrations of dissolved and total aluminum, cadmium, copper, iron, manganese, and zinc were large enough to be of environmental concern (Morrison and Knudsen Corporation and ICF Keiser Engineers, 1994). Therefore, the discussion of metal chemistry in this report is directed toward describing the variations that were measured at sites AR34.5 and AR31.0 for these metals. Water samples also were analyzed for dissolved and total arsenic, barium, chromium, cobalt, lead, mercury, nickel, selenium, silver, and vanadium. More than 90 percent of the samples analyzed for dissolved arsenic, lead, and vanadium and dissolved and total chromium, selenium, and silver had concentrations less than the analytical reporting level. Concentrations of total arsenic, dissolved and total barium, dissolved and total cobalt, total lead, dissolved and total nickel, and total vanadium measured in water samples collected at site AR34.5 generally were greater than the analytical reporting level (table 2), but were not considered to be of environmental concern. Therefore, only limited discussion of these data are included in this report. Samples collected for analysis of dissolved metals and trace elements were filtered through a 0.45-μm filter.

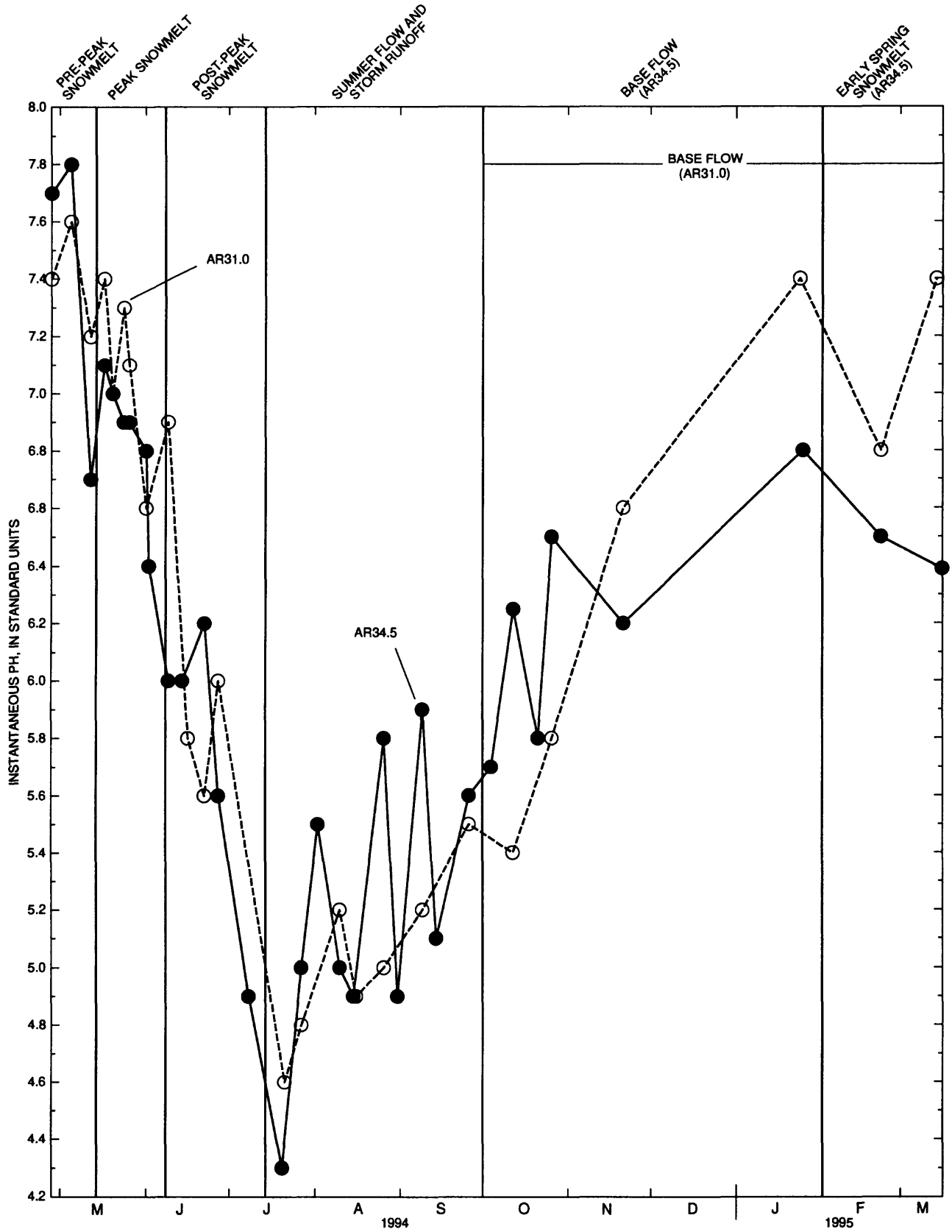


Figure 3. Instantaneous pH for sites AR34.5 and AR31.0, April 1994 through March 1995.

Table 2. Statistical summary of water-quality data for sites AR34.5 and AR31.0, April 1994 through March 1995

[Concentrations in micrograms per liter; <, less than; see fig. 1 for location of sites]

Constituent	Number of analyses	Number of analyses greater than reporting level	Minimum	25th percentile	Median	75th percentile	Maximum
			SITE AR34.5				
Metals of concern:							
Aluminum, dissolved	34	24	<40	<40	160	450	12,600
Aluminum, total	52	52	1,430	2,920	4,350	6,680	55,600
Iron, dissolved	34	34	190	780	2,500	3,760	6,420
Iron, total	52	52	3,070	5,900	8,680	14,300	138,000
Copper, dissolved	34	34	7	85	530	960	4,500
Copper, total	52	52	70	440	900	1,260	3,660
Cadmium, dissolved	34	30	<0.5	1	1.7	2.3	6.1
Cadmium, total	52	48	<0.5	1.1	2.0	2.6	5.5
Manganese, dissolved	34	34	200	370	710	880	2,520
Manganese, total	52	52	260	500	830	1,060	2,750
Zinc, dissolved	34	34	25	140	260	340	1,140
Zinc, total	52	51	<52	170	290	350	970
Other trace elements:							
Arsenic, total	52	43	<2	4	7	10	170
Barium, dissolved	34	27	<20	20	24	27	56
Barium, total	52	51	<20	29	56	80	1,020
Cobalt, dissolved	34	30	<6	10	17	22	60
Cobalt, total	52	51	<6	13	21	28	62
Lead, total	52	42	<2	<2	5	13	197
Nickel, dissolved	34	17	<15	<15	15	17	29
Nickel, total	52	33	<15	<15	18	24	50
Vanadium, total	52	23	<4	<4	<4	7	110
			SITE AR31.0				
Metals of concern:							
Aluminum, dissolved	25	17	<30	<40	73	400	770
Aluminum, total	25	22	<30	220	450	570	1,390
Iron, dissolved	25	20	<15	80	430	1,680	2,510
Iron, total	24	24	39	690	1,710	2,230	2,950
Copper, dissolved	25	22	<4	15	240	780	1,010
Copper, total	25	25	10	52	280	740	820
Cadmium, dissolved	25	18	<0.5	<0.5	1.4	2.0	2.5
Cadmium, total	25	20	<0.5	0.5	1.1	1.8	2.1
Manganese, dissolved	25	25	19	270	390	720	1,000
Manganese, total	25	25	21	290	380	660	940
Zinc, dissolved	24	23	<5	54	170	290	310
Zinc, total	25	24	<4	88	140	260	300
Other trace elements:							
Arsenic, total	25	1	<2	<2	<2	<2	2
Barium, dissolved	25	19	<20	21	25	28	31
Barium, total	25	23	<20	24	26	27	30

Table 2. Statistical summary of water-quality data for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Concentrations in micrograms per liter; <, less than; see fig. 1 for location of sites]

Constituent	Number of analyses	Number of analyses greater than reporting level	Minimum	25th percentile	Median	75th percentile	Maximum
			SITE AR31.0—Continued				
Other trace elements—Continued:							
Cobalt, dissolved	25	18	<5	<6	10	18	23
Cobalt, total	25	18	<5	<6	11	16	21
Lead, total	25	9	<2	<2	<2	<2	8
Nickel, dissolved	25	8	<15	<15	<15	<15	19
Nickel, total	25	6	<15	<15	<15	<15	23
Vanadium, total	25	1	<3	<4	<4	<4	4

This definition of "dissolved" is an operational one—only substances that pass through the filter are considered to be dissolved. However, numerous investigations of trace-element chemistry have indicated that water filtered through a 0.45-µm filter can contain substantial amounts of colloidal trace elements (Kimball and others, 1995; Horowitz and others, 1996). Because colloids can pass through a 0.45-µm filter, trace-metal concentrations reported as dissolved might include a substantial percentage of colloidal-size particles.

Comparisons of reported dissolved to reported total concentrations of aluminum, iron, copper, cadmium, manganese, and zinc indicated that reported dissolved-cadmium, -manganese, and -zinc concentrations frequently were greater than the reported total concentrations in samples collected from sites AR34.5 and AR31.0. Reported dissolved concentrations of aluminum were greater than reported total concentrations for samples collected from site AR31.0 during the summer-flow and storm-runoff period (July 15–September 30); reported dissolved concentrations of copper were greater than the reported total concentrations for samples collected from sites AR34.5 and AR31.0 during the summer-flow and storm-runoff period. Because dissolved-metal concentrations cannot be larger than total-metal concentrations, measurements of dissolved-metal concentrations that exceeded the total-metal concentrations resulted from either sampling and processing errors or laboratory uncertainties, or both. Laboratory personnel indicated that laboratory precision and accuracy of laboratory quality-control and quality-assurance samples were within 10 percent (Barbara Dabou, oral commun., 1996). In addition, field quality-control and quality-assurance samples indicated that no substantial contamination of environmental samples occurred during sample collection and processing, and analyses of replicate samples generally were within 10 percent. Further review of the data was unable to resolve the anomalies and resulted in some uncertainty in the reported metal concentrations. In general, the dissolved concentration was greater than the total concentration by less than 20 percent; the dissolved- and the total-metal concentration data were used to describe the metal chemistry and compute metal loads. However, the reader needs to be aware that uncertainty exists in the data and that the true error or uncertainty is unknown.

The metal chemistry section of this report describes the spatial and temporal variations in metal concentrations; the spatial and temporal variations in the percentage of metals that are in the dissolved and suspended fraction; and correlations of concentrations of metals of concern, streamflow, specific conductance, and pH.

Variations in Metal Concentrations

Large spatial and temporal variations in concentrations of the metals of concern occurred during the study. A statistical summary of metal concentrations upstream (at site AR34.5) and downstream (at site AR31.0) from Terrace Reservoir is listed in table 2. The statistics in this summary can be used to compare differences between dissolved and total metals at the same site and differences in metal concentrations upstream and downstream from Terrace Reservoir. The median and maximum concentrations of the metals of concern were larger upstream from the reservoir than downstream from the reservoir. Upstream and downstream from Terrace Reservoir, the largest concentrations of dissolved aluminum, iron, copper, cadmium, manganese, and zinc generally occurred between mid-June and November (figs. 4–9). Upstream from the reservoir (site AR34.5), the largest concentrations of total aluminum, iron, copper, cadmium, manganese, and zinc generally occurred between July and September during storm runoff. After November, dissolved- and total-metal concentrations generally decreased downstream from the reservoir after the closure of the reservoir outlet. Small increases in total-metals concentrations that occurred upstream from the reservoir in February and March may have been related to early spring snowmelt runoff.

Percentage of Metals in the Dissolved and Suspended Fraction

The percentage of the dissolved metal was computed by dividing the dissolved-metal concentration by the total-metal concentration and multiplying by 100. The remainder is computed to be the suspended portion. The percentages are used to provide an indication of the dominant mode of metal transport into and out of Terrace Reservoir. Temporal variations were evaluated by dividing the annual streamflow hydrograph into the discrete flow periods as previously defined (fig. 2). The percentage of dissolved metals computed for samples collected during storm runoff at site AR34.5 are presented separately from other water-quality samples collected between July 15, 1994, through September 30, 1994, because the largest concentrations of total aluminum, iron, copper, cadmium, manganese, and zinc that occurred upstream from the reservoir generally occurred between July and September during storm runoff.

Aluminum

Throughout the study, aluminum was transported into the reservoir predominantly in the particulate or suspended form (fig. 10). More than 90 percent of the aluminum was in the suspended fraction during the pre-peak snowmelt, peak snowmelt, base-flow, and the early spring snowmelt periods. During the post-peak snowmelt, the summer-flow, and the storm-runoff periods, the percentage of dissolved aluminum increased slightly; however, the suspended-aluminum fraction still predominated.

Downstream from the reservoir, the suspended-aluminum fraction was predominant only during the pre-peak snowmelt and peak snowmelt periods. During the peak snowmelt period, when estimated reservoir residence times were between 3 and 5 days (Stogner and Edelmann, 1996), a large percentage of aluminum was transported out of Terrace Reservoir in the suspended fraction. After June 8 (the end of the peak snowmelt period), most of the aluminum that was transported out of Terrace Reservoir was in the dissolved fraction.

Iron

The temporal variations in the percentage of dissolved and suspended fraction of iron were similar upstream and downstream from Terrace Reservoir. During the pre-peak snowmelt and peak snowmelt periods, more than 90 percent of the iron was transported into and out of the reservoir in the suspended fraction (fig. 10). However, the percent dissolved-iron fraction generally was greater than 50 percent during the post-peak snowmelt and the summer-flow periods. The percentage of dissolved-iron fraction upstream from the reservoir decreased to about 25 percent during storm runoff, indicating that most of the iron transported into the reservoir during storm runoff was in the suspended fraction. During the base-flow and early spring snowmelt periods, most of the iron generally entered the reservoir in the suspended fraction.

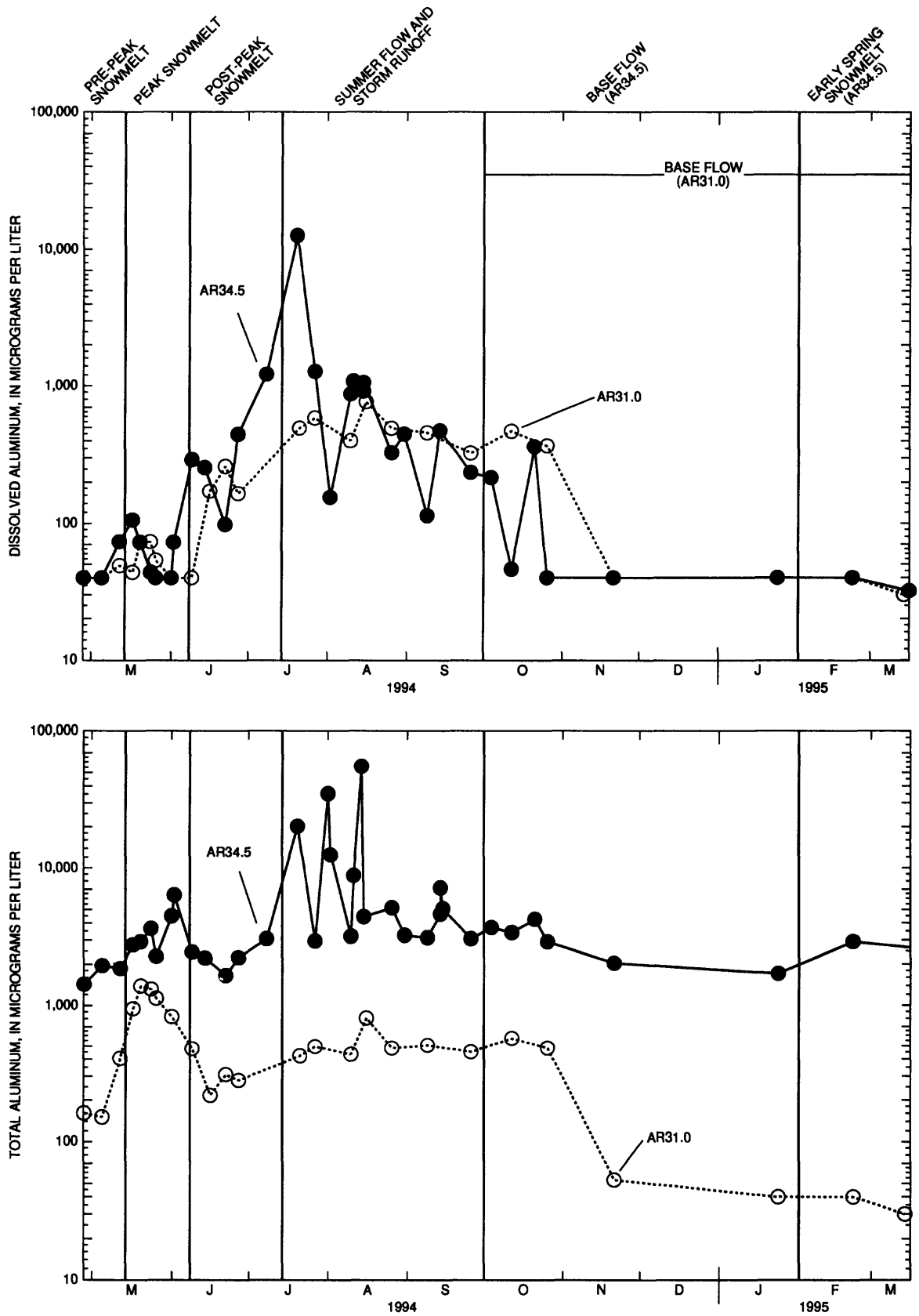


Figure 4. Dissolved- and total-aluminum concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

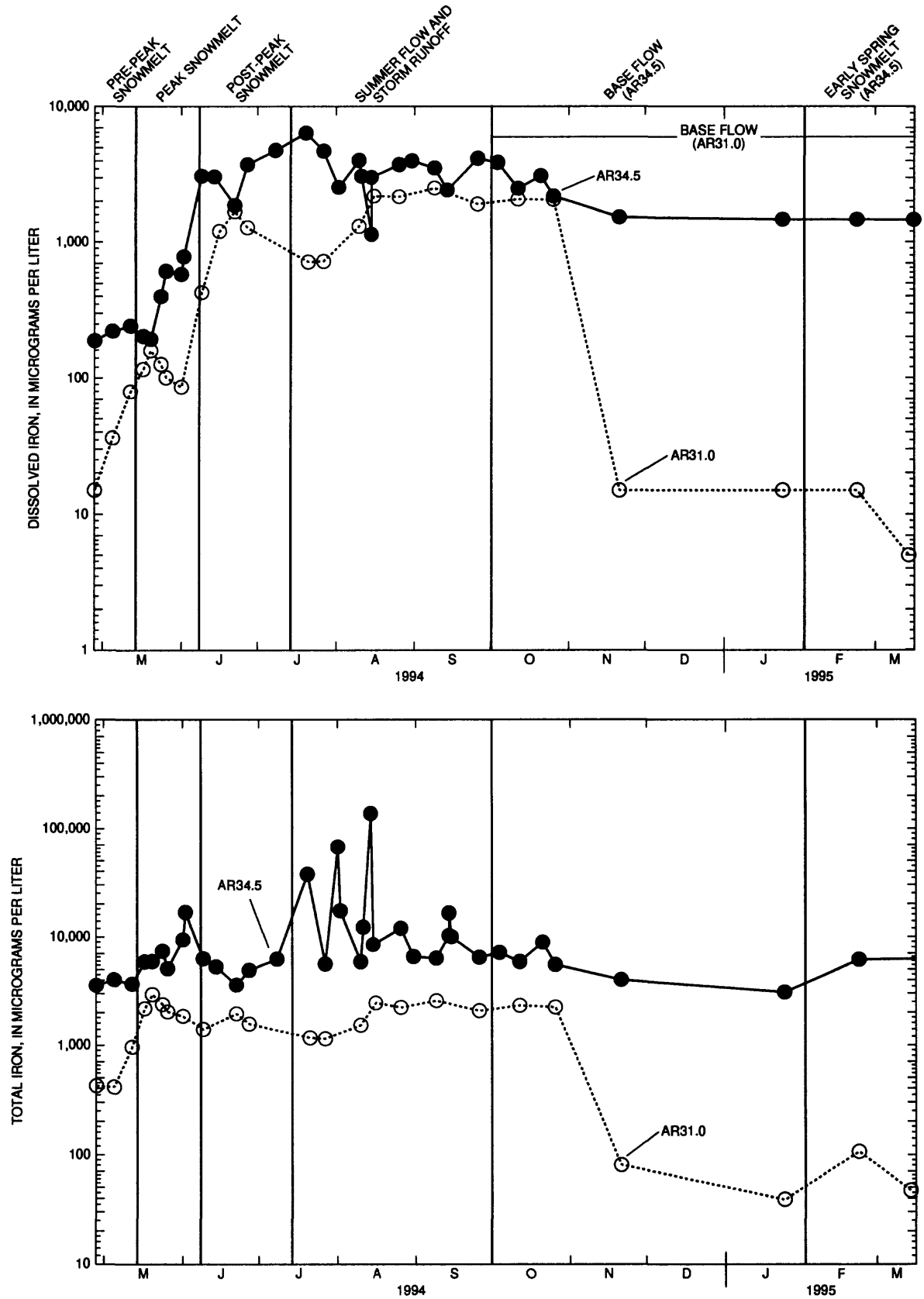


Figure 5. Dissolved- and total-iron concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

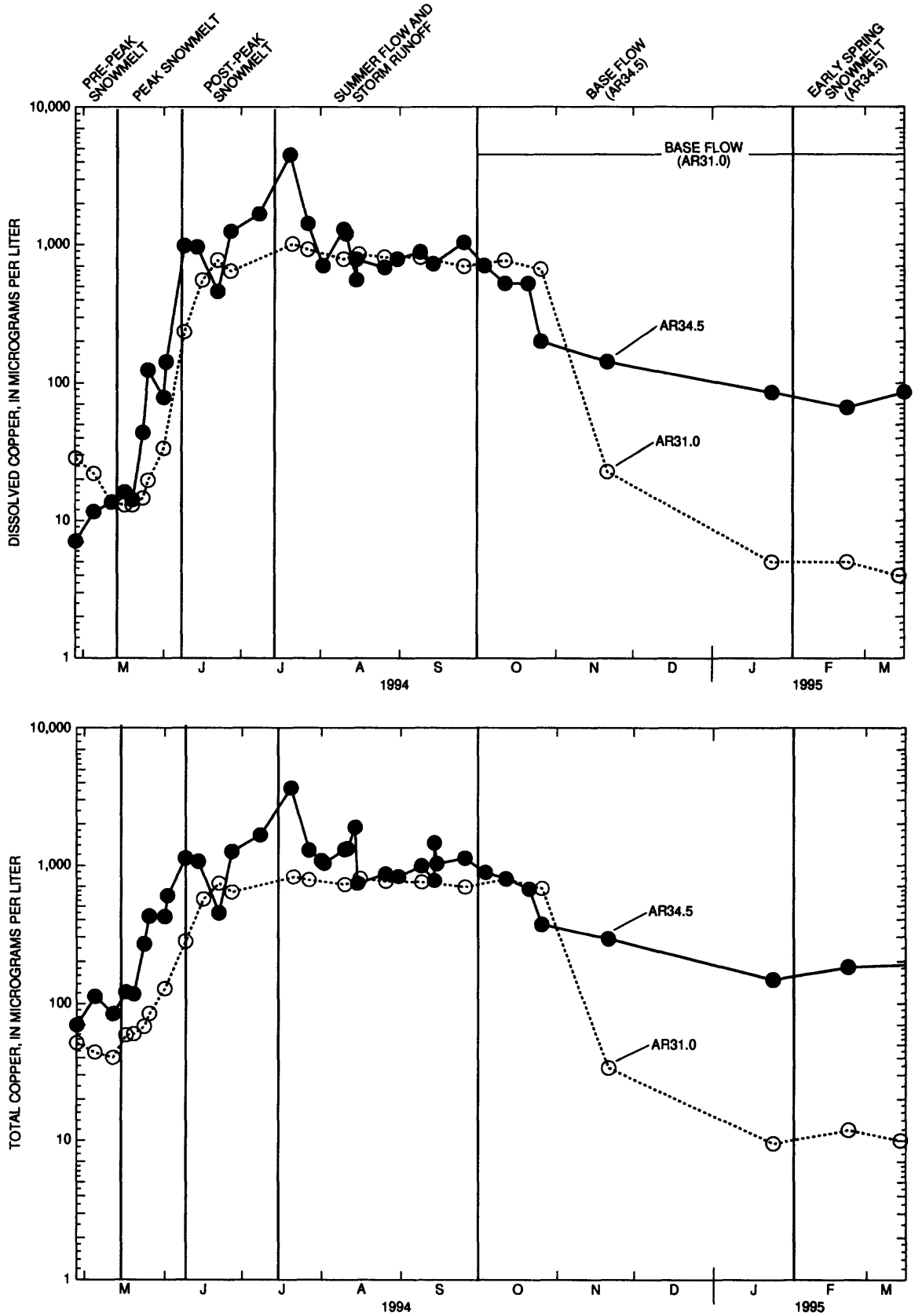


Figure 6. Dissolved- and total-copper concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

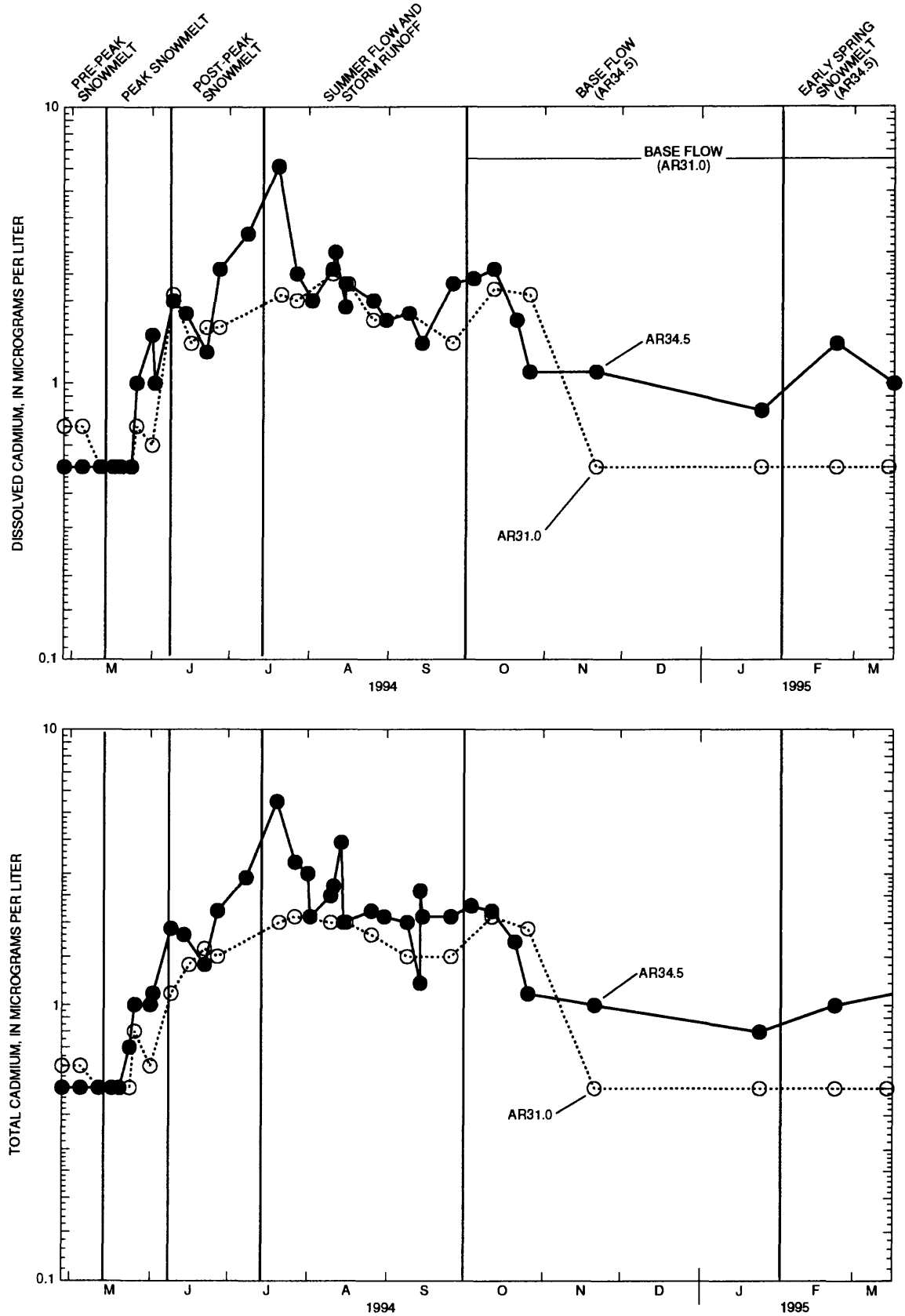


Figure 7. Dissolved- and total-cadmium concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

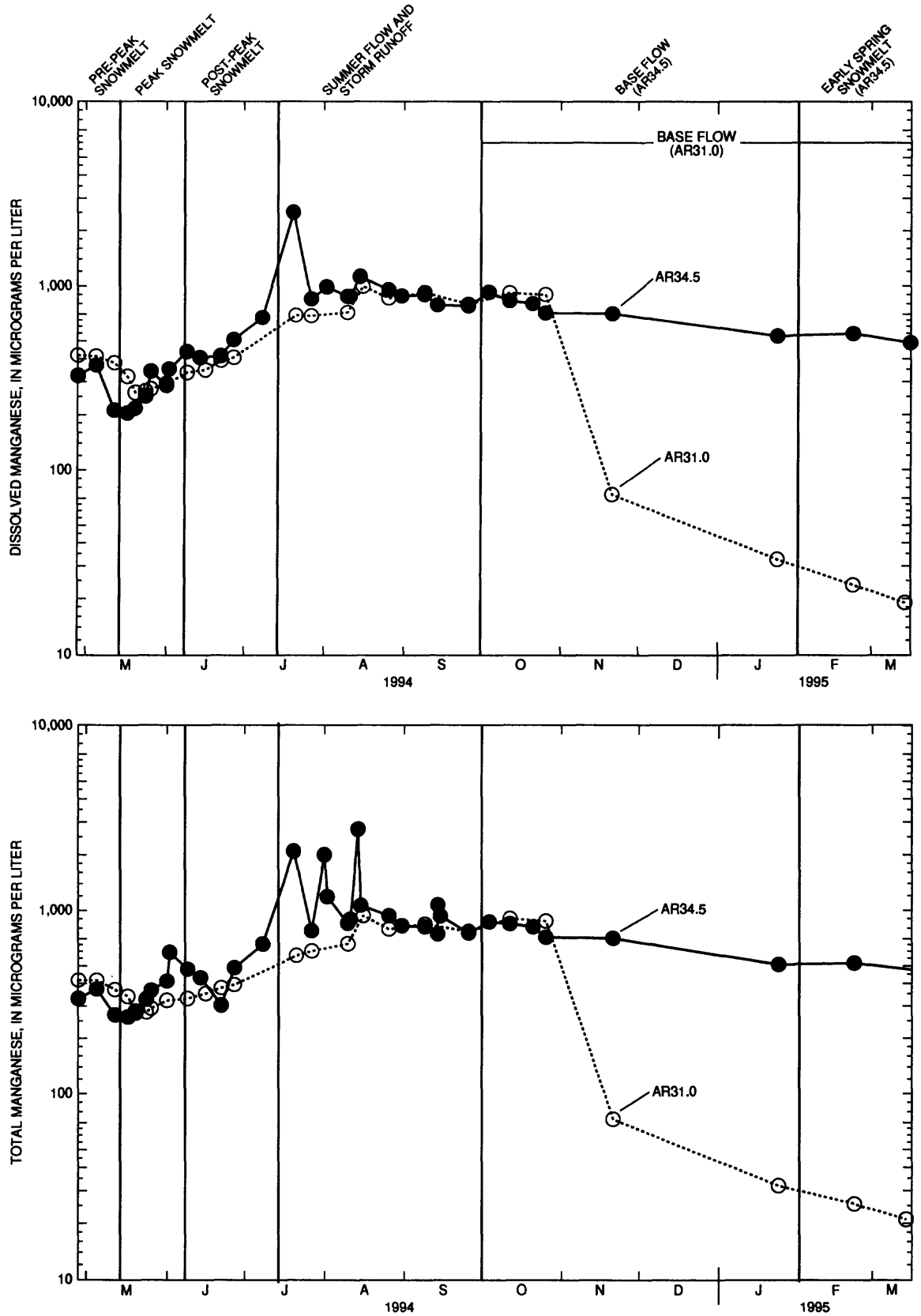


Figure 8. Dissolved- and total-manganese concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

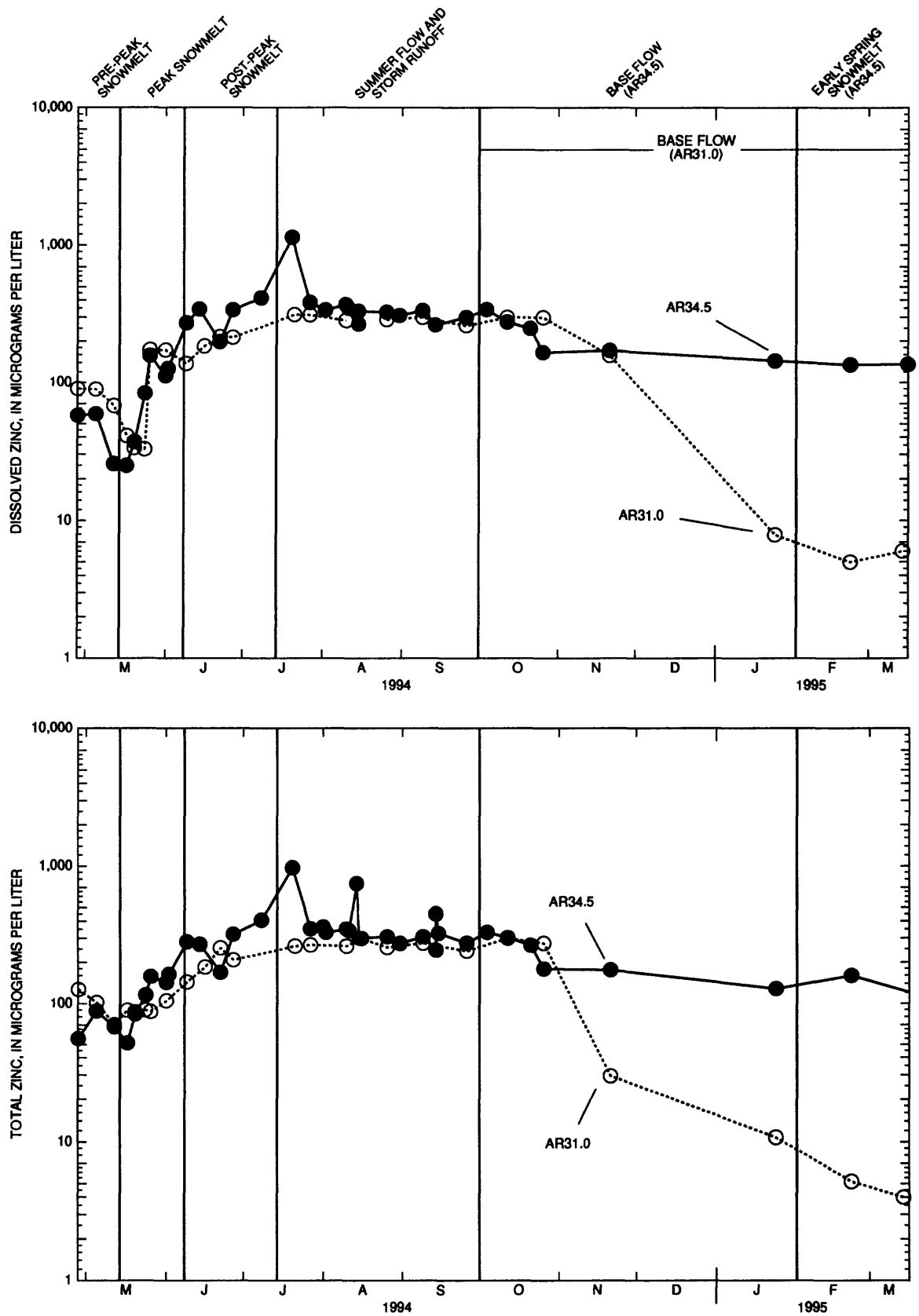


Figure 9. Dissolved- and total-zinc concentrations for sites AR34.5 and AR31.0, April 1994 through March 1995.

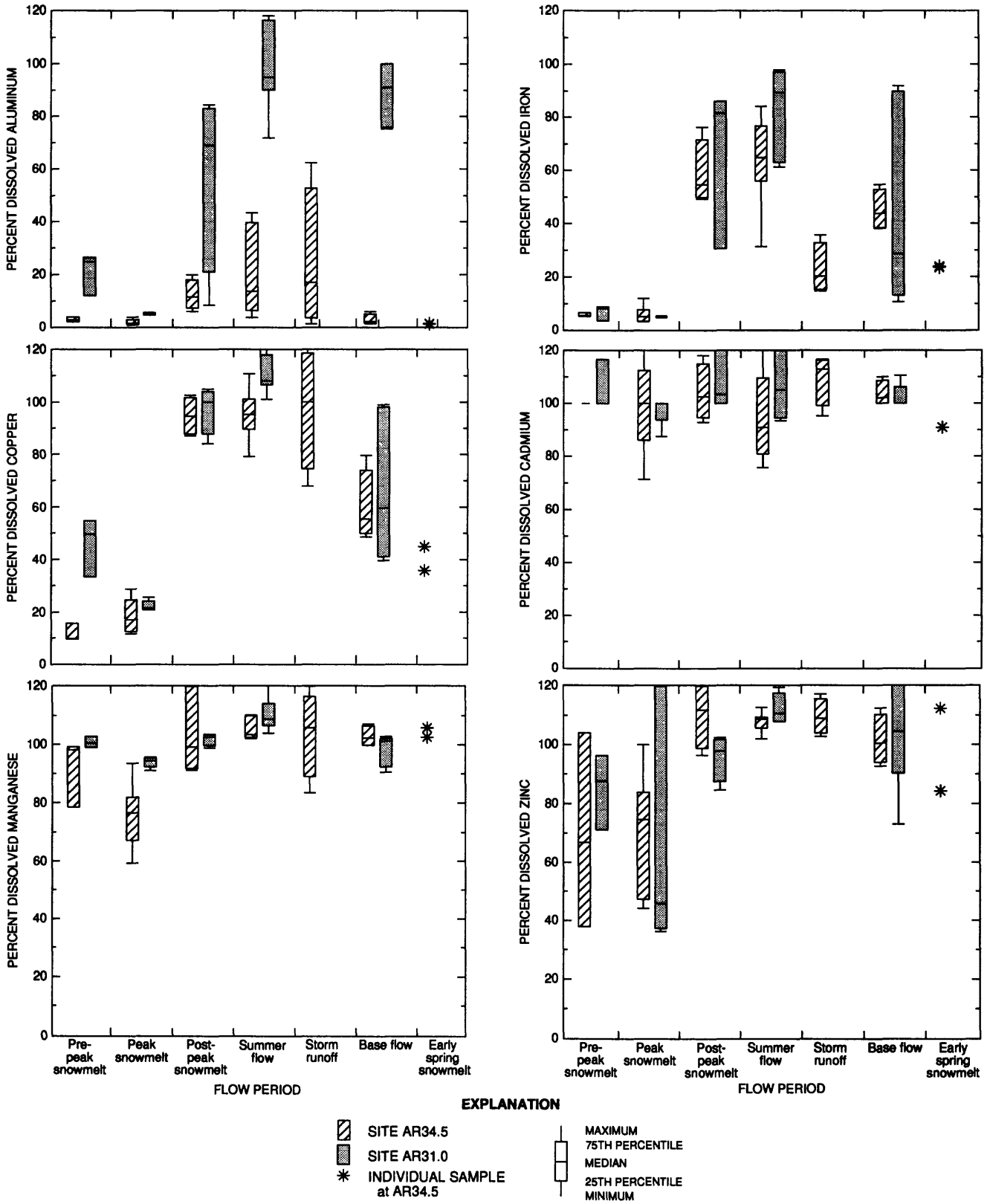


Figure 10. Temporal variations in the percentage of dissolved metals for sites AR34.5 and AR31.0, April 1994 through March 1995.

Copper

Generally, temporal variations in the percentage of dissolved and suspended copper transported into and out of Terrace Reservoir were similar to the temporal variations for iron. During the pre-peak snowmelt and peak snowmelt periods, generally more than 80 percent of the copper was transported into the reservoir in the suspended fraction (fig. 10). However, the percentage of dissolved-copper fraction increased to more than 90 percent during the post-peak snowmelt period. As streamflow diminished during the base-flow period, the percentage of dissolved-copper fraction decreased. The two samples collected upstream from the reservoir during the early spring snowmelt period indicated that the percentage of dissolved-copper fraction continued to decrease.

With the exception of the pre-peak snowmelt period, the temporal variations in the percentage of dissolved and suspended fraction of copper downstream from Terrace Reservoir were similar to the temporal variations that occurred upstream from the reservoir (fig. 10). During the pre-peak snowmelt period, the percentage of dissolved-copper fraction ranged from about 35 to about 55 percent, more than two times greater than the dissolved-copper fraction upstream from the reservoir. During the peak snowmelt period, the percentage of dissolved-copper fraction decreased to about 25 percent and, conversely, the percentage of suspended fraction increased to about 75 percent. These percentages were similar to those upstream from the reservoir. During this period, when the estimated reservoir residence times were short (between 3 and 5 days), a large percentage of copper was transported into and out of Terrace Reservoir in the suspended fraction. As occurred upstream from the reservoir, a marked increase in the percentage of dissolved-copper fraction occurred during the post-peak snowmelt and the summer-flow periods. Between June 9 and September 30 (the post-peak snowmelt, the summer-flow, and the storm-runoff periods), almost all the copper was transported out of the reservoir in the dissolved fraction.

Cadmium, Manganese, and Zinc

In general, almost all the cadmium was transported into and out of the reservoir in the dissolved form (fig. 10). During the pre-peak snowmelt and peak snowmelt periods, most of the manganese and zinc generally were transported into the reservoir in the dissolved form. After about June 9, almost all the manganese and zinc entering the reservoir were in the dissolved form. Less temporal variation occurred downstream from the reservoir. In general, throughout the entire study period, almost all the manganese was transported out of the reservoir in the dissolved form; and, except for the peak snowmelt period, zinc was predominantly transported out of the reservoir in the dissolved form.

Correlations of Metal Concentrations, Streamflow, Specific Conductance, and pH

A correlation coefficient is a statistic that is frequently used to describe the strength of a relation between two variables (Iman and Conover, 1983). Correlation coefficients are always between -1 and $+1$. Positive correlation coefficients indicate that one variable increases as the other variable increases; negative correlation coefficients indicate that one variable increases as the other variable decreases. A correlation coefficient of zero indicates that each variable has no predictive ability for the other. The closer the correlation coefficient is to either a -1 or $+1$, the stronger the relation. A correlation analysis was made on the data collected between April 1994 and March 1995 at sites AR34.5 and AR31.0. Pearson correlation coefficients were computed using pH, the logarithms of the concentrations of the metals of concern, streamflow, and specific conductance. Because the metal concentrations, streamflow, and specific conductance were assumed not to be normally distributed, logarithms were used to transform the concentrations of metals, streamflow, and specific conductance. The results of the correlation analysis are listed in tables 3 and 4; correlations were considered significant when the correlation coefficient had a probability less than 0.05. Significant correlations that had correlation coefficients between 0.707 and 0.865 were considered to be moderately correlated; the percentage of the explained variation was between 50 and 75 percent. Significant correlations that had correlation coefficients between 0.866 and 0.999 were considered to be strongly correlated; the percentage of the explained variation was greater than 75 percent.

Table 3. Correlations of metal concentrations to streamflow, specific conductance, and pH for site AR34.5, April 1994 through March 1995

[r, Pearson correlation coefficient; p, probability of obtaining a larger Pearson correlation coefficient; correlation coefficients between 0.707 and 0.865 are moderately correlated; correlation coefficients between 0.866 and 0.999 are strongly correlated; $p < 0.05$ is significant; number of observations are between 28 and 34; correlation coefficients that are significant and either moderately or strongly correlated are shown in bold type; see fig. 1 for location of sites]

	Logarithm		Logarithm		Logarithm		Logarithm		Logarithm		Logarithm	
	Dissolved aluminum	Total aluminum	Dissolved iron	Total iron	Dissolved copper	Total copper	Dissolved cadmium	Total cadmium	Dissolved manganese	Total manganese	Dissolved zinc	Total zinc
						LOGARITHM OF STREAMFLOW						
r	−0.319	−0.009	−0.585	0.108	−0.426	−0.268	−0.402	−0.443	−0.711	−0.611	−0.495	−0.425
p	.0974	.9637	.0011	.0011	.0238	.1679	.0341	.0180	.5836	.5836	.0011	.5836
						LOGARITHM OF SPECIFIC CONDUCTANCE						
r	.345	.141	.670	.065	.487	.341	.544	.554	**.793**	.689	.596	.539
p	.0615	.4556	.0001	.7311	.0064	.0648	.0019	.0015	**.0001**	.0001	.0005	.0021
						pH						
r	**−.875**	−.551	**−.874**	−.512	**−.912**	**−.862**	**−.884**	**−.888**	**−.813**	**−.806**	**−.847**	**−.882**
p	**.0001**	.0016	**.0001**	.0038	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED ALUMINUM						
r	1.000	.531	.636	.519	**.752**	**.794**	**.748**	**.815**	.677	.674	.691	**.794**
p	0	.0025	.0001	.0033	**.0001**	**.0001**	**.0001**	**.0001**	.0001	.0001	.0001	**.0001**
						LOGARITHM OF TOTAL ALUMINUM						
r	.531	1.000	.365	**.973**	.456	.568	.523	.527	.570	**.715**	.483	.587
p	.0025	0	.0470	**.0001**	.0112	.0007	.0030	.0019	.0010	**.0001**	.0068	.0004
						LOGARITHM OF DISSOLVED IRON						
r	.636	.365	1.000	.338	**.950**	**.878**	**.902**	**.935**	**.816**	**.788**	**.937**	**.924**
p	.0001	.0470	0	.0675	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF TOTAL IRON						
r	.519	**.973**	.338	1.000	.441	.561	.506	.498	.509	.651	.466	.553
p	.0033	**.0001**	.0675	0	.0146	.0008	.0043	.0036	.0040	.0001	.0094	.0010
						LOGARITHM OF DISSOLVED COPPER						
r	**.752**	.456	**.950**	.441	1.000	**.967**	**.937**	**.964**	**.793**	**.762**	**.954**	**.959**
p	**.0001**	.0112	**.0001**	.0146	0	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**

Table 3. Correlations of metal concentrations to streamflow, specific conductance, and pH for site AR34.5, April 1994 through March 1995—Continued

[r, Pearson correlation coefficient; p, probability of obtaining a larger Pearson correlation coefficient; correlation coefficients between 0.707 and 0.865 are moderately correlated; correlation coefficients between 0.866 and 0.999 are strongly correlated; $p < 0.05$ is significant; number of observations are between 28 and 34; correlation coefficients that are significant and either moderately or strongly correlated are shown in bold type; see fig. 1 for location of sites]

	Logarithm		Logarithm		Logarithm		Logarithm		Logarithm		Logarithm	
	Dissolved aluminum	Total aluminum	Dissolved iron	Total iron	Dissolved copper	Total copper	Dissolved cadmium	Total cadmium	Dissolved manganese	Total manganese	Dissolved zinc	Total zinc
						LOGARITHM OF TOTAL COPPER						
r	**0.794**	0.568	**0.878**	0.561	**0.967**	1.000	**0.930**	**0.951**	**0.733**	**0.750**	**0.922**	**0.957**
p	**.0001**	.0007	**.0001**	.0008	**.0001**	0	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED CADMIUM						
r	**.858**	.318	**.868**	.519	**.956**	**.917**	1.000	**.973**	**.714**	.693	**.760**	**.756**
p	**.0001**	.1206	**.0001**	.0093	**.0001**	**.0001**	0	**.0001**	**.0001**	.0001	**.0001**	**.0001**
						LOGARITHM OF TOTAL CADMIUM						
r	**.815**	.527	**.935**	.498	**.964**	**.951**	**.972**	1.000	**.832**	**.814**	**.953**	**.969**
p	**.0001**	.0019	**.0001**	.0036	**.0001**	**.0001**	**.0001**	0	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED MANGANESE						
r	.677	.570	**.816**	.509	**.793**	**.733**	**.816**	**.832**	1.000	**.963**	**.865**	**.859**
p	.0001	.0010	**.0001**	.0040	**.0001**	**.0001**	**.0001**	**.0001**	0	**.0001**	**.0001**	**.0001**
						LOGARITHM OF TOTAL MANGANESE						
r	.674	**.715**	**.788**	.651	**.762**	**.750**	**.797**	**.814**	**.963**	1.000	**.831**	**.854**
p	.0001	**.0001**	**.0001**	.0001	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED ZINC						
r	.691	.483	**.937**	.466	**.954**	**.922**	**.934**	**.953**	**.865**	**.831**	1.000	**.968**
p	.0001	.0068	**.0001**	.0094	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0	**.0001**
						LOGARITHM OF TOTAL ZINC						
r	**.794**	.587	**.924**	.553	**.959**	**.957**	**.958**	**.969**	**.859**	**.854**	**.968**	1.000
p	**.0001**	.0004	**.0001**	.0010	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0

Table 4. Correlations of metal concentrations to streamflow, specific conductance, and pH for site AR31.0, April 1994 through March1995

[r, Pearson correlation coefficient; p, probability of obtaining a larger Pearson correlation coefficient; correlation coefficients between 0.707 and 0.865 are moderately correlated; correlation coefficients between 0.866 and 0.999 are strongly correlated; $p < 0.05$ is significant; number of observations are between 28 and 34; correlation coefficients that are significant and either moderately or strongly correlated are shown in bold type; see fig. 1 for location of sites]

	Logarithm		Logarithm		Logarithm		Logarithm		Logarithm		Logarithm	
	Dissolved aluminum	Total aluminum	Dissolved iron	Total iron	Dissolved copper	Total copper	Dissolved cadmium	Total cadmium	Dissolved manganese	Total manganese	Dissolved zinc	Total zinc
						LOGARITHM OF STREAMFLOW						
r	−0.229	0.639	0.088	0.597	−0.171	−0.012	−0.161	−0.180	0.151	0.188	−0.150	0.182
p	.3058	.0014	.6978	.0043	.4475	.9558	.4733	.4198	.5025	.4026	.5149	.4174
						LOGARITHM OF SPECIFIC CONDUCTANCE						
r	.155	−.576	−.194	−.529	−.042	−.183	.014	.042	−.169	−.192	−.210	−.279
p	.4578	.0026	.3526	.0078	.8415	.3815	.9440	.8431	.4187	.3583	.3244	.1750
						pH						
r	**−.948**	−.279	**−.822**	−.452	**−.904**	**−.870**	**−.855**	**−.917**	−.621	−.594	**−.710**	−.656
p	**.0001**	.1753	**.0001**	.0265	**.0001**	**.0001**	**.0001**	**.0001**	.0009	.0018	**.0001**	.0004
						LOGARITHM OF DISSOLVED ALUMINUM						
r	1.000	.395	**.882**	.559	**.900**	**.885**	**.858**	**.927**	**.723**	.701	.702	**.733**
p	0	.0506	**.0001**	.0045	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	.0001	.0001	**.0001**
						LOGARITHM OF TOTAL ALUMINUM						
r	.395	1.000	.601	**.945**	.386	.556	.318	.332	**.750**	**.768**	.539	**.728**
p	.0506	0	.0015	**.0001**	.0565	.0039	.1206	.1043	**.0001**	**.0001**	.0066	**.0001**
						LOGARITHM OF DISSOLVED IRON						
r	**.882**	.601	1.000	**.794**	**.925**	**.959**	**.868**	**.893**	**.826**	**.818**	**.780**	**.862**
p	**.0001**	.0015	0	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF TOTAL IRON						
r	.559	**.945**	**.794**	1.000	.607	**.751**	.519	.534	**.859**	**.873**	.678	**.854**
p	.0045	**.0001**	**.0001**	0	.0016	**.0001**	.0093	.0071	**.0001**	**.0001**	.0004	**.0001**
						LOGARITHM OF DISSOLVED COPPER						
r	**.900**	.386	**.925**	.607	1.000	**.978**	**.956**	**.968**	**.787**	**.768**	**.854**	**.843**
p	**.0001**	.0565	**.0001**	.0016	0	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**

Table 4. Correlations of metal concentrations to streamflow, specific conductance, and pH for site AR31.0, April 1994 through March1995—Continued

[r, Pearson correlation coefficient; p, probability of obtaining a larger Pearson correlation coefficient; correlation coefficients between 0.707 and 0.865 are moderately correlated; correlation coefficients between 0.866 and 0.999 are strongly correlated; $p < 0.05$ is significant; number of observations are between 28 and 34; correlation coefficients that are significant and either moderately or strongly correlated are shown in bold type; see fig. 1 for location of sites]

	Logarithm		Logarithm		Logarithm		Logarithm		Logarithm		Logarithm	
	Dissolved aluminum	Total aluminum	Dissolved iron	Total iron	Dissolved copper	Total copper	Dissolved cadmium	Total cadmium	Dissolved manganese	Total manganese	Dissolved zinc	Total zinc
						LOGARITHM OF TOTAL COPPER						
r	**0.885**	0.556	**0.959**	**0.751**	**0.978**	1.000	**0.917**	**0.938**	**0.855**	**0.843**	**0.884**	**0.906**
p	**.0001**	.0039	**.0001**	**.0001**	**.0001**	0	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED CADMIUM						
r	**.858**	.318	**.868**	.519	**.956**	**.917**	1.000	**.973**	**.714**	.693	**.760**	**.756**
p	**.0001**	.1206	**.0001**	.0093	**.0001**	**.0001**	0	**.0001**	**.0001**	.0001	**.0001**	**.0001**
						LOGARITHM OF TOTAL CADMIUM						
r	**.927**	.332	**.893**	.534	**.968**	**.938**	**.973**	1.000	**.718**	.697	**.776**	**.760**
p	**.0001**	.1043	**.0001**	.0071	**.0001**	**.0001**	**.0001**	0	**.0001**	.0001	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED MANGANESE						
r	**.723**	**.750**	**.826**	**.859**	**.787**	**.855**	**.714**	**.718**	1.000	**.998**	**.874**	**.975**
p	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0	**.0001**	**.0001**	**.0001**
						LOGARITHM OF TOTAL MANGANESE						
r	.701	**.768**	**.818**	**.873**	**.768**	**.843**	.693	.697	**.998**	1.000	**.866**	**.971**
p	.0001	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	.0001	.0001	**.0001**	0	**.0001**	**.0001**
						LOGARITHM OF DISSOLVED ZINC						
r	.702	.539	**.780**	.678	**.854**	**.884**	**.760**	**.776**	**.874**	**.866**	1.000	**.911**
p	.0001	.0066	**.0001**	.0004	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0	**.0001**
						LOGARITHM OF TOTAL ZINC						
r	**.733**	**.728**	**.862**	**.854**	**.843**	**.906**	**.756**	**.760**	**.975**	**.971**	**.911**	1.000
p	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	**.0001**	0

Correlation between concentrations of metals and streamflow, specific conductance, and pH were evaluated to determine whether field measurements of streamflow, specific conductance, or pH could potentially be used to predict metal concentrations. At site AR34.5, correlations of the logarithm of metal concentrations with streamflow and specific conductance generally were not significant or had correlation coefficients less than 0.6 (table 3), indicating that neither streamflow nor specific conductance would be a reliable predictor of metal concentrations for this site. At site AR31.0, correlations of metal concentrations with streamflow and specific conductance generally were not significant (table 4).

At both sites, the concentrations of several metals were strongly or moderately negatively correlated to pH. At site AR34.5, pH was strongly correlated to concentrations of dissolved aluminum, dissolved iron, dissolved copper, dissolved and total cadmium, and total zinc. Correlation coefficients ranged from –0.874 to –0.912 (table 3), indicating that if a linear relation existed between pH and the logarithms of the concentrations of metals, pH could explain between 76 and 83 percent of the variation in metal concentration. Additionally, pH was moderately correlated to total copper, dissolved and total manganese, and dissolved zinc; correlation coefficients ranged from –0.806 to –0.862 (table 3), indicating that pH could explain between 65 and 74 percent of the variation in metal concentration. The pH was weakly correlated to the logarithms of concentrations of total aluminum and total iron (correlation coefficient of –0.551 and –0.512, respectively). Because pH was strongly correlated with concentrations of several metals, scatterplots of pH and the logarithms of the concentrations of metals were made to further evaluate whether a linear relation appeared to exist between pH and the logarithms of the concentrations of selected metals. Upstream from Terrace Reservoir at site AR34.5, a visual observation of the plots indicated that a reasonably linear relation existed between pH and the logarithms of concentrations of dissolved aluminum, dissolved iron, dissolved and total copper, and dissolved and total zinc. Linear relations also existed between correlations of pH to the logarithms of the concentrations of metals that were moderately correlated with pH. Downstream from Terrace Reservoir at site AR31.0, correlations of pH to the logarithms of concentrations of dissolved aluminum, dissolved and total copper, and total cadmium were strongly correlated (table 4). Additionally, correlations of pH to the logarithms of concentrations of dissolved iron, dissolved cadmium, and dissolved zinc (table 4) were moderately correlated. However, an evaluation of scatterplots of pH and the logarithms of the concentrations of these metals indicated that, with the exception of dissolved aluminum, a linear relation did not exist between pH and the logarithms of the concentrations of these metals.

Correlations among concentrations of metals indicate that, during the study, significant correlations occurred between the concentrations of all the metals of concern. At both sites, concentrations of most of the metals were moderately to strongly correlated with one another (tables 3 and 4). Strong cross correlations between concentrations of metals indicate that the predominant source of metals was the same or that similar processes affect the metal concentrations, or both.

METAL LOADS INTO AND OUT OF TERRACE RESERVOIR

Metal loads were computed to estimate the quantity of metals that was transported into and out of Terrace Reservoir between April 1994 through March 1995. Metal loads are a function of metal concentration and streamflow and represent the amount of a metal transported past a river cross section during a specific time interval. The load estimates presented in this report are limited to dissolved and total aluminum, iron, copper, cadmium, manganese, and zinc.

There are numerous methods for computing metal loads. The simplest method of estimating loads is the time-interval method (Scheider and others, 1979), in which the data record for each site is divided into discrete intervals, generally at the midpoint between sampling points. The metal load then is estimated as the product of the concentration for that discrete period and the sum of the streamflow for that period. The primary disadvantage of this method is that the statistical uncertainty of the loads cannot be determined. Another method used for estimating loads is with regression equations between two constituents that are strongly related. Correlations between the logarithms of metal concentrations and streamflow and the logarithms of metal concentrations and specific conductance were weak (tables 3 and 4). Therefore, streamflow and specific conductance were not used to estimate concentrations for calculating metal loads. Correlations between the logarithm of

metal concentrations and pH generally were strong at both sites (AR34.5 and AR31.0). However, at site AR31.0, scatterplots of the data indicated that a linear relation did not exist between pH and the logarithms of most of the metal concentrations; therefore, linear-regression models could not be used for predicting metal loads at site AR31.0. Correlations and scatterplots between the logarithms of metal concentrations and pH at site AR34.5 indicated that a linear relation existed. However, the correlations generally indicated that between 65 and 83 percent of the variation in metal concentrations could be explained with pH; conversely, between 17 and 35 percent of the variation in metal concentrations could not be explained with pH.

A variation of the standard time-interval method that generally allowed for an estimate of statistical certainty in load calculations and takes into account the large temporal variations that occurred in metal concentrations was used to estimate metal loads in this report. In the modified time-interval method, the data record is divided into several discrete time intervals based on changes in concentration, streamflow, or events. The mean concentration of the values that occurred during each time interval was multiplied by the mean daily streamflow to determine daily metal loads. Estimates of the daily metal loads were summed into flow-period and annual metal loads. The resulting percent standard errors using this method generally were less than 15 percent for dissolved and total aluminum, copper, cadmium, manganese, and zinc. However, at site AR31.0, standard errors for total and dissolved iron were as large as 30 percent and for dissolved zinc, as large as 50 percent.

Copper was used as the indicator constituent to determine the divisions for the time intervals for aluminum, iron, cadmium, manganese, and zinc because: (1) Copper was identified as the primary metal of concern by Morrison and Knudsen Corporation and ICF Keiser Engineers (1994); (2) copper was identified as an excellent predictor of the concentrations of iron, cadmium, manganese, and zinc at the Summitville Mine site (Miller and Van Zyl, 1995); and (3) strong cross correlations between concentrations of metals indicate that the predominant source of metals was the same or that similar processes affect the metal concentrations, or both (tables 3 and 4). The time-interval periods were made by analysis of the hydrograph and copper-concentration data, and divisions were made at large changes in copper concentration or where a change in the flow regime occurred. The divisions of time intervals for the other constituents were the same as were determined for copper. Nine time intervals were used to estimate loads at site AR31.0, and 18 time intervals were used to estimate loads at site AR34.5, with each time interval generally containing between 3 and 7 data points. Attempts were made to divide the data so that there were at least three samples in each time interval, allowing for calculation of standard errors of load estimates. However, metal loads associated with storms at site AR34.5 were calculated separately. By removing the metal concentration measured from samples collected during storms from the rest of the data for the time interval, the large metal concentrations that were associated with storms did not bias the mean concentration and standard error of the other data. Because the storms frequently contained only one or two samples, standard errors generally could not be determined for these storms.

Metal loads varied considerably as a result of changes in streamflow or changes in metal concentrations, or both. Some of the physical and chemical processes that affected metal transport through Terrace Reservoir included mixing, sorption, flocculation, and sedimentation. A summary of metal loads, by flow period, for sites AR34.5 and AR31.0 is included in table 5. Daily load estimates and standard errors for dissolved and total aluminum, iron, copper, cadmium, manganese, and zinc are presented in tables 6 and 7 in the "Supplemental Data" section at the back of this report.

Aluminum

Large variations in aluminum loads occurred during the study. The largest daily loads of total aluminum were transported into and out of Terrace Reservoir during the peak snowmelt period (fig. 11). During the peak snowmelt period, the maximum daily total-aluminum load that entered the reservoir was about 11 tons (table 7). Large daily total-aluminum loads also were transported into the reservoir during rainstorm runoff during the summer period. Most of the total-aluminum loads that entered the reservoir during rainstorm runoff remained in the reservoir (fig. 11). The smallest daily total-aluminum loads occurred during the base-flow period between November 1994 and February 1995 (fig. 11).

Table 5. Estimates of dissolved- and total-metal loads for sites AR34.5 and AR31.0, April 1994 through March 1995

[All loads are in pounds; <, less than; --, difference was not computed because concentrations within the period contained less than values]

Site (see fig. 1 for site location)	Metal	Load							
		Early spring snowmelt period (04/01–04/14/94)	Pre-peak snowmelt period (04/15–05/14/94)	Peak snowmelt period (05/15–06/08/94)	Post-peak snowmelt period (06/09–07/14/94)	Summer-flow period and storm-runoff period (07/15–09/30/94)	Base-flow and early spring snowmelt period (10/01/94–03/31/95)	Annual (04/01/94–03/31/95)	Reservoir-release period (04/01–11/07/94)
AR34.5	Aluminum, dissolved	161	2,030	6,420	21,400	17,700	1,760	49,500	48,700
AR31.0	Aluminum, dissolved	104	1,450	4,570	11,300	14,800	4,940	37,200	37,000
	Difference[1]	+57	+580	+1,850	+10,100	+2,900	−3,180	+12,300	+11,700
AR34.5	Aluminum, total	5,300	66,900	331,000	111,000	141,000	71,100	726,000	726,000
AR31.0	Aluminum, total	577	11,600	86,900	16,700	15,300	5,660	137,000	137,000
	Difference[1]	+4,720	+55,300	+244,000	+94,300	+126,000	+65,400	+589,000	+589,000
AR34.5	Iron, dissolved	508	6,390	54,300	156,000	75,200	50,600	343,000	309,000
AR31.0	Iron, dissolved	106	1,730	14,200	71,700	47,400	21,300	156,000	156,000
	Difference[1]	+402	+4,660	+40,100	+84,300	+27,800	+29,300	+187,000	+153,000
AR34.5	Iron, total	11,200	141,000	752,000	250,000	286,000	144,000	1,580,000	1,480,000
AR31.0	Iron, total	1,450	26,600	185,000	95,800	55,300	23,200	387,000	387,000
	Difference[1]	+9,750	+114,000	+567,000	+154,000	+231,000	+121,000	+1,190,000	+1,090,000
AR34.5	Copper, dissolved	31	383	10,200	50,000	21,900	5,500	88,000	85,600
AR31.0	Copper, dissolved	50	652	4,940	35,700	25,400	7,670	74,400	74,400
	Difference[1]	−19	−269	+5,260	+14,300	−3,500	−2,170	+13,600	+11,200
AR34.5	Copper, total	245	3,100	33,800	52,000	24,200	9,040	122,000	122,000
AR31.0	Copper, total	110	1,540	10,900	34,900	23,100	7,480	78,000	78,000
	Difference[1]	+135	+1,560	+22,900	+17,100	+1,100	+1,560	+44,000	+44,000
AR34.5	Cadmium, dissolved	<1.4	<15	<84	106	49	33	<288	<266
AR31.0	Cadmium, dissolved	1.4	20	72	91	62	<19	<265	<265
	Difference[1]	--	--	--	15	−13	--	--	--

Table 5. Estimates of dissolved- and total-metal loads for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[All loads are in pounds; <, less than; --, difference was not computed because concentrations within the period contained less than values]

Site (see fig. 1 for site location)	Metal	Load							
		Early spring snowmelt period (04/01–04/14/94)	Pre-peak snowmelt period (04/15–05/14/94)	Peak snowmelt period (05/15–06/08/94)	Post-peak snowmelt period (06/09–07/14/94)	Summer-flow period and storm-runoff period (07/15–09/30/94)	Base-flow and early spring snowmelt period (10/01/94–03/31/95)	Annual (04/01/94–03/31/95)	Reservoir-release period (04/01–11/07/94)
AR34.5	Cadmium, total	<1.4	<15	<80	97	51	31	<275	<255
AR31.0	Cadmium, total	1.4	18	60	84	58	<18	<239	<239
	Difference[1]	--	--	--	+13	-7	--	--	--
AR34.5	Manganese, dissolved	637	8,090	27,800	23,300	18,700	16,900	95,400	83,300
AR31.0	Manganese, dissolved	975	12,300	26,500	22,200	24,400	9,130	95,500	95,400
	Difference[1]	-338	-4,210	+1,300	+1,100	-5,700	+7,770	-100	-12,100
AR34.5	Manganese, total	733	9,260	36,300	22,300	20,100	16,600	105,000	93,400
AR31.0	Manganese, total	970	12,300	28,100	21,600	22,400	8,670	94,000	93,800
	Difference[1]	-237	-3,040	+8,200	+700	-2,300	+7,930	+11,000	-400
AR34.5	Zinc, dissolved	97	1,240	9,730	14,800	7,260	4,580	37,700	33,800
AR31.0	Zinc, dissolved	200	2,580	10,400	11,500	8,990	3,130	36,800	36,600
	Difference[1]	-103	-1,340	-670	+3,300	-1,730	+1,450	+900	-2,800
AR34.5	Zinc, total	166	2,120	12,000	13,700	7,240	4,670	39,900	36,700
AR31.0	Zinc, total	241	3,130	9,240	11,900	8,190	2,760	35,500	35,500
	Difference[1]	-75	-1,010	+2,760	+1,800	-950	+1,910	+4,400	+1,200

[1]Differences that are positive indicate a loss in load between AR34.5 and AR31.0; differences that are negative indicate a gain in load between AR34.5 and AR31.0. Differences are rounded to three signifcant figures.

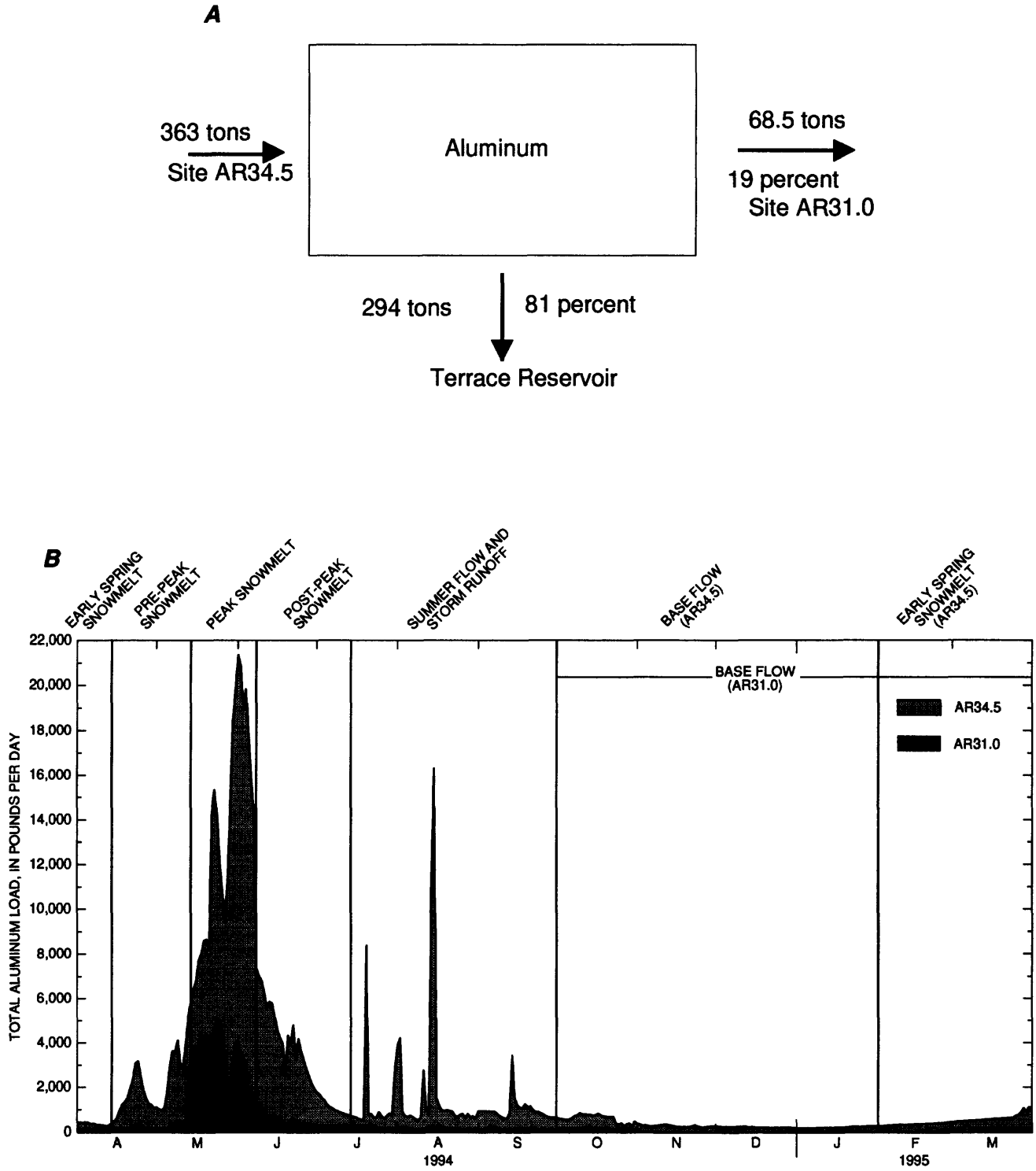


Figure 11. Annual (A) and daily (B) total-aluminum loads into (site AR34.5) and out of (site AR31.0) Terrace Reservoir, April 1994 through March 1995.

Throughout the study, aluminum was transported into the reservoir predominantly in the suspended fraction (fig. 10). By comparison, most of the aluminum transported out of the reservoir was predominantly in the dissolved fraction, except during the pre-peak and peak snowmelt periods (fig. 10).

About 81 percent of the 363 tons of total aluminum that entered the reservoir was not transported out of the reservoir, indicating that the reservoir was a sink for an estimated 294 tons of aluminum (table 5; fig. 11). Although 81 percent of the aluminum was not transported out of the reservoir during the study, about 68.5 tons was transported downstream to the Alamosa River, and most of this load (about 63 percent) was transported out of the reservoir during the peak snowmelt period from May 15 through June 8, 1994 (table 5; fig. 11). Although most of the total-aluminum load was not transported out of the reservoir, about 75 percent of the dissolved-aluminum load that entered the reservoir was transported out of the reservoir during the study (table 5).

Iron

Large variations in iron loads occurred during the study. The largest daily total-iron loads were transported into and out of Terrace Reservoir during the peak snowmelt period (fig. 12). During the peak snowmelt period, the maximum daily total-iron load that entered the reservoir was about 25 tons (table 7). Large daily total-iron loads also were transported into the reservoir during rainstorms during the summer period, and like total-aluminum loads, almost all the total-iron loads that entered the reservoir during rainstorm runoff remained in the reservoir. The smallest daily iron loads occurred during the base-flow period between November 1994 and February 1995 (fig. 12).

During the pre-peak and peak snowmelt periods, more than 90 percent of the iron was transported into and out of the reservoir in the suspended fraction (fig. 10). However, most of the iron transported into and out of the reservoir during the post-peak snowmelt and summer-flow periods was transported in the dissolved fraction. During these periods, about 60 percent of the iron entering the reservoir generally was in the dissolved fraction; and generally more than 70 percent of the iron being discharged from the reservoir was in the dissolved fraction (fig. 10).

An estimated 75 percent of the 790 tons of total iron that entered the reservoir remained in the reservoir, indicating that the reservoir was a sink for an estimated 596 tons of iron (table 5; fig. 12). Although 75 percent of the iron was not transported through the reservoir, about 194 tons was transported downstream to the Alamosa River, and most of this load (about 73 percent) was transported out of the reservoir during the peak and post-peak snowmelt periods from May 15 through July 14, 1994 (table 5; fig. 12).

Between April 1 and June 8, 1994, most of the dissolved iron that entered the reservoir probably was in colloidal form (that is, less than 0.45 μm), which aggregated, then settled from the reservoir water column under the low gradient conditions of the reservoir, resulting in almost a 75-percent loss in dissolved iron at site AR31.0 (downstream from Terrace Reservoir). Between June 9 and September 30, 1994, about 50 percent of the dissolved iron that entered the reservoir was transported out of the reservoir (table 5).

Copper

The maximum daily total-copper load of about 3,770 lbs (about 1.9 tons) entered the reservoir on June 8, about a week later than the maximum daily total-aluminum and total-iron loads (table 7). This was a substantially smaller load than the daily maximum total-aluminum and iron loads that entered the reservoir. Although the maximum daily load occurred at the end of the peak snowmelt period, the largest copper loads were transported into and out of the reservoir during the post-peak snowmelt period (fig. 13). Almost 45 percent of the annual total-copper load was transported into and out of Terrace Reservoir during the post-peak snowmelt period (table 5), which corresponded to a period when streamflow had substantially diminished. The smallest daily total-copper loads occurred during the base-flow period between November 1994 and February 1995 (fig. 13).

During the pre-peak and peak snowmelt periods, most of the copper transported into and out of the reservoir was in the suspended fraction. During these periods, about two-thirds of the approximately 18.5 tons of total copper that entered the reservoir (table 5) remained in the reservoir and was not discharged downstream to the Alamosa River.

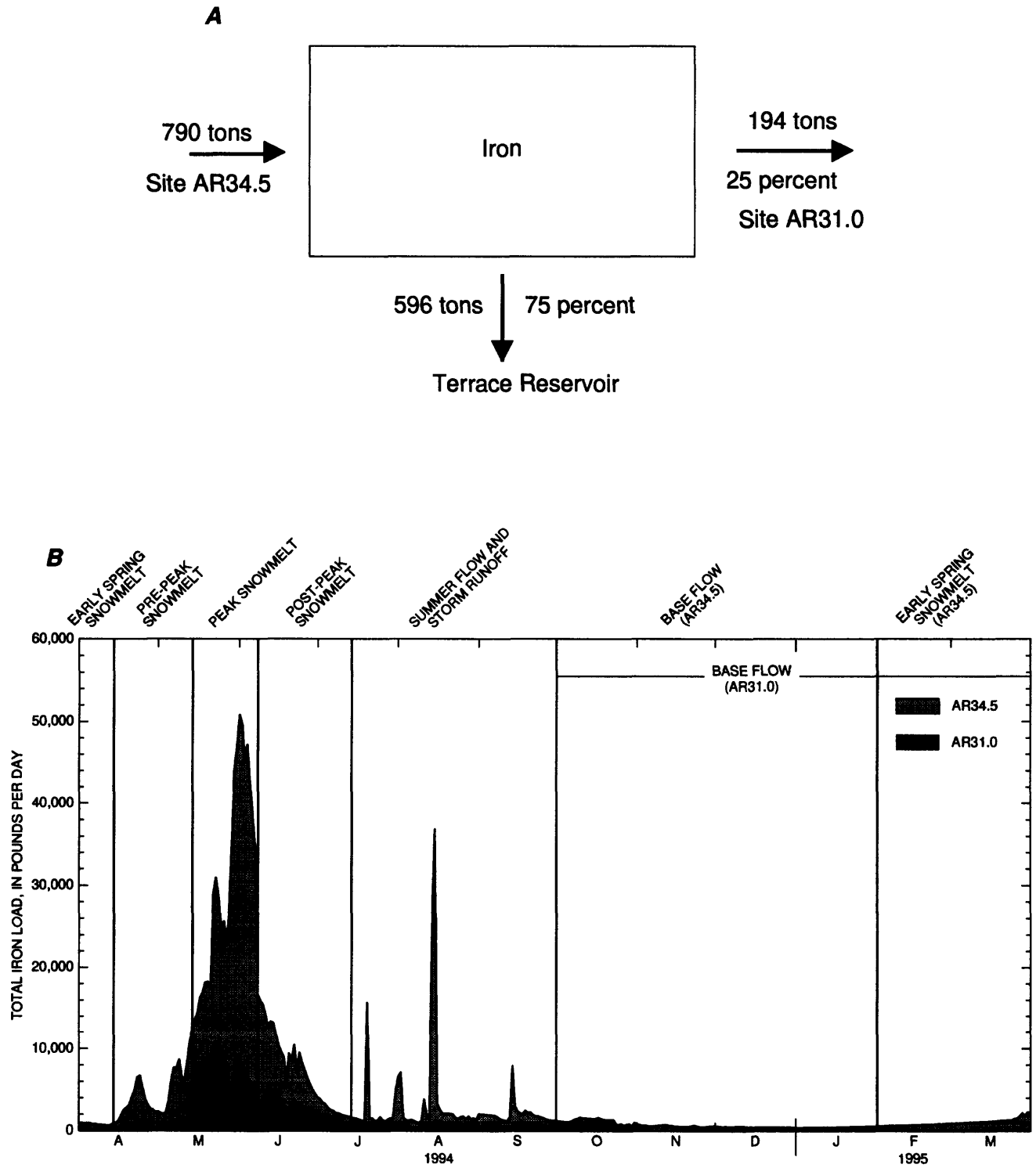


Figure 12. Annual (A) and daily (B) total-iron loads into (site AR34.5) and out of (site AR31.0) Terrace Reservoir, April 1994 through March 1995.

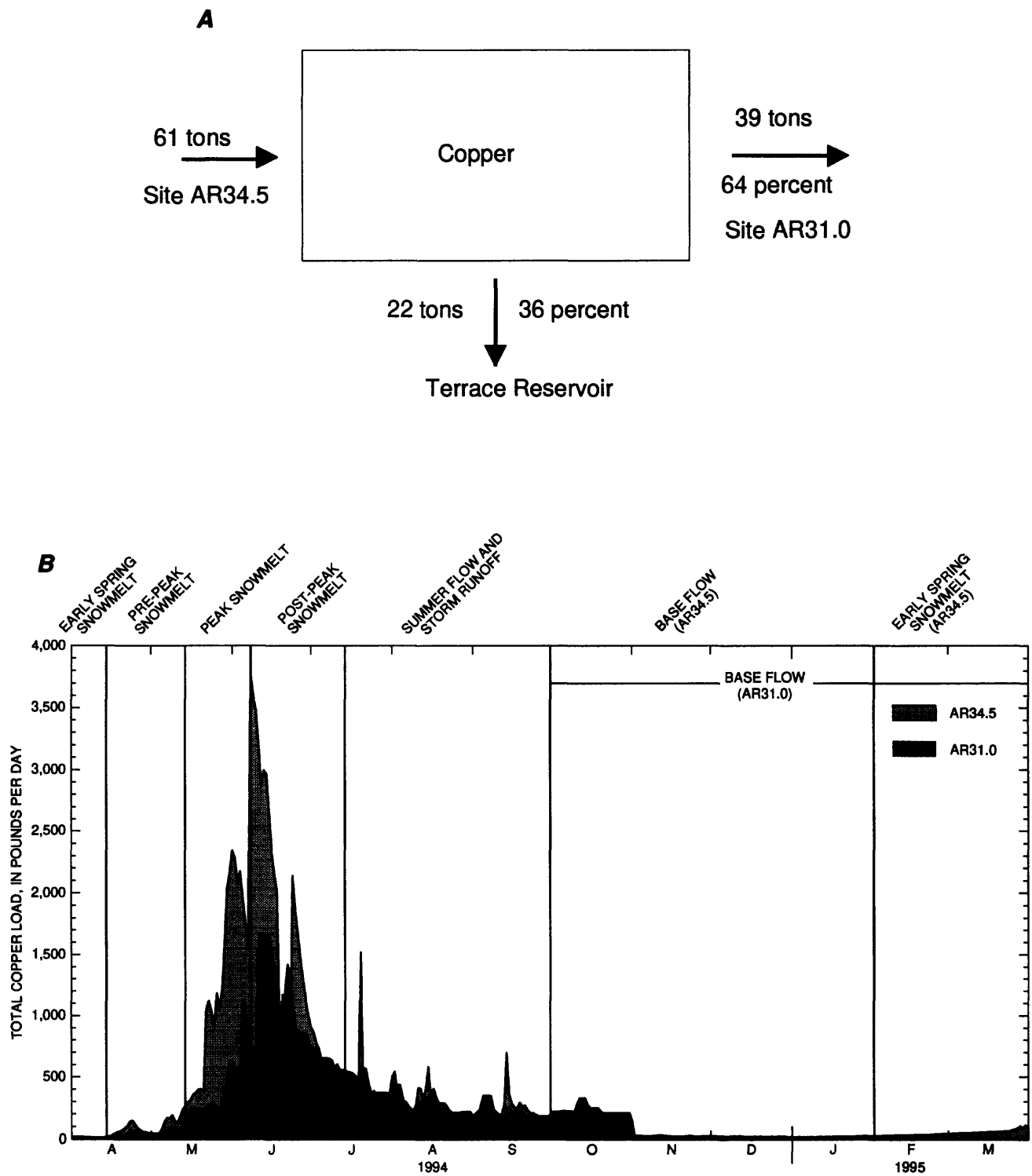


Figure 13. Annual (A) and daily (B) total-copper loads into (site AR34.5) and out of (site AR31.0) Terrace Reservoir, April 1994 through March 1995.

However, as indicated previously, most of the copper generally was transported into and out of the reservoir in the dissolved fraction during the post-peak snowmelt, summer-flow, storm-runoff, and base-flow periods; and generally more than 90 percent of the copper that was transported into and out of the reservoir during post-peak snowmelt and summer-flow periods was in the dissolved fraction (fig. 10). During the post-peak snowmelt and summer-flow periods, about 75 percent of the approximately 38 tons of total copper that entered the reservoir was transported out of the reservoir (table 5; fig. 13).

Overall, during the study, an estimated 39 tons of total copper was discharged from the reservoir downstream to the Alamosa River, and an estimated 22 tons of total copper remained in the reservoir. Between April 1 and November 7, 1994, the period when water was released from the reservoir, the dissolved-copper load transported out of the reservoir was about 87 percent of the dissolved-copper load transported into the reservoir, and the total-copper load transported out of the reservoir was about 64 percent of the total-copper load transported into the reservoir (table 5).

Cadmium

Throughout the study, cadmium was transported into and out of the reservoir almost entirely in the dissolved fraction (fig. 10). Daily total-cadmium loads ranged from less than 0.1 to about 6.5 lbs (table 7). The maximum daily total-cadmium load occurred on the same date, June 8, as the maximum daily total-copper load. In general, most of the cadmium load was transported through the reservoir (table 5). The data indicate that between about 75 and 85 percent of the total-cadmium load that entered the reservoir during the peak and post-peak snowmelt periods was transported out of the reservoir. Overall, less than 275 lbs of total-cadmium load entered the reservoir, and less than 239 lbs of total cadmium was transported out of the reservoir (table 5). Between April 1 and November 7, 1994, the period when the reservoir was releasing water, the cadmium load transported out of the reservoir was nearly equivalent to the cadmium load transported into the reservoir (table 5).

Manganese

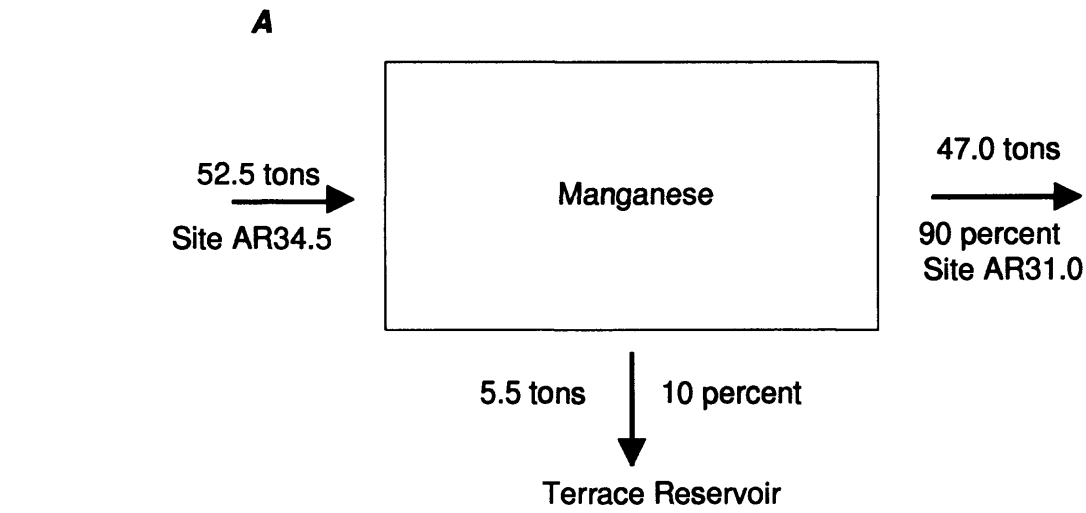
Large variations in manganese loads occurred during the study (fig. 14). The largest daily manganese loads were transported into and out of Terrace Reservoir during the peak snowmelt period (fig. 14). During the peak snowmelt period, the maximum daily total-manganese load that entered the reservoir was about 2,230 lbs (table 7), or slightly more than 1 ton. The maximum daily total-manganese load occurred on June 1, 1994, the same date as the maximum aluminum and iron loads and about a week earlier than the maximum daily copper and cadmium loads (table 7). Large daily total-manganese loads also were transported into the reservoir during rainstorms during the summer period. Most of the total-manganese loads that entered the reservoir during rainstorm runoff did not appear to have been transported out of the reservoir (fig. 14). The smallest daily manganese loads occurred during the base-flow period between November 1994 and February 1995 (fig. 14).

Throughout the study, most of the manganese was transported into and out of the reservoir in the dissolved fraction (fig. 10). However, during the peak snowmelt period, between 20 and 30 percent of the manganese was transported into the reservoir in the suspended fraction (fig. 10).

About 90 percent of the 52.5 tons of total-manganese load that entered the reservoir was transported out of the reservoir, indicating that the reservoir was a sink for only a small fraction of manganese (table 5; fig. 14). About 55 percent of the annual total-manganese load was transported into and out of the reservoir during the peak and post-peak snowmelt periods (table 5).

Zinc

The maximum daily total-zinc load of about 943 lbs entered the reservoir on June 8, 1994, the same date as the maximum daily total-copper and total-cadmium loads and about a week later than the maximum daily total-aluminum, iron, and manganese loads (table 7). Although the maximum daily load occurred at the end of the peak snowmelt period, the largest zinc loads were transported into and out of the reservoir during the post-peak snowmelt period (table 5; fig. 15)—a period when streamflow had substantially diminished.



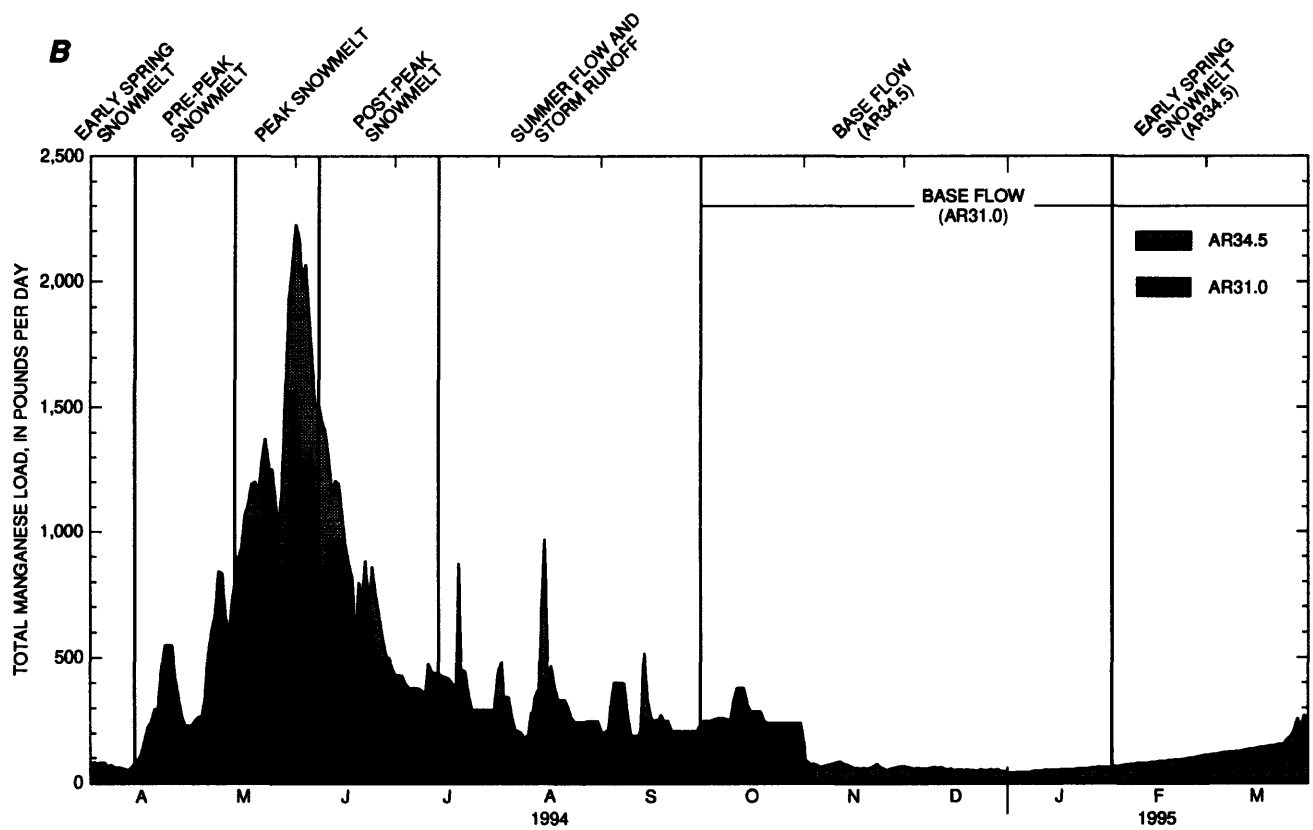


Figure 14. Annual (A) and daily (B) total-manganese loads into (site AR34.5) and out of (site AR31.0) Terrace Reservoir, April 1994 through March 1995.

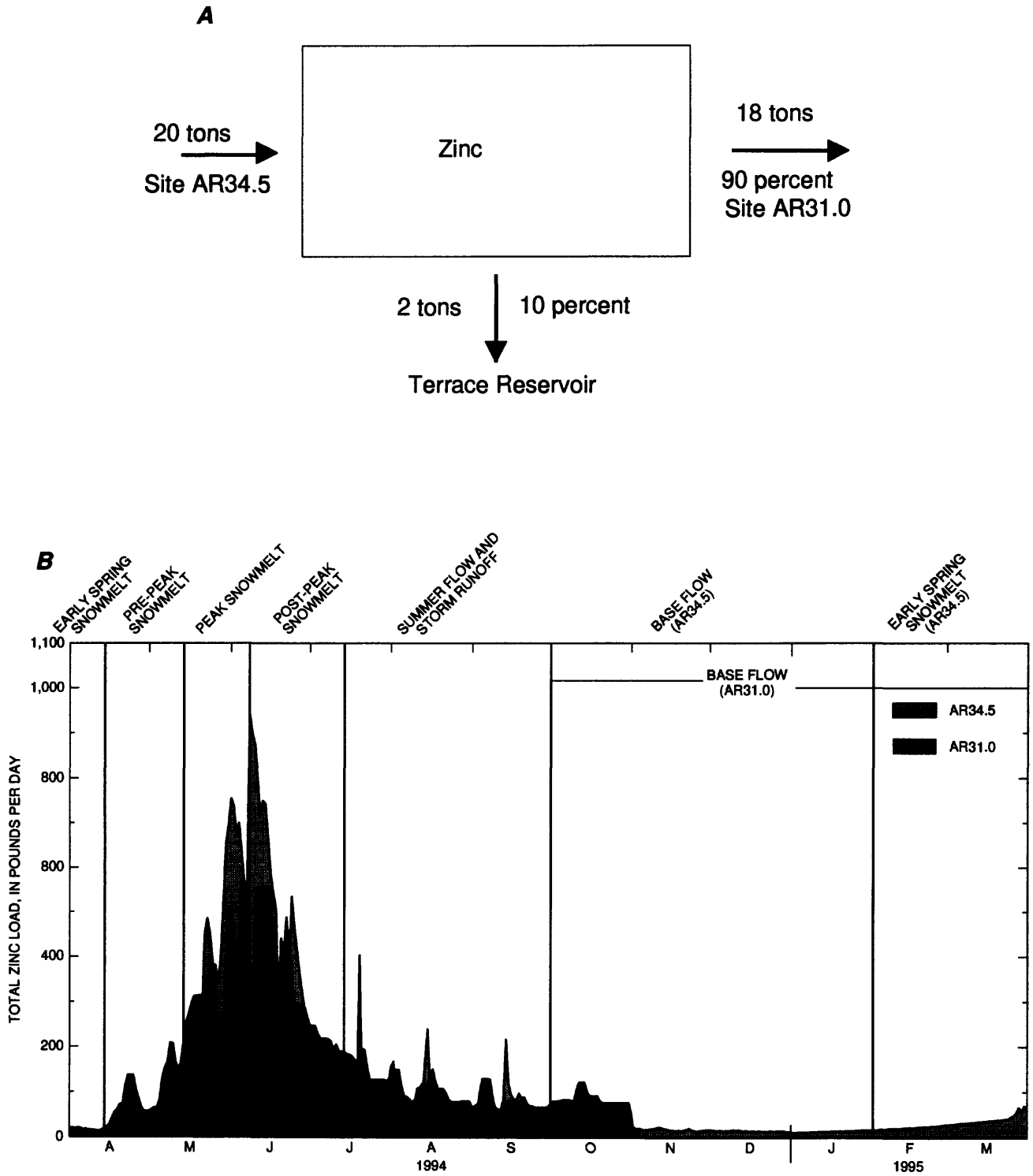


Figure 15. Annual (A) and daily (B) total-zinc loads into (site AR34.5) and out of (site AR31.0) Terrace Reservoir, April 1994 through March 1995.

Upstream from Terrace Reservoir, total-zinc loads increased substantially during rainstorms during the summer period. Most of the total-zinc loads that entered the reservoir during rainstorm runoff did not appear to have been transported out of the reservoir (fig. 15). The smallest daily zinc loads occurred during the base-flow period between November 1994 and February 1995 (fig. 15).

During most of the study, zinc was transported into and out of the reservoir mostly in the dissolved fraction (fig. 10). However, during the pre-peak and peak snowmelt periods, about 30 percent of the zinc generally was transported into the reservoir in the suspended fraction (fig. 10).

During the study, about 90 percent of the 20 tons of total zinc that entered the reservoir was transported out of the reservoir, indicating that the reservoir was a sink for only a small fraction of zinc (table 5; fig. 15). About 60 percent of the annual total-zinc load was transported out of the reservoir between May 15 and July 14, 1994, during the peak and post-peak snowmelt periods. Another 23 percent of the annual total-zinc load was transported out of the reservoir during the summer-flow period from July 15 through the end of September 1994.

SUMMARY

Terrace Reservoir is a small irrigation reservoir located on the Alamosa River at an elevation of about 8,550 ft above sea level in the San Juan Mountains in Conejos County, Colorado. The Alamosa River and Terrace Reservoir are the primary sources of water for crops and livestock in the southwestern part of the San Luis Valley. Much of the drainage basin upstream from Terrace Reservoir contains extensive areas of mineralized rocks that in some places have been mined and that contribute a substantial metal load to Terrace Reservoir. Gold, silver, copper, and lead mining have occurred in the basin for more than 100 years, and extensive mining activities have occurred intermittently at the Summitville Mine. Historically, the Summitville Mine site has produced highly acidic, metal-enriched water that drained from the mine site into Wightman Fork and flowed to the Alamosa River and Terrace Reservoir.

A comparison of the streamflow hydrographs upstream and downstream from Terrace Reservoir indicated that from April 1 through June 8, 1994, the volume of water released from Terrace Reservoir was within 5 percent of the volume of water that entered the reservoir. During the post-peak snowmelt and summer-flow periods, more water was released from the reservoir than entered the reservoir due to downstream irrigation demand. During the base-flow and early spring snowmelt periods from October 1, 1994, through March 31, 1995, 46 percent more water entered the reservoir than was released from the reservoir. Over the entire study period, there was only a small difference between the volume of water that entered the reservoir and the volume of water that was released from the reservoir.

During the study period, pH immediately upstream from Terrace Reservoir ranged from 4.3 to 7.8. The highest pH occurred during the pre-peak snowmelt period; the lowest pH occurred during storm runoff during summer. Downstream from Terrace Reservoir, pH ranged from 4.6 to 7.6. The highest pH occurred during the pre-peak snowmelt period, and the lowest pH occurred during summer in mid-July.

Large spatial and temporal variations in concentrations of the metals of concern occurred during the study. The median and maximum concentrations of dissolved and total aluminum, iron, copper, cadmium, manganese, and zinc were larger upstream from the reservoir than downstream from the reservoir. Upstream and downstream from Terrace Reservoir, the largest concentrations of dissolved aluminum, iron, copper, cadmium, manganese, and zinc generally occurred between mid-June and November. Upstream from the reservoir, the largest concentrations of total aluminum, iron, copper, cadmium, manganese, and zinc generally occurred between July and September during storm runoff. After November, dissolved- and total-metal concentrations generally decreased downstream from the reservoir after the closure of the reservoir outlet works.

Throughout the study, aluminum was transported into the reservoir predominantly in the particulate or suspended form. Downstream from the reservoir, the suspended-aluminum fraction was predominant only during the pre-peak snowmelt and peak snowmelt periods. After June 8, most of the aluminum that was transported out of Terrace Reservoir was in the dissolved fraction. During the pre-peak snowmelt and peak snowmelt periods, more than 90 percent of the iron was transported into the reservoir in the suspended fraction. However, the dissolved fraction of iron generally increased to more than 50 percent during the post-peak snowmelt and

summer-flow periods. The temporal variations in the percentage of dissolved and suspended fraction of iron downstream from Terrace Reservoir were similar to the temporal variations that occurred upstream from the reservoir. Generally, the temporal variations in the percentage of dissolved and suspended copper transported into and out of Terrace Reservoir were similar to the temporal variations that occurred with the percentage of dissolved and suspended iron that was transported into and out of Terrace Reservoir. With the exception of the pre-peak snowmelt period, the temporal variations in the percentage of dissolved and suspended fraction of copper downstream from Terrace Reservoir were similar to the temporal variations that occurred upstream from the reservoir. During the entire study period, cadmium, manganese, and zinc generally were transported into and out of the reservoir predominantly in the dissolved form.

Logarithms of metal concentrations generally were not significantly correlated with streamflow or the logarithm of specific conductance. Correlations between the logarithms of metal concentrations and pH generally were strong upstream and downstream from the reservoir. However, downstream from the reservoir, scatterplots of the data indicated that a linear relation did not exist between pH and the logarithms of the metal concentrations. Correlations and scatterplots between the logarithms of metal concentrations and pH upstream from the reservoir indicated that a linear relation existed. The correlations generally indicated that between 65 and 83 percent of the variation in metal concentrations could be explained by pH. The metals of concern were significantly correlated with one another. Because the correlations among the logarithms of the concentrations of metals generally were good, copper was used as the indicator constituent to determine the divisions for the time intervals for estimating aluminum, iron, cadmium, manganese, and zinc loads.

Metal loads varied considerably as a result of changes in streamflow or changes in metal concentrations, or both. The largest daily loads of aluminum, iron, and manganese were transported into and out of Terrace Reservoir during the peak snowmelt period. The smallest metal loads occurred during the base-flow period between November 1994 and February 1995. About 81 percent of the 363 tons of total aluminum that entered the reservoir remained in the reservoir, indicating that the reservoir was a sink for an estimated 294 tons of aluminum. About 75 percent of the 790 tons of total iron that entered the reservoir remained in the reservoir, indicating that the reservoir was a sink for an estimated 596 tons of iron. The maximum daily total-copper load entered the reservoir on June 8, about a week later than the maximum daily total-aluminum and total-iron loads. The largest copper loads were transported into and out of the reservoir during the post-peak snowmelt period. Overall, during the study, an estimated 39 tons of total copper was discharged from the reservoir downstream to the Alamosa River, and about 22 tons of total copper remained in the reservoir. Between April 1 and November 7, 1994, the period when the reservoir was releasing water, the total-copper load transported out of the reservoir was about 64 percent of the total-copper load transported into the reservoir. About 90 percent of the total-manganese and total-zinc loads that entered the reservoir was transported out of the reservoir, indicating that the reservoir was a sink for only a small fraction of manganese and zinc.

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SUPPLEMENTAL DATA

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Menganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	04/01/94	13	2.4	41	1.9	2.4	0.3	<0.1	<0.1	52	6.6	7.9	1.5
AR31.0	04/01/94	8.4	0.6	8.5	3.7	4.1	0.8	0.1	<0.1	78	2.3	16	1.4
AR34.5	04/02/94	14	2.5	43	2.0	2.6	0.3	<0.1	<0.1	54	6.9	8.4	1.5
AR31.0	04/02/94	8.8	0.6	8.9	3.9	4.4	0.9	0.1	<0.1	83	2.4	17	1.5
AR34.5	04/03/94	13	2.3	40	1.9	2.4	0.3	<0.1	<0.1	50	6.4	7.7	1.4
AR31.0	04/03/94	8.1	0.6	8.2	3.6	4.0	0.8	0.1	<0.1	76	2.2	16	1.4
AR34.5	04/04/94	14	2.5	43	2.0	2.6	0.3	<0.1	<0.1	54	6.9	8.4	1.5
AR31.0	04/04/94	8.8	0.6	8.9	3.9	4.4	0.9	0.1	<0.1	83	2.4	17	1.5
AR34.5	04/05/94	13	2.5	42	2.0	2.5	0.3	<0.1	<0.1	53	6.8	8.1	1.5
AR31.0	04/05/94	8.6	0.6	8.7	3.8	4.3	0.9	0.1	<0.1	81	2.4	16	1.5
AR34.5	04/06/94	11	2.1	35	1.7	2.1	0.3	<0.1	<0.1	44	5.7	6.8	1.2
AR31.0	04/06/94	7.2	0.5	7.3	3.2	3.6	0.7	0.1	<0.1	67	2.0	14	1.2
AR34.5	04/07/94	12	2.2	37	1.8	2.2	0.3	<0.1	<0.1	47	6.0	7.3	1.3
AR31.0	04/07/94	7.7	0.5	7.8	3.4	3.8	0.8	0.1	<0.1	72	2.1	15	1.3
AR34.5	04/08/94	10	1.9	33	1.6	2.0	0.2	<0.1	<0.1	42	5.3	6.4	1.2
AR31.0	04/08/94	6.7	0.5	6.8	3.0	3.3	0.7	0.1	<0.1	63	1.9	13	1.2
AR34.5	04/09/94	10	1.9	33	1.6	2.0	0.2	<0.1	<0.1	42	5.3	6.4	1.2
AR31.0	04/09/94	6.7	0.5	6.8	3.0	3.3	0.7	0.1	<0.1	63	1.9	13	1.2
AR34.5	04/10/94	10	1.9	32	1.5	1.9	0.2	<0.1	<0.1	40	5.1	6.2	1.1
AR31.0	04/10/94	6.5	0.5	6.6	2.9	3.2	0.7	0.1	<0.1	61	1.8	12	1.1
AR34.5	04/11/94	9.3	1.7	29	1.4	1.8	0.2	<0.1	<0.1	37	4.8	5.7	1.0
AR31.0	04/11/94	6.0	0.4	6.1	2.7	3.0	0.6	0.1	<0.1	57	1.7	12	1.0
AR34.5	04/12/94	8.6	1.6	27	1.3	1.6	0.2	<0.1	<0.1	34	4.4	5.3	1.0
AR31.0	04/12/94	5.6	0.4	5.6	2.5	2.8	0.6	0.1	<0.1	52	1.5	11	1.0
AR34.5	04/13/94	10	1.9	32	1.5	1.9	0.2	<0.1	<0.1	40	5.1	6.2	1.1
AR31.0	04/13/94	6.5	0.5	6.6	2.9	3.2	0.7	0.1	<0.1	61	1.8	12	1.1
AR34.5	04/14/94	13	2.4	41	1.9	2.4	0.3	<0.1	<0.1	52	6.6	7.9	1.5
AR31.0	04/14/94	8.4	0.6	8.5	3.7	4.1	0.8	0.1	<0.1	78	2.3	16	1.4
AR34.5	04/15/94	14	2.7	45	2.2	2.7	0.3	<0.1	<0.1	57	7.3	8.8	1.6
AR31.0	04/15/94	9.3	0.7	9.4	4.1	4.6	0.9	0.1	<0.1	87	2.6	18	1.6
AR34.5	04/16/94	19	3.5	60	2.8	3.6	0.4	<0.1	<0.1	76	9.7	12	2.1
AR31.0	04/16/94	12	0.9	13	5.4	6.1	1.2	0.2	<0.1	115	3.4	24	2.1
AR34.5	04/17/94	28	5.3	89	4.2	5.3	0.7	<0.2	<0.1	113	14	17	3.2
AR31.0	04/17/94	18	1.3	19	8.1	9.1	1.8	0.3	<0.1	172	5.1	35	3.1
AR34.5	04/18/94	37	6.9	118	5.6	7.0	0.9	<0.3	<0.1	149	19	23	4.2
AR31.0	04/18/94	24	1.7	25	11	12	2.4	0.4	<0.1	226	6.7	46	4.1
AR34.5	04/19/94	41	7.6	129	6.1	7.7	0.9	<0.3	<0.1	163	21	25	4.6
AR31.0	04/19/94	26	1.9	27	12	13	2.7	0.4	<0.1	248	7.3	51	4.5
AR34.5	04/20/94	46	8.5	145	6.9	8.7	1.1	<0.3	<0.1	183	23	28	5.2
AR31.0	04/20/94	32	2.2	32	14	16	3.2	0.5	<0.1	296	8.7	60	5.4

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	04/21/94	59	11	185	8.8	11	1.4	<0.4	<0.1	235	30	36	6.6
AR31.0	04/21/94	32	2.2	32	14	16	3.2	0.5	<0.1	298	8.8	61	5.4
AR34.5	04/22/94	71	13	223	11	13	1.6	<0.5	<0.1	282	36	43	7.9
AR31.0	04/22/94	49	3.4	49	22	24	4.9	0.7	0.1	455	13	93	8.3
AR34.5	04/23/94	93	17	294	14	18	2.2	<0.7	<0.1	372	48	57	11
AR31.0	04/23/94	59	4.2	60	26	29	5.9	0.9	0.1	553	16	113	10
AR34.5	04/24/94	96	18	303	14	18	2.2	<0.7	<0.1	383	49	59	11
AR31.0	04/24/94	59	4.2	60	26	29	5.9	0.9	0.1	553	16	113	10
AR34.5	04/25/94	75	14	237	11	14	1.7	<0.6	<0.1	300	38	46	8.5
AR31.0	04/25/94	59	4.2	60	26	29	5.9	0.9	0.1	553	16	113	10
AR34.5	04/26/94	57	11	178	8.5	11	1.3	<0.4	<0.1	226	29	35	6.4
AR31.0	04/26/94	45	3.2	46	20	22	4.5	0.7	0.1	422	13	86	7.7
AR34.5	04/27/94	46	8.6	146	6.9	8.7	1.1	<0.3	<0.1	184	24	28	5.2
AR31.0	04/27/94	37	2.6	37	16	18	3.7	0.5	0.1	346	10	71	6.3
AR34.5	04/28/94	39	7.2	122	5.8	7.3	0.9	<0.3	<0.1	154	20	24	4.4
AR31.0	04/28/94	29	2.0	29	13	14	2.9	0.4	<0.1	270	8.0	55	4.9
AR34.5	04/29/94	37	6.9	117	5.6	7.0	0.9	<0.3	<0.1	149	19	23	4.2
AR31.0	04/29/94	25	1.7	25	11	12	2.5	0.4	<0.1	231	6.8	47	4.2
AR34.5	04/30/94	33	6.1	103	4.9	6.2	0.8	<0.2	<0.1	130	17	20	3.7
AR31.0	04/30/94	25	1.7	25	11	12	2.5	0.4	<0.1	231	6.8	47	4.2
AR34.5	05/01/94	34	6.3	106	5.1	6.4	0.8	<0.3	<0.1	134	17	21	3.8
AR31.0	05/01/94	25	1.7	25	11	12	2.5	0.4	<0.1	231	6.8	47	4.2
AR34.5	05/02/94	31	5.7	97	4.6	5.8	0.7	<0.2	<0.1	123	16	19	3.5
AR31.0	05/02/94	27	1.9	27	12	13	2.7	0.4	<0.1	250	7.4	51	4.6
AR34.5	05/03/94	30	5.5	94	4.5	5.6	0.7	<0.2	<0.1	119	15	18	3.3
AR31.0	05/03/94	28	2.0	29	13	14.1	2.8	0.4	<0.1	265	7.8	54	4.8
AR34.5	05/04/94	32.2	6.0	102	4.8	6.1	0.7	<0.2	<0.1	129	17	20	3.6
AR31.0	05/04/94	28	2.0	29	13	14	2.8	0.4	<0.1	265	7.8	54	4.8
AR34.5	05/05/94	52	9.7	165	7.8	9.9	1.2	<0.4	<0.1	209	27	32	5.9
AR31.0	05/05/94	36	2.5	37	16	18	3.6	0.5	0.1	337	10	69	6.2
AR34.5	05/06/94	87	16	273	13	16	2.0	<0.7	<0.1	346	44	53	9.8
AR31.0	05/06/94	56	3.9	57	25	28	5.6	0.8	0.1	524	16	107	9.6
AR34.5	05/07/94	110	20	347	17	21	2.6	<0.8	<0.1	439	56	68	12
AR31.0	05/07/94	65	4.6	66	29	33	6.6	1.0	0.1	614	18	125	11
AR34.5	05/08/94	109	50	345	16	54	2.5	<0.8	<0.1	436	56	67	12
AR31.0	05/08/94	72	5.1	73	32	36	7.2	1.1	0.1	674	20	138	12
AR34.5	05/09/94	124	23	392	19	24	2.9	<0.9	<0.1	496	63	76	14
AR31.0	05/09/94	90	6.4	92	40	45	9.0	1.3	0.1	846	25	173	16
AR34.5	05/10/94	93	17	293	14	18	2.2	<0.7	<0.1	370	47	57	10
AR31.0	05/10/94	90	6.3	91	40	45	9.0	1.3	0.1	840	25	171	15
AR34.5	05/11/94	86	16	270	13	16	2.0	<0.6	<0.1	342	44	53	9.6
AR31.0	05/11/94	71	5.0	72	31	35	7.1	1.0	0.1	666	20	136	12

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	05/12/94	118	22	372	18	22	2.7	<0.9	<0.1	471	60	73	13
AR31.0	05/12/94	64	4.5	64	28	62	6.4	0.9	0.1	596	18	122	11
AR34.5	05/13/94	155	29	489	23	29	3.6	<1.2	<0.1	619	79	95	18
AR31.0	05/13/94	112	14	231	23	28	2.9	1.0	0.1	519	25	129	64
AR34.5	05/14/94	176	33	555	26	33	4.1	<1.3	<0.1	702	90	108	20
AR31.0	05/14/94	143	17	295	29	35	3.7	1.3	0.1	662	31	165	81
AR34.5	05/15/94	194	36	611	29	37	4.5	<1.5	<0.1	774	99	119	22
AR31.0	05/15/94	174	21	358	35	43	4.5	1.6	0.1	803	38	200	99
AR34.5	05/16/94	206	38	648	31	39	4.8	<1.5	<0.1	821	105	126	23
AR31.0	05/16/94	187	23	386	38	46	4.9	1.7	0.2	866	41	216	106
AR34.5	05/17/94	234	44	738	35	44	5.4	<1.8	<0.1	934	119	144	26
AR31.0	05/17/94	203	24	419	41	50	5.3	1.8	0.2	940	44	234	116
AR34.5	05/18/94	243	45	766	36	46	5.6	<1.8	<0.1	970	124	149	27
AR31.0	05/18/94	215	26	442	43	53	5.6	1.9	0.2	993	47	248	122
AR34.5	05/19/94	261	49	822	39	49	6.1	<2.0	<0.1	1,040	133	160	29
AR31.0	05/19/94	216	26	444	44	53	5.6	1.9	0.2	996	48	248	122
AR34.5	05/20/94	262	49	827	39	50	6.1	<2.0	<0.1	1,050	134	161	30
AR31.0	05/20/94	216	26	444	44	53	5.6	1.9	0.2	998	47	249	123
AR34.5	05/21/94	250	46	787	38	47	5.8	<1.9	<0.1	997	127	153	28
AR31.0	05/21/94	216	26	444	44	53	5.6	1.9	0.2	996	47	248	122
AR34.5	05/22/94	171	--	1,560	--	171	--	<1.9	--	982	--	325	--
AR31.0	05/22/94	217	26	446	44	54	5.6	2.0	0.2	1,000	47	249	123
AR34.5	05/23/94	184	--	1,680	--	183	--	<2.1	--	1,060	--	350	--
AR31.0	05/23/94	240	29	494	48	59	6.3	2.2	0.2	1,110	53	277	136
AR34.5	05/24/94	170	--	1,550	--	170	--	<1.9	--	977	--	324	--
AR31.0	05/24/94	256	31	528	52	63	6.7	2.3	0.2	1,180	56	295	146
AR34.5	05/25/94	145	--	1,320	--	145	--	<1.7	--	333	--	276	--
AR31.0	05/25/94	256	31	528	52	63	6.7	2.3	0.2	1,180	56	295	146
AR34.5	05/26/94	125	27	1,620	153	282	46	2.9	0.4	805	50	625	33
AR31.0	05/26/94	232	28	478	47	57	6.0	2.1	0.2	1,070	51	267	132
AR34.5	05/27/94	111	24	1,440	136	251	41	2.5	0.4	715	44	289	30
AR31.0	05/27/94	178	21	366	36	44	4.6	1.6	0.1	822	39	205	101
AR34.5	05/28/94	129	28	1,670	157	291	48	3.0	0.4	829	52	335	34
AR31.0	05/28/94	102	--	220	--	86	--	1.5	--	750	--	441	--
AR34.5	05/29/94	169	36	2,200	207	382	63	3.9	0.6	1,090	68	440	45
AR31.0	05/29/94	102	--	220	--	56	--	1.5	--	750	--	441	--
AR34.5	05/30/94	215	46	2,790	262	484	80	4.9	0.7	1,380	86	558	57
AR31.0	05/30/94	145	--	311	--	122	--	2.2	--	1,060	--	626	--
AR34.5	05/31/94	228	49	2,960	278	514	84	5.2	0.7	1,470	91	593	61
AR31.0	05/31/94	193	--	416	--	162	--	2.9	--	1,420	--	836	--
AR34.5	06/01/94	248	53	3,220	302	559	92	5.7	0.8	1,590	99	644	66
AR31.0	06/01/94	195	--	419	--	164	--	2.9	--	1,430	--	842	--

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	06/02/94	242	52	3,140	295	546	90	5.5	0.8	1,560	97	629	64
AR31.0	06/02/94	170	--	367	--	143	--	2.6	--	1,250	--	737	--
AR34.5	06/03/94	220	47	2,860	267	496	82	5.0	0.7	1,420	88	572	58
AR31.0	06/03/94	158	--	341	--	133	--	2.4	--	1,160	--	684	--
AR34.5	06/04/94	230	49	2,980	281	519	85	5.3	0.8	1,480	92	598	61
AR31.0	06/04/94	152	--	327	--	128	--	2.3	--	1,120	--	656	--
AR34.5	06/05/94	206	44	2,680	252	466	77	4.7	0.7	1,330	82	536	55
AR31.0	06/05/94	160	--	1,710	--	941	--	8.4	--	1,340	--	550	--
AR34.5	06/06/94	185	40	2,400	226	418	69	4.2	0.6	1,190	74	481	49
AR31.0	06/06/94	153	--	1,640	--	903	--	8.0	--	1,290	--	528	--
AR34.5	06/07/94	167	36	2,170	204	376	62	3.8	0.5	1,070	67	434	44
AR31.0	06/07/94	126	--	1,350	--	744	--	6.6	--	1,060	--	435	--
AR34.5	06/08/94	1,630	665	10,800	1,180	3,590	490	7.3	1.1	1,490	176	1,010	35
AR31.0	06/08/94	108	--	1,150	--	636	--	5.7	--	908	--	372	--
AR34.5	06/09/94	1,550	633	10,300	1,130	3,420	467	6.9	1.1	1,420	168	961	81
AR31.0	06/09/94	103	--	1,100	--	608	--	5.4	--	868	--	356	--
AR34.5	06/10/94	1,510	616	10,000	1,100	3,330	454	6.8	1.0	1,380	163	936	79
AR31.0	06/10/94	103	--	1,100	--	608	--	5.4	--	868	--	356	--
AR34.5	06/11/94	1,390	568	9,230	1,010	3,060	419	6.2	1.0	1,270	150	862	73
AR31.0	06/11/94	514	80	3,570	382	1,700	164	4.0	0.2	985	46	428	26
AR34.5	06/12/94	1,240	505	8,220	899	2,730	373	5.5	0.9	1,130	134	767	65
AR31.0	06/12/94	514	80	3,570	382	1,700	164	4.0	0.2	985	46	528	56
AR34.5	06/13/94	1,300	529	8,600	940	2,850	390	5.8	0.9	1,180	140	802	68
AR31.0	06/13/94	514	80	3,570	382	1,700	164	4.0	0.2	985	46	528	26
AR34.5	06/14/94	1,280	524	8,520	321	2,830	386	5.7	0.9	1,170	138	795	67
AR31.0	06/14/94	514	80	3,570	382	1,700	164	4.0	0.2	985	46	528	26
AR34.5	06/15/94	1,150	468	7,610	832	2,520	345	5.1	0.8	1,050	124	710	60
AR31.0	06/15/94	514	80	3,570	382	1,700	164	4.0	0.2	985	46	528	26
AR34.5	06/16/94	1,010	413	6,720	734	2,230	304	4.5	0.7	926	109	627	53
AR31.0	06/16/94	473	73	3,290	352	1,560	151	3.6	0.2	907	42	486	24
AR34.5	06/17/94	934	381	6,200	678	2,060	281	4.2	0.6	855	101	579	49
AR31.0	06/17/94	423	66	2,940	315	1,400	135	3.3	0.1	812	38	435	21
AR34.5	06/18/94	874	357	5,800	634	1,930	263	3.9	0.6	800	94	542	46
AR31.0	06/18/94	368	57	2,560	274	1,220	118	2.8	0.1	707	33	379	18
AR34.5	06/19/94	153	--	2,910	--	718	--	2.0	--	648	--	310	--
AR31.0	06/19/94	302	47	2,100	225	1,000	96	2.3	0.1	579	27	310	15
AR34.5	06/20/94	256	--	4,880	--	1,200	--	3.4	--	1,080	--	519	--
AR31.0	06/20/94	273	42	1,900	203	904	87	2.1	0.1	523	24	281	14
AR34.5	06/21/94	233	--	4,440	--	1,100	--	3.1	--	989	--	473	--
AR31.0	06/21/94	374	58	2,600	278	1,240	119	2.9	0.1	717	33	384	19
AR34.5	06/22/94	284	--	5,400	--	1,330	--	3.8	--	1,200	--	575	--
AR31.0	06/22/94	438	68	3,050	326	1,450	140	3.4	0.1	841	39	451	22

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	06/23/94	194	--	3,690	--	909	--	2.6	--	821	--	393	--
AR31.0	06/23/94	403	62	2,800	300	1,330	129	3.1	0.1	773	36	414	20
AR34.5	06/24/94	925	378	6,140	671	2,040	278	4.1	0.6	847	100	573	48
AR31.0	06/24/94	331	51	2,300	246	1,100	106	2.5	0.1	635	29	340	17
AR34.5	06/25/94	806	329	5,350	585	1,780	242	3.6	0.6	738	87	499	42
AR31.0	06/25/94	278	43	1,940	207	921	89	2.1	0.1	534	25	286	14
AR34.5	06/26/94	719	294	4,770	522	1,580	216	3.2	0.5	658	78	446	68
AR31.0	06/26/94	266	41	1,850	199	882	85	2.0	0.1	511	24	274	13
AR34.5	06/27/94	630	257	4,180	457	1,390	190	2.8	0.4	576	68	390	33
AR31.0	06/27/94	266	41	1,850	198	882	85	2.0	0.1	511	24	274	13
AR34.5	06/28/94	558	228	3,704	405	1,230	168	2.5	0.4	511	60	346	29
AR31.0	06/28/94	266	41	1,850	198	882	85	2.0	0.1	511	24	274	13
AR34.5	06/29/94	486	198	3,230	353	1,070	146	2.2	0.3	445	52	301	26
AR31.0	06/29/94	265	41	1,850	198	879	85	2.0	0.1	509	24	273	13
AR34.5	06/30/94	436	178	2,890	316	960	131	1.9	0.3	399	47	270	23
AR31.0	06/30/94	244	38	1,700	182	808	78	1.9	0.1	468	22	251	12
AR34.5	07/01/94	394	161	2,610	286	868	119	1.8	0.3	360	42	244	21
AR31.0	07/01/94	228	35	1,580	170	754	73	1.8	0.1	437	20	234	11
AR34.5	07/02/94	376	154	2,500	273	828	113	1.7	0.3	344	41	233	20
AR31.0	07/02/94	228	35	1,580	170	754	73	1.8	0.1	437	20	234	11
AR34.5	07/03/94	337	138	2,240	245	743	102	1.5	0.2	309	36	209	18
AR31.0	07/03/94	227	35	1,580	169	751	72	1.7	0.1	435	200	233	11
AR34.5	07/04/94	316	129	2,100	230	697	95	1.4	0.2	290	34	196	17
AR31.0	07/04/94	211	33	1,460	157	697	67	1.6	0.1	404	19	217	11
AR34.5	07/05/94	274	112	1,820	199	605	83	1.2	0.2	251	30	170	14
AR31.0	07/05/94	201	31	1,400	150	665	64	1.5	0.1	385	18	507	10
AR34.5	07/06/94	251	102	1,660	182	552	76	1.1	0.2	229	27	155	13
AR31.0	07/06/94	201	31	1,400	150	665	64	1.5	0.1	385	18	207	10
AR34.5	07/07/94	239	97	1,580	173	526	72	1.1	0.2	218	26	148	12
AR31.0	07/07/94	201	31	1,400	150	665	64	1.5	0.1	385	18	207	10
AR34.5	07/08/94	215	88	1,430	156	473	65	1.0	0.1	197	23	133	11
AR31.0	07/08/94	200	31	1,390	149	662	64	1.5	0.1	383	18	206	10
AR34.5	07/09/94	209	85	1,390	152	460	63	0.9	0.1	191	22	129	11
AR31.0	07/09/94	196	30	1,360	146	647	62	1.5	0.1	375	17	201	10
AR34.5	07/10/94	194	79	1,290	141	427	58	0.9	0.1	178	21	120	10
AR31.0	07/10/94	177	78	1,230	132	587	57	1.4	0.1	340	16	182	9
AR34.5	07/11/94	185	76	1,230	134	408	56	0.8	0.1	169	20	115	10
AR31.0	07/11/94	384	42	712	152	706	50	1.7	0.1	543	7.5	236	8
AR34.5	07/12/94	176	72	1,170	128	388	53	0.8	0.1	161	19	109	9.2
AR31.0	07/12/94	354	39	657	141	652	46	1.6	0.1	502	6.9	218	7.1
AR34.5	07/13/94	170	69	1,130	123	375	51	0.8	0.1	156	18	105	8.9
AR31.0	07/13/94	354	38	657	141	652	46	1.6	0.1	502	6.9	218	7.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	07/14/94	155	63	1,030	113	342	47	0.7	0.1	142	17	96	8.1
AR31.0	07/14/94	352	38	652	140	647	45	1.6	0.1	498	6.8	216	7.0
AR34.5	07/15/94	152	62	1,010	110	335	46	0.7	0.1	139	16	94	8.0
AR31.0	07/15/94	344	37	638	137	632	44	1.5	0.1	487	6.7	211	6.8
AR34.5	07/16/94	146	60	971	106	322	44	0.7	0.1	134	16	91	7.7
AR31.0	07/16/94	341	37	633	136	627	44	1.5	0.1	483	6.6	210	6.8
AR34.5	07/17/94	134	55	891	98	296	40	0.6	0.1	123	14	83	7.0
AR31.0	07/17/94	336	36	623	134	618	43	1.5	0.1	475	6.5	206	6.7
AR34.5	07/18/94	125	51	832	91	276	68	0.6	0.1	115	14	78	6.6
AR31.0	07/18/94	322	35	598	128	593	42	1.4	0.1	456	6.3	198	6.4
AR34.5	07/19/94	125	51	832	91	276	68	0.6	0.1	115	14	78	6.6
AR31.0	07/19/94	306	33	568	122	564	40	1.4	0.1	434	6.0	188	6.1
AR34.5	07/20/94	5,230	--	2,660	--	1,870	--	2.5	--	1,050	--	473	--
AR31.0	07/20/94	346	68	642	138	637	45	1.5	0.1	490	6.7	213	6.9
AR34.5	07/21/94	345	--	1,270	--	385	--	0.7	--	230	--	104	--
AR31.0	07/21/94	365	40	677	145	672	47	1.6	0.1	517	7.1	224	7.3
AR34.5	07/22/94	352	--	1,300	--	393	--	0.7	--	235	--	106	--
AR31.0	07/22/94	360	39	667	143	662	46	1.6	0.1	509	7.0	221	7.2
AR34.5	07/23/94	283	--	1,040	--	316	--	0.6	--	1,890	--	85	--
AR31.0	07/23/94	282	31	524	112	520	36	1.3	0.1	400	5.5	174	5.6
AR34.5	07/24/94	290	--	1,070	--	324	--	0.6	--	193	--	87	--
AR31.0	07/24/94	234	26	435	93	431	30	1.0	0.1	332	4.6	144	4.7
AR34.5	07/25/94	386	--	1,430	--	432	--	0.8	--	258	--	116	--
AR31.0	07/25/94	237	26	440	94	437	31	1.1	0.1	336	4.6	44	4.7
AR34.5	07/26/94	310	--	1,150	--	347	--	0.6	--	207	--	93	--
AR31.0	07/26/94	237	26	440	94	436	31	1.1	0.1	336	4.6	146	4.7
AR34.5	07/27/94	269	--	994	--	301	--	0.5	--	179	--	81	--
AR31.0	07/27/94	237	26	440	94	436	31	1.1	0.1	336	4.6	146	4.7
AR34.5	07/28/94	317	--	1,170	--	355	--	0.6	--	212	--	96	--
AR31.0	07/28/94	237	26	440	94	436	31	1.1	0.1	336	4.6	146	4.7
AR34.5	07/29/94	359	--	1,320	--	401	--	0.7	--	239	--	108	--
AR31.0	07/29/94	237	26	440	94	436	31	1.1	0.1	336	4.6	146	4.7
AR34.5	07/30/94	317	--	1,170	--	355	--	0.6	--	212	--	96	--
AR31.0	07/30/94	235	26	435	93	431	30	1.0	0.1	332	4.6	144	4.7
AR34.5	07/31/94	45	--	742	--	206	--	0.6	--	289	--	99	--
AR31.0	07/31/94	234	26	435	93	431	30	1.0	0.1	332	4.6	144	4.7
AR34.5	08/01/94	62	--	1,020	--	283	--	0.8	--	396	--	136	--
AR31.0	08/01/94	264	29	489	105	485	34	1.2	0.1	374	5.1	162	5.2
AR34.5	08/02/94	67	--	1,100	--	306	--	0.9	--	428	--	147	--
AR31.0	08/02/94	280	30	519	111	515	36	1.2	0.1	396	5.4	172	5.6
AR34.5	08/03/94	246	--	1,140	--	364	--	0.7	--	247	--	104	--
AR31.0	08/03/94	277	30	514	110	610	36	1.2	0.1	392	5.4	170	5.5

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	08/04/94	199	--	917	--	294	--	0.6	--	199	--	84	--
AR31.0	08/04/94	277	30	514	110	510	36	1.2	0.1	392	5.4	170	5.5
AR34.5	08/05/94	190	--	873	--	280	--	0.6	--	190	--	80	--
AR31.0	08/05/94	213	23	395	85	392	78	0.9	0.1	302	4.1	131	4.2
AR34.5	08/06/94	204	--	939	--	301	--	0.6	--	204	--	86	--
AR31.0	08/06/94	171	18	316	68	314	22	0.8	0.1	242	3.3	105	3.4
AR34.5	08/07/94	185	--	851	--	273	--	0.5	--	185	--	78	--
AR31.0	08/07/94	168	18	311	67	309	22	0.7	0.1	238	3.3	103	3.3
AR34.5	08/08/94	161	--	742	--	238	--	0.5	--	162	--	68	--
AR31.0	08/08/94	157	17	292	62	289	20	0.7	<0.1	223	3.1	97	3.1
AR34.5	08/09/94	152	--	698	--	224	--	0.4	--	152	--	64	--
AR31.0	08/09/94	144	16	267	57	265	19	0.6	<0.1	204	2.8	88	2.9
AR34.5	08/10/94	180	--	830	--	266	--	0.5	--	180	--	76	--
AR31.0	08/10/94	154	17	287	61	284	20	0.7	<0.1	219	3.0	95	3.1
AR34.5	08/11/94	341	--	966	--	375	--	0.9	--	275	--	109	--
AR31.0	08/11/94	162	18	302	65	299	21	0.7	0.1	230	3.2	100	3.2
AR34.5	08/12/94	275	--	1,270	--	406	--	0.8	--	275	--	116	--
AR31.0	08/12/94	189	25	846	33	304	12	0.8	0.1	355	11	114	2.9
AR34.5	08/13/94	213	--	982	--	315	--	0.6	--	214	--	90	--
AR31.0	08/13/94	207	27	928	36	333	13	0.8	0.1	389	12	125	3.2
AR34.5	08/14/94	298	--	369	--	181	--	0.6	--	365	--	87	--
AR31.0	08/14/94	205	27	916	35	329	13	0.8	0.1	384	12	123	3.2
AR34.5	08/15/94	426	--	528	--	260	--	0.9	--	524	--	124	--
AR31.0	08/15/94	205	27	916	35	329	163	0.8	0.1	384	12	123	3.2
AR34.5	08/16/94	140	22	1,400	45	267	19	0.7	0.1	333	13	115	3.1
AR31.0	08/16/94	238	31	1,070	41	383	15	1.0	0.1	447	14	144	3.7
AR34.5	08/17/94	111	17	1,110	36	211	15	0.5	<0.1	263	10	91	2.4
AR31.0	08/17/94	262	34	1,170	45	420	16	1.0	0.1	491	15	158	4.1
AR34.5	08/18/94	90	14	901	29	171	12	0.4	<0.1	214	8.2	74	2.0
AR31.0	08/18/94	215	28	962	37	346	13	0.9	0.1	403	12	130	3.4
AR34.5	08/19/94	88	14	880	28	167	12	0.4	<0.1	209	8.0	72	1.9
AR31.0	08/19/94	187	25	835	32	300	12	0.7	0.1	350	11	112	2.9
AR34.5	08/20/94	90	14	901	29	171	12	0.4	<0.1	214	8.2	74	2.0
AR31.0	08/20/94	187	25	835	32	300	12	0.7	0.1	350	11	112	2.9
AR34.5	08/21/94	88	14	880	28	167	12	0.4	<0.1	209	8.0	72	1.9
AR31.0	08/21/94	187	25	835	32	300	12	0.7	0.1	350	11	112	2.9
AR34.5	08/22/94	86	13	859	28	163	11	0.4	<0.1	204	7.8	70	1.9
AR31.0	08/22/94	171	22	765	30	275	10	0.7	<0.1	321	9.8	103	2.7
AR34.5	08/23/94	69	11	692	22	132	9.2	0.3	<0.1	164	6.3	57	1.5
AR31.0	08/23/94	148	20	661	26	237	9.1	0.6	<0.1	277	8.5	89	2.3
AR34.5	08/24/94	63	9.7	629	20	120	8.3	0.3	<0.1	149	5.7	52	1.4
AR31.0	08/24/94	137	18	615	24	221	8.5	0.5	<0.1	258	7.9	23	2.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	08/25/94	71	11	713	23	136	9.4	0.3	<0.1	169	6.5	58	1.6
AR31.0	08/25/94	137	18	615	24	221	8.5	0.5	<0.1	258	7.9	83	2.1
AR34.5	08/26/94	75	12	754	24	144	10	0.4	<0.1	179	6.9	62	1.6
AR31.0	08/26/94	137	18	615	24	221	8.5	0.5	<0.1	258	7.9	83	2.1
AR34.5	08/27/94	61	9.4	608	20	116	8.0	0.3	<0.1	144	5.5	50	1.3
AR31.0	08/27/94	137	18	615	24	221	8.5	0.5	<0.1	258	7.9	83	2.1
AR34.5	08/28/94	75	12	754	24	144	10	0.4	<0.1	179	6.9	62	1.6
AR31.0	08/28/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	08/29/94	63	9.7	629	20	120	8.3	0.3	<0.1	149	5.7	52	1.4
AR31.0	08/29/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	08/30/94	65	10	650	21	124	8.6	0.3	<0.1	154	5.9	53	1.4
AR31.0	08/30/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	08/31/94	56	8.7	566	18	108	7.5	0.3	<0.1	134	5.2	46	1.2
AR31.0	08/31/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/01/94	86	13	859	28	163	11	0.4	<0.1	204	7.8	70	1.9
AR31.0	09/01/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/02/94	235	--	666	--	276	--	0.6	--	190	--	76	--
AR31.0	09/02/94	101	13	452	18	162	6.2	0.4	<0.1	190	5.8	61	1.6
AR34.5	09/03/94	893	--	2,530	--	1,050	--	2.5	--	721	--	287	--
AR31.0	09/03/94	101	13	452	18	162	6.2	0.4	<0.1	190	5.8	61	1.6
AR34.5	09/04/94	676	--	1,910	--	793	--	1.9	--	545	--	217	--
AR31.0	09/04/94	174	23	777	30	279	11	0.7	0.1	325	10	105	2.7
AR34.5	09/05/94	476	--	1,350	--	559	--	1.3	--	384	--	153	--
AR31.0	09/05/94	226	30	1,010	39	362	14	0.9	0.1	423	13	136	3.5
AR34.5	09/06/94	376	--	1,070	--	441	--	1.0	--	304	--	121	--
AR31.0	09/06/94	226	30	1,010	39	362	14	0.9	0.1	423	13	136	3.5
AR34.5	09/07/94	34	--	1,050	--	264	--	0.5	--	267	--	100	--
AR31.0	09/07/94	226	30	1,010	39	362	14	0.9	0.1	423	13	136	3.5
AR34.5	09/08/94	31	--	976	--	245	--	0.5	--	247	--	92	--
AR31.0	09/08/94	223	29	997	38	358	14	0.9	0.1	418	13	134	3.5
AR34.5	09/09/94	27	--	842	--	211	--	0.4	--	213	--	80	--
AR31.0	09/09/94	150	20	672	26	241	9.3	0.6	<0.1	282	8.6	91	2.3
AR34.5	09/10/94	25	--	766	--	192	--	0.4	--	194	--	72	--
AR31.0	09/10/94	106	14	475	18	171	6.5	0.4	<0.1	199	6.1	64	1.7
AR34.5	09/11/94	23	--	708	--	178	--	0.4	--	179	--	67	--
AR31.0	09/11/94	106	14	475	18	171	6.5	0.4	<0.1	199	6.1	64	1.7
AR34.5	09/12/94	22	--	689	--	173	--	0.3	--	174	--	65	--
AR31.0	09/12/94	106	14	475	18	171	6.5	0.4	<0.1	199	6.1	64	1.7
AR34.5	09/13/94	31	--	957	--	240	--	0.5	--	242	--	91	--
AR31.0	09/13/94	109	14	487	19	175	6.7	0.4	<0.1	204	6.2	66	1.7
AR34.5	09/14/94	228	--	1,160	--	350	--	0.7	--	379	--	127	--
AR31.0	09/14/94	127	17	568	22	204	7.8	0.5	<0.1	238	7.3	76	2.0

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	09/15/94	85	26	1,346	150	276	48	0.9	0.1	329	13	115	7.7
AR31.0	09/15/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/16/94	68	20	1,070	119	219	38	0.7	0.1	262	10	91	6.1
AR31.0	09/16/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/17/94	60	18	959	107	196	34	0.6	0.1	234	9.2	82	5.5
AR31.0	09/17/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/18/94	59	18	941	105	193	33	0.6	0.1	230	9.0	80	5.4
AR31.0	09/18/94	143	19	638	25	229	8.8	0.6	<0.1	267	8.2	86	2.2
AR34.5	09/19/94	70	21	1,110	123	227	39	0.7	0.1	271	11	94	6.3
AR31.0	09/19/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/20/94	63	19	996	111	204	35	0.7	0.1	244	9.5	85	5.7
AR31.0	09/20/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	09/21/94	64	19	1,014	113	208	36	0.7	0.1	248	9.7	87	5.8
AR31.0	09/21/94	124	16	557	22	200	7.7	0.5	<0.1	233	7.1	75	1.9
AR34.5	09/22/94	55	16	867	97	178	31	0.6	<0.1	212	8.3	74	5.0
AR31.0	09/22/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/23/94	50	15	793	88	162	28	0.5	<0.1	194	7.6	68	4.5
AR31.0	09/23/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/24/94	50	15	793	88	162	28	0.5	<0.1	194	7.6	68	4.5
AR31.0	09/24/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/25/94	46	14	738	82	151	26	0.5	<0.1	180	7.0	63	4.2
AR31.0	09/25/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/26/94	44	13	701	78	144	25	0.5	<0.1	171	6.7	60	4.0
AR31.0	09/26/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/27/94	40	12	627	70	128	22	0.4	<0.1	153	6.0	54	3.6
AR31.0	09/27/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/28/94	37	11	590	66	121	21	0.4	<0.1	144	5.6	50	3.4
AR31.0	09/28/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/29/94	36	11	572	64	117	20	0.4	<0.1	140	5.5	49	3.3
AR31.0	09/29/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	09/30/94	36	11	572	64	117	20	0.4	<0.1	140	5.5	49	3.3
AR31.0	09/30/94	117	15	522	20	187	7.2	0.5	<0.1	219	6.7	70	1.8
AR34.5	10/01/94	35	10	553	62	113	20	0.4	<0.1	135	5.3	47	3.2
AR31.0	10/01/94	132	17	591	23	212	8.1	0.5	<0.1	248	7.6	80	2.1
AR34.5	10/02/94	34	10	535	60	110	19	0.4	<0.1	131	5.1	46	3.1
AR31.0	10/02/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	10/03/94	33	9.8	516	58	106	18	0.3	<0.1	126	4.9	44	3.0
AR31.0	10/03/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	10/04/94	31	9.5	498	56	102	18	0.3	<0.1	122	4.8	42	2.9
AR31.0	10/04/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	10/05/94	31	9.5	498	56	102	18	0.3	<0.1	122	4.8	42	2.9
AR31.0	10/05/94	143	19	638	25	229	8.8	0.6	<0.1	267	8.2	86	2.2

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	10/06/94	31	9.5	498	56	102	18	0.3	<0.1	122	4.8	42	2.9
AR31.0	10/06/94	145	19	649	25	233	8.9	0.6	<0.1	272	8.3	88	2.3
AR34.5	10/07/94	35	10	553	62	113	20	0.4	<0.1	135	5.3	47	3.2
AR31.0	10/07/94	145	19	649	25	233	8.9	0.6	<0.1	272	8.3	88	2.3
AR34.5	10/08/94	40	12	627	70	128	22	0.4	<0.1	153	6.0	54	3.6
AR31.0	10/08/94	145	19	649	25	233	8.9	0.6	<0.1	272	8.3	88	2.3
AR34.5	10/09/94	42	13	664	74	136	24	0.4	<0.1	162	6.3	57	3.8
AR31.0	10/09/94	143	19	638	25	229	8.8	0.6	<0.1	267	8.2	86	2.2
AR34.5	10/10/94	46	14	738	82	151	26	0.5	<0.1	180	7.0	63	4.2
AR31.0	10/10/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	10/11/94	44	13	701	78	144	25	0.5	<0.1	171	6.7	60	4.0
AR31.0	10/11/94	184	24	823	32	296	11	0.7	0.1	345	11	111	2.9
AR34.5	10/12/94	44	13	701	78	144	25	0.5	<0.1	171	6.7	60	4.0
AR31.0	10/12/94	213	28	951	37	341	13	0.8	0.1	398	12	128	3.3
AR34.5	10/13/94	43	13	682	76	140	24	0.4	<0.1	167	6.5	58	3.9
AR31.0	10/13/94	213	28	951	37	341	13	0.8	0.1	398	12	128	3.3
AR34.5	10/14/94	43	13	682	76	140	24	0.4	<0.1	167	6.5	58	3.9
AR31.0	10/14/94	213	28	951	37	341	13	0.8	0.1	398	12	128	3.3
AR34.5	10/15/94	41	12	646	72	132	23	0.4	<0.1	158	6.2	55	3.7
AR31.0	10/15/94	176	23	788	30	283	11	0.7	0.1	330	10	106	2.7
AR34.5	10/16/94	42	13	664	74	136	24	0.4	<0.1	162	6.3	57	3.8
AR31.0	10/16/94	161	21	719	28	258	9.9	0.6	<0.1	301	9.2	97	2.5
AR34.5	10/17/94	45	14	719	80	147	26	0.5	<0.1	176	6.9	61	4.1
AR31.0	10/17/94	161	21	719	28	258	9.9	0.6	<0.1	301	9.2	97	2.5
AR34.5	10/18/94	42	13	664	74	136	24	0.4	<0.1	162	6.3	57	3.8
AR31.0	10/18/94	161	21	719	28	258	9.9	0.6	<0.1	301	9.2	97	2.5
AR34.5	10/19/94	38	12	609	68	125	22	0.4	<0.1	149	5.8	52	3.5
AR31.0	10/19/94	161	21	719	28	258	9.9	0.6	<0.1	301	9.2	97	2.5
AR34.5	10/20/94	38	12	609	68	125	22	0.4	<0.1	149	5.8	52	3.5
AR31.0	10/20/94	140	18	626	24	225	8.6	0.6	<0.1	262	8.0	84	2.2
AR34.5	10/21/94	37	11	590	66	121	21	0.4	<0.1	144	5.6	50	3.4
AR31.0	10/21/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/22/94	37	11	590	66	121	21	0.4	<0.1	144	5.6	50	3.4
AR31.0	10/22/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/23/94	37	11	590	66	121	21	0.4	<0.1	144	5.6	50	3.4
AR31.0	10/23/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/24/94	5.8	0.2	245	21	18	3.7	0.2	<0.1	90	7.1	23	1.2
AR31.0	10/24/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/25/94	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	10/25/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/26/94	6.2	0.3	263	23	19	4.0	0.2	<0.1	97	7.6	24	1.3
AR31.0	10/26/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	10/27/94	4.6	0.2	193	17	14	2.9	0.1	<0.1	71	5.6	18	0.9
AR31.0	10/27/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/28/94	5.8	0.2	245	21	18	3.7	0.2	<0.1	90	7.1	23	1.2
AR31.0	10/28/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/29/94	6.2	0.3	263	23	19	4.0	0.2	<0.1	97	7.6	24	1.3
AR31.0	10/29/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/30/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	10/30/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	10/31/94	7.7	0.3	324	28	23	4.9	0.2	<0.1	119	9.4	30	1.5
AR31.0	10/31/94	135	18	603	23	216	8.3	0.5	<0.1	253	7.7	81	2.1
AR34.5	11/01/94	6.0	0.3	254	22	18	3.9	0.2	<0.1	94	7.3	24	1.2
AR31.0	11/01/94	91	12	406	16	146	5.6	0.4	<0.1	170	5.2	55	1.4
AR34.5	11/02/94	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	11/02/94	5.6	--	2.1	--	3.2	--	0.1	--	10	--	22	--
AR34.5	11/03/94	4.8	0.2	201	18	14	3.1	0.1	<0.1	74	5.8	19	1.0
AR31.0	11/03/94	5.8	--	2.2	--	3.3	--	<0.1	--	11	--	23	--
AR34.5	11/04/94	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	11/04/94	4.1	--	1.5	--	2.3	--	<0.1	--	7.5	--	16	--
AR34.5	11/05/94	4.6	0.2	193	17	14	2.9	0.1	<0.1	71	5.6	18	0.9
AR31.0	11/05/94	2.4	--	0.9	--	1.4	--	<0.1	--	4.4	--	9.4	--
AR34.5	11/06/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	11/06/94	2.2	--	0.8	--	1.2	--	<0.1	--	4.0	--	8.5	--
AR34.5	11/07/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	11/07/94	1.3	--	0.5	--	0.7	--	<0.1	--	2.3	--	5.0	--
AR34.5	11/08/94	4.6	0.2	193	17	14	2.9	0.1	<0.1	71	5.6	18	0.9
AR31.0	11/08/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	11/09/94	4.8	0.2	201	18	14	3.1	0.1	<0.1	74	5.8	19	1.0
AR31.0	11/09/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	11/10/94	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	11/10/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	11/11/94	5.4	0.2	228	20	16	3.5	0.2	<0.1	84	6.6	21	1.1
AR31.0	11/11/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	11/12/94	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	11/12/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.7	--
AR34.5	11/13/94	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	11/13/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	11/14/94	4.8	0.2	201	18	14	3.1	0.1	<0.1	74	5.8	19	1.0
AR31.0	11/14/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	11/15/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	11/15/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.7	--
AR34.5	11/16/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	11/16/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.8	--

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	11/17/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	11/17/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.8	--
AR34.5	11/18/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	11/18/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.8	--
AR34.5	11/19/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	11/19/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.8	--
AR34.5	11/20/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	11/20/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.9	--
AR34.5	11/21/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	11/21/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.9	--
AR34.5	11/22/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	11/22/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.3	--	2.8	--
AR34.5	11/23/94	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	11/23/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/24/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	11/24/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/25/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	11/25/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/26/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	11/26/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/27/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	11/27/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/28/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	11/28/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/29/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	11/29/94	0.8	--	0.3	--	0.4	--	<0.1	--	1.4	--	3.0	--
AR34.5	11/30/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	11/30/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/01/94	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	12/01/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	12/02/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	12/02/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	12/03/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	12/03/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	12/04/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/04/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	12/05/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	12/05/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.1	--	2.5	--
AR34.5	12/06/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/06/94	0.6	--	0.2	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/07/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/07/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	12/08/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/08/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/09/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	12/09/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/10/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	12/10/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/11/94	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	12/11/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/12/94	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	12/12/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/13/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/13/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/14/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/14/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/15/94	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	12/15/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/16/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/16/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/17/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/17/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/18/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/18/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/19/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/19/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/20/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/20/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/21/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/21/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/22/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/22/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/23/94	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	12/23/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/24/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/24/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/25/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/25/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/26/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/26/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/27/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/27/94	0.7	--	0.3	--	0.4	--	<0.1	--	1.2	--	2.6	--
AR34.5	12/28/94	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	12/28/94	0.8	--	0.3	--	0.5	--	<0.1	--	1.5	--	3.2	--

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	12/29/94	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	12/29/94	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	12/30/94	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	12/30/94	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	12/31/94	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	12/31/94	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	01/01/95	2.7	0.1	114	9.9	8.2	1.7	0.1	<0.1	42	3.3	11	0.5
AR31.0	01/01/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	01/02/95	2.7	0.1	114	9.9	8.2	1.7	0.1	<0.1	42	3.3	11	0.5
AR31.0	01/02/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	01/03/95	2.7	0.1	114	9.9	8.2	1.7	0.1	<0.1	42	3.3	11	0.5
AR31.0	01/03/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.6	--	3.5	--
AR34.5	01/04/95	2.9	0.1	123	11	8.8	1.9	0.1	<0.1	45	3.5	11	0.6
AR31.0	01/04/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.7	--	3.6	--
AR34.5	01/05/95	2.9	0.1	123	11	8.8	1.9	0.1	<0.1	45	3.5	11	0.6
AR31.0	01/05/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.7	--	3.7	--
AR34.5	01/06/95	2.9	0.1	123	11	8.8	1.9	0.1	<0.1	45	3.5	11	0.6
AR31.0	01/06/95	0.9	--	0.3	--	0.5	--	<0.1	--	1.7	--	3.7	--
AR34.5	01/07/95	2.9	0.1	123	11	8.8	1.9	0.1	<0.1	45	3.5	11	0.6
AR31.0	01/07/95	0.8	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.1	<0.1
AR34.5	01/08/95	2.9	0.1	123	11	8.8	1.9	0.1	<0.1	45	3.5	11	0.6
AR31.0	01/08/95	0.8	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.1	<0.1
AR34.5	01/09/95	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	01/09/95	0.8	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.1	<0.1
AR34.5	01/10/95	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	01/10/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.1	<0.1
AR34.5	01/11/95	3.1	0.1	131	12	9.4	2.0	0.1	<0.1	48	3.8	12	0.6
AR31.0	01/11/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/12/95	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	01/12/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/13/95	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	01/13/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/14/95	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	01/14/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/15/95	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	01/15/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/16/95	3.3	0.1	140	12	10	2.1	0.1	<0.1	52	4.0	13	0.7
AR31.0	01/16/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/17/95	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	01/17/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/18/95	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	01/18/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	01/19/95	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	01/19/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/20/95	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	01/20/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/21/95	3.5	0.1	149	13	11	2.3	0.1	<0.1	55	4.3	14	0.7
AR31.0	01/21/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/22/95	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	01/22/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/23/95	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	01/23/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/24/95	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	01/24/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/25/95	3.7	0.2	158	14	11	2.4	0.1	<0.1	58	4.6	15	0.8
AR31.0	01/25/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/26/95	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	01/26/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/27/95	3.9	0.2	166	14	12	2.5	0.1	<0.1	61	4.8	15	0.8
AR31.0	01/27/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/28/95	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	01/28/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/29/95	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	01/29/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/30/95	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	01/30/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/31/95	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	01/31/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/01/95	4.1	0.2	175	15	12	2.7	0.1	<0.1	64	5.1	16	0.8
AR31.0	02/01/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/02/95	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	02/02/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/03/95	4.3	0.2	184	16	13	2.8	0.1	<0.1	68	5.3	17	0.9
AR31.0	02/03/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/04/95	4.6	0.2	193	17	14	2.9	0.1	<0.1	71	5.6	18	0.9
AR31.0	02/04/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/05/95	4.8	0.2	201	18	14	3.1	0.1	<0.1	74	5.8	19	1.0
AR31.0	02/05/95	0.9	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	02/06/95	4.8	0.2	201	18	14	3.1	0.1	<0.1	74	5.8	19	1.0
AR31.0	02/06/95	1.0	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/07/95	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	02/07/95	1.0	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/08/95	5.0	0.2	210	18	15	3.2	0.1	<0.1	77	6.1	20	1.0
AR31.0	02/08/95	1.0	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	02/09/95	5.2	0.2	219	19	16	3.3	0.1	<0.1	81	6.3	20	1.0
AR31.0	02/09/95	1.1	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/10/95	5.2	0.2	219	19	16	3.3	0.1	<0.1	81	6.3	20	1.0
AR31.0	02/10/95	1.1	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/11/95	5.2	0.2	219	19	16	3.3	0.1	<0.1	81	6.3	20	1.0
AR31.0	02/11/95	1.1	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/12/95	5.2	0.2	219	19	16	3.3	0.1	<0.1	81	6.3	20	1.0
AR31.0	02/12/95	1.1	0.1	0.3	0.1	0.1	<0.1	<0.1	<0.1	0.7	0.1	0.2	<0.1
AR34.5	02/13/95	5.4	0.2	228	20	16	3.5	0.2	<0.1	84	6.6	21	1.1
AR31.0	02/13/95	1.1	0.1	0.4	0.1	0.1	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/14/95	5.4	0.2	228	20	16	3.5	0.2	<0.1	84	6.6	21	1.1
AR31.0	02/14/95	1.1	0.1	0.4	0.1	0.1	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/15/95	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	02/15/95	1.1	0.1	0.4	0.1	0.1	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/16/95	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	02/16/95	1.2	0.1	0.4	0.1	0.1	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/17/95	5.6	0.2	236	21	17	3.6	0.2	<0.1	87	6.8	22	1.1
AR31.0	02/17/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/18/95	5.8	0.2	245	21	18	3.7	0.2	<0.1	90	7.1	23	1.2
AR31.0	02/18/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/19/95	5.8	0.2	245	21	18	3.7	0.2	<0.1	90	7.1	23	1.2
AR31.0	02/19/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/20/95	6.0	0.3	254	22	18	3.9	0.2	<0.1	94	7.3	24	1.2
AR31.0	02/20/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/21/95	6.0	0.3	254	22	18	3.9	0.2	<0.1	94	7.3	24	1.2
AR31.0	02/21/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/22/95	6.0	0.3	254	22	18	3.9	0.2	<0.1	94	7.3	24	1.2
AR31.0	02/22/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/23/95	6.2	0.3	263	23	19	4.0	0.2	<0.1	97	7.6	24	1.3
AR31.0	02/23/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.8	0.1	0.2	<0.1
AR34.5	02/24/95	6.4	0.3	271	24	19	4.1	0.2	<0.1	100	7.8	25	1.3
AR31.0	02/24/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	02/25/95	6.4	0.3	271	24	19	4.1	0.2	<0.1	100	7.8	25	1.3
AR31.0	02/25/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	02/26/95	6.6	0.3	280	24	20	4.3	0.2	<0.1	103	8.1	26	1.3
AR31.0	02/26/95	1.2	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	02/27/95	6.8	0.3	289	25	21	4.4	0.2	<0.1	106	8.3	27	1.4
AR31.0	02/27/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	02/28/95	7.0	0.3	298	26	21	4.5	0.2	<0.1	110	8.6	28	1.4
AR31.0	02/28/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/01/95	7.2	0.3	306	27	22	4.7	0.2	<0.1	113	8.9	28	1.5
AR31.0	03/01/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	03/02/95	7.2	0.3	306	27	22	4.7	0.2	<0.1	113	8.9	28	1.5
AR31.0	03/02/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/03/95	7.5	0.3	315	28	22.6	4.8	0.2	<0.1	116	9.1	29.2	1.5
AR31.0	03/03/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/04/95	7.5	0.3	315	28	22.6	4.8	0.2	<0.1	116	9.1	29	1.5
AR31.0	03/04/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/05/95	7.7	0.3	324	28	23.2	4.9	0.2	<0.1	119	9.4	30	1.5
AR31.0	03/05/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/06/95	7.9	0.3	333	29	23.8	5.1	0.2	<0.1	122	9.6	31	1.6
AR31.0	03/06/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/07/95	7.9	0.3	333	29	23.8	5.1	0.2	<0.1	122	9.6	31	1.6
AR31.0	03/07/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/08/95	8.1	0.3	342	30	24.5	5.2	0.2	<0.1	126	9.9	32	1.6
AR31.0	03/08/95	1.3	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1
AR34.5	03/09/95	8.1	0.3	342	30	24.5	5.2	0.2	<0.1	126	9.9	32	1.6
AR31.0	03/09/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.2	0.2	<0.1
AR34.5	03/10/95	8.3	0.3	350	31	25	5.3	0.2	<0.1	129	10	32	1.7
AR31.0	03/10/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.2	0.2	<0.1
AR34.5	03/11/95	8.3	0.3	350	31	25	5.3	0.2	<0.1	129	10	32	1.7
AR31.0	03/11/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.2	0.2	<0.1
AR34.5	03/12/95	8.5	0.4	359	31	26	5.5	0.2	<0.1	132	10	33	1.7
AR31.0	03/12/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/13/95	8.7	0.4	368	32	26	5.6	0.2	<0.1	135	11	34	1.8
AR31.0	03/13/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/14/95	8.9	0.4	376	33	27	5.7	0.3	<0.1	139	11	35	1.8
AR31.0	03/14/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/15/95	8.9	0.4	376	33	27	5.7	0.3	<0.1	139	11	35	1.8
AR31.0	03/15/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/16/95	9.1	0.4	385	34	28	5.9	0.3	<0.1	142	11	36	1.8
AR31.0	03/16/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/17/95	9.3	0.4	394	34	28	6.0	0.3	<0.1	145	11	36	1.9
AR31.0	03/17/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/18/95	9.3	0.4	394	34	28	6.0	0.3	<0.1	145	11	36	1.9
AR31.0	03/18/95	1.5	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.3	<0.1
AR34.5	03/19/95	9.5	0.4	403	35	29	6.1	0.3	<0.1	148	12	37	1.9
AR31.0	03/19/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1
AR34.5	03/20/95	9.7	0.4	412	36	30	6.3	0.3	<0.1	152	12	38	2.0
AR31.0	03/20/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1
AR34.5	03/21/95	9.7	0.4	412	36	30	6.3	0.3	<0.1	152	12	38	2.0
AR31.0	03/21/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1
AR34.5	03/22/95	9.9	0.4	420	37	30	6.4	0.3	<0.1	155	12	39	2.0
AR31.0	03/22/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1

Table 6. Estimated daily dissolved-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	03/23/95	10	0.4	429	38	31	6.5	0.3	<0.1	158	12	40	2.0
AR31.0	03/23/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1
AR34.5	03/24/95	10	0.4	429	38	31	6.5	0.3	<0.1	158	12	40	2.0
AR31.0	03/24/95	1.6	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.1	0.2	0.3	<0.1
AR34.5	03/25/95	11	0.5	482	42	34	7.3	0.3	<0.1	177	14	45	2.3
AR31.0	03/25/95	1.5	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.3	<0.1
AR34.5	03/26/95	12	0.5	508	44	36	7.7	0.3	<0.1	187	15	47	2.4
AR31.0	03/26/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/27/95	14	0.6	578	50	41	8.8	0.4	<0.1	213	17	54	2.8
AR31.0	03/27/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/28/95	17	0.7	709	62	51	11	0.5	<0.1	261	20	66	3.4
AR31.0	03/28/95	1.4	0.1	0.5	0.1	0.2	<0.1	<0.1	<0.1	1.0	0.2	0.2	<0.1
AR34.5	03/29/95	14	0.6	604	53	43	9.2	0.4	<0.1	222	18	56	2.9
AR31.0	03/29/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.2	0.2	<0.1
AR34.5	03/30/95	18	0.7	744	65	53	11	0.5	<0.1	274	22	69	3.5
AR31.0	03/30/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.2	0.2	<0.1
AR34.5	03/31/95	17	0.7	718	63	51	11	0.5	<0.1	264	21	67	3.4
AR31.0	03/31/95	1.4	0.1	0.4	0.1	0.2	<0.1	<0.1	<0.1	0.9	0.1	0.2	<0.1

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	04/01/94	426	55	899	103	20	2.0	<0.1	<0.1	59	4.0	14	1.4
AR31.0	04/01/94	46	16	116	35	8.8	0.7	0.1	<0.1	78	3.0	19	3.2
AR34.5	04/02/94	449	58	949	109	21	2.1	<0.1	<0.1	62	4.2	14	1.5
AR31.0	04/02/94	49	17	123	37	9.3	0.7	0.1	<0.1	82	3.2	20	3.4
AR34.5	04/03/94	414	54	874	100	19	1.9	<0.1	<0.1	57	3.9	13	1.4
AR31.0	04/03/94	45	16	113	34	8.6	0.6	0.1	<0.1	76	2.9	19	3.1
AR34.5	04/04/94	449	58	949	109	21	2.1	<0.1	<0.1	62	4.2	14	1.5
AR31.0	04/04/94	49	17	123	37	9.3	0.7	0.1	<0.1	82	3.2	20	3.4
AR34.5	04/05/94	438	57	924	106	20	2.1	<0.1	<0.1	61	4.1	14	1.5
AR31.0	04/05/94	48	17	120	36	9.0	0.7	0.1	<0.1	80	3.1	20	3.3
AR34.5	04/06/94	367	48	774	89	17	1.7	<0.1	<0.1	51	3.5	12	1.2
AR31.0	04/06/94	40	14	100	30	7.6	0.6	0.1	<0.1	67	2.6	17	2.7
AR34.5	04/07/94	390	51	824	95	18	1.8	<0.1	<0.1	54	3.7	12	1.3
AR31.0	04/07/94	43	15	107	32	8.1	0.6	0.1	<0.1	71	2.8	18	2.9

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	04/08/94	343	45	724	83	16	1.6	<0.1	<0.1	48	3.2	11	1.2
AR31.0	04/08/94	37	13	94	28	7.1	0.5	0.1	<0.1	63	2.4	16	2.6
AR34.5	04/09/94	343	45	724	83	16	1.6	<0.1	<0.1	48	3.2	11	1.2
AR31.0	04/09/94	37	13	94	28	7.1	0.5	0.1	<0.1	63	2.4	16	2.6
AR34.5	04/10/94	331	43	699	80	15	1.6	<0.1	<0.1	46	3.1	11	1.1
AR31.0	04/10/94	36	13	91	28	6.8	0.5	0.1	<0.1	60	2.3	15	2.5
AR34.5	04/11/94	308	40	649	74	14	1.4	<0.1	<0.1	43	2.9	9.7	1.0
AR31.0	04/11/94	34	12	84	26	6.4	0.5	0.1	<0.1	56	2.2	14.0	2.3
AR34.5	04/12/94	284	37	599	69	13	1.3	<0.1	<0.1	39	2.7	9	1.0
AR31.0	04/12/94	31	11	78	24	5.9	0.4	0.1	<0.1	52	2.0	13	2.1
AR34.5	04/13/94	331	43	699	80	15	1.6	<0.1	<0.1	46	3.1	10	1.1
AR31.0	04/13/94	36	13	91	28	6.8	0.5	0.1	<0.1	60	2.3	15	2.5
AR34.5	04/14/94	426	55	899	103	20	2.0	<0.1	<0.1	59	4.0	14	1.4
AR31.0	04/14/94	46	16	116	35	8.8	0.7	0.1	<0.1	78	3.0	19	3.2
AR34.5	04/15/94	473	62	999	115	22	2.2	<0.1	<0.1	66	4.5	15	1.6
AR31.0	04/15/94	52	18	129	39	9.8	0.7	0.1	<0.1	86	3.3	22	3.5
AR34.5	04/16/94	627	82	1,320	152	29	2.9	<0.1	<0.1	87	5.9	20	2.1
AR31.0	04/16/94	68	24	171	52	13	1.0	0.2	<0.1	115	4.4	28	4.7
AR34.5	04/17/94	934	122	1,972	226	43	4.4	<0.2	<0.1	129	8.8	30	3.1
AR31.0	04/17/94	102	36	256	78	19	1.4	0.2	<0.1	171	6.6	42	7.0
AR34.5	04/18/94	1,230	160	2,600	298	57	5.8	<0.3	<0.1	170	12	39	4.1
AR31.0	04/18/94	134	47	336	102	25	1.9	0.3	<0.1	225	8.7	56	9.2
AR34.5	04/19/94	1,350	175	2,850	327	62	6.3	<0.3	<0.1	187	13	43	4.5
AR31.0	04/19/94	147	51	369	112	28	2.1	0.3	<0.1	246	9.5	61	10
AR34.5	04/20/94	1,510	197	3,200	367	70	7.1	<0.3	<0.1	210	14	48	5.1
AR31.0	04/20/94	175	61	440	134	33	2.5	0.4	<0.1	294	11	73	12
AR34.5	04/21/94	1,940	252	4,090	470	90	9.1	<0.4	<0.1	268	18	61	6.5
AR31.0	04/21/94	177	62	443	135	34	2.5	0.4	<0.1	296	11	74	12
AR34.5	04/22/94	2,330	303	4,920	564	108	11	<0.5	<0.1	323	22	74	7.8
AR31.0	04/22/94	270	94	676	206	51	3.8	0.6	<0.1	452	18	112	18
AR34.5	04/23/94	3,080	400	6,490	745	142	14	<0.7	<0.1	426	29	97	10
AR31.0	04/23/94	328	114	821	250	62	4.6	0.8	<0.1	549	21	136	22
AR34.5	04/24/94	3,170	412	6,690	768	147	15	<0.7	<0.1	439	30	100	11
AR31.0	04/24/94	328	114	821	250	62	4.6	0.8	<0.1	549	21	136	22
AR34.5	04/25/94	2,480	323	5,240	602	115	12	<0.6	<0.1	344	23	79	8.4
AR31.0	04/25/94	328	114	821	250	62	4.6	0.8	<0.1	549	21	136	22
AR34.5	04/26/94	1,870	243	3,940	453	86	8.8	<0.4	<0.1	259	18	59	6.3
AR31.0	04/26/94	250	87	627	191	47	3.5	0.6	<0.1	419	16	104	17
AR34.5	04/27/94	1,520	198	3,220	370	70	7.2	<0.3	<0.1	211	14	48	5.1
AR31.0	04/27/94	205	72	514	156	39	2.9	0.5	<0.1	344	13	86	14
AR34.5	04/28/94	1,280	166	2,700	309	59	6.0	<0.3	<0.1	177	12	40	4.3
AR31.0	04/28/94	160	56	401	122	30	2.2	0.4	<0.1	268	10	67	11

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	04/29/94	1,230	160	2,600	298	57	5.8	<0.3	<0.1	170	12	39	4.1
AR31.0	04/29/94	137	48	343	104	26	1.9	0.3	<0.1	229	8.9	57	9.4
AR34.5	04/30/94	1,080	140	2,270	261	50	5.0	<0.2	<0.1	149	10	34	3.6
AR31.0	04/30/94	137	48	343	104	26	1.9	0.3	<0.1	229	8.9	57	9.4
AR34.5	05/01/94	1,110	145	2,350	269	51	5.2	<0.3	<0.1	154	10	35	3.7
AR31.0	05/01/94	137	48	343	104	26	1.9	0.3	<0.1	229	8.9	57	9.4
AR34.5	05/02/94	1,020	132	2,150	246	47	4.8	<0.2	<0.1	142	9.6	32	3.4
AR31.0	05/02/94	148	52	372	113	28	2.1	0.4	<0.1	249	9.6	62	10
AR34.5	05/03/94	982	128	2,070	238	45	4.6	<0.2	<0.1	136	9.2	31	3.3
AR31.0	05/03/94	157	55	394	120	30	2.2	0.4	<0.1	264	10	66	11
AR34.5	05/04/94	1,060	138	2,250	258	49	5.0	<0.2	<0.1	147	10	34	3.6
AR31.0	05/04/94	157	55	394	120	30	2.2	0.4	<0.1	264	10	66	11
AR34.5	05/05/94	1,730	225	3,640	418	80	8.1	<0.4	<0.1	239	16	55	5.8
AR31.0	05/05/94	200	70	501	152	38	2.8	0.5	<0.1	335	13	83	14
AR34.5	05/06/94	2,860	372	6,040	693	132	13	<0.7	<0.1	396	27	91	9.6
AR31.0	05/06/94	311	108	779	237	59	4.4	0.7	<0.1	521	20	130	21
AR34.5	05/07/94	3,630	472	7,660	880	168	17	<0.8	<0.1	503	34	115	12
AR31.0	05/07/94	364	127	912	277	69	5.1	0.9	0.1	610	24	152	25
AR34.5	05/08/94	3,610	469	7,610	874	167	17	<0.8	<0.1	499	34	114	12
AR31.0	05/08/94	400	139	1,000	305	76	5.6	0.9	0.1	670	26	167	28
AR34.5	05/09/94	4,100	534	8,660	994	190	19	<0.9	<0.1	568	39	130	14
AR31.0	05/09/94	502	175	1,260	383	95	7.0	1.2	0.1	841	32	209	34
AR34.5	05/10/94	3,060	398	6,470	742	142	14	<0.7	<0.1	424	29	97	10
AR31.0	05/10/94	498	174	1,250	380	94	7.0	1.2	0.1	834	32	208	34
AR34.5	05/11/94	2,830	368	5,970	685	131	13	<0.6	<0.1	391	27	90	9.5
AR31.0	05/11/94	395	138	990	301	75	5.5	0.9	0.1	661	26	164	27
AR34.5	05/12/94	3,890	506	8,210	943	180	18	<0.9	<0.1	539	37	123	13
AR31.0	05/12/94	354	123	886	270	67	4.9	0.8	<0.1	592	23	147	24
AR34.5	05/13/94	5,120	666	10,800	1,240	237	24	<1.2	<0.1	709	48	162	17
AR31.0	05/13/94	2,210	183	4,400	369	126	11	1.1	0.1	549	27	163	1.3
AR34.5	05/14/94	5,810	755	12,300	1,410	268	27	<1.3	<0.1	804	55	184	20
AR31.0	05/14/94	2,810	233	5,610	470	160	14	1.4	0.2	700	34	208	1.7
AR34.5	05/15/94	6,400	832	13,500	1,550	296	30	<1.5	<0.1	886	60	202	22
AR31.0	05/15/94	3,410	283	6,810	570	195	17	1.6	0.2	849	42	253	2.1
AR34.5	05/16/94	6,790	883	14,300	1,645	314	32	<1.5	<0.1	940	64	215	23
AR31.0	05/16/94	3,680	304	7,340	615	210	18	1.8	0.2	915	45	272	2.2
AR34.5	05/17/94	7,720	1,000	16,300	1,870	357	36	<1.8	<0.1	1,070	73	244	26
AR31.0	05/17/94	4,000	330	7,960	668	228	20	1.9	0.3	993	49	296	2.4
AR34.5	05/18/94	8,020	1,040	16,900	1,940	371	38	<1.8	<0.1	1,110	76	254	27
AR31.0	05/18/94	4,220	349	8,420	705	241	21	2.0	0.3	1,050	51	312	2.5
AR34.5	05/19/94	8,610	1,120	18,200	2,090	398	40	<2.0	<0.1	1,190	81	272	29
AR31.0	05/19/94	4,230	350	8,440	707	241	21	2.0	0.3	1,050	52	314	2.6

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	05/20/94	8,660	1,120	18,300	2,100	400	41	<2.0	<0.1	1,200	82	274	29
AR31.0	05/20/94	4,240	351	8,450	708	242	21	2.0	0.3	1,050	52	314	2.6
AR34.5	05/21/94	8,240	1,072	17,400	2,000	381	39	<1.9	<0.1	1,140	78	261	28
AR31.0	05/21/94	4,230	350	8,440	707	241	21	2.0	0.3	1,050	52	314	2.6
AR34.5	05/22/94	14,300	--	28,800	--	1,040	--	<2.7	--	1,280	--	452	--
AR31.0	05/22/94	4,250	352	8,480	711	242	21	2.0	0.3	1,060	52	315	2.6
AR34.5	05/23/94	15,300	--	30,900	--	1,120	--	<2.9	--	1,370	--	486	--
AR31.0	05/23/94	4,720	390	9,410	788	269	23	2.3	0.3	1,170	57	349	2.8
AR34.5	05/24/94	14,200	--	28,600	--	1,040	--	<2.7	--	1,270	--	450	--
AR31.0	05/24/94	5,030	417	10,000	841	287	25	2.4	0.3	1,250	61	373	3.0
AR34.5	05/25/94	12,100	--	24,400	--	886	--	<2.3	--	1,080	--	383	--
AR31.0	05/25/94	5,030	417	10,000	841	287	25	2.4	0.3	1,250	61	373	3.0
AR34.5	05/26/94	10,800	2,900	25,700	8,380	1,180	142	2.5	0.1	1,120	170	381	15
AR31.0	05/26/94	4,560	377	9,080	761	260	23	2.2	0.3	1,130	55	337	2.7
AR34.5	05/27/94	9,580	2,570	22,800	7,450	1,050	126	2.3	0.1	998	151	338	14
AR31.0	05/27/94	3,490	289	6,960	583	199	17	1.7	0.2	868	42	258	2.1
AR34.5	05/28/94	11,100	2,990	26,500	8,640	1,220	146	2.6	0.1	1,160	175	393	16
AR31.0	05/28/94	2,120	--	4,720	--	329	--	1.5	--	824	--	268	--
AR34.5	05/29/94	14,600	3,920	34,700	11,300	1,600	192	3.4	0.1	1,520	230	516	21
AR31.0	05/29/94	2,120	--	4,720	--	329	--	1.5	--	824	--	268	--
AR34.5	05/30/94	18,500	4,970	44,000	14,400	2,030	244	4.4	0.1	1,930	291	653	26
AR31.0	05/30/94	3,000	--	6,690	--	467	--	2.2	--	1,170	--	380	--
AR34.5	05/31/94	19,700	5,280	46,800	15,300	2,160	259	4.6	0.1	2,050	309	694	28
AR31.0	05/31/94	4,010	--	8,930	--	623	--	2.9	--	1,560	--	507	--
AR34.5	06/01/94	21,400	5,740	50,800	16,600	2,340	282	5.0	0.2	2,230	336	754	30
AR31.0	06/01/94	4,040	--	9,000	--	628	--	2.9	--	1,570	--	511	--
AR34.5	06/02/94	20,900	5,610	49,600	16,200	2,290	275	4.9	0.2	2,170	328	737	30
AR31.0	06/02/94	3,530	--	7,880	--	549	--	2.6	--	1,380	--	447	--
AR34.5	06/03/94	19,000	5,100	45,100	14,700	2,080	250	4.5	0.1	1,980	299	670	27
AR31.0	06/03/94	3,280	--	7,320	--	510	--	2.4	--	1,280	--	415	--
AR34.5	06/04/94	19,800	5,330	47,200	15,400	2,170	261	4.7	0.2	2,070	312	700	28
AR31.0	06/04/94	3,150	--	7,020	--	490	--	2.3	--	1,230	--	398	--
AR34.5	06/05/94	17,800	4,780	42,300	13,800	1,950	234	4.2	0.1	1,850	280	628	25
AR31.0	06/05/94	1,910	--	5,580	--	1,120	--	4.4	--	1,320	--	574	--
AR34.5	06/06/94	16,000	4,290	38,000	12,400	1,750	210	3.8	0.1	1,660	251	564	23
AR31.0	06/06/94	1,830	--	5,360	--	1,070	--	4.2	--	1,270	--	551	--
AR34.5	06/07/94	14,400	3,860	34,200	11,200	1,580	190	3.4	0.1	1,500	226	508	20
AR31.0	06/07/94	1,510	--	4,410	--	883	--	3.5	--	1,040	--	454	--
AR34.5	06/08/94	7,360	591	16,700	996	3,770	391	6.5	0.7	1,510	146	943	90
AR31.0	06/08/94	1,290	--	3,770	--	755	--	3.0	--	892	--	388	--
AR34.5	06/09/94	7,010	562	15,900	948	3,590	372	6.2	0.7	1,440	139	898	86
AR31.0	06/09/94	1,230	--	3,610	--	721	--	2.8	--	853	--	371	--

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	06/10/94	6,820	547	15,500	923	3,490	362	6.0	0.7	1,400	135	874	84
AR31.0	06/10/94	1,230	--	3,610	--	721	--	2.8	--	853	--	371	--
AR34.5	06/11/94	6,290	504	14,300	850	3,220	333	5.5	0.6	1,290	124	805	77
AR31.0	06/11/94	692	70	4,530	490	1,670	131	3.9	0.1	966	32	557	53
AR34.5	06/12/94	5,600	449	12,700	757	2,860	297	4.9	0.6	1,150	111	717	69
AR31.0	06/12/94	692	70	4,530	490	1,670	131	3.9	0.1	966	32	557	53
AR34.5	06/13/94	5,850	469	13,300	791	2,990	310	5.1	0.6	1,200	116	750	72
AR31.0	06/13/94	692	70	4,530	490	1,670	131	3.9	0.1	966	32	557	53
AR34.5	06/14/94	5,800	465	13,200	784	2,970	308	5.1	0.6	1,190	115	743	71
AR31.0	06/14/94	692	70	4,530	490	1,670	131	3.9	0.1	966	32	557	53
AR34.5	06/15/94	5,180	415	11,800	700	2,650	275	4.6	0.5	1,060	102	663	64
AR31.0	06/15/94	692	70	4,530	490	1,670	131	3.9	0.1	966	32	557	53
AR34.5	06/16/94	4,570	367	10,400	618	2,340	242	4.0	0.5	940	90	586	56
AR31.0	06/16/94	637	64	4,170	451	1,530	120	3.6	0.1	889	29	513	49
AR34.5	06/17/94	4,220	339	9,600	571	2,160	224	3.7	0.4	868	84	541	52
AR31.0	06/17/94	571	58	3,740	404	1,370	108	3.2	0.1	796	26	459	44
AR34.5	06/18/94	3,950	317	8,990	534	2,020	210	3.5	0.4	812	78	506	48
AR31.0	06/18/94	497	50	3,250	351	1,200	94	2.8	0.1	693	23	400	38
AR34.5	06/19/94	2,590	--	5,620	--	699	--	2.2	--	475	--	263	--
AR31.0	06/19/94	407	41	2,660	288	980	77	2.3	0.1	568	19	328	31
AR34.5	06/20/94	4,330	--	9,420	--	1,170	--	3.7	--	796	--	441	--
AR31.0	06/20/94	368	37	2,410	260	886	70	2.1	0.1	513	17	296	28
AR34.5	06/21/94	3,950	--	8,580	--	1,070	--	3.3	--	725	--	402	--
AR31.0	06/21/94	504	51	3,300	356	1,210	95	2.8	0.1	703	23	406	38
AR34.5	06/22/94	4,800	--	10,400	--	1,300	--	4.0	--	881	--	488	--
AR31.0	06/22/94	591	60	3,870	418	1,420	112	3.3	0.1	825	27	476	45
AR34.5	06/23/94	3,280	--	7,120	--	886	--	2.8	--	602	--	333	--
AR31.0	06/23/94	543	55	3,560	384	1,310	103	3.0	0.1	758	25	437	42
AR34.5	06/24/94	4,180	335	9,510	565	2,140	222	3.7	0.4	860	83	536	51
AR31.0	06/24/94	446	45	2,920	315	1,070	84	2.5	0.1	622	20	359	34
AR34.5	06/25/94	3,640	292	8,280	492	1,860	193	3.2	0.4	749	72	466	45
AR31.0	06/25/94	375	38	2,460	265	903	71	2.1	0.1	524	17	302	29
AR34.5	06/26/94	3,250	261	7,390	440	1,660	172	2.9	0.3	668	64	416	40
AR31.0	06/26/94	359	36	2,350	254	865	68	2.0	0.1	501	16	289	28
AR34.5	06/27/94	2,850	228	6,470	385	1,460	151	2.5	0.3	585	56	364	35
AR31.0	06/27/94	359	36	2,350	254	865	68	2.0	0.1	501	16	289	28
AR34.5	06/28/94	2,520	202	5,740	341	1,290	134	2.2	0.3	519	50	323	31
AR31.0	06/28/94	359	36	2,350	254	865	68	2.0	0.1	501	16	289	28
AR34.5	06/29/94	219	176	5,000	297	1,120	117	1.9	0.2	452	44	282	27
AR31.0	06/29/94	358	36	2,340	253	861	68	2.0	0.1	499	16	288	27
AR34.5	06/30/94	1,970	158	4,480	266	1,010	104	1.7	0.2	405	39	252	24
AR31.0	06/30/94	329	33	2,150	232	792	62	1.8	0.1	459	15	265	25

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	07/01/94	1,780	143	4,050	241	911	94	1.6	0.2	366	35	228	22
AR31.0	07/01/94	307	31	2,010	217	739	58	1.7	0.1	428	14	247	24
AR34.5	07/02/94	1,700	136	3,860	230	869	90	1.5	0.2	349	34	218	21
AR31.0	07/02/94	307	31	2,010	217	739	58	1.7	0.1	428	14	247	24
AR34.5	07/03/94	1,520	122	3,460	206	780	81	1.3	0.2	313	30	195	19
AR31.0	07/03/94	306	31	2,000	216	736	58	1.7	0.1	426	14	246	23
AR34.5	07/04/94	1,430	115	3,250	193	731	76	1.3	0.1	294	28	183	18
AR31.0	07/04/94	284	29	1,860	201	684	54	1.6	0.1	396	13	228	22
AR34.5	07/05/94	1,240	100	2,820	168	635	66	1.1	0.1	255	24	159	15
AR31.0	07/05/94	271	27	1,770	192	652	51	1.5	0.1	378	12	218	21
AR34.5	07/06/94	1,130	91	2,580	153	580	60	1.0	0.1	233	22	145	14
AR31.0	07/06/94	271	27	1,770	192	652	51	1.5	0.1	378	12	218	21
AR34.5	07/07/94	1,080	86	2,450	146	552	57	0.9	0.1	222	21	138	13
AR31.0	07/07/94	271	27	1,770	192	652	51	1.5	0.1	378	12	218	21
AR34.5	07/08/94	971	78	2,210	131	497	52	0.9	0.1	200	19	124	12
AR31.0	07/08/94	269	27	1,760	190	649	51	1.5	0.1	376	12	217	21
AR34.5	07/09/94	944	76	2,150	128	483	50	0.8	0.1	194	19	121	12
AR31.0	07/09/94	264	27	1,730	186	635	50	1.5	0.1	368	12	212	20
AR34.5	07/10/94	877	70	1,990	118	448	46	0.8	0.1	180	17	112	11
AR31.0	07/10/94	239	24	1,560	169	575	45	1.3	0.1	334	11	192	18
AR34.5	07/11/94	836	67	1,900	113	428	44	0.7	0.1	172	16	107	10
AR31.0	07/11/94	351	17	996	96	604	23	1.6	<0.1	475	20	205	1.3
AR34.5	07/12/94	796	64	1,810	108	407	42	0.7	0.1	164	16	102	9.8
AR31.0	07/12/94	324	16	920	88	558	21	1.5	<0.1	438	19	190	1.2
AR34.5	07/13/94	769	62	1,750	104	393	41	0.7	0.1	158	15	98	9.4
AR31.0	07/13/94	324	16	920	88	558	21	1.5	<0.1	438	19	190	1.2
AR34.5	07/14/94	701	56	1,590	95	359	37	0.6	0.1	144	14	90	8.6
AR31.0	07/14/94	322	16	913	88	553	21	1.4	<0.1	435	19	188	1.2
AR34.5	07/15/94	688	55	1,560	93	352	36	0.6	0.1	141	14	88	8.4
AR31.0	07/15/94	315	16	892	86	541	20	1.4	<0.1	425	18	184	1.2
AR34.5	07/16/94	661	53	1,500	89	338	35	0.6	0.1	136	13	85	8.1
AR31.0	07/16/94	312	15	885	85	536	20	1.4	<0.1	422	18	183	1.1
AR34.5	07/17/94	607	49	1,380	82	310	32	0.5	0.1	125	12	78	7.5
AR31.0	07/17/94	307	15	872	84	528	20	1.4	<0.1	415	18	180	1.1
AR34.5	07/18/94	566	45	1,290	77	290	30	0.5	0.1	116	11	73	7.0
AR31.0	07/18/94	295	15	837	80	507	19	1.3	<0.1	399	17	173	1.1
AR34.5	07/19/94	566	45	1,290	77	290	30	0.5	0.1	116	11	73	7.0
AR31.0	07/19/94	281	14	796	76	482	18	1.3	<0.1	379	16	164	1.0
AR34.5	07/20/94	8,380	--	15,700	--	1,520	--	2.3	--	872	--	404	--
AR31.0	07/20/94	317	16	899	86	545	20	1.4	<0.1	429	18	186	1.2
AR34.5	07/21/94	798	--	1,510	--	348	--	0.9	--	209	--	95	--
AR31.0	07/21/94	334	16	948	91	574	22	1.5	<0.1	452	19	195	1.2

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	07/22/94	814	--	1,540	--	355	--	0.9	--	213	--	97	--
AR31.0	07/22/94	329	16	934	90	566	21	1.5	<0.1	445	19	193	1.2
AR34.5	07/23/94	654	--	1,240	--	285	--	0.7	--	172	--	78	--
AR31.0	07/23/94	259	13	733	70	444	17	1.2	<0.1	350	15	151	1.0
AR34.5	07/24/94	670	--	1,270	--	292	--	0.7	--	176	--	80	--
AR31.0	07/24/94	215	11	609	59	369	14	1.0	<0.1	290	12	126	0.8
AR34.5	07/25/94	893	--	1,700	--	389	--	1.0	--	234	--	106	--
AR31.0	07/25/94	217	11	616	59	373	14	1.0	<0.1	293	13	127	0.8
AR34.5	07/26/94	718	--	1,360	--	313	--	0.8	--	188	--	85	--
AR31.0	07/26/94	217	11	616	59	373	14	1.0	<0.1	293	13	127	0.8
AR34.5	07/27/94	622	--	1,180	--	271	--	0.7	--	163	--	74	--
AR31.0	07/27/94	217	11	616	59	373	14	1.0	<0.1	293	13	127	0.8
AR34.5	07/28/94	734	--	1,390	--	320	--	0.8	--	192	--	87	--
AR31.0	07/28/94	217	11	616	59	373	14	1.0	<0.1	293	13	127	0.8
AR34.5	07/29/94	830	--	1,580	--	362	--	0.9	--	218	--	99	--
AR31.0	07/29/94	217	11	616	59	373	14	1.0	<0.1	293	13	127	0.8
AR34.5	07/30/94	734	--	1,393	--	320	--	0.8	--	192	--	87	--
AR31.0	07/30/94	215	11	609	59	369	14	1.0	<0.1	290	12	126	0.8
AR34.5	07/31/94	2,850	481	4,780	866	367	38	0.8	0.1	325	12	113	8.5
AR31.0	07/31/94	215	11	609	59	369	14	1.0	<0.1	290	12	126	0.8
AR34.5	08/01/94	3,910	659	6,550	1,190	503	52	1.0	0.1	445	16	154	12
AR31.0	08/01/94	242	12	685	66	415	16	1.1	<0.1	326	14	141	0.9
AR34.5	08/02/94	4,230	712	7,090	1,283	543	56	1.1	0.1	482	18	167	13
AR31.0	08/02/94	256	13	726	70	440	16	1.2	<0.1	346	15	150	0.9
AR34.5	08/03/94	900	--	1,648	--	364	--	0.7	--	240	--	98	--
AR31.0	08/03/94	254	13	719	69	436	16	1.1	<0.1	343	15	148	0.9
AR34.5	08/04/94	727	--	1,330	--	294	--	0.6	--	194	--	80	--
AR31.0	08/04/94	254	13	719	69	436	16	1.1	<0.1	343	15	148	0.9
AR34.5	08/05/94	692	--	1,270	--	280	--	0.5	--	184	--	76	--
AR31.0	08/05/94	195	9.7	553	53	335	12	0.9	<0.1	264	11	114	0.7
AR34.5	08/06/94	744	--	1,360	--	301	--	0.6	--	198	--	81	--
AR31.0	08/06/94	156	7.7	443	43	268	10	0.7	<0.1	211	9.1	91	0.6
AR34.5	08/07/94	675	--	1,240	--	273	--	0.5	--	180	--	74	--
AR31.0	08/07/94	154	7.6	436	42	264	9.9	0.7	<0.1	208	8.9	90	0.6
AR34.5	08/08/94	588	--	1,080	--	238	--	0.5	--	157	--	64	--
AR31.0	08/08/94	144	7.1	408	39	247	9.3	0.6	<0.1	194	8.4	84	0.5
AR34.5	08/09/94	554	--	1,010	--	224	--	0.4	--	148	--	60	--
AR31.0	08/09/94	132	6.5	374	36	226	8.5	0.6	<0.1	178	7.7	77	0.5
AR34.5	08/10/94	658	--	1,200	--	266	--	0.5	--	175	--	72	--
AR31.0	08/10/94	142	7.0	401	39	243	9.1	0.6	<0.1	191	8.2	83	0.5
AR34.5	08/11/94	2,760	--	3,840	--	413	--	0.8	--	281	--	107	--
AR31.0	08/11/94	149	7.4	422	41	256	9.6	0.7	<0.1	201	8.7	87	0.5

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	08/12/94	1,000	--	1,840	--	406	--	0.8	--	267	--	110	--
AR31.0	08/12/94	217	21	910	28	294	8.3	0.7	<0.1	336	10	108	3.6
AR34.5	08/13/94	779	--	1,430	--	315	--	0.6	--	207	--	85	--
AR31.0	08/13/94	238	23	998	31	322	9.1	0.8	<0.1	369	12	118	4.0
AR34.5	08/14/94	11,400	6,620	25,700	18,700	406	206	0.9	0.3	674	215	167	76
AR31.0	08/14/94	235	23	985	31	318	9.0	0.8	<0.1	364	11	117	3.9
AR34.5	08/15/94	16,300	9,480	36,900	26,900	583	295	1.3	0.5	966	308	239	108
AR31.0	08/15/94	235	23	985	31	318	9.0	0.8	<0.1	364	11	117	3.9
AR34.5	08/16/94	1,520	343	3,350	983	306	6.7	0.8	<0.1	319	20	105	6.0
AR31.0	08/16/94	274	27	1,150	36	371	10	0.9	0.1	424	13	136	4.6
AR34.5	08/17/94	1,200	271	2,650	778	242	5.3	0.6	<0.1	252	16	83	4.7
AR31.0	08/17/94	300	29	1,260	39	407	12	1.0	0.1	465	14	150	5.0
AR34.5	08/18/94	976	220	2,150	631	197	4.3	0.5	<0.1	205	13	68	3.8
AR31.0	08/18/94	247	24	1,030	32	334	9.4	0.8	<0.1	382	12	123	4.1
AR34.5	08/19/94	953	215	2,100	616	192	4.2	0.5	<0.1	200	12	66	3.7
AR31.0	08/19/94	214	21	898	28	290	8.2	0.7	<0.1	332	10	107	3.6
AR34.5	08/20/94	976	220	2,150	631	197	4.3	0.5	<0.1	205	13	68	3.8
AR31.0	08/20/94	214	21	898	28	290	8.2	0.7	<0.1	332	10	107	3.6
AR34.5	08/21/94	953	215	2,100	616	192	4.2	0.5	<0.1	200	12	66	3.7
AR31.0	08/21/94	214	21	898	28	290	8.2	0.7	<0.1	332	10	107	3.6
AR34.5	08/22/94	930	210	2,050	602	188	4.1	0.5	<0.1	195	12	64	3.6
AR31.0	08/22/94	196	19	823	26	266	7.5	0.6	<0.1	304	9.5	98	3.3
AR34.5	08/23/94	749	169	1,650	484	151	3.3	0.4	<0.1	157	9.8	52	2.9
AR31.0	08/23/94	170	17	711	22	230	6.5	0.6	<0.1	263	8.2	84	2.8
AR34.5	08/24/94	681	154	1,500	440	137	3.0	0.3	<0.1	143	8.9	47	2.7
AR31.0	08/24/94	158	15	661	20	214	6.0	0.5	<0.1	244	7.6	78	2.6
AR34.5	08/25/94	772	174	1,700	499	156	3.4	0.4	<0.1	162	10	53	3.0
AR31.0	08/25/94	158	15	661	20	214	6.0	0.5	<0.1	244	7.6	78	2.6
AR34.5	08/26/94	817	184	1,800	528	165	3.6	0.4	<0.1	171	11	57	3.2
AR31.0	08/26/94	158	15	661	20	214	6.0	0.5	<0.1	244	7.6	78	2.6
AR34.5	08/27/94	658	148	1,450	426	133	2.9	0.3	<0.1	138	8.6	46	2.6
AR31.0	08/27/94	158	15	661	20	214	6.0	0.5	<0.1	244	7.6	78	2.6
AR34.5	08/28/94	817	184	1,800	528	165	3.6	0.4	<0.1	171	11	57	3.2
AR31.0	08/28/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	08/29/94	681	154	1,500	440	137	3.0	0.3	<0.1	143	8.9	47	2.7
AR31.0	08/29/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	08/30/94	703	159	1,550	455	142	3.1	0.4	<0.1	148	9.2	49	2.8
AR31.0	08/30/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	08/31/94	613	138	1,350	396	124	2.7	0.3	<0.1	128	8.0	42	2.4
AR31.0	08/31/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/01/94	930	210	2,050	602	188	4.1	0.5	<0.1	195	12	64	3.6
AR31.0	09/01/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	09/02/94	2,980	--	6,110	--	276	--	0.6	--	272	--	83	--
AR31.0	09/02/94	116	11	486	15	157	4.4	0.4	<0.1	180	5.6	58	1.9
AR34.5	09/03/94	11,300	--	23,200	--	1,050	--	2.1	--	1,030	--	314	--
AR31.0	09/03/94	116	11	486	15	157	4.4	0.4	<0.1	180	5.6	58	1.9
AR34.5	09/04/94	8,550	--	17,600	--	794	--	1.6	--	781	--	237	--
AR31.0	09/04/94	199	20	835	26	270	7.6	0.7	<0.1	309	9.6	99	3.3
AR34.5	09/05/94	6,020	--	12,400	--	559	--	1.1	--	550	--	167	--
AR31.0	09/05/94	259	25	1,080	34	350	9.9	0.8	<0.1	401	12	129	4.3
AR34.5	09/06/94	4,760	--	9,770	--	442	--	0.9	--	435	--	132	--
AR31.0	09/06/94	259	25	1,080	34	350	9.9	0.8	<0.1	401	12	129	4.3
AR34.5	09/07/94	928	--	1,880	--	295	--	0.6	--	242	--	91	--
AR31.0	09/07/94	259	25	1,080	34	350	9.9	0.8	<0.1	401	12	129	4.3
AR34.5	09/08/94	860	--	1,740	--	273	--	0.5	--	224	--	85	--
AR31.0	09/08/94	256	25	1,070	33	346	9.8	0.8	<0.1	396	12	127	4.3
AR34.5	09/09/94	742	--	1,500	--	236	--	0.5	--	194	--	73	--
AR31.0	09/09/94	173	17	723	22	234	6.6	0.6	<0.1	267	8.3	86	2.9
AR34.5	09/10/94	675	--	1,370	--	214	--	0.4	--	176	--	66	--
AR31.0	09/10/94	122	12	511	16	165	4.7	0.4	<0.1	189	5.9	61	2.0
AR34.5	09/11/94	624	--	1,260	--	198	--	0.4	--	163	--	61	--
AR31.0	09/11/94	122	12	511	16	165	4.7	0.4	<0.1	189	5.9	61	2.0
AR34.5	09/12/94	607	--	1,230	--	193	--	0.4	--	158	--	60	--
AR31.0	09/12/94	122	12	511	16	165	4.7	0.4	<0.1	189	5.9	61	2.0
AR34.5	09/13/94	843	--	1,710	--	268	--	0.5	--	220	--	83	--
AR31.0	09/13/94	125	12	524	16	169	4.8	0.4	<0.1	194	6.0	62	2.1
AR34.5	09/14/94	3,440	--	7,900	--	698	--	1.2	--	516	--	216	--
AR31.0	09/14/94	146	14	611	19	197	5.6	0.5	<0.1	226	7.1	72	2.4
AR34.5	09/15/94	1,540	139	3,020	302	356	32	0.8	<0.1	332	12	118	5.1
AR31.0	09/15/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/16/94	1,220	110	2,400	240	282	26	0.7	<0.1	264	9.2	94	4.1
AR31.0	09/16/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/17/94	1,100	99	2,150	215	254	23	0.6	<0.1	237	8.3	84	3.6
AR31.0	09/17/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/18/94	1,070	97	2,110	211	248	22	0.6	<0.1	232	8.1	83	3.6
AR31.0	09/18/94	164	16	686	21	222	6.2	0.5	<0.1	253	7.9	81	2.7
AR34.5	09/19/94	1,260	114	2,480	248	292	26	0.7	<0.1	273	9.6	97	4.2
AR31.0	09/19/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/20/94	1,140	103	2,230	224	263	24	0.6	<0.1	246	8.6	87	3.8
AR31.0	09/20/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	09/21/94	1,160	104	2,270	228	268	24	0.6	<0.1	250	8.8	89	3.9
AR31.0	09/21/94	143	14	598	19	193	5.5	0.5	<0.1	221	6.9	71	2.4
AR34.5	09/22/94	990	89	1,940	195	229	21	0.5	<0.1	214	7.5	76	3.3
AR31.0	09/22/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	09/23/94	905	82	1,780	178	209	19	0.5	<0.1	196	6.8	70	3.0
AR31.0	09/23/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/24/94	905	82	1,780	178	209	19	0.5	<0.1	196	6.8	70	3.0
AR31.0	09/24/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/25/94	842	76	1,650	166	195	18	0.4	<0.1	182	6.4	65	2.8
AR31.0	09/25/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/26/94	800	72	1,570	157	185	17	0.4	<0.1	173	6.1	62	2.7
AR31.0	09/26/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/27/94	716	65	1,400	141	166	15	0.4	<0.1	155	5.4	55	2.4
AR31.0	09/27/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/28/94	674	61	1,320	132	156	14	0.4	<0.1	146	5.1	52	2.2
AR31.0	09/28/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/29/94	653	59	1,280	128	151	14	0.3	<0.1	141	4.9	50	2.2
AR31.0	09/29/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	09/30/94	653	59	1,280	128	151	14	0.3	<0.1	141	4.9	50	2.2
AR31.0	09/30/94	134	13	561	17	181	5.1	0.4	<0.1	207	6.5	67	2.2
AR34.5	10/01/94	632	57	1,240	124	146	13	0.3	<0.1	136	4.8	49	2.1
AR31.0	10/01/94	152	15	636	20	205	5.8	0.5	<0.1	235	7.3	76	2.5
AR34.5	10/02/94	611	55	1,200	120	141	13	0.3	<0.1	132	4.6	47	2.0
AR31.0	10/02/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	10/03/94	590	53	1,160	116	136	12	0.3	<0.1	127	4.5	45	2.0
AR31.0	10/03/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	10/04/94	568	51	1,120	112	132	12	0.3	<0.1	123	4.3	44	1.9
AR31.0	10/04/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	10/05/94	568	51	1,120	112	132	12	0.3	<0.1	123	4.3	44	1.9
AR31.0	10/05/94	164	16	686	21	222	6.2	0.5	<0.1	253	7.9	81	2.7
AR34.5	10/06/94	568	51	1,120	112	132	12	0.3	<0.1	123	4.3	44	1.9
AR31.0	10/06/94	167	16	698	22	226	6.4	0.5	<0.1	258	8.1	83	2.8
AR34.5	10/07/94	632	57	1,240	124	146	13	0.3	<0.1	136	4.8	49	2.1
AR31.0	10/07/94	167	16	698	22	226	6.4	0.5	<0.1	258	8.1	83	2.8
AR34.5	10/08/94	716	65	1,400	141	166	15	0.4	<0.1	155	5.4	55	2.4
AR31.0	10/08/94	167	16	698	22	226	6.4	0.5	<0.1	258	8.1	83	2.8
AR34.5	10/09/94	758	68	1,490	149	175	16	0.4	<0.1	164	5.7	58	2.5
AR31.0	10/09/94	164	16	686	21	222	6.2	0.5	<0.1	253	7.9	81	2.7
AR34.5	10/10/94	842	76	1,650	166	195	18	0.4	<0.1	182	6.4	65	2.8
AR31.0	10/10/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	10/11/94	800	72	1,570	157	185	17	0.4	<0.1	173	6.1	62	2.7
AR31.0	10/11/94	211	21	885	28	286	8.1	0.7	<0.1	327	10	105	3.5
AR34.5	10/12/94	800	72	1,570	157	185	17	0.4	<0.1	173	6.1	62	2.7
AR31.0	10/12/94	244	24	1,020	32	330	9.3	0.8	<0.1	378	12	121	4.1
AR34.5	10/13/94	779	70	1,530	153	180	16	0.4	<0.1	168	5.9	60	2.6
AR31.0	10/13/94	244	24	1,020	32	330	9.3	0.8	<0.1	378	12	121	4.1

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	10/14/94	779	70	1,530	153	180	16	0.4	<0.1	168	5.9	60	2.6
AR31.0	10/14/94	244	24	1,020	32	330	9.3	0.8	<0.1	378	12	121	4.1
AR34.5	10/15/94	737	66	1,450	145	170	15	0.4	<0.1	159	5.6	57	2.5
AR31.0	10/15/94	202	20	848	26	274	7.7	0.7	<0.1	313	9.8	101	3.4
AR34.5	10/16/94	758	68	1,490	149	175	16	0.4	<0.1	164	5.7	58	2.5
AR31.0	10/16/94	184	18	773	24	250	7.0	0.6	<0.1	286	8.9	92	3.1
AR34.5	10/17/94	821	74	1,610	162	190	17	0.4	<0.1	178	6.2	63	2.7
AR31.0	10/17/94	184	18	773	24	250	7.0	0.6	<0.1	286	8.9	92	3.1
AR34.5	10/18/94	758	68	1,490	149	175	16	0.4	<0.1	164	5.7	58	2.5
AR31.0	10/18/94	184	18	773	24	250	7.0	0.6	<0.1	286	8.9	92	3.1
AR34.5	10/19/94	695	63	1,360	137	161	15	0.4	<0.1	150	5.3	53	2.3
AR31.0	10/19/94	184	18	773	24	250	7.0	0.6	<0.1	286	8.9	92	3.1
AR34.5	10/20/94	695	63	1,360	137	161	15	0.4	<0.1	150	5.3	53	2.3
AR31.0	10/20/94	161	16	673	21	218	6.1	0.5	<0.1	249	7.8	80	2.7
AR34.5	10/21/94	674	61	1,320	132	156	14	0.4	<0.1	146	5.1	52	2.2
AR31.0	10/21/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/22/94	674	61	1,320	132	156	14	0.4	<0.1	146	5.1	52	2.2
AR31.0	10/22/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/23/94	674	61	1,320	132	156	14	0.4	<0.1	146	5.1	52	2.2
AR31.0	10/23/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/24/94	370	37	755	94	36	6.2	0.2	<0.1	88	7.8	23	1.8
AR31.0	10/24/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/25/94	356	36	728	91	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	10/25/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/26/94	396	40	809	101	38	6.7	0.2	<0.1	95	8.4	25	1.9
AR31.0	10/26/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/27/94	290	29	593	74	28	4.9	0.1	<0.1	69	6.2	18	1.4
AR31.0	10/27/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/28/94	370	37	755	94	36	6.2	0.2	<0.1	88	7.8	23	1.8
AR31.0	10/28/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/29/94	396	40	809	101	38	6.7	0.2	<0.1	95	8.4	25	1.9
AR31.0	10/29/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/30/94	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	10/30/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	10/31/94	488	49	997	125	47	8.2	0.2	<0.1	117	10.4	30	2.4
AR31.0	10/31/94	155	15	648	20	210	5.9	0.5	<0.1	240	7.5	77	2.6
AR34.5	11/01/94	383	38	782	98	37	6.4	0.2	<0.1	92	8.1	24	1.9
AR31.0	11/01/94	104	10	436	14	141	4.0	0.3	<0.1	161	5.0	52	1.7
AR34.5	11/02/94	356	36	728	91	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	11/02/94	7.5	--	11	--	4.8	--	<0.1	--	10	--	4.1	--
AR34.5	11/03/94	304	30	620	77.5	29	5.1	0.1	<0.1	73	6.4	19	1.5
AR31.0	11/03/94	7.7	--	12	--	4.9	--	<0.1	--	11	--	4.3	--

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	11/04/94	317	32	647	80.8	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	11/04/94	5.4	--	8.3	--	3.5	--	<0.1	--	7.5	--	3.0	--
AR34.5	11/05/94	290	29	593	74.1	28	4.9	0.1	<0.1	69	6.2	18	1.4
AR31.0	11/05/94	3.2	--	4.8	--	2.0	--	<0.1	--	4.3	--	1.7	--
AR34.5	11/06/94	264	26	539	67.4	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	11/06/94	2.9	--	4.3	--	1.8	--	<0.1	--	3.9	--	1.6	--
AR34.5	11/07/94	277	28	566	70.7	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	11/07/94	1.7	--	2.6	--	1.1	--	<0.1	--	2.3	--	0.9	--
AR34.5	11/08/94	290	29	593	74.1	28	4.9	0.1	<0.1	69	6.2	18	1.4
AR31.0	11/08/94	0.9	--	1.3	--	0.5	--	<0.1	--	1.2	--	0.5	--
AR34.5	11/09/94	304	30	620	77.5	29	5.1	0.1	<0.1	73	6.4	19	1.5
AR31.0	11/09/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	11/10/94	317	32	647	80.8	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	11/10/94	0.9	--	1.3	--	0.5	--	<0.1	--	1.2	--	0.5	--
AR34.5	11/11/94	343	34	701	87.6	33	5.8	0.1	<0.1	82	7.3	21	1.7
AR31.0	11/11/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	11/12/94	356	36	728	91.0	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	11/12/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/13/94	317	32	647	80.8	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	11/13/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	11/14/94	304	30	620	78	29	5.1	0.1	<0.1	73	6.4	19	1.5
AR31.0	11/14/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	11/15/94	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	11/15/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/16/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	11/16/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/17/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	11/17/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/18/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	11/18/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/19/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	11/19/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/20/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	11/20/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/21/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	11/21/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/22/94	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	11/22/94	0.9	--	1.4	--	0.6	--	<0.1	--	1.3	--	0.5	--
AR34.5	11/23/94	317	32	647	81	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	11/23/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/24/94	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	11/24/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	11/25/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	11/25/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/26/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	11/26/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/27/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	11/27/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/28/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	11/28/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/29/94	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	11/29/94	1.0	--	1.5	--	0.6	--	<0.1	--	1.4	--	0.6	--
AR34.5	11/30/94	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	11/30/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/01/94	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	12/01/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	12/02/94	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	12/02/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	12/03/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	12/03/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	12/04/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/04/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	12/05/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	12/05/94	0.8	--	1.3	--	0.5	--	<0.1	--	1.1	--	0.5	--
AR34.5	12/06/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/06/94	0.9	--	1.3	--	0.5	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/07/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/07/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/08/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/08/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/09/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	12/09/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/10/94	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	12/10/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/11/94	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	12/11/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/12/94	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	12/12/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/13/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/13/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/14/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/14/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/15/94	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	12/15/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	12/16/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/16/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/17/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/17/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/18/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/18/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/19/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/19/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/20/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/20/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/21/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/21/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/22/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/22/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/23/94	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	12/23/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/24/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/24/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/25/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/25/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/26/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/26/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/27/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/27/94	0.9	--	1.3	--	0.6	--	<0.1	--	1.2	--	0.5	--
AR34.5	12/28/94	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	12/28/94	1.1	--	1.6	--	0.7	--	<0.1	--	1.5	--	0.6	--
AR34.5	12/29/94	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	12/29/94	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	12/30/94	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	12/30/94	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	12/31/94	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	12/31/94	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	01/01/95	172	17	350	44	17	2.9	0.1	<0.1	41	3.6	11	0.8
AR31.0	01/01/95	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	01/02/95	172	17	350	44	17	2.9	0.1	<0.1	41	3.6	11	0.8
AR31.0	01/02/95	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	01/03/95	172	17	350	44	17	2.9	0.1	<0.1	41	3.6	11	0.8
AR31.0	01/03/95	1.2	--	1.8	--	0.7	--	<0.1	--	1.6	--	0.7	--
AR34.5	01/04/95	185	18	377	47	18	3.1	0.1	<0.1	44	3.9	12	0.9
AR31.0	01/04/95	1.2	--	1.8	--	0.8	--	<0.1	--	1.7	--	0.7	--
AR34.5	01/05/95	185	18	377	47	18	3.1	0.1	<0.1	44	3.9	12	0.9
AR31.0	01/05/95	1.2	--	1.9	--	0.8	--	<0.1	--	1.7	--	0.7	--

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	01/06/95	185	18	377	47	18	3.1	0.1	<0.1	44	3.9	12	0.9
AR31.0	01/06/95	1.2	--	1.9	--	0.8	--	<0.1	--	1.7	--	0.7	--
AR34.5	01/07/95	185	18	377	47	18	3.1	0.1	<0.1	44	3.9	12	0.9
AR31.0	01/07/95	0.8	0.1	1.5	0.5	0.2	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/08/95	185	18	377	47	18	3.1	0.1	<0.1	44	3.9	12	0.9
AR31.0	01/08/95	0.8	0.1	1.5	0.5	0.2	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/09/95	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	01/09/95	0.8	0.1	1.5	0.5	0.2	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/10/95	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	01/10/95	0.9	0.1	1.5	0.5	0.2	<0.1	<0.1	<0.1	0.6	0.1	0.2	<0.1
AR34.5	01/11/95	198	20	404	50	19	3.3	0.1	<0.1	47	4.2	12	1.0
AR31.0	01/11/95	0.9	0.1	1.6	0.5	0.3	<0.1	<0.1	<0.1	0.6	0.1	0.2	0.1
AR34.5	01/12/95	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	01/12/95	0.9	0.1	1.6	0.5	0.3	<0.1	<0.1	<0.1	0.6	0.1	0.2	0.1
AR34.5	01/13/95	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	01/13/95	0.9	0.1	1.6	0.5	0.3	<0.1	<0.1	<0.1	0.6	0.1	0.2	0.1
AR34.5	01/14/95	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	01/14/95	0.9	0.1	1.6	0.5	0.3	<0.1	<0.1	<0.1	0.6	0.1	0.2	0.1
AR34.5	01/15/95	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	01/15/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/16/95	211	21	431	54	20	3.5	0.1	<0.1	50	4.5	13	1.0
AR31.0	01/16/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/17/95	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	01/17/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/18/95	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	01/18/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/19/95	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	01/19/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/20/95	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	01/20/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/21/95	224	22	458	57	22	3.8	0.1	<0.1	54	4.8	14	1.1
AR31.0	01/21/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/22/95	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	01/22/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/23/95	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	01/23/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/24/95	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	01/24/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/25/95	238	24	485	61	23	4.0	0.1	<0.1	57	5.0	15	1.2
AR31.0	01/25/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/26/95	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	01/26/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	01/27/95	251	25	512	64	24	4.2	0.1	<0.1	60	5.3	16	1.2
AR31.0	01/27/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/28/95	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	01/28/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/29/95	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	01/29/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/30/95	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	01/30/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	01/31/95	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	01/31/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/01/95	264	26	539	67	26	4.4	0.1	<0.1	63	5.6	16	1.3
AR31.0	02/01/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/02/95	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	02/02/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/03/95	277	28	566	71	27	4.7	0.1	<0.1	66	5.9	17	1.4
AR31.0	02/03/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/04/95	290	29	593	74	28	4.9	0.1	<0.1	69	6.2	18	1.4
AR31.0	02/04/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/05/95	304	30	620	78	29	5.1	0.1	<0.1	73	6.4	19	1.5
AR31.0	02/05/95	0.9	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/06/95	304	30	620	78	29	5.1	0.1	<0.1	73	6.4	19	1.5
AR31.0	02/06/95	1.0	0.1	1.7	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/07/95	317	32	647	81	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	02/07/95	1.0	0.1	1.8	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/08/95	317	32	647	81	31	5.3	0.1	<0.1	76	6.7	20	1.6
AR31.0	02/08/95	1.0	0.1	1.8	0.6	0.3	<0.1	<0.1	<0.1	0.7	0.1	0.2	0.1
AR34.5	02/09/95	330	33	674	84	32	5.5	0.1	<0.1	79	7.0	21	1.6
AR31.0	02/09/95	1.1	0.1	1.9	0.6	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/10/95	330	33	674	84	32	5.5	0.1	<0.1	79	7.0	21	1.6
AR31.0	02/10/95	1.1	0.1	1.9	0.6	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/11/95	330	33	674	84	32	5.5	0.1	<0.1	79	7.0	21	1.6
AR31.0	02/11/95	1.1	0.1	1.9	0.6	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/12/95	330	33	674	84	32	5.5	0.1	<0.1	79	7.0	21	1.6
AR31.0	02/12/95	1.1	0.1	1.9	0.6	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/13/95	343	34	701	88	33	5.8	0.1	<0.1	82	7.3	21	1.7
AR31.0	02/13/95	1.1	0.1	2.0	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/14/95	343	34	701	88	33	5.8	0.1	<0.1	82	7.3	21	1.7
AR31.0	02/14/95	1.1	0.1	2.0	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/15/95	356	36	728	91	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	02/15/95	1.1	0.1	2.0	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/16/95	356	36	728	91	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	02/16/95	1.2	0.1	2.0	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	02/17/95	356	36	728	91	34	6.0	0.1	<0.1	85	7.6	22	1.8
AR31.0	02/17/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/18/95	370	37	755	94	36	6.2	0.2	<0.1	88	7.8	23	1.8
AR31.0	02/18/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/19/95	370	37	755	94	36	6.2	0.2	<0.1	88	7.8	23	1.8
AR31.0	02/19/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/20/95	383	38	782	98	37	6.4	0.2	<0.1	92	8.1	24	1.9
AR31.0	02/20/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/21/95	383	38	782	98	37	6.4	0.2	<0.1	92	8.1	24	1.9
AR31.0	02/21/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.8	0.1	0.2	0.1
AR34.5	02/22/95	383	38	782	98	37	6.4	0.2	<0.1	92	8.1	24	1.9
AR31.0	02/22/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/23/95	396	40	809	101	38	6.7	0.2	<0.1	95	8.4	25	1.9
AR31.0	02/23/95	1.2	0.1	2.1	0.7	0.3	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/24/95	409	41	836	104	40	6.9	0.2	<0.1	98	8.7	26	2.0
AR31.0	02/24/95	1.2	0.1	2.2	0.7	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/25/95	409	41	836	104	40	6.9	0.2	<0.1	98	8.7	26	2.0
AR31.0	02/25/95	1.2	0.1	2.2	0.7	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/26/95	422	42	862	108	41	7.1	0.2	<0.1	101	9.0	26	2.1
AR31.0	02/26/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/27/95	436	44	890	111	42	7.3	0.2	<0.1	104	9.2	27	2.1
AR31.0	02/27/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	02/28/95	449	45	916	114	43	7.5	0.2	<0.1	107	9.5	28	2.2
AR31.0	02/28/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/01/95	462	46	943	118	45	7.8	0.2	<0.1	110	9.8	29	2.3
AR31.0	03/01/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/02/95	462	46	943	118	45	7.8	0.2	<0.1	110	9.8	29	2.3
AR31.0	03/02/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/03/95	475	48	970	121	46	8.0	0.2	<0.1	114	10.1	30	2.3
AR31.0	03/03/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/04/95	475	48	970	121	46	8.0	0.2	<0.1	114	10.1	30	2.3
AR31.0	03/04/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/05/95	488	49	997	125	47	8.2	0.2	<0.1	117	10.4	30	2.4
AR31.0	03/05/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/06/95	502	50	1,020	128	48	8.4	0.2	<0.1	120	10.6	31	2.5
AR31.0	03/06/95	1.3	0.1	2.3	0.8	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.2	0.1
AR34.5	03/07/95	502	50	1,020	128	48	8.4	0.2	<0.1	120	10.6	31	2.5
AR31.0	03/07/95	1.3	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.2	0.1
AR34.5	03/08/95	515	52	1,050	131	50	8.6	0.2	<0.1	123	10.9	32	2.5
AR31.0	03/08/95	1.3	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.2	0.1
AR34.5	03/09/95	515	52	1,050	131	50	8.6	0.2	<0.1	123	11	32	2.5
AR31.0	03/09/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1

Table 7. Estimated daily total-metal loads and standard errors for sites AR34.5 and AR31.0, April 1994 through March 1995—Continued

[Loads and standard errors are in pounds per day; <, less than; --, no data]

Site	Date	Aluminum		Iron		Copper		Cadmium		Manganese		Zinc	
		Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error	Load	Standard error
AR34.5	03/10/95	528	53	1,080	135	51	8.9	0.2	<0.1	126	11	33	2.6
AR31.0	03/10/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/11/95	528	53	1,080	135	51	8.9	0.2	<0.1	126	11	33	2.6
AR31.0	03/11/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/12/95	541	54	1,100	138	52	9.1	0.2	<0.1	129	12	34	2.7
AR31.0	03/12/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/13/95	554	56	1,130	142	54	9.3	0.2	<0.1	132	12	35	2.7
AR31.0	03/13/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/14/95	568	57	1,160	145	55	9.5	0.2	<0.1	136	12	35	2.8
AR31.0	03/14/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/15/95	568	57	1,160	145	55	9.5	0.2	<0.1	136	12	35	2.8
AR31.0	03/15/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/16/95	581	58	1,190	148	56	9.8	0.2	<0.1	139	12	36	2.9
AR31.0	03/16/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/17/95	594	59	1,210	152	58	1<0.1	0.2	<0.1	142	13	37	2.9
AR31.0	03/17/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/18/95	594	59	1,210	152	58	1<0.1	0.2	<0.1	142	13	37	2.9
AR31.0	03/18/95	1.5	0.1	2.6	0.9	0.4	<0.1	<0.1	<0.1	1.1	0.1	0.3	0.1
AR34.5	03/19/95	607	61	1,240	155	59	10	0.2	<0.1	145	13	38	3.0
AR31.0	03/19/95	1.6	0.1	2.8	1.0	0.5	<0.1	<0.1	<0.1	1.2	0.1	0.3	0.1
AR34.5	03/20/95	620	62	1,270	158	60	10	0.3	<0.1	148	13	39	3.1
AR31.0	03/20/95	1.6	0.1	2.8	1.0	0.5	<0.1	<0.1	<0.1	1.2	0.1	0.3	0.1
AR34.5	03/21/95	620	62	1,270	158	60	10	0.3	<0.1	148	13	39	3.1
AR31.0	03/21/95	1.6	0.1	2.9	1.0	0.5	<0.1	<0.1	<0.1	1.2	0.1	0.3	0.1
AR34.5	03/22/95	634	63	1,290	162	61	11	0.3	<0.1	152	13	40	3.1
AR31.0	03/22/95	1.6	0.1	2.8	1.0	0.5	<0.1	<0.1	<0.1	1.2	0.1	0.3	0.1
AR34.5	03/23/95	647	65	1,320	165	63	11	0.3	<0.1	155	14	40	3.2
AR31.0	03/23/95	1.6	0.1	2.8	1.0	0.5	<0.1	<0.1	<0.1	1.2	0.1	0.3	0.1
AR34.5	03/24/95	647	65	1,320	165	63	11	0.3	<0.1	155	14	40	3.2
AR31.0	03/24/95	1.6	0.1	2.8	0.9	0.5	<0.1	<0.1	<0.1	1.1	0.1	0.3	0.1
AR34.5	03/25/95	726	73	1,480	185	70	12	0.3	<0.1	174	15	45	3.6
AR31.0	03/25/95	1.5	0.1	2.6	0.9	0.4	<0.1	<0.1	<0.1	1.1	0.1	0.3	0.1
AR34.5	03/26/95	766	77	1,560	195	74	13	0.3	<0.1	183	16	48	3.8
AR31.0	03/26/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/27/95	871	87	1,780	222	84	15	0.4	<0.1	208	18	54	4.3
AR31.0	03/27/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/28/95	1,070	107	2,180	273	104	18	0.4	<0.1	256	23	67	5.3
AR31.0	03/28/95	1.4	0.1	2.5	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/29/95	911	91	1,860	232	88	15	0.4	<0.1	218	19	57	4.5
AR31.0	03/29/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/30/95	1,120	112	2,290	286	109	19	0.5	<0.1	268	24	70	5.5
AR31.0	03/30/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.3	0.1
AR34.5	03/31/95	1,080	108	2,210	276	105	18	0.4	<0.1	259	23	68	5.3
AR31.0	03/31/95	1.4	0.1	2.4	0.8	0.4	<0.1	<0.1	<0.1	1.0	0.1	0.2	0.1