WATER-QUALITY DATA FOR THE RIO GRANDE BETWEEN PICACHO BRIDGE NEAR LAS CRUCES AND CALLE DEL NORTE BRIDGE NEAR MESILLA, NEW MEXICO, 1996-97

By G.F. Huff

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ABSTRACT

The City of Las Cruces is concerned about water quality in a reach of the Rio Grande that receives outfall from the City of Las Cruces wastewater-treatment plant. Water-quality samples were collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico; from the sampling site at the City of Las Cruces wastewater-treatment plant; and from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico. The samples were collected on 12 days from August 6, 1996, to February 28, 1997, and were analyzed for a suite of dissolved and total constituents including trace metals. Instantaneous stream discharge was measured concurrently with collection of the Rio Grande samples. At the wastewater-treatment plant, the City of Las Cruces provided instantaneous discharge rates concurrent with sampling. Quality-control measures used in this study to ensure analytical accuracy included replicate sampling, replicate analysis of split samples, ambient blanks, equipment blanks, and analysis of standard reference water samples.

INTRODUCTION

The City of Las Cruces, New Mexico, is concerned with the quality of water in a reach of the Rio Grande extending from Picacho Bridge near Las Cruces, New Mexico, downstream to Calle del Norte Bridge near Mesilla, New Mexico (fig. 1). This reach of the Rio Grande receives outfall from the City of Las Cruces wastewater-treatment plant. Constituents of particular concern in this reach of the Rio Grande include dissolved and total trace metals.

Purpose and Scope

This report presents field measurements and results of laboratory analyses of water-quality samples collected from the Rio Grande and from the City of Las Cruces wastewater-treatment plant. Instantaneous discharge rates of the Rio Grande, as measured by the U.S. Geological Survey, and of the wastewater-treatment plant, as provided by the City of Las Cruces, are reported. The results of quality-control measures used during this study also are included.

Field measurements reported include stream discharge, specific conductance at 25 °C, dissolved oxygen, pH, and water temperature. Laboratory analyses reported include determinations of dissolved and total organic carbon, dissolved calcium, magnesium, barium, and uranium; dissolved solids; and aluminum, antimony, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc. Total hardness was calculated from dissolved calcium and magnesium concentrations. Water-quality sampling was conducted on August 6, 7, 20, and 21, 1996; October 8 and 9, 1996; December 10 and 11, 1996; and February 11, 12, 27, and 28, 1997.

Study Area

The study area includes the reach of the Rio Grande from Picacho Bridge downstream to Calle del Norte Bridge. This reach of the Rio Grande receives outfall from the City of Las Cruces wastewater-treatment plant. Outfall from the treatment plant was sampled at the outfall sampling site at the treatment plant. The exact locations at which samples were collected are: Picacho Bridge, 32°18'37" N., 106°49'38" W.; City of Las Cruces wastewater-treatment plant sampling site, 32°17'39" N., 106°48'59" W.; and Calle del Norte Bridge, 32°15'51" N., 106°49'29" W. Sampling locations are shown in figure 1.

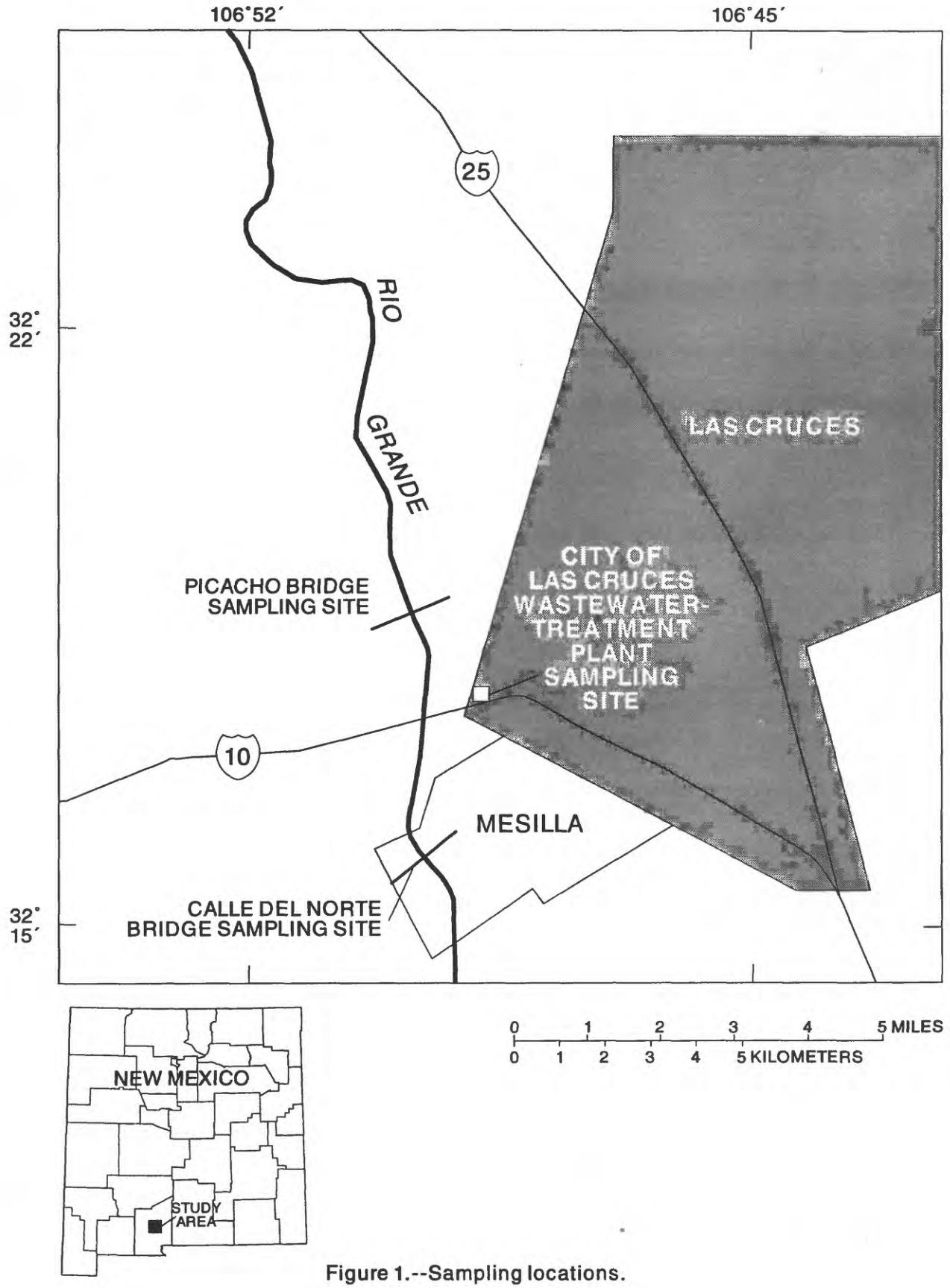

Figure 1.--Sampling locations.

Previous Investigations

Nickerson (1995) and Healy (1996) presented water-quality data for the reach of the Rio Grande between Picacho Bridge and Calle del Norte Bridge. The report by Healy (1996) contains water-quality data for the outfall from the City of Las Cruces wastewater-treatment plant.

Sampling and Analysis Methods and Protocols

The equal-width increment method (Shelton, 1994) was used to collect water-quality samples from the Rio Grande. Processing of samples for inorganic analysis followed the protocol recommended by Horowitz and others (1994). Samples for dissolved and total organic carbon analysis were processed using protocols recommended by Ward and Harr (1990). Samples for which dissolved concentrations are reported were passed through a 0.45-micrometer filter before being bottled and shipped for analysis. Samples for which total concentrations are reported were not filtered before being bottled and shipped for analysis. Table 1 lists the method detection limits for, minimum reporting levels for, and references documenting laboratory analytical methods used in this study. The method detection limit represents the minimum concentration of an analyte that can be identified and reported with 99-percent confidence that the analyte concentration is greater than zero. The minimum reporting level represents the smallest measured concentration of an analyte that may be reliably reported using a given analytical method.

WATER-QUALITY DATA

Five types of water-quality samples were collected during sampling of the Rio Grande and the outfall of the City of Las Cruces wastewater-treatment plant. These five types of samples for which analyses are presented are environmental samples, replicate samples, split samples, ambient blanks, and equipment blanks. Environmental samples represent water collected at each sampling location on which field measurements and selected laboratory analyses were performed. Replicate samples represent water collected from both Rio Grande sampling locations approximately 30 to 45 minutes after environmental samples on which selected laboratory analyses were performed. Samples collected from the wastewater-treatment plant were homogenized, split into two equal aliquots, and sent for laboratory analysis of selected constituents. Field measurements also were made at the treatment plant sampling site. One aliquot was arbitrarily designated as the environmental sample and the other was designated as the split sample. Ambient blanks represent reagent-grade purified water (organic-free water for organic carbon samples and inorganic blank water for all other samples) that was bottled, sealed, and transported to a sampling location. Once at the sampling location, the bottles were unsealed and exposed to the local environment during collection of the environmental sample. After sampling was completed, the ambient-blank bottles were resealed, preserved, and shipped to the laboratory for analysis of selected constituents. Ambient blanks were collected on a rotating basis from one of the three sampling locations on each day of water-quality sampling. Equipment blanks represent reagent-grade purified water that went through all appropriate sample-processing steps for either organic or inorganic samples and was shipped to the laboratory for analysis of selected constituents. One equipment blank was collected for each sampling day.

Tables 2, 3, and 4 list the results of water-quality analyses of environmental samples, replicate samples, and ambient blanks, respectively, collected at the Rio Grande at the Picacho Bridge sampling location. Results of water-quality analyses of environmental samples, split samples, and ambient blanks collected at the City of Las Cruces wastewater-treatment plant sampling site are listed in tables 5, 6, and 7, respectively. A part of the treatment process was inoperative during the February 11 sampling of outfall from the wastewater-treatment plant. Results of water-quality analyses of environmental samples, replicate samples, and ambient blanks collected from the Rio Grande at the Calle del Norte Bridge sampling location are listed in tables 8, 9, and 10, respectively. Table 11 reports the results of water-quality analyses of all equipment blanks.

QUALITY CONTROL

Field quality-control measures included collection of replicate samples, split samples, ambient blanks, and equipment blanks. Laboratory quality-control measures included, but were not limited to, spike recovery analyses on samples collected from the City of Las Cruces wastewater-treatment plant, recoveries calculated from analysis of standard reference water samples, laboratory blanks, and generation of quality-control charts throughout periods of sample analysis. All laboratory results tabulated in this report were reviewed and validated following the recommendations of Pritt and Raese (1995). The maintenance and calibration of laboratory instruments also followed the recommendations of Pritt and Raese.

Table 12 lists absolute and relative differences between selected constituents in environmental and replicate samples collected at the Picacho Bridge sampling location. Table 13 contains absolute and relative differences between selected constituents in environmental and split samples collected at the City of Las Cruces wastewater-treatment plant sampling site. Absolute and relative differences between selected constituents in environmental and replicate samples taken at the Calle del Norte Bridge sampling location are shown in table 14. Results shown in tables 12, 13, and 14 are limited to constituents for which the absolute difference between environmental and replicate samples or between environmental and split samples was non-zero for samples collected on at least one sampling day. The results in this report are greater than 99 percent complete, containing results for 3,947 of a possible total of 3,948 field and laboratory determinations.

A spike is a solution with a known concentration of analyte added in a known amount to a sample. The sample is analyzed before the spike is added, resulting in an unspiked concentration of the analyte in question. After the spike is added the sample is reanalyzed, resulting in a spiked concentration of the analyte in question. The spike recovery is calculated from:

$$\text{spike recovery} = [(\text{spiked concentration} - \text{unspiked concentration})/\text{spike}] \times 100 \text{ percent.} \quad (1)$$

Spike recoveries in samples collected at the City of Las Cruces wastewater-treatment plant are shown in table 15. A value of 100 percent indicates that all spike material added can be accounted for analytically. With the exceptions of total organic carbon and total zinc in the sample collected on December 11, 1996 (values of 160 and 132 percent, respectively), and total chromium and total nickel in the sample collected on August 7, 1996 (values of 194 and 260 percent, respectively), all spike recoveries were within 100 ± 20 percent of the expected value. Tables 16 and 17 summarize the results of water-quality analyses of ambient and equipment blanks collected in this study.

Analytical accuracy was monitored during the study by calculating recoveries from analysis of standard reference water samples and from analysis of laboratory blanks. The analytical result of a laboratory blank represents the analyte quantity obtained following analysis of a laboratory-generated sample that does not contain the analyte of interest. Samples were analyzed and monitored for analytical accuracy in sets. Sample set 1 represents samples collected August 6 and 7, 1996. Sample set 2 represents samples collected August 20 and 21, 1996. Sample set 3 represents samples collected October 8 and 9, 1996. Sample set 4 represents samples collected December 10 and 11, 1996. Sample set 5 represents samples collected February 11 and 12, 1997. Sample set 6 represents samples collected February 27 and 28, 1997. Recoveries were calculated from:

$$\text{recovery} = (\text{analyzed concentration in reference sample}/\text{expected concentration}) \times 100 \text{ percent.} \quad (2)$$

The recoveries are given in table 18. A recovery of 100 percent indicates a perfect match between the analytical value obtained for the reference sample and the expected value in the reference sample. Laboratory blanks were generated for each sample set for all analytes tabulated in this report. With the exception of dissolved solids in sample sets 4, 5, and 6, all laboratory blanks showed results less than the minimum reporting levels for all analytes. Laboratory blanks for dissolved solids in sample sets 4, 5, and 6 showed values of 4, 2, and 5 milligrams per liter, respectively.

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Table 1. --Method detection limits for, minimum reporting levels for, and references documenting laboratory analytical methods used in this study

[mg/L, milligrams per liter; --, not determined in this study; µg/L, micrograms per liter; ND, no method detection limit has been established]

	Dissolved			Total		
Water-quality parameter	Method detection limit	Minimum reporting level	Source for method documentation	Method detection limit	Minimum reporting level	Source for method documentation
Organic carbon	0.03 mg/L	0.1 mg/L	Brenton and Arnet, 1993	0.11 mg/L	0.1 mg/L	Fishman and Friedman, 1989
Calcium	0.007 mg/L	0.02 mg/L	Fishman, 1993	--	--	--
Magnesium	0.002 mg/L	0.01 mg/L	Fishman, 1993	--	--	--
Dissolved solids	5.5 mg/L	1.0 mg/L	Fishman and Friedman, 1989	--	--	--
Aluminum	0.7 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	10.0 µg/L	Fishman, 1993
Antimony	0.2 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Brown and McLain, 1994
Barium	0.1 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	--	--	--
Beryllium	0.4 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	10.0 µg/L	Fishman and Friedman, 1989
Cadmium	0.1 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993
Chromium	0.2 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	McLain, 1993
Cobalt	0.1 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993

Table 1. --Method detection limits for, minimum reporting levels for, and references documenting laboratory analytical methods used in this study--Concluded

Water-quality parameter	Dissolved			Total		
	Method detection limit	Minimum reporting level	Source for method documentation	Method detection limit	Minimum reporting level	Source for method documentation
Copper	0.5 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993
Lead	0.1 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993
Manganese	0.2 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	10.0 µg/L	Fishman and Friedman, 1989
Mercury	ND	0.1 µg/L	Fishman and Friedman, 1989	ND	0.1 µg/L	Fishman and Friedman, 1989
Molybdenum	0.4 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Jones, 1997
Nickel	0.6 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993
Selenium	ND	1.0 µg/L	Fishman and Friedman, 1989	ND	1.0 µg/L	Fishman and Friedman, 1989
Silver	0.3 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	1.0 µg/L	Fishman, 1993
Uranium	0.1 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	--	--	--
Zinc	0.8 µg/L	1.0 µg/L	Garbarino and Taylor, 1996	ND	10.0 µg/L	Fishman and Friedman, 1989

Table 2.--Analytical results on environmental samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico

[inst., instantaneous; µS/cm, microsiemens per centimeter at 25 degrees Celsius (deg C); mg/L, milligrams per liter; µg/L, micrograms per liter; unfltrd, unfiltered; <, less than]

Date	Time	Discharge, inst. (cubic feet per second)	Specific conductance (µS/cm)	Oxygen, dissolved (mg/L)	pH water whole, field (standard units)	Temperature water (deg C)	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Hardness, total (mg/L as $CaCO_3$)	Solids, residue at 105 deg C, total (mg/L)
Aug 1996												
06...	1250	1,180	623	7.3	8.2	31.5	3.4	5.1	42	11	150	542
07...	1130	1,060	620	7.4	8.2	24.0	3.3	6.9	41	11	150	582
20...	0845	1,140	595	6.6	8.0	24.0	3.3	6.4	35	9.5	130	754
21...	1300	1,140	603	6.9	8.3	25.5	3.3	6.1	39	10	140	488
Oct												
08...	1225	186	1,160	8.4	8.4	19.5	3.3	4.3	83	18	280	824
09...	1115	210	1,300	7.8	8.4	21.5	3.1	3.7	100	20	330	918
Dec												
10...	1210	52	1,640	9.1	8.3	13.0	3.1	2.9	110	24	370	1,080
11...	1145	50	1,630	9.4	8.5	12.5	3.2	2.9	110	23	370	1,070
Feb 1997												
11...	1230	45	1,650	10.0	8.7	11.5	3.4	3.9	120	24	400	1,100
12...	1145	45	1,650	10.0	8.4	11.0	2.7	3.9	110	24	370	1,110
27...	1315	596	851	9.6	8.5	9.5	3.6	5.1	58	14	200	618
28...	1130	580	845	10.0	8.5	8.5	3.7	5.9	56	13	190	620

Table 2.--Analytical results on environmental samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Continued

Date	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)
Aug 1996											
06...	19	1,500	1.0	1	72	<1.0	<10	<1.0	<1	1.0	<1
07...	20	1,800	<1.0	1	70	<1.0	<10	<1.0	<1	2.0	1
20...	10	2,600	<1.0	<1	62	<1.0	<10	<1.0	<1	<1.0	2
21...	6.0	1,700	<1.0	1	68	<1.0	<10	<1.0	<1	2.0	1
Oct											
08...	5.0	1,400	<1.0	<1	138	<1.0	<10	<1.0	<1	2.0	<1
09...	5.0	970	<1.0	<1	164	<1.0	<10	<1.0	<1	3.0	<1
Dec											
10...	5.0	70	<1.0	<1	113	<1.0	<10	<1.0	<1	2.0	1
11...	5.0	50	<1.0	<1	112	<1.0	<10	<1.0	<1	2.0	<1
Feb 1997											
11...	4.0	80	<1.0	1	124	<1.0	<10	<1.0	<1	2.0	<1
12...	5.0	80	<1.0	<1	121	<1.0	<10	<1.0	<1	2.0	<1
27...	4.0	1,100	<1.0	1	65	<1.0	<10	<1.0	<1	1.0	<1
28...	4.0	1,100	<1.0	1	64	<1.0	<10	<1.0	<1	1.0	<1

Table 2.--Analytical results on environmental samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Continued

Date	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)
Aug 1996										
06...	<1.0	<1	4.0	2	<1.0	1	1.0	200	<0.1	<0.10
07...	<1.0	<1	3.0	3	<1.0	1	<1.0	200	<0.1	<0.10
20...	<1.0	2	1.0	3	<1.0	3	<1.0	180	<0.1	<0.10
21...	<1.0	<1	1.0	2	<1.0	1	1.0	160	<0.1	<0.10
Oct										
08...	<1.0	1	5.0	3	<1.0	<1	2.0	50	<0.1	<0.10
09...	<1.0	<1	2.0	2	<1.0	<1	2.0	40	<0.1	<0.10
Dec										
10...	<1.0	<1	4.0	<1	<1.0	<1	34	50	<0.1	<0.10
11...	<1.0	<1	4.0	<1	<1.0	<1	32	40	<0.1	<0.10
Feb 1997										
11...	<1.0	<1	3.0	<1	<1.0	<1	21	40	<0.1	<0.10
12...	<1.0	<1	4.0	<1	<1.0	<1	19	40	<0.1	<0.10
27...	<1.0	<1	<1.0	2	<1.0	1	2.0	160	<0.1	<0.10
28...	<1.0	1	2.0	2	<1.0	2	2.0	160	<0.1	<0.10

Table 2.--Analytical results on environmental samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Concluded

Date	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996											
06...	6.0	4	3.0	3	<1	<1	<1.0	<1	2.0	4.0	10
07...	6.0	4	1.0	2	<1	<1	<1.0	<1	2.0	2.0	<10
20...	5.0	5	2.0	3	<1	<1	<1.0	<1	2.0	2.0	<10
21...	6.0	5	2.0	2	<1	<1	<1.0	<1	2.0	2.0	<10
Oct											
08...	7.0	7	2.0	2	<1	<1	<1.0	<1	3.0	4.0	<10
09...	8.0	6	3.0	2	<1	<1	<1.0	<1	4.0	2.0	<10
Dec											
10...	8.0	7	2.0	2	<1	<1	<1.0	<1	4.0	6.0	<10
11...	8.0	7	2.0	1	<1	<1	<1.0	<1	4.0	5.0	<10
Feb 1997											
11...	8.0	7	2.0	<1	<1	<1	<1.0	<1	4.0	14	10
12...	7.0	6	1.0	<1	<1	<1	<1.0	<1	4.0	6.0	<10
27...	6.0	6	<1.0	2	<1	<1	<1.0	<1	3.0	4.0	<10
28...	6.0	5	<1.0	2	<1	<1	<1.0	<1	3.0	3.0	<10

Table 3.--Analytical results on replicate samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico

[mg/L, milligrams per liter; deg C, degrees Celsius; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Hardness, total (mg/L as $CaCO_3$)	Solids, residue at 105 deg C, total (mg/L)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)
Aug 1996										
06...	1330	3.3	5.9	42	11	150	512	20	1,700	<1.0
20...	0920	3.3	5.8	36	9.8	130	786	8.0	2,000	1.0
Oct										
08...	1300	3.3	4.6	83	18	280	846	6.0	1,500	<1.0
Dec										
10...	1255	3.1	3.3	110	24	370	1,080	5.0	60	<1.0
Feb 1997										
12...	1220	2.6	5.0	120	25	400	1,110	4.0	80	<1.0
28...	1215	3.9	6.6	58	14	200	618	4.0	1,200	<1.0

Date	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)
Aug 1996										
06...	2	73	<1.0	<10	<1.0	<1	<1.0	1	<1.0	1
20...	<1	66	<1.0	<10	<1.0	<1	<1.0	1	<1.0	<1
Oct										
08...	<1	138	<1.0	<10	<1.0	<1	2.0	1	<1.0	1
Dec										
10...	<1	117	<1.0	<10	<1.0	<1	<2.0	<1	<1.0	<1
Feb 1997										
12...	<1	128	<1.0	<10	<1.0	<1	2.0	<1	<1.0	<1
28...	2	68	<1.0	<10	<1.0	<1	1.0	1	<1.0	1

Table 3.--Analytical results on replicate samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Concluded

Date	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)
Aug 1996										
06...	4.0	4	<1.0	2	<1.0	200	<0.1	<0.10	6.0	5
20...	1.0	2	<1.0	2	1.0	160	<0.1	<0.10	6.0	5
Oct										
08...	6.0	2	<1.0	<1	2.0	50	<0.1	<0.10	6.0	6
Dec										
10...	2.0	<1	<1.0	<1	35	50	<0.1	<0.10	8.0	7
Feb 1997										
12...	1.0	<1	<1.0	<1	20	40	<0.1	<0.10	8.0	7
28...	<1.0	2	<1.0	2	2.0	170	<0.1	<0.10	6.0	5

Date	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996									
06...	2.0	7	<1	<1	<1.0	<1	2.0	4.0	20
20...	2.0	2	<1	<1	<1.0	<1	2.0	7.0	<10
Oct									
08...	2.0	2	<1	<1	<1.0	<1	3.0	4.0	<10
Dec									
10...	2.0	1	<1	<1	<1.0	<1	4.0	9.0	<10
Feb 1997									
12...	2.0	1	<1	<1	<1.0	<1	4.0	2.0	<10
28...	<1.0	2	<1	<1	<1.0	<1	3.0	<1.0	<10

Table 4.--Analytical results on ambient blanks collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico

[mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dis-solved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dis-solved (mg/L as Ca)	Magne-sium, dis-solved (mg/L as Mg)	Alu-minum, dis-solved (µg/L as Al)	Alu-minum, total recov-erable (µg/L as Al)	Anti-mony, dis-solved (µg/L as Sb)	Anti-mony, total (µg/L as Sb)	Barium, dis-solved (µg/L as Ba)
Aug 1996										
20...	0847	<0.10	<0.10	<0.02	<0.01	<1.0	<10	<1.0	<1	<1.0
Oct										
09...	1116	<0.10	0.10	<0.02	<0.01	3.0	10	<1.0	<1	<1.0
Feb 1997										
11...	1231	<0.10	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0
28...	1132	<0.10	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0

Date	Beryl-lium, dis-solved (µg/L as Be)	Beryl-lium, total recov-erable (µg/L as Be)	Cadmium, dis-solved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chro-mium, dis-solved (µg/L as Cr)	Chro-mium, total recov-erable (µg/L as Cr)	Cobalt, dis-solved (µg/L as Co)	Cobalt, total recov-erable (µg/L as Co)	Copper, dis-solved (µg/L as Cu)
Aug 1996									
20...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Oct									
09...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Feb 1997									
11...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
28...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0

Table 4.--Analytical results on ambient blanks collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Concluded

Date	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)
Aug 1996									
20...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Oct									
09...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Feb 1997									
11...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
28...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1

Date	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996									
20...	<1.0	<1	<1	<1	<1.0	<1	<1.0	<1.0	<10
Oct									
09...	<1.0	<1	<1	<1	<1.0	<1	<1.0	1.0	<10
Feb 1997									
11...	<1.0	<1	<1	<1	<1.0	<1	<1.0	3.0	<10
28...	<1.0	<1	<1	<1	<1.0	<1	<1.0	4.0	<10

Table 5.--Analytical results on environmental samples collected at the City of Las Cruces wastewater-treatment plant

[inst., instantaneous; µS/cm, microsiemens per centimeter at 25 degrees Celsius (deg C); mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered; --, no data]

Date	Time	Discharge, inst. (cubic feet per second)	Specific conductance (µS/cm)	Oxygen, dissolved (mg/L)	ph water whole, field (standard units)	Temperature water (deg C)	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Hardness, total (mg/L as $CaCO_3$)
Aug 1996											
06...	0950	15	1,260	6.7	7.5	29.0	5.1	7.6	72	18	250
07...	0950	15	1,260	6.4	7.4	28.0	5.0	5.8	72	18	250
20...	1100	16	1,220	6.4	7.3	32.0	5.5	8.9	70	18	250
21...	1130	17	1,210	6.3	7.3	28.0	5.0	6.6	71	18	250
Oct											
08...	0935	18	1,230	5.7	7.3	25.5	6.5	8.0	71	18	250
09...	0945	17	1,240	6.2	7.5	26.0	6.3	7.4	73	17	250
Dec											
10...	1030	16	1,270	6.8	7.3	21.0	10	9.6	81	18	280
11...	1030	16	1,290	6.9	7.3	21.0	7.8	39	78	17	260
Feb 1997											
11...	1100	14	1,410	6.7	7.8	18.0	13	18	95	21	320
12...	1015	14	1,430	7.1	7.5	19.0	7.1	10	93	21	320
27...	1130	15	1,410	6.7	7.3	18.0	7.6	8.6	95	21	320
28...	0945	14	1,410	7.2	7.5	10.5	7.6	9.9	93	21	320

Table 5.--Analytical results on environmental samples collected at the City of Las Cruces wastewater-treatment plant--Continued

Date	Solids, residue at 105 deg C, total (mg/L)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)
Aug 1996											
06...	812	17	30	<1.0	<1	8.0	<1.0	<10	<1.0	<1	1.0
07...	798	15	30	<1.0	<1	8.0	<1.0	<10	<1.0	<1	2.0
20...	786	13	40	<1.0	<1	9.0	<1.0	<10	<1.0	<1	1.0
21...	780	13	40	<1.0	<1	8.0	<1.0	<10	<1.0	<1	2.0
Oct											
08...	786	14	20	<1.0	<1	7.0	<1.0	<10	<1.0	<1	2.0
09...	784	11	30	<1.0	<1	7.0	<1.0	<10	<1.0	<1	2.0
Dec											
10...	836	11	60	1.0	<1	16	<1.0	<10	<1.0	<1	<1.0
11...	902	12	720	1.0	1	17	<1.0	<10	<1.0	<1	1.0
Feb 1997											
11...	--	9.0	50	1.0	<1	19	<1.0	<10	<1.0	<1	1.0
12...	920	9.0	50	1.0	<1	20	<1.0	<10	<1.0	<1	2.0
27...	900	8.0	50	1.0	<1	15	<1.0	<10	<1.0	<1	2.0
28...	904	8.0	50	1.0	1	15	<1.0	<10	<1.0	<1	2.0

Table 5.--Analytical results on environmental samples collected at the City of Las Cruces wastewater-treatment plant--Continued

Date	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total tecoverable (µg/L as Hg)
Aug 1996											
06...	<1	<1.0	<1	3.0	1	<1.0	<1	32	50	<0.1	<0.10
07...	<1	<1.0	<1	2.0	1	<1.0	<1	30	40	<0.1	<0.10
20...	<1	<1.0	<1	2.0	2	<1.0	<1	39	50	<0.1	<0.10
21...	<1	<1.0	<1	2.0	2	<1.0	<1	35	40	<0.1	<0.10
Oct											
08...	<1	<1.0	<1	<1.0	<1	<1.0	<1	55	60	<0.1	<0.10
09...	<1	<1.0	<1	<1.0	<1	<1.0	<1	51	60	<0.1	<0.10
Dec											
10...	<1	<1.0	<1	2.0	3	<1.0	<1	31	40	<0.1	<0.10
11...	3	<1.0	<1	8.0	56	<1.0	8	37	70	<0.1	<0.10
Feb 1997											
11...	<1	<1.0	<1	2.0	3	<1.0	<1	47	60	<0.1	<0.10
12...	<1	<1.0	<1	1.0	2	<1.0	<1	51	60	<0.1	<0.10
27...	<1	<1.0	<1	1.0	5	<1.0	1	45	50	<0.1	<0.10
28...	<1	<1.0	<1	3.0	3	<1.0	<1	79	80	<0.1	<0.10

Table 5.--Analytical results on environmental samples collected at the City of Las Cruces wastewater-treatment plant--Concluded

Date	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996											
06...	27	23	3.0	2	<1	<1	<1.0	<1	10	18	30
07...	28	23	3.0	1	<1	<1	<1.0	<1	10	16	20
20...	31	27	4.0	2	<1	<1	<1.0	<1	11	16	<10
21...	31	27	4.0	1	<1	<1	<1.0	<1	10	14	10
Oct											
08...	20	18	3.0	2	<1	<1	<1.0	<1	9.0	15	20
09...	20	16	3.0	2	<1	<1	<1.0	<1	8.0	11	10
Dec											
10...	22	19	2.0	2	1	1	<1.0	<1	7.0	25	30
11...	18	16	2.0	3	1	1	<1.0	3	7.0	46	100
Feb 1997											
11...	28	27	2.0	2	1	1	<1.0	<1	11	31	30
12...	42	40	3.0	2	1	1	<1.0	<1	13	40	30
27...	30	27	2.0	2	1	1	<1.0	<1	11	24	30
28...	31	27	2.0	2	1	1	<1.0	<1	12	24	20

Table 6.--Analytical results on split samples collected at the City of Las Cruces wastewater-treatment plant

[mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)
Aug 1996												
06...	0950	5.1	7.6	17	30	<1.0	<1	8.0	<1.0	<10	<1.0	<1
07...	0950	5.0	5.8	15	30	<1.0	<1	8.0	<1.0	<10	<1.0	<1
20...	1100	5.5	8.9	13	40	<1.0	<1	9.0	<1.0	<10	<1.0	<1
21...	1130	5.0	6.6	13	40	<1.0	<1	8.0	<1.0	<10	<1.0	<1
Oct												
08...	0935	6.5	8.0	14	20	<1.0	<1	7.0	<1.0	<10	<1.0	<1
09...	0945	6.3	7.4	11	30	<1.0	<1	7.0	<1.0	<10	<1.0	<1
Dec												
10...	1030	10	9.6	11	60	1.0	<1	16	<1.0	<10	<1.0	<1
11...	1030	7.8	39	12	720	1.0	1	17	<1.0	<10	<1.0	<1
Feb 1997												
11...	1100	13	18	9.0	50	1.0	<1	19	<1.0	<10	<1.0	<1
12...	1015	7.1	10	9.0	50	1.0	<1	20	<1.0	<10	<1.0	<1
27...	1130	7.6	8.6	8.0	50	1.0	<1	15	<1.0	<10	<1.0	<1
28...	0945	7.6	9.9	8.0	50	1.0	1	15	<1.0	<10	<1.0	<1

Table 6.--Analytical results on split samples collected at the City of Las Cruces wastewater-treatment plant--Continued

Date	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)
Aug 1996												
06...	1.0	<1	<1.0	<1	3.0	1	<1.0	<1	32	50	<0.1	<0.10
07...	2.0	<1	<1.0	<1	2.0	1	<1.0	<1	30	40	<0.1	<0.10
20...	1.0	<1	<1.0	<1	2.0	2	<1.0	<1	39	50	<0.1	<0.10
21...	2.0	<1	<1.0	<1	2.0	2	<1.0	<1	35	40	<0.1	<0.10
Oct												
08...	2.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	55	50	<0.1	<0.10
09...	2.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	51	50	<0.1	<0.10
Dec												
10...	1.0	<1	<1.0	<1	2.0	3	<1.0	<1	31	40	<0.1	<0.10
11...	1.0	3	<1.0	<1	8.0	56	<1.0	8	37	70	<0.1	<0.10
Feb 1997												
11...	1.0	<1	<1.0	<1	2.0	3	<1.0	<1	47	60	<0.1	<0.10
12...	2.0	<1	<1.0	<1	1.0	2	<1.0	<1	51	40	<0.1	<0.10
27...	2.0	<1	<1.0	<1	1.0	5	<1.0	1	45	50	<0.1	<0.10
28...	2.0	<1	<1.0	<1	3.0	3	<1.0	<1	78	80	<0.1	<0.10

Table 6.--Analytical results on split samples collected at the City of Las Cruces wastewater-treatment plant--Concluded

Date	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996											
06...	27	23	3.0	2	<1	<1	<1.0	<1	10	18	20
07...	28	23	3.0	1	<1	<1	<1.0	<1	10	16	20
20...	31	27	4.0	5	<1	<1	<1.0	<1	11	16	10
21...	31	27	4.0	1	<1	<1	<1.0	<1	10	14	10
Oct											
08...	20	18	3.0	2	<1	<1	<1.0	<1	9.0	15	20
09...	20	16	3.0	2	<1	<1	<1.0	<1	8.0	11	10
Dec											
10...	22	19	2.0	2	1	1	<1.0	<1	7.0	25	30
11...	18	16	2.0	3	1	1	<1.0	3	7.0	46	100
Feb 1997											
11...	28	27	2.0	2	1	1	<1.0	<1	11	31	30
12...	42	40	3.0	2	1	1	<1.0	<1	13	40	30
27...	30	27	2.0	2	1	1	<1.0	<1	11	24	30
28...	31	27	2.0	2	1	1	<1.0	<1	12	24	20

Table 7.--Analytical results on ambient blanks collected at the City of Las Cruces wastewater-treatment plant

[mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)
Aug 1996										
06...	0953	<0.10	<0.10	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0
21...	1132	<0.10	<0.10	<0.02	<0.01	3.0	<10	1.0	<1	<1.0
Dec										
10...	1032	<0.10	0.30	<0.02	<0.01	6.0	<10	<1.0	<1	<1.0
Feb 1997										
12...	1017	<0.10	0.40	0.02	<0.01	3.0	<10	<1.0	<1	<1.0

Date	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)
Aug 1996									
06...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
21...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Dec									
10...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Feb 1997									
12...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0

Table 7.--Analytical results on ambient blanks collected at the City of Las Cruces wastewater-treatment plant--Concluded

Date	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)
Aug 1996									
06...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
21...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Dec									
10...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Feb 1997									
12...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1

Date	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996									
06...	<1.0	<1	<1	<1	<1.0	<1	<1.0	<1.0	<10
21...	<1.0	<1	<1	<1	<1.0	<1	<1.0	2.0	<10
Dec									
10...	<1.0	<1	<1	<1	<1.0	<1	<1.0	<1.0	<10
Feb 1997									
12...	<1.0	<1	<1	<1	<1.0	<1	<1.0	4.0	<10

Table 8.--Analytical results on environmental samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico

[µS/cm, microsiemens per centimeter at 25 degrees Celsius (deg C); mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Discharge, inst. (cubic feet per second)	Specific conductance (µS/cm)	Oxygen, dissolved (mg/L)	ph water whole, field (standard units)	Temperature water (deg C)	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Hardness, total (mg/L as $CaCO_3$)
Aug 1996											
06...	0830	1,120	623	7.0	8.3	23.0	3.3	6.5	42	11	150
07...	0800	1,290	611	7.3	8.2	24.0	3.3	6.3	40	10	140
20...	1330	1,680	595	7.1	8.1	27.0	3.5	6.0	36	9.5	130
21...	0845	1,630	610	6.3	8.3	24.0	3.3	6.2	38	10	140
Oct											
08...	0845	172	1,190	7.9	8.2	18.0	3.2	4.0	83	18	280
09...	0815	154	1,240	8.0	8.4	18.0	3.2	3.9	93	20	310
Dec											
10...	0845	48	1,600	9.4	8.3	10.0	3.5	4.1	110	23	370
11...	0810	48	1,620	9.9	8.4	9.5	3.5	3.7	100	22	340
Feb 1997											
11...	0915	45	1,650	9.4	8.4	6.0	3.4	3.9	110	23	370
12...	0815	43	1,650	9.8	8.4	7.5	3.4	5.1	110	24	370
27...	0930	563	853	10.4	8.5	6.0	3.8	6.1	57	13	200
28...	0830	530	854	9.7	8.5	7.5	3.6	6.7	58	14	20

Table 8.--Analytical results on environmental samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Continued

Date	Solids, residue at 105 deg C, total (mg/L)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)
Aug 1996											
06...	546	25	1,900	<1.0	1	73	<1.0	<10	<1.0	<1	2.0
07...	628	21	1,900	2.0	1	68	<1.0	<10	<1.0	<1	2.0
20...	678	6.0	2,700	1.0	<1	63	<1.0	<10	<1.0	<1	<1.0
21...	692	5.0	2,500	<1.0	<1	66	<1.0	<10	<1.0	<1	1.0
Oct											
08...	826	5.0	1,200	<1.0	<1	142	<1.0	<10	<1.0	<1	2.0
09...	884	5.0	1,000	<1.0	<1	154	<1.0	<10	<1.0	<1	3.0
Dec											
10...	1,060	7.0	50	<1.0	<1	99	<1.0	<10	<1.0	<1	1.0
11...	1,070	6.0	50	<1.0	<1	96	<1.0	<10	<1.0	<1	1.0
Feb 1997											
11...	1,090	5.0	90	<1.0	<1	105	<1.0	<10	<1.0	<1	2.0
12...	1,080	4.0	120	<1.0	1	109	<1.0	<10	<1.0	<1	1.0
27...	614	6.0	1,100	<1.0	1	61	<1.0	<10	<1.0	<1	1.0
28...	614	4.0	1,200	<1.0	2	66	<1.0	<10	<1.0	<1	1.0

Table 8.--Analytical results on environmental samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Continued

Date	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)
Aug 1996											
06...	1	<1.0	<1	6.0	3	<1.0	2	<1.0	220	<0.1	<0.10
07...	1	<1.0	1	3.0	3	<1.0	2	<1.0	180	<0.1	<0.10
20...	2	<1.0	6	2.0	2	<1.0	4	1.0	230	<0.1	<0.10
21...	2	<1.0	1	2.0	2	<1.0	2	<1.0	170	<0.1	<0.10
Oct											
08...	<1	<1.0	1	2.0	5	<1.0	<1	1.0	30	<0.1	<0.10
09...	<1	<1.0	<1	1.0	2	<1.0	<1	1.0	30	<0.1	<0.10
Dec											
10...	<1	<1.0	<1	2.0	1	<1.0	<1	11	20	<0.1	<0.10
11...	<1	<1.0	<1	2.0	1	<1.0	<1	10	20	<0.1	<0.10
Feb 1997											
11...	<1	<1.0	<1	4.0	<1	<1.0	<1	10	20	<0.1	<0.10
12...	<1	<1.0	<1	<1.0	<1	<1.0	<1	9.0	30	<0.1	<0.10
27...	1	<1.0	<1	<1.0	2	<1.0	2	2.0	150	<0.1	<0.10
28...	<1	<1.0	<1	<1.0	2	<1.0	2	1.0	160	<0.1	<0.10

Table 8.--Analytical results on environmental samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Concluded

Date	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996											
06...	6.0	4	2.0	2	<1	<1	<1.0	<1	2.0	6.0	20
07...	6.0	4	2.0	3	<1	<1	<1.0	<1	2.0	6.0	20
20...	6.0	4	2.0	6	<1	<1	<1.0	<1	2.0	8.0	20
21...	6.0	4	2.0	2	<1	<1	<1.0	<1	2.0	6.0	<10
Oct											
08...	7.0	7	2.0	2	<1	<1	<1.0	<1	4.0	5.0	<10
09...	8.0	7	2.0	2	<1	<1	<1.0	<1	4.0	<1.0	<10
Dec											
10...	9.0	8	2.0	<1	<1	<1	<1.0	<1	4.0	7.0	<10
11...	9.0	8	2.0	1	<1	<1	<1.0	<1	4.0	6.0	<10
Feb 1997											
11...	10	9	1.0	1	<1	<1	<1.0	<1	5.0	6.0	<10
12...	12	10	1.0	1	<1	<1	<1.0	<1	6.0	6.0	<10
27...	6.0	6	<1.0	2	<1	<1	<1.0	<1	3.0	10	<10
28...	7.0	6	1.0	2	<1	<1	<1.0	<1	3.0	5.0	<10

Table 9.--Analytical results on replicate samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico

[mg/L, milligrams per liter; deg C, degrees Celsius; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Hardness total (mg/L as $CaCO_3$)	Solids, residue at 105 deg C, total (mg/L)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)
Aug 1996										
07...	0840	3.5	5.9	41	11	150	534	18	1,800	1.0
21...	0930	3.4	6.2	38	10	140	430	6.0	2,700	<1.0
Oct										
09...	0850	3.4	3.9	94	20	320	890	5.0	910	<1.0
Dec										
11...	0850	3.5	5.3	110	24	370	1,070	4.0	360	<1.0
Feb 1997										
11...	0945	3.3	3.8	120	25	400	1,080	4.0	90	<1.0
27...	1005	3.9	6.9	59	14	210	610	4.0	1,100	<1.0

Date	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)
Aug 1996										
07...	2	70	<1.0	<10	<1.0	<1	2.0	3	<1.0	<1
21...	<1	66	<1.0	<10	<1.0	<1	2.0	2	<1.0	1
Oct										
09...	<1	148	<1.0	<10	<1.0	<1	3.0	<1	<1.0	<1
Dec										
11...	<1	101	<1.0	<10	<1.0	<1	1.0	<1	<1.0	<1
Feb 1997										
11...	<1	115	<1.0	<10	<1.0	<1	2.0	<1	<1.0	<1
27...	1	63	<1.0	<10	<1.0	<1	1.0	<1	<1.0	1

Table 9.--Analytical results on replicate samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Concluded

Date	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)
Aug 1996										
07...	2.0	2	<1.0	1	<1.0	170	<0.1	<0.10	7.0	4
21...	2.0	2	<1.0	3	<1.0	180	<0.1	<0.10	6.0	4
Oct										
09...	2.0	<1	<1.0	<1	1.0	40	<0.1	<0.10	8.0	7
Dec										
11...	2.0	1	<1.0	<1	11	20	<0.1	<0.10	9.0	8
Feb 1997										
11...	<1.0	<1	<1.0	<1	10	20	<0.1	<0.10	11	9
27...	<1.0	2	<1.0	2	2.0	150	<0.1	<0.10	7.0	5

Date	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996									
07...	1.0	4	<1	<1	<1.0	<1	2.0	7.0	50
21...	2.0	2	<1	<1	<1.0	<1	2.0	4.0	<10
Oct									
09...	2.0	2	<1	<1	<1.0	<1	3.0	3.0	<10
Dec									
11...	2.0	1	<1	<1	<1.0	<1	5.0	5.0	<10
Feb 1997									
11...	1.0	<1	<1	<1	<1.0	<1	6.0	12	10
27...	<1.0	2	<1	<1	<1.0	<1	3.0	2.0	<10

Table 10.--Analytical results on ambient blanks collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico

[mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Time	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)
Aug 1996										
07...	0802	<0.10	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0
Oct										
08...	0846	0.60	0.10	<0.02	<0.01	4.0	<10	<1.0	<1	<1.0
Dec										
11...	0812	<0.10	0.30	<0.02	<0.01	4.0	<10	<1.0	<1	<1.0
Feb 1997										
27...	0932	<0.10	0.40	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0

Date	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)
Aug 1996									
07...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Oct									
08...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	3.0
Dec									
11...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Feb 1997									
27...	<1.0	<10	<1.0	<1	<1.0	<1	<1.0	<1	<1.0

Table 10.--Analytical results on ambient blanks collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Concluded

Date	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)
Aug 1996									
07...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Oct									
08...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Dec									
11...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1
Feb 1997									
27...	<1	<1.0	<1	<1.0	<10	<0.1	<0.10	<1.0	<1

Date	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996									
07...	<1.0	<1	<1	<1	<1.0	<1	<1.0	<1.0	<10
Oct									
08...	<1.0	<1	<1	<1	<1.0	<1	<1.0	5.0	<10
Dec									
11...	<1.0	<1	<1	<1	<1.0	<1	<1.0	3.0	<10
Feb 1997									
27...	<1.0	<1	<1	<1	<1.0	<1	<1.0	2.0	<10

Table 11.--Analytical results on equipment blanks

[mg/L, milligrams per liter; µg/L, micrograms per liter; <, less than; unfltrd, unfiltered]

Date	Carbon, organic, dissolved (mg/L as C)	Carbon, organic, total (mg/L as C)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Aluminum, dissolved (µg/L as Al)	Aluminum, total recoverable (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Antimony, total (µg/L as Sb)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Beryllium, total recoverable (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)
Aug 1996												
06...	0.30	0.30	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
07...	0.20	<0.10	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
20...	0.40	<0.10	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
21...	0.20	<0.10	<0.02	<0.01	4.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
Oct												
08...	0.20	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
09...	0.20	0.10	0.05	<0.01	4.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
Dec												
10...	0.20	0.10	<0.02	<0.01	7.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
11...	0.10	<0.10	<0.02	<0.01	4.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
Feb 1997												
11...	0.20	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
12...	0.20	0.30	0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0
27...	0.10	0.30	0.05	<0.01	4.0	10	<1.0	<1	<1.0	<1.0	<10	<1.0
28...	0.20	0.20	<0.02	<0.01	3.0	<10	<1.0	<1	<1.0	<1.0	<10	<1.0

Table 11.--Analytical results on equipment blanks--Continued

Date	Cadmium water unfltrd, total (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Cobalt, total recoverable (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Mercury, dissolved (µg/L as Hg)
Aug 1996												
06...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1
07...	<1	<1.0	<1	<1.0	<1	<1.0	1	<1.0	<1	<1.0	<10	<0.1
20...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1
21...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1
Oct												
08...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1
09...	<1	<1.0	<1	<1.0	<1	3.0	<1	<1.0	<1	<1.0	<10	<0.1
Dec												
10...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1
11...	<1	<1.0	<1	<1.0	<1	5.0	<1	<1.0	<1	<1.0	<10	<0.1
Feb 1997												
11...	<1	<1.0	<1	<1.0	<1	1.0	<1	<1.0	<1	<1.0	<10	<0.1
12...	<1	<1.0	<1	<1.0	<1	2.0	<1	<1.0	<1	<1.0	<10	<0.1
27...	<1	<1.0	<1	<1.0	<1	2.0	<1	<1.0	<1	<1.0	<10	<0.1
28...	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0	<10	<0.1

Table 11.--Analytical results on equipment blanks--Concluded

Date	Mercury, total recoverable (µg/L as Hg)	Molybdenum, dissolved (µg/L as Mo)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Selenium, total (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Silver, total recoverable (µg/L as Ag)	Uranium natural, dissolved (µg/L as U)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)
Aug 1996												
06...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	2.0	20
07...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	2.0	<10
20...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	9.0	<10
21...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	4.0	<10
Oct												
08...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	<1.0	<10
09...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	11	<10
Dec												
10...	<0.10	<1.0	1	<1.0	<1	<1	<1	<1.0	<1	<1.0	5.0	<10
11...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	6.0	<10
Feb 1997												
11...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	3.0	<10
12...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	8.0	<10
27...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	15	<10
28...	<0.10	<1.0	<1	<1.0	<1	<1	<1	<1.0	<1	<1.0	2.0	<10

Table 12.--Absolute and relative differences between selected constituents in environmental and replicate samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico

[E, concentration of constituent in environmental sample; R, concentration of constituent in replicate sample; %, percent; mg/L, milligrams per liter; BRL, E and/or R less than the minimum reporting level]

	Dissolved solids		Organic carbon, dissolved		Organic carbon, total		Calcium, dissolved		Magnesium, dissolved	
Date	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%
August 6, 1996	30	5.7	0.1	3	-0.8	7	0	0	0	0
August 20, 1996	-32	4.2	0	0	0.6	10	-1	3	-0.3	3
October 8, 1996	-22	2.6	0	0	-0.3	7	0	0	0	0
December 10, 1996	0	0	0	0	-0.4	10	0	0	0	0
February 12, 1997	0	0	0.1	4	-1.1	25	-10	8.7	-1	4
February 28, 1997	2	0.3	-0.2	5	-0.7	10	-1	2	-1	7

Table 12.--Absolute and relative differences between selected constituents in environmental and replicate samples collected from the Rio Grande at Picacho Bridge near Las Cruces, New Mexico--Concluded

	Barium, dissolved		Chromium, dissolved		Chromium, total		Aluminum, dissolved		Aluminum, total	
Date	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$
August 6, 1996	-1	1	0	0	BRL	BRL	-1	5	-200	10
August 20, 1996	-4	6	BRL	BRL	1	30	2	20	600	30
October 8, 1996	0	0	0	0	BRL	BRL	-1	20	-100	7
December 10, 1996	-4	3	0	0	0	0	0	0	10	20
February 12, 1997	-7	6	0	0	BRL	BRL	1	20	0	0
February 28, 1997	-4	6	0	0	BRL	BRL	0	0	-100	9

Table 13.--Absolute and relative differences between selected constituents in environmental and split samples collected at the City of Las Cruces wastewater-treatment plant

[E, concentration of constituent in environmental sample; S, concentration of constituent in split sample; µg/L, micrograms per liter; BRL, E and/or S less than the minimum reporting level]

	Chromium, dissolved		Manganese, dissolved		Manganese, total		Nickel, dissolved		Zinc, total	
Date	(E-S), in µg/L	$\frac{\lvert E-S \rvert}{(E+S)/2} \times 100\%$	(E-S), in µg/L	$\frac{\lvert E-S \rvert}{(E+S)/2} \times 100\%$	(E-S), in µg/L	$\frac{\lvert E-S \rvert}{(E+S)/2} \times 100\%$	(E-S), in µg/L	$\frac{\lvert E-S \rvert}{(E+S)/2} \times 100\%$	(E-S), in µg/L	$\frac{\lvert E-S \rvert}{(E+S)/2} \times 100\%$
August 6, 1996	0	0	0	0	0	0	0	0	10	40
August 7, 1996	0	0	0	0	0	0	0	0	0	0
August 20, 1996	0	0	0	0	0	0	BRL	BRL	0	0
August 21, 1996	0	0	0	0	0	0	0	0	0	0
October 8, 1996	0	0	0	0	10	20	0	0	0	0
October 9, 1996	0	0	0	0	10	20	0	0	0	0
December 10, 1996	BRL	BRL	0	0	0	0	0	0	0	0
December 11, 1996	0	0	0	0	0	0	0	0	0	0
February 11, 1997	0	0	0	0	0	0	0	0	0	0
February 12, 1997	0	0	0	0	20	40	0	0	0	0
February 27, 1997	0	0	0	0	0	0	0	0	0	0
February 28, 1997	0	0	1	1	0	0	0	0	0	0

Table 14.--Absolute and relative differences between selected constituents in environmental and replicate samples collected from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico

[E, concentration of constituent in environmental sample; R, concentration of constituent in replicate sample; mg/L, milligrams per liter; µg/L, micrograms per liter; BRL, E and/or R less than the minimum reporting level]

	Dissolved solids		Organic carbon, dissolved		Organic carbon, total		Calcium, dissolved		Magnesium, dissolved		Barium, dissolved	
Date	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in mg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2} \times 100\%$
August 7, 1996	94	16	-0.2	6	0.4	7	-1	2	-1	10	-2	3
August 21, 1996	262	46.7	-0.1	3	0	0	0	0	0	0	0	0
October 9, 1996	-6	0.7	-0.2	6	0	0	-1	1	0	0	6	4
December 11, 1996	0	0	0	0	-1.6	36	-10	10	-2	9	-5	5
February 11, 1997	10	0.9	0.1	3	0.1	3	-10	9	-2	9	-10	9
February 27, 1997	4	0.7	-0.1	3	-0.8	12	-2	3	-1	7	-2	3

Table 14.--Absolute and relative differences between selected constituents in environmental and replicate samples from the Rio Grande at Calle del Norte Bridge near Mesilla, New Mexico--Concluded

	Chromium, dissolved		Chromium, total		Aluminum, dissolved		Aluminum, total		Uranium, dissolved	
Date	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%	(E-R), in µg/L	$\frac{\lvert E-R \rvert}{(E+R)/2}$ x 100%
August 7, 1996	0	0	-2	100	3	15	100	5	0	0
August 21, 1996	-1	67	0	0	-1	20	-200	8	0	0
October 9, 1996	0	0	BRL	BRL	0	0	90	9.4	1	30
December 11, 1996	0	0	BRL	BRL	2	40	-310	150	-1	20
February 11, 1997	0	0	BRL	BRL	1	20	0	0	-1	20
February 27, 1997	0	0	BRL	BRL	2	40	0	0	0	0

Table 15.--Spike recoveries in environmental samples collected at the City of Las Cruces wastewater-treatment plant
[All values are percentages]

Sampling date	Carbon, dissolved	Organic carbon, total	Barium, dissolved	Aluminum, dissolved	Aluminum, total	Antimony, dissolved	Antimony, total	Beryllium, dissolved
August 6, 1996	99	102	107	98	109	113	88	108
August 7, 1996	99	92	103	92	105	113	83	98
August 20, 1996	100	104	106	84	108	112	84	92
August 21, 1996	96	116	104	85	109	110	102	90
October 8, 1996	106	100	103	90	93	100	83	100
October 9, 1996	104	103	99	88	88	99	96	94
December 10, 1996	95	88	101	97	98	101	97	103
December 11, 1996	96	160	97	103	107	100	85	105
February 11, 1997	85	100	101	92	109	99	87	101
February 12, 1997	102	80	99	92	100	99	86	100
February 27, 1997	102	97	102	95	89	102	92	102
February 28, 1997	97	106	104	95	97	102	107	102

Table 15.--Spike recoveries in environmental samples collected at the City of Las Cruces wastewater-treatment plant--Continued

Sampling date	Beryllium, total	Cadmium, dissolved	Cadmium, total	Chromium, dissolved	Chromium, total	Cobalt, dissolved	Cobalt, total	Copper, dissolved
August 6, 1996	97	98	99	90	90	91	108	93
August 7, 1996	101	98	102	90	194	90	106	96
August 20, 1996	94	101	96	94	111	97	88	98
August 21, 1996	102	97	108	94	109	95	94	97
October 8, 1996	96	99	104	92	102	94	104	99
October 9, 1996	94	97	106	92	101	94	101	97
December 10, 1996	93	97	97	95	100	95	99	100
December 11, 1996	95	98	95	99	103	99	99	101
February 11, 1997	88	97	108	90	102	94	105	99
February 12, 1997	96	97	106	91	103	93	103	97
February 27, 1997	88	96	106	92	106	95	105	97
February 28, 1997	95	97	106	93	103	96	105	98

Table 15.--Spike recoveries in environmental samples collected at the City of Las Cruces wastewater-treatment plant--Continued

Sampling date	Copper, total	Lead, dissolved	Lead, total	Manganese, dissolved	Manganese, total	Mercury, dissolved	Mercury, total	Molybdenum, dissolved	Molybdenum, total
August 6, 1996	104	103	101	92	92	105	108	104	90
August 7, 1996	112	102	102	92	98	103	98	103	90
August 20, 1996	94	104	94	96	90	103	93	104	97
August 21, 1996	95	103	103	94	97	94	95	102	95
October 8, 1996	102	101	103	95	88	111	94	96	91
October 9, 1996	101	101	105	97	91	92	97	94	94
December 10, 1996	91	99	101	96	96	103	99	98	90
December 11, 1996	109	98	92	98	96	100	105	98	85
February 11, 1997	103	97	98	91	90	113	101	98	102
February 12, 1997	97	96	99	91	117	110	101	98	95
February 27, 1997	89	95	101	95	94	103	84	99	99
February 28, 1997	98	95	98	95	84	101	87	100	99

Table 15.--Spike recoveries in environmental samples collected at the City of Las Cruces wastewater-treatment plant--Concluded

Sampling date	Nickel, dissolved	Nickel, total	Selenium, dissolved	Selenium, total	Silver, dissolved	Silver, total	Uranium, dissolved	Zinc, dissolved	Zinc, total
August 6, 1996	86	108	120	108	92	104	95	84	98
August 7, 1996	90	260	95	103	90	114	99	87	120
August 20, 1996	94	69	100	104	94	100	101	94	106
August 21, 1996	94	104	99	117	93	100	101	95	92
October 8, 1996	95	105	86	81	93	90	98	99	93
October 9, 1996	89	100	81	92	93	90	100	89	95
December 10, 1996	90	99	89	90	87	92	94	93	112
December 11, 1996	100	98	97	98	90	94	94	95	132
February 11, 1997	91	99	95	103	94	98	95	89	97
February 12, 1997	88	98	97	105	93	96	92	82	102
February 27, 1997	89	106	118	105	90	92	98	100	102
February 28, 1997	89	105	93	110	91	94	98	98	100

Table 16.--Minimum, median, and maximum values for constituents in all ambient blanks in which at least one analysis exceeds the minimum reporting level for that constituent

[mg/L, milligrams per liter; <, less than; µg/L, micrograms per liter]

Constituent	Minimum reporting level	Minimum concentration	Median concentration	Maximum concentration	Number of analyses, from a total of 12, showing values greater than the minimum reporting level
Organic carbon, dissolved	0.1mg/L	<0.1mg/L	<0.1 mg/L	0.6 mg/L	1
Organic carbon, total	0.1mg/L	<0.1mg/L	0.2 mg/L	0.4 mg/L	9
Calcium, dissolved	0.02 mg/L	<0.02 mg/L	<0.02 mg/L	0.02 mg/L	1
Aluminum, dissolved	1.0 µg/L	<1.0 µg/L	3.0 µg/L	6.0 µg/L	11
Aluminum, total	10 µg/L	<10 µg/L	<10 µg/L	10 µg/L	1
Antimony, dissolved	1.0 µg/L	<1.0 µg/L	<1.0 µg/L	1.0 µg/L	1
Copper, dissolved	1.0 µg/L	<1.0 µg/L	<1.0 µg/L	3.0 µg/L	1
Zinc, dissolved	1.0 µg/L	<1.0 µg/L	2.0 µg/L	5.0 µg/L	8

Table 17.--Minimum, median, and maximum values for constituents in all equipment blanks in which at least one analysis exceeds the minimum reporting level for that constituent

[mg/L, milligrams per liter; <, less than; µg/L, micrograms per liter]

Constituent	Minimum reporting level	Minimum concentration	Median concentration	Maximum concentration	Number of analyses, from a total of 12, showing values greater than the minimum reporting level
Organic carbon, dissolved	0.1mg/L	0.1mg/L	0.2 mg/L	0.4 mg/L	12
Organic carbon, total	0.1mg/L	<0.1mg/L	0.2 mg/L	0.3 mg/L	8
Calcium, dissolved	0.02 mg/L	<0.02 mg/L	<0.02 mg/L	0.05 mg/L	3
Aluminum, dissolved	1.0 µg/L	3.0 µg/L	3.0 µg/L	7.0 µg/L	8
Copper, dissolved	1.0 µg/L	<1.0 µg/L	<1.0 µg/L	5.0 µg/L	5
Copper, total	1.0 µg/L	<1 µg/L	<1 µg/L	1 µg/L	1
Molybdenum, total	1.0 µg/L	<1 µg/L	<1 µg/L	1 µg/L	1
Zinc, dissolved	1.0 µg/L	<1.0 µg/L	5.0 µg/L	15 µg/L	11
Zinc, total	10 µg/L	<10 µg/L	<10 µg/L	20 µg/L	1

Table 18.--Recoveries in standard reference water samples

[*, no range available; %, percent]

Sample set number	Organic carbon, dissolved				Organic carbon, total				Calcium, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	*	99.4	1	1	95.5 to 102	98.3	3	3	100 to 102	101	5	5
2	*	102	1	1	96.0 to 105	98.0	3	3	97.8 to 102	100	5	5
3	*	101	1	1	97.0 to 100	98.0	3	3	98.7 to 103	101	5	5
4	*	99.0	1	1	98.0 to 98.0	98.0	2	2	97.6 to 103	103	5	5
5	*	98.0	1	1	*	98.0	1	1	101 to 103	103	5	5
6	*	102	1	1	*	100	1	1	101 to 104	103	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Magnesium, dissolved				Aluminum, dissolved				Aluminum, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value
1	101 to 104	104	5	5	96.0 to 114	102	5	5	100 to 117	111	5	5
2	97.9 to 103	102	5	5	93.0 to 97.5	95.1	5	5	91.1 to 124	105	5	3
3	98.5 to 103	101	5	5	92.0 to 103	101	5	5	83.5 to 113	105	5	5
4	98.8 to 101	99.9	5	5	98.5 to 116	104	5	5	87.1 to 117	97.1	5	5
5	101 to 102	102	5	5	69.5 to 101	91.0	5	4	88.5 to 107	102	5	5
6	100 to 103	101	5	5	78.5 to 102	101	5	4	96.5 to 110	105	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Antimony, dissolved				Antimony, total				Barium, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	109 to 119	111	3	3	112 to 121	112	3	2	98.3 to 101	98.6	5	5
2	106 to 116	109	3	3	68.1 to 120	103	4	3	98.9 to 102	99.6	5	5
3	98.7 to 107	101	3	3	82.0 to 113	103	3	3	101 to 102	102	5	5
4	80.3 to 116	104	4	4	104 to 139	117	3	2	98.6 to 104	101	5	5
5	99.8 to 102	100	3	3	110 to 112	111	3	3	94.4 to 104	102	5	5
6	100 to 106	103	3	3	100 to 128	106	3	2	94.8 to 101	99.0	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Beryllium, dissolved				Beryllium, total				Cadmium, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	96.8 to 122	102	5	4	90.5 to 100	90.9	3	3	100 to 102	101	5	5
2	93.8 to 99.2	96.7	5	5	99.6 to 109	103	5	5	96.6 to 112	103	5	5
3	100 to 110	105	5	5	90.2 to 103	99.6	5	5	101 to 107	103	5	5
4	101 to 105	103	5	5	100 to 102	101	2	2	98.1 to 106	103	5	5
5	99.5 to 104	103	5	5	94.9 to 97.1	96.0	2	2	97.2 to 113	103	5	5
6	97.1 to 105	104	5	5	100 to 102	100	3	3	99.4 to 107	103	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Cadmium, total				Chromium, dissolved				Chromium, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	98.8 to 103	100	3	3	97.3 to 107	98.6	5	5	88.2 to 108	105	3	3
2	98.2 to 102	99.3	4	4	99.9 to 109	104	5	5	103 to 110	105	3	3
3	101 to 106	104	4	4	99.3 to 111	101	5	5	58.8 to 103	96.8	5	4
4	94.2 to 103	98.9	5	5	99.7 to 113	106	5	5	91.6 to 100	97.2	4	4
5	100 to 107	102	3	3	95.8 to 104	101	5	5	96.8 to 103	97.9	4	4
6	102 to 106	104	5	5	98.2 to 108	103	5	5	82.2 to 105	99.4	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Cobalt, dissolved				Cobalt, total				Copper, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	94.6 to 109	97.2	5	5	98.8 to 103	100	3	3	94.4 to 104	97.5	5	5
2	99.2 to 113	102	5	5	102 to 123	114	4	3	92.7 to 105	98.7	5	5
3	97.9 to 106	102	5	5	108 to 114	113	4	4	97.5 to 105	99.7	5	5
4	96.9 to 114	102	5	5	104 to 116	111	5	5	92.0 to 118	104	5	5
5	94.8 to 108	98.4	5	5	114 to 118	116	3	3	95.2 to 107	98.1	5	5
6	99.0 to 109	104	5	5	112 to 118	116	4	4	101 to 106	103	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Copper, total				Lead, dissolved				Lead, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	95.0 to 102	97.1	3	3	98.2 to 102	99.6	5	5	102 to 109	106	3	3
2	85.4 to 102	97.0	4	4	100 to 103	101	5	5	95.0 to 99.4	97.0	4	4
3	80.0 to 105	103	4	4	101 to 121	103	5	4	100 to 107	104	4	4
4	93.1 to 104	99.0	5	5	97.8 to 117	102	5	5	92.5 to 112	109	5	5
5	95.0 to 99.4	98.0	3	3	95.9 to 120	104	5	5	91.0 to 102	99.9	3	3
6	97.7 to 102	100	5	5	97.6 to 118	99.7	5	5	97.0 to 108	106	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Manganese, dissolved				Manganese, total				Mercury, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	95.6 to 104	101	5	5	94.4 to 106	96.7	5	5	101 to 109	105	5	105
2	98.3 to 104	103	5	5	83.7 to 95.2	94.3	5	5	94.2 to 111	105	5	105
3	99.3 to 109	103	5	5	95.9 to 97.1	96.4	3	3	111 to 114	112	2	112
4	97.7 to 110	103	5	5	99.1 to 116	103	3	3	101 to 106	105	3	105
5	101 to 102	102	5	5	93.9 to 106	104	4	4	105 to 122	110	3	2
6	99.1 to 105	103	5	5	94.6 to 100	99.2	3	3	75.6 to 106	101	4	3

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Mercury, total				Molybdenum, dissolved				Molybdenum, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determi-nations	Number of determi-nations having recoveries within 100±20% of the expected value
1	96.2 to 117	103	5	5	98.0 to 107	103	5	5	92.4 to 99.5	92.4	3	3
2	83.0 to 130	89.4	4	3	98.6 to 104	100	5	5	93.5 to 112	101	4	4
3	93.1 to 101	97.3	2	2	96.4 to 99.7	97.2	5	5	91.0 to 95.2	92.4	4	4
4	70.7 to 107	87.2	4	3	97.5 to 101	99.2	5	5	94.6 to 119	99.1	4	4
5	83.0 to 104	99.6	4	4	100 to 105	104	5	5	71.4 to 96.6	93.7	4	3
6	77.0 to 100	89.0	4	2	99.5 to 105	100	5	5	81.0 to 102	96.6	5	5

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Nickel, dissolved				Nickel, total				Selenium, dissolved			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	87.1 to 94.8	93.1	5	5	97.7 to 109	99.1	3	3	95.8 to 108	99.4	4	4
2	95.0 to 101	95.8	5	5	100 to 106	101	4	4	97.4 to 114	104	4	4
3	90.0 to 112	96.9	5	5	97.7 to 104	102	4	4	76.5 to 91.6	79.8	4	2
4	94.3 to 114	111	5	5	97.7 to 109	104	5	5	80.3 to 115	104	4	4
5	93.6 to 120	95.7	5	5	97.7 to 102	101	3	3	78.2 to 96.3	83.6	4	3
6	95.8 to 119	99.8	5	5	101 to 135	111	5	4	82.2 to 109	93.0	4	4

Table 18.--Recoveries in standard reference water samples--Continued

Sample set number	Selenium, total				Silver, dissolved				Silver, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	90.4 to 111	98.7	4	4	97.7 to 102	99.6	5	5	42.5 to 102	62.5	3	1
2	89.8 to 118	103	4	4	73.3 to 106	103	5	4	47.5 to 106	102	3	2
3	75.0 to 87.0	81.8	4	2	102 to 113	104	5	5	35.0 to 104	70.8	4	2
4	83.7 to 92.1	90.2	4	4	98.5 to 106	103	5	5	76.0 to 125	88.5	3	1
5	78.0 to 94.1	81.8	4	2	101 to 111	107	5	5	74.7 to 99.2	76.4	3	1
6	81.6 to 89.2	88.1	4	4	92.5 to 102	97.4	5	5	74.7 to 96.6	83.3	3	2

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Table 18.--Recoveries in standard reference water samples--Concluded

Sample set number	Uranium, dissolved				Zinc, dissolved				Zinc, total			
	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value	Range of recovery, in percent	Median recovery, in percent	Number of determinations	Number of determinations having recoveries within 100±20% of the expected value
1	93.5 to 105	96.1	3	3	88.2 to 96.1	93.6	5	5	100 to 110	101	5	5
2	97.0 to 101	101	3	3	93.8 to 104	98.7	5	5	66.7 to 117	82.8	5	3
3	97.0 to 103	100	3	3	90.2 to 105	97.1	5	5	98.1 to 113	107	3	3
4	93.5 to 96.1	94.8	3	3	99.8 to 110	104	5	5	101 to 111	108	3	3
5	96.1 to 98.7	96.5	3	3	101 to 107	103	5	5	99.0 to 106	104	4	4
6	93.5 to 100	97.4	3	3	102 to 108	107	5	5	94.3 to 101	100	3	3