USGS
science for a changing world

Hydrologic Data from the Study of Acidic Contamination in the Miami Wash—Pinal Creek Area, Arizona, Water Years 1997–2004

Open-File Report 2008–1273

U.S. Department of the Interior
U.S. Geological Survey

Hydrologic Data from the Study of Acidic Contamination in the Miami Wash—Pinal Creek Area, Arizona, Water Years 1997–2004

By A.D. Konieczki, J.G. Brown, and J.T.C. Parker

Open-File Report 2008–1273

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
DIRK KEMPTHORNE, Secretary

U.S. Geological Survey
Mark D. Myers, Director

U.S. Geological Survey, Reston, Virginia: 2008

For product and ordering information:
World Wide Web: http://www.usgs.gov/pubprod
Telephone: 1-888-ASK-USGS

For more information on the USGS--the Federal source for science about the Earth, its natural and living resources, natural hazards, and the environment:
World Wide Web: http://www.usgs.gov
Telephone: 1-888-ASK-USGS

Suggested citation:
Konieczki, A.D., Brown, J.G., and Parker, J.T.C., 2008, Hydrologic data from the study of acidic contamination in the Miami Wash—Pinal Creek Area, Arizona, Water Years 1997–2004: U.S. Geological Survey Open-File Report 2008–1273, 204 p.

Contents

Figures

Tables

Conversion Factors and Vertical Datum

Conversion Factors

Multiply	By	To obtain
centimeter (cm)	0.3937	inch
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot
kilometer (km)	0.6214	mile
square centimeter (cm^2)	0.1550	square inch
square meter (m^2)	10.76	square foot
square kilometer (km^2)	0.3861	square mile
cubic meter (m^3)	35.31	cubic foot
cubic meter (m^3)	0.0008107	acre-foot
liter per minute (L/min)	0.2642	gallon per minute
cubic meter per second (m^3/s)	35.31	cubic foot per second

In this report, temperature is reported in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by using the following equation:

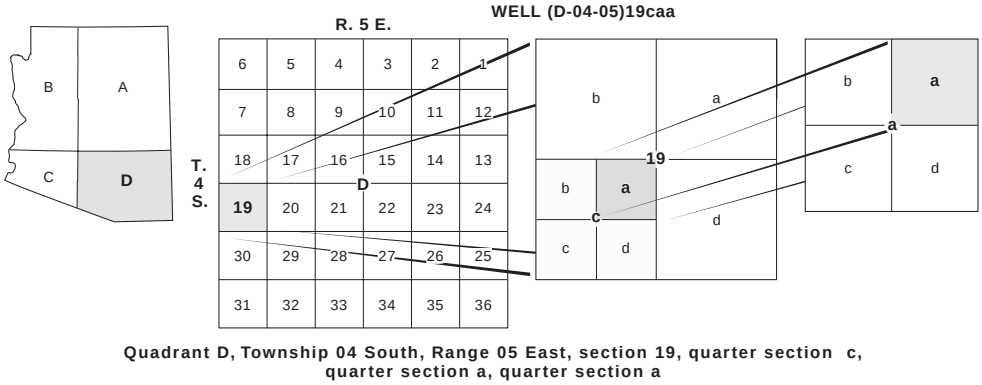
$$°F = 1.8\ (°C) + 32$$

Vertical Datum

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

Well Numbering and Naming System

WELL-NUMBERING AND NAMING SYSTEM



Well-numbering and naming system.

VERTICAL DATUM

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

Hydrologic Data from the Study of Acidic Contamination in the Miami Wash—Pinal Creek Area, Arizona, Water Years 1997–2004

By A.D. Konieczki, J.G. Brown, and J.T.C. Parker

Abstract

Since 1984, hydrologic data have been collected as part of a U.S. Geological Survey study of the occurrence and movement of acidic contamination in the aquifer and streams of the Pinal Creek drainage basin near Globe, Arizona. Ground-water data from that study are presented for water years 1997 through 2004 and include location, construction information, site plans, water levels, chemical and physical field measurements, and selected chemical analyses of water samples for 31 project wells. Hydrographs of depth to ground water are also included. Surface-water data for four sites are also presented and include selected chemical analyses of water samples. Monthly precipitation data and long-term precipitation statistics are presented for two sites. Chemical analyses of samples collected from the stream and shallow ground water in the perennial reach of Pinal Creek are also included.

Introduction

Copper has been mined since 1903 from granite porphyry adjacent to an aquifer in the Pinal Creek drainage basin (fig. 1). Mining, the principal industry in the area, has long been recognized as the cause of some contamination of ground-water resources. These effects were first quantified in 1983 (Rouse, 1983; Envirologic Systems, Inc., 1983); and since 1983, dissolved-metal concentrations have been monitored in the ground water and surface water in Pinal Creek Basin.

The study area is in Gila County, Arizona, and includes the communities of Globe, Miami, and Claypool (fig. 1). The Pinal Creek drainage basin is in the Upper Salt River (USR) ground-water basin (Smith and others, 1996, p. 281) and in Hydrologic Unit 15060103 (Upper Salt River; U.S. Geological Survey, 1975). Miami Wash, a tributary to Pinal Creek, drains the area that contains the most intensive mining activity. Pinal Creek flows into the Salt River about 5 km upstream from the high-water line of Roosevelt Lake.

In the spring of 1984, the U.S. Geological Survey (USGS) began a study of contaminant movement in the Pinal Creek drainage basin in cooperation with the Arizona Department of Health Services and Salt River Project (SRP). Initial sets of observation wells were drilled at five sites in October 1984 (fig. 1), and initial samples for chemical analysis were collected in November 1984. The objectives of the study are to identify and describe the processes that control the movement and reactions of inorganic ground-water contaminants, monitor the movement of the contaminants, and model the movement of water and inorganic contaminants in ground water and surface water in the basin. A major focus of this study has been to understand how solutes and solids in the system are transformed by each other in a complex environment. The study focuses on the destination or fate of contaminants rather than on sources of ground-water contamination. Since 1985, principal project funding has been provided by the USGS Toxics Substances Hydrology Program.

Stream-channel vegetation growth, remedial ground-water pumping, a subsurface ground-water barrier, and the return of treated ground water to the creek by the Pinal Creek Group (http://www.pinalcreekgroup.com/) has resulted in a large change in the concentration of dissolved Mn in samples collected from Pinal Creek at Setka Ranch (09498380) and Pinal Creek at Inspiration Dam (09498400) (Brown and others, 2001). Dissolved Mn concentration in samples from Pinal Creek at Setka Ranch declined from 63,600 mg/L in June 14, 1999 to 530 mg/L in December 27, 1999 and was less than detection limit (60 mg/L) by January 15, 2002. In samples from Pinal Creek at Inspiration Dam dissolved Mn concentration declined from 15,500 mg/L in July 27, 1998 to 1,300 mg/L in October 20, 1998.

Annual precipitation in Miami and at the Globe Range Station from 1996 to 2003 ranged from 115 to 498 mm. The mean annual precipitation for the period of record in Miami and Globe was 481 and 405, respectively. The yearly mean discharge at gaging station, 09498400, Pinal Creek at Inspiration Dam near Globe for water years 1996 through 2003 ranged from 0.11 to 0.19 m3/s which was below the average discharge for the period of the record of 0.34 m^3/s.

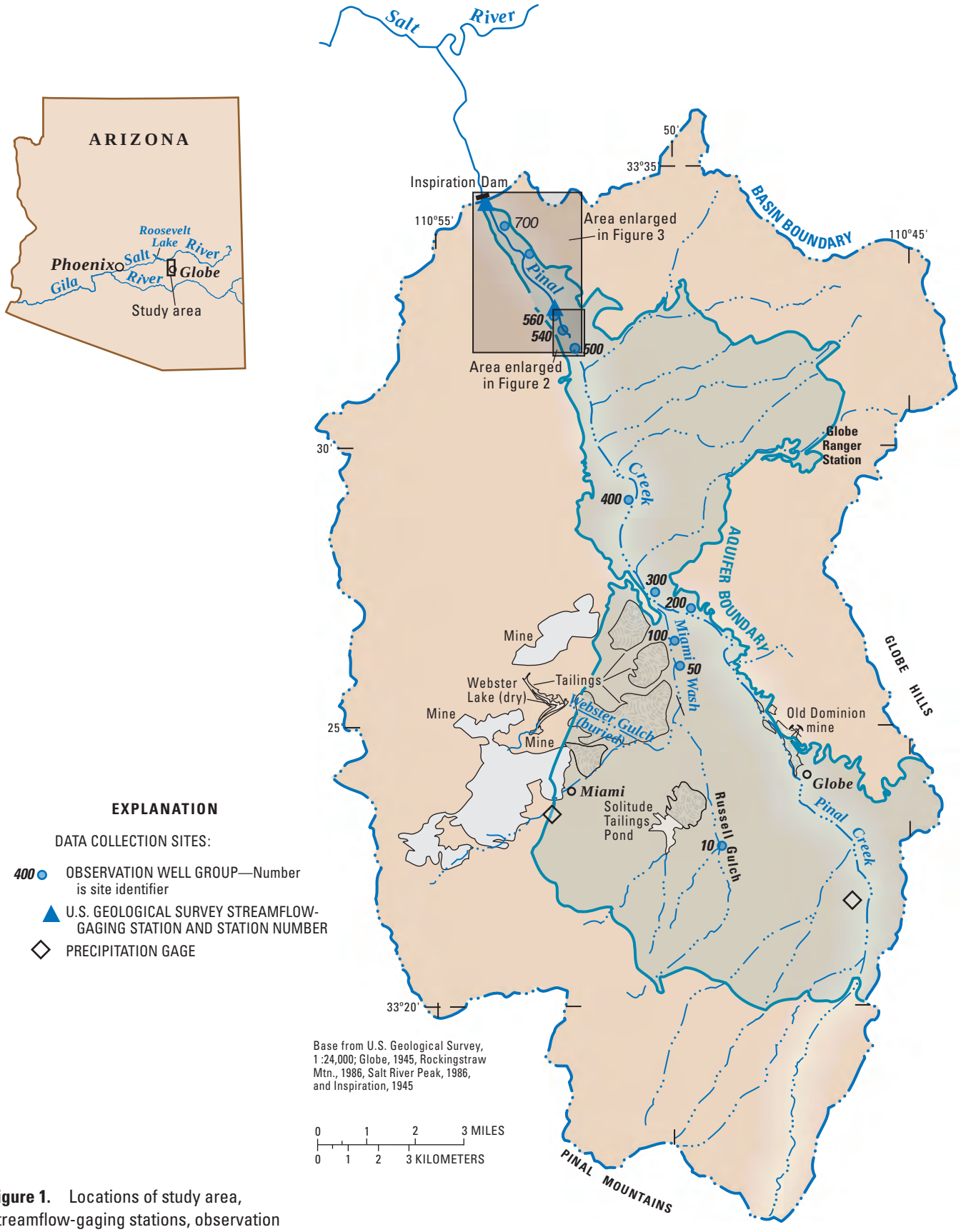


Figure 1. Locations of study area, streamflow-gaging stations, observation well groups, and precipitation gages, Pinal Creek Basin.

Purpose and Scope

The purpose of this report is to present hydrologic data for ground water and surface water of Pinal Creek Basin near Globe, Arizona. Included in this report are chemical analyses of ground water and streamflow, records of stream discharge, and ground-water levels. The data have been and are to be used in several interpretive reports in which an exhaustive data summary would be inappropriate. In the interest of completeness, some data that have been published elsewhere are included. This report includes data for water years 1997 through 2004, which correspond to the period October 1, 1996, through September 30, 2004.

Other Publications Pertinent to the Study Site

A partial list of papers, which include investigations completed at Pinal Creek, are included in the "Selected References" section of this report. A comprehensive bibliography of related publications can be obtained at http://toxics.usgs.gov/bib/bib-pinal.html. The following summary focuses on some of the publications related to studies completed at the site.

Geology of the Globe–Miami mining district has been described by Ransome (1903) and Peterson (1962). In 1979, the Central Arizona Association of Governments, which is responsible for water-quality management planning in Gila County, established a Mineral Extraction Task Force (METF) to study water-quality problems in the Globe–Miami area. The METF study identified areas where contaminated water was present and probable sources for the contamination (Rouse, 1981, 1983; Envirologic Systems, Inc., 1983).

Lithologic, water-chemistry, water-level and streamflow data collected as part of the present USGS study for water years 1984–96 were presented by Eychaner and others (1989), Brown (1990), Longsworth and Taylor (1992), Gellenbeck and Hunter (1994), and Konieczki and Angeroth (1997). Neaville and Brown (1994) described the hydrogeology and the hydrologic system of the Pinal Creek Basin.

Eychaner and Stollenwerk (1985) described the distribution of contaminants in the aquifer and the principal geochemical reactions on the basis of the initial data collection.

Brown and Favor (1996) presented the results from research at the site through 1992. Geohydrology of the system, the chemical characteristics and extent of the principal contaminant plume, the physical and chemical processes that alter aqueous and solid phases, and results of geochemical-computer modelled simulations are included in the report.

Numerous papers that discuss work and findings at the site were presented at technical meetings of the Toxics Substances Hydrology Program in 1985 (Massachusetts), 1987 (Florida), 1988 (Arizona), 1991 (California), 1993 (Colorado), and 1999 (South Carolina), 1994 American Geophysical Union Conference (San Francisco), and DOI Hazardous Materials conferences in 1994 and 1995.

Data Collection

Most water samples and field water-quality parameters were collected using standard USGS methods (USGS, variously dated). Explanations of modified or nonstandard methods used to collect data or samples are included in this report. Well-construction data and water-level measurements were made in inch-pound units and converted to metric units. Childress and others (1999) present an explanation of the USGS National Water Quality Laboratory's approach for determining long-term method detection levels and establishing reporting levels, details relevant new reporting conventions, and provides preliminary guidance on interpreting data reported with the new conventions.

Ground Water

Ground-water samples from the project wells were obtained using submersible pumps. Most of the samples were collected using a two pump method. This method involves placing the sampling pump near the screened interval and another pump, operating at a higher flow rate than the sampling pump, near the ground-water surface, which ensured a net upward flow of water from the aquifer past the sampling pump. Water discharged from the sampling pump through tygon tubing was monitored for pH, specific conductance, temperature, dissolved-oxygen concentration, and oxidation-reduction potential. When these field values had stabilized the samples were collected.

Occasionally, pump failures required that sampling be done with a single pump. On those occasions the pump was placed 3 to 4.5 m above the screened interval and a volume of water equivalent to three times the volume of the water in the screened interval was evacuated. The pump was then lowered to the screened interval and samples were collected when the field values had stabilized.

Pump-discharge rate and duration are included in the data tables when the data are available. Samples for dissolved constituents were passed through a 0.45-mm polycarbonate filter and collected in polypropylene bottles. Unfiltered samples for total constituent analyses were collected in polypropylene bottles. Nitric acid (HNO_3) was used as a preservative in samples for metal analyses. For total dissolved-inorganic carbon (TDIC) analyses, water was collected in septum vials, and during analysis was extracted directly through the vial's septum to prevent exposure to the atmosphere.

Data that are presented for 31 project wells include location, construction details (table 1), site plan, water-level measurements, and chemical analyses of water samples (appendix A). In February 1997 four wells (well groups 540 and 560) were drilled near the acid front of the plume and added to the observation network. Hydrographs showing water-level data available for selected wells are included in the "Hydrologic Data" section of this report. Information for six project exploration boreholes is also included. Water levels were measured with a chalked steel tape or a calibrated electric tape. During the study period water levels were not obtained at the following wells because the depth to water exceeded the well depth: 52, 54, 103, 104, 107, 201, 202, 303, 402, 403, 506, 541, and 562.

In August 1996, a Global Positioning System survey was conducted on all of the USGS well groups within the study area. Land-surface datums were updated to reflect the new and more accurate data. Water-level measuring points were also surveyed to compare to the land-surface datum. Some measuring points have shifted from their original position. The largest change occurred at well 504 where the measuring point dropped 0.11 meters. Most wells had no change.

Surface Water and Shallow Ground Water Along the Perennial Reach

From 1996 until March 1998, routine surface-water samples were obtained, usually bimonthly, from three sites (appendix B): Pinal Creek at Setka Ranch (09498380), Pinal Creek at Inspiration Dam (09498400) and Pinal Creek at Head of Flow (333156110521000). The location of the head of flow is the beginning of perennial flow in Pinal Creek and changes over time (fig. 2). In November, 1999, a water-treatment plant was put into operation and the head of flow became the point at which treated water was returned to the creek. Beginning in June 1998, the number of sites sampled bimonthly was increased, and the number and locations of sites varied from trip to trip in response to observed changes in water chemistry. Bimonthly sampling also included a variable number of shallow ground-water samples obtained from drive points at depths that ranged from 0.6 to 4.5 m below land surface (table 2; appendix B).

Because the creek was generally too shallow for the use of a standard depth-integrated sampler, dip samples were taken in wide-mouth 3L polyurethane jugs. Although considered to be dip samples, water was collected at several sections from the water surface to within about an inch of the bottom, as would have been done using a standard sampler, and an effort was made to collect a volume of water in each section in rough proportion to the fraction of flow in that section of the stream.

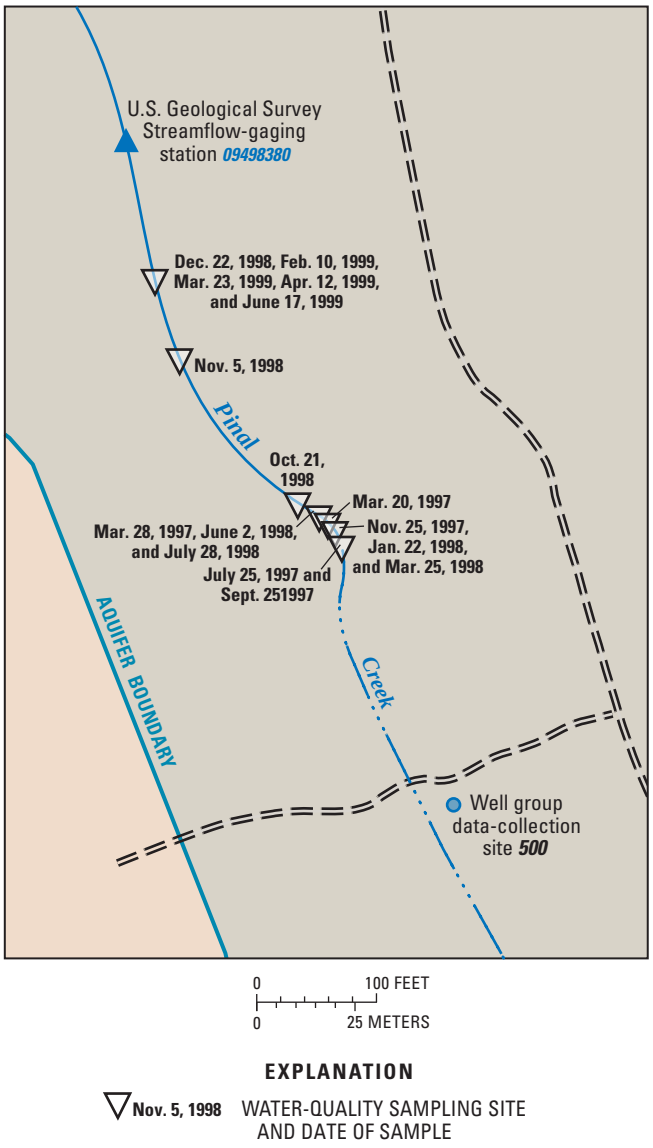


Figure 2. Locations of head of flow (333156110521000) and water-quality sampling sites.

Shallow ground-water samples were collected from about 0.6 to 1 m below the stream bed from 3/8-inch diameter stainless steel drive points that were installed just prior to sampling and removed directly after. In 2001–2002, a network of deeper drive points was installed along the perennial reach (fig. 3; table 2). Each of these points consisted of a slotted aluminum or steel tip attached to 3 mm-diameter nylon tubing. To install, the tips were placed at the end of hollow stainless steel drive tubing, through which the nylon tube was threaded.

Table 1. Ground-water monitoring sites.

Well	Well location	Site identifier	Land surface	Well depth	Date of construction	Last water-level data	Last water level
010	A-01-15 34BDD1	332310110490501	3466.34	89	01-06-89	11-12-03	58.23
051	A-01-15 09DCD1	332611110495101	3241.78	109.7	10-11-84	11-12-03	80.68
052	A-01-15 09DCD2	332611110495102	3241.78	65	10-12-84	11-12-03	Dry
053	A-01-15 09DCD3	332611110495103	3241.78	91.3	10-12-84	11-12-03	80.54
054	A-01-15 09DCD4	332611110495104	3241.78	36	10-12-84	11-12-03	Dry
101	A-01-15 09DBC1	332629110495801	3234.95	118.4	10-10-84	11-12-03	82.32
102	A-01-15 09DBC2	332629110495802	3234.95	82.8	10-11-84	07-24-03	80.8
103	A-01-15 09DBC3	332629110495803	3234.95	62.7	10-11-84	11-12-03	Dry
104	A-01-15 09DBC4	332629110495804	3234.95	36.6	10-11-84	11-12-03	Dry
105	A-01-15 09DBC5	332629110495805	3234.95	160.2	05-22-86	11-12-03	82.15
107	A-01-15 09DBC7	332629110495807	3234.95	64.8	12-14-88	11-12-03	Dry
201	A-01-15 04DCC1	332707110495501	3212.73	60.9	10-05-84	11-12-03	Dry
202	A-01-15 04DCC2	332707110495502	3212.73	40.4	10-06-84	11-12-03	Dry
301	A-01-15 04CBD1	332717110501901	3190.3	194	10-07-84	11-12-03	81.2
302	A-01-15 04CBD2	332717110501902	3190.3	117.3	10-08-84	11-12-03	81.61
303	A-01-15 04CBD3	332717110501903	3190.3	47.1	10-08-84	11-12-03	Dry
304	A-01-15 04CBD4	332717110501904	3190.3	99.3	05-24-86	11-12-03	81.71
401	A-02-15 29DBD1	332904110504801	3092.7	112.3	10-09-84	11-12-03	77.47
402	A-02-15 29DBD2	332904110504802	3094.86	68.4	10-10-84	11-12-03	Dry
403	A-02-15 29DBD3	332904110504803	3094.86	42	10-10-84	11-12-03	Dry
404	A-02-15 29DBD4	332904110504804	3094.86	181.4	09-04-86	11-12-03	80.2
501	A-02-15 07BDD1	333151110520501	2945.44	55.8	05-22-86	11-12-03	48
502	A-02-15 07BDD2	333151110520502	2945.44	124.8	05-22-86	11-12-03	48.3
503	A-02-15 07BDD3	333151110520503	2945.44	82	05-22-86	11-12-03	48.38
504	A-02-15 07BDD4	333151110520504	2945.44	227.1	07-24-86	11-12-03	45.95
505	A-02-15 07BDD5	333151110520505	2945.44	71	12-17-88	11-12-03	48.1
506	A-02-15 07BDD6	333151110520506	2945.44	22	12-15-88	11-12-03	Dry
541	A-02-15 07BBD1	333151110521201	2948.62	41.33	02-22-97	11-12-03	Dry
542	A-02-15 07BBD2	333151110521202	2948.62	64.8	02-22-97	11-12-03	58.48
561	A-02-15 07BBD3	333204110521701	2937.42	50.33	02-23-97	11-12-03	45.44
562	A-02-15 07BBD4	333204110521702	2937.42	24.33	02-24-97	11-12-03	Dry
601	A-02-14 01ABB	333307110530601	2856.72	28.2	03-31-92	11-12-03	8.33
701	A-03-14 26DDD1	333403110534501	2771.99	16.5	05-11-90	08-11-03	5.98
702	A-03-14 26DDD2	333403110534502	2771.99	24	05-11-90	08-11-03	6.24

Table 2. Perennial reach ground-water surface-water sites.

[Suffix dp or G refers to a 4 to 6 ft long stainless steel drive point driven to depths between 2 and 4 ft.
Suffix dp8 refers to a stainless steel or aluminum slotted point driven to depths ranging from 2.3 to 3 meters.
Suffix dp14 refers to a stainless steel or aluminum slotted point driven to depths ranging from 3.3 to 4.5 meters.
Suffix SW or S refers to a surface-water site at Pinal Creek.]

Site number	Site name	Location*
333156110521101	HOF** dp	A-02-15 06CCD
333159110521000	Outfall	
333218110522400	D1.5S	
333218110522401	D1.5G	A-02-15 06CCD2
333221110522601	Z0dp	A-02-15 06CCA7
333224110522700	Z1SW	
333224110522701	Z1dp	A-02-15 06CCA6
333229110523100	Z2.2SW	
333229110523101	Z2.2dp	A-02-15 06CBC1
333233110523300	Z4SW	
333233110523301	Z4dp	A-02-15 06CBC2
333236110523600	Z4.3SW (HOFB)	
333236110523601	Z4.3dp (HOFB)	A-02-15 06CBB1
333236110523602	Z4.3dp14	A-02-15 06CBB2
333236110523603	Z4.3dp8	A-02-15 06CBB3
333238110523700	Z4.4SW	
333238110523800	Z4.7SW	
333238110523801	Z4.7dp	A-02-14 01DAA1
333238110523802	Z4.5SW	
333239110523800	Z4.6SW	
333239110523801	Z4.6dp	A-02-14 01DAA2
333239110523802	Z4.6dp14	A-02-14 01DAA3
333239110523803	Z4.6dp8	A-02-14 01DAA4
333241110523801	Z4.8dp	A-02-14 01DAA5
333241110523802	Z4.8dp14	A-02-14 01DAA6
333241110523803	Z4.8dp8	A-02-14 01DAA7
333243110523800	Z5SW	
333243110523801	Z5dp	A-02-14 01ADD01
333243110523802	Z5dp14	A-02-14 01ADD02
333243110523803	Z5dp8	A-02-14 01ADD03
333247110524203	Z5.5dp8	A-02-14 01ADD06
333249110524201	Z5.5dp	A-02-14 01ADD04
333249110524202	Z5.5dp14	A-02-14 01ADD05
333249110524204	Z5.5Ldp8	A-02-14 01ADD07
333249110524205	Z5.5Ldp14	A-02-14 01ADD08
333249110524209	Z5Ldp	A-02-14 01ADD09
333250110524300	Z5.7SW	
333250110524301	Z5.7dp	A-02-14 01ADA1
333252110524800	Z6.2SW	
333252110524801	Z6.2dp	A-02-14 01ADB1
333252110524802	Z6.2dp14	A-02-14 01ADB2
333252110524803	Z6.2Ldp14	A-02-14 01ADB7
333252110524804	Z6.2Ldp14	A-02-14 01ADB6
333254110525001	Z6.4dp	A-02-14 01ADB3
333254110525002	Z6.4dp14	A-02-14 01ADB4
333254110525003	Z6.4dp8	A-02-14 01ADB5
333255110525400	Z6.7SW	
333257110530100	Z7SW	
333257110530101	Z7dp	A-02-14 01ABD1
333257110530102	Z7dp3	A-02-14 01ABD2
333257110530103	Z7dp8	A-02-14 01ABD3
333257110530104	Z7dp14	A-02-14 01ABD6
333258110530201	Z7.8dp	A-02-14 01ABD4
333258110530202	Z7.8dp14	A-02-14 01ABD5
333301110530800	Z8.3SW	
333301110530801	Z8.3DP	A-02-14 01BAA1
333304110531101	Z9.2DP	A-02-14 01BAA2
333310110531400	Z9aSW	
333310110531401	Z9adp	A-03-14 36CDD1
333310110531402	Z9adp8	A-03-14 36CDD2
333310110531403	Z9adp14	A-03-14 36CDD3
333312110531301	Z9.5DP	A-03-14 36CDD5
333317110531300	Z10SW	
333317110531301	Z10dp	A-03-14 36CDA
333332110531500	JJ15aSW	
333332110531501	JJ15adp	A-03-14 36CAA1
333353110534000	D10S	
333353110534001	D10G	A-03-14 35AAD
333417110535401	D11G	A-03-14 26DBD

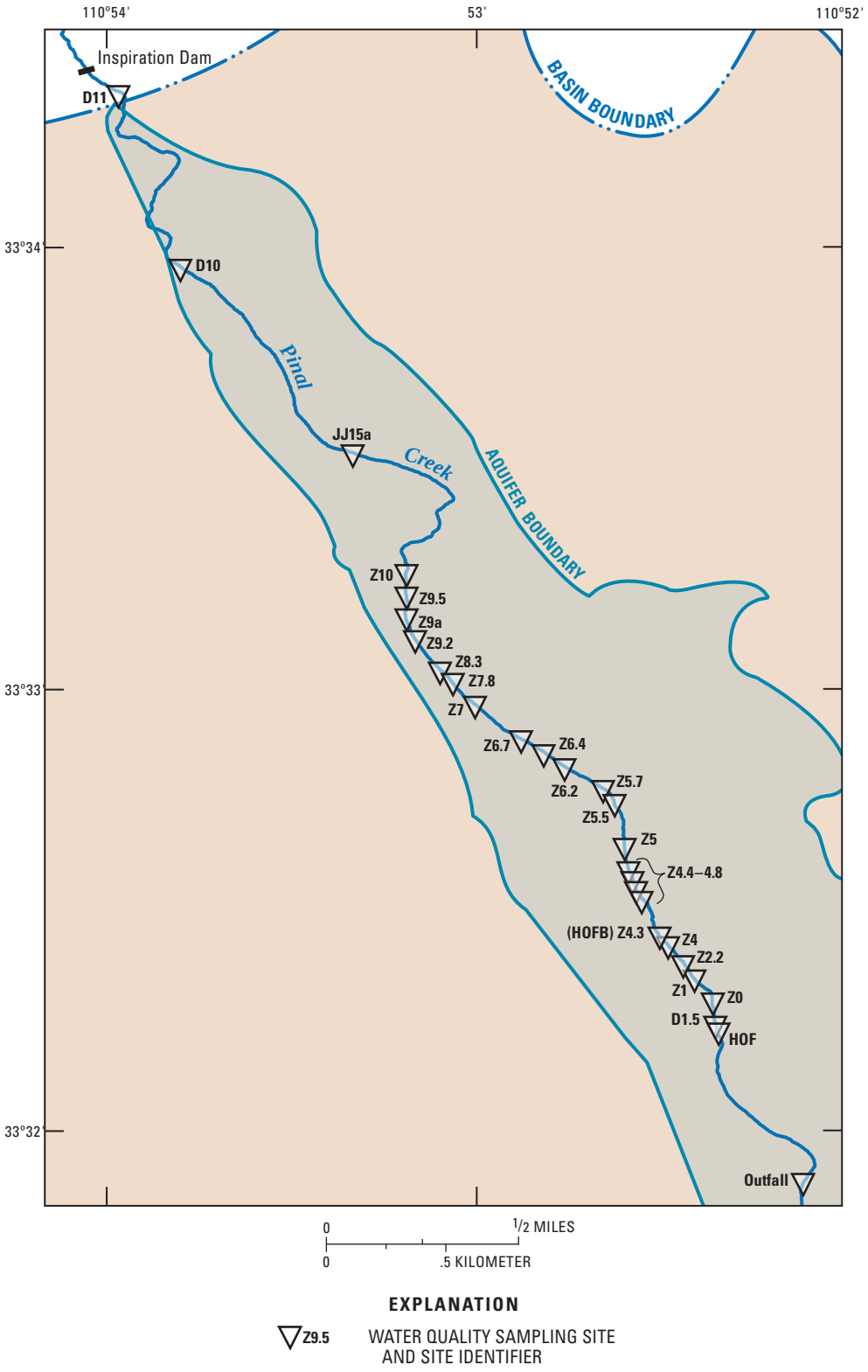


Figure 3. Location of water-quality sampling sites in the perennial reach of Pinal Creek Basin.

The setup was driven to depth using an electric rotary hammer. The hollow drive tubing was then removed, leaving in place the tip attached to the nylon tubing. Where conditions allowed, points were installed in pairs. These points ranged in depth from 0.9 to 4.5 m below the creek bed. A peristaltic pump equipped with Masterflex tubing was used to obtain water from the drive points. An in-line 0.45 mm capsule filter was used for all filtered samples.

Monthly precipitation data and long-term precipitation statistics are presented for the two active precipitation-measurement sites closest to Pinal Creek (fig. 1; appendix C). The data were compiled from published climatological data reports and annual summaries (National Climatic Data Center, issued monthly and annually) and from the Western Regional Climate Center Desert Research Institute (http://www.wrcc.dri.edu/summary/climsmaz.html). Chemical analyses presented in this report were done by the USGS National Water-Quality Laboratory (NWQL), Arvada, Colorado; by C.C. Fuller, a hydrologist in the USGS National Research Program (NRP), Menlo Park, California; by the USGS Project Laboratory, Ocala, Florida; and by USGS research laboratory, Reston, Virginia. Where analyses from multiple sources appear in the same table, they are identified by a designated number in the laboratory column.

Physical Properties and Water Chemistry

Measured pH was 4.0 or less in well group 50 and in four of the five wells in group 100 during water years 1997–2004. Specific conductance was generally greater than 2,000 mS/cm in all well groups except 10, 200, and 560 and ranged from 376 to 3,950 mS/cm over the same period. Dissolved Al, Cu, Fe, and Mn was greater than 10,000 mg/L in some wells in well groups 50, 100, 300, and 400.

Dissolved concentrations of B, Ba, Be, Ca, Co, Li, Mg, Mn, Ni, Sr, or Zn were in some cases greater than total-recoverable concentrations of these elements in laboratory analyses of samples from Pinal Creek at Inspiration Dam. The differences in concentrations from these analyses probably resulted from differences in precision between the analytical techniques used. The dissolved fraction was analyzed using ICP; the total-recoverable concentration was analyzed using a graphite furnace-equipped atomic absorption (GFAA) spectrophotometer, which is less precise. Discrepancies also can result from rounding of values. The concentrations therefore are considered to be equal.

Fuller and the NWQL analyzed water samples for most metals by inductively coupled plasma (ICP), which simultaneously determines the concentration of as many as 20 elements. An elevated concentration of one element, particularly iron, can interfere with the analytical accuracy and detection limits of other elements that are present in much lower concentrations.

Water-Quality Control Data

The USGS National Water Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. Falsely reporting a concentration greater for the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a nondetection for a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as less than LRL for samples in which the analyte either was not detected or did not pass identification. Analyte detected at concentrations between the LT-MDL and the LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of “E” (appendix D). These data should be used with the understanding that their uncertainty is greater than that of data reported without the E remark code.

Acknowledgments

These data were collected with the cooperation and assistance of landowners and local residents who granted permission to cross over, collect data, and install wells on their properties. Landowners and local residents that cooperated with the study include: Barbara Caretto, Hollis Crim, Pat Kelley, Eva Setka, Martin Setka, Nellie Setka, Arizona Department of Transportation, Phelps Dodge Miami, Incorporated (formerly Cyprus Miami Mining Corporation), Broken Hills Proprietary Company, Limited (formerly Magma Copper Corporation), and the U.S. Forest Service.

Selected References

Brown, J.G., 1990, Chemical, geologic, and hydrologic data from the study of acidic contamination in the Miami Wash–Pinal Creek area, Arizona, water years 1988–89: U.S. Geological Survey Open-File Report 90–395, 75 p.

Brown, J.G., 1991, Particle tracking analysis of flow in the stream-aquifer system in Pinal Creek Basin, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 448–453.

Brown, J.G., and Eychaner, J.H., 1996a, Research of acidic contamination of ground water and surface water, Pinal Creek Basin, Arizona, *in* Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water-Supply Paper 2466, chap. A, p. 1–20.

Brown, J.G., and Eychaner, J.H., 1996b, Distribution of chemical constituents in surface water, Pinal Creek Basin, Arizona, *in* Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water-Supply Paper 2466, chap. D, p. 61–79.

Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water-Supply Paper 2466, 103 p.

Brown, J.G., and Favor, Barbara, eds., 1996, Hydrologic and geochemical factors affecting metal contaminant transport in Pinal Creek Basin near Globe, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1035–1042.

Brown, J.G., Fuller, C.F., and Harvey, J.W., 2001, Controls on metal attenuation in streamflow and shallow ground water in Pinal Creek Basin, Arizona [abs.], in Arizona Hydrological Society 14th Annual Symposium, September 12–15, 2001, Tucson, Arizona.

Brown, J.G., Harvey, J.W., Glynn, P.D., Busenberg, E., and Stollenwerk, K.G., 1995, Hydrologic and geochemical characterization of metal contaminant transport in Pinal Creek Basin near Globe, Arizona: Ninth V.E. McKelvey Forum on Mineral Resources, February 22–25, 1994, Tucson, Arizona.

Brown, J.G., Harvey, J.W., Glynn, P.D., Fuller, C.C., Busenberg, E., Wagner, B.J., and Lind, C.J., 1996, Characterization of acidic contaminants in ground water and surface water in Pinal Creek Basin, Arizona: U.S. Department of the Interior Hazardous Materials (HAZMAT) Conference, May 25–28, 1995, Colorado Springs, Colorado.

Brown, J.G., Stollenwerk, K.G., and Glynn, P.D., 1993, Geochemical and hydrologic characterization of acidic mine contamination in Pinal Creek Basin, Arizona: U.S. Department of the Interior Hazardous Materials (HAZMAT) Management Conference, Denver, Colorado, May 1993, Resource Guide.

Childress, C.J. Oblinger, Foreman, W.T., Connor, B.F., and Maloney, 1999, New reporting procedures based on long-term method detection levels and some considerations for interpretations of water-quality data provided by the U.S. Geological Survey National Water Quality Laboratory: U.S. Geological Survey 99–193, 19 p. Available at http://water.usgs.gov/owq/OFR_99-193/, accessed October 18, 2007.

Envirologic Systems, Inc., 1983, Mining activities and water-quality report: Florence, Arizona, Central Arizona Association of Governments, Mineral Extraction Task Force Report METF–7, 142 p.

Eychaner, J.H., 1988, Evolution of acidic ground-water contamination in a copper-mining area *in* Arizona, in Ouazar, D., Brebbia, C.A., and Stout, G.E., eds., Computer Methods and Water Resources, First International Conference, Morocco, 1988, Proceedings, v. 6 (Water Quality, Planning and Management): Southampton, U.K., Computational Mechanics Publications, p. 291–302.

Eychaner, J.H., 1989a, Movement of inorganic contaminants in acidic water near Globe, Arizona, *in* Mallard, G.E., and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Phoenix, Arizona, September 26–30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88–4220, p. 567–575.

Eychaner, J.H., 1989b, Research activities related to acidic water near Globe, Arizona, *in* Mallard, G.E., and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Phoenix, Arizona, September 26–30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88–4220, p. 599–601.

Eychaner, J.H., 1991a, Inorganic contaminants in acidic water near Globe, Arizona, *in* Rasmussen, T.C., ed., Survival in the Desert: Water Quality and Quantity Issues into the 21st Century: Arizona Hydrological Society, Proceedings of the Third Annual Symposium, Casa Grande, Arizona, September 20–22, 1990, p. 242–252.

Eychaner, J.H., 1991b, The Globe, Arizona, research site—Contaminants related to copper mining in a hydrologically integrated environment, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 439–447.

Eychaner, J.H., 1991c, Solute transport in perennial streamflow at Pinal Creek, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 481–485.

Eychaner, J.H., Rehmann, M.R., and Brown, J.G., 1989, Chemical, geologic, and hydrologic data from the study of acidic contamination in the Miami Wash–Pinal Creek area, Arizona, water years 1984–87: U.S. Geological Survey Open-File Report 89–410, 105 p.

Eychaner, J.H., and Stollenwerk, K.G., 1985, Neutralization of acidic ground water near Globe, Arizona, *in* Schmidt, K.D., ed., Groundwater Contamination and Reclamation, Proceedings of a Symposium, Tucson, Arizona, August 14–15, 1985: Bethesda, Maryland, American Water Resources Association, p. 141–148.

Eychaner, J.H., 1987, Acidic ground-water contamination from copper mining near Globe, Arizona, I. Overview, *in* Franks, B.J., ed., U.S. Geological Survey Program on Toxic Waste—Ground-Water Contamination— Proceedings of the Third Technical Meeting, Pensacola, Florida, March 23–27, 1987: U.S. Geological Survey Open-File Report 87–109, p. D–13 to D–18.

Faires, L.M., and Eychaner, J.H., 1991, Trace-element trends at Pinal Creek, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 461–465.

Ficklin, W.H., Love, A.H., and Briggs, P.K., 1991, Analytical results for total and partial metal extractions in aquifer material, Pinal Creek, Globe, Arizona: U.S. Geological Survey Open-File Report 91–111, 33 p.

Ficklin, W.H., Love, A.H., and Papp, C.S.E., 1991, Solid-phase variations in an aquifer as the aqueous solution changes, Globe, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 475–480.

Fuller, C.C., 1996, Experimental studies of trace-metal partitioning in perennial reaches of Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water- Resources Investigations Report 94–4015, p. 1101–1105.

Fuller, C.C., and Harvey, J.W., 1994, Effect of surface chemical reactions in the hyporheic zone on trace-metal partitioning, Pinal Creek, Arizona: American Geophysical Union, EOS Transactions, v. 75, no. 44, supplement, p. 261.

Gellenbeck, D.J., and Hunter, Y.R., 1994, Hydrologic data from the study of acidic contamination in the Miami Wash–Pinal Creek area, Arizona, water years 1992–93: U.S. Geological Survey Open-File Report 94–508, 103 p.

Glynn, P.D., 1991, Effect of impurities in gypsum on contaminant transport at Pinal Creek, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 466–474.

Glynn, P.D., and Brown, J.G., in press, Reactive- transport modeling of acidic metal-contaminated ground water at a site with sparse spatial information, *in* Lichtner, P.C., Steefel, C.I., and Oelkers, E.H., Mineralogical Society of America Short Course—Reactive Transport in Porous Media: General Principles and Application to Geochemical Processes (in press).

Glynn, P.D., and Busenberg, Eurybiades, 1996a, Dissolved gas and chlorofluorocarbon content of ground waters in the Pinal Creek Basin, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1043–1054.

Glynn, P.D., and Busenberg, Eurybiades, 1996b, Unsaturated zone diffusion of carbon dioxide and oxygen in the Pinal Creek Basin, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water- Resources Investigations Report 94–4015, p. 1055–1064.

Glynn, P.D., Engesgaard, Peter, and Kipp, K.L., 1991, Use and limitations of two computer codes for simulating geochemical mass transport at the Pinal Creek Toxic-Waste Site, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 454–460.

Harvey, J.W., and Fuller, C.C., 1995, Role of stream-subsurface water exchange in enhancing manganese precipitation in a contaminated drainage basin: American Geophysical Union, Programs and Abstracts of Fifteenth Annual Hydrology Days, Report 95.2, April 3–7, 1995.

Harvey, J.W., and Fuller, C.C., 1996 Association of selected metals with colloidal and suspended particulate material in shallow ground water and surface water at Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1073–1079.

Harvey, J.W., Bencala, K.E., Wagner, B.J., and Fuller, C.C., 1994, Modeling hydrological exchange within the stream-catchment continuum: Bulletin of the North American Benthological Society, v. 11, no. 1, p. 98.

Harvey, J.W., Fuller, C.C., and Wagner, B.J., 1996, Interactions between shallow ground water and surface water that affect metal transport in Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1065–1072.

Harvey, J.W., Wagner, B.J., and Bencala, K.E., 1996, Evaluating the reliability of the stream tracer approach to characterize stream-subsurface water exchange: Water Resources Research, v. 32, no. 8, p. 2441–2451.

Haschenburger, J.K., 1989a, Manganese in channel sediments of Pinal Creek, Arizona, in Mallard, G.E., and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Phoenix, Arizona, September 26–30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88–4220, p. 593–597.

Haschenburger, J.K., 1989b, Variation of copper in stream sediment: Tempe, Arizona State University, M.S. thesis, 67 p.

Hem, J.D., 1985, Study and interpretation of the chemical characteristics of natural water, 3d ed.: U.S. Geological Survey Water-Supply Paper 2254, 263 p.

Hem, J.D., and Lind, C.J., 1994, Chemistry of manganese precipitation in Pinal Creek, Arizona, USA—A laboratory study: Geochimica et Cosmochimica Acta, v. 58, no. 6, p. 1601–1614.

Hem, J.D., and Lind, C.J., 1996, Chemical processes in manganese oxide and carbonate precipitation in Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water- Resources Investigations Report 94–4015, p. 1095–1099.

Hulseapple, S.M., 1995, A field study of reareation and solute transport at Pinal Creek, Globe, Arizona: Tucson, University of Arizona, M.S. thesis.

Hulseapple, S.M., and Conklin, M., 1995, A field study of volatile solute transport in a stream contaminated with heavy metals: American Geophysical Union, EOS Transactions, v. 76, no. 46, supplement, p. 226.

Hydro Geo Chem, Inc., 1989, Investigation of acid water contamination along Miami Wash and Pinal Creek, Gila County, Arizona: Claypool, Arizona, Cyprus Miami Mining Corporation report, 140 p.

Lind, C.J., 1991, Manganese minerals and associated fine particulates in the Pinal Creek streambed, in Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 486–491.

Lind, C.J., and Anderson, L.D., 1992, Trace metal scavenging by precipitating Mn and Fe oxides, in Kharaka, Y.K., and Maest, A.S., eds., Proceedings of the Seventh International Symposium on Water-Rock Interaction—WRI–7, Park City, Utah, U.S.A., July 13–18, 1992: Rotterdam, A.A. Balkema Publishers, v. 1, p. 397–402.

Lind, C.J., and Hem, J.D., 1993, Manganese minerals and associated fine particulates in the streambed of Pinal Creek, Arizona, U.S.A.—A mining-related acid drainage problem: Applied Geochemistry, v. 8, no. 1, p. 67–80.

Lind, C.J., and Hem, J.D., 1996, Manganese and iron oxide deposits and trace-metal associations in stream sediments, Pinal Creek Basin, Arizona, *in* Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water-Supply Paper 2466, chap. E, p. 81–98.

Lind, C.J., and Oscarson, R.L., 1994, The interaction of acidic, iron-rich drainage from copper mining activities with alluvial and streambed sediments at Pinal Creek, Arizona: Third International Symposium on Environmental Geochemistry, Krakow, Poland, September 12–13, 1994, p. 237.

Lind, C.J., and Stollenwerk, K.G., 1996, Alteration of alluvium by acidic ground water resulting from copper mining at Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1089–1094.

Longsworth, S.A., 1991, Measurement of stream reareation at Pinal Creek, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 492–497.

Longsworth, S.A., and Taylor, A.M., 1992, Hydrologic data from the study of acidic contamination in the Miami Wash–Pinal Creek area, Arizona, water years 1990–91: U.S. Geological Survey Open-File Report 92–468, 59 p.

Love, A.H., and Ficklin, W.H., 1990, Sequential-partial extraction of Pinal Creek aquifer material near Globe, Arizona, for SO4-2 and PO4-3, in Rocky Mountain Conference on Analytical Chemistry, 32nd, July 29–August 3, 1990, Proceedings: Society for Applied Spectroscopy, 6 p.

National Climatic Data Center, issued monthly, Climatological data, Arizona: U.S. Department of Commerce, National Climatic Data Center, v. 97–100, no. 1–12.

National Climatic Data Center, issued annually, Climatological data annual summaries, Arizona: U.S. Department of Commerce, National Climatic Data Center, v. 91–93, no. 13.

Neaville, C.C., 1989, Simulation of ground- and surface-water flow in the Globe area, Arizona, *in* Mallard, G.E., and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Phoenix, Arizona, September 26–30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88–4220, p. 577–579.

Neaville, C.C., 1991, Hydrogeology and simulation of ground-water and surface-water flow in the Pinal Creek Basin, Gila County, Arizona: Tucson, University of Arizona, M.S. thesis, 149 p.

Neaville, C.C., and Brown, J.G., 1994, Hydrogeology and hydrologic system of Pinal County, Arizona: U.S. Geological Survey Water-Resources Investigations Report 93–4212, 32 p.

Novo-Gradac, K.J., and Smith, C.N., 1991, Application of MINTEQA2 to the speciation of contaminants at Globe, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 498–501.

Peterson, N.P., 1962, Geology and ore deposits of the Globe–Miami district, Arizona: U.S. Geological Survey Professional Paper 342, 151 p.

Pool, D.R., and Eychaner, J.H., 1995, Measurements of aquifer-storage change and specific yield using gravity surveys: Ground Water, v. 33, no. 3, May–June 1995, p. 425–432.

Puls, R.W., and Eychaner, J.H., 1990, Sampling of ground water for inorganics—pumping rate, filtration, and oxidation effects, *in* Proceedings of the Fourth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring, and Geophysical Methods, Las Vegas, Nevada, May 14–17, 1990: Dublin, Ohio, Water Well Journal Publishing Company, p. 313–327.

Puls, R.W., Eychaner, J.H., and Powell, R.M., 1990, Colloidal-facilitated transport of inorganic contaminants in ground water: Part I, Sampling considerations: U.S. Environmental Protection Agency Environmental Research Brief, EPA 600/M–90/023, 11 p.

Puls, R.W., and Powell, R.M., 1990, Transport of Fe59-labeled iron oxide colloids in laboratory columns using natural aquifer material: American Geophysical Union, EOS Transactions, v. 71, p. 504.

Puls, R.W., Powell, R.M., and Clark, D.A., 1996, Assessment of colloidal transport in ground water, Pinal Creek Basin, Arizona, *in* Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water- Supply Paper 2466, chap. C, p. 51–60.

Puls, R.W., Powell, R.M., and Rees, T.F., 1991, Stability and transport of inorganic colloids through contaminated aquifer material, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological SurveyWater-Resources Investigations Report 91–4034, p. 507–510.

Ransome, F.L., 1903, Geology of the Globe copper district, Arizona: U.S. Geological Survey Professional Paper 12, 168 p.

Reese, R.S., 1989, Characterization of organic contamination of ground water in a mining area, Globe, Arizona: Tucson, University of Arizona, M.S. thesis, 138 p.

Reese, R.S., and Bassett, R.L., 1990, Characterization of organic contamination of ground water in a mining area, Globe, Arizona, *in* Lehr, J.H., ed., Ground Water Management No. 1, Proceedings, Ground- Water Geochemistry Conference, Kansas City, Missouri, February 20–22, 1990: National Water Well Association, Association of Ground-Water Scientists and Engineers, p. 221–236.

Rouse, J.V., 1981, Geohydrology of the Globe–Miami, Arizona, area: Florence, Arizona, Central Arizona Association of Governments, Mineral Extraction Task Force Report METF–5, 103 p.

1983, Water-quality report for the Globe–Miami area: Florence, Arizona, Central Arizona Association of Governments, Mineral Extraction Task Force Report METF–6, 2 volumes, 448 p.

Smith, C.F., Duet, N.R., Fisk, G.G., McCormack, H.F., Partin, C.K., Pope, G.L., Rigas, P.D., and Tadayon, Saeid, 1996, Water Resources Data, Arizona, water year 1995: U.S. Geological Survey Water-Data Report AZ–95–1, 306 p.

Spindler, P.H., 1993, Algal distribution and chemical gradients in Pinal Creek, Gila County, Arizona: Tempe, Arizona State University, M.S. thesis, 73 p.

Spindler, P.H., and Sommerfeld, M.R., 1996, Relations among algal species and chemical gradients in Pinal Creek, near Globe, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1107-1113.

Stollenwerk, K.G., 1988, Neutralization of acidic ground water in eastern Arizona, *in* Ragone, S.E., ed., U.S. Geological Survey's Program on Toxic Waste— Ground-Water Contamination—Fiscal Year 1986 Program Overview and Selected Abstracts from the Second Technical Meeting, Cape Cod, Massachusetts, October 21–25, 1985: U.S. Geological Survey Open-File Report 86–481, p. E–7 to E–8.

Stollenwerk, K.G., 1990, Simulation of the sorption of Co, Cu, Ni, and Zn with a two-site, diffuse layer sorption model: American Geophysical Union, EOS Transactions, v. 71, no. 17, p. 519.

Stollenwerk, K.G., 1991, Simulation of copper, cobalt, and nickel sorption in an alluvial aquifer near Globe, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 502–506.

Stollenwerk, K.G., 1994, Geochemical interactions between constituents in acidic groundwater and alluvium in an aquifer near Globe, Arizona: Applied Geochemistry, v. 9, no. 4, p. 353–369.

Stollenwerk, K.G., 1996, Simulation of reactions affecting transport of constituents in the acidic plume, Pinal Creek Basin, Arizona, *in* Brown, J.G., and Favor, Barbara, eds., 1996, Hydrology and geochemistry of aquifer and stream contamination related to acidic water in Pinal Creek Basin near Globe, Arizona: U.S. Geological Survey Water-Supply Paper 2466, chap. B, p. 21–49.

Stollenwerk, K.G., and Eychaner, J.H., 1987, Acidic ground-water contamination from copper mining near Globe, Arizona, in II. Neutralization capacity of alluvium, *in* Franks, B.J., ed., U.S. Geological Survey Program on Toxic Waste—Ground-Water Contamination—Proceedings of the Third Technical Meeting, Pensacola, Florida, March 23–27, 1987: U.S. Geological Survey Open-File Report 87–109, p. D–19 to D–24.

Stollenwerk, K.G., and Eychaner, J.H., 1989, Solubility of aluminum and iron in ground water near Globe, Arizona, *in* Mallard, G.E., and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Phoenix, Arizona, September 26–30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88–4220, p. 581–591.

Tolle, Shirin, and Arthur, G.V., 1991, Aquifer restoration under the Clean Water Act, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 520–523.

Western Region Climate Center, Desert Research Institute, Climatological Data Summaries, accessed September 2004 at http://www.wrcc.dri.edu/index.html

U.S. Geological Survey, 1975, Hydrologic unit map—1974, State of Arizona: U.S. Geological Survey Hydrologic Unit Map series, 1 sheet.

U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at http://pubs.water.usgs.gov/twri9A

Villinski, J.E., Conklin, M.H., and Liang, L., 1995, Effect of natural organic matter on the Mn/Fe redox couple: American Chemical Society, April 4–5, 1995.

Wagner, B.J., and Harvey, J.W., 1994, Evaluating data worth for designing tracer experiments in stream- aquifer systems: American Geophysical Union, EOS Transactions, v. 75, no. 44, November 1, 1994, p. 259.

Wagner, B.J., and Harvey, J.W., 1996, Solute-transport parameter estimation for an injection experiment at Pinal Creek, Arizona, *in* Morganwalp, D.W., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Colorado Springs, Colorado, September 20–24, 1993: U.S. Geological Survey Water-Resources Investigations Report 94–4015, p. 1081–1087.

Wallin, R.W., 1991, Ground-water transport of polycyclic aromatic hydrocarbons in association with humic substances in the Pinal Creek Basin, Globe, Arizona: Tucson, University of Arizona, M.S. thesis, 80 p.

Wallin, R.W., Bassett, R.L., and Eychaner, J.H., 1991, Ground-water transport of polycyclic aromatic hydrocarbons in association with humic substances in the Pinal Creek Basin, Globe, Arizona, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 511–515.

Walter, G.R., and Norris, J.R., 1991, Hydrochemical zoning in the Pinal Creek alluvium, *in* Mallard, G.E., and Aronson, D.A., eds., U.S. Geological Survey Toxic Substances Hydrology Program— Proceedings of the Technical Meeting, Monterey, California, March 11–15, 1991: U.S. Geological Survey Water-Resources Investigations Report 91–4034, p. 516–519.

Appendix A. Ground Water

GROUND WATER

Well 10

LOCATION.—Lat 33°23'10", long 110°49'05", in SE1/4SE1/4NW1/4, sec. 34, T. 1 N., R. 15 E. (A-01-15)34bdd1, 90 m east of Russell Gulch, and 3 km southwest of Globe.

Landowner: Pinto Valley Division, Broken Hills Proprietary Company, Limited (previously Magma Copper Corporation).

LAND-SURFACE DATUM.—1,056.54 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—In December 1988, three attempts to drill this well using a hollow-stem auger were abandoned at depths of less than 3 m because of large rocks in the hole.

DRILLING AND WELL CONSTRUCTION

The well was cased and screened with nominal 10-centimeter diameter, schedule 40, polyvinyl chloride (PVC) pipe. The screened interval is a single 9.1-meter length of PVC pipe that has 5,472 factory-cut slots 4.4 cm long by 0.51 mm wide for a total open area of 1,228 cm^2. The borehole annulus around the slotted pipe is filled to approximately 17.0 m below land surface with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 16.4 to 17.0 m below land surface. Native material fills the borehole annulus from approximately 16.4 to 2.4 m below land surface. A concrete seal extends from the land surface to a depth of 2.4 m.

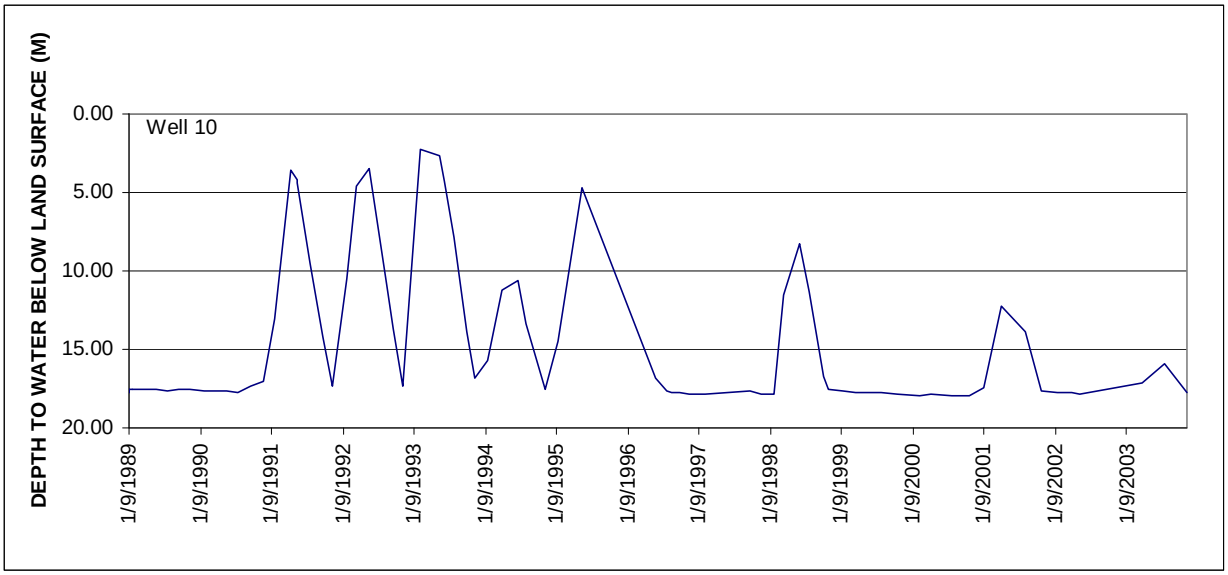
Logs: D, driller's; G, geologist; P, particle size.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
10	bdd1	01–06–89	Air hammer	27.9	27.1	18.0–27.1	Basin fill	2.4	DGP

GROUND WATER—Continued

Well 10—Continued

Date	Water level, in meters below land surface	Date	Water level, in meters below land surface	Date	Water level, in meters below land surface
11–22–96	17.87	01–13–99	17.68	04–03–01	12.27
02–06–97	17.84	03–24–99	17.71	08–08–01	13.90
09–25–97	17.67	05–18–99	17.73	10–25–01	17.62
11–24–97	17.82	07–28–99	17.80	01–16–02	17.77
01–23–98	17.86	10–19–99	17.90	04–03–02	17.79
03–20–98	11.58	02–14–00	17.91	05–14–02	17.82
06–08–98	8.28	04–11–00	17.87	03–27–03	17.17
07–27–98	11.29	07–27–00	17.99	07–24–03	15.94
10–09–98	16.78	10–26–00	18.00	11–12–03	17.75
11–02–98	17.58	01–09–01	17.44		



GROUND WATER—Continued

Well 10—Continued

Field Measurements										
[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data]										
Well	**Date**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
10	6/8/1998	376	7.1	436	--	25.4	7.8	115	3.1	2.53
10	11/2/1998	450	6.9	--	18.0	17.0	5.0	160	2.9	0.30
10	5/14/2002	528	6.9	--	31.0	19.0	4.9	192	2.6	1.40

Laboratory Measurements										
[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; mg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated]										
Well	**Date**	**Laboratory**	**Calcium, dissolved (mg/L as Ca)**	**Magnesium, dissolved (mg/L as Mg)**	**Sodium, dissolved (mg/L as Na)**	**Potassium, dissolved (mg/L as K)**	**Sulfate, dissolved (mg/L as SO_4)**	**Chloride, dissolved (mg/L as Cl)**	**Fluoride, dissolved (mg/L as F)**	**Silica, dissolved (mg/L as SiO_2)**
10	6/8/1998	10	37.9	11.3	23.6	1.55	52.9	7.58	0.4	22.8
10	11/2/1998	10	45.3	14.4	26.7	1.45	58.8	10.8	0.4	24.0
10	5/14/2002	10	54.7	17.0	30.4	1.89	60.0	15.0	0.4	24.4

Well	**Date**	**Laboratory**	**Aluminum, dissolved (μg/L as Al)**	**Barium, dissolved (μg/L as Ba)**	**Beryllium, dissolved (μg/L as Be)**	**Boron, dissolved (μg/L as B)**	**Cadmium, dissolved (μg/L as Cd)**	**Chromium, dissolved (μg/L as Cr)**	**Cobalt, dissolved (μg/L as Co)**	**Copper, dissolved (μg/L as Cu)**	**Iron, dissolved (μg/L as Fe)**
10	6/8/1998	10	<10	95.4	<1.0	20	<8	<14	<12	<10	<10
10	11/2/1998	10	<10	104	<1.6	<16	<8	<14	<7	<10	<10
10	5/14/2002	10	<20	125	<.5	E12	<8	<10	<13	<6	<10

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
10	6/8/1998	10	<100	<4	<4.0	<60	<40	<4	229	<10	<20
10	11/2/1998	10	<100	E5	<3.0	<50	<40	<4	280	<10	E9
10	5/14/2002	10	0.19	E2	E2.0	<50	<30	<9	330	<8	E15

GROUND WATER—Continued

Well Group 50

LOCATION.—Lat 33°26'11", long 110°49'51", in SE1/4SW1/4SE1/4, sec. 9, T. 1 N., R. 15 E. (A-01-15)09dcd, 170 m east of Miami Wash, and 6 km northwest of Globe.

Landowner: Pinto Valley Division, Broken Hills Proprietary Company, Limited (previously Magma Copper Corporation).

LAND SURFACE DATUM.—988.10 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 51, 52, 53, and 54 were originally identified as MP1W1, MP1W2, MP1W3, and MP1W4, respectively.

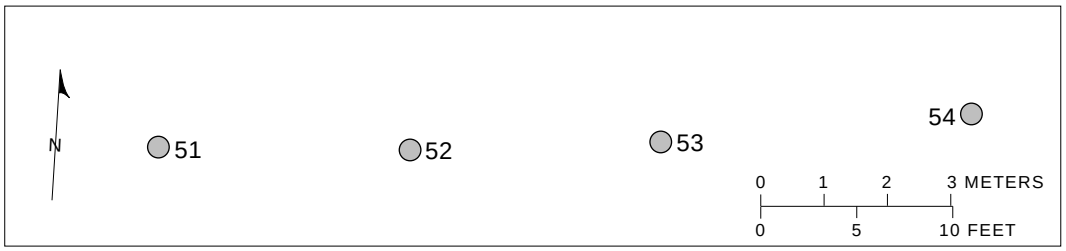
DRILLING AND WELL CONSTRUCTION

All holes listed below were drilled by normal-circulation rotary drilling with bentonite mud. The wells were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to a depth of 3 m for each well.

Logs: C, caliper; E, electric; G, geologist; P, particle size; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
51	dcd1	10–11–84	Rotary, bentonite	33.5	33.4	32.4–33.3	Basin fill	3	CEGP
52	dcd2	10–12–84	Rotary, bentonite	20.1	19.8	18.8–19.7	Alluvium	3	--
53	dcd3	10–12–84	Rotary, bentonite	28.0	27.8	26.8–27.7	Basin fill	3	--
54	dcd4	10–12–84	Rotary, bentonite	11.3	11.0	10.0–10.9	Alluvium	3	--

WELL GROUP 50 SITE PLAN



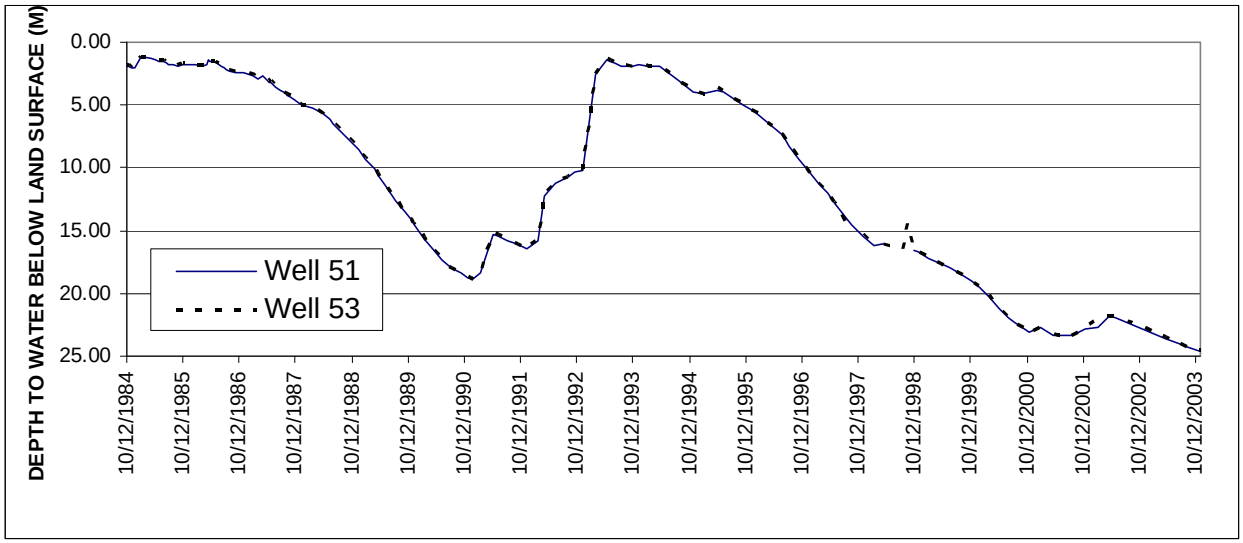
GROUND WATER—Continued

Well Group 50—Continued

	Water level, in meters below land surface			
	Well number			
Date	51	52	53	54
11–08–96	10.07	10.03	10.03	10.03
02–06–97	11.41	11.37	11.37	Dry
03–27–97	12.01	11.97	11.97	Dry
05–09–97	12.74	12.72	12.72	Dry
07–24–97	13.93	13.89	14.47	Dry
09–03–97	14.51	14.48	--	--
11–07–97	15.40	15.36	15.36	--
01–23–98	16.25	16.21	16.21	Dry
03–16–98	16.07	--	--	--
03–24–98	16.07	16.04	16.03	Dry
07–27–98	16.48	16.43	16.44	Dry
09–03–98	--	--	14.47	--
10–07–98	16.62	16.59	16.58	Dry
11–06–98	16.75	16.71	16.71	Dry
01–13–99	17.19	17.14	17.14	--
03–24–99	17.64	17.60	17.60	--
05–19–99	17.87	17.82	17.83	Dry
06–09–99	17.98	17.94	17.94	--
07–28–99	18.39	18.35	18.35	Dry
10–20–99	19.03	18.99	18.98	Dry
12–09–99	19.55	19.30	19.51	--
02–14–00	20.24	Dry	20.21	Dry
04–11–00	21.19	--	21.15	--
06–12–00	21.97	Dry	21.91	--
07–27–00	22.37	--	22.34	--
10–26–00	23.13	Dry	23.08	Dry
01–09–01	22.76	Dry	22.73	Dry
04–03–01	23.33	Dry	23.28	Dry
05–03–01	23.36	Dry	23.29	Dry
08–08–01	23.40	--	23.35	Dry
10–25–01	22.79	Dry	22.75	Dry
01–16–02	22.75	Dry	22.09	Dry
04–03–02	21.87	Dry	21.83	Dry
05–16–02	21.89	Dry	21.85	Dry
03–27–03	23.56	Dry	23.52	Dry
07–24–03	24.15	Dry	24.11	Dry
08–13–03	24.27	Dry	24.23	--
11–12–03	24.59	Dry	24.55	Dry

GROUND WATER—Continued

Well Group 50—Continued



GROUND WATER—Continued

Well Group 100

LOCATION.—Lat 33×°26'29", long 110×°49'58", in SW1/4NW1/4SE1/4, sec. 9, T. 1 N., R. 15 E. (A-01-15)09dbc, in the right-of-way of State Highway 88, 150 m east of Miami Wash, and 7 km northwest of Globe.

Landowner: Arizona Department of Transportation.

LAND-SURFACE DATUM.—986.01 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 101, 102, 103, 104, 105, and 106 were originally identified as X1W1, X1W2, X1W3, X1W4, X1W5, and X1W6, respectively.

DRILLING AND WELL CONSTRUCTION

Wells 101–105 were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to the depth listed.

Well 1EX was drilled for exploration purposes. After water samples and cuttings were collected, the hole was sealed with concrete to its total depth.

The casing of well 106 was accidentally crushed at about 46 m depth during pressure grouting. The borehole annulus probably is grouted from 0 to 15 m and from 46 to 55 m. Air jetting during attempted development removed most water from the upper casing. The water level rose from 37 to 29 m below land surface during the next 54 days, which represents an average inflow of 1.2 L/d. The casing then was filled with concrete.

Well 107 was cased with nominal 10-centimeter diameter, schedule 80 PVC pipe. The well has a single 4.4-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 3,168 factory cut slots 3.4 cm long by 0.64 mm wide for a total open area of 689 cm^2. The borehole around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 1 to 2 m above the screen. A concrete seal extends from the land surface to a depth of 1.5 m.

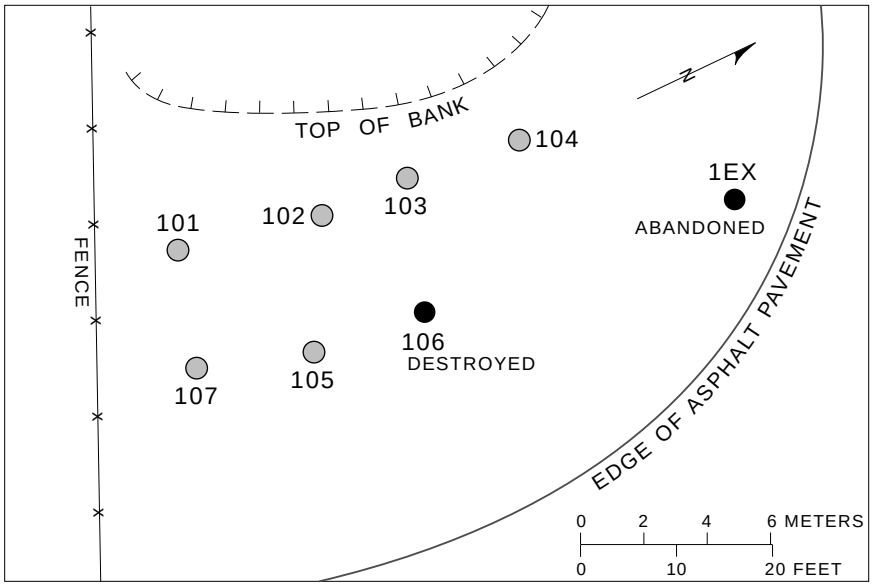
GROUND WATER—Continued

Well Group 100—Continued

Logs: C, caliper; D, driller's; E, electric; G, geologist; P, particle size; U, gamma-gamma; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
101	dbc1	10–10–84	Rotary, bentonite	36.3	36.1	35.1–36.0	Basin fill	3	CEGPU
102	dbc2	10–11–84	Rotary, bentonite	25.3	25.2	24.2–25.1	Alluvium	3	--
103	dbc3	10–11–84	Rotary, bentonite	19.2	19.1	18.1–19.0	Alluvium	3	--
104	dbc4	10–11–84	Rotary, bentonite	11.3	11.2	10.1–11.1	Alluvium	3	--
1EX	--	12–11–85	Dual-wall air rotary	77.7	--	--	--	--	DGP
105	dbc5	05–22–86	Rotary, bentonite	49.1	48.8	47.2–48.1	Basin fill	38.1	D
106	dbc6	05–20–86	Rotary, bentonite	62.5	--	--	--	--	--
107	dbc7	12–14–88	Hollow stem auger	22.6	19.3	14.9–19.2	Alluvium	1.5	DGP

WELL GROUP 100 SITE PLAN



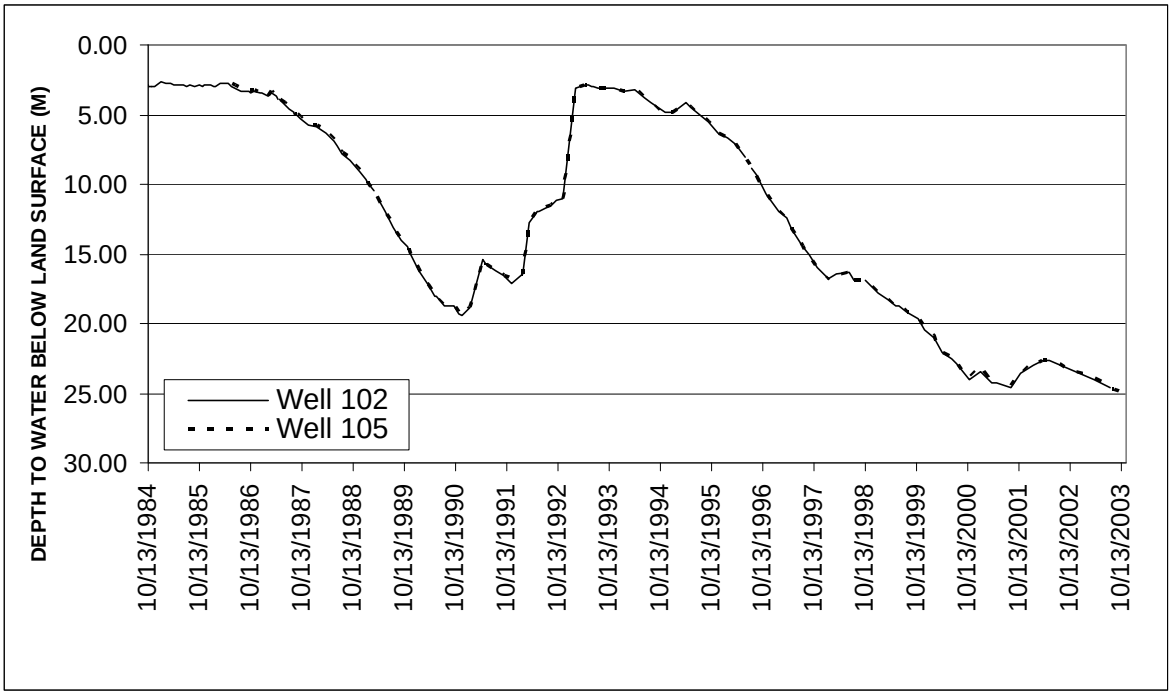
GROUND WATER—Continued

Well Group 100—Continued

	Water level, in meters below land surface					
	Well number					
Date	101	102	103	104	105	107
11–06–96	10.63	10.64	10.65	10.68	10.69	10.60
02–06–97	11.90	11.90	11.92	Dry	11.98	11.86
03–27–97	12.44	12.44	12.45	Dry	12.52	12.40
05–07–97	13.19	13.19	13.21	Dry	13.27	13.15
07–24–97	14.47	14.46	14.47	Dry	14.53	14.40
09–04–97	15.06	15.05	15.07	--	15.13	15.00
11–07–97	15.96	15.95	15.96	Dry	16.03	15.90
01–23–98	16.80	16.80	17.09	Dry	16.85	16.74
03–24–98	16.41	16.40	16.42	Dry	16.45	16.35
06–15–98	16.32	16.32	16.33	--	16.36	16.28
07–23–98	16.85	16.85	14.47	--	--	--
07–27–98	--	--	16.87	Dry	16.88	16.80
10–07–98	16.92	16.91	16.93	Dry	16.94	16.87
11–06–98	17.12	17.11	17.13	--	17.14	17.08
01–13–99	17.82	17.82	17.85	Dry	17.83	17.77
03–24–99	18.31	18.31	18.33	--	18.32	18.26
05–18–99	18.77	18.77	18.79	--	18.77	18.71
06–10–99	18.67	18.70	18.72	Dry	18.68	18.63
07–28–99	19.19	19.19	Dry	Dry	19.17	19.13
10–20–99	19.63	19.63	Dry	Dry	19.59	19.56
12–09–99	20.45	20.45	Dry	Dry	20.40	Dry
02–14–00	21.01	21.00	Dry	Dry	20.94	Dry
04–11–00	22.12	22.11	Dry	Dry	22.04	Dry
06–12–00	22.51	22.51	Dry	Dry	22.46	Dry
07–27–00	22.89	22.88	--	--	22.82	--
10–26–00	24.00	23.99	Dry	Dry	23.92	Dry
01–09–01	23.12	23.41	Dry	Dry	23.06	Dry
04–03–01	24.28	24.27	Dry	Dry	24.21	Dry
05–02–01	24.29	24.28	--	--	--	--
08–08–01	24.60	24.58	Dry	Dry	24.53	Dry
10–25–01	23.61	23.60	Dry	Dry	23.56	Dry
01–16–02	22.96	22.95	Dry	Dry	22.90	Dry
04–03–02	22.67	22.66	Dry	--	22.61	Dry
05–16–02	22.65	22.63	Dry	Dry	22.59	Dry
03–27–03	24.00	23.99	Dry	Dry	23.95	Dry
07–24–03	24.63	24.63	Dry	Dry	24.58	Dry
08–13–03	24.75	--	Dry	Dry	24.71	Dry
11–12–03	25.09	--	Dry	Dry	25.04	Dry

GROUND WATER—Continued

Well Group 100—Continued



GROUND WATER—Continued

Well Group 100—Continued

Field Measurements

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; IT, incremental titration; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved, IT field (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved, IT field (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
101	11–19–93	2,630	4.0	--	20.0	18.0	0.3	--	--	4.5	0.47
	06–22–94	1,790	3.9	431	37.0	21.0	<.1	--	--	3.4	.97
	11–09–94	1,740	4.0	--	--	17.5	.3	--	--	1.9	.62
	05–18–95	1,350	4.0	--	--	21.0	.1	--	--	4.9	.88
	11–29–95	1,260	4.0	476	--	18.5	.2	--	--	4.5	.72
	06–03–96	1,400	4.1	436	20.0	18.5	.3	--	--	4.5	1.42
102	11–19–93	3,150	3.8	--	--	18.0	.2	--	--	4.5	.45
	06–22–94	2,960	3.9	434	36.5	21.5	<.1	--	--	2.6	.85
	05–18–95	1,790	3.8	--	--	19.0	.1	--	--	4.5	.77
	11–30–95	1,620	3.9	448	--	19.0	.2	--	--	3.8	1.03
	06–05–96	1,800	4.0	436	--	20.0	.2	--	--	3.8	.67
103	11–19–93	2,170	4.0	--	19.5	18.0	.1	--	--	4.5	.53
	11–09–94	1,850	3.7	--	--	18.0	.4	--	--	1.5	.70
	05–18–95	1,590	4.0	--	--	17.5	.1	--	--	4.9	.65
	11–30–95	1,620	3.9	484	--	19.0	.3	--	--	4.9	.78
	06–01–96	1,780	3.9	450	--	21.5	.9	--	--	2.3	.48
104	11–19–93	1,970	3.9	--	--	18.0	.6	--	--	4.5	.58
	11–09–94	2,560	3.5	--	--	19.0	.4	--	--	1.9	.75
	05–17–95	2,830	3.8	--	--	17.0	.1	--	--	4.9	.68
	11–29–95	2,340	3.7	--	--	19.0	.4	--	--	4.5	.65
	06–01–96	2,090	3.8	579	--	21.5	.9	--	--	3.4	.75
105	06–22–94	4,040	6.3	308	--	21.0	.1	573	699	3.4	.60
	11–09–94	4,090	6.0	--	--	19.5	.7	--	--	1.1	1.27
	05–17–95	3,470	6.5	--	--	19.0	.2	637	777	4.5	.87
	06–07–96	3,900	6.3	252	--	20.0	.5	555	677	4.5	1.8
	06–07–96*	3,450	6.4	382	--	23.3	1.0	521	636	3.8	2.5
107	06–22–94	2,030	3.8	459	35.5	22.0	<.1	--	--	3.4	.58
	05–18–95	1,820	3.8	--	--	19.5	.2	--	--	4.9	.42

*Resampled after being pumped with large pump.

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 140, USGS research laboratory, Menlo Park, California; 150, USGS research laboratory, Reston, Virginia; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown]

Well	Date	Laboratory	Ionic balance (percent)	Ionic strength (mol/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)
101	11–19–93	110	2.09	0.079	340	72	85	--	1,800
	06–22–94	10	-15.52	.037	170	39	43	5.0	1,000
	06–22–94	110	-.14	.046	160	42	53	--	1,100
	06–22–94	140	-.67	.050	150	40	51	5.2	1,200
	11–09–94	110	.58	.045	150	39	63	--	1,000
	11–09–94	140	8.21	.044	200	40	60	5.4	950
	05–18–95	140	-.77	.037	120	38	56	6.1	890
	11–29–95	140	-5.14	.032	100	30	50	4.4	810
	06–03–96	10	-8.7	.033	100	33	49	4.9	850
102	11–19–93	110	-.44	.114	580	71	90	--	2,700
	06–22–94	110	2.15	.086	520	43	62	--	2,000
	06–22–94	140	-.56	.086	510	41	54	3.9	2,000
	05–18–95	140	-3.16	.054	200	50	70	5.1	1,300
	11–30–95	140	-4.69	.040	100	50	60	4.4	1,000
	06–05–96	10	-4.6	.045	140	52	60	5.3	1,100
103	11–19–93	110	-1.85	.067	310	49	84	--	1,600
	11–09–94	110	2.64	.046	150	46	65	--	1,000
	11–09–94	140	2.03	.045	160	47	57	3.2	1,000
	11–09–94	10	--	.039	150	45	57	4.2	1,100
	05–18–95	140	-1.36	.043	140	48	60	4.9	1,000
	11–30–95	140	-5.99	.040	100	50	60	2.7	1,000
	06–01–96	10	-5.4	.045	150	53	63	4.7	1,100
104	11–19–93	110	1.99	.055	320	80	87	--	1,200
	11–09–94	110	-.51	.069	350	94	100	--	1,600
	11–09–94	140	1.37	.068	370	100	87	8.9	1,600
	05–17–95	140	--	--	370	87	72	7.0	1,700
	11–29–95	20	--	--	310	82	82	7.4	--
	11–29–95	140	-4.58	.064	300	90	90	6.6	1,600
	06–01–96	10	-5.0	.053	280	69	75	7.1	1,300
105	06–22–94	110	-2.25	.093	560	180	200	--	1,800
	06–22–94	140	.55	.098	610	180	230	28	1,800
	11–09–94	110	16.82	.092	620	180	280	--	1,700
	11–09–94	140	15.36	.094	630	190	230	28	1,800
	05–17–95	140	-3.47	.066	360	110	240	31	1,200
	06–07–96	10	-3.90	.071	400	110	240	30	1,400
	06–07–96*	10	-4.7	.086	520	140	190	28	1,700
107	06–22–94	110	2.78	.055	170	56	68	--	1,200
	06–22–94	140	2.86	.055	170	56	59	4.8	1,300
	05–18–95	140	-3.41	.048	140	56	65	5.9	1,200

*Resampled after being pumped with large pump.

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements—Continued

Well	Date	Laboratory	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)
101	11–19–93	110	50	--	100	27,000	--	--	--	<100	--
	06–22–94	10	24	1.3	76	12,000	13	18	120	41	<20
	06–22–94	110	33	--	79	14,000	--	--	--	--	--
	06–22–94	140	14	--	79	11,000	--	--	--	--	--
	11–09–94	110	23	--	87	16,000	--	--	--	--	--
	11–09–94	140	26	--	86	12,000	--	--	--	--	--
	05–18–95	140	13	--	79	9,500	--	--	--	--	--
	11–29–95	140	10	--	40	7,500	--	--	--	--	--
	06–03–96	10	30	2.8	74	7,860	15	15	66	35	<10
102	11–19–93	110	65	--	110	42,000	--	--	--	<100	--
	06–22–94	110	43	--	86	29,000	--	--	--	--	--
	06–22–94	140	34	--	83	22,000	--	--	--	--	--
	05–18–95	140	22	--	86	11,000	--	--	--	--	--
	11–30–95	140	23	--	40	8,900	--	--	--	--	--
	06–05–96	10	35	4.6	83	10,100	16	20	40	55	<15
103	11–19–93	110	48	--	100	18,000	--	--	--	<100	--
	11–19–93	150	--	--	--	13,000	--	--	--	23	--
	11–09–94	110	34	--	98	20,000	--	--	--	--	--
	11–09–94	140	34	--	88	14,000	--	--	--	--	--
	11–09–94	10	34	4.1	87	15,000	11	22	130	36	<20
	05–18–95	140	23	--	90	12,000	--	--	--	--	--
	11–30–95	140	24	--	40	12,000	--	--	--	--	--
	06–01–96	10	37	4.8	94	13,500	15	21	51	39	<15
104	11–19–93	110	73	--	120	13,000	--	--	--	<100	--
	11–09–94	110	46	--	120	27,000	--	--	--	--	--
	11–09–94	140	59	--	110	20,000	--	--	--	--	--
	05–17–95	140	30	--	68	11,000	--	--	--	--	--
	11–29–95	10	--	--	110	19,000	19	45	40	28	<20
	11–29–95	140	31	--	50	20,000	--	--	--	--	--
	06–01–96	10	47	5.4	92	13,900	18	38	59	20	<15
105	06–22–94	110	210	--	46	<5,000	--	--	--	--	--
	06–22–94	140	230	--	53	<110	--	--	--	--	--
	11–09–94	110	210	--	55	<5,000	--	--	--	--	--
	11–09–94	140	150	--	51	<110	--	--	--	--	--
	05–17–95	140	140	--	47	<110	--	--	--	--	--
	06–07–96	10	180	--	43	25	21	<1.5	114	<3.0	<15
	06–07–96*	10	150	--	47	22	16	<1.5	126	<3.0	<15
107	06–22–94	110	44	--	100	26,000	--	--	--	--	--
	06–22–94	140	36	--	100	19,000	--	--	--	--	--
	05–18–95	140	34	--	94	16,000	--	--	--	--	--

*Resampled after being pumped with large pump.

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements—Continued

Well	Date	Laboratory	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)
105	06–22–94	110	--	<100	<200	--	--	11,000	--	550	--
	06–22–94	140	<50	<30	<130	--	--	12,000	--	<90	--
	11–09–94	110	--	<100	<200	--	--	12,000	--	200	--
	11–09–94	140	20	<30	190	--	--	13,000	--	<90	--
	05–17–95	140	<20	<30	<130	--	--	6,100	--	<90	--
	06–07–96	10	<9	<30	99	<30	190	7,200	<30	<30	<3.0
	06–07–96*	10	11	<30	430	<30	210	11,000	<30	<30	<3.0
107	06–22–94	110	--	17,000	250,000	--	--	9,100	--	320	--
	06–22–94	140	310	16,000	280,000	--	--	9,900	--	350	--
	05–18–95	140	<20	15,000	180,000	--	--	9,000	--	350	--

*Resampled after being pumped with large pump.

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements—Continued

Well	Date	Laboratory	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)
101	11–19–93	110	3,500	25,000	280,000	--	--	6,400	--	220	--
	06–22–94	10	1,200	11,000	--	<30	140	7,200	<30	240	<3.0
	06–22–94	110	--	12,000	210,000	--	--	6,400	--	360	--
	06–22–94	140	230	12,000	280,000	--	--	6,700	--	250	--
	11–09–94	110	--	12,000	190,000	--	--	5,900	--	360	--
	11–09–94	140	220	11,000	170,000	--	--	6,600	--	<240	--
	05–18–95	140	150	10,000	150,000	--	--	6,400	--	<90	--
	11–29–95	140	140	8,500	120,000	--	--	5,400	--	190	--
	06–03–96	10	--	9,000	120,000	<20	130	5,600	<20	180	3.0
102	11–19–93	110	3,500	26,000	350,000	--	--	12,000	--	<100	--
	06–22–94	110	--	12,000	230,000	--	--	6,600	--	330	--
	06–22–94	140	240	12,000	240,000	--	--	6,800	--	290	--
	05–18–95	140	250	14,000	210,000	--	--	8,300	--	310	--
	11–30–95	140	190	12,000	170,000	--	--	6,700	--	270	--
	06–05–96	10	--	14,000	170,000	60	180	6,900	<30	330	<3.0
103	11–19–93	110	2,100	15,000	220,000	--	--	8,300	--	<100	--
	11–19–93	150	--	15,000	--	--	--	11,000	--	260	--
	11–09–94	110	--	14,000	200,000	--	--	7,300	--	490	--
	11–09–94	140	--	14,000	180,000	--	--	8,100	--	120	--
	11–09–94	10	1,100	13,000	--	<30	190	8,500	<30	300	<3.0
	05–18–95	140	240	13,000	170,000	--	--	8,200	--	<90	--
	11–30–95	140	200	13,000	150,000	--	--	7,200	--	310	--
	06–01–96	10	--	14,000	130,000	60	200	8,400	<30	310	<3.0
104	11–19–93	110	350	15,000	--	--	--	27,000	--	420	--
	11–09–94	110	--	20,000	20,000	--	--	23,000	--	830	--
	11–09–94	140	470	20,000	19,000	--	--	27,000	--	610	--
	05–17–95	140	340	10,000	42,000	--	--	24,000	--	560	--
	11–29–95	10	330	18,000	27,000	60	260	20,000	<30	520	<3.0
	11–29–95	140	370	19,000	29,000	--	--	20,000	--	540	--
	06–01–96	10	270	14,000	3,500	50	220	17,000	<30	430	<3.0

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements—Continued

Well	Date	Lab-ora-tory	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, total (mg/L as C)	Carbon, inorganic, dissolved (mg/L as C)
101	11–19–93	20	--	--	--	42	--
	11–19–93	110	1,000	--	2,700	--	--
	06–22–94	10	690	33	1,800	--	--
	06–22–94	20	--	--	--	50	--
	06–22–94	110	730	--	1,600	--	--
	06–22–94	140	700	--	1,800	--	--
	11–09–94	110	790	--	1,600	--	--
	11–09–94	140	790	--	1,700	--	--
	11–09–94	20	--	--	--	61	--
	05–18–95	20	--	--	--	12	26
	05–18–95	140	800	--	1,400	--	--
	11–29–95	20	--	--	--	--	22
	11–29–95	140	690	--	1,200	--	--
	06–03–96	20	--	--	--	--	19
	06–03–96	10	760	<12	1,200	--	--
102	11–19–93	20	--	--	--	31	--
	11–19–93	110	1,100	--	3,300	--	--
	06–22–94	110	860	--	1,900	--	--
	06–22–94	20	--	--	--	47	--
	06–22–94	140	800	--	1,900	--	--
	05–18–95	140	680	--	2,200	--	--
	05–18–95	20	--	--	--	26	32
	11–30–95	20	--	--	--	--	21
	11–30–95	140	610	--	1,800	--	--
	06–05–96	10	740	<18	1,900	--	--
	06–05–96	20	--	--	--	--	--
103	11–19–93	20	--	--	--	25	--
	11–19–93	110	650	--	1,700	--	--
	11–19–93	150	870	--	2,100	--	--
	11–09–94	110	610	--	2,100	--	--
	11–09–94	140	--	--	2,200	--	--
	11–09–94	10	630	27	2,100	--	--
	11–09–94	20	--	--	--	57	--

GROUND WATER—Continued

Well Group 100—Continued

Laboratory Measurements—Continued

Well	Date	Lab-ora-tory	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, total (mg/L as C)	Carbon, inorganic, dissolved (mg/L as C)
103	05–18–95	140	600	--	2,000	--	--
	05–18–95	20	--	--	--	44	31
	11–30–95	140	670	--	1,900	--	--
	11–30–95	20	--	--	--	--	.4
	06–01–96	10	760	<18	1,900	--	--
	06–01–96	20	--	--	--	--	26
104	11–19–93	20	--	--	--	23	--
	11–19–93	110	1,500	--	1,600	--	--
	11–19–93	150	--	--	--	--	--
	11–09–94	110	1,500	--	2,800	--	--
	11–09–94	140	--	--	2,800	--	--
	11–09–94	20	--	--	--	46	--
	05–17–95	140	1,100	--	1,700	--	--
	05–17–95	20	--	--	--	24	26
	11–29–95	10	1,300	<18	2,400	--	--
	11–29–95	140	1,300	--	2,700	--	--
	11–29–95	20	--	--	--	--	15
	06–01–96	20	--	--	--	--	20
	06–01–96	10	1,200	<18	1,900	--	--
105	06–22–94	110	1,600	--	<150		--
	06–22–94	140	1,600	--	40	--	--
	11–09–94	110	1,700	--	230	--	--
	11–09–94	140	--	--	20	--	--
	05–17–95	140	1,000	--	59	--	--
	06–07–96	10	1,400	<18	<9.0	--	--
	06–07–96*	10	1,100	<18	16	--	--
107	06–22–94	110	720	--	2,300	--	--
	06–22–94	20	--	--	--	44	--
	06–22–94	140	700	--	2,600	--	--
	05–18–95	140	700	--	2,300	--	--
	05–18–95	20	--	--	--	--	32

*Resampled after being pumped with large pump.

GROUND WATER—Continued

Well Group 100—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, water, dissolved (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
101	11/6/1996	1,820	4.0	399	--	17.0	<.1	--	--	1.7	1.00
101	5/7/1997	1,670	4.0	226	--	21.0	0.1	--	--	1.8	0.92
101	11/7/1997	1,420	4.0	434	--	19.0	0.4	--	--	2.9	0.63
101	6/15/1998	1,560	4.1	435	--	21.5	<.1	--	--	3.6	0.62
101	11/6/1998	2,610	4.0	--	--	18.5	0.2	--	--	2.8	0.43
101	6/10/1999	3,350	3.9	--	30.0	20.5	0.1	--	--	2.5	0.40
101	12/10/1999	--	3.9	--	9.0	14.2	<.1	--	--	2.5	0.38
101	7/27/2000	2,780	4.0	--	36.0	20.5	0.3	--	--	3.2	0.60
101	5/3/2001	2,850	3.9	--	--	19.5	--	--	--	--	--
101	5/16/2002	3,470	3.9	--	--	20.2	0.1	--	--	2.8	0.58
101	8/13/2003	2,350	3.9	--	--	20.0	0.2	--	--	2.5	0.57
102	11/6/1996	2,300	4.0	417	--	19.2	0.1	--	--	1.2	0.95
102	5/7/1997	2,280	4.0	--	--	23.0	0.1	--	--	1.5	0.75
102	11/7/1997	1,660	4.0	451	--	19.9	0.2	--	--	3.3	0.67
102	6/15/1998	1,970	4.0	449	--	19.7	<.1	--	--	3.0	0.52
102	11/6/1998	2,700	4.0	--	21.0	19.0	0.1	--	--	2.6	0.55
102	6/10/1999	--	3.9	--	29.0	20.5	0.1	--	--	2.3	0.43
102	12/10/1999	--	3.8	--	7.5	15.1	<.1	--	--	2.8	0.40
102	7/27/2000	3,160	3.9	--	37.0	22.5	0.2	--	--	2.9	0.52
102	5/2/2001	2,910	3.9	--	--	19.5	0.2	--	--	--	--
102	5/16/2002	3,040	3.7	--	33.5	22.0	<.1	--	--	1.8	0.53
103	11/6/1996	2,250	3.9	411	--	18.0	0.1	--	--	1.4	0.87
103	5/7/1997	2,250	3.9	239	--	21.8	0.1	--	--	1.4	0.78
103	11/7/1997	1,900	3.8	466	--	20.6	0.2	--	--	3.3	0.38

Field Measurements (continued)

[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]

Well	Date	Specific conductance (µS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
103	6/15/1998	1,860	3.9	471	--	20.2	<.1	--	--	2.4	0.70
103	11/6/1998	2,450	3.9	--	--	19.0	<.1	--	--	2.6	0.53
103	6/10/1999	2,800	3.8	--	32.0	21.5	0.1	--	--	--	--
105	11/6/1996	3,750	6.3	167	--	19.4	0.3	612	747	1.2	1.32
105	5/7/1997	3,680	6.4	--	--	21.4	0.3	--	--	3.6	1.52
105	11/7/1997	3,950	6.2	326	--	16.8	0.5	598	730	2.5	0.62
105	6/15/1998	3,760	6.3	257	--	19.6	0.1	588	--	3.5	1.07
105	11/4/1998	3,620	6.4	--	--	18.5	0.5	556	--	3.4	1.00
105	6/10/1999	2,940	6.4	--	22.0	19.5	0.2	519	--	2.3	0.65
105	12/10/1999	2,180	6.7	--	7.0	15.5	<.1	424	--	3.3	0.83
105	7/27/2000	1,500	7.0	--	--	20.5	0.3	367	--	2.8	0.67
105	5/3/2001	1,210	7.1	--	--	21.0	0.4	320	--	--	--
105	5/16/2002	2,040	6.6	--	33.0	24.0	0.4	365	--	2.5	0.42
105	8/13/2003	2,370	6.5	--	--	19.5	0.1	362	--	2.6	0.38

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)
101	11/6/1996	10	160	49.0	58.0	4.70	1,100	34.0	4.3
101	5/7/1997	10	127	39.4	47.5	5.28	875	31.5	3.5
101	11/7/1997	10	112	36.6	50.2	4.94	770	42.5	3.4
101	6/15/1998	10	153	49.7	59.7	5.75	1,010	54.5	4.2
101	11/6/1998	10	253	84.0	80.6	6.19	1,720	62.3	0.8
101	6/10/1999	10	396	134	87.9	7.56	2,550	71.6	0.4
101	12/10/1999	10	426	151	86.4	8.84	2,850	55.5	7.5
101	7/27/2000	10	302	105	67.3	<.24	1,930	48.6	8.2

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)
101	5/3/2001	10	355	114	65.3	7.78	2,020	70.9	10.3
101	5/16/2002	10	418	161	77.6	8.18	2,590	84.0	23.3
101	8/13/2003	10	294	117	78.4	8.87	1,470	91.5	12.6
102	11/6/1996	10	240	85.0	70.0	5.30	1,600	34.0	6.7
102	5/7/1997	10	224	73.5	58.3	5.87	1,350	34.0	7.1
102	11/7/1997	10	166	58.2	52.5	5.67	999	45.1	4.4
102	6/15/1998	10	208	71.1	66.2	5.95	1,180	61.9	5.9
102	11/6/1998	10	308	105	84.3	6.34	1,760	78.9	1.1
102	6/10/1999	10	422	137	89.0	7.19	2,160	89.5	0.9
102	12/10/1999	10	545	182	106	8.33	3,100	75.6	9.6
102	7/27/2000	10	457	139	78.5	6.30	2,320	53.4	9.4
102	5/2/2001	10	415	122	69.4	7.43	1,890	84.9	11.0
102	5/16/2002	10	386	131	80.5	7.42	2,100	89.0	15.4
103	11/6/1996	10	260	79.0	73.0	4.50	1,500	38.0	6.5
103	5/7/1997	10	284	79.4	63.5	5.28	1,510	37.0	6.2
103	11/7/1997	10	227	64.9	59.1	5.04	1,200	41.7	5.2
103	6/15/1998	10	226	65.8	61.9	5.10	1,110	57.6	5.4
103	11/6/1998	10	309	91.0	77.1	5.51	1,510	78.1	1.3
103	6/10/1999	10	357	110	83.7	6.57	1,770	93.8	0.7
105	11/6/1996	10	640	180	210	25.0	2,000	200	0.5
105	5/7/1997	10	479	142	252	27.9	1,680	170	0.6
105	11/7/1997	10	591	185	208	28.4	1,980	168	0.6
105	6/15/1998	10	577	178	206	28.1	1,870	144	0.5
105	11/4/1998	10	519	162	210	28.2	1,650	127	0.7
105	6/10/1999	10	419	135	176	25.1	1,380	107	0.9
105	12/10/1999	10	243	80.8	166	24.1	800	72.0	1.5
105	7/27/2000	10	128	40.3	158	20.9	380	52.1	0.9
105	5/3/2001	10	86.7	30.0	150	18.4	251	41.4	0.9
105	5/16/2002	10	267	73.2	123	19.5	796	44.5	1.2
105	8/13/2003	10	353	103	115	19.3	1,050	47.3	1.6

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)
101	11/6/1996	10	78.0	10,700	14.0	21.0	<4.0	63	<15
101	5/7/1997	10	74.7	9,660	13.0	18.4	98	42	<15
101	11/7/1997	10	71.8	8,590	13.4	15.7	45	24	<15
101	6/15/1998	10	76.1	13,800	9.5	21.4	71	40	<42
101	11/6/1998	10	78.9	25,900	7.8	38.1	80	E25	14
101	6/10/1999	10	86.2	48,700	6.4	56.4	E52	36	<56
101	12/10/1999	10	82.4	55,400	6.2	63.8	<64	71	<56
101	7/27/2000	10	77.8	34,900	7.5	46.9	E22	31	<42
101	5/3/2001	10	78.3	42,400	7.3	49.6	54	31	<42
101	5/16/2002	10	81.9	66,100	6.8	63.2	56	E50	<30
101	8/13/2003	10	84.8	29,500	9.5	42.6	42	42	E8
102	11/6/1996	10	94.0	18,800	17.0	31.0	<4.0	84	<15
102	5/7/1997	10	90.1	16,500	14.9	30.1	72	59	<20
102	11/7/1997	10	86.2	11,300	14.8	23.2	77	33	<5
102	6/15/1998	10	91.1	15,600	10.2	28.8	65	51	<42
102	11/6/1998	10	94.7	24,300	9.8	43.8	71	E34	<14
102	6/10/1999	10	103	35,700	8.9	56.0	E51	40	<56
102	12/10/1999	10	103	50,700	8.0	77.7	<64	83	<56
102	7/27/2000	10	98.9	44,000	8.5	55.1	101	48	<42
102	5/2/2001	10	99.2	42,100	8.6	66.9	64	30	<42
102	5/16/2002	10	97.9	55,000	8.3	71.2	53	39	<30
103	11/6/1996	10	100	22,800	16.0	30.0	30	66	<15
103	5/7/1997	10	99.4	24,100	14.9	33.7	52	44	<15
103	11/7/1997	10	94.5	18,200	14.1	26.7	69	28	<15
103	6/15/1998	10	100	19,300	8.8	28.7	65	29	<42
103	11/6/1998	10	104	29,000	9.3	40.4	84	17	20
103	6/10/1999	10	107	35,100	8.2	51.5	87	47	<42
105	11/6/1996	10	44.0	10	23.0	<1.5	98	<3	<15
105	5/7/1997	10	44.0	M	20.9	<1.5	122	3	<15
105	11/7/1997	10	43.4	<20	24.1	<1.5	110	<3	<15

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; mg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)
105	6/15/1998	10	44.4	<30	23.6	<3.0	102	<24	<42
105	11/4/1998	10	44.1	<60	20.7	1.7	117	<48	<14
105	6/10/1999	10	45.6	<30	19.9	<4.8	108	<24	<42
105	12/10/1999	10	50.7	<40	21.9	<1.6	77	<8	<14
105	7/27/2000	10	55.6	<20	24.4	<1.6	119	<8	<14
105	5/3/2001	10	58.9	<150	30.9	<1.0	130	<80	<140
105	5/16/2002	10	49.0	<40	19.1	<1.5	111	<24	<30
105	8/13/2003	10	43.9	3	16.8	<1.2	85	<6	E15

Well	Date	Laboratory	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)
101	11/6/1996	10	--	10,700	180,000	50	150	7,900	<30
101	5/7/1997	10	--	9,730	129,000	<30	126	6,580	<30
101	11/7/1997	10	--	8,860	106,000	<30	120	5,910	<30
101	6/15/1998	10	--	12,200	140,000	<300	132	8,890	<180
101	11/6/1998	10	498	20,800	233,000	<600	162	15,300	E18
101	6/10/1999	10	--	34,300	356,000	<400	190	24,900	<200
101	12/10/1999	10	2,000	40,800	357,000	<400	218	27,400	<96
101	7/27/2000	10	211	30,200	205,000	<300	207	17,800	<102
101	5/3/2001	10	606	41,100	197,000	2.94	209	19,600	<102
101	5/16/2002	10	770	78,500	161,000	4.43	228	28,300	<140
101	8/13/2003	10	398	46,300	56,700	3.08	228	15,400	<12
102	11/6/1996	10	--	18,600	230,000	60	210	10,000	<30
102	5/7/1997	10	--	17,700	154,000	<40	200	10,700	<40
102	11/7/1997	10	--	13,400	94,100	<10	174	8,570	<10
102	6/15/1998	10	--	17,300	103,000	<300	181	11,800	<180
102	11/6/1998	10	415	25,300	142,000	<100	204	18,100	E2
102	6/10/1999	10	--	34,800	151,000	<400	219	26,200	<200
102	12/10/1999	10	1,210	51,300	165,000	<400	245	34,700	<136

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)
102	7/27/2000	10	542	43,000	118,000	<300	230	24,800	<102
102	5/2/2001	10	468	47,600	65,800	2.16	262	19,800	<102
102	5/16/2002	10	509	58,500	29,400	2.29	257	22,000	<140
103	11/6/1996	10	--	18,000	130,000	<30	220	13,000	<30
103	5/7/1997	10	--	18,200	95,900	<30	230	13,200	<30
103	11/7/1997	10	--	13,700	53,400	<30	202	10,900	<30
103	6/15/1998	10	--	14,500	31,700	<300	200	11,900	<180
103	11/6/1998	10	286	20,100	43,900	<600	213	17,000	<300
103	6/10/1999	10	--	27,800	26,600	<300	211	21,500	<150
105	11/6/1996	10	<9	<30	750	<30	230	11,000	<30
105	5/7/1997	10	<9	<30	391	70	231	8,160	<30
105	11/7/1997	10	<9	<30	1,190	<30	251	12,300	<30
105	6/15/1998	10	<36	<30	835	<300	249	12,400	<180
105	11/4/1998	10	<7	<10	775	160	249	11,600	<300
105	6/10/1999	10	E16	<30	692	<300	231	10,200	<150
105	12/10/1999	10	E7	67	282	<100	182	5,350	E25
105	7/27/2000	10	<13	11	<10	<100	142	1,340	<34
105	5/3/2001	10	<130	<100	<100	<.08	134	263	<340
105	5/16/2002	10	<39	<20	77	0.12	141	4,960	<140
105	8/13/2003	10	E6	<21	221	E.07	197	7,800	20

Well	Date	Laboratory	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)
101	11/6/1996	10	290	<3	1,000	<18	1,800	--
101	11/6/1996	20	--	--	--	--	--	25
101	5/7/1997	10	220	<3	754	<18	1,430	--
101	5/7/1997	20	--	--	--	--	--	25
101	11/7/1997	10	220	<3	689	<18	1,250	--
101	11/7/1997	20	--	--	--	--	--	45

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)
101	6/15/1998	10	220	<12	942	<30	1,750	--
101	6/15/1998	20	--	--	--	--	--	45
101	11/6/1998	10	500	E13	1,450	26	2,850	--
101	11/6/1998	20	--	--	--	--	--	34
101	6/10/1999	10	760	<16	2,140	45	4,680	--
101	6/10/1999	20	--	--	--	--	--	49
101	12/10/1999	10	880	<28	2,180	<40	5,150	--
101	12/10/1999	20	--	--	--	--	--	46
101	7/27/2000	10	530	<21	1,560	E16	3,250	--
101	7/27/2000	10	--	--	--	--	--	48
101	5/3/2001	10	570	<21	1,640	<30	3,690	--
101	5/3/2001	10	--	--	--	--	--	41
101	5/16/2002	10	830	<27	1,920	E16	4,130	--
101	5/16/2002	20	--	--	--	--	--	39
101	8/13/2003	10	510	<15	1,420	<18	2,420	--
101	8/13/2003	20	--	--	--	--	--	46
102	11/6/1996	10	470	<3	1,100	<18	3,000	--
102	11/6/1996	20	--	--	--	--	--	28
102	5/7/1997	10	430	<4	888	<24	2,430	--
102	5/7/1997	20	--	--	--	--	--	25
102	11/7/1997	10	270	<1	681	<6	1,620	--
102	11/7/1997	20	--	--	--	--	--	37
102	6/15/1998	10	320	<12	854	<30	2,150	--
102	6/15/1998	20	--	--	--	--	--	39
102	11/6/1998	10	480	10	1,180	20	3,150	--
102	11/6/1998	20	--	--	--	--	--	35
102	6/10/1999	10	740	<16	1,560	<40	4,220	--
102	6/10/1999	20	--	--	--	--	--	32
102	12/10/1999	10	1,000	<28	2,100	<40	5,700	--
102	12/10/1999	20	--	--	--	--	--	34

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)
102	7/27/2000	10	740	<21	1,740	<30	4,460	--
102	7/27/2000	10	--	--	--	--	--	30
102	5/2/2001	10	590	<21	1,590	<30	3,840	--
102	5/2/2001	10	--	--	--	--	--	31
102	5/16/2002	10	650	<27	1,540	<24	3,240	--
102	5/16/2002	20	--	--	--	--	--	27
103	11/6/1996	10	430	<3	1,100	<18	2,700	--
103	11/6/1996	20	--	--	--	--	--	23
103	5/7/1997	10	450	3	1,040	25	2,620	--
103	5/7/1997	20	--	--	--	--	--	25
103	11/7/1997	10	340	<3	832	<18	1,910	--
103	11/7/1997	20	--	--	--	--	--	33
103	6/15/1998	10	310	<12	873	<30	1,860	--
103	6/15/1998	20	--	--	--	--	--	30
103	11/6/1998	10	440	8	1,140	11	2,600	--
103	11/6/1998	20	--	--	--	--	--	26
103	6/10/1999	10	580	<12	1,250	<30	3,240	--
103	6/10/1999	20	--	--	--	--	--	30
105	11/6/1996	10	<30	<3	1,700	<18	<9	--
105	5/7/1997	10	<30	<3	1,460	<18	40	--
105	11/7/1997	10	<30	<3	1,720	<18	<9	--
105	6/15/1998	10	<120	<12	1,620	<30	<60	--
105	11/4/1998	10	<240	<24	1,420	<10	<120	--
105	6/10/1999	10	<120	<12	1,170	<30	<60	--
105	12/10/1999	10	<40	<7	726	E8	E19	--
105	7/27/2000	10	<40	<7	401	<10	E17	--
105	5/3/2001	10	<400	<70	315	<100	E122	--
105	5/16/2002	10	<90	<27	699	<24	<72	--
105	8/13/2003	10	E20	<15	917	<18	E8	--

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Carbon-13/ Carbon-12, unfiltered (per mil)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)
101	7/27/2000	10	-12.49	71.72	--	--
101	5/3/2001	10	--	--	-59.5	-8.03
102	7/27/2000	10	-12.03	--	--	--
102	5/2/2001	10	--	--	-57.8	-7.78
105	5/3/2001	10	--	--	-71.3	-10.02

GROUND WATER—Continued

Well Group 200

LOCATION.—Lat 33°27'07", long 110°49'55", in SW1/4SW1/4SE1/4, sec. 4, T. 1 N., R. 15 E. (A-01-15)04dcc, 7 m northeast of Bixby Road, 50 m north of Pinal Creek, and 8 km northwest of Globe.

Landowner: F.R. Kelly, Claypool, Arizona.

LAND-SURFACE DATUM.—979.24 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 201 and 202 were originally identified as X2W1 and X2W2, respectively.

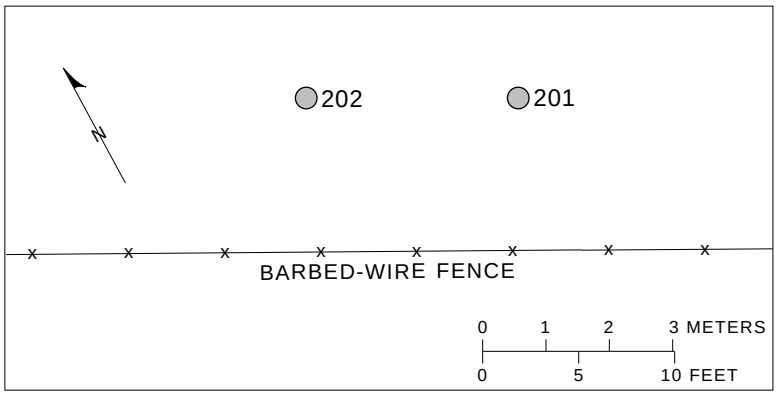
DRILLING AND WELL CONSTRUCTION

Both holes listed below were drilled by normal-circulation rotary drilling with bentonite mud. The wells were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to the depth listed.

Logs: C, caliper; E, electric; G, geologist; J, gamma; P, particle size; U, gamma-gamma; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
201	dcc1	10–05–84	Rotary, bentonite	18.6	18.6	17.6–18.5	Basin fill	3	CEGJPU
202	dcc2	10–06–84	Rotary, bentonite	12.5	12.3	11.3–12.2	Alluvium	3	--

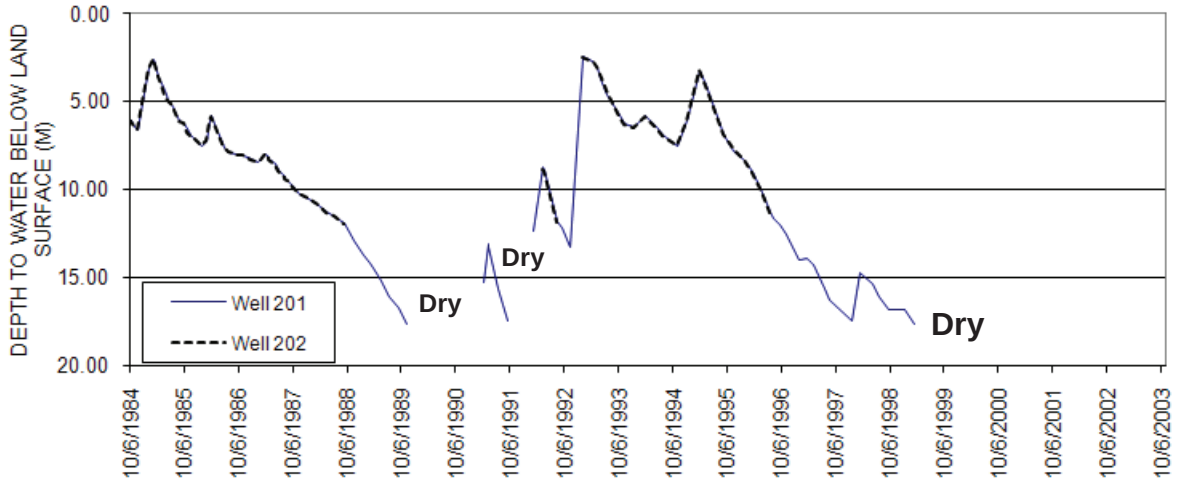
WELL GROUP 200 SITE PLAN



GROUND WATER—Continued

Well Group 200—Continued

Date	Water level, in meters below land surface		Date	Water level, in meters below land surface	
	Well number			Well number	
	201	202		201	202
11–07–96	12.54	Dry	10–26–99	Dry	Dry
02–06–97	14.05	Dry	01–11–00	Dry	Dry
03–27–97	13.90	Dry	02–14–00	Dry	Dry
05–09–97	14.26	Dry	04–11–00	Dry	Dry
07–24–97	15.70	Dry	06–12–00	Dry	Dry
09–04–97	16.29	Dry	10–26–00	Dry	Dry
01–23–98	17.45	Dry	01–09–01	Dry	Dry
03–23–98	14.79	Dry	04–03–01	Dry	Dry
06–12–98	15.39	--	08–08–01	Dry	Dry
07–28–98	16.14	--	10–25–01	Dry	Dry
10–07–98	16.84	Dry	01–16–02	Dry	Dry
01–13–99	16.88	Dry	04–03–02	Dry	Dry
03–24–99	17.66	Dry	03–27–03	Dry	Dry
05–18–99	Dry	Dry	07–24–03	Dry	Dry
07–28–99	Dry	Dry	11–12–03	Dry	Dry



GROUND WATER—Continued

Well Group 200—Continued

Field Measurements

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved (mg/L as $CaCO_3$)	Average discharge (L/min)	Pumping period (hours)
201	6/12/1998	751	7.2	380	21.4	7.9	194	2.4	0.88

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; mg/L, micrograms per liter; <, actual value is known to be less than value shown]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
201	6/12/1998	10	105	19.6	32.7	1.80	151	36.5	0.2	25.9

Well	Date	Laboratory	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)
201	6/12/1998	10	<10	29	<1.0	70	<8	<14	<12	<10	<10

Well	Date	Laboratory	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)
201	6/12/1998	10	<100	11	<4.0	<60	<40	<4	340	<10	<20

GROUND WATER—Continued

Well Group 300

LOCATION.—Lat 33°27'17", long 110°50'19", in SE1/4NW1/4SW1/4, sec. 4, T. 1 N., R. 15 E. (A-01-15)04cbd, 100 m northeast of Pinal Creek, and 8 km northwest of Globe.

Landowner: H and E Ranch, Inc., Globe, Arizona.

LAND-SURFACE DATUM.—972.40 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 301, 302, 303, and 304 were originally identified as X3W1, X3W2, X3W3, and X3W4, respectively.

DRILLING AND WELL CONSTRUCTION

All holes for which well depth is listed below were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to the depth listed. Caving of subsurface and surface materials interfered with completing several holes to their planned depths.

Wells 3EX, 3EX2, and 3EX3 were drilled for exploration purposes. After water samples and cuttings were collected, the total depth of each hole was sealed with concrete.

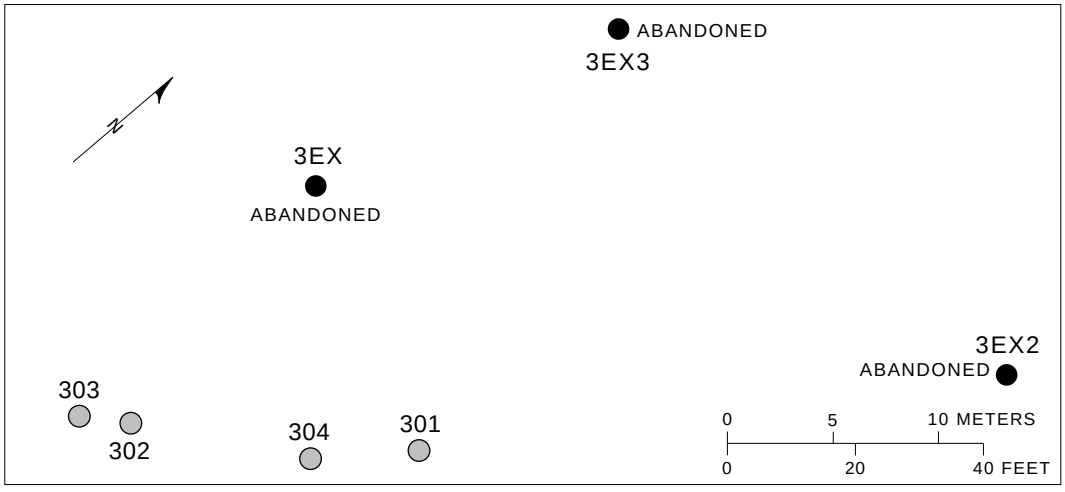
GROUND WATER—Continued

Well Group 300—Continued

Logs: C, caliper; D, driller's; E, electric; G, geologist; J, gamma; P, particle size; U, gamma-gamma; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
301	cbd1	10–07–84	Rotary, bentonite	59.4	59.1	58.1–59.0	Basin fill	3	CEJGPU
302	cbd2	10–08–84	Rotary, bentonite	36.0	35.8	34.8–35.7	Alluvium	3	--
303	cbd3	10–08–84	Rotary, bentonite	14.6	14.4	13.4–14.3	Alluvium	3	D
3EX	--	12–17–85	Dual-wall air rotary	54.9	--	--	--	--	DGP
3EX2	--	12–19–85	Dual-wall air rotary	36.6	--	--	--	--	--
3EX3	--	01–09–86	Dual-wall air rotary	102.1	--	--	--	--	GP
304	cbd4	05–24–86	Rotary, bentonite	48.8	30.3	28.7–29.6	Alluvium	27	D

WELL GROUP 300 SITE PLAN



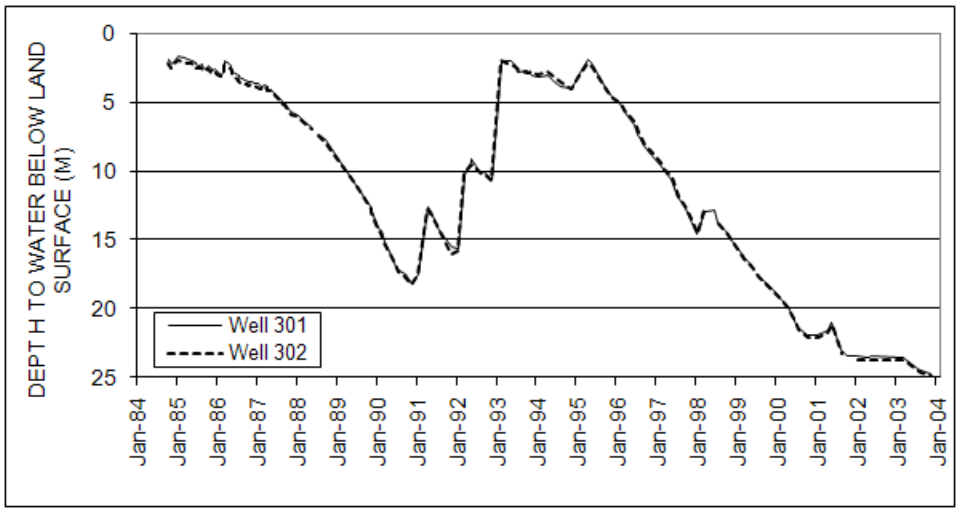
GROUND WATER—Continued

Well Group 300—Continued

Date	Water level, in meters below land surface			
	Well number			
	301	302	303	304
11–07–96	8.82	8.65	8.52	8.67
02–06–97	9.67	9.45	9.34	9.47
03–27–97	10.03	9.83	9.71	9.84
05–08–97	10.67	10.51	10.40	10.53
07–24–97	11.92	11.80	--	11.50
09–03–97	12.57	12.52	12.41	12.53
11–06–97	13.61	13.51	13.43	13.53
01–23–98	14.57	14.51	--	14.52
03–19–98	13.02	12.83	12.79	12.86
06–14–98	12.86	--	12.67	--
07–28–98	13.83	13.79	13.70	13.79
10–09–98	14.49	14.68	Dry	14.68
11–05–98	14.97	15.00	--	--
01–13–99	15.60	15.65	Dry	15.67
03–24–99	16.33	16.41	Dry	16.42
05–18–99	16.88	16.96	Dry	16.97
06–10–99	--	17.27	Dry	17.30
07–28–99	17.60	17.70	--	17.71
10–20–99	18.27	18.40	Dry	18.42
12–09–99	18.71	18.81	Dry	18.83
02–14–00	19.22	19.30	Dry	19.32
04–11–00	19.85	19.91	Dry	19.94
06–12–00	20.85	20.95	Dry	20.97
07–26–00	21.42	21.54	Dry	21.56
10–26–00	21.97	22.09	Dry	22.11
01–09–01	21.95	22.11	--	22.11
04–03–01	21.65	21.76	Dry	21.77
05–03–01	21.05	21.12	Dry	21.14
08–08–01	23.03	23.22	--	23.24
10–25–01	23.45	--	Dry	23.79
01–16–02	23.46	23.75	Dry	23.77
04–03–02	23.57	23.71	--	23.73
05–15–02	23.50	23.76	Dry	23.78
03–27–03	23.56	23.66	Dry	23.68
07–24–03	24.36	24.51	Dry	24.53
08–12–03	24.51	24.61	--	24.64
11–12–03	24.75	24.87	Dry	24.90

GROUND WATER—Continued

Well Group 300—Continued



GROUND WATER—Continued

Well Group 300—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, (mg/L as $CaCO_3$)**	**Bicarbonate, water, dissolved, (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
301	11/7/1996	3,170	6.3	195	--	17.1	<.1	163	747	1.8	1.72
301	5/8/1997	2,820	6.3	--	--	26.4	0.1	159	--	--	1.20
301	11/6/1997	2,780	6.2	179	--	21.5	0.3	144	176	3.6	1.08
301	6/14/1998	2,180	6.3	--	--	20.3	<.1	135	--	2.6	1.95
301	11/5/1998	2,270	6.3	--	20.0	19.0	<.1	131	--	2.5	1.38
301	6/10/1999	2,090	6.2	--	34.0	22.0	0.1	130	--	2.3	1.10
301	7/26/2000	2,380	6.1	--	38.0	23.0	0.2	111	--	3.2	0.83
301	5/3/2001	2,510	6.1	--	--	19.5	0.2	107	--	--	--
301	5/15/2002	2,020	6.4	--	36.0	22.0	0.3	176	--	1.5	0.95
301	8/12/2003	2,930	6.1	--	--	23.0	0.2	114	--	2.9	0.62
302	11/7/1996	2,120	4.0	428	21.1	19.2	<.1	--	--	1.4	0.98
302	5/8/1997	2,510	4.0	233	--	23.5	0.1	--	--	--	1.02
302	11/6/1997	2,260	3.9	468	--	19.8	0.2	--	--	3.5	0.57
302	6/14/1998	1,970	4.0	--	--	21.4	<.1	--	--	3.8	0.52
302	11/5/1998	2,080	4.0	--	23.0	19.0	<.1	--	--	3.1	0.37
302	6/10/1999	2,370	4.0	--	20.0	20.5	<.1	--	--	2.6	0.48
302	12/9/1999	--	4.0	--	13.0	17.0	<.1	--	--	3.6	0.35
302	7/26/2000	3,160	3.9	--	--	22.0	0.2	--	--	3.6	0.50
302	5/3/2001	2,660	4.0	--	--	20.5	0.2	--	--	--	--
302	5/15/2002	2,530	4.0	--	33.0	--	0.2	--	--	2.4	0.50
302	8/12/2003	2,590	3.9	--	--	--	--	--	--	--	--
303	11/7/1996	2,160	4.4	429	24.4	18.2	<.1	--	--	1.5	0.77
303	5/8/1997	1,920	4.6	409	--	22.3	0.2	--	--	2.3	1.07
303	11/6/1997	2,080	4.3	492	--	21.2	0.3	--	--	1.8	0.40

Field Measurements (continued)

[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]

Well	Date	Specific conductance (µS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved, (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved, (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
303	6/14/1998	2,130	4.4	--	--	20.6	2.5	--	--	1.1	0.57
304	11/7/1996	2,270	4.0	410	22.9	19.0	0.1	--	--	1.2	0.90
304	5/8/1997	2,290	4.1	--	--	21.5	0.2	--	--	2.3	0.88
304	11/6/1997	2,210	4.0	460	--	18.4	0.1	--	--	3.6	0.40
304	6/14/1998	1,950	4.1	--	--	20.9	<.1	--	--	3.3	0.60
304	11/5/1998	2,110	4.1	--	23.0	18.0	0.1	--	--	3.1	0.43
304	6/10/1999	2,260	4.1	--	32.0	20.5	0.1	--	--	--	--
304	12/9/1999	2,620	4.0	--	10.0	17.0	<.1	--	--	3.3	0.57
304	7/26/2000	2,950	4.0	--	--	24.5	0.3	--	--	3.1	0.43
304	5/3/2001	2,120	4.0	--	--	20.5	0.3	--	--	--	--
304	5/15/2002	2,470	4.0	--	35.0	20.5	0.2	--	--	2.0	0.58
304	8/12/2003	2,550	4.0	--	--	22.5	<.1	--	--	2.7	0.40

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
301	11/7/1996	10	600	150	70.0	7.00	2,200	96.0	5.3	33.0
301	5/8/1997	10	461	109	61.5	7.00	1,670	76.5	5.6	29.2
301	11/6/1997	10	463	120	69.2	7.09	1,750	73.1	5.2	31.0
301	6/14/1998	10	348	94.0	62.5	6.85	1,370	55.4	5.8	27.7
301	11/5/1998	10	342	99.9	68.1	6.74	1,470	54.8	4.1	27.0
301	6/10/1999	10	372	107	73.5	6.60	1,460	55.5	3.2	30.6
301	7/26/2000	10	314	98.1	72.1	6.41	1,400	45.7	5.0	29.5
301	5/3/2001	10	396	114	76.2	6.40	1,710	54.8	5.9	35.2

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
301	5/15/2002	10	356	64.5	61.4	8.54	1,150	36.1	4.6	23.9
301	8/12/2003	10	401	113	121	12.6	1,690	58.1	5.9	42.8
302	11/7/1996	10	270	50.0	67.0	4.00	1,400	44.0	4.4	80.0
302	5/8/1997	10	302	66.5	69.6	5.00	1,650	51.5	5.0	81.5
302	11/6/1997	10	254	65.5	69.3	5.21	1,470	60.1	4.5	79.4
302	6/14/1998	10	216	57.8	61.4	4.09	1,190	61.0	4.5	80.5
302	11/5/1998	10	233	63.0	64.7	4.47	1,250	64.9	1.4	82.9
302	6/10/1999	10	290	83.9	83.2	5.29	1,620	73.6	0.6	87.8
302	12/9/1999	10	377	107	82.4	6.49	2,110	76.3	6.5	90.4
302	7/26/2000	10	422	117	84.9	5.90	2,360	66.6	7.1	87.3
302	5/3/2001	10	337	101	73.3	5.76	1,750	62.0	2.5	85.5
302	5/15/2002	10	324	90.2	65.2	6.33	1,720	78.1	8.01	80.5
302	8/12/2003	10	316	101	114	11.0	1,680	80.0	10.8	111
303	11/7/1996	10	340	86.0	73.0	5.90	1,300	56.0	1.9	63.0
303	5/8/1997	10	271	68.8	62.7	5.86	1,100	56.7	1.7	54.5
303	11/6/1997	10	329	87.2	67.4	6.21	1,320	53.6	3.9	77.2
303	6/14/1998	10	336	87.7	67.2	6.90	1,310	74.5	4.2	76.9
304	11/7/1996	10	320	61.0	66.0	4.20	1,500	56.0	3.6	79.0
304	5/8/1997	10	289	57.1	63.1	5.09	1,400	54.5	4.5	81.2
304	11/6/1997	10	282	62.5	68.3	5.07	1,410	52.7	3.9	81.8
304	6/14/1998	10	232	56.3	56.8	4.37	1,180	62.5	4.3	78.4
304	11/5/1998	10	254	60.6	60.0	4.52	1,260	68.9	1.0	79.8
304	6/10/1999	10	279	69.5	69.6	5.33	1,470	77.0	0.6	82.0
304	12/9/1999	10	340	86.1	75.1	5.10	1,740	75.2	0.4	87.2
304	7/26/2000	10	417	103	80.4	5.10	2,140	67.5	5.8	85.8
304	5/3/2001	10	266	68.6	57.0	5.35	1,270	54.2	1.6	77.2
304	5/15/2002	10	337	87.3	68.8	4.89	1,660	83.4	5.68	81.8
304	8/12/2003	10	374	110	83.6	7.59	1,650	80.6	11.0	90.9

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)
301	11/7/1996	10	1,540	27.0	91.0	<4.0	80	21	--	130	101,000
301	5/8/1997	10	1,110	24.3	77.5	38	23	16	--	80	87,600
301	11/6/1997	10	1,420	22.2	102	32	42	<25	--	101	114,000
301	6/14/1998	10	1,300	17.3	87.0	57	35	<42	--	78	95,300
301	11/5/1998	10	1,590	15.5	115	72	<80	<14	444	106	126,000
301	6/10/1999	10	1,780	15.0	114	E40	E12	<56	--	73	141,000
301	7/26/2000	10	1,760	15.4	113	78	E20	<42	480	90	154,000
301	5/3/2001	10	2,520	16.7	150	61	<80	<140	784	114	209,000
301	5/15/2002	10	260	24.6	29.2	45	<24	<30	219	<20	46,300
301	8/12/2003	10	3,000	<60.0	149	50	24	E9	548	67	167,000
302	11/7/1996	10	17,700	18.0	25.0	<4.0	66	<15	--	12,000	170,000
302	5/8/1997	10	23,100	17.1	31.0	86	58	<15	--	14,800	195,000
302	11/6/1997	10	20,100	17.2	26.7	67	44	<15	--	14,200	169,000
302	6/14/1998	10	15,900	13.7	22.2	66	42	<42	--	12,600	136,000
302	11/5/1998	10	17,500	13.8	23.7	65	E21	<42	--	13,400	139,000
302	6/10/1999	10	23,700	11.2	31.1	76	34	<42	--	18,400	176,000
302	12/9/1999	10	28,800	11.0	37.0	<48	31	<14	697	24,200	202,000
302	7/26/2000	10	40,600	10.5	43.3	66	41	<42	505	28,400	223,000
302	5/3/2001	10	28,400	12.0	36.6	<160	<80	<140	273	24,600	168,000
302	5/15/2002	10	26,500	11.8	34.8	48	28	<30	451	24,000	127,000
302	8/12/2003	10	45,500	<200	53.3	63	41	<15	412	35,000	94,200
303	11/7/1996	10	5,550	17.0	22.0	71	14	<15	270	8,000	260
303	5/8/1997	10	3,380	14.8	14.0	72	7	<15	149	5,000	52
303	11/6/1997	10	6,940	18.2	26.4	62	11	<15	246	8,550	938
303	6/14/1998	10	6,900	13.5	25.2	80	<24	<42	261	9,280	<30
304	11/7/1996	10	15,200	16.0	25.0	30	38	<15	--	10,000	120,000
304	5/8/1997	10	15,100	15.7	26.8	61	45	<15	--	10,200	128,000

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)
304	11/6/1997	10	16,400	16.1	26.3	65	36	<15	--	11,700	142,000
304	6/14/1998	10	14,100	14.8	21.6	71	38	<42	--	11,000	125,000
304	11/5/1998	10	14,800	13.0	23.2	80	E16	<42	--	11,600	122,000
304	6/10/1999	10	17,800	12.4	25.4	57	E17	<42	--	14,300	141,000
304	12/9/1999	10	22,300	12.9	29.6	E40	21	<14	510	17,500	151,000
304	7/26/2000	10	34,800	11.4	35.7	86	31	<42	430	22,700	188,000
304	5/3/2001	10	18,600	10.8	25.7	68	E19	<42	400	15,300	112,000
304	5/15/2002	10	27,400	11.6	32.6	71	<80	<30	342	19,800	101,000
304	8/12/2003	10	9,920	11.9	43.7	51	38	E8	337	34,900	22,200

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
301	11/7/1996	10	50	160	38,400	<30	520	6	1,100	<18	2,000
301	5/8/1997	10	<30	139	30,000	<30	380	<3	963	<18	1,360
301	11/6/1997	10	<50	178	34,100	<50	360	<5	960	<30	1,740
301	6/14/1998	10	<300	164	26,700	<180	330	<12	763	<30	1,380
301	11/5/1998	10	460	181	35,700	E35	440	10	793	<10	1,700
301	6/10/1999	10	<400	197	32,400	<200	500	<16	846	<40	1,790
301	7/26/2000	10	<300	198	32,300	<102	470	<21	785	<30	1,880
301	5/3/2001	10	1.03	240	41,000	<102	550	<21	945	<30	2,770
301	5/15/2002	10	0.29	127	15,900	<140	150	<27	668	<24	488
301	8/12/2003	10	0.33	349	33,200	<12	590	<15	1,500	<18	2,460
302	11/7/1996	10	90	170	9,100	<30	290	<3	1,000	<18	1,800
302	5/8/1997	10	<30	194	11,200	<30	350	<3	1,260	<18	2,310
302	11/6/1997	10	<100	194	10,100	<30	350	<3	1,170	<18	2,010
302	6/14/1998	10	<300	178	9,180	<180	260	<12	1,030	<30	1,800

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
302	11/5/1998	10	<300	184	10,300	<150	330	<12	1,100	<30	1,870
302	6/10/1999	10	<300	196	13,900	<150	400	<12	1,390	<30	2,400
302	12/9/1999	10	<100	193	18,400	E21	550	<7	1,620	17	3,180
302	7/26/2000	10	<300	210	22,500	<102	640	<21	1,730	E17	3,830
302	5/3/2001	10	3.06	210	18,400	<340	560	<70	1,460	<100	3,180
302	5/15/2002	10	5.50	182	16,800	<140	450	<27	1,310	<24	2,550
302	8/12/2003	10	3.72	300	16,300	<12	540	<15	2,160	<18	2,960
303	11/7/1996	10	<30	120	19,000	<30	500	<3	1,100	<18	1,400
303	5/8/1997	10	<30	132	12,200	<30	300	<3	937	<18	853
303	11/6/1997	10	<30	189	16,800	<30	480	<3	1,120	<18	1,450
303	6/14/1998	10	<300	202	18,200	<180	480	<12	1,140	<30	1,650
304	11/7/1996	10	<30	170	17,000	<30	350	<3	970	<18	1,500
304	5/8/1997	10	260	176	14,200	30	370	<3	910	<18	1,610
304	11/6/1997	10	<100	185	13,100	<30	350	<3	1,020	<18	1,800
304	6/14/1998	10	<300	159	11,000	<180	270	<12	950	<30	1,770
304	11/5/1998	10	<300	167	13,100	<150	350	<12	1,020	<30	1,710
304	6/10/1999	10	<300	173	14,100	<150	400	<12	1,160	<30	1,940
304	12/9/1999	10	<100	170	17,000	E21	460	<7	1,390	15	2,370
304	7/26/2000	10	<300	186	22,300	<102	570	<21	1,630	<30	3,170
304	5/3/2001	10	12.7	151	14,000	<102	330	<21	1,050	<30	2,190
304	5/15/2002	10	16.1	169	18,700	<140	440	<27	1,300	<24	2,420
304	8/12/2003	10	16.4	230	5,750	<12	470	<15	1,620	<18	2,670

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Carbon, inorganic, dissolved (mg/L as C)	Carbon-13/ Carbon-12, unfiltered (per mil)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)
301	7/26/2000	10	--	-8.67	--	--	--
301	5/3/2001	10	--	--	--	-63.7	-8.80
302	11/7/1996	20	23	--	--	--	--
302	5/8/1997	20	31	--	--	--	--
302	11/6/1997	20	37	--	--	--	--
302	6/14/1998	20	35	--	--	--	--
302	11/5/1998	20	32	--	--	--	--
302	6/10/1999	20	36	--	--	--	--
302	12/9/1999	20	38	--	--	--	--
302	7/26/2000	10	36	-12.06	62.94	--	--
302	5/3/2001	10	37	--	--	-62.0	-8.18
302	5/15/2002	20	29	--	--	--	--
302	8/12/2003	20	43	--	--	--	--
303	11/7/1996	20	22	--	--	--	--
303	5/8/1997	20	25	--	--	--	--
303	11/6/1997	20	39	--	--	--	--
303	6/14/1998	20	30	--	--	--	--
304	11/7/1996	20	17	--	--	--	--
304	5/8/1997	20	24	--	--	--	--
304	11/6/1997	20	38	--	--	--	--
304	6/14/1998	20	38	--	--	--	--
304	11/5/1998	20	34	--	--	--	--
304	6/10/1999	20	42	--	--	--	--
304	12/9/1999	20	34	--	--	--	--
304	7/26/2000	10	39	--	--	--	--
304	5/3/2001	10	36	--	--	-61.4	-8.62
304	5/15/2002	20	33	--	--	--	--
304	8/12/2003	20	42	--	--	--	--

GROUND WATER—Continued

Well Group 400

LOCATION.—Lat 33°29'04", long 110°50'48", in SE1/4NW1/4SE1/4, sec. 29, T. 2 N., R. 15 E. (A-02-15)29dbd, 10 m west of Pinal Creek, and 11 km northwest of Globe.

Landowner: Tonto National Forest.

LAND-SURFACE DATUM.—943.31 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 401, 402, 403, and 404 were originally identified as X4W1, X4W2, X4W3, and X4W4, respectively.

DRILLING AND WELL CONSTRUCTION

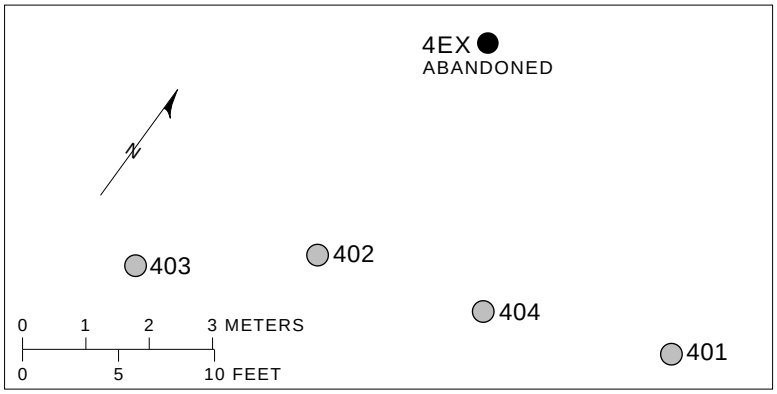
All holes for which well depth is listed below were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to the depth listed.

Well 4EX was drilled for exploration purposes. After water samples and cuttings were collected, the total depth of the hole was sealed with concrete.

Logs: C, caliper; D, driller's; E, electric; G, geologist; P, particle size; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
401	dbd1	10–09–84	Rotary, bentonite	34.4	34.2	33.2–34.1	Basin fill	3	CEGP
402	dbd2	10–10–84	Rotary, bentonite	21.0	20.8	19.8–20.7	Alluvium	3	--
403	dbd3	10–10–84	Rotary, bentonite	13.1	13.0	12.0–12.9	Alluvium	3	--
4EX	--	01–07–86	Dual-wall air rotary	73.2	--	--	--	--	DGP
404	dbd4	09–04–86	Cable tool	55.5	55.3	53.7–54.6	Basin fill	48.5	D

WELL GROUP 400 SITE PLAN



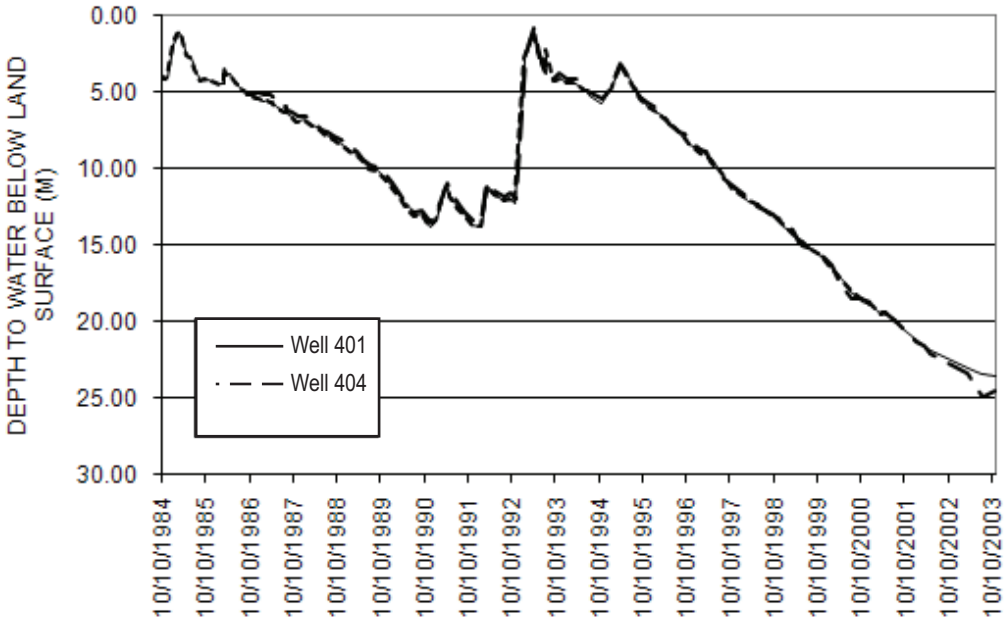
GROUND WATER—Continued

Well Group 400—Continued

Date	Water level, in meters below land surface			
	Well number			
	401	402	403	404
11–07–96	8.45	8.44	8.42	8.18
02–06–97	8.73	9.04	9.02	8.76
03–27–97	9.16	9.17	9.00	8.97
05–08–97	9.40	9.52	9.51	9.52
07–24–97	10.28	10.28	10.27	10.39
09–05–97	10.72	10.72	10.70	10.72
11–06–97	11.36	11.36	11.34	11.16
03–23–98	12.22	12.22	12.22	11.94
06–08–98	12.37	12.38	12.37	12.47
10–08–98	13.18	13.18	Dry	13.04
11–05–98	13.38	13.37	--	13.14
01–13–99	13.83	13.83	Dry	13.56
03–24–99	14.28	14.30	Dry	14.10
05–18–99	14.68	14.70	--	14.74
06–11–99	14.87	14.88	Dry	15.04
07–28–99	15.21	15.21	Dry	15.21
10–20–99	15.69	15.69	Dry	15.59
12–09–99	16.06	16.07	--	15.82
02–14–00	16.60	16.60	Dry	16.40
04–11–00	17.06	17.07	Dry	17.21
06–12–00	17.62	17.64	Dry	18.06
07–23–00	18.04	18.06	Dry	18.50
10–26–00	18.71	18.72	--	18.49
01–09–01	18.96	18.98	Dry	18.72
04–03–01	19.58	19.59	Dry	19.41
05–01–01	19.40	19.42	Dry	19.38
08–08–01	20.10	20.12	Dry	20.10
10–25–01	20.66	Dry	Dry	20.53
01–16–02	21.23	Dry	Dry	21.27
04–03–02	21.74	Dry	Dry	21.56
05–16–02	22.00	--	Dry	22.11
03–27–03	23.16	Dry	Dry	23.35
07–24–03	23.42	Dry	Dry	24.71
08–12–03	23.50	Dry	Dry	24.89
11–12–03	23.61	Dry	Dry	24.44

GROUND WATER—Continued

Well Group 400—Continued



GROUND WATER—Continued

Well Group 400—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, water, dissolved (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
401	11/7/1996	2,310	4.4	415	--	16.6	0.2	--	--	2.0	1.00
401	5/8/1997	2,290	4.4	216	--	21.0	0.1	--	--	1.5	1.18
401	11/6/1997	2,160	4.3	406	--	19.2	0.1	--	--	3.3	0.58
401	6/12/1998	2,250	4.3	--	20.5	19.5	<.1	--	--	4.2	0.93
401	11/5/1998	2,290	4.4	--	20.0	16.0	0.2	--	--	2.3	0.62
401	6/11/1999	2,070	4.4	--	20.0	19.2	0.2	--	--	2.6	0.48
401	12/9/1999	2,100	4.4	--	-1.0	15.0	<.1	--	--	3.3	0.78
401	7/26/2000	2,280	4.3	--	35.0	21.5	0.2	--	--	3.7	0.57
401	5/3/2001	2,570	4.3	--	--	17.5	0.3	--	--	--	--
401	5/16/2002	2,230	4.3	--	19.0	19.5	0.3	--	--	1.7	0.82
401	8/12/2003	2,460	4.2	--	--	22.5	<.1	--	--	2.8	0.47
402	11/7/1996	2,170	4.2	375	22.0	17.7	<.1	--	--	1.9	0.90
402	5/8/1997	2,170	4.2	229	--	23.0	0.1	--	--	1.5	0.78
402	11/6/1997	2,070	4.0	426	--	17.3	0.1	--	--	3.8	0.58
402	6/12/1998	2,190	4.2	--	--	20.3	<.1	--	--	4.2	0.50
402	11/5/1998	2,190	4.3	--	7.0	14.5	0.2	--	--	2.3	0.87
402	6/11/1999	1,940	4.3	--	--	19.2	0.1	--	--	2.6	--
402	12/9/1999	1,900	4.3	--	3.0	15.5	<.1	--	--	3.6	0.33
402	7/26/2000	2,190	4.3	--	27.0	19.5	0.4	--	--	3.1	0.53
402	5/1/2001	1,940	4.0	--	--	20.5	--	--	--	--	--
403	11/7/1996	1,690	5.5	378	--	16.5	<.1	25	30	1.2	1.05
403	5/8/1997	1,650	5.2	--	--	20.9	0.3	13	--	3.1	1.18
403	11/6/1997	1,940	4.5	470	--	17.0	0.1	--	--	1.8	0.72

Field Measurements (continued)

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
404	6/8/1998	389	7.6	--	--	22.1	7.9	170	--	3.0	0.68
404	7/23/2000	473	7.6	--	38.0	22.5	3.1	166	--	3.0	0.97
404	5/16/2002	492	7.6	--	29.0	30.0	5.8	168	--	1.9	0.65

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
401	11/7/1996	10	350	68.0	61.0	4.60	1,600	55.0	4.4	68.0
401	5/8/1997	10	293	63.7	55.3	4.62	1,450	52.4	4.4	67.7
401	11/6/1997	10	290	65.5	62.7	4.92	1,440	51.5	3.5	66.6
401	6/12/1998	10	310	71.0	66.1	5.23	1,500	58.4	3.5	69.2
401	11/5/1998	10	293	67.4	67.1	4.44	1,440	57.7	1.0	66.2
401	6/11/1999	10	274	62.5	66.8	4.75	1,330	61.3	1.0	71.1
401	12/9/1999	10	259	56.9	56.2	4.67	1,330	63.5	1.7	65.0
401	7/26/2000	10	314	68.3	67.9	4.82	1,420	66.0	4.0	70.6
401	5/3/2001	10	390	81.3	66.5	5.12	1,640	67.3	2.6	71.3
401	5/16/2002	10	291	69.4	63.7	4.14	1,460	59.3	3.76	72.5
401	8/12/2003	10	349	81.0	71.2	5.33	1,540	76.2	4.7	72.6
402	11/7/1996	10	260	69.0	60.0	5.10	1,400	55.0	4.5	72.0
402	5/8/1997	10	256	65.3	55.7	4.75	1,330	55.5	4.5	70.1
402	11/6/1997	10	249	69.0	63.2	4.86	1,340	57.6	2.9	70.8
402	6/12/1998	10	277	74.7	66.0	5.43	1,390	57.9	3.8	72.8
402	11/5/1998	10	261	70.6	66.7	4.71	1,360	57.7	1.3	69.1
402	6/11/1999	10	228	61.8	65.2	4.54	1,120	58.2	1.5	72.3
402	12/9/1999	10	219	55.8	54.4	4.86	1,120	61.2	2.0	67.4

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
402	7/26/2000	10	281	71.6	68.2	4.66	1,320	65.7	3.4	73.0
402	5/1/2001	10	269	61.6	53.4	4.90	1,160	45.0	1.4	77.6
403	11/7/1996	10	280	62.0	50.0	5.60	980	49.0	1.4	49.0
403	5/8/1997	10	262	59.6	50.2	6.24	968	52.4	2.7	58.1
403	11/6/1997	10	300	72.7	58.1	6.52	1,180	57.4	4.8	69.6
404	6/8/1998	10	40.6	14.2	22.3	2.94	10.7	7.61	0.3	24.7
404	7/23/2000	10	50.4	17.7	25.0	3.23	59.4	11.1	0.4	24.1
404	5/16/2002	10	50.1	17.6	24.5	3.18	56.9	10.5	0.44	24.9

Well	Date	Laboratory	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)
401	11/7/1996	10	10,600	18.0	24.0	<4.0	59	<15	--	11,000	180,000
401	5/8/1997	10	8,820	18.6	22.1	103	42	<15	--	9,860	153,000
401	11/6/1997	10	9,270	18.4	22.1	25	42	<25	--	10,300	150,000
401	6/12/1998	10	9,440	14.3	22.8	68	45	<42	--	11,100	156,000
401	11/5/1998	10	8,970	15.0	23.8	109	9	<14	366	10,300	151,000
401	6/11/1999	10	7,910	15.5	20.3	52	E14	<42	--	9,330	132,000
401	12/9/1999	10	7,230	13.1	17.2	45	E15	<42	530	8,290	116,000
401	7/26/2000	10	9,400	12.3	20.6	101	E17	<42	380	10,000	141,000
401	5/3/2001	10	10,900	13.9	24.1	76	E19	<42	612	11,200	165,000
401	5/16/2002	10	9,020	12.8	20.6	64	<80	<30	369	8,240	121,000
401	8/12/2003	10	9,810	13.6	21.9	58	21	<15	260	9,640	110,000
402	11/7/1996	10	9,260	16.0	24.0	<4.0	57	18	--	11,000	170,000
402	5/8/1997	10	8,500	14.2	22.2	64	51	<15	--	9,820	149,000
402	11/6/1997	10	8,740	15.1	20.7	43	35	<15	--	10,100	141,000
402	6/12/1998	10	8,730	10.8	21.5	78	51	<42	--	10,500	142,000
402	11/5/1998	10	8,070	11.9	21.6	101	<8	17	412	9,650	133,000

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)
402	6/11/1999	10	6,510	11.0	17.1	73	E13	<56	--	8,140	107,000
402	12/9/1999	10	5,660	10.4	14.9	E47	E12	<42	474	7,070	92,600
402	7/26/2000	10	7,410	11.7	17.8	73	E18	<42	333	9,090	119,000
402	5/1/2001	10	6,810	10.9	18.1	72	E38	<140	399	7,440	103,000
403	11/7/1996	10	490	21.0	1.8	55	3	9	21	430	16
403	5/8/1997	10	1,670	20.0	4.3	63	7	9	71	1,860	<3
403	11/6/1997	10	5,920	26.6	16.2	77	16	<15	335	6,560	5,800
404	6/8/1998	10	<10	13.3	<1.0	30	<8	<14	<12	<10	<10
404	7/23/2000	10	<20	11.3	<1.6	24	<8	<14	<13	<10	<10
404	5/16/2002	10	<20	11.0	<.5	20	<8	<10	<13	<6	<10

Well	Date	Laboratory	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)
401	11/7/1996	10	70	140	20,000	<30	390	<3	900	<18	2,000
401	5/8/1997	10	<30	126	19,200	<30	350	<3	813	<18	1,850
401	11/6/1997	10	<50	141	18,900	<50	390	<5	882	<30	1,850
401	6/12/1998	10	<300	142	21,500	<180	360	<12	985	<30	1,940
401	11/5/1998	10	250	144	20,500	E14	370	6	927	28	1,770
401	6/11/1999	10	<300	139	18,800	<150	320	<12	895	<30	1,610
401	12/9/1999	10	<300	110	17,100	<102	350	<21	830	<30	1,520
401	7/26/2000	10	<300	121	21,400	<102	390	<21	1,010	<30	1,910
401	5/3/2001	10	5.61	136	24,700	<102	430	<21	1,260	<30	2,330
401	5/16/2002	10	4.37	127	20,700	<140	360	<27	1,050	<24	1,650
401	8/12/2003	10	4.58	155	21,200	<12	370	<15	1,320	<18	1,730
402	11/7/1996	10	70	140	22,000	<30	440	4	970	<18	2,100
402	5/8/1997	10	<30	137	21,100	33	430	<3	889	<18	1,980
402	11/6/1997	10	<30	138	21,000	<30	450	<3	954	<18	2,000
402	6/12/1998	10	<300	138	23,900	<180	430	<12	1,040	<30	2,130

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
402	11/5/1998	10	170	137	22,700	E12	450	E14	971	12	1,910
402	6/11/1999	10	<400	119	19,200	<200	300	<16	897	<40	1,580
402	12/9/1999	10	<300	111	17,300	<102	350	<21	804	<30	1,520
402	7/26/2000	10	<300	126	22,700	<102	430	<21	1,050	<30	1,840
402	5/1/2001	10	6.78	124	19,400	<102	340	<21	924	<30	1,690
403	11/7/1996	10	<10	76	4,900	<10	150	<1	1,200	<6	390
403	5/8/1997	10	<10	103	7,940	<10	230	<1	1,090	<6	718
403	11/6/1997	10	<100	141	19,900	<30	440	<3	1,270	<18	1,890
404	6/8/1998	10	<100	13	<4.0	<60	<40	<4	261	<10	<20
404	7/23/2000	10	<100	14	E1.2	<34	<40	<7	323	<10	<20
404	5/16/2002	10	<.08	12	<2.0	<50	<30	<9	326	<8	<24

Well	Date	Laboratory	Carbon, inorganic, dissolved (mg/L as C)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)	Carbon-13/ Carbon-12, unfiltered (per mil)
401	11/7/1996	20	17	--	--	--	--
401	5/8/1997	20	30	--	--	--	--
401	6/12/1998	20	40	--	--	--	--
401	11/5/1998	20	34	--	--	--	--
401	6/11/1999	20	43	--	--	--	--
401	12/9/1999	20	40	--	--	--	--
401	7/26/2000	10	34	--	--	--	-9.50
401	5/3/2001	10	38	--	-62.8	-8.49	--
401	5/16/2002	20	34	--	--	--	--
401	8/12/2003	20	42	--	--	--	--
402	11/7/1996	20	30	--	--	--	--
402	5/8/1997	20	23	--	--	--	--
402	11/6/1997	20	25	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Carbon, inorganic, dissolved (mg/L as C)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)	Carbon-13/ Carbon-12, unfiltered (per mil)
402	6/12/1998	20	33	--	--	--	--
402	11/5/1998	20	30	--	--	--	--
402	6/11/1999	20	36	--	--	--	--
402	12/9/1999	20	30	--	--	--	--
402	7/26/2000	10	32	66.16	--	--	-10.44
402	5/1/2001	10	35	--	-60.2	-8.48	--
403	11/7/1996	20	19	--	--	--	--
403	11/6/1997	20	21	--	--	--	--
404	6/8/1998	10					
404	7/23/2000	10					-10.58
404	5/16/2002	10					

GROUND WATER—Continued

Well Group 500

LOCATION.—Lat 33°31'51", long 110°52'05", in SE1/4SE1/4NW1/4, sec. 7, T. 2 N., R. 15 E. (A-02-15)07bdd, 60 m east of Pinal Creek, and 16 km northwest of Globe.

Landowner: Tonto National Forest.

LAND-SURFACE DATUM.—897.77 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Wells 501, 502, 503, and 504 were originally identified as X5W1, X5W2, X5W3, and X5W4, respectively. In Brown (1990) and Longsworth and Taylor (1992), the location of wells 505 and 506 in the site plan were incorrect and have been corrected in this report.

DRILLING AND WELL CONSTRUCTION

Well 5EX was drilled for exploration purposes. After water samples and cuttings were collected, the entire depth of the hole was sealed with concrete.

Wells 501–504 were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.5 to 1.5 m above the screen. A concrete seal extends from the land surface to the depth listed. Hole 503 caved during installation of casing.

Well 505 was cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. The well has a a single 1.5-meter length of slotted, 10-centimeter diameter, schedule 40, PVC pipe as the well screen. The screen has 3,648 factory-cut slots 4.4 cm long by 0.51 mm wide for a total open area of 819 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.9 to 1.2 m above the screen. A concrete seal extends from the land surface to the depth listed.

Well 506 was cased with nominal 10-centimeter diameter, schedule 80, PVC pipe. The well has a single 1.5-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen in well 506 has 1,056 factory-cut slots 3.4 cm long by 0.64 mm wide for a total open area of 230 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated alluvium. Formation material collapsed around the casing from 0.8 to 3.4 m above the screen, or to within about 1.8 m of land surface. A layer of bentonite pellets 0.3 m thick was placed in the annulus on the collapsed material. A concrete seal extends from the land surface to a depth of 1.5 m.

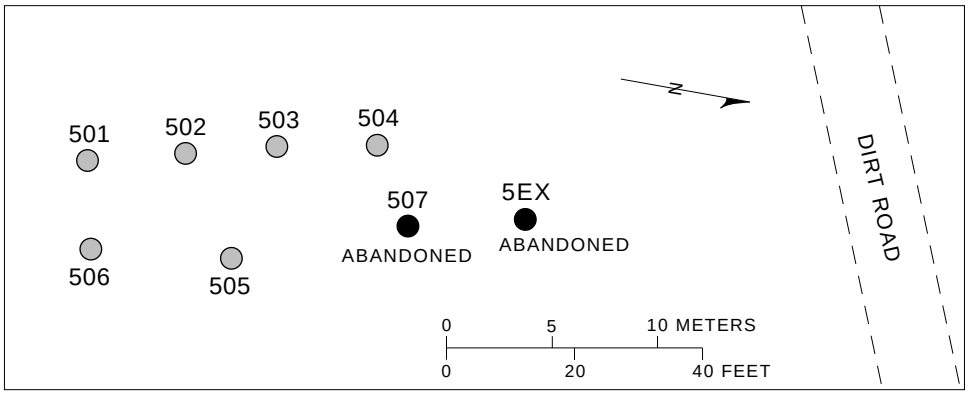
GROUND WATER—Continued

Well Group 500—Continued

Logs: D, driller's; G, geologist; P, particle size; --, no data.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
5EX	--	12–13–85	Dual-wall air rotary	89.9	--	--	--	--	DGP
501	bdd1	05–22–86	Rotary, bentonite	17.1	17.0	15.4–16.3	Alluvium	15.2	D
502	bdd2	05–22–86	Rotary, bentonite	38.1	38.0	36.5–37.4	Basin fill	35.1	D
503	bdd3	05–22–86	Rotary, bentonite	73.2	25.0	23.4–24.3	Alluvium	19.8	D
504	bdd4	07–24–86	Cable tool	69.5	69.2	67.6–68.6	Basin fill	64.0	D
505	bdd5	12–17–88	Hollow-stem auger	22.2	21.6	15.5–21.6	Alluvium	1.5	DGP
506	bdd6	12–15–88	Hollow-stem auger	7.3	6.7	5.2–6.7	Alluvium	1.5	DGP

WELL GROUP 500 SITE PLAN

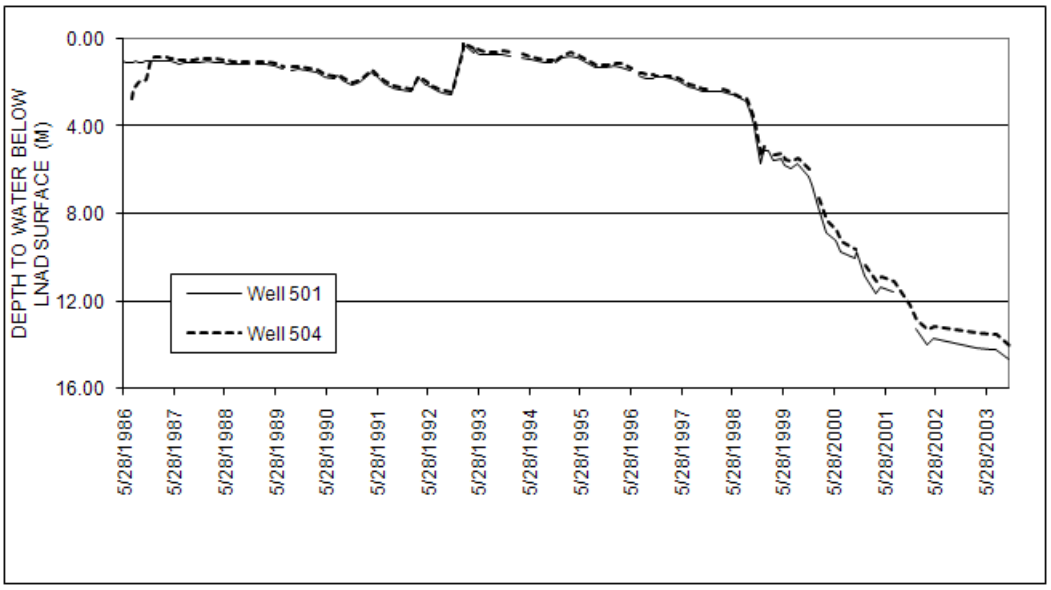


GROUND WATER—Continued

Well Group 500—Continued

Date	Water level, in meters below land surface					
	Well number					
	501	502	503	504	505	506
11–05–96	1.86	1.86	1.94	1.65	1.89	1.83
11–22–96	1.83	1.87	1.93	1.69	1.90	1.83
02–07–97	1.83	1.84	1.90	1.68	1.87	1.78
03–28–97	1.84	1.87	1.92	1.69	1.88	1.81
05–05–97	1.95	1.96	2.02	1.80	1.99	1.92
07–25–97	2.22	2.24	2.30	2.07	2.26	2.19
09–05–97	2.31	2.33	2.39	2.15	2.36	2.29
11–03–97	2.42	2.43	2.49	2.26	2.46	2.40
12–17–97	2.43	2.44	2.50	2.29	2.47	2.41
01–22–98	2.46	2.48	2.54	--	--	--
03–23–98	2.44	2.46	2.52	2.31	2.49	2.42
04–23–98	2.50	2.52	2.58	2.37	2.54	2.47
06–09–98	2.63	2.65	2.70	2.49	2.67	2.61
07–28–98	2.78	2.80	2.85	2.65	2.82	2.76
09–04–98	2.85	--	2.92	2.72	2.89	--
10-08–98	3.49	3.51	3.59	3.29	3.54	3.43
11–03–98	4.01	4.04	4.09	3.75	4.05	3.99
11–12–98	4.50	4.54	4.60	4.20	4.55	4.45
12–18–98	5.77	5.82	5.87	5.37	5.82	--
01–13–99	5.17	5.20	5.26	4.86	5.20	5.11
02–11–99	5.14	--	--	--	--	--
03–24–99	5.60	5.64	5.69	5.27	5.65	5.52
05–18–99	5.52	5.53	5.57	5.20	5.56	5.51
06–09–99	5.82	5.86	5.91	5.50	5.87	5.71
07–26–99	5.95	6.00	6.04	5.62	5.99	5.83
09–16–99	5.71	5.78	5.81	5.41	5.76	--
12–07–99	6.29	6.35	6.37	5.93	--	--
12–08–99	--	--	--	--	--	6.06
12–27–99	6.70	6.77	--	--	6.75	--
02–14–00	7.73	7.81	7.85	7.26	7.77	Dry
04–11–00	8.87	8.96	8.99	8.31	8.90	Dry
06–12–00	9.27	9.32	9.37	8.71	9.30	Dry
07–24–00	9.77	9.83	9.87	9.25	9.78	--
10–26–00	10.07	10.15	10.19	9.59	10.06	Dry
11–09–00	9.77	9.83	9.87	9.25	9.78	Dry
01-09–01	10.80	10.92	10.94	10.32	10.83	Dry
04–03–01	11.62	11.72	--	11.06	11.64	Dry
05–02–01	11.33	11.43	11.46	10.85	11.36	Dry
08–08–01	11.59	11.69	11.72	11.05	11.62	Dry
11–26–01	--	12.81	--	12.19	12.74	--
01-15–02	13.23	13.47	13.52	12.81	13.41	Dry
04–03–02	13.94	14.03	14.07	13.26	13.97	Dry

	Water level, in meters below land surface					
	Well number					
Date	501	502	503	504	505	506
05–14–02	13.70	13.78	13.81	13.11	13.72	--
03–27–03	14.11	14.18	14.21	13.45	14.12	Dry
07–24–03	14.16	14.25	14.27	13.48	14.18	Dry
08–11–03	14.21	14.29	14.31	13.51	14.22	Dry
11–12–03	14.63	14.72	14.75	14.00	14.66	Dry



GROUND WATER—Continued

Well Group 500—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, dissolved (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
501	11/5/1996	2,660	5.7	445	--	18.0	0.2	55	67	2.3	0.87
501	11/4/1997	2,560	5.4	485	--	19.4	0.1	47	57	4.2	0.58
501	6/9/1998	2,510	5.6	--	--	21.6	0.1	44.8	--	3.8	0.97
501	11/3/1998	2,640	5.5	--	22	19.0	10.4	43.0	--	3.2	0.63
501	6/9/1999	2,450	5.6	--	33	21.7	<.1	52.8	--	3.4	0.55
501	12/7/1999	2,620	5.6	--	18	18.9	0.1	46.0	--	3.4	0.62
501	7/24/2000	2,540	5.8	--	37	22.0	0.2	64.3	--	4.2	0.92
501	5/2/2001	2,410	5.4	--	--	21.5	0.4	87.9	--	--	--
501	5/14/2002	2,290	5.8	--	35	21.0	--	64.0	--	3.0	0.50
501	8/11/2003	2,350	5.7	--	--	22.5	<.1	55.4	--	1.5	0.78
502	11/5/1996	1,580	7.3	623	--	17.7	3.6	143	174	2.3	0.58
502	11/3/1997	1,530	7.3	378	--	20.0	3.2	28.8	157	3.3	0.72
502	6/9/1998	1,640	7.2	--	--	20.4	3.4	134	--	3.8	0.68
502	11/3/1998	1,850	7.3	--	11	17.5	3.3	144	--	3.0	0.75
502	6/9/1999	1,900	7.2	--	32	21.6	3.2	142	--	--	--
502	12/7/1999	2,020	7.4	--	13	17.7	2.6	144	--	2.9	0.43
502	7/24/2000	2,200	7.2	--	41	23.0	2.8	142	--	4.2	0.85
502	5/2/2001	2,230	7.2	--	--	22.0	0.5	142	--	--	--
502	5/14/2002	2,470	7.2	--	--	22.5	1.5	147	--	2.6	0.52
502	8/11/2003	2,830	7.1	--	--	23.5	0.5	157	--	3.3	0.73
503	11/6/1996	2,590	5.3	447	--	18.6	0.1	27	33	1.1	0.82
503	5/5/1997	2,610	5.2	--	--	23.1	0.2	22	--	1.9	1.73
503	11/4/1997	2,450	5.1	525	--	18.0	0.1	20	24	4.5	0.58
503	6/9/1998	2,450	5.2	--	--	20.6	0.1	17.6	--	4.5	0.58

Field Measurements (continued)

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, dissolved (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
503	11/3/1998	2,530	5.3	--	24	19.0	<.1	24.0	--	2.6	0.63
503	6/9/1999	2,360	5.5	--	33	21.0	0.1	33.6	--	2.6	--
503	12/7/1999	2,470	5.5	--	18	16.9	0.2	37.0	--	3.3	0.78
503	7/24/2000	2,500	5.8	--	43	23.0	0.1	60.8	--	4.2	0.83
503	5/2/2001	2,340	5.9	--	--	20.5	0.1	76.1	--	--	--
503	5/14/2002	2,350	6.1	--	--	24.0	0.4	91.0	--	2.0	0.68
503	8/11/2003	2,400	6.0	--	--	23.0	0.2	79.9	--	3.0	0.77
504	5/5/1997	391	7.5	--	--	22.0	5.6	189	--	6.8	1.02
504	11/3/1997	415	7.6	403	--	21.3	4.8	167	203	3.3	2.00
504	6/9/1998	395	7.6	--	--	19.3	6	171	--	7.6	0.80
504	12/7/1999	384	7.8	--	19	19.0	4.4	191	--	3.4	2.10
504	7/24/2000	404	7.3	--	--	21.0	5.4	179	--	6.1	0.92
504	5/14/2002	398	7.6	--	37.5	21.5	4.6	183	--	3.8	1.13
505	5/2/2001	2,370	5.8	--	--	22.0	0.1	64.0	--	--	--
506	11/6/1996	2,630	5.9	506	--	16.9	0.1	71	87	2.0	0.78
506	11/4/1997	2,550	5.6	511	--	20.2	0.1	64	78	3.8	0.60
506	6/9/1998	2,550	5.7	--	--	21.5	0.1	51.2	--	4.5	0.48
506	11/3/1998	2,720	5.8	--	18	18.5	<.1	79.0	--	3.3	0.42
506	6/9/1999	2,500	5.8	--	34	21.0	0.5	32.0	--	--	--

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)
501	11/5/1996	10	510	120	67	4.60	1,800	55.0	2.2	63.0	810
501	11/4/1997	10	473	111	64.7	4.59	1,750	52.9	2.4	60.2	910

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)
501	6/9/1998	10	475	111	64.7	4.55	1,700	52.5	2.3	60.7	850
501	11/3/1998	10	449	106	62.8	4.15	1,640	52.5	1.8	57.3	780
501	6/9/1999	10	455	108	64.5	4.69	1,630	56.4	1.6	55.6	480
501	12/7/1999	10	421	96.2	56.1	3.96	1,600	56.3	1.7	52.6	410
501	7/24/2000	10	421	95.8	82.9	4.71	1,520	54.1	1.7	52.1	140
501	5/2/2001	10	440	101	69.4	4.22	1,430	55.8	1.4	57.0	E40
501	5/14/2002	10	396	88.1	58.2	3.85	1,370	56.3	1.57	53.6	140
501	8/11/2003	10	422	91.2	67.1	4.48	1,350	56.1	1.5	54.8	<150
502	11/5/1996	10	310	51.0	35.0	3.10	860	23.0	0.3	27.0	M
502	11/3/1997	10	306	53.7	34.8	2.99	884	23.4	0.3	27.5	<10
502	6/9/1998	10	326	57.6	37.1	3.15	932	22.9	<.1	27.8	<10
502	11/3/1998	10	334	57.3	37.1	2.87	950	23.9	0.2	27.3	<10
502	6/9/1999	10	380	64.3	38.9	3.40	1,080	25.7	0.3	28.8	<30
502	12/7/1999	10	377	61.7	35.4	3.05	1,130	26.4	0.2	27.4	<40
502	7/24/2000	10	425	69.7	40.5	3.76	1,230	25.9	0.1	28.4	<40
502	5/2/2001	10	458	78.5	45.0	3.75	1,300	26.3	0.2	29.2	<40
502	5/14/2002	10	525	85.9	42.7	3.6.0	1,550	29.7	0.22	29.2	80
502	8/11/2003	10	615	101	50.9	4.61	1,720	36.6	0.2	29.6	<3
503	11/6/1996	10	470	110	64.0	5.00	1,800	51.0	2.7	66.0	2,190
503	5/5/1997	10	445	104	62.8	4.91	1,710	49.3	4.4	63.9	2,150
503	11/4/1997	10	421	104	61.6	5.39	1,670	48.9	2.9	60.0	2,130
503	6/9/1998	10	412	102	61.0	5.10	1,600	52.6	3.3	60.1	2,010
503	11/3/1998	10	414	100	60.8	4.52	1,570	51.5	2.0	56.8	1,770
503	6/9/1999	10	422	97.5	59.3	5.22	1,550	55.0	1.5	54.0	1,370
503	12/7/1999	10	398	94.7	60.7	4.72	1,540	55.1	1.6	53.4	1,150
503	7/24/2000	10	428	93.1	61.4	4.00	1,500	52.4	1.4	48.4	480
503	5/2/2001	10	435	89.8	54.9	4.37	1,390	53.3	1.0	50.1	260
503	5/14/2002	10	446	85.0	56.0	4.63	1,390	52.5	0.71	48.5	120
503	8/11/2003	10	595	109	82.8	6.21	1,380	53.2	1.0	50.4	300
504	5/5/1997	10	40.4	14.3	18.4	2.09	12.6	8.88	0.3	25.4	<5

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (µg/L as Al)
504	11/3/1997	10	42.4	15.4	19.4	2.00	12.4	9.42	0.3	26.0	<5
504	6/9/1998	10	43.5	15.1	18.5	2.27	12.6	8.58	0.3	26.5	<10
504	12/7/1999	10	41.1	14.6	18.5	2.12	11.5	9.96	0.3	26.3	<20
504	7/24/2000	10	42.5	15.2	19.2	2.23	11.0	8.55	0.2	26.2	<20
504	5/14/2002	10	42.8	15.0	17.8	2.27	13.0	8.23	0.28	27.2	<20
505	5/2/2001	10	406	93.2	60.0	4.24	1,410	54.6	1.8	59.6	120
506	11/6/1996	10	520	120	68.0	3.60	1,800	52.0	0.5	66.0	30
506	11/4/1997	10	456	113	64.0	4.57	1,720	48.7	0.5	64.2	30
506	6/9/1998	10	444	109	60.9	4.10	1,650	50.9	0.9	63.5	60
506	11/3/1998	10	471	113	63.7	3.83	1,650	51.0	0.9	58.9	30
506	6/9/1999	10	479	113	67.5	3.96	1,650	55.4	0.8	65.1	E30

Well	Date	Laboratory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)
501	11/5/1996	10	27.0	5.1	58	14	25	410	<30	30	<30
501	11/4/1997	10	26.8	4.8	71	8	<25	447	<50	<15	<50
501	6/9/1998	10	26.6	5.9	65	<24	<42	461	<30	<30	<300
501	11/3/1998	10	24.3	E7.4	67	15	<14	504	21	17	150
501	6/9/1999	10	21.7	E4.1	63	<24	<42	412	<30	E26	<300
501	12/7/1999	10	21.0	E2.5	55	<24	<42	363	E22	<30	<300
501	7/24/2000	10	18.6	E1.0	120	E19	51	221	61	E22	190
501	5/2/2001	10	19.9	E.8	62	<24	<42	95	<30	<100	0.25
501	5/14/2002	10	18.6	E1.2	64	<80	<30	110	<20	<100	1.21
501	8/11/2003	10	16.2	E1.1	57	8	E12	87	13	14	0.38
502	11/5/1996	10	25.0	<.5	26	<1	9	<3	<10	<3	20
502	11/3/1997	10	26.6	<.5	25	<1	<5	<3	<10	<3	<10
502	6/9/1998	10	28.8	<1.0	23	<8	<14	<12	<10	<10	<100
502	11/3/1998	10	28.4	1.1	27	<48	<84	<7	<10	<60	130

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)
502	6/9/1999	10	32.6	<4.8	E22	<24	<42	<21	<30	<30	<300
502	12/7/1999	10	31.2	<1.6	E22	<8	<42	<39	<10	<30	130
502	7/24/2000	10	37.1	<1.6	49	<24	<42	<39	E21	<30	<300
502	5/2/2001	10	41.4	<1.0	<48	<24	<42	<39	<30	<100	0.10
502	5/14/2002	10	44.5	<1.5	<39	<24	<30	<39	<20	<30	0.45
502	8/11/2003	10	52.3	<1.2	E14	<6	E14	<9	<21	<24	<.16
503	11/6/1996	10	32.0	10.0	56	18	25	870	790	10	<30
503	5/5/1997	10	32.2	9.1	55	8	42	875	818	<24	<80
503	11/4/1997	10	29.7	8.5	67	21	27	815	857	<9	<30
503	6/9/1998	10	25.6	8.1	61	<24	<42	770	930	<30	<300
503	11/3/1998	10	23.8	9.6	40	10	<14	766	900	<10	<100
503	6/9/1999	10	25.2	6.7	75	E11	<42	590	710	E23	<300
503	12/7/1999	10	24.4	6.7	67	E17	<56	531	659	26	<400
503	7/24/2000	10	33.6	2.1	97	<24	<42	311	181	<30	<300
503	5/2/2001	10	46.3	2.4	64	<80	<140	169	42	<100	0.29
503	5/14/2002	10	47.4	E1.2	55	<24	<30	109	22	<30	1.42
503	8/11/2003	10	46.1	1.8	51	E4	E13	107	31	<24	0.17
504	5/5/1997	10	13.9	<.5	27	2	<5	<3	<10	<3	20
504	11/3/1997	10	13.9	<.5	26	<1	<5	<3	<10	<3	<10
504	6/9/1998	10	13.9	<1.0	28	<8	<14	<12	<10	<10	<100
504	12/7/1999	10	11.8	<1.6	17	<8	<14	<13	<10	<10	<100
504	7/24/2000	10	10.7	<1.6	33	<8	<14	<13	<10	<10	<100
504	5/14/2002	10	8.9	<.5	21	<8	<10	<13	<6	<10	0.24
505	5/2/2001	10	19.9	2.4	78	8	11	224	<30	<10	0.36
506	11/6/1996	10	22.0	<1.5	58	<3	<15	20	<30	<9	<30
506	11/4/1997	10	21.5	<2.5	65	8	<25	<15	<50	<15	<50
506	6/9/1998	10	19.6	<3.0	68	<24	<42	36	<30	<30	<300
506	11/3/1998	10	22.2	2.8	81	15	25	72	14	<10	150
506	6/9/1999	10	15.0	<6.4	E45	<32	<56	E23	<40	E28	<400

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)
501	11/5/1996	10	170	63,000	<30	600	8	1,700	<18	690
501	11/4/1997	10	177	59,100	<50	610	<5	1,580	<30	710
501	6/9/1998	10	175	58,400	<180	560	<12	1,600	<30	758
501	11/3/1998	10	164	58,500	E34	570	6	1,460	10	817
501	6/9/1999	10	136	54,100	<102	420	<21	1,510	<30	658
501	12/7/1999	10	138	48,700	<102	490	<21	1,350	<30	707
501	7/24/2000	10	112	45,000	E72	440	50	1,360	38	369
501	5/2/2001	10	124	33,100	<102	260	<21	1,500	<30	134
501	5/14/2002	10	116	32,600	<140	300	<27	1,280	<24	174
501	8/11/2003	10	142	29,600	<12	280	<15	1,450	<18	143
502	11/5/1996	10	12	2.0	<10	<10	<1	1,300	7	<3
502	11/3/1997	10	16	<1.0	<10	<10	<1	1,370	<6	<3
502	6/9/1998	10	17	<4.0	<60	<40	<4	1,490	<10	<20
502	11/3/1998	10	E22	<18.0	E34	<40	8	1,460	10	<120
502	6/9/1999	10	E13	<9.0	<150	<120	<12	1,670	<30	<60
502	12/7/1999	10	21	<2.2	E26	<120	<21	1,570	<10	23
502	7/24/2000	10	25	12	<102	<120	<21	1,810	E22	<60
502	5/2/2001	10	16	E2.9	<102	<120	<21	2,050	<30	E33
502	5/14/2002	10	16	<5.0	<140	<90	<27	2,250	<24	<72
502	8/11/2003	10	20	E1.1	15	E10	<15	2,660	<18	<9
503	11/6/1996	10	190	74,000	<30	810	11	1,600	<18	1,800
503	5/5/1997	10	194	68,100	<80	770	19	1,510	<48	1,800
503	11/4/1997	10	181	64,900	<30	700	<3	1,370	<18	1,670
503	6/9/1998	10	182	64,100	<180	670	<12	1,410	<30	1,660
503	11/3/1998	10	171	59,700	E4	580	6	1,350	10	1,420
503	6/9/1999	10	147	56,800	<102	560	<21	1,440	<30	1,290
503	12/7/1999	10	140	50,100	<136	460	<28	1,350	<40	1,110
503	7/24/2000	10	102	40,100	<102	360	<21	1,510	<30	693

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Well	Date	Laboratory	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)
503	5/2/2001	10	111	23,600	<102	300	<21	1,620	<30	350
503	5/14/2002	10	75	13,600	<140	170	<27	1,750	<24	261
503	8/11/2003	10	105	5,380	<12	200	<15	2,460	<18	307
504	5/5/1997	10	15	<1.0	<10	<10	<1	314	6	<3
504	11/3/1997	10	16	<1.0	<10	<10	<1	323	<6	<20
504	6/9/1998	10	18	<4.0	<60	<40	<4	319	<10	<20
504	12/7/1999	10	15	<2.2	<34	<40	<7	307	<10	<20
504	7/24/2000	10	13	<2.2	<34	<40	<7	322	E8	<20
504	5/14/2002	10	14	<2.0	<50	<30	<9	313	E6	<24
505	5/2/2001	10	144	39,200	<102	440	<21	1,370	<30	283
506	11/6/1996	10	170	52,000	<30	390	8	1,800	<18	48
506	11/4/1997	10	180	56,200	<60	450	<5	1,590	<30	<15
506	6/9/1998	10	174	52,800	<180	420	<12	1,570	<30	<60
506	11/3/1998	10	160	51,700	<50	460	E18	1,530	16	<120
506	6/9/1999	10	163	37,400	<200	300	<16	1,600	<40	<80

Well	Date	Laboratory	Carbon, inorganic, dissolved (mg/L as C)	Carbon-13/ Carbon-12, unfiltered (per mil)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)
501	7/24/2000	10	--	-5.75	--	--	--
501	5/2/2001	10	--	--	--	-66.7	-9.14
502	5/2/2001	10	--	--	--	-63.9	-8.92
503	11/6/1996	20	20	--	--	--	--
503	11/4/1997	20	42	--	--	--	--
503	12/7/1999	20	46	--	--	--	--
503	7/24/2000	10	--	-8.17	57.89	--	--
503	5/2/2001	10	--	--	--	-65.1	-9.01
504	7/24/2000	10	--	-10.33	--	--	--
505	5/2/2001	10	--	--	--	-65.6	-9.09

GROUND WATER—Continued

Well Group 540

LOCATION.—Lat 33°31'51", long 110°52'12", in SE1/4NW1/4NW1/4, sec. 7, T. 2 N., R. 15 E. (A-02-15)07bbd, 70 m west of Pinal Creek, and 16 km northwest of Globe.

Landowner: Tonto National Forest.

REMARKS.—Well 541 is 3 meters north of Well 542.

LAND-SURFACE DATUM.—898.70 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

DRILLING AND WELL CONSTRUCTION

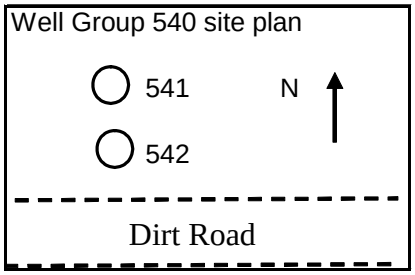
Wells 541 and 542 were cased with a 5.1-centemeter diameter, schedule 40, PVC pipe. The wells have a single 1.5-meter length of perforated, 5.1-centemeter diameter, schedule 40, PVC pipe as the well screen. The screen has 246 factory-cut slots 5.1-centemeter long by 0.51 mm wide per foot for a total open area of 320 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A concrete seal extends from the land surface to 3.0 meters below land surface.

Well 541: Backfill extends from 3.0 to 8.6 meters below land surface; EP grout (bentonite) extends from 8.6 to 10.2 meters below the land surface; and pea gravel extends from 10.2 to 12.6 meters below the land surface. The hole was drilled to 24.7 meters and backfilled to 12.6 meters below land surface.

Well 542: Backfill extends from 3.0 to 14.8 meters below land surface; EP grout extends from 14.8 to 17.0 meters below land surface; additional backfill extends from 17.0 to 17.3 meters below land surface, and pea gravel extends from 17.3 to 19.7 meters below land surface. The hole was drilled to 20.9 meters and backfilled to 19.7 meters below land surface.

Logs: D, driller's; G, geologist; P, particle size.

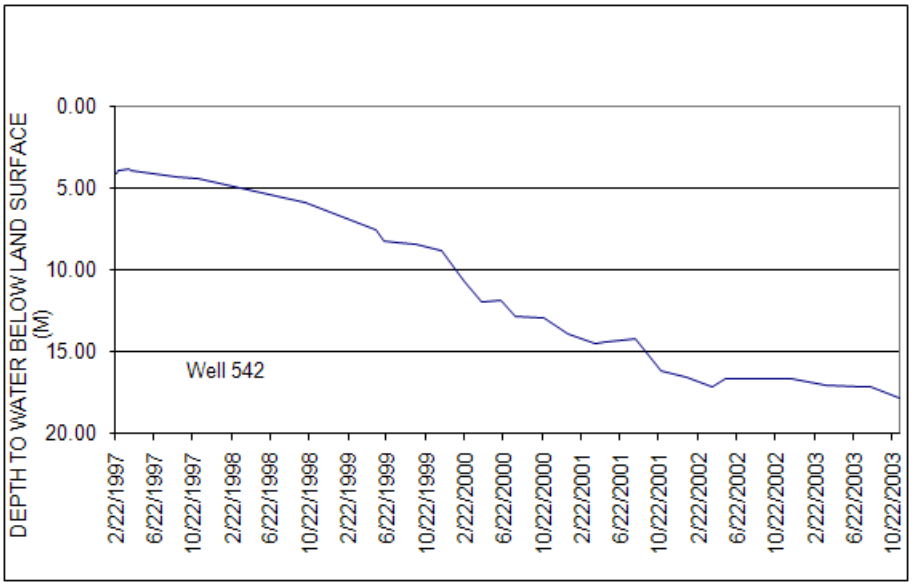
Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
541	bbd1	02–22–97	Hollow-stem auger	24.7	12.6	11.1–12.6	Alluvium	3.0	D,G,P
542	bbd2	02–22–97	Hollow-stem auger	20.9	19.8	18.2–19.7	Alluvium	3.0	D



GROUND WATER—Continued

Well Group 540—Continued

Date	Water level, in meters below land surface, Well number 541	Well number 542	Date	Water level, in meters below land surface, Well number 541	Well number 542
02–22–97	4.11	4.11	04–11–00	11.90	11.89
02–25–97	2.89	3.87	06–12–00	11.83	11.82
04–02–97	3.83	3.78	07–24–00	--	12.81
04–10–97	3.85	3.83	07–25–00	Dry	--
09–02–97	4.25	4.25	10–26–00	Dry	12.94
11–05–97	4.36	4.35	01–09–01	Dry	13.86
01–22–98	4.40	--	04–03–01	Dry	14.51
09–07–98	4.76	--	05–01–01	--	14.37
10–08–98	5.82	5.89	08–08–01	--	14.18
11–04–98	6.29	--	10–25–01	Dry	16.11
01–13–99	7.38	--	01–15–02	Dry	16.59
03–24–99	8.00	--	04–03–02	Dry	17.15
05–18–99	7.51	7.49	05–15–02	Dry	16.68
06–08–99	8.20	8.25	12–11–02	--	16.63
07–26–99	8.27	8.33	03–27–03	Dry	16.99
09–16–99	8.30	8.35	07–24–03	Dry	17.17
12–08–99	8.72	8.75	08–12–03	Dry	17.15
02–14–00	10.69	10.70	11–12–03	Dry	17.82


DEPTH TO WATER BELOW LAND SURFACE (M)
0.00
5.00
10.00
15.00
20.00
Well 542
2/22/1997
6/22/1997
10/22/1997
2/22/1998
6/22/1998
10/22/1998
2/22/1999
6/22/1999
10/22/1999
2/22/2000
6/22/2000
10/22/2000
2/22/2001
6/22/2001
10/22/2001
2/22/2002
6/22/2002
10/22/2002
2/22/2003
6/22/2003
10/22/2003

GROUND WATER—Continued

Well Group 540—Continued

Field Measurements									
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]									
Well	**Date**	**Specific conduc-tance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Tempe-rature, air (°C)**	**Tempe-rature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Average discharge (L/min)**	**Pumping period (hours)**
541	5/6/1997	2,090	4.6	--	--	20.2	0.2	1.5	0.77
541	11/5/1997	1,920	4.4	436	--	20.5	0.1	1.7	1.27
541	2/20/1998	1,920	4.3	437	--	17.4	0.1	2.2	0.77
541	6/11/1998	1,970	4.3	--	19.5	18.1	<.1	1.1	0.87
541	11/4/1998	2,010	4.4	--	22.0	19.0	0.2	1.1	0.97
541	6/8/1999	2,040	4.5	--	21.0	19.5	0.1	1.8	--
541	12/8/1999	2,200	4.3	--	14.0	17.0	<.1	1.8	0.52
542	5/6/1997	2,200	4.3	--	--	19.7	0.2	1.9	0.67
542	11/5/1997	2,080	4.2	416	--	16.4	0.2	2.4	1.12
542	2/20/1998	2,090	4.2	433	--	17.2	0.1	2.0	0.83
542	6/11/1998	2,140	4.3	--	24.5	18.2	<.1	2.0	1.02
542	11/4/1998	2,160	4.4	--	22.0	19.0	0.2	1.7	0.78
542	6/8/1999	2,150	4.4	--	31.0	22.0	0.1	1.5	--
542	12/8/1999	2,230	4.4	--	14.0	17.5	<.1	1.9	0.73
542	7/25/2000	2,040	4.5	--	--	24.0	0.4	1.8	0.53
542	5/1/2001	1,930	4.5	--	--	20.0	0.1	--	--
542	5/15/2002	2,150	4.5	--	36.0	--	0.1	0.9	0.58
542	8/11/2003	2,010	4.3	--	--	21.1	0.2	1.9	0.47

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)
541	5/6/1997	10	294	73.2	49.5	6.69	1,250	43.9	5.1	61.7
541	11/5/1997	10	286	73.6	52.8	6.16	1,200	45.4	3.3	61.9
541	2/20/1998	10	307	76.0	56.4	5.96	1,190	47.1	2.3	64.9
541	6/11/1998	10	284	74.0	52.3	5.85	1,220	50.2	3.6	59.7
541	11/4/1998	10	280	70.8	53.0	5.08	1,180	48.6	2.0	57.6
541	6/8/1999	10	324	81.9	60.5	6.14	1,250	55.0	1.7	64.3
541	12/8/1999	10	311	77.0	56.7	5.75	1,300	55.1	2.2	63.1
542	5/6/1997	10	310	79.6	55.3	6.18	1,380	46.3	3.6	65.0
542	11/5/1997	10	301	78.5	55.1	6.36	1,380	49.6	3.0	62.8
542	2/20/1998	10	326	81.5	59.6	5.66	1,330	49.8	2.0	66.6
542	6/11/1998	10	300	78.0	54.9	5.70	1,340	53.5	3.5	62.2
542	11/4/1998	10	299	74.9	55.2	5.00	1,300	50.7	1.6	61.0
542	6/8/1999	10	319	79.9	61.5	5.44	1,340	56.5	1.5	63.4
542	12/8/1999	10	303	72.6	56.6	5.48	1,350	55.4	1.8	59.5
542	7/25/2000	10	310	69.2	60.6	5.44	1,250	51.1	2.2	61.2
542	5/1/2001	10	273	63.5	65.5	5.61	1,130	55.6	1.5	63.0
542	5/15/2002	10	316	69.8	62.3	4.61	1,360	59.2	2.92	65.6
542	8/11/2003	10	356	77.6	87.0	7.80	1,220	52.2	2.5	81.0

Well	Date	Laboratory	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, water, dissolved (µg/L as Fe)
541	5/6/1997	10	4,450	40.5	13.5	69	21	23	1,060	3,660	6,690
541	11/5/1997	10	4,470	36.8	13.1	70	15	<15	995	3,620	8,760
541	2/20/1998	10	4,800	39.9	15.8	92	<48	<84	1,020	3,730	11,500
541	6/11/1998	10	4,810	35.0	11.3	67	<24	<42	--	3,490	16,000
541	11/4/1998	10	3,880	26.9	13.1	64	16	<84	834	2,730	14,300

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, water, dissolved (µg/L as Fe)
541	6/8/1999	10	4,150	26.9	12.0	E76	E22	<70	749	3,160	22,100
541	12/8/1999	10	4,170	24.2	10.3	53	E12	<42	679	2,820	16,600
542	5/6/1997	10	5,720	26.1	13.8	81	10	<15	--	4,770	62,300
542	11/5/1997	10	5,170	23.6	12.1	66	18	25	--	4,100	58,900
542	2/20/1998	10	5,150	25.2	14.6	84	<48	<84	--	4,130	64,100
542	6/11/1998	10	4,720	16.4	10.3	68	25	<42	--	3,810	58,300
542	11/4/1998	10	4,220	17.6	11.9	91	11	23	682	3,460	61,200
542	6/8/1999	10	4,110	17.5	9.6	67	E13	<56	--	3,400	61,800
542	12/8/1999	10	3,570	16.0	7.7	57	<24	<42	663	2,960	56,500
542	7/25/2000	10	3,510	15.8	6.5	79	E14	<42	525	2,710	58,100
542	5/1/2001	10	3,070	18.1	7.4	70	E10	E21	573	2,410	47,800
542	5/15/2002	10	3,500	16.9	8.6	55	E12	E16	492	2,630	42,600
542	8/11/2003	10	4,650	17.3	11.8	56	14	E9	424	2,990	22,400

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
541	5/6/1997	10	<30	168	52,800	35	730	5	1,030	<18	2,550
541	11/5/1997	10	<30	167	49,600	<30	670	<3	993	<18	2,490
541	2/20/1998	10	<600	184	51,200	<360	690	<24	1,060	<60	2,540
541	6/11/1998	10	<300	164	45,700	<180	590	<12	1,020	<30	2,260
541	11/4/1998	10	150	169	42,700	E83	650	E14	963	13	2,180
541	6/8/1999	10	<500	162	44,900	<250	670	E10	1,160	<50	2,240
541	12/8/1999	10	E70	164	41,400	<102	690	<21	1,100	<30	1,950
542	5/6/1997	10	170	173	44,700	<80	<30	<8	1,100	<18	2,400
542	11/5/1997	10	<30	169	40,500	<30	620	5	1,040	<18	2,140
542	2/20/1998	10	<600	187	43,000	<360	620	<24	1,120	<60	2,300
542	6/11/1998	10	<300	167	40,000	<180	590	<12	1,070	<30	1,990
542	11/4/1998	10	120	167	37,900	<300	570	E19	1,010	12	1,880

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
542	6/8/1999	10	<400	157	38,100	<200	550	<16	1,120	<40	1,930
542	12/8/1999	10	E80	150	34,000	<102	520	<21	1,030	<30	1,680
542	7/25/2000	10	<300	150	32,600	<102	480	<21	996	<30	1,730
542	5/1/2001	10	2.12	158	27,000	<102	400	<21	954	<30	1,400
542	5/15/2002	10	5.78	160	30,800	<140	430	<27	1,050	<24	1,440
542	8/11/2003	10	8.01	214	26,900	<12	430	<15	1,470	<18	1,450

Well	Date	Laboratory	Carbon, inorganic, dissolved (mg/L as C)	Carbon-13/ Carbon-12, unfiltered (per mil)	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/ Oxygen-16, unfiltered (per mil)
541	5/6/1997	20	20			
541	11/5/1997	20	33			
541	2/20/1998	20	31			
541	6/11/1998	20	30			
541	11/4/1998	20	29			
541	6/8/1999	20	36			
541	12/8/1999	20	29			
542	5/6/1997	20	16			
542	11/5/1997	20	36			
542	2/20/1998	20	35			
542	6/11/1998	20	33			
542	11/4/1998	20	32			
542	6/8/1999	20	37			
542	12/8/1999	20	33			
542	7/25/2000	10	33	-8.88		
542	5/1/2001	10	34		-64.9	-8.81
542	5/15/2002	20	22			
542	8/11/2003	20	35			

GROUND WATER—Continued

Well Group 560

LOCATION.—Lat 33°32'04", long 110°52'17", in SE1/4NW1/4NW1/4, sec. 7, T. 2 N., R. 15 E. (A-02-15)07bbd, 70 m southwest of Pinal Creek, and 16 km northwest of Globe.

Landowner: Tonto National Forest.

REMARKS.—Well 561 is about 4 meters north of Well 562.

LAND-SURFACE DATUM.—895.32 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

DRILLING AND WELL CONSTRUCTION

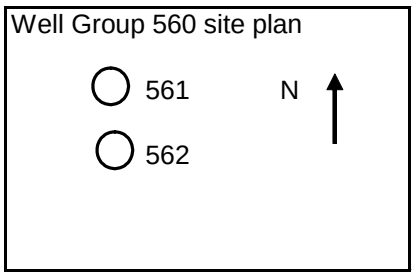
Wells 561 and 562 were cased with a 5.1-centimenter diameter, schedule 40, PVC pipe. The wells have a single 1.5-meter length of perforated, 5.1-centimenter diameter, schedule 40, PVC pipe as the well screen. The screen has 246 factory-cut slots 5.1-centimenter long by 0.51 mm wide per foot for a total open area of 319.9 cm^2. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A concrete seal extends from the land surface to 3.0 meters below land surface.

Well 561: Backfill extends from 3.0 to 11.4 meters below land surface; EP grout extends from 11.4 feet to 12.9 meters below the land surface; and above the screen, pea gravel extends from 12.9 to 15.4 meters below the land surface. The hole was drilled to 17.1 meters and backfilled to 15.3 meters.

Well 562: Backfill extends from 3.0 to 3.7 meters below land surface; grout extends from 3.7 to 4.9 meters below land surface; additional backfill extends from 4.9 to 5.2 meters below land surface, and above the screen, pea gravel extends from 5.2 to 7.4 meters below land surface. The hole was drilled to 7.6 meters and backfilled to 7.4 meters.

Logs: D, driller's; G, geologist; P, particle size.

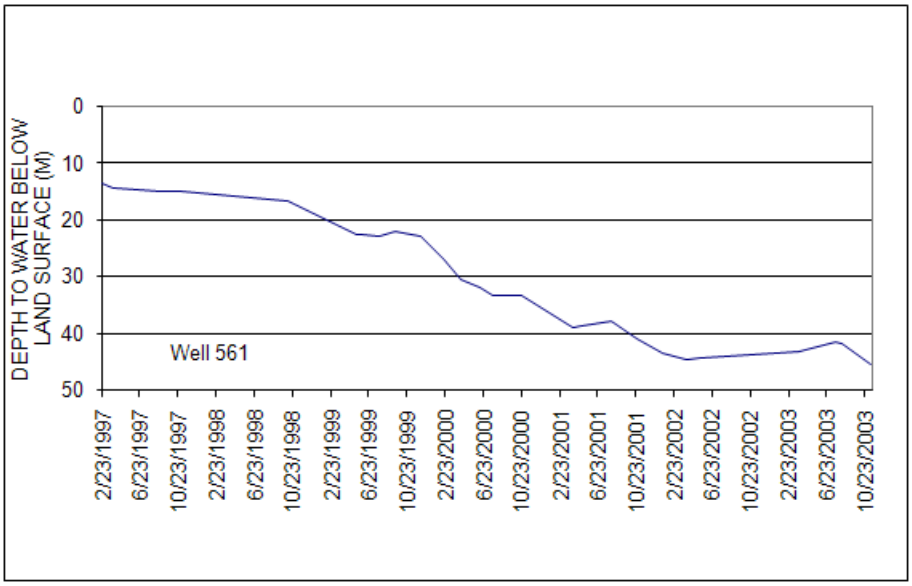
Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
561	bbd3	02–23–97	Hollow-stem auger	17.1	15.3	13.8–15.3	Alluvium	3.0	D,G,P
562	bbd4	02–24–97	Hollow-stem auger	7.6	7.4	5.9–7.4	Alluvium	3.0	D



GROUND WATER—Continued

Well Group 560—Continued

	Water level, in meters below land surface			Water level, in meters below land surface	
	Well number			Well number	
Date	561	562	Date	561	562
02–23–97	4.11	--	09–16–99	6.70	6.67
02–24–97	--	4.11	12–08–99	6.99	6.97
04–02–97	4.33	4.30	02–14–00	8.19	--
04–03–97	4.35	4.30	04–11–00	9.29	--
04–10–97	4.36	4.31	06–12–00	9.75	DRY
09–02–97	4.52	4.48	07–24–00	10.15	--
11–05–97	4.55	4.50	10–26–00	10.19	DRY
03–25–98	--	4.53	04–03–01	11.88	DRY
06–11–98	--	4.62	05–01–01	11.76	--
09–07–98	--	4.74	08–08–01	11.55	DRY
09–29–98	--	4.80	10–25–01	12.43	DRY
10–08–98	5.06	5.01	01–15–02	13.24	DRY
11–04–98	--	5.39	04–03–02	13.61	DRY
01–13–99	--	6.43	05–15–02	13.54	--
03–24–99	--	6.73	03–27–03	13.17	DRY
05–18–99	6.86	6.84	07–24–03	12.67	DRY
06–08–99	6.91	6.88	08–12–03	12.71	DRY
07–28–99	6.93	6.90	11–12–03	13.85	DRY



GROUND WATER—Continued

Well Group 560

Field Measurements											
[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; IT, incremental titration; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown]											
Well	**Date**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, water, dissolved, (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
561	5/6/1997	2,030	5.0	--	--	21.0	0.2	14	--	1.7	0.83
561	11/5/1997	1,980	4.5	445	--	20.3	0.2	--	--	1.6	0.88
561	2/20/1998	1,950	4.6	509	--	14.2	0.1	--	--	1.9	0.72
561	6/11/1998	1,950	4.6	--	--	18.7	<.1	--	--	1.7	0.77
561	11/4/1998	1,990	4.6	--	21.0	19.0	0.3	2	--	0.9	1.10
561	6/8/1999	1,970	4.3	--	33.0	22.0	0.1	--	--	1.1	--
561	12/8/1999	2,080	4.6	--	5.0	15.6	<.1	--	--	1.8	1.00
561	7/24/2000	1,870	4.6	--	--	22.0	0.1	--	--	2.1	0.75
561	5/1/2001	1,850	4.6	--	--	21.0	0.1	--	--	--	--
561	5/15/2002	1,960	5.1	--	--	23.0	0.4	--	--	1.3	0.42
561	8/12/2003	2,080	5.1	--	--	21.0	1.4	4.5	--	1.7	0.38
562	5/6/1997	2,080	5.2	337	--	20.2	0.2	16	--	1.4	0.60
562	11/5/1997	1,870	5.1	494	--	17.2	0.2	16	20	1.7	0.78
562	2/20/1998	1,890	5.1	480	--	14.2	0.1	11	14	2.0	0.83
562	6/11/1998	1,920	5.1	--	--	19.7	<.1	19.7	--	1.2	0.57
562	11/4/1998	2,010	5.0	--	9.0	17.0	0.5	8	--	1.1	0.97
562	6/8/1999	1,950	4.7	--	36.0	22.5	1.6	4	--	1.1	0.37
562	12/8/1999	2,050	4.8	--	--	17.1	3.6	--	--	1.9	0.38

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO2)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)
561	5/6/1997	10	306	74.6	56.6	6.58	1,250	45.1	4.8	66.5	3,510	34.6
561	11/5/1997	10	303	73.1	54.7	6.32	1,220	46.1	3.5	64.0	3,550	33.2
561	2/20/1998	10	309	71.4	55.6	5.97	1,190	48.6	2.9	64.9	3,790	35.3
561	6/11/1998	10	299	70.8	53.0	6.20	1,180	51.3	3.6	62.7	3,790	30.5
561	11/4/1998	10	286	68.7	54.1	5.81	1,170	50.3	2.0	60.9	4,040	36.5
561	6/8/1999	10	303	73.7	64.4	6.23	1,160	76.7	1.2	55.8	3,310	48.9
561	12/8/1999	10	308	68.3	53.1	5.02	1,240	54.5	1.1	47.9	1,790	33.2
561	7/24/2000	10	275	60.8	59.2	5.35	1,060	45.1	1.4	48.0	1,550	25.1
561	5/1/2001	10	315	64.1	62.4	4.71	1,060	46.5	0.8	43.1	920	23.8
561	5/15/2002	10	310	70.0	59.0	4.61	1,170	56.6	0.89	38.9	580	20.5
561	8/12/2003	10	327	91.2	80.5	6.85	1,220	53.3	0.9	41.4	610	15.1
562	5/6/1997	10	312	72.9	51.6	6.09	1,240	42.4	5.7	65.3	2,680	30.5
562	11/5/1997	10	302	71.0	51.7	6.14	1,180	45.8	4.2	65.5	2,680	30.7
562	2/20/1998	10	312	70.5	53.5	5.78	1,140	46.3	8.4	67.6	2,780	31.5
562	6/11/1998	10	307	73.3	53.0	5.75	1,150	49.2	4.4	65.7	3,120	26.4
562	11/4/1998	10	297	72.2	52.9	5.62	1,140	47.4	2.1	65.3	2,900	25.9
562	6/8/1999	10	312	75.2	58.9	6.07	1,160	54.0	2.0	64.6	3,290	26.9
562	12/8/1999	10	310	73.7	55.7	--	1,240	53.6	2.2	59.0	2,530	25.9

Well	Date	Laboratory	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, water, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)
561	5/6/1997	10	16.0	73	21	18	1,190	4,830	<9	<30	180	54,900
561	11/5/1997	10	15.1	67	15	<15	1,100	4,710	<9	<30	170	53,300
561	2/20/1998	10	18.8	83	<48	<84	1,140	4,770	<60	<600	184	53,900
561	6/11/1998	10	16.5	61	<24	<42	1,060	4,690	<30	<300	169	51,200
561	11/4/1998	10	16.7	84	23	21	1,090	4,220	36	250	155	50,200

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, water, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)
561	6/8/1999	10	11.4	100	<40	<70	912	3,630	1,680	<500	122	46,900
561	12/8/1999	10	4.9	76	<24	<42	619	1,900	1,430	<300	116	37,300
561	7/24/2000	10	4.4	71	13	E12	570	1,450	831	<100	92	34,800
561	5/1/2001	10	4.0	64	14	30	526	992	504	1.96	71	34,100
561	5/15/2002	10	2.2	64	E11	<30	398	657	90	4.72	73	30,500
561	8/12/2003	10	2.2	50	8	E10	359	701	<24	2.85	110	31,600
562	5/6/1997	10	8.9	73	23	25	847	563	<9	<30	183	49,300
562	11/5/1997	10	8.7	67	15	17	792	694	<9	<30	178	46,500
562	2/20/1998	10	12.1	87	<48	<84	847	781	<60	<600	194	48,600
562	6/11/1998	10	9.4	69	<24	<42	812	920	<30	<300	182	47,800
562	11/4/1998	10	E10.5	67	<8	<14	823	1,200	11	<1000	184	47,500
562	6/8/1999	10	14.1	94	E22	<70	1,050	3,590	<50	<500	152	51,500
562	12/8/1999	10	11.1	55	E23	E24	898	2,980	<30	<300	148	47,800

Well	Date	Laboratory	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)	Carbon-13/Carbon-12, unfiltered (per mil)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
561	5/6/1997	10	37	690	7	1,100	<18	2,560	--	--	--	--
561	5/6/1997	20	--	--	--	--	--	--	20	--	--	--
561	11/5/1997	10	<30	680	5	1,020	<18	2,450	--	--	--	--
561	11/5/1997	20	--	--	--	--	--	--	34	--	--	--
561	2/20/1998	10	<360	630	<24	1,020	<60	2,380	--	--	--	--
561	2/20/1998	20	--	--	--	--	--	--	33	--	--	--
561	6/11/1998	10	<180	610	<12	1,000	<30	2,240	--	--	--	--
561	6/11/1998	20	--	--	--	--	--	--	35	--	--	--
561	11/4/1998	10	E47	590	E19	951	<10	2,000	--	--	--	--
561	11/4/1998	20	--	--	--	--	--	--	34	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)	Carbon-13/Carbon-12, unfiltered (per mil)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
561	6/8/1999	10	<250	610	<20	1,040	<50	1,740	--	--	--	--
561	6/8/1999	20	--	--	--	--	--	--	49	--	--	--
561	12/8/1999	10	<102	440	<21	968	<30	1,200	--	--	--	--
561	12/8/1999	20	--	--	--	--	--	--	38	--	--	--
561	7/24/2000	10	<34	410	8	859	<10	1,040	41	-8.57	--	-
561	5/1/2001	10	<45	350	<5	926	<8	978	42	--	-65.9	-9.27
561	5/15/2002	10	<140	330	<27	972	<24	681	--	--	--	--
561	5/15/2002	20	--	--	--	--	--	--	5.3	--	--	--
561	8/12/2003	10	<12	330	<15	1,370	<18	651	--	--	--	--
562	5/6/1997	10	44	710	5	1,120	<18	2,370	--	--	--	--
562	11/5/1997	10	<30	710	6	1,030	<18	2,420	--	--	--	--
562	11/5/1997	20	--	--	--	--	--	--	31	--	--	--
562	2/20/1998	10	<360	710	<24	1,050	<60	2,540		--	--	--
562	2/20/1998	20	--	--	--	--	--	--	29	--	--	--
562	6/11/1998	10	<180	710	<12	1,070	<30	2,500		--	--	--
562	6/11/1998	20	--	--	--	--	--	--	27	--	--	--
562	11/4/1998	10	E47	670	10	998	<100	2,510	--	--	--	--
562	11/4/1998	20	--	--	--	--	--	--	26	--	--	--
562	6/8/1999	10	<250	690	<20	1,070	<50	2,530	--	--	--	--
562	6/8/1999	20	--	--	--	--	--	--	35	--	--	--
562	12/8/1999	10	<102	680	E18	1,040	<30	2,290	--	--	--	--
562	12/8/1999	20	--	--	--	--	--	--	28	--	--	--

GROUND WATER—Continued

Well 601

LOCATION.—Lat 33°33'07", long 110°53'06", in NW1/4NW1/4NE1/4, sec. 1, T. 2 N., R. 14 E. (A-02-14)01abb, 43 m east of Pinal Creek, and 20 km northwest of Globe.

Landowner: Cyprus Miami Mining Corporation.

LAND-SURFACE DATUM.—870.73 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

REMARKS.—Caving occurred after the casing was placed in the borehole. Natural material fills the borehole annulus around the well screen. Pumping water from this well is difficult.

DRILLING AND WELL CONSTRUCTION

Well 601 was cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. The well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 1,470 factory-cut slots 3.8 cm long by 0.64 mm wide for a total open area of 358 cm^2.

The borehole annulus is filled with natural material to between 3.4 and 5.2 m below land surface. Bentonite was placed on top of this uneven surface, but a good seal was not achieved. Sand and natural material was placed on top of the bentonite up to approximately 1.2 m below land surface. Cement grout seals the well from the land surface to 1.2 m below land surface and was used to set a 1.5-meter-long steel security casing.

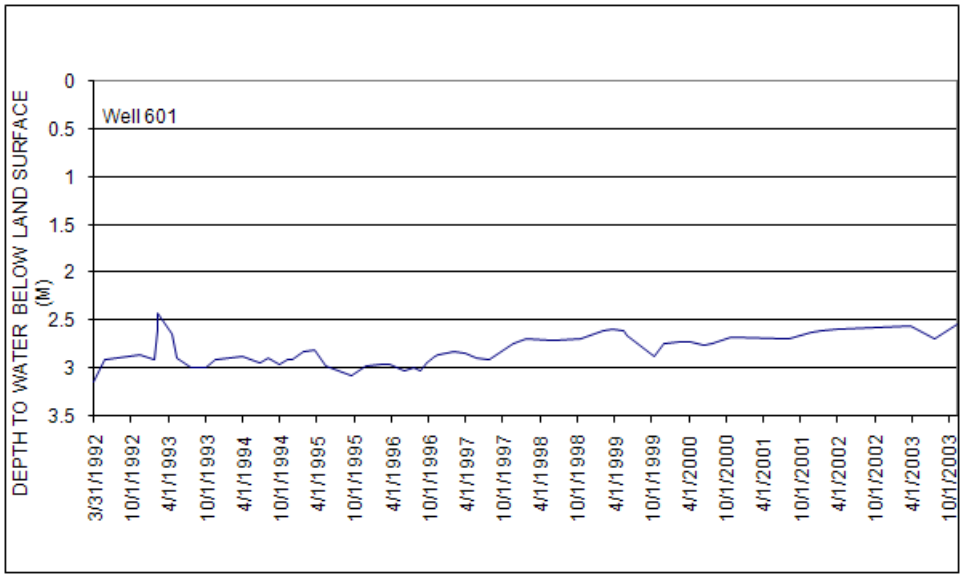
Logs: D, driller's.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
601	abb	03–31–92	Hollow-stem auger	12.0	8.9	8.0–8.9	Alluvium	1.2	D

GROUND WATER—Continued

Well 601—Continued

Date	Water level, in meters below land surface	Date	Water level, in meters below land surface	Date	Water level, in meters below land surface	Date	Water level, in meters below land surface
11–05–96	2.87	01–22–98	2.70	10–19–99	2.87	08–08–01	2.69
11–21–96	2.86	06–10–98	2.71	12–06–99	2.74	11–24–01	2.63
02–07–97	2.83	10–20–98	2.69	02–14–00	2.72	01–15–02	2.60
03–28–97	2.84	02–10–99	2.61	04–11–00	2.73	04–02–02	2.59
05–22–97	2.89	03–23–99	2.60	06–13–00	2.77	03–27–03	2.55
07–24–97	2.92	05–18–99	2.62	07–25–00	2.75	07–24–03	2.70
11–24–97	2.75	06–07–99	2.65	10–26–00	2.67	11–12–03	2.54



GROUND WATER—Continued

Well 601—Continued

Field Measurements

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; IT, incremental titration; L/min, liters per minute; --, no data]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved, IT field (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved, IT field (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
601	11–17–93	2,730	6.4	--	18.0	0.9	122	149	2.3	0.72
	06–21–94	2,590	6.6	420	20.0	1.9	138	168	2.6	.52
	11–07–94	2,590	6.3	--	19.0	.7	122	149	1.1	1.18
	05–16–95	2,700	6.5	--	20.0	--	125	--	2.3	--
	06–06–96	2,260	6.2	368	19.5	.4	114	139	--	--

Laboratory Measurements

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; mol/L, moles per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown]

Well	Date	Laboratory	Ionic balance (percent)	Ionic strength (mol/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)
601	11–17–93	110	-1.1	0.083	670	91	36	--	1,900	80
	06–21–94	110	1.8	.071	510	110	76	--	1,500	71
	06–21–94	140	.49	.071	510	110	72	4.8	1,600	71
	11–07–94	140	-.56	.067	470	100	72	5.6	1,500	60
	05–16–95	140	.42	.066	460	100	70	4.2	1,600	50
	06–06–96	10	3.7	.059	410	88	64	3.7	1,300	45

Well	Date	Laboratory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)
601	11–17–93	110	--	37	<1,000	--	--	--	<100	--	<40
	06–21–94	110	--	44	<5,000	--	--	--	--	--	--
	06–21–94	140	--	45	<110	--	--	--	--	--	<20
	11–07–94	110	--	--	--	--	--	--	--	--	--
	11–07–94	140	--	51	<110	--	--	--	--	--	20
	05–16–95	140	--	45	<110	--	--	--	--	--	<20
	06–06–96	10	46	52	<5.0	23	<2.5	30	<5.0	<25	<15

GROUND WATER—Continued

Well 601—Continued

Laboratory Measurements—Continued

Well	Date	Laboratory	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)
601	11–17–93	110	<20	120	--	--	900	--	<100	--
	06–21–94	110	<100	<200	--	--	300	--	<500	--
	06–21–94	140	<30	<130	--	--	370	--	<90	--
	11–07–94	110	--	--	--	--	--	--	--	--
	11–07–94	140	<30	<130	--	--	310	--	<90	--
	05–16–95	140	<30	<130	--	--	420	--	<90	--
	06–06–96	10	<50	<15	<50	110	320	<50	60	<5.0

Well	Date	Laboratory	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon, inorganic, dissolved (mg/L as C)
601	11–17–93	110	1,900	--	<30	--
	06–21–94	110	1,900	--	<150	--
	06–21–94	140	1,900	--	<20	--
	11–07–94	110	--	--	--	--
	11–07–94	140	--	--	<20	--
	05–16–95	140	1,600	--	30	--
	06–06–96	10	1,600	<30	<15	--
	06–06–96	20	--	--	--	35

GROUND WATER—Continued

Well 601—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, water, dissolved (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
601	11/5/1996	2,060	6.3	323	--	20.4	<.1	117	143	1.7	1.18
601	6/10/1998	2,050	6.7	--	--	24.5	0.8	131	--	2.9	0.60
601	6/7/1999	1,940	6.3	--	36.0	22.5	0.5	123	--	2.3	0.67
601	12/6/1999	2,030	6.3	--	--	17.9	2.3	117	--	2.3	0.98
601	7/25/2000	1,990	6.2	--	40.0	24.0	0.8	112	--	2.2	0.75

Laboratory Measurements											
[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]											
Well	**Date**	**Laboratory**	**Calcium, dissolved (mg/L as Ca)**	**Magnesium, dissolved (mg/L as Mg)**	**Sodium, dissolved (mg/L as Na)**	**Potassium, dissolved (mg/L as K)**	**Sulfate, dissolved (mg/L as SO_4)**	**Chloride, dissolved (mg/L as Cl)**	**Fluoride, dissolved (mg/L as F)**	**Silica, dissolved (mg/L as SiO_2)**	**Aluminum, dissolved (µg/L as Al)**
601	11/5/1996	10	400	88.0	63.0	3.20	1,300	44.0	0.2	48.0	20
601	6/10/1998	10	357	77.9	53.6	3.55	1,100	41.7	0.1	45.7	<30
601	6/7/1999	10	334	73.6	53.5	3.31	1,070	44.3	0.2	48.6	<30
601	12/6/1999	10	322	70.6	50.4	3.37	1,090	43.9	0.1	48.0	<40
601	7/25/2000	10	325	73.6	53.7	3.09	1,070	41.9	0.2	54.5	E10

Well	**Date**	**Laboratory**	**Barium, dissolved (µg/L as Ba)**	**Beryllium, dissolved (µg/L as Be)**	**Boron, dissolved (µg/L as B)**	**Cadmium, dissolved (µg/L as Cd)**	**Chromium, dissolved (µg/L as Cr)**	**Cobalt, dissolved (µg/L as Co)**	**Copper, dissolved (µg/L as Cu)**	**Iron, water, dissolved (µg/L as Fe)**	**Lead, dissolved (µg/L as Pb)**
601	11/5/1996	10	22.0	<1.5	60	<3	<15	<9	<30	<9	<30

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Well	Date	Laboratory	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, water, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)
601	6/10/1998	10	18.8	<3.0	63	<24	<42	<36	<30	<30	<300
601	6/7/1999	10	17.8	<4.8	53	<24	<42	<21	<30	E24	<300
601	12/6/1999	10	17.1	<4.8	53	<24	<42	<39	<30	E18	<300
601	7/25/2000	10	16.1	<1.6	48	<8	E9	E6	13	41	<100

Well	Date	Laboratory	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)	Carbon-13/Carbon-12, unfiltered (per mil)
601	11/5/1996	10	93	2,100	<30	<30	3	1,600	<18	<9	--
601	6/10/1998	10	100	6,800	<180	<120	<12	1,380	<30	<60	--
601	6/7/1999	10	92	9,930	<150	<120	<12	1,310	<30	E51	--
601	12/6/1999	10	94	11,800	<102	<120	<21	1,250	<30	<60	--
601	7/25/2000	10	98	12,400	E19	E20	8	1,240	E9	E15	6.83

GROUND WATER—Continued

Well Group 700

LOCATION.—Lat 33°34'03", long 110°53'45", in SE1/4SE1/4SE1/4, sec. 26, T. 3 N., R. 14 E. (A-03-14)26ddd, 52 m east of Pinal Creek, and 21 km northwest of Globe.

Landowner: Cyprus Miami Mining Corporation.

LAND-SURFACE DATUM.—844.90 m above National Geodetic Vertical Datum of 1929 (levels by Water Resources Division, U.S. Geological Survey).

DRILLING AND WELL CONSTRUCTION

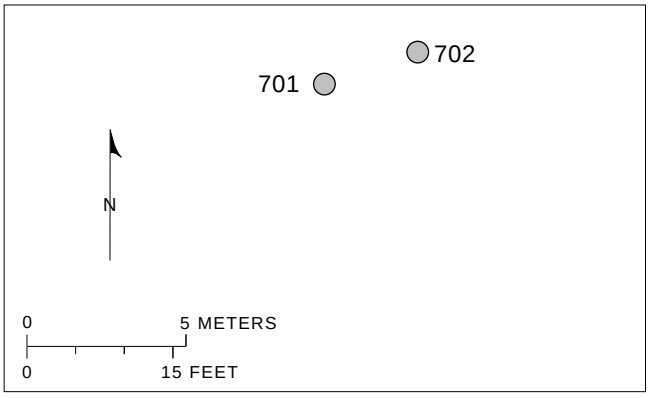
Well 701 was cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. The well has a 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The hole caved during installation of casing. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 0.3 to 1.0 m above the screen. A concrete seal extends from the land surface to a depth of 3.6 m.

Well 702 was cased with nominal 5-centimeter diameter, class 160, PVC pipe. The well has a 0.9-meter length of slotted, 5-centimeter diameter, class 160, PVC pipe as the well screen. The screen has 216 field-cut slots that average 4.6 cm long and are 0.51 mm wide for a total open area of 51 cm^2. The hole caved during installation of casing. The borehole annulus around the screen is filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 1.2 to 2.1 m above the screen. A concrete seal extends from the land surface to a depth of 5.2 m.

Logs: D, driller's; G, geologist; P, particle size.

Well	Section location	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic Unit	Bottom of seal (meters)	Logs available
701	ddd1	05–11–90	Hollow-stem auger	8.7	5.0	4.1–5.0	Alluvium	3.6	D
702	ddd2	05–11–90	Hollow-stem auger	8.1	7.3	6.4–7.3	Alluvium	5.2	DGP

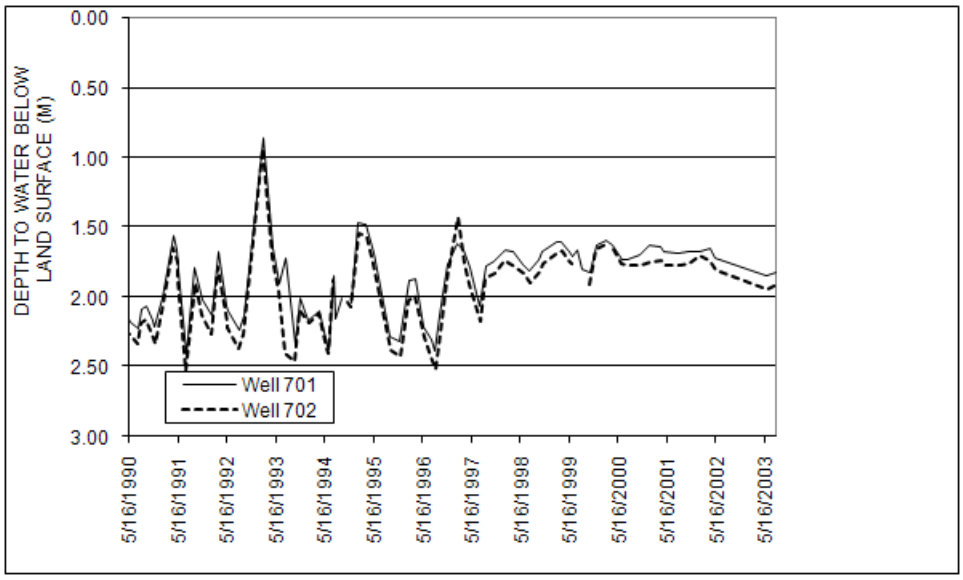
WELL GROUP 700 SITE PLAN



GROUND WATER—Continued

Well Group 700—Continued

	Water level, in meters below land surface											
	Well number			Well number			Well number				Well number	
Date	701	702	Date	701	702	Date	701	702	Date	701	702
11–05–96	1.84	1.96	06–10–98	1.77	1.83	10–19–99	1.83	1.91	04–03–01	1.63	1.73
11–21–96	1.76	1.87	07–27–98	1.81	1.90	12–06–99	1.63	1.65	05–01–01	1.68	1.76
02–06–97	1.62	1.42	10–07–98	1.73	1.82	02–15–00	1.59	1.62	08–08–01	1.69	1.77
03–27–97	1.66	1.75	11–02–98	1.67	1.75	04–11–00	1.63		10–24–01	1.67	1.75
05–06–97	1.80	1.90	02–11–99	1.61	1.69	04–12–00	1.63	1.65	01–15–02	1.67	1.69
07–24–97	2.07	2.17	03–24–99	1.60	1.67	06–13–00	1.73	1.76	04–02–02	1.65	1.73
09–03–97	1.78	1.86	05–17–99	1.67	1.74	07–25–00	--	1.76	05–15–02	1.72	1.80
11–04–97	1.74	1.82	06–09–99	1.71	1.76	07–26–00	1.74	--	06–04–03	1.85	1.94
01–22–98	1.66	1.73	07–19–99	1.67	--	10–26–00	1.70	1.77	08–11–03	1.82	1.90
03–24–98	1.68	1.77	08–24–99	1.80	--	01–09–01	1.63	1.74			



GROUND WATER—Continued

Well Group 700—Continued

Field Measurements

[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; IT, incremental titration; L/min, liters per minute; --, no data]

Well	Date	Specific conductance (μS/cm)	pH (standard units)	Oxidation reduction potential (mV)	Temperature, air (°C)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved, IT field (mg/L as $CaCO_3$)	Bicarbonate, water, dissolved, IT field (mg/L as HCO_3)	Average discharge (L/min)	Pumping period (hours)
701	06–21–94	2,720	6.9	315	--	17.5	0.1	192	234	4.2	0.73
	05–16–95	2,840	6.9	--	27.0	17.0	.1	194	237	3.0	.48
	05–30–96	2,260	6.9	340	33.0	21.5	.2	160	195	4.2	.63
702	06–21–94	2,760	6.9	313	--	17.0	.1	188	229	4.2	.35
	05–16–95	2,820	6.9	--	28.0	18.5	.1	186	226	1.9	.37
	05–31–96	2,410	6.9	412	--	19.0	4.7	165	201	1.5	.43

Laboratory Measurements

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 140, USGS research laboratory, Menlo Park, California; mol/L, moles per liter; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown]

Well	Date	Laboratory	Ionic balance (percent)	Ionic strength (mol/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)
701	06–21–94	110	-4.9	0.071	470	110	80	--	1,600
	06–21–94	140	-1.4	.069	480	110	77	3.6	1,500
	05–16–95	140	1.9	.073	510	120	87	3.8	1,500
	05–30–96	10	.13	.055	390	85	69	3.8	1,200
702	06–21–94	110	-.45	.075	520	120	98	--	1,600
	06–21–94	140	-2.0	.071	490	110	79	4.6	1,600
	05–16–95	140	.49	.073	510	120	82	1.6	1,600
	05–31–96	10	5.9	.059	470	88	57	3.9	1,200

Well	Date	Laboratory	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
701	06–21–94	110	82	--	40	<5,000	--	--	--
	06–21–94	140	75	--	41	<110	--	--	--
	05–16–95	140	69	--	36	<110	--	--	--
	05–30–96	10	48	0.50	39	11	23	<2.5	81
702	06–21–94	110	80	--	43	<5,000	--	--	--
	06–21–94	140	77	--	41	<110	--	--	--
	05–16–95	140	72	--	36	<110	--	--	--
	05–31–96	10	48	.40	43	<5.0	20	<1.5	68

GROUND WATER—Continued

Well Group 700—Continued

Laboratory Measurements—Continued

Well	Date	Laboratory	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
701	06–21–94	110	--	--	--	<100	<200	--	--
	06–21–94	140	--	--	50	<30	140	--	--
	05–16–95	140	--	--	<20	<30	210	--	--
	05–30–96	10	<5.0	<25	<15	<30	33	<50	83
702	06–21–94	110	--	--	--	<100	<200	--	--
	06–21–94	140	--	--	40	<30	<130	--	--
	05–16–95	140	--	--	<20	<30	<130	--	--
	05–31–96	10	<3.0	<15	14	<30	<9.0	<30	54

Well	Date	Laboratory	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
701	06–21–94	110	1,300	--	<500	--	1,700	--	<150
	06–21–94	140	1,400	--	<90	--	1,600	--	<20
	05–16–95	140	1,600	--	<90	--	1,700	--	30
	05–30–96	10	1,100	<50	<50	<5.0	1,500	<30	<15
702	06–21–94	110	790	--	<500	--	1,900	--	<150
	06–21–94	140	810	--	<90	--	1,700	--	<20
	05–16–95	140	1,000	--	<90	--	1,700	--	100
	05–31–96	10	1,100	40	<30	<3.0	1,400	<18	<9.0

GROUND WATER—Continued

Well Group 700—Continued

Field Measurements											
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, milligrams per liter; L/min, liters per minute; --, no data]											
Well	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Oxidation reduction potential (mV)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, dissolved (mg/L as $CaCO_3$)**	**Bicarbonate, dissolved, (mg/L as HCO_3)**	**Average discharge (L/min)**	**Pumping period (hours)**
701	11/5/1996	2,190	6.9	254	--	21.1	<.5	173	211	1.5	1.18
701	5/6/1997	2,530	6.9	112	--	21.0	0.2	183	--	2.4	0.75
701	11/4/1997	2,340	6.8	246	--	21.0	0.1	147	179	1.4	1.03
701	6/10/1998	2,380	6.9	--	--	17.8	<.1	165	--	5.3	0.68
701	11/2/1998	2,520	6.9	--	24.5	21.5	<.1	159	--	2.6	0.75
701	6/7/1999	2,430	6.9	--	34.0	22.5	<.1	152	--	9.1	0.48
701	12/6/1999	2,430	7.0	--	0.0	16.8	0.2	149	--	1.8	0.97
701	7/25/2000	2,320	7.0	--	35.0	20.0	0.2	140	--	4.2	0.83
701	5/1/2001	2,460	7.1	--	--	16.5	0.1	159	--	--	--
701	5/15/2002	2,390	7.1	--	23.0	17.0	0.2	172	--	2.4	0.60
701	8/11/2003	2,490	7.0	--	--	24.0	0.1	154	--	1.8	0.70
702	11/5/1996	2,220	6.9	302	--	20.0	0.6	175	213	1.2	0.77
702	5/6/1997	2,450	6.9	148	--	21.2	0.1	176	--	1.4	0.78
702	11/4/1997	2,310	6.9	396	--	18.2	0.1	153	187	1.5	0.88
702	6/10/1998	2,380	6.9	--	--	19.0	<.1	154	--	2.3	0.47
702	11/2/1998	2,460	7.0	--	22.0	18.5	<.1	157	--	1.0	0.72
702	6/7/1999	2,430	6.9	--	--	22.5	<.1	152	--	5.7	0.67
702	12/6/1999	2,410	7.0	--	--	17.9	<.1	144	--	1.8	0.58
702	7/25/2000	2,310	7.0	--	32.0	21.0	0.1	138	--	2.4	0.47
702	5/1/2001	2,330	7.0	--	--	19.5	0.1	146	--	--	--
702	5/15/2002	2,270	7.0	--	--	19.5	0.1	152	--	1.1	0.63
702	8/11/2003	2,270	7.0	--	--	24.0	<.1	151	--	1.5	0.62

Laboratory Measurements									
[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified; V, value affected by contamination.]									
Well	**Date**	**Laboratory**	**Calcium, dissolved (mg/L as Ca)**	**Magnesium, dissolved (mg/L as Mg)**	**Sodium, dissolved (mg/L as Na)**	**Potassium, dissolved (mg/L as K)**	**Sulfate, dissolved (mg/L as SO_4)**	**Chloride, dissolved (mg/L as Cl)**	**Fluoride, dissolved (mg/L as F)**
701	11/5/1996	10	460	93.0	73.0	3.70	1,400	51.0	0.5
701	5/6/1997	10	443	98.1	78.5	4.23	1,470	54.0	0.5
701	11/4/1997	10	448	98.9	74.6	4.76	1,480	50.3	0.5
701	6/10/1998	10	454	99.7	71.9	3.87	1,400	53.5	0.5
701	11/2/1998	10	453	98.7	71.3	4.31	1,420	50.1	0.5
701	6/7/1999	10	415	93.7	72.7	4.07	1,390	50.6	0.5
701	12/6/1999	10	431	95.9	71.1	3.81	1,380	51.2	0.6
701	7/25/2000	10	416	85.5	66.4	3.89	1,270	45.8	0.9
701	5/1/2001	10	445	96.8	79.1	3.53	1,350	59.0	0.7
701	5/15/2002	10	446	84.3	73.2	3.64	1,300	54.7	0.7
701	8/11/2003	10	486	96.4	90.6	5.24	1,240	56.2	0.8
702	11/5/1996	10	470	93.0	68.0	4.00	1,400	50.0	0.4
702	5/6/1997	10	422	92.6	74.5	4.28	1,400	52.5	0.4
702	11/4/1997	10	445	96.6	75.3	4.50	1,440	49.2	0.5
702	6/10/1998	10	460	99.6	71.2	4.33	1,390	53.2	0.2
702	11/2/1998	10	441	97.2	72.4	4.23	1,350	48.6	0.5
702	6/7/1999	10	450	94.9	70.1	3.95	1,380	53.5	0.4
702	12/6/1999	10	421	91.3	68.7	4.06	1,340	50.9	0.5
702	7/25/2000	10	396	86.0	65.6	3.85	1,260	46.8	1.1
702	5/1/2001	10	454	90.7	60.3	3.85	1,290	53.7	0.5
702	5/15/2002	10	405	81.5	65.3	4.81	1,250	52.4	0.6
702	8/11/2003	10	419	84.0	80.9	5.78	1,230	55.8	0.7

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified; V, value affected by contamination.]

Well	Date	Laboratory	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)
701	11/5/1996	10	41.0	<5	24.0	<1.5	66	<3	<15	<9
701	5/6/1997	10	38.1	M	24.2	<1.5	77	<3	<15	<9
701	11/4/1997	10	40.1	<20	26.0	<1.5	62	<3	<15	<9
701	6/10/1998	10	38.5	<30	23.0	<3.0	75	<24	<42	<36
701	11/2/1998	10	40.1	<30	26.0	<4.8	72	<24	<42	<21
701	6/7/1999	10	38.1	<30	21.3	<4.8	71	<24	<42	<21
701	12/6/1999	10	41.8	<40	25.3	<4.8	61	<24	<48	<39
701	7/25/2000	10	41.3	<40	2.2	<1.6	48	<24	<42	<39
701	5/1/2001	10	38.9	<40	21.5	1.5	60	<8	13	18
701	5/15/2002	10	38.1	<40	21.1	<1.5	60	<80	<30	<39
701	8/11/2003	10	38.0	<2	21.0	<1.2	53	<6	26	<9
702	11/5/1996	10	37.0	<5	22.0	<1.5	57	<3	<15	<9
702	5/6/1997	10	36.0	20	22.1	<1.5	64	<3	<15	<9
702	11/4/1997	10	39.4	<20	24.7	<1.5	67	<3	<15	<9
702	6/10/1998	10	37.9	<30	23.2	<3.0	75	<24	<42	<36
702	11/2/1998	10	39.9	<10	23.8	<1.6	89	<48	<14	E28
702	6/7/1999	10	38.8	<30	23.2	<4.8	50	<24	<42	<21
702	12/6/1999	10	39.8	<20	23.0	<1.6	68	<8	19	<13
702	7/25/2000	10	39.7	230	21.1	<1.6	E42	<24	<42	<39
702	5/1/2001	10	39.4	<40	20.7	<1.0	57	<80	<42	<130
702	5/15/2002	10	35.1	<40	19.3	<1.5	55	<24	<30	<39
702	8/11/2003	10	36.2	<2	21.8	<1.2	43	<6	E11	<9

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified; V, value affected by contamination.]

Well	Date	Laboratory	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)
701	11/5/1996	10	<30	90	60	76	1,400	<30	<30	<3
701	5/6/1997	10	<30	151	60	82	1,360	34	<30	<3
701	11/4/1997	10	<30	89	<100	81	1,340	<30	<30	<3
701	6/10/1998	10	<30	163	<300	82	1,480	<180	<120	<12
701	11/2/1998	10	<30	153	<300	88	1,440	<150	<120	<12
701	6/7/1999	10	<30	176	<300	70	1,440	<150	<120	<12
701	12/6/1999	10	<30	96	<400	85	1,250	<102	<120	<21
701	7/25/2000	10	<30	242	<300	7	1,300	<102	<120	<21
701	5/1/2001	10	<30	12	0.08	76	1,250	<102	<120	<21
701	5/15/2002	10	<20	193	0.23	77	1,290	<140	<90	<27
701	8/11/2003	10	<21	119	<.08	97	1,070	23	E10	<15
702	11/5/1996	10	<30	<9	40	56	1,200	<30	<30	<3
702	5/6/1997	10	<30	<9	40	69	889	<30	<30	<3
702	11/4/1997	10	<30	<9	<30	81	1,130	<30	<30	<3
702	6/10/1998	10	<30	<30	<300	79	1,200	<180	<120	<12
702	11/2/1998	10	<10	<10	110	78	1,190	E65	<240	5
702	6/7/1999	10	<30	<30	<300	83	1,220	<150	<120	<12
702	12/6/1999	10	<10	<10	<100	69	1,110	E29	E20	<7
702	7/25/2000	10	187	M	<300	71	1,200	<102	<120	<21
702	5/1/2001	10	<30	<100	E.05	63	696	<102	<120	<21
702	5/15/2002	10	<20	<30	0.20	59	927	<140	<90	<27
702	8/11/2003	10	V11	<24	E.06	81	1,060	17	E10	<15

Well	Date	Laboratory	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)	Carbon-13/ Carbon-12, unfiltered (per mil)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
701	11/5/1996	10	1,500	<18	<9	--	--	--	--
701	5/6/1997	10	1,640	<18	28	--	--	--	--
701	11/4/1997	10	1,620	<18	<9	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, USGS National Water-Quality Laboratory, Arvada, Colorado; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified; V, value affected by contamination.]

Well	Date	Laboratory	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Carbon-13/ Carbon-12, unfiltered (per mil)	Carbon-14, filtered, percent modern	Deuterium/ Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
701	6/10/1998	10	1,600	<30	<60	--	--	--	--
701	11/2/1998	10	1,590	<30	<60	--	--	--	--
701	6/7/1999	10	1,530	<30	<60	--	--	--	--
701	12/6/1999	10	1,520	<30	<60	--	--	--	--
701	7/25/2000	10	188	<30	<60	-8.46	--	--	--
701	5/1/2001	10	1,580	<30	<20	--	--	-67.0	-9.12
701	5/15/2002	10	1,450	<24	<72	--	--	--	--
701	8/11/2003	10	1,670	<18	E6	--	--	--	--
702	11/5/1996	10	1,600	<18	<9	--	--	--	--
702	5/6/1997	10	1,610	<18	<9	--	--	--	--
702	11/4/1997	10	1,600	<18	<9	--	--	--	--
702	6/10/1998	10	1,630	<30	<60	--	--	--	--
702	11/2/1998	10	1,550	41	<120	--	--	--	--
702	6/7/1999	10	1,530	<30	E27	--	--	--	--
702	12/6/1999	10	1,490	E9	E11	--	--	--	--
702	7/25/2000	10	1,370	<30	<60	-9.18	63.96	--	--
702	5/1/2001	10	1,530	<30	<200	--	--	-66.4	-9.06
702	5/15/2002	10	1,410	<24	<72	--	--	--	--
702	8/11/2003	10	1,470	<18	19	--	--	--	--

GROUND WATER—Continued

Perennial reach shallow ground-water data

LOCATION.—See fig. 3 for locations of sample sites.

Field Measurements									
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, E, estimated; milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown; E, estimated]									
Site Location	**Other Id**	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
A-02-15 06CCD	Head of flow	6/4/1998	2,430	5.8	16.7	0.1	52.8	--	--
A-02-15 06CCD2	D1.5	6/2/1998	2,080	5.7	20.0	6.1	24.0	--	--
A-02-15 06CCD2	D1.5	6/3/1998	2,170	5.4	20.8	0.1	30.4	--	--
A-02-15 06CCD2	D1.5	6/1/1999	2,230	5.3	19.5	0.3	24.0	0.3	--
A-02-15 06CCA7	Z0	6/3/1998	2,270	5.6	20.4	0.2	40.0	--	--
A-02-15 06CCA7	Z0	12/23/1998	2,180	5.3	16.3	1.0	31.9	0.8	0.45
A-02-15 06CCA7	Z0	2/11/1999	2,160	5.8	14.7	1.6	35.5	0.3	0.2
A-02-15 06CCA7	Z0	3/24/1999	2,340	5.5	16.9	0.9	40.0	0.3	--
A-02-15 06CCA7	Z0	4/23/1999	2,360	5.5	17.5	0.2	28.8	0.4	--
A-02-15 06CCA7	Z0	6/1/1999	2,430	5.5	21.5	0.2	22.4	0.3	0.47
A-02-15 06CCA7	Z0	12/28/1999	2,430	5.7	15.0	9.1	28.8	0.2	0.4
A-02-15 06CCA7	Z0	2/16/2000	2,240	6.9	18.0	4.0	12.3	--	--
A-02-15 06CCA6	Z1	6/4/1998	2,010	5.4	19.5	0.1	32.0	--	--
A-02-15 06CCA6	Z1	6/1/1999	2,330	5.6	24.5	3.8	6.4	0.3	--
A-02-15 06CBC1	Z2.2	6/2/1999	2,090	5.7	22.0	0.1	38.4	--	--
PINAL CREEK AT Z4DP	Z4	6/4/1998	2,160	5.6	22.1	0.2	16.8	--	--
PINAL CREEK AT Z4DP	Z4	6/2/1999	2,230	5.8	22.0	<.1	35.2	E0.3	--
A-02-15 06CBB1	Z4.3DP	2/16/2000	2,290	5.8	14.5	0.1	15.2	0.4	0.17
A-02-15 06CBB1	Z4.3DP	4/13/2000	2,220	5.7	17.5	0.3	8.4	0.2	0.3
A-02-15 06CBB1	Z4.3DP	6/14/2000	2,210	5.9	22.0	0.1	18.1	--	--
A-02-15 06CBB1	Z4.3DP	8/30/2000	2,190	6.0	21.5	0.1	53.0	--	--
A-02-15 06CBB1	Z4.3DP	10/18/2000	2,130	6.2	19.5	0.2	60.0	--	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	1,930	6.8	13.0	6.9	12.0	--	--

Field Measurements									
[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, E, estimated; milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown; E, estimated]									
Site Location	**Other Id**	**Date**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
A-02-15 06CBB2	Z4.3DP14	11/28/2001	1,840	6.5	16.5	<1.0	16.0	0.4	0.25
A-02-15 06CBB3	Z4.8DP8	12/6/2001	1,890	6.7	14.0	<1.0	12.0	--	0.17
A-02-14 01DAA1	Z4.7	6/2/1999	2,390	5.8	19.0	0.1	52.8	E0.3	--
A-02-14 01DAA2	Z4.6DP	11/28/2001	1,920	6.0	17.5	0.1	22.0	0.3	0.28
A-02-14 01DAA2	Z4.6DP	6/24/2002	2,000	6.1	18.9	--	14.1	--	--
A-02-14 01DAA3	Z4.6DP14	11/28/2001	1,940	6.0	17.5	<.1	24.0	0.3	0.15
A-02-14 01DAA3	Z4.6DP14	6/24/2002	2,000	6.0	18.2	--	17.8	--	--
A-02-14 01DAA3	Z4.6DP14	5/19/2004	1,830	6.1	16.6	0.3	16.0	--	--
A-02-14 01DAA4	Z4.6DP8	12/6/2001	1,960	5.9	18.0	E.2	23.0	0.3	0.25
A-02-14 01DAA4	Z4.6DP8	6/24/2002	2,000	6.1	17.3	--	12.5	--	--
A-02-14 01DAA5	Z4.8DP	11/28/2001	2,050	5.8	18.0	0.3	34.0	E0.4	0.1
A-02-14 01DAA5	Z4.8DP	4/2/2002	2,020	5.9	20.0	0.4	24.4	--	--
A-02-14 01DAA5	Z4.8DP	6/24/2002	2,000	6.0	20.5	--	16.0	--	--
A-02-14 01DAA5	Z4.8DP	11/5/2002	2,030	5.9	16.9	0.3	23.6	--	--
A-02-14 01DAA5	Z4.8DP	5/19/2004	--	--	--	--	--	--	--
A-02-14 01DAA6	Z4.8DP14	11/28/2001	2,020	5.7	18.5	0.1	35.0	E0.4	0.13
A-02-14 01DAA6	Z4.8DP14	6/24/2002	1,950	5.9	19.9	--	22.1	--	--
A-02-14 01DAA6	Z4.8DP14	11/5/2002	2,050	5.8	18.0	0.4	26.5	--	--
A-02-14 01DAA7	Z4.8DP8	12/6/2001	2,020	5.8	18.0	<.1	34.0	E0.4	0.25
A-02-14 01DAA7	Z4.8DP8	6/25/2002	1,960	5.9	18.6	--	19.9	--	--
A-02-14 01DAA7	Z4.8DP8	11/5/2002	2,090	5.9	18.1	0.1	21.1	--	--
A-02-14 01DAA7	Z4.8DP8	5/19/2004	1,900	5.9	18.0	0.2	16.0	--	--
A-02-14 01ADD01	Z5	6/4/1998	2,240	6.1	20.2	0.1	105	--	--
A-02-14 01ADD01	Z5	12/23/1998	2,240	6.0	18.6	0.8	106	0.4	0.27
A-02-14 01ADD01	Z5	2/11/1999	2,220	6.2	17.2	1.0	117	0.3	0.32
A-02-14 01ADD01	Z5	3/24/1999	2,320	6.2	18.1	0.5	126	0.3	--
A-02-14 01ADD01	Z5	4/23/1999	2,420	6.2	18.5	0.2	115	--	--
A-02-14 01ADD01	Z5	6/2/1999	2,420	6.2	19.5	0.1	49.6	E0.3	--
A-02-14 01ADD01	Z5	8/25/1999	2,300	6.2	20.2	0.2	126	--	0.18
A-02-14 01ADD01	Z5	12/28/1999	2,410	6.1	15.7	0.2	102	0.4	0.25

Field Measurements									
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, E, estimated; milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown; E, estimated]									
Site Location	**Other Id**	**Date**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
A-02-14 01ADD01	Z5	6/14/2000	2,310	6.2	--	0.1	57.5	--	--
A-02-14 01ADD01	Z5	8/30/2000	2,450	6.1	21.0	0.1	95.0	--	--
A-02-14 01ADD01	Z5	10/18/2000	2,350	6.0	20.0	0.2	87.0	--	--
A-02-14 01ADD01	Z5	1/26/2001	1,960	5.9	45.0	3.9	10.0	--	--
A-02-14 01ADD01	Z5	4/4/2001	2,110	6.0	17.7	0.2	34.0	--	0.38
A-02-14 01ADD01	Z5	6/25/2002	2,010	6.0	20.7	--	6.8	--	--
A-02-14 01ADD01	Z5	5/19/2004	1,860	6.2	20.0	3.3	2.7	--	--
A-02-14 01ADD02	Z5	12/6/2001	1,970	6.1	17.5	--	65.0	E0.4	0.25
A-02-14 01ADD02	Z5	6/25/2002	1,970	6.0	20.2	--	26.8	--	--
A-02-14 01ADD03	Z5	12/6/2001	1,990	5.9	16.5	--	28.0	E0.4	0.2
A-02-14 01ADD03	Z5	6/25/2002	2,000	5.7	21.0	--	5.3	--	--
A-02-14 01ADD06	Z5	12/6/2001	2,080	6.7	15.5	<.1	71.0	E0.4	
A-02-14 01ADD06	Z5	6/25/2002	2,070	6.5	19.7	--	56.6	--	--
A-02-14 01ADD04	Z5	11/28/2001	1,970	6.6	16.0	<.1	39.0	E0.3	0.17
A-02-14 01ADD05	Z5	12/6/2001	2,080	6.6	15.5	<.1	77.0	E0.4	--
A-02-14 01ADD05	Z5	6/25/2002	2,100	6.5	19.7	--	67.6	--	--
A-02-14 01ADD07	Z5	6/25/2002	2,060	6.6	21.1	--	49.5	--	--
A-02-14 01ADD07	Z5	5/19/2004	1,870	6.5	18.2	<.1	28.0	--	--
A-02-14 01ADD08	Z5	6/25/2002	2,040	6.6	19.0	--	67.2	--	--
A-02-14 01ADD08	Z5	5/19/2004	1,840	6.6	17.6	0.1	36.0	--	--
A-02-14 01ADD09	Z5	6/25/2002	2,120	6.8	21.3	--	50.2	--	--
A-02-14 01ADD09	Z5	5/19/2004	1,860	6.7	19.0	0.1	30.0	--	--
A-02-14 01ADA1	Z5.7	6/2/1999	2,400	6.4	20.0	<.1	75.2	E0.3	--
A-02-14 01ADA1	Z5.7	8/30/2000	2,170	6.7	22.0	0.1	72.0	--	--
A-02-14 01ADA1	Z5.7	10/18/2000	2,120	6.6	20.0	<.1	68.0	--	--
A-02-14 01ADA1	Z5.7	1/26/2001	2,000	6.9	14.5	0.1	38.0	--	--
A-02-14 01ADA1	Z5.7	6/13/2001	1,930	6.2	--	0.2	13.4	--	--
A-02-14 01ADA1	Z5.7	8/6/2001	1,960	6.2	23.0	0.1	20.6	--	0.55
A-02-14 01ADB1	Z6.2	6/17/1999	2,190	6.0	22.0	0.3	68.8	--	--
A-02-14 01ADB1	Z6.2	10/18/2000	2,290	5.8	22.4	<.1	63.0	--	--

Field Measurements									
[µS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, E, estimated; milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown; E, estimated]									
Site Location	**Other Id**	**Date**	**Specific conduc-tance (µS/cm)**	**pH (stan-dard units)**	**Temper-ature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
A-02-14 01ADB1	Z6.2	1/25/2001	--	--	--	--	--	--	--
A-02-14 01ADB1	Z6.2	1/26/2001	2,290	6.1	16.0	0.3	59.0	--	--
A-02-14 01ADB1	Z6.2	4/4/2001	2,280	6.0	16.1	0.1	45.5	--	0.5
A-02-14 01ADB1	Z6.2	6/13/2001	2,220	5.9	--	0.1	49.7	--	--
A-02-14 01ADB1	Z6.2	8/6/2001	2,260	6.0	23.0	0.2	51.7	--	0.38
A-02-14 01ADB1	Z6.2	6/26/2002	2,070	6.3	20.0	--	48.3	--	--
A-02-14 01ADB2	Z6.2	10/24/2001	2,110	6.0	--	--	45.0	--	--
A-02-14 01ADB2	Z6.2	12/6/2001	2,070	5.9	19.0	0.1	48.0	E0.4	--
A-02-14 01ADB2	Z6.2	6/26/2002	2,000	6.0	21.3	--	43.4	--	--
A-02-14 01ADB7	Z6.2	6/26/2002	1,920	6.0	19.9	--	40.8	--	--
A-02-14 01ADB6	Z6.2	6/26/2002	2,450	6.4	20.5	--	94.7	--	--
A-02-14 01ADB3	Z6.2	11/28/2001	2,040	6.7	17.0	<.1	58.0	E0.4	0.15
A-02-14 01ADB3	Z6.2	6/26/2002	2,150	6.6	20.1	--	72.7	--	--
A-02-14 01ADB3	Z6.2	5/20/2004	1,940	6.5	17.8	0.2	57.4	--	--
A-02-14 01ADB4	Z6.2	11/28/2001	2,040	6.1	17.0	0.2	51.0	--	0.2
A-02-14 01ADB4	Z6.2	6/26/2002	1,990	6.1	18.6	--	41.6	--	--
A-02-14 01ADB5	Z6.2	12/6/2001	2,070	6.1	180.0	<.1	55.0	E0.4	0.17
A-02-14 01ADB5	Z6.2	6/26/2002	2,010	6.1	18.6	--	42.2	--	--
A-02-14 01ADB5	Z6.2	5/20/2004	1,970	6.3	16.5	0.1	40.0	--	--
A-02-14 01ABD1	Z7	6/3/1998	2,040	6.5	22.5	0.2	167	--	--
A-02-14 01ABD1	Z7	6/3/1999	2,140	6.6	18.5	<.1	176	E0.3	--
A-02-14 01ABD1	Z7	8/25/1999	1,860	6.5	21.1	0.1	162	--	--
A-02-14 01ABD1	Z7	8/30/2000	2,050	6.4	19.0	0.3	118	--	--
A-02-14 01ABD1	Z7	6/13/2001	1,970	6.2	20.0	0.1	79.7	--	--
A-02-14 01ABD1	Z7	5/20/2004	1,880	7.0	18.3	<.1	53.0	--	--
A-02-14 01ABD2	Z7DP3	6/26/2002	2,090	6.9	20.5	--	38.4	--	--
A-02-14 01ABD3	Z7DP8	6/26/2002	2,020	6.7	20.0	--	33.1	--	--
A-02-14 01ABD3	Z7DP8	5/20/2004	1,910	7.0	18.6	0.2	59.0	--	--
A-02-14 01ABD6	Z7DP14	6/26/2002	2,050	6.5	--	--	45.7	--	--
A-02-14 01ABD4	Z7.8DP	6/27/2002	1,830	6.7	19.0	--	127	--	--

Field Measurements									
[μS/cm, microsiemens per centimeter at 25 degrees Celsius; mV, millivolts; °C, degrees Celsius; mg/L, E, estimated; milligrams per liter; L/min, liters per minute; --, no data; <, actual value is known to be less than value shown; E, estimated]									
Site Location	**Other Id**	**Date**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Temperature, water (°C)**	**Oxygen, dissolved (mg/L)**	**Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)**	**Average discharge (L/min)**	**Pumping period (hours)**
A-02-14 01ABD5	Z7.8DP14	6/27/2002	1,910	6.6	18.6	--	56.8	--	--
A-02-14 01BAA1	Z8.3DP	2/12/2003	2,200	7.0	11.5	0.2	--	--	--
A-02-14 01BAA2	Z9.2DP	2/12/2003	1,960	6.4	17.0	<.1	56.2	--	--
A-03-14 36CDD1	Z9a	6/3/1998	2,000	6.4	20.7	0.3	139	--	--
A-03-14 36CDD1	Z9a	6/13/2001	2,040	6.2	21.5	0.2	95.3	--	--
A-03-14 36CDD1	Z9a	6/27/2002	1,840	6.3	18.4	--	72.3	--	--
A-03-14 36CDD1	Z9a	2/12/2003	1,980	6.3	17.1	0.1	58.4	--	--
A-03-14 36CDD1	Z9a	5/28/2003	2,070	6.3	19.5	0.1	54.0	--	--
A-03-14 36CDD1	Z9a	11/18/2003	1,860	6.4	17.0	0.4	53.0	--	--
A-03-14 36CDD1	Z9a	5/20/2004	1,940	6.4	20.0	<.1	68.0	--	--
A-03-14 36CDD2	Z9aDP8	6/27/2002	1,860	6.3	18.3	--	93.4	--	--
A-03-14 36CDD3	Z9aDP14	6/27/2002	1,880	6.3	18.5	--	68.8	--	--
A-03-14 36CDD3	Z9aDP14	5/28/2003	2,060	6.2	19.4	0.1	55.1	--	--
A-03-14 36CDD3	Z9aDP14	11/18/2003	1,860	6.4	18.0	0.2	49.0	--	--
A-03-14 36CDD3	Z9aDP14	5/20/2004	1,780	6.3	19.3	0.1	46.0	--	--
A-03-14 36CDD5	Z9.5DP	2/12/2003	2,500	6.6	14.0	0.3	120	--	--
A-03-14 36CDA	Z10DP	2/12/2003	2,170	6.9	11.5	0.4	46.3	--	--
A-03-14 36CAA1	JJ15	6/1/1998	2,190	5.3	26.3	1.2	4.8	--	--
A-03-14 36CAA1	JJ15	6/3/1999	2,280	5.4	24.0	1.6	9.6	E0.4	
A-03-14 35AAD	D10	6/1/1998	2,240	6.7	23.5	0.3	88.1	--	--
A-03-14 35AAD	D10	6/11/2001	2,020	6.7	22.0	0.7	42.4	--	--
A-03-14 26DBD	D11	6/1/1998	1,080	7.2	20.1	0.1	184	--	--
A-03-14 26DBD	D11	6/3/1999	1,030	7.1	23.0	0.4	165	E0.4	--

Laboratory Measurements

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site Location	Other Id	Date	Specific conductance (µS/cm)	pH (standard units)	Temperature, water (°C)	Oxygen, dissolved (mg/L)	Alkalinity, water, dissolved, field, (mg/L as $CaCO_3$)	Average discharge (L/min)	Pumping period (hours)
A-02-15 06CCD	Head of flow	6/4/1998	440	440	108	62.0	6.5	1,570	53.0
A-02-15 06CCD2	D1.5	6/2/1998	440	340	81.0	57.0	14.3	1,230	51.1
A-02-15 06CCD2	D1.5	6/3/1998	440	350	88.0	58.0	9.9	1,320	49.7
A-02-15 06CCD2	D1.5	6/1/1999	440	340	85.0	57.0	7.7	1,350	51.5
A-02-15 06CCA7	Z0	6/3/1998	440	410	102	63.0	6.1	1,470	48.7
A-02-15 06CCA7	Z0	12/23/1998	440	361	91.1	59.8	--	1,370	49.8
A-02-15 06CCA7	Z0	2/11/1999	10	364	90.3	57.4	5.24	1,420	50.6
A-02-15 06CCA7	Z0	3/24/1999	440	370	92.0	58.0	6.3	1,410	51.1
A-02-15 06CCA7	Z0	4/23/1999	10	360	91.0	59.0	--	1,450	52.7
A-02-15 06CCA7	Z0	6/1/1999	440	380	95.0	61.0	6.6	1,440	50.5
A-02-15 06CCA7	Z0	12/28/1999	440	400	102	68.0	5.5	1,520	55.1
A-02-15 06CCA7	Z0	2/16/2000	440	440	38.0	87.0	6.9	1,260	49.7
A-02-15 06CCA6	Z1	6/4/1998	440	340	81.0	60.0	9.2	1,190	48.4
A-02-15 06CCA6	Z1	6/1/1999	440	370	91.0	62.0	8.3	1,390	51.2
A-02-15 06CBC1	Z2.2	6/2/1999	440	340	78.0	56.0	5	1,200	49.3
PINAL CREEK AT Z4DP	Z4	6/4/1998	440	360	86.0	59.0	8.1	1,310	49.7
PINAL CREEK AT Z4DP	Z4	6/2/1999	440	370	90.0	63.0	7.9	1,330	52.4
A-02-15 06CBB1	Z4.3DP	2/16/2000	440	360	81.0	83.0	5.5	1,240	51.9
A-02-15 06CBB1	Z4.3DP	4/13/2000	440	360	64.0	80.0	4.9	1,260	48.4
A-02-15 06CBB1	Z4.3DP	6/14/2000	440	400	61.0	79.0	--	1,300	53.2
A-02-15 06CBB1	Z4.3DP	8/30/2000	10	398	57.4	68.7	5.52	1,200	51.3
A-02-15 06CBB1	Z4.3DP	10/18/2000	10	392	58.6	66.9	--	1,190	51.8
A-02-15 06CBB1	Z4.3DP	10/18/2000	140	420	61.0	65.0	6.80	--	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	10	380	49.4	55.1	--	1,100	49.0
A-02-15 06CBB1	Z4.3DP	1/26/2001	140	380	50.0	60.0	5.20	--	--
A-02-15 06CBB2	Z4.3DP14	11/28/2001	440	400	53.0	62.0	4.80	1,110	55.3
A-02-15 06CBB3	Z4.8DP8	12/6/2001	440	390	53.0	60.0	4.60	1,100	58.0
A-02-14 01DAA1	Z4.7	6/2/1999	440	380	89.0	58.0	4.60	1,410	49.7
A-02-14 01DAA2	Z4.6DP	11/28/2001	440	330	69.0	66.0	4.70	1,130	57.1
A-02-14 01DAA2	Z4.6DP	6/24/2002	10	331	66.0	64.5	4.43	1,170	59.2

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Calcium, dissolved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)
A-02-14 01DAA3	Z4.6DP14	11/28/2001	440	320	70.0	64.0	4.30	1,120	56.1
A-02-14 01DAA3	Z4.6DP14	6/24/2002	440	331	75.4	65.0	3.68	1,160	57.6
A-02-14 01DAA3	Z4.6DP14	5/19/2004	440	370	49.6	61.4	5.41	1,090	51.7
A-02-14 01DAA4	Z4.6DP8	12/6/2001	440	320	69.0	66.0	4.70	1,140	57.4
A-02-14 01DAA4	Z4.6DP8	6/24/2002	10	337	65.8	63.2	4.39	1,170	53.7
A-02-14 01DAA5	Z4.8DP	11/28/2001	440	320	78.0	59.0	4.20	1,200	53.7
A-02-14 01DAA5	Z4.8DP	4/2/2002	440	320	74.5	59.6	4.33	1,170	54.1
A-02-14 01DAA5	Z4.8DP	6/24/2002	440	313	75.4	65.0	3.68	1,160	58.9
A-02-14 01DAA5	Z4.8DP	11/5/2002	440	309	75.6	64.3	4.16	1,170	52.6
A-02-14 01DAA5	Z4.8DP	5/19/2004	10	360	53.1	64.1	4.74	1,100	54.9
A-02-14 01DAA6	Z4.8DP14	11/28/2001	440	310	68.0	60.0	4.70	1,180	53.1
A-02-14 01DAA6	Z4.8DP14	6/24/2002	10	302	75.0	62.2	4.34	1,140	53.9
A-02-14 01DAA6	Z4.8DP14	11/5/2002	440	309	75.8	59.4	4.61	1,130	55.0
A-02-14 01DAA7	Z4.8DP8	12/6/2001	440	330	79.0	59.0	4.50	1,180	50.6
A-02-14 01DAA7	Z4.8DP8	6/25/2002	10	305	75.4	63.9	3.95	1,150	55.0
A-02-14 01DAA7	Z4.8DP8	11/5/2002	440	312	76.4	61.5	4.31	1,160	52.0
A-02-14 01DAA7	Z4.8DP8	5/19/2004	440	322	75.1	64.4	4.96	1,140	50.8
A-02-14 01ADD01	Z5	6/4/1998	440	410	95.0	62.0	5.30	1,340	46.0
A-02-14 01ADD01	Z5	12/23/1998	440	417	96.9	63.6	5.30	1,410	46.8
A-02-14 01ADD01	Z5	2/11/1999	10	418	96.6	62.6	3.90	1,420	50.8
A-02-14 01ADD01	Z5	3/24/1999	440	420	96.0	61.0	3.30	1,360	51.1
A-02-14 01ADD01	Z5	4/23/1999	10	420	96.0	61.0	--	1,380	53.3
A-02-14 01ADD01	Z5	6/2/1999	440	410	92.0	59.0	4.60	1,390	50.4
A-02-14 01ADD01	Z5	8/25/1999	440	430	99.0	63.0	4.00	1,470	52.3
A-02-14 01ADD01	Z5	12/28/1999	440	405	92.5	64.0	4.30	1,340	50.9
A-02-14 01ADD01	Z5	6/14/2000	440	400	86.0	75.0	--	1,370	51.4
A-02-14 01ADD01	Z5	8/30/2000	10	407	92.7	64.3	3.84	1,370	50.5
A-02-14 01ADD01	Z5	10/18/2000	10	394	92.3	63.1	--	1,400	49.6
A-02-14 01ADD01	Z5	10/18/2000	140	430	95.0	62.0	5.70	--	--
A-02-14 01ADD01	Z5	1/26/2001	10	371	59.4	58.3	--	1,110	46.8
A-02-14 01ADD01	Z5	1/26/2001	140	371	60.0	61.0	5.00	--	--
A-02-14 01ADD01	Z5	4/4/2001	10	361	76.6	65.2	--	1,240	54.0

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Calcium, dissolved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)
A-02-14 01ADD01	Z5	4/4/2001	140	375	78.0	66.0	5.10	--	--
A-02-14 01ADD01	Z5	6/25/2002	10	403	53.2	66.2	4.84	1,190	53.5
A-02-14 01ADD01	Z5	5/19/2004	440	370	47.2	62.9	5.09	1,100	55.0
A-02-14 01ADD02	Z5	12/6/2001	440	330	76.0	58.0	3.90	1,130	50.7
A-02-14 01ADD02	Z5	6/25/2002	10	335	70.9	64.9	4.07	1,150	54.5
A-02-14 01ADD03	Z5	12/6/2001	440	350	68.0	60.0	4.20	1,160	57.2
A-02-14 01ADD03	Z5	6/25/2002	10	397	58.9	66.6	4.50	1,190	56.6
A-02-14 01ADD06	Z5	12/6/2001	440	410	69.0	64.0	4.10	1,180	55.0
A-02-14 01ADD06	Z5	6/25/2002	10	420	63.0	68.2	4.63	1,200	57.4
A-02-14 01ADD04	Z5	11/28/2001	440	380	56.0	62.0	4.50	1,120	56.3
A-02-14 01ADD05	Z5	12/6/2001	440	400	68.0	65.0	4.20	1,180	55.2
A-02-14 01ADD05	Z5	6/25/2002	10	409	68.4	61.9	4.19	1,210	57.5
A-02-14 01ADD07	Z5	6/25/2002	10	412	64.0	68.0	4.66	1,190	56.6
A-02-14 01ADD07	Z5	5/19/2004	440	367	55.2	65.4	5.25	1,110	54.7
A-02-14 01ADD08	Z5	6/25/2002	10	388	69.4	64.7	4.35	1,180	56.7
A-02-14 01ADD08	Z5	5/19/2004	440	369	53.5	65.5	5.03	1,090	53.1
A-02-14 01ADD09	Z5	6/25/2002	10	444	58.1	69.9	5.13	1,250	61.3
A-02-14 01ADD09	Z5	5/19/2004	440	382	52.7	66.4	5.73	1,130	56.7
A-02-14 01ADA1	Z5.7	6/2/1999	440	390	90.0	60.0	5.20	1,390	52.1
A-02-14 01ADA1	Z5.7	8/30/2000	10	368	62.1	62.1	5.35	1,210	48.9
A-02-14 01ADA1	Z5.7	10/18/2000	10	380	63.7	64.5	--	1,200	49.9
A-02-14 01ADA1	Z5.7	10/18/2000	140	390	62.0	59.0	6.00	--	--
A-02-14 01ADA1	Z5.7	1/26/2001	10	373	46.5	49.1	--	1,130	47.8
A-02-14 01ADA1	Z5.7	1/26/2001	140	371	62.0	61.0	5.30	--	--
A-02-14 01ADA1	Z5.7	6/13/2001	10	337	63.0	70.9	--	1,150	55.4
A-02-14 01ADA1	Z5.7	6/13/2001	140	371	56.0	61.0	5.30	--	--
A-02-14 01ADA1	Z5.7	8/6/2001	10	374	50.8	58.6	4.68	1,140	55.3
A-02-14 01ADA1	Z5.7	8/6/2001	140	370	53.0	63.0	5.40	--	--
A-02-14 01ADB1	Z6.2	6/17/1999	440	420	99.0	60.0	4.20	1,400	52.3
A-02-14 01ADB1	Z6.2	10/18/2000	10	373	88.7	60.8	--	1,360	51.6
A-02-14 01ADB1	Z6.2	10/18/2000	140	390	90.0	59.0	7.10	--	--
A-02-14 01ADB1	Z6.2	1/25/2001	140	387	92.0	65.0	4.00	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Calcium, dissolved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)
A-02-14 01ADB1	Z6.2	1/26/2001	10	387	77.3	50.5	--	1,340	51.8
A-02-14 01ADB1	Z6.2	4/4/2001	10	381	83.0	58.2	--	1,330	53.9
A-02-14 01ADB1	Z6.2	4/4/2001	140	381	94.0	66.0	4.00	--	--
A-02-14 01ADB1	Z6.2	6/13/2001	10	362	89.2	67.6	--	1,330	57.8
A-02-14 01ADB1	Z6.2	6/13/2001	140	401	88.0	65.0	4.00	--	--
A-02-14 01ADB1	Z6.2	8/6/2001	10	386	86.3	61.5	3.57	1,330	58.1
A-02-14 01ADB1	Z6.2	8/6/2001	140	380	89.0	66.0	4.20	--	--
A-02-14 01ADB1	Z6.2	6/26/2002	10	412	73.7	65.6	--	1,270	57.4
A-02-14 01ADB2	Z6.2	10/24/2001	440	380	82.0	60.0	3.90	1,220	51.1
A-02-14 01ADB2	Z6.2	12/6/2001	440	330	78.0	60.0	3.80	1,210	50.9
A-02-14 01ADB2	Z6.2	6/26/2002	10	346	79.9	62.5	3.65	1,220	52.9
A-02-14 01ADB7	Z6.2	6/26/2002	10	336	77.7	60.5	3.22	1,170	51.5
A-02-14 01ADB6	Z6.2	6/26/2002	10	504	94.5	75.7	4.01	1,580	64.5
A-02-14 01ADB3	Z6.2	11/28/2001	440	340	74.0	63.0	3.70	1,190	51.3
A-02-14 01ADB3	Z6.2	6/26/2002	10	450	69.8	70.5	4.35	1,320	63.4
A-02-14 01ADB3	Z6.2	5/20/2004	440	365	73.4	69.7	4.47	1,190	55.2
A-02-14 01ADB4	Z6.2	11/28/2001	440	350	79.0	63.0	3.60	1,190	51.2
A-02-14 01ADB4	Z6.2	6/26/2002	10	337	76.3	65.9	3.54	1,200	54.9
A-02-14 01ADB5	Z6.2	12/6/2001	440	340	77.0	63.0	3.40	1,210	50.7
A-02-14 01ADB5	Z6.2	6/26/2002	10	326	73.4	73.4	3.92	1,220	56.2
A-02-14 01ADB5	Z6.2	5/20/2004	440	350	83.6	69.8	3.89	1,210	53.8
A-02-14 01ABD1	Z7	6/3/1998	440	400	84.0	64.0	4.80	1,140	43.9
A-02-14 01ABD1	Z7	6/3/1999	440	370	76.0	59.0	4.50	1,110	45.7
A-02-14 01ABD1	Z7	8/25/1999	440	370	79.0	61.0	4.80	1,070	47.7
A-02-14 01ABD1	Z7	8/30/2000	10	336	72.9	56.5	3.26	1,090	45.2
A-02-14 01ABD1	Z7	6/13/2001	10	337	75.9	57.5	--	1,180	50.3
A-02-14 01ABD1	Z7	6/13/2001	140	374	77.0	59.0	3.60	--	--
A-02-14 01ABD1	Z7	5/20/2004	440	395	57.2	67.9	5.45	1,180	57.5
A-02-14 01ABD2	Z7DP3	6/26/2002	10	453	57.6	71.3	4.99	1,270	59.9
A-02-14 01ABD3	Z7DP8	6/26/2002	10	440	57.1	67.5	4.98	1,230	59.0
A-02-14 01ABD3	Z7DP8	5/20/2004	440	390	58.6	67.0	5.33	1,170	56.4
A-02-14 01ABD6	Z7DP14	6/26/2002	10	418	69.3	67.7	4.34	1,240	58.5

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Calcium, dissolved (mg/L as Ca)	Magne-sium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)
A-02-14 01ABD4	Z7.8DP	6/27/2002	10	365	71.4	57.3	3.27	1,020	45.0
A-02-14 01ABD5	Z7.8DP14	6/27/2002	10	402	62.8	63.7	3.91	1,140	53.8
A-02-14 01BAA1	Z8.3DP	2/12/2003	440	411	57.8	62.9	4.84	1,220	49.1
A-02-14 01BAA2	Z9.2DP	2/12/2003	440	341	72.7	56.5	3.53	1,080	46.4
A-03-14 36CDD1	Z9a	6/3/1998	440	390	84.0	63.0	7.10	1,120	42.3
A-03-14 36CDD1	Z9a	6/13/2001	10	345	79.9	53.7	--	1,170	47.4
A-03-14 36CDD1	Z9a	6/27/2002	10	337	75.2	55.9	3.33	1,070	46.6
A-03-14 36CDD1	Z9a	2/12/2003	440	333	74.2	56.8	3.51	1,090	46.8
A-03-14 36CDD1	Z9a	5/28/2003	440	330	75.8	58.6	3.56	1,100	50.7
A-03-14 36CDD1	Z9a	11/18/2003	440	338	78.2	60.4	3.68	1,130	51.1
A-03-14 36CDD1	Z9a	5/20/2004	440	379	89.0	65.1	4.08	1,250	54.9
A-03-14 36CDD2	Z9aDP8	6/27/2002	10	332	74.1	57.8	3.32	1,080	47.4
A-03-14 36CDD3	Z9aDP14	6/27/2002	10	338	75.5	57.6	3.35	1,100	47.5
A-03-14 36CDD3	Z9aDP14	5/28/2003	440	331	76.5	59.1	3.56	1,110	50.6
A-03-14 36CDD3	Z9aDP14	11/18/2003	440	336	78.1	60.7	3.76	1,130	50.2
A-03-14 36CDD3	Z9aDP14	5/20/2004	440	329	75.9	59.8	4.08	1,110	49.1
A-03-14 36CDD5	Z9.5DP	2/12/2003	440	455	106	65.3	3.66	1,430	52.3
A-03-14 36CDA	Z10DP	2/12/2003	440	406	60.4	61.6	4.84	1,210	49.7
A-03-14 36CAA1	JJ15	6/1/1998	440	400	94.0	64.0	7.40	1,340	49.9
A-03-14 36CAA1	JJ15	6/3/1999	440	390	90.0	63.0	5.10	1,360	50.8
A-03-14 35AAD	D10	6/1/1998	440	420	97.0	68.0	6.60	1,310	48.2
A-03-14 35AAD	D10	6/11/2001	10	358	66.4	65.0	--	1,170	53.4
A-03-14 35AAD	D10	6/11/2001	140	393	68.0	63.0	5.00	--	--
A-03-14 26DBD	D11	6/1/1998	440	150	37.0	53.0	6.00	380	27.5
A-03-14 26DBD	D11	6/3/1999	440	150	32.0	44.0	2.70	347	24.2

Site location	Other Id	Date	Lab-ora-tory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
A-02-15 06CCD	Head of flow	6/4/1998	440	1.5	59.9	<110	--	--	--
A-02-15 06CCD2	D1.5	6/2/1998	440	5.0	70.6	2,200	--	--	--
A-02-15 06CCD2	D1.5	6/3/1998	440	5.1	74.9	1,900	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
A-02-15 06CCD2	D1.5	6/1/1999	440	5.2	72.1	<2,090	--	--	--
A-02-15 06CCA7	Z0	6/3/1998	440	3.3	70.6	770	--	--	--
A-02-15 06CCA7	Z0	12/23/1998	440	3.3	68.5	1,020	--	--	--
A-02-15 06CCA7	Z0	2/11/1999	10	3.4	68.6	1,320	20.6	E3.0	74
A-02-15 06CCA7	Z0	3/24/1999	440	3.2	69.0	1,410	--	--	--
A-02-15 06CCA7	Z0	4/23/1999	10	3.0	69.5	1,840	--	--	--
A-02-15 06CCA7	Z0	6/1/1999	440	4.3	72.3	1,400	--	--	--
A-02-15 06CCA7	Z0	12/28/1999	440	2.3	67.5	1,420	--	--	--
A-02-15 06CCA7	Z0	2/16/2000	440	1.6	13.1	<110	--	--	--
A-02-15 06CCA6	Z1	6/4/1998	440	5.1	77.0	2,000	--	--	--
A-02-15 06CCA6	Z1	6/1/1999	440	4.8	77.0	1,390	--	--	--
A-02-15 06CBC1	Z2.2	6/2/1999	440	2.9	70.4	430	--	--	--
PINAL CREEK AT Z4DP	Z4	6/4/1998	440	4.3	68.5	720	--	--	--
PINAL CREEK AT Z4DP	Z4	6/2/1999	440	4.3	70.4	430	--	--	--
A-02-15 06CBB1	Z4.3DP	2/16/2000	440	2.5	58.0	560	--	--	--
A-02-15 06CBB1	Z4.3DP	4/13/2000	440	2.5	40.0	270	--	--	--
A-02-15 06CBB1	Z4.3DP	6/14/2000	440	2.3	40.1	160	--	--	--
A-02-15 06CBB1	Z4.3DP	8/30/2000	10	2.7	27.4	60	18.9	1.2	50
A-02-15 06CBB1	Z4.3DP	10/18/2000	10	4.9	24.3	E50	15.0	E1.0	E54
A-02-15 06CBB1	Z4.3DP	10/18/2000	140	--	25.4	<110	--	--	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	10	1.7	14.5	<150	6.2	<10.0	176
A-02-15 06CBB1	Z4.3DP	1/26/2001	140	--	15.4	<110	--	--	--
A-02-15 06CBB2	Z4.3DP14	11/28/2001	440	2.0	19.1	<110	--	--	--
A-02-15 06CBB3	Z4.8DP8	12/6/2001	440	1.8	17.9	<110	--	--	--
A-02-14 01DAA1	Z4.7	6/2/1999	440	2.1	62.7	<110	--	--	--
A-02-14 01DAA2	Z4.6DP	11/28/2001	440	2.7	44.6	<110	--	--	--
A-02-14 01DAA2	Z4.6DP	6/24/2002	10	2.9	38.8	<110	--	--	--
A-02-14 01DAA3	Z4.6DP14	11/28/2001	440	2.8	47.0	<110	--	--	--
A-02-14 01DAA3	Z4.6DP14	6/24/2002	440	2.9	53.5	<110	--	--	--
A-02-14 01DAA3	Z4.6DP14	5/19/2004	440	2.2	25.5	<110	--	--	--
A-02-14 01DAA4	Z4.6DP8	12/6/2001	440	2.9	46.5	<110	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
A-02-14 01DAA4	Z4.6DP8	6/24/2002	10	2.7	38.8	<110	--	--	--
A-02-14 01DAA5	Z4.8DP	11/28/2001	440	2.6	59.1	<110	--	--	--
A-02-14 01DAA5	Z4.8DP	4/2/2002	440	2.3	58.4	130	--	--	--
A-02-14 01DAA5	Z4.8DP	6/24/2002	440	1.2	53.5	<110	--	--	--
A-02-14 01DAA5	Z4.8DP	11/5/2002	440	1.8	57.8	120	--	--	--
A-02-14 01DAA5	Z4.8DP	5/19/2004	10	1.3	23.0	<110	--	--	--
A-02-14 01DAA6	Z4.8DP14	11/28/2001	440	2.8	58.2	<110	--	--	--
A-02-14 01DAA6	Z4.8DP14	6/24/2002	10	2.6	57.6	<110	--	--	--
A-02-14 01DAA6	Z4.8DP14	11/5/2002	440	2.7	55.5	310	--	--	--
A-02-14 01DAA7	Z4.8DP8	12/6/2001	440	2.7	59.5	<110	--	--	--
A-02-14 01DAA7	Z4.8DP8	6/25/2002	10	1.9	57.2	<110	--	--	--
A-02-14 01DAA7	Z4.8DP8	11/5/2002	440	2.2	57.2	190	--	--	--
A-02-14 01DAA7	Z4.8DP8	5/19/2004	440	2.1	47.1	<110	--	--	--
A-02-14 01ADD01	Z5	6/4/1998	440	1.8	62.0	<110	--	--	--
A-02-14 01ADD01	Z5	12/23/1998	440	1.7	57.8	<120	--	--	--
A-02-14 01ADD01	Z5	2/11/1999	10	1.4	54.9	E20	17.8	<4.8	61
A-02-14 01ADD01	Z5	3/24/1999	440	1.3	55.8	160	--	--	--
A-02-14 01ADD01	Z5	4/23/1999	10	2.4	55.6	<120	--	--	--
A-02-14 01ADD01	Z5	6/2/1999	440	1.5	56.3	<110	--	--	--
A-02-14 01ADD01	Z5	8/25/1999	440	1.4	53.9	<110	--	--	--
A-02-14 01ADD01	Z5	12/28/1999	440	2.3	57.3	270	--	--	--
A-02-14 01ADD01	Z5	6/14/2000	440	1.8	47.9	<110	--	--	--
A-02-14 01ADD01	Z5	8/30/2000	10	1.4	53.9	<40	18.2	<1.0	54
A-02-14 01ADD01	Z5	10/18/2000	10	2.9	54.4	<80	18.8	E1.0	E61
A-02-14 01ADD01	Z5	10/18/2000	140	--	56.5	<110	--	--	--
A-02-14 01ADD01	Z5	1/26/2001	10	1.5	25.3	E140	19.5	<10.0	171
A-02-14 01ADD01	Z5	1/26/2001	140	--	25.9	160	--	--	--
A-02-14 01ADD01	Z5	4/4/2001	10	1.3	40.1	<150	17.5	<10.0	196
A-02-14 01ADD01	Z5	4/4/2001	140	--	42.8	<110	--	--	--
A-02-14 01ADD01	Z5	6/25/2002	10	1.4	16.7	<110	--	--	--
A-02-14 01ADD01	Z5	5/19/2004	440	1.5	13.4	<110	--	--	--
A-02-14 01ADD02	Z5	12/6/2001	440	1.9	54.2	<110	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO2)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Boron, dissolved (µg/L as B)
A-02-14 01ADD02	Z5	6/25/2002	10	1.4	49.5	<110	--	--	--
A-02-14 01ADD03	Z5	12/6/2001	440	1.8	37.3	<110	--	--	--
A-02-14 01ADD03	Z5	6/25/2002	10	1.1	29.9	<110	--	--	--
A-02-14 01ADD06	Z5	12/6/2001	440	1.3	34.0	<110	--	--	--
A-02-14 01ADD06	Z5	6/25/2002	10	1.3	33.0	<110	--	--	--
A-02-14 01ADD04	Z5	11/28/2001	440	1.7	23.4	<110	--	--	--
A-02-14 01ADD05	Z5	12/6/2001	440	1.4	33.3	<110	--	--	--
A-02-14 01ADD05	Z5	6/25/2002	10	1.1	36.1	<110	--	--	--
A-02-14 01ADD07	Z5	6/25/2002	10	1.5	33.0	<110	--	--	--
A-02-14 01ADD07	Z5	5/19/2004	440	1.6	23.6	<110	--	--	--
A-02-14 01ADD08	Z5	6/25/2002	10	1.5	36.3	<110	--	--	--
A-02-14 01ADD08	Z5	5/19/2004	440	1.2	27.3	<110	--	--	--
A-02-14 01ADD09	Z5	6/25/2002	10	1.5	24.1	<110	--	--	--
A-02-14 01ADD09	Z5	5/19/2004	440	1.6	19.0	<110	--	--	--
A-02-14 01ADA1	Z5.7	6/2/1999	440	2.3	56.3	<110	--	--	--
A-02-14 01ADA1	Z5.7	8/30/2000	10	2.2	29.3	<40	14.9	<1.0	52
A-02-14 01ADA1	Z5.7	10/18/2000	10	2.0	27.1	<80	14.1	E1.0	E51
A-02-14 01ADA1	Z5.7	10/18/2000	140	--	26.9	<110	--	--	--
A-02-14 01ADA1	Z5.7	1/26/2001	10	1.5	22.4	<40	9.4	<3.0	65
A-02-14 01ADA1	Z5.7	1/26/2001	140	--	27.3	<110	--	--	--
A-02-14 01ADA1	Z5.7	6/13/2001	10	1.6	28.9	30	16.3	1	64
A-02-14 01ADA1	Z5.7	6/13/2001	140	--	27.7	<110	--	--	--
A-02-14 01ADA1	Z5.7	8/6/2001	10	1.3	29.1	<380	E19.0	<25.0	<325
A-02-14 01ADA1	Z5.7	8/6/2001	140	--	30.1	<110	--	--	--
A-02-14 01ADB1	Z6.2	6/17/1999	440	0.9	63.1	<110	--	--	--
A-02-14 01ADB1	Z6.2	10/18/2000	10	0.6	65.3	E70	24.3	E.8	E74
A-02-14 01ADB1	Z6.2	10/18/2000	140	--	66.7	<110	--	--	--
A-02-14 01ADB1	Z6.2	1/25/2001	140	--	56.3	<110	--	--	--
A-02-14 01ADB1	Z6.2	1/26/2001	10	0.7	51.3	<20	16.6	<1.0	40
A-02-14 01ADB1	Z6.2	4/4/2001	10	0.6	58.8	<40	19.1	<3.0	71
A-02-14 01ADB1	Z6.2	4/4/2001	140	--	64.6	<110	--	--	--
A-02-14 01ADB1	Z6.2	6/13/2001	10	0.8	64.5	E10	20.5	<3.0	83

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
A-02-14 01ADB1	Z6.2	6/13/2001	140	--	62.9	<110	--	--	--
A-02-14 01ADB1	Z6.2	8/6/2001	10	0.7	66.7	<380	E17.7	<25.0	<325
A-02-14 01ADB1	Z6.2	8/6/2001	140	--	67.7	<110	--	--	--
A-02-14 01ADB1	Z6.2	6/26/2002	10	1.3	45.6	<110	--	--	--
A-02-14 01ADB2	Z6.2	10/24/2001	440	1.0	64.2	<110	--	--	--
A-02-14 01ADB2	Z6.2	12/6/2001	440	1.2	64.6	<110	--	--	--
A-02-14 01ADB2	Z6.2	6/26/2002	10	1.0	56.3	<110	--	--	--
A-02-14 01ADB7	Z6.2	6/26/2002	10	0.4	58.4	<110	--	--	--
A-02-14 01ADB6	Z6.2	6/26/2002	10	0.7	66.7	<110	--	--	--
A-02-14 01ADB3	Z6.2	11/28/2001	440	0.7	54.6	<110	--	--	--
A-02-14 01ADB3	Z6.2	6/26/2002	10	1.1	38.0	<110	--	--	--
A-02-14 01ADB3	Z6.2	5/20/2004	440	1.0	37.1	<110	--	--	--
A-02-14 01ADB4	Z6.2	11/28/2001	440	0.3	61.9	<110	--	--	--
A-02-14 01ADB4	Z6.2	6/26/2002	10	0.4	56.3	<110	--	--	--
A-02-14 01ADB5	Z6.2	12/6/2001	440	0.6	58.5	<110	--	--	--
A-02-14 01ADB5	Z6.2	6/26/2002	10	0.5	55.3	<110	--	--	--
A-02-14 01ADB5	Z6.2	5/20/2004	440	0.9	47.1	<110	--	--	--
A-02-14 01ABD1	Z7	6/3/1998	440	0.2	47.1	<110	--	--	--
A-02-14 01ABD1	Z7	6/3/1999	440	0.3	43.0	<110	--	--	--
A-02-14 01ABD1	Z7	8/25/1999	440	0.2	45.8	<110	--	--	--
A-02-14 01ABD1	Z7	8/30/2000	10	0.3	47.1	<40	19.3	<1.0	50
A-02-14 01ABD1	Z7	6/13/2001	10	0.4	50.1	<20	20.9	<1.0	90
A-02-14 01ABD1	Z7	6/13/2001	140	--	50.4	<110	--	--	--
A-02-14 01ABD1	Z7	5/20/2004	440	1.5	22.5	<110	--	--	--
A-02-14 01ABD2	Z7DP3	6/26/2002	10	1.5	23.7	<110	--	--	--
A-02-14 01ABD3	Z7DP8	6/26/2002	10	1.3	25.8	<110	--	--	--
A-02-14 01ABD3	Z7DP8	5/20/2004	440	1.5	23.8	<110	--	--	--
A-02-14 01ABD6	Z7DP14	6/26/2002	10	1.1	38.2	<110	--	--	--
A-02-14 01ABD4	Z7.8DP	6/27/2002	10	0.3	39.8	<110	--	--	--
A-02-14 01ABD5	Z7.8DP14	6/27/2002	10	0.9	34.7	<110	--	--	--
A-02-14 01BAA1	Z8.3DP	2/12/2003	440	1.1	22.5	<110	--	--	--
A-02-14 01BAA2	Z9.2DP	2/12/2003	440	0.2	48.1	<110	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO2)	Aluminum, dissolved (μg/L as Al)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Boron, dissolved (μg/L as B)
A-03-14 36CDD1	Z9a	6/3/1998	440	0.2	49.2	<110	--	--	--
A-03-14 36CDD1	Z9a	6/13/2001	10	0.3	51.0	<40	20.9	<1.0	128
A-03-14 36CDD1	Z9a	6/27/2002	10	0.2	49.9	<110	--	--	--
A-03-14 36CDD1	Z9a	2/12/2003	440	0.2	49.9	<110	--	--	--
A-03-14 36CDD1	Z9a	5/28/2003	440	<.2	48.5	160	--	--	--
A-03-14 36CDD1	Z9a	11/18/2003	440	<.2	45.7	210	--	--	--
A-03-14 36CDD1	Z9a	5/20/2004	440	0.2	45.2	<110	--	--	--
A-03-14 36CDD2	Z9aDP8	6/27/2002	10	0.2	51.0	<110	--	--	--
A-03-14 36CDD3	Z9aDP14	6/27/2002	10	0.2	50.6	<110	--	--	--
A-03-14 36CDD3	Z9aDP14	5/28/2003	440	<.2	49.4	180	--	--	--
A-03-14 36CDD3	Z9aDP14	11/18/2003	440	0.2	46.4	210	--	--	--
A-03-14 36CDD3	Z9aDP14	5/20/2004	440	0.2	45.9	<110	--	--	--
A-03-14 36CDD5	Z9.5DP	2/12/2003	440	0.2	42.3	<110	--	--	--
A-03-14 36CDA	Z10DP	2/12/2003	440	1.1	26.4	<110	--	--	--
A-03-14 36CAA1	JJ15	6/1/1998	440	2.3	70.6	840	--	--	--
A-03-14 36CAA1	JJ15	6/3/1999	440	2.0	54.6	180	--	--	--
A-03-14 35AAD	D10	6/1/1998	440	1.4	53.5	<110	--	--	--
A-03-14 35AAD	D10	6/11/2001	10	1.3	33.3	E10	8.7	<3.0	89
A-03-14 35AAD	D10	6/11/2001	140	--	34.1	<110	--	--	--
A-03-14 26DBD	D11	6/1/1998	440	1.1	38.5	<110	--	--	--
A-03-14 26DBD	D11	6/3/1999	440	1.4	38.7	<110	--	--	--
Site location	**Other Id**	**Date**	**Laboratory**	**Cadmium, dissolved (μg/L as Cd)**	**Chromium, dissolved (μg/L as Cr)**	**Cobalt, dissolved (μg/L as Co)**	**Copper, dissolved (μg/L as Cu)**	**Iron, dissolved (μg/L as Fe)**	**Lead, dissolved (μg/L as Pb)**
A-02-15 06CCD	Head of flow	6/4/1998	440	--	--	90	<30	<130	--
A-02-15 06CCD2	D1.5	6/2/1998	440	--	--	730	360	<130	--
A-02-15 06CCD2	D1.5	6/3/1998	440	--	--	590	<30	450	--
A-02-15 06CCD2	D1.5	6/1/1999	440	--	--	870	<30	<130	--
A-02-15 06CCA7	Z0	6/3/1998	440	--	--	330	<30	<130	--
A-02-15 06CCA7	Z0	12/23/1998	440	--	--	347	<30	<120	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Cad-mium, dissolved (μg/L as Cd)	Chro-mium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)
A-02-15 06CCA7	Z0	2/11/1999	10	<24	<42	410	E21	<30	<300
A-02-15 06CCA7	Z0	3/24/1999	440	--	--	440	<30	<130	--
A-02-15 06CCA7	Z0	4/23/1999	10	--	--	660	40	<130	--
A-02-15 06CCA7	Z0	6/1/1999	440	--	--	510	<30	<130	--
A-02-15 06CCA7	Z0	12/28/1999	440	--	--	180	90	520	--
A-02-15 06CCA7	Z0	2/16/2000	440	--	--	<20	<30	<130	--
A-02-15 06CCA6	Z1	6/4/1998	440	--	--	700	<30	<130	--
A-02-15 06CCA6	Z1	6/1/1999	440	--	--	340	120	<130	--
A-02-15 06CBC1	Z2.2	6/2/1999	440	--	--	60	60	<130	--
PINAL CREEK AT Z4DP	Z4	6/4/1998	440	--	--	<20	40	<130	--
PINAL CREEK AT Z4DP	Z4	6/2/1999	440	--	--	<20	<30	<130	--
A-02-15 06CBB1	Z4.3DP	2/16/2000	440	--	--	<20	<30	<130	--
A-02-15 06CBB1	Z4.3DP	4/13/2000	440	--	--	<20	30	<130	--
A-02-15 06CBB1	Z4.3DP	6/14/2000	440	--	--	<20	<30	<130	--
A-02-15 06CBB1	Z4.3DP	8/30/2000	10	<24	<42	<39	<30	<30	0.23
A-02-15 06CBB1	Z4.3DP	10/18/2000	10	<40	<70	<65	<50	<50	0.12
A-02-15 06CBB1	Z4.3DP	10/18/2000	140	--	--	<20	<30	<130	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	10	<80	<100	<130	<50	<100	0.43
A-02-15 06CBB1	Z4.3DP	1/26/2001	140	--	--	<20	<30	<130	--
A-02-15 06CBB2	Z4.3DP14	11/28/2001	440	--	--	<20	<30	<130	--
A-02-15 06CBB3	Z4.8DP8	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01DAA1	Z4.7	6/2/1999	440	--	--	<20	<30	<130	--
A-02-14 01DAA2	Z4.6DP	11/28/2001	440	--	--	<20	<30	<130	--
A-02-14 01DAA2	Z4.6DP	6/24/2002	10	--	--	<20	<30	<130	--
A-02-14 01DAA3	Z4.6DP14	11/28/2001	440	--	--	<20	<30	<130	--
A-02-14 01DAA3	Z4.6DP14	6/24/2002	440	--	--	<20	<30	<130	--
A-02-14 01DAA3	Z4.6DP14	5/19/2004	440	--	--	<20	<30	<130	--
A-02-14 01DAA4	Z4.6DP8	12/6/2001	440	--	--	<20	<30	250	--
A-02-14 01DAA4	Z4.6DP8	6/24/2002	10	--	--	<20	<30	<130	--
A-02-14 01DAA5	Z4.8DP	11/28/2001	440	--	--	20	<30	<130	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Cad-mium, dissolved (μg/L as Cd)	Chro-mium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)
A-02-14 01DAA5	Z4.8DP	4/2/2002	440	--	--	<20	<30	<130	--
A-02-14 01DAA5	Z4.8DP	6/24/2002	440	--	--	<20	<30	<130	--
A-02-14 01DAA5	Z4.8DP	11/5/2002	440	--	--	<20	<30	<130	--
A-02-14 01DAA5	Z4.8DP	5/19/2004	10	--	--	<20	<30	<130	--
A-02-14 01DAA6	Z4.8DP14	11/28/2001	440	--	--	70	<30	<130	--
A-02-14 01DAA6	Z4.8DP14	6/24/2002	10	--	--	40	<30	<130	--
A-02-14 01DAA6	Z4.8DP14	11/5/2002	440	--	--	40	<30	<130	--
A-02-14 01DAA7	Z4.8DP8	12/6/2001	440	--	--	40	<30	<130	--
A-02-14 01DAA7	Z4.8DP8	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01DAA7	Z4.8DP8	11/5/2002	440	--	--	<20	<30	<130	--
A-02-14 01DAA7	Z4.8DP8	5/19/2004	440	--	--	40	<30	<130	--
A-02-14 01ADD01	Z5	6/4/1998	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	12/23/1998	440	--	--	25	<30	<120	--
A-02-14 01ADD01	Z5	2/11/1999	10	<24	<42	<21	<30	<30	<300
A-02-14 01ADD01	Z5	3/24/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	4/23/1999	10	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	6/2/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	8/25/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	12/28/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	6/14/2000	440	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	8/30/2000	10	<24	<42	E25	<30	<30	0.33
A-02-14 01ADD01	Z5	10/18/2000	10	<40	<70	<65	<50	<50	0.32
A-02-14 01ADD01	Z5	10/18/2000	140	--	--	30	<30	<130	--
A-02-14 01ADD01	Z5	1/26/2001	10	<80	<100	<130	<50	<100	1.13
A-02-14 01ADD01	Z5	1/26/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	4/4/2001	10	<80	<100	<130	<50	<100	1.07
A-02-14 01ADD01	Z5	4/4/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD01	Z5	5/19/2004	440	--	--	<20	<30	<130	--
A-02-14 01ADD02	Z5	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADD02	Z5	6/25/2002	10	--	--	<20	<30	<130	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)
A-02-14 01ADD03	Z5	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADD03	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD06	Z5	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADD06	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD04	Z5	11/28/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADD05	Z5	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADD05	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD07	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD07	Z5	5/19/2004	440	--	--	<20	<30	<130	--
A-02-14 01ADD08	Z5	6/25/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADD08	Z5	5/19/2004	440	--	--	<20	<30	<130	--
A-02-14 01ADD09	Z5	6/25/2002	10	--	--	<20	<30	960	--
A-02-14 01ADD09	Z5	5/19/2004	440	--	--	<20	<30	<130	--
A-02-14 01ADA1	Z5.7	6/2/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADA1	Z5.7	8/30/2000	10	<24	<42	<39	<30	<30	0.13
A-02-14 01ADA1	Z5.7	10/18/2000	10	<40	<70	<65	<50	<50	0.23
A-02-14 01ADA1	Z5.7	10/18/2000	140	--	--	<20	<30	<130	--
A-02-14 01ADA1	Z5.7	1/26/2001	10	<24	<30	<39	<10	<30	0.38
A-02-14 01ADA1	Z5.7	1/26/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADA1	Z5.7	6/13/2001	10	<8	<10	<13	6	<10	0.67
A-02-14 01ADA1	Z5.7	6/13/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADA1	Z5.7	8/6/2001	10	<200	<250	<330	<120	<250	0.22
A-02-14 01ADA1	Z5.7	8/6/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	6/17/1999	440	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	10/18/2000	10	<40	<70	<65	<50	<50	0.30
A-02-14 01ADB1	Z6.2	10/18/2000	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	1/25/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	1/26/2001	10	<8	E7	<13	8	<10	1.31
A-02-14 01ADB1	Z6.2	4/4/2001	10	<8	<30	<39	E10	<30	1.28
A-02-14 01ADB1	Z6.2	4/4/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	6/13/2001	10	<24	<30	<39	14	<30	0.77

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Cad-mium, dissolved (μg/L as Cd)	Chro-mium, dissolved (μg/L as Cr)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Lead, dissolved (μg/L as Pb)
A-02-14 01ADB1	Z6.2	6/13/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	8/6/2001	10	<200	<250	<330	<120	<250	0.39
A-02-14 01ADB1	Z6.2	8/6/2001	140	--	--	<20	<30	<130	--
A-02-14 01ADB1	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB2	Z6.2	10/24/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADB2	Z6.2	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADB2	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB7	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB6	Z6.2	6/26/2002	10	--	--	<20	<30	4,240	--
A-02-14 01ADB3	Z6.2	11/28/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADB3	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB3	Z6.2	5/20/2004	440	--	--	<20	<30	<130	--
A-02-14 01ADB4	Z6.2	11/28/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADB4	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB5	Z6.2	12/6/2001	440	--	--	<20	<30	<130	--
A-02-14 01ADB5	Z6.2	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ADB5	Z6.2	5/20/2004	440	--	--	<20	<30	<130	--
A-02-14 01ABD1	Z7	6/3/1998	440	--	--	<20	<30	<130	--
A-02-14 01ABD1	Z7	6/3/1999	440	--	--	<20	<30	<130	--
A-02-14 01ABD1	Z7	8/25/1999	440	--	--	<20	<30	<130	--
A-02-14 01ABD1	Z7	8/30/2000	10	<24	<42	<39	<30	<30	0.21
A-02-14 01ABD1	Z7	6/13/2001	10	<8	<10	<13	E5	<10	0.45
A-02-14 01ABD1	Z7	6/13/2001	140	--	--	<20	<30	<130	--
A-02-14 01ABD1	Z7	5/20/2004	440	--	--	<20	<30	2,800	--
A-02-14 01ABD2	Z7DP3	6/26/2002	10	--	--	<20	<30	3,380	--
A-02-14 01ABD3	Z7DP8	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ABD3	Z7DP8	5/20/2004	440	--	--	<20	<30	2780	--
A-02-14 01ABD6	Z7DP14	6/26/2002	10	--	--	<20	<30	<130	--
A-02-14 01ABD4	Z7.8DP	6/27/2002	10	--	--	<20	<30	<130	--
A-02-14 01ABD5	Z7.8DP14	6/27/2002	10	--	--	<20	<30	<130	--
A-02-14 01BAA1	Z8.3DP	2/12/2003	440	--	--	<20	<30	<130	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Cad-mium, dissolved (µg/L as Cd)	Chro-mium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)
A-02-14 01BAA2	Z9.2DP	2/12/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	6/3/1998	440	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	6/13/2001	10	<8	<30	<13	<5	<30	0.42
A-03-14 36CDD1	Z9a	6/27/2002	10	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	2/12/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	5/28/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	11/18/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD1	Z9a	5/20/2004	440	--	--	<20	<30	<130	--
A-03-14 36CDD2	Z9aDP8	6/27/2002	10	--	--	<20	<30	<130	--
A-03-14 36CDD3	Z9aDP14	6/27/2002	10	--	--	<20	<30	<130	--
A-03-14 36CDD3	Z9aDP14	5/28/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD3	Z9aDP14	11/18/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDD3	Z9aDP14	5/20/2004	440	--	--	<20	<30	<130	--
A-03-14 36CDD5	Z9.5DP	2/12/2003	440	--	--	<20	<30	<130	--
A-03-14 36CDA	Z10DP	2/12/2003	440	--	--	<20	<30	<130	--
A-03-14 36CAA1	JJ15	6/1/1998	440	--	--	<20	70	<130	--
A-03-14 36CAA1	JJ15	6/3/1999	440	--	--	<20	<30	<130	--
A-03-14 35AAD	D10	6/1/1998	440	--	--	<20	<30	<130	--
A-03-14 35AAD	D10	6/11/2001	10	<24	<30	<39	<5	<30	0.25
A-03-14 35AAD	D10	6/11/2001	140	--	--	<20	<30	<130	--
A-03-14 26DBD	D11	6/1/1998	440	--	--	<20	<30	<130	--
A-03-14 26DBD	D11	6/3/1999	440	--	--	<20	<30	<130	--

Site location	Other Id	Date	Lab-ora-tory	Lithium, dissolved (µg/L as Li)	Manga-nese, dissolved (µg/L as Mn)	Molyb-denum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)
A-02-15 06CCD	Head of flow	6/4/1998	440	--	49,800	--	420	--	1,500
A-02-15 06CCD2	D1.5	6/2/1998	440	--	56,000	--	790	--	1,100
A-02-15 06CCD2	D1.5	6/3/1998	440	--	66,400	--	890	--	1,200
A-02-15 06CCD2	D1.5	6/1/1999	440	--	66,900	--	950	--	1,170
A-02-15 06CCA7	Z0	6/3/1998	440	--	65,200	--	720	--	1,400

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)
A-02-15 06CCA7	Z0	12/23/1998	440	--	60,100	--	680	--	1,300
A-02-15 06CCA7	Z0	2/11/1999	10	196	70,000	<150	700	E7	1,250
A-02-15 06CCA7	Z0	3/24/1999	440	--	65,900	--	810	--	1,240
A-02-15 06CCA7	Z0	4/23/1999	10	--	65,100	--	1,030	--	1,220
A-02-15 06CCA7	Z0	6/1/1999	440	--	67,500	--	880	--	1,310
A-02-15 06CCA7	Z0	12/28/1999	440	--	54,200	--	1,520	--	1,410
A-02-15 06CCA7	Z0	2/16/2000	440	--	160	--	<90	--	1,300
A-02-15 06CCA6	Z1	6/4/1998	440	--	64,200	--	890	--	1,200
A-02-15 06CCA6	Z1	6/1/1999	440	--	58,900	--	1,020	--	1,290
A-02-15 06CBC1	Z2.2	6/2/1999	440	--	47,100	--	520	--	1,190
PINAL CREEK AT Z4DP	Z4	6/4/1998	440	--	50,100	--	570	--	1,200
PINAL CREEK AT Z4DP	Z4	6/2/1999	440	--	54,200	--	520	--	1,300
A-02-15 06CBB1	Z4.3DP	2/16/2000	440	--	54,000	--	570	--	1,270
A-02-15 06CBB1	Z4.3DP	4/13/2000	440	--	28,000	--	350	--	1,160
A-02-15 06CBB1	Z4.3DP	6/14/2000	440	--	19,500	--	350	--	1,340
A-02-15 06CBB1	Z4.3DP	8/30/2000	10	142	1,530	<102	E70	<21	1,170
A-02-15 06CBB1	Z4.3DP	10/18/2000	10	115	1,260	<170	<200	<35	1,190
A-02-15 06CBB1	Z4.3DP	10/18/2000	140	--	1,600	--	<90	--	1,250
A-02-15 06CBB1	Z4.3DP	1/26/2001	10	118	<32	<450	<530	<46	1,100
A-02-15 06CBB1	Z4.3DP	1/26/2001	140	--	80.0	--	<90	--	1,160
A-02-15 06CBB2	Z4.3DP14	11/28/2001	440	--	500	--	90	--	1,210
A-02-15 06CBB3	Z4.8DP8	12/6/2001	440	--	<60	--	<90	--	1,170
A-02-14 01DAA1	Z4.7	6/2/1999	440	--	57,600	--	500	--	1,370
A-02-14 01DAA2	Z4.6DP	11/28/2001	440	--	30,900	--	270	--	1,270
A-02-14 01DAA2	Z4.6DP	6/24/2002	10	--	29,200	--	280	--	1,220
A-02-14 01DAA3	Z4.6DP14	11/28/2001	440	--	36,900	--	270	--	1,250
A-02-14 01DAA3	Z4.6DP14	6/24/2002	440	--	29,400	--	160	--	1,240
A-02-14 01DAA3	Z4.6DP14	5/19/2004	440	--	6,740	--	<140	--	1,130
A-02-14 01DAA4	Z4.6DP8	12/6/2001	440	--	32,100	--	280	--	1,270
A-02-14 01DAA4	Z4.6DP8	6/24/2002	10	--	28,500	--	270	--	1,220

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Lithium, dissolved (μg/L as Li)	Manga-nese, dissolved (μg/L as Mn)	Molyb-denum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)
A-02-14 01DAA5	Z4.8DP	11/28/2001	440	--	43,800	--	290	--	1,300
A-02-14 01DAA5	Z4.8DP	4/2/2002	440	--	40,800	--	290	--	1,170
A-02-14 01DAA5	Z4.8DP	6/24/2002	440	--	29,400	--	160	--	1,240
A-02-14 01DAA5	Z4.8DP	11/5/2002	440	--	36,800	--	210	--	1,220
A-02-14 01DAA5	Z4.8DP	5/19/2004	10	--	8,890	--	<90	--	1,150
A-02-14 01DAA6	Z4.8DP14	11/28/2001	440	--	45,400	--	350	--	1,260
A-02-14 01DAA6	Z4.8DP14	6/24/2002	10	--	40,400	--	320	--	1,160
A-02-14 01DAA6	Z4.8DP14	11/5/2002	440	--	40,000	--	320	--	1,160
A-02-14 01DAA7	Z4.8DP8	12/6/2001	440	--	45,200	--	320	--	1,300
A-02-14 01DAA7	Z4.8DP8	6/25/2002	10	--	37,500	--	240	--	1,190
A-02-14 01DAA7	Z4.8DP8	11/5/2002	440	--	38,600	--	250	--	1,200
A-02-14 01DAA7	Z4.8DP8	5/19/2004	440	--	35200	--	<300	--	1210
A-02-14 01ADD01	Z5	6/4/1998	440	--	44,900	--	360	--	1,500
A-02-14 01ADD01	Z5	12/23/1998	440	--	43,500	--	300	--	1,500
A-02-14 01ADD01	Z5	2/11/1999	10	135	42,000	<150	250	<12	1,460
A-02-14 01ADD01	Z5	3/24/1999	440	--	38,700	--	250	--	1,420
A-02-14 01ADD01	Z5	4/23/1999	10	--	39,500	--	250	--	1,430
A-02-14 01ADD01	Z5	6/2/1999	440	--	40,700	--	310	--	1,410
A-02-14 01ADD01	Z5	8/25/1999	440	--	38,100	--	230	--	1,530
A-02-14 01ADD01	Z5	12/28/1999	440	--	44,600	--	410	--	1,430
A-02-14 01ADD01	Z5	6/14/2000	440	--	27,200	--	280	--	1,410
A-02-14 01ADD01	Z5	8/30/2000	10	138	29,000	<102	200	<21	1,240
A-02-14 01ADD01	Z5	10/18/2000	10	122	35,800	<170	230	<35	1,440
A-02-14 01ADD01	Z5	10/18/2000	140	--	37,200	--	260	--	1,520
A-02-14 01ADD01	Z5	1/26/2001	10	133	320	<450	<530	<46	1,070
A-02-14 01ADD01	Z5	1/26/2001	140	--	310	--	<90	--	1,180
A-02-14 01ADD01	Z5	4/4/2001	10	145	7,580	<450	<530	<46	1,310
A-02-14 01ADD01	Z5	4/4/2001	140	--	8,140	--	120	--	1,250
A-02-14 01ADD01	Z5	6/25/2002	10	--	520	--	<90	--	1,060
A-02-14 01ADD01	Z5	5/19/2004	440	--	170	--	<90	--	1,040
A-02-14 01ADD02	Z5	12/6/2001	440	--	26,000	--	190	--	1,320

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Lithium, dissolved (μg/L as Li)	Manga-nese, dissolved (μg/L as Mn)	Molyb-denum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)
A-02-14 01ADD02	Z5	6/25/2002	10	--	25,000	--	180	--	1,220
A-02-14 01ADD03	Z5	12/6/2001	440	--	8,470	--	110	--	1,270
A-02-14 01ADD03	Z5	6/25/2002	10	--	4,650	--	<90	--	1,190
A-02-14 01ADD06	Z5	12/6/2001	440	--	12,700	--	<90	--	1,390
A-02-14 01ADD06	Z5	6/25/2002	10	--	17,200	--	<90	--	1,260
A-02-14 01ADD04	Z5	11/28/2001	440	--	9,940	--	<90	--	1,220
A-02-14 01ADD05	Z5	12/6/2001	440	--	12,800	--	<90	--	1,390
A-02-14 01ADD05	Z5	6/25/2002	10	--	19,400	--	<90	--	1,270
A-02-14 01ADD07	Z5	6/25/2002	10	--	20,200	--	<90	--	1,280
A-02-14 01ADD07	Z5	5/19/2004	440	--	11,400	--	<90	--	1,110
A-02-14 01ADD08	Z5	6/25/2002	10	--	23,200	--	200	--	1,300
A-02-14 01ADD08	Z5	5/19/2004	440	--	12,800	--	<90	--	1,170
A-02-14 01ADD09	Z5	6/25/2002	10	--	12,300	--	<90	--	1,220
A-02-14 01ADD09	Z5	5/19/2004	440	--	8,320	--	<90	--	1,110
A-02-14 01ADA1	Z5.7	6/2/1999	440	--	41,300	--	240	--	1,380
A-02-14 01ADA1	Z5.7	8/30/2000	10	116	19,900	E57	<120	<21	1,170
A-02-14 01ADA1	Z5.7	10/18/2000	10	110	21,700	<170	<200	<35	1,210
A-02-14 01ADA1	Z5.7	10/18/2000	140	--	21,600	--	<90	--	1,190
A-02-14 01ADA1	Z5.7	1/26/2001	10	96	9,990	<140	<160	<5	897
A-02-14 01ADA1	Z5.7	1/26/2001	140	--	11,700	--	<90	--	1,260
A-02-14 01ADA1	Z5.7	6/13/2001	10	189	2,860	<50	E40	<5	1,260
A-02-14 01ADA1	Z5.7	6/13/2001	140	--	2,980	--	<90	--	1,370
A-02-14 01ADA1	Z5.7	8/6/2001	10	141	3,820	<1100	<1300	<120	1,120
A-02-14 01ADA1	Z5.7	8/6/2001	140	--	3,600	--	<90	--	1,190
A-02-14 01ADB1	Z6.2	6/17/1999	440	--	43,300	--	180	--	1,540
A-02-14 01ADB1	Z6.2	10/18/2000	10	164	48,500	<170	210	<35	1,430
A-02-14 01ADB1	Z6.2	10/18/2000	140	--	49,900	--	230	--	1,490
A-02-14 01ADB1	Z6.2	1/25/2001	140	--	41,200	--	110	--	1,590
A-02-14 01ADB1	Z6.2	1/26/2001	10	147	40,200	<50	160	<5	1,200
A-02-14 01ADB1	Z6.2	4/4/2001	10	154	45,900	<140	190	<46	1,280
A-02-14 01ADB1	Z6.2	4/4/2001	140	--	52,200	--	210	--	1,450

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Lab-ora-tory	Lithium, dissolved (µg/L as Li)	Manga-nese, dissolved (µg/L as Mn)	Molyb-denum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)
A-02-14 01ADB1	Z6.2	6/13/2001	10	175	41,300	<140	190	E2	1,440
A-02-14 01ADB1	Z6.2	6/13/2001	140	--	38,900	--	120	--	1,570
A-02-14 01ADB1	Z6.2	8/6/2001	10	165	39,600	<1100	<1300	<120	1,360
A-02-14 01ADB1	Z6.2	8/6/2001	140	--	36,500	--	120	--	1,540
A-02-14 01ADB1	Z6.2	6/26/2002	10	--	27,500	--	<90	--	1,340
A-02-14 01ADB2	Z6.2	10/24/2001	440	--	41,800	--	180	--	1,350
A-02-14 01ADB2	Z6.2	12/6/2001	440	--	42,100	--	160	--	1,440
A-02-14 01ADB2	Z6.2	6/26/2002	10	--	39,900	--	180	--	1,330
A-02-14 01ADB7	Z6.2	6/26/2002	10	--	36,000	--	<90	--	1,320
A-02-14 01ADB6	Z6.2	6/26/2002	10	--	39,900	--	<90	--	1,680
A-02-14 01ADB3	Z6.2	11/28/2001	440	--	13,900	--	<90	--	1,430
A-02-14 01ADB3	Z6.2	6/26/2002	10	--	25,000	--	<90	--	1,370
A-02-14 01ADB3	Z6.2	5/20/2004	440	--	28,500	--	<90	--	1,290
A-02-14 01ADB4	Z6.2	11/28/2001	440	--	31,600	--	<90	--	1,480
A-02-14 01ADB4	Z6.2	6/26/2002	10	--	32,900	--	<90	--	1,370
A-02-14 01ADB5	Z6.2	12/6/2001	440	--	26,200	--	<90	--	1,450
A-02-14 01ADB5	Z6.2	6/26/2002	10	--	30,900	--	<90	--	1,380
A-02-14 01ADB5	Z6.2	5/20/2004	440	--	36,700	--	<90	--	1,350
A-02-14 01ABD1	Z7	6/3/1998	440	--	4,600	--	<90	--	1,500
A-02-14 01ABD1	Z7	6/3/1999	440	--	5,100	--	<90	--	1,430
A-02-14 01ABD1	Z7	8/25/1999	440	--	5,800	--	<90	--	1,520
A-02-14 01ABD1	Z7	8/30/2000	10	74	9,020	<102	<120	<21	1,330
A-02-14 01ABD1	Z7	6/13/2001	10	96	13,000	<50	<50	<5	1,400
A-02-14 01ABD1	Z7	6/13/2001	140	--	10,800	--	<90	--	1,560
A-02-14 01ABD1	Z7	5/20/2004	440	--	15,200	--	<90	--	1,150
A-02-14 01ABD2	Z7DP3	6/26/2002	10	--	7,350	--	<90	--	1,190
A-02-14 01ABD3	Z7DP8	6/26/2002	10	--	11,000	--	<90	--	1,200
A-02-14 01ABD3	Z7DP8	5/20/2004	440	--	17900	--	<90	--	1160
A-02-14 01ABD6	Z7DP14	6/26/2002	10	--	19,000	--	<90	--	1,380
A-02-14 01ABD4	Z7.8DP	6/27/2002	10	--	3,420	--	<90	--	1,390
A-02-14 01ABD5	Z7.8DP14	6/27/2002	10	--	11,700	--	<90	--	1,330

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Lithium, dissolved (μg/L as Li)	Manganese, dissolved (μg/L as Mn)	Molybdenum, dissolved (μg/L as Mo)	Nickel, dissolved (μg/L as Ni)	Silver, dissolved (μg/L as Ag)	Strontium, dissolved (μg/L as Sr)
A-02-14 01BAA1	Z8.3DP	2/12/2003	440	--	10,800	--	<90	--	1,240
A-02-14 01BAA2	Z9.2DP	2/12/2003	440	--	14,600	--	<90	--	1,370
A-03-14 36CDD1	Z9a	6/3/1998	440	--	4,500	--	<90	--	1,500
A-03-14 36CDD1	Z9a	6/13/2001	10	104	14,300	<140	<160	<14	1,440
A-03-14 36CDD1	Z9a	6/27/2002	10	--	15,400	--	<90	--	1,380
A-03-14 36CDD1	Z9a	2/12/2003	440	--	18,200	--	30	--	1,370
A-03-14 36CDD1	Z9a	5/28/2003	440	--	18,400	--	<90	--	1,340
A-03-14 36CDD1	Z9a	11/18/2003	440	--	20,200	--	<90	--	1,360
A-03-14 36CDD1	Z9a	5/20/2004	440	--	15,300	--	<90	--	1,540
A-03-14 36CDD2	Z9aDP8	6/27/2002	10	--	17,400	--	<90	--	1,400
A-03-14 36CDD3	Z9aDP14	6/27/2002	10	--	15,400	--	<90	--	1,410
A-03-14 36CDD3	Z9aDP14	5/28/2003	440	--	20,500	--	<90	--	1,340
A-03-14 36CDD3	Z9aDP14	11/18/2003	440	--	22,600	--	<90	--	1,360
A-03-14 36CDD3	Z9aDP14	5/20/2004	440	--	22,600	--	<90	--	1,380
A-03-14 36CDD5	Z9.5DP	2/12/2003	440	--	6,980	--	<90	--	1,830
A-03-14 36CDA	Z10DP	2/12/2003	440	--	4,360	--	40	--	1,280
A-03-14 36CAA1	JJ15	6/1/1998	440	--	7,600	--	320	--	1,400
A-03-14 36CAA1	JJ15	6/3/1999	440	--	1,600	--	<90	--	1,360
A-03-14 35AAD	D10	6/1/1998	440	--	1,800	--	<90	--	1,500
A-03-14 35AAD	D10	6/11/2001	10	137	<10.0	<140	<160	<5	1,270
A-03-14 35AAD	D10	6/11/2001	140	--	170	--	<90	--	1,430
A-03-14 26DBD	D11	6/1/1998	440	--	930	--	<90	--	630
A-03-14 26DBD	D11	6/3/1999	440	--	1,600	--	<90	--	620

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-02-15 06CCD	Head of flow	6/4/1998	440	--	110	99	250	130	-65.6	-9.30
A-02-15 06CCD2	D1.5	6/2/1998	440	--	1,600	--	--	--	-67.1	-9.17
A-02-15 06CCD2	D1.5	6/3/1998	440	--	590	230	290	210	-65.6	-9.22
A-02-15 06CCD2	D1.5	6/1/1999	440	--	1,620	48	1,100	410	-66.8	-9.16
A-02-15 06CCA7	Z0	6/3/1998	440	--	180	98	270	220	-64.7	-9.30
A-02-15 06CCA7	Z0	12/23/1998	440	--	220	--	--	--	--	--
A-02-15 06CCA7	Z0	2/11/1999	10	<30	343	--	--	--	--	--
A-02-15 06CCA7	Z0	3/24/1999	440	--	340	--	--	--	--	--
A-02-15 06CCA7	Z0	4/23/1999	10	--	1,210	--	--	--	--	--
A-02-15 06CCA7	Z0	6/1/1999	440	--	510	42	1,100	320	-65.0	-9.05
A-02-15 06CCA7	Z0	12/28/1999	440	--	250	--	--	--	--	--
A-02-15 06CCA7	Z0	2/16/2000	440	--	<20	--	--	--	--	--
A-02-15 06CCA6	Z1	6/4/1998	440	--	600	83	280	270	-66.6	-9.36
A-02-15 06CCA6	Z1	6/1/1999	440	--	980	42	310	310	-64.0	-8.98
A-02-15 06CBC1	Z2.2	6/2/1999	440	--	130	--	--	--	-63.9	-9.17
PINAL CREEK AT Z4DP	Z4	6/4/1998	440	--	460	1,200	220	350	-63.1	-9.19
PINAL CREEK AT Z4DP	Z4	6/2/1999	440	--	360	25	440	120	-63.5	-8.78
A-02-15 06CBB1	Z4.3DP	2/16/2000	440	--	40	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	4/13/2000	440	--	50	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	6/14/2000	440	--	30	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	8/30/2000	10	<30	<60	26	200	190	-63.0	-8.66
A-02-15 06CBB1	Z4.3DP	10/18/2000	10	<50	<100	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	10/18/2000	140	--	20	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	10	<80	<200	--	--	--	--	--
A-02-15 06CBB1	Z4.3DP	1/26/2001	140	--	<20	--	--	--	--	--
A-02-15 06CBB2	Z4.3DP14	11/28/2001	440	--	<20	--	--	--	--	--
A-02-15 06CBB3	Z4.8DP8	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01DAA1	Z4.7	6/2/1999	440	--	60	16	1,600	200	-66.1	-9.15

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-02-14 01DAA2	Z4.6DP	11/28/2001	440	--	<20	--	--	--	--	--
A-02-14 01DAA2	Z4.6DP	6/24/2002	10	--	<20	--	--	--	--	--
A-02-14 01DAA3	Z4.6DP14	11/28/2001	440	--	<20	--	--	--	--	--
A-02-14 01DAA3	Z4.6DP14	6/24/2002	440	--	<20	--	--	--	--	--
A-02-14 01DAA3	Z4.6DP14	5/19/2004	440	--	20	--	--	--	-63.0	-8.69
A-02-14 01DAA4	Z4.6DP8	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01DAA4	Z4.6DP8	6/24/2002	10	--	<20	--	--	--	--	--
A-02-14 01DAA5	Z4.8DP	11/28/2001	440	--	80	--	--	--	--	--
A-02-14 01DAA5	Z4.8DP	4/2/2002	440	--	90	--	--	--	--	--
A-02-14 01DAA5	Z4.8DP	6/24/2002	440	--	<20	--	--	--	--	--
A-02-14 01DAA5	Z4.8DP	11/5/2002	440	--	<20	--	--	--	--	--
A-02-14 01DAA5	Z4.8DP	5/19/2004	10	--	<20	--	--	--	-62.6	-8.60
A-02-14 01DAA6	Z4.8DP14	11/28/2001	440	--	240	--	--	--	--	--
A-02-14 01DAA6	Z4.8DP14	6/24/2002	10	--	160	--	--	--	--	--
A-02-14 01DAA6	Z4.8DP14	11/5/2002	440	--	190	--	--	--	--	--
A-02-14 01DAA7	Z4.8DP8	12/6/2001	440	--	140	--	--	--	--	--
A-02-14 01DAA7	Z4.8DP8	6/25/2002	10	--	50	--	--	--	--	--
A-02-14 01DAA7	Z4.8DP8	11/5/2002	440	--	40	--	--	--	--	--
A-02-14 01DAA7	Z4.8DP8	5/19/2004	440	--	180	--	--	--	-63.6	-8.69
A-02-14 01ADD01	Z5	6/4/1998	440	--	<20	29	210	140	-65.7	-9.39
A-02-14 01ADD01	Z5	12/23/1998	440	--	<25	--	--	--	--	--
A-02-14 01ADD01	Z5	2/11/1999	10	<30	61	--	--	--	--	--
A-02-14 01ADD01	Z5	3/24/1999	440	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	4/23/1999	10	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	6/2/1999	440	--	40	3.4	890	170	-65.9	-9.31
A-02-14 01ADD01	Z5	8/25/1999	440	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	12/28/1999	440	--	35	--	--	--	--	--
A-02-14 01ADD01	Z5	6/14/2000	440	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	8/30/2000	10	<30	<60	1.6	540	140	-66.1	-9.20
A-02-14 01ADD01	Z5	10/18/2000	10	<50	E50	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-02-14 01ADD01	Z5	10/18/2000	140	--	30	--	--	--	--	--
A-02-14 01ADD01	Z5	1/26/2001	10	<80	<200	--	--	--	--	--
A-02-14 01ADD01	Z5	1/26/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	4/4/2001	10	<80	E112	--	--	--	--	--
A-02-14 01ADD01	Z5	4/4/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD01	Z5	5/19/2004	440	--	<20	--	--	--	-63.0	-8.64
A-02-14 01ADD02	Z5	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADD02	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD03	Z5	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADD03	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD06	Z5	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADD06	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD04	Z5	11/28/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADD05	Z5	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADD05	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD07	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD07	Z5	5/19/2004	440	--	<20	--	--	--	-63.8	-8.67
A-02-14 01ADD08	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD08	Z5	5/19/2004	440	--	<20	--	--	--	-63.3	-8.75
A-02-14 01ADD09	Z5	6/25/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADD09	Z5	5/19/2004	440	--	<20	--	--	--	-62.3	-8.58
A-02-14 01ADA1	Z5.7	6/2/1999	440	--	70	1.9	300	77	-64.3	-9.10
A-02-14 01ADA1	Z5.7	8/30/2000	10	<30	E41	1.1	170	43	-64.8	-8.78
A-02-14 01ADA1	Z5.7	10/18/2000	10	<50	<100	--	--	--	--	--
A-02-14 01ADA1	Z5.7	10/18/2000	140	--	<20	--	--	--	--	--
A-02-14 01ADA1	Z5.7	1/26/2001	10	<24	<60	--	--	--	--	--
A-02-14 01ADA1	Z5.7	1/26/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADA1	Z5.7	6/13/2001	10	<8	28				-64.2	-8.91
A-02-14 01ADA1	Z5.7	6/13/2001	140	--	30	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-02-14 01ADA1	Z5.7	8/6/2001	10	<200	<500	--	--	--	--	--
A-02-14 01ADA1	Z5.7	8/6/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADB1	Z6.2	6/17/1999	440	--	40	--	--	--	-64.4	-9.23
A-02-14 01ADB1	Z6.2	10/18/2000	10	<50	E54	--	--	--	--	--
A-02-14 01ADB1	Z6.2	10/18/2000	140	--	30	--	--	--	--	--
A-02-14 01ADB1	Z6.2	1/25/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADB1	Z6.2	1/26/2001	10	<8	21	--	--	--	--	--
A-02-14 01ADB1	Z6.2	4/4/2001	10	<24	E33	--	--	--	--	--
A-02-14 01ADB1	Z6.2	4/4/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADB1	Z6.2	6/13/2001	10	<24	E45	--	--	--	-67.2	-9.08
A-02-14 01ADB1	Z6.2	6/13/2001	140	--	<20	--	--	--	--	--
A-02-14 01ADB1	Z6.2	8/6/2001	10	<200	<500	--	--	--	--	--
A-02-14 01ADB1	Z6.2	8/6/2001	140	--	30	--	--	--	--	--
A-02-14 01ADB1	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB2	Z6.2	10/24/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADB2	Z6.2	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADB2	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB7	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB6	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB3	Z6.2	11/28/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADB3	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB3	Z6.2	5/20/2004	440	--	<20	--	--	--	-63.3	-8.63
A-02-14 01ADB4	Z6.2	11/28/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADB4	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB5	Z6.2	12/6/2001	440	--	<20	--	--	--	--	--
A-02-14 01ADB5	Z6.2	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ADB5	Z6.2	5/20/2004	440	--	<20	--	--	--	-63.9	-8.73
A-02-14 01ABD1	Z7	6/3/1998	440	--	<20	6.3	150	50	-68.0	-9.46
A-02-14 01ABD1	Z7	6/3/1999	440	--	<20	1.3	260	54	-67.0	-9.40
A-02-14 01ABD1	Z7	8/25/1999	440	--	<20	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-02-14 01ABD1	Z7	8/30/2000	10	<30	E36	--	--	--	-66.8	-9.31
A-02-14 01ABD1	Z7	6/13/2001	10	<8	E11	--	--	--	-65.3	-9.09
A-02-14 01ABD1	Z7	6/13/2001	140	--	<20	--	--	--	--	--
A-02-14 01ABD1	Z7	5/20/2004	440	--	<20	--	--	--	-63.3	-8.54
A-02-14 01ABD2	Z7DP3	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ABD3	Z7DP8	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ABD3	Z7DP8	5/20/2004	440	--	<20	--	--	--	-62.7	-8.44
A-02-14 01ABD6	Z7DP14	6/26/2002	10	--	<20	--	--	--	--	--
A-02-14 01ABD4	Z7.8DP	6/27/2002	10	--	<20	--	--	--	--	--
A-02-14 01ABD5	Z7.8DP14	6/27/2002	10	--	<20	--	--	--	--	--
A-02-14 01BAA1	Z8.3DP	2/12/2003	440	--	<20	--	--	--	--	--
A-02-14 01BAA2	Z9.2DP	2/12/2003	440	--	<20	--	--	--	--	--
A-03-14 36CDD1	Z9a	6/3/1998	440	--	<20	18	160	51	-65.7	-9.40
A-03-14 36CDD1	Z9a	6/13/2001	10	<24	<60	--	--	--	-66.2	-9.08
A-03-14 36CDD1	Z9a	6/27/2002	10	--	<20	--	--	--		
A-03-14 36CDD1	Z9a	2/12/2003	440	--	<20	--	--	--		
A-03-14 36CDD1	Z9a	5/28/2003	440	--	<20	--	--	--		
A-03-14 36CDD1	Z9a	11/18/2003	440	--	<20	--	--	--		
A-03-14 36CDD1	Z9a	5/20/2004	440	--	<20	--	--	--	-64.9	-8.83
A-03-14 36CDD2	Z9aDP8	6/27/2002	10	--	<20	--	--	--	--	--
A-03-14 36CDD3	Z9aDP14	6/27/2002	10	--	<20	--	--	--	--	--
A-03-14 36CDD3	Z9aDP14	5/28/2003	440	--	<20	--	--	--	--	--
A-03-14 36CDD3	Z9aDP14	11/18/2003	440	--	<20	--	--	--	--	--
A-03-14 36CDD3	Z9aDP14	5/20/2004	440	--	<20	--	--	--	-63.8	-8.77
A-03-14 36CDD5	Z9.5DP	2/12/2003	440	--	<20	--	--	--	--	--
A-03-14 36CDA	Z10DP	2/12/2003	440	--	<20	--	--	--	--	--
A-03-14 36CAA1	JJ15	6/1/1998	440	--	370	63	190	370	-65.5	-9.03
A-03-14 36CAA1	JJ15	6/3/1999	440	--	50	--	--	--	-64.8	-8.92
A-03-14 35AAD	D10	6/1/1998	440	--	20	30	190	210	-65.2	-9.07
A-03-14 35AAD	D10	6/11/2001	10	<24	<60	--	--	--	-63.9	-8.89

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California;mg/L, milligrams per liter; μg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated]

Site location	Other Id	Date	Laboratory	Vanadium, dissolved (μg/L as V)	Zinc, dissolved (μg/L as Zn)	1,1,2-Trichloro-1,2,2-trifluoroethane (pg/kg)	Dichlorodifluoromethane (pg/kg)	Trichlorofluoromethane (pg/kg)	Deuterium/Protium, unfiltered (per mil)	Oxygen-18/Oxygen-16, unfiltered (per mil)
A-03-14 35AAD	D10	6/11/2001	140	--	<20	--	--	--	--	--
A-03-14 26DBD	D11	6/1/1998	440	--	<20	3.8	57	27	-70.5	-9.76
A-03-14 26DBD	D11	6/3/1999	440	--	<20	--	--	--	-68.5	-9.66

Appendix B. Surface Water

SURFACE WATER

333156110521100 Pinal Creek at Head of Flow near Globe, Arizona

LOCATION.—See fig. 2 for locations of head of flow.

Field Measurements											
[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; --, no data]											
Date	**Time**	**Discharge, instantaneous (ft^3/s)**	**Specific conductance (µS/cm)**	**pH (standard units)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Barometric pressure (mm of mercury)**	**Oxygen, dissolved (mg/L)**	**Oxygen, dissolved (percent saturation)**	**Alkalinity, dissolved, (mg/L as $CaCO_3$)**	**Bicarbonate, dissolved (mg/L as HCO_3)**
11/22/1996	0845	--	2,990	6.1	13.5	14.5	685	1.4	16	129	157
2/7/1997	0810	--	3,160	6.0	-5.0	10.0	693	2.6	26	27	33
3/28/1997	0915	--	2,720	6.0	18.0	14.7	683	2.2	25	72	88
5/23/1997	0750	0.15	2,680	6.0	16.0	17.4	681	1.2	14	91	111
7/25/1997	0855	0.4	2,750	6.0	31.0	23.0	681	3.4	45	80	98
9/25/1997	1320	0.02	2,710	6.0	29.0	23.0	679	1.9	26	79	96
11/25/1997	0835	0.04	2,700	6.0	5.0	13.0	685	1.3	14	70	85
1/22/1998	1315	--	2,570	5.8	10.5	13.5	683	3.2	35	68	83
3/25/1998	0845	0.02	2,390	6.0	14.0	13.2	679	2.0	22	69	84
6/2/1998	1045	--	2,600	5.6	--	17.8	685	1.7	20	45	--
7/28/1998	0730	0.5	2,660	6.1	26.0	22.2	680	2.5	33	53	--
10/21/1998	0850	--	2,250	5.6	13.0	17.0	683	0.8	9	22	--
11/12/1998	1320	--	2,060	5.5	14.5	16.8	685	1.6	19	29	--
12/22/1998	1050	--	1,970	5.6	10.0	14.0	685	1.0	11	23	--
2/10/1999	0945	--	2,000	5.7	10.0	12.8	680	1.6	17	22	--
3/23/1999	0950	--	2,030	5.5	14.0	16.0	680	1.4	17	22	--
4/22/1999	0940	--	2,110	5.5	20.5	17.5	--	1.4	--	22	--
6/14/1999	0845	--	2,130	5.4	--	19.5	--	0.3	--	19	--

Laboratory Measurements

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated]

Date	Laboratory	Resdue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved, (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved, (mg/L as F)	Boron, dissolved (μg/L as B)	Copper, dissolved (μg/L as Cu)
11/22/1996	10	2,830	520	120	72.0	4.40	1,900	56.0	0.6	61	<30
2/7/1997	10	2,110	360	87.0	59.0	5.30	1,400	45.0	5.6	73	200
3/28/1997	10	2,690	521	116	65.3	4.14	1,780	56.7	1.7	62	38
5/23/1997	10	2,730	516	120	70.4	4.64	1,810	54.7	1.4	92	<50
7/25/1997	10	2,610	479	114	70.7	4.82	1,750	47.2	1.4	89	<30
9/25/1997	10	2,700	491	123	76.4	4.76	1,790	56.4	1.6	84	<30
11/25/1997	10	2,660	502	124	71.5	4.50	1,760	45.9	1.3	71	<30
1/22/1998	10	2,590	474	118	66.9	4.12	1,730	54.8	1.2	60	<30
3/25/1998	10	2,450	455	115	63.9	4.41	1,620	49.9	1.1	77	<50
6/2/1998	440	2,460	460	115	68.0	4.50	1,620	57.9	1.6	--	<30
7/28/1998	10	2,680	528	136	76.8	5.53	1,740	57.1	0.8	77	<30
10/21/1998	10	2,050	354	90.4	55.7	6.57	1,340	50.3	8.7	78	<30
11/12/1998	10	1,830	331	79.0	56.5	5.99	1,170	51.6	3.5	72	50
12/22/1998	440	1,880	311	74.3	54.0	6.90	1,240	48.2	5.0	--	41
2/10/1999	10	1,890	320	75.1	54.6	5.87	1,230	50.9	4.5	71	45
3/23/1999	10	1,900	324	75.6	52.8	6.34	1,230	50.8	3.7	<160	E71
4/22/1999	10	--	330	78.0	56.0	--	1,240	51.7	6.3	--	80
6/14/1999	440	2,050	350	89.0	63.0	7.00	1,320	50.7	5.7	--	160

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated]

Date	Laboratory	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)
11/22/1996	10	87	25,000	190	10	22.0	<1.5	<3	<15	<30
2/7/1997	10	40	57,000	780	1,200	25.0	6.4	14	24	<30
3/28/1997	10	12	46,400	320	<9	22.3	<1.5	<3	35	<30
5/23/1997	10	<15	44,700	280	<15	24.1	<2.5	<5	28	<50
7/25/1997	10	530	42,100	290	32	25.1	<1.5	<3	23	<30
9/25/1997	10	307	43,100	310	15	28.8	<1.5	<3	22	40
11/25/1997	10	199	43,100	290	43	23.2	3.0	<8	18	<30
1/22/1998	10	174	39,800	350	<60	20.8	<3.0	<24	<42	<300
3/25/1998	10	466	36,700	240	<100	32.8	<5.0	<40	<70	<500
6/2/1998	440	<130	45,500	380	50	--	--	--	--	--
7/28/1998	10	222	30,200	390	<60	42.5	<3.0	<24	<42	<300
10/21/1998	10	508	57,700	830	601	24.5	E4.7	E16	E26	<300
11/12/1998	10	38	45,400	650	1,110	23.5	E4.7	E15	<42	<300
12/22/1998	440	<120	56,900	900	1,370	--	--	--	--	--
2/10/1999	10	46	58,300	980	1,550	20.3	5.6	25	<42	<300
3/23/1999	10	<100	60,100	1,080	1,800	22.2	<16.0	E38	<140	<1000
4/22/1999	10	<130	58,800	1,130	1,600	--	--	--	--	--
6/14/1999	440	<130	66,900	1,190	1,510	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated]

Date	Laboratory	Lithium, dissolved (μg/L as Li)	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Deuterium/ Protium ratio (per mil)	Oxygen-18/ Oxygen-16 ratio (per mil)
11/22/1996	10	140	<30	<3	<5	12	54.0	1,800	<18	--	--
2/7/1997	10	190	<30	4	1,800	620	68.0	1,300	<18	--	--
3/28/1997	10	139	<30	<3	60	55	50.2	1,660	<18	--	--
5/23/1997	10	161	<50	<5	<5	55	56.5	1,730	<30	--	--
7/25/1997	10	163	<30	<3	<20	42	57.9	1,660	<18	--	--
9/25/1997	10	170	<30	<3	<20	59	59.3	1,740	<18	--	--
11/25/1997	10	168	<30	<3	40	48	59.9	1,740	<18	--	--
1/22/1998	10	165	<180	<12	<30	41	55.1	1,650	<30	--	--
3/25/1998	10	155	<300	<20	50	<60	56.0	1,610	<50	--	--
6/2/1998	440	--	--	--	<110	50	59.9	1,600	--	-67.1	-9.20
7/28/1998	10	220	<180	<12	40	<36	67.3	1,880	<30	--	--
10/21/1998	10	191	<150	E10	1,990	453	66.4	1,230	<30	--	--
11/12/1998	10	182	<150	<12	1,490	301	64.6	1,140	<30	--	--
12/22/1998	440	--	--	--	1,830	767	66.9	1,060	--	--	--
2/10/1999	10	195	<150	E7	2,300	755	70.4	1,050	<30	--	--
3/23/1999	10	197	<500	<40	2,190	758	72.3	1,050	<100	--	--
4/22/1999	10	--	--	--	2,280	780	73.4	1,080	--	--	--
6/14/1999	440	--	--	--	2,470	730	78.5	1,200	--	-65.4	-9.17

SURFACE WATER—Continued

09498380 Pinal Creek at Setka Ranch near Globe, Arizona

LOCATION.—Lat 33°32'23", long 110°52'26", in SE1/4SW1/4SW1/4, sec. 6, T. 2 N., R. 15 E., at an unpaved ford 2.9 km downstream from Hicks Crossing, 5.1 km upstream from Inspiration Dam, 11.3 km upstream from mouth, and 18 km northwest of Globe.

DRAINAGE AREA.—458 km^2, including approximately 85 km^2 that is partly or entirely noncontributing due to mine pits and dumps.

CHANNEL ELEVATION.—884 m above National Geodetic Vertical Datum of 1929, from topographic map.

PERIOD OF RECORD.—July 1987 to current year.

REMARKS.—Station was formerly identified by number 333223110522600.

Field Measurements

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; --, no data]

Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (µS/cm)	pH, water (standard units)	Temperature, air (°C)	Temperature (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, dissolved (mg/L as HCO_3)
11/22/1996	0945	--	2,300	6.1	15.5	17.0	686	7.9	92	41	50
2/7/1997	1015	3.3	2,320	6.0	4.0	5.0	694	8.0	69	26	32
3/28/1997	1040	--	2,240	6.0	19.5	20.0	685	6.1	75	29	35
5/23/1997	1025	--	2,200	6.0	--	20.2	683	6.1	76	29	35
7/25/1997	1045	2.6	2,150	5.9	33.0	23.4	682	6.1	81	27	33
9/25/1997	1205	2.6	2,140	6.0	26.0	22.0	680	5.8	75	29	35
11/25/1997	1050	2.9	2,150	5.8	16.5	17.8	688	6.3	75	22	27
1/23/1998	1000	--	2,060	5.6	12.0	14.5	685	7.3	80	27	33
3/25/1998	1015	3.1	2,020	5.9	--	18.0	680	6.0	72	24	29
6/2/1998	0930	2.7	2,090	5.7	27.0	19.5	685	5.6	69	25	--
7/28/1998	0945	2.5	2,090	5.8	34.0	23.0	682	5.9	78	27	--
10/21/1998	1045	1.0	2,150	5.7	16.0	18.6	685	2.0	25	27	--
11/3/1998	1445	1.2	2,200	5.8	23.0	19.0	682	4.9	60	30	--
12/22/1998	0950	0.3	2,050	6.0	5.0	13.5	685	8.5	92	26	--
2/10/1999	1055	0.5	2,090	5.7	--	16.0	680	7.0	80	28	--
3/23/1999	1055	0.4	2,210	5.9	21.7	19.6	675	--	--	22	--
4/22/1999	1045	0.3	2,280	5.9	23.0	20.5	672	7.6	97	26	--
6/14/1999	1010	0.2	2,140	6.0	--	23.0	--	7.3	--	19	--
12/27/1999	1405	5.7	2,230	7.5	--	17.2	--	8.3	--	10	--

Field Measurements (continued)

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; --, no data]

Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (µS/cm)	pH, water (standard units)	Temperature, air (°C)	Temperature (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, dissolved (mg/L as HCO_3)
2/15/2000	0800	7.1	2,160	7.2	5.0	15.5	--	8.5	--	10	--
8/29/2000	1000	6.0	1,980	7.0	--	22.5	683	7.1	92	15	--
10/17/2000	0845	5.8	1,970	7.4	--	18.0	--	8.2	--	6	--
1/25/2001	0840	7.8	1,910	7.5	--	15.5	--	7.2	--	11	--
4/5/2001	0830	6.0	1,930	7.7	--	18.0	680	2.1	25	14	--
6/12/2001	0845	5.4	1,870	7.6	--	--	--	8.2	--	10	--
8/6/2001	1515	5.0	1,900	7.2	33.8	23.5	--	7.2	--	8	--
10/24/2001	0830	7.5	1,890	7.2	--	17.5	--	--	--	17	--
1/15/2002	0950	6.3	1,870	7.0	9.0	16.0	682	6.1	70	12	--
4/2/2002	1210	5.5	2,030	7.2	--	21.0	680	7.3	93	13	--
8/21/2002	0715	--	2,130	7.3	--	--	681	7.9	--	6	--
11/4/2002	0830	--	2,100	7.2	--	16.0	680	8.8	101	11	--
5/27/2003	1135	--	2,040	7.6	--	22.1	683	7.8	101	6	--
11/18/2003	2300	--	2,100	7.2	--	--	--	--	--	11	--
5/18/2004	1115	3.0	1,860	7.3	--	22.0	684	7.8	100	6	--

Laboratory Measurements

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Residue, water, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, water, dissolved (mg/L as $S0_4$)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Boron, dissolved (µg/L as B)	Copper, dis–solved (µg/L as Cu)
11/22/1996	10	2,120	360	86.0	57.0	5.70	1,400	45.0	5.5	66	160
2/7/1997	10	2,110	370	83.0	53.0	5.30	1,400	44.0	5.5	78	190
3/28/1997	10	2,130	356	86.5	56.4	5.75	1,420	45.4	5.2	65	196
5/23/1997	10	2,110	363	84.8	55.8	5.96	1,390	46.0	4.9	82	199
7/25/1997	10	2,020	344	81.9	54.7	6.19	1,340	45.8	2.5	74	161
9/25/1997	10	2,050	345	87.1	57.7	5.75	1,360	46.2	3.4	86	190
11/25/1997	10	2,040	350	87.3	58.0	6.00	1,340	46.6	5.0	73	208

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Residue, water, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, water, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Boron, dissolved (µg/L as B)	Copper, dissolved (µg/L as Cu)
1/23/1998	10	1,970	333	82.0	55.5	5.93	1,300	49.8	5.1	74	226
3/25/1998	10	2,000	351	84.3	55.8	6.23	1,300	50.8	7.2	73	283
6/2/1998	440	1,970	340	83.0	56.0	11.3	1,280	49.7	4.8	--	260
7/28/1998	10	1,960	358	88.5	59.4	6.25	1,230	49.8	3.6	83	240
10/21/1998	10	1,960	332	82.7	56.9	6.82	1,270	49.0	7.6	69	E19
11/3/1998	10	1,980	336	82.7	54.0	6.11	1,290	50.9	1.6	68	E20
12/22/1998	440	2,010	339	84.6	57.4	8.00	1,310	48.4	4.5	--	<30
2/10/1999	10	2,040	351	88.1	60.0	6.07	1,320	51.2	3.9	74	31
3/23/1999	10	2,080	350	84.6	56.7	6.22	1,370	52.0	3.4	<160	<100
4/22/1999	10	2,110	353	90.2	62.2	6.19	1,390	51.8	5.2	66	37
6/14/1999	440	2,120	360	90.0	61.0	6.90	1,390	50.5	4.7	--	<30
12/27/1999	440	1,880	375	56.5	103	5.50	1,270	54.7	1.9	--	<30
2/15/2000	440	1,860	430	35.0	72.0	8.60	1,250	49.0	1.6	--	<30
8/29/2000	10	1,690	384	46.0	57.8	5.27	1,130	47.4	1.5	54	<10
10/17/2000	10	--	352	54.2	61.8	--	1,150	48.6	1.5	E61	<50
10/17/2000	140	--	380	57.0	59.0	6.80	--	--	--	--	<30
1/25/2001	10	--	356	52.4	59.3	--	1,090	47.6	1.7	169	<50
1/25/2001	140	--	367	50.0	60.0	5.30	--	--	--	--	<30
4/5/2001	10	--	325	45.8	59.8	--	1,050	51.9	1.5	54	<5
4/5/2001	140	--	358	46.0	54.0	4.70	--	--	--	--	<30
6/12/2001	10	--	335	48.3	56.7	--	1,090	53.0	1.5	55	<5
6/12/2001	140	--	366	53.0	61.0	5.20	--	--	--	--	<30
8/6/2001	10	1,650	349	48.8	60.2	5.02	1,110	54.6	1.4	56	<120
8/6/2001	140	--	385	49.0	61.0	4.90	--	--	--	--	<30
10/24/2001	440	1,660	343	57.0	60.0	5.00	1,100	54.8	1.6	--	<30
1/15/2002	440	1,690	380	49.7	60.3	5.05	1,110	54.8	1.5	--	<30
4/2/2002	440	1,740	380	47.2	62.2	5.17	1,170	56.9	1.5	--	<30
8/21/2002	10	1,820	422	50.4	61.6	4.98	1,210	53.7	1.7	--	<30

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Residue, water, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, water, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Boron, dissolved (μg/L as B)	Copper, dissolved (μg/L as Cu)
11/4/2002	440	1,790	387	46.7	66.2	4.95	1,210	52.8	1.43	--	<30
5/27/2003	440	1,700	378	48.9	64.0	5.05	1,140	48.3	1.3	--	<30
11/18/2003	440	1,690	371	51.9	63.7	5.21	1,120	52.8	1.4	--	<30
5/18/2004	440	--	370	47.4	63.2	5.27	1,090	54.5	1.5	--	<30

Date	Laboratory	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)
11/22/1996	10	72	59,000	780	1,200	25.0	5.2	8	<15	70	180
2/7/1997	10	44	59,000	760	1,200	24.0	5.1	17	22	<30	180
3/28/1997	10	117	61,300	780	1,050	27.6	5.3	12	21	<30	195
5/23/1997	10	117	60,300	860	1,140	27.2	6.2	29	<35	<70	192
7/25/1997	10	94	57,100	780	1,050	26.8	5.2	7	25	<30	188
9/25/1997	10	140	58,700	800	1,150	27.7	6.0	11	23	<30	195
11/25/1997	10	135	59,200	800	1,300	27.3	5.1	14	23	<30	195
1/23/1998	10	99	55,600	800	1,260	25.4	5.8	<24	<42	<300	192
3/25/1998	10	110	59,500	810	1,510	28.6	7.1	<40	<70	<500	196
6/2/1998	440	<130	57,100	780	1,300	--	--	--	--	--	--
7/28/1998	10	230	61,700	780	1,440	29.1	6.1	<24	<42	<300	207
10/21/1998	10	249	63,300	870	1,330	25.4	6.2	E16	E31	<300	199
11/3/1998	10	164	61,300	860	1,220	25.1	E4.6	E16	E23	<300	195
12/22/1998	440	<120	62,200	820	1,120	--	--	--	--	--	--
2/10/1999	10	101	67,500	950	1,220	24.4	5.5	31	<42	<300	197
3/23/1999	10	E76	64,500	1,060	1,220	24.0	<16.0	<80	<140	<1,000	197
4/22/1999	10	108	63,900	1,020	1,210	25.2	4.9	30	<42	<300	213
6/14/1999	440	<130	63,600	1,010	1,110	--	--	--	--	--	--
12/27/1999	440	<130	530	<90	<20	--	--	--	--	--	--
2/15/2000	440	<130	270	<90	<20	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)
8/29/2000	10	<10	66.4	<40	<20	48.9	<1.6	<8	E8	<100	124
10/17/2000	10	<50	144	<200	<100	8.5	E.8	<40	<70	0.14	131
10/17/2000	140	<130	260	<90	<20	--	--	--	--	--	--
1/25/2001	10	<100	664	<530	<200	8.1	<10.0	<80	<100	<.08	141
1/25/2001	140	<130	570	<90	<20	--	--	--	--	--	--
4/5/2001	10	<10	160	<50	E14	11.3	<1.0	<8	<10	<.08	116
4/5/2001	140	<130	430	<90	<20	--	--	--	--	--	--
6/12/2001	10	<10	220	<50	<20	7.6	<1.0	<8	<10	<.08	138
6/12/2001	140	<130	230	<90	<20	--	--	--	--	--	--
8/6/2001	10	<10	104	<50	<500	7.5	<1.0	<200	<10	<.08	131
8/6/2001	140	<130	160	<90	<20	--	--	--	--	--	--
10/24/2001	440	<130	480	<90	<20	--	--	--	--	--	--
1/15/2002	440	<130	<60	<90	<20	--	--	--	--	--	--
4/2/2002	440	<130	<60	<90	<20	--	--	--	--	--	--
8/21/2002	10	<130	<60	<90	<20	--	--	--	--	--	--
11/4/2002	440	<130	<60	<90	<20	--	--	--	--	--	--
5/27/2003	440	<130	<60	<90	<20	--	--	--	--	--	--
11/18/2003	440	<130	70	<90	<20	--	--	--	--	--	--
5/18/2004	440	<130	<60	<90	<20	--	--	--	--	--	--

Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Deutrium/ Protium ratio (per mil)	Oxygen-18/ Oxygen-16 ratio (per mil)
11/22/1996	10	30	<3	1,830	580	67.0	1,300	<18	--	--
2/7/1997	10	<30	5	1,810	610	65.0	1,200	<18	--	--
3/28/1997	10	<30	6	1,860	618	67.1	1,310	<18	--	--
5/23/1997	10	<70	<7	1,900	675	69.3	1,300	<42	--	--
7/25/1997	10	<30	4	1,710	573	66.7	1,180	<18	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Deutrium/ Protium ratio (per mil)	Oxygen-18/ Oxygen-16 ratio (per mil)
9/25/1997	10	<60	<4	1,690	582	68.0	1,220	<18	--	--
11/25/1997	10	<30	5	1,940	624	69.0	1,200	<18	--	--
1/23/1998	10	<180	<12	1,980	605	65.6	1,160	<30	--	--
3/25/1998	10	<300	<20	2,090	658	69.6	1,210	<50	--	--
6/2/1998	440	--	--	1,900	640	70.6	1,100	--	-66.2	-9.19
7/28/1998	10	<180	<12	2,020	678	74.2	1,240	<30	--	--
10/21/1998	10	<150	E10	1,930	757	71.9	1,150	<30	--	--
11/3/1998	10	<150	E6	1,770	674	69.5	1,140	<30	--	--
12/22/1998	440	--	--	1,700	668	69.9	1,180		--	--
2/10/1999	10	<150	<12	1,900	685	71.8	1,190	<30	--	--
3/23/1999	10	<500	<40	1,740	684	70.1	1,180	<100	--	--
4/22/1999	10	<150	14	1,800	643	74.1	1,220	<30	--	--
6/14/1999	440	--	--	1,800	580	74.0	1,260	--	-63.7	-9.08
12/27/1999	440	--	--	<110	<20	13.0	1,190	--	--	--
2/15/2000	440	--	--	<110	<20	11.7	1,230	--	--	--
8/29/2000	10	<34	<7	M	<13	12.5	1,070	<10	-63.0	-8.88
10/17/2000	10	<170	<35	<80	<65	15.2	1,120	<50	--	--
10/17/2000	140	--	--	<110	<20	16.0	1,200	--	--	--
1/25/2001	10	<450	<46	<150	<130	15.3	1,110	<80	--	--
1/25/2001	140	--	--	210	<20	15.1	1,110	--	--	--
4/5/2001	10	<50	<5	<20	<13	17.7	978	<8	--	--
4/5/2001	140	--	--	<110	<20	20.3	1,090	--	--	--
6/12/2001	10	<50	<5	<20	<13	18.7	914	<8	-64.3	-8.92
6/12/2001	140	--	--	<110	<20	18.5	1,150	--	--	--
8/6/2001	10	<50	<5	<20	<13	17.5	1,050	<200	--	--
8/6/2001	140	--	--	<110	<20	18.1	1,200	--	--	--
10/24/2001	440	--	--	<110	<20	19.9	1,100	--	--	--
1/15/2002	440	--	--	<110	<20	17.3	1,050	--	--	--
4/2/2002	440	--	--	<110	<20	14.8	1,010	--	--	--
8/21/2002	10	--	--	<110	<20	13.2	1,030	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; mg/L, milligrams per liter; μg/L, micrograms per liter; <, actual value is known to be less than value shown; --, no data; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)	Deutrium/ Protium ratio (per mil)	Oxygen-18/ Oxygen-16 ratio (per mil)
11/4/2002	440	--	--	140	<20	13.0	1,130	--	--	--
5/27/2003	440	--	--	180	<20	12.8	960	--	--	--
11/18/2003	440	--	--	230	<20	14.2	972	--	--	--
5/18/2004	440	--	--	<110	<20	12.9	1,040	--	-63.0	-8.65

SURFACE WATER—Continued

09498400 Pinal Creek at Inspiration Dam near Globe, Arizona

LOCATION.—Lat 33°34'23", long 110°54'02", in NE1/4NW1/4SE1/4, sec. 26, T. 3 N., R. 14 E., in Tonto National Forest, on right bank 2.1 m upstream from Inspiration Dam, 6.2 km upstream from mouth, and 22 km northwest of Globe.

DRAINAGE AREA.—504 km^2, including approximately 85 km^2 that is partly or entirely noncontributing due to mine pits and dumps.

Water Discharge Records

PERIOD OF RECORD.—July 1980 to current year.

GAGE.—Water-stage recorder in stilling well. Elevation of gage is 835 m above National Geodetic Vertical Datum of 1929, from topographic map. In February 1991 a steel-plate weir with "V" notch was added to the concrete dam lip, 2.1 m below the stilling well. The "V" notch is 2.1 m from the right bank.

AVERAGE DISCHARGE.—24 years (water years 1981–2004), 0.34 m^3/s (11,000,000 m^3/yr).

REMARKS.—Records rated as fair for water years 1997 to 2004. Since Nov. 20, 1999, base flows may be affected by discharges from a ground-water treatment plant, located about 5 mi. upstream from the gage

.

Monthly and yearly mean discharge, in cubic meters per second

Water Year	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1996	0.20	0.21	0.22	0.21	0.22	0.23	0.22	0.19	0.17	0.16	0.15	0.15	0.19
1997	0.16	0.18	0.20	0.22	0.33	0.23	0.22	0.20	0.14	0.12	0.14	0.14	0.19
1998	0.15	0.17	0.19	0.19	0.24	0.22	0.18	0.16	0.12	0.11	0.15	0.13	0.17
1999	0.12	0.11	0.10	0.09	0.10	0.10	0.10	0.07	0.03	0.24	0.13	0.09	0.11
2000	0.07	0.11	0.20	0.23	0.24	0.25	0.21	0.16	0.15	0.15	0.31	0.18	0.19
2001	0.29	0.37	0.21	0.22	0.20	0.21	0.18	0.13	0.10	0.11	0.13	0.12	0.19
2002	0.25	0.19	0.20	0.19	0.16	0.15	0.13	0.10	0.06	0.05	0.05	0.28	0.15
2003	0.08	0.09	0.11	0.12	0.13	0.13	0.10	0.06	0.03	0.03	0.17	0.48	0.13
2004	0.07	0.10	0.11	0.12	0.12	0.18	0.10	0.06	0.02	0.02	0.14	0.03	0.09

Monthly and yearly discharge, in thousands of cubic meters

Water Year	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1997	424	477	542	579	792	624	569	537	374	316	380	355	5,968
1998	393	434	502	505	569	586	480	432	301	300	397	344	5,242
1999	326	274	255	243	236	270	254	181	79	644	353	244	3,359
2000	195	291	548	604	608	660	548	438	397	398	817	455	5,959
2001	786	953	551	587	490	551	463	359	268	303	343	315	5,969
2002	657	497	525	497	393	407	340	280	160	137	137	713	4,745
2003	224	237	285	311	318	336	260	160	90	78	451	1,258	4,009
2004	196	255	291	312	308	477	247	150	60	60	377	70	2,806

SURFACE WATER—Continued

09498400 Pinal Creek at Inspiration Dam near Globe, Arizona

Field Measurements									
[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; k, count outside of acceptable range; --, no data]									
Date	**Time**	**Discharge, instantaneous (ft^3/s)**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Barometric pressure (mm of mercury)**	**Oxygen, dissolved (mg/L)**	**Oxygen, dissolved (percent saturation)**
11/21/1996	1200	6.7	2,590	7.8	22.0	17.0	693	8.7	100
2/6/1997	1125	7.9	2,440	7.5	14.5	12.0	690	10.1	104
3/27/1997	1150	7.8	2,220	7.7	19.0	21.0	689	7.6	95
5/22/1997	1030	7.3	2,300	7.6	24.0	21.5	686	8.1	102
7/24/1997	1100	5.8	2,060	7.6	--	24.0	685	8.3	111
9/25/1997	0950	6.8	2,250	7.4	22.0	22.0	681	7.7	100
11/24/1997	1110	6.4	2,300	7.2	14.0	11.0	693	10.0	101
1/22/1998	1145	6.7	2,210	7.2	10.2	10.0	690	11.1	110
3/24/1998	1115	7.4	2,190	7.4	21.0	16.0	686	9.2	104
6/1/1998	1055	5.1	1,920	7.1	27.0	22.0	686	7.8	100
7/27/1998	1030	4.1	2,190	7.2	34.5	27.8	686	7.0	100
10/20/1998	1110	4.1	2,340	7.0	26.0	17.0	686	7.9	92
2/19/1999	1015	3.6	2,350	7.9	14.0	10.3	688	10.6	106
3/31/1999	1630	3.4	2,400	7.6	21.5	21.6	--	--	--
5/28/1999	1220	1.9	2,450	7.7	31.5	27.8	687	6.8	97
6/23/1999	1115	0.93	2,500	7.5	33.5	25.8	688	7.3	101
9/8/1999	1230	2.7	2,340	7.9	31.0	23.7	688	7.6	100
12/17/1999	1215	7.4	2,270	7.5	13.5	11.2	693	9.6	97
2/15/2000	1707	9.5	2,280	7.6	--	18.7	689	7.3	87
4/18/2000	1230	7.1	2,260	7.5	23.5	21.8	701	7.8	98
6/13/2000	1430	4.8	2,250	7.5	--	30.2	--	6.4	--
7/19/2000	1030	5.5	2,240	7.5	33.0	22.9	690	7.6	99
12/14/2000	1110	7.4	2,170	7.8	9.0	8.9	694	10.1	96
2/7/2001	1100	6.7	2,060	7.4	19.0	12.8	682	9.5	101

Field Measurements (continued)

[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; k, count outside of acceptable range; --, no data]

Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (μS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)
4/19/2001	0945	5.9	2,110	7.7	25.0	17.5	686	8.2	96
6/11/2001	1500	3.5	2,060	7.5	--	--	--	5.9	--
9/4/2001	1500	4	2,120	7.6	36.5	27.1	685	6.5	93
10/24/2001	1500	6.5	2,030	--	--	19.0	--	--	--
12/20/2001	1035	6.9	2,060	7.7	12.0	8.4	691	10.4	99
1/15/2002	1320	6.6	2,040	7.4	11.0	12.5	685	7.6	80
3/29/2002	1130	4.9	2,140	7.6	19.5	17.7	686	8.5	100
6/11/2002	1250	2.4	2,190	7.6	33.0	25.4	686	7.1	97
9/6/2002	1210	2	2,250	7.0	30.5	25.8	687	7.3	101
12/4/2002	1135	3.6	2,180	7.7	11.5	11.0	686	9.3	94
2/20/2003	1205	4.5	2,210	7.7	14.0	12.3	685	9.2	96
6/4/2003	1025	1.6	2,260	7.6	30.5	18.9	686	7.9	95

Date	Time	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, dissolved (mg/L as HCO_3)	Turbidity, (NTU)	E-Coli, whole, thermotol, urease, mf (cols./100 mL)	Coliform, fecal, 0.7 μm-mf (cols./100 mL)	Streptococci, fecal, 0.45 μm-mf (cols./100 mL)
11/21/1996	1200	89	109	0.3	E2k	E2k	21
2/6/1997	1125	77	94	0.2	<1	E2k	E1k
3/27/1997	1150	70	85	0.47	<1	E4k	E44k
5/22/1997	1030	60	73	0.23	E2k	E5k	36
7/24/1997	1100	46	56	0.22	<1	E3k	32
9/25/1997	0950	63	77	0.32	E33k	21	74
11/24/1997	1110	49	60	0.5	E3k	E18k	E11k
1/22/1998	1145	51	62	0.25	E22k	E18k	E14k
3/24/1998	1115	54	66	1.9	<1	E5k	E30k
6/1/1998	1055	33	41	0.52	E15k	E20k	39
7/27/1998	1030	52	63	3.8	77	E300k	280
10/20/1998	1110	54	65	140	E14k	E33k	--
2/19/1999	1015	58	70	0.19	E3k	E14k	--

Field Measurements (continued)

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; µm, micrometer; mf, membrane filter; E, estimated; k, count outside of acceptable range; --, no data]

Date	Time	Alkalinity, dissolved (mg/L as $CaCO_3$)	Bicarbonate, dissolved (mg/L as HCO_3)	Turbi-dity, (NTU)	E-Coli, whole, thermotol, urease, mf (cols./100 mL)	Coliform, fecal, 0.7 µm-mf (cols./100 mL)	Streptococci, fecal, 0.45 µm-mf (cols./100 mL)
3/31/1999	1630	75	92	0.35	73	70	--
5/28/1999	1220	92	112	0.34	53	460	--
6/23/1999	1115	116	142	0.91	E35k	90	--
9/8/1999	1230	99	121	1.1	E6k	70	--
12/17/1999	1215	43	52	0.67	<1	E17k	--
2/15/2000	1707	--	--	--	--	--	--
4/18/2000	1230	39	48	1.1	E3k	E5k	--
6/13/2000	1430	18	--	--	--	--	--
7/19/2000	1030	38	47	1.5	E15k	48	--
12/14/2000	1110	37	45	0.8	<1	E2k	--
2/7/2001	1100	36	44	0.6	E2k	E6k	--
4/19/2001	0945	45	55	0.7	E18k	24	--
6/11/2001	1500	36	--	--	--	--	--
9/4/2001	1500	40	49	0.62	E22k	40	--
10/24/2001	1500	38	--	--	--	--	--
12/20/2001	1035	48	58	0.78	E7k	E2k	--
1/15/2002	1320	50	--	--	--	--	--
3/29/2002	1130	46	56	0.51	E4k	E6k	--
6/11/2002	1250	45	55	0.57	E8k	35	--
9/6/2002	1210	45	55	0.97	100	--	--
12/4/2002	1135	52	62	0.42	E8k	--	--
2/20/2003	1205	53	65	0.66	E1k	--	--
6/4/2003	1025	72	87	0.27	45	--	--

Laboratory Measurements

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Solids, residue at 180°C, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Calcium, dissolved (mg/L as Ca)	Calcium, total (mg/L as Ca)	Magnesium, total (mg/L as Mg)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)
11/21/1996	10	2,350	2,230	430	--	--	96.0	64.0	4.40	1,500
2/6/1997	10	2,330	2,220	399	400	94.0	94.9	66.6	4.25	1,470
3/27/1997	10	2,400	2,200	403	411	94.1	93.0	63.0	4.60	1,460
5/22/1997	10	2,340	2,120	392	393	87.8	87.7	57.2	4.69	1,410
7/24/1997	10	2,350	2,110	387	386	100	89.6	60.2	5.00	1,410
9/25/1997	10	2,340	2,160	396	400	200	94.3	63.1	4.73	1,430
11/24/1997	10	2,270	2,100	388	406	90.0	92.6	61.7	4.33	1,390
1/22/1998	10	1,650	2,100	396	366	100	92.6	61.7	4.15	1,390
3/24/1998	10	2,230	2,100	388	227	90.0	94.3	64.8	4.45	1,390
6/1/1998	10	2,230	2,060	395	232	70.5	93.5	63.1	4.40	1,360
7/27/1998	10	2,310	2,060	394	212	81.5	94.4	64.6	5.07	1,360
10/20/1998	20	2,240	2,040	400	420	90.0	88.0	62.0	4.50	1,400
2/19/1999	20	2,220	1,940	400	410	85.0	85.0	66.0	3.60	1,300
3/31/1999	20	2,270	2,060	410	420	91.0	90.0	62.0	4.20	1,400
5/28/1999	20	2,370	2,100	440	430	91.0	90.0	64.0	3.70	1,400
6/23/1999	20	2,440	2,130	440	450	96.0	96.0	69.0	4.00	1,400
9/8/1999	20	2,200	1,960	390	400	82.0	81.0	54.0	4.10	1,300
12/17/1999	20	2,150	1,920	400	400	72.0	73.0	60.0	4.80	1,300
2/15/2000	20	2,110	1,930	420	420	56.0	56.0	71.0	5.30	1,300
4/18/2000	20	2,000	1,910	400	400	68.0	66.0	65.0	4.40	1,300
6/13/2000	440	--	--	410	--	--	70.0	70.0	--	--
7/19/2000	20	2,080	1,910	400	400	69.0	68.0	61.0	4.60	1,300
12/14/2000	20	1,970	1,790	380	380	68.0	68.0	62.0	4.60	1,200
2/7/2001	20	1,850	1,670	370	370	60.0	59.0	61.0	4.20	1,100
4/19/2001	20	1,930	1,780	370	370	65.0	64.0	61.0	3.80	1,200
6/11/2001	10	--	--	356	--	--	63.4	63.7	--	1,170
6/11/2001	140	--	--	399	--	--	67.0	64.0	4.70	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Solids, residue at 180°C, dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Calcium, dissolved (mg/L as Ca)	Calcium, total (mg/L as Ca)	Magnesium, total (mg/L as Mg)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)
9/4/2001	20	E1,940	1,790	380	380	64.0	64.0	58.0	4.50	1,200
10/24/2001	440	--	1,770	367	--	--	66.0	63.0	5.00	1,150
12/20/2001	20	E1,960	1,780	363	368	64.0	64.0	56.0	4.50	1,210
1/15/2002	440	--	1,820	395	--	--	64.9	62.9	4.54	1,180
3/29/2002	20	1,950	1,780	371	370	59.0	60.0	61.0	4.40	1,200
6/11/2002	20	1,750	1,850	377	401	66.0	63.0	69	4.20	1,250
9/6/2002	20	2,070	1,860	389	387	64.0	63.0	65	5.30	1,250
12/4/2002	20	2,050	1,860	400	398	65.0	63.0	62	4.40	1,240
2/20/2003	20	2,050	1,840	391	399	63.0	63.0	65	4.30	1,230
6/4/2003	20	2,140	1,880	397	407	71.0	70.0	67	3.80	1,240

Date	Laboratory	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Boron, total (µg/L as B)	Boron, dissolved (µg/L as B)	Copper, total (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total (µg/L as Fe)	Iron, dissolved (µg/L as Fe)	Manganese, total (µg/L as Mn)	Manganese, dissolved (µg/L as Mn)
11/21/1996	10	46.0	2.8	80	63	10.0	8	40	<9	30,000	31,000
2/6/1997	10	49.9	2.7	--	52	--	<30	--	<9	--	27,900
3/27/1997	10	49.7	2.9	--	76	--	<30	--	<9	--	32,000
5/22/1997	10	45.4	2.6	--	57	--	<30	--	<9	--	27,500
7/24/1997	10	49.3	2.7	74	76	20.2	<30	--	<9	27,600	26,900
9/25/1997	10	48.9	2.6	68	71	50.7	<30	--	<30	28,400	27,800
11/24/1997	10	48.0	2.4	67	61	51.1	<30	--	<9	20,900	19,900
1/22/1998	10	49.8	2.4	54	66	47.9	<30	--	<30	17,100	16,600
3/24/1998	10	49.9	2.1	--	64	--	<30	--	<30	--	19,600
6/1/1998	10	50.8	2.1	73	72	11.0	<30	--	<30	9,450	8,500
7/27/1998	10	50.8	2.3	72	63	12.0	<30	--	<30	15,800	15,500
10/20/1998	20	54.0	1.8	64	--	198	<1	9,500	3	11,600	1,300
2/19/1999	20	50.0	1.1	56	--	<1	<1	18	2	180	140

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Boron, total (µg/L as B)	Boron, dissolved (µg/L as B)	Copper, total (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total (µg/L as Fe)	Iron, dissolved (µg/L as Fe)	Manganese, total (µg/L as Mn)	Manganese, dissolved (µg/L as Mn)
3/31/1999	20	50.0	1.2	62	61	3	<1	90	2	360	110
5/28/1999	20	51.0	1.0	63	63	<1	<1	14	6	150	110
6/23/1999	20	53.0	1.0	61	61	2	2	15	4	290	220
9/8/1999	20	50.0	1.1	60	58	6	2	170	2	19,000	19,000
12/17/1999	20	52.0	1.5	56	58	1	<1	111	3	2,200	2,200
2/15/2000	20	52.0	1.3	55	55	7	<1	524	5	2,300	1,600
4/18/2000	20	53.0	1.3	54	55	5	<1	52	<1	410	220
6/13/2000	440	--	--	--	--	--	<30	--	<130	--	370
7/19/2000	20	54.0	1.3	58	55	<2	<2	99	<2	400	270
12/14/2000	20	53.0	1.2	60	50	<2	<2	121	3	790	760
2/7/2001	20	52.0	1.1	50	60	<2	<2	54	2	240	220
4/19/2001	20	51.0	1.1	60	60	<2	<2	24	<2	230	210
6/11/2001	10	54.0	1.4		63		<5	--	<10	--	235
6/11/2001	140	--	--	--	--	--	<30	--	<130	--	230
9/4/2001	20	57.0	1.2	55	56	2	<2	16	<2	197	194
10/24/2001	440	57.5	1.3	--	--	--	<30	--	<130	--	380
12/20/2001	20	56.0	1.1	49	53	<2	<2	100	<2	314	240
1/15/2002	440	52.7	1.3	--	--	--	<30	--	<130	--	183
3/29/2002	20	54.0	1.0	50	48	2	<2	48	2	243	196
6/11/2002	20	55.0	1.0	52	53	2	<2	25	<2	236	225
9/6/2002	20	59.0	1.0	60	55	<2	2	15	2	186	175
12/4/2002	20	57.0	0.9	47	50	<2	3	26	6	595	569
2/20/2003	20	57.0	0.9	44	44	<2	<2	65	<2	317	237
6/4/2003	20	59.0	0.8	48	50	<2	<2	29	3	475	415

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Nickel, total (μg/L as Ni)	Nickel, dissolved (μg/L as Ni)	Zinc, total (μg/L as Zn)	Zinc, dissolved (μg/L as Zn)	Oxygen demand, chemical (high level) (mg/L)	Arsenic, total (μg/L as As)	Arsenic, dissolved (μg/L as As)	Antimony, total, (μg/L as Sb)	Antimony, dissolved (μg/L as Sb)	Barium, total (μg/L as Ba)	Barium, dissolved (μg/L as Ba)
11/21/1996	10	400	380	260	270	<10	<1	<1	<1	<1	--	14.0
2/6/1997	10	--	360	--	306	<10	<1	<1	--	<1	--	12.2
3/27/1997	10	--	360	--	268	30	<1	<1	<1.4	<1	--	19.3
5/22/1997	10	--	360	--	252	<10	<1	<1	--	<1	--	13.1
7/24/1997	10	90	340	143	206	<10	<1	<1	4.3	<1	12	11.5
9/25/1997	10	210	310	164	172	<10	<1	<1	4.0	<1	17	14.8
11/24/1997	10	280	300	268	273	<10	<1	<1	3.2	<1	10	8.3
1/22/1998	10	250	280	243	277	<10	<1	<1	2.8	<1	9	7.0
3/24/1998	10	--	290	--	279	<10	<1	1	--	<1	--	10.7
6/1/1998	10	200	220	149	159	<10	<1	<1	<1.0	<1	6	3.6
7/27/1998	10	150	150	66	<60	<10	<1	<1	<1.0	<1	10	5.0
10/20/1998	20	191	78	240	51	<5	6	<1	<1	<1	61.0	8.0
2/19/1999	20	6	6	5	5	12	<1	<1	<1	<1	4.1	4.0
3/31/1999	20	5	4	5	4	<5	<1	<1	<1	<1	4.9	4.0
5/28/1999	20	6	6	3	3	7	<1	<1	<1	<1	4.7	4.0
6/23/1999	20	7	6	5	4	<5	<1	<1	<1	<1	4.0	3.0
9/8/1999	20	92	90	9	10	10	<1	<1	<1	<1	19.0	18
12/17/1999	20	72	74	23	24	<5	<1	<1	<1	<1	7.9	7.0
2/15/2000	20	50	43	14	9	28	<1	<1	<1	<1	11.0	6.0
4/18/2000	20	16	15	4	6	<5	<1	<1	<1	<1	7.0	6.0
6/13/2000	440	--	<90	--	<20	--	--	--	--	--	--	--
7/19/2000	20	5	4	<2	19	<5	<1	<1	<1	<1	7.6	7.0
12/14/2000	20	34	29	30	30	<5	<1	<1	<1	<1	10.0	10.0
2/7/2001	20	6	5	3	3	--	<1	<1	<1	<1	8.0	8.0
4/19/2001	20	5	5	4	9	<5	<1	<1	<1	<1	9.0	9.0
6/11/2001	10	--	<50	--	<20	--	--	--	--	--	--	8.8

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Nickel, total (µg/L as Ni)	Nickel, dissolved (µg/L as Ni)	Zinc, total (µg/L as Zn)	Zinc, dissolved (µg/L as Zn)	Oxygen demand, chemical (high level) (mg/L)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Antimony, total, (µg/L as Sb)	Antimony, dissolved (µg/L as Sb)	Barium, total (µg/L as Ba)	Barium, dissolved (µg/L as Ba)
6/11/2001	140	--	<90	--	<20	--	--	--	--	--	--	--
9/4/2001	20	4	4	<2	12	18	<1	<1	<1	<1	10.0	11.0
10/24/2001	440	--	<90	--	<20	--	--	--	--	--	--	--
12/20/2001	20	4	5	10	23	8	<2	<2	<1	<1	9.7	9.4
1/15/2002	440	--	<90	--	<20	--	--	--	--	--	--	--
3/29/2002	20	4	3	4	7	<5	<1	<1	<1	<1	9.0	8.7
6/11/2002	20	4	4	5	7	<5	<1	<1	<1	<1	11.0	11.0
9/6/2002	20	4	3	2	17	<5	2	2	<1	<1	13.0	12.0
12/4/2002	20	6	5	4	6	<5	6	1	<1	<1	17.0	18.0
2/20/2003	20	4	4	12	14	<5	1	1	<1	<1	13.0	13.0
6/4/2003	20	4	3	2	6	<5	<1	1	<1	<1	14.0	14.0

Date	Laboratory	Beryllium, total (µg/L as Be)	Beryllium, dissolved (µg/L as Be)	Cadmium, total (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Chromium, total (µg/L as Cr)	Chromium, dissolved (µg/L as Cr)	Lead, total (µg/L as Pb)	Lead, dissolved (µg/L as Pb)	Lithium, total (µg/L as Li)	Lithium, dissolved (µg/L as Li)
11/21/1996	10	<10	<1.5	5	5	<1.0	<1.0	<1	<1	--	140
2/6/1997	10	--	1.7	--	4	--	22	--	<30	--	149
3/27/1997	10	--	<1.5	--	10	--	<15	--	<30	--	143
5/22/1997	10	--	<1.5	--	<3	--	<15	--	<30	--	141
7/24/1997	10	0.90	<1.5	--	<3	--	<15	0.30	<30	120	160
9/25/1997	10	0.60	<1.5	--	<3	--	31	0.30	<30	110	155
11/24/1997	10	1.30	1.7	--	<3	--	<15	0.30	<30	125	146
1/22/1998	10	1.40	<3.0	--	<24	--	<42	0.20	<300	118	149
3/24/1998	10	--	<3.0	--	<24	--	<42	--	<300	--	154
6/1/1998	10	1.00	<3.0	--	<24	<4	<42	0.30	<300	121	149
7/27/1998	10	0.27	<3.0	--	<24	<4	<42	0.87	<300	124	149
10/20/1998	20	2.00	<.5	1.7	<.5	<1	<1	12	<1	--	--
2/19/1999	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Beryllium, total (µg/L as Be)	Beryllium, dissolved (µg/L as Be)	Cadmium, total (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Chromium, total (µg/L as Cr)	Chromium, dissolved (µg/L as Cr)	Lead, total (µg/L as Pb)	Lead, dissolved (µg/L as Pb)	Lithium, total (µg/L as Li)	Lithium, dissolved (µg/L as Li)
3/31/1999	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
5/28/1999	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
6/23/1999	20	<.5	M	<.5	<.5	<1	<1	<1	<1	--	--
9/8/1999	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
12/17/1999	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
2/15/2000	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
4/18/2000	20	<.5	<.5	<.5	<.5	<1	<1	<1	<1	--	--
7/19/2000	20	<2	<2	<2.0	<2.0	<2	<2	<2	<2	--	--
12/14/2000	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
2/7/2001	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
4/19/2001	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
6/11/2001	10	--	<1	--	<8	--	<10	--	<.08	--	108
9/4/2001	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
12/20/2001	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
3/29/2002	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
6/11/2002	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
9/6/2002	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
12/4/2002	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
2/20/2003	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--
6/4/2003	20	<1	<1	<.5	<.5	<1	<1	<2	<2	--	--

Date	Laboratory	Mercury, total (µg/L as Hg)	Mercury, dissolved (µg/L as Hg)	Molybdenum, total (µg/L as Mo)	Molybdenum, dissolved (µg/L as Mo)	Selenium, total (µg/L as Se)	Selenium, dissolved (µg/L as Se)	Silver, total (µg/L as Ag)	Silver, dissolved (µg/L as Ag)	Aluminum, total (µg/L as Al)	Aluminum, dissolved (µg/L as Al)
11/21/1996	10	<.1	<.1	--	1.0	<1	<1	--	<1.0	--	--
2/6/1997	10	<.1	<.1	--	<30	--	<1	--	<3	--	110
3/27/1997	10	<.1	<.1	--	32	--	<1	<1.40	<3	--	150

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Mercury, total (µg/L as Hg)	Mercury, dissolved (µg/L as Hg)	Molybdenum, total (µg/L as Mo)	Molybdenum, dissolved (µg/L as Mo)	Selenium, total (µg/L as Se)	Selenium, dissolved (µg/L as Se)	Silver, total (µg/L as Ag)	Silver, dissolved (µg/L as Ag)	Aluminum, total (µg/L as Al)	Aluminum, dissolved (µg/L as Al)
5/22/1997	10	<.1	<.1	--	<30	--	<1	--	<3	--	100
7/24/1997	10	<.1	<.1	2.4	<30	13.0	<1	<1.40	<3	42	40
9/25/1997	10	<.1	<.1	3.0	<30	13.2	<1	<1.40	<3	58	20
11/24/1997	10	<.1	<.1	1.4	<30	13.4	<1	<1.40	<3	119	50
1/22/1998	10	<.1	<.1	1.2	<180	8.7	<1	<1.40	<12	83	40
3/24/1998	10	<.1	<.1	--	<180	--	<1	--	<12	--	60
6/1/1998	10	<.1	<.1	<.8	<180	<4.0	<1	<1	<12	175	<30
7/27/1998	10	<.1	0.1	1.9	<180	<4.0	<1	<1	<12	687	<30
10/20/1998	20	<.1	<.1	--	--	1	<1	<1	<1	--	--
2/19/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
3/31/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
5/28/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
6/23/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
9/8/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
12/17/1999	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
2/15/2000	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
4/18/2000	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
6/13/2000	440	--	--	--	--	--	--	--	--	--	<110
7/19/2000	20	<.1	<.1	--	--	<1	<1	<2	<2	--	--
12/14/2000	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
2/7/2001	20	<.1	<.1	--	--	1	1	<1	<1	--	--
4/19/2001	20	<.1	<.1	--	--	<1	1	<1	<1	--	--
6/11/2001	10	--	--	--	<50	--	--	--	<5	--	M
6/11/2001	140	--	--	--	--	--	--	--	--	--	<110
9/4/2001	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
10/24/2001	440	--	--	--	--	--	--	--	--	--	<110
12/20/2001	20	<.1	<.1	--	--	<4	<2	<1	<1	--	--
1/15/2002	440	--	--	--	--	--	--	--	--	--	<110
3/29/2002	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Mercury, total (µg/L as Hg)	Mercury, dissolved (µg/L as Hg)	Molybdenum, total (µg/L as Mo)	Molybdenum, dissolved (µg/L as Mo)	Selenium, total (µg/L as Se)	Selenium, dissolved (µg/L as Se)	Silver, total (µg/L as Ag)	Silver, dissolved (µg/L as Ag)	Aluminum, total (µg/L as Al)	Aluminum, dissolved (µg/L as Al)
6/11/2002	20	<.1	<.1	--	--	<1	<1	<1	<1	--	--
9/6/2002	20	<.1	<.10	--	--	1	<1	<1	<1	--	--
12/4/2002	20	<.1	<.10	--	--	<1	<1	<1	<1	--	--
2/20/2003	20	<.1	<.10	--	--	<1	<1	<1	<1	--	--
6/4/2003	20	<.1	<.10	--	--	<1	1	<1	<1	--	--

Date	Laboratory	Cobalt, total (µg/L as Co)	Cobalt, dissolved (µg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, total (µg/L as Sr)	Strontium, dissolved (µg/L as Sr)	Thallium, total, (µg/L as Tl)	Thallium, dissolved (µg/L as Tl)	Vanadium, dissolved (µg/L as V)
2/6/1997	10	--	94	54.3	--	1,530	--	--	<18
3/27/1997	10	--	154	52.5	--	1,440	<.6	<.1	<18
5/22/1997	10	--	98	53.9	--	1,400	--	--	<18
7/24/1997	10	10	46	55	1,400	1,390	<.6	--	<18
9/25/1997	10	30	52	54.1	1,400	1,400	<.6	--	<18
11/24/1997	10	30	30	54	1,400	1,390	<.6	--	<18
1/22/1998	10	30	<36	54.3	1,430	1,410	<.6	--	<30
3/24/1998	10	--	61	53.7	--	1,400		--	<30
6/1/1998	10	M	<36	54.9	1,410	1,420	<.6	--	<30
7/27/1998	10	M	<36	48.7	1,370	1,390	<.6	--	<30
10/20/1998	20	--	--	--	--	--	<2	<2	--
2/19/1999	20	--	--	--	--	--	<2	<2	--
3/31/1999	20	--	--	--	--	--	<2	<2	--
5/28/1999	20	--	--	--	--	--	<2	<2	--
6/23/1999	20	--	--	--	--	--	<2	<2	--
9/8/1999	20	--	--	--	--	--	<2	<2	--
12/17/1999	20	--	--	--	--	--	<2	<2	--
2/15/2000	20	--	--	--	--	--	<2	<2	--
4/18/2000	20	--	--	--	1,300	--	<2	<2	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Cobalt, total (μg/L as Co)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, total (μg/L as Sr)	Strontium, dissolved (μg/L as Sr)	Thallium, total, (μg/L as Tl)	Thallium, dissolved (μg/L as Tl)	Vanadium, dissolved (μg/L as V)
6/13/2000	440	--	<20	30.4	--	1,380	--	--	--
7/19/2000	20	--	--	--	1,300	--	<2	<2	--
12/14/2000	20	--	--	--	1,300	--	<2	<2	--
2/7/2001	20	--	--	--	1,200	--	<2	<2	--
4/19/2001	20	--	--	--	1,100	--	<2	<2	--
6/11/2001	10	--	<13	32	--	1,150	--	--	<8
6/11/2001	140	--	<20	30.2	--	1,370	--	--	--
9/4/2001	20	--	--	--	1,190	--	<2	<2	--
10/24/2001	440	--	<20	29.6	--	1,260	--	--	--
12/20/2001	20	--	--	--	1,180	--	<2	<2	--
1/15/2002	440	--	<20	27.7	--	1,330	--	--	--
3/29/2002	20	--	--	--	1,130	--	<2	<2	--
6/11/2002	20	--	--	--	1,170	--	<2	<2	--
9/6/2002	20	--	--	--	1,200	--	<2	<2	--
12/4/2002	20	--	--	--	1,220	--	<2	<2	--
2/20/2003	20	--	--	--	1,230	--	<2	<2	--
6/4/2003	20	--	--	--	1,310	--	<2	<2	--

Date	Laboratory	Ammonia plus organic nitrogen, total (mg/L as N)	Ammnia, dissolved (mg/L as N)	Ammnia, total (mg/L as N)	NO_2 and NO_3, dissolved (mg/L as N)	NO_2 and NO_3, total (mg/L as N)	NO_2, dissolved (mg/L as N)	Ortho-phos-phate, dissolved (mg/L as P)	Phos-phorus, total (mg/L as P)	Sediment, suspended (mg/L)
11/21/1996	10	<.20	--	0.02	--	<.020	--	--	<.02	0.7
2/6/1997	10	<.20	--	0.02	--	<.020	--	--	0.03	0.2
3/27/1997	10	<.20	0.005	0.02	0.011	<.020	<.001	<.001	<.02	1
5/22/1997	10	<.20	--	0.03	--	<.020	--	--	0.03	16
7/24/1997	10	<.20	--	0.03	--	<.020	--	--	<.02	4
9/25/1997	10	<.20	--	0.03	--	<.020	--	--	<.02	33

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Ammonia plus organic nitrogen, total (mg/L as N)	Ammnia, dissolved (mg/L as N)	Ammnia, total (mg/L as N)	NO_2 and NO_3, dissolved (mg/L as N)	NO_2 and NO_3, total (mg/L as N)	NO_2, dissolved (mg/L as N)	Ortho-phos-phate, dissolved (mg/L as P)	Phos-phorus, total (mg/L as P)	Sediment, suspended (mg/L)
11/24/1997	10	<.20	--	0.03	--	<.020	--	--	0.02	3
1/22/1998	10	<.20	--	0.02	--	<.020	--	--	0.03	54
3/24/1998	10	0.24	--	0.02	--	<.020	--	--	<.02	72
6/1/1998	10	0.21	--	0.02	--	<.020	--	--	<.02	29
7/27/1998	10	<.20	--	0.03	--	<.020	--	--	<.02	20
10/20/1998	20	0.57	--	0.02	--	<.020	--	--	0.25	19
2/19/1999	20	<.20	--	0.02	--	<.020	--	--	<.02	<1
3/31/1999	20	<.20	--	<.01	--	<.020	--	--	<.02	4
5/28/1999	20	<.20	--	<.01	--	<.020	--	--	0.02	1
6/23/1999	20	<.20	--	<.01	--	<.020	--	--	<.02	1
9/8/1999	20	<.20	--	0.02	--	<.020	--	--	0.02	16
12/17/1999	20	<.20	--	0.02	--	0.02	--	--	0.04	2
2/15/2000	20	<.20	--	0.03	--	<.020	--	--	0.03	10
4/18/2000	20	<.20	--	0.04	--	<.020	--	--	<.02	1
6/13/2000	440	--	--	--	--	--	--	--	--	--
7/19/2000	20	0.22	--	0.02	--	<.020	--	--	<.02	2
12/14/2000	20	<.20	--	0.03	--	<.020	--	--	<.02	11
2/7/2001	20	<.20	--	<.01	--	<.020	--	--	<.02	2
4/19/2001	20	<.20	--	<.01	--	<.020	--	--	<.02	2
9/4/2001	20	<.20	--	0.02	--	<.020	--	--	<.02	2
12/20/2001	20	1.1	--	0.02	--	<.020	--	--	<.02	1
3/29/2002	20	<.20	--	0.01	--	<.020	--	--	<.02	1
6/11/2002	20	<.20	--	0.02	--	<.020	--	--	<.02	4
9/6/2002	20	<.20	--	0.01	--	<.020	--	--	<.02	2
12/4/2002	20	<.20	--	<.01	--	<.020	--	--	<.02	4
2/20/2003	20	0.4	--	0.01	--	<.020	--	--	<.02	2
6/4/2003	20	<.20	--	<.01	--	<.020	--	--	<.02	1

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research laboratory, Menlo Park, California. °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Date	Laboratory	Deuterium/ Protium ratio (per mil)	Oxygen-18/ Oxygen-16 ratio (per mil)	Uranium, natural, dissolved (μg/L as U)	Uranium, natural, total (μg/L as U)
3/27/1997	10	--	--	<.2	--
7/24/1997	10	--	--	--	<.400
9/25/1997	10	--	--	--	0.4
11/24/1997	10	--	--	--	<.400
1/22/1998	10	--	--	--	<.400
6/1/1998	10	--	--	--	<.400
7/27/1998	10	--	--	--	<.400
6/11/2001	10	-64.3	-8.84	--	--

SURFACE WATER—Continued

Perennial reach surface-water data

LOCATION.—See fig. 3 for locations of sample sites.

Field Measurements											
[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; --, no data]											
Site name	**Date**	**Time**	**Discharge, instantaneous (ft^3/s)**	**Specific conductance (μS/cm)**	**pH (standard units)**	**Temperature, air (°C)**	**Temperature, water (°C)**	**Barometric pressure (mm of mercury)**	**Oxygen, dissolved (mg/L)**	**Oxygen, dissolved (percent saturation)**	**Alkalinity, dissolved (mg/L as $CaCO_3$)**
Outfall	12/27/1999	1140	5.8	2,220	7.8	--	16.4	--	8.8	--	8.0
Outfall	2/15/2000	0750	7.2	2,250	7.6	--	17.0	--	7.4	--	--
Outfall	4/12/2000	1545	7.2	2,180	7.4	--	19.0	--	--	--	5.8
Outfall	6/12/2001	0655	6.8	1,910	7.5	--		--	7.4	--	11.1
D1.5S	6/14/1999	0725	0.23	2,150	5.5	--	19.0	--	0.7	--	19.2
Pinal Creek at Z1	6/2/1998	0825	3.1	2,160	5.9	--	18.0	680	6.1	73	28.8
Pinal Creek at Z1	6/14/1999	1130	0.09	2,160	6.2	--	28.5	--	7.6	--	12.8
Pinal Creek at Z2.2	6/13/2000	0600	6.4	2,150	7.3	--	17.5	--	4.7	--	6.4
Pinal Creek at Z4	6/2/1998	0905	3.4	2,140	6.1	--	19.8	680	7.6	94	26.4
Pinal Creek at Z4	2/15/2000	1005	--	2,160	7.2	12.5	17.5	--	8.2	--	10.0
Pinal Creek at Z4.3	6/14/1999	1220	--	2,010	5.8	--	20.0	--	0.9	--	33.6
Pinal Creek at Z4.3	10/18/1999	1205	--	1,960	6.0	--	21.4	--	3.6	--	51.2
Pinal Creek at Z4.3	8/30/2000	1045	--	--	--	--	--	--	--	--	--
Pinal Creek at Z4.4	6/14/1999	1315	--	1,930	5.9	--	21.5	--	3.7	--	41.6
Pinal Creek at Z4.4	8/24/1999	1300	--	2,060	5.9	--	23.0	--	1.3	--	51.2
Pinal Creek at Z4.4	8/24/1999	1320	--	2,000	5.9	--	20.8	--	0.5	--	64.0
Pinal Creek at Z4.4	10/18/1999	1235	--	1,890	6.0	--	19.2	--	1.8	--	51.2
Pinal Creek at Z4.7	6/17/1999	0830	0.7	2,090	6.0	--	20.5	--	3.2	--	46.4
Pinal Creek at Z4.7	2/15/2000	1050	7.1	2,220	6.2	15.0	19.0	--	7.2	--	12.5
Pinal Creek at Z4.7	4/12/2000	0840	6.6	2,180	6.2	18.0	17.5	--	6.6	--	8.5
Pinal Creek at Z4.7	6/13/2000	0720	7.1	2,140	6.9	--	17.7	--	8.5	--	16.6
Pinal Creek at Z4.7	8/7/2001	0710	--	1,920	6.4	--	20.0	--	3.8	--	10.4

Field Measurements (continued)

[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; --, no data]

Site name	Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (μS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)
Pinal Creek at Z4.5	10/18/1999	1405	0.52	2,030	6.0	--	20.0	--	3.2	--	46.4
Pinal Creek at Z4.6	12/28/1999	1440	5.6	2,280	6.2	--	17.4	--	6.7	--	19.2
Pinal Creek at Z5	6/2/1998	1005	4.5	2,220	6.3	--	21.0	682	7.6	97	30.4
Pinal Creek at Z5	12/22/1998	1205	2.8	2,140	6.3	--	16.0	685	7.8	89	43.3
Pinal Creek at Z5	2/10/1999	1240	1.9	2,110	6.1	11.5	17.0	682	7.5	88	48.0
Pinal Creek at Z5	3/23/1999	1230	1.7	2,280	6.3	--	20.4	682	6.7	83	51.2
Pinal Creek at Z5	4/22/1999	1205	1.5	2,330	6.3	--	22.0	--	7.4	--	54.4
Pinal Creek at Z5	6/17/1999	0910	1.4	2,180	6.4	--	22.0	--	5.6	--	51.2
Pinal Creek at Z5	8/25/1999	0745	1.5	2,220	6.2	26.0	19.2	--	3.7	--	62.4
Pinal Creek at Z5	10/18/1999	1450	1.6	2,100	6.1	--	19.3	--	4.4	--	57.6
Pinal Creek at Z5	12/28/1999	1050	7.4	2,310	6.3	--	16.6	--	6.3	--	25.6
Pinal Creek at Z5	2/15/2000	1105	9.1	2,230	6.1	--	20.0	--	6.2	--	17.8
Pinal Creek at Z5	4/12/2000	0915	7.2	2,200	6.1	--	19.0	--	5.8	--	13.2
Pinal Creek at Z5	6/13/2000	0740	8.1	2,160	6.6	--	18.5	--	7.2	--	18.3
Pinal Creek at Z5	8/29/2000	1215	6.4	2,010	6.5	--	22.5	684	5.9	77	18.0
Pinal Creek at Z5	10/17/2000	1045	5.7	2,040	6.2	--	19.5	--	6.0	--	13.0
Pinal Creek at Z5	1/25/2001	1015	2.9	1,940	6.2	--	17.0	--	4.8	--	22.0
Pinal Creek at Z5	4/5/2001	1000	6.1	1,930	6.6	--	17.5	682	1.7	20	16.5
Pinal Creek at Z5	6/12/2001	1025	5.5	--	--	--		--	--	--	--
Pinal Creek at Z5	8/7/2001	0735	4.5	1,940	6.5	--	20.0	--	4.2	--	12.6
Pinal Creek at Z5	11/4/2002	1005	--	2,120	6.6	--	15.0	682	8.0	89	11.5
Pinal Creek at Z5.7	6/17/1999	1045	1.3	2,130	6.7	--	24.0	--	6.9	--	38.4
Pinal Creek at Z5.7	10/18/1999	1545	1.5	2,080	6.7	--	19.8	--	7.1	--	56.0
Pinal Creek at Z5.7	12/28/1999	1140	6.3	2,310	6.5	--	17.5	--	7.9	--	27.2
Pinal Creek at Z5.7	2/15/2000	1230	8.7	2,260	6.7	19.0	20.0	--	7.9	--	28.4
Pinal Creek at Z5.7	4/12/2000	0930	--	2,220	6.4	--	20.0	--	7.5	--	13.1
Pinal Creek at Z5.7	8/29/2000	1255	7.0	2,010	6.9	--	23.5	684	6.1	81	20.0

Field Measurements (continued)

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; µm, micrometer; mf, membrane filter; E, estimated; --, no data]

Site name	Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (µS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)
Pinal Creek at Z5.7	10/17/2000	1130	5.3	2,030	6.5	--	21.5	--	6.5	--	13.0
Pinal Creek at Z5.7	1/25/2001	1100	2.0	2,040	6.4	--	17.5	--	6.2	--	24.0
Pinal Creek at Z5.7	4/5/2001	1015	6.2	1,950	6.8	--	17.5	--	1.8	--	16.4
Pinal Creek at Z5.7	6/12/2001	1040	5.1	1,900	6.7	--		--	--	--	10.4
Pinal Creek at Z5.7	6/13/2001	1045	--	--	--	--	--	--	--	--	--
Pinal Creek at Z5.7	8/7/2001	0830	4.5	1,940	6.4	--	20.0	--	9.8	--	11.4
Pinal Creek at Z5.7	10/24/2001	1125	6.2	1,890	6.8	--	18.6	--	--	--	16.7
Pinal Creek at Z5.7	1/15/2002	1145	5.5	1,920	7.3	16.5	15.5	684	7.0	79	12.0
Pinal Creek at Z5.7	4/2/2002	1335	4.7	2,010	7.4	--	23.5	680	6.8	91	14.6
Pinal Creek at Z5.7	8/21/2002	0915	--	2,140	6.7	--		--	7.3	--	6.3
Pinal Creek at Z5.7	11/4/2002	1035	--	2,120	6.9	--	14.5	--	8.0	--	11.9
Pinal Creek at Z5.7	2/11/2003	0930	--	2,120	6.5	--	13.0	685	9.9	105	7.6
Pinal Creek at Z5.7	5/27/2003	1315	--	2,100	6.3	--	21.0	--	6.5	--	9.4
Pinal Creek at Z5.7	11/17/2003	1055	--	1,840	6.6	--	15.5	--	9.2	--	9.1
Pinal Creek at Z5.7	5/18/2004	1240	2.2	1,850	7.0	--	23.5	--	7.3	--	6.1
Pinal Creek at Z6.2	6/17/1999	1120	--	2,170	6.2	--	26.5	--	5.6	--	17.6
Pinal Creek at Z6.2	4/4/2001	0925	--	1,910	6.6	--	16.5	--	6.9	--	14.4
Pinal Creek at Z6.2	6/12/2001	1140	--	1,900	6.6	--	--	--	6.4	--	8.4
Pinal Creek at Z6.2	8/7/2001	0930	--	1,930	6.5	--	21.0	--	5.9	--	10.4
Pinal Creek at Z6.7	6/17/1999	1315	--	2,160	6.2	--	29.5	--	5.9	--	11.2
Pinal Creek at Z7	6/2/1998	1325	3.7	2,100	6.8	--	28.6	--	8.7	--	32.8
Pinal Creek at Z7	6/17/1999	1345	--	2,150	6.4	--	31.5	--	5.3	--	11.2
Pinal Creek at Z7	8/25/1999	1040	3.6	2,150	7.0	31.0	24.8	--	5.9	--	75.2
Pinal Creek at Z7	10/19/1999	0905	2.1	2,040	7.1	12.5	15.1	--	6.6	--	77.7
Pinal Creek at Z7	12/29/1999	0830	7.2	2,210	6.9	9.0	13.0	--	9.1	--	38.4
Pinal Creek at Z7	2/15/2000	1435	8.4	2,240	6.8	--	21.5	--	7.3	--	29.2
Pinal Creek at Z7	4/12/2000	1315	7.2	2,180	6.7	--	24.5	--	7.1	--	23.8

Field Measurements (continued)

[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; --, no data]

Site name	Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (μS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)
Pinal Creek at Z7	6/13/2000	1030	6.7	2,160	6.6	--	22.6	--	7.7	--	23.8
Pinal Creek at Z7	10/17/2000	1405	--	2,080	6.8	--	22.0	--	5.5	--	25.0
Pinal Creek at Z7	1/25/2001	1305	2.0	2,090	6.8	--	17.0	--	6.4	--	50.0
Pinal Creek at Z7	4/5/2001	1233	--	1,950	6.7	15.0	16.7	--	--	--	21.6
Pinal Creek at Z7	6/12/2001	1245	--	1,930	6.5	--	22.5	--	5.5	--	16.9
Pinal Creek at Z7	6/13/2001	1250	--	--	--	--	--	--	--	--	--
Pinal Creek at Z7	8/7/2001	1300	--	1,940	6.4	--	22.5	--	5.8	--	17.4
Pinal Creek at Z7	4/2/2002	1000	--	2,040	6.8	--	15.0	680	--	--	14.3
Pinal Creek at Z7	8/21/2002	1000	--	2,140	6.3	--	--	--	6.9	--	3.9
Pinal Creek at Z7	8/21/2002	1005	--	2,150	6.5	--	--	--	6.0	--	16.3
Pinal Creek at Z7	11/4/2002	1250	--	2,160	7.0	--	16.2	--	7.6	--	11.3
Pinal Creek at Z7	11/4/2002	1320	--	2,190	6.6	--	14.5	--	5.8	--	23.9
Pinal Creek at Z7	2/11/2003	1000	--	2,150	7.0	--	10.5	--	9.6	--	7.5
Pinal Creek at Z7	2/11/2003	1020	--	--	6.9	--	10.5	--	--	--	7.3
Pinal Creek at Z7	5/27/2003	0800	--	2,200	6.5	--	18.2	686	4.0	48	13.8
Pinal Creek at Z7	5/27/2003	0815	--	2,160	6.2	--	18.4	686	4.7	56	4.1
Pinal Creek at Z7	5/27/2003	0830	--	2,130	6.2	--	18.8	686	5.3	64	5.5
Pinal Creek at Z8.3 SW	8/21/2002	1155	--	2,140	6.5	--	--	--	--	--	16.7
Pinal Creek at Z8.3 SW	11/4/2002	1500	--	2,170	6.8	--	15.0	--	6.7	--	23.0
Pinal Creek at Z8.3 SW	2/11/2003	1240	--	2,140	6.9		11.5	686	9.0	92	16.2
Pinal Creek at Z8.3 SW	5/27/2003	1415	--	2,210	--	--	18.9	--	5.5	--	26.0
Pinal Creek at Z8.3 SW	11/17/2003	1500	--	1,970	6.8	--	14.0	--	8.6	--	26.0
Pinal Creek at Z8.3 SW	5/18/2004	1430	1.9	1,920	6.8	--	19.0	683	6.3	76	20.0
Pinal Creek at Z9A	6/2/1998	1215	6.5	2,200	7.0	--	26.5	681	7.9	112	36.0

Field Measurements (continued)

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; µm, micrometer; mf, membrane filter; E, estimated; --, no data]

Site name	Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (µS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)
Pinal Creek at Z9A	11/12/1998	1145	4.8	2,240	6.7	14.5	13.8	685	9.2	100	49.6
Pinal Creek at Z9A	12/22/1998	1420	3.2	2,090	6.6	--	13.2	685	7.8	84	35.7
Pinal Creek at Z9A	2/10/1999	1420	3.1	2,110	6.6	8.4	15.0	685	8.3	92	31.7
Pinal Creek at Z9A	3/23/1999	1415	--	2,130	6.5	25.0	22.0	681	7.4	96	27.2
Pinal Creek at Z9A	4/22/1999	1345	--	2,280	6.7	--	24.0	--	6.9	--	32.0
Pinal Creek at Z9A	8/24/1999	1510	2.9	2,110	7.0	31.6	27.7	--	4.4	--	86.5
Pinal Creek at Z9A	10/19/1999	0950	2.8	1,980	7.0	--	17.4	--	6.3	--	96.1
Pinal Creek at Z9A	12/29/1999	1100	8.5	2,220	7.0	9.0	14.7	--	8.2	--	40.0
Pinal Creek at Z9A	2/15/2000	1510	11	2,260	6.7	24.0	21.0	--	7.4	--	34.5
Pinal Creek at Z9A	4/12/2000	1340	7.8	2,200	6.7	--	24.4	--	6.8	--	30.0
Pinal Creek at Z9A	6/13/2000	1145	6.4	2,090	6.6	--	24.5	--	6.8	--	21.6
Pinal Creek at Z9A	8/29/2000	1555	8.2	2,000	6.9	--	23.0	683	5.5	72	51.0
Pinal Creek at Z9A	10/17/2000	1510	5.7	2,070	6.6	--	20.5	--	5.7	--	38.0
Pinal Creek at Z9A	1/25/2001	1410	3.5	2,090	6.8	--	16.0	--	6.3	--	58.0
Pinal Creek at Z9A	4/5/2001	1325	7.0	1,980	6.7	16.7	17.1	--	6.7	--	29.1
Pinal Creek at Z9A	6/13/2001	1610	5.0	1,960	6.5	--	--	--	5.4	--	26.9
Pinal Creek at Z9A	8/7/2001	1400	5.4	1,980	6.6	--	22.4	--	6.0	--	24.7
Pinal Creek at Z9A	10/24/2001	1300	7.6	1,960	6.8	19.5	17.9	--	--	--	26.0
Pinal Creek at Z9A	1/16/2002	0950	6.4	1,920	6.7	5.0	12.5	684	5.4	57	28.0
Pinal Creek at Z9A	4/2/2002	0845	5.0	2,030	6.7	--	14.0	683	7.5	82	27.4
Pinal Creek at Z9A	8/21/2002	1320	--	2,130	6.5	--	--	--	5.9	--	25.5
Pinal Creek at Z9A	11/4/2002	1555	--	2,160	6.7	--	15.0	--	6.4	--	30.7
Pinal Creek at Z9A	2/11/2003	1340	--	2,140	6.8	--	13.0	--	--	--	25.2
Pinal Creek at Z9A	5/27/2003	1510	--	2,180	6.5	--	19.0	--	5.0	--	33.0
Pinal Creek at Z9A	11/17/2003	1417	--	1,950	7.1	--	14.5	--	7.5	--	30.0
Pinal Creek at Z9A	5/18/2004	1530	2.5	--	6.6	--	19.2	--	5.4	--	30.0
Pinal Creek at Z10SW	2/11/2003	1420	--	2,140	6.7	--	13.0	--	8.6	--	25.5

Field Measurements (continued)

[ft^3/s, cubic feet per second; μS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; NTU, nephelometric turbidity units; cols./100 mL, colonies per 100 milliliters; μm, micrometer; mf, membrane filter; E, estimated; --, no data]

Site name	Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (μS/cm)	pH (standard units)	Temperature, air (°C)	Temperature, water (°C)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)	Oxygen, dissolved (percent saturation)	Alkalinity, dissolved (mg/L as $CaCO_3$)
Pinal Creek at Z10SW	5/27/2003	1600	--	2,190	6.4	--	19.5	--	4.5	--	27.6
Pinal Creek at Z10SW	11/17/2003	1710	--	2,030	6.8	--	14.0	--	6.8	--	27.0
Pinal Creek at JJ15.SW	6/2/1998	1445	5.0	2,300	7.1	--	30.5	--	6.7	--	23.2
Pinal Creek at JJ15.SW	12/22/1998	1610	3.4	2,060	7.4	13.8	13.2	685	9.6	102	25.9
Pinal Creek at JJ15.SW	2/10/1999	1650	2.8	2,110	7.6	9.5	14.4	--	8.8	--	24.0
Pinal Creek at JJ15.SW	3/23/1999	1605	2.3	2,170	8.2	26.0	23.5	682	8.8	116	27.2
Pinal Creek at JJ15.SW	4/22/1999	1540	2.3	2,320	7.7	--	25.5	--	7.0	--	33.6
Pinal Creek at JJ15.SW	6/15/1999	0805	1.4	2,180	7.6	--	20.5	--	7.6	--	48.0
Pinal Creek at JJ15.SW	10/19/1999	1255	2.6	1,970	7.4	--	20.2	--	6.4	--	60.8
Pinal Creek at JJ15.SW	12/28/1999	1630	7.5	2,240	6.9	--	16.0	--	7.1	--	24.0
Pinal Creek at JJ15.SW	2/15/2000	1620	9.6	2,220	7.0	--	20.5	--	6.6	--	21.5
Pinal Creek at JJ15.SW	8/29/2000	0805	18	751	7.5	--	20.0	683	5.6	69	63.0
Pinal Creek at JJ15.SW	6/12/2001	1515	3.9	1,980	7.5	--		--		--	21.8
Pinal Creek at D10	6/2/1998	1150	4.0	2,290	7.0	--	25.5	--	7.5	--	28.8

Laboratory Measurements										
[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]										
Site name	**Date**	**Laboratory**	**Residue, dissolved, sum of constituents (mg/L)**	**Calcium, dissolved (mg/L as Ca)**	**Magnesium, dissolved (mg/L as Mg)**	**Sodium, dissolved (mg/L as Na)**	**Potassium, dissolved (mg/L as K)**	**Sulfate, dissolved (mg/L as SO_4)**	**Chloride, dissolved (mg/L as Cl**	**Fluoride, dissolved (mg/L as F)**
Outfall	12/27/1999	440	1,890	385	57.0	104	5.8	1,270	54.5	1.8
Outfall	2/15/2000	440	1,870	430	34.0	72.0	8.2	1,260	49.2	1.6
Outfall	4/12/2000	440	1,830	400	45.0	78.0	6.7	1,230	50.7	1.5
Outfall	6/12/2001	440	1,630	329	53.0	59.0	5.1	1,100	56.1	1.5
Outfall	6/12/2001	140	--	360	53.0	60.0	5.2	--	--	--
A-02-15 06CCC (D1.5S)	6/14/1999	440	2,080	360	90.0	63.0	7.7	1,340	50.1	5.0
Pinal Creek at Z1	6/2/1998	440	1,980	340	83.0	57.0	11.2	1,280	49.7	4.7
Pinal Creek at Z1	6/14/1999	440	--	390	97.0	66.0	--	1,420	52.3	4.9
Pinal Creek at Z2.2	6/13/2000	440	--	390	55.0	60.0	--	1,230	49.9	1.7
Pinal Creek at Z4	6/2/1998	440	1,990	350	84.0	57.0	10.8	1,280	51.0	4.7
Pinal Creek at Z4	2/15/2000	440	1,880	430	34.0	74.0	7.6	1,260	53.5	1.6
Pinal Creek at Z4.3	6/14/1999	10	2,020	370	88.0	63.0	5.7	1,300	52.7	3.9
Pinal Creek at Z4.3	10/18/1999	440	1,940	350	84.0	62.0	7.0	1,240	50.9	4.4
Pinal Creek at Z4.4	6/14/1999	440	1,900	340	78.0	55.0	6.1	1,240	50.1	2.5
Pinal Creek at Z4.4	8/24/1999	440	2,010	360	87.0	63.0	6.2	1,280	54.3	2.9
Pinal Creek at Z4.4	8/24/1999	440	1,970	360	85.0	63.0	5.2	1,240	53.1	2.6
Pinal Creek at Z4.4	10/18/1999	440	1,900	350	86.0	66.0	5.5	1,190	51.7	1.7
Pinal Creek at Z4.7	6/17/1999	440	1,990	360	84.0	59.0	5.3	1,280	50.7	2.8
Pinal Creek at Z4.7	2/15/2000	440	1,900	420	38.0	73.0	7.1	1,270	53.1	1.7
Pinal Creek at Z4.7	4/12/2000	440	1,860	410	49.0	74.0	7.3	1,240	49.4	1.7
Pinal Creek at Z4.7	6/13/2000	440	--	390	58.0	64.00		1,240	50.6	1.8
Pinal Creek at Z4.7	8/7/2001	10	1,670	365	49.9	56.5	4.25	1,110	53.4	1.5
Pinal Creek at Z4.7	8/7/2001	140	--	366	50.0	62.0	5.0	--	--	--
Pinal Creek at Z4.5	10/18/1999	440	--	370	91.0	69.0	--	1,280	51.3	4.6
Pinal Creek at Z4.6	12/28/1999	440	1,930	370	64.0	92.0	5.9	1,290	54.0	2.1
Pinal Creek at Z5	6/2/1998	440	2,040	360	87.0	59.0	10.7	1,320	50.4	4.0
Pinal Creek at Z5	6/2/1998	440	2,050	370	89.0	60.0	8.7	1,320	51.9	3.6

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at Z5	12/22/1998	440	2,080	367	87.9	58.7	5.3	1,360	48.6	2.7
Pinal Creek at Z5	2/10/1999	10	2,090	380	92.1	62.2	4.44	1,350	51.3	2.8
Pinal Creek at Z5	3/23/1999	440	2,130	380	90.0	59.0	3.8	1,400	53.2	2.5
Pinal Creek at Z5	4/22/1999	10	--	390	94.0	62.0		1,410	52.2	1.4
Pinal Creek at Z5	6/17/1999	440	2,110	390	94.0	57.0	4.2	1,370	50.5	2.4
Pinal Creek at Z5	8/25/1999	440	2,210	410	100	67.0	2.9	1,410	55.1	2.2
Pinal Creek at Z5	10/18/1999	440	2,200	410	100	69.0	5.1	1,400	52.6	2.4
Pinal Creek at Z5	12/28/1999	440	1,970	380	65.5	89.0	6.4	1,300	55.0	2.0
Pinal Creek at Z5	2/15/2000	440	1,920	420	43.0	69.0	6.4	1,290	51.3	1.8
Pinal Creek at Z5	4/12/2000	440	1,890	410	54.0	74.0	4.7	1,260	48.8	1.8
Pinal Creek at Z5	6/13/2000	440	--	390	60.0	63.0	--	1,260	52.2	1.8
Pinal Creek at Z5	8/29/2000	10	1,730	362	52.6	61.7	5.4	1,150	51.7	1.6
Pinal Creek at Z5	10/17/2000	10	--	355	60.1	64.1	--	1,180	48.9	1.8
Pinal Creek at Z5	10/17/2000	140	--	370	60.0	59.0	5.9	--	--	--
Pinal Creek at Z5	1/25/2001	10	--	352	54.0	59.5	--	1,150	47.1	2.0
Pinal Creek at Z5	1/25/2001	10	--	335	58.9	59.5	4.64	--	--	--
Pinal Creek at Z5	1/25/2001	140	--	352	64.0	64.0	5.2	--	--	--
Pinal Creek at Z5	4/5/2001	10	--	322	51.1	60.3	--	1,090	51.2	1.6
Pinal Creek at Z5	4/5/2001	10	--	332	49.4	58.1	4.67	--	--	--
Pinal Creek at Z5	4/5/2001	140	--	368	52.0	57.0	4.8	--	--	--
Pinal Creek at Z5	6/12/2001	140	--	360	56.0	61.0	5.2	--	--	--
Pinal Creek at Z5	8/7/2001	10	1,690	354	52.7	52.2	4.65	1,130	53.3	1.5
Pinal Creek at Z5	8/7/2001	140	--	372	53.0	59.0	4.7	--	--	--
Pinal Creek at Z5	11/4/2002	440	1,810	376	49.6	69.4	5.1	1,220	53.9	1.6
Pinal Creek at Z5.7	6/17/1999	440	2,120	400	96.0	57.0	4.7	1,380	51.3	2.5
Pinal Creek at Z5.7	10/18/1999	440	2,190	400	94.0	72.0	4.8	1,400	51.0	2.6
Pinal Creek at Z5.7	12/28/1999	440	1,990	390	68.5	94.5	4.4	1,310	54.2	2.0
Pinal Creek at Z5.7	2/15/2000	440	1,990	430	54.0	68.0	6.6	1,310	51.2	1.9

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at Z5.7	4/12/2000	440	1,900	410	53.0	73.0	4.7	1,270	49.0	1.8
Pinal Creek at Z5.7	8/29/2000	10	1,750	376	56.6	67.1	4.91	1,160	47.1	1.6
Pinal Creek at Z5.7	10/17/2000	10	--	342	57.3	61.1	--	1,180	50.7	1.8
Pinal Creek at Z5.7	10/17/2000	140	--	370	60.0	61.0	7.5	--	--	--
Pinal Creek at Z5.7	1/25/2001	10	--	355	75.7	62.1	--	1,180	48.8	2.1
Pinal Creek at Z5.7	1/25/2001	140	--	355	69.0	65.0	5.2	--	--	--
Pinal Creek at Z5.7	4/5/2001	10	--	317	49.9	58.2	--	1,090	52.0	1.6
Pinal Creek at Z5.7	4/5/2001	140	--	371	53.0	57.0	4.7	--	--	--
Pinal Creek at Z5.7	6/12/2001	10	--	337	50.3	43.4	--	1,160	53.9	1.7
Pinal Creek at Z5.7	6/13/2001	140	--	376	57.0	61.0	5.3	--	--	--
Pinal Creek at Z5.7	8/7/2001	10	1,680	363	51.7	56.1	3.78	1,120	52.8	1.5
Pinal Creek at Z5.7	8/7/2001	140	--	360	51.0	60.0	4.8	--	--	--
Pinal Creek at Z5.7	10/24/2001	440	1,680	351	59.0	62.0	5.2	1,110	55.3	1.5
Pinal Creek at Z5.7	1/15/2002	440	1,700	380	51.5	60.5	4.88	1,120	52.7	1.6
Pinal Creek at Z5.7	4/2/2002	440	1,740	370	48.8	62.7	5.19	1,170	54.5	1.6
Pinal Creek at Z5.7	8/21/2002	440	1,830	416	56.0	59.2	4.69	1,210	54.2	1.5
Pinal Creek at Z5.7	11/4/2002	440	1,810	370	49.4	71.3	5.23	1,230	53.0	1.6
Pinal Creek at Z5.7	2/11/2003	440	1,810	415	43.2	64.4	4.96	1,210	48.8	1.3
Pinal Creek at Z5.7	5/27/2003	440	1,800	382	54.1	65.4	5.31	1,210	50.7	1.6
Pinal Creek at Z5.7	11/17/2003	440	1,710	374	53.1	64.4	5.12	1,130	52.8	1.5
Pinal Creek at Z5.7	5/18/2004	440	--	--	--	--	--	1,090	54.6	1.5
Pinal Creek at Z6.2	6/17/1999	440	2,130	410	97.0	60.0	6.1	1,400	52.1	2.3
Pinal Creek at Z6.2	4/4/2001	10	--	333	59.0	58.5	--	1,100	51.5	1.6
Pinal Creek at Z6.2	4/4/2001	10	--	335	53.8	58.5	4.18	--	--	--
Pinal Creek at Z6.2	4/4/2001	140	--	364	57.0	59.0	4.6	--	--	--
Pinal Creek at Z6.2	6/12/2001	10	--	336	53.6	65.0	--	1,120	54.1	1.6
Pinal Creek at Z6.2	6/12/2001	140	--	372	57.0	61.0	5.2	--	--	--
Pinal Creek at Z6.2	8/7/2001	10	1,690	361	52.3	57.4	4.23	1,120	53.3	1.5

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at Z6.2	8/7/2001	140	--	374	52.0	60.0	4.7	--	--	--
Pinal Creek at Z6.7	6/17/1999	440	2,090	400	96.0	58.0	4.8	1,400	51.1	2.1
Pinal Creek at Z7	6/2/1998	440	2,090	390	94.0	64.0	9.1	1,340	50.7	3.6
Pinal Creek at Z7	6/17/1999	440	2,110	420	99.0	62.0	4.2	1,390	51.3	1.9
Pinal Creek at Z7	8/25/1999	440	2,170	410	97.0	65.0	3.8	1,380	53.5	1.9
Pinal Creek at Z7	10/19/1999	440	2,160	400	91.0	70.0	4.4	1,380	51.0	2.0
Pinal Creek at Z7	12/29/1999	440	1,990	390	63.0	90.5	5.1	1,310	54.9	1.8
Pinal Creek at Z7	2/15/2000	440	1,940	410	53.0	69.0	7.7	1,290	51.2	1.7
Pinal Creek at Z7	4/12/2000	440	1,900	400	57.0	73.0	4.3	1,260	48.1	1.7
Pinal Creek at Z7	6/13/2000	440	--	380	61.0	62.0	--	1,260	50.8	1.7
Pinal Creek at Z7	10/17/2000	10	--	362	64.0	63.7	--	1,190	50.8	1.6
Pinal Creek at Z7	10/17/2000	140	--	360	62.0	59.0	6.5	--	--	--
Pinal Creek at Z7	1/25/2001	10	--	379	82.4	60.5	--	1,210	48.5	1.7
Pinal Creek at Z7	1/25/2001	140	--	379	77.0	65.0	4.8	--	--	--
Pinal Creek at Z7	4/5/2001	10	--	324	53.6	59.1	--	1,110	51.0	1.5
Pinal Creek at Z7	4/5/2001	140	--	370	57.0	59.0	4.7	--	--	--
Pinal Creek at Z7	6/12/2001	10	--	345	58.5	60.2	--	1,130	53.5	1.6
Pinal Creek at Z7	6/13/2001	140	--	372	61.0	61.0	5.1	--	--	--
Pinal Creek at Z7	8/7/2001	10	1,710	365	55.4	58.5	3.81	1,130	53.8	1.4
Pinal Creek at Z7	8/7/2001	140	--	372	56.0	62.0	4.7	--	--	--
Pinal Creek at Z7	4/2/2002	440	1,740	380	51.3	62.3	4.68	1,160	54.1	1.3
Pinal Creek at Z7	8/21/2002	10	1,880	448	65.8	59.0	4.63	1,230	54.0	1.5
Pinal Creek at Z7	8/21/2002	10	--	<454	62.1	60.0	4.4	1,210	54.5	1.3
Pinal Creek at Z7	11/4/2002	440	1,810	374	50.8	72.0	5.6	1,230	54.4	1.5
Pinal Creek at Z7	11/4/2002	440	1,830	369	54.3	73.0	5.33	1,230	53.5	1.4
Pinal Creek at Z7	2/11/2003	440	1,830	415	49.5	64.6	4.79	1,220	49.2	1.3
Pinal Creek at Z7	5/27/2003	440	1,880	399	61.4	68.0	4.86	1,250	54.1	1.4
Pinal Creek at Z8.3 SW	8/21/2002	10	1,900	466	62.3	59.1	4.51	1,220	55.6	1.3

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at Z8.3 SW	11/4/2002	440	1,840	379	54.1	72.2	5.66	1,230	55.4	1.3
Pinal Creek at Z8.3 SW	2/11/2003	440	1,830	412	53.8	64.9	4.97	1,220	49.1	1.2
Pinal Creek at Z8.3 SW	5/27/2003	440	1,890	397	64.7	67.4	4.44	1,250	53.6	1.2
Pinal Creek at Z8.3 SW	11/17/2003	440	1,770	381	58.8	65.9	5.05	1,160	53.8	1.3
Pinal Creek at Z8.3 SW	5/18/2004	440	--	--	--	--	--	1,140	54.6	1.3
Pinal Creek at Z9A	6/2/1998	440	2,070	390	92.0	64.0	9.1	1,330	49.5	3.2
Pinal Creek at Z9A	11/12/1998	440	2,040	388	92.2	63.0	7.4	1,310	49.9	2.1
Pinal Creek at Z9A	12/22/1998	440	2,040	392	91.7	62.7	6.1	1,350	47.8	1.7
Pinal Creek at Z9A	2/10/1999	10	2,030	403	91.0	61.6	4.06	1,340	51.3	1.8
Pinal Creek at Z9A	3/23/1999	440	2,010	380	87.0	60.0	4.5	1,350	51.4	1.6
Pinal Creek at Z9A	4/22/1999	10	--	410	93.0	65.0	--	1,340	52.7	1.6
Pinal Creek at Z9A	8/24/1999	440	2,070	400	92.0	67.0	5.4	1,320	52.8	1.5
Pinal Creek at Z9A	10/19/1999	440	2,070	400	91.0	71.0	5.2	1,300	49.7	1.4
Pinal Creek at Z9A	12/29/1999	440	1,970	390	67.0	90.0	4.9	1,290	52.7	1.7
Pinal Creek at Z9A	2/15/2000	440	1,930	410	53.0	67.0	5.7	1,280	50.9	1.6
Pinal Creek at Z9A	4/12/2000	440	1,910	400	59.0	73.0	4.1	1,260	53.4	1.6
Pinal Creek at Z9A	6/13/2000	440	--	410	68.0	70.0	--	1,260	50.4	1.6
Pinal Creek at Z9A	8/29/2000	10	1,690	355	57.4	59.9	5.51	1,100	49.7	1.2
Pinal Creek at Z9A	10/17/2000	10	--	365	65.2	62.6	--	1,190	48.6	1.5
Pinal Creek at Z9A	10/17/2000	140	--	380	65.0	59.0	7.0	--	--	--
Pinal Creek at Z9A	1/25/2001	10	--	376	63.2	51.2	--	1,160	48.3	1.3
Pinal Creek at Z9A	1/25/2001	140	--	376	74.0	64.0	4.7	--	--	--
Pinal Creek at Z9A	4/5/2001	10	--	336	60.2	63.0	--	1,120	52.2	1.4
Pinal Creek at Z9A	4/5/2001	140	--	367	59.0	58.0	4.4	--	--	--
Pinal Creek at Z9A	4/5/2001	140	--	365	59.0	60.0	4.6	--	--	--
Pinal Creek at Z9A	6/13/2001	140	--	381	82.0	56.0	3.7	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at Z9A	6/13/2001	10	--	343	60.2	60.1	--	1,170	53.8	1.4
Pinal Creek at Z9A	6/13/2001	140	--	400	63.0	61.0	5.1	--	--	--
Pinal Creek at Z9A	8/7/2001	140	--	360	57.0	62.0	4.5	--	--	--
Pinal Creek at Z9A	8/7/2001	10	1,740	371	58.9	57.8	4.96	1,140	54.1	1.2
Pinal Creek at Z9A	10/24/2001	440	1,720	359	63.0	62.0	5.0	1,120	56.1	1.4
Pinal Creek at Z9A	1/16/2002	440	1,750	388	56.4	60.7	4.67	1,150	51.5	1.2
Pinal Creek at Z9A	4/2/2002	440	1,750	370	54.3	62.5	4.54	1,160	52.7	1.2
Pinal Creek at Z9A	8/21/2002	10	1,870	447	65.4	59.1	4.28	1,200	53.9	1.1
Pinal Creek at Z9A	11/4/2002	440	1,860	401	59.3	65.3	5.04	1,220	52.9	1.2
Pinal Creek at Z9A	2/11/2003	440	1,830	407	56.6	62.0	4.73	1,210	49.8	1.1
Pinal Creek at Z9A	5/27/2003	440	1,870	390	68.2	66.3	4.38	1,230	52.7	1.0
Pinal Creek at Z9A	11/17/2003	440	1,790	381	62.8	66.4	4.9	1,170	53.6	1.1
Pinal Creek at Z9A	5/18/2004	440	--	--	--	--	--	1,150	53.9	1.0
Pinal Creek at Z10SW	2/11/2003	440	--	--	--	--	--	1,210	49.5	1.1
Pinal Creek at Z10SW	5/27/2003	440	1,850	391	69.6	66.0	4.1	1,220	52.5	0.9
Pinal Creek at Z10SW	11/17/2003	440	1,800	382	65.1	67.1	4.98	1,180	56.0	1.1
Pinal Creek at JJ15.SW	6/2/1998	440	2,060	390	92.0	63.0	9.1	1,350	49.1	3.0
Pinal Creek at JJ15.SW	12/22/1998	440	2,040	403	94.2	65.1	5.6	1,360	48.3	1.5
Pinal Creek at JJ15.SW	2/10/1999	10	2,050	410	93.0	64.2	4.0	1,350	51.3	1.6
Pinal Creek at JJ15.SW	3/23/1999	440	2,040	400	88.0	64.0	3.9	1,360	52.0	1.5
Pinal Creek at JJ15.SW	4/22/1999	10	--	420	93.0	66.0	--	1,360	53.2	1.4
Pinal Creek at JJ15.SW	6/15/1999	440	2,100	440	104	64.0	4.2	1,360	51.2	1.3
Pinal Creek at JJ15.SW	10/19/1999	440	2,060	410	92.0	73.0	5.4	1,310	50.5	1.4

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Residue, dissolved, sum of constituents (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl	Fluoride, dissolved (mg/L as F)
Pinal Creek at JJ15.SW	12/28/1999	440	1,940	380	70.5	83.0	4.5	1,290	52.9	1.7
Pinal Creek at JJ15.SW	2/15/2000	440	1,940	420	57.0	69.0	6.3	1,280	52.2	1.6
Pinal Creek at JJ15.SW	8/29/2000	10	560	121	18.9	17.7	6.8	328	15.0	0.5
Pinal Creek at JJ15.SW	6/12/2001	10	--	347	59.0	59.0		1,170	54.7	1.4
Pinal Creek at JJ15.SW	6/12/2001	140	--	388	64.0	62.0	4.7	--	--	--
Pinal Creek at SITE D10	6/2/1998	440	2,050	400	93.0	63.0	7.0	1,340	49.8	2.6

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Boron, dissolved (μg/L as B)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)
Outfall	12/27/1999	440	--	<30	<130	715	<90	<20
Outfall	2/15/2000	440	--	<30	<130	310	<90	<20
Outfall	4/12/2000	440	--	<30	<130	70	<90	<20
Outfall	6/12/2001	440	--	<30	<130	310	<90	<20
Outfall	6/12/2001	140	--	<30	<130	320	<90	<20
A-02-15 06CCC (D1.5S)	6/14/1999	440	--	40	<130	68,300	1,140	1,510
Pinal Creek at Z1	6/2/1998	440	--	220	<130	57,800	760	1,200
Pinal Creek at Z1	6/14/1999	440	--	30	<130	65,600	1,070	1,010
Pinal Creek at Z2.2	6/13/2000	440	--	<30	<130	670	<90	<20
Pinal Creek at Z4	6/2/1998	440	--	190	<130	57,600	770	1,100
Pinal Creek at Z4	2/15/2000	440	--	<30	<130	150	<90	<20

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Lab-ora-tory	Boron, dissolved (μg/L as B)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)
Pinal Creek at Z4.3	6/14/1999	10	--	30	<130	49,500	530	360
Pinal Creek at Z4.3	10/18/1999	440	--	<30	<130	44,900	480	230
Pinal Creek at Z4.4	6/14/1999	440	--	<30	<130	44,100	450	150
Pinal Creek at Z4.4	8/24/1999	440	--	<30	890	52,700	450	60
Pinal Creek at Z4.4	8/24/1999	440	--	<30	<130	52,400	330	30
Pinal Creek at Z4.4	10/18/1999	440	--	<30	430	44,900	340	50
Pinal Creek at Z4.7	6/17/1999	440	--	<30	<130	52,100	500	90
Pinal Creek at Z4.7	2/15/2000	440	--	<30	<130	7,700	<90	<20
Pinal Creek at Z4.7	4/12/2000	440	--	<30	<130	6,200	<90	<20
Pinal Creek at Z4.7	6/13/2000	440	--	<30	<130	3,600	<90	<20
Pinal Creek at Z4.7	8/7/2001	10	<325	<120	<250	2,280	<1,300	<500
Pinal Creek at Z4.7	8/7/2001	140	--	<30	<130	2,130	<90	<20
Pinal Creek at Z4.5	10/18/1999	440	--	<30	<130	57,900	590	80
Pinal Creek at Z4.6	12/28/1999	440	--	<30	<130	13,200	130	30
Pinal Creek at Z5	6/2/1998	440	--	120	<130	55,700	670	740
Pinal Creek at Z5	6/2/1998	440	--	90	<130	56,600	640	620
Pinal Creek at Z5	12/22/1998	440	--	<30	<120	51,400	470	204
Pinal Creek at Z5	2/10/1999	10	81	<30	137	55,600	540	275
Pinal Creek at Z5	3/23/1999	440	--	<30	<130	50,300	480	190
Pinal Creek at Z5	4/22/1999	10	--	<30	<130	51,800	500	140
Pinal Creek at Z5	6/17/1999	440	--	<30	<130	50,800	430	80
Pinal Creek at Z5	8/25/1999	440	--	<30	<130	57,100	420	40
Pinal Creek at Z5	10/18/1999	440	--	<30	<130	57,600	520	60
Pinal Creek at Z5	12/28/1999	440	--	<30	<130	17,800	170	30
Pinal Creek at Z5	2/15/2000	440	--	<30	<130	12,300	110	<20
Pinal Creek at Z5	4/12/2000	440	--	<30	<130	10,500	<90	<20
Pinal Creek at Z5	6/13/2000	440	--	<30	<130	7,100	120	<20
Pinal Creek at Z5	8/29/2000	10	52	<30	<30	8,170	E80	<60
Pinal Creek at Z5	10/17/2000	10	E51	<50	<50	9,320	E90	<100
Pinal Creek at Z5	10/17/2000	140	--	<30	<130	9,400	<90	<20

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Lab-ora-tory	Boron, dissolved (µg/L as B)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Zinc, dissolved (µg/L as Zn)
Pinal Creek at Z5	1/25/2001	10	46	E3	<10	16,700	150	28
Pinal Creek at Z5	1/25/2001	140	--	<30	<130	17,800	150	50
Pinal Creek at Z5	4/5/2001	10	49	<5	<10	6,460	60	24
Pinal Creek at Z5	4/5/2001	140	--	<30	<130	6,680	<90	<20
Pinal Creek at Z5	6/12/2001	10	--	--	--	--	--	--
Pinal Creek at Z5	6/12/2001	140	--	<30	<130	5,560	<90	<20
Pinal Creek at Z5	8/7/2001	10	<325	<120	<250	7,670	<1300	<500
Pinal Creek at Z5	8/7/2001	140	--	<30	<130	7,270	<90	30
Pinal Creek at Z5	11/4/2002	440	--	<30	<130	4,290	<90	<20
Pinal Creek at Z5.7	6/17/1999	440	--	<30	<130	39,500	350	50
Pinal Creek at Z5.7	10/18/1999	440	--	<30	<130	54,400	510	90
Pinal Creek at Z5.7	12/28/1999	440	--	<30	<130	18,000	160	25
Pinal Creek at Z5.7	2/15/2000	440	--	<30	<130	16,900	140	<20
Pinal Creek at Z5.7	4/12/2000	440	--	<30	<130	10,100	<90	<20
Pinal Creek at Z5.7	8/29/2000	10	E48	<30	<30	8,660	E60	E31
Pinal Creek at Z5.7	10/17/2000	10	E61	<50	<50	8,840	<200	<100
Pinal Creek at Z5.7	10/17/2000	140	--	<30	<130	9,400	<90	<20
Pinal Creek at Z5.7	1/25/2001	10	176	<50	<100	29,100	<530	<200
Pinal Creek at Z5.7	1/25/2001	140	--	<30	<130	24,200	200	<20
Pinal Creek at Z5.7	4/5/2001	10	55	<5	<10	6,110	60	E17
Pinal Creek at Z5.7	4/5/2001	140	--	<30	<130	6,340	<90	<20
Pinal Creek at Z5.7	6/12/2001	10	43	<5	<10	4,730	E30	<20
Pinal Creek at Z5.7	6/13/2001	140	--	<30	<130	5,330	<90	<20
Pinal Creek at Z5.7	8/7/2001	10	<325	<120	<250	5,280	<1300	<500
Pinal Creek at Z5.7	8/7/2001	140	--	<30	<130	4,930	<90	<20
Pinal Creek at Z5.7	10/24/2001	440	--	<30	<130	3,310	<90	<20
Pinal Creek at Z5.7	1/15/2002	440	--	<30	<130	2,420	<90	<20
Pinal Creek at Z5.7	4/2/2002	440	--	<30	<130	1,810	<90	<20
Pinal Creek at Z5.7	8/21/2002	440	--	<30	<130	3,470	<90	<20
Pinal Creek at Z5.7	11/4/2002	440	--	<30	<130	4,300	<90	<20

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Lab-ora-tory	Boron, dissolved (µg/L as B)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Zinc, dissolved (µg/L as Zn)
Pinal Creek at Z5.7	2/11/2003	440	--	<30	<130	3,400	40	<20
Pinal Creek at Z5.7	5/27/2003	440	--	<30	<130	5,370	60	<20
Pinal Creek at Z5.7	11/17/2003	440	--	<30	<130	1,840	<90	<20
Pinal Creek at Z6.2	6/17/1999	440	--	<30	<130	27,000	330	50
Pinal Creek at Z6.2	4/4/2001	10	190	<50	<100	7,770	<530	<200
Pinal Creek at Z6.2	4/4/2001	140	--	<30	<130	5,870	<90	<20
Pinal Creek at Z6.2	6/12/2001	10	58	<5	E7	4,470	70	E16
Pinal Creek at Z6.2	6/12/2001	140	--	<30	<130	4,810	<90	<20
Pinal Creek at Z6.2	8/7/2001	10	<325	<120	<250	4,610	<1300	<500
Pinal Creek at Z6.2	8/7/2001	140	--	<30	<130	4,330	<90	<20
Pinal Creek at Z6.7	6/17/1999	440	--	<30	<130	16,500	240	40
Pinal Creek at Z7	6/2/1998	440	--	40	<130	48,400	550	450
Pinal Creek at Z7	6/17/1999	440	--	<30	<130	10,400	210	30
Pinal Creek at Z7	8/25/1999	440	--	<30	<130	45,000	280	<20
Pinal Creek at Z7	10/19/1999	440	--	<30	<130	45,900	350	50
Pinal Creek at Z7	12/29/1999	440	--	<30	<130	18,200	160	10
Pinal Creek at Z7	2/15/2000	440	--	<30	<130	13,400	100	<20
Pinal Creek at Z7	4/12/2000	440	--	<30	<130	11,700	110	30
Pinal Creek at Z7	6/13/2000	440	--	<30	<130	5,000	120	<20
Pinal Creek at Z7	10/17/2000	10	E61	<50	<50	9,710	<200	<100
Pinal Creek at Z7	10/17/2000	140	--	<30	<130	9,600	<90	<20
Pinal Creek at Z7	1/25/2001	10	190	<50	<100	20,900	<530	<200
Pinal Creek at Z7	1/25/2001	140	--	<30	<130	20,500	120	<20
Pinal Creek at Z7	4/5/2001	10	92	<10	<30	4,670	<160	<60
Pinal Creek at Z7	4/5/2001	140	--	<30	<130	6,680	<90	<20
Pinal Creek at Z7	6/12/2001	10	75	<5	<10	2,500	E40	E10
Pinal Creek at Z7	6/13/2001	140	--	<30	<130	2,760	<90	<20
Pinal Creek at Z7	8/7/2001	10	<325	<120	<250	2,440	<1300	<500
Pinal Creek at Z7	8/7/2001	140	--	<30	<130	2,350	<90	<20
Pinal Creek at Z7	4/2/2002	440	--	<30	<130	1,170	<90	<20

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Lab-ora-tory	Boron, dissolved (µg/L as B)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Zinc, dissolved (µg/L as Zn)
Pinal Creek at Z7	8/21/2002	10	--	<30	<130	1,210	<90	<20
Pinal Creek at Z7	8/21/2002	10	--	<30	<130	2,040	<90	<20
Pinal Creek at Z7	11/4/2002	440	--	<30	<130	1,570	<90	<20
Pinal Creek at Z7	11/4/2002	440	--	<30	<130	3,150	<90	<20
Pinal Creek at Z7	2/11/2003	440	--	<30	<130	1,070	<90	<20
Pinal Creek at Z7	5/27/2003	440	--	<30	<130	1,760	<90	<20
Pinal Creek at Z8.3 SW	8/21/2002	10	--	<30	<130	1,250	<90	<20
Pinal Creek at Z8.3 SW	11/4/2002	440	--	<30	<130	1,940	<90	<20
Pinal Creek at Z8.3 SW	2/11/2003	440	--	<110	<130	820	<90	<20
Pinal Creek at Z8.3 SW	5/27/2003	440	--	<30	<130	1,470	<90	<20
Pinal Creek at Z8.3 SW	11/17/2003	440	--	<30	<130	2,390	<90	<20
Pinal Creek at Z9A	6/2/1998	440	--	<30	<130	40,000	500	380
Pinal Creek at Z9A	11/12/1998	440	--	<30	<120	28,400	350	257
Pinal Creek at Z9A	12/22/1998	440	--	<30	<120	10,500	220	88
Pinal Creek at Z9A	2/10/1999	10	71	<30	<30	7,600	230	108
Pinal Creek at Z9A	3/23/1999	440	--	<30	<130	5,000	200	60
Pinal Creek at Z9A	4/22/1999	10	--	<30	<130	3,400	120	40
Pinal Creek at Z9A	8/24/1999	440	--	<30	<130	26,200	120	<20
Pinal Creek at Z9A	10/19/1999	440	--	<30	<130	31,200	190	30
Pinal Creek at Z9A	12/29/1999	440	--	<30	<130	15,000	110	<20
Pinal Creek at Z9A	2/15/2000	440	--	<30	<130	9,600	<90	<20
Pinal Creek at Z9A	4/12/2000	440	--	<30	<130	8,600	<90	<20
Pinal Creek at Z9A	6/13/2000	440	--	<30	<130	2,400	<90	<20
Pinal Creek at Z9A	8/29/2000	10	58	<30	<30	7,460	<120	<60
Pinal Creek at Z9A	10/17/2000	10	E64	<50	<50	7,710	<200	<100
Pinal Creek at Z9A	10/17/2000	140	--	<30	130	7,900	<90	<20
Pinal Creek at Z9A	1/25/2001	10	50	<50	<100	10,100	E50	<200

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Boron, dissolved (μg/L as B)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Zinc, dissolved (μg/L as Zn)
Pinal Creek at Z9A	1/25/2001	140	--	<30	<130	10,400	<90	<20
Pinal Creek at Z9A	4/5/2001	10	180	<50	<100	3,910	<530	<200
Pinal Creek at Z9A	4/5/2001	140	--	<30	<130	3,940	<90	<20
Pinal Creek at Z9A	4/5/2001	140	--	<30	130	3,870	<90	<20
Pinal Creek at Z9A	6/13/2001	140	--	<30	<130	11,000	<90	<20
Pinal Creek at Z9A	6/13/2001	10	88	<5	<10	2,500	<50	<20
Pinal Creek at Z9A	6/13/2001	140	--	<30	<130	2,730	<90	<20
Pinal Creek at Z9A	8/7/2001	140	--	<30	<130	2,090	<90	<20
Pinal Creek at Z9A	8/7/2001	10	<325	<120	<250	2,240	<1300	<500
Pinal Creek at Z9A	10/24/2001	440	--	<30	<130	2,610	<90	<20
Pinal Creek at Z9A	1/16/2002	440	--	<30	<130	1,860	<90	<20
Pinal Creek at Z9A	4/2/2002	440	--	<30	<130	1,770	<90	<20
Pinal Creek at Z9A	8/21/2002	10	--	<30	<130	2,530	<90	<20
Pinal Creek at Z9A	11/4/2002	440	--	<30	<130	3,260	<90	<20
Pinal Creek at Z9A	2/11/2003	440	--	<30	<130	2,190	<90	<20
Pinal Creek at Z9A	5/27/2003	440	--	<30	<130	3,330	<90	<20
Pinal Creek at Z9A	11/17/2003	440	--	<30	<130	4,180	<90	<20
Pinal Creek at Z10SW	5/27/2003	440	--	<30	<130	360	<90	30
Pinal Creek at Z10SW	11/17/2003	440	--	<30	<130	535	<90	<20
Pinal Creek at JJ15.SW	6/2/1998	440	--	<30	<130	24,600	360	250
Pinal Creek at JJ15.SW	12/22/1998	440	--	<30	<120	1,340	<90	<25
Pinal Creek at JJ15.SW	2/10/1999	10	66	<30	<30	24	<120	E29
Pinal Creek at JJ15.SW	3/23/1999	440	--	<30	<130	610	<90	<20
Pinal Creek at JJ15.SW	4/22/1999	10	--	<30	<130	560	<90	<20
Pinal Creek at JJ15.SW	6/15/1999	440	--	<30	<130	650	<90	<20

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Lab-ora-tory	Boron, dissolved (µg/L as B)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Zinc, dissolved (µg/L as Zn)
Pinal Creek at JJ15.SW	10/19/1999	440	--	<30	<130	12,600	180	<20
Pinal Creek at JJ15.SW	12/28/1999	440	--	<30	<130	3,100	<90	<20
Pinal Creek at JJ15.SW	2/15/2000	440	--	<30	<130	3,700	<90	<20
Pinal Creek at JJ15.SW	8/29/2000	10	38	27	<10	255	<50	<20
Pinal Creek at JJ15.SW	6/12/2001	10	58	<5	<10	47	<50	<20
Pinal Creek at JJ15.SW	6/12/2001	140	--	<30	<130	80	<90	<20
Pinal Creek at SITE D10	6/2/1998	440	--	<30	<130	17,900	280	170

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Labora-tory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
Outfall	12/27/1999	440	--	--	--	--	--	--
Outfall	2/15/2000	440	--	--	--	--	--	--
Outfall	4/12/2000	440	--	--	--	--	--	--
Outfall	6/12/2001	440	--	--	--	--	--	--
Outfall	6/12/2001	140	--	--	--	--	--	--
A-02-15 06CCC (D1.5S)	6/14/1999	440	--	--	--	--	--	--
Pinal Creek at Z1	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z1	6/14/1999	440	--	--	--	--	--	--
Pinal Creek at Z2.2	6/13/2000	440	--	--	--	--	--	--
Pinal Creek at Z4	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z4	2/15/2000	440	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
Pinal Creek at Z4.3	6/14/1999	10	--	--	--	--	--	--
Pinal Creek at Z4.3	10/18/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.4	6/14/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.4	8/24/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.4	8/24/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.4	10/18/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.7	6/17/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.7	2/15/2000	440	--	--	--	--	--	--
Pinal Creek at Z4.7	4/12/2000	440	--	--	--	--	--	--
Pinal Creek at Z4.7	6/13/2000	440	--	--	--	--	--	--
Pinal Creek at Z4.7	8/7/2001	10	<23.0	<25.0	<200	<250	<.08	139
Pinal Creek at Z4.7	8/7/2001	140	--	--	--	--	--	--
Pinal Creek at Z4.5	10/18/1999	440	--	--	--	--	--	--
Pinal Creek at Z4.6	12/28/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z5	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z5	12/22/1998	440	--	--	--	--	--	--
Pinal Creek at Z5	2/10/1999	10	18.1	<4.8	<24	<42	<300	175
Pinal Creek at Z5	3/23/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	4/22/1999	10	--	--	--	--	--	--
Pinal Creek at Z5	6/17/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	8/25/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	10/18/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	12/28/1999	440	--	--	--	--	--	--
Pinal Creek at Z5	2/15/2000	440	--	--	--	--	--	--
Pinal Creek at Z5	4/12/2000	440	--	--	--	--	--	--
Pinal Creek at Z5	6/13/2000	440	--	--	--	--	--	--
Pinal Creek at Z5	8/29/2000	10	54.3	E.8	<24	<42	<.08	154
Pinal Creek at Z5	10/17/2000	10	14.4	E1.0	<40	<70	E.07	135
Pinal Creek at Z5	10/17/2000	140	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Labora-tory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
Pinal Creek at Z5	1/25/2001	10	14	<1.0	<8	<10	<.08	129
Pinal Creek at Z5	1/25/2001	140	--	--	--	--	--	--
Pinal Creek at Z5	4/5/2001	10	12.8	<1.0	<8	E6	<.08	116
Pinal Creek at Z5	4/5/2001	140	--	--	--	--	--	--
Pinal Creek at Z5	6/12/2001	10	9.4	--	--	--	--	--
Pinal Creek at Z5	6/12/2001	140	--	--	--	<250	<.08	137
Pinal Creek at Z5	8/7/2001	10	<23.0	<25.0	<200	--	--	--
Pinal Creek at Z5	8/7/2001	140	--	--	--	--	--	--
Pinal Creek at Z5	11/4/2002	440	--	--	--	--	--	--
Pinal Creek at Z5.7	6/17/1999	440	--	--	--	--	--	--
Pinal Creek at Z5.7	10/18/1999	440	--	--	--	--	--	--
Pinal Creek at Z5.7	12/28/1999	440	--	--	--	--	--	--
Pinal Creek at Z5.7	2/15/2000	440	--	--	--	--	--	--
Pinal Creek at Z5.7	4/12/2000	440	--	--	--	<42	E.08	141
Pinal Creek at Z5.7	8/29/2000	10	67.0	<1.0	<24	<70	E.06	132
Pinal Creek at Z5.7	10/17/2000	10	15.2	1.3	<40	--	--	--
Pinal Creek at Z5.7	10/17/2000	140	--	--	--	<100	<.08	135
Pinal Creek at Z5.7	1/25/2001	10	14.9	<10.0	<80	--	--	--
Pinal Creek at Z5.7	1/25/2001	140	--	--	--	E7	<.08	106
Pinal Creek at Z5.7	4/5/2001	10	12.0	<1.0	<8	--	--	--
Pinal Creek at Z5.7	4/5/2001	140	--	--	--	<10	<.08	108
Pinal Creek at Z5.7	6/12/2001	10	9.5	<1.0	<8	--	--	--
Pinal Creek at Z5.7	6/13/2001	140	--	--	--	<250	<.08	139
Pinal Creek at Z5.7	8/7/2001	10	E10.9	<25.0	<200	--	--	--
Pinal Creek at Z5.7	8/7/2001	140	--	--	--	--	--	--
Pinal Creek at Z5.7	10/24/2001	440	--	--	--	--	--	--
Pinal Creek at Z5.7	1/15/2002	440	--	--	--	--	--	--
Pinal Creek at Z5.7	4/2/2002	440	--	--	--	--	--	--
Pinal Creek at Z5.7	8/21/2002	440	--	--	--	--	--	--
Pinal Creek at Z5.7	11/4/2002	440	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)
Pinal Creek at Z5.7	2/11/2003	440	--	--	--	--	--	--
Pinal Creek at Z5.7	5/27/2003	440	--	--	--	--	--	--
Pinal Creek at Z5.7	11/17/2003	440	--	--	--	--	--	--
Pinal Creek at Z6.2	6/17/1999	440	--	--	--	<100	<.08	147
Pinal Creek at Z6.2	4/4/2001	10	8.5	<10.0	<80	--	--	--
Pinal Creek at Z6.2	4/4/2001	140	--	--	--	16	<.08	143
Pinal Creek at Z6.2	6/12/2001	10	8.3	E.6	E4	--	--	--
Pinal Creek at Z6.2	6/12/2001	140	--	--	--	<250	E.06	137
Pinal Creek at Z6.2	8/7/2001	10	<23.0	<25.0	<200	--	--	--
Pinal Creek at Z6.2	8/7/2001	140	--	--	--	--	--	--
Pinal Creek at Z6.7	6/17/1999	440	--	--	--	--	--	--
Pinal Creek at Z7	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z7	6/17/1999	440	--	--	--	--	--	--
Pinal Creek at Z7	8/25/1999	440	--	--	--	--	--	--
Pinal Creek at Z7	10/19/1999	440	--	--	--	--	--	--
Pinal Creek at Z7	12/29/1999	440	--	--	--	--	--	--
Pinal Creek at Z7	2/15/2000	440	--	--	--	--	--	--
Pinal Creek at Z7	4/12/2000	440	--	--	--	--	--	--
Pinal Creek at Z7	6/13/2000	440	--	--	--	--	--	--
Pinal Creek at Z7	10/17/2000	10	16.7	E1.0	<40	<70	E.06	133
Pinal Creek at Z7	10/17/2000	140	--	--	--	--	--	--
Pinal Creek at Z7	1/25/2001	10	13.5	<10.0	<80	<100	E.06	128
Pinal Creek at Z7	1/25/2001	140	--	--	--	--	--	--
Pinal Creek at Z7	4/5/2001	10	8.7	<3.0	<8	<30	<.08	128
Pinal Creek at Z7	4/5/2001	140	--	--	--	--	--	--
Pinal Creek at Z7	6/12/2001	10	4.5	<1.0	<8	<10	<.08	119
Pinal Creek at Z7	6/13/2001	140	--	--	--	--	--	--
Pinal Creek at Z7	8/7/2001	10	<23.0	<25.0	<200	<250	0.09	122
Pinal Creek at Z7	8/7/2001	140	--	--	--	--	--	--
Pinal Creek at Z7	4/2/2002	440	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Labora-tory	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)
Pinal Creek at Z7	8/21/2002	10	--	--	--	--	--	--
Pinal Creek at Z7	8/21/2002	10	--	--	--	--	--	--
Pinal Creek at Z7	11/4/2002	440	--	--	--	--	--	--
Pinal Creek at Z7	11/4/2002	440	--	--	--	--	--	--
Pinal Creek at Z7	2/11/2003	440	--	--	--	--	--	--
Pinal Creek at Z7	5/27/2003	440	--	--	--	--	--	--
Pinal Creek at Z8.3 SW	8/21/2002	10	--	--	--	--	--	--
Pinal Creek at Z8.3 SW	11/4/2002	440	--	--	--	--	--	--
Pinal Creek at Z8.3 SW	2/11/2003	440	--	--	--	--	--	--
Pinal Creek at Z8.3 SW	5/27/2003	440	--	--	--	--	--	--
Pinal Creek at Z8.3 SW	11/17/2003	440	--	--	--	--	--	--
Pinal Creek at Z9A	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at Z9A	11/12/1998	440	--	--	--	--	--	--
Pinal Creek at Z9A	12/22/1998	440	--	--	--	--	--	--
Pinal Creek at Z9A	2/10/1999	10	3.0	<4.8	<24	<42	<300	138
Pinal Creek at Z9A	3/23/1999	440	--	--	--	--	--	--
Pinal Creek at Z9A	4/22/1999	10	--	--	--	--	--	--
Pinal Creek at Z9A	8/24/1999	440	--	--	--	--	--	--
Pinal Creek at Z9A	10/19/1999	440	--	--	--	--	--	--
Pinal Creek at Z9A	12/29/1999	440	--	--	--	--	--	--
Pinal Creek at Z9A	2/15/2000	440	--	--	--	--	--	--
Pinal Creek at Z9A	4/12/2000	440	--	--	--	--	--	--
Pinal Creek at Z9A	6/13/2000	440	--	--	--	<42	<.08	124
Pinal Creek at Z9A	8/29/2000	10	76.4	<1.0	<24	<70	E.06	125
Pinal Creek at Z9A	10/17/2000	10	16.1	E.8	<40	--	--	--
Pinal Creek at Z9A	10/17/2000	140	--	--	--	<100	E.05	97
Pinal Creek at Z9A	1/25/2001	10	9.9	<1.0	<80	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Barium, dissolved (μg/L as Ba)	Beryllium, dissolved (μg/L as Be)	Cadmium, dissolved (μg/L as Cd)	Chromium, dissolved (μg/L as Cr)	Lead, dissolved (μg/L as Pb)	Lithium, dissolved (μg/L as Li)
Pinal Creek at Z9A	1/25/2001	140	--	--	--	<100	<.08	130
Pinal Creek at Z9A	4/5/2001	10	7.3	<10.0	<80	--	--	--
Pinal Creek at Z9A	4/5/2001	140	--	--	--	--	--	--
Pinal Creek at Z9A	4/5/2001	140	--	--	--	--	--	--
Pinal Creek at Z9A	6/13/2001	140	--	--	--	<10	<.08	116
Pinal Creek at Z9A	6/13/2001	10	6.6	<1.0	<8	--	--	--
Pinal Creek at Z9A	6/13/2001	140	--	--	--	--	--	--
Pinal Creek at Z9A	8/7/2001	140	--	--	--	<250	<.08	133
Pinal Creek at Z9A	8/7/2001	10	<23.0	<25.0	<200	--	--	--
Pinal Creek at Z9A	10/24/2001	440	--	--	--	--	--	--
Pinal Creek at Z9A	1/16/2002	440	--	--	--	--	--	--
Pinal Creek at Z9A	4/2/2002	440	--	--	--	--	--	--
Pinal Creek at Z9A	8/21/2002	10	--	--	--	--	--	--
Pinal Creek at Z9A	11/4/2002	440	--	--	--	--	--	--
Pinal Creek at Z9A	2/11/2003	440	--	--	--	--	--	--
Pinal Creek at Z9A	5/27/2003	440	--	--	--	--	--	--
Pinal Creek at Z9A	11/17/2003	440	--	--	--	--	--	--
Pinal Creek at Z10SW	5/27/2003	440	--	--	--	--	--	--
Pinal Creek at Z10SW	11/17/2003	440	--	--	--	--	--	--
Pinal Creek at JJ15.SW	6/2/1998	440	--	--	--	--	--	--
Pinal Creek at JJ15.SW	12/22/1998	440	--	--	--	<42	<300	141
Pinal Creek at JJ15.SW	2/10/1999	10	<3.0	<4.8	<24	--	--	--
Pinal Creek at JJ15.SW	3/23/1999	440	--	--	--	--	--	--
Pinal Creek at JJ15.SW	4/22/1999	10	--	--	--	--	--	--
Pinal Creek at JJ15.SW	6/15/1999	440	--	--	--	--	--	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)
Pinal Creek at JJ15.SW	10/19/1999	440	--	--	--	--	--	--
Pinal Creek at JJ15.SW	12/28/1999	440	--	--	--	--	--	--
Pinal Creek at JJ15.SW	2/15/2000	440	--	--	--	<10	<.08	30
Pinal Creek at JJ15.SW	8/29/2000	10	69.7	<1.0	<8	<10	<.08	136
Pinal Creek at JJ15.SW	6/12/2001	10	5.6	<1.0	<8	--	--	--
Pinal Creek at JJ15.SW	6/12/2001	140	--	--	--	--	--	--
Pinal Creek at SITE D10	6/2/1998	440	--	--	--	--	--	--

Site name	Date	Laboratory	Molybdenum, dissolved (µg/L as Mo)	Silver, dissolved (µg/L as Ag)	Aluminum, dissolved (µg/L as Al)	Cobalt, dissolved (µg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)
Outfall	12/27/1999	440	--	--	<110	<20	13.4	1,230	--
Outfall	2/15/2000	440	--	--	<110	<20	11.6	1,250	--
Outfall	4/12/2000	440	--	--	<110	<20	8.77	1,210	--
Outfall	6/12/2001	440	--	--	<110	<20	18.4	1,140	--
Outfall	6/12/2001	140	--	--	<110	<20	18.7	1,160	--
D1.5S	6/14/1999	440	--	--	2,300	790	77.4	1,250	--
Pinal Creek at Z1	6/2/1998	440	--	--	1,800	610	70.6	1,200	--
Pinal Creek at Z1	6/14/1999	440	--	--	1,470	500	77.9	1,360	--
Pinal Creek at Z2.2	6/13/2000	440	--	--	<110	<20	16.6	1,190	--
Pinal Creek at Z4	6/2/1998	440	--	--	1,700	580	70.6	1,200	--
Pinal Creek at Z4	2/15/2000	440	--	--	<110	<20	11.2	1,240	--
Pinal Creek at Z4.3	6/14/1999	10	--	--	560	<20	67.8	1,230	--
Pinal Creek at Z4.3	10/18/1999	440	--	--	340	30	71.0	1,270	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)
Pinal Creek at Z4.4	6/14/1999	440	--	--	430	30	64.8	1,120	--
Pinal Creek at Z4.4	8/24/1999	440	--	--	300	<20	71.2	1,320	--
Pinal Creek at Z4.4	8/24/1999	440	--	--	<110	<20	68.7	1,340	--
Pinal Creek at Z4.4	10/18/1999	440	--	--	<110	<20	74.7	1,380	--
Pinal Creek at Z4.7	6/17/1999	440	--	--	510	<20	67.8	1,240	--
Pinal Creek at Z4.7	2/15/2000	440	--	--	<110	<20	19.1	1,220	--
Pinal Creek at Z4.7	4/12/2000	440	--	--	230	<20	15.8	1,200	--
Pinal Creek at Z4.7	6/13/2000	440	--	--	<110	<20	19.7	1,230	--
Pinal Creek at Z4.7	8/7/2001	10	<1,100	<120	<380	<330	18.9	1,080	<200
Pinal Creek at Z4.7	8/7/2001	140	--	--	<110	<20	19.1	1,210	--
Pinal Creek at Z4.5	10/18/1999	440	--	--	420	<20	77.2	1,440	--
Pinal Creek at Z4.6	12/28/1999	440	--	--	200	<20	27.1	1,200	--
Pinal Creek at Z5	6/2/1998	440	--	--	1,000	400	70.6	1,300	--
Pinal Creek at Z5	6/2/1998	440	--	--	940	330	70.6	1,300	--
Pinal Creek at Z5	12/22/1998	440	--	--	490	112	64.2	1,320	--
Pinal Creek at Z5	2/10/1999	10	<150	<12	390	114	65.5	1,360	<30
Pinal Creek at Z5	3/23/1999	440	--	--	370	90	63.8	1,300	--
Pinal Creek at Z5	4/22/1999	10	--	--	330	70	64.6	1,390	--
Pinal Creek at Z5	6/17/1999	440	--	--	140	50	61.8	1,410	--
Pinal Creek at Z5	8/25/1999	440	--	--	220	<20	67.8	1,560	--
Pinal Creek at Z5	10/18/1999	440	--	--	310	20	71.5	1,580	--
Pinal Creek at Z5	12/28/1999	440	--	--	160	<20	31.6	1,250	--
Pinal Creek at Z5	2/15/2000	440	--	--	<110	<20	23.6	1,230	--
Pinal Creek at Z5	4/12/2000	440	--	--	<110	<20	20.3	1,220	--
Pinal Creek at Z5	6/13/2000	440	--	--	<110	<20	23.1	1,230	--
Pinal Creek at Z5	8/29/2000	10	<102	<21	<40	<39	20.7	1,100	<30
Pinal Creek at Z5	10/17/2000	10	<170	<35	E60	<65	24.2	1,160	<50
Pinal Creek at Z5	10/17/2000	140	--	--	<110	<20	24.4	1,180	--
Pinal Creek at Z5	1/25/2001	10	<50	<5	90	E6	31.2	959	<8

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)
Pinal Creek at Z5	1/25/2001	140	--	--	<110	<20	33.8	1,190	--
Pinal Creek at Z5	4/5/2001	10	<50	<5	30	<13	23.8	1,020	<8
Pinal Creek at Z5	4/5/2001	140	--	--	<110	<20	25.6	1,130	--
Pinal Creek at Z5	6/12/2001	140	--	--	<110	<20	23.3	1,190	--
Pinal Creek at Z5	8/7/2001	10	<1,100	<120	<380	<330	23.4	1,060	<200
Pinal Creek at Z5	8/7/2001	140	--	--	<110	<20	24.6	1,190	--
Pinal Creek at Z5	11/4/2002	440	--	--	150	<20	17.7	1,170	--
Pinal Creek at Z5.7	6/17/1999	440	--	--	<110	<20	60.5	1,430	--
Pinal Creek at Z5.7	10/18/1999	440	--	--	210	50	72.1	1,460	--
Pinal Creek at Z5.7	12/28/1999	440	--	--	160	<20	32.6	1,320	--
Pinal Creek at Z5.7	2/15/2000	440	--	--	<110	<20	29.4	1,310	--
Pinal Creek at Z5.7	4/12/2000	440	--	--	<110	<20	20.1	1,210	--
Pinal Creek at Z5.7	8/29/2000	10	<102	<21	<40	<39	21.9	1,010	<30
Pinal Creek at Z5.7	10/17/2000	10	<170	<35	E50	<65	23.3	1,120	<50
Pinal Creek at Z5.7	10/17/2000	140	--	--	<110	<20	24.4	1,190	--
Pinal Creek at Z5.7	1/25/2001	10	<450	<46	E120	<130	41.7	1,220	<80
Pinal Creek at Z5.7	1/25/2001	140	--	--	<110	<20	41.9	1,280	--
Pinal Creek at Z5.7	4/5/2001	10	<50	<5	30	<13	23.4	1,000	<8
Pinal Creek at Z5.7	4/5/2001	140	--	--	<110	<20	25.2	1,150	--
Pinal Creek at Z5.7	6/12/2001	10	<50	<5	30	<13	22.4	948	<8
Pinal Creek at Z5.7	6/13/2001	140	--	--	<110	<20	23.5	1,200	--
Pinal Creek at Z5.7	8/7/2001	10	<1,100	<120	730	<330	21.5	1,080	<200
Pinal Creek at Z5.7	8/7/2001	140	--	--	<110	<20	22.2	1,190	--
Pinal Creek at Z5.7	10/24/2001	440	--	--	<110	<20	22.9	1,120	--
Pinal Creek at Z5.7	1/15/2002	440	--	--	<110	<20	19.7	1,080	--
Pinal Creek at Z5.7	4/2/2002	440	--	--	<110	<20	16.7	1,040	--
Pinal Creek at Z5.7	8/21/2002	440	--	--	<110	<20	18.0	1,110	--
Pinal Creek at Z5.7	11/4/2002	440	--	--	130	<20	18.6	1,180	--
Pinal Creek at Z5.7	2/11/2003	440	--	--	<110	<20	13.8	1,140	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)
Pinal Creek at Z5.7	5/27/2003	440	--	--	190	<20	19.7	1,040	--
Pinal Creek at Z5.7	11/17/2003	440	--	--	230	<20	16.1	1,020	--
Pinal Creek at Z6.2	6/17/1999	440	--	--	120	<20	60.1	1,460	--
Pinal Creek at Z6.2	4/4/2001	10	<450	<46	<150	<130	25.6	1,100	<80
Pinal Creek at Z6.2	4/4/2001	140	--	--	<110	<20	27.6	1,190	--
Pinal Creek at Z6.2	6/12/2001	10	<50	<5	30	14	24.3	1,010	15
Pinal Creek at Z6.2	6/12/2001	140	--	--	<110	<20	23.9	1,200	--
Pinal Creek at Z6.2	8/7/2001	10	<1,100	<120	<380	<330	21.8	1,090	<200
Pinal Creek at Z6.2	8/7/2001	140	--	--	<110	<20	22.6	1,190	--
Pinal Creek at Z6.7	6/17/1999	440	--	--	140	<20	59.0	1,450	--
Pinal Creek at Z7	6/2/1998	440	--	--	250	240	68.0	1,400	--
Pinal Creek at Z7	6/17/1999	440	--	--	<110	<20	60.0	1,540	--
Pinal Creek at Z7	8/25/1999	440	--	--	<110	<20	61.8	1,540	--
Pinal Creek at Z7	10/19/1999	440	--	--	<110	30	65.9	1,420	--
Pinal Creek at Z7	12/29/1999	440	--	--	160	<20	33.7	1,320	--
Pinal Creek at Z7	2/15/2000	440	--	--	<110	<20	27.2	1,250	--
Pinal Creek at Z7	4/12/2000	440	--	--	<110	<20	24.6	1,260	--
Pinal Creek at Z7	6/13/2000	440	--	--	<110	<20	25.9	1,230	--
Pinal Creek at Z7	10/17/2000	10	<170	<35	<80	<65	27.4	1,200	<50
Pinal Creek at Z7	10/17/2000	140	--	--	<110	<20	26.7	1,190	--
Pinal Creek at Z7	1/25/2001	10	<450	<46	<150	<130	43.3	1,340	<80
Pinal Creek at Z7	1/25/2001	140	--	--	120	<20	44.9	1,440	--
Pinal Creek at Z7	4/5/2001	10	<140	<5	150	<39	26.6	1,030	<24
Pinal Creek at Z7	4/5/2001	140	--	--	<110	<20	27.7	1,180	--
Pinal Creek at Z7	6/12/2001	10	<50	<5	20	<13	26.2	1,110	<8
Pinal Creek at Z7	6/13/2001	140	--	--	<110	<20	26.5	1,240	--
Pinal Creek at Z7	8/7/2001	10	<1,100	<120	<380	<330	25.1	1,100	<200
Pinal Creek at Z7	8/7/2001	140	--	--	<110	<20	25.8	1,240	--
Pinal Creek at Z7	4/2/2002	440	--	--	<110	<20	20.1	1,090	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (µg/L as Mo)	Silver, dissolved (µg/L as Ag)	Aluminum, dissolved (µg/L as Al)	Cobalt, dissolved (µg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)
Pinal Creek at Z7	8/21/2002	10	--	--	<110	<20	19.0	1,130	--
Pinal Creek at Z7	8/21/2002	10	--	--	<110	<20	23.3	1,180	--
Pinal Creek at Z7	11/4/2002	440	--	--	120	<20	19.2	1,200	--
Pinal Creek at Z7	11/4/2002	440	--	--	120	<20	24.4	1,250	--
Pinal Creek at Z7	2/11/2003	440	--	--	<110	<20	15.5	1,190	--
Pinal Creek at Z7	5/27/2003	440	--	--	190	<20	24.6	1,190	--
Pinal Creek at Z8.3 SW	8/21/2002	10	--	--	<110	<20	22.7	1,180	--
Pinal Creek at Z8.3 SW	11/4/2002	440	--	--	<110	<20	22.5	1,260	--
Pinal Creek at Z8.3 SW	2/11/2003	440	--	--	<110	<20	18.0	1,240	--
Pinal Creek at Z8.3 SW	5/27/2003	440	--	--	180	<20	28.0	1,260	--
Pinal Creek at Z8.3 SW	11/17/2003	440	--	--	230	<20	20.8	1,100	--
Pinal Creek at Z9A	6/2/1998	440	--	--	140	160	64.2	1,400	--
Pinal Creek at Z9A	11/12/1998	440	--	--	170	42	62.0	1,400	--
Pinal Creek at Z9A	12/22/1998	440	--	--	<120	<25	57.8	1,500	--
Pinal Creek at Z9A	2/10/1999	10	<150	<12	50	<21	57.3	1,400	<30
Pinal Creek at Z9A	3/23/1999	440	--	--	<120	<20	56.0	1,340	--
Pinal Creek at Z9A	4/22/1999	10	--	--	<120	<20	57.3	1,470	--
Pinal Creek at Z9A	8/24/1999	440	--	--	<110	<20	54.8	1,540	--
Pinal Creek at Z9A	10/19/1999	440	--	--	<110	<20	61.0	1,480	--
Pinal Creek at Z9A	12/29/1999	440	--	--	<110	<20	35.5	1,340	--
Pinal Creek at Z9A	2/15/2000	440	--	--	<110	<20	29.7	1,220	--
Pinal Creek at Z9A	4/12/2000	440	--	--	<110	<20	26.7	1,260	--
Pinal Creek at Z9A	6/13/2000	440	--	--	<110	<20	29.5	1,370	--
Pinal Creek at Z9A	8/29/2000	10	<102	<21	<40	<39	26.4	1,140	<30
Pinal Creek at Z9A	10/17/2000	10	<170	<35	<80	<65	29.5	1,230	<50
Pinal Creek at Z9A	10/17/2000	140	--	--	<110	<20	29.5	1,250	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 20, 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)
Pinal Creek at Z9A	1/25/2001	10	<50	<46	<20	<13	38.5	1,330	<8
Pinal Creek at Z9A	1/25/2001	140	--	--	<110	<20	37.7	1,450	--
Pinal Creek at Z9A	4/5/2001	10	<450	<46	<150	<130	28.9	1,180	<80
Pinal Creek at Z9A	4/5/2001	140	--	--	<110	<20	30.4	1,230	--
Pinal Creek at Z9A	4/5/2001	140	--	--	<110	<20	30.3	1,240	--
Pinal Creek at Z9A	6/13/2001	140	--	--	<110	<20	51.7	1,610	--
Pinal Creek at Z9A	6/13/2001	10	<50	<5	E10	<13	30.1	1,150	<8
Pinal Creek at Z9A	6/13/2001	140	--	--	<110	<20	30.3	1,290	--
Pinal Creek at Z9A	8/7/2001	140	--	--	<110	<20	28.5	1,240	--
Pinal Creek at Z9A	8/7/2001	10	<1,100	<120	<380	<330	28.8	1,180	<200
Pinal Creek at Z9A	10/24/2001	440	--	--	<110	<20	27.7	1,200	--
Pinal Creek at Z9A	1/16/2002	440	--	--	<110	<20	24.4	1,220	--
Pinal Creek at Z9A	4/2/2002	440	--	--	<110	<20	23.1	1,160	--
Pinal Creek at Z9A	8/21/2002	10	--	--	<110	<20	27.7	1,230	--
Pinal Creek at Z9A	11/4/2002	440	--	--	<110	<20	25.2	1,280	--
Pinal Creek at Z9A	2/11/2003	440	--	--	<110	<20	22.1	1,270	--
Pinal Creek at Z9A	5/27/2003	440	--	--	170	<20	31.9	1,290	--
Pinal Creek at Z9A	11/17/2003	440	--	--	220	<20	24.4	1,160	--
Pinal Creek at Z10SW	5/27/2003	440	--	--	180	<20	32.7	1,310	--
Pinal Creek at Z10SW	11/17/2003	440	--	--	220	<20	24.9	1,180	--
Pinal Creek at JJ15.SW	6/2/1998	440	--	--	<110	<20	64.2	1,400	--
Pinal Creek at JJ15.SW	12/22/1998	440	--	--	<120	<25	49.2	1,490	--
Pinal Creek at JJ15.SW	2/10/1999	10	<150	<12	<30	<21	54.7	1,460	<30
Pinal Creek at JJ15.SW	3/23/1999	440	--	--	<120	<20	52.4	1,450	--
Pinal Creek at JJ15.SW	4/22/1999	10	--	--	<120	<20	56.3	1,550	--

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; μg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Molybdenum, dissolved (μg/L as Mo)	Silver, dissolved (μg/L as Ag)	Aluminum, dissolved (μg/L as Al)	Cobalt, dissolved (μg/L as Co)	Silica, dissolved (mg/L as SiO_2)	Strontium, dissolved (μg/L as Sr)	Vanadium, dissolved (μg/L as V)
Pinal Creek at JJ15.SW	6/15/1999	440	--	--	<110	<20	48.3	1,620	--
Pinal Creek at JJ15.SW	10/19/1999	440	--	--	<110	<20	61.2	1,530	--
Pinal Creek at JJ15.SW	12/28/1999	440	--	--	<110	<20	35.8	1,300	--
Pinal Creek at JJ15.SW	2/15/2000	440	--	--	<110	<20	30.9	1,330	--
Pinal Creek at JJ15.SW	8/29/2000	10	<45	<5	<20	<13	13.6	379	<8
Pinal Creek at JJ15.SW	6/12/2001	10	<50	<5	M	<13	28.5	1,110	E5
Pinal Creek at JJ15.SW	6/12/2001	140	--	--	<110	<20	29.2	1,330	--
Pinal Creek at SITE D10	6/2/1998	440	--	--	<110	<20	59.9	1,400	--

Site name	Date	Laboratory	Trichlorofluoromethane, total, under nitrogen atmosphere (pg/kg)	Deuterium/Protium ratio, total (per mil)	Oxygen-18/Oxygen-16 ratio, total (per mil)
Outfall	6/12/2001	440	--	-64.1	-8.91
D1.5S	6/14/1999	440	--	-65.0	-9.17
Pinal Creek at Z1	6/2/1998	440	--	-65.3	-9.22
Pinal Creek at Z1	6/14/1999	440	--	-64.6	-8.91
Pinal Creek at Z4	6/2/1998	440	--	-65.2	-9.12
Pinal Creek at Z4.3	6/14/1999	10	--	-64.3	-8.94
Pinal Creek at Z4.3	8/30/2000	10	360	--	--
Pinal Creek at Z4.4	6/14/1999	440	--	-65.7	-9.05
Pinal Creek at Z4.7	6/17/1999	440	--	-66.6	-9.13
Pinal Creek at Z5	6/2/1998	440	--	-66.8	-9.18
Pinal Creek at Z5	6/2/1998	440	--	-66.3	-9.21
Pinal Creek at Z5	6/17/1999	440	--	-65.5	-9.10

Laboratory Measurements (continued)

[Laboratory—10, 440 USGS National Water-Quality Laboratory, Arvada, Colorado; 140, USGS research laboratory, Menlo Park, California; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; sediment analyses are completed at the Iowa District Sediment Laboratory; --, no data; <, actual value is known to be less than value shown]

Site name	Date	Laboratory	Trichlorofluoromethane, total, under nitrogen atmosphere (pg/kg)	Deuterium/Protium ratio, total (per mil)	Oxygen-18/Oxygen-16 ratio, total (per mil)
Pinal Creek at Z5	8/29/2000	10	--	-63.0	-8.91
Pinal Creek at Z5.7	6/17/1999	440	--	-67.3	-9.12
Pinal Creek at Z5.7	8/29/2000	10	--	-64.2	-8.93
Pinal Creek at Z5.7	6/12/2001	10	--	-63.8	-8.92
Pinal Creek at Z5.7	5/18/2004	440	--	-63.8	-8.59
Pinal Creek at Z6.2	6/17/1999	440	--	-66.8	-9.08
Pinal Creek at Z6.2	6/12/2001	10	--	-62.7	-8.99
Pinal Creek at Z6.7	6/17/1999	440	--	-66.4	-9.01
Pinal Creek at Z7	6/2/1998	440	--	-63.6	-9.20
Pinal Creek at Z7	6/17/1999	440	--	-65.4	-9.02
Pinal Creek at Z7	6/12/2001	10	--	-64.7	-8.91
Pinal Creek at Z8.3 SW	5/18/2004	440	--	-63.1	-8.65
Pinal Creek at Z9A	6/2/1998	440	--	-64.1	-9.14
Pinal Creek at Z9A	8/29/2000	10	--	-63.6	-8.79
Pinal Creek at Z9A	6/13/2001	10	--	-64.0	-8.94
Pinal Creek at Z9A	5/18/2004	440	--	-63.8	-8.62
Pinal Creek at JJ15.SW	6/2/1998	440	--	-64.7	-9.03
Pinal Creek at JJ15.SW	6/15/1999	440	--	-65.6	-8.91
Pinal Creek at JJ15.SW	8/29/2000	10	--	-41.0	-6.81
Pinal Creek at JJ15.SW	6/12/2001	10	--	-64.1	-8.86
Pinal Creek at SITE D10	6/2/1998	440	--	-66.1	-9.15

Appendix C. Precipitation Data

PRECIPITATION DATA

Globe Ranger Station

LOCATION.—Lat 33°22'40", long 110°46'11", in NE1/4 NW1/4 NW1/4 sec. 1, T. 1 S., R. 15 E., at U.S. Forest Service ranger station 2.4 km southeast of Globe post office.

ELEVATION.—1,097 m above National Geodetic Vertical Datum of 1929, from topographic map.

PERIOD OF RECORD.—March 1981 to current year. Between January 1907 and February 1981, precipitation near Globe was recorded at 10 locations ranging from 0.8 km north to 3.9 km northwest of the present site at elevations between 1,049 and 1,131 m. The longest periods at a single site were from January 1907 to September 1925 at elevation 1,090 m and from May 1953 to June 1975 at elevation 1,080 m.

Precipitation, in millimeters

[M, insufficient or partial data (1–9 daily values missing)]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly total
1996	4	M88	19	0	0	5	M59	M25	M62	M18	M28	M2	M222
1997	M83	58	4	M6	17	0	5	M74	M9	31	17	M62	M283
1998	14	124	56	13	0	M0	50	59	35	27	M35	24	M436
1999	3	8	8	47	0	22	87	M59	M46	0	0	0	M280
2000	4	9	M0	2	0	23	4	94	4	148	65	2	M355
2001	70	37	20	54	6	0	43	57	21	M0	7	M11	M326
2002	0	0	M13	3	M0	M0	46	M42	21	M4	M0	M0	M125
2003	M0	M100	M22	M8	0	4	71	M0	36	M5	30	13	M289

Monthly precipitation statistics, in millimeters, 1907–95 (all gage sites)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean	41	38	36	15	9	9	64	71	33	31	28	44
Maximum	219	155	129	72	70	49	172	206	136	156	121	218
Minimum	0	0	0	0	0	0	7	8	0	0	0	0
Number of observations	96	96	96	96	96	95	95	95	95	95	95	94

Annual precipitation statistics, in millimeters, 1907–95 (all gage sites)

Mean	405
Maximum	712
Minimum	203
Number of observations	94

PRECIPITATION DATA—Continued

Miami

LOCATION.—Lat 33°24'15", long 110°52'09", in SE1/4 NE1/4 NW1/4 sec. 30, T. 1 N., R. 15 E., at Miami East plant site of BHP, 0.5 km northwest of Miami post office.

ELEVATION.—1,084 m above National Geodetic Vertical Datum of 1929, from topographic map.

PERIOD OF RECORD.—February 1914 to current year.

Precipitation, in millimeters

[[M, insufficient or partial data (1–9 daily values missing)]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly total
1996	0	85	11	0	1	9	70	22	45	22	40	0	305
1997	109	61	6	7	10	2	11	67	18	20	16	83	409
1998	18	131	65	12	0	0	44	43	30	8	32	30	414
1999	4	16	5	52	0	7	125	43	32	0	0	1	283
2000	7	11	66	3	0	42	29	136	0	145	59	2	498
2001	61	43	22	65	9	4	88	42	18	17	6	38	412
2002	0	0	12	3	0	0	0	33	9	8	19	21	115
2003	18	117	43	8	0	0	52	93	61	4	34	24	454

Monthly precipitation statistics, in millimeters, 1914–95

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean	53	47	46	18	10	9	62	76	38	31	35	57
Maximum	261	206	173	100	64	91	219	213	179	193	181	293
Minimum	0	0	0	0	0	0	5	8	0	0	0	0
Number of observations	90	89	90	90	90	89	90	90	90	90	90	90

Annual precipitation statistics, in millimeters, 1914–95

Mean	481
Maximum	925
Minimum	115
Number of observations	90

Appendix D. Quality Control Data

Quality Control Data

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Lab-ora-tory	Alka-linity (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Potassium, dissolved (mg/L as K)	Sodium, dissolved (mg/L as Na)	Chlo-ride, dis-solved (mg/L as Cl)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	17.4	<.10	<.040	<.40	<.03	<1.70
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	12.0	<.10	<.040	<.40	<.03	<.30
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	13.4	<.10	<.040	<.40	<.03	<.30
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	--	<.10	<.040	<.40	<.03	<.30
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	--	0.04	<.03	--	<.1	--
A-01-15 09DBC1	8/13/03	Blank	10	--	0.15	0.016		<.10	<.20
A-02-15 29DBD4	5/16/02	Blank	10	--	0.02	<.008		<.09	<.30
A-02-14 01ABD5	6/27/02	Blank	440	56.8	<.10	<.040	<.40	<.03	<.30
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	4	1	<.40	1	--
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	4.0	0.8	<.40	0.9	--
PINAL CREEK AT Z9A	8/7/01	Blank	10	--	<.01	<.008	<.09	<.06	<.08
PINAL CREEK AT Z9A	11/4/02	Blank	440	--	<.10	<.040	<.40	<.03	<.20
PINAL CREEK AT Z9A	5/27/03	Blank	440	--	<.10	<.040	<.40	<.03	<.20
PINAL CREEK AT Z9A	11/17/03	Blank	10	--	<.10	<.040	<.40	<.03	<.20
A-03-14 36CDD1	5/20/04	Blank	10	--	--	--	--	--	<.20
PINAL CREEK AT Z10SW	2/11/03	Blank	10	--	0.01	<.040	<.40	<.03	0.25
A-01-15 09DBC1	5/16/02	Replicate	10		422	161	7.18	76.9	83.5
A-02-14 01DAA5	4/2/02	Replicate	440	24.4	310	74	4.4	60	53.3
A-02-14 01DAA7	6/25/02	Replicate	440	19.9	312	76.5	4.21	59.9	56.6

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Alkalinity (mg/L as $CaCO_3$)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Potassium, dissolved (mg/L as K)	Sodium, dissolved (mg/L as Na)	Chloride, dissolved (mg/L as Cl)
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	--	367	51.9	4.94	56.6	53.2
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	--	367	51.8	4.73	55.4	53.2
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	23	386	56.5	5.45	67	58.1
PINAL CREEK AT Z9A	10/24/01	Replicate	440	26	358	63	4.9	62	54
PINAL CREEK AT Z9A	1/15/02	Replicate	440	28	389	56.5	4.54	60.7	53.9
PINAL CREEK AT Z9A	5/18/04	Replicate	10	--	--	--	--	--	54.3
A-03-14 36CDD1	6/27/02	Replicate	10	72.3	340	75.3	3.28	55.6	48.8

Site	Date	Sample Type	Laboratory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Sulfate, dissolved (mg/L as SO_4)	Ammonia plus organic nitrogen, total (mg/L as N)	Ammonia, dissolved (mg/L as N)	NO_2 and NO_3, dissolved (mg/L as N)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	<.1	<.10	E.4	--	--	--
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	<.1	<.06	<.1	--	--	--
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	E.1	<.06	E.1	--	--	--
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	<.10	<.003	<.1	--	--	--
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	--	--	--	0.2	0.02	<.020
A-01-15 09DBC1	8/13/03	Blank	10	<.2	0.07	<.2	--	--	--
A-02-15 29DBD4	5/16/02	Blank	10	<.10	<.13	E.1	--	--	--
A-02-14 01ABD5	6/27/02	Blank	440	<.10	<.06	0.1	--	--	--
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	<.06	--	--	--	--
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	<.06	--	--	--	--

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Fluoride, dissolved (mg/L as F)	Silica, dissolved (mg/L as SiO_2)	Sulfate, dissolved (mg/L as SO_4)	Ammonia plus organic nitrogen, total (mg/L as N)	Ammonia, dissolved (mg/L as N)	NO_2 and NO_3, dissolved (mg/L as N)
PINAL CREEK AT Z9A	8/7/01	Blank	10	<.2	<.09	0.2	--	--	--
PINAL CREEK AT Z9A	11/4/02	Blank	440	<.17	<.06	<.2	--	--	--
PINAL CREEK AT Z9A	5/27/03	Blank	440	<.2	<.07	<.2	--	--	--
PINAL CREEK AT Z9A	11/17/03	Blank	10	<.2	<.06	<.2	--	--	--
A-03-14 36CDD1	5/20/04	Blank	10	<.2	--	<.2	--	--	--
PINAL CREEK AT Z10SW	2/11/03	Blank	10	0	<.06	<.2	--	--	--
A-01-15 09DBC1	5/16/02	Replicate	10	23.5	80.8	2,580	--	--	--
A-02-14 01DAA5	4/2/02	Replicate	440	2.3	58.6	1,180	--	--	--
A-02-14 01DAA7	6/25/02	Replicate	440	1.9	57.2	1,150	--	--	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	1.5	22.0	1,120	--	--	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	1.5	21.6	1,120	--	--	--
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	1.36	22.7	1,230	--	--	--
PINAL CREEK AT Z9A	10/24/01	Replicate	440	1.5	28	1,100	--	--	--
PINAL CREEK AT Z9A	1/15/02	Replicate	440	1.1	24.5	1,140	--	--	--
PINAL CREEK AT Z9A	5/18/04	Replicate	10	1.0	--	1,150	--	--	--
A-03-14 36CDD1	6/27/02	Replicate	10	0.12	49.8	1,070	--	--	--

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Phosphorus, total (mg/L as P)	Aluminum, dissolved (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	--	<110	--	--	--	--
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	--	<110	--	--	--	--
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	--	<110	--	--	--	--
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	--	<110	--	--	--	--
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	<.02	<3	--	--	<.5	<1
A-01-15 09DBC1	8/13/03	Blank	10	--	M	<.30	<.3	M	<.06
A-02-15 29DBD4	5/16/02	Blank	10	--	<1	E.03	<.2	<1	<.06
A-02-14 01ABD5	6/27/02	Blank	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	<110	--	--	--	--
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	8/7/01	Blank	10	--	<20	--	--	<.9	<1.0
PINAL CREEK AT Z9A	11/4/02	Blank	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	5/27/03	Blank	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	11/17/03	Blank	10	--	<110	--	--	--	--
A-03-14 36CDD1	5/20/04	Blank	10	--		--	--	--	--
PINAL CREEK AT Z10SW	2/11/03	Blank	10	--	<110	--	--	--	--
A-01-15 09DBC1	5/16/02	Replicate	10	--	64,700	--	--	6.1	62.6
A-02-14 01DAA5	4/2/02	Replicate	440	--	140	--	--	--	--
A-02-14 01DAA7	6/25/02	Replicate	440	--	<110	--	--	--	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	--	<380	--	--	<23.0	<25.0
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	--	<380	--	--	<23.0	<25.0

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Phosphorus, total (mg/L as P)	Aluminum, dissolved (µg/L as Al)	Antimony, dissolved (µg/L as Sb)	Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Beryllium, dissolved (µg/L as Be)
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	10/24/01	Replicate	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	1/15/02	Replicate	440	--	<110	--	--	--	--
PINAL CREEK AT Z9A	5/18/04	Replicate	10	--	--	--	--	--	--
A-03-14 36CDD1	6/27/02	Replicate	10	--	<110	--	--	--	--

Site	Date	Sample Type	Laboratory	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	--	--	--	<20	<30	<130
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	--	--	--	<20	<30	<130
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	--	--	--	<20	<30	<130
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	--	--	--	<20	<30	<130
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	--	<.5	<1	--	<2	<2
A-01-15 09DBC1	8/13/03	Blank	10	<7	<.04	E.4	0.064	41.5	11
A-02-15 29DBD4	5/16/02	Blank	10	<7	<.04	<.8	<.020	1.8	<10
A-02-14 01ABD5	6/27/02	Blank	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	8/7/01	Blank	10	<13	<8	<10	<13	<5	<10
PINAL CREEK AT Z9A	11/4/02	Blank	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	5/27/03	Blank	440	--	--	--	<20	<30	<130

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)
PINAL CREEK AT Z9A	11/17/03	Blank	10	--	--	--	<20	<30	<130
A-03-14 36CDD1	5/20/04	Blank	10	--	--	--	--	--	--
PINAL CREEK AT Z10SW	2/11/03	Blank	10	--	--	--	<20	<30	<130
A-01-15 09DBC1	5/16/02	Replicate	10	50	E50	<30	728	78,000	160,000
A-02-14 01DAA5	4/2/02	Replicate	440	--	--	--	<20	<30	<130
A-02-14 01DAA7	6/25/02	Replicate	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<325	<200	<250	<330	<120	<250
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<325	<200	<250	<330	<120	<250
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	10/24/01	Replicate	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	1/15/02	Replicate	440	--	--	--	<20	<30	<130
PINAL CREEK AT Z9A	5/18/04	Replicate	10	--	--	--	--	--	--
A-03-14 36CDD1	6/27/02	Replicate	10	--	--	--	<20	<30	<130

Site	Date	Sample Type	Laboratory	Lead, dissolved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Selenium, dissolved (µg/L as Se)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	--	--	<60.0	--	<90	--
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	--	--	<60.0	--	<90	--
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	--	--	<60.0	--	<90	--
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	--	--	<60.0	--	<90	--

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Lab-ora-tory	Lead, dis-solved (µg/L as Pb)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molyb-denum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Sele-nium, dis-solved (µg/L as Se)
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	<2	--	<1	--	<1	--
A-01-15 09DBC1	8/13/03	Blank	10	0.1	E.3	3.9	<.3	0.18	<.5
A-02-15 29DBD4	5/16/02	Blank	10	<.08	<.3	0.2	<.2	E.04	<.3
A-02-14 01ABD5	6/27/02	Blank	440	--	--	<60.0	--	<90	--
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	--	210	--	<90	--
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	--	210	--	<90	--
PINAL CREEK AT Z9A	8/7/01	Blank	10	<.08	<4	<3.0	<50	<50	--
PINAL CREEK AT Z9A	11/4/02	Blank	440	--	--	<60.0	--	<90	--
PINAL CREEK AT Z9A	5/27/03	Blank	440	--	--	<60.0	--	<90	--
PINAL CREEK AT Z9A	11/17/03	Blank	10	--	--	<60.0	--	<90	--
A-03-14 36CDD1	5/20/04	Blank	10	--	--		--		--
PINAL CREEK AT Z10SW	2/11/03	Blank	10	--	--	<60.0	--	<90	--
A-01-15 09DBC1	5/16/02	Replicate	10	4.44	226	28,000	<140	820	--
A-02-14 01DAA5	4/2/02	Replicate	440	--	--	41,100	--	300	--
A-02-14 01DAA7	6/25/02	Replicate	440	--	--	38,400	--	220	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<.08	128	5,290	<1,100	<1,300	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<.08	131	5,280	<1,100	<1,300	--
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	--	--	1,950	--	<90	--
PINAL CREEK AT Z9A	10/24/01	Replicate	440	--	--	2,590	--	<90	--
PINAL CREEK AT Z9A	1/15/02	Replicate	440	--	--	1,870	--	<90	--
PINAL CREEK AT Z9A	5/18/04	Replicate	10	--	--	--	--	--	--
A-03-14 36CDD1	6/27/02	Replicate	10	--	--	15400	--	<90	--

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Laboratory	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Thallium, dissolved (µg/L as Tl)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Uranium, dissolved (µg/L as U)
PINAL CRKAT SETKA RANCH	10/24/01	Blank	440	--	<15.0	--	--	<20	--
PINAL CRKAT SETKA RANCH	1/15/02	Blank	10	--	<15.0	--	--	<20	--
PINAL CRKAT SETKA RANCH	4/2/02	Blank	440	--	15	--	--	<20	--
PINAL CRKAT SETKA RANCH	8/21/02	Blank	10	--	<15.0	--	--	<20	--
PINAL CREEK AT INSPIRATION DAM	6/11/02	Blank	20	--	--	--	--	<2	--
A-01-15 09DBC1	8/13/03	Blank	10	<.2	1.87	<.04	E.1	5	<.02
A-02-15 29DBD4	5/16/02	Blank	10	<1.0	0.12	<.04	E.1	<1	<.02
A-02-14 01ABD5	6/27/02	Blank	440	--	<15.0	--	--	<20	--
PINAL CREEK AT Z9A	1/25/01	Blank	140	--	<15.0	--	--	<20	--
PINAL CREEK AT Z9A	1/25/01	Blank	440	--	<15.0	--	--	<20	--
PINAL CREEK AT Z9A	8/7/01	Blank	10	<5	<.8	--	<8	<20	--
PINAL CREEK AT Z9A	11/4/02	Blank	440	--	<15.0	--	--	<20	--
PINAL CREEK AT Z9A	5/27/03	Blank	440	--	<15.0	--	--	<20	--
PINAL CREEK AT Z9A	11/17/03	Blank	10	--	<15.0	--	--	<20	--
A-03-14 36CDD1	5/20/04	Blank	10	--		--	--	--	--
PINAL CREEK AT Z10SW	2/11/03	Blank	10	--	<15.0	--	--	<20	--
A-01-15 09DBC1	5/16/02	Replicate	10	<27	1,910	--	E13	4,010	--
A-02-14 01DAA5	4/2/02	Replicate	440	--	1,180	--	--	90	--
A-02-14 01DAA7	6/25/02	Replicate	440	--	1,190	--	--	50	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<120	1,080	--	<200	<500	--
PINAL CREEK AT Z5.7	8/7/01	Replicate	10	<120	1,080	--	<200	<500	--

Quality Control Data (continued)

[Laboratory—10, 440, USGS National Water-Quality Laboratory, Arvada, Colorado; 20, USGS research laboratory, Ocala, Florida; 140, USGS research lobratory, Menlo Park, California; mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, actual value is known to be less than value shown; E, estimated; M, presence verified, not quantified]

Site	Date	Sample Type	Lab-ora-tory	Silver, dis-solved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Thallium, dissolved (µg/L as Tl)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Ura-nium, dis-solved (µg/L as U)
PINAL CREEK AT Z8.3 SW	11/4/02	Replicate	440	--	1,250	--	--	<20	--
PINAL CREEK AT Z9A	10/24/01	Replicate	440	--	1,210	--	--	<20	--
PINAL CREEK AT Z9A	1/15/02	Replicate	440	--	1,230	--	--	<20	--
PINAL CREEK AT Z9A	5/18/04	Replicate	10	--	--	--	--	--	--
A-03-14 36CDD1	6/27/02	Replicate	10	--	1,390	--	--	<20	--

This page intentionally left blank.

For more information concerning the research in this report, contact the
Director, Arizona Water Science Center
U.S. Geological Survey, 520 N. Park Avenue, Suite 221
Tucson, Arizona 85719
http://az.water.usgs.gov