HYDROLOGIC DATA FROM THE STUDY OF ACIDIC CONTAMINATION IN THE MIAMI WASH–PINAL CREEK AREA, ARIZONA, WATER YEARS 1990–91

by Steve A. Longsworth and Andrew M. Taylor

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ILLUSTRATIONS

CONVERSION FACTORS AND VERTICAL DATUM

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)	0.155	square inch
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
degree Celsius (°C)	°F = 1.8 x °C + 32	degree Farenheit

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, generally referred to as *Sea Level Datum of 1929.*

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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 1990 and 1991 and include location, construction information, site plans, water levels, chemical and physical field measurements, and selected chemical analyses of water samples for nine monitoring well sites. Also included are mineralogic and particle-size analyses of drill cuttings from three wells. Surface-water data are presented for two sites and include discharge measurements, chemical and physical field measurements, and chemical analyses of water. Monthly discharge data are presented for one site. In March 1990, water-chemistry information was obtained from 11 surface-water and 12 ground-water data-collection sites during the solute-transport study of the perennial reach of Pinal Creek upstream from Inspiration Dam. Chemical and physical field measurements and chemical analyses are presented for the solute-transport study. Monthly precipitation data and long-term precipitation statistics are presented for two sites.

INTRODUCTION

Copper has been mined since 1903 from granite porphyry adjacent to an aquifer in the Pinal Creek drainage basin (fig. 1). Ground-water contamination related to mining, the area's principal industry, has long been recognized in the area and was first quantified in 1983. Large differences in selected dissolved-metal concentrations have been measured in the interacting ground water and surface water of the 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 area (Boner and others, 1989, p. 302) 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 the Salt River Project. An initial set of observation wells was drilled at five sites in October 1984, and initial

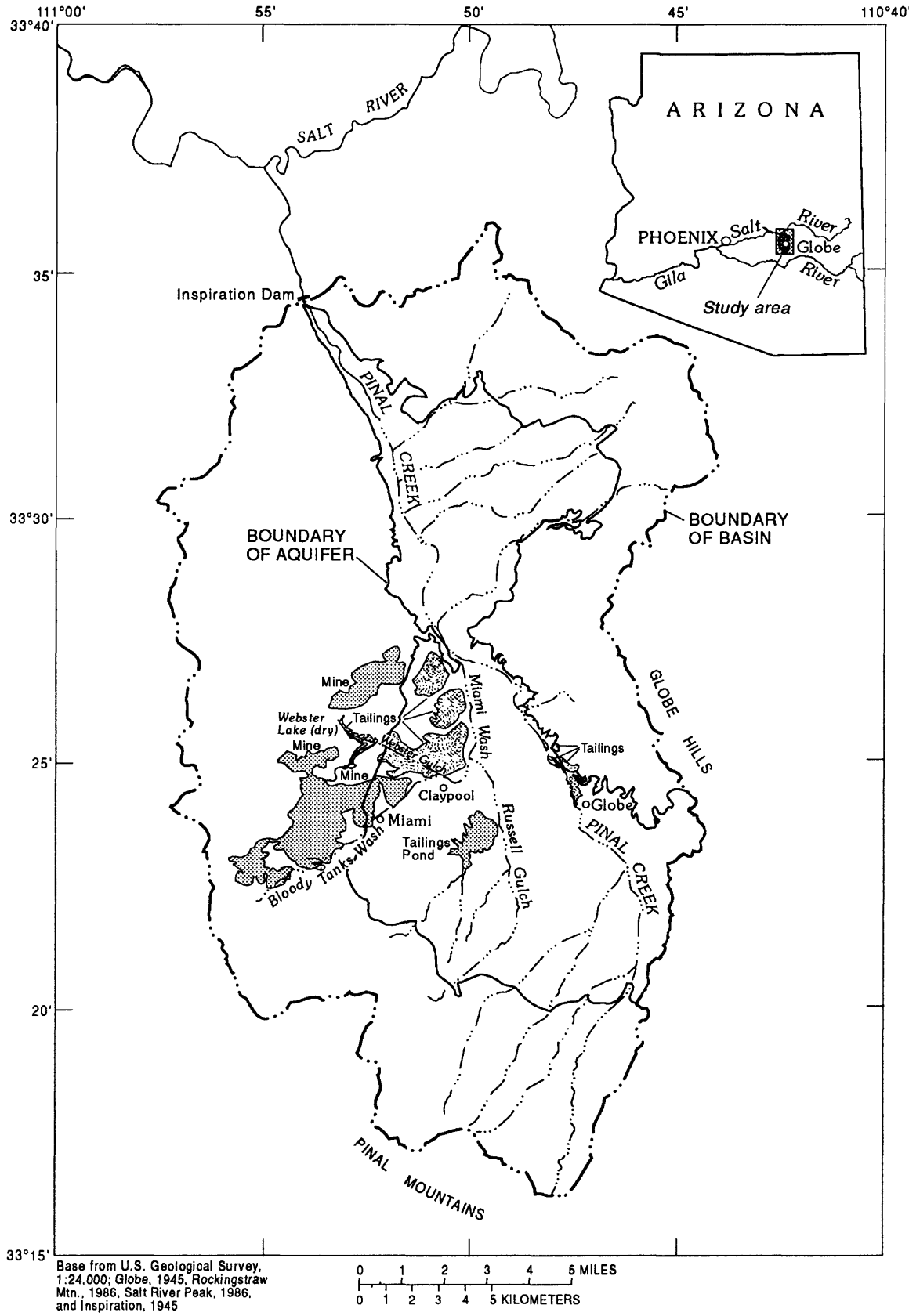

Figure 1.—Location of Pinal Creek basin and study area.

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 concern is 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 funding has been provided by the U.S. Geological Survey Toxic Waste Ground-Water Contamination Program.

Purpose and Scope

The purpose of this report is to present hydrologic data on the ground water and surface water of Pinal Creek basin near Globe, Arizona. Included in this report are chemical analyses of ground water and streamflow, geologic and particle-size logs of boreholes, 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 and selected data collected by other agencies are included. This report includes data for water years 1990 and 1991, which correspond to the period October 1, 1989, through September 30, 1991.

Relation to Other Reports

Geology of the Globe-Miami mining district has been described by Ransome (1903) and Peterson (1962). Contaminated ground water related to mining was first quantified in a study by the Central Arizona Association of Governments (CAAG), which is responsible for water-quality management planning in Gila County. In 1979, CAAG established a Mineral Extraction Task Force (METF) to study water-quality problems in the Globe-Miami area. The task force included representatives of mining companies, local governments, State and Federal agencies, and the Salt River Project, which manages Roosevelt Lake. Principal funding for the METF study was provided by the U.S. Environmental Protection Agency, three mining companies, and the U.S. Bureau of Mines. The METF study identified areas where contaminated water was present and probable sources for the contamination. Results of the METF study were presented in ten reports, of which three include data on surface water and ground water (Rouse, 1981, 1983; Envirologic Systems, Inc., 1983).

Lithologic, water-chemistry, and water-level data collected as part of the present study for water years 1984-89 were presented by Eychaner and others (1989) and Brown (1990). 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. Different aspects of the study were presented at technical meetings of the Toxic Waste Program in 1985 (Eychaner, 1988a; Stollenwerk, 1988) and in 1987 (Eychaner and Stollenwerk, 1987; Stollenwerk and Eychaner, 1987). Eychaner (1988b) presented an overview with additional geochemical and geologic data. Five papers addressing work at the site were presented at a program technical meeting in Phoenix, Arizona, in September 1988 (Eychaner, 1989a, b; Haschenburger, 1989; Neaville, 1989; Stollenwerk and Eychaner, 1989). A concurrent study that focused on the feasibility of remedial action in the area was carried out by Hydro Geo Chem, Inc. (1989). Fourteen papers addressing

work at the site were presented at a program technical meeting in Monterey, California, in March 1991 (Brown, 1991; Eychaner, 1991a, b; Faires and Eychaner, 1991; Ficklin and others, 1991; Glynn, 1991; Glynn and others, 1991; Lind, 1991; Longsworth, 1991; Novo-Gradac and Smith, 1991; Puls and others, 1991; Stollenwerk, 1991; Wallin and others, 1991; Walter and Norris, 1991).

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. Hollis Crim, Pat Kelley, Eva Setka, Martin Setka, and Nellie Setka, landowners; Arizona Department of Transportation; Cyprus Miami Mining Corporation; Magma Copper Corporation; and the U.S. Forest Service generously cooperated with the study.

Well-Numbering and Naming System

Each project well is identified by a two- or three-digit number that denotes well number and group. For example, well 103 is the third well drilled in group 100. Project well numbers that include the characters EX represent exploration holes that were abandoned after water samples and cuttings were collected; the EX holes were sealed with concrete to their total depths. The site-identification number of each well is the concatenation of its latitude, longitude, and a two-digit sequence number that identifies the well in a 1-second grid. Well 103 is thus identified as 332629110495803. In the land-net method of identifying sites, well 103 is (A-01-15)09dbc3, which encodes the third site in $SW^1/_4NW^1/_4$ $SE^1/_4$ sec. 9, T. 1 N., R. 15 E., in quadrant A (fig. 2).

DATA COLLECTION

During water year 1990, the USGS drilled four boreholes in the study area. One borehole was drilled in well group 450, one borehole was drilled in well group 500, and two boreholes were drilled down-valley from well site 500 and designated well group 700 (fig. 3). Three wells drilled earlier in the study (54, 104, and 202) have been dry since 1988 or 1989. Wells 103, 201, 303, and 403 were dry for parts of water years 1990-91.

Boreholes 453 and 701 were completed as wells and cased with nominal 10-centimeter-diameter polyvinyl chloride (PVC) pipe. Borehole 702 was cased with 0.8-centimeter-diameter PVC pipe. The borehole drilled at site 500 was not completed as a well. Factory-slotted PVC pipe was used for well screens in boreholes 453 and 701. Field-cut PVC pipe was used for well screen in borehole 702. Each borehole annulus to at least 0.3 m above the screen was filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets from about 0.4 to about 1 m thick was placed above the gravel in each well. The annulus above the bentonite was filled with concrete grout or random cuttings, and the uppermost part of the annulus was filled with concrete grout. A 1.5-meter-long steel security casing protects each well

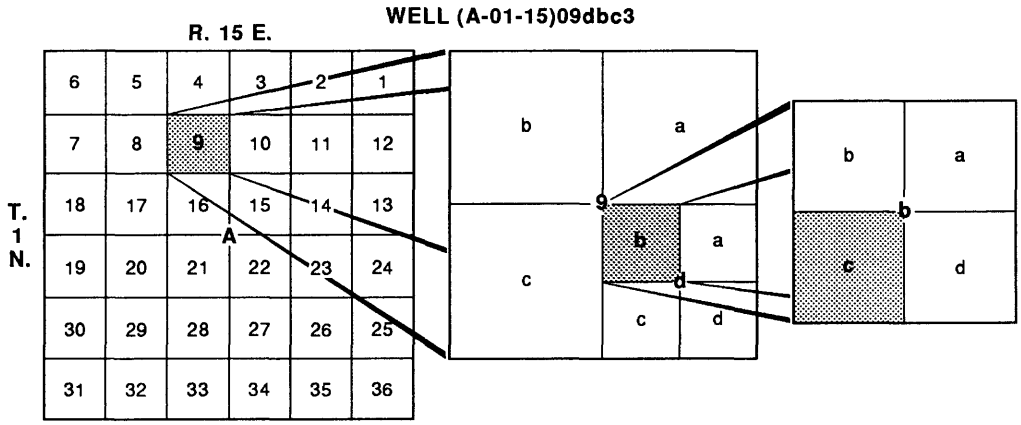

Figure 2.—Well-numbering and naming system.

from disturbance. Construction details for individual wells are included in the "Hydrologic Data" section of this report. The wells were developed by jetting high-pressure air horizontally through the well screen to agitate the gravel pack and formation and to airlift water and fine sediments from the well. Development generally lasted 1 to 2 hours and in most wells ended when no further fine material was visible in the pumped water.

Ground-water samples from the project wells were collected by installing either a 240-volt electric-submersible pump and rigid polyvinyl-chloride riser pipe or a 12-volt submersible pump used with or without an inflatable packer in the well and pumping until a representative sample could be collected. Discharge rate, water level, pH, specific conductance, temperature, and dissolved-oxygen concentration generally were monitored during pumping. Water samples were collected only after at least three casing volumes of water had been pumped and the values of each field measurement had stabilized. Pumping rate, duration, and water-level drawdown are included in the data tables. Samples for dissolved constituents were passed through a 0.45-micron (142-millimeter-diameter) polycarbonate filter and collected in polypropylene bottles. Nitric acid was used as a preservative for some sample types. Unfiltered samples were collected in glass bottles for total inorganic carbon and in polypropylene bottles for other total constituent analyses.

Most field data and surface-water samples were collected using methods described by Boner and others (1989, p. 4-28), including the methods of collecting, examining, and computing records of discharge and water chemistry; definition of terms related to streamflow, water quality, and other hydrologic data; and the description of the downstream order, latitude-longitude, and land-net methods of identifying data-collection sites. Explanations of modified or nonstandard methods used to collect data or samples are included in this report. Well-construction data and water-level and grain-size measurements were made in inch-pound units and converted to metric units.

Data are presented for 37 project wells and include location, construction details, site plan, water-level measurements, and chemical analyses of water samples. Mineralogic and particle-size information from drill cuttings are presented for three of the four wells drilled during water year 1990. Particle sizes were determined by wet sieving. Water levels were measured with a chalked steel tape or a calibrated electric tape.

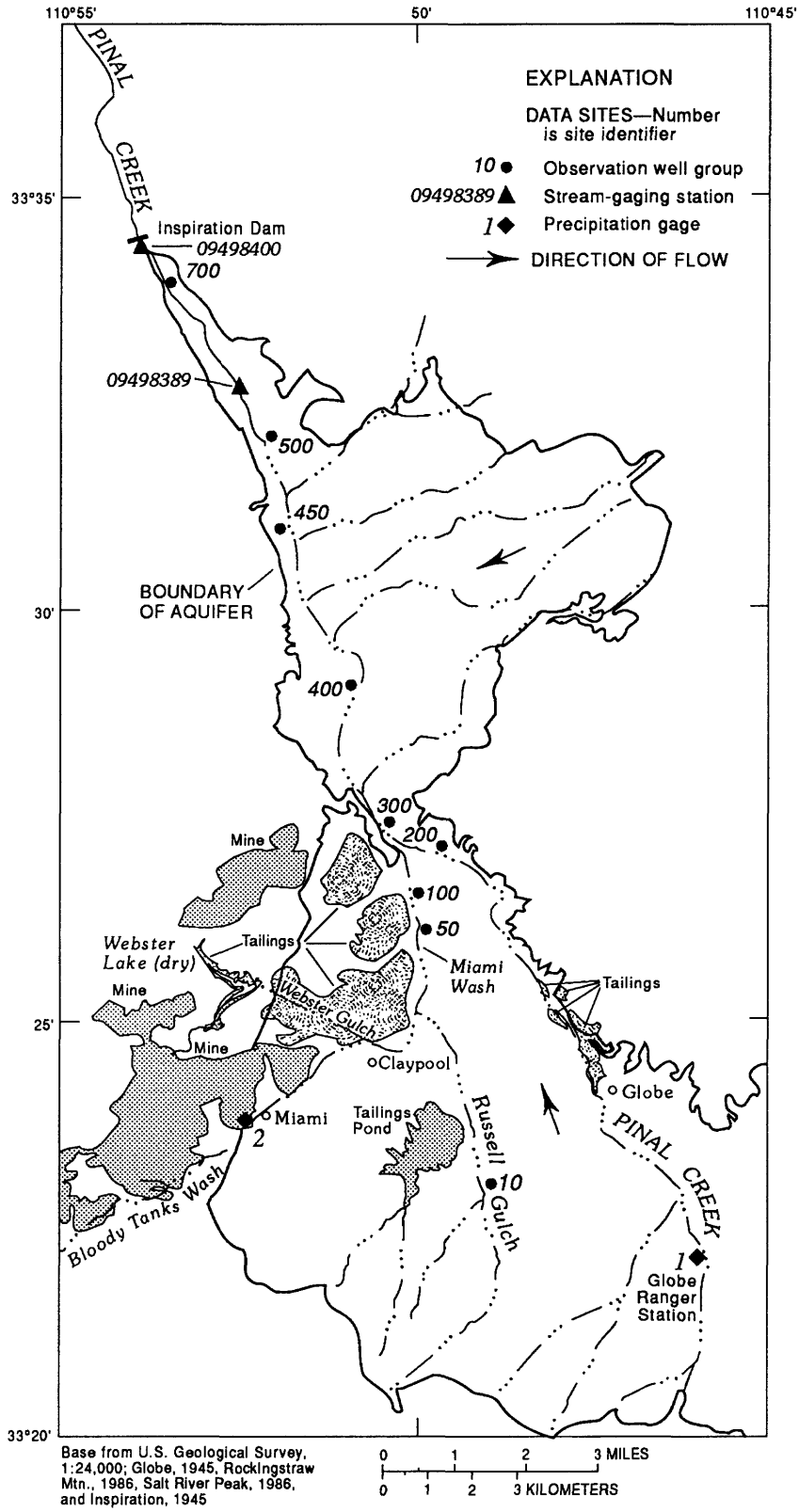

Figure 3.—Locations of ground-water, surface-water, and precipitation data-collection sites, Pinal Creek basin.

Chemical analyses of water from two sites along Pinal Creek (fig. 3) are presented. Monthly discharge data and water-quality field measurements taken in cross section are presented for Pinal Creek at Inspiration Dam (09498400). More than 115 additional observations of no flow and observations, estimates, and measurements of discharge at various points in the basin during water years 1990 and 1991 are on file in the project records.

Data from the solute-transport study in March 1990 are presented. During March 6-8, 1990, samples of surface water were collected at 11 sites in the perennial reach of Pinal Creek upstream from Inspiration Dam to evaluate the interactions among pH, manganese precipitation, and gas exchange with the atmosphere as well as other processes. Samples of shallow ground water were collected concurrently adjacent to the sites and one sample was collected upgradient from the beginning of perennial flow (Eychaner, 1991b; Longsworth 1991; fig. 4, this report). Surface-water samples were collected through a nylon sediment-sample nozzle fixed near the centroid of streamflow and connected by tubing to a peristaltic pump. Ground-water samples were collected by pumping through a 1.9-centimeter-diameter stainless-steel well casing and screen that was hand driven to about 1.5 m below the water table and developed by pumping for 10 to 20 minutes. Temperature, pH, dissolved-oxygen concentrations, specific conductance, and platinum (Pt) electrode potential were measured at each sampling site. Filtered and unfiltered samples were collected for chemical analysis.

Monthly precipitation data and long-term precipitation statistics are presented for the two active precipitation-measurement sites nearest to Pinal Creek. The data were assembled from published climatological data reports and annual summaries (National Climatic Data Center, issued monthly and annually, respectively). Because precipitation data customarily are reported on a calendar-year basis, data for the full calendar years 1989 through 1991 are included to cover water years 1990-91.

Most chemical analyses included in this report were done by the U.S. Geological Survey National Water-Quality Laboratory (NWQL), Arvada, Colorado; by the U.S. Geological Survey Project Laboratory, Ocala, Florida; and by K.G. Stollenwerk, a geochemist in the U.S. Geological Survey National Research Program (NRP), Lakewood, Colorado. Chemical analyses were also done by Linda Faires in the NRP, Lakewood, Colorado. Where analyses from multiple sources appear in the same table, they are identified by a designated number in the laboratory column. If the laboratory is not indicated, the analysis is from NWQL.

An ionic balance was computed as part of the review of laboratory results (Hem, 1985, p. 164). The balance was computed as:

$$\frac{\Sigma cations - \Sigma anions}{\Sigma cations + \Sigma anions} \; x100 \; percent$$

where

$\Sigma cations$ = the sum of the concentrations of all positively charged ions, in milliequivalents per liter, and

$\Sigma anions$ = the sum of the concentrations of all negatively charged ions, in milliequivalents per liter.

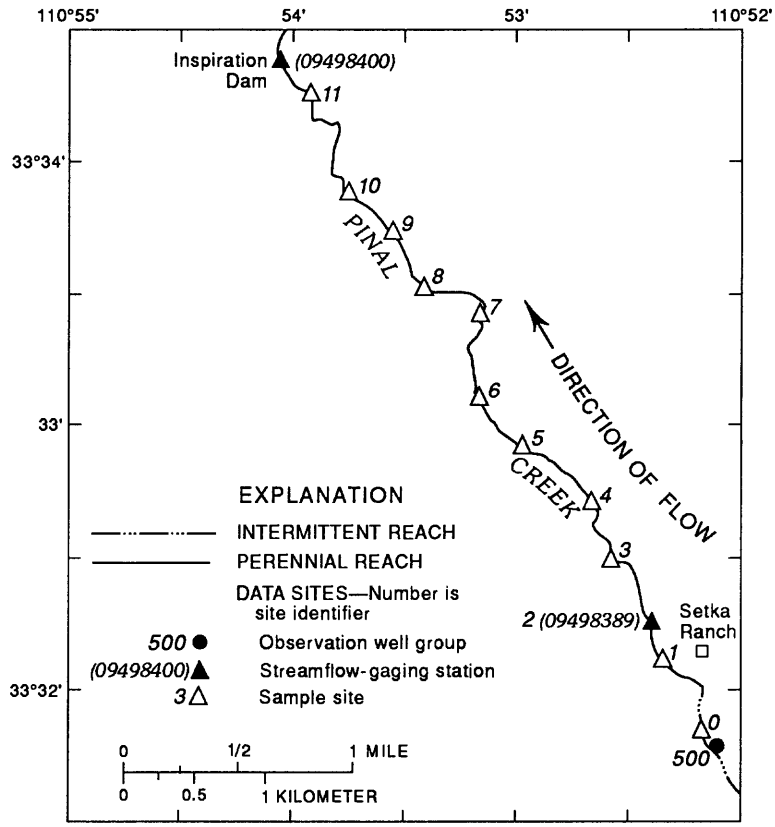

Figure 4.—Locations of ground-water and surface-water sites sampled during the solute-transport study, March 1990.

All ionic species determined in the analysis were included in the computation. Iron was assumed to be in the +2 oxidation state because field measurements and geochemical modeling showed negligible +3 iron in waters with more than 200 µg/L (micrograms per liter) dissolved iron (Eychaner and Stollenwerk, 1985). The ionic balance and ionic strength (Hem, 1985, p. 16) are reported in data tables for wells drilled by this project if adequate constituents were determined to make the values meaningful.

The NWQL and Stollenwerk analyzed water samples for most metals by inductively coupled plasma-emission spectroscopy (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 concentration. Under criteria described by Eychaner and others (1989, p. 5), five cobalt analyses from NWQL were deleted because of interference.

Analysis of dissolved fluoride done by the NWQL using the ion-specific electrode method in some cases produced anomalous results. At large concentrations, dissolved aluminum complexes with fluoride ions and prevents the electrode from detecting all the dissolved fluoride present in the sample. An ion-specific electrode was used to verify fluoride concentrations in spare sample water by a series of dilutions and standard additions. As a result, NWQL reports of dissolved-fluoride concentrations less than 1 mg/L (milligrams per liter) were discarded if dissolved aluminum was greater than 10 mg/L. Under these criteria, two fluoride analyses were deleted from the data base. Values for 40 samples analyzed using the modified

ion-specific electrode method were added to the data base and are included with analyses done by Stollenwerk.

In laboratory analyses of samples from Pinal Creek at Setka Ranch and Pinal Creek at Inspiration Dam, dissolved concentrations of cadmium, manganese, nickel, or zinc were in some cases greater than total-recoverable concentrations of these elements. 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 graphite furnace-atomic absorption, which is less precise. The concentrations therefore are considered to be equal. Discrepancies also can result from rounding of values.

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(page 15 follows)

HYDROLOGIC DATA

GROUND WATER
WELL 10

LOCATION.--Lat 33°23'10", long 110°49'05", in SE¼SE¼NW¼, sec.34, T. 1 N., R. 15 E. (A-01-15)34bdd1, 90 m east of Russel Gulch, and 3 km southwest of Globe.
Landowner: Pinto Valley Division, Magma Copper Corporation
LAND SURFACE DATUM.--1,056.1 m above National Geodetic Vertical Datum of 1929, from topographic map.
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 holes.

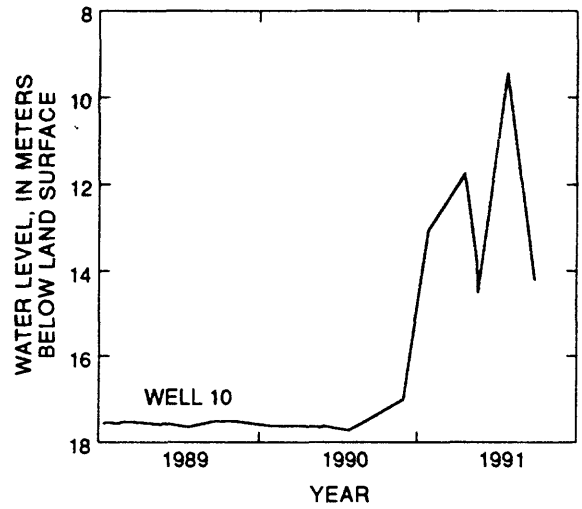
DRILLING AND WELL CONSTRUCTION

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 with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets was placed in the annulus from approximately 2.0 to 2.6 m above the slotted pipe. A concrete seal extends from the land surface to the depth listed.

Logs: D, drillers; G, geologist; P, particle size

Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
10	01-09-89	Air hammer	27.9	27.1	18.0-27.1	Basin fill	2.4	DGP

Date	Water level, in meters below land surface
11-01-89	17.51
11-16-89	17.53
01-26-90	17.62
03-27-90	17.61
05-22-90	17.64
05-23-90	17.61
07-24-90	17.71
09-25-90	17.38
11-29-90	17.01
01-25-91	13.07
04-19-91	3.58
05-16-91	4.19
05-20-91	4.43
07-25-91	9.44
09-24-91	14.21



FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liter per minute; m, meters]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
010	11-01-89	577	6.6	16.5	---	259	6.4	360	4.2	1.1	0.3
	05-22-90	583	6.7	17.5	256	---	7.1	320	4.2	.9	---
	05-20-91	390	6.7	18.0	142	---	7.4	580	20.1	.6	.6

GROUND WATER--Continued
WELL 10--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter; <, actual value is known to be less than the 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)	Ionic balance (Percent)	Ionic strength (mol/L)	Solids, sum of constituents, dissolved (mg/L)
010	11-01-89	10	62	19	33	1.6	69	17	0.40	24	-0.24	0.009	354
	11-01-89	110	64	25	33	---	81	18	----	23	1.6	.010	---
	05-22-90	110	64	20	35	---	76	18	----	26	.80	.010	---
	05-20-91	10	38	12	26	1.3	69	9.2	.50	25	.02	.006	251
	05-20-91	110	37	12	24	---	59	8.0	----	23	.53	.006	---

Well	Date	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)	Lead, dissolved (µg/L as Pb)	Lithium dissolved (µg/L as Li)
010	11-01-89	<10	120	<0.5	20	<1.0	<5	<3	<10	<3	<10	7
	11-01-89	<500	---	----	--	<50	<6	<20	<10	<20	<50	--
	05-22-90	<500	---	----	--	----	--	<20	<10	<20	---	--
	05-20-91	10	82	<.5	20	<1.0	<5	<3	<10	17	<10	<4
	05-20-91	<500	---	----	--	<50	--	<20	<10	<20	---	--

Well	Date	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)
010	11-01-89	420	<10	<10	<1.0	370	<6	15
	11-01-89	20	<50	<50	----	370	--	86
	05-22-90	<30	---	<50	----	---	--	<15
	05-20-91	2	<10	<10	1.0	230	<6	21
	05-20-91	<30	---	<50	----	210	--	<15

GROUND WATER--Continued
WELL GROUP 50

LOCATION.--Lat 33°26'11", long 110°49'51", in SE¼SW¼SE¼ 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, Magma Copper Corporation

LAND SURFACE DATUM.--987.55 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. Well 54 has been dry since about April 1989.

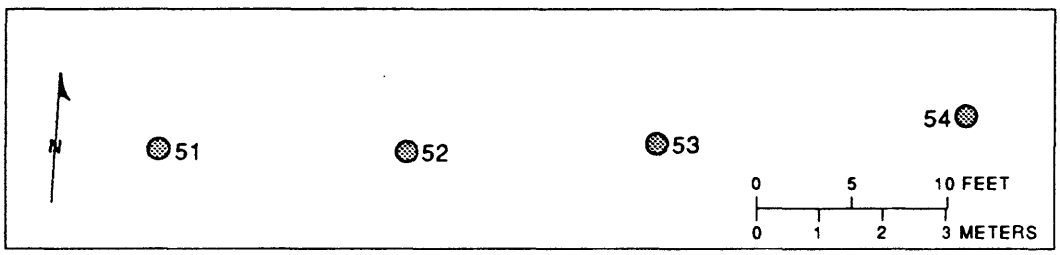
DRILLING AND WELL CONSTRUCTION

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 the depth listed.

Logs: C, caliper; E, electric; G, geologist; P, particle-size.

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

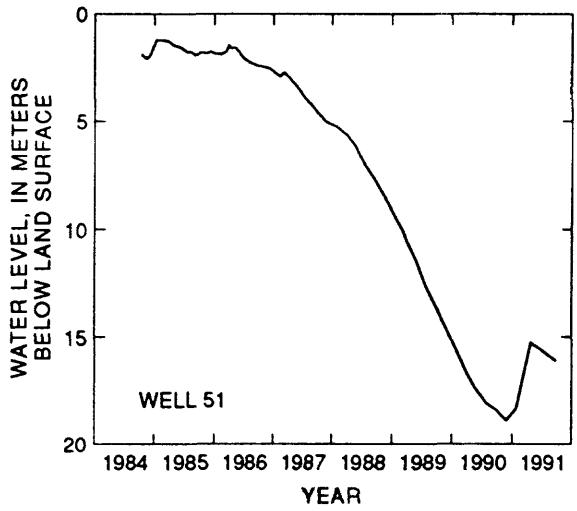
SITE PLAN

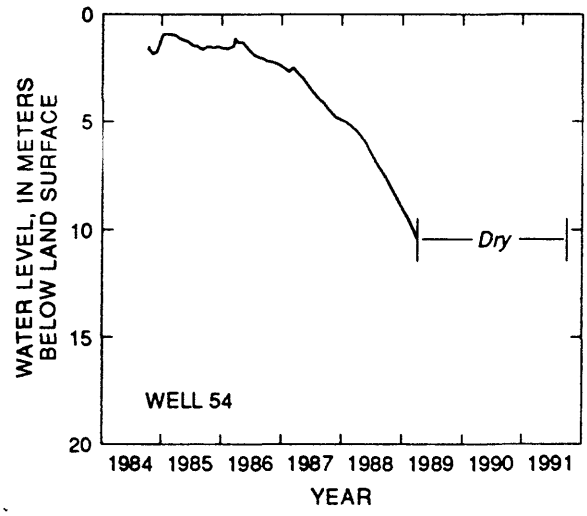


WATER LEVEL, IN METERS BELOW LAND SURFACE
[Dashes, dry]

Date	Well number 51	52	53	54	Date	Well number 51	52	53	54
10-30-89	14.20	14.10	14.13	--	11-06-90	18.71	18.63	18.64	--
11-16-89	14.43	14.33	14.37	--	11-29-90	18.88	18.80	18.82	--
01-26-90	15.64	15.54	15.57	--	01-25-91	18.32	18.23	18.25	--
03-27-90	16.62	16.52	16.55	--	04-19-91	15.26	15.16	15.16	--
05-21-90	17.37	17.27	17.31	--	05-16-91	15.40	15.30	15.31	--
05-23-90	17.39	17.29	17.32	--	05-21-91	15.42	15.33	15.33	--
07-24-90	18.04	17.95	17.98	--	07-25-91	15.78	15.70	15.72	--
09-25-90	18.39	18.30	18.33	--	09-24-91	16.09	16.02	16.04	--

GROUND WATER--Continued
WELl GROUP 50--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE--Continued





FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liters per minute; <, actual value is known to be less than the value shown]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)
051	10-30-89	7,780	3.5	18.0	0.2	440	33	0.3
	05-21-90	7,470	3.5	19.0	.3	460	53	.3
	11-06-90	8,200	3.6	18.0	.8	---	15	.9
	05-21-91	5,790	3.6	19.0	.3	---	36	.7
052	05-21-90	3,540	3.4	19.5	.2	520	3.4	.6
	05-21-91	1,340	3.9	21.0	<.1	---	3.8	.8
053	05-21-91	4,220	3.7	20.0	.1	---	12	.5

GROUND WATER--Continued
WELL GROUP 50--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS water-quality laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)
051	10-30-89	10	---	---	---	---	-----	---	----	47	---	-----
	10-30-89	110	470	320	190	---	7,900	260	----	--	110	-4.4
	05-21-90	10	---	---	---	---	-----	---	----	51	---	-----
	05-21-90	110	450	310	180	---	6,300	250	22	--	100	1.8
	11-06-90	110	460	280	160	---	5,800	250	----	--	110	2.6
	11-06-90	20	---	---	---	---	-----	---	----	62	---	-----
	05-21-91	20	---	---	---	---	-----	---	----	52	---	-----
	05-21-91	110	540	240	150	---	4,800	140	16	--	110	6.5
052	05-21-90	10	---	---	---	---	-----	---	----	26	---	-----
	05-21-90	110	220	130	95	---	2,300	110	11	--	91	2.7
	05-21-91	10	63	35	42	3.5	450	35	3.9	--	74	19
	05-21-91	20	---	---	---	---	-----	---	----	34	---	-----
	05-21-91	110	63	32	21	---	550	42	3.8	--	70	4.0
053	05-21-91	10	400	130	96	7.7	3,100	94	6.3	--	93	.81
	05-21-91	20	---	---	---	---	-----	---	----	41	---	-----
	05-21-91	110	460	150	110	---	3,300	92	----	--	110	6.7

Well	Date	Ionic strength (mol/L)	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)
051	10-30-89	-----	-------	--	--	---	----	---	-----	-------	---------
	10-30-89	0.333	190,000	--	--	---	700	280	7,400	120,000	2,000,000
	05-21-90	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-90	.283	170,000	--	--	---	----	---	8,200	99,000	1,770,000
	11-06-90	.266	150,000	--	--	---	500	---	6,200	100,000	1,700,000
	11-06-90	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-91	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-91	.225	130,000	--	--	---	500	---	5,400	77,000	1,320,000
052	05-21-90	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-90	.105	40,000	--	--	---	----	---	3,000	29,000	640,000
	05-21-91	.025	8,500	12	20	70	42	<5	-----	10,000	170,000
	05-21-91	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-91	.026	7,400	--	--	---	<100	---	810	9,400	160,000
053	05-21-91	.135	47,000	10	73	230	180	<20	-----	45,000	720,000
	05-21-91	-----	-------	--	--	---	----	---	-----	-------	---------
	05-21-91	.151	71,000	--	--	---	<250	---	3,300	47,000	820,000

GROUND WATER--Continued
WELL GROUP 50--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	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)
051	10-30-89	---	---	------	---	-----	--	-----	---	------
	10-30-89	236	---	59,000	<30	2,370	--	1,230	---	17,600
	05-21-90	---	---	------	---	-----	--	-----	---	------
	05-21-90	---	---	54,600	---	2,000	--	-----	---	15,600
	11-06-90	---	---	47,200	---	1,970	--	1,100	---	16,200
	11-06-90	---	---	------	---	-----	--	-----	---	------
	05-21-91	---	---	------	---	-----	--	-----	---	------
	05-21-91	---	---	45,300	---	200	--	1,100	---	13,900
052	05-21-90	---	---	------	---	-----	--	-----	---	------
	05-21-90	---	---	17,900	---	1,000	--	-----	---	4,300
	05-21-91	20	84	5,600	<10	210	<1	240	49	1,300
	05-21-91	---	---	------	---	-----	--	-----	---	------
	05-21-91	---	---	5,200	---	200	--	230	---	1,250
053	05-21-91	70	320	22,000	<30	900	4	750	230	6,500
	05-21-91	---	---	------	---	-----	--	-----	---	------
	05-21-91	---	---	29,400	---	1,200	--	840	---	9,500

GROUND WATER--Continued
WELL GROUP 100

LOCATION.--Lat 33°26'29", long 110°49'58", in SW¼NW¼SE¼ 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.--985.40 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. Well 104 has been dry since about April 1989.

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.

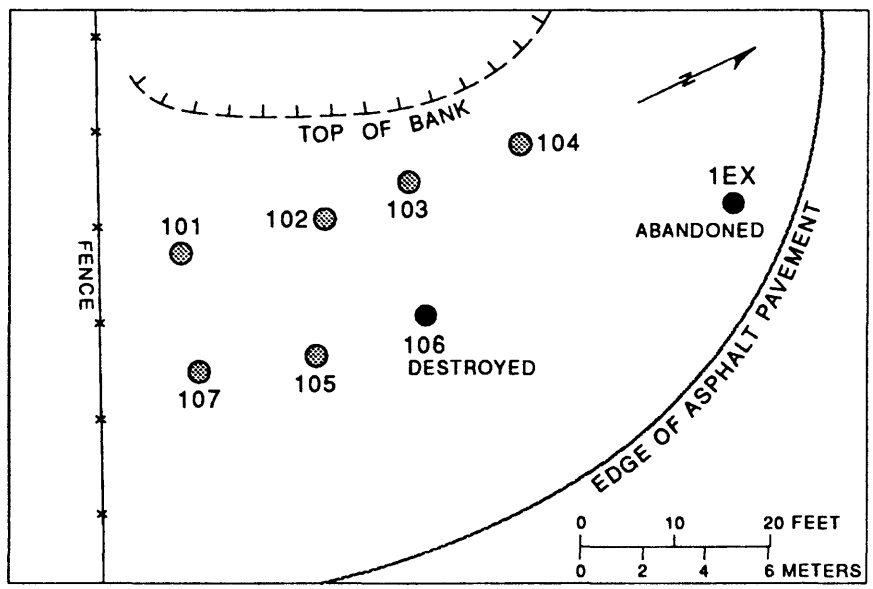
The casing of well 106 accidentally was crushed at about 46 m depth during pressure grouting. The borehole annulus probably is grouted from 0 to 15 m and from 46 to 55 m. Air jetting during attempted development removed most water from the upper casing. The water level rose from 37 to 29 m below land 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 the depth listed.

Logs: C, caliper; D, driller's; E, electric; G, geologist; P, particle-size; U, gamma-gamma.

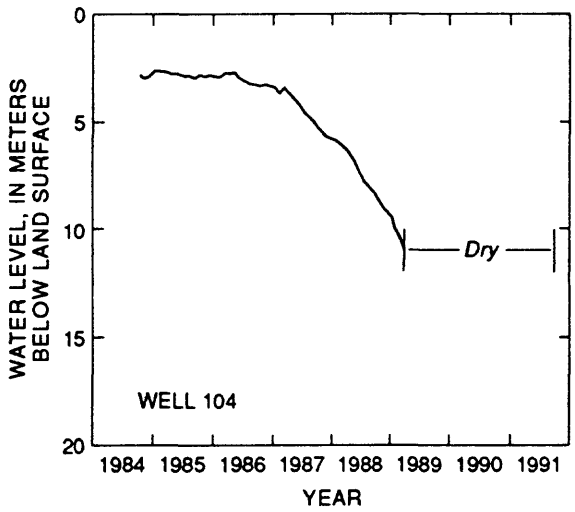
Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
101	10-10-84	Rotary, bentonite	36.3	36.1	35.1-36.0	Basin fill	3	CEGPU
102	10-11-84	Rotary, bentonite	25.3	25.2	24.2-25.1	Alluvium	3	-----
103	10-11-84	Rotary, bentonite	19.2	25.3	18.1-19.0	Alluvium	3	-----
104	10-11-84	Rotary, bentonite	11.3	11.2	10.2-11.1	Alluvium	3	-----
1EX	12-11-85	Dual-wall air rotary	77.7	----	---------	----------	----	DGP
105	05-22-86	Rotary, bentonite	49.1	48.8	47.2-48.1	Basin fill	38.1	D
106	05-20-86	Rotary, bentonite	62.5	----	---------	----------	----	-----
107	12-14-88	Hollow-stem auger	22.6	19.2	14.9-19.3	Alluvium	1.5	DGP

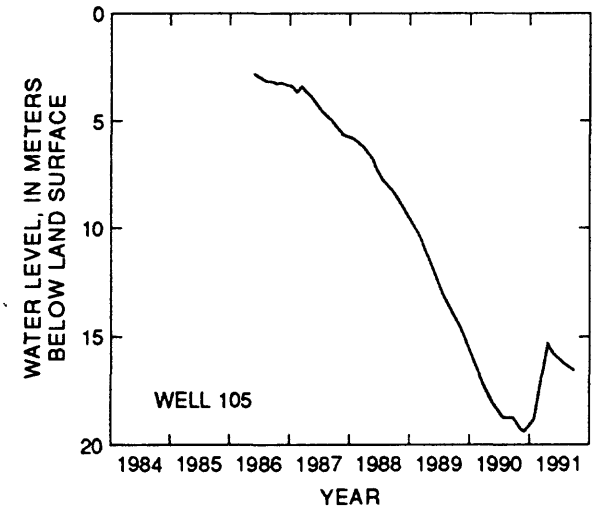
SITE PLAN



GROUND WATER--Continued
WELL GROUP 100--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE
[Dashes, dry]

Date	Well location 101	102	103	104	105	107	Date	Well location 101	102	103	104	105	107
10-31-89	14.57	14.52	14.52	---	14.49	14.47	11-29-90	19.46	19.42	-----	---	19.39	19.36
11-16-89	14.84	14.79	14.79	---	14.76	14.73	01-25-91	18.86	18.83	18.84	---	18.80	18.77
01-26-90	16.20	16.15	16.16	---	16.10	16.09	04-19-91	15.44	15.41	15.40	---	15.33	15.35
03-27-90	17.29	17.25	17.25	---	17.22	17.18	05-15-91	15.77	15.74	15.74	---	15.68	15.68
05-22-90	18.10	18.05	18.07	---	18.03	18.00	05-16-91	15.78	15.74	15.74	---	15.69	15.68
05-23-90	18.12	18.07	18.08	---	18.05	18.01	05-21-91	15.83	15.79	15.79	---	15.73	15.73
07-24-90	18.78	18.74	18.44	---	18.72	18.68	07-25-91	16.30	16.26	16.27	---	16.21	16.20
09-25-90	18.80	18.76	18.77	---	18.73	18.71	09-24-91	16.59	16.56	16.55	---	16.52	16.49
11-07-90	19.32	19.29	-----	---	19.25	19.21							





FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liters per minute; m, meter; <, actual value is known to be less than the value shown; >, actual value is known to be greater than the value shown]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
101	10-31-89	6,590	3.6	18.0	---	---	0.1	450	45	0.4	-----
	05-22-90	6,430	3.6	18.0	---	---	.4	480	37	.4	-----
	11-07-90	6,030	3.7	18.0	---	---	<.1	420	29	.5	-----
	05-21-91	5,950	3.7	18.5	---	---	.1	---	36	.4	0.2
102	11-07-90	4,960	3.6	18.5	---	---	<.1	420	18	.4	-----
103	10-31-89	4,440	3.6	18.5	---	---	.1	460	25	.4	.1
	05-22-90	4,250	3.6	18.5	---	---	.3	460	4.2	.3	-----
	05-21-91	3,720	3.4	19.5	---	---	1.2	---	3.8	.7	-----
105	10-31-89	3,630	6.4	19.0	---	623	.8	320	17	1.1	>16.8
	05-22-90	3,560	6.2	19.5	612	---	1.0	340	9.1	1.4	9.3
107	05-21-91	3,500	3.5	20.0	---	---	.1	---	3.8	.9	-----

GROUND WATER--Continued
WELL GROUP 100--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS water-quality laboratory, Ocala, Florida; mg/L, milligrams per liter; mol/L, moles per liter; µg/L, micrograms per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)	Ionic strength (mol/L)
101	10-31-89	10	---	---	---	---	-----	---	-----	50	---	----	-----
	10-31-89	110	490	250	170	---	6,400	220	-----	--	100	-5.5	0.267
	05-22-90	10	400	220	150	9.0	5,900	240	24	51	59	----	-----
	05-22-90	110	470	240	160	---	5,500	220	31	--	96	-2.8	.238
	11-07-90	10	430	210	140	9.0	5,000	110	16	--	60	1.2	.223
	11-07-90	110	380	190	120	---	4,800	200	-----	--	86	-8.3	.197
	11-07-90	20	---	---	---	---	-----	---	-----	71	---	----	-----
	05-21-91	10	480	210	150	9.0	4,900	160	15	--	100	-2.8	.208
	05-21-91	20	---	---	---	---	-----	---	-----	63	---	----	-----
	05-21-91	110	410	210	90	---	4,400	180	-----	--	110	7.4	.215
102	11-07-90	110	420	150	130	---	3,700	160	16	--	92	-5.4	.153
	11-07-90	20	---	---	---	---	-----	---	-----	61	---	----	-----
103	10-31-89	10	---	---	---	---	-----	---	-----	28	---	----	-----
	10-31-89	110	480	150	130	---	3,500	150	-----	--	100	-3.5	.145
	05-22-90	10	---	---	---	---	-----	---	-----	39	---	----	-----
	05-22-90	110	530	150	120	---	3,000	120	11	--	100	4.5	.138
	05-21-91	20	---	---	---	---	-----	---	-----	40	---	----	-----
	05-21-91	110	320	89	98	---	2,300	93	-----	--	74	-7.4	.092
105	10-31-89	110	380	120	330	---	1,500	160	-----	--	51	-3.4	.076
	05-22-90	110	420	140	340	---	1,400	170	.24	--	53	3.9	.076
107	05-21-91	10	360	98	85	5.0	2,100	86	7.5	--	100	2.2	.094
	05-21-91	20	---	---	---	---	-----	---	-----	39	---	----	-----
	05-21-91	110	330	110	74	---	2,300	88	-----	--	66	-2.9	.094

GROUND WATER--Continued
WELL GROUP 100--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	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)	Lead, dissolved (µg/L as Pb)	Lithium dissolved (µg/L as Li)
101	10-31-89	-------	----	---	---	-----	---	------	-------	----------	----	---
	10-31-89	150,000	----	---	---	<500	170	6,700	98,000	1,410,000	650	---
	05-22-90	150,000	<100	100	520	180	3	------	-------	----------	<10	430
	05-22-90	130,000	----	---	---	-----	---	6,000	76,000	1,290,000	----	---
	11-07-90	160,000	<100	80	500	200	4	------	85,000	1,200,000	<100	400
	11-07-90	100,000	----	---	---	290	---	3,800	69,000	970,000	----	---
	11-07-90	-------	----	---	---	-----	---	------	-------	----------	----	---
	05-21-91	88,000	12	110	330	310	<50	------	81,000	1,100,000	<100	430
	05-21-91	-------	----	---	---	-----	---	------	-------	----------	----	---
	05-21-91	160,000	----	---	---	600	---	5,600	87,000	1,360,000	----	---
102	11-07-90	76,000	----	---	---	<250	---	2,600	49,000	640,000	----	---
	11-07-90	-------	----	---	---	-----	---	------	-------	----------	----	---
103	10-31-89	-------	----	---	---	-----	---	------	-------	----------	----	---
	10-31-89	58,000	----	---	---	<500	300	3,000	41,000	540,000	330	---
	05-22-90	-------	----	---	---	-----	---	------	-------	----------	----	---
	05-22-90	57,000	----	---	---	-----	---	2,800	36,000	540,000	----	---
	05-21-91	-------	----	---	---	-----	---	------	-------	----------	----	---
	05-21-91	30,000	----	---	---	110	---	1,600	22,000	300,000	----	---
105	10-31-89	<1,000	----	---	---	<100	60	30	36	590	150	---
	05-22-90	<5,000	----	---	---	-----	---	<200	<100	900	----	---
107	05-21-91	33,000	12	46	130	100	<20	------	27,000	370,000	40	260
	05-21-91	-------	----	---	---	-----	---	------	-------	----------	----	---
	05-21-91	22,000	----	---	---	<100	---	1,300	18,000	390,000	----	---

Well	Date	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)	H-2/H-1 stable-isotope ratio (per mil)	O-18/O-16 stable-isotope ratio (per mil)
101	10-31-89	------	----	-----	----	-----	-----	------	-----	-----
	10-31-89	48,000	<300	1,900	----	1,700	-----	13,000	-----	-----
	05-22-90	49,000	----	1,900	<1.0	1,800	2,000	14,000	-----	-----
	05-22-90	44,000	----	2,000	----	-----	-----	12,000	-----	-----
	11-07-90	46,000	2	2,600	<1.0	1,700	2,800	12,000	-----	-----
	11-07-90	34,000	----	1,300	----	1,300	-----	10,000	-----	-----
	11-07-90	------	----	-----	----	-----	-----	------	-----	-----
	05-21-91	39,000	<100	1,500	13	1,600	420	11,000	-----	-----
	05-21-91	------	----	-----	----	-----	-----	------	-----	-----
	05-21-91	54,000	----	2,000	----	1,800	-----	16,000	-----	-----
102	11-07-90	28,000	----	980	----	1,200	-----	700	-----	-----
	11-07-90	------	----	-----	----	-----	-----	------	-----	-----
103	10-31-89	------	----	-----	----	-----	-----	------	-----	-----
	10-31-89	42,000	<300	1,200	----	1,700	-----	5,600	-----	-----
	05-22-90	------	----	-----	----	-----	-----	------	-57.4	-7.95
	05-22-90	38,000	----	900	----	-----	-----	5,600	-----	-----
	05-21-91	------	----	-----	----	-----	-----	------	-----	-----
	05-21-91	20,000	----	500	----	990	-----	3,200	-----	-----
105	10-31-89	3,600	110	170	----	1,300	-----	92	-----	-----
	05-22-90	4,600	----	<500	----	-----	-----	<150	-----	-----
107	05-21-91	23,000	<30	620	8.0	1,000	130	3,800	-----	-----
	05-21-91	------	----	-----	----	-----	-----	------	-----	-----
	05-21-91	14,000	----	400	----	720	-----	2,500	-----	-----

GROUND WATER--Continued
WELL GROUP 200

LOCATION.--Lat 33°27'07", long 110°49'55", in SW¼SW¼SE¼ 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.--978 m above National Geodetic Vertical Datum of 1929, from topographic map.
REMARKS.--Wells 201 and 202 were originally identified as X2W1 and X2W2, respectively. Well 202 has been dry since about September 1988.

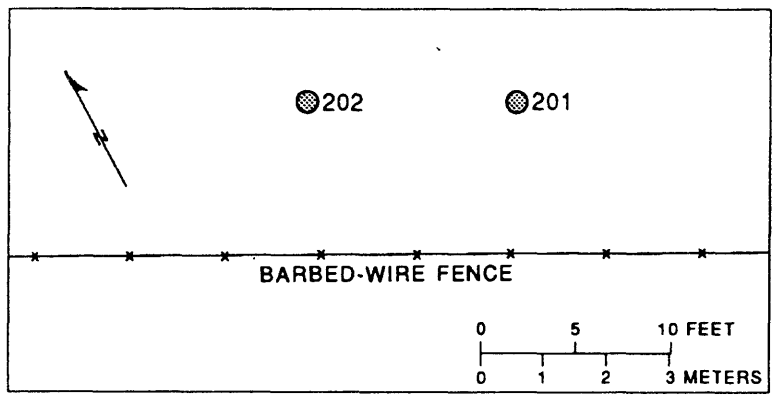
DRILLING AND WELL CONSTRUCTION

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 the depth listed.

Logs: C, caliper; E, electric; G, geologist; J, gamma; P, particle-size; U, gamma-gamma.

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

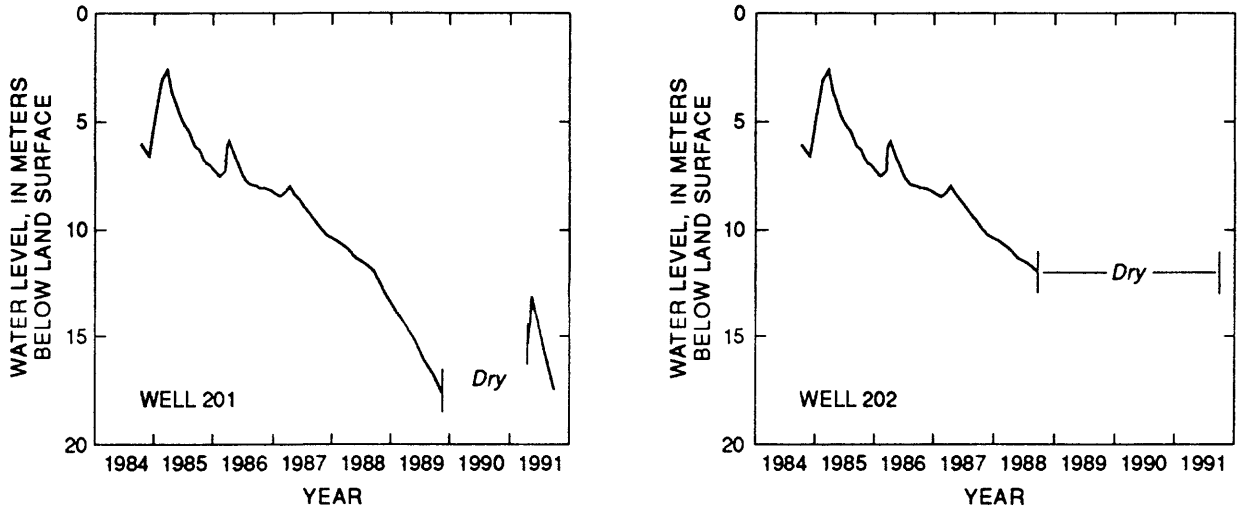
SITE PLAN



WATER LEVEL, IN METERS BELOW LAND SURFACE
[Dashes, dry]

Date	Well number 201	202	Date	Well number 201	202
11-16-89	17.64	---	01-25-91	-----	---
01-26-90	-----	---	04-19-91	15.31	---
03-27-90	-----	---	05-16-91	13.09	---
05-23-90	-----	---	05-22-91	13.27	---
07-24-90	-----	---	05-23-91	13.30	---
09-25-90	-----	---	07-25-91	15.64	---
11-29-90	-----	---	09-24-91	17.48	---

GROUND WATER--Continued
WELL GROUP 200--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE--Continued



FIELD MEASUREMENTS

[μS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liters per minute]

Well	Date	Specific conductance (μS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)
201	05-23-91	1,030	6.6	20.5	154	--	7.5	--	2.3	1.2

LABORATORY MEASUREMENTS

[110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; mg/L, milligrams per liter; mol/L, moles per liter; μg/L, micrograms per liter; <, actual value is known to be less than the value shown]

Well	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	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)	Ionic balance (Percent)	Ionic strength (mol/L)
201	05-23-91	110	170	36	67	440	82	0.16	41	1.7	0.025

Well	Date	Aluminum, dissolved (μg/L as Al)	Cadmium, dissolved (μg/L as Cd)	Cobalt, dissolved (μg/L as Co)	Copper, dissolved (μg/L as Cu)	Iron, dissolved (μg/L as Fe)	Manganese, dissolved (μg/L as Mn)	Nickel, dissolved (μg/L as Ni)	Strontium, dissolved (μg/L as Sr)	Zinc, dissolved (μg/L as Zn)
201	05-23-91	<500	<50	<20	<10	40	<30	<50	470	15

GROUND WATER--Continued
WELL GROUP 300

LOCATION.--Lat 33°27'17", long 110°50'19", in SE¼NW¼SW¼ 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 m above National Geodetic Vertical Datum of 1929, from topographic map.
REMARKS.--Wells 301, 302, 303, and 304 were originally identified as X3W1, X3W2, X3W3, and X3W4, respectively.

DRILLING AND WELL CONSTRUCTION

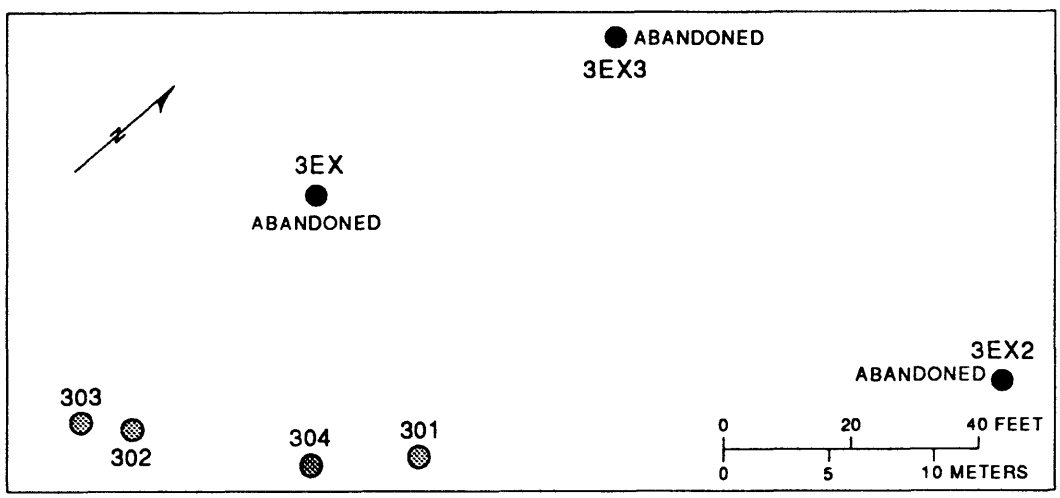
All holes for which well depth is listed below were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide 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 interferred 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, each hole was sealed with concrete to its total depth.

Logs: C, caliper; D, drillers; E, electric; G, geologist; P, particle-size; U, gamma-gamma.

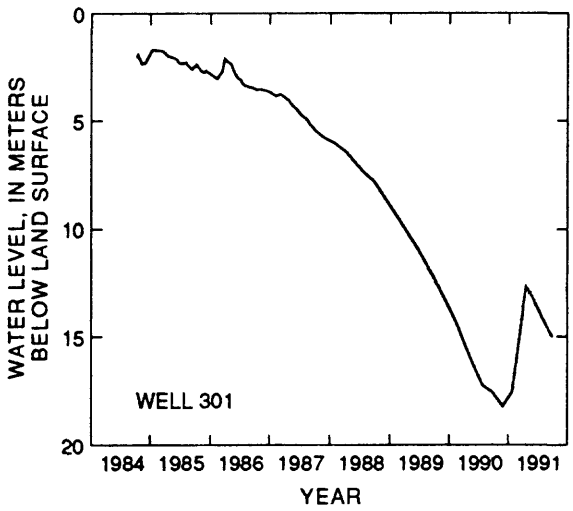
Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
301	10-07-84	Rotary, bentonite	59.4	59.1	58.1-59.0	Basin fill	3	CEGPU
302	10-08-84	Rotary, bentonite	36.0	35.8	34.8-35.7	Alluvium	3	-----
303	10-08-84	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	1-09-86	Dual-wall air rotary	102.1	----	---------	--------	----	GP
304	5-24-86	Rotary, bentonite	48.8	30.3	28.7-29.6	Alluvium	27.4	D

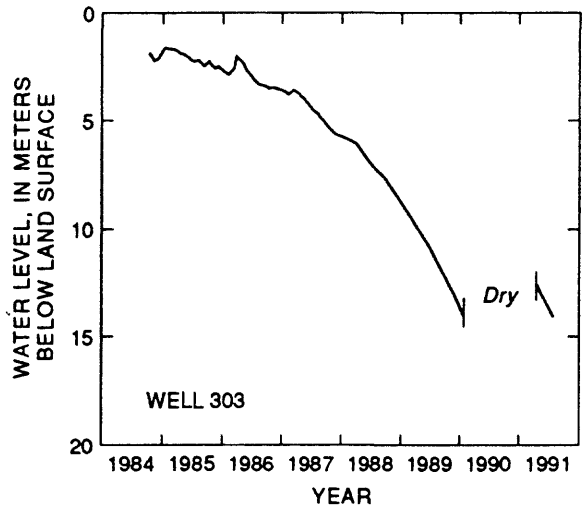
SITE PLAN



GROUND WATER--Continued
WELL GROUP 300--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE
[Dashes, dry; NM, not measured]

Date	Well number 301	302	303	304	Date	Well number 301	302	303	304
11-02-89	12.73	12.82	12.65	12.77	09-25-90	17.55	17.64	-----	17.63
11-16-89	12.99	13.03	12.86	12.97	11-29-90	18.18	18.28	-----	18.27
01-26-90	14.10	14.15	14.02	14.10	01-25-91	17.51	17.60	-----	17.58
02-14-90	14.43	14.49	NM	NM	04-19-91	12.65	12.77	12.58	12.70
03-27-90	15.17	15.23	-----	15.19	05-16-91	12.94	13.22	13.05	13.15
05-22-90	16.16	16.26	-----	16.22	05-23-91	13.01	13.31	13.10	13.24
05-23-90	16.22	16.27	-----	16.25	07-25-91	14.11	14.23	14.08	14.19
07-24-90	17.20	17.30	-----	17.28	09-24-91	15.00	15.10	-----	15.07





FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liter per minute; m, meter; <, actual value is known to be less than the value shown]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate weter wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Draw down (m)
301	11-02-89	3,580	6.7	18.5	---	322	0.1	290	36	0.8	6.1
	05-22-90	3,610	6.5	19.5	320	---	.5	690	15	1.4	10.4
302	11-02-89	6,480	3.8	18.0	---	---	.1	440	35	.4	.5
	05-23-91	5,120	3.7	19.0	---	---	.5	---	36	.6	----
303	11-02-89	3,830	4.5	17.5	---	---	.2	410	4.2	.4	.1
	05-23-91	3,400	3.9	21.0	---	---	<.1	---	2.3	.6	----
304	05-22-90	4,740	3.7	19.0	---	---	.2	460	35	.3	.1
	05-23-91	3,090	3.9	19.5	---	---	<.1	---	38	.4	----

GROUND WATER--Continued
WELL GROUP 300--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS water-quality laboratory, Ocala, Florida; mg/L, milligrams per liter; mol/L, moles per liter; µg/L, micrograms per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)
301	11-02-89	10	---	---	---	---	-----	---	-----	--	---	------
	11-02-89	110	790	160	72	---	2,200	95	0.96	--	36	3.3
	05-22-90	10	---	---	---	---	-----	---	-----	--	---	------
	05-22-90	110	770	150	69	---	2,000	100	-----	--	34	4.6
302	11-02-89	10	---	---	---	---	-----	---	-----	43	---	------
	11-02-89	110	530	300	180	---	6,600	200	21	--	100	0.78
	05-23-91	20	---	---	---	---	-----	---	-----	55	---	------
	05-23-91	110	520	220	140	---	4,000	150	13	--	110	7.8
303	11-02-89	10	560	130	89	8.4	2,600	94	8.4	37	77	-1.6
	11-02-89	110	570	150	95	---	2,700	97	7.8	--	82	-2.1
	05-23-91	10	530	140	100	8.9	2,300	90	12	--	110	-2.8
	05-23-91	20	---	--	---	---	-----	---	-----	45	---	------
	05-23-91	110	390	100	74	---	2,000	88	13	--	75	-12
304	05-22-90	10	---	---	---	---	-----	---	-----	45	---	------
	05-22-90	110	450	160	130	---	3,400	150	14	--	97	2.9
	05-23-91	20	---	---	---	---	-----	---	-----	43	---	------
	05-23-91	110	160	63	43	---	2,000	40	9.6	--	50	-21

Well	Date	Ionic strength (mol/L)	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	11-02-89	-----	-------	--	--	---	----	---	-----	-------	---------
301	11-02-89	0.104	<5,000	--	--	---	<500	190	<200	<100	2,200
301	05-22-90	-----	-------	--	--	---	----	---	-----	-------	---------
301	05-22-90	.099	<5,000	--	--	---	----	---	<200	200	1,000
302	11-02-89	-----	-------	--	--	---	----	---	-----	-------	---------
302	11-02-89	.289	150,000	--	--	---	660	150	7,000	100,000	1,770,000
302	05-23-91	-----	-------	--	--	---	----	---	-----	-------	---------
302	05-23-91	.190	110,000	--	--	---	400	---	4,200	61,000	1,020,000
303	11-02-89	.110	11,000	17	39	140	49	<20	-----	19,000	250,000
303	11-02-89	.114	6,800	--	--	---	<500	130	1,800	21,000	260,000
303	05-23-91	.096	19,000	17	76	50	32	<20	680	30,000	25,000
303	05-23-91	-----	-------	--	--	---	----	---	-----	-------	---------
303	05-23-91	.077	10,000	--	--	---	<100	---	620	22,000	18,000
304	05-22-90	-----	-------	--	--	---	----	---	-----	-------	---------
304	05-22-90	.155	86,000	--	--	---	----	---	3,500	48,000	720,000
304	05-23-91	-----	-------	--	--	---	----	---	-----	-------	---------
304	05-23-91	.072	21,000	--	--	---	<100	---	1,400	18,000	280,000

GROUND WATER--Continued
WELL GROUP 300--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	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)	H-2/H-1 stable-isotope ratio (per mil)	O-18 O-16 stable-isotope ratio (per mil)
301	11-02-89	---	---	------	----	-----	---	-----	---	------	-56.5	-7.60
	11-02-89	110	---	17,000	<100	<500	---	1,500	---	<150	-----	-----
	05-22-90	---	---	------	----	-----	---	-----	---	------	-----	-----
	05-22-90	---	---	22,000	----	1,000	---	-----	---	200	-----	-----
302	11-02-89	---	---	------	----	-----	---	-----	---	------	-55.0	-7.05
	11-02-89	390	---	60,000	<300	2,400	---	1,600	---	12,000	-----	-----
	05-23-91	---	---	------	----	-----	---	-----	---	------	-----	-----
	05-23-91	---	---	45,000	----	2,000	---	1,300	---	11,000	-----	-----
303	11-02-89	120	250	50,000	<30	840	7.0	2,000	33	3,200	-----	-----
	11-02-89	150	---	53,000	<100	990	---	2,100	---	3,600	-----	-----
	05-23-91	60	390	43,000	<30	1,100	5.0	2,000	<18	3,900	-----	-----
	05-23-91	---	---	------	----	-----	---	-----	---	------	-----	-----
	05-23-91	---	---	30,000	----	700	---	1,500	---	3,100	-----	-----
304	05-22-90	---	---	------	----	-----	---	-----	---	------	-----	-----
	05-22-90	---	---	37,000	----	1,000	---	-----	---	6,500	-----	-----
	05-23-91	---	---	------	----	-----	---	-----	---	------	-----	-----
	05-23-91	---	---	11,000	----	400	---	490	---	2,700	-----	-----

GROUND WATER--Continued
WELL GROUP 400

LOCATION.--Lat 33°29'04", long 110°50'48", in SE¼NW¼SE¼ 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 m above National Geodetic Vertical Datum of 1929, from topographic map.
REMARKS.--Wells 401, 402, 403, and 404 were originally identified as X4W1, X4W2, X4W3, and X4W4, respectively.

DRILLING AND WELL CONSTRUCTION

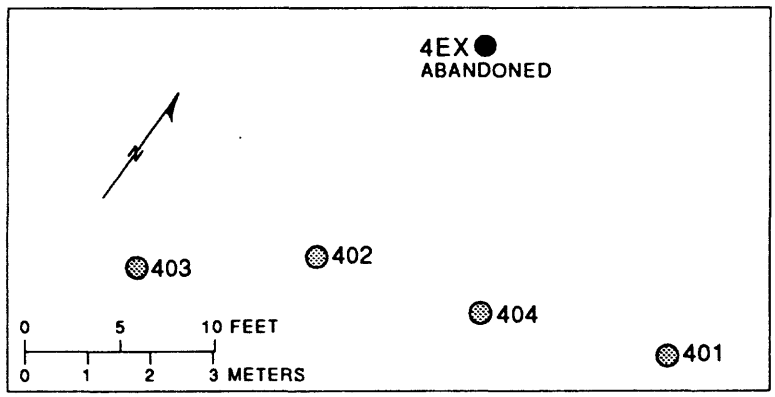
All holes for which well depth is listed below were cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. Each screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide 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 hole was sealed with concrete to its total depth.

Logs: C, caliper; D, drillers; E, electric; G, geologist; P, particle-size.

Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
401	10-09-84	Rotary, bentonite	34.4	34.2	33.2-34.1	Basin fill	3	CEGP
402	10-10-84	Rotary, bentonite	21.0	20.9	19.8-20.7	Alluvium	3	----
403	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	09-04-86	Cable tool	55.5	55.3	53.7-54.6	Basin fill	48.5	D

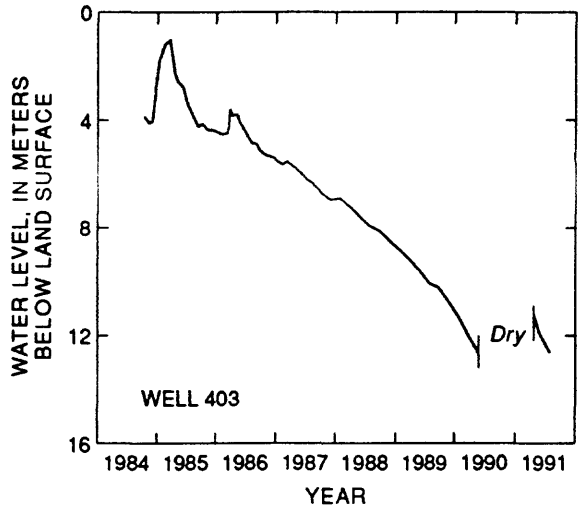
SITE PLAN

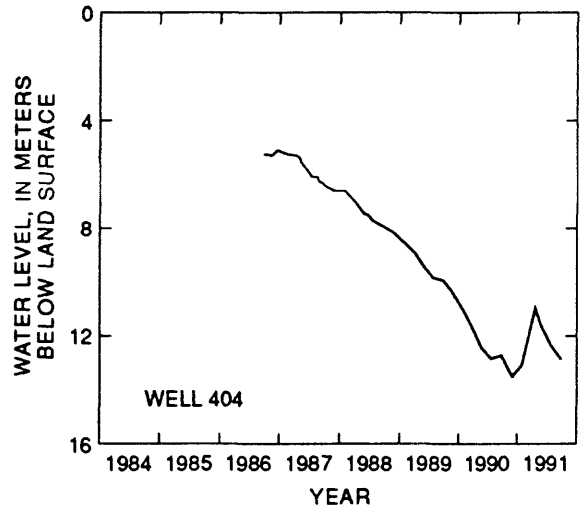


WATER LEVEL, IN METERS BELOW LAND SURFACE
[Dashes, dry]

Date	Well number 401	402	403	404	Date	Well number 401	402	403	404
11-16-89	10.62	10.71	10.69	10.34	11-29-90	13.83	13.89	-----	13.50
01-26-90	11.31	11.40	11.38	11.02	01-25-91	13.37	13.44	-----	13.07
03-27-90	11.98	12.06	12.06	11.73	04-19-91	11.22	11.28	11.26	10.96
05-23-90	12.62	12.69	12.69	12.44	05-16-91	11.74	11.80	11.79	11.48
05-24-90	12.31	12.70	12.69	12.45	05-23-91	11.85	11.91	11.90	11.60
07-24-90	13.16	13.17	-----	12.85	07-25-91	12.59	12.65	12.63	12.37
09-25-90	13.01	13.09	-----	12.73	09-24-91	13.15	13.21	-----	12.87
11-09-90	13.59	13.66	-----	13.28					

GROUND WATER--Continued
WELL GROUP 400--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE--Continued





FIELD MEASUREMENTS

[μS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liter per minute; m, meter]

Well	Date	Specific conductance (μS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
401	05-24-90	3,350	4.9	18.5	18	--	0.8	360	4.5	0.7	----
402	11-09-90	4,320	4.0	18.0	---	--	.1	410	4.9	.5	----
	05-23-91	3,450	4.1	19.0	---	--	.6	---	16	.7	----
403	05-23-91	407	4.6	17.0	---	--	5.6	---	1.9	.7	----
404	05-24-90	401	7.6	19.5	221	--	9.3	310	17	1.1	12.7

GROUND WATER--Continued
WELL GROUP 400--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter; pCi/L, picocuries per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)
401	05-24-90	10	---	-----	--	---	-------	-----	------	--	--	------
	05-24-90	110	430	140	90	---	2,400	110	9.6	--	62	-0.24
402	11-09-90	110	410	150	92	---	3,000	140	13	--	74	-7.6
	11-09-90	20	---	-----	--	---	-------	-----	------	56	--	------
	05-23-91	20	---	-----	--	---	-------	-----	------	44	--	------
	05-23-91	110	340	82	65	---	2,500	93	9.0	--	56	-18
403	05-23-91	20	---	-----	--	---	-------	-----	------	11	--	------
	05-23-91	110	30	7.1	16	---	100	12	.78	--	32	7.8
404	05-24-90	10	44	14	24	2.5	8.3	5.1	.40	--	25	5.9
	05-24-90	110	44	14	25	---	13	8.2	.57	--	27	3.4

Well	Date	Ionic strength (mol/L)	Solids, sum of constituents, dissolved (mg/L)	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	05-24-90	-----	---	------	--	---	--	------	--	-----	------	-------
	05-24-90	0.103	---	8,900	--	---	--	------	--	2,100	19,000	350,000
402	11-09-90	.120	---	16,000	--	---	--	<250	--	2,100	25,000	450,000
	11-09-90	-----	---	------	--	---	--	------	--	-----	------	-------
	05-23-91	-----	---	------	--	---	--	------	--	-----	------	-------
	05-23-91	.091	---	9,400	--	---	--	<100	--	1,400	14,000	240,000
403	05-23-91	-----	---	------	--	---	--	------	--	-----	------	-------
	05-23-91	.005	---	<1,000	--	---	--	<100	--	<40	410	70
404	05-24-90	.006	232	<10	15	0.7	20	<1.0	<5	<3	<10	13
	05-24-90	.006	---	<500	--	---	--	------	--	<20	<10	<20

Well	Date	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)	Tritium, total (pCi/L)	H-2/H-1 stable-isotope ratio (par mil)	O-18/O-16 stable-isotope ratio (per mil)
401	05-24-90	---	--	------	--	----	----	-----	--	-----	27	-----	-----
	05-24-90	---	--	52,000	--	900	----	-----	--	3,300	--	-----	-----
402	11-09-90	---	--	45,000	--	970	----	1,400	--	4,300	--	-----	-----
	11-09-90	---	--	------	--	----	----	-----	--	-----	--	-----	-----
	05-23-91	---	--	------	--	----	----	-----	--	-----	--	-----	-----
	05-23-91	---	--	27,000	--	550	----	480	--	2,500	--	-----	-----
403	05-23-91	---	--	------	--	----	----	-----	--	-----	--	-----	-----
	05-23-91	---	--	2,700	--	<100	----	100	--	100	--	-----	-----
404	05-24-90	<10	14	9	<10	<10	<1.0	260	<6	19	--	-72.5	-10.5
	05-24-90	---	--	<30	--	<50	----	-----	--	<15	--	-----	-----

GROUND WATER--Continued
WELL GROUP 450

LOCATION.--Lat 33°31'08", long 110°51'56", in NE¼SW¼NE¼ sec. 18, T. 2 N., R. 15 E. (A-02-15)18aca, 10 m west of Pinal Creek, and 15 km northwest of Globe.

Landowner: Cyprus Miami Mining Corporation

LAND SURFACE DATUM.--908.36 m above National Geodetic Vertical Datum of 1929 (Levels by Cyprus Miami Mining Corporation).

DRILLING AND WELL CONSTRUCTION

Each well was cased with nominal 10-centimeter diameter, schedule 40 PVC pipe. The borehole annulus around each screen is filled with washed pea gravel from uncontaminated local alluvium.

Well 451 has a 2.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 2,112 factory-cut slots 3.4 cm long by 0.64 mm wide for a total open area of 460 cm^2. During drilling, formation material collapsed around the casing from approximately 1.3 to 16.8 m above the screen, or to within about 4.6 m of land surface. A layer of bentonite pellets 0.3 m thick was placed in the annulus upon the collapsed material. A concrete seal extends from the land surface to a depth of 3 m.

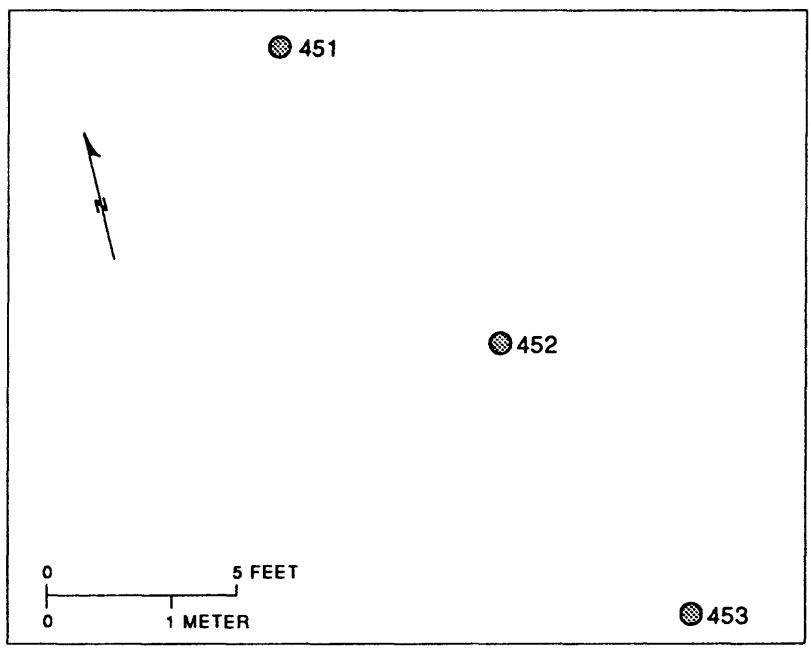
Well 452 has a 3.0-meter length of slotted, 10-centimeter diameter, schedule 40, PVC pipe as the well screen. The screen has 1,824 factory-cut slots 4.44 cm long by 0.51 mm wide for a total open area of 413 cm^2. Sand was back-filled on top of the gravel from approximately 1.5 to 3.5 m above the screen. A layer of bentonite pellets 0.3 m thick was placed in the annulus upon the back-filled sand. A concrete seal extends from the land surface to a depth of 1.8 m.

Well 453 has a 3.0-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 2,320 factory-cut slots 3.4 cm long by 0.64 mm wide for a total open area of 505 cm^2. The hole caved during installation of casing. Sand was back-filled on top of the gravel from approximately 0.3 m below to 0.6 m above the screen. A layer of bentonite pellets 0.5 m thick was placed in the annulus on the back-filled sand. A concrete seal extends from the land surface to a depth of 2.3 m.

Logs: *D*, drillers; *G*, geologist; *P*, particle size.

Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
451	12-21-88	Hollow-stem auger	24.7	24.4	21.5-24.4	Alluvium	3.0	DGP
452	12-17-88	Hollow-stem auger	8.5	8.2	5.2-8.2	Alluvium	1.8	DGP
453	05-08-90	Hollow-stem auger	24.4	6.3	3.3-6.3	Alluvium	2.3	DGP

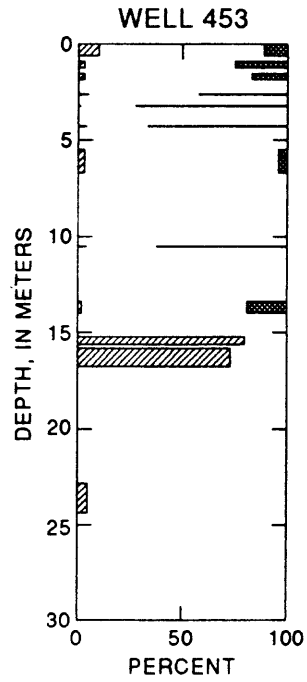
SITE PLAN



GROUND WATER--Continued
WELL GROUP 450--Continued
LOG INFORMATION

Well 453

	Thickness (meters)	Bottom of depth interval (meters)
Summary of geologist log:		
Sand, fine to coarse grained near surface, coarsens with depth; few pebbles, sub-angular to angular near top	0.7	0.7
No sample	.2	.9
Sand, brown, coarse, contains gravel in lower part of interval; clasts mostly sub-rounded, maximum clast size, 30 mm	.2	1.1
Sand, brown, coarse; medium sand and gravel at bottom of interval	.4	1.5
Sand, coarse and gravel; medium to coarse sand at bottom of interval	.2	1.7
No sample	.6	2.3
Sand, medium to coarse with subangular pebbles, maximum clast size 40 mm; some sand clumped with manganese(?)	.3	2.6
No sample	.4	3.0
Sand, medium to coarse with cobbles, maximum clast size 90 mm; some sand clumped with manganese (?)	.2	3.2
No sample	1.1	4.3
Sand, coarse, with pebbles and cobbles; maximum clast size 90 mm	.1	4.4
No sample	1.1	5.5
Sand, fine to coarse with mica grains.	.3	5.8
No sample	2.1	7.9
Sand, medium to coarse	2.5	10.4
Sand and gravel, maximum clast size 40 mm x 50 mm; bottom of interval predominately hard, compacted, friable sand	.3	10.7
Gravel	.6	11.3
No sample	2.1	13.4
Sand, fine to medium, becomes silty with depth; one clast 30 mm x 90 mm; sticky clay with medium to coarse sand at bottom of interval	.6	14.0
No sample	1.2	15.2
Silt, with few coarse sand grains, some clay; dark brown	.4	15.6
No sample	.2	15.8
Same as interval 15.2-15.6	1.0	16.8
No sample	3.9	20.7
Gravel	.3	21.0
No sample	3.1	24.1
No sample, material recovered probably sloughed off from sides of hole	.3	24.4



EXPLANATION

GRAVEL

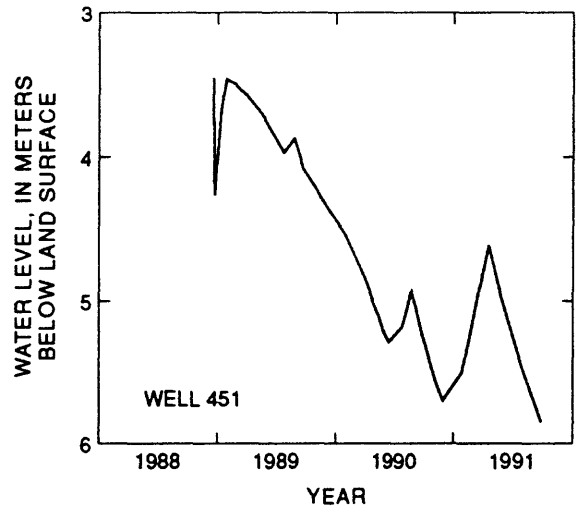
SAND

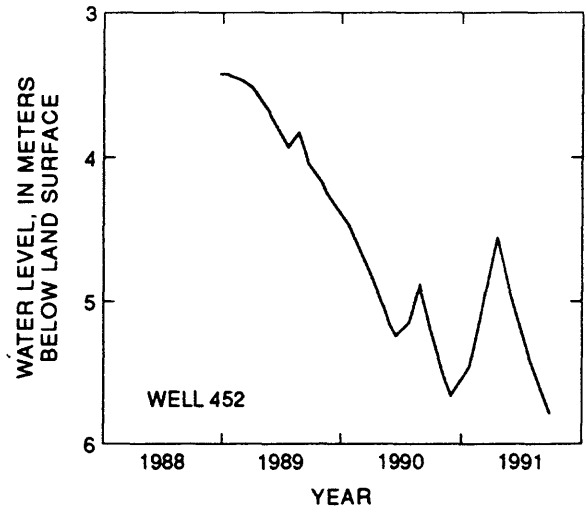
SILT AND CLAY

All intervals for which particle-size data available contain at least 1-percent silt and gravel. Intervals that appear to contain only sand are intervals for which particle-size data are unavailable.

GROUND WATER--Continued
WELL GROUP 450--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE
[NM, not measured]

Date	Well number 451	452	453	Date	Well number 451	452	453	Date	Well number 451	452	453
10-31-89	4.22	4.17		05-22-90	NM	NM	5.11	11-29-90	5.70	5.66	5.63
11-16-89	4.29	4.25		05-23-90	5.18	5.14	NM	01-25-91	5.50	5.46	5.41
01-26-90	4.53	4.48		05-24-90	5.19	5.15	NM	04-19-91	4.61	4.55	4.50
03-27-90	4.83	4.79		06-14-90	5.29	5.24	5.21	05-16-91	4.88	4.83	4.79
05-07-90	5.08	5.03		07-24-90	5.18	5.14	5.10	05-22-91	NM	NM	4.86
05-08-90	5.08	5.03		08-25-90	4.93	4.89	4.84	05-24-91	4.95	4.91	4.86
05-10-90	5.09	5.05	5.01	09-25-90	5.22	5.18	5.14	07-25-91	5.45	5.40	5.36
05-16-90	NM	NM	5.05	11-07-90	5.57	5.53	5.49	09-24-91	5.85	5.79	5.75





FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liter per minute; <, actual value is known to be less than the value shown]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)
451	10-31-89	3,980	4.3	18.0	--	--	0.1	330	4.5	0.9
	05-24-90	3,870	4.3	19.0	--	--	.2	350	4.9	.6
	08-25-90	4,060	4.2	18.5	--	--	.2	340	4.9	2.0
	11-07-90	3,980	4.3	18.0	--	--	<.1	360	5.7	.6
	05-24-91	3,760	4.2	18.0	--	--	.5	---	4.5	.8
452	10-31-89	3,580	5.0	19.5	--	34	.1	440	4.5	.6
	05-24-90	3,470	5.0	19.0	26	--	.2	400	4.9	.6
	08-25-90	2,920	5.0	21.0	18	--	.7	400	4.9	.6
	11-07-90	3,300	5.1	20.0	23	--	.1	390	5.3	.3
	05-22-91	1,800	5.3	13.5	16	--	1.3	---	11	.8
453	08-25-90	1,580	5.2	23.5	29	--	1.2	410	1.5	.6
	11-07-90	3,060	5.3	19.0	26	--	.3	380	2.3	.4
	05-24-91	1,420	5.5	14.0	18	--	.4	---	3.8	.5

GROUND WATER--Continued
WELL GROUP 450--Continued
LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)	Ionic strength (mol/L)
451	10-31-89	10	---	---	---	---	-----	---	----	47	--	-----	-----
	10-31-89	110	610	190	110	---	2,800	120	----	--	90	3.4	0.122
	05-24-90	10	550	160	110	8.5	2,900	89	9.3	41	79	-3.5	.119
	05-24-90	110	570	180	110	---	2,500	130	----	--	82	3.5	.113
	08-25-90	10	---	---	---	---	-----	---	----	56	--	-----	-----
	08-25-90	110	540	160	96	---	2,700	120	11	--	74	-3.6	.114
	11-07-90	110	480	160	110	---	2,600	160	----	--	78	-3.8	.110
	11-07-90	20	---	---	---	---	-----	---	----	63	--	-----	-----
	05-24-91	20	---	---	---	---	-----	---	----	60	--	-----	-----
	05-24-91	110	440	130	82	---	2,400	120	11	--	60	-7.5	.098
452	10-31-89	10	---	---	---	---	-----	---	----	42	--	-----	-----
	10-31-89	110	660	170	100	---	2,400	110	----	--	72	3.1	.104
	05-24-90	10	---	---	---	---	-----	---	----	43	--	-----	-----
	05-24-90	110	680	170	110	---	2,500	100	5.2	--	69	2.0	.108
	08-25-90	10	---	---	---	---	-----	---	----	35	--	-----	-----
	08-25-90	110	590	88	60	---	1,800	48	----	--	64	2.2	.079
	11-07-90	110	500	130	74	---	2,000	100	----	--	65	-3.5	.084
	11-07-90	20	---	---	---	---	-----	---	----	50	--	-----	-----
	05-22-91	10	270	56	42	4.1	1,000	47	4.6	--	50	-2.4	.042
	05-22-91	20	---	---	---	---	-----	---	----	27	--	-----	-----
	05-22-91	110	270	59	37	---	750	49	5.0	--	44	9.7	.037
453	08-25-90	10	---	---	---	---	-----	---	----	30	--	-----	-----
	08-25-90	110	190	52	47	---	720	33	4.6	--	59	.45	.032
	11-07-90	10	530	120	78	8.1	1,900	75	3.4	--	66	.82	.082
	11-07-90	110	460	110	65	---	1,700	90	----	--	62	-2.8	.074
	11-07-90	20	---	---	---	---	-----	--	----	44	--	-----	-----
	05-24-91	20	---	---	---	---	-----	--	----	24	--	-----	-----
	05-24-91	110	230	55	33	---	540	38	4.1	--	45	18	.030

Well	Date	Solids, sum of constituents, dissolved (mg/L)	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)	Lead, dissolved (µg/L as Pb)
451	10-31-89	--	------	--	--	---	----	--	-----	------	-------	----
	10-31-89	--	9,100	--	--	---	<500	20	2,500	21,000	230,000	<100
	05-24-90	--	13,000	18	35	170	100	20	1,200	17,000	230,000	50
	05-24-90	--	8,100	--	--	---	----	--	2,200	17,000	200,000	----
	08-25-90	--	------	--	--	---	----	--	-----	------	-------	----
	08-25-90	--	6,900	--	--	---	----	--	2,200	16,000	230,000	----
	11-07-90	--	7,300	--	--	---	<100	--	1,900	16,000	240,000	----
	11-07-90	--	------	--	--	---	----	--	-----	------	-------	----
	05-24-91	--	------	--	--	---	----	--	-----	------	-------	----
	05-24-91	--	5,400	--	--	---	<100	--	1,800	12,000	200,000	----

GROUND WATER--Continued
WELL GROUP 450--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	Solids, sum of constituents, dissolved (mg/L)	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)	Lead, dissolved (µg/L as Pb)
452	10-31-89	-----	------	--	--	--	----	--	-----	---	---	---
	10-31-89	-----	<5,000	--	--	--	<500	80	1,000	370	400	220
	05-24-90	-----	------	--	--	--	----	--	-----	---	---	---
	05-24-90	-----	<5,000	--	--	--	----	--	1,300	700	600	---
	08-25-90	-----	------	--	--	--	----	--	-----	---	---	---
	08-25-90	-----	<1,000	--	--	--	----	--	710	440	51	---
	11-07-90	-----	<1,000	--	--	--	<100	--	1,100	560	100	---
	11-07-90	-----	------	--	--	--	----	--	-----	---	---	---
	05-22-91	1,520	1,900	32	5	40	10	9	450	230	19	<10
	05-22-91	-----	------	--	--	--	----	--	-----	---	---	---
	05-22-91	-----	<1,000	--	--	--	<100	--	490	200	70	---
453	08-25-90	-----	------	--	--	--	----	--	-----	---	---	---
	08-25-90	-----	<1,000	--	--	--	----	--	190	34	<40	---
	11-07-90	2,880	1,500	41	5	80	25	20	630	70	58	40
	11-07-90	-----	<1,000	--	--	--	<100	--	560	50	<40	---
	11-07-90	-----	------	--	--	--	----	--	-----	---	---	---
	05-24-91	-----	------	--	--	--	----	--	-----	---	---	---
	05-24-91	-----	<1,000	--	--	--	<100	--	<40	<20	<40	---

Well	Date	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Silver, dissolved (µg/L as Ag)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
451	10-31-89	---	-------	----	-----	-----	----	---	-----
	10-31-89	---	100,000	<100	1,400	2,500	----	---	4,800
	05-24-90	310	88,000	<30	1,200	2,200	13	71	3,900
	05-24-90	---	96,000	----	1,000	-----	----	---	4,000
	08-25-90	---	-------	----	-----	-----	----	---	-----
	08-25-90	---	78,000	----	1,200	-----	----	---	4,200
	11-07-90	---	76,000	----	1,200	2,100	----	---	4,000
	11-07-90	---	-------	----	-----	-----	----	---	-----
	05-24-91	---	-------	----	-----	-----	----	---	-----
	05-24-91	---	60,000	----	860	1,800	----	---	3,400
452	10-31-89	---	-------	----	-----	-----	----	---	-----
	10-31-89	---	110,000	<100	1,200	2,400	----	---	4,200
	05-24-90	---	-------	----	-----	-----	----	---	-----
	05-24-90	---	120,000	----	1,000	-----	----	---	3,800
	08-25-90	---	-------	----	-----	-----	----	---	-----
	08-25-90	---	53,000	----	710	-----	----	---	2,500
	11-07-90	---	80,000	----	1,000	1,700	----	---	3,300
	11-07-90	---	-------	----	-----	-----	----	---	-----
	05-22-91	130	35,000	<10	450	970	6.0	<6	1,300
	05-22-91	---	-------	----	-----	-----	----	---	-----
	05-22-91	---	35,000	----	400	970	----	---	1,600
453	08-25-90	---	-------	----	-----	-----	----	---	-----
	08-25-90	---	24,000	----	300	-----	----	---	770
	11-07-90	250	76,000	<30	850	1,900	12	<18	2,000
	11-07-90	---	64,000	----	700	1,600	----	---	2,000
	11-07-90	---	-------	----	-----	-----	----	---	-----
	05-24-91	---	-------	----	-----	-----	----	---	-----
	05-24-91	---	27,000	----	300	980	----	---	1,100

WELL GROUP 500

LOCATION.--Lat 33°31'51", long 110°52'05", in SE¼SE¼NW¼ 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.--896.57 m above National Geodetic Vertical Datum of 1929 (levels by Cyprus Miami Mining Corporation).
REMARKS.--Wells 501, 502, 503, and 504 were originally identified as X5W1, X5W2, X5W3, and X5W4, respectively.

DRILLING AND WELL CONSTRUCTION

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

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 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 aproximately 0.9 to 1.2 m above the screen. A concrete seal extends from the land surface to a depth of 1.5 m.

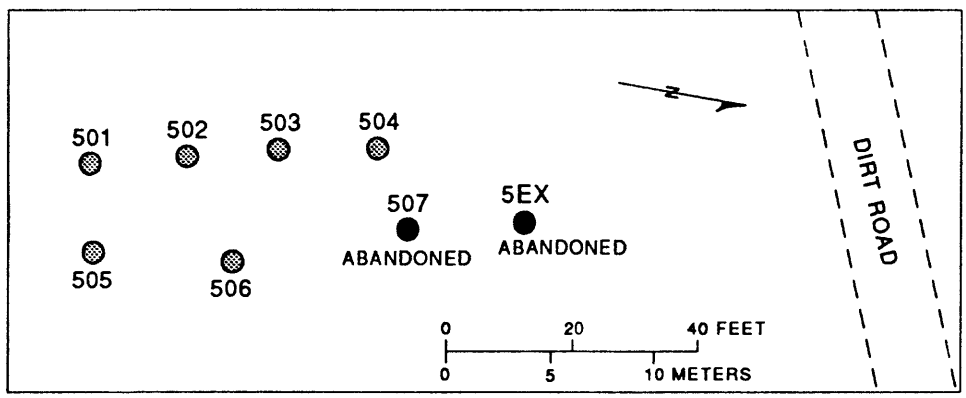
Well 506 was cased with nominal 10-centimeter diameter, schedule 80, PVC pipe. The well has a a single 1.5-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as well screen. The screen in well 506 has 1,056 factory-cut slots 3.4 cm long by 0.64 mm wide for a total open area of 230 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 upon the collapsed material.

Well 507 was drilled for exploration purposes. After lithologic samples and cuttings were collected, the hole was sealed with concrete to its total depth.

Logs: D, drillers; G, geologist; P, particle size.

Well	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	05-22-86	Rotary, bentonite	17.1	17.0	15.4-16.3	Alluvium	15.2	D
502	05-22-86	Rotary, bentonite	38.1	38.0	36.5-37.4	Basin fill	32.6	D
503	05-22-86	Rotary, bentonite	73.2	25.3	23.4-24.1	Alluvium	19.8	D
504	07-24-86	Cable tool	69.5	69.2	67.6-68.6	Basin fill	64.0	D
505	12-17-88	Hollow-stem auger	22.2	21.6	15.5-21.6	Alluvium	1.5	DGP
506	12-15-88	Hollow-stem auger	7.3	6.7	5.2-6.7	Alluvium	1.5	DGP
507	05-10-90	Hollow-stem auger	22.2	----	---------	----------	----	DGP

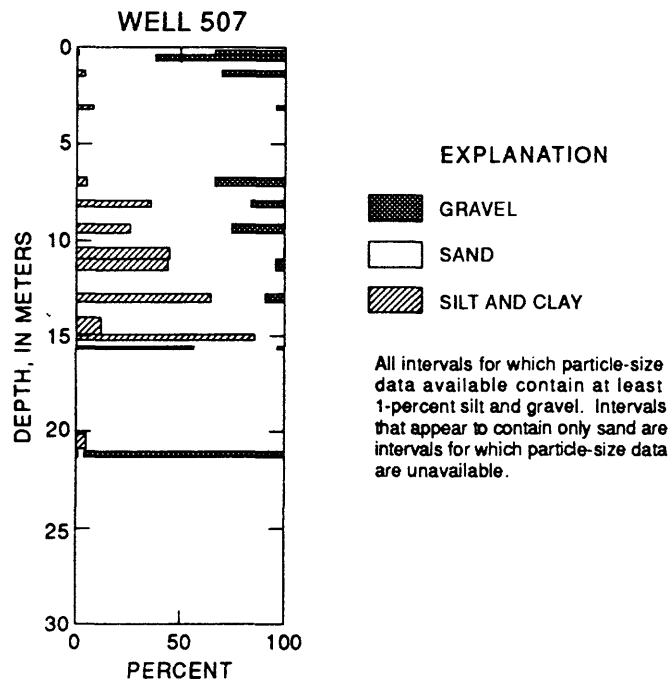
SITE PLAN



GROUND WATER--Continued
WELL GROUP 500--Continued
LOG INFORMATION

Well 507

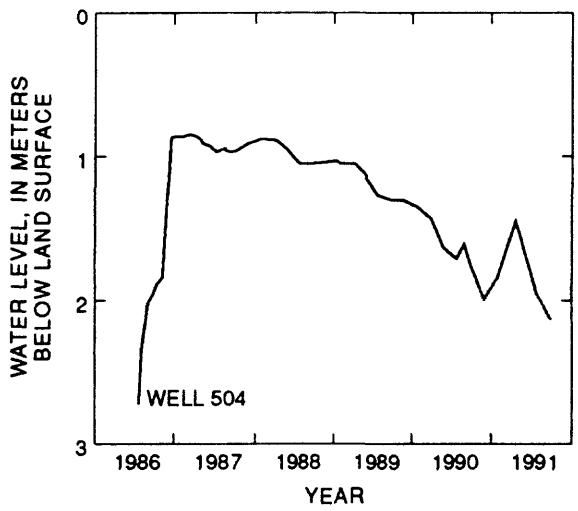
Summary of geologist log:	Thickness (meters)	Bottom of depth interval (meters)
Sand, fine to coarse, and gravel; pebbles 10-20 mm	0.2	0.2
Sand with manganese (?) staining top 8 cm of interval; coarse sand and gravel remaining interval, light brown to dark orange	.2	.4
Sand, medium to coarse, and gravel with manganese (?) staining; light orange to light brown; gravel predominsntly quartz and feldspar, maximum clast size, 10 mm	.8	1.2
Sand, fine to coarse; dark brown with some manganese(?) staining; one clast 80 mm x 80 mm	.3	1.5
No sample	1.5	3.0
Sand, medium to coarse, with few pebbles; uniform dark brown	.2	3.2
No sample	3.5	6.7
Sand, fine to coarse; dark brown; silty at top of interval coarsening with depth and includes gravel at bottom of interval; possibly includes manganese coatings	1.2	7.9
Sand, fine to medium; dark brown	.3	8.2
Sand, fine; some silt and clay; dark brown; sticky; few pebbles	.8	9.0
No sample	.2	9.2
Sand, fine; some silt and clay; brown; sticky; few pebbles; maximum clast size, 50 mm	1.2	10.4
Sand, fine; similar to overlying interval; less silt and clay in interval 11.3-11.4 m	1.2	11.6
Sand, fine, grevelly; clay at bottom of interval	1.2	12.8
Sand, fine, and clay	.1	12.9
Clay, silty	1.1	14.0
Sand, fine, silty	.9	14.9
Clay, gray; sticky; sandy at base of interval; few pebbles throughout interval	.5	15.4
Sand, fine to medium; some silt and clay; few small pebbles	.4	15.8
Sand, coarse, and gravel, light to medium dark brown; some fine sand	.7	16.5
Sand, fine to medium	1.2	17.7
No sample	2.4	20.1
Sand, fine to medium; light to dark brown; well sorted; compacted; some silt; 25 mm band of dark grained, packed sand at 20.6 m	.8	20.9
No sample	.1	21.0
Sand, similar to but coarser than interval 20.1-20.9 m compacted, friable	1.0	22.0
No sample; possibly cobbles or boulders	.2	22.2

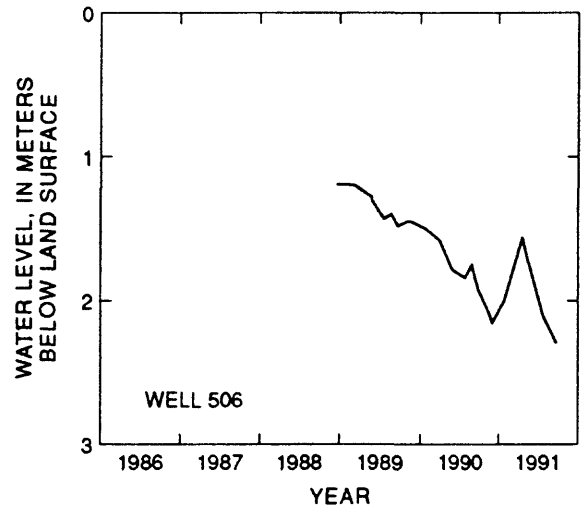


All intervals for which particle-size data are available contain at least 1 percent silt and gravel. Intervals that appear to contain only sand are intervals for which particle-size data are unavailable.

GROUND WATER--Continued
WELL GROUP 500--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE

Date	Well number 501	502	503	504	505	506	Date	Well number 501	502	503	504	505	506
11-01-89	1.46	1.44	1.55	1.30	1.51	1.45	11-08-90	2.08	2.06	2.15	1.93	2.12	2.08
11-16-89	1.46	1.45	1.54	1.30	1.51	1.45	11-29-90	2.14	2.13	2.22	1.99	2.18	2.15
01-26-90	1.50	1.49	1.58	1.35	1.55	1.50	01-25-91	2.00	1.99	2.08	1.85	2.03	2.00
03-27-90	1.58	1.58	1.67	1.43	1.64	1.58	04-19-91	1.56	1.55	1.64	1.45	1.60	1.56
05-23-90	1.81	1.69	2.16	1.63	1.82	1.78	05-16-91	1.71	1.70	1.79	1.58	1.75	1.72
07-24-90	1.85	1.84	1.92	1.71	1.89	1.84	05-22-91	1.74	2.04	1.81	1.62	1.79	1.76
08-24-90	1.74	1.75	1.83	1.61	1.80	1.75	07-25-91	2.09	2.08	2.17	1.94	2.13	2.10
09-25-90	1.91	1.90	2.00	1.76	1.95	1.92	09-24-91	2.28	2.26	2.35	2.13	2.32	2.29





FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liters per minute; m, meters]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
501	11-01-89	3,680	5.7	18.0	---	126	0.1	330	49	0.4	6.4
	08-25-90	3,730	6.1	19.0	117	---	.2	370	4.9	1.7	---
	05-22-91	3,700	5.6	18.5	104	---	.2	426	15	.5	---
502	11-01-89	1,870	7.1	19.0	---	187	3.8	320	53	.8	3.6
	05-23-90	1,960	7.3	19.0	161	---	3.6	310	49	.6	3.2
	05-22-91	2,010	7.2	19.5	189	---	---	306	42	1.0	---
503	11-01-89	3,710	5.5	18.0	---	99	.1	370	57	.3	1.2
	05-23-90	3,570	6.1	18.5	89	---	.1	390	33	.6	.6

GROUND WATER--Continued
Well GROUP 500--Continued
FIELD MEASUREMENTS--Continued

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
504	11-01-89	410	7.3	20.5	---	223	6.4	340	53	0.5	9.7
	11-08-90	426	7.2	20.5	232	---	6.4	280	45	.7	---
505	11-01-89	3,640	5.9	18.0	---	154	.1	360	45	.5	.6
	05-23-90	3,680	6.0	18.5	154	---	.2	390	49	.4	1.7
	11-08-90	3,700	5.9	18.5	159	---	.2	350	35	.6	---
506	11-01-89	3,560	5.9	19 0	---	161	.1	350	4.9	.7	---
	05-23-90	3,570	6.1	18.5	154	---	.1	390	5.3	.5	---
	08-24-90	3,720	6.2	20.0	146	---	.2	390	45	.6	---
	11-08-90	3,610	5.9	19.0	142	---	.2	360	5.3	.3	---

LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 20, USGS research laboratory, Ocala, Florida; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter; pCi/L; picocuries per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the 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)	Carbon, inorganic, total (mg/L as C)	Silica, dissolved (mg/L as SiO_2)	Ionic balance (Percent)	Ionic strength (mol/L)
501	11-01-89	110	750	180	99	---	2,300	110	----	--	72	6.4	0.107
	08-25-90	110	670	150	91	---	2,400	110	0.56	--	63	-3.0	.103
	05-22-91	110	530	120	74	---	2,000	120	----	--	50	-5.8	.084
502	11-01-89	110	360	71	37	---	940	22	----	--	30	4.4	.046
	05-23-90	10	---	---	---	---	-----	-----	----	--	---	----	-----
	05-23-90	110	340	68	41	---	1,100	23	.19	--	31	-2.2	.047
	05-22-91	10	380	68	44	3.0	1,300	24	.80	--	29	-7.5	.054
	05-22-91	110	330	62	33	---	920	130	.16	--	21	-5.9	.045
503	11-01-89	10	660	150	85	4.9	2,400	120	1.2	--	65	-2.8	.103
	11-01-89	110	720	180	98	---	2,400	110	1.2	--	74	3.6	.108
	05-23-90	10	690	150	95	4.5	2,500	97	1.6	--	68	-1.9	.106
	05-23-90	110	760	190	110	---	2,400	120	1.6	--	81	5.8	.112
504	11-01-89	10	---	---	---	---	-----	-----	----	--	---	-----	-----
	11-01-89	110	43	20	18	---	23	9.7	----	--	24	2.3	.007
	11-08-90	110	43	16	20	---	13	8.7	.22	--	28	-.60	.006
505	11-01-89	110	700	180	91	---	2,300	110	.16	--	<64	1.8	.104
	05-23-90	110	650	190	100	---	2,300	110	----	--	68	1.4	.103
	11-08-90	110	600	160	97	---	2,300	120	.21	--	58	-4.7	.099
506	11-01-89	10	650	150	85	4.4	2,300	120	.20	--	53	-3.6	.099
	11-01-89	110	630	180	91	---	2,200	110	----	--	61	.89	.098
	05-23-90	10	670	150	95	4.4	2,300	120	.30	--	56	-2.0	.100
	05-23-90	110	670	170	95	---	2,200	110	----	--	56	1.9	.099
	08-24-90	10	---	---	---	---	-----	-----	----	80	---	-----	-----
	08-24-90	110	690	150	95	---	2,300	120	.20	--	57	-.56	.102
	11-08-90	110	640	160	97	---	2,100	120	----	--	51	.59	.096

GROUND WATER--Continued
WELL GROUP 500--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	Solids, sum of constituents, dissolved (mg/L)	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)	Lead, dissolved (µg/L as Pb)	Lithium dissolved (mg/L as Li)
501	11-01-89	-----	<5,000	--	----	--	<500	140	<200	<100	<200	170	---
	08-25-90	-----	<1,000	--	----	--	------	---	<40	<20	<40	----	---
	05-22-91	-----	<1,000	--	----	--	<100	---	<40	<20	<40	----	---
502	11-01-89	-----	<1,000	--	----	--	<100	<10	<40	<20	<40	180	---
	05-23-90	-----	------	--	----	--	------	---	----	----	----	----	---
	05-23-90	-----	<5,000	--	----	--	------	---	<200	<100	<200	----	---
	05-22-91	1,940	<10	34	<0.5	30	<1.0	<5	<3	<10	6	<10	23
	05-22-91	-----	<1,000	--	----	--	<100	---	<40	<20	<40	----	---
503	11-01-89	3,620	130	29	2	80	9.0	<20	40	<30	<3	40	230
	11-01-89	-----	<5,000	--	----	--	<500	130	<200	<100	<200	200	---
	05-23-90	3,740	230	31	2	80	13	20	70	<30	20	<30	240
	05-23-90	-----	<5,000	--	----	--	------	---	<200	<100	<20	----	---
504	11-01-89	-----	------	--	----	--	------	---	----	----	----	----	---
	11-01-89	-----	<500	--	----	--	<50	<6	<20	<10	<20	<50	---
	11-08-90	-----	<500	--	----	--	<50	--	<20	<10	23	----	---
	11-01-89	-----	<5,000	--	----	--	<500	60	<200	<100	<200	200	---
	05-23-90	-----	<5,000	--	----	--	--	--	<200	<100	<200	----	---
	11-08-90	-----	<1,000	--	----	--	<100	--	<40	40	<40	----	---
506	11-01-89	3,490	30	24	<2	70	4.0	<20	10	<30	19	<30	160
	11-01-89	-----	<1,000	--	----	--	<100	<10	<40	<20	<40	<100	---
	05-23-90	3,520	20	24	<2	80	<3.0	<20	10	<30	<9	<30	180
	05-23-90	-----	<5,000	--	----	--	------	---	<200	<100	<200	----	---
	08-24-90	-----	------	--	----	--	------	---	----	----	----	----	---
	08-24-90	-----	<1,000	--	----	--	------	---	<40	<20	<40	----	---
	11-08-90	-----	<1,000	--	----	--	<100	---	<40	<20	<40	----	---

Well	Date	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)	Tritium, total (pCi/L)	H-2/H-1 stable-isotope ratio (per mil)	O-18/O-16 stable-isotope ratio (per mil)
501	11-01-89	76,000	<100	<500	2,700	---	<150	--	-----	------
	08-25-90	68,000	----	550	-----	---	40	--	-----	------
	05-22-91	57,000	----	400	1,900	---	60	--	-----	------
502	11-01-89	130	<100	90	1,500	---	<30	--	-----	------
	05-23-90	-------	----	----	-----	---	----	10	-----	------
	05-23-90	<300	----	<500	-----	---	<150	--	-----	------
	05-22-91	7	<10	<10	1,700	<6	7	--	-----	------
	05-22-91	<60	----	<100	3,000	---	<30	--	-----	------
503	11-01-89	78,000	<30	630	2,300	<18	65	--	-----	------
	11-01-89	88,000	<100	810	2,600	---	<150	--	-----	------
	05-23-90	85,000	<30	690	2,400	<18	99	--	-----	------
	05-23-90	110,000	----	900	-----	---	200	--	-----	------
504	11-01-89	-------	----	----	-----	---	----	--	-74.0	-10.05
	11-01-89	210	<50	<50	280	---	25	--	-----	------
	11-08-90	<30	----	<50	320	---	<15	--	-----	------
505	11-01-89	58,000	<100	<500	2,600	---	<150	--	-----	------
	05-23-90	67,000	----	<500	-----	---	<150	--	-----	------
	11-08-90	49,000	--	200	2,200	---	40	--	-----	------
506	11-01-89	42,000	<30	120	2,300	<18	61	--	-63.0	-8.30
	11-01-89	46,000	<100	84	2,500	---	29	--	-----	------
	05-23-90	46,000	<30	160	2,400	<18	16	--	-----	------
	05-23-90	50,000	----	<500	-----	---	<150	--	-----	------
	08-24-90	-------	----	----	-----	---	----	--	-----	------
	08-24-90	45,000	----	190	-----	---	<30	--	-----	------
	11-08-90	38,000	----	<100	1,900	---	<30	--	-----	------

GROUND WATER--Continued
WELL GROUP 700

LOCATION.--Lat 33°34'03", long 110°53'45", in SE¼SE¼SE¼ sec.26, T. 3 N., R. 14 E. (A-03-14)26ddd1, 52 m east of Pinal Creek, and 21 km northwest of Globe.
Landowner: Cyprus Miami Mining Corporation.
LAND SURFACE DATUM.--845.8 m above National Geodetic Vertical Datum of 1929, from topographic map.

DRILLING AND WELL CONSTRUCTION

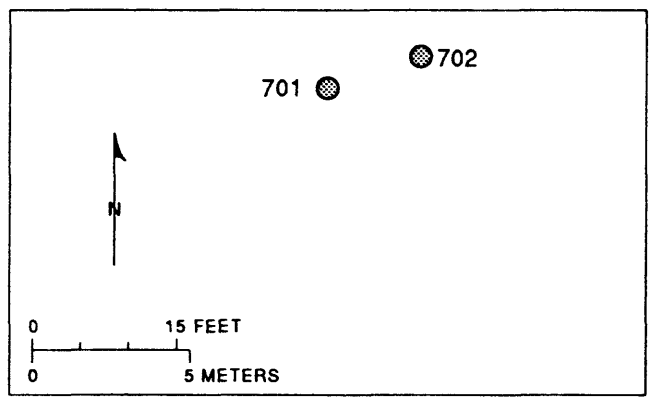
Well 701 was cased with nominal 10-centimeter diameter, schedule 40, PVC pipe. The well has a 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, PVC pipe as the well screen. The screen has 1,470 factory-cut slots 3.6 cm long by 0.64 mm wide for a total open area of 339 cm^2. The hole caved 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 the depth listed.

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 the depth listed.

Logs: D, drillers; G, geologist; P, particle size.

Well	Date completed	Drilling method	Hole depth (meters)	Well depth (meters)	Screened interval (meters)	Geologic unit	Bottom of seal (meters)	Logs available
701	05-11-90	Hollow-stem auger	8.5	4.7	3.8-4.7	Alluvium	1.1	D
702	05-11-90	Hollow-stem auger	8.1	7.3	6.4-7.3	Alluvium	1.1	DGP

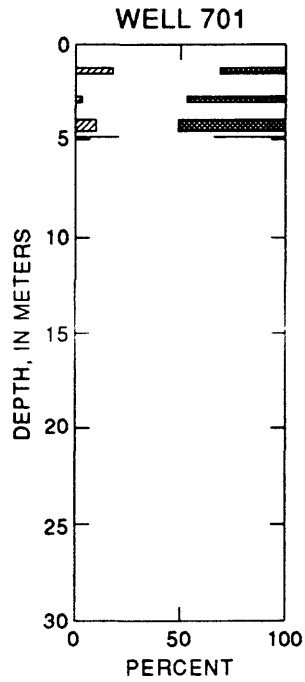
SITE PLAN

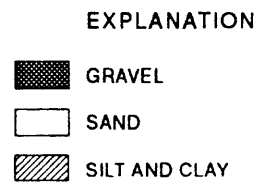


GROUND WATER--Continued
WELL GROUP 700
LOG INFORMATION

Well 701

Summary of geologist log:	Thickness (meters)	Bottom of depth interval (meters)
Sand, fine to coarse; approximately 10-percent coarse; light brown; few cobbles just below surface.....	1.2	1.2
Sand, fine to coarse; some silt.....	.2	1.4
Sand, fine to coarse; clayey; grades to coarse sand and gravel with mica grains at bottom of interval; sand is partially cemented.....	.1	1.5
No sample.....	1.2	2.7
Sand, coarse; gray to dark brown, and gravel; pink to dark red and orange; maximum clast size, 125 mm....	.3	3.0
No sample.....	1.0	4.0
Sand, gray; loose, and gravel; clayey below 4.1 m; several cobbles 80 mm....	.6	4.6
No sample.....	4.1	8.7

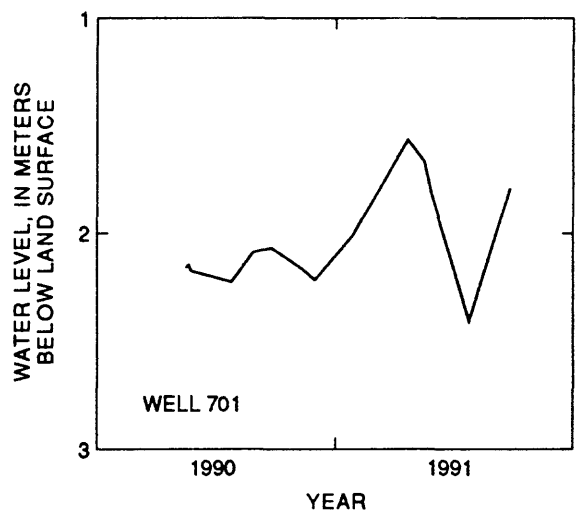


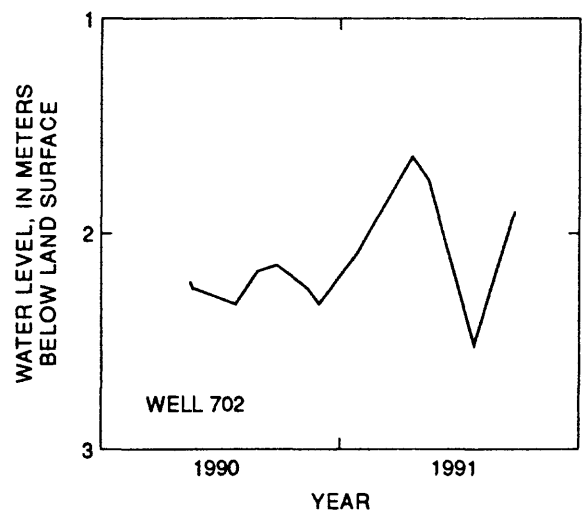


All intervals for which particle-size data available contain at least 1-percent silt and gravel. Intervals that appear to contain only sand are intervals for which particle-size data are unavailable.

WATER LEVEL, IN METERS BELOW LAND SURFACE

Date	Well number 701	Well number 702	Date	Well number 701	Well number 702
05-16-90	2.16	2.23	11-29-90	2.22	2.33
05-17-90	2.15	2.26	01-25-91	2.01	2.10
05-23-90	2.18	2.26	04-19-91	1.56	1.64
07-25-90	2.23	2.33	05-16-91	1.66	1.75
08-24-90	2.09	2.18	05-24-91	1.81	1.87
09-25-90	2.07	2.15	07-25-91	2.41	2.52
11-08-90	2.17	2.26	09-24-91	1.79	1.90





GROUND WATER--Continued
WELL GROUP 700--Continued
FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liters per minute; m, meters]

Well	Date	Specific conductance (µS/cm)	pH (Standard units)	Temperature water (°C)	Bicarbonate water dis it field (mg/L as HCO_3)	Bicarbonate water wh it field (mg/L as HCO_3)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)	Drawdown (m)
701	05-23-90	3,230	7.1	19.0	246	--	0.3	210	5.3	0.5	0.4
	08-24-90	3,370	7.1	21.5	234	--	.3	110	4.9	.6	.3
	11-08-90	3,370	6.5	20.0	210	--	.2	150	5.3	.3	---
	05-24-91	3,350	6.8	18.0	205	--	.2	---	3.4	.7	---
702	05-23-90	2,940	7.0	20.0	215	--	.1	90	3.8	.6	2.3
	08-24-90	3,160	7.3	21.0	235	--	---	94	2.3	.4	1.7
	11-08-90	3,200	6.9	19.5	239	--	.2	94	2.6	.3	2.1
	05-24-91	3,200	6.9	19.5	234	--	.3	---	3.4	.4	---

LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; <, actual value is known to be less than the value shown; mg/L, milligrams per liter; µg/L, micrograms per liter; mol/L, moles per liter]

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)	Ionic balance (Percent)	Ionic strength (mol/L)
701	05-23-90	10	640	130	89	4.8	1,900	100	0.40	39	0.27	0.088
	05-23-90	110	590	140	85	---	1,800	110	.25	37	-.97	.084
	08-24-90	110	620	120	80	---	2,000	97	----	39	-4.5	.088
	11-08-90	10	640	140	97	5.0	2,000	97	.20	42	.02	.090
	11-08-90	110	540	130	80	---	1,900	120	----	38	-5.6	.081
	05-24-91	110	720	150	89	---	1,700	110	.26	19	11	.089
702	05-23-90	10	610	110	74	6.2	1,700	87	.20	29	1.9	.080
	05-23-90	110	550	120	70	---	1,700	83	.25	28	-1.8	.079
	08-24-90	110	640	110	67	---	1,800	77	--	29	.71	.083
	11-08-90	10	630	120	80	6.1	2,100	83	.20	32	-5.2	.090
	11-08-90	110	590	120	74	---	1,700	90	----	32	1.3	.080
	05-24-91	110	660	120	82	---	1,700	91	.23	29	6.1	.084

GROUND WATER--Continued
WELL GROUP 700--Continued
LABORATORY MEASUREMENTS--Continued

Well	Date	Solids, sum of constituents, dissolved (mg/L)	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)	Lead, dissolved (µg/L as Pb)
701	05-23-90	3,030	10	35	<2	70	<3.0	<20	<9	<30	340	<30
	05-23-90	-----	<5,000	--	--	--	------	---	<200	<100	<200	---
	08-24-90	-----	<1,000	--	--	--	------	---	<40	<20	<40	---
	11-08-90	3,130	<10	33	<2	70	<3.0	<20	<9	<30	340	<30
	11-08-90	-----	<1,000	--	--	--	<100	---	<40	<20	280	---
	05-24-91	-----	<1,000	--	--	--	<100	---	<40	<20	280	---
702	05-23-90	2,730	10	52	<2	70	3.0	<20	<9	<30	1,200	<30
	05-23-90	-----	<5,000	--	--	--	------	---	<200	<100	1,100	---
	08-24-90	-----	<1,000	--	--	--	------	---	<40	<20	1,800	---
	11-08-90	3,180	<10	33	<2	70	<3.0	<20	<9	<30	1,500	30
	11-08-90	-----	<1,000	--	--	--	<100	---	<40	<20	1,400	---
	05-24-91	-----	<1,000	--	--	--	<100	---	<40	<20	720	---

Well	Date	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Vanadium, dissolved (µg/L as V)	Zinc, dissolved (µg/L as Zn)
701	05-23-90	97	670	<30	<30	2,200	<18	23
	05-23-90	---	600	---	<500	-----	---	<150
	08-24-90	---	320	---	<100	-----	---	<30
	11-08-90	110	350	<30	<30	2,300	<18	<9
	11-08-90	---	280	---	<100	2,000	---	<30
	05-24-91	---	400	---	<100	2,800	---	<30
702	05-23-90	65	2,800	<30	<30	2,400	<18	17
	05-23-90	---	2,900	---	<500	-----	---	<150
	08-24-90	---	2,000	---	<100	-----	---	<30
	11-08-90	73	2,100	<30	<30	2,500	<18	<9
	11-08-90	---	1,900	---	<100	2,400	---	<30
	05-24-91	---	1,800	---	300	3,000	---	60

SURFACE WATER
09498380 PINAL CREEK AT SETKA RANCH NEAR GLOBE, ARIZONA

LOCATION.--Lat 33°32'23", long 110°52'26", in SE¼SW¼SW¼ 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 AND LABORATORY DATA

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter; °C, degrees Celsius; mm, millimeters; mg/L, milligrams per liter; µg/L, micrograms per liter; <, actual value is known to be less than the value shown]

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 wat dis tot it field (mg/L as $CaCO_3$)	Bicarbonate water dis it field (mg/L as HCO_3)
11-15-89	0950	3.6	3,740	6.7	19.0	18.0	694	---	--	74	90
01-25-90	0950	3.4	3,710	6.5	2.5	17.0	696	6.6	76	70	85
03-28-90	0925	3.3	3,740	6.5	14.0	17.5	685	5.9	70	69	84
05-25-90	0905	3.1	3,560	6.5	23.5	19.0	684	8.0	97	67	82
07-25-90	0750	2.7	3,750	6.7	24.0	19.0	685	6.1	75	84	102
09-27-90	0945	3.0	3,630	6.6	22.0	22.5	685	5.6	73	63	77
11-28-90	0955	2.3	3,670	6.5	4.0	17.0	694	6.7	77	56	68
01-24-91	1025	3.6	3,690	6.6	4.5	17.5	691	6.0	70	57	69
03-20-91	0955	4.6	3,620	6.4	10.5	18.0	682	5.5	66	69	84
05-15-91	1000	4.3	3,530	6.3	22.5	20.0	683	6.2	77	57	70
07-24-91	1035	3.1	3,490	6.3	33.0	22.0	686	7.0	90	51	62
09-25-91	1000	1.4	3,370	6.3	26.0	21.0	689	6.5	82	46	56

Date	Carbonate water dis it field (mg/L as CO_3)	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)	Silica, dissolved (mg/L as SiO_2)	Solids, residue at 180 °C dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Barium, dissolved (mg/L)
11-15-89	0	640	150	94	5.1	2,400	120	67	3,850	3,610	25
01-25-90	0	660	150	95	5.0	2,500	110	67	3,840	3,720	27
03-28-90	0	690	160	100	5.1	2,300	120	70	3,920	3,580	27
05-25-90	0	670	140	94	4.9	2,200	130	66	3,800	3,440	24
07-25-90	0	630	140	95	6.0	2,400	110	66	3,770	3,580	93
09-27-90	0	640	150	100	6.0	2,300	110	70	3,710	3,510	35
11-28-90	0	640	140	100	5.5	2,500	84	71	3,750	3,670	28
09-24-91	0	610	140	97	4.9	2,000	100	70	3,760	3,150	29
03-20-91	0	640	140	1,100	5.3	3,400	150	72	3,660	5,640	28
05-15-91	0	620	140	100	5.2	2,100	96	74	3,520	3,260	28
07-24-91	0	590	140	100	5.1	2,400	120	70	3,500	3,550	27
09-25-91	0	570	130	89	5.3	2,200	82	69	3,500	3,260	26

SURFACE WATER--Continued
09498380 PINAL CREEK AT SETKA RANCH NEAR GLOBE, ARIZONA--Continued
FIELD AND LABORATORY DATA--Continued

Date	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Cobalt, dissolved (µg/L as Co)	Copper, dissolved (µg/L as Cu)	Copper, total recoverable (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Iron, total recoverable (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)
11-15-89	4.0	20	20	16	17	86	170	<1	<1	82,000
01-25-90	<3.0	<20	30	10	14	85	180	<1	<1	84,000
03-28-90	6.0	20	30	14	17	87	290	<1	<1	91,000
05-25-90	4.0	<20	30	9	13	95	520	<1	<1	87,000
07-25-90	6.0	20	40	42	110	<3	3,100	<1	2	81,000
09-27-90	4.0	20	40	49	76	87	810	<1	1	92,000
11-28-90	8.0	20	60	15	33	79	120	<1	<1	94,000
09-24-91	8.0	20	60	9	64	90	780	<1	2	89,000
03-20-91	6.0	20	40	60	60	95	230	<1	<1	85,000
05-15-91	6.0	20	50	48	50	56	100	<1	<1	[1]90,000
07-24-91	6.0	20	50	25	36	47	-----	<1	<1	[1]87,000
09-25-91	8.0	20	70	35	41	89	160	<1	<1	84,000

Date	Manganese, total recoverable (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Nickel, total recoverable (µg/L as Ni)	Silver, dissolved (µg/L as Ag)	Strontium, dissolved (µg/L as Sr)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)	Vanadium, dissolved (µg/L as V)	Lithium, dissolved (µg/L as Li)	Molybdenum, dissolved (µg/L as Mo)
11-15-89	82,000	590	600	18	2,400	43	40	<18	240	<30
01-25-90	120,000	640	670	9.0	2,400	30	40	<18	250	<30
03-28-90	94,000	690	700	19	2,400	[1]55	40	<18	250	<30
05-25-90	90,000	650	800	11	2,300	33	40	<18	250	<30
07-25-90	91,000	670	800	11	2,300	59	80	<6	270	10
09-27-90	91,000	800	840	16	2,300	44	50	<18	280	<30
11-28-90	99,000	810	860	13	2,300	49	50	<18	300	<30
09-24-91	100,000	[1]820	800	12	2,300	[1]71	50	<18	290	<30
03-20-91	94,000	770	900	12	2,200	49	50	<18	250	<30
05-15-91	88,000	[1]840	820	15	2,200	[1]56	40	<18	260	<30
07-24-91	81,000	830	---	18	2,100	[1]32	30	<18	280	<30
09-25-91	84,000	830	900	12	2,000	[1]46	40	<18	290	<30

[1]Dissolved concentrations appear greater than total recoverable values because of differences in analytical precision or rounding of values.

SURFACE WATER--Continued

09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, ARIZONA

LOCATION.--Lat 33°34'23", long 110°54'02", in NE¼NW¼SE¼ sec.26, T.3 N., R.14 E., in Tonto National Forest, on right bank 6 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.

REMARKS.--Inspiration Dam is a concrete-gravity dam approximately 3 m tall and 22 m long. It was built in 1912 as a diversion dam, but may never have been used for that purpose. The dam was abandonded in 1929, and since at least 1979 has been filled to the crest with sediment.

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, located 7 ft below the stilling well. The "V" notch is located 7 ft from the right bank.

AVERAGE DISCHARGE.--11 years (water years 1981-91), 0.31 m^3/s, 10,000,000 m^3/yr.

REMARKS.--Records fair.

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
1990	0.20	0.17	0.22	0.22	0.17	0.17	0.21	0.16	0.15	0.39	0.80	0.26	0.26
1991	.19	.23	.53	.33	.18	1.1	.32	.31	.22	.17	.15	.15	.33

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
1990	525	447	586	579	405	463	544	438	387	1,042	2,159	670	8,241
1991	516	597	1,419	893	448	3,047	836	838	575	449	391	398	10,412

FIELD AND LABORATORY DATA

PERIOD OF RECORD.--November 1989 to current year.

[ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; NTU, nephelometric turbidity units; mm, millimeters; cols./100 mL, colonies per 100 millimeters; µg/L, micrograms per liter; t/d, tons per day; E, estimated; <, actual value is known to be less than the value shown; K, Based on nonideal colony count]

Date	Time	Discharge, instantaneous (ft^3/s)	Specific conductance (µS/cm)	pH (Standard units)	Temperature air (°C)	Temperature water (°C)	Alkalinity wat dis tot it field (mg/L as $CaCO_3$)	Bicarbonate water dis it field (mg/L as HCO_3)	Carbonate water dis it field (mg/L as CO_3)	Turbidity (NTU)	Barometric pressure (mm of mercury)	Oxygen, dissolved (mg/L)
11-15-89	1405	5.8	3,500	7.9	21.5	18.5	127	155	0	0.50	695	---
01-25-90	1445	6.3	3,470	7.8	17.0	17.0	106	129	0	.40	696	9.0
03-28-90	1430	6.3	3,400	7.7	22.0	22.0	72	88	0	1.0	687	8.6
05-25-90	1340	5.3	3,320	7.7	32.5	28.0	82	100	0	.60	687	7.6
07-25-90	1250	E4.9	3,550	7.9	32.0	32.0	138	168	0	71	689	6.8
09-27-90	1430	5.6	3,450	7.8	31.5	30.5	114	139	0	30	685	6.1
11-28-90	1500	7.0	3,470	7.9	14.0	17.5	113	138	0	11	695	8.4
09-24-91	1610	.53	3,500	7.8	11.0	14.0	153	187	0	1.5	691	8.5
03-20-91	1445	9.0	3,400	7.9	17.0	21.0	119	145	0	18	683	7.2
05-15-91	1615	9.5	3,380	7.7	27.0	24.0	110	134	0	1.6	685	7.0
07-24-91	1630	4.9	3,400	7.9	37.0	30.0	97	118	0	1.5	686	6.5
09-25-91	1725	4.6	3,320	7.8	25.0	25.0	101	123	0	2.1	689	7.1

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, ARIZONA--Continued
FIELD AND LABORATORY DATA--Continued

Date	Oxygen, dissolved (percent saturation)	Coliform, fecal um-mf (cols./100 mL)	Streptococci, fecal kf agar (cols./100 mL)	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)	Solids, residue at 180 °C dissolved (mg/L)
11-15-89	---	K4	34	640	130	84	4.6	2,200	110	0.30	3,500
01-25-90	103	K4	K9	630	140	77	4.3	2,100	91	.30	3,460
03-28-90	111	K17	K9	620	140	86	4.8	2,300	76	<.10	3,490
05-25-90	110	130	49	610	140	85	5.1	2,200	110	.40	3,500
07-25-90	105	270	440	660	140	87	8.0	2,100	90	.10	3,460
09-27-90	92	80	220	600	150	92	6.2	2,100	100	.20	3,550
11-28-90	98	44	130	600	150	86	4.8	2,300	100	.40	3,480
09-24-91	92	K1	K16	590	130	92	5.1	2,100	110	.70	3,230
03-20-91	91	K9	61	480	150	93	5.5	2,200	130	.50	3,490
05-15-91	94	K9	34	620	150	92	5.6	2,000	100	.60	3,360
07-24-91	97	K2	100	600	140	96	5.3	2,300	120	.80	3,400
09-25-91	96	73	230	600	140	93	5.2	2,200	94	.80	3,360

Date	Solids, sum of constituents, dissolved (mg/L)	Residue total at 105 °C, suspended (mg/L)	Nitrogen, NO2+NO3 total (mg/L as N)	Nitrogen ammonia, total (mg/L as N)	Nitrogen ammonia, plus organic total (mg/L as N)	Phosphorus total (mg/L as P)	Antimony, total (µg/L as Sb)	Arsenic, total (µg/L as As)	Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Beryllium, total recoverable (µg/L as Be)
11-15-89	3,280	61	<0.100	0.160	<0.20	0.030	<1	<1	<1	<100	10
01-25-90	3,130	14	<.100	.050	.30	.040	--	<1	<1	<100	---
03-28-90	3,280	6	<.100	.040	.40	.020	<1	<1	<1	<100	<10
05-25-90	3,230	2	<.100	.030	<.20	.030	--	<1	<1	<100	---
07-25-90	3,210	164	<.100	.180	<.20	.150	1	2	1	200	<10
09-27-90	3,170	182	<.100	.090	.40	.030	--	3	<1	<100	---
11-28-90	3,370	26	<.100	.120	.20	.050	<1	2	<1	<100	<10
09-24-91	3,130	7	<.100	.060	<.20	.030	--	1	<1	<100	---
03-20-91	3,170	41	.094	.090	.30	.090	--	2	<1	<100	---
05-15-91	3,070	33	.086	.060	<.20	.100	--	1	<1	<100	---
07-24-91	3,370	7	<.050	.310	.30	.050	--	1	<1	<100	---
09-25-91	3,230	32	<.050	.110	<.20	.080	--	1	<1	100	---

Date	Boron, dissolved (µg/L as B)	Cadmium, total recoverable (µg/L as Cd)	Cadmium, dissolved (µg/L as Cd)	Chromium, total recoverable (µg/L as Cr)	Chromium, dissolved (µg/L as Cr)	Copper, total recoverable (µg/L as Cu)	Copper, dissolved (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)	Iron, dissolved (µg/L as Fe)	Lead, total recoverable (µg/L as Pb)	Lead, dissolved (µg/L as Pb)
11-15-89	70	2	2.0	--	3	8	5	80	30	<1	<1
01-25-90	70	2	2.0	4	3	7	4	60	40	1	<1
03-28-90	70	1	1.0	4	4	6	3	90	40	<1	<1
05-25-90	70	2	<1.0	3	2	7	4	140	30	<1	<1
07-25-90	70	2	2.0	8	1	190	10	6,400	20	5	<1
09-27-90	70	2	2.0	6	2	200	8	6,500	30	6	<1
11-28-90	90	3	3.0	3	1	65	4	1,500	40	1	<1
09-24-91	60	2	2.0	1	1	40	9	1,100	<10	2	<1
03-20-91	70	3	4.0	5	3	12	7	4,100	<10	2	<1
05-15-91	70	4	4.0	1	<1	50	7	1,400	<10	<1	<1
07-24-91	80	4	4.0	3	2	19	6	-----	20	<1	<1
09-25-91	80	3	3.0	6	2	41	4	1,300	<10	<1	<1

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, ARIZONA--Continued
FIELD AND LABORATORY DATA--Continued

Date	Lithium, dissolved (µg/L as Li)	Manganese, total recoverable (µg/L as Mn)	Manganese, dissolved (µg/L as Mn)	Mercury total recoverable (µg/L as Hg)	Selenium, total (µg/L as Se)	Selenium, dissolved (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Zinc, total recoverable (µg/L as Zn)	Zinc, dissolved (µg/L as Zn)	Sediment, suspended (mg/L)	Sediment discharge, suspended (T/D)
11-15-89	130	39,000	37,000	<0.10	<1	<1	<1.0	20	[1]30	4	0.06
01-25-90	140	32,000	27,000	<0.10	<1	<1	<1.0	20	20	4	.07
03-28-90	140	14,000	13,000	0.10	<1	<1	<1.0	20	20	6	.10
05-25-90	140	24,000	[1]26,000	<0.10	<1	<1	<1.0	20	20	625	8.9
07-25-90	150	44,000	40,000	<0.10	<1	<1	<1.0	50	10	705	----
09-27-90	160	48,000	48,000	<0.10	<1	<1	<1.0	50	<10	294	4.4
11-28-90	170	58,000	56,000	<0.10	<1	<1	<1.0	30	20	55	1.0
09-24-91	100	10,000	10,000	<0.10	<1	<1	<1.0	20	10	31	.04
03-20-91	160	40,000	36,000	<0.10	<1	<1	<1.0	40	30	300	7.3
05-15-91	160	41,000	39,000	<0.10	<1	<1	<1.0	20	20	78	2.0
07-24-91	190	49,000	46,000	<0.10	<1	<1	<1.0	<10	[1]20	6	.07
09-25-91	190	40,000	40,000	<0.10	<1	<1	<1.0	20	<10	58	.72

[1]Dissolved concentrations appear greater than total recoverable values because of differences in analytical precision or rounding of values.

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990
SURFACE WATER
FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; ft^3/s, cubic feet per second]

	Site name	Date	Specific conductance (µS/cm)	Temperature water (°C)	pH (Standard units)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Discharge, instantaneous (ft^3/s)
	S01	03-06-90	3,670	17.5	6.0	4.9	400	1.8
(09498380)	S02	03-06-90	3,660	18.0	6.1	5.9	380	3.4
	S03	03-06-90	3,680	18.5	6.8	8.2	350	3.7
	S04	03-06-90	3,600	16.0	6.6	6.6	370	5.6
	S05	03-07-90	3,530	19.0	6.7	7.8	380	6.8
	S06	03-07-90	3,460	21.0	6.7	7.5	330	7.2
	S07	03-07-90	3,450	19.0	7.0	7.4	360	7.2
	S08	03-08-90	3,450	12.0	6.9	8.5	440	4.7
	S09	03-08-90	3,450	19.5	7.3	9.1	350	5.0
	S10	03-08-90	3,430	19.0	7.2	8.3	340	5.9
(09498400)	S11	03-08-90	3,390	17.5	7.3	7.4	280	5.8

LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 130, USGS research laboratory (Linda Faires), Lakewood, Colorado; mg/L, milligrams per liter; µg/L, micrograms per liter; pCi/L, picocuries per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the value shown]

Site name	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Carbon, inorganic, dissolved (mg/L as C)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Cadmium, dissolved (µg/L as Cd)	Cobalt, dissolved (µg/L as Co)
S01	03-06-90	10	---	---	---	-----	--	--	29	---	--	---	----
	03-06-90	110	620	160	86	2,300	94	63	--	---	--	---	<200
	03-06-90	130	---	---	---	-----	--	--	--	130	24	8.0	30
S02	03-06-90	10	---	---	---	-----	--	--	28	---	--	---	----
	03-06-90	10	---	---	---	-----	--	--	--	---	--	---	----
	03-06-90	10	---	---	---	-----	--	--	--	---	--	---	----
	03-06-90	110	610	170	88	2,200	94	64	--	---	--	---	----
	03-06-90	130	---	---	---	-----	--	--	--	80	21	5.0	20
	03-06-90	10	---	---	---	-----	--	--	31	---	--	---	----
	03-06-90	110	590	160	86	2,200	94	61	--	---	--	---	----
S03	03-06-90	10	---	---	---	-----	--	--	16	---	--	---	----
	03-06-90	110	710	180	100	2,300	90	73	--	---	--	---	----
	03-06-90	130	---	---	---	-----	--	--	--	40	22	6.0	20
S04	03-06-90	10	---	---	---	-----	--	--	26	---	--	---	----
	03-06-90	110	550	150	80	2,200	90	55	--	---	--	---	----
	03-06-90	130	---	---	---	-----	--	--	--	3	27	3.0	10
	03-07-90	10	---	---	---	-----	--	--	28	---	--	---	----
	03-07-90	110	590	150	84	2,100	90	59	--	---	--	---	----

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990--Continued
SURFACE WATER--Continued
LABORATORY MEASUREMENTS--Continued

Site name	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Silica, dissolved (mg/L as SiO_2)	Carbon inorganic, dissolved (mg/L as C)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Cadmium, dissolved (µg/L as Cd)	Cobalt, dissolved (µg/L as Co)
S05	03-07-90	10	---	---	--	-----	--	--	23	--	--	---	--
	03-07-90	110	620	150	87	2,200	90	58	--	--	--	---	--
	03-07-90	130	---	---	--	-----	--	--	--	20	19	4.0	10
S06	03-07-90	10	---	---	--	-----	--	--	22	--	--	---	--
	03-07-90	110	650	160	89	2,100	81	58	--	--	--	---	--
	03-07-90	130	---	---	--	-----	--	--	--	--	18	3.0	8
S07	03-06-90	10	---	---	--	-----	--	--	21	--	--	---	--
	03-06-90	110	650	160	88	2,100	90	60	--	--	--	---	--
	03-07-90	10	---	---	--	-----	--	--	22	--	--	---	--
	03-07-90	110	640	160	87	2,100	82	59	--	--	--	---	--
	03-07-90	10	---	---	--	-----	--	--	21	--	--	---	--
	03-07-90	110	630	170	88	2,100	90	61	--	--	--	---	--
	03-07-90	130	---	---	--	-----	--	--	--	7	11	2.0	3
S08	03-08-90	10	---	---	--	-----	--	--	17	--	--	---	--
	03-08-90	110	630	160	86	2,100	88	61	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	--	5	3.0	4
	03-08-90	10	---	---	--	-----	--	--	16	--	--	---	--
	03-08-90	110	600	150	83	2,000	88	59	--	--	--	---	--
S09	03-08-90	10	---	---	--	-----	--	--	18	--	--	---	--
	03-08-90	110	550	140	76	2,000	90	53	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	7	5	2.0	2
S10	03-08-90	10	---	---	--	-----	--	--	16	--	--	---	--
	03-08-90	110	640	150	93	2,000	90	58	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	--	4	2.0	--
S11	03-08-90	10	---	---	--	-----	--	--	16	--	--	---	--
	03-08-90	110	640	150	92	2,100	90	51	--	--	--	---	--
	03-08-90	10	--	--	--	-----	--	--	19	--	--	---	--
	03-08-90	110	610	150	88	2,000	86	54	--	--	--	---	--
	03-08-90	110	640	140	91	2,100	86	51	--	--	--	---	--
	03-08-90	10	---	---	--	-----	--	--	--	--	--	---	--
	03-08-90	10	---	---	--	-----	--	--	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	3	7	2.0	2

Site name	Date	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Zinc, dissolved (µg/L as Zn)	Tritium, total (pCi/L)	O-18/O-16 stable-isotope ratio (per mil)	H-2/H-1 stable-isotope ratio (per mil)	Uranium natural, dissolved (µg/L as U)	Thorium, dissolved (µg/L as TH)
S01	03-06-90	----	----	------	--	---	-----	----	--	--	--	---	----
	03-06-90	<100	<200	81,000	--	860	2,200	<150	--	--	--	---	----
	03-06-90	13	----	------	6	750	-----	36	--	--	--	1.0	0.90

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990--Continued
SURFACE WATER--Continued
LABORATORY MEASUREMENTS--Contined

Site name	Date	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Zinc, dissolved (µg/L as Zn)	Tritium, total (pCi/L)	O-18/O-16 stable-isotope ratio (per mil)	H-2/H-1 stable-isotope ratio (per mil)	Uranium natural, dissolved (µg/L as U)	Thorium, dissolved (µg/L as TH)
S02	03-06-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-06-90	----	----	------	--	----	-----	----	--	-8.10	-58.4	----	----
	03-06-90	----	----	------	--	----	-----	----	29	-----	-----	----	----
	03-06-90	<100	<200	82,000	--	690	2,200	<150	--	-----	-----	----	----
	03-06-90	----	----	------	4	760	-----	----	--	-----	-----	----	0.70
	03-06-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-06-90	<100	<200	79,000	--	520	2,100	<150	--	-----	-----	----	----
S03	03-06-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-06-90	<100	<200	92,000	--	920	2,500	<150	--	-----	-----	----	----
	03-06-90	7	----	------	4	710	-----	38	--	-----	-----	----	.30
S04	03-06-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-06-90	<100	<200	61,000	--	<500	2,100	<150	--	-----	-----	----	----
	03-06-90	4	----	------	4	530	-----	----	--	-----	-----	1.0	2.0
	03-07-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-07-90	<100	<200	65,000	--	<500	2,200	<150	--	-----	-----	----	----
S05	03-07-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-07-90	<100	<200	56,000	--	<500	2,300	<150	--	-----	-----	----	----
	03-07-90	6	----	------	4	450	-----	28	--	-----	-----	----	.90
S06	03-07-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-07-90	<100	<200	50,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-07-90	----	----	------	2	400	-----	----	--	-----	-----	----	4.0
S07	03-06-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-06-90	<100	<200	41,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-07-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-07-90	<100	<200	43,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-07-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-07-90	<100	<200	41,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-07-90	2	----	------	2	370	-----	30	--	-----	-----	----	.60
S08	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	35,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-08-90	----	----	------	--	380	-----	----	--	-----	-----	.50	----
	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	31,000	--	<500	2,300	<150	--	-----	-----	----	----
S09	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	<300	--	<500	2,000	<150	--	-----	-----	----	----
	03-08-90	4	----	------	5	290	-----	14	--	-----	-----	.70	1.0
S10	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	23,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-08-90	----	----	------	1	280	-----	----	--	-----	-----	----	.60
S11	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	17,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-08-90	----	----	------	--	----	-----	----	--	-----	-----	----	----
	03-08-90	<100	<200	14,000	--	<500	2,300	<150	--	-----	-----	----	----
	03-08-90	<100	<200	13,000	--	<500	2,400	<150	--	-----	-----	----	----
	03-08-90	----	----	------	--	----	-----	----	35	-----	-----	----	----
	03-08-90	----	----	------	--	----	-----	----	--	-8.25	-60.0	----	----
	03-08-90	4	----	------	4	210	-----	19	--	-----	-----	.80	----

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990--Continued
GROUND WATER
FIELD MEASUREMENTS

[µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligrams per liter; mV, millivolts; L/min, liter per minute; <, actual value is known to be less than the value shown; >, actual value is known to be greater than the value shown]

Site name	Date	Specific conductance (µS/cm)	Temperature water (°C)	pH (Standard units)	Oxygen, dissolved (mg/L)	Oxidation reduction potential (mV)	Average discharge (L/min)	Pumping period (hours)
G00	03-05-90	3,670	14.5	6.1	0.5	400	0.8	1.0
G01	03-06-90	3,640	17.0	5.8	.2	400	.8	>.6
G02	03-06-90	3,690	16.5	5.8	.4	430	---	.8
G03	03-06-90	3,620	16.0	6.0	.4	430	.8	.8
G04	03-06-90	3,540	17.0	6.0	.5	440	.8	1.0
G05	03-07-90	3,390	14.5	6.4	.3	390	.4	.5
G06	03-07-90	3,060	16.0	6.8	.4	100	.8	.8
G07	03-07-90	3,210	16.0	6.7	.9	360	---	.8
G08	03-08-90	3,430	15.0	5.8	.4	420	---	.6
G09	03-08-90	3,160	19.0	6.5	.6	380	.8	.6
G10	03-08-90	3,140	19.0	6.6	.5	330	.8	.9
G11	03-08-90	1,830	18.0	6.8	.4	200	.8	>.3

LABORATORY MEASUREMENTS

[10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 130, USGS research laboratory (Linda Faires), Lakewood, Colorado; mg/L, milligrams per liter; µg/L, micrograms per liter; pCi/L, picocuries per liter; per mil, difference in parts per thousand between isotopic ratio in sample and reference standard; <, actual value is known to be less than the value shown]

Site name	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Chloride dissolved (mg/L as Cl)	Silica, dissolved (mg/L) as SiO_2)	Carbon, inorganic, dissolved (mg/L as C)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Cadmium, dissolved (µg/L as Cd)	Cobalt, dissolved (µg/L as Co)
G00	03-05-90	10	---	---	--	-----	--	--	51	--	--	---	----
	03-05-90	10	---	---	--	-----	--	--	--	--	--	---	----
	03-05-90	110	650	160	91	2,200	94	51	--	--	--	---	<200
	03-05-90	130	---	---	--	-----	--	--	--	20	17	8.0	30
G01	03-06-90	10	---	---	--	-----	--	--	55	--	--	---	----
	03-06-90	110	610	150	85	2,100	90	66	--	--	--	---	<200
	03-06-90	130	---	---	--	-----	--	--	--	--	29	7.0	30
G02	03-06-90	10	---	---	--	-----	--	--	55	--	--	---	----
	03-06-90	110	---	---	--	2,300	92	--	--	--	--	---	----
	03-06-90	130	---	---	--	-----	--	--	--	10	22	3.0	30
G03	03-06-90	10	---	---	--	-----	--	--	50	--	--	---	----
	03-06-90	110	600	160	85	2,100	92	59	--	--	--	---	----
	03-06-90	130	---	---	--	-----	--	--	--	5	26	3.0	9
G04	03-06-90	10	---	---	--	-----	--	--	57	--	--	---	----
	03-06-90	110	580	150	78	2,100	89	54	--	--	--	---	----
	03-06-90	130	---	---	--	-----	--	--	--	3	27	3.0	3
G05	03-07-90	10	---	---	--	-----	--	--	31	--	--	---	----
	03-07-90	110	640	160	90	2,000	88	56	--	--	--	---	----
	03-07-90	130	---	---	--	-----	--	--	--	2	21	4.0	2

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990--Continued
GROUND WATER--Continued
LABORATORY MEASUREMENTS--Continued

Site name	Date	Laboratory	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Chloride dissolved (mg/L as Cl)	Silica, dissolved (mg/L) as SiO_2)	Carbon, inorganic, dissolved (mg/L as C)	Aluminum, dissolved (µg/L as Al)	Barium, dissolved (µg/L as Ba)	Cadmium, dissolved (µg/L as Cd)	Cobalt, dissolved (µg/L as Co)
G06	03-07-90	10	---	---	--	-----	--	--	56	--	--	---	--
	03-07-90	110	580	140	73	1,700	79	42	--	--	--	---	--
	03-07-90	130	---	---	--	-----	--	--	--	--	32	2.0	2
G07	03-07-90	10	---	---	--	-----	--	--	44	--	--	---	--
	03-07-90	10	---	---	--	-----	--	--	--	--	--	---	--
	03-07-90	110	590	140	73	1,900	83	42	--	--	--	---	--
	03-07-90	130	---	---	--	-----	--	--	--	--	25	2.0	1
G08	03-08-90	10	---	---	--	-----	--	--	14	--	--	---	--
	03-08-90	110	590	150	81	2,400	88	58	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	--	26	2.0	--
G09	03-08-90	10	---	---	--	-----	--	--	41	--	--	---	--
	03-08-90	110	560	140	78	1,700	81	41	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	--	24	---	--
G10	03-08-90	10	---	---	--	-----	--	--	42	--	--	---	--
	03-08-90	110	580	130	82	1,900	81	41	--	--	--	---	--
	03-08-90	130	---	---	--	-----	--	--	--	--	20	---	--
G11	03-08-90	10	---	--	--	-----	--	--	49	--	--	---	--
	03-08-90	10	---	--	--	-----	--	--	--	--	--	---	--
	03-08-90	110	300	64	69	780	42	34	--	--	--	---	--
	03-08-90	130	---	--	--	-----	--	--	--	--	34	---	--

Site name	Date	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Zinc, dissolved (µg/L as Zn)	Tritium, total (pCi/L)	O-18/O-16 stable-isotope ratio (per mil)	H-2/H-1 stable-isotope ratio (per mil)	Uranium natural dissolved (µg/L as U)	Thorium, dissolved (µg/L as Th)
G00	03-05-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-05-90	----	----	--	------	--	----	-----	----	--	-8.00	-57.0	---	---
	03-05-90	<100	<200	--	60,000	--	570	2,200	<150	--	-----	-----	---	---
	03-05-90	25	----	2	------	4	450	-----	32	--	-----	-----	1.0	1.0
G01	03-06-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-06-90	<100	<200	--	87,000	--	860	2,200	<150	--	-----	-----	---	---
	03-06-90	6	----	2	------	3	830	-----	27	--	-----	-----	---	---
G02	03-06-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-06-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-06-90	18	----	1	------	3	560	-----	29	--	-----	-----	1.0	2.0
G03	03-06-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-06-90	<100	<200	--	75,000	--	<500	2,200	<150	--	-----	-----	---	---
	03-06-90	4	----	2	------	4	260	-----	33	--	-----	-----	---	---
G04	03-06-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-06-90	<100	<200	--	51,000	--	<500	2,300	<150	--	-----	-----	---	---
	03-06-90	30	----	2	------	6	180	-----	44	--	-----	-----	1.0	2.0

SOLUTE-TRANSPORT STUDY DATA, MARCH 6-8, 1990--Continued
GROUND WATER--Continued
LABORATORY MEASUREMENTS--Continued

Site name	Date	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Molybdenum, dissolved (µg/L as Mo)	Nickel, dissolved (µg/L as Ni)	Strontium, dissolved (µg/L as Sr)	Zinc, dissolved (µg/L as Zn)	Tritium, total (pCi/L)	O-18/O-16 stable-isotope ratio (per mil)	H-2/H-1 stable-isotope ratio (per mil)	Uranium natural dissolved (µg/L as U)	Thorium, dissolved (µg/L as Th)
G05	03-07-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-07-90	<100	<200	--	21,000	--	<500	2,400	<150	--	-----	-----	---	---
	03-07-9	7	----	3	------	5	190	-----	31	--	-----	-----	3.0	4.0
G06	03-07-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-07-90	<100	<200	--	1,700	--	<500	2,300	<150	--	-----	-----	---	---
	03-07-9-	6	----	4	------	4	48	-----	2	--	-----	-----	3.0	3.0
G07	03-07-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-07-90	----	----	--	------	--	----	-----	----	--	-8.40	-61.0	---	---
	03-07-90	<100	<200	--	<300	--	<500	2,200	<150	--	-----	-----	---	---
	03-07-90	7	----	4	------	2	22	-----	5	--	-----	-----	2.0	2.0
G08	03-08-90	----	----	--	------	--	----	-----	----	37	-8.20	-60.5	---	---
	03-08-90	<100	<200	--	4,300	--	<500	2,200	<150	--	-----	-----	---	---
	03-08-90	88	----	--	------	4	280	-----	37	--	-----	-----	1.0	2.0
G09	03-08-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-08-90	<100	<200	--	<300	--	<500	2,200	<150	--	-----	-----	---	---
	03-08-90	4	----	2	------	2	21	-----	6	--	-----	-----	2.0	---
G10	03-08-90	----	----	--	------	--	----	-----	----	37	-8.55	-62.0	---	---
	03-08-90	<100	<200	--	<300	--	<500	2,200	<150	--	-----	-----	---	---
	03-08-90	4	----	1	------	2	7	-----	4	--	-----	-----	2.0	2.0
G11	03-08-90	----	----	--	------	--	----	-----	----	--	-----	-----	---	---
	03-08-90	----	----	--	------	--	----	-----	----	10	-9.60	-68.5	---	---
	03-08-90	<100	<200	--	<300	--	<500	1,200	<150	--	-----	-----	---	---
	03-08-90	----	----	1	------	4	7	-----	----	--	-----	-----	3.0	---

PRECIPITATION DATA
GLOBE RANGER STATION

LOCATION.--Lat 33°22'40", long 110°46'11", in NE¼NW¼NW¼ 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 and from May 1953 to June 1975 at elevation 1,080 m.

Precipitation, in millimeters

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	The year
1989	57	4	29	0	12	0	71	63	0	26	2	14	278
1990	17	19	48	23	4	1	76	92	52	3	28	115	477
1991	29	13	129	0	0	9	26	99	14	37	63	49	468

Precipitation statistics for 1907-91 (all gage sites), in millimeters

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	The Year
Number of observations	85	85	85	85	85	84	84	85	84	84	84	83	82
Mean	41	36	37	14	9	9	66	71	34	30	27	46	
Maximum	165	155	121	72	65	49	172	206	136	156	121	218	
Minimum	0	0	0	0	0	0	7	8	0	0	0	0	
Yearly													
Mean	420												
Maximum	712												
Minimum	203												

MIAMI

LOCATION.--Lat 33°24'15", long 110°52'09", in SE¼NE¼NW¼ sec.30, T.1 N., R.15 E., at Miami East plant site of Magma Copper Corporation, 0.5 km northwest of Miami post office.

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

PERIOC OF RECORD.--February 1914 to current year.

Precipitation, in millimeters

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	The year
1989	65	6	37	0	2	0	148	16	0	39	3	17	333
1990	20	44	45	22	5	1	35	121	70	3	21	133	520
1991	55	24	170	0	0	9	8	75	39	53	72	74	577

Precipitation statistics for 1914-91, in millimeters

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	The year
Number of observations	77	78	78	78	78	78	78	78	78	78	78	78	77
Mean	53	44	47	19	10	9	65	78	40	33	35	60	
Maximum	245	206	173	100	64	91	219	213	179	193	181	293	
Minimum	0	0	0	0	0	0	9	8	0	0	0	0	
Yearly													
Mean	493												
Maximum	578												
Minimum	167												