CHEMICAL, GEOLOGIC, AND HYDROLOGIC DATA FROM THE STUDY OF ACIDIC CONTAMINATION IN THE MIAMI WASH-PINAL CREEK AREA, ARIZONA, WATER YEARS 1988-89

By James G. Brown

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ILLUSTRATIONS

CONVERSION FACTORS

For readers who prefer to use inch-pound units, conversion factors for the terms in this report are listed below:

Multiply	*By*	*To obtain*
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
square centimeter (cm^2)	0.155	square inch ($in.^2$)
square kilometer (km^2)	0.3861	square mile (mi^2)
cubic meter (m^3)	35.31	cubic foot (ft^3)
cubic meter (m^3)	0.0008107	acre-foot (acre-ft)
liter per minute (L/min)	0.2642	gallon per minute (gal/min)
cubic meter per second (m^3/s)	35.31	cubic foot per second (ft^3/s)

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, geologic, and water-quality 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 1988 and 1989 and include location, construction information, site plans, water levels, and chemical analyses of water samples for seven groups of monitoring wells. Also included are mineralogic and particle-size analyses of drill cuttings from four wells. Surface-water data are presented for five sites and include discharge measurements and chemical analyses of water. Monthly discharge data are presented for one site. 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 near Globe, Arizona (fig. 1). Contaminated ground water related to mining has long been recognized in the area, but it was first quantified in 1983. Large differences in dissolved-metal concentrations have been measured in the interacting ground water and surface water of the Pinal Creek basin.

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 water-quality samples 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. During the period of this report, the work was done in cooperation with the Salt River Project and the U.S. Environmental Protection Agency.

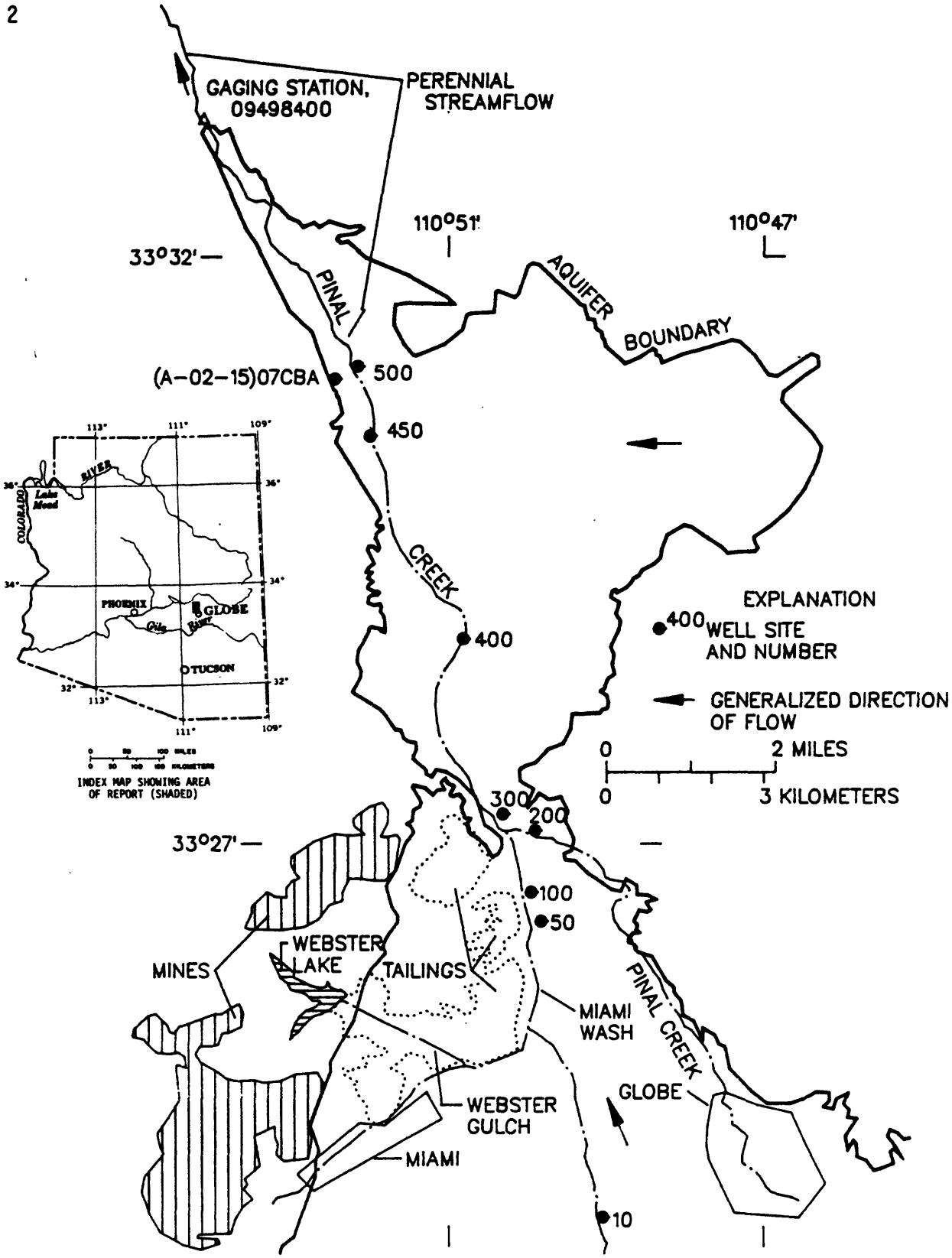

Figure 1.--Area of study.

The study area is in Gila County, Arizona, near the communities of Globe, Miami, and Claypool; Globe is the county seat. The area had a population of about 20,000 in 1980. Principal industries are mining, tourism, public administration, and ranching. Pinal Creek flows into the Salt River about 5 km upstream from the high-water line of Roosevelt Lake. The 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.

Purpose and Scope

The purpose of this report is to present hydrologic, geologic, and water-quality data on the ground water and surface water of the 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 the 1988 and 1989 water years, which correspond to the period October 1, 1987, through September 30, 1989. A few analyses of samples collected during earlier water years were unavailable or incomplete when Eychaner and others (1989) was published and are included in this report.

Relation to Other Reports

The 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 done 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 from surface and ground waters (Rouse, 1981, 1983; Envirologic Systems, Inc., 1983).

Lithologic, water-quality, and water-level data collected as part of the present study for water years 1984-87 were presented by Eychaner and others (1989). 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 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).

Acknowledgments

These data could not have been collected without the cooperation and assistance of landowners and local residents who granted permission to cross over, collect data, and install wells on their properties. Karl and Wendy Baughman; Stephen Bixby, Sr.; Stephen Bixby, Jr.; Hollis Crim; Pat Kelley; Eva, Martin, and Nellie Setka; Arizona Department of Transportation; Cyprus Miami Mining Corporation; and Magma Copper Corporation generously cooperated with the study.

Data in this report were collected by the diligent efforts of many people, who at times worked long hours under difficult field conditions. The efforts of S.E. Buell, T.J. Lopes, C.C. Neaville, and H.W. Sanger, U.S. Geological Survey, are particularly appreciated.

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 SW¼NW¼SE¼ sec. 9, T. 1 N., R. 15 E.

DATA COLLECTION

During the 1989 water year, the USGS drilled six wells in the study area. One well was drilled in well group 100, and two wells were drilled in well group 500. Two wells were drilled between well groups 400 and 500 (fig. 1), and were designated well group 450. One well was drilled upgradient from the area of known mining activity for the purpose of obtaining samples of uncontaminated ground water and aquifer material. Three wells drilled earlier in the study went dry in 1988 or 1989.

All holes completed as wells were cased with nominal 10-centimeter-diameter polyvinyl chloride (PVC) pipe. Factory-slotted PVC pipe was used for well screens. Each borehole annulus to at least 0.5 m above the screen was filled with washed pea gravel from uncontaminated local alluvium. A layer of bentonite pellets from about 0.3 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 steel security casing from 1.7 to 2.7 m long protects each well from disturbance. Construction details for individual wells are included in the "Basic 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 20 to 40 minutes and in most wells ended when no further fine material was visible in the pumped water. Well 010 continued to yield muddy water after two development sessions that included a total of about 3 hours of jetting. Well 107 continued to yield muddy water after two development sessions that included a total of about 2 hours and 20 minutes of jetting. Both wells, however, yielded clear water when pumped for sampling purposes.

Most field data and water samples were collected using standard USGS methods. Boner and others (1989, p. 4-28) detailed the methods of collecting, examining, and computing records of discharge and water quality; defined terms related to streamflow, water quality, and other hydrologic data; and described 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, water-level, and grain-size measurements were made in inch-pound units and converted to metric units (International System of Units).

Water samples were collected by installing a 240-volt electric submersible pump and rigid PVC riser pipe 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 parameter had stabilized. Pumping rate, duration, and drawdown are included in the data tables. Some wells were sampled with a bladder pump, a 12-volt submersible pump, or a PVC bailer. The same criteria for representative samples were applied.

At selected wells, R.W. Puls of the U.S. Environmental Protection Agency collected water samples to study the impact of pumping rate, filter-pore size, and sampling atmosphere on analytical concentrations of inorganic constituents (Puls and Eychaner, 1990). At each well, samples were collected at two pumping rates that differed by a factor of at least 13. Some samples collected at each rate were filtered and bottled while exposed to air; others were filtered and bottled in a nitrogen-filled glove box. In each sampling atmosphere, water was pumped through filters that ranged in pore size from 0.03 to 10 microns. In addition, unfiltered samples were collected in each atmosphere.

Data are presented for 36 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 wells drilled during water year 1989. Mineralogic descriptions were based on microscopic examination of the cuttings. Particle sizes were determined by wet sieving. Water levels were measured with a chalked steel tape or a calibrated electric tape. Some data for well (A-02-15)07cba also are included.

Chemical analyses of water from four sites along Pinal Creek (fig. 2) are presented. Monthly discharge data and water-quality field measurements taken in cross section are presented for Pinal Creek at Inspiration Dam (09498400). Chemical analyses of water from recently drained Webster Lake are included. More than 60 additional observations of no flow and observations, estimates, and measurements of discharge at various points in the basin during water years 1988 and 1989 are on file in the project records.

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 1987 through 1989 are included to cover water years 1988-89.

CHEMICAL ANALYSES

Most chemical analyses included in this report were done by the U.S. Geological Survey National Water-Quality Laboratory (NWQL), Arvada, Colorado; by K.G. Stollenwerk, a geochemist in the U.S. Geological Survey National Research Program (NRP), Lakewood, Colorado; and by R.W. Puls, a chemist in a U.S. Environmental Protection Agency research program, Ada, Oklahoma. Chemical analyses were also done by Kirk Nordstrom and others in the USGS NRP, Menlo Park, California; and by the Hydrology and Geosciences Departments at the University of Arizona. 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. In addition, most of the water-quality column headings include a five-digit parameter code, which is used by the USGS computer system, WATSTORE, to uniquely identify a specific constituent.

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

$$\frac{\Sigma \text{ cations} - \Sigma \text{ anions}}{\Sigma \text{ cations} + \Sigma \text{ anions}} \cdot 100 \text{ percent},$$

where

Σ *cations* = the sum of the concentrations of all positively charged ions, in milliequivalents per liter, and

Σ *anions* = the sum of the concentrations of all negatively charged ions, in milliequivalents per liter.

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 enough constituents were determined to make the values meaningful.

NWQL, Stollenwerk, and Puls 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), two cobalt analyses from NWQL were deleted because of interference.

Analyses of dissolved fluoride done by the NWQL using the ion-specific electrode method sometimes 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 36 samples analyzed using the modified ion-specific electrode method were added to the data base and are included with analyses done by Stollenwerk.

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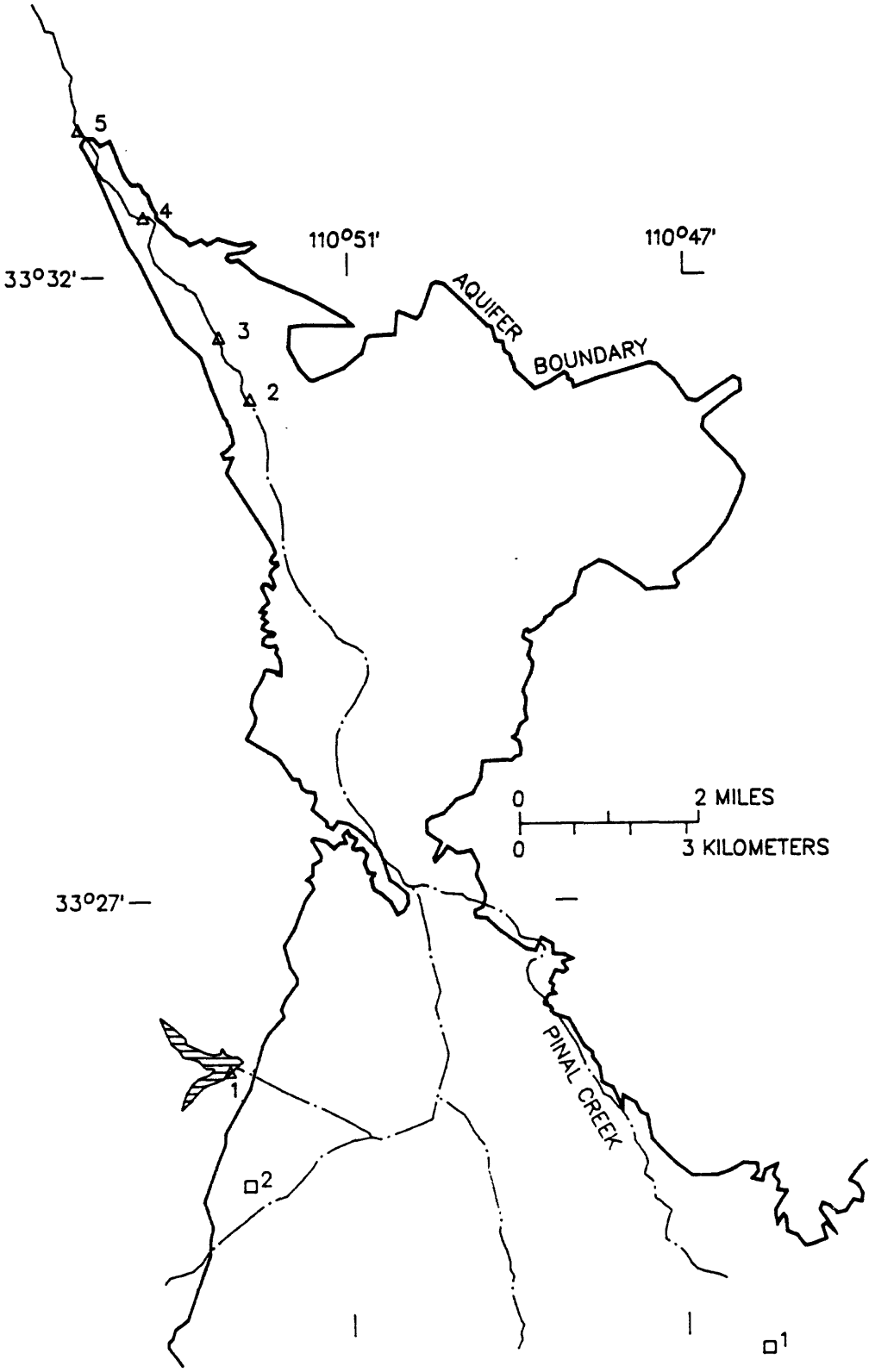

Figure 2.--Locations of surface-water and precipitation-data sites.

EXPLANATION

△ SURFACE-WATER DATA SITE

1 Webster Lake near Miami
2 Pinal Creek at Blumer driveway, near Globe
3 Pinal Creek at Setka Ranch, near Globe
4 Pinal Creek at Pringle pump station, near Globe
5 Pinal Creek at Inspiration Dam, near Globe

□ PRECIPITATION-DATA SITE

1 Globe Ranger Station
2 Miami

Figure 2.

Eychaner, J.H., 1988a, Geohydrologic setting of the Miami Wash-Pinal Creek acidic ground-water study near Globe, Arizona, *in* Ragone, S.E., ed., U.S. Geological Survey's Program on Toxic Waste—Ground-Water Contamination—Fiscal Year 1986 Program Overview and Selected Abstracts from the Second Technical Meeting, Cape Cod, Massachusetts, October 21-25, 1985: U.S. Geological Survey Open-File Report 86-481, p. E-3 to E-5.

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(PAGE 15 FOLLOWS)

BASIC 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 pipe. The screened interval is a single 9.1-meter-long 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 2.4 m. The well was developed in February 1989 by jetting high-pressure air horizontally through the slots to agitate the formation and airlift water and sediment. Well continued to yield muddy water after development.

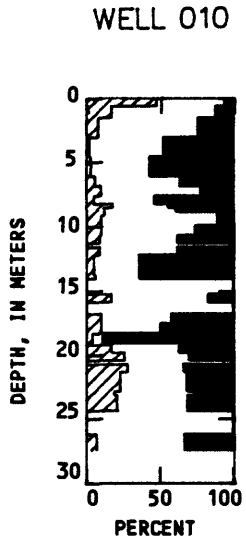
LOGS: D, drillers; G, geologist; P, particle size.

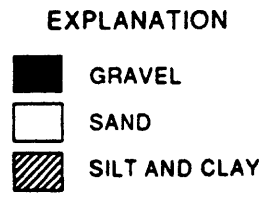
WELL	DATE COMPLETED	DRILLING METHOD	HOLE DEPTH (meters)	WELL DEPTH (meters)	SCREENED INTERVAL (meters)	GEOLOGIC UNIT	BOTTOM OF SEAL (meters)	LOGS AVAILABLE
10	01-09-89	AIR HAMMER	27.9	27.1	18.0-27.1	BASIN FILL	2.4	DGP

LOG INFORMATION

Summary of geologist log:	Thickness (m)	Bottom of depth interval (m)
Silt and sand, light brown, loose, dry, powdery	0.6	0.6
Sand, light brown, loose, dry; well graded, contains silt in upper pert of interval, gravel throughout; no sample from 2.7 to 3.0 m	7.0	7.6
Sand and gravel, light brownish-gray, loose; dry above, moist below 8.4 m; well graded, fine to very coarse	1.2	8.8
Sand, brown, loose, moist; fine to medium grained; contains some sticky clay; some cobbles	8.7	17.5
Sand and gravel, loose, moist; sand is fine to medium grained; contains rounded gravel 0.01 to 0.02 m in diameter that is coated with brown clayey silt	0.8	18.3
Gravel, sandy, gray brown, loose, moist; sand is medium grained; more clay binder from 18.7 to 19.0 m	0.7	19.0
Clay, sandy, gray brown, wet, plastic	0.2	19.2
Sand, clayey, brown, very moist, sand is medium grained; more clay in upper half of interval	1.2	20.4
No samples	0.3	20.7
Sand, silty, loose, dry; contains some gravel, small amount of clay, strong HCl reaction below 21.3 m	0.6	21.3
Sand, gravelly, loose, wet; sand is medium to coarse grained; contains some sticky clay	0.3	24.7
No sample	1.5	26.2
Sand, gravelly, light gray, loose, moist, well graded, strong HCl reaction	1.2	27.4

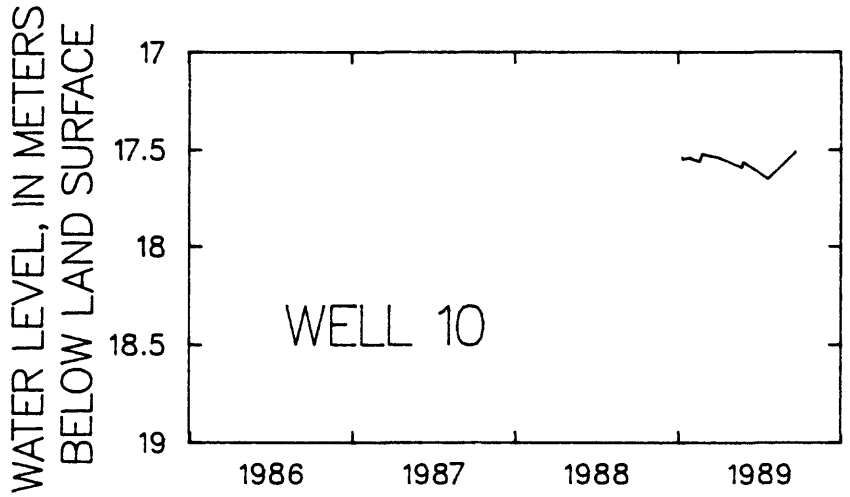
GROUND WATER--Continued
WELL 10--Continued
LOG INFORMATION--Continued





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.

DATE	WATER LEVEL, IN METERS BELOW LAND SURFACE
01-09-89	17.54
01-10-89	17.55
01-26-89	17.54
02-03-89	17.55
02-17-89	17.56
02-23-89	17.52
03-09-89	17.53
03-31-89	17.54
05-23-89	17.59
05-26-89	17.56
07-21-89	17.65
09-21-89	17.51



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
010	03-09-89	623	6.76	17.5	--	242	7.2	300	2.6	1.4	0.2
010	05-23-89	646	6.91	17.0	248	--	7.3	330	2.8	0.5	0.4

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)
10	03-09-89	10	59	19	33	1.8	76	15	0.40	23
10	03-09-89	110	62	19	33	--	83	16	--	25
10	05-23-89	110	55	21	27	--	68	18	0.33	27
10	05-23-89	120	--	--	--	--	--	--	--	--

WELL	DATE	LABORATORY	IONIC BALANCE (PERCENT	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)
10	03-09-89	10	0.0	0.009	347	<10	--	120	<0.5	10	<1
10	03-09-89	110	-0.3	0.009	--	<500	--	--	--	--	<50
10	05-23-89	110	-2.5	0.009	--	<500	--	--	--	--	<50
10	05-23-89	120	--	--	--	--	0.3	--	--	--	--

WELL	DATE	LABORATORY	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)
10	03-09-89	10	<5	<3	<10	17	<10	4	26	<10
10	03-09-89	110	--	<20	20	30	--	--	40	--
10	05-23-89	110	--	<20	<10	40	--	--	<30	--
10	05-23-89	120	--	--	--	--	--	--	--	--

WELL	DATE	LABORATORY	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, (IV) DISSOLVED (UG/L AS SE)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	TRITIUM TOTAL (PCI/L) (07000)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
10	03-09-89	10	<10	--	370	<6	13	22	--	--
10	03-09-89	110	<50	--	370	--	20	--	--	--
10	05-23-89	110	<50	--	370	--	<15	--	--	--
10	05-23-89	120	--	<0.5	--	--	--	--	-67.0	-9.00

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 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.

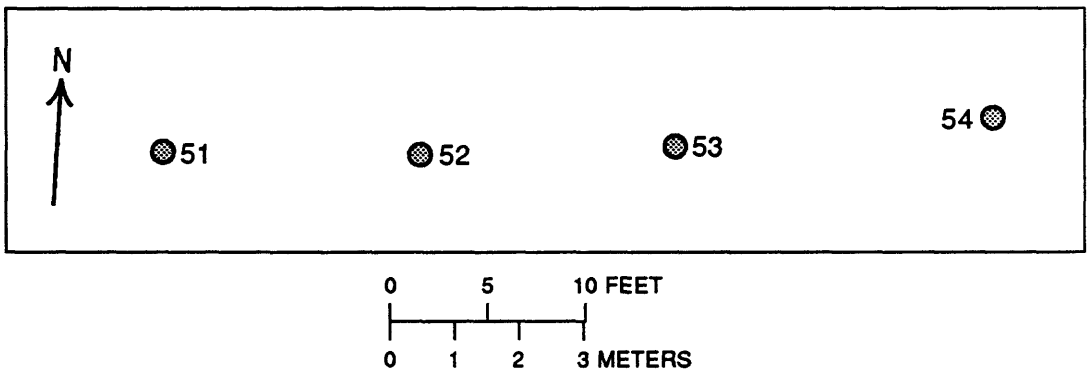
DRILLING AND WELL CONSTRUCTION

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, polyvinyl chloride pipe. Each well has a single 0.9-meter long, slotted, 10-centimeter diameter, schedule 80, polyvinyl chloride 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. The wells were developed by jetting high-pressure air horizontally through the screen to agitate the formation and airlift water and sediment until no further visible sediment was removed.

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

WELL	DATE COMPLE-TED	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	--

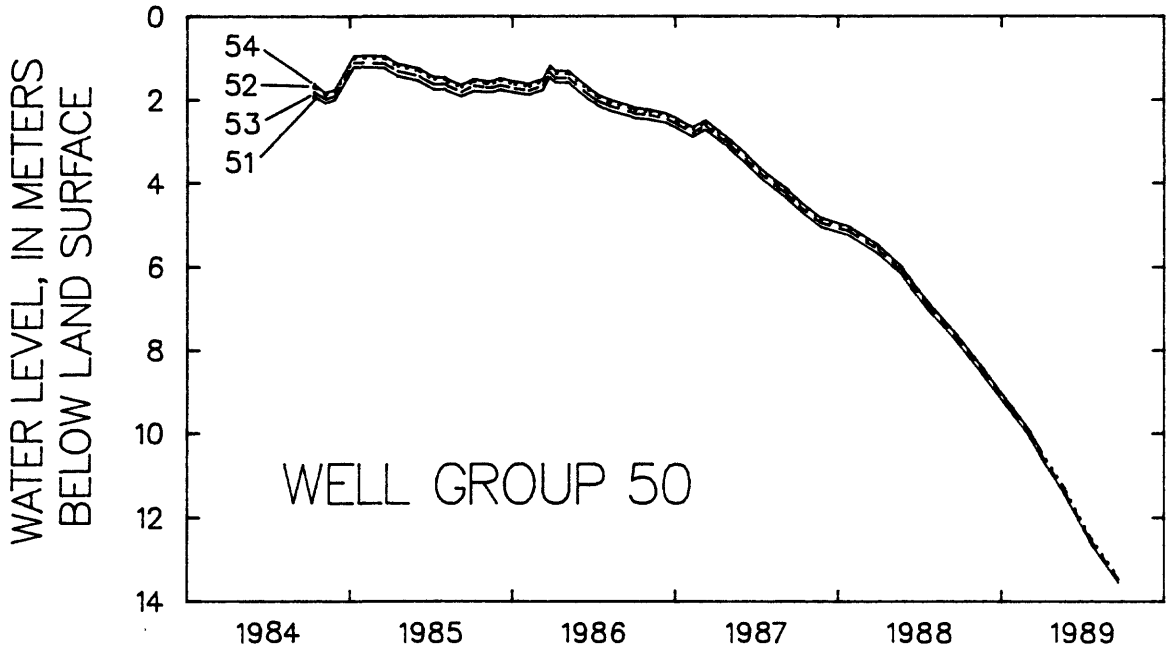
SITE PLAN



WATER LEVEL, IN METERS BELOW LAND SURFACE

DATE	WELL NUMBER 51	52	53	54	DATE	WELL NUMBER 51	52	53	54
10-06-87	4.63	4.46	4.54	4.42	01-09-89	9.29	9.16	9.22	9.14
11-23-87	5.04	4.86	4.94	4.82	01-27-89	9.54	9.41	9.47	9.38
01-27-88	5.25	5.08	5.15	5.04	03-06-89	10.09	9.95	10.01	9.94
03-31-88	5.68	5.51	5.58	5.47	03-31-89	10.56	10.43	10.48	10.41
05-23-88	6.18	6.02	6.09	5.99	05-22-89	11.42	11.29	11.34	--
06-13-88	6.51	6.35	6.41	6.31	05-26-89	11.50	11.38	11.43	--
07-21-88	7.03	6.87	6.94	6.84	07-21-89	12.61	12.49	12.54	--
09-21-88	7.76	7.61	7.68	7.59	09-21-89	13.55	13.43	13.47	--
11-21-88	8.59	8.44	8.50	8.42					

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



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
51	06-13-88	8500	3.71	18.0	--	0	0.6	--	87.	0.4	--
51	01-09-89	8800	3.65	18.0	--	0	0.4	460	57.	0.3	0.3
51	03-06-89	8400	3.46	18.0	--	0	<0.1	430	45.	0.3	--
51	05-22-89	7820	3.65	18.5	--	0	<0.1	420	68.	0.4	--
51	05-22-89	7820	3.65	18.5	--	0	<0.1	420	68.	0.4	--
51	06-13-89	--	--	--	--	--	--	--	--	--	--
53	05-22-89	6870	3.64	19.0	--	0	<0.1	420	14.	0.6	--
54	01-09-89	3800	3.83	17.5	--	0	--	--	1.9	0.5	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona. Flouride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LAB-ORA-TORY	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, INOR-GANIC, TOTAL (MG/L AS C) (00685)
51	06-13-88	10	--	--	--	--	--	--	3.9	--	40
51	06-13-88	110	410	350	190	8700	440	34	--	--	--
51	06-13-88	310	--	--	--	--	--	--	--	4.2	--
51	01-09-89	10	--	--	--	--	--	--	--	--	56
51	01-09-89	110	420	320	190	8600	290	--	--	--	--
51	03-06-89	10	--	--	--	--	--	--	--	--	61
51	03-06-89	110	500	360	210	7800	400	--	--	--	--
51	05-22-89	110	400	310	200	7400	270	31	--	--	--
51	05-22-89	10	--	--	--	--	--	--	--	--	51
51	05-22-89	120	--	--	--	--	--	--	--	--	--
53	05-22-89	110	350	220	150	5900	220	27	--	--	--
53	05-22-89	10	--	--	--	--	--	--	--	--	52
54	01-09-89	10	--	--	--	--	--	--	--	--	21
54	01-09-89	110	510	120	120	2300	190	9.3	--	--	--

WELL	DATE	LAB-ORA-TORY	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IONIC BAL-ANCE (PER-CENT)	IONIC STRE-NGTH (MOL/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)
51	06-13-88	10	--	--	--	--	--	--	--	--	--
51	06-13-88	110	100	2.1	0.397	--	220000	--	870	9300	140000
51	06-13-88	310	--	--	--	--	--	--	--	--	--
51	01-09-89	10	--	--	--	--	--	--	--	--	--
51	01-09-89	110	97	-5.0	0.359	--	220000	--	700	10000	130000
51	03-06-89	10	--	--	--	--	--	--	--	--	--
51	03-06-89	110	110	6.1	0.370	--	230000	--	1000	9500	150000
51	05-22-89	110	98	2.3	0.338	--	230000	--	700	8800	120000
51	05-22-89	10	--	--	--	--	--	--	--	--	--
51	05-22-89	120	--	--	--	--	--	1	--	--	--
53	05-22-89	110	85	-4.7	0.249	--	150000	--	500	6100	87000
53	05-22-89	10	--	--	--	--	--	--	--	--	--
54	01-09-89	10	--	--	--	--	--	--	--	--	--
54	01-09-89	110	81	-3.5	0.099	--	16000	--	<100	1600	18000

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

WELL	DATE	LAB-ORA-TORY	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, (IV) DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
51	06-13-88	10	--	--	--	--	--	--	--	--
51	06-13-88	110	2510000	670000	2800	--	1200	20000	--	--
51	06-13-88	310	--	--	--	--	--	--	--	--
51	01-09-89	10	--	--	--	--	--	--	--	--
51	01-09-89	110	2250000	63000	2700	--	1200	18000	--	--
51	03-06-89	10	--	--	--	--	--	--	--	--
51	03-06-89	110	2710000	75000	3000	--	1400	24000	--	--
51	05-22-89	110	2330000	56000	2800	--	1100	19000	--	--
51	05-22-89	10	--	--	--	--	--	--	--	--
51	05-22-89	120	--	--	--	<0.5	--	--	-53.0	-6.60
53	05-22-89	110	1500000	42000	1900	--	930	11000	--	--
53	05-22-89	10	--	--	--	--	--	--	--	--
54	01-09-89	10	--	--	--	--	--	--	--	--
54	01-09-89	110	130000	63000	870	--	2100	2900	--	--

WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records were provided by the U.S. Environmental Protection Agency (EPA).

LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown. Filter-pore size of 635 represents slot width of well screen. These samples were otherwise unfiltered.

WELL	DATE	SAMPLE NUMBERS	AVERAGE DIS-CHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXID-ATION RED-UCTION POTEN-TIAL (MV) (00090)
51	06-13-88	1-7	0.61	1.1	--	--	8000	3.7	--	--	0	--
	06-13-88	8-13	87.	0.4	--	18.0	8500	3.7	0.6	--	0	--

GROUND WATER--Continued
WELL GROUP 50--Continued
WATER QUALITY--EPA FILTRATION STUDY--Continued

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
51	06-13-88	1	1	0.4	390	320	150	7.0	--	--	220000	290
	06-13-88	2	1	10.	430	360	200	10	--	--	260000	<190
	06-13-88	3	1	635	440	360	200	11	--	--	260000	200
	06-13-88	4	2	0.1	450	370	180	15	--	--	260000	<190
	06-13-88	5	2	0.4	460	380	210	12	--	--	280000	<190
	06-13-88	6	2	0.4	450	370	180	16	--	--	260000	<180
	06-13-88	7	2	10.	450	370	210	14	--	--	280000	2500
	06-13-88	8	1	0.1	380	310	150	7.0	--	--	210000	250
	06-13-88	9	1	0.4	390	320	170	7.5	--	--	220000	280
	06-13-88	10	1	10.	420	340	180	10	8600	450	250000	250
	06-13-88	11	2	0.4	460	370	170	17	--	--	260000	<190
	06-13-88	12	2	10.	450	370	180	13	--	--	270000	<190
	06-13-88	13	2	635	460	390	200	13	--	--	280000	<200

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
51	06-13-88	1	<750	310	1500	150000	2680000	<180	400	71000	2600	1200	20000
	06-13-88	2	<710	310	1700	160000	2530000	<190	580	73000	2900	1400	22000
	06-13-88	3	<710	320	1700	160000	2560000	<190	570	74000	2900	1400	22000
	06-13-88	4	<70	340	1800	150000	2690000	<220	610	76000	2900	1500	22000
	06-13-88	5	<100	260	1700	170000	2770000	<270	380	79000	3200	1300	24000
	06-13-88	6	<70	330	1700	150000	2700000	<220	600	76000	2900	1500	22000
	06-13-88	7	<130	<2500	2500	160000	2780000	<270	630	76000	2900	1500	23000
	06-13-88	8	<730	300	1500	150000	2630000	<180	440	70000	2500	1200	19000
	06-13-88	9	<740	300	1500	150000	2660000	<180	470	70000	2500	1200	20000
	06-13-88	10	<700	310	1600	150000	2490000	<170	520	71000	2800	1300	21000
	06-13-88	11	<70	340	1800	150000	2730000	<220	580	77000	3000	1500	23000
	06-13-88	12	<90	280	1800	160000	2690000	<260	340	77000	3100	1300	23000
	06-13-88	13	<100	290	1700	170000	2770000	<260	360	79000	3200	1300	23000

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

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

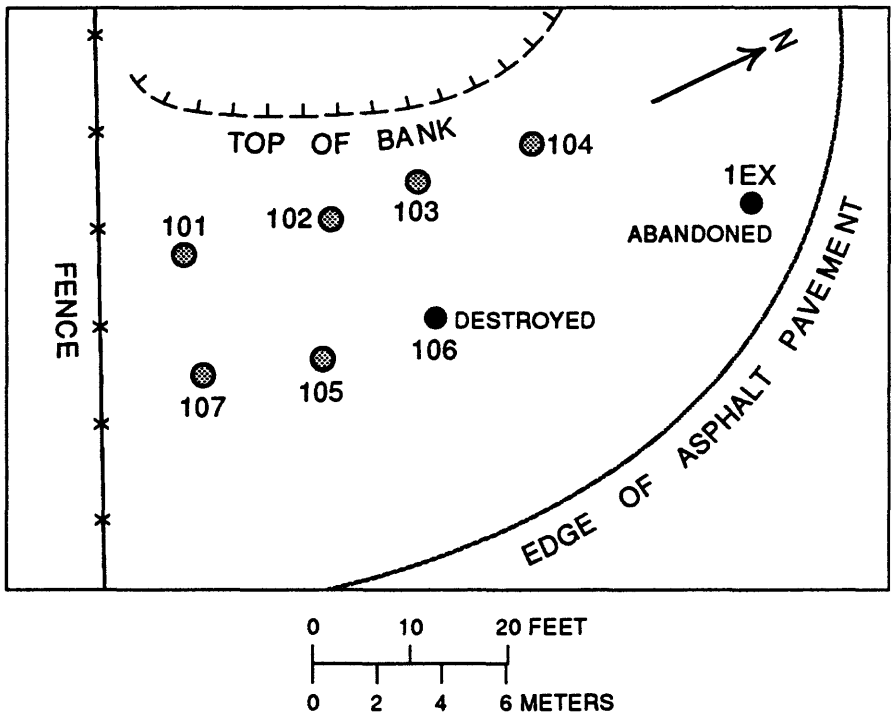
The casing of well 106 was accidentally crushed at about the 46-meter depth during pressure grouting. The borehole annulus probably is grouted from 0 to 15 m and from 46 to 55 m. Air jetting during attempted development removed most water from the upper casing. The water level rose from 37 to 29 m below 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 polyvinyl chloride pipe. The well has a single 4.4-meter long slotted, 10-centimeter diameter, schedule 80, polyvinyl chloride 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 COMPLE-TED	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

GROUND WATER--Continued
WELL GROUP 100--Continued
SITE PLAN



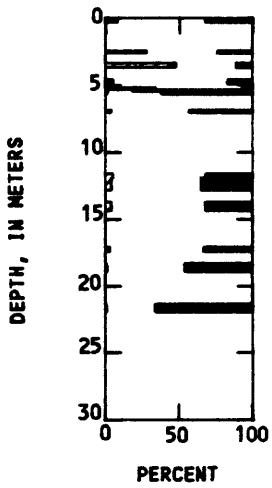
LOG INFORMATION

Well: 107

Summary of geologist log:	Thickness (m)	Bottom of depth interval (m)
Artificial fill, orange brown, loose, moist, fine to medium grained; contains some rounded gravel 25 to 51 mm in diameter	1.9	2.0
Clay, crumbly, moist; sandy and sticky below 2.6 meters	1.5	4.1
Sand, light brown, loose, dry to moist, fine to medium grained; contains cobbles as large as 142 mm in diameter	1.0	5.1
Clay, sandy, brown, sticky, moist	0.2	5.3
Sand, black, loose, medium to coarse grained; contains some gravel	0.2	5.5
Sand, orange brown, loose, moist, contains some gravel; bright orange stains on quartz grains below 5.8 meters	1.0	6.5
Sand, brown, bottom half is coarser and contains gravel	0.7	7.2
Sand, orange brown, loose, moist, medium grained	1.5	8.7
No sample	1.7	10.4
Sand, brown, loose, saturated, medium to coarse grained; orange staining from 12.0 to 12.9 m and at 17.1 m; contains some gravel; some clay below 21 m; no samples 10.7-11.9 m, 12.9-13.4 m, 18.9-19.5 m, 20.5-21.0 m	11.9	22.3
No sample	0.3	22.6

GROUND WATER--Continued
WELL GROUP 100--Continued
LOG INFORMATION--Continued

WELL 107



EXPLANATION

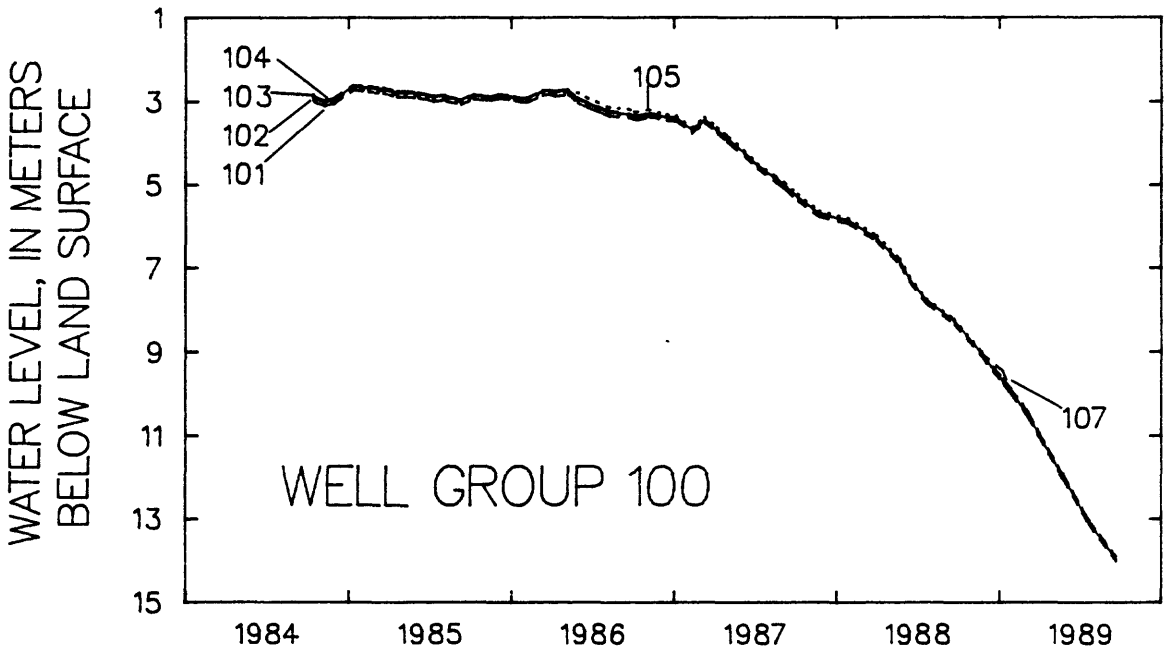
GRAVEL
SAND
SILT AND CLAY

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.

WATER LEVEL, IN METERS BELOW LAND SURFACE

	WELL NUMBER					
DATE	101	102	103	104	105	107
10-06-87	5.39	5.32	5.29	5.29	5.22	--
11-23-87	5.78	5.71	5.69	5.68	5.63	--
01-27-88	5.94	5.87	5.86	5.85	5.80	--
03-31-88	6.37	6.31	6.29	6.29	6.22	--
05-23-88	6.93	6.85	6.84	6.84	6.78	--
06-14-88	7.35	7.28	7.27	7.27	7.21	--
07-21-88	7.86	7.78	7.77	7.77	7.74	--
09-21-88	8.34	8.26	8.25	8.25	8.22	--
11-21-88	9.10	9.04	9.02	9.03	8.99	--
12-14-88	--	--	--	--	--	9.35
12-21-88	--	--	--	--	--	9.38
01-10-89	9.77	9.71	9.70	9.45	9.65	9.63
01-27-89	10.00	9.94	9.93	9.93	9.88	9.87
03-07-89	10.56	10.50	10.49	10.49	10.45	10.42
03-31-89	11.03	10.98	10.97	10.98	10.93	10.91
05-23-89	12.02	11.97	11.96	--	11.95	11.90
05-26-89	12.04	11.98	11.97	--	11.94	11.91
07-21-89	13.13	13.08	13.07	--	13.05	13.01
09-21-89	14.03	13.98	13.98	--	13.95	13.91

GROUND WATER--Continued
WELL GROUP 100--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE--Continued



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
101	04-30-87	7300	3.80	17.5	--	0	1.0		68.	0.4	0.6
101	06-14-88	7790	3.49	18.0	--	0	0.2	410	57.	0.5	0.5
101	01-10-89	7400	3.76	18.0	--	0	1.6	440	42.	0.4	0.4
101	03-07-89	7070	3.62	18.5	--	0	<0.1	420	3.0	0.5	--
101	05-23-89	6850	3.69	18.0	--	0	<0.1	410	45.	0.4	--
102	05-23-89	5980	3.68	19.0	--	0	<0.1	420	4.5	0.6	--
103	06-14-88	5290	3.51	17.5	--	0	1.3	410	42.	0.2	--
103	01-10-89	4800	3.85	18.0	--	0	0.2	460	23.	0.3	0.1
103	03-07-89	4740	3.67	18.0	--	0	<0.1	430	23.	0.2	--
103	05-23-89	4660	3.73	18.5	--	0	<0.1	420	22.	0.4	--
104	06-14-88	3180	3.74	18.0	--	0	0.6	430	15.	0.4	--
104	01-10-89	3110	4.01	17.0	--	0	--	--	1.1	1.0	--
105	06-14-88	4070	6.18	19.0	680	--	0.3	260	15.	1.1	13.3
105	01-10-89	3700	6.50	18.5	673	--	0.9	350	14.	1.5	13.9
105	03-07-89	4400	6.30	19.0	--	--	--	--	0.76	1.0	--
105	03-07-89	3900	6.34	19.0	--	661	0.2	310	2.6	0.6	--
105	05-23-89	3610	6.51	21.5	640	--	0.8	280	13.	1.5	12.1
107	01-10-89	4180	4.07	17.5	--	0	--	--	3.8	0.6	--
107	03-07-89	--	3.72	18.5	--	0	<0.1	440	3.0	0.9	--
107	05-23-89	4310	3.79	19.5	--	0	<0.1	440	4.2	0.6	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona; 320, University of Arizona Geosciences Department Laboratory, Tucson, Arizona. Fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LAB-ORA-TORY	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)
101	04-30-87	--	--	--	--	--	--	--	26	5.6	--
101	04-30-87	110	450	230	170	--	6400	190	--	--	--
101	04-30-87	320	--	--	--	--	--	--	--	--	--
101	06-14-88	10	520	320	180	7.9	7000	300	--	3.3	--
101	06-14-88	110	480	290	190	--	6600	360	24	--	--
101	06-14-88	310	--	--	--	--	--	--	--	--	3.2
101	01-10-89	10	--	--	--	--	--	--	--	--	--
101	01-10-89	110	460	250	180	--	6000	280	--	--	--
101	03-07-89	10	--	--	--	--	--	--	--	--	--
101	03-07-89	110	550	270	180	--	5800	350	--	--	--
101	05-23-89	110	340	190	150	--	5900	220	24	--	--
101	05-23-89	120	--	--	--	--	--	--	--	--	--
101	05-23-89	10	--	--	--	--	--	--	--	--	--
102	05-23-89	110	370	180	160	--	4700	210	21	--	--
102	05-23-89	10	--	--	--	--	--	--	--	--	--
103	06-14-88	10	--	--	--	--	--	--	--	--	--
103	06-14-88	110	520	180	150	--	3900	220	15	--	--
103	06-14-88	310	--	--	--	--	--	--	--	--	2.2
103	01-10-89	10	--	--	--	--	--	--	--	--	--
103	01-10-89	110	450	150	130	--	3500	190	--	--	--
103	03-07-89	10	--	--	--	--	--	--	--	--	--
103	03-07-89	110	460	140	120	--	3500	270	--	--	--
103	05-23-89	110	430	150	150	--	3200	170	13	--	--
103	05-23-89	10	--	--	--	--	--	--	--	--	--
104	06-14-88	10	--	--	--	--	--	--	--	1.4	--
104	06-14-88	110	440	110	95	--	1700	120	5.3	--	--
104	06-14-88	310	--	--	--	--	--	--	--	--	1.4
104	01-10-89	10	--	--	--	--	--	--	--	--	--
104	01-10-89	110	390	90	85	--	1900	120	5.8	--	--
105	06-14-88	10	--	--	--	--	--	--	--	1.9	--
105	06-14-88	110	570	150	270	--	1800	190	0.22	--	--
105	06-14-88	310	--	--	--	--	--	--	--	--	1.6
105	01-10-89	110	400	110	310	--	1500	180	--	--	--
105	03-07-89	110	530	150	320	--	1700	150	--	--	--
105	03-07-89	110	460	120	330	--	1300	130	--	--	--
105	05-23-89	120	--	--	--	--	--	--	--	--	--
105	05-23-89	110	380	110	380	--	1500	150	0.28	--	--
107	01-10-89	10	--	--	--	--	--	--	--	--	--
107	01-10-89	110	420	130	110	--	2800	160	10	--	--
107	03-07-89	110	410	120	120	--	2900	130	--	--	--
107	03-07-89	10	440	140	140	7.2	3300	33	--	--	--
107	05-23-89	110	410	130	130	--	3100	170	12	--	--
107	05-23-89	10	--	--	--	--	--	--	--	--	--

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

WELL	DATE	LAB-ORA-TORY	CARBON, INOR-GANIC, TOTAL (MG/L AS C) (00685)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IONIC BAL-ANCE PER-CENT)	IONIC STRE-NGTH (MOL/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	DENSITY (GM/ML AT 20 C) (71820)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)
101	04-30-87	--	53	--	--	--	--	1.008	--	--	--
101	04-30-87	110	--	--	5.1	0.296	--	--	--	--	--
101	04-30-87	320	--	--	--	--	--	--	--	--	--
101	06-14-88	10	--	87	-9.1	0.286	--	--	2.20	1.8	<0.100
101	06-14-88	110	--	110	2.2	0.303	--	--	--	--	--
101	06-14-88	310	--	--	--	--	--	--	--	--	--
101	01-10-89	10	56	--	--	--	--	--	--	--	--
101	01-10-89	110	--	97	0.6	0.269	--	--	--	--	--
101	03-07-89	10	59	--	--	--	--	--	--	--	--
101	03-07-89	110	--	120	6.1	0.279	--	--	--	--	--
101	05-23-89	110	--	74	-4.7	0.249	--	--	--	--	--
101	05-23-89	120	--	--	--	--	--	--	--	--	--
101	05-23-89	10	61	--	--	--	--	--	--	--	--
102	05-23-89	110	--	89	-3.0	0.200	--	--	--	--	--
102	05-23-89	10	55	--	--	--	--	--	--	--	--
103	06-14-88	10	40	--	--	--	--	--	--	--	--
103	06-14-88	110	--	110	2.7	0.180	--	--	--	--	--
103	06-14-88	310	--	--	--	--	--	--	--	--	--
103	01-10-89	10	39	--	--	--	--	--	--	--	--
103	01-10-89	110	--	96	-2.9	0.152	--	--	--	--	--
103	03-07-89	10	46	--	--	--	--	--	--	--	--
103	03-07-89	110	--	39	-3.4	0.153	--	--	--	--	--
103	05-23-89	110	--	94	2.2	0.144	--	--	--	--	--
103	05-23-89	10	38	--	--	--	--	--	--	--	--
104	06-14-88	10	28	--	--	--	--	--	--	--	--
104	06-14-88	110	--	86	5.8	0.081	--	--	--	--	--
104	06-14-88	310	--	--	--	--	--	--	--	--	--
104	01-10-89	10	--	--	--	--	--	--	--	--	--
104	01-10-89	110	--	75	-5.7	0.080	--	--	--	--	--
105	06-14-88	10	--	--	--	--	--	--	--	--	--
105	06-14-88	110	--	52	-1.2	0.094	--	--	--	--	--
105	06-14-88	310	--	--	--	--	--	--	--	--	--
105	01-10-89	110	--	46	-6.3	0.076	--	--	--	--	--
105	03-07-89	110	--	48	15	0.083	--	--	--	--	--
105	03-07-89	110	--	52	5.8	0.075	--	--	--	--	--
105	05-23-89	120	--	--	--	--	--	--	--	--	--
105	05-23-89	110	--	48	0.0	0.074	--	--	--	--	--
107	01-10-89	10	20	--	--	--	--	--	--	--	--
107	01-10-89	110	--	88	-0.4	0.121	--	--	--	--	--
107	03-07-89	110	--	91	-2.5	0.124	--	--	--	--	--
107	03-07-89	10	35	93	-1.3	0.137	--	--	--	--	--
107	05-23-89	110	--	80	-2.0	0.132	--	--	--	--	--
107	05-23-89	10	34	--	--	--	--	--	--	--	--

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

WELL	DATE	LAB-ORA-TORY	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ANTI-MONY, DIS-SOLVED (UG/L AS SB) (01095)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)
101	04-30-87	--	--	--	--	--	--	--	--	--	--
101	04-30-87	110	--	190000	--	--	--	--	--	400	--
101	04-30-87	320	--	--	--	--	--	--	--	--	--
101	06-14-88	10	<0.010	200000	<1	3	300	130	470	280	4
101	06-14-88	110	--	180000	--	--	--	--	--	710	--
101	06-14-88	310	--	--	--	--	--	--	--	--	--
101	01-10-89	10	--	--	--	--	--	--	--	--	--
101	01-10-89	110	--	180000	--	--	--	--	--	600	--
101	03-07-89	10	--	--	--	--	--	--	--	--	--
101	03-07-89	110	--	170000	--	--	--	--	--	900	--
101	05-23-89	110	--	140000	--	--	--	--	--	400	--
101	05-23-89	120	--	--	--	0.4	--	--	--	--	--
101	05-23-89	10	--	--	--	--	--	--	--	--	--
102	05-23-89	110	--	120000	--	--	--	--	--	400	--
102	05-23-89	10	--	--	--	--	--	--	--	--	--
103	06-14-88	10	--	--	--	--	--	--	--	--	--
103	06-14-88	110	--	86000	--	--	--	--	--	400	--
103	06-14-88	310	--	--	--	--	--	--	--	--	--
103	01-10-89	10	--	--	--	--	--	--	--	--	--
103	01-10-89	110	--	73000	--	--	--	--	--	200	--
103	03-07-89	10	--	--	--	--	--	--	--	--	--
103	03-07-89	110	--	65000	--	--	--	--	--	700	--
103	05-23-89	110	--	69000	--	--	--	--	--	200	--
103	05-23-89	10	--	--	--	--	--	--	--	--	--
104	06-14-88	10	--	--	--	--	--	--	--	--	--
104	06-14-88	110	--	11000	--	--	--	--	--	90	--
104	06-14-88	310	--	--	--	--	--	--	--	--	--
104	01-10-89	10	--	--	--	--	--	--	--	--	--
104	01-10-89	110	--	11000	--	--	--	--	--	<100	--
105	06-14-88	10	--	--	--	--	--	--	--	--	--
105	06-14-88	110	--	<1000	--	--	--	--	--	<100	--
105	06-14-88	310	--	--	--	--	--	--	--	--	--
105	01-10-89	110	--	<1000	--	--	--	--	--	<100	--
105	03-07-89	110	--	<1000	--	--	--	--	--	<100	--
105	03-07-89	110	--	<1000	--	--	--	--	--	<100	--
105	05-23-89	120	--	--	--	1	--	--	--	--	--
105	05-23-89	110	--	<1000	--	--	--	--	--	<100	--
107	01-10-89	10	--	--	--	--	--	--	--	--	--
107	01-10-89	110	--	41000	--	--	--	--	--	100	--
107	03-07-89	110	--	45000	--	--	--	--	--	250	--
107	03-07-89	10	--	57000	--	--	13	60	230	90	<20
107	05-23-89	110	--	50000	--	--	--	--	--	100	--
107	05-23-89	10	--	--	--	--	--	--	--	--	--

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

WELL	DATE	LABORATORY	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, (IV) DISSOLVED (UG/L AS SE)
101	04-30-87	--	1100	--	--	--	--	--	--	--	--
101	04-30-87	110	6700	110000	1600000	--	--	490000	--	1900	--
101	04-30-87	320	--	--	--	--	--	--	--	--	--
101	06-14-88	10	--	120000	1100000	--	450	60000	<1	2100	--
101	06-14-88	110	7400	120000	1990000	--	--	57000	--	2500	--
101	06-14-88	310	--	--	--	--	--	--	--	--	--
101	01-10-89	10	--	--	--	--	--	--	--	--	--
101	01-10-89	110	7600	110000	1610000	--	--	54000	--	2200	--
101	03-07-89	10	--	--	--	--	--	--	--	--	--
101	03-07-89	110	6300	110000	1840000	--	--	59000	--	2300	--
101	05-23-89	110	5000	76000	1660000	--	--	37000	--	1200	--
101	05-23-89	120	--	--	--	--	--	--	--	--	<0.5
101	05-23-89	10	--	--	--	--	--	--	--	--	--
102	05-23-89	110	4400	69000	1100000	--	--	37000	--	1700	--
102	05-23-89	10	--	--	--	--	--	--	--	--	--
103	06-14-88	10	--	--	--	--	--	--	--	--	--
103	06-14-88	110	3800	62000	900000	--	--	44000	--	1400	--
103	06-14-88	310	--	--	--	--	--	--	--	--	--
103	01-10-89	10	--	--	--	--	--	--	--	--	--
103	01-10-89	110	3400	48000	630000	--	--	42000	--	1200	--
103	03-07-89	10	--	--	--	--	--	--	--	--	--
103	03-07-89	110	2400	46000	690000	--	--	43000	--	1000	--
103	05-23-89	110	3000	44000	670000	--	--	39000	--	1200	--
103	05-23-89	10	--	--	--	--	--	--	--	--	--
104	06-14-88	10	--	--	--	--	--	--	--	--	--
104	06-14-88	110	1300	18000	160000	--	--	42000	--	740	--
104	06-14-88	310	--	--	--	--	--	--	--	--	--
104	01-10-89	10	--	--	--	--	--	--	--	--	--
104	01-10-89	110	1200	16000	150000	--	--	35000	--	700	--
105	06-14-88	10	--	--	--	--	--	--	--	--	--
105	06-14-88	110	<40	30	750	--	--	11000	--	<100	--
105	06-14-88	310	--	--	--	--	--	--	--	--	--
105	01-10-89	110	<40	50	80	--	--	4800	--	<100	--
105	03-07-89	110	<40	60	200	--	--	6800	--	<100	--
105	03-07-89	110	<40	60	100	--	--	5200	--	<100	--
105	05-23-89	120	--	--	--	--	--	--	--	--	<0.5
105	05-23-89	110	<40	<20	<40	--	--	3900	--	<100	--
107	01-10-89	10	--	--	--	--	--	--	--	--	--
107	01-10-89	110	2600	30000	490000	--	--	45000	--	970	--
107	03-07-89	110	2100	34000	500000	--	--	38000	--	920	--
107	03-07-89	10	--	36000	530000	<30	300	41000	<30	890	--
107	05-23-89	110	2100	37000	590000	--	--	39000	--	800	--
107	05-23-89	10	--	--	--	--	--	--	--	--	--

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

WELL	DATE	LAB-ORA-TORY	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	THAL-LIUM, DIS-SOLVED (UG/L AS TL) (01057)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ALPHA, DIS-SOLVED (PCI/L) (01503)	TRITIUM TOTAL (PCI/L) (07000)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
101	04-30-87	--	--	--	--	--	--	--	--	--
101	04-30-87	110	1100	--	--	150000	--	--	--	--
101	04-30-87	320	--	--	--	--	<3.5	--	--	--
101	06-14-88	10	1600	<1	45	15000	--	39	--	--
101	06-14-88	110	1500	--	--	17000	--	--	--	--
101	06-14-88	310	--	--	--	--	--	--	--	--
101	01-10-89	10	--	--	--	--	--	36	--	--
101	01-10-89	110	1600	--	--	14000	--	--	--	--
101	03-07-89	10	--	--	--	--	--	--	--	--
101	03-07-89	110	1700	--	--	17000	--	--	--	--
101	05-23-89	110	1200	--	--	9400	--	--	--	--
101	05-23-89	120	--	--	--	--	--	--	-54.0	-6.60
101	05-23-89	10	--	--	--	--	--	--	--	--
102	05-23-89	110	1400	--	--	8900	--	--	--	--
102	05-23-89	10	--	--	--	--	--	--	--	--
103	06-14-88	10	--	--	--	--	--	--	--	--
103	06-14-88	110	1600	--	--	8300	--	--	--	--
103	06-14-88	310	--	--	--	--	--	--	--	--
103	01-10-89	10	--	--	--	--	--	37	--	--
103	01-10-89	110	1600	--	--	6300	--	--	--	--
103	03-07-89	10	--	--	--	--	--	--	--	--
103	03-07-89	110	1400	--	--	6100	--	--	--	--
103	05-23-89	110	1500	--	--	5700	--	--	--	--
103	05-23-89	10	--	--	--	--	--	--	--	--
104	06-14-88	10	--	--	--	--	--	--	--	--
104	06-14-88	110	1800	--	--	2300	--	--	--	--
104	06-14-88	310	--	--	--	--	--	--	--	--
104	01-10-89	10	--	--	--	--	--	29	--	--
104	01-10-89	110	1600	--	--	2100	--	--	--	--
105	06-14-88	10	--	--	--	--	--	47	--	--
105	06-14-88	110	1500	--	--	40	--	--	--	--
105	06-14-88	310	--	--	--	--	--	--	--	--
105	01-10-89	110	1400	--	--	50	--	--	--	--
105	03-07-89	110	1500	--	--	90	--	--	--	--
105	03-07-89	110	1300	--	--	100	--	--	--	--
105	05-23-89	120	--	--	--	--	--	--	-60.0	-8.00
105	05-23-89	110	1400	--	--	<30	--	--	--	--
107	01-10-89	10	--	--	--	--	--	--	--	--
107	01-10-89	110	1700	--	--	4400	--	--	--	--
107	03-07-89	110	1400	--	--	4900	--	--	--	--
107	03-07-89	10	1600	--	71	4500	--	--	--	--
107	05-23-89	110	1400	--	--	5100	--	--	--	--
107	05-23-89	10	--	--	--	--	--	--	--	--

GROUND WATER--Continued
WELL GROUP 100--Continued
WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records were provided by the U.S. Environmental Protection Agency.

LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown. Filter-pore size of 635 represents slot width of well screen. These samples were otherwise unfiltered.

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WELL	DATE	SAMPLE NUMBERS	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXIDATION REDUCTION POTENTIAL (MV) (00090)
101	03-07-89	1-8	3.0	0.5		18.4	7100	3.6	<0.1	--	0	420
104	06-14-88	1-6	0.76	1.2	--	23.0	3020	3.9	0.1	--	0	440
	06-14-88	7-12	15.	0.4	--	18.0	3180	3.7	0.6	--	0	430
105	06-14-88	1-5	1.1	1.0	--	23.5	4400	6.4	0.2	--	--	240
	06-14-88	6-13	15.	1.1	13.3	19.0	4070	6.2	0.3	--	--	260
	03-07-89	1-4	0.76	1.0	--	19.0	4400	6.3	--	--	--	--
	03-07-89	5-8	2.6	0.6	--	19.0	3900	6.3	0.2	--	661	310
107	03-07-89	1-6	3.0	0.9		18.5	--	3.7	<0.1	--	0	440

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE (99902)	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
101	03-07-89	1	1	0.1	462	241	175	6.5	--	--	157000	<100
	03-07-89	2	1	0.1	475	241	178	6.5	--	--	158000	<100
	03-07-89	3	1	0.4	483	246	190	6.9	--	--	161000	<100
	03-07-89	4	1	0.4	471	245	185	6.5	--	--	160000	<100
	03-07-89	5	1	5.	473	236	167	7.0	--	--	155000	<100
	03-07-89	6	1	5.	471	244	181	6.4	--	--	159000	<100
	03-07-89	7	1	635	469	240	180	7.2	--	--	157000	<100
	03-07-89	8	1	635	484	245	185	7.0	--	--	160000	<100
104	06-14-88	1	1	0.1	410	100	78	4.8	--	--	14000	<45
	06-14-88	2	1	0.4	410	90	59	3.8	--	--	12000	<41
	06-14-88	3	1	10.	400	95	66	4.7	--	--	12000	<42
	06-14-88	4	1	635	400	95	68	5.1	--	--	13000	<42
	06-14-88	5	2	0.4	440	110	73	7.6	--	--	13000	<46
	06-14-88	6	2	10.	470	120	92	8.8	1900	--	16000	<52
	06-14-88	7	1	0.1	410	100	83	4.8	1900	120	14000	<47
	06-14-88	8	1	10.	410	98	72	4.4	1900	120	14000	<46
	06-14-88	9	1	0.4	410	99	78	5.0	--	--	14000	<46
	06-14-88	10	2	0.03	420	97	59	5.0	--	--	12000	<50
	06-14-88	11	2	0.4	430	100	76	9.5	--	--	13000	<65
	06-14-88	12	2	10.	480	120	94	8.3	--	--	17000	<55

GROUND WATER--Continued
WELL GROUP 100--Continued
WATER QUALITY--EPA FILTRATION STUDY--Continued

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
105	06-14-88	1	1	0.4	740	200	140	16	--	--	<10	<20
	06-14-88	2	1	10.	760	210	160	16	--	--	900	<24
	06-14-88	3	2	0.4	760	200	160	20	--	--	2600	<21
	06-14-88	4	2	10.	800	210	120	15	1800	110	1200	<22
	06-14-88	5	2	635	790	200	130	16	--	--	1200	<22
	06-14-88	6	1	0.1	560	150	290	19	--	--	30	<14
	06-14-88	7	1	0.4	560	150	290	19	--	--	40	<21
	06-14-88	8	1	10.	570	150	280	18	--	--	1300	<21
	06-14-88	9	1	635	580	140	200	16	2200	--	2700	<12
	06-14-88	10	2	0.1	580	140	160	14	--	--	30	<12
	06-14-88	11	2	0.4	600	140	150	14	--	--	200	<14
	06-14-88	12	2	0.4	600	140	150	14	--	--	80	<14
	06-14-88	13	2	635	620	150	140	14	--	--	980	<14
	03-07-89	1	1	0.1	551	151	315	32.8	--	--	<400	<100
	03-07-89	2	1	0.4	579	149	309	39.6	--	--	<400	<100
	03-07-89	3	1	5.	588	164	380	37.9	--	--	<400	<100
	03-07-89	4	1	635	590	165	381	38.7	--	--	<400	<100
	03-07-89	5	1	0.1	473	117	295	34.9	--	--	<400	<100
	03-07-89	6	1	0.4	478	117	300	37.1	--	--	<400	<100
	03-07-89	7	1	5.	479	128	361	35.5	--	--	<400	<100
	03-07-89	8	1	635	499	133	368	35.3	--	--	<400	<100
107	03-07-89	1	2	0.1	446	124	107	14.7	--	--	50300	<100
	03-07-89	2	2	0.1	452	126	110	15.1	--	--	51000	<100
	03-07-89	3	2	0.4	454	129	116	14.5	--	--	52800	<100
	03-07-89	4	2	0.4	450	127	112	14.2	--	--	50900	<100
	03-07-89	5	2	5.	464	145	141	5.0	--	--	56000	<100
	03-07-89	6	2	635	451	141	133	6.0	--	--	54500	<100

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
101	03-07-89	1	<70	190	990	92000	1440000	<100	420	49000	1800	1500	14000
	03-07-89	2	<70	190	1000	94000	1470000	<100	430	50000	1900	1600	15000
	03-07-89	3	<70	190	1000	95000	1490000	<100	450	51000	1900	1600	15000
	03-07-89	4	<70	190	1000	94000	1470000	<100	450	50000	1900	1600	14000
	03-07-89	5	<70	190	1000	92000	1460000	<100	420	50000	1900	1500	16000
	03-07-89	6	<70	190	1000	94000	1470000	<100	440	50000	1900	1600	14000
	03-07-89	7	<70	190	990	93000	1460000	<100	440	49000	1900	1500	15000
	03-07-89	8	<70	200	1000	95000	1490000	<100	440	51000	1900	1600	16000
104	06-14-88	1	<40	18	700	17000	160000	<16	50	41000	640	1700	2200
	06-14-88	2	<40	16	630	15000	140000	<15	40	37000	580	1700	2000
	06-14-88	3	<40	17	680	16000	160000	<10	140	41000	620	1700	2100
	06-14-88	4	<40	18	680	16000	150000	<10	140	41000	630	1700	2100
	06-14-88	5	<50	24	720	16000	160000	35	160	42000	680	1900	2600

GROUND WATER--Continued
WELL GROUP 100--Continued
WATER QUALITY--EPA FILTRATION STUDY--Continued

WELL	DATE	SAMPLE NUMBER	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
	06-14-88	6	<10	26	780	18000	180000	<21	180	46000	730	2000	2600
	06-14-88	7	<40	20	710	17000	160000	<16	130	41000	650	1800	2300
	06-14-88	8	<40	22	700	17000	160000	<16	<22	40000	650	1700	2300
	06-14-88	9	<40	23	700	17000	160000	<16	110	41000	640	1700	2200
	06-14-88	10	1000	18	700	16000	150000	<10	150	41000	640	1800	2400
	06-14-88	11	290	11	740	17000	160000	<71	170	43000	640	1900	1900
	06-14-88	12	<10	25	820	19000	180000	<22	190	48000	750	2000	2600
105	06-14-88	1	20	<10	40	20	1800	<9	170	19000	27	2000	<6
	06-14-88	2	60	<1	40	37	2400	<14	80	19000	25	2000	50
	06-14-88	3	50	4	40	23	2900	45	180	19000	36	2200	320
	06-14-88	4	<10	<1	40	94	4000	<7	170	20000	31	2100	140
	06-14-88	5	<10	<1	40	22	2600	<7	180	20000	25	2100	310
	06-14-88	6	120	<11	20	44	260	<14	110	11000	17	1500	22
	06-14-88	7	100	1	20	41	290	<14	70	11000	16	1600	24
	06-14-88	8	100	<1	10	<35	1000	14	100	11000	17	1600	26
	06-14-88	9	880	<1	10	19	1600	3	130	12000	16	1500	20
	06-14-88	10	130	1	10	54	490	<7	120	11000	30	1600	810
	06-14-88	11	80	<0	20	120	2800	20	110	12000	29	1500	460
	06-14-88	12	70	<0	10	81	1500	<15	110	11000	24	1500	130
	06-14-88	13	70	<0	10	7	930	3	100	12000	19	1500	56
	03-07-89	1	<50	<10	50	<40	<400	<80	300	6500	<40	1600	1400
	03-07-89	2	<50	<10	<40	<40	<400	<80	300	6600	<40	1600	700
	03-07-89	3	<50	<10	<40	<40	<400	<80	260	6900	<40	1700	1500
	03-07-89	4	<50	<10	<40	<40	<400	<80	250	6900	<40	1700	1900
	03-07-89	5	<40	<10	<40	40	<400	<80	270	5000	<40	1400	780
	03-07-89	6	<40	<10	<40	<40	<400	<80	270	5000	<40	1400	860
	03-07-89	7	<400	<10	100	<40	<400	<80	270	5100	<40	1400	1400
	03-07-89	8	<400	<10	<40	<40	<400	<80	220	5400	<40	1500	1400
107	03-07-89	1	<50	60	68	31000	51000	<80	300	40000	930	1400	7600
	03-07-89	2	<50	60	710	32000	51000	<80	310	40000	920	1400	5200
	03-07-89	3	<50	70	680	33000	53000	<80	310	40000	940	1500	5400
	03-07-89	4	<50	60	690	32000	52000	<80	310	40000	960	1400	6800
	03-07-89	5	<50	60	740	37000	54000	<80	270	44000	1000	1600	8200
	03-07-89	6	<50	60	720	36000	52000	<80	270	42000	970	1600	9200

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.

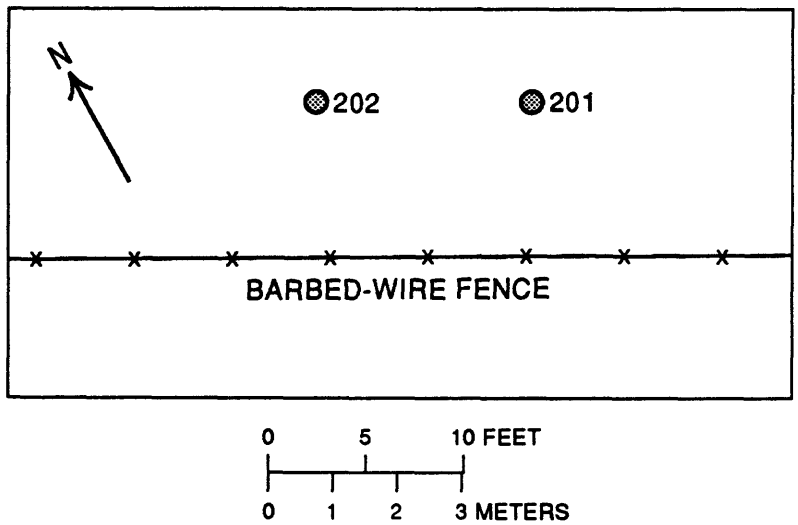
DRILLING AND WELL CONSTRUCTION

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, polyvinyl chloride pipe. Each well has a single 0.9-meter length of slotted, 10-centimeter diameter, schedule 80, polyvinyl chloride 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. The wells were developed by jetting high-pressure air horizontally through the screen to agitate the formation and airlift water and sediment until no further visible sediment was removed.

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

WELL	DATE COMPLE-TED	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	--

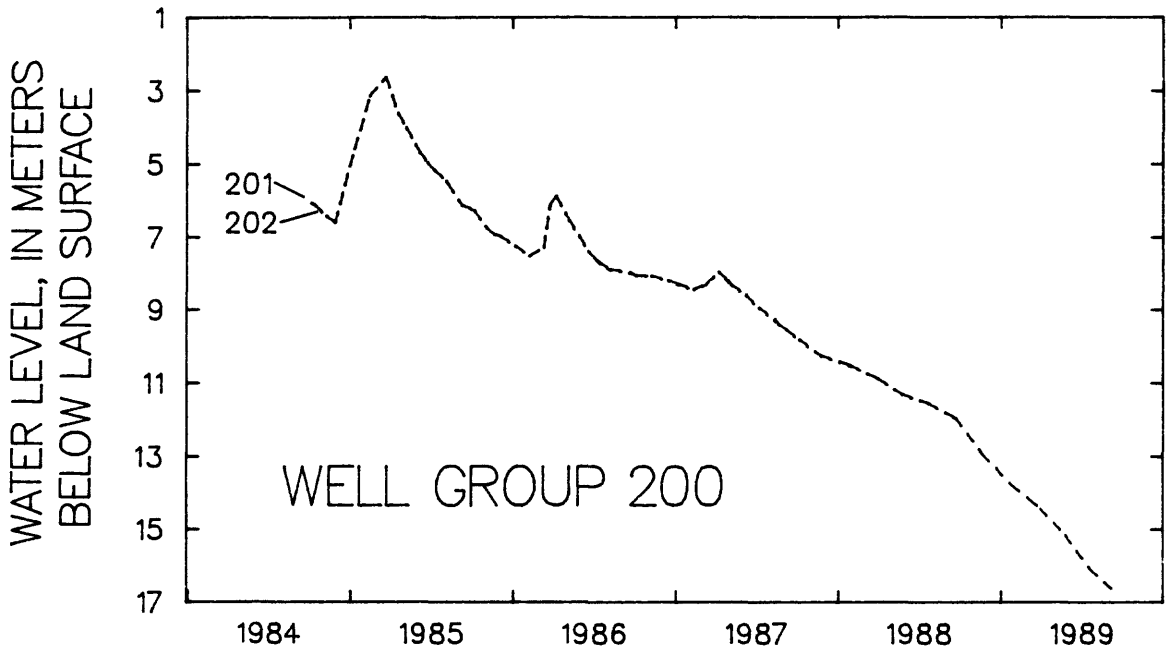
SITE PLAN



WATER LEVEL, IN METERS BELOW LAND SURFACE

DATE	---WELL NUMBER--- 201	202	DATE	---WELL NUMBER--- 201	202
10-06-87	9.81	9.84	11-21-88	12.94	--
11-23-87	10.24	10.26	01-26-89	13.79	--
01-27-88	10.51	10.53	03-08-89	14.17	--
03-31-88	10.88	10.88	03-31-89	14.43	--
05-23-88	11.30	11.31	05-26-89	15.16	--
07-21-88	11.54	11.55	07-21-89	16.09	--
09-21-88	11.95	11.97	09-21-89	16.79	--

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



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
201	03-08-89	1170	7.06	18.5	206	--	8.0	340	2.3	0.4	--

WATER QUALITY--LABORATORY MEASUREMENTS

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVE (MG/L AS CL (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IONIC BALANCE (PERCENT)	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)
201	03-08-89	110	170	23	46	430	21	0.19	25	-2.0	0.022	715

WELL	DATE	LABORATORY	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
201	03-08-89	110	<500	<50	<20	<10	40	50	<50	470	30

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

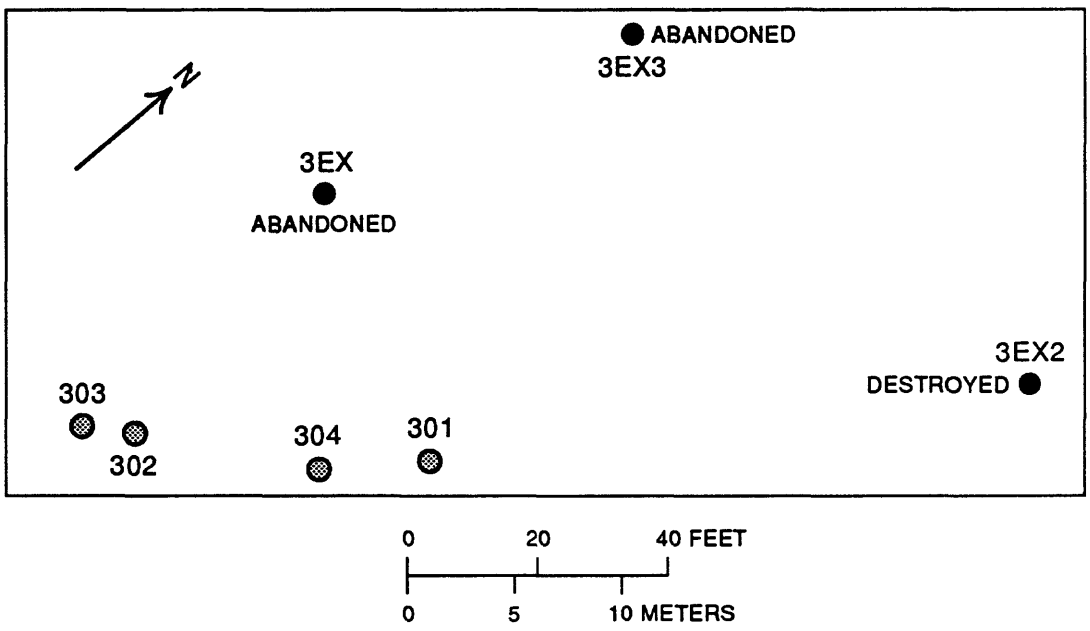
All holes for which well depth is listed below were cased with nominal 10-centimeter-diameter, schedule 40, polyvinyl chloride pipe. Each well has a single 0.9-meter long slotted, 10-centimeter-diameter, schedule 80, polyvinyl chloride pipe as the well screen. Each screen has 1,470 factory-cut slots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

Wells 3EX, 3EX2, and 3EX3 were drilled for exploration purposes. After water samples and cuttings were collected, 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.

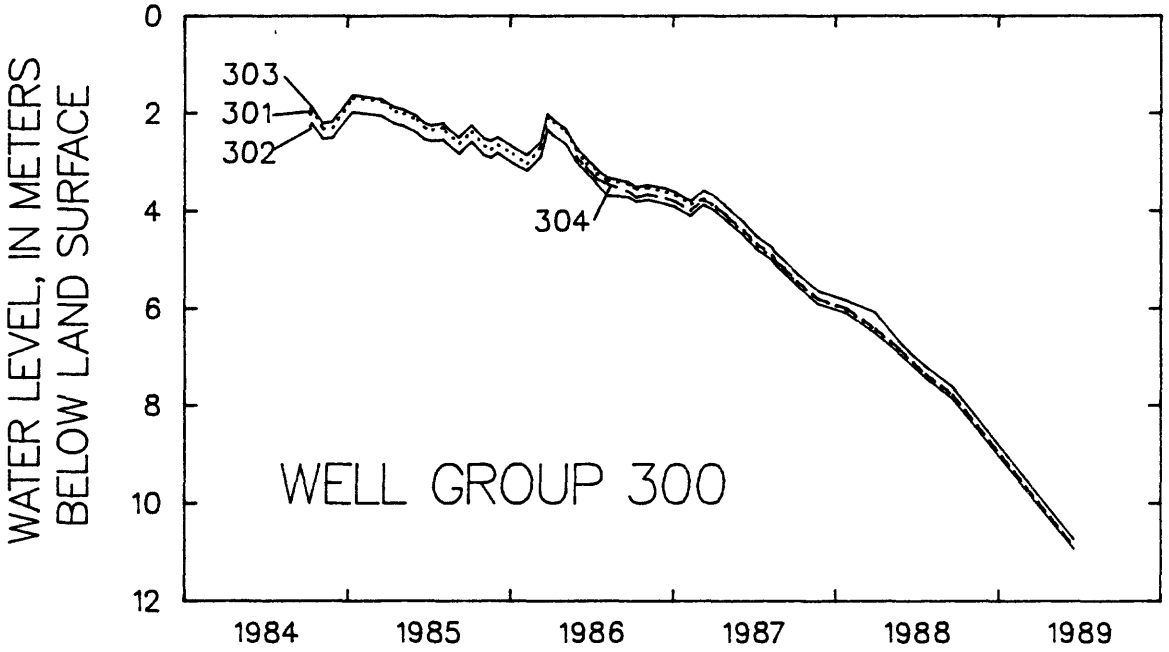
	DATE COMPLE-TED	DRILLING METHOD	HOLE DEPTH meters	WELL DEPTH meters	SCREENED INTERVAL (meters)	GEOLOGIC UNIT	BOTTOM OF SEAL (meters)	LOGS AVAILABLE
301	10-07-84	ROTARY, BENTONITE	59.4	59.1	58.1-59.0	BASIN FILL	3	CEGPU
302	10-08-84	ROTARY, BENTONITE	36.0	35.8	34.8-35.7	ALLUVIUM	3	--
303	10-08-84	ROTARY, 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

DATE	301	302	303	304	DATE	301	302	303	304
10-06-87	5.48	5.53	5.28	5.44	06-16-88	--	--	6.90	--
11-23-87	5.80	5.90	5.64	5.80	07-21-88	7.37	7.43	7.19	7.35
01-27-88	6.03	6.10	5.84	6.00	09-21-88	7.80	7.87	7.63	7.78
03-31-88	6.44	6.51	6.08	6.41	06-19-89	10.89	10.93	10.73	10.87



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
303	06-16-88	3240	4.19	19.0	0	--	--	370	24.	0.2	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona. Fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, INORGANIC, TOTAL (MG/L AS C) (00685)
303	06-16-88	10	--	--	--	--	--	--	1.1	--	20
303	06-16-88	110	430	110	92	2000	77	4.7	--	--	--
303	06-16-88	310	--	--	--	--	--	--	--	1.3	--

WELL	DATE	LABORATORY	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IONIC BALANCE (PERCENT)	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)
303	06-16-88	10	--	--	--	--	--	--	--
303	06-16-88	110	78	-0.6	0.085	--	4000	100	1400
303	06-16-88	310	--	--	--	--	--	--	--

WELL	DATE	LABORATORY	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
303	06-16-88	10	--	--	--	--	--	--
303	06-16-88	110	18000	180000	39000	810	1600	2800
303	06-16-88	310	--	--	--	--	--	--

GROUND WATER--Continued
WELL GROUP 300--Continued
WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records provided by the U.S. Environmental Protection Agency.

LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SAMPLE NUMBERS	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXIDATION REDUCTION POTENTIAL (MV) (00090)
303	06-16-88	1-6	0.76	0.6	--	24.0	3210	4.2	--	--	0	390
	06-16-88	7-12	24.	0.2	--	19.0	3240	4.2	--	--	0	370

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
303	06-16-88	1	1	0.1	400	98	69	6.1	--	--	7700	35
	06-16-88	2	1	0.4	400	98	68	5.9	--	--	7500	36
	06-16-88	3	1	10.	440	110	84	8.7	--	--	8700	120
	06-16-88	4	2	0.1	460	110	79	8.7	--	--	9200	44
	06-16-88	5	2	0.4	490	120	94	7.8	2000	--	9700	48
	06-16-88	6	2	10.	510	120	99	11	--	--	9800	50
	06-16-88	7	1	0.1	390	91	57	4.7	--	--	6700	<38
	06-16-88	8	1	0.4	420	100	67	5.5	--	--	7600	<41
	06-16-88	9	1	0.4	430	100	69	5.9	--	--	76000	<42
	06-16-88	10	1	10.	490	120	93	9.8	--	--	9900	<50
	06-16-88	11	2	0.1	470	110	74	7.5	--	--	8900	<46
	06-16-88	12	2	0.4	520	130	100	12	2000	--	9300	<51

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
303	06-16-88	1	<50	16	700	16000	180000	14	150	38000	700	1600	2600
	06-16-88	2	<50	15	690	15000	180000	7	140	37000	700	1600	2500
	06-16-88	3	70	6	730	17000	190000	<160	180	41000	800	1700	2900
	06-16-88	4	<20	19	800	18000	210000	15	190	43000	830	1800	3700
	06-16-88	5	<20	19	820	19000	220000	<17	190	45000	840	1800	3100
	06-16-88	6	<9	23	860	19000	220000	<20	200	46000	860	1900	3300
	06-16-88	7	<50	17	680	15000	170000	<5	120	38000	690	1400	2800
	06-16-88	8	<50	19	750	17000	190000	<11	140	41000	750	1600	3300
	06-16-88	9	<50	19	750	17000	190000	<5	150	41000	740	1600	2700
	06-16-88	10	<10	24	860	19000	210000	20	190	46000	880	1900	4100
	06-16-88	11	<20	20	830	18000	210000	10	180	44000	840	1800	3900
	06-16-88	12	<9	23	880	18000	200000	35	190	45000	870	1900	3400

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, polyvinyl chloride pipe. Each well has a single 0.9-meter long slotted, 10-centimeter-diameter, schedule 80, polyvinyl chloride 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.

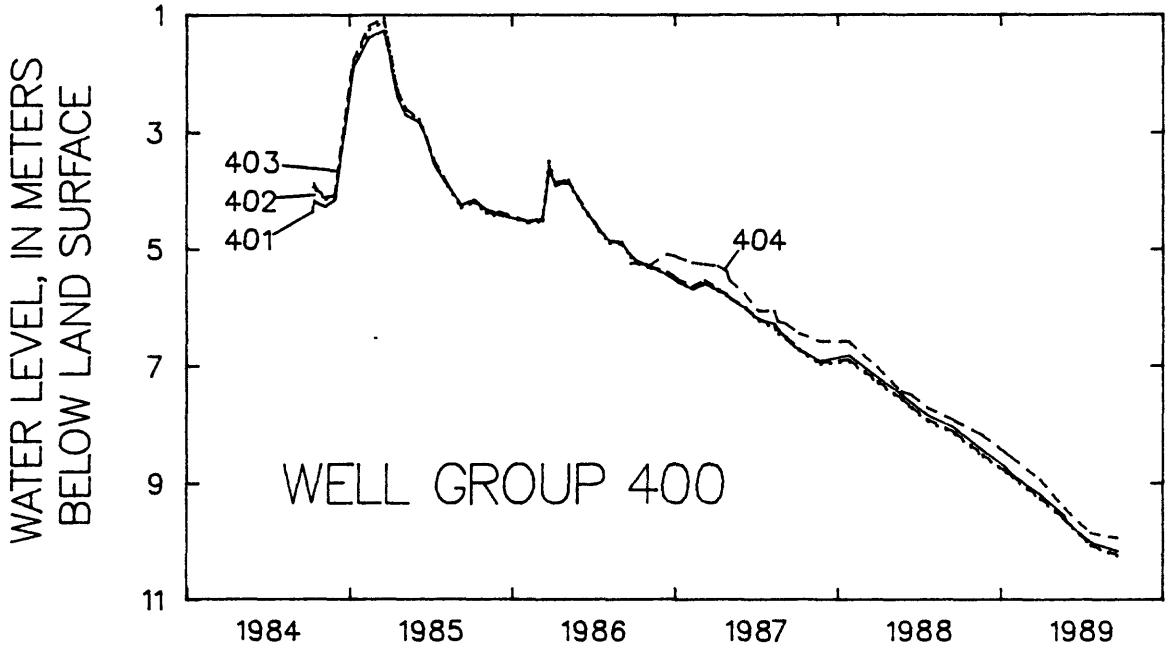
WELL	DATE COMPLETED	DRILLING METHOD	HOLE DEPTH (meters)	WELL DEPTH (meters)	SCREENED INTERVAL (meters)	GEOLOGIC UNIT	BOTTOM OF SEAL (meters)	LOGS AVAILABLE
401	10-09-84	ROTARY, BENTONITE	34.4	34.2	33.2-34.1	BASIN FILL	3	CEGP
402	10-10-84	ROTARY, BENTONITE	21.0	20.9	19.8-20.7	ALLUVIUM	3	--
403	10-10-84	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

DATE	WELL NUMBER 401	402	403	404	DATE	WELL NUMBER 401	402	403	404
10-06-87	6.73	6.73	6.70	6.44	11-21-88	8.43	8.53	8.50	8.17
11-23-87	6.92	6.97	6.94	6.58	01-12-89	8.72	8.81	8.79	8.47
01-27-88	6.82	6.92	6.89	6.58	01-26-89	8.85	8.89	8.87	8.55
03-31-88	7.20	7.29	7.26	7.02	03-31-89	9.19	9.27	9.24	8.93
05-23-88	7.48	7.57	7.55	7.43	05-25-89	9.56	9.63	9.61	9.42
06-15-88	7.63	7.72	7.70	7.49	05-26-89	9.65	9.64	9.61	9.43
07-21-88	7.84	7.94	7.91	7.71	07-21-89	10.01	10.07	10.06	9.85
09-21-88	8.06	8.16	8.13	7.93	09-21-89	10.17	10.25	10.23	9.94

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



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
401	01-12-89	3690	4.87	18.0	20	--	2.4	410	53.	0.4	2.6
401	05-25-89	4210	4.60	18.0	--	1	0.3	370	38.	0.6	--
402	06-15-88	4730	3.93	19.0	--	0	0.2	360	15.	0.2	0.1
402	01-12-89	4600	4.13	18.0	--	0	0.3	470	27.	0.3	0.1
402	05-25-89	4550	4.07	18.0	--	0	<0.1	400	22.	0.5	--
403	06-15-88	3260	4.92	19.0	15	--	0.1	380	27.	0.4	--
403	05-25-89	3520	4.63	19.5	--	--	<0.1	400	4.2	0.7	--
404	11-07-86	530	7.62	18.5	--	218	8.3	--	15.	0.8	11.7
404	06-15-88	460	7.41	19.5	210	--	5.6	280	19.	0.9	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona; 320, University of Arizona Geosciences Department Laboratory, Tucson, Arizona. Fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, INORGANIC, TOTAL (MG/L AS C) (00685)
401	01-12-89	10	--	--	--	--	--	--	--	--	55
401	01-12-89	110	340	120	90	2600	110	9.5	--	--	--
401	05-25-89	110	430	180	120	3100	130	12	--	--	--
401	05-25-89	10	--	--	--	--	--	--	--	--	62
401	05-25-89	120	--	--	--	--	--	--	--	--	--
402	06-15-88	10	--	--	--	--	--	--	--	--	47
402	06-15-88	110	530	190	120	3300	150	10	--	--	--
402	06-15-88	310	--	--	--	--	--	--	--	1.8	--
402	01-12-89	10	--	--	--	--	--	--	--	--	50
402	01-12-89	110	500	160	120	3300	140	--	--	--	--
402	05-25-89	110	410	160	110	3300	140	12	--	--	--
402	05-25-89	10	--	--	--	--	--	--	--	--	57
402	05-25-89	120	--	--	--	--	--	--	--	--	--
403	06-15-88	10	--	--	--	--	--	--	1.0	--	--
403	06-15-88	110	550	120	79	2000	58	2.0	--	--	--
403	06-15-88	310	--	--	--	--	--	--	--	1.2	--
403	05-25-89	110	540	140	98	2000	95	2.7	--	--	--
403	05-25-89	120	--	--	--	--	--	--	--	--	--
404	11-07-86	--	49	16	41	72	13	0.50	--	--	--
404	11-07-86	110	56	17	42	89	12	--	--	--	--
404	11-07-86	320	--	--	--	--	--	--	--	--	--
404	06-15-88	10	--	--	--	--	--	--	0.6	--	--
404	06-15-88	110	42	14	26	14	7.6	0.52	--	--	--
404	06-15-88	310	--	--	--	--	--	--	--	0.3	--

WELL	DATE	LABORATORY	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IONIC BALANCE (PERCENT)	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ANTIMONY, DISSOLVED (UG/L AS SB) (01095)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM DISSOLVED (UG/L AS CD) (01025)
401	01-12-89	10	--	--	--	--	--	--	--	--	--
401	01-12-89	110	62	-5.6	0.106	--	15000	--	--	--	200
401	05-25-89	110	75	3.4	0.136	--	23000	--	--	--	200
401	05-25-89	10	--	--	--	--	--	--	--	--	--
401	05-25-89	120	--	--	--	--	--	--	0.2	--	--
402	06-15-88	10	--	--	--	--	--	<1	1	100	50
402	06-15-88	110	84	-0.6	0.143	--	15000	--	--	--	200
402	06-15-88	310	--	--	--	--	--	--	--	--	--
402	01-12-89	10	--	--	--	--	--	--	--	--	--
402	01-12-89	110	86	-0.7	0.139	--	18000	--	--	--	200

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

WELL	DATE	LAB-ORA-TORY	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IONIC BAL-ANCE (PER-CENT)	IONIC STRE-NGTH (MOL/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ANTI-MONY, DIS-SOLVED (UG/L AS SB) (01095)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)
402	05-25-89	110	72	-6.0	0.135	--	19000	--	--	--	200
402	05-25-89	10	--	--	--	--	--	--	--	--	--
402	05-25-89	120	--	--	--	--	--	--	--	--	--
403	06-15-88	10	--	--	--	--	--	--	--	--	--
403	06-15-88	110	46	-1.7	0.084	--	<1000	--	--	--	<100
403	06-15-88	310	--	--	--	--	--	--	--	--	--
403	05-25-89	110	54	2.9	0.086	--	<1000	--	--	--	<100
403	05-25-89	120	--	--	--	--	--	--	--	--	--
404	11-07-86	--	25	1.6	0.008	327	20	--	--	17	<1
404	11-07-86	110	28	2.4	0.009	--	<80	--	--	--	<50
404	11-07-86	320	--	--	--	--	--	--	--	--	--
404	06-15-88	10	--	--	--	--	--	--	--	--	--
404	06-15-88	110	26	5.1	0.006	--	<500	--	--	--	<50
404	06-15-88	310	--	--	--	--	--	--	--	--	--

WELL	DATE	LAB-ORA-TORY	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM (IV), DIS-OLVED (UG/L AS SE)
401	01-12-89	10	--	--	--	--	--	--	--	--
401	01-12-89	110	--	3100	27000	460000	--	54000	1200	--
401	05-25-89	110	--	3100	33000	690000	--	60000	1300	--
401	05-25-89	10	--	--	--	--	--	--	--	--
401	05-25-89	120	--	--	--	--	--	--	--	<0.5
402	06-15-88	10	2	--	--	430000	<100	70000	--	--
402	06-15-88	110	--	2800	34000	580000	--	62000	1500	--
402	06-15-88	310	--	--	--	--	--	--	--	--
402	01-12-89	10	--	--	--	--	--	--	--	--
402	01-12-89	110	--	4100	36000	590000	--	72000	1600	--
402	05-25-89	110	--	2600	29000	600000	--	51000	1200	--
402	05-25-89	10	--	--	--	--	--	--	--	--
402	05-25-89	120	--	--	--	--	--	--	--	--
403	06-15-88	10	--	--	--	--	--	--	--	--
403	06-15-88	110	--	470	2300	2700	--	37000	500	--
403	06-15-88	310	--	--	--	--	--	--	--	--
403	05-25-89	110	--	660	3400	36000	--	46000	800	--
403	05-25-89	120	--	--	--	--	--	--	--	--
404	11-07-86	--	--	4	10	5	<10	680	--	--
404	11-07-86	110	--	<20	<10	<20	--	760	90	--
404	11-07-86	320	--	--	--	--	--	--	--	--
404	06-15-88	10	--	--	--	--	--	--	--	--
404	06-15-88	110	--	<20	<10	<20	--	<30	<50	--
404	06-15-88	310	--	--	--	--	--	--	--	--

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

WELL	DATE	LAB-ORA-TORY	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ALPHA, DIS-SOLVED (PCI/L) (01503)	TRITIUM TOTAL (PCI/L) (07000)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
401	01-12-89	10	--	--	--	--	28	--	--
401	01-12-89	110	--	1800	3400	--	--	--	--
401	05-25-89	110	--	2100	4700	--	--	--	--
401	05-25-89	10	--	--	--	--	--	--	--
401	05-25-89	120	--	--	--	--	--	--	--
402	06-15-88	10	<1.0	--	4300	--	--	--	--
402	06-15-88	110	--	2200	4700	--	--	--	--
402	06-15-88	310	--	--	--	--	--	--	--
402	01-12-89	10	--	--	--	--	--	--	--
402	01-12-89	110	--	2300	5000	--	--	--	--
402	05-25-89	110	--	1700	4400	--	--	--	--
402	05-25-89	10	--	--	--	--	38	--	--
402	05-25-89	120	--	--	--	--	--	-57.0	-7.40
403	06-15-88	10	--	--	--	--	--	--	--
403	06-15-88	110	--	1900	1100	--	--	--	--
403	06-15-88	310	--	--	--	--	--	--	--
403	05-25-89	110	--	2100	1800	--	--	--	--
403	05-25-89	120	--	--	--	--	--	--	--
404	11-07-86	--	--	320	<3	--	--	--	--
404	11-07-86	110	--	340	<15	--	--	--	--
404	11-07-86	320	--	--	--	<3.5	--	--	--
404	06-15-88	10	--	--	--	--	0.5	--	--
404	06-15-88	110	--	260	<15	--	--	--	--
404	06-15-88	310	--	--	--	--	--	--	--

GROUND WATER--Continued
WELL GROUP 400--Continued
WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records were provided by the U.S. Environmental Protection Agency.
LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown. Filter-pore size of 635 represents slot width of well screen. These samples were otherwise unfiltered.

WELL	DATE	SAMPLE NUMBERS	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXIDATION REDUCTION POTENTIAL (MV) (00090)
403	06-15-88	1-7	0.76	1.0	--	24.5	3200	5.1	0.2	--	--	400
	06-15-88	8-12	27.	0.4	--	19.0	3260	4.9	0.1	--	--	380

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
403	06-15-88	1	1	0.1	530	130	68	5.6	--	--	1200	<31
	06-15-88	2	1	0.4	530	110	69	5.5	--	--	1900	<31
	06-15-88	3	1	10.	550	120	61	6.6	--	--	1200	<36
	06-15-88	4	1	635	530	110	72	5.5	--	--	1200	<31
	06-15-88	5	2	0.4	630	130	80	8.5	--	--	2100	<44
	06-15-88	6	2	0.4	660	140	90	8.8	--	--	2000	<45
	06-15-88	7	2	10.	650	140	89	8.2	1900	--	1300	<42
	06-15-88	8	1	0.1	540	110	75	5.9	--	--	1600	<34
	06-15-88	9	1	0.4	550	110	56	4.3	--	--	1500	<39
	06-15-88	10	1	635	600	120	38	4.3	--	--	1200	<43
	06-15-88	11	2	0.4	600	130	70	6.4	--	--	2000	<43
	06-15-88	12	2	10.	670	140	92	9.3	1900	--	2000	<48

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
403	06-15-88	1	40	10	360	1600	450	<5	60	35000	410	1900	900
	06-15-88	2	20	11	360	2100	6600	<5	70	35000	420	1900	950
	06-15-88	3	20	15	370	1600	1200	61	70	35000	440	2000	1600
	06-15-88	4	40	11	360	1700	320	2	70	35000	410	2000	910
	06-15-88	5	90	17	530	2900	14000	52	80	40000	520	2200	1300
	06-15-88	6	50	18	580	2600	9200	32	80	41000	520	2300	1800
	06-15-88	7	<10	15	410	1700	1000	19	80	41000	510	2300	1200
	06-15-88	8	30	12	450	2300	850	<5	80	39000	450	2000	1100
	06-15-88	9	30	13	470	2200	1900	<2	60	40000	460	1900	1000
	06-15-88	10	40	7	490	1900	130	<15	40	41000	480	1800	1100
	06-15-88	11	<20	14	520	2500	1900	<6	80	43000	530	2200	1900
	06-15-88	12	20	17	660	2800	2900	<19	90	46000	570	2300	1500

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).

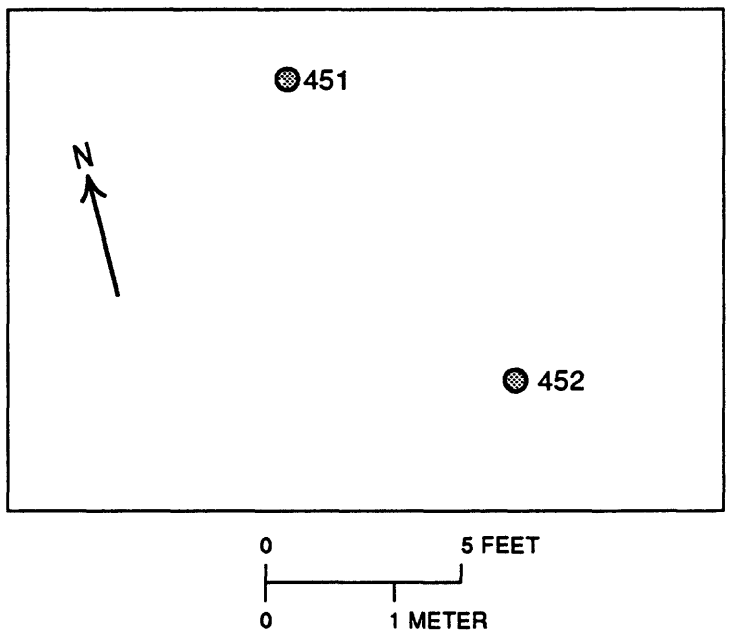
DRILLING AND WELL CONSTRUCTION

Each well was cased with nominal 10-centimeter-diameter, schedule 40 polyvinyl chloride pipe. Well 451 has a 2.9-meter long slotted, 10-centimeter-diameter, schedule 80, polyvinyl chloride 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 476 cm^2. Well 452 has a 3.0-meter long slotted, 10-centimeter-diameter, schedule 40, polyvinyl chloride 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. The borehole annulus around each screen is filled with washed pea gravel from uncontaminated local alluvium. In well 451, 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 on the collapsed material. A concrete seal extends from the land surface to a depth of 3 m. In well 452, sand was backfilled 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 on the backfilled sand. A concrete seal extends from the land surface to a depth of 1.8 m

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

WELL	DATE COMPLE-TED	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

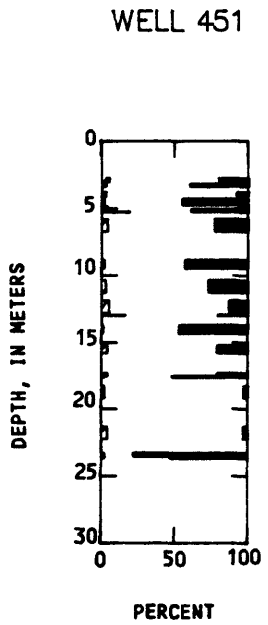
SITE PLAN

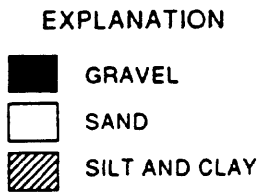


GROUND WATER--Continued
WELL GROUP 450--Continued
LOG INFORMATION

Well 451

Summary of geologist log:	Thickness (m)	Bottom of depth interval (m)
Sand, brown, medium grained; is coarser and includes gravel in lower half of interval; silty layer about 0.03 m thick at 0.1 m depth; maximum clast size 63.5 mm	1.0	1.0
No sample	0.2	1.2
Sand, brown to light brown; mostly loose, coarse grained; maximum clast size 89 mm; contains subrounded cobbles above 3.9 mm; firm sand and gravel at bottom of interval; no samples 3.9-4.3 m	4.1	5.3
No sample	0.5	5.8
Sand, coarser intervals gray-brown, finer intervals brown; loose, saturated; contains interbeds of medium- to coarse-grained sand, minor amount of clay at 6.4 m	0.9	6.7
No sample	0.6	7.3
Sand, brown, loose, saturated, coarse grained; contains some subangular medium to large gravel	1.4	8.7
No sample	0.1	8.8
Sand, gray-brown, mostly loose, medium to coarse grained; contains gravel, maximum clast size 140 mm; contains some sticky mud near 9.3; scattered iron stains at 11.0 m, blacker from 11.4 to 11.5 m, contains thin green layer at 13 m; no samples 10.3-10.4, 11.5-12.2, 13.0-13.7 m	5.6	14.4
No sample	0.5	14.9
Sand and gravel, brown to gray-brown; sand is well sorted abvove 15.2 and below 16.4 m, poorly sorted otherwise; maximum clast size 152 mm	2.4	17.3
Sand, gray-brown, fine grained, loose; may contain manganese precipitate	0.2	17.5
Sand, coarse, contains large gravel; sticky clay and sand at bottom of interval	0.1	17.6
No sample, material recovered probably sloughed off from sides of hole	5.7	23.3
Sand and gravel, loose; sand coarse to medium grained; contains some sticky clay	0.4	23.7
Gravel, contains up to cobble-sized clasts; maximum clast size 102 mm	0.1	23.8
No sample	0.9	24.7

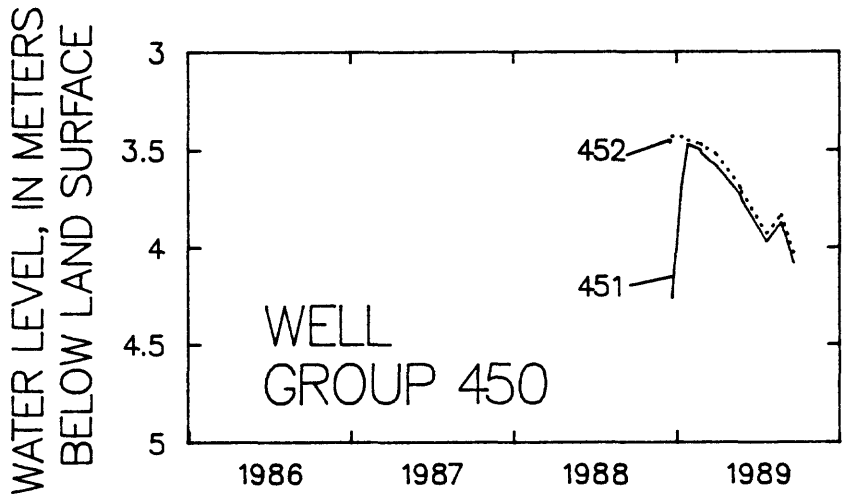




All intervals for which particle-size data are available contain at least 1-percent silt and gravel. Intervals that appear to contain only sand are intervals for which particle-size data are unavailable.

GROUND WATER--Continued
WELL GROUP 450--Continued
WATER LEVEL, IN METERS BELOW LAND SURFACE

DATE	--WELL NUMBER- 451	452
12-17-88	--	3.46
12-21-88	4.26	3.43
01-11-89	3.69	3.43
01-26-89	3.47	3.45
02-24-89	3.50	3.47
03-09-89	3.54	3.49
05-24-89	3.73	3.69
08-23-89	3.87	3.83
03-31-89	3.58	3.52
05-24-89	3.73	3.69
05-26-89	3.75	3.71
07-21-89	3.97	3.93
08-23-89	3.87	3.83
09-21-89	4.08	4.04



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXID-ATION RED-UCTION POTEN-TIAL (MV) (00090)	AVER-AGE DIS-CHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW-DOWN (M)
451	03-09-89	4060	4.94	19.0	15	--	<0.1	250	3.4	0.6	--
451	05-24-89	3980	4.58	18.5	--	--	<0.1	280	4.5	0.6	--
451	08-23-89	3920	4.26	18.5	--	0	<0.1	310	--	--	--
452	01-11-89	3760	6.01	18.5	113	--	0.4	430	16.	0.3	2.0
452	03-09-89	3700	5.58	18.0	66	--	<0.1	290	28.	0.3	0.3
452	05-24-89	3640	5.61	18.5	53	--	<0.1	350	16.	0.3	0.2
452	08-23-89	3320	5.40	19.5	--	37	<0.1	400	--	--	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona. Fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	CARBON, INORGANIC, TOTAL (MG/L AS C) (00685)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)
451	03-09-89	10	590	160	100	11	2300	120	9.4	--	77
451	03-09-89	110	590	130	82	--	2400	180	10	--	69
451	05-24-89	110	560	140	82	--	2600	120	--	--	94
451	05-24-89	10	--	--	--	--	--	--	--	56	--
451	05-24-89	120	--	--	--	--	--	--	--	--	--
451	08-23-89	10	--	--	--	--	--	--	--	51	--
451	08-23-89	110	560	170	100	--	2800	120	10	--	82
452	01-11-89	10	690	150	91	1.2	2400	90	3.3	--	56
452	01-11-89	110	620	130	92	--	2300	110	--	--	56
452	03-09-89	10	630	140	90	8.9	2500	110	4.2	--	55
452	03-09-89	110	560	130	80	--	2200	150	--	--	59
452	05-24-89	110	520	120	68	--	2100	97	--	--	71
452	05-24-89	10	--	--	--	--	--	--	--	50	--
452	05-24-89	120	--	--	--	--	--	--	--	--	--
452	08-23-89	10	--	--	--	--	--	--	--	46	--
452	08-23-89	110	600	150	90	--	2300	100	5.3	--	63

WELL	DATE	LABORATORY	IONIC BALANCE (PERCENT)	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)
451	03-09-89	10	5.7	0.106	3670	9100	--	27	35	110
451	03-09-89	110	-1.2	0.104	--	4100	--	--	--	--
451	05-24-89	110	-2.6	0.107	--	6400	--	--	--	--
451	05-24-89	10	--	--	--	--	--	--	--	--
451	05-24-89	120	--	--	--	--	--	--	--	--
451	08-23-89	10	--	--	--	--	--	--	--	--
451	08-23-89	110	-3.6	0.118	--	8000	--	--	--	--
452	01-11-89	10	-0.2	0.105	3630	660	--	35	<2	80
452	01-11-89	110	-2.9	0.097	--	<1000	--	--	--	--
452	03-09-89	10	-5.5	0.103	3670	1400	--	27	3	70
452	03-09-89	110	-4.2	0.092	--	<1000	--	--	--	--
452	05-24-89	110	-5.8	0.086	--	<1000	--	--	--	--
452	05-24-89	10	--	--	--	--	--	--	--	--
452	05-24-89	120	--	--	--	--	1	--	--	--
452	08-23-89	10	--	--	--	--	--	--	--	--
452	08-23-89	110	-0.7	0.097	--	<1000	--	--	--	--

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

WELL	DATE	LAB-ORA TORY	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
451	03-09-89	10	39	20	1600	13000	150000	<30	330	110000
451	03-09-89	110	<100	--	1800	11000	140000	--	--	100000
451	05-24-89	110	<100	--	2200	18000	150000	--	--	95000
451	05-24-89	10	--	--	--	--	--	--	--	--
451	05-24-89	120	--	--	--	--	--	--	--	--
451	08-23-89	10	--	--	--	--	--	--	--	--
451	08-23-89	110	<100	70	2300	19000	190000	160	--	95000
452	01-11-89	10	13	<20	420	<30	280	<30	230	92000
452	01-11-89	110	<100	--	520	210	310	--	--	100000
452	03-09-89	10	19	<20	600	<30	170	<30	230	89000
452	03-09-89	110	<100	--	670	70	200	--	--	99000
452	05-24-89	110	<100	--	770	60	100	--	--	86000
452	05-24-89	10	--	--	--	--	--	--	--	--
452	05-24-89	120	--	--	--	--	--	--	--	--
452	08-23-89	10	--	--	--	--	--	--	--	--
452	08-23-89	110	<100	<10	1000	120	80	<100	--	96000

WELL	DATE	LAB-ORA-TORY	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, (IV) DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
451	03-09-89	10	<30	1200	--	2100	<18	3400	--	--
451	03-09-89	110	--	1200	--	1600	--	3500	--	--
451	05-24-89	110	--	1500	--	2200	--	5000	--	--
451	05-24-89	10	--	--	--	--	--	--	--	--
451	05-24-89	120	--	--	--	--	--	--	--	--
451	08-23-89	10	--	--	--	--	--	--	--	--
451	08-23-89	110	<100	1300	--	2200	--	4500	--	--
452	01-11-89	10	<30	640	--	2200	<18	870	--	--
452	01-11-89	110	--	780	--	2300	--	890	--	--
452	03-09-89	10	<30	820	--	2100	<18	1600	--	--
452	03-09-89	110	--	600	--	2000	--	2000	--	--
452	05-24-89	110	--	1100	--	2100	--	2700	--	--
452	05-24-89	10	--	--	--	--	--	--	--	--
452	05-24-89	120	--	--	<0.5	--	--	--	-58.0	-7.70
452	08-23-89	10	--	--	--	--	--	--	--	--
452	08-23-89	110	<100	1100	--	2100	--	3200	--	--

GROUND WATER--Continued
WELL GROUP 450--Continued
WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records provided by the U.S. Environmental Protection Agency.

LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown. Filter-pore size of 635 represents slot width of well screen. These samples were otherwise unfiltered.

WELL	DATE	SAMPLE NUMBERS	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXIDATION REDUCTION POTENTIAL (MV) (00090)
451	03-09-89	1-4	0.76	1.8	--		3930	5.0	<0.1	--	--	260
451	03-09-89	5-8	3.4	0.6	--	19.0	4060	4.9	<0.1	15	--	250
452	03-09-89	1-3	3.0	1.5	--	--	3690	5.4	0.2	--	--	370
452	03-09-89	4-6	28.	0.3	--	17.8	3700	5.6	<0.1	66	--	290

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
451	03-09-89	1	1	0.1	597	152	87.8	15.3	--	--	6250	<100
	03-09-89	2	1	0.4	586	150	92.4	15.7	--	--	6490	<100
	03-09-89	3	1	5.	599	161	100	12.9	--	--	6500	<100
	03-09-89	4	1	635	621	163	103	12.9	--	--	8320	<100
	03-09-89	5	1	0.1	617	162	105	12.7	--	--	9790	<100
	03-09-89	6	1	0.4	623	162	105	12.8	--	--	10000	<100
	03-09-89	7	1	5.	637	168	112	12.7	--	--	10300	<100
	03-09-89	8	1	635	632	163	103	12.4	--	--	10100	<100
452	03-09-89	1	1	0.1	675	146	101	9.3	--	--	1610	<100
	03-09-89	2	1	0.4	652	130	77.0	14.6	--	--	1540	<100
	03-09-89	3	1	5.	692	148	101	9.3	--	--	1410	<100
	03-09-89	4	1	0.1	561	119	84.8	7.1	--	--	890	<100
	03-09-89	5	1	0.4	685	136	87.7	13.5	--	--	1110	<100
	03-09-89	6	1	5.	683	142	89.7	9.9	--	--	1550	<100

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
451	03-09-89	1	<50	20	1500	6130	154000	<80	350	110000	1000	1900	3000
	03-09-89	2	<50	20	1500	6380	156000	<80	330	110000	1000	1900	3000
	03-09-89	3	<50	20	1700	6920	156000	<80	270	120000	1000	2000	3000
	03-09-89	4	<50	10	1600	6930	166000	<80	350	120000	1100	2000	3100
	03-09-89	5	<50	20	1700	12000	149000	<80	350	110000	1200	2000	3800
	03-09-89	6	<50	20	1800	12000	151000	<80	360	110000	1200	2000	3800
	03-09-89	7	<50	20	700	13000	154000	<80	380	120000	1200	2100	3900
	03-09-89	8	<50	30	1700	12000	154000	<80	350	120000	1200	2100	3900

GROUND WATER--Continued
WELL GROUP 450--Continued
WATER QUALITY--EPA FILTRATION STUDY--Continued

WELL	DATE	SAMPLE NUMBER	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
452	03-09-89	1	<50	20	860	<40	<400	<80	300	94000	1000	2200	2400
	03-09-89	2	<50	20	830	<40	<400	<80	290	91000	970	2000	2400
	03-09-89	3	<50	20	870	<40	<400	<80	220	100000	1000	2200	2500
	03-09-89	4	<40	10	550	<40	<400	<80	230	73000	750	1800	1500
	03-09-89	5	<50	10	620	<40	<400	<80	290	88000	910	2000	1800
	03-09-89	6	<50	20	650	<40	520	80	200	91000	890	2100	1800

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, polyvinyl chloride pipe. Each well has a single 0.9-meter long slotted, 10-centimeter-diameter, schedule 80, polyvinyl chloride 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.

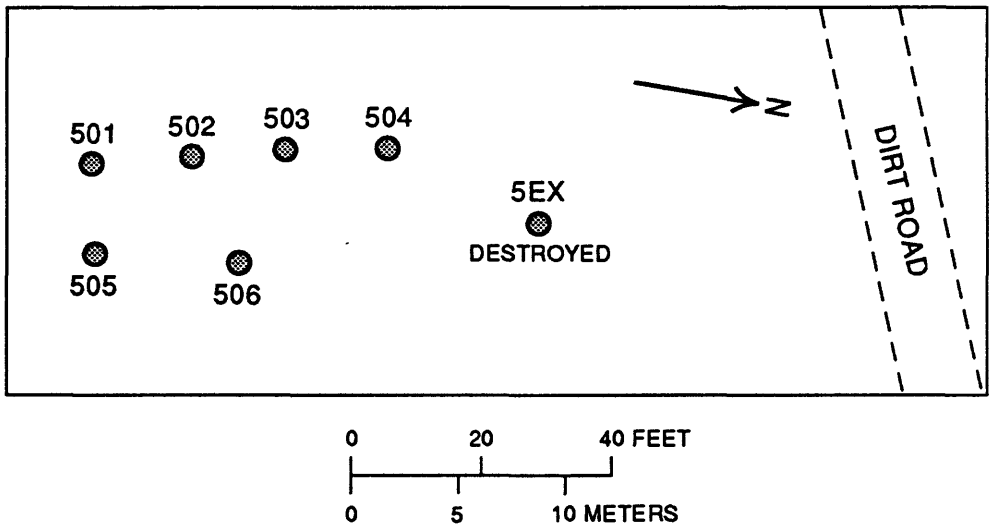
Well 505 was cased with nominal 10-centimeter-diameter, schedule 40, polyvinyl chloride pipe. The well has a a single 1.5-meter long slotted, 10-centimeter-diameter, schedule 40, polyvinyl chloride pipe as well screen. The screen has 3,648 factory-cut slots 4.4 cm long by 0.51 mm wide for a total open 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, polyvinyl chloride pipe. The well has a a single 1.5-meter long slotted, 10-centimeter-diameter, schedule 80, polyvinyl chloride 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.

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

WELL	DATE COMPLE-TED	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

GROUND WATER--Continued
WELL GROUP 500--Continued
SITE PLAN



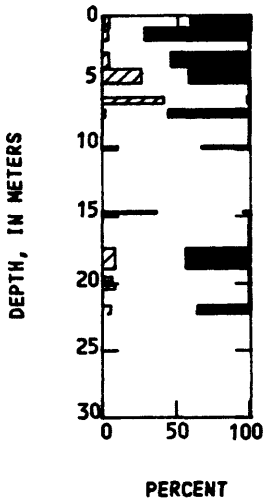
LOG INFORMATION

Well 505

Summary of geologist log:	Thickness (m)	Bottom of depth interval (m)
Sand, brown to black, loose, wet, fine to coarse grained	0.3	0.3
Sand, orange, brown, black; loose, moist, medium to coarse grained; orange coatings present; contains some gravel, maximum clast size 406 mm	0.3	0.6
No sample	0.3	0.9
Sand and gravel, brown, generally loose, wet; sand is medium to coarse grained; maximum clast size 152 mm; no sample 1.8-2.4 m	2.1	3.0
Sand and gravel, black, loose, wet; sand is coarse grained; maximum clast size, 51 mm; manganese oxide coatings present; 25-51 mm brown sandy clay stringer at bottom of interval	0.5	3.5
No sample	0.5	4.0
Sand, brown to black, loose, wet, fine to coarse grained; manganese oxide coatings present on some grains; maximum clast size 76 mm; no samples 5.0-5.5, 6.6-7.3 m	3.6	7.6
Clay, sticky; sand, and gravel	<0.1	7.6
Silt and clay, brown to brownish gray, moist, somewhat plastic; sandy below 9.0 m; no sample 8.5-9.0 m	2.1	9.7
Sand, loose, wet, fine to medium grained; gravel above 10 m, stiff clay with black and orange streaks from 10.0 to 10.1 m; maxixum clast size 127 mm	1.9	11.6
No sample	0.6	12.2
Clay, brown, moist, stiff, plastic, dull luster; is silty, brown with black streaks from 13.5-13.7.m; no sample 13.1-13.2 m	1.7	13.9
Sand, brown to grayish-brown, fine to coarse grained	0.2	14.1
Clay, dark gray, moist, stiff, blocky, dull luster; no sample 14.6-14.8	0.5	14.6
No sample	0.2	14.8
Sand, orange brown, loose, wet, medium to coarse grained; contains some gravel	0.7	16.2
No sample	1.2	17.4
Sand and gravel, loose, wet; sand is medium to coarse grained; maximum clast size 102 mm; contains sticky clay below 18.3 m	1.3	18.7
Gravel, loose, wet; contains cobbles up to 102 mm; HCl reaction	0.2	18.9
No sample	0.3	19.2
Sand and sandstone; sand is light brown, loose to firm, uniform, moist; variable HCl reaction; sandstone reacts strongly with HCl	0.6	19.8
No sample	0.3	20.1
Sand, light brown, fine grained; above 20.4 contains silt and sticky clay that reacts with HCl; no samples 20.4-20.7	1.5	21.6
Sandstone, strong HCl reaction; contains 0.1-meter-thick, gravelly, sandy zone above 21.9 m; more strongly cemented below 21.l m	0.6	22.2

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

WELL 505



EXPLANATION

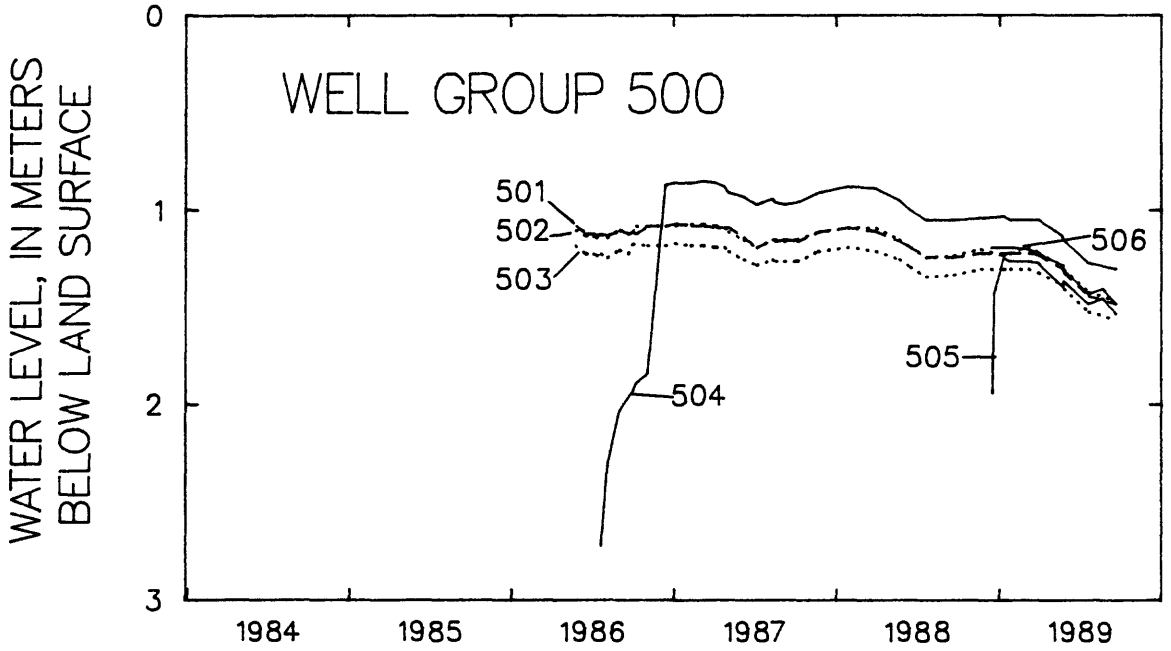
GRAVEL
SAND
SILT AND CLAY

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.

WATER LEVEL, IN METERS BELOW LAND SURFACE

	WELL NUMBER					
DATE	501	502	502	504	505	506
10-06-87	1.16	1.15	1.26	.96	--	--
11-23-87	1.11	1.11	1.21	.91	--	--
01-27-88	1.09	1.09	1.19	.88	--	--
03-31-88	1.11	1.09	1.21	.89	--	--
05-23-88	1.16	1.15	1.25	.95	--	--
06-16-88	1.19	1.19	1.29	1.00	--	--
07-21-88	1.24	1.24	1.34	1.05	--	--
09-21-88	1.24	1.23	1.33	1.05	--	--
11-21-88	1.22	1.20	1.30	1.04	--	--
12-15-88	--	--	--	--	--	1.19
12-17-88	--	--	--	--	1.94	--
12-21-88	--	--	--	--	1.42	1.19
01-11-89	1.22	1.23	1.30	1.03	1.24	1.19
01-26-89	1.22	1.22	1.30	1.05	1.26	1.19
03-08-89	1.22	1.18	1.30	1.05	1.26	1.20
03-31-89	1.23	1.22	1.32	1.05	1.27	1.22
05-24-89	1.30	1.28	1.38	1.13	1.39	1.28
05-26-89	1.32	1.30	1.40	1.15	1.36	1.30
07-21-89	1.44	1.42	1.52	1.27	1.48	1.43
08-23-89	--	--	--	--	1.45	1.40
09-21-89	1.48	1.46	1.56	1.30	1.53	1.48

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



WATER QUALITY--FIELD MEASUREMENTS

REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXYGEN, DISSOLVED (MG/L) (00300)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAWDOWN (M)
501	04-28-87	3400	6.20	18.0		140	0.8	--	15.	0.7	0.2
501	06-16-88	3710	5.81	18.5	144	--	<0.1	280	49.	0.3	--
501	03-08-89	3810	5.81	18.5	--	132	<0.1	320	28.	0.4	--
501	05-24-89	3810	5.92	18.5	--	128	<0.1	310	45.	0.3	--
502	01-11-89	1560	7.34	19.0	--	198	4.5	390	38.	0.4	6.0
503	06-16-88	3720	5.69	19.0	113	--	<0.1	320	45.	1.0	--
503	01-11-89	3800	5.94	18.0	--	113	0.4	430	32.	0.6	.2
503	03-08-89	3820	5.67	18.0	--	103	<0.1	370	3.8	0.3	--
503	05-24-89	3850	5.82	18.0	--	105	<0.1	330	49.	0.4	--
504	01-11-89	393	7.59	20.5	235	--	6.1	370	64.	0.8	12.2
505	01-11-89	3750	6.26	18.0	173	--	0.2	180	80.	1.0	--
505	03-08-89	3780	5.91	18.5	--	160	<0.1	350	38.	0.3	--
505	05-24-89	3800	6.02	18.5	--	152	<0.1	320	42.	0.3	--
505	08-23-89	3520	6.11	19.0	--	169	<0.1	320	--	--	--
506	03-08-89	3650	6.05	18.0	--	194	<0.1	340	3.8	0.3	--
506	05-24-89	3700	6.12	19.0	--	178	<0.1	310	17.	0.7	--
506	08-23-89	3620	5.96	20.0	--	171	<0.1	340	--	--	--

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

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona. 320, University of Arizona Geosciences Department Laboratory, Tucson, Arizona. Fluoride analyses reported with Stollenwerk's analyses were made by Tucson project personnel using a specific-ion electrode.
REMARKS: <, Actual value is known to be less than the value shown.

WELL	DATE	LABORATORY	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
501	04-28-87	10	640	150	80	4.0	2100	100	0.20	--	--
501	04-28-87	110	660	150	110	--	2000	110	--	--	--
501	04-28-87	320	--	--	--	--	--	--	--	--	--
501	06-16-88	10	710	160	91	4.6	2300	110	0.30	1.2	--
501	06-16-88	110	680	160	84	--	2300	110	0.14	--	--
501	06-16-88	310	--	--	--	--	--	--	--	--	1.1
501	03-08-89	110	650	140	59	--	2200	160	--	--	--
501	05-24-89	110	620	150	79	--	2300	100	0.28	--	--
502	01-11-89	10	--	--	--	--	--	--	--	--	--
502	01-11-89	110	230	43	33	--	760	22	0.19	--	--
503	06-16-88	10	--	--	--	--	--	--	--	1.1	--
503	06-16-88	110	660	150	81	--	2100	130	0.42	--	--
503	06-16-88	310	--	--	--	--	--	--	--	--	1.3
503	01-11-89	10	--	--	--	--	--	--	--	--	--
503	01-11-89	110	690	140	91	--	2300	120	--	--	--
503	03-08-89	110	600	170	61	--	2200	160	--	--	--
503	05-24-89	110	550	140	90	--	2300	100	0.92	--	--
503	05-24-89	120	--	--	--	--	--	--	--	--	--
504	01-11-89	10	--	--	--	--	--	--	--	--	--
504	01-11-89	110	40	14	18	--	15	9.4	0.21	--	--
505	01-11-89	10	710	160	87	7.7	2500	110	0.20	--	--
505	01-11-89	110	620	120	75	--	2300	110	--	--	--
505	03-08-89	10	710	160	97	4.7	2500	110	0.20	--	--
505	03-08-89	110	660	140	76	--	2300	160	--	--	--
505	05-24-89	110	650	160	88	--	2200	110	--	--	--
505	08-23-89	110	620	160	88	--	2300	100	0.19	--	--
506	03-08-89	10	660	160	95	4.4	2300	120	0.20	--	--
506	03-08-89	110	630	140	86	--	2100	160	--	--	--
506	05-24-89	110	540	130	69	--	2100	99	--	--	--
506	05-24-89	120	--	--	--	--	--	--	--	--	--
506	08-23-89	110	650	160	88	--	2100	100	0.22	--	--

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

WELL	DATE	LABORATORY	CARBON, INORGANIC, TOTAL (MG/L AS C) (00685)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IONIC BALANCE (PERCENT)	IONIC STRENGTH (MOL/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)
501	04-28-87	10	--	59	3.1	0.093	--	0.380	0.90	<0.100	0.070
501	04-28-87	110	--	--	7.2	0.092	--	--	--	--	--
501	04-28-87	320	--	--	--	--	--	--	--	--	--
501	06-16-88	10	53	61	1.3	0.103	3570	0.290	0.90	<0.100	0.030
501	06-16-88	110	--	62	0.1	0.101	--	--	--	--	--
501	06-16-88	310	--	--	--	--	--	--	--	--	--
501	03-08-89	110	--	47	-3.3	0.096	--	--	--	--	--
501	05-24-89	110	--	53	-4.2	0.097	--	--	--	--	--
502	01-11-89	10	--	--	--	--	--	--	--	--	--
502	01-11-89	110	--	27	-8.7	0.034	--	--	--	--	--
503	06-16-88	10	--	--	--	--	--	--	--	--	--
503	06-16-88	110	--	15	3.0	0.095	--	--	--	--	--
503	06-16-88	310	--	--	--	--	--	--	--	--	--
503	01-11-89	10	--	--	--	--	--	--	--	--	--
503	01-11-89	110	--	69	-0.3	0.102	--	--	--	--	--
503	03-08-89	110	--	47	-3.0	0.096	--	--	--	--	--
503	05-24-89	110	--	50	-7.5	0.094	--	--	--	--	--
503	05-24-89	120	--	--	--	--	--	--	--	--	--
504	01-11-89	10	--	--	--	--	--	--	--	--	--
504	01-11-89	110	--	26	-5.8	0.006	--	--	--	--	--
505	01-11-89	10	--	57	-3.3	0.107	3770	--	--	--	--
505	01-11-89	110	--	53	-6.9	0.095	--	--	--	--	--
505	03-08-89	10	--	59	-2.6	0.108	3770	--	--	--	--
505	03-08-89	110	--	55	-4.0	0.099	--	--	--	--	--
505	05-24-89	110	--	50	0.5	0.096	--	--	--	--	--
505	08-23-89	110	--	59	-2.7	0.098	--	--	--	--	--
506	03-08-89	10	--	49	-2.8	0.101	3520	--	--	--	--
506	03-08-89	110	--	47	-2.7	0.094	--	--	--	--	--
506	05-24-89	110	--	38	-8.6	0.086	--	--	--	--	--
506	05-24-89	120	--	--	--	--	--	--	--	--	--
506	08-23-89	110	--	54	2.2	0.095	--	--	--	--	--

WELL	DATE	LABORATORY	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ANTIMONY, DISSOLVED (UG/L AS SB) (01095)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)
501	04-28-87	10	<10	--	--	29	<2	70	5	--	10
501	04-28-87	110	<160	--	--	--	--	--	<100	--	<40
501	04-28-87	320	--	--	--	--	--	--	--	--	--
501	06-16-88	10	10	<1	1	30	<2	60	5	3	10
501	06-16-88	110	<1000	--	--	--	--	--	<100	--	<40
501	06-16-88	310	--	--	--	--	--	--	--	--	--
501	03-08-89	110	<1000	--	--	--	--	--	<100	--	<40
501	05-24-89	110	<1000	--	--	--	--	--	<100	--	<40
502	01-11-89	10	--	--	--	--	--	--	--	--	--
502	01-11-89	110	<500	--	--	--	--	--	<50	--	<20

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

WELL	DATE	LABORATORY	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ANTIMONY, DISSOLVED (UG/L AS SB) (01095)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)
503	06-16-88	10	--	--	--	--	--	--	--	--	--
503	06-16-88	110	<1000	--	--	--	--	--	<100	--	<40
503	06-16-88	310	--	--	--	--	--	--	--	--	--
503	01-11-89	10	--	--	--	--	--	--	--	--	--
503	01-11-89	110	<1000	--	--	--	--	--	<100	--	<40
503	03-08-89	110	<1000	--	--	--	--	--	<100	--	<40
503	05-24-89	110	<500	--	--	--	--	--	<50	--	<20
503	05-24-89	120	--	--	--	--	--	--	--	--	--
504	01-11-89	10	--	--	--	--	--	--	--	--	--
504	01-11-89	110	<500	--	--	--	--	--	<50	--	<20
505	01-11-89	10	10	--	--	38	<2	60	<3	<20	<9
505	01-11-89	110	<1000	--	--	--	--	--	<100	--	<40
505	03-08-89	10	10	--	--	35	<2	60	4	<20	10
505	03-08-89	110	<160	--	--	--	--	--	<100	--	<40
505	05-24-89	110	<1000	--	--	--	--	--	<100	--	<40
505	08-23-89	110	<1000	--	--	--	--	--	<100	80	<200
506	03-08-89	10	<10	--	--	25	<2	60	4	<20	10
506	03-08-89	110	<1000	--	--	--	--	--	<100	--	<40
506	05-24-89	110	<1000	--	--	--	--	--	<100	--	<40
506	05-24-89	120	--	--	--	--	--	--	--	--	--
506	08-23-89	110	<1000	--	--	--	--	--	<100	70	<200

WELL	DATE	LABORATORY	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	THALLIUM, DISSOLVED (UG/L AS TL) (01057)
501	04-28-87	10	80	24	70	220	44000	30	300	2300	--
501	04-28-87	110	<20	<40	--	--	46000	--	<100	1900	--
501	04-28-87	320	--	--	--	--	--	--	--	--	--
501	06-16-88	10	<30	22	<30	220	57000	<30	300	2500	<1
501	06-16-88	110	20	80	--	--	53000	--	300	2400	--
501	06-16-88	310	--	--	--	--	--	--	--	--	--
501	03-08-89	110	60	60	--	--	52000	--	500	1600	--
501	05-24-89	110	<20	<40	--	--	58000	--	300	2100	--
502	01-11-89	10	--	--	--	--	--	--	--	--	--
502	01-11-89	110	<10	<20	--	--	<30	--	<50	1200	--
503	06-16-88	10	--	--	--	--	--	--	--	--	--
503	06-16-88	110	<20	<40	--	--	63000	--	500	2300	--
503	06-16-88	310	--	--	--	--	--	--	--	--	--
503	01-11-89	10	--	--	--	--	--	--	--	--	--
503	01-11-89	110	100	50	--	--	86000	--	850	2700	--
503	03-08-89	110	91	580	--	--	60000	--	400	1600	--
503	05-24-89	110	<10	<20	--	--	59000	--	510	2200	--
503	05-24-89	120	--	--	--	--	--	--	--	--	--
504	01-11-89	10	--	--	--	--	--	--	--	--	--
504	01-11-89	110	<10	<20	--	--	<30	--	<50	310	--

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

WELL	DATE	LAB-ORA-TORY	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	THAL-LIUM, DIS-SOLVED (UG/L AS TL) (01057)
505	01-11-89	10	<30	67	<30	190	47000	<30	230	2400	--
505	01-11-89	110	100	60	--	--	49000	--	200	2300	--
505	03-08-89	10	50	650	<30	190	50000	<30	200	2600	--
505	03-08-89	110	50	820	--	--	53000	--	200	2200	--
505	05-24-89	110	<20	<40	--	--	51000	--	300	2400	--
505	08-23-89	110	<100	<200	170	--	51000	<100	340	2500	--
506	03-08-89	10	<30	14	<30	150	31000	<30	70	2400	--
506	03-08-89	110	52	<40	--	--	33000	--	100	2100	--
506	05-24-89	110	<20	<40	--	--	29000	--	<100	1700	--
506	05-24-89	120	--	--	--	--	--	--	--	--	--
506	08-23-89	110	<100	<40	190	--	41000	<100	<500	2400	--

WELL	DATE	LAB-ORA-TORY	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ALPHA, DIS-SOLVED (PCI/L) (01503)	TRITIUM TOTAL (PCI/L) (07000)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
501	04-28-87	10	<18	38	--	--	--	--
501	04-28-87	110	--	<30	--	--	--	--
501	04-28-87	320	--	--	<3.5	--	--	--
501	06-16-88	10	<18	36	--	41	--	--
501	06-16-88	110	--	30	--	--	--	--
501	06-16-88	310	--	--	--	--	--	--
501	03-08-89	110	--	60	--	--	--	--
501	05-24-89	110	--	<30	--	--	--	--
502	01-11-89	10	--	--	--	<5.7	--	--
502	01-11-89	110	--	30	--	--	--	--
503	06-16-88	10	--	--	--	--	--	--
503	06-16-88	110	--	100	--	--	--	--
503	06-16-88	310	--	--	--	--	--	--
503	01-11-89	10	--	--	--	46	--	--
503	01-11-89	110	--	90	--	--	--	--
503	03-08-89	110	--	110	--	--	--	--
503	05-24-89	110	--	<15	--	--	--	--
503	05-24-89	120	--	--	--	--	-59.0	-7.90
504	01-11-89	10	--	--	--	<0.3	--	--
504	01-11-89	110	--	<15	--	--	--	--
505	01-11-89	10	<18	24	--	--	--	--
505	01-11-89	110	--	30	--	--	--	--
505	03-08-89	10	<18	37	--	--	--	--
505	03-08-89	110	--	60	--	--	--	--
505	05-24-89	110	--	30	--	--	--	--
505	08-23-89	110	--	<150	--	--	--	--
506	03-08-89	10	<18	25	--	42	--	--
506	03-08-89	110	--	40	--	--	--	--
506	05-24-89	110	--	<30	--	--	--	--
506	05-24-89	120	--	--	--	--	--	--
506	08-23-89	110	--	<150	--	--	--	--

GROUND WATER--Continued
WELL GROUP 500--Continued
WATER QUALITY--EPA FILTRATION STUDY

The samples listed below were collected as part of a study of the impacts of pumping rate, filter-pore diameter, and sample atmosphere on the analytical concentrations of inorganic constituents in ground water. Records provided by the U.S. Environmental Protection Agency.
LABORATORY: Laboratory analyses done by EPA research laboratory (R.W. Puls), Ada, Oklahoma.
SAMPLING ATMOSPHERE: 1, Sample filtered and bottled in air; 2, Sample filtered and bottled in nitrogen-filled glove box.
REMARKS: <, Actual value is known to be less than the value shown. Filter-pore size of 635 represents slot width of well screen. These samples were otherwise unfiltered.

WELL	DATE	SAMPLE NUMBERS	AVERAGE DISCHARGE (L/MIN)	PUMPING PERIOD (HOURS)	DRAW DOWN (M)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	OXIDATION REDUCTION POTENTIAL (MV) (00090)
503	06-16-88	1-6	1.1	0.6	--	--	3600	5.7	<0.1	--	--	--
	06-16-88	7-14	45.	0.2	--	19.0	3720	5.7	<0.1	--	--	320
	03-08-89	1-2	0.11	0.7	--	18.1	3800	5.7	<0.1	--	--	360
	03-08-89	3-5	3.8	0.3	--	18.2	3820	5.7	<0.1	--	103	370
	03-08-89	6-8	30.	0.5	--	18.1	3820	5.7	<0.1	--	--	370
505	03-08-89	1-3	0.11	1.6	--	21.1	3740	6.2	<0.1	--	--	310
506	03-08-89	1-3	0.38	2.4	--	--	3620	6.1	0.2	--	--	320

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
503	06-16-88	1	1	0.1	640	150	70	3.4	2300	--	<40	<61
	06-16-88	2	1	0.4	650	140	59	3.1	2400	--	<20	<65
	06-16-88	3	1	10.	640	150	72	3.7	2300	--		
	06-16-88	4	2.	0.4	650	150	67	3.5	--	--		
	06-16-88	5	2.	10.	700	160	79	4.5	2200	--	<40	<61
	06-16-88	6	2.	635	700	150	55	3.0	--	--	30	<67
	06-16-88	7	1	0.1	640	140	65	3.3	2300	--	<40	<58
	06-16-88	8	1	0.4	640	140	71	3.5	2300	--	<40	<58
	06-16-88	9	1	0.4	670	150	54	3.3	2300	140	90	<67
	06-16-88	10	1	10.	670	150	59	3.0	--	--	<20	<67
	06-16-88	11	2	0.1	640	130	48	2.2	--	--	30	<63
	06-16-88	12	2	0.4	720	150	50	2.9	--	--	50	<73
	06-16-88	13	2	20.	740	160	74	4.9	--	--	<70	<80
	06-16-88	14	2	10.	770	170	83	4.4	--	--	<10	<82
	03-08-89	1	1	0.1	694	151	90.8	7.7	--	--	<400	<100
	03-08-89	2	1	0.4	703	148	82.0	11.6	--	--	<400	<100
	03-08-89	3	1	0.03	681	142	74.7	9.0	--	--	<400	<100
	03-08-89	4	1	0.1	706	153	93.2	6.5	--	--	<400	<100
	03-08-89	5	1	0.4	704	146	83.6	11.3	--	--	<400	<100
	03-08-89	6	1	0.03	692	146	77.0	7.9	--	--	<400	<100
	03-08-89	7	1	0.1	705	155	94.9	6.4	--	--	<400	<100
	03-08-89	8	1	0.4	704	147	84.6	11.2	--	--	<400	<100

GROUND WATER--Continued
WELL GROUP 500--Continued
WATER QUALITY--EPA FILTRATION STUDY--Continued

WELL	DATE	SAMPLE NUMBER	SAMPLING ATMOSPHERE	FILTER-PORE SIZE (MICROMETERS) (81352)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
505	03-08-89	1	1	0.03	746	140	79.0	8.7	--	--	<400	<100
	03-08-89	2	1	0.1	738	139	73.3	9.9	--	--	<400	<100
	03-08-89	3	1	0.4	759	139	80.8	12.0	--	--	<400	<100
506	03-08-89	1	1	0.03	660	144	75.4	10.5	--	--	<400	<100
	03-08-89	2	1	0.1	668	150	83.8	8.7	--	--	<400	<100
	03-08-89	3	1	0.4	692	152	89.0	11.0	--	--	<400	<100

WELL	DATE	SAMPLE NUMBER	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
503	06-16-88	1	20	3	20	43	85	<5	150	68000	470	2500	63
	06-16-88	2	40	4	10	<5	<39	<2	120	68000	470	2300	21
	06-16-88	3	20	4	20	30	96	<5	140	68000	480	2400	41
	06-16-88	4	40	4	20	35	85	<2	140	69000	480	2400	300
	06-16-88	5	320	10	20	71	170	<16	160	72000	530	2500	--
	06-16-88	6	<9	2	20	12	91	<15	14	73000	500	2500	260
	06-16-88	7	20	3	10	33	<37	<5	140	66000	440	2400	45
	06-16-88	8	20	2	10	16	<37	<5	150	66000	440	2400	41
	06-16-88	9	40	<1	20	51	420	<15	130	68000	540	2300	980
	06-16-88	10	8	5	10	5	<38	<2	130	69000	450	2400	37
	06-16-88	11	60	4	20	51	83	<6	100	66000	440	2400	870
	06-16-88	12	9	3	20	54	210	<15	130	72000	500	2500	300
	06-16-88	13	20	7	20	42	430	<16	150	74000	530	2600	340
	06-16-88	14	10	7	50	50	130	<78	170	77000	540	2700	200
	03-08-89	1	<50	<10	<40	<40	<400	<80	290	75000	580	2300	50
	03-08-89	2	<50	<10	<40	<40	<400	<80	290	76000	590	2300	60
	03-08-89	3	<50	10	<40	<40	<400	<80	300	73000	560	2200	50
	03-08-89	4	<50	<10	<40	<40	<400	<80	290	76000	590	2400	40
	03-08-89	5	<50	<10	<40	<40	<400	<80	300	76000	560	2300	40
	03-08-89	6	<50	10	<40	<40	<400	<80	300	72000	520	2300	40
	03-08-89	7	<40	<10	<40	<40	<400	<80	290	74000	570	2400	40
	03-08-89	8	<50	<10	<40	<40	<400	<80	300	73000	580	2300	40
505	03-08-89	1	<50	<10	<40	<40	<400	<80	250	35000	200	2400	<40
	03-08-89	2	<50	<10	<40	<40	<400	<80	230	35000	150	2400	<40
	03-08-89	3	<50	<10	<40	<40	<400	<80	260	36000	200	2400	<40
506	03-08-89	1	<50	<10	<40	<40	<400	<80	240	26000	80	2200	<40
	03-08-89	2	<50	<10	<40	<40	<400	<80	210	27000	50	2200	<40
	03-08-89	3	<50	<10	<40	<40	<400	<80	230	28000	60	2200	<40

GROUND WATER--Continued
OTHER WELLS

WELL CHARACTERICSTICS

WELL	LATITUDE (DEG-M-S)	LONGITUDE (DEG-M-S)	SITE-ID	LOCAL NUMBER	PRIMARY USE OF WATER	DATE WELL CON-STRUC-TED	OWNER
MAUREL	33 31 43	110 52 22	333143110522201	(A-02-15)07cba	Domestic	1988	MAUREL, A & L

WELL	ALTITUDE OF LAND SURFACE (METERS)	DEPTH OF WELL (METERS)	DIAMETER OF CASING (CM)	CASING MATERIAL
MAUREL	920	37.	15	S

MAUREL WELL
WATER QUALITY

LABORATORY: 10, USGS National Water-Quality Laboratory, Arvada, Colorado; 110, USGS research laboratory (K.G. Stollenwerk), Lakewood, Colorado.
REMARKS: <, Actual value is known to be less than the value shown.

DATE	LAB-ORA-TORY	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
JAN 1989												
11...	10	1040	7.4	21.0	255	150	23	52	4.0	350	21	0.40
11...	110	1040	--	--	255	140	24	53	--	340	21	--

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IONIC BAL ANCE (PER-CENT)	IONIC STRE-NGTH (MOL/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
JAN 1989											
11...	33	-1.3	0.020	760	<10	52	<0.5	60	<1	<5	<3
11...	32	-3.3	0.019	--	<500	--	--	--	<50	--	<20

DATE	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	TRITIUM TOTAL (PCI/L) (07000)
JAN 1989											
11...	<10	21	<10	44	9	<10	10	570	9	860	11
11...	<10	<20	--	--	<30	--	<50	570	--	970	--

SURFACE WATER
332521110522200 WEBSTER LAKE NEAR MIAMI, AZ

LOCATION.--Lat 33°25'21", Long 110°52'22", in SE¼SW¼SW¼, sec. 18, T. 1 N., R. 15 E., 0.9 km northwest of Inspiration concentrator, 4 km west of Pinal Creek, and 2.6 km north of Miami.

DRAINAGE AREA.--36 km^2. A series of impoundments and diversions in the basin decreased the contributing drainage area to 15 km^2 after 1983, 6.4 km^2 after 1984, and 3.2 km^2 after 1986 (Inspiration Consolidated Copper Company filing to U.S. Environmental Protection Agency, September 15, 1987).

PREVIOUS DATA COLLECTION AT SITE.--Two chemical analyses of lake surface water collected in November 1981 and February 1982 were reported by the Central Association of Governments, Mineral Extraction Task Force. Documents filed on August 27, 1986, with the U.S. Environmental Protection Agency report eight partial analyses of lake surface water from 1974 to 1986 and analyses at several depths in July 1976 and November 1983. U.S. Environmental Protection Agency reported one analysis of near-bottom water from September 1986. Monthly analyses of lake surface water for pH, copper, iron, and sulfate from August 1986 to April 1988 were reported to U.S. Environmental Protection Agency by Inspiration Consolidated Copper Company and Cyprus Miami Mining Corporation.

REMARKS.--The following lake elevations were taken from the reports of Inspiration Consolidated Copper Company and Cyprus Miami Mining Corporation to the U.S. Environmental Protection Agency. Elevations since August 1986 were measured at the edge of water with surveying instruments. Topographic mapping based on aerial photographs taken December 14, 1988, shows a minumum elevation of 1,095.1 m on the dry lake bed.

LAKE ELEVATION (METERS NGVD)

DATE	ELEVATION	DATE	ELEVATION	DATE	ELEVATION	DATE	ELEVATION
- -66	1122.6	- -83	1120.7	02-28-87	1117.82	01-11-88	1103.41
- -67	1121.1	- -84	1123.2	04-30-87	1116.16	01-19-88	1103.04
- -68	1122.9	- -85	1122.6	06-01-87	1114.95	02-23-88	1101.50
- -69	1122.0	- -86	1122.0	06-30-87	1113.58	02-29-88	1101.01
- -70	1120.1	08-18-86	1120.64	07-31-87	1111.97	03-07-88	1100.42
- -71	1119.5	09-22-96	1120.65	08-31-87	1110.43	03-15-88	1099.32
- -75	1115.0	10-13-86	1120.48	10-31-87	1107.10	04-01-88	1097.97
- -80	1125.3	11-17-86	1119.75	11-24-87	1105.99	04-29-88	1095.62
- -81	1121.1	12-31-86	1118.86	12-01-87	1105.56	06-13-88	1094.96
- -82	1119.8	01-31-87	1118.32	01-04-88	1103.75		

WATER-QUALITY DATA

LABORATORY: 110, USGS research laboratory (KG Stollenwerk), Lakewood, Colorado; 120, USGS research laboratory (D.K. Nordstrom), Menlo Park, California; 310, University of Arizona Hydrology Department Laboratory, Tucson, Arizona.
REMARKS: Dip sample collected from surface at south shore of lake; <, Actual value is known to be less than the value shown.

DATE	LABORATORY	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE WATER (DEG C) (00010)	PH (STANDARD UNITS) (00400)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	IONIC BALANCE (PERCENT)
FEB 1988											
01...	110	13800	11.0	2.7	0	510	730	240	20000	350	0.00
01...	120	--	--	--	--	--	--	--	--	--	--
01...	310	--	--	--	--	--	--	--	--	--	--
01...	10	--	--	--	--	--	--	--	--	--	--

SURFACE WATER
332521110522200 WEBSTER LAKE NEAR MIAMI, AZ
WATER-QUALITY DATA--Continued

DATE	IONIC STRE-NGTH (MOL/L)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	TRITIUM TOTAL (PCI/L) (07000)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)
FEB 1988											
01...	0.869	--	850000	20000	210000	5970000	100000	32000	--	--	--
01...	--	--	--	--	--	--	--	--		-3.77	-41.5
01...	--	5.8	--	--	--	--	--	--	--	--	--
01...	--	--	--	--	--	--	--	--	53	--	--

333147110520500 PINAL CREEK AT BLUMER DRIVEWAY NEAR GLOBE, AZ

LOCATION.--Lat 33°31'47", long 110°52'05", in SE¼SE¼NW¼, sec. 7, T. 2 N., R. 15 E., at an unpaved ford 1.7 km downstream from Hicks Crossing, 6.3 km upstream from Inspiration Dam, 12.5 km upstream from mouth, and 17 km northwest of Globe.

DRAINAGE AREA.--455 km^2, including approximately 85 km^2 that is partly or entirely noncontributing due to mine pits and dumps.

CHANNEL ELEVATION.--895 m above National Geodetic Vertical Datum of 1929 from topographic map.

PREVIOUS DATA COLLECTION AT SITE.--Five discharge measurements and water-quality analyses from March 1985 to September 1987.

WATER QUALITY DATA

LABORATORY: Laboratory analysis by University Arizona Hydrology Department Laboratory, Tucson, Arizona.

DATE	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
June 16, 1988	3.8

09498380 PINAL CREEK AT SETKA RANCH NEAR GLOBE, AZ

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

SURFACE WATER--Continued
09498380 PINAL CREEK AT SETKA RANCH NEAR GLOBE, AZ--Continued
WATER QUALITY DATA

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)
JUN 1988											
28...	1030	4.3	3610	6.80	25.5	20.0	690	7.8	97	94	115
JUL											
20...	1010	3.8	3610	7.00	29.5	23.0	690	6.2	81	93	114
SEP											
20...	1020	3.4	3650	6.94	29.5	22.0	683	6.2	81	89	109
NOV											
17...	1020	3.6	3640	6.82	13.0	18.0	685	6.7	80	98	120
JAN 1989											
26...	1135	3.9	3880	6.80	14.0	18.5	687	6.7	81	90	110
MAR											
30...	1010	3.4	3660	6.79	19.0	20.0	689	6.5	80	91	111
MAY											
30...	1045	2.9	3610	6.70	26.5	22.5	684	7.4	97	89	109
JUL											
20...	0940	2.7	3640	6.77	30.5	22.0	687	6.5	84	92	112
SEP											
20...	0945	3.2	3670	6.62	20.0	20.5	684	5.9	74	73	89

DATE	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)
JUN 1988											
28...	0	620	150	86	4.9	2400	120	56	3790	3500	23
JUL											
20...	0	600	150	83	4.4	2400	110	58	3800	3470	27
SEP											
20...	0	660	160	91	5.0	2400	110	61	3800	3560	29
NOV											
17...	0	650	160	93	5.0	2400	120	61	3810	3550	26

DATE	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)
JAN 1989											
26...	0	680	150	91	4.6	2400	120	60	3710	3570	25
MAR											
30...	0	680	160	97	5.0	2400	110	60	3800	3580	26
MAY											
30...	0	720	160	100	5.1	2400	110	64	3830	3630	30
JUL											
20...	0	640	150	89	5.0	2400	120	63	3830	3460	26
SEP											
20...	0	680	150	95	5.5	2500	110	67	3870	3690	29

SURFACE WATER--Continued
09498380 PINAL CREEK AT SETKA RANCH NEAR GLOBE, AZ--Continued
WATER QUALITY DATA--Continued

DATE	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
JUN 1988										
28...	4	10	10	9	16	63	130	<5	<5	59000
JUL										
20...	1	10	10	11	26	11	310	9	<5	59000
SEP										
20...	9	5	10	15	22	24	290	<5	<5	66000
NOV										
17...	2	10	10	18	28	40	190	<5	<5	60000
JAN 1989										
26...	<3	<10	20	17	26	20	160	<5	<5	63000
MAR										
30...	8	<10	20	19	24	31	200	<5	<5	65000
MAY										
30...	<3	<10	20	10	12	130	150	<1	<1	72000
JUL										
20...	2	<20	20	9	20	67	380	<1	1	69000
SEP										
20...	<3	<10	20	36	31	69	290	<1	<1	82000

DATE	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)
JUN 1988										
28...	79000	320	400	12	2200	31	60	<12	210	<20
JUL										
20...	68000	330	400	9.0	2300	35	40	<6	200	10
SEP										
20...	56000	340	390	3.0	2400	42	40	<6	230	10
NOV										
17...	62000	360	400	7.0	2400	35	40	<6	210	<10

DATE	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)
JAN 1989										
26...	61000	410	500	9.0	2400	36	40	<18	230	<30
MAR										
30...	65000	430	400	7.0	2500	34	40	<18	220	<30
MAY										
30...	72000	480	500	6.0	2800	47	40	<18	270	<30
JUL										
20...	78000	470	500	<5.0	2300	33	40	<6	220	20
SEP										
20...	84000	590	800	12	2500	46	50	<18	240	10

SURFACE WATER--Continued

333332110531701 PINAL CREEK AT PRINGLE PUMP STATION NEAR GLOBE, AZ

LOCATION.--Lat 33°33'32", long 110°53'17", in NW¼NE¼SW¼, sec. 36, T. 3 N., R. 14 E., 200 m southeast of pump house at Pringle Pump Station, 2.1 km upstream from Inspiration Dam, 8.2 km upstream from mouth, and 21 km northwest of Globe.

DRAINAGE AREA.--500 km^2, including approximately 85 km^2 that is partly or entirely noncontributing due to mine pits and dumps.

CHANNEL ELEVATION.--861 m above National Geodetic Vertical Datum of 1929, from topographic map.

PREVIOUS DATA COLLECTION AT SITE.--One discharge and four water-quality analyses between April and July 1980, and one discharge measurement and water-quality analysis in February 1982 reported by the Central Arizona Association of Governments, Mineral Extraction Task Force, as site GM 28.

WATER QUALITY DATA

LABORATORY: Laboratory analysis by USGS research laboratory (D.K. Nordstrom), Menlo Park, California.

DATE	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)
May 25, 1989...	-7.90	-59.0

09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ

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 high and 22 m long that was built in 1912 as a diversion dam; however, the dam may never have been used for that purpose. The dam was abandoned 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. Elevation of gage is 835 m above National Geodetic Vertical Datum of 1929, from topographic map.

AVERAGE DISCHARGE.--9 years (water years 1981-89), 0.32 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	JUN	JUL	AUG	SEP	THE YEAR
1988	0.18	0.16	0.22	0.40	0.23	0.21	0.21	0.20	0.17	0.18	0.26	0.14	0.21
1989	.16	.15	.17	.21	.20	.20	.20	.16	.13	.39	.29	.08	.20

Monthly and yearly discharge, in thousands of cubic meters

WATER YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	THE YEAR
1988	493	424	582	1080	572	571	540	545	438	480	707	358	6790
1989	429	382	457	575	481	535	513	430	330	1050	771	206	6160

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER-QUALITY RECORDS

PERIOD OF RECORD.--November 1979 to current year.

WATER QUALITY DATA
LABORATORY: USGS National Water-Quality Laboratory, Arvada, Colorado
REMARKS: <, Actual value is known to be less than the value shown; K, Based on nonideal colony count.

09498400 PINAL CREEK AT INSPIRATION DAM, NR GLOBE, AZ

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CARBONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	TURBIDITY (NTU) (00076)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)
OCT 1987												
22...	1200	6.9	3290	8.1	26.0	21.0	113	138	0	0.40	690	8.2
NOV												
25...	1125	6.6	3500	8.1	16.5	14.0	122	149	0	0.50	687	9.1
DEC												
31...	1220	8.8	3370	8.2	10.0	14.0	122	149	0	0.90	695	9.1
JAN 1988												
29...	1245	8.2	3320	7.8	15.0	18.0	127	155	0	3.6	690	7.8
FEB												
24...	1215	8.2	3320	7.7	17.0	19.5	127	155	0	0.50	693	7.8
MAR												
18...	1135	8.1	3410	8.0	16.0	18.0	112	137	0	0.60	698	8.3
APR												
29...	1030	7.4	3420	8.0	21.0	22.5	113	138	0	0.40	690	7.6
MAY												
26...	1135	8.1	3430	8.0	33.0	27.5	102	124	0	1.3	688	6.9
JUN												
28...	1405	6.9	3390	8.0	31.5	29.0	98	120	0	1.1	693	8.3
JUL												
20...	1500	3.7	3480	8.1	35.0	34.0	110	134	0	2.3	692	6.0
SEP												
20...	1510	5.1	3480	8.0	31.0	27.0	109	133	0	2.5	684	6.7
NOV												
17...	1415	6.3	3480	8.1	18.0	19.5	119	145	0	1.0	685	7.9
JAN 1989												
27...	1230	8.7	3620	7.8	11.0	14.0	119	145	0	10	691	9.0
MAR												
30...	1445	6.3	3420	8.0	26.5	27.0	106	129	0	0.40	691	6.8
MAY												
30...	1520	4.8	3410	7.8	29.5	29.5	85	104	0	1.0	686	7.1
JUL												
20...	1445	12	3410	8.0	38.0	33.0	113	138	0	1.4	687	6.4
SEP												
20...	1540	3.9	3410	7.9	26.5	26.0	123	150	0	1.1	686	7.2

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER QUALITY DATA--Continued

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT 1987											
22...	103	K5	50	590	130	73	3.6	1800	100	0.20	3360
NOV											
25...	99	K5	35	510	110	74	3.5	2100	110	0.30	3410
DEC											
31...	98	<1	K11	540	120	73	3.4	2100	110	0.20	3390
JAN 1988											
29...	92	K4	24	630	140	80	3.5	2000	90	0.20	3380
FEB											
24...	95	K3	K9	560	120	82	4.4	2200	110	0.20	3410
MAR											
18...	97	K8	K18	580	130	83	4.2	2200	110	0.10	3400
APR											
29...	98	K8	35	590	130	83	4.6	2200	100	0.20	3480
MAY											
26...	98	K13	48	660	140	84	4.8	2200	110	0.30	3180
JUN											
28...	121	K11	25	700	160	82	4.9	2200	110	0.30	3540
JUL											
20...	95	83	180	690	170	84	4.5	2200	110	0.20	3580
SEP											
20...	95	210	2500	580	130	84	4.9	2200	110	0.20	3600
NOV											
17...	97	K8	K14	620	140	86	4.5	2200	110	0.20	3550
JAN 1989											
27...	97	150	62	530	110	85	4.2	2200	110	0.20	3380
MAR											
30...	96	K13	67	660	150	83	5.0	2200	110	0.20	3520
MAY											
30...	105	20	22	590	140	88	5.0	2300	110	0.20	3550
JUL											
20...	100	22	82	680	150	84	4.9	2200	110	0.30	3580
SEP											
20...	100	30	67	680	140	79	5.2	2200	100	0.30	3490

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER QUALITY DATA--Continued

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	ANTI-MONY, TOTAL (UG/L AS SB) (01097)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE) (01012)
OCT 1987											
22...	2800	1	<0.100	0.180	<0.20	0.080	--	<1	<1	100	--
NOV											
25...	3010	<1	<0.100	0.150	0.40	<0.010	--	<1	<1	<100	--
DEC											
31...	3050	6	<0.100	0.180	0.50	0.030	--	<1	<1	100	--
JAN 1988											
29...	3050	1	<0.100	0.180	0.40	0.040	--	<1	<1	<100	--
FEB											
24...	3190	4	0.200	0.070	0.30	0.050	--	1	<1	200	--
MAR											
18...	3200	9	<0.100	0.160	0.70	0.030	--	<1	<1	<100	--
APR											
29...	3210	8	<0.100	0.160	0.70	0.040	--	<1	<1	<100	--
MAY											
26...	3290	7	<0.100	0.210	0.70	0.040	--	1	1	<100	--
JUN											
28...	3350	10	<0.100	0.250	0.80	0.090	--	<1	<1	<100	--
JUL											
20...	3360	8	0.100	0.390	0.90	0.030	--	<1	<1	100	--
SEP											
20...	3210	3	<0.100	0.410	1.1	0.050	--	1	<1	<100	--
NOV											
17...	3270	1	<0.100	0.350	0.40	0.040	<1	1	<1	<100	<10
JAN 1989											
27...	3150	28	<0.100	0.280	0.70	0.040	--	1	<1	<100	--
MAR											
30...	3310	<1	<0.100	0.170	0.50	0.030	<1	1	<1	<100	<10
MAY											
30...	3310	8	<0.100	0.180	0.40	0.020	--	<1	<1	<100	--
JUL											
20...	3330	<1	<0.100	0.170	0.60	<0.010	<1	1	1	100	<10
SEP											
20...	3310	12	<0.100	0.120	0.50	0.030	--	<1	<1	<100	--

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER QUALITY DATA--Continued

DATE	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)
OCT 1987											
22...	70	1	1	<1	4	13	6	100	20	<5	<5
NOV											
25...	70	2	2	6	3	20	11	90	30	<5	<5
DEC											
31...	60	1	2	6	<5	23	12	110	20	<5	<5
JAN 1988											
29...	50	2	2	4	3	54	15	340	20	<5	<5
FEB											
24...	60	2	3	4	4	24	10	130	40	<5	<5
MAR											
18...	60	2	2	4	5	190	13	90	40	<5	<5
APR											
29...	70	2	2	4	2	13	9	80	30	<5	<5
MAY											
26...	70	2	2	3	3	18	7	160	30	<5	<5
JUN											
28...	60	1	1	5	4	13	4	90	40	<5	<5
JUL											
20...	70	1	3	3	3	20	7	260	30	<5	<5
SEP											
20...	70	3	2	4	4	26	7	720	20	<5	<5
NOV											
17...	60	3	2	4	3	19	8	80	30	<5	<5
JAN 1989											
27...	60	1	2	4	3	120	7	910	30	<5	<5
MAR											
30...	70	3	2	3	4	14	10	70	30	<5	<5
MAY											
30...	70	1	2	5	4	11	6	100	40	<1	3
JUL											
20...	80	<1	2	3	4	16	7	220	30	2	<1
SEP											
20...	90	1	2	3	4	24	4	850	30	1	<1

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER QUALITY DATA--Continued

DATE	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
OCT 1987											
22...	--	30000	33000	<0.10	<1	<1	<1.0	30	20	2	0.04
NOV											
25...	--	31000	28000	<0.10	<1	<1	<1.0	20	30	3	0.05
DEC											
31...	--	27000	27000	<0.10	<1	<1	<1.0	<20	20	8	0.19
JAN 1988											
29...	--	32000	29000	<0.10	<1	<1	<1.0	30	30	13	0.29
FEB											
24...	--	35000	32000	<0.10	<1	<1	<1.0	30	30	17	0.38
MAR											
18...	--	34000	29000	<0.10	<1	<1	1.0	30	40	8	0.18
APR											
29...	--	34000	35000	<0.10	<1	<1	1.0	30	30	24	0.48
MAY											
26...	150	33000	33000	<0.10	<1	<1	<1.0	40	20	169	3.7
JUN											
28...	140	37000	36000	<0.10	<1	<1	<1.0	20	20	141	2.6
JUL											
20...	140	41000	35000	<0.10	<1	<1	1.0	20	20	16	0.16
SEP											
20...	150	35000	36000	<0.10	<1	<1	<1.0	20	20	12	0.17
NOV											
17...	130	36000	40000	<0.10	<1	<1	<1.0	30	30	3	0.05
JAN 1989											
27...	150	39000	36000	<0.10	<1	<1	<1.0	40	30	73	1.7
MAR											
30...	140	38000	38000	<0.10	<1	<1	<1.0	20	20	2	0.03
MAY											
30...	--	27000	23000	<0.10	<1	<1	<1.0	20	20	10	0.13
JUL											
20...	170	48000	36000	<0.10	<1	<1	<1.0	20	10	11	0.36
SEP											
20...	130	34000	32000	<0.10	<1	<1	<1.0	40	20	37	0.39

SURFACE WATER--Continued
09498400 PINAL CREEK AT INSPIRATION DAM NEAR GLOBE, AZ--Continued
WATER-QUALITY CROSS-SECTION FIELD MEASUREMENTS

REMARKS.--Individual cross-section measurements were made immediately before or after composite measurements. Temperature and dissolved oxygen were measured in stream; pH and specific conductance were measured by instruments at stream side.

TIME	SAMPLE LOCATION, CROSS SECTION (FT FM L BANK) (00009)	NUMBER OF SAMPLING POINTS (COUNT) (00063)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	OXYGEN, DISSOLVED (MG/L) (00300)	PH (STANDARD UNITS) (00400)	SEDIMENT, SUSPENDED (MG/L) (80154)
				August 26, 1988					
1040	--	10	6.4	--	29.0	3400	6.2	7.90	62
--	0.50	1	0.62	0.40	29.0	3400	6.3	7.89	42
--	1.50	1	0.93	0.40	29.0	3400	6.3	7.90	52
--	2.50	1	0.88	0.39	29.0	3400	6.3	7.89	94
--	3.50	1	1.3	0.42	29.0	3400	6.2	7.89	62
--	4.50	1	0.94	0.48	29.0	3410	6.2	7.89	71
--	5.50	1	0.84	0.42	29.0	3400	6.2	7.89	74
--	6.50	1	0.56	0.26	29.0	3410	6.3	7.89	68
--	7.50	1	0.25	0.26	29.0	3410	6.4	7.89	57
--	8.50	1	0.06	0.18	29.0	3410	6.4	7.90	49
--	9.50	1	0.0	0.10	29.0	3410	6.6	7.90	--
				September 20, 1989					
1540	--	7	3.9	--	26.0	3410	7.2	7.91	37
--	6.10	1	0.31	0.28	26.0	3450	7.2	7.81	22
--	5.10	1	0.71	0.38	26.0	3420	7.2	7.81	22
--	4.10	1	0.83	0.40	26.0	3440	7.2	7.81	68
--	3.10	1	1.1	0.32	26.0	3420	7.2	7.84	23
--	2.10	1	0.64	0.32	26.0	3420	7.2	7.82	60
--	1.10	1	0.30	0.22	26.0	3410	7.1	7.82	25
--	0.10	1	0.04	0.04	26.0	3410	7.0	7.82	26

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 m and from May 1953 to June 1975 at elevation 1,080 m.

Precipitation, in millimeters

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	THE YEAR
1987	35	59	36	1	30	15	49	79	21	11	41	58	436
1988	67	28	3	39	0	32	81	117	21	33	25	11	458
1989	57	4	29	0	12	0	71	63	0	26	2	14	278

Precipitation statistics for 1907-89 (all gage sites), in millimeters

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	THE YEAR
NUMBER OF OBSERVATIONS	83	83	83	83	83	82	82	83	82	83	83	82	80
MEAN	41	36	36	14	9	9	66	70	34	30	27	45	420
MAXIMUM	165	155	121	72	65	49	172	206	136	156	121	218	712
MINIMUM	0	0	0	0	0	0	7	8	0	0	0	0	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.

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

Precipitation, in millimeters

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	THE YEAR
1987	35	74	25	T	33	0	30	78	12	16	53	56	413
1988	75	30	2	41	0	11	49	80	15	11	27	13	354
1989	65	6	37	0	2	0	148	16	0	39	3	17	333

Precipitation statistics for 1914-89, in millimeters

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	THE YEAR
NUMBER OF OBSERVATIONS	75	76	76	76	76	76	76	76	76	76	76	76	75
MEAN	53	44	45	19	10	9	66	77	40	33	35	59	485
MAXIMUM	245	206	173	100	64	91	219	213	179	193	181	293	578
MINIMUM	0	0	0	0	0	0	9	8	0	0	0	0	167