UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ANALYTICAL RESULTS FOR 127 WATER SAMPLES FROM THE PAPAGO INDIAN RESERVATION AND VICINITY, ARIZONA

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Open-File Report 80-310

1980

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Analytical Results for 127 water samples from the Papago Indian Reservation and vicinity, Arizona

by

Walter H. Ficklin, David J. Preston, Alice R. Stanley

and Gary A. Nowlan

Abstract

One hundred twenty-seven water samples were collected from the Papago Indian Reservation and vicinity as a part of a mineral resource study. The samples were analyzed for arsenic, copper, zinc, molybdenum, cobalt, nickel, iron, manganese, uranium, sodium, potassium, calcium, magnesium, alkalinity (as bicarbonate), sulfate, fluoride, chloride, nitrate and silica. Temperature, pH, and specific conductance were also measured. The data are presented in the accompanying tables. Also included are the locations and a description of each sample site.

Introduction

This report presents data pertaining to water samples collected during an extension of a study of the Papago Indian Reservation, Arizona reported by Ficklin and others (1978). Most of the samples were collected in the Baboquivari Mountains where anomalous areas had been evident from data presented by the original study. Samples were also collected from areas outside of the reservation boundary to determine the extent of the anomalous area east of the Baboquivari Mountains. Most of the samples were collected during the period from November 1978 to January 1979.

A conscious effort was made to locate and sample dug wells for the following reasons: (1) they commonly had no metal in contact with the water; (2) they were easy to sample with the sampling equipment available; (3) the water in the well could be sampled directly in contrast to the sampling of a storage tank; (4) dug wells are usually located in areas near enough exposed bedrock so that geological interpretations of analytical results are possible; and (5) many of the dug wells are abandoned or remote, so that they probably would not be sampled during any present day survey of domestic wells.

Figure 1 is an index map of the area sampled. Figures 2-5 indicate the locations of the samples for this study. Some cultural features especially ranches, presently have different names than are shown on U.S. Geological Survey 15-minute topographic maps of the areas studied. In this report, the names on the topographic maps are used to make comparison between this report and the topographic maps easier.

Acknowledgments

We wish to acknowledge the cooperation of the Papago Tribe of Arizona during the course of this study. Also we want to thank a number of ranchers and land owners in the study area for access to their property, permission to publish the data, and special assistance in some cases.

Robert Miller (Elkhorn Ranch) (Fresnal Ranch in figure 2)

John King (Anvil Ranch)

V. O. Carney (Chiltepines Ranch)

Joe M. King (Los Encinos Ranch)

Pete Phelps (Santa Margarita Ranch)

Pruett-Wray Cattle Company (Buenos Aires Ranch)

Elizabeth Brown Isaman (Rancho El Mirador) (Los Avispas Ranch in figure 3)

Rancho de la Osa

C. G. Newman Enterprises, Inc.

Donald E. Janson

Kip Ripley Realty, Inc.

ASARCO, Inc.

John Donaldson, Jr.

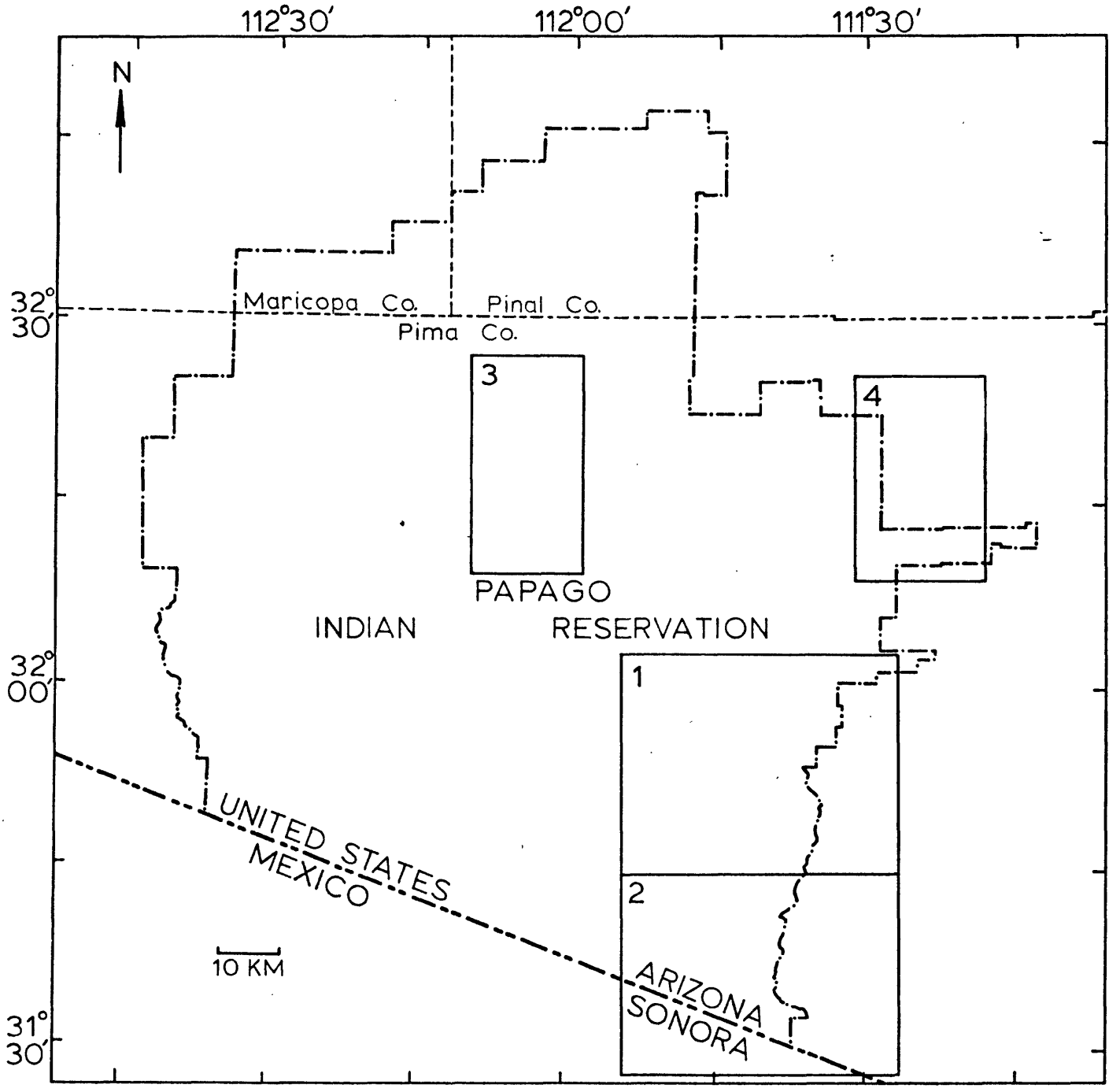

Figure 1.--Locations of areas shown in figures 2-5.

Explanation:
Boundaries

- International
- Reservation
- County

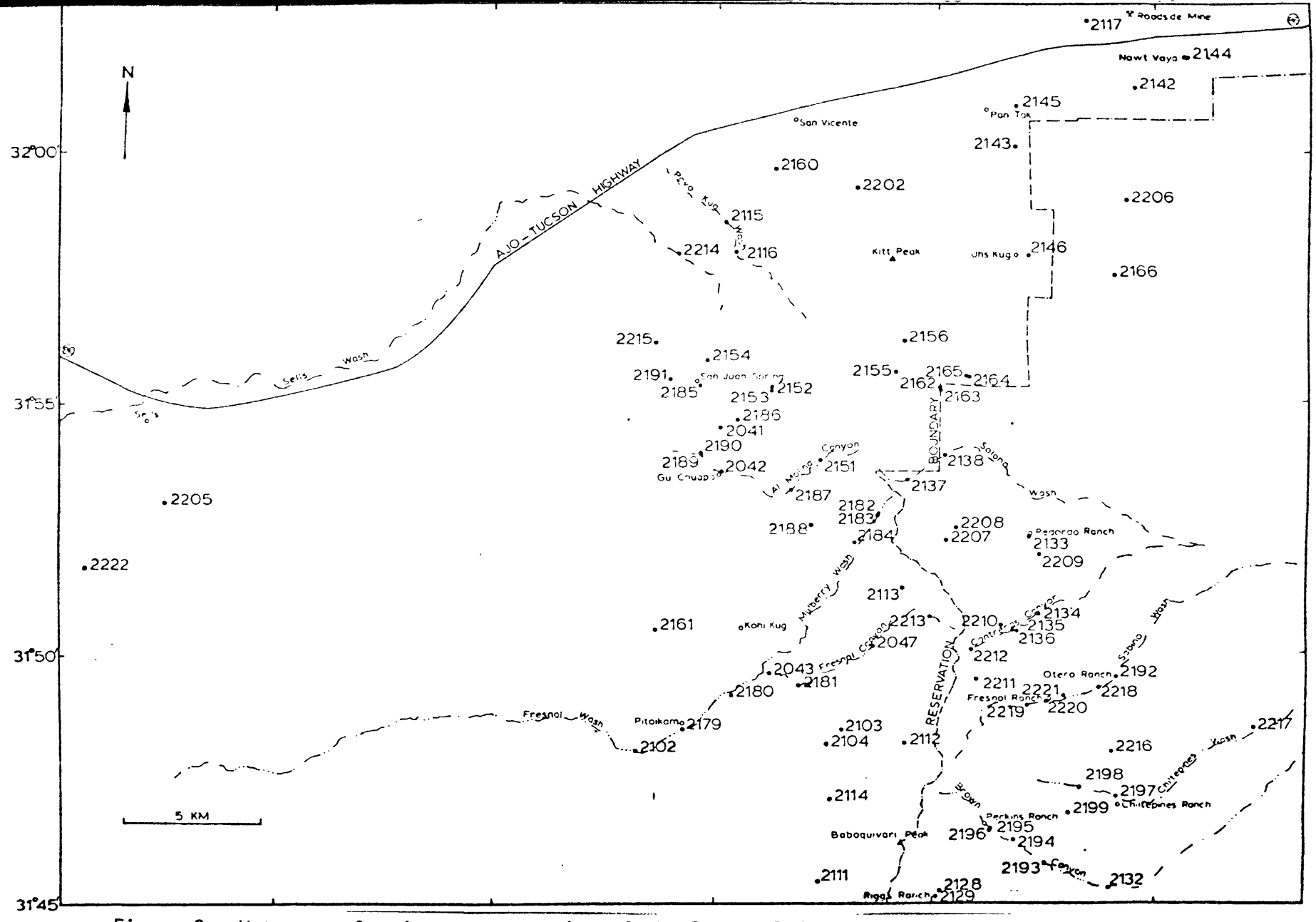

Figure 2.--Water sample sites on a portion of the Papago Indian Reservation and vicinity, Arizona. Area 1 in figure 1.

EXPLANATION

- • Sample Site
- —···— Intermittent stream
- ⚒ Mine
- c Cultural feature--where a sample site and a cultural feature coincide, a solid dot designates both and the cultural feature is labeled.

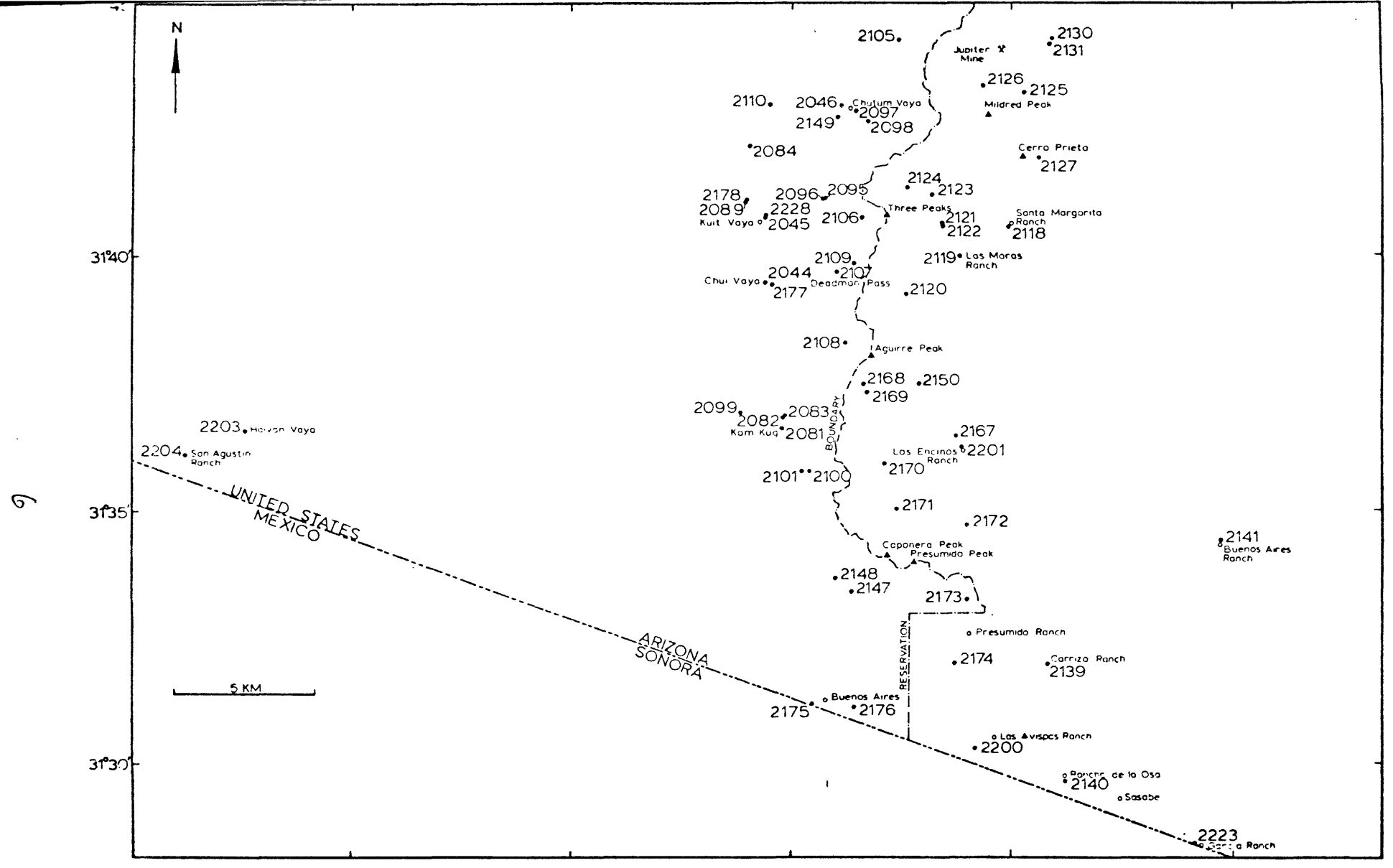

Figure 3.--Water sample sites on a portion of the Papago Indian Reservation and vicinity, Arizona. Area 2 in figure 1.

EXPLANATION

- ● Sample Site
- ⚒ Mine
- o Cultural feature--where a sample site and a cultural feature coincide, a solid dot designates both and the cultural feature is labeled.

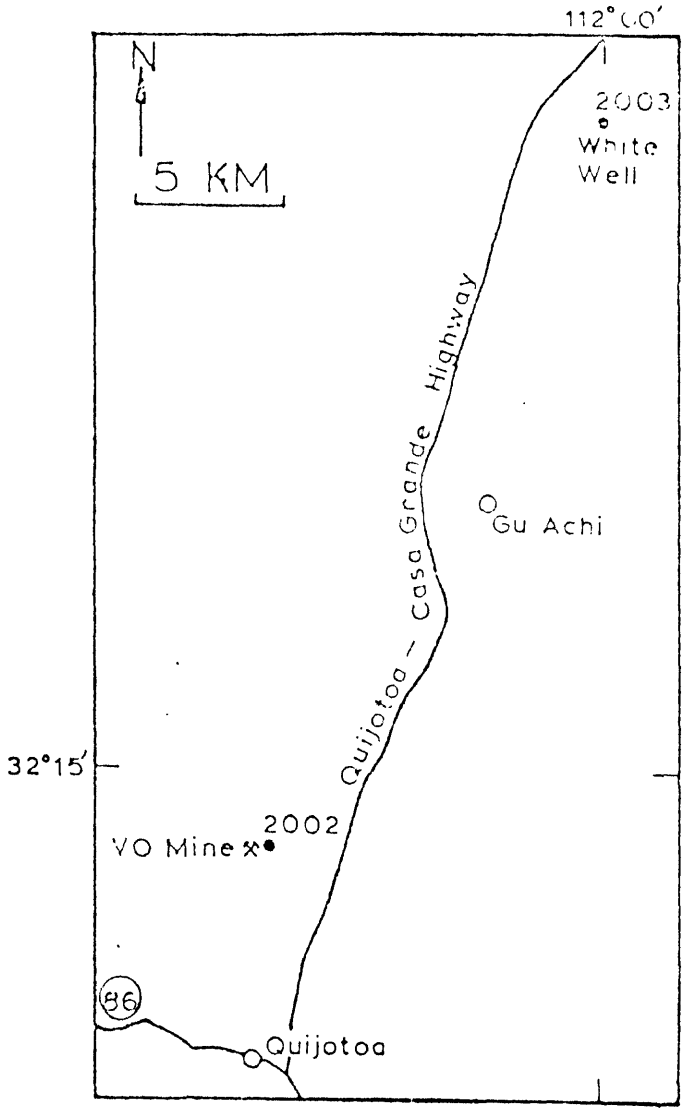

Figure 4.--Water sample sites on a portion of the Papago Indian Reservation, Arizona. Area 3 in figure 1.

EXPLANATION

- • Sample Site
- ⚒ Mine
- ○ Cultural feature--where a sample locality and a cultural feature coincide, a solid dot designates both and the cultural feature is labeled.

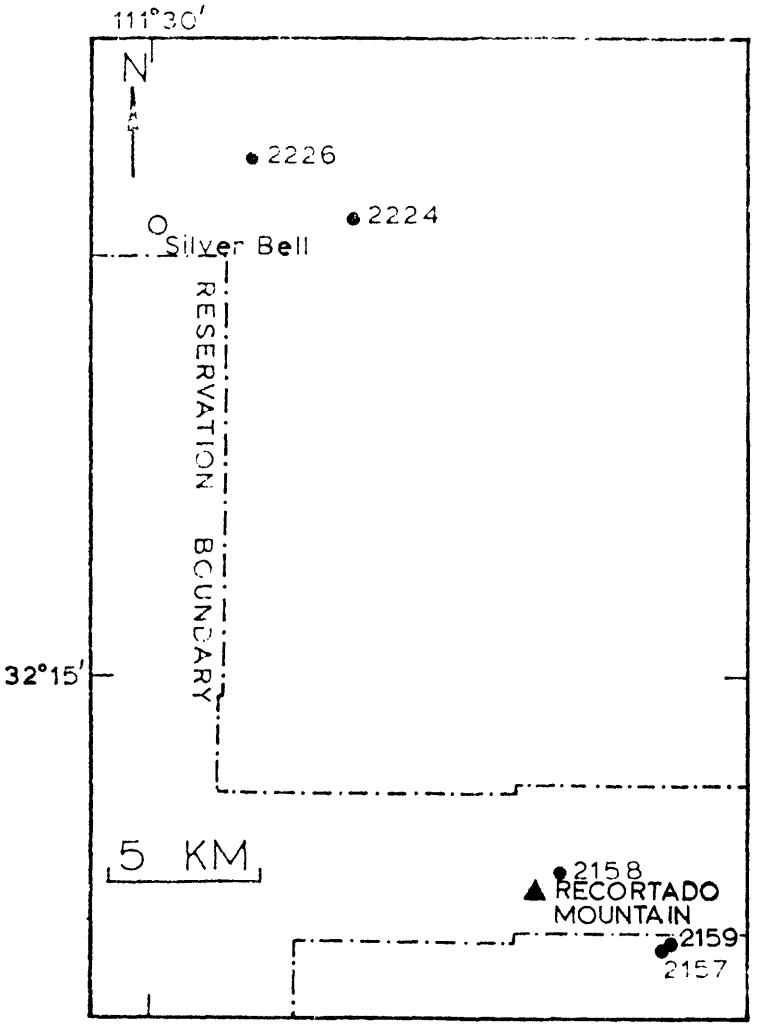

Figure 5.--Water sample sites on a portion of the Papago Indian Reservation and vicinity, Arizona. Area 4 in figure 1.

EXPLANATION

- ● Sample Site
- ○ Cultural feature

Sampling Techniques

Samples were usually collected from wells by lowering a plastic bottle suspended from a cord into each well and filling the bottle with well water. Where a bottle could not be lowered into the well, an adjacent storage tank or the stream of water from a pumping well was sampled. At the sample site a portion of water was filtered through a 0.45-micron membrane filter and then acidified with 0.5 ml of concentrated nitric acid for each 100 ml of water sample. Another portion of the same sample was neither filtered nor acidified. All samples were stored in polethylene bottles.

Analytical Techniques

Water temperature was measured at the sample site. Specific conductance and pH were measured within one or two days of sample collection. Alkalinity, sulfate, chloride, fluoride, nitrate, and silica were determined in the untreated portion of the sample. Most sulfate, chloride, fluoride, and nitrate concentrations were measured by ion chromatography. However, a few samples collected early in the study were measured by ion-selective electrodes and turbidimetric procedures. The filtered, acidified sample was used to determine copper, zinc, molybdenum, cobalt, nickel, iron, manganese, arsenic, uranium, sodium, magnesium, potassium and calcium.

Table 1 is a list of analytical techniques employed for the analyses of each constituent and a list of the reports that describe the analytical methods used.

Results

Table 2 is a list of sample locations, sample sources, and other information for the samples shown in figures 1-5.

Table 3 is a list of the analytical results.

Table 1.--Analytical methods used for water analyses, Papago Indian Reservation, Arizona.

Constituent	Method	Reference
Alkalinity	Gran's Plot Titration with sulfuric acid	Orion Research, Inc. (1975).
Sulfate	Ion Chromatography	Smee and Hall (1978).
Fluoride	Ion Chromatography	Smee and Hall (1978).
Chloride	Ion Chromatography	Smee and Hall (1978).
Nitrate	Ion Chromatography	Smee and Hall (1978).
Sulfate	Barium Sulfate-turbidimetric	Tabatabai (1974)
Chloride	Gran's Plot Titration with silver nitrate	Orion Research, Inc. (1975).
Fluoride	Gran's Plot addition	Orion Research, Inc. (1975).
Sodium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Magnesium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Potassium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Calcium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Copper	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Zinc	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Molybdenum	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Cobalt	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Nickel	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Arsenic	Flameless atomic absorption spectrophotometry	Miller and Ficklin (1976).
Iron	Flame and Flameless atomic absorption spectrophotometry	Aruscavage (1977).
Manganese	Flame and Flameless atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Uranium	Fluorometric	Ward and Bondar (1977).
Silica	Molybdate Blue	Brown, Skougstad, and Fishman (1970, p. 138-140).

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 1				
2047	31°50'13"	111°36'22"	In Fresnal Canyon, 2.9 km west of Reservation boundary.	Spout of pumping well.	12-15-78	2	Yes	Mortared stone lining.
2047	31°50'13"	111°36'22"	--do----------	--do---------	4-11-79	2	--do------	Same well as preceding.
2115	31°58'37"	111°39'46"	Pavo Kuq Wash, 3.3 km southeast of Arizona Rt. 86.	Well---------	11-29-78	1	Yes	Mortared stone lining.
2116	31°58'02"	111°39'33"	Pavo Kuq Wash, 4.5 km southeast of Arizona Rt. 86.	Well---------	11-29-78	7	No	Mortared stone lining. In silicified zone containing minor copper mineralization.
2117	32°02'37"	111°31'30"	1.5 km west of Roadside Mine-----	Well---------	11-29-78	7	No	Concrete lining.
2128	31°45'19"	111°34'50"	0.2 km northeast of Riggs Ranch--	Spring-------	12- 3-78	---	---	Spring is developed. In tributary of main stream.
2129	31°45'12"	111°34'58"	Riggs Ranch----------	Stream-------	12- 3-78	---	---	Main stream.
2132	31°45'20"	111°31'02"	Brown Canyon, 5.0 km southeast of Perkins Ranch.	Spout of pumping well.	12- 3-78	?	Yes	Drilled well.
2133	31°52'55"	111°32'51"	Redondo Ranch----------	Steel storage tank.	12- 4-78	?	Probably	On hill southwest of ranch buildings.
2133	31°52'55"	111°32'51"	--do----------	--do---------	1-22-79	--do----	--do----	Same well as preceding.
2134	31°50'52"	111°32'39"	Contreras Canyon, 2.7 km east of Reservation boundary.	Well---------	12- 4-78	1.5	Probably	Mortared stone lining.
2135	31°50'33"	111°33'11"	80 m. northwest of site 2136------	Seep---------	12- 4-78	---	---	---
2136	31°50'34"	111°33'07"	Contreras Canyon, 1.8 km east of Reservation boundary.	Stream-------	12- 4-78	---	---	---
2137	31°53'32"	111°35'25"	Solano Wash, 0.3 km south of Reservation boundary.	Stream-------	12- 4-78	---	---	---
2138	31°54'01"	111°34'44"	Solano Wash, 0.2 km east of Reservation boundary.	Well---------	12- 4-78	0	Probably	Concrete lining.
2142	32°01'17"	111°30'28"	2.7 km south of Roadside Mine---	Well---------	12 -7-78	1	Yes	Mortared stone lining.
2143	32°00'06"	111°33'06"	1.7 km southeast of Pan Tak-----	Well---------	12- 7-78	2.5	Yes	Mortared stone lining.
2144	32°01'55"	111°29'17"	Nawt Vaya----------	Well---------	12- 8-78	11	Yes	Mortared stone lining.
2145	32°00'54"	111°33'06"	1.0 km east of Pan Tak----------	Well---------	12- 8-78	2.5	Yes	Concrete lining.
2146	31°57'59"	111°32'53"	0.5 km east of Uhs Kuq----------	Well---------	12- 8-78	6	Yes	Mortared stone lining.
2151	31°53'54"	111°37'35"	Ali Molina Canyon, 3.7 km east-northeast of Gu Chuapo.	Spring-------	12-10-78	---	---	Only remnants of developed spring remain.
2152	31°55'21"	111°38'42"	2.7 km east of San Juan spring--	Stream-------	12-10-78	---	---	North fork.
2153	31°55'17"	111°38'43"	0.1 km south of site 2152-------	Stream-------	12-10-78	---	---	South fork.
2154	31°55'54"	111°40'11"	0.9 km northeast of San Juan spring.	Seep---------	12-10-78	---	---	---
2155	31°55'39"	111°35'53"	4.1 km south of Kitt Peak-------	Stream-------	12-10-78	---	---	---
2156	31°56'18"	111°35'42"	3.0 km south of Kitt Peak-------	Stream-------	12-10-78	---	---	---
2160	31°59'40"	111°38'38"	1.8 km south of San Vincente----	Stream-------	12-11-78	---	---	---
2161	31°50'33"	111°41'20"	3.0 km west of Kohi Kuq---------	Well---------	12-11-78	6	Yes	Mortared stone lining.
2162	31°55'22"	111°34'52"	0.1 km northwest of site 2163---	Well---------	12-11-78	2	Yes	Not plotted on USGS topographic map of Baboquivari Peak quadrangle.

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*--Continued

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 1--Continued				
2163	31°55'19"	111°34'52"	5.1 km south-southeast of Kitt Peak.	Well---------	12-11-78	3	Yes	Mortared stone lining.
2164	31°55'35"	111°34'14"	1.1 km east-northeast of sites 2162.	Well---------	12-11-78	2.5	No	Mortared stone lining. Not plotted on USGS topographic map of Baboquivari Peak quadrangle.
2165	31°55'35"	111°34'19"	0.1 km northwest of site 2164----	Stream-------	12-11-78	---	---	---
2166	31°57'35"	111°30'56"	3.6 km east-southeast of Uhs Kug-	Well---------	12-11-78	2.5	Probably	Mortared stone lining.
2179	31°48'32"	111°40'47"	Pitoi Kam----------	Well---------	12-15-78	3	Yes	Concrete lining.
2180	31°49'14"	111°39'35"	2.5 km south of Kohi Kug in Fresnal Wash----------	Metal storage tank.	12-15-78	?	Yes	Storage tank fed by drilled well.
2181	31°49'25"	111°38'05"	3 km southeast of Kohi Kug, in Fresnal Canyon.	Stream-------	12-15-78	---	---	---
2182	31°52'52"	111°36'14"	6.5 km northeast of Kohi Kug, in Mulberry Wash.	Spring-------	12-15-78	---	Yes	Spring is developed.
2183	31°52'50"	111°36'17"	40 m downstream from site 2182--	Spring-------	12-15-78	---	---	Spring is developed.
2184	31°52'17"	111°36'48"	1.2 km southwest of sites 2182 and 2183.	Well---------	12-15-78	2	Yes	Concrete lining. A drilled well is 100 m west.
2185	31°55'24"	111°40'20"	0.2 km southeast of San Juan spring.	Stream-------	12-17-78	---	---	---
2186	31°54'43"	111°39'29"	2.0 km southeast of San Juan spring.	Stream-------	12-17-78	---	---	---
2187	31°53'20"	111°38'17"	Ali Molina Canyon, 2.6 km southeast of Gu Chuapo.	Stream-------	12-17-78	---	---	---
2188	31°52'37"	111°37'48"	4.5 km northeast of Kohi Kug----	Well---------	12-17-78	2.5	No	Actually is access to valve in sediment-filled dam. Lined with concrete.
2189	31°54'01"	111°40'20"	Ali Molina Wash, 1.0 km northwest of Gu Chuapo.	Stream-------	12-17-78	---	---	---
2190	31°54'04"	111°40'20"	0.1 km north of site 2189-----	Stream-------	12-17-78	---	---	Main stream.
2191	31°55'31"	111°41'01"	1.0 km west of San Juan spring.	Stream-------	12-17-78	---	---	Tributary.
2192	31°49'36"	111°30'53"	Otero Ranch----------	Well---------	1-15-79	1.5	Yes	Concrete lining.
2193	31°45'52"	111°32'32"	2.5 km southeast of Perkins Ranch.	Spring-------	1-16-79	---	---	At base of stone dam.
2194	31°46'20"	111°33'14"	1.2 km southeast of Perkins Ranch.	Well---------	1-16-79	4.5	Yes	Steel lining.
2195	31°46'34"	111°33'46"	0.2 km southeast of Perkins Ranch.	Stream-------	1-16-79	---	---	Main stream.
2196	31°46'31"	111°33'46"	0.1 m south of site 2195------	Stream-------	1-16-79	---	---	Tributary.
2197	31°47'08"	111°31'51"	0.25 km north of Chiltepines Ranch.	Well---------	1-16-79	2.5	Yes	Concrete lining.
2198	31°47'23"	111°31'42"	1.5 km west-northwest of Chiltepines Ranch.	Spout of flowing well.	1-16-79	?	Yes	Drilled well. Depth is 40 m. Well is not plotted on USGS topographic map of Baboquivari Peak quadrangle.

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*--Continued

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 1--Continued				
2199	31°46'50"	111°31'56"	1.7 km west-southwest of Chiltepines Ranch.	Pipe in drill hole.	1-16-79	---	---	Rusty iron pipe.
2202	31°59'18"	111°36'44"	2.9 km northwest of Kitt Peak----	Well---------	1-19-79	7.5	No	No lining.
2205	31°53'04"	111°52'29"	3.1 km south of Sells----------	Well---------	1-21-79	2	No	Lined with timbers.
2206	31°59'04"	111°30'36"	5.0 km northeast of Uhs Kug------	Spring-------	1-22-79	---	---	Spring is developed.
2207	31°52'20"	111°34'43"	3.0 km west of Redondo Ranch-----	Stream-------	1-22-79	---	---	---
2208	31°52'35"	111°34'28"	2.6 km west of Redondo Ranch-----	Stream-------	1-22-79	---	---	---
2209	31°52'03"	111°32'37"	0.8 km south-southeast of Redondo Ranch.	Stream-------	1-22-79	---	---	---
2210	31°50'38"	111°33'30"	Contreras Canyon, 1.3 km east of Reservation boundary.	Stream-------	1-22-79	---	---	Tributary.
2211	31°49'33"	111°34'04"	2.8 km west-northwest of Fresnal Ranch.	Spring-------	1-23-79	---	---	Spring is developed. Not ploted on USGS topographic map of the Baboquivari Peak quadrangle.
2212	31°50'10"	111°34'11"	0.6 km east of Reservation boundary.	Stream-------	1-23-79	---	---	---
2213	31°50'49"	111°35'06"	Fresnal Canyon, 1.2 km west of Reservation boundary.	Stream-------	1-23-79	---	---	---
2214	31°58'01"	111°40'52"	Sells Wash, 4.8 km north-northwest of San Juan spring.	Stream-------	1-24-79	---	---	---
2215	31°56'16"	111°41'22"	2.0 km northwest of San Juan spring.	Stream-------	1-24-79	---	---	---
2216	31°48'07"	111°31'01"	3.0 km southeast of Fresnal Ranch.	Steel storage tank.	1-25-79	?	Yes	Drilled well. Well is 74 m deep. Well not plotted on USGS topographic map of Baboquivari Peak quadrangle.
2217	31°48'33"	111°27'42"	5.5 km northeast of Chiltepines Ranch and 0.1 km north of Chiltepines Wash.	Metal storage tank.	1-25-79	?	Yes	Drilled well. Depth is 310 m. Not plotted on USGS topographic map of Palo Alto Ranch quadrangle.
2218	31°49'25"	111°31'17"	0.6 km southwest of Otero Ranch.	Well---------	1-25-79	?	Yes	Concrete lining.
2219	31°49'02"	111°32'55"	0.6 km west of Fresnal Ranch---	Spout of flowing well.	1-25-79	?	Yes	Drilled well. Depth is 48 m.
2220	31°49'09"	111°32'28"	Fresnal Ranch----------	Well---------	1-25-79	2.5	Yes	Not plotted on USGS topographic map of Baboquivari Peak quadrangle. Another dug well is 30 m south.
2221	31°49'13"	111°32'03"	2.0 km west-southwest of Otero Ranch.	Spout of flowing well.	1-25-79	?	?	Drilled well. Not plotted on USGS topographic map of Baboquivari Peak quadrangle. Over 60 m deep. Serves as drinking water source for ranch.
2222	31°51'47"	111°54'17"	6.0 km south-southwest of Sells.	Well---------	1-26-79	8	Yes	Mortared stone lining.

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*--Continued

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 2				
2044	31°39'28"	111°40'35"	Chui Vaya----------	Well---------	12-13-78	3	Yes	Mortared stone lining.
2044	31°39'28"	111°40'35"	--do----------	--do---------	1-24-79	2	--do----	Same well as preceding.
2044	31°39'28"	111°40'35"	--do----------	--do---------	4-11-79	2	--do----	Same well as preceding.
2045	31°40'45"	111°40'33"	Kuit Vaya----------	Well	12-13-78	6	No	No lining.
2045	31°40'45"	111°40'33"	--do----------	--do---------	1-17-79	1	--do----	Same well as preceding.
2045	31°40'45"	111°40'33"	--do----------	--do---------	4-11-79	1.5	--do----	Same well as preceding.
2084	31°42'11"	111°40'54"	2.6 km north-northwest of Kuit Vaya.	Well---------	12-14-78	5.5	No	No lining.
2089	31°41'04"	111°41'00"	0.9 km northwest of Kuit Vaya---	Well---------	12-14-78	2.5	No	No lining.
2089	31°41'04"	111°41'00"	--do----------	--do---------	1-17-79	2.5	--do----	Same well as preceding.
2118	31°40'34"	111°35'03"	Santa Margarita Ranch----------	Well---------	11-30-78	2	Probably	Dug well. Concrete lining.
2119	31°39'59"	111°36'09"	Las Moras Ranch----------	Galvanized storage tank.	11-30-78	---	Yes	Storage tank fed by drilled well.
2119	31°39'59"	111°36'09"	--do----------	Spout of pumping well.	1-18-79	?	Yes	Same well as preceding
2120	31°39'14"	111°37'24"	1.6 km east of Deadman Pass-----	Well---------	11-30-78	2.5	Yes	Concrete lining.
2121	31°40'35"	111°36'34"	2.0 km east of Three Peaks------	Spout of pumping well.	11-30-78	?	Yes	Drilled well.
2122	31°40'33"	111°36'34"	50 m south of site 2121---------	Spout of pumping well.	11-30-78	?	Yes	Drilled well.
2123	31°41'11"	111°36'48"	1.7 km east-northeast of Three Peaks.	Well---------	11-30-78	0.5	Yes	Concrete lining.
2124	31°41'19"	111°37'22"	1.2 km northeast of Three Peaks.	Steel storage tank.	11-30-78	?	Yes	Drilled well. Not plotted on USGS topographic map of Presumido Peak quadrangle.
2125	31°43'13"	111°34'42"	1.5 km northeast of Mildred Peak	Spout of pumping well.	12- 1-78	?	No	Drilled well in old dug well. Rusted steel lining.
2126	31°43'23"	111°35'38"	1.1 km north of Mildred Peak----	Well---------	12- 1-78	5.5	Probably	Concrete lining.
2127	31°41'54"	111°34'22"	0.5 km east of Cerro Prieto-----	Spring-------	12 -1-78	---	---	150 m southwest of well. Well not plotted on USGS topographic map of Presumido Peak quadrangle.
2130	31°44'20"	111°34'06"	1.8 km east-northeast of Jupiter Mine.	Stream-------	12- 3-78	---	---	Tributary of main stream. From north.
2131	31°44'10"	111°34'09"	1.7 km east of Jupiter Mine-----	Stream-------	12- 3-78	---	---	Tributary of main stream. From west.
2139	31°31'59"	111°34'13"	Carrizo Ranch----------	Well---------	12- 5-78	9	Yes	Concrete lining.
2140	31°29'40"	111°33'48"	Rancho de la Osa----------	Spout of pumping well.	12- 5-78	?	?	Drilled well. 115 m to submersible pump.

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*--Continued

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 2--Continued				
2141	31°34'25"	111°30'16"	Buenos Aires Ranch----------	Steel storage tank.	12- 5-78	?	?	Drilled well. 127 m deep.
2147	31°33'25"	111°38'38"	1.8 km southwest of Caponera Peak	Well---------	12-10-78	4.5	Yes	Mortared stone lining.
2148	31°33'41"	111°39'00"	2.0 km west-southwest of Caponera Peak.	Pipe from spring-----	12-10-78	---	---	Galvanized pipe.
2149	31°42'45"	111°38'57"	0.5 km southwest of Chutum Vaya--	Stream-------	12-10-78	---	---	---
2150	31°37'30"	111°37'07"	2.7 km northwest of Los Encinos Ranch.	Stream-------	12-10-78	---	---	---
2167	31°36'29"	111°36'16"	0.8 km northwest of Los Encinos Ranch.	Well---------	12-12-78	11	Yes	Concrete lining. Not plotted on USGS topographic map of Presumido Peak quadrangle.
2168	31°37'28"	111°38'19"	1.0 km south of Aguirre Peak-----	Earth reservoir.	12-12-78	---	---	---
2169	31°37'19"	111°38'18'	1.3 km south of Aguirre Peak-----	Stream-------	12-12-78	---	---	---
2170	31°35'55"	111°37'55"	2.8 km west-southwest of Los Encinos Ranch----------	Stream-------	12-12-78	---	---	---
2171	31°35'01"	111°37'38"	3.2 km southwest of Los Encinos Ranch.	Stream-------	12-12-78	---	---	---
2172	31°34'44"	111°36'04"	2.5 km south of Los Encinos Ranch.	Well---------	12-12-78	9	No	Concrete lining.
2173	31°33'15"	111°36'02"	1.3 km north of Presumido Ranch--	Well---------	12-13-78	1.	Yes	Concrete lining.
2174	31°32'03"	111°36'19"	1.4 km southwest of Presumido Ranch.	Stream-------	12-13-78	---	---	---
2175	31°31'13"	111°39'33"	Buenos Aires----------	Well---------	12-13-78	3.5	Yes	Mortared stone lining.
2176	31°31'09"	111°38'36"	1.5 km east of Buenos Aires------	Well---------	12-13-78	5	Yes	Mortared stone lining.
2177	31°39'28"	111°40'26"	0.3 km east of Chui Vaya---------	Stream-------	12-13-78	---	---	Main stream.
2177	31°39'28"	111°40'26"	--do----------	--do---------				
2178	31°41'03"	111°40'59"	0.9 km northwest of Kuit Vaya----	Spring-------	12-14-78	---	---	Well of site 2089 is 15 m away.
2200	31°30'19"	111°35'52"	0.6 km southwest of Los Avispas Ranch.	Spring-------	1-18-79	---	---	---
2201	31°36'16"	111°35'59"	Los Encinos Ranch----------	Metal pressure tank.	1-18-79	?	Yes	Drilled well.
2203	31°36'36"	111°52'21"	Haivan Vaya----------	Well---------	1-21-79	2	Yes	Mortared stone lining.
2204	31°36'07"	111°53'39"	San Agustin Ranch----------	Well---------	1-21-79	2.5	No	No lining. Not plotted on USGS topographic map of Vamori quadrangle.
2223	31°28'26"	111°30'50"	0.3 km northwest of Garcia Ranch-	Well---------	1-26-79	16.5	No	Concrete lining.
2228	31°40'44"	111°40'33"	Kuit Vaya----------	Stream-------	4-11-79	---	---	Well at site 2045 is 10 m away.
				Area 3				
2002	32°13'39"	112°07'03"	VO Mine----------	Pool---------	10-24-76	---	---	Pool fills excavation for small open-pit operation.
2003	32°26'06"	111°59'16"	White well----------	Mortared stone tank.	10-24-76	?	Yes	Drilled well.

Table 2.--*Sample locations, sample source, and other information, Papago Indian Reservation and vicinity, Arizona*--Continued

[Samples collected by Walter H. Ficklin, J. Howard McCarthy, Gary A. Nowlan, and David J. Preston. Wells were dug wells unless noted otherwise under "Remarks." Sample source--"well" denotes that the sample was obtained by means of a plastic bottle suspended on a cord. Leaders (--) indicate no data or not applicable.]

Site	Latitude °N	Longitude °W	Location	Sample source	Date of sample collection	Depth to water (meters)	Galvanized pipe in well	Remarks
				Area 4				
2157	32°10'21"	111°18'51"	0.15 km southwest of site 2159---	Pool---------	12-11-78	---	---	Stagnant.
2158	32°11'24"	111°21'10"	North base of Recortado Mountain-	Well---------	12-11-78	3.5	Yes	Mortared concrete block lining.
2159	32°10'23"	111°18'49"	4.2 km southeast of Recortado Mountain.	Well---------	12-11-78	2	Yes	No lining.
2224	32°23'01"	111°25'53"	6.4 km east of Silver Bell-------	Well---------	1-28-79	0.3	No	Mortared stone lining.
2226	32°24'51"	111°27'48"	4.0 km northeast of Silver Bell--	Mortared stone tank.	1-28-79	?	Yes	Drilled well.

Table 3.--*Results of water analyses, Papago Indian Reservation and vicinity, Arizona*

[Analysts: Alice R. Stanley, David J. Preston, John B. McHugh, and Walter H. Ficklin]

Site	Date of sample collection	HCO_3^- (mg/L)	$SO_4^=$ (mg/L)	Cl^- (mg/L)	F^- (mg/L)	$NO_3^=$ (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Ca (mg/L)	Cu µg/L	Zn µg/L	Fe µg/L	Mn µg/L	Mo (µg/L)	As (µg/L)	U (µg/L)	Co (µg/L)	Ni (µg/L)	SiO_2 (mg/L)	pH	Temp. (°C)	Specific conductance (µmhos/cm)
												Area 1											
2047	12-15-78	360	26	37	0.2	4.1	33	18	1.4	68	27	110	11	5.0	25	<1.0	2.8	--	--	30	7.6	17.5	690
2047	4-11-79	230	43	72	.3	2.3	46	44	1.1	95	11	61	17	1.8	2.6	2.5	--	--	--	24	7.9	18.0	690
2115	11-29-78	49	33	27	.7	7.5	20	5.0	1.6	28	12	110	600	89	29	<1.0	1.7	--	--	43	6.6	19.0	260
2116	11-29-78	230	96	87	1.1	1.3	65	10	4.5	68	23	35	2.5	110	450	<1.0	17	--	--	50	7.6	20.0	630
2117	11-29-78	560	78	1,360	.7	6.8	150	65	9.5	190	15	150	2.1	200	5.3	5.0	29	--	--	82	7.4	20.0	3,000
2123	12- 3-78	360	53	17	.3	5.4	18	13	1.1	83	9.2	20	2.2	<1.0	4.5	<1.0	1.3	--	--	34	7.8	15.0	640
2129	12- 3-78	230	24	10	.2	.6	7.5	10	.9	50	8.2	7.0	100	<1.0	5.7	<1.0	1.3	--	--	25	7.5	14.0	320
2132	12- 3-78	190	62	20	.8	60	15	10	1.7	63	30	30	100	12	6.4	<1.0	2.6	--	--	33	7.1	15.0	480
2133	12- 4-78	220	38	31	2.1	5.1	33	10	1.3	45	19	2,340	13	13	36	<1.0	4.1	--	--	30	7.2	5.5	450
2133	1-22-79	190	31	19	1.5	3.2	43	10	1.8	35	5.4	1,480	7.5	4.6	150	<1.0	4.1	<1.0	2.4	36	7.0	19.0	450
2134	12- 4-78	130	59	17	.8	29	15	13	1.9	60	21	70	100	11	8.6	<1.0	5.0	--	--	33	6.8	16.5	460
2135	12- 4-78	11	15	13	.9	64	2.5	5.0	1.4	7.5	13	10	11	1.4	2.7	<1.0	.2	--	--	20	6.9	9.5	120
2136	12- 4-78	110	49	13	.5	1.7	13	7.5	.7	45	9.3	6.0	100	<1.0	3.9	<1.0	3.0	--	--	30	7.8	12.0	310
2137	12- 4-78	18	29	19	.5	<.1	13	5.0	1.0	7.5	10	8.5	400	1.8	5.5	5.5	.5	--	--	28	7.1	7.5	150
2138	12- 4-78	190	120	59	1.3	<.1	37	15	2.5	68	13	25	7.8	20	37	<1.0	17	--	--	28	7.0	16.0	650
2142	12- 7-78	550	79	66	3.3	<.1	43	33	3.5	120	9.7	9.7	3.9	16	33	1.4	27	--	--	60	7.4	16.5	940
2143	12- 7-78	160	66	68	.4	3.8	23	7.5	4.0	40	2.4	2.4	9.2	1.1	19	<1.0	29	--	--	39	7.5	15.5	390
2144	12- 8-78	320	3.8	6.2	1.2	4.2	4.3	33	3.2	63	6.4	6.3	2.4	<1.0	13	3.7	4.6	--	--	70	8.2	20.0	480
2145	12- 8-78	330	6.1	27	.5	3.3	15	10	4.4	93	1.7	1.7	3.1	20	10	<1.0	53	--	--	40	7.4	20.0	550
2146	12- 8-78	220	4.4	39	1.3	7.7	28	10	5.0	38	.6	.6	8.6	1610	15	<1.0	1.8	--	--	37	7.6	15.5	460
2151	12-10-78	88	67	25	.7	<.1	23	2.5	2.1	35	1.3	7.4	6.0	2.7	12	<1.0	.9	--	--	28	7.0	14.0	350
2152	12-10-78	25	27	19	.4	.7	18	2.5	1.5	15	2.7	4.5	400	2.8	17	<1.0	1.1	--	--	24	7.5	9.0	160
2153	12-10-78	31	34	17	.6	.8	7.5	5.0	1.7	18	1.2	6.2	8.4	1.2	14	<1.0	<.2	--	--	27	7.6	5.5	200
2154	12-10-78	93	58	31	.2	12	28	7.5	4.4	33	2.2	6.4	3.7	8.2	6.0	<1.0	<.2	--	--	37	6.9	8.5	330
2155	12-10-78	23	26	15	.2	.2	2.5	2.5	1.1	15	3.5	4.8	900	4.3	17	<1.0	2.4	--	--	27	7.5	5.0	140
2156	12-10-78	170	33	30	.5	.3	30	7.5	3.1	33	1.7	5.3	2.5	1.0	50	<1.0	13	--	--	27	7.6	8.5	380
2160	12-11-78	31	35	16	.5	1.0	13	2.5	1.6	13	22	5.4	1.8	3.2	15	<1.0	.6	--	--	27	7.2	5	180
2161	12-11-78	280	16	25	.3	9.1	20	15	4.0	70	3.6	26	16	670	6.0	5.3	.4	--	--	70	7.7	19	510
2162	2-11-78	60	26	17	.3	.6	13	5.0	2.3	20	2.3	90	63	6.9	16	<1.0	.9	--	--	28	6.8	16	200
2163	2-11-78	340	39	45	1.1	.1	40	13	2.7	68	4.8	60	4.5	8.1	71	<1.0	16	--	--	38	7.2	15	570
2164	2-11-78	560	34	83	.5	6.2	53	20	8.8	130	2.4	50	300	5100	65	<1.0	10	--	--	34	7.3	14	960
2165	2-11-78	110	35	30	.3	6.5	13	7.5	4.0	35	2.3	3.5	160	380	16	<1.0	3.0	--	--	26	7.7	11	350
2166	2-11-78	70	41	24	.5	1.9	25	5.0	1.9	20	3.5	90	21	36	5.0	<1.0	1.3	--	--	45	6.4	20	270
2179	12-15-78	310	36	17	.3	.3	23	30	3.0	80	1.0	12	2.1	3.4	1.8	2.2	3.9	--	--	36	7.0	22	570
2180	12-15-78	300	35	15	.2	.5	18	15	4.1	80	1.1	1,200	2.3	7.6	1.5	<1.0	2.3	--	--	25	8.3	15	530
2181	12-15-78	330	78	24	.2	3.7	13	18	6.1	95	2.0	5.7	3.2	17	2.0	3.6	2.1	--	--	18	8.3	11.5	630
2182	12-15-78	270	350	44	1.2	6.1	40	28	5.9	25	2.0	16	1.2	6.8	50	<1.0	41	--	--	25	7.5	13.0	940
2183	12-15-78	380	560	43	2.4	<.1	68	65	3.4	320	1.1	9.2	3.4	14	28	<1.0	3.9	--	--	35	8.1	12	1,2[illegible]
2184	12-15-78	140	70	24	.5	6.1	7.5	10	7.2	55	2.4	12	1.6	1.5	15	<1.0	18	--	--	23	7.8	13	4[illegible]
2185	12-17-78	110	58	41	.7	2.5	23	7.5	5.1	43	2.0	9.1	1.3	2.3	50	<1.0	1.9	--	--	26	7.9	12.0	390
2186	12-17-78	33	29	23	.4	.5	13	5.0	1.8	25	1.1	7.3	5.9	<1.0	16	<1.0	.5	--	--	23	7.8	12.0	180
2187	12-17-78	130	73	30	.6	.3	18	10	4.2	53	1.4	12	1.7	<1.0	14	<1.0	1.9	--	--	27	8.1	11.5	410
2188	12-17-78	450	48	20	.3	68	13	18	10	100	3.0	11	19	1780	14	<1.0	1.8	--	--	20	7.0	15.5	670
2189	12-17-78	160	47	29	.5	3.6	15	10	5.0	55	1.5	7.2	<1.0	<1.0	10	1.2	2.0	--	--	24	8.0	12.5	410
2190	12-17-78	250	28	22	.3	12	7.5	10	5.1	78	1.1	6.0	<1.0	<1.0	8.0	1.2	11	--	--	27	7.7	13.5	500
2191	12-17-78	92	47	35	.5	2.6	18	7.5	4.7	43	1.6	23	1.3	7.8	28	<1.0	13	--	--	20	8.0	13.0	340

Table 3.--*Results of water analyses, Papago Indian Reservation and vicinity, Arizona*--Continued

[Analysts: Alice R. Stanley, David J. Preston, John B. McHugh, and Walter H. Ficklin]

Site	Date of sample collection	HCO_3^- (mg/L)	$SO_4^=$ (mg/L)	Cl^- (mg/L)	F^- (mg/L)	$NO_3^=$ (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Ca (mg/L)	Cu µg/L	Zn µg/L	Fe µg/L	Mn µg/L	Mo (µg/L)	As (µg/L)	U (µg/L)	Co (µg/L)	Ni (µg/L)	SiO_2 (mg/L)	pH	Temp. (°C)	Specific conductance (µmhos/cm
Area 1--Continued																							
2192	1-15-79	240	89	20	0.7	2.5	33	15	0.5	83	2.0	50	2.5	2.1	35	<1.0	5.8	2.1	8.2	34	6.9	18.5	600
2193	1-16-79	160	75	19	.4	1.8	20	10	2.5	50	1.5	30	3.1	<1.0	9.4	<1.0	1.8	1.1	3.7	24	7.4	10.0	420
2194	1-16-79	95	53	10	.2	1.8	18	13	1.7	25	3.3	20	100	26	1.7	<1.0	.5	<1.0	2.3	21	7.3	18.0	300
2195	1-16-79	170	49	13	.2	.5	15	10	1.6	55	2.1	7.0	1.1	<1.0	5.1	<1.0	2.1	1.1	2.8	22	8.3	9.0	410
2196	1-16-79	200	68	18	.2	1.0	18	13	2.4	63	1.6	3.6	3.3	1.9	7.5	<1.0	1.8	1.6	3.8	22	8.3	7.5	460
2197	1-16-79	290	270	57	1.3	1.0	68	10	1.5	110	6.0	35	2.7	2.1	44	<1.0	13	3.4	7.4	37	7.0	17.5	1,040
2198	1-16-79	100	130	32	.8	2.5	28	13	1.2	58	7.5	900	900	25	55	<1.0	4.5	2.0	5.1	28	6.9	18.5	550
2199	1-16-79	110	170	19	.9	4.0	28	43	1.2	65	115	200	5.7	19	310	<1.0	14	2.1	7.1	29	6.9	17.0	580
2202	1-19-79	210	93	51	.4	690	98	44	32	100	55	30	100	2000	130	<1.0	2.6	5.7	21	66	6.3	14.0	1,650
2205	1-21-79	530	38	240	.6	2.0	170	63	8.4	43	1.3	9.7	100	400	6.2	44	1.8	1.8	4.4	36	8.1	20.0	1,280
2206	1-22-79	26	30	17	.3	1.3	18	3.5	2.5	10	3.4	6.2	7.4	<1.0	3.2	<1.0	.7	<1.0	1.8	17	8.0	10.5	190
2207	1-22-79	40	43	17	.4	.9	18	5.0	2.1	15	2.9	4.1	100	<1.0	8.6	<1.0	1.0	<1.0	2.1	21	8.0	8.5	240
2208	1-22-79	250	61	26	1.6	6.0	35	15	2.5	45	2.9	1.9	2.8	<1.0	210	<1.0	1.7	1.3	2.4	20	8.3	10.5	480
2209	1-22-79	170	67	29	.8	4.0	23	11	2.7	43	3.7	2.8	200	2.2	170	<1.0	2.8	1.0	2.6	19	7.9	11.5	380
2210	1-22-79	47	29	8.3	.7	.8	13	5.0	1.4	13	2.8	.7	100	3.5	20	<1.0	.8	<1.0	1.1	15	7.8	9.5	180
2211	1-23-79	100	45	69	.1	.6	10	5.5	.9	58	1.1	5.4	2.5	2.1	1.8	<1.0	1.5	<1.0	2.0	25	7.1	17	330
2212	1-23-79	69	16	11	.1	.1	7.5	5.0	1.2	20	4.0	4.8	7.3	<1.0	1.2	<1.0	<.2	<1.0	2.2	18	7.7	8	220
2213	1-23-79	160	19	23	.2	1.6	13	10	4.6	38	1.4	3.0	5.7	<1.0	1.6	<1.0	1.2	<1.0	1.8	15	8.4	7.0	360
2214	1-24-79	55	37	22	.3	2.3	20	5.0	3.7	17	6.1	6.7	10	4.8	120	<1.0	2.0	<1.0	3.3	23	7.9	8.0	260
2215	1-24-79	72	110	43	.3	1.6	35	10	5.7	33	5.8	2.4	1.8	<1.0	13	<1.0	5.0	1.2	2.9	23	8.2	9.5	450
2216	1-25-79	290	240	42	2.5	<.1	98	48	4.6	20	6.6	5.0	100	2.2	5.3	<1.0	22	3.0	5.5	39	8.9	9.0	830
2217	1-25-79	230	26	16	1.3	1.1	43	3.0	3.6	38	2.0	13	3.8	<1.0	7.2	4.3	6.5	<1.0	1.8	29	8.1	9.0	390
2218	1-25-79	170	100	25	.3	.7	20	15	1.6	65	2.6	1200	100	13	4.6	<1.0	1.8	1.7	4.9	25	7.0	14.5	560
2219	1-25-79	260	58	22	.4	<.1	25	15	1.7	58	2.1	220	7500	1000	4.5	<1.0	1.0	2.8	6.0	8.0	7.4	16.5	550
2220	1-25-79	120	55	14	.3	2.4	13	7.5	2.1	43	1.9	6.5	1.9	<1.0	3.3	<1.0	.5	1.0	2.8	18	7.2	11.0	360
2221	1-25-79	250	110	27	.3	1.7	23	18	1.0	75	20	730	5.4	23	4.5	<1.0	5.5	2.5	7.3	21	7.1	23.0	610
2222	1-26-79	500	19	150	.5	1.8	58	69	3.3	65	2.6	19	2.1	1.2	3.8	6.8	2.2	1.4	3.7	68	8.2	20.0	920
Area 2																							
2043	12-13-78	480	140	110	0.8	<0.1	120	20	10	200	4.9	40	3.1	1.8	23	1.5	13	--	--	40	7.3	22	1,140
2044	1-24-79	340	110	130	.9	<.1	43	30	13	90	4.6	25	3.1	3.0	100	1.6	13	3.3	7.8	33	7.4	18.5	1,240
2044	4-11-79	170	190	320	1.2	5.5	200	44	11	120	7.5	26	3.1	1.4	31	4.4	--	--	--	40	7.9	17.0	1,700
2045	12-13-78	600	200	180	.8	<.1	110	65	9.3	220	7.0	8.5	4.6	3.8	120	<1.0	6.5	--	--	40	7.9	18.5	1,500
2045	1-17-79	470	220	210	.9	.8	190	27	8.1	100	6.3	40	2.5	2.4	200	1.4	5.0	3.1	8.0	40	7.2	20.0	1,360
2045	4-11-79	270	200	470	.4	3.8	240	49	7.5	120	13	130	3.7	2.1	120	4.0	--	--	--	43	7.9	21.0	1,730
2084	12-14-78	410	25	69	.5	1.4	83	15	6.6	63	1.1	25	19	1090	37	3.1	1.2	--	--	26	7.9	20	770
2089	12-14-78	760	570	550	1.3	<.1	260	45	12	180	13	15	86	1600	830	2.0	12	--	--	40	7.5	12	3,100
2089	1-17-79	580	210	280	1.3	<.1	380	29	9.9	110	9.6	7.5	9.2	300	350	4.6	15	2.7	11	30	7.6	12.0	2,190
2118	11-30-78	108	8.2	31	.2	15	7.5	5.0	1.9	43	7.7	230	5.2	21	1.3	<1.0	.4	--	--	28	7.1	17.0	250
2119	11-30-78	260	100	64	1.2	.4	43	13	2.0	80	11	80	100	81	7.4	<1.0	7.5	--	--	50	8.0	9.5	630
2119	1-18-79	210	85	21	1.1	<.1	38	13	2.4	78	40	160	4.0	400	130	<1.0	4.7	2.6	5.6	52	7.8	13.5	650
2120	11-30-78	530	25	105	.9	<.1	50	15	5.2	80	6.1	50	100	1810	35	<1.0	1.1	--	--	39	7.4	18.0	900
2121	11-30-78	140	19	28	.3	1.0	13	25	1.1	110	28	140	300	16	5.0	<1.0	0.8	--	--	27	7.1	19.0	290
2122	11-30-78	160	19	87	.2	16	23	7.5	2.3	43	19	1360	100	19	3.4	<1.0	18	--	--	27	7.2	15.5	450
2123	11-30-78	190	16	27	.1	3.8	15	7.5	4.5	53	9.1	30	100	84	4.2	1.8	.4	--	--	32	7.2	17.0	360

Table 3.--*Results of water analyses, Papago Indian Reservation and vicinity, Arizona*--Continued

[Analysts: Alice R. Stanley, David J. Preston, John B. McHugh, and Walter H. Ficklin]

Site	Date of sample collection	HCO_3^- (mg/L)	$SO_4^=$ (mg/L)	Cl^- (mg/L)	F^- (mg/L)	$NO_3^=$ (mg/L)	Na (mg/L)	Mg (mg/L)	K (mg/L)	Ca (mg/L)	Cu µg/L	Zn µg/L	Fe µg/L	Mn µg/L	Mo (µg/L)	As (µg/L)	U (µg/L)	Co (µg/L)	Ni (µg/L)	SiO_2 (mg/L)	pH	Temp. (°C)	Specific conductance (µmhos/cm)
Area 2--Continued																							
2124	11-30-78	310	37	130	0.7	<0.1	73	7.5	3.9	53	17	670	100	3.0	37	1.0	5.0	--	--	35	8.3	11.0	730
2125	12- 1-78	150	30	27	.2	6.9	13	18	.4	68	8.9	60	9.7	18	3.1	3.1	.4	--	--	40	6.8	19.0	330
2126	12- 1-78	170	28	18	.1	32	15	10	1.9	45	7.4	80	100	17	3.9	5.6	.7	--	--	40	6.9	18.0	380
2127	12- 1-78	80	13	15	<.1	1.3	5.0	10	1.9	47	7.6	5.9	100	<1.0	4.4	<1.0	<.2	--	--	40	7.3	10.5	290
2130	12- 3-78	180	57	13	.9	.6	13	10	1.0	43	8.7	6.6	1.9	<1.0	2.0	<1.0	1.6	--	--	24	8.4	11.5	320
2131	12- 3-78	43	50	9.2	1.8	<.1	10	7.5	1.3	30	11	7.3	2.9	<1.0	2.1	<1.0	.2	--	--	19	7.8	10.0	210
2139	12- 5-78	280	19	42	.7	11	28	13	1.2	63	16	70	1.7	<1.0	1.0	<1.0	2.6	--	--	32	7.2	18.5	530
2140	12- 5-78	81	5.5	27	.2	35	10	5.0	2.2	25	26	50	9.8	9.4	3.7	<1.0	<.2	--	--	32	6.9	17.0	270
2141	12- 5-78	180	3.3	16	.4	6.0	30	5.0	2.3	35	8.2	10	2.0	2.8	5.4	1.0	8.0	--	--	25	8.0	20.5	340
2147	12-10-78	130	15	15	.3	8.3	18	7.5	7.8	28	3.7	50	7.8	4.9	10	3.4	1.6	--	--	40	7.4	16.5	300
2148	12-10-78	290	35	26	.2	7.3	15	10	8.9	73	6.9	20	150	1920	10	1.5	2.0	--	--	37	6.6	22.5	580
2149	12-10-78	460	37	48	.3	1.3	38	15	3.9	78	1.7	6.7	1.3	4.0	23	<1.0	12	--	--	24	7.8	7.0	730
2150	12-10-78	230	49	57	.6	1.6	48	13	6.6	48	2.3	11	<1.0	2.3	10	<1.0	11	--	--	13	7.7	9.0	600
2167	12-12-78	86	26	36	.3	2.5	20	7.5	3.0	25	4.8	490	100	16	50	4.3	.4	--	--	40	7.0	19	340
2168	12-12-78	26	2.6	3.5	.1	.3	2.5	1.0	3.7	4.5	1.3	7.6	16	17	<1.0	1.0	.2	--	--	1.0	7.4	9	69
2169	12-12-78	540	11	26	.6	.3	80	25	8.4	75	1.7	4.8	1.3	1.5	7.5	2.1	14	--	--	13	8.3	7	820
2170	12-12-78	110	12	23	.4	5.4	3.9	10	4.5	35	5.9	20	1.5	1.2	<1.0	<1.0	.4	--	--	15	7.8	7.5	250
2171	12-12-78	48	13	14	.1	10	10	5.0	3.9	13	1.1	20	2.6	<1.0	<1.0	<1.0	<.2	--	--	16	7.1	6.5	180
2172	12-12-78	270	5.2	44	.2	1.7	23	13	3.6	70	.9	2.2	2.5	1570	4.5	<1.0	2.5	--	--	33	7.7	20	490
2173	12-13-78	140	11	47	1.0	.3	13	7.5	2.9	45	2.4	220	10	18	1.0	<1.0	3.8	--	--	34	7.2	16	290
2174	12-13-78	28	26	22	.3	7.3	25	2.5	2.0	5.0	1.0	5.8	5.6	2.1	<1.0	1.0	<.2	--	--	50	7.2	8.5	250
2175	12-13-78	360	13	27	.3	1.9	18	28	4.0	73	2.0	24	2.8	2.4	<1.0	5.2	3.8	--	--	30	7.6	19	610
2176	12-13-78	150	25	23	.2	1.3	20	10	4.0	45	1.8	190	3.9	120	1.0	2.3	1.0	--	--	36	7.5	19	360
2177	12-13-78	350	140	130	.4	<.1	55	30	8.2	110	1.6	3.7	<1.0	2.3	7.8	1.3	16	--	--	23	8.3	15.0	910
2177	4-11-79	120	210	450	.6	1.5	150	41	8.3	98	6.8	7.0	2.7	<1.0	31	5.2	--	--	--	34	8.0	22.0	1,050
2178	12-14-78	490	120	78	.8	.3	100	30	6.6	130	7.9	4.7	1.0	7.8	110	1.9	7.0	--	--	28	7.4	10.0	1,100
2200	1-18-79	46	20	12	.2	7.1	28	2.5	1.3	5.0	3.7	40	600	3.3	<1.0	1.6	.5	<1.0	28	36	7.1	17.5	130
2201	1-18-79	220	9.2	74	.6	69	43	16	3.0	70	3.6	530	9.5	1.9	6.4	5.1	9.0	<1.0	1.7	37	7.7	12.0	620
2203	1-21-79	460	280	220	1.2	65	250	46	6.6	88	33	40	4.3	2.8	9.4	7.1	110	3.4	7.2	72	3.1	21.0	1,550
2204	1-21-79	470	15	530	.9	<.1	250	43	7.3	100	2.9	3.3	400	2200	2.8	1.1	5.0	1.8	2.0	33	8.1	18.5	1,700
2223	1-26-79	39	31	24	15	140	18	13	6.3	53	2.0	18	100	<1.0	1.5	1.2	.5	<1.0	1.8	26	7.8	17.5	420
2228	4-11-79	170	170	310	.5	6.8	140	44	6.8	85	6.0	6.2	3.3	1.5	50	3.6	--	--	--	16	8.0	20.0	1,280
Area 3																							
2202	10-24-76	180	7.5	4.6	0.2	<0.1	2.2	8.7	12	51	89	2.9	19	100	120	25	0.6	--	--	17	7.3	21	280
2203	10-24-76	270	40	87	1.1	4.5	130	9.9	3.4	16	7.9	4.4	13	2.2	13	18	8.2	--	--	32	9.3	20	710
Area 4																							
2157	12-11-78	590	17	5.4	0.3	28	5.1	18	7.2	33	7.0	40	2.8	600	10	10	1.4	--	--	28	7.2	11	920
2158	12-11-78	360	16	54	1.2	4.7	130	<.1	3.5	160	5.3	16	6.9	3.2	7.0	7.0	13	--	--	40	8.2	18	670
2159	12-11-78	590	12	7.8	.4	2.7	30	30	7.7	25	4.4	7.5	32	570	15	15	3.3	--	--	50	7.7	19	830
2224	1-28-78	98	2820	380	1.7	2.9	370	160	16	550	64	30	100	26	500	1.3	2.2	20	30	54	7.2	17.0	3,900
2226	1-28-78	420	54	98	1.1	140	180	20	2.6	70	100	300	5.2	3.4	5.0	9.3	11	--	--	40	8.1	8.0	1,130

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