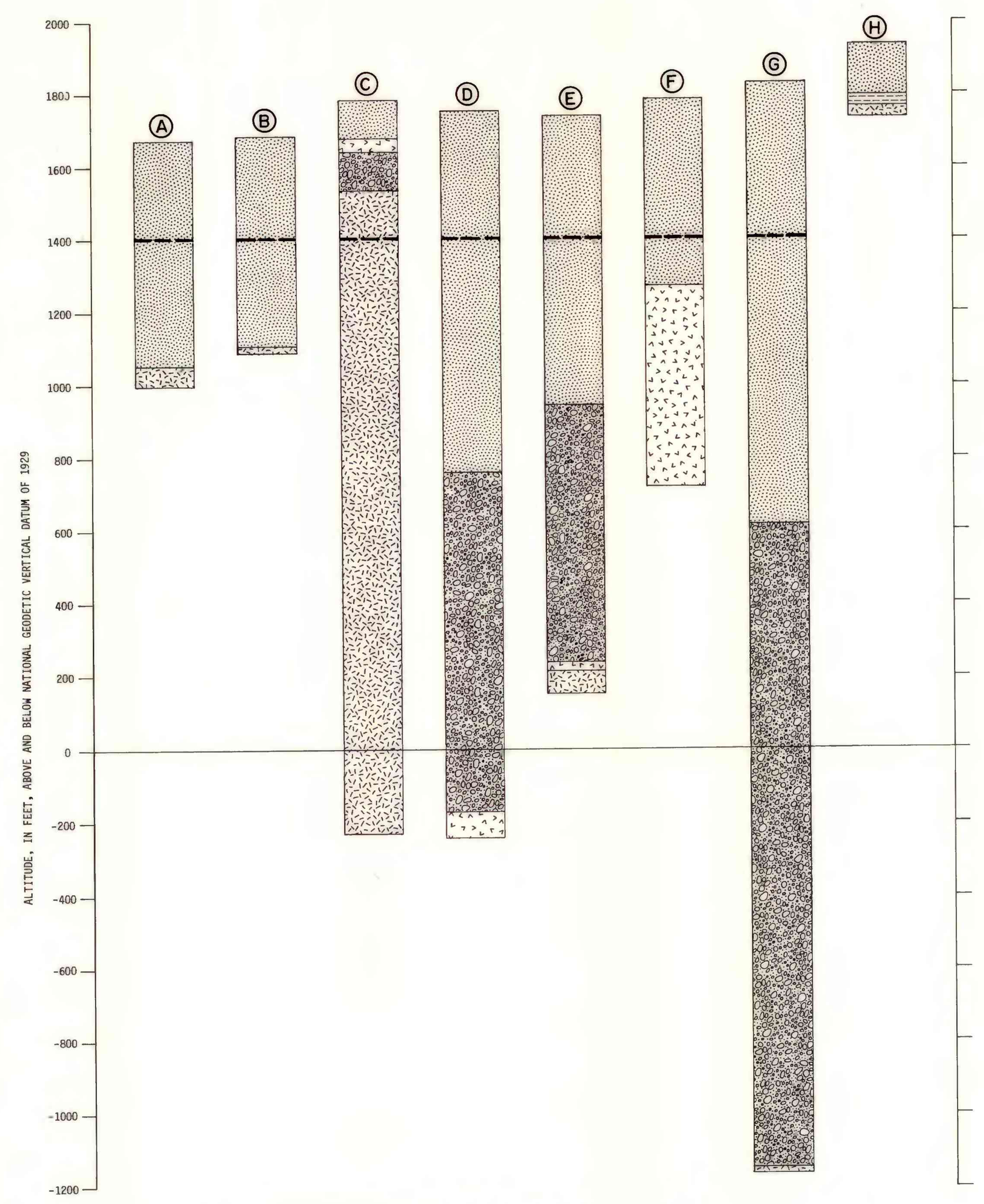
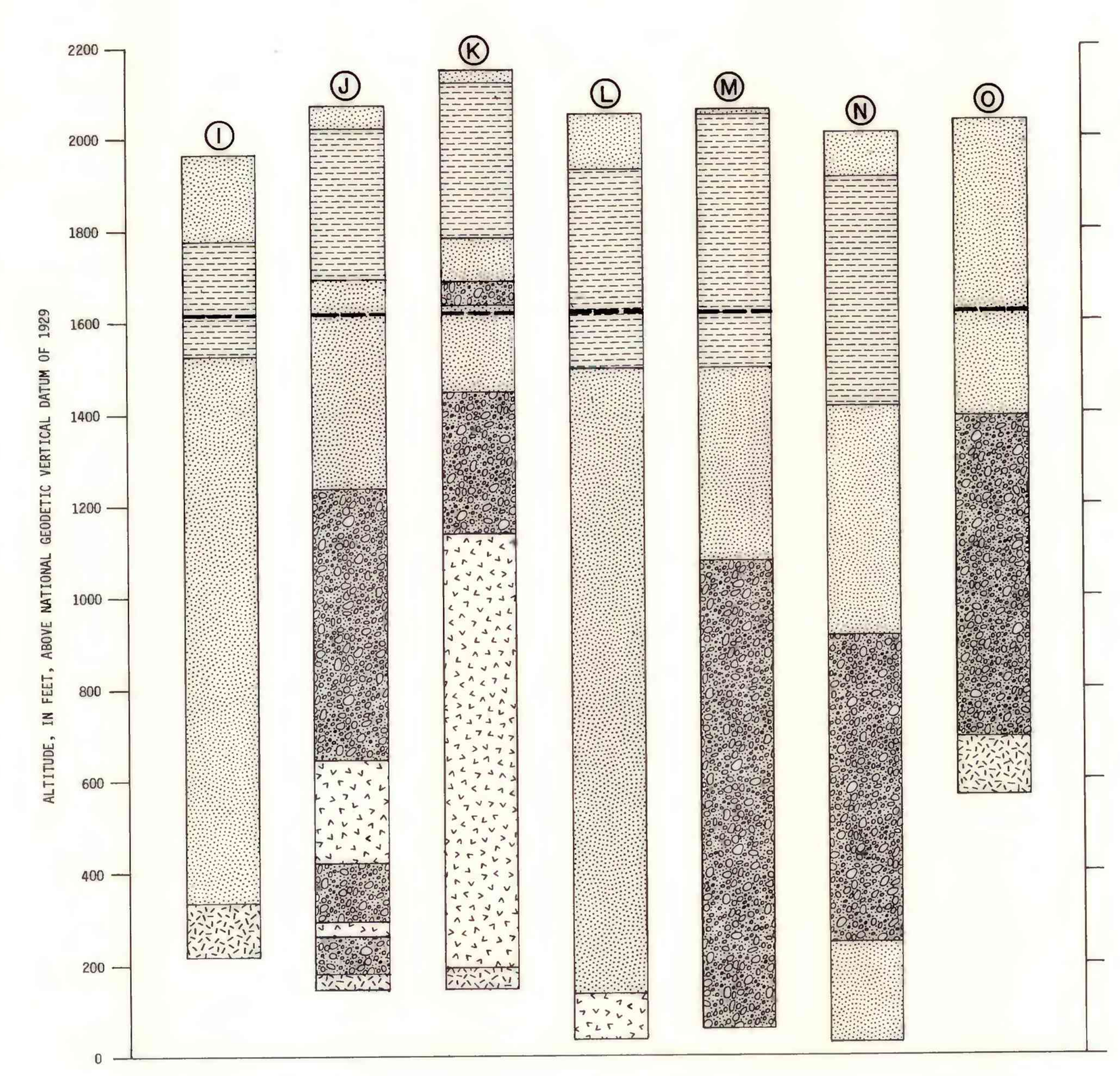
PREPARED IN COOPERATION WITH THE
U.S. BUREAU OF INDIAN AFFAIRS



Selected well logs showing geohydrologic units in the northern part of Vekol Valley



Selected well logs showing geohydrologic units in the southern part of Vekol Valley

BASIN SEDIMENTS

Mixture of clay, silt, sand, and gravel

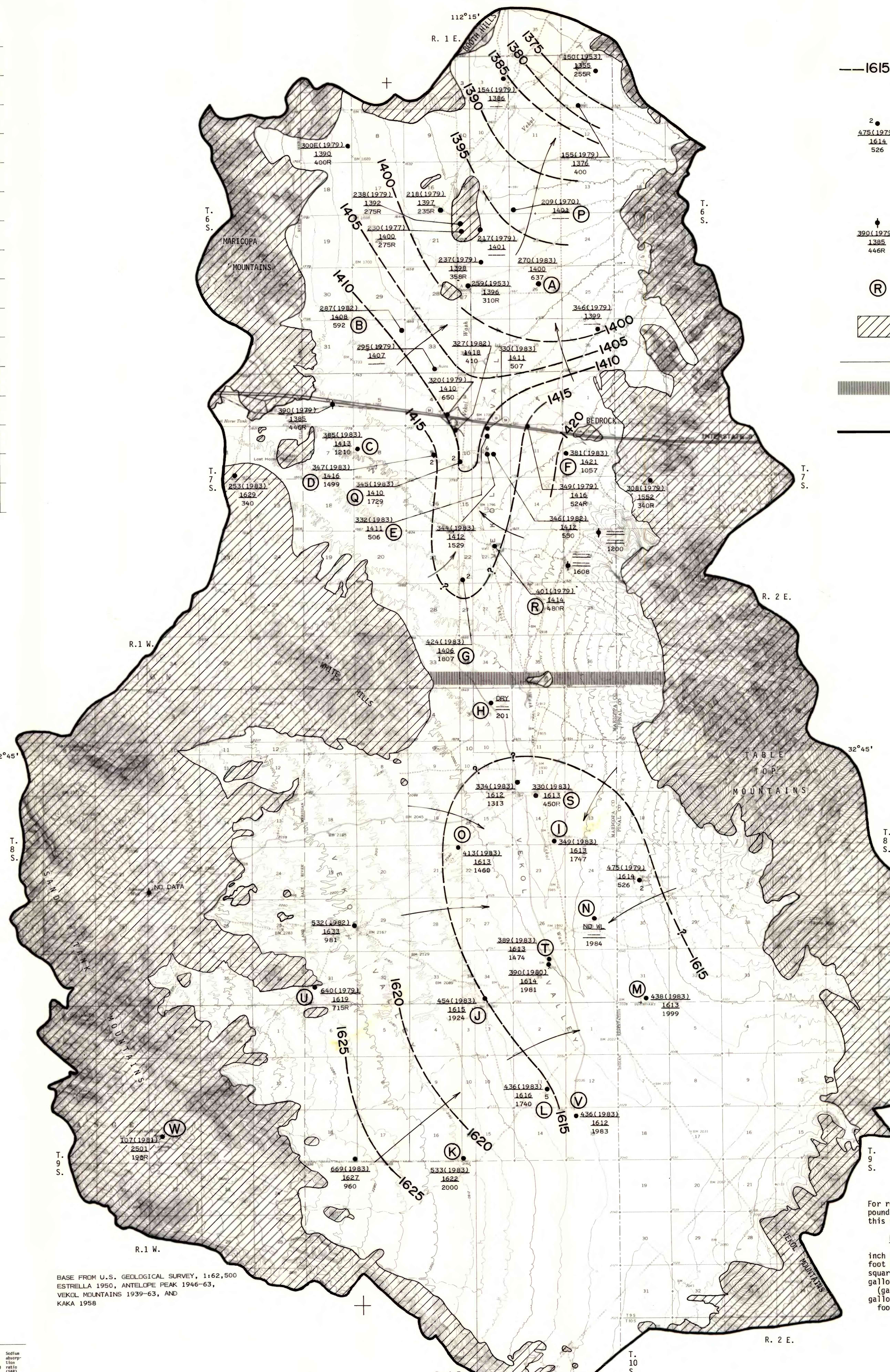
More than 85 percent silt and clay

SEDIMENTARY ROCKS—Moderately to well-consolidated silt, sand, and pebble conglomerate

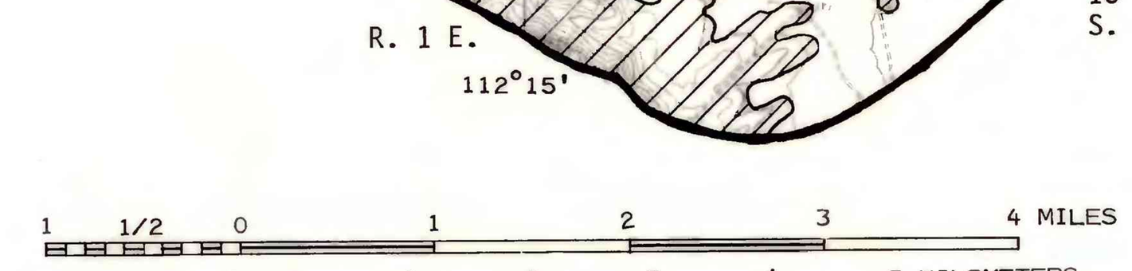
VOLCANIC ROCKS—Basalt and rhyolite

CRYSTALLINE ROCKS—Granite, schist, quartzite, and small amounts of shale and dolomitic limestone; generally impermeable

STATIC WATER LEVEL



BASE FROM U.S. GEOLOGICAL SURVEY, 1:62,500
ESTRELLA 1950, ANTELOPE PEAK 1946-63,
VEKOL MOUNTAINS 1939-63, AND
KAKA 1958



CONTOUR INTERVAL 25 AND 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Table 1.--Chemical analyses of water from selected wells in the northern and southern parts of Vekol Valley

[Analytical results in milligrams per liter except as indicated]

Well number or name	Date of sample	Temperature (°C)	Silica (SiO_2)	Boron (B)	Iron (Fe)	Manganese (Mn)	Arsenic (As)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity total lab. ($CaCO_3$)	Sulfate (So_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3) Nitrite (NO_2) as N	Dissolved solids calculated	Specific conductance (micromhos at 25°C)	Hardness as $CaCO_3$	Ph (field units)	Sodium absorption ratio (SAR)
Northern part																					
P	3-81	26.0	30	0.3	0.016	<.001	0.008	15	6.7	110	3.1	160	45	45	1.1	6.2	380	614	65	7.9	6.5
Q	12-79	32.0	30	.23	.01	<.001	.009	11	5.8	110	3.4	160	47	49	2.0	6.4	383	597	51	8.2	6.7
E	9-82	31.5	32	.28	.017	<.001	.006	12	5.6	97	3.1	187	31	29	1.0	5.4	347	557	53	7.1	6.4
R	3-81	27.0	36	.26	.021	.002	.013	9.9	4.2	99	2.8	220	8.6	4.3	.8	3.3	313	478	42	8.0	7.3
Southern part																					
L	12-83	38.0	42	.24	.024	.002	.006	13	1.6	120	3.1	111	72	68	.6	7.6	[1]421	670	39	8.3	8.6
M	11-83	37.3	17	.42	.033	.004	.009	3.4	.30	180	1.3	118	89	110	1.2	9.9	[1]517	860	10	8.8	26
S	3-81	29.5	28	.18	<.01	.007	.003	30	5.4	94	2.6	150	46	56	.4	7.1	385	634	98	7.7	4.4
T	12-79	39.0	43	.24	.03	.01	.009	5.9	.6	130	1.7	90	76	84	.7	8.4	430	719	17	8.4	14
U	3-81	36.5	48	.22	<.01	<.001	.014	30	14	56	1.7	180	26	21	.7	4.0	324	493	130	7.4	2.3
V	12-79	36.5	44	.17	.04	.03	.005	13	2.2	130	6.6	100	95	78	.5	8.3	467	715	42	8.0	8.8
W	3-81	23.5	38	.09	<.01	.16	.007	57	11	66	1.3	310	.4	11	.3	.19	374	599	190	7.4	2.2

[1]Residue dissolved calculated sum.

EXPLANATION

——1615—?— WATER-LEVEL CONTOUR—Shows approximate altitude of the water level. Queried where uncertain. Contour interval 5 feet. National Geodetic Vertical Datum of 1929

2 ● 475(1979) / 1614 / 526 — WELL IN WHICH DEPTH TO WATER WAS MEASURED—First entry, 475(1979), is depth to water in feet below land surface [E, estimated; (1979), year in which depth to water was measured]. Second entry, 1614, is altitude of the water level in feet above National Geodetic Vertical Datum of 1929. Third entry, 526, is depth of well in feet (R, reported depth). Number, 2, next to symbol indicates number of wells at this location

390(1979) / 1385 / 446R — ABANDONED OR UNUSED WELL—First entry, 390(1979) is depth to water in feet below land surface [(1979), year in which depth to water was measured]. Second entry, 1385, is altitude of the water level in feet above mean sea level. Third entry, 446R, is depth of well in feet (R, reported depth)

(R) WELL FOR WHICH A WELL LOG OR CHEMICAL ANALYSIS IS SHOWN

BEDROCK OF THE MOUNTAINS—Crystalline and volcanic rocks; includes some thin basin sediments in narrow mountain passes and valleys

GENERALIZED DIRECTION OF GROUND-WATER FLOW

BEDROCK AT SHALLOW DEPTH—Separates the ground-water systems of the northern and southern parts of the valley

BOUNDARY OF STUDY AREA

CONVERSION FACTORS

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

Multiply	By	To obtain
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
square mile (mi^2)	2.590	square kilometer (km^2)
gallon per minute (gal/min)	0.06390	liter per second (L/s)
gallon per minute per foot [(gal/min)/ft]	0.2070	liter per second per meter [(L/s)/m]

INTRODUCTION

Vekol Valley is a north-trending valley in south-central Arizona. The valley includes 270 mi^2 and is bounded by the Table Top and Vekol Mountains on the east, the Sand Tank and Maricopa Mountains and the White Hills on the west, and the Booth and Haley Hills on the north. The climate is semiarid and precipitation occurs as local summer thunderstorms and regional winter storms. The average annual precipitation is 7 to 8 in., and the potential evaporation rate is about 10 times that of the average annual rainfall (Sellers and Hill, 1974, p. 7, 44). Storm runoff occurs mainly as sheetflow and floods of short duration. Although some runoff is diverted into catchment tanks for use by livestock, runoff is not used for irrigation or public supply.

Vekol Valley is underlain by a thick sequence of basin sediments, sedimentary rocks, and volcanic rocks. The surrounding mountains are composed of crystalline and volcanic rocks, which also underlie the basin sediments to form the sides and bottom of the basin. The valley is divided into a northern part and a southern part by a bedrock outcrop of crystalline rocks between the White Hills on the west and the Table Top Mountains on the east (R. P. Wilson, 1979, p. 8). The northern part is about 90 mi^2 (J. R. Marie and K. J. Hollett, U.S. Geological Survey, written commun., 1984) and the southern part is about 180 mi^2.

The hydrologic data on which this map is based are available, for the most part, in computer-printout form and may be consulted at the Arizona Department of Water Resources, 99 East Virginia, Phoenix, and the U.S. Geological Survey offices in: Federal Building, 301 West Congress Street, Tucson, and 3738 North 16th Street, Suite E, Phoenix. Material from which copies can be made at private expense is available at the Tucson and Phoenix offices of the U.S. Geological Survey.

GEOHYDROLOGY

In Vekol Valley, ground water originates from precipitation that infiltrates along the mountain fronts and along stream channels. The mountainous area from which runoff is derived includes about 110 mi^2. Vekol Wash is the main stream that drains the valley.

At least four geohydrologic units are present (see selected well logs). The units are the basin sediments, sedimentary rocks, volcanic rocks, and crystalline rocks. The main water-bearing unit is the basin sediments, which consist of clay, silt, sand, and gravel. The sedimentary rocks also are a significant water-bearing unit. The volcanic and crystalline rocks may be water-bearing units where fractured and faulted but generally are impermeable.

The crystalline and volcanic rocks that make up the mountains extend from the mountain fronts into the valley as pediments, which are covered by thin basin sediments. The edges of the pediments were used to delineate the boundary between the basin sediments and the rocks that make up the mountains. The areal extent of the pediments was defined on the basis of geophysical studies (S. M. Pape, U.S. Geological Survey, oral commun., 1983; S. G. Davis, U.S. Geological Survey, written commun., 1984).

Ground water in Vekol Valley is present in the basin sediments and in the volcanic and sedimentary rocks. The basin sediments range from 0 to more than 3,000 ft thick in the northern part of the valley and from 0 to more than 4,000 ft thick in the southern part. These sediments generally are thickest along the axes of the basins and thin to extinction along the mountain fronts. The basin sediments are underlain by sedimentary, volcanic, and crystalline rocks.

Measured depth to water in the basin sediments ranges from 150 to 424 ft in the northern part and from 330 to 669 ft in the southern part. Water-level contours are based on depth-to-water measurements in selected wells and were largely estimated in the southern part because of the sparsity of data for that region. Because of small head gradients throughout the valley and the lack of accurate altitude data at each well with which to reference depth-to-water information, water-level contours are poorly defined. Ground-water withdrawal has not resulted in long-term water-level declines in the valley.

Generally, ground water in the northern part is under unconfined conditions and ground water in the southern part is under confined conditions. Exceptions to this generalization however can be found in both the northern and southern parts of the valley.

In the northern part, ground water probably moves from south to north through the basin sediments and exits the valley east of the Booth Hills. In the southern part, ground water probably moves from the surrounding mountains to the center of the valley. The exit is unknown but probably is to the south.

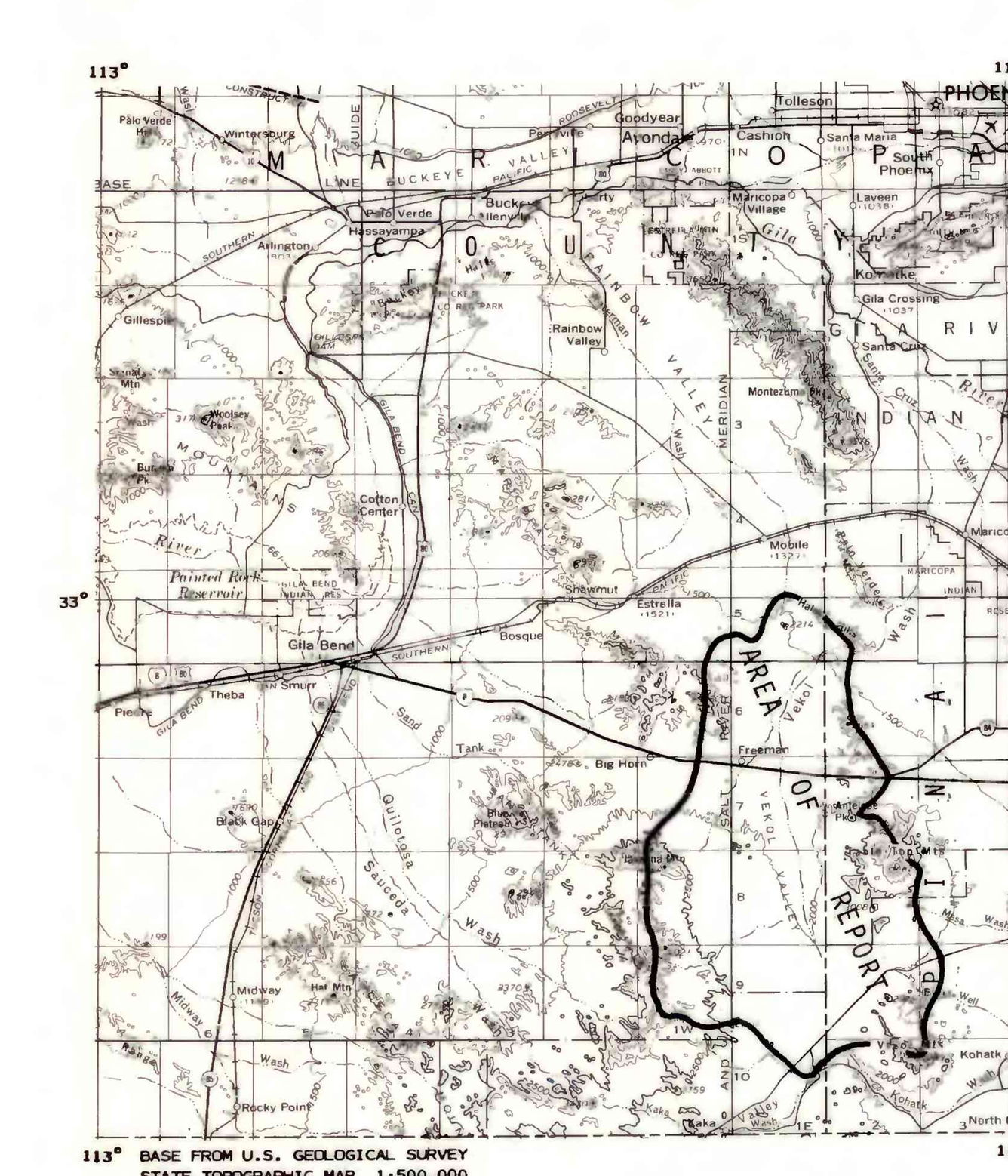
Properly constructed and developed wells in the basin sediments generally yield more than 500 gal/min. In the northern part of Vekol Valley, wells yield as much as 2,500 gal/min and specific capacities are as great as 87 (gal/min)/ft. In the southern part, wells yield as much as 4,000 gal/min and specific capacities are as great as 60 (gal/min)/ft.

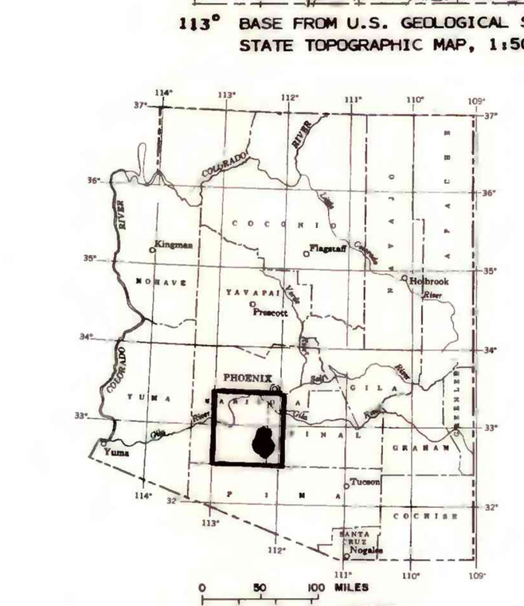
The quality of ground water in both the northern and the southern parts of the valley generally is suitable for most purposes. Chemical analyses of water for selected wells are shown in table 1.

SELECTED REFERENCES

Sellers, W. D., and Hill, R. H., eds., 1974, Arizona climate 1931-1972: Tucson, University of Arizona Press, 616 p.

Wilson, R. P., 1979, Availablity of ground-water on Federal land near the Ak-Chin Indian Reservation, Arizona—A reconnaissance study: U.S. Geological Survey Open-File Report 79-1165, 36 p.





AREA OF REPORT

GEOHYDROLOGIC CONDITIONS IN THE VEKOL VALLEY, PINAL AND MARICOPA COUNTIES, ARIZONA—1983

BY
MELINDA K. CUFF