UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division

TEST-DRILLING AND PUMPING-TEST DATA

JOSHUA TREE NATIONAL MONUMENT, CALIFORNIA

1968

Prepared in cooperation with the
National Park Service

OPEN-FILE REPORT

Menlo Park, California
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INTRODUCTION

At the request of the National Park Service, the Geological Survey augered 21 test holes in the northwestern part of Joshua Tree National Monument during February 1968 (figs. 1, 2). The purpose was to obtain information on the location, thickness, extent, and water-bearing characteristics of the unconsolidated deposits in the highland areas near Pinto Wye, Stirrup Tank, Queen Valley, Pleasant Valley, Pinyon Well, Wall Street Mill, and Cow Camp (fig. 2). Data on the augering program are shown in table 1.

In March 1968 the test hole at Cow Camp and three older wells were pumped to determine their yield characteristics. The results of the pumping tests are shown in table 2.

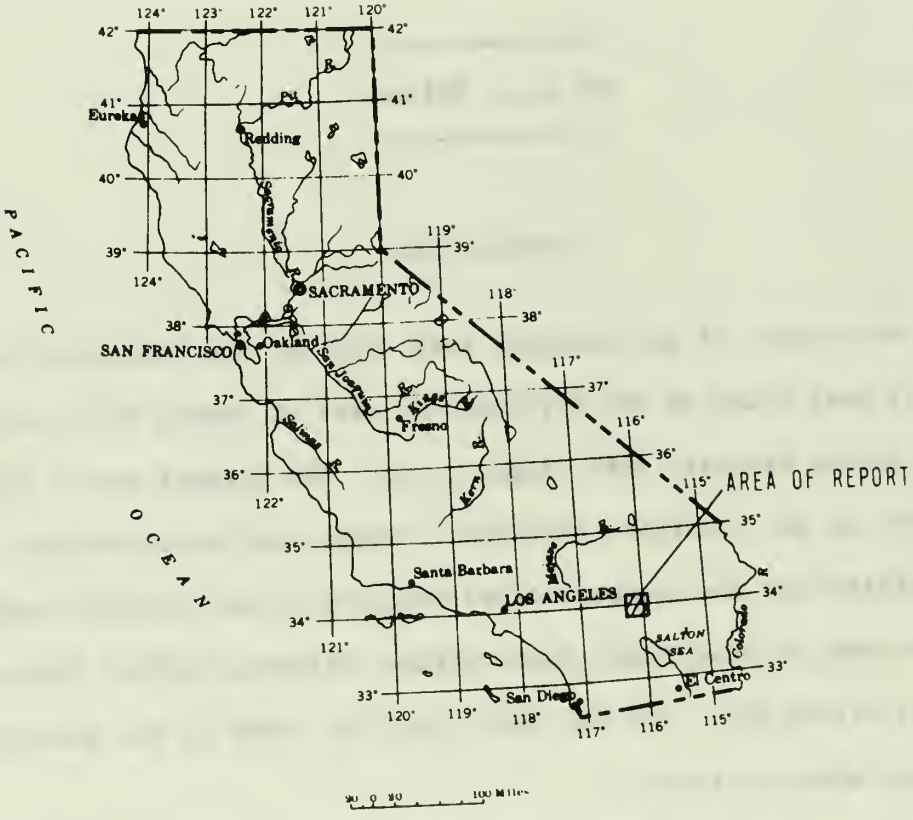
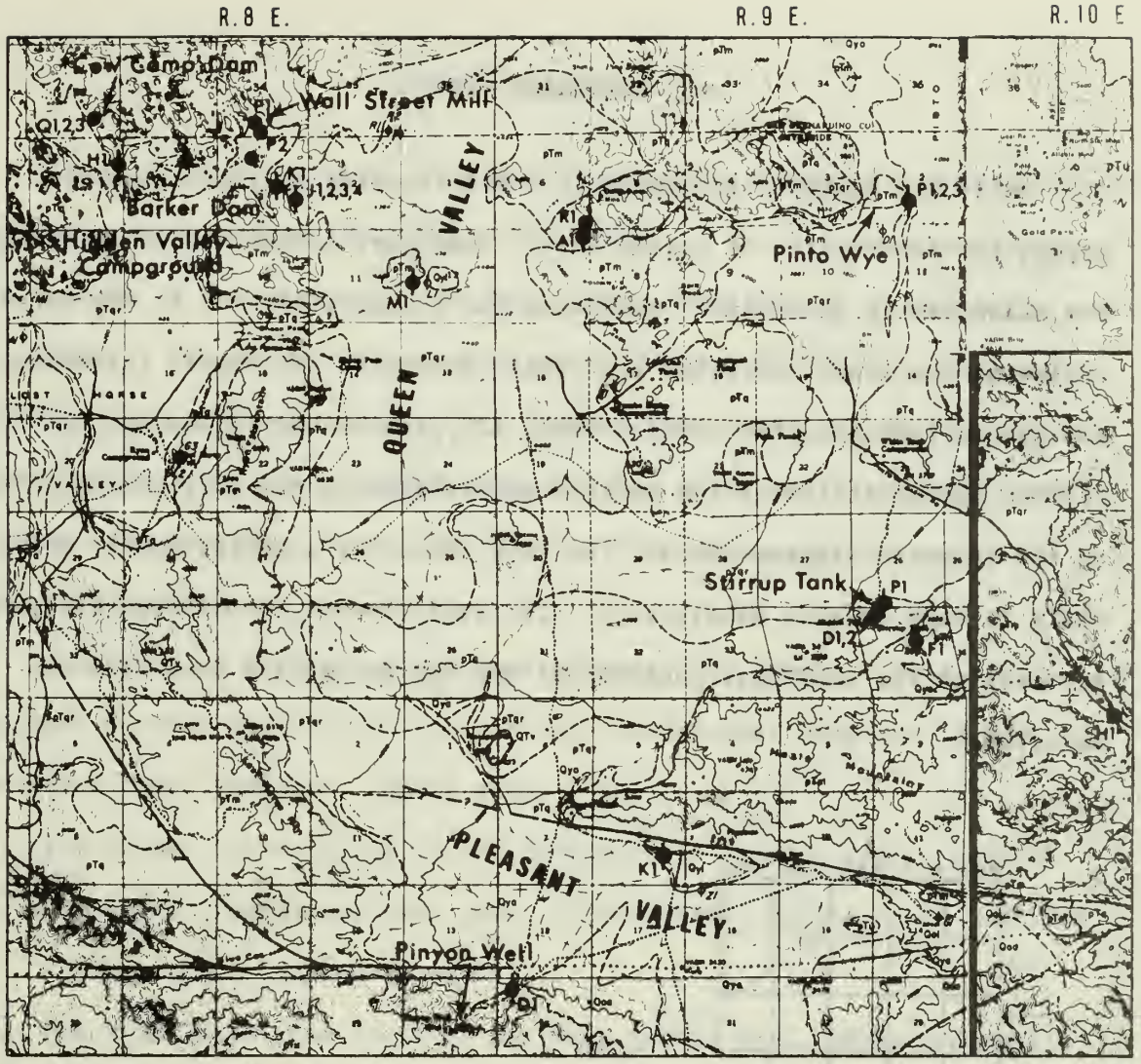


FIGURE 1.--Index map.



EXPLANATION

E1 Water well

L1 Dry or destroyed well

G1 Cased test hole

K1 Destroyed test hole

Pleistocene and Holocene

Qyl Young lake beds

Qya Young alluvium

Qol Old lake beds

Qoa Old alluvium

QUATERNARY

QTv Volcanic rocks

QUATERNARY AND TERTIARY

pTm pTu pTq pTqr Crystalline bedrock

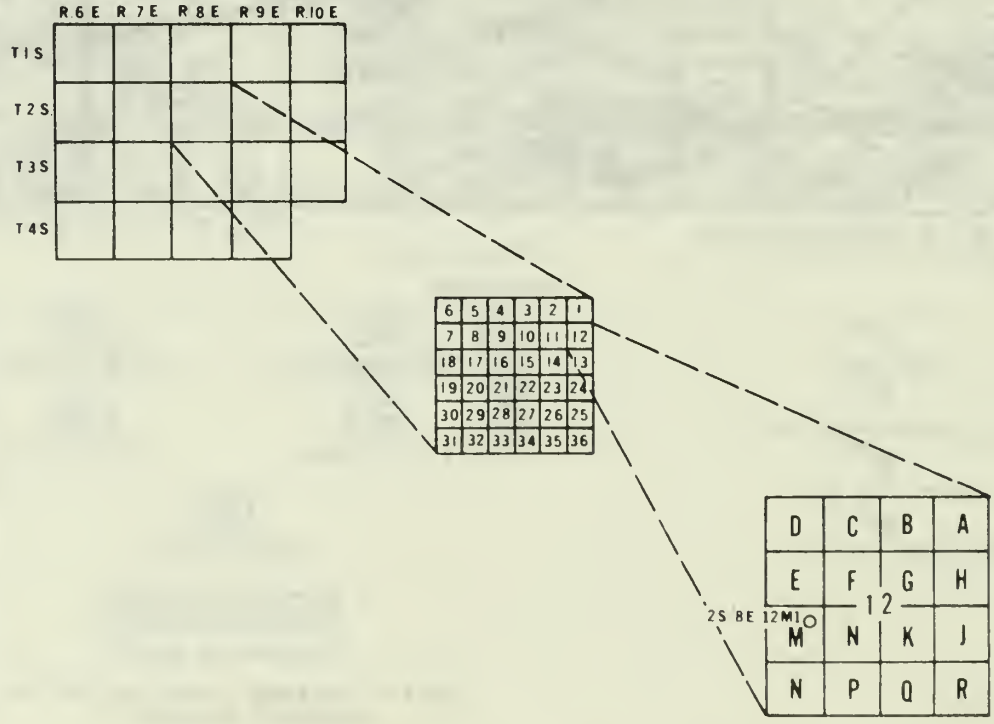
PRE-TERTIARY

See Weir and Bader (1963) for detailed geological explanation

FIGURE 2.--Map of part of Joshua Tree National Monument showing geology and location of wells and test holes.

WELL-NUMBERING SYSTEM

Wells are numbered according to their location in the rectangular system for subdivision of public land. That part of the number preceding the slash (as in 2S/8E-12M1) indicates the township (T. 2 S.); the number following the slash indicates the range (R. 8 E.); the number following the hyphen indicates the section (sec. 12); the letter following the section number indicates the 40-acre subdivision of the section according to the lettered diagram below. The final digit is a serial number for wells in each 40-acre subdivision. The area covered by the report lies entirely in the southeast quadrant of the San Bernardino base line and meridian.



TEST DRILLING

Most of the test holes (table 1) were bored through the unconsolidated alluvium and residuum (Weir and Bader, 1963, p. 24, 31) into bedrock or to a depth of approximately 100 feet, the depth limit of the augering equipment. Two holes were cased using 1-1/4-inch ID (inside diameter) plastic (polyethylene) pipe with a 60-mesh sand point set on the bottom. One test hole was cased with 3-inch ID fiber pipe, perforated with sawed slots. The remaining test holes did not penetrate saturated material and were backfilled.

The results of the test borings indicate four general areas that warrant further exploration for shallow ground-water supplies in the unconsolidated deposits. These are:

1. The narrow canyon about 1 mile southeast of Stirrup Tank. Coarse-grained alluvium in that area, if saturated, should yield moderate quantities of water to wells.
2. The broad flat area south of the Wall Street Mill, where apparently only the basal part of the alluvium is saturated. Geophysical methods or augering should be used to locate low areas on the bedrock surface beneath the alluvium, where the thickest saturated section should occur and low to moderate yields of water to wells could be expected.
3. The alluvium-filled valley a short distance below Barker Dam. The valley is recharged by leakage from the reservoir above the dam. Low to moderate yields can be expected from shallow wells. The area is about 1.5 miles upgradient from Hidden Valley campground (fig. 2).

TABLE 1.--Data on test holes

Test hole number, latitude longitude	Area	Date drilled	Depth of bore hole (feet)	Casing; size, depth cased, perforations	Depth to water below land surface (feet)	Altitude of land surface (feet)	EC[1] °F/°C	Remarks
1S/8E-32Q2 34 02 12 116 09 47	Cow Camp	2-18-68	62.2	1½-in. plastic; 1¼-in. plastic 60-mesh sand point 33.5-35 ft.	6.6	4,120	200± 64±/18±	Weathered bedrock at 39 ft.
1S/8E-32Q3 34 02 12 116 09 47	Cow Camp	2-21-68	38.0	3-in. fiber pipe; 2-in. sawed slots, 2 around, 4 rows per ft; 20-36.5 ft.	5.6	4,120	200 64/17.8	Pumped at 1 gpm 5 hours; drawdown 1.3 ft.
1S/8E-34P2 34 01 47 116 09 32	Wall Street Mill	2-18-68	43.0	1¼-in. plastic, 60-mesh sand point 37.5-39 ft.	22.6	4,320	-	Bedrock at 41 ft; EC probably <300
2S/8E-3J1 34 01 26 116 07 33	NW Queen Valley	2-17-68	15.0	None	Dry	4,325	-	Bedrock at 15 ft.
2S/8E-3J2 34 01 26 116 07 33	NW Queen Valley	2-17-68	8.0	None	Dry	4,320	-	Bedrock at 8 ft.

See footnote at end of table.

Test hole number, latitude longtitude	Area	Date drilled	Depth of bore hole (feet)	Casing; size, depth cased, perforations	Depth to water below land surface (feet)	Altitude of land surface (feet)	EC[1] °F/°C	Remarks
2S/8E-3J3 34 01 26 116 07 32	NW Queen Valley	2-17-68	19.0	None	Dry	4,325	-	Bedrock at 19 ft.
2S/8E-3J4 34 01 34 116 07 35	NW Queen Valley	2-17-68	32.0	None	Dry	4,325	-	Bedrock at 22 ft.
2S/8E-3K1 34 01 34 116 07 44	Narrows between Queen and Lost Horse Valleys	2-17-68	34.0	None	Dry	4,305	-	Hard bedrock at 34 ft.
2S/8E-5H1 34 01 47 116 09 32	1 mile W Barker Dam	2-19-68	57.0	None	Dry	4,165	-	Hard bedrock at 55 ft.
2S/8E-12M1 34 00 40 116 05 44	Playa in Queen Valley	2-21-68	35.0	None	Dry	4,390	-	Bedrock at 12 ft.
2S/9E-2P1 34 01 24 116 00 40	Pinto Wye	2-16-68	33.0	None	Dry	3,620	-	Bedrock at 32 ft.
2S/9E-2P2 34 01 24 116 00 38	Pinto Wye	2-16-68	57.0	None	Dry	3,620	-	Bedrock at 38 ft.
2S/9E-2P3 34 01 25 116 00 37	Pinto Wye	2-16-68	47.0	None	Dry	3,615	-	Bedrock at 37 ft.

See footnote at end of table.

Test hole number, latitude longtitude	Area	Date drilled	Depth of bore hole (feet)	Casing; size, depth cased, perforations	Depth to water below land surface (feet)	Altitude of land surface (feet)	EC[1] °F/°C	Remarks
2S/9E-7A1 34 01 09 116 04 21	.5 mile SW of Desert Queen Mine	2-17-68	50.0	None	Dry	4,390	-	Bedrock at 12 ft.
2S/9E-26P1	Stirrup Tank	2-20-68	32.0	None	Dry	3,520	-	Bedrock at 32 ft.
2S/9E-35D1	Stirrup Tank	2-20-68	10.0	None	Dry	3,500±	-	Attempted to core 8-9.5 ft; no recovery
2S/9E-35D2	Stirrup Tank	2-20-68	55.0	None	Dry	3,490±	-	Hard bedrock at 55 ft.
2S/9E-35F1	Stirrup Tank	2-20-68	63.0	None	Dry	3,420±	-	Bedrock at 48 ft.
3S/9E-8K1 33 55 22 116 03 29	Pleasant Valley	2-21-68	98.0	None	Dry	3,220±	-	Playa silt and clay to total depth
3S/9E-19D1 33 54 04 116 05 06	1 mile NE Pinyon Well	2-20-68	31.0	None	Dry	3,640	-	Hard bedrock at 31 ft.
3S/10E-6H1 33 56 35 115 58 25	Canyon at west end of Pinto Basin	2-19-68	97.0	None	Dry	2,808	-	Coarse alluvium to total depth

[1]Electrical conductance in micromhos at 25°C.

4. The northwest-trending valley west of Cow Camp, including the small canyon at Cow Camp. A thin layer of saturated unconsolidated material probably underlies much of the area. Data from the 3-inch test hole at Cow Camp suggest that a supply of water of a few gallons per minute could be developed. A concrete dam above Cow Camp detains runoff, which leaks into the alluvial valley at Cow Camp and recharges the ground-water reservoir.

Available data (Weir and Bader, 1963) indicate that the ground water in that part of the monument, with respect to dissolved solids, is good to excellent in chemical quality. However, the concentration of fluoride in ground water in some of the area is above the optimum recommended by the U.S. Public Health Service (1962, p. 8). Above-optimum concentration of fluoride probably would not be critical for transient users at a campground.

PUMPING TESTS

The four pumping tests (table 2) and other data (Weir and Bader, 1963) suggest that expected yields to shallow wells in that part of the monument are, at most, a few gallons per minute.

A 5-hour pumping test of the 3-inch test hole at Cow Camp (1S/8E-32Q3) suggests that a properly constructed supply well there would yield a few gallons per minute of water of excellent chemical quality (table 1). The test hole was drilled near an old dug well (Q1), which reportedly was originally dug more than 20 feet deep but is now only 12 feet deep. On June 20, 1968, the dug well was dry.

The small ground-water basin there is recharged largely by leakage from a concrete dam across a bedrock narrows a few hundred feet upstream from the well. In June 1968 the Geological Survey installed gages to record the water level in well 1S/8E-32Q3, the water level in the lake above the dam, and the precipitation. The seasonal fluctuations in water level in response to precipitation will aid in evaluating the ground-water potential of that small basin. The small catchment area of the lake is largely barren granitic bedrock with little soil cover; thus much of the total precipitation runs into the lake.

TABLE 2.--Data on pumping tests

Well number latitude longitude	Area	Date pumped	Type and depth (feet)	Pump type	Pump time (hours)	Pumping rate (gpm)	Drawdown (feet)	Specific capacity	Remarks
1S/8E-32Q3 34 02 12 116 09 47	Cow Camp	3-28-68	Test 36.5	Air lift	5.00	1.0	1.35	0.74	Well not adequately developed for maximum yield
1S/8E-34P1 34 02 10 116 07 58	Wall Street Mill	3-28-68	Dug 32.8	Submersible	6.92	5.0 See remarks	9.0	See remarks	Most of water pumped during test was from dead storage in the well; effective diameter of well 5-6 ft; yield at maximum drawdown estimated to be less than 1 gpm; specific capacity approximately 0.1; temp 58°F/14.4°C; EC at 25°C = 260
2S/8E-3C1 34 01 49 116 08 01	Queen well (Olson)	3-28-68	Domestic 108	Lift	2.25	4.2 See remarks	12±	See remarks	Pumped approximately 600 gallons from enlarged dug storage at bottom of well; specific capacity, probably 0.01-0.1; temp. 67°F/19.4°C; EC at 25°C = 270
2S/9E-6R1 34 01 14 116 04 20	Southwest of Desert Queen Mine	3-27-68	Dug 84	Submersible	7.00	2.0 See remarks	2.8	0	No recovery, dug well apparently is precipitation catchment

The Queen well (2S/8E-3C1) was pumped for 2-1/4 hours using the installed lift pump, which could be regulated to produce a minimum of about 5 gallons per minute. This pumping rate drew the water level down about 10 feet, to the level of the pump intake, after about 600 gallons were pumped. The well apparently had not been pumped for several months. The well recovered extremely slowly, which in general corresponds to a reported yield of about 500 gallons per week (oral commun., John Wise, Joshua Tree National Monument, 1968). The electrical conductance (270 at 25°C) and previous chemical analyses of ground water in the area (Weir and Bader, 1963, p. 101) suggest that the water is of excellent chemical quality.

Approximately 2,100 gallons were pumped from the Wall Street Mill well (1S/8E-34P1) in about 7 hours of pumping; most of the water was pumped from dead storage in the large-diameter dug well. The yield of the aquifer to the well during the test is estimated to be less than 1 gallon per minute with a drawdown of 9 feet. The electrical conductance of the water indicates it is of excellent chemical quality (table 2).

Well 2S/9E-6R1 is apparently a collector of precipitation. The water level in the well did not recover after pumping. Test hole 2S/9E-7A1, bored into alluvium and weathered bedrock a few hundred feet southwest of the pumped well, did not encounter saturated material, even at a depth of several tens of feet below the elevation of the water level in the pumped well. The conductance of the water in 6R1 was 850 at 25°C, which suggests long-time contact with the granitic bedrock and concentration of salts by evaporation from the large surface area of the dug well.

REFERENCES

U.S. Public Health Service, 1962, Drinking water standards, 1962: Pub. 956, 61 p.

Weir, J. E., Jr., and Bader, J. S., 1963, Ground water and related geology of Joshua Tree National Monument, California: U.S. Geol. Survey open-file rept., 123 p.