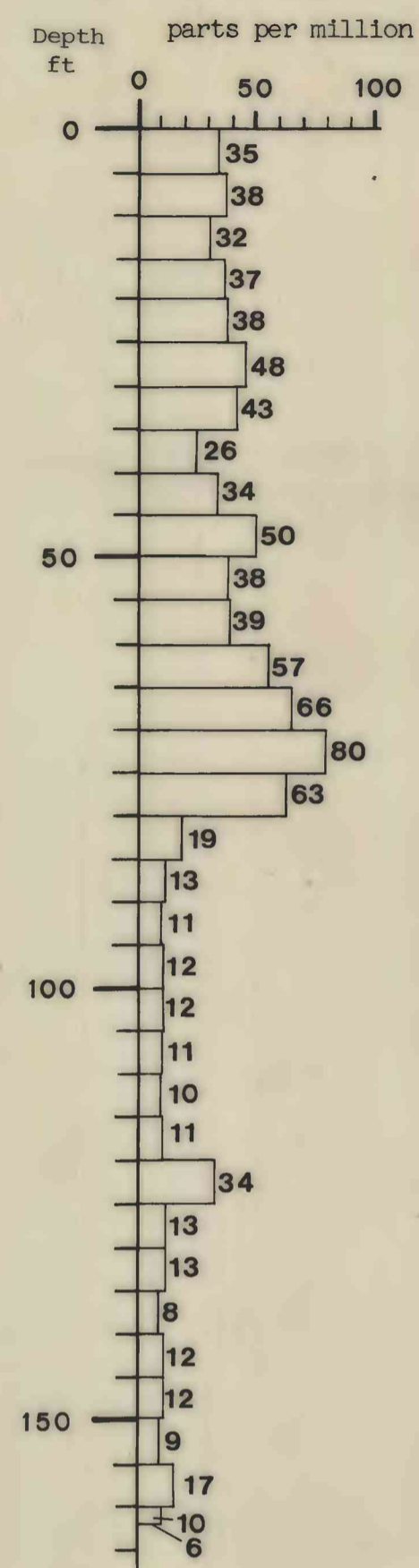
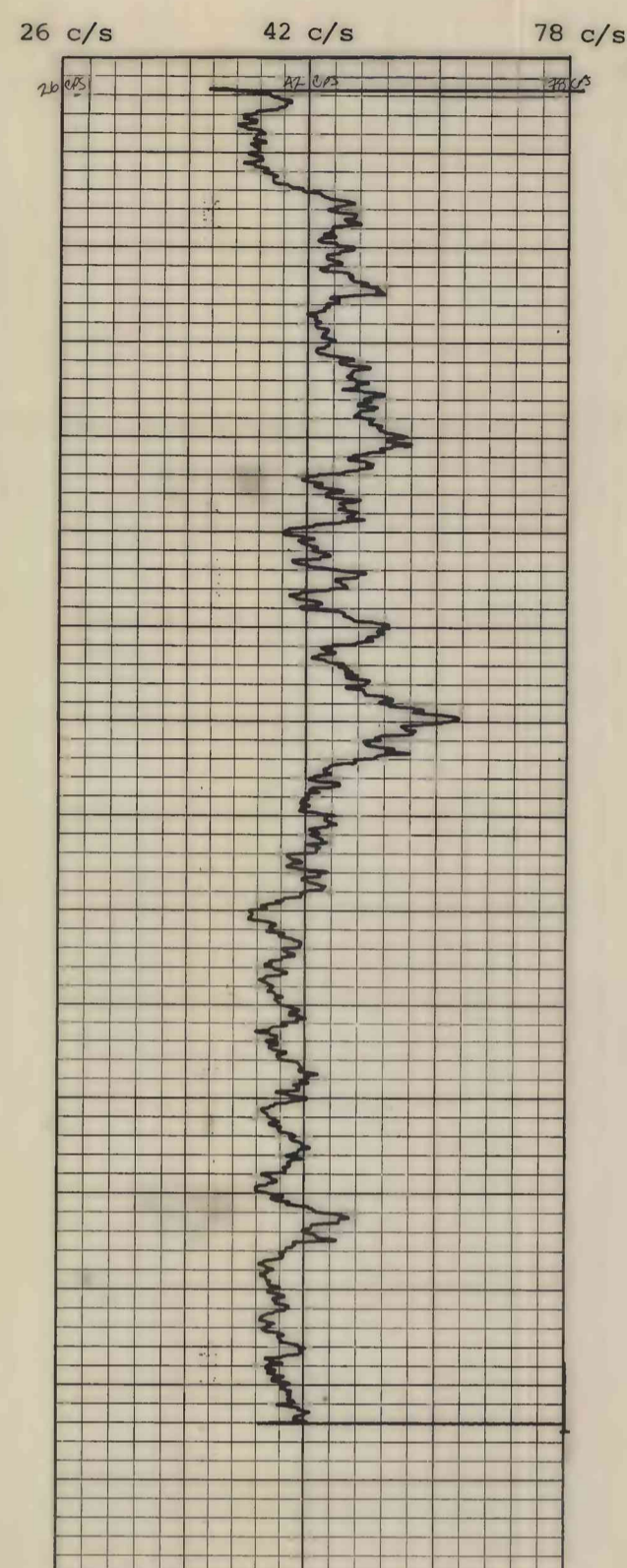


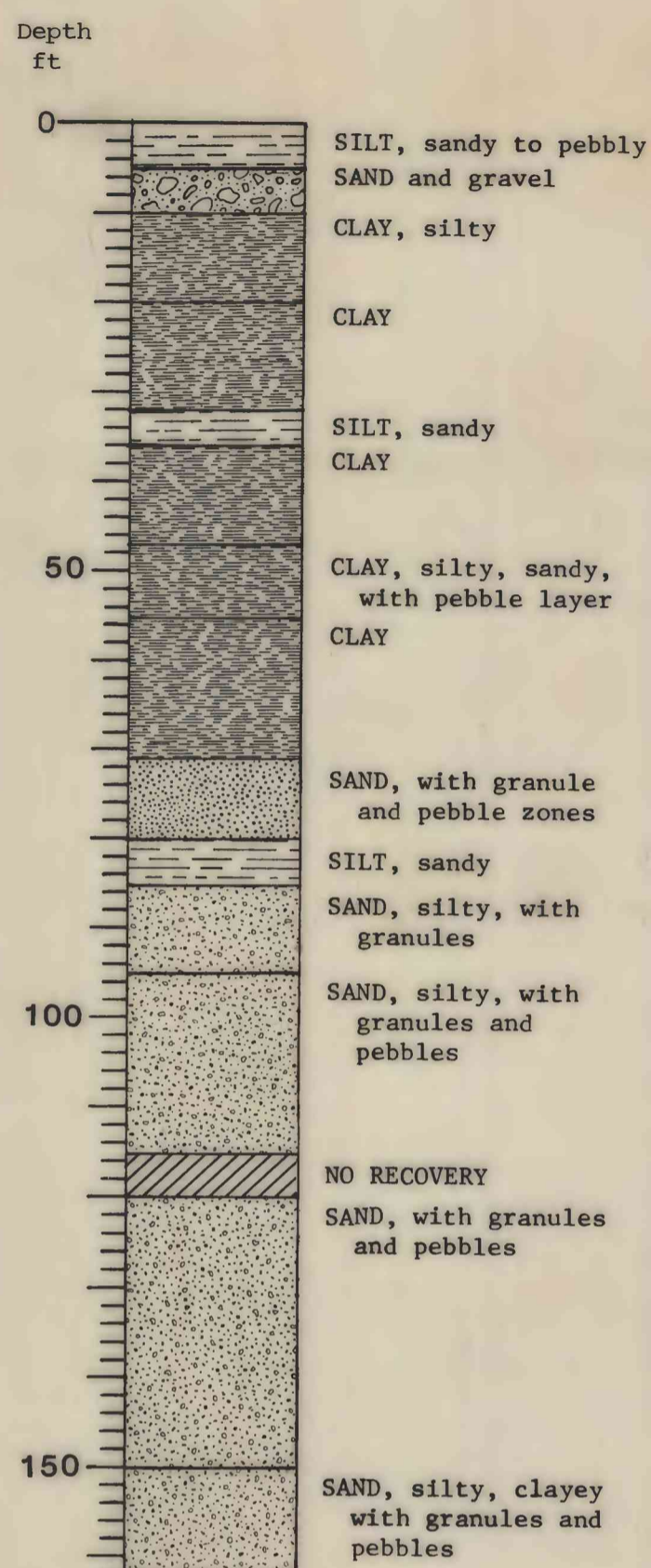
LITHIUM LOG
(J. D. Vine, 1978, written commun.)



GAMMA - RAY LOG
[c/s]



COLUMNAR SECTION



Total depth (TD) = 162 ft

LITHOLOGIC LOG

Depth (feet)	DESCRIPTION
0-5	Silt, pale-yellowish-brown (10YR 6/2 dry), calcareous, and medium to coarse sand with occasional pebbles, 4-8 mm across. Unit composed of 50 percent silt and 50 percent sand
5-10	Sand and gravel. Very fine to very coarse sand, with granules and pebbles in a yellowish-gray (5Y 8/1 dry) silty matrix. Unit composed of 20 percent silt, 35 percent very fine sand, 10 percent fine sand, 5 percent medium sand, 5 percent coarse sand, 5 percent very coarse sand, and 40 percent granules and pebbles. Unit is calcareous and has a 6 in. layer of light-green (5G 7/4) clay at 8 ft
10-14	Clay, yellowish-gray (5Y 8/1 dry), silty, calcareous
14-20	Clay, light-olive-gray (5Y 6/1 dry), silty, calcareous. Unit composed of 65 percent clay and 35 percent silt
20-29	Clay, dusky-yellow (5Y 6/4 dry), calcareous
29-32	Clay, light-olive-gray (5Y 6/1 dry), calcareous
32-36	Silt, pale-olive (10Y 6/2 dry) and very fine sand, calcareous
36-47	Clay, greenish-gray (5GY 6/1), calcareous
47-50	Clay, light-olive-gray (5Y 6/1), micaceous with some silt to coarse sand. Unit contains a thin layer of 25-50 mm size pebble gravel at 47 ft
50-55	Clay, yellowish-gray (5Y 8/1), calcareous, with 2-3 percent subrounded medium quartz sand
55-60	Clay, light-olive-gray (5Y 6/1), calcareous
60-71	Clay, yellowish-gray (5Y 7/2), calcareous, with occasional layers of well-indurated clay
71-80	Sand, pale-yellow-brown (10YR 6/2), medium to coarse, slightly calcareous, subrounded to subangular, composed of quartz and feldspar, with scattered quartz monzonite(?) granules as much as 4 mm across. Unit contains two pebbly layers at 71 ft and at 76 ft and scattered granules of volcanic rock at 76-80 ft
80-85	Silt, pale-yellow-brown (10YR 6/2), calcareous, and medium to very coarse, sand composed of quartz, feldspar, and volcanic rock grains. Unit is well-cemented and composed of 60 percent silt and 40 percent sand
85-91	Sand, medium, and granules in a grayish-orange (10YR 7/4), calcareous, silty matrix. Unit is well-cemented. Sand composition similar to sand from 80-85 ft, but contains some epidote grains
91-95	Sand and granules in a silt matrix. Lithology similar to 85-91 ft, but silt matrix is moderate-yellowish-brown (10YR 5/4)
95-115	Sand, moderate-yellowish-brown (10YR 5/4), angular to subangular, composed of quartz, volcanic rock, and feldspar, and silt with scattered granules and pebbles. Unit is well-cemented and composed of 70 percent sand and 30 percent silt. Pebbles as much as 25 mm across. Calcite fills fractures. Below 110 ft unit is moderate-brown (5YR 4/4)
115-120	No recovery
120-125	Sand, pale-yellow-brown (10YR 6/2), coarse, well-cemented, calcareous, with subangular to subrounded granules of quartz, quartz diorite and volcanic rock fragments. Granules comprise 10 percent of the unit
125-145	Sand, moderate-yellowish-brown (10YR 5/4), medium to coarse, well-cemented, slightly calcareous, composed of quartz, feldspar, and mica. Some scattered pebbles as much as 45 mm in unit below 130 ft
145-150	Sand, light-brown (5YR 5/6), medium to coarse with scattered 4-20 mm quartzite and quartz monzonite pebbles
150-155	Sand, moderate-yellowish-brown (10YR 5/4), medium to very coarse, and subangular to subrounded quartz monzonite granules in a silty to clayey matrix
155-162	Sand and granules. Lithology similar to 150-155 ft, but granules are quartz or quartz diorite. Unit is more indurated and calcareous. From 106-162 ft the unit is dusky-yellow-brown (10YR 4/2)

INTRODUCTION

DISCUSSION

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) directed the Secretary of the Interior to prepare and implement by September 1980 a comprehensive long-range plan for the management, use, development, and protection of public lands within the California Desert Conservation Area (CDCA). The responsibility to prepare this plan was assigned to the Bureau of Land Management's (BLM) California Desert Planning Staff. The BLM was directed to evaluate mineral as well as botanical, wildlife, cultural, and recreation resource data for effective multiple-use land planning. In turn, the BLM requested assistance from the U.S. Geological Survey (USGS) in defining the mineral resources.

In 1978 the USGS drilled 56 shallow test wells to depths of 50-600 ft to provide BLM with the requested mineral resource data. The lithologic, water quality, and geophysical data obtained from one of these test wells drilled on Soggy Dry Lake, Calif., are presented in this report.

LOCATION AND DRILLING METHODS

Test well SO-1 was drilled in SW1/4 NE1 sec. 8, T. 4 N., R. 3 E., SEV, California (lat. 34°27'00" N., long. 116°11'24" W.) on Soggy Dry Lake (see index map). This test well was completed in May 1978 to a total depth of 162 ft by a contracted, track mounted, reverse circulation drill rig. Drilling fluids, a mixture of air and water, were pumped down the outer annulus of dual-wall drill pipe to an open face insert bit. Drilling fluids mixed with sediment cuttings were forced up the inner annulus of the drill pipe to the surface where samples were collected. This drilling technique ensured recovery of uncontaminated sediment or ground-water samples because the return cuttings or ground water were not in contact with the bore wall. In situ ground water was used as a drilling fluid where possible; otherwise, a fine mist of imported freshwater and air was used.

A continuous lithologic log was completed during drilling. Sediment samples were collected at 5-ft intervals and were described in the field. Field lithologic descriptions were supplemented by microscopic study when the samples were returned to the laboratory. Sediment names used in this report are those defined by Folk (1968). The rock-color chart (Goddard and others, 1948) was used to color classify damp to wet samples. Lithologic percentages are approximate.

Drill cuttings were analyzed for lithium (Li) by the USGS, in Denver, Colo. Lithium analyses are included in this report to complete the mineral resource appraisal on Soggy Dry Lake.

WATER QUALITY

Ground-water samples were collected at the first aquifer having measurable flow into the borehole and at total depth of the test well by stopping drill rotation and pumping air through the drill string. The aquifer was allowed to flow for several minutes to remove drilling fluids and cuttings from the drill string before a ground-water sample was collected. Temperature and pH of raw, untreated samples and specific gravity of filtered samples were measured in the field. Chemical analyses of filtered samples collected from test well SO-1 are listed in the chemical analyses table.

GEOPHYSICAL LOG

A gamma-ray logging survey was run from the surface to a drilled depth of 141 feet. The log was run through the drill string because the plays sediments would have squeezed in or collapsed and sealed the well before conventional open-hole logs could have been run in the well. Before the log can be interpreted, corrections must be made for the effect of the drill pipe. The necessary data for the correction, described on Schlumberger Chart POR-8, are listed below. The corrected log will approximate the natural radioactivity, but quantitative measurement is not possible, inasmuch as the sonde was not calibrated.

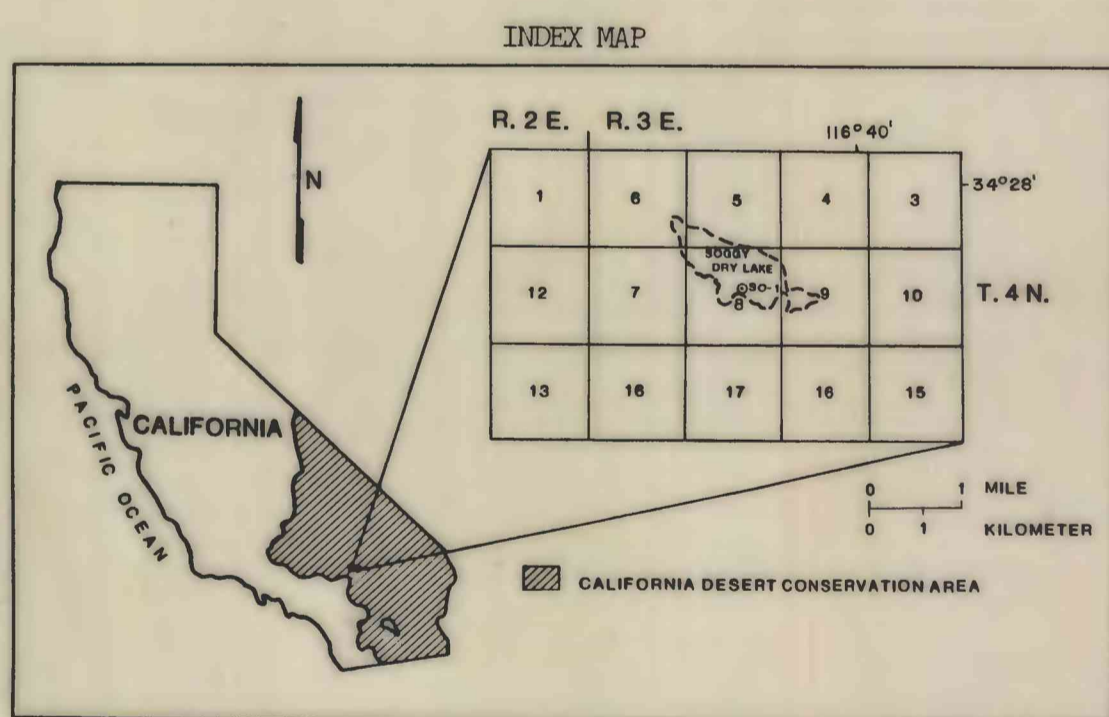
Test well diameter: 4.5 in.	Total thickness of dual-wall drill pipe: 0.63 in.
Drill string inner diameter: 2.47 in.	Sonde outer diameter: 1.25 in.
Outer diameter: 4.5 in.	Logging speed: 17 ft/min

ACKNOWLEDGMENTS

G. Thomas Server supplemented field lithologic descriptions by laboratory study of sediment cuttings under binocular microscope. J. D. Cathcart, U.S. Geological Survey, Denver, Colo., ran the geophysical log.

REFERENCES

- Folk, R. L., 1968, Petrology of sedimentary rocks: Austin, University of Texas, 170 p.
- Goddard, E. N., chm., and others, 1948, Rock-color chart: National Research Council; reprinted by Geological Society of America, 1951, 1963, 1970, 6 p.



CONVERSION FACTORS

Multiply English unit	By	To obtain metric unit
Inches (in.)	2.540	Centimeters (cm)
Feet (ft)	0.305	Meters (m)

Chemical analyses of ground water from test well SO-1, Soggy Dry Lake, California
[Analyses by U.S. Geological Survey, Denver, Colo.]

Test well-sample No.	Date sample collected	Sample depth (ft)	Specific conductance (microhms/cm at 25°C)	pH	Temperature, water (°C)	Specific gravity	Hardness, total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃) [*]	Alkalinity, total (CaCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Iodide (I)	Silica (SiO ₂)	Solids, residue on evaporation at 100°C	Nitrite plus nitrate (N)	Phosphorus (P)	Boron (B)	Iron (Fe)	Lithium (Li)	Manganese (Mn)	Strontium (Sr)	Uranium (U)	
SO-1-1	5/23/78	115	1,551	8.5	8.4	19.1	1.007	73	16	7.8	330	43	171	140	380	190	2.9	0.05	11	1,070	0.15	0.01	780	40	40	20	440	2.0
SO-1-2	5/23/78	162	1,984	8.8	8.3	20.0	1.000	26	6.7	2.3	440	37	232	190	480	230	4.7	.07	10	1,330	.02	.01	1,400	50	30	0	210	3.1

* Calculated.

This report has not been edited for conformity with U.S. Geological Survey editorial standards

GEOPHYSICAL, LITHOLOGIC, AND WATER-QUALITY DATA FROM SOGGY DRY LAKE, SAN BERNARDINO COUNTY, CALIFORNIA

By
Roger D. Dockter

1980