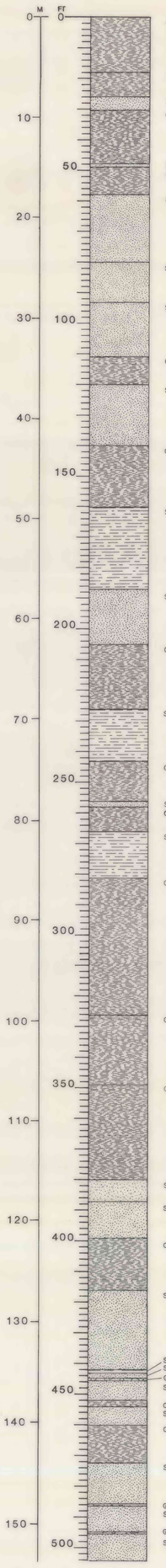
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

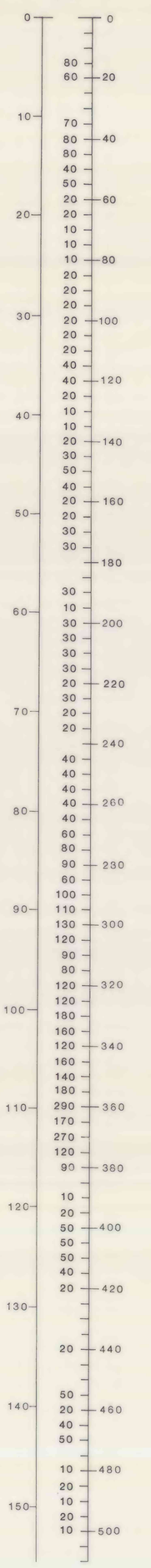
OPEN-FILE REPORT 91-264
PLATE 1 OF 2

LITHOLOGIC LOGS FROM DANBY DRY LAKE TEST WELL NO. 1



Depth (Feet)	Depth (Meters)	Description
0 - 18	0 - 5.5	CLAY, olive-gray (5Y 4/1), calcareous, moist
18 - 26	5.5 - 7.9	CLAY, sandy
26 - 30.5	7.9 - 9.3	SAND, silty, fine to medium
30.5 - 45	9.3 - 13.7	CLAY, sandy, dark-yellowish-brown (10YR 4/2), calcareous, massive; halite (?) crystals precipitated from saline brine collected in sample bag
45 - 48	13.7 - 14.6	CLAY, variegated dark-yellowish-brown (10YR 4/2) and moderate brown (5YR 4/4), calcareous
48 - 49	14.6 - 14.9	SANDSTONE, red-brown, fine-grained, minor (less than 5 percent) gravel
49 - 58	14.9 - 17.7	CLAY, dark-yellowish-brown (10YR 4/2), calcareous
58 - 80	17.7 - 24.4	SAND, silty, dark-yellowish-brown (10YR 4/2) very fine to fine. Unit consists of 85 percent sand and 15 percent silt. DAN-1-1 collected from this unit
80 - 93	24.4 - 28.3	SAND, very fine to fine, interbedded with dark-yellowish-brown (10YR 4/2) calcareous CLAY. Unit consists of 90 percent sand and 10 percent clay. Number of clay interbeds increase to 20 percent in basal 2 ft (0.6 m) of unit
93 - 111	28.3 - 33.8	SAND, silty, dark-yellowish-brown (10YR 4/2), very fine
111 - 120	33.8 - 36.6	CLAY, dark-yellowish-brown (10YR 4/2), calcareous, interbedded with very fine SAND and SILT. Unit consists of 55 percent clay, 35 percent sand, 10 percent silt
120 - 140	36.6 - 42.7	SAND, silty, dark-yellowish-brown (10YR 5/4), very fine. Minor (less than 5 percent) calcareous clay
140 - 160	42.7 - 48.8	CLAY, sandy, dark-yellowish-brown (10YR 4/2), calcareous. Clay content increases from 50 percent in upper 5 ft (1.5 m) of unit to 80 percent at 150 ft (45.7 m) then decreases to 50 percent at base of unit. Unit at 150 ft (45.7 m) consists of 80 percent variegated dark-yellowish-brown to brown-gray (5YR 4/1) clay, 15 percent very fine sand or silt, and 5 percent very coarse sand
160 - 187	48.8 - 57.0	SILT, sandy, clayey, dark-yellowish-brown (10YR 4/2). Unit consists of 50 percent silt, 30 percent very fine sand, and 20 percent calcareous clay
187 - 205	57.0 - 62.5	SAND, silty, olive-gray (5Y 4/2) to dark-yellowish-brown (10YR 5/4), very fine to fine. Unit consists of 85 percent sand and 15 percent silt at top of unit and 50 percent sand, 25 percent silt, and 25 percent clay at base
205 - 226	62.5 - 68.9	CLAY, sandy, olive-gray (5Y 4/2), calcareous. Very fine to fine sand content increases to 30 percent in basal 5 ft (1.5 m) of unit
226 - 243	68.9 - 74.1	SILT, sandy, olive-gray (5Y 4/2)
243 - 258	74.1 - 78.6	CLAY, olive-gray (5Y 4/2), calcareous, massive
258 - 260	78.6 - 79.2	SAND, very fine to fine
260 - 268	79.2 - 81.7	CLAY, sandy, silty, olive-gray (5Y 4/1), calcareous
268 - 281	81.7 - 85.6	SILT, variegated dark-yellowish-brown (10YR 4/2). Unit varies from 80 percent silt to very fine sand and 20 percent clay in upper 7 ft (2.1 m) to 60 percent silt and sand and 40 percent calcareous clay at base
281 - 326	85.6 - 99.4	CLAY, silty, sandy, olive-black (5Y 2/1) to moderate-yellowish-brown (10YR 5/4), calcareous. Very fine sand content increases to 30 percent at 291 ft (88.7 m) then decreases rapidly. Basal 6 ft (1.8 m) of unit consists of 65 percent calcareous clay, 20 percent very fine sand, and 15 percent silt
326 - 349	99.4 - 106.4	CLAY, moderate-yellowish-brown (10YR 5/4), interbedded with dark-yellowish-brown (10YR 4/2) very fine to fine SAND. Clay interbeds 0.1 - 0.2 in (2 - 4 mm) thick, sand interbeds 0.2 - 0.3 in. (4 - 8 mm) thick. Unit consists of 50 percent clay and 50 percent sand in upper 4 ft (1.2 m) then 70 percent clay and 30 percent sand to base of unit
349 - 380	106.4 - 115.8	CLAY, silty, dark-yellowish-brown (10YR 4/2) and moderate-yellowish-brown (10YR 5/4), calcareous. Silt content increases from 10 percent to 20 percent in upper 16 ft (4.9 m) of unit. Unit includes 10 percent sand from 367 ft (111.9 m) to base of unit. Sand grain size increases from very fine at 367 ft (111.9 m) to medium to coarse at base of unit
380 - 387	115.8 - 118.0	SAND, moderate-yellowish-brown (10YR 5/4), coarse to very coarse, and GRAVEL. Unit consists of 50 percent quartz sand, 35 percent gravel, and 15 percent silt. Gravel consists of poorly sorted, sub-angular quartz and granitic rock fragments up to 1 in. (25.4 mm) maximum diameter
387 - 399	118.0 - 121.6	SAND, silty, moderate-yellowish-brown (10YR 5/4), fine. Unit includes rare (≤ 1 percent) granitic pebbles, 0.5 in. (12.7 maximum diameter
399 - 416	121.6 - 126.8	CLAY, silty, pale-yellowish-brown (10YR 6/2), calcareous, massive. Clay is variegated pale-yellowish-brown to pale olive (10Y 6/2) from 405 ft (123.4 m) to base of unit
416 - 442	126.8 - 134.7	SAND, silty, pale brown (5YR 5/2), very fine
442 - 443	134.7 - 135.0	SILT
443 - 445	135.0 - 135.6	SAND, silty, same as interval 416 - 442 ft (126.8 - 134.7 m)
445 - 445.5	135.6 - 135.8	GRAVEL, subrounded pebbles to 1 in. (25.4 mm) maximum diameter
445.5 - 452	135.8 - 137.8	SAND, silty, same as interval 416 - 442 ft (126.8 - 134.7 m)
452 - 454	137.8 - 138.4	CLAY, dark-yellowish-brown (10YR 4/2), calcareous
454 - 460	138.4 - 140.2	SAND, silty, dark-yellowish-brown (10YR 4/2), very fine
460 - 472.5	140.2 - 144.0	CLAY, silty, dark-yellowish-brown (10YR 4/2), calcareous, massive
472.5 - 485.5	144.0 - 148.0	SAND, silty, dark-yellowish-brown (10YR 4/2), very fine. Rare (≤ 1 percent) dark-yellowish-brown (10YR 4/2) calcareous clay interbeds less than 2 in. (50.8 mm) thick
485.5 - 486.5	148.0 - 148.3	GRAVEL, dark gray, poorly sorted, sub-rounded to subanguiar quartz pebbles to 0.25 in. (6.4 mm) maximum diameter
486.5 - 495	148.3 - 150.9	SAND, silty, same as interval 472.5 - 485.5 ft (144.0 - 148.0 m)
495 - 495.5	150.9 - 151.0	GRAVEL, same as interval 485.5 - 486.5 ft (148.0 - 148.3 m)
495.5 - 504	151.0 - 153.6	SAND, silty, same as interval 472.5 - 485.5 ft (144.0 - 148.0 m). DAN-1-2A collected from this unit

Lithium Analyses
(J.D. Vine, Written Commun., 1978)



INTRODUCTION

Lithologic and water quality data from Danby Dry Lake, California were obtained in April, 1978. These data provide leasable mineral resource input to the Bureau of Land Management's comprehensive long-range plan, authorized by the Federal Land Policy and Management Act of October 21, 1976 (Public Law 94-579), for the management, use, development, and protection of public lands within the California Desert Conservation Area (index map).

DRILLING AND LITHOLOGIC LOGGING TECHNIQUES

The test well was completed by the reverse circulation drilling technique. Drilling fluids, either air or water or both, are pumped down the outer annulus of dual-wall drill pipe to an open-throat button bit. The drilling fluids and cuttings then are forced up the inner annulus of the drill pipe to the surface. This technique assures recovery of uncontaminated sediment and water samples. In situ ground water is used as a drilling fluid as much as possible; otherwise a fine mist of imported fresh water and air is used.

Lithologic characteristics of the samples of the drill cuttings are described in the field. Field descriptions are later supplemented by laboratory examination. The rock color chart (Goddard and others, 1948) is used to color classify damp to wet samples. Sediment names are described by Wentworth (1922). Percentage of lithologic constituents listed in the lithologic description are approximate. "No Recovery" is used where samples are not collected.

The drill cuttings and water samples are analyzed for Lithium (Li) by the U.S. Geological Survey's Lithium Resource Appraisal Group in Denver, Colorado. The lower economic limit for lithium extraction is currently 1,000 ppm Li in sediments and 50 - 100 ppm Li in groundwater.

WATER QUALITY

Water samples are collected at the first aquifer with significant flow and at total depth (T.D.) by stopping drill rotation and pumping air through the drill string. The aquifer is allowed to flow for several minutes before a water sampled is collected. The water temperature, pH, and specific gravity of raw and filtered untreated samples are measured in the field.

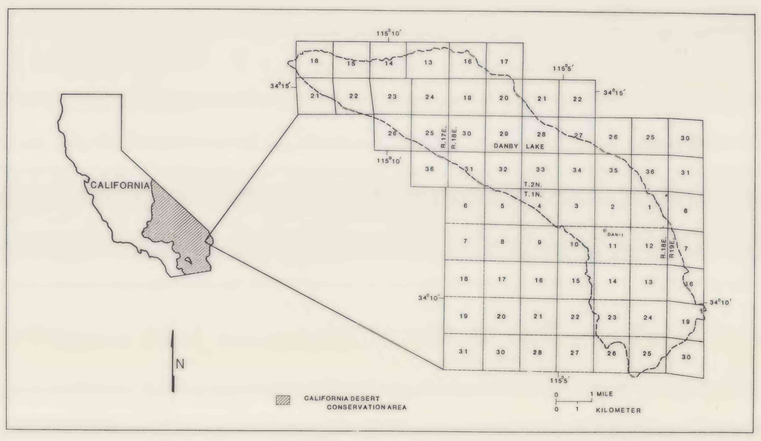
ACKNOWLEDGMENTS

G. Thomas Server provided laboratory lithologic descriptions.

REFERENCES

Goddard, E.N., chm, and others, 1949, Rock-color chart: National Research Council; reprinted by Geological Society of America, 1951, 1963, 1970, 6 p.

Wentworth, C.K., 1922, A scale of grade and class terms for clastic sediments: Journal of Geology, v. 30, p. 377 - 392.



TEST WELL LOCATION

DAN-1 Latitude: 34°11' 42"
Longitude: 115°03' 42"
NE¼NW¼ Sec. 11, T. 1 N., R. 18 E.
San Bernardino Meridian

WATER QUALITY DATA FROM DANBY DRY LAKE TEST WELL NO. 1
(Analyses by U.S. Geological Survey, Water Resource Division, Denver Colorado)

Test Well number	Date of collection	Depth of water sample (ft)	Water temperature (°C)	pH lab	pH field	Specific gravity	Specific conductance (microhms/cm at 25°C)	Percent sodium	SAR* (sodium absorption rate)
DAN-1-1	4/18/78	75	24.3	7.4	5.8	1.140	187,000	99	950
DAN-1-2A	4/19/78	504	30.6	8.2	7.9	1.015	3,450	94	30

Results in mg/L

Test Well number	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Phosphorus (P)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Total Nitrate (NO_2+NO_3)	Iodide (I)
DAN-1-1	7.0±0.4+	370	110	81,000	360	0.55	3,800	130,000	0.4	0.04	0.15
DAN-1-2A	24	34	1.7	660	5.5	0.00	620	380	6.4	0.01	0.14

Results in mg/L

Test Well number	Bicarbonate (HCO_3)#	Manganese (Mn)	Iron (FE)	Boron (B)	Lithium (Li)	Strontium (Sr)	Uranium (U)	Solids, residue on evaporation at 180°C (TDS)	Total Alkalinity Calcium Carbonate ($CaCO_3$)	Total hardness	Percent Difference
DAN-1-1	50	0	1.700	1.100	0.720	5.100		172,000	41	1,400	-2.56
DAN-1-2A	93	0.680	0.160	1.400	0.180	1.900	0.001	1,890	76	94	9.26

* SAR — Water Classification
10 — Excellent
10-18 — Good
18-26 — Fair
26 — Poor

\+ Determined on 1:200 dilution.
\# Calculated.

LITHOLOGIC AND WATER QUALITY DATA FROM DANBY DRY LAKE, SAN BERNARDINO COUNTY, CALIFORNIA

BY

J. P. CALZIA

1991