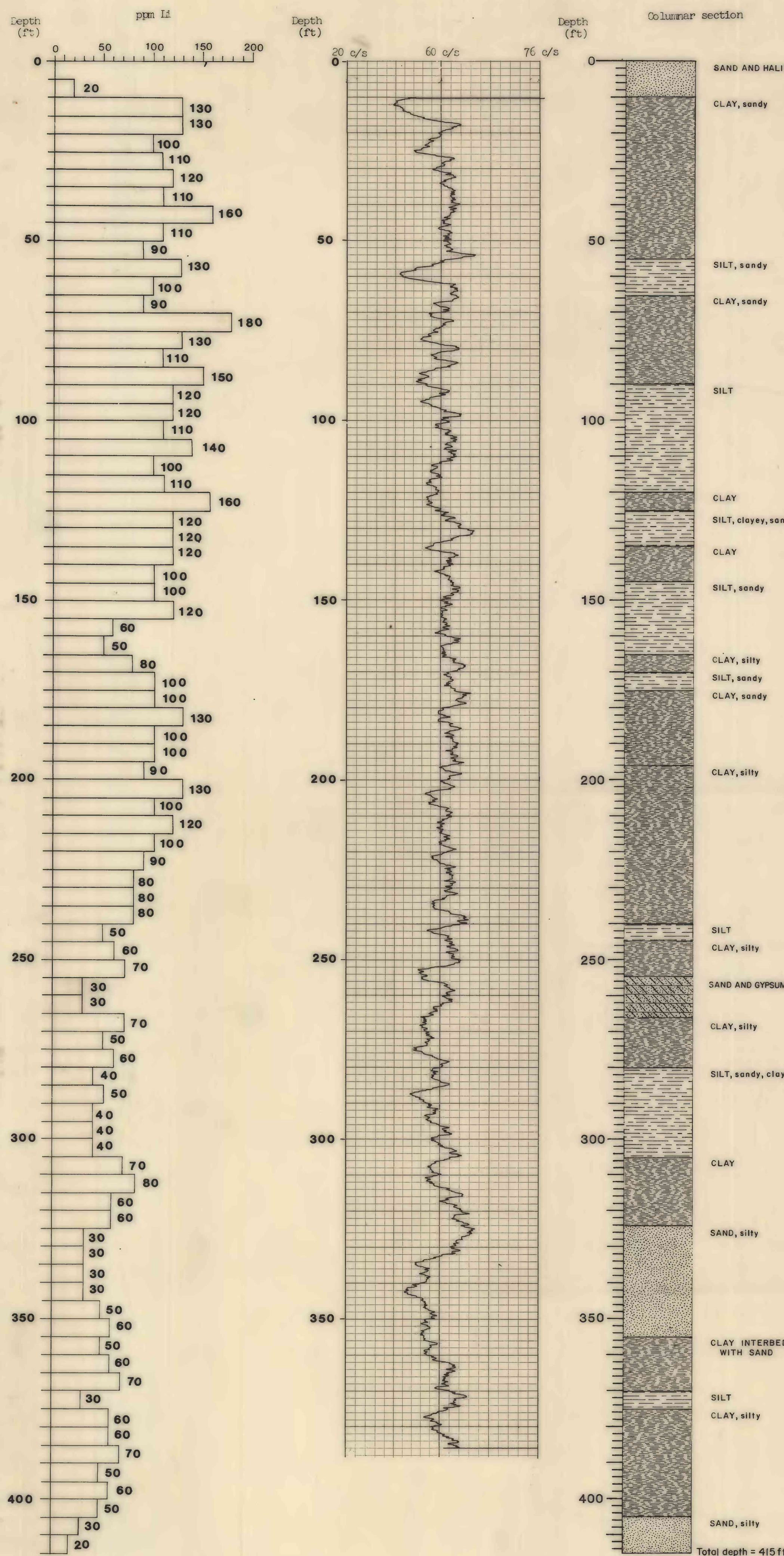


LITHIUM ANALYSES OF DRILL CUTTINGS
(J. D. Vine, 1978, written comman.)

GAMMA-RAY LOG
(c/s, counts per second)

LITHOLOGIC LOG

DISCUSSION



Introduction

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 potential, 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 Cadiz Dry Lake, Calif. are presented in this report.

LOCATION AND DRILLING METHODS

Test well CAD-1 was drilled in SE1/4 sec. 3, T. 2 N., R. 15 E., SBI, California (lat 34°17'30" N., long 115°23'54" W.) on Cadiz Dry Lake (see index map). This test well was completed in April 1978 to a total depth of 415 ft by a contracted, truck-mounted, reverse-circulation drill rig. Drilling fluids, either air or water or both, 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 unconsolidated sediment or ground-water samples because the return cuttings or ground water are 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 defined by Folk (1968). The rock-color chart (Oodard and others, 1968) was used to color classify deep 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 Cadiz Dry Lake.

WATER QUALITY

Ground water samples were collected at the first aquifer having reasonable 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. Water quality data of filtered samples collected from CAD-1 and brine wells on Cadiz Dry Lake are listed in the chemical analyses table. A well completion schedule of the brine wells is listed below.

Brine Well Schedule, Cadiz Dry Lake
(—, no data; 25, sand surface datum)

Well No.	Location, San Bernardino Meridian, Calif.	Date Drilled	Total Depth (ft)	Water Level (from LSL, ft)	Perforations (drill depth, ft)	Casing dia. (in.)	Packing (gpm)	Yield (gpm)
CAD-N-2	3/4 sec. 21, T. 3 N., R. 15 E.,	Jan. 1978	250	pppg	50-250	10	gravel	40
CAD-D-1	SE1/4 sec. 33, T. 3 N., R. 15 E.,	1973	160±5	*	0-160±5	12	1" rock	*
CAD-D-2	SE1/4 sec. 33, T. 3 N., R. 15 E.,	1973	180	*	0-180	15	gravel	*
CAD-D-3	NE1/4 sec. 33, T. 3 N., R. 15 E.,	1974	160±5	60-75	0-160±5	15	1" rock	25 (open bottom)
CAD-D-4	SE1/4 sec. 33, T. 3 N., R. 15 E.,	1974	160±5	pppg	0-160±5	12	do	—
CAD-B-1	NE1/4 sec. 11, T. 2 N., R. 15 E.,	—	190±5	25	90-190	10	gravel	100
CAD-B-2	NE1/4 sec. 11, T. 2 N., R. 15 E.,	—	190±5	25	40-190	10	do	10-15
CAD-T-2	NE1/4 sec. 13, T. 2 N., R. 15 E.,	—	200	—	50-200	12	do	—
CAD-T-3	NE1/4 sec. 13, T. 2 N., R. 15 E.,	1972(?)	175	pppg	50-175	12	do	20-50
CAD-N-1	1/4 sec. 19, do. Nov. 1974	217	do	do	10-217	10	do	—

* Estimated at 20 ft
* Estimated at 25 gpm

GENERAL LOG

A gamma-ray logging survey was run from the surface to a drilled depth of 386 feet. The log was run through the drill pipe because the plays sediments would have squeezed in or collapsed and sealed the test 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 G-2, 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. Some outer diameter: 1.25 in.
Outer diameter: 4.5 in. Logging speed: 17 ft/min

ACKNOWLEDGMENTS

O. Thomas Server supplemented field lithologic descriptions by laboratory study of sediment cuttings under binocular microscope. J. D. Othart, 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.

Oodard, E. N., et al., and others, 1968, Rock-color chart: National Research Council, reprinted by Geological Society of America, 1951, 1963, 1970, 6 p.

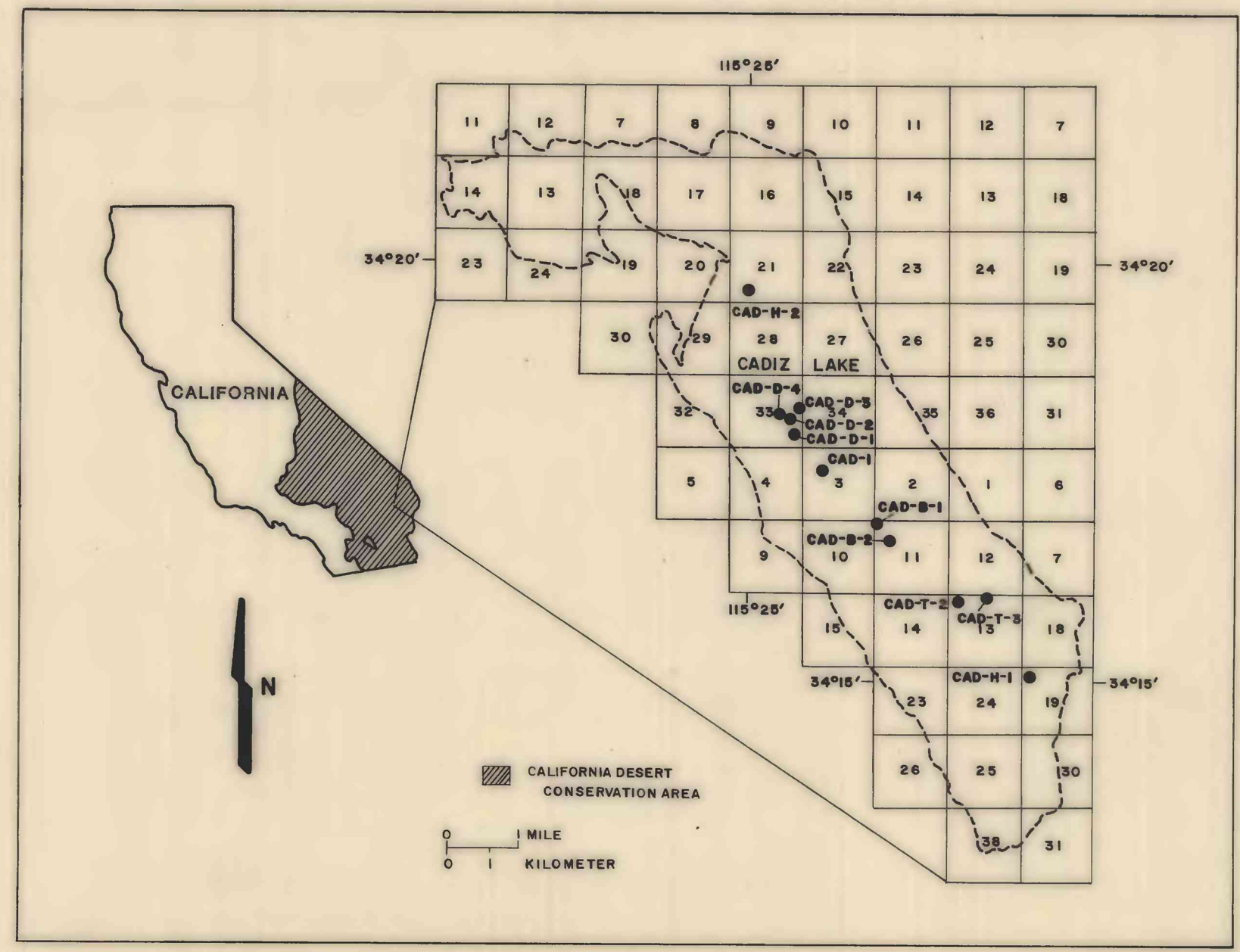
CONVERSION FACTORS

Multiply English unit	By	To obtain metric unit
Inches (in.)	2.54	Centimeters (cm)
Feet (ft)	0.305	Meters (m)

Chemical analysis of ground water from selected wells on Cadiz Dry Lake, California
(—, no data; Analyses by U.S. Geological Survey, Denver, Colo.)

Well sample No.	Date sample collected	Sample depth (ft)	Specific conductance (microhm/cm at 25°C)	pH	mg/l																							
					Temperature, water (°C)	Specific gravity	Nonions, total	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Boronate (BO ₃)	Ammonia, total (NH ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Iodide (I)	Silica (SiO ₂)	Sulfide, residue at 100°C	Strontium plus nitrate (Sr)								
CAD-N-2	12/7/76	250	170,000	6.8	7.1	24.5	1.100	21,000	7,500	400	49,000	570	18	15	1,500	50,000	1.1	1.1	23	155,000	23	0.02	3,800	500	20,000	2,800	150,000	0.92
CAD-D-2	12/7/76	180	233,000	6.1	6.2	24.0	1.200	55,000	20,000	1,100	100,000	1,700	17	14	0.0	200,000	1.2	6.5	7.6	330,000	0.57	0.10	0	3,000	58,000	8,000	390,000	0.33
CAD-D-1	12/7/76	160±5	232,000	5.9	6.3	23.0	1.210	60,000	22,000	1,100	97,000	1,500	11	9	0.0	190,000	1.0	4.4	4.9	330,000	0.25	0.02	0	1,000	58,000	15,000	410,000	—
CAD-D-3	12/7/76	do	234,000	6.5	5.9	23.0	1.200	44,000	16,000	970	100,000	1,600	9	7	0.0	190,000	1.1	10	13	325,000	0.43	0.03	0	2,000	48,000	4,800	300,000	—
CAD-D-4	12/7/76	do	232,000	7.1	6.3	23.0	1.200	65,000	24,000	1,200	93,000	1,500	13	11	0.0	200,000	0.8	4.4	12	336,000	0.04	0.04	0	600	63,000	14,000	30,000	—
CAD-1	4/26/78	175	200,000	5.9	6.2	24.8	1.222	44,000	15,000	1,500	86,000	2,500	27*	22	19	210,000	1.6	0.22	3,020-04*	365,000	0.10	1.5	14,000	740	80,000	9,900	530,000	0.85
CAD-B-1	12/8/76	190±5	234,000	5.6	6.1	26.0	1.190	35,000	20,000	1,000	88,000	1,800	19	16	0.0	180,000	0.7	3.8	8.3	310,000	0.08	0.03	0	500	60,000	5,500	390,000	0.63†
CAD-T-3	12/8/76	175	222,000	6.7	6.6	24.5	1.160	44,000	16,000	860	78,000	1,300	5	4	0.0	160,000	1.6	3.3	7.6	268,000	8.5	0.05	0	1,000	48,000	12,000	310,000	0.31*
CAD-N-1	12/8/76	217	195,000	6.5	6.9	24.5	1.120	23,000	8,400	460	60,000	720	12	10	110	110,000	0.6	2.2	21	189,000	4.6	0.03	6,900	400	24,000	4,000	150,000	0.92

* Calculated.
† Determined on 1:200 dilution.
* Sample collected from CAD-B-2.
* Composite sample collected from CAD-T-2 and CAD-T-3.



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