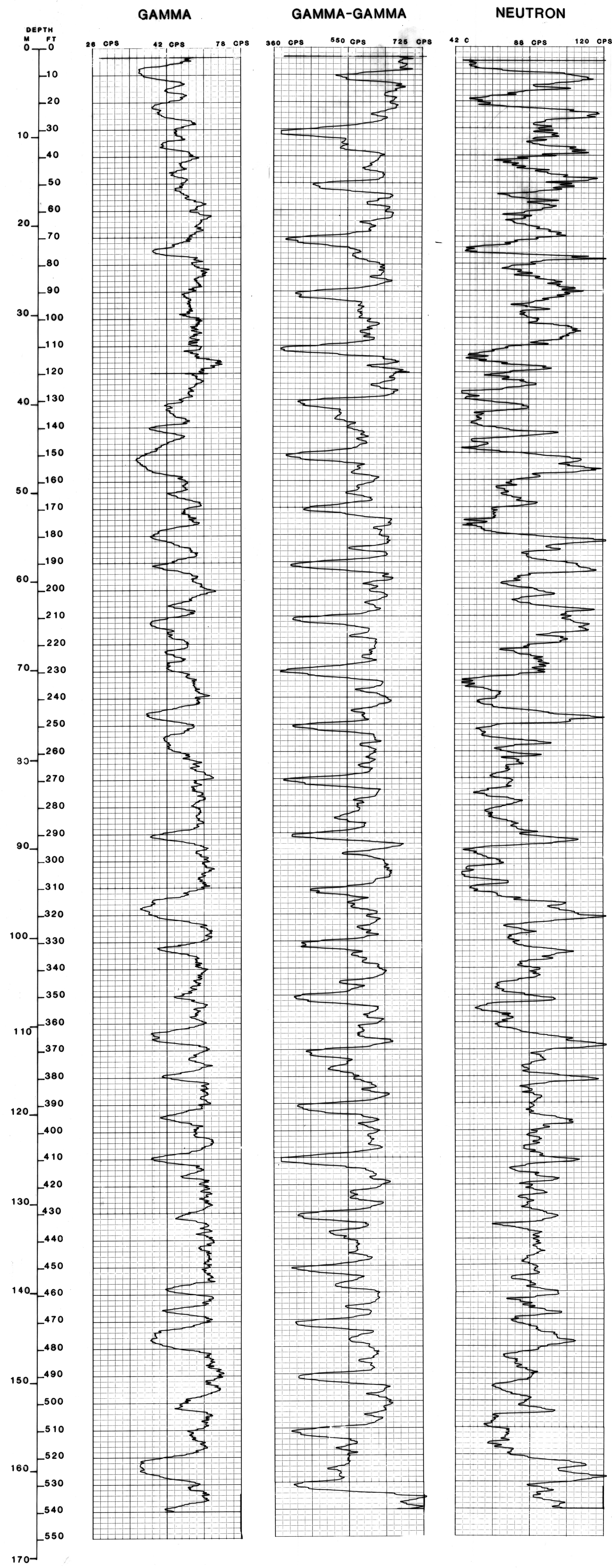


GEOPHYSICAL LOGS FROM BRISTOL DRY LAKE TEST WELL NO. 2

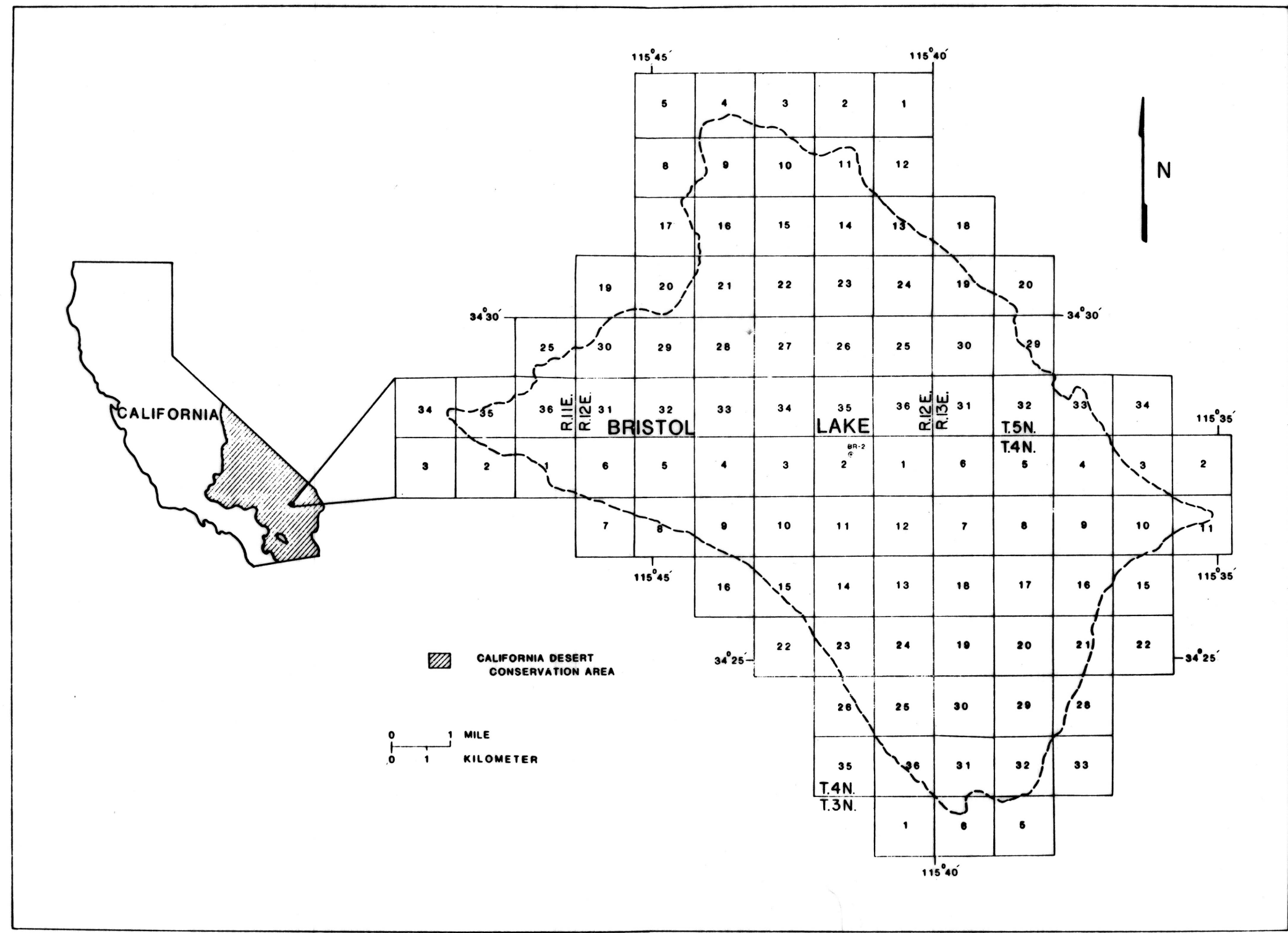
LITHOLOGIC LOGS FROM BRISTOL DRY LAKE TEST WELL NO. 2



Depth (Feet)	Depth (Meters)	Description
0 - 11	0 - 3.4	CLAY, moderate-yellowish-brown (10YR 5/4) and pale olive (10Y 6/2), calcareous
11 - 14	3.4 - 4.3	SALT, mixed with 5 percent moderate-olive brown (5Y 4/4) calcareous SILT
14 - 55	4.3 - 16.8	CLAY, dark-yellowish-brown (10YR 4/2), calcareous, mixed equally with SALT. Salt content decreases to 10 to 15 percent at base of unit
55 - 77	16.8 - 23.5	CLAY, dark-yellowish-brown (10YR 4/2), light brown (5YR 3/6), and pale olive (10Y 6/2), calcareous
77 - 82	23.5 - 25.0	SALT, mixed with 15 percent dark-yellowish-brown (10YR 4/2) and pale olive (10Y 6/2) calcareous CLAY
82 - 133	25.0 - 40.5	CLAY, moderate-yellowish-brown (10YR 5/4), calcareous
133 - 134	40.5 - 40.8	SALT, clean
134 - 142	40.8 - 43.3	CLAY, light-olive-gray (5Y 5/2), calcareous, mixed with 20 percent SALT
142 - 143	43.3 - 44.2	SALT
143 - 166	44.2 - 50.6	SALT, mixed with 5 to 15 percent light-olive-gray (5Y 5/2) and moderate-olive-brown (5Y 4/4) calcareous CLAY
166 - 168	50.6 - 51.2	CLAY, dark-yellowish-brown (10YR 4/2), calcareous
168 - 196	51.2 - 59.7	SALT, mixed with 15 to 20 percent light-olive-gray (5Y 5/2) and grayish-olive (10Y 4/2) calcareous CLAY
196 - 207	59.7 - 63.1	CLAY, variegated light-olive-gray (5Y 5/2) and grayish-olive (10Y 4/2), calcareous
207 - 218	63.1 - 66.4	CLAY, same as above, mixed with 20 percent SALT. Salt content increases to 50 percent from 210 - 215 ft (64.0 - 63.5 m) then decreases to 20 percent at base of unit. BR-2-1 collected from this unit
218 - 219.5	66.4 - 66.9	CLAY, green
219.5 - 233.5	66.9 - 71.2	CLAY, same as interval 196 - 207 ft (59.7 - 63.1 m), mixed with 10 percent SALT
233.5 - 247	71.2 - 75.3	CLAY, silty, light-olive-gray (5Y 5/2) and dark-yellowish-brown (10YR 4/2), calcareous
247 - 253	75.3 - 77.1	SALT, mixed with 25 percent dark-yellowish-brown (10YR 4/2) and dusky-olive-green (5G 5/2) calcareous CLAY
253 - 270	77.1 - 82.3	CLAY, dark-yellowish-brown (10YR 4/2), calcareous, mixed equally with SALT. Salt content decreases to 5 percent at base of unit
270 - 351	82.3 - 107.0	CLAY, moderate-yellowish-brown (10YR 5/4), calcareous. Unit includes interbeds of clean SALT at 292 - 294 ft (89.0 - 89.6 m) and 331 - 331.5 ft (100.9 - 101.0 m) and interbeds of dark-yellowish-brown (10YR 4/2) CLAY mixed equally with SALT at 318 - 325 ft (96.9 - 99.1 m) and 333.5 - 335 ft (101.7 - 102.1 m)
351 - 353	107.0 - 107.6	SALT, mixed with 10 percent dark-yellowish-brown (10YR 4/2) calcareous CLAY
353 - 365.5	107.6 - 111.4	CLAY, dark-yellowish-brown (10YR 4/2), calcareous
365.5 - 369	111.4 - 112.5	SALT, with minor (less than 5 percent) dark-yellowish-brown (10YR 4/2) calcareous SILT
369 - 380	112.5 - 115.8	CLAY, moderate-yellowish-brown (10YR 5/4), calcareous
380 - 385	115.8 - 117.3	SALT, mixed with 20 percent CLAY. Clay same as above
385 - 399	117.3 - 121.6	CLAY, same as interval 369 - 380 ft (112.5 - 115.8 m)
399 - 405	121.6 - 123.4	CLAY, same as above, mixed with 10 percent SALT
405 - 411	123.4 - 125.3	CLAY, variegated moderate-yellowish-brown (10YR 5/4), dark-yellowish-brown (10YR 4/2), grayish-orange (10YR 7/6), and dusky-yellowish-brown (10YR 2/2), calcareous
411 - 413.5	125.3 - 126.0	SALT
413.5 - 417	126.0 - 127.1	CLAY, same as interval 405 - 411 ft (123.4 - 125.3 m)
417 - 419	127.1 - 127.7	SALT
419 - 520	127.7 - 158.5	CLAY, dark-yellowish-brown (10YR 4/2) and moderate-yellowish-brown (10YR 5/4), calcareous, with minor (less than 5 percent) SALT. Unit includes subrounded to sub-angular basalt pebbles, 0.3 - 0.4 in. (7 - 10 mm) maximum diameter at 430.5 ft (131.2 m). SALT content increases to 40 percent from 463 - 480 ft (141.1 - 146.3 m) then decreases to less than 5 percent from 480 ft (146.3 m) to base of unit. BR-2-2 collected at 495 ft (150.9 m)
520 - 523	158.5 - 159.4	SALT, mixed with 20 percent dark-yellowish-brown (10YR 4/2) calcareous CLAY
523 - 530.5	159.4 - 161.7	SALT, mixed with 15 percent moderate-yellowish-brown (10YR 5/4), pale-olive-brown (10YR 5/4), and pale olive (10Y 6/2) calcareous SILT
530.5 - 540	161.7 - 164.6	CLAY, silty, variegated dark-yellowish-brown (10YR 4/2) and dusky-yellowish-brown (10YR 2/2), calcareous
540 - 544	164.6 - 165.8	SALT, mixed with CLAY. Clay same as above
544 - 565	165.8 - 172.2	CLAY, same as interval 530.5 - 540 (161.7 - 164.6 m)
565 - 568	172.2 - 173.1	SALT, mixed with 10 percent dusky-yellowish-green (5G 5/2), calcareous CLAY
568 - 586	173.1 - 178.6	CLAY, dark-yellowish-brown (10YR 4/2) and pale olive (10Y 6/2), calcareous. Unit includes interbed of CLAY and SALT at 574 - 578 ft (175.0 - 176.2 m)
586 - 593	178.6 - 180.7	SALT, mixed with minor (less than 5 percent) silt
593 - 649	180.7 - 197.8	CLAY, moderate-yellowish-brown (10YR 5/4) from 593 - 610 ft (180.7 - 185.9 m) then dark-yellowish-brown (10YR 4/2) to base of unit. Unit includes interbed of CLAY and 20 percent SALT at 615 - 617 ft (187.5 - 188.1 m)
649 - 662	197.8 - 201.8	SALT, mixed with 10 percent light-olive-gray (5Y 5/2) and pale olive (10Y 6/2) calcareous CLAY
662 - 665.5	201.8 - 202.8	CLAY, dark-greenish-gray (5G 4/2), calcareous
665.5 - 673	202.8 - 205.1	SALT, mixed with 15 percent variegated light-olive-gray (5Y 5/2) and pale olive (10Y 6/2) calcareous silty CLAY
673 - 695	205.1 - 211.8	CLAY, dark-yellowish-brown (10YR 4/2), calcareous. Unit includes interbed of SALT at 681 - 684 ft (207.6 - 208.5 m)
695 - 709	211.8 - 216.1	SALT, mixed with 10 percent dark-yellowish-brown (10YR 4/2) calcareous SILT. Silt content increases to 50 percent at base of unit
709 - 766	216.1 - 233.5	CLAY, variegated light-olive-gray 5Y 5/2 and grayish-olive (10Y 4/2), calcareous. Unit includes interbed of SALT, mixed equally with CLAY at 743 - 750 ft (228.6 m)
766 - 771	233.5 - 235.0	SALT, mixed equally with variegated pale olive (10Y 6/2) and dark-yellowish-brown (10YR 4/2) calcareous CLAY
771 - 791	235.0 - 241.1	CLAY, variegated dark-yellowish-brown (10YR 4/2), pale olive (10Y 6/2), and dusky-yellowish-brown (10YR 2/2) calcareous
791 - 800	241.1 - 243.8	SALT, mixed with 20 percent dark-yellowish-brown (10YR 4/2) calcareous SILT. Unit includes interbed of pale olive (10Y 6/2) calcareous CLAY at 794 - 795 ft (242.0 - 242.3 m)
800 - 813	243.8 - 247.8	CLAY, variegated dark-yellowish-brown (10YR 4/2), dusky-yellow-green (5Y 5/2), and pale olive (10Y 6/2), calcareous
813 - 815	247.8 - 248.4	SALT

INTRODUCTION			
Geophysical, lithologic, and water quality data from Bristol Dry Lake, California, were obtained in May, 1978. These data provide feasible 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 bottom 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.			
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 sample is collected. The water temperature, pH, and specific gravity of raw and filtered untreated samples are measured in the field.			
GEOPHYSICAL LOGGING TECHNIQUES			
Radioactive geophysical logs, including gamma, gamma-gamma, and neutron logs, are obtained from the land surface to a depth of 164.6 m (540 ft). Radioactive logs are run through the drill pipe because the plays sediments would squeeze in and heal the test well before conventional electric logs could be completed in a open test well. Total thickness of the dual-wall drill pipe is 15.88 mm (0.62 in.). The radioactive source of the gamma-gamma log is Cesium (Cs-137), Americium-Beryllium (Am ²⁴¹ -Be) source is used for the neutron log.			
GEOPHYSICAL LOGGING PARAMETERS			
	Natural Gamma	Gamma-Gamma	Neutron
Scale switch (CPS)	0-50	0-100	0-50
Time constant (seconds)	4	4	4
Position potential (dial division)	10.0	3.0	7.0
Sensitivity potential (span; dial division)	10.0	5.0	8.1
Input pulse (volts)	1-2	1-2	1-2
Polarity (N = Negative, P = Positive)	N	N	N
Logging speed (10/min)	17	17	17
Tool length (ft)	2.8	2.8	4.5
Source spacing (in.)		16	6
ACKNOWLEDGMENTS			
G. Thomas Server provided laboratory lithologic descriptions. Geophysical logging was performed by James Cathcart of the Office of Energy Resources, U.S. Geological Survey, Denver, Colorado.			
REFERENCES			
Goddard, E.N., chn, and others, 1949, Rock-color charts: 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.			

WATER QUALITY DATA FROM BRISTOL DRY LAKE TEST WELL NO. 2 (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		Specific gravity	Specific conductance (microhms/cm at 25 °C)	Percent sodium	SAR ^a (sodium absorption ratio)	Percent calcium	Percent magnesium
				lab	field						
BR-2-1	5/9/78	215	28.3	6.5	5.7	2.220	195,000	70	134		
BR-2-2	5/9/78	495	28.6	6.0	5.9		191,000	50	76		
Test Well number	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Results in mg/L		Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Total Nitrate (NO ₃ -N)
						Phosphorus (P)					
BR-2-1	5,010.4 ^a	24,000	3,500	84,000	2,400	1.9	19	220,000	1.4	0.64	0.09
BR-2-2	3.4	32,000	2,300	65,000	2,300	2.1	3.1	210,000	1.0	0.91	1.3
Test Well number	Bicarbonate (HCO ₃)	Manganese (Mn)	Iron (Fe)	Boron (B)	Lithium (Li)	Strontium (Sr)	Uranium (U)	Results in mg/L		Total hardness	Percent difference
								Solids, residue on evaporation at 180 °C (TDS)	Alkalinity Calcium Carbonate (CaCO ₃)		
BR-2-1	24	110,000	2,100	3,200	110,000	860,000		185,000	20	75,000	-8.82
BR-2-2	32	120,000	0,330	3,200	96,000	83,000	0.001	337,000	26	140,000	-2.19
^a SAR ^a Water Classification											
10 Excellent											
10-18 Good											
18-26 Fair											
26 Poor											
^b Determined on 1:200 dilution.											
^c Calculated.											



TEST WELL LOCATION
BR-2 Latitude: 34°27' 58" N
Longitude: 115°41' 28" W
Sears, Sec. 2, T. 4 N., R. 12 E.
San Bernardino Meridian

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

BY

J. P. CALZIA