

GEOLOG. PB Co.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

**GEOLOGIC DATA FROM TEST DRILLING IN
PALM BEACH COUNTY, FLORIDA SINCE 1970**

OPEN-FILE REPORT 76-713

Prepared in cooperation with PALM BEACH COUNTY
and the SOUTH FLORIDA WATER MANAGEMENT DISTRICT

PALM BEACH CO.
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Tallahassee, Florida
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By James J. Schneider

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ABSTRACT

Test hole data that may be used to determine the type and character of the subsurface materials and the thickness and areal extent of the shallow aquifer are presented. Lithologic logs from 66 test wells and geophysical logs from 54 test wells are contained in this report.

INTRODUCTION

A study of the water resources in Palm Beach County, southeast Florida (fig. 1), was started in January 1970 by the U.S. Geological Survey in cooperation with Palm Beach County and South Florida Water Management District (Central and Southern Florida Flood Control District). The purpose of the study is to provide the geohydrologic information needed for water management and land use decisions. The study area includes all of Palm Beach County, with emphasis on the urbanized eastern part of the county and the readily developable area in the central part of the county (Land and others, 1973).

The purpose of this report is to present test-hole data that are being used to determine the type and character of the subsurface materials and the thickness and areal extent of the shallow aquifer. This report contains lithologic logs from 66 test wells and geophysical logs from 54 test wells drilled as a part of the water resources investigation.

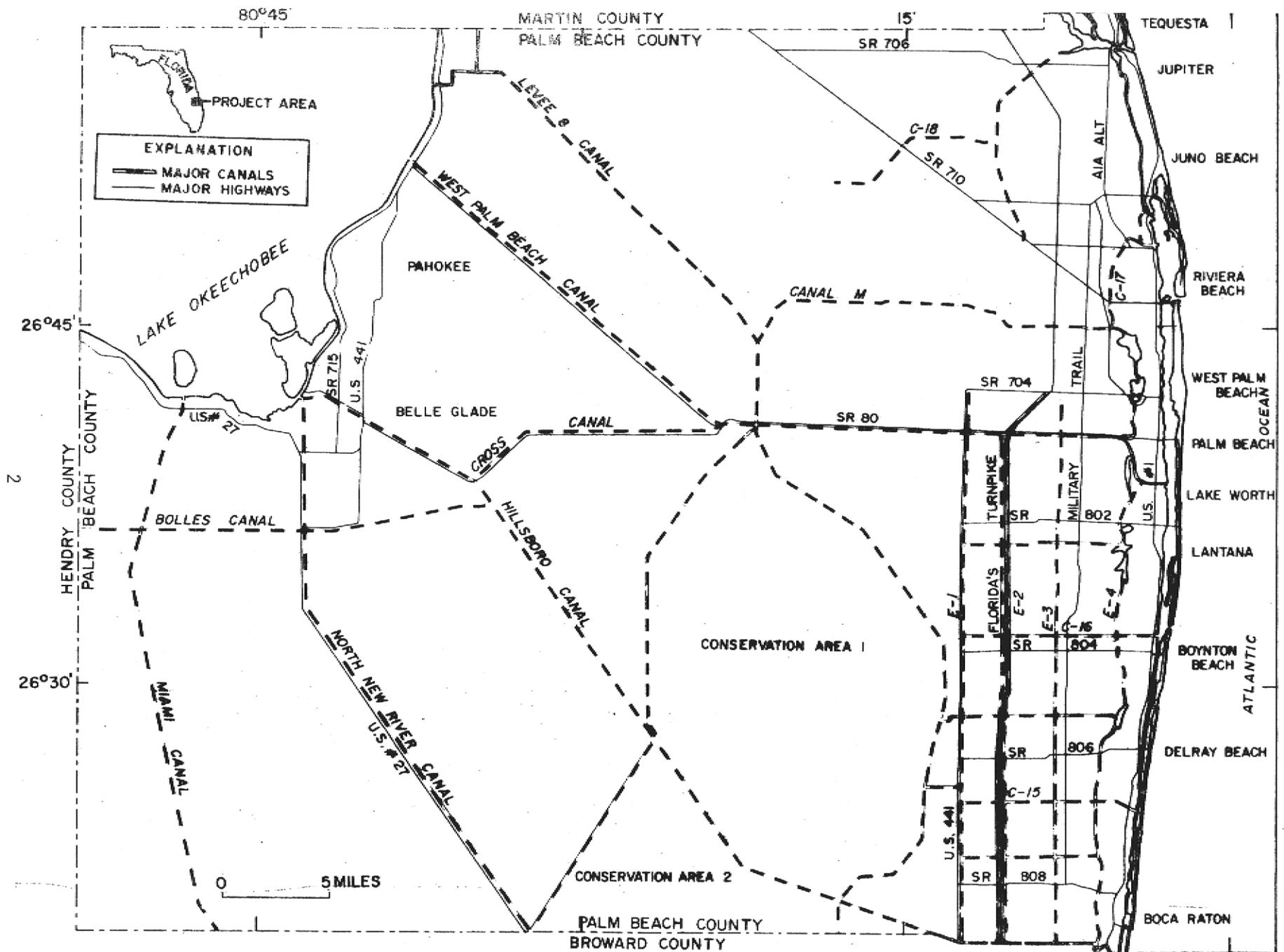


Figure 1.--Location of principal highways and canals in Palm Beach County.

The test holes are listed in table 1 and their locations are shown on figure 2. Wells deeper than 150 feet were drilled with a rotary rig and the shallower wells with a drive wash rig. Samples of drill cuttings were collected and the reaction of the drill stem, mud pump, and rate of penetration of the formation being penetrated was noted. The cuttings were examined and geologists logs of the lithology were prepared.

In addition to the lithologic logs, borehole geophysical logs were run on each test well. Only gamma ray logs were run in those test holes which were cased during drilling. Both gamma ray and electrical logs were run in the open holes drilled by the rotary method before casing was set. In some test holes the total depth shown by the geophysical logs and the lithologic log may not be the same. Some of the reasons for this include the inability to get the probe to the depth drilled, the non-recovery of cores or cuttings while drilling, and setting casing before logging.

All substances emit some natural gamma radiation and gamma ray logs are graphical representations of the number of gamma rays detected for a unit of time. The quantity of radiation emitted and detected is dependent on the type of geologic materials through which the probe passes and the method used for detection. There is no unique correlation between gamma rays emitted and some specific type of material. There is instead a range of values which can be expected in sand or limestone or any other

Table 1.--Types of logs available for selected test holes in Palm Beach County.

Well Number	U S G S Well Number	Depth (feet)	Land Surface Altitude (feet)	Type of log and page number			
				Lithologic	S P	Resistivity	Gamma-Ray
PB-597	265803080051501	104	21	9			56
PB-598	265600080080501	210	11	9			56
PB-600	263633080035701	345	15	10			56
PB-632	264646080031401	272	9	11			57
PB-634	263050080033501	188	10	12			57
PB-639	265604080091101	330	16	13	58	58	58
PB-640	265532080135601	230	19	13	59	59	59
PB-641	264658080041401	312	20	14	60	60	60
PB-649	265633080205201	200	26	14	61	61	61
PB-650	265728080290001	193	7	15	62	62	62
PB-651	265432080364501	230	22	15	63	63	63
PB-652	264708080035101	313	20	16	64	64	64
PB-653	264656080052901	312	12	17	65	65	65
PB-654	264708080065801	282	18	18			
PB-655	264838080092001	267	20	19	66	66	
PB-657	263758080092501	281	18	20	67	67	67
PB-658	262201080091301	340	15	20	68	68	68

Table 1.--(Cont'd) Types of logs available for selected test holes in Palm Beach County.

Well Number	U S G S Well Number	Depth (feet)	Land Surface Altitude (feet)	Type of log and page number			
				Lithologic	S P	Resistivity	Gamma-Ray
PB-659	262113080175001	245	15	21	69	69	69
PB-665	262147080121301	255	18	22			70
PB-666	262213080065201	415	13	22			70
PB-667	264122080054601	357	15	23			70
PB-668	263634080051201	358	10	24			71
PB-669	263515080045201	345	12	25			71
PB-670	263517080061801	325	15	26			
PB-671	263523080085201	119	18	27			72
PB-672	263527080121701	234	17	27			72
PB-673	262859080094801	249	19	28			72
PB-674	262902080065401	302	17	29			73
PB-675	262818080051801	387	14	30			73
PB-676	264112080235701	175	15	31			73
PB-677	264103080200701	190	16	31			74
PB-678	264058080175201	189	20	32			74
PB-679	264842080172201	174	22	33			74
PB-681	265802080053801	246	12	34	75	75	75

Table 1.--(Cont'd) Types of logs available for selected test holes in Palm Beach County.

Well Number	U S G S Well Number	Depth (feet)	Land Surface Altitude (feet)	Type of log and page number			
				Lithologic	S P	Resistivity	Gamma-Ray
PB-690	262712080040701	275	11	35			
PB-692	262853080035501	279	13	36			
PB-693	263527080030601	275	8	37			
PB-694	263627080030401	249	8	38			
PB-695	263746080025601	249	6	39			
PB-697	264040080042801	322	15	39			
PB-699	264043080092701	357	20	40			
PB-700	264142080110801	260	19	40			
PB-708	265200080032001	140	18	41			
PB-709	265208080032001	189	17	42			
PB-712	265510080080701	280	14	43			76
PB-789	265550080071801	112	8	43	77	77	
PB-791	265550080085001	130	17	44	79	78	78
PB-792	265522080080501	112	14	44			80
PB-798	264537080085601	120	18	45			80
PB-799	264619080054601	280	13	45			81
PB-800	264612080044601	340	15	46			81

Table 1.--(Cont'd) Types of logs available for selected test holes in Palm Beach County.

Well Number	U S G S Well Number	Depth (feet)	Land Surface Altitude (feet)	Type of log and page number			
				Lithologic	P S	Resistivity	Gamma-Ray
PB-830	265106080241401	220	22	47	82	82	82
PB-832	265611080081201	153	14	47	84	83	83
PB-833	265258080054001	520	10	48	85	85	85
PB-834-B	263455080030802	200	8	49	87	86	86
PB-835-B	264103080025902	120	4	49	88	88	
PB-836	264048080322301	240	12	50	90	89	89
PB-837	264702080313401	200	12	50	91	91	91
PB-838	265134080373801	240	14	51			92
PB-839	264111080400401	220	15	51	93	93	93
PB-840	262713080375001	260	11	52	94	94	
PB-841	262000080322001	250	8	52	96	95	95
PB-842	262000080464001	240	16	53	97	97	97
PB-843	264152080483401	580	13	54	98	98	98
PB-844	264641080061801	187	14	55			99
PB-845	264653080063701	89	17	55			99

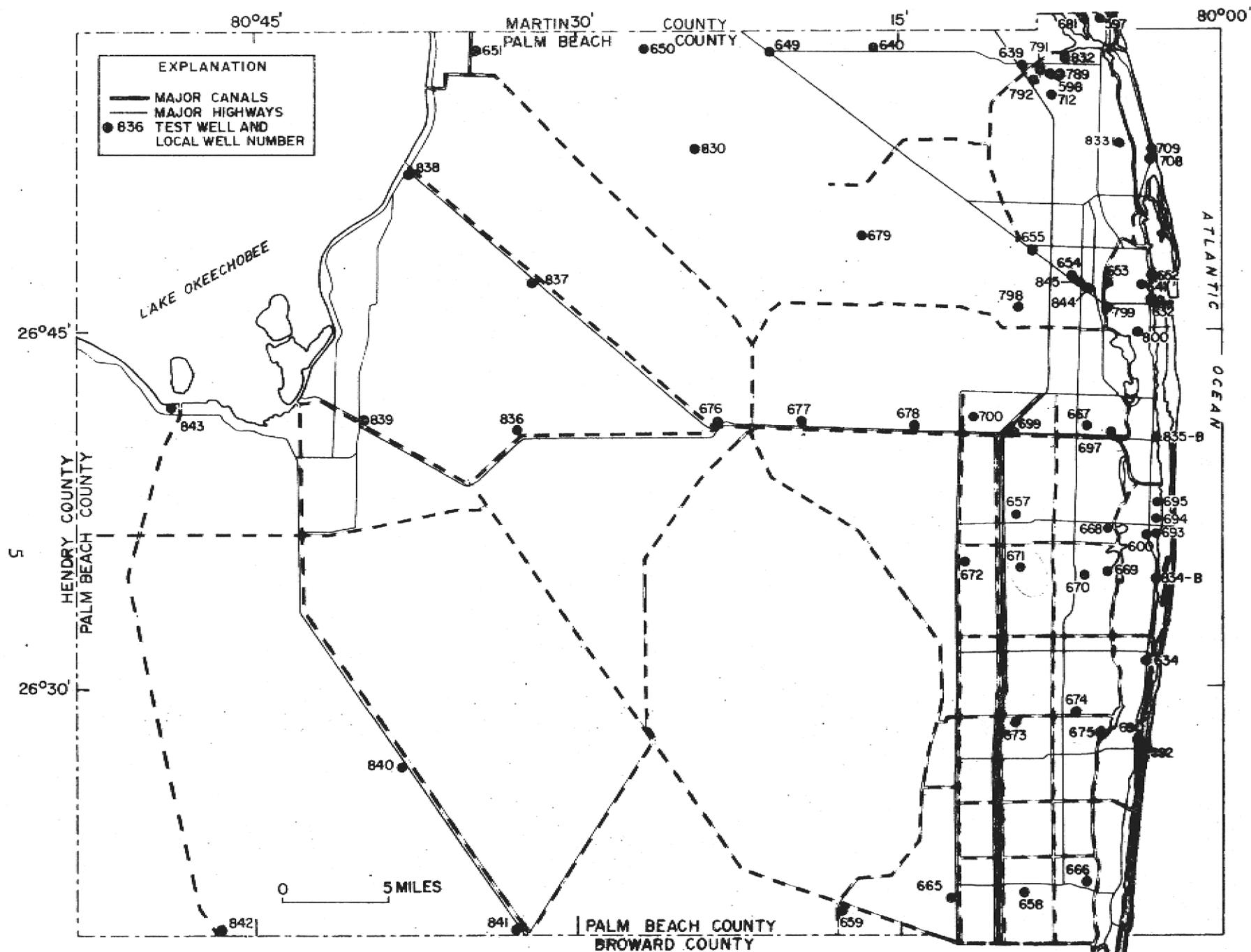


Figure 2.--Location of test holes and well numbers in Palm Beach County.

material. Because ranges of values generally overlap, it is essential that other types of information be available to assist in the interpretation of gamma ray logs. In general, in the areas of south Florida under investigation, increasing gamma ray activity indicate increasing percentage of clay in the geologic formation being logged. Gamma ray logs do not give direct measurement of water quality.

Gamma ray logs are normally calibrated in terms of counts per second detected, using a time period averaging system the selection of which is based on how rapidly the detecting device is moved through the bore hole and how radioactive the materials surrounding the bore hole are.

Electrical logs measure two properties of geologic formations, spontaneous potential and resistivity. Spontaneous potential (SP) is the electrical current generated at the juncture between two formations of dissimilar material and the drilling fluid in the hole. Resistivity is the resistance of the formation to the flow of an electric current and is affected by the nature of the formation and the contained fluid. On the chart where these two measured properties are displayed graphically, SP is the lefthand curve and resistivity is the right hand curve. SP is measured in millivolts and resistivity in ohms.

Figure 3 (Guyod, 1966) shows an artificial set of gamma ray and electrical log curves representing the type of log response to be expected in a sandstone, limestone, and clay sequence of formations. It should be remembered that the log response from such materials under natural conditions likely will be much less explicit than the responses shown in figure 3.

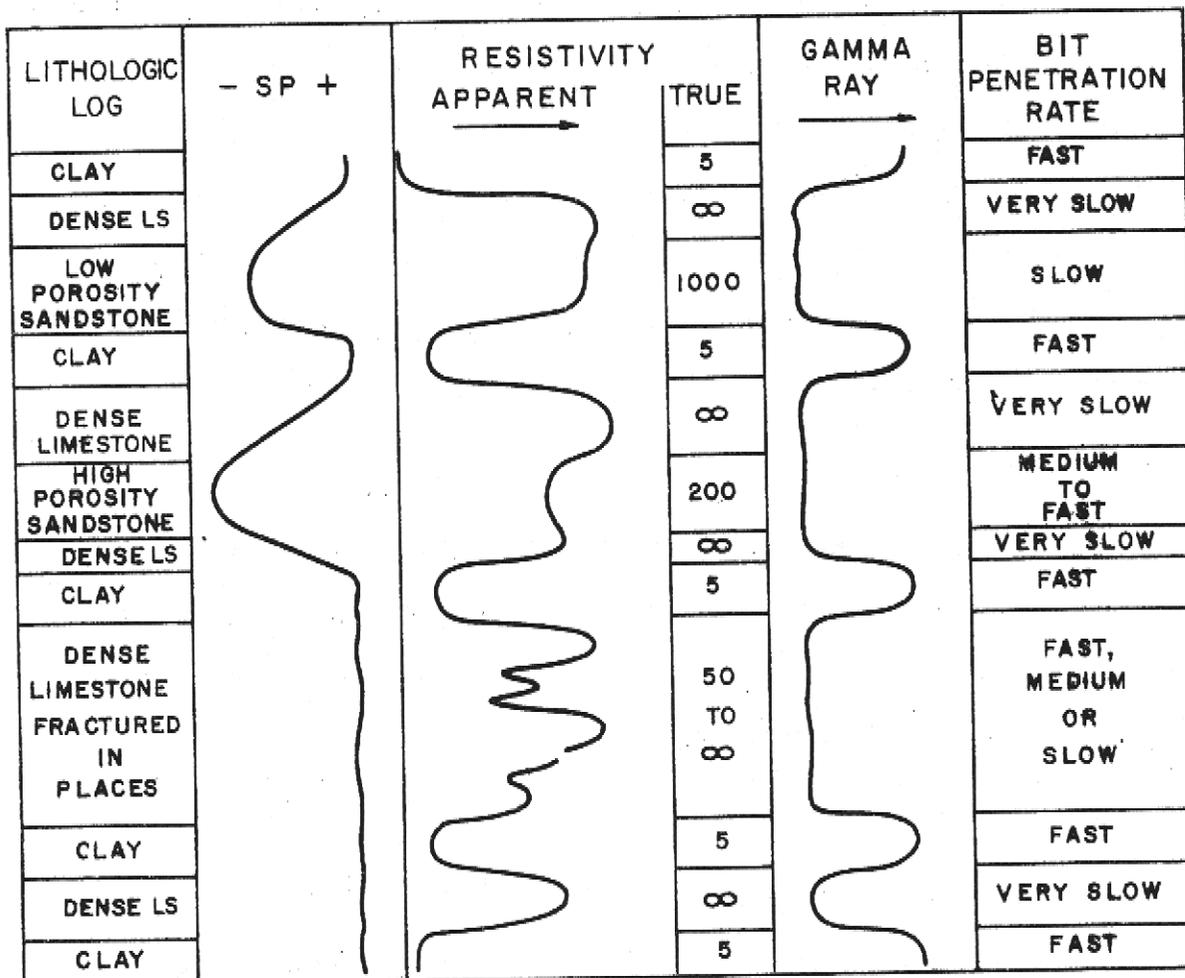


Figure 3.--Artificial electric and gamma ray log approximating the appearance that an actual log would have in a sequence of clay beds and several types of rock. It is assumed that the water in the aquifer is fresh and that the rocks are not radioactive: (Guyod, 1966)

The logs in this report and the original logs can only be used in a qualitative sense. The type of equipment with which they were obtained does not make absolute value measurements. However, they are a valuable additional tool in making lithologic determinations and in correlating geologic formations. The logs as shown in this report represent reductions from the original logs, made by use of a digitizer. The digitizer was used in order to alter the horizontal-vertical scale ratio for publication. Had photographically reduced logs been used, much of the detail shown would have been lost.

Well numbering system

In order to coordinate data from wells on a nationwide basis, the U.S. Geological Survey has adopted a well numbering system which locates the well by a 15-digit number based on latitude and longitude. The county well numbers are for convenience only.

REFERENCES

- Guyod, Hubert, 1966, Interpretation of electric and gamma ray logs in water wells: The Well Log Analysts, January - March 1966.
- Land, L.F., Rodis, H.G., Schneider, J.J., 1973, Appraisal of the water resources of Eastern Palm Beach County, Florida: Florida Bur. Geology Rept. Inv. 67, 64 p.

Lithologic log of well PB-597

<u>Material</u>	<u>Depth, feet below land surface.</u>
Sand, white, fine.	0-10
Sand, tan, fine; some thin limestone beds.	21
Sand, tan, medium to coarse; some thin limestone beds.	52
Sand, grey, medium to coarse.	60
Sand, tan, fine.	67
Sand, greyish tan, fine; some thin limestone beds.	78
Sand, grey, medium to coarse.	84
Sand, tan, fine.	87
Limestone.	89
Sand, tan, medium; shell fragments.	100
Sand, grey, fine; silt; shell fragments.	104

Lithologic log of well PB-598

<u>Material</u>	<u>Depth, feet below land surface.</u>
Sand, gray, fine.	0-3
Sand, tan, fine to medium.	20
Sand, dark gray, fine to medium.	26
Sand, brown, fine to medium.	37
Sand, gray, fine; shell fragments.	79
Shell fragments, large.	82
Sand, gray, fine; shell fragments; thin limestone beds.	111
Limestone, sandy.	115
Sand, gray, fine; shell fragments; thin limestone beds.	121
Limestone, sandy.	124
Sand, gray, coarse; shell fragments; thin limestone beds.	136
Shell fragments; thin limestone beds.	138
Limestone, sandy.	146
Sand, tan, fine; thin limestone beds; shell fragments.	157
Limestone, sandy.	164
Sand, gray, fine to coarse; a little shell and thin limestone beds.	199
Limestone.	210

Lithologic log of well PB-600

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand and muck.	0- 5
Sand, tan, fine to coarse.	39
Sand, gray, fine; thin layers of sandy limestone; some shell.	42
Sand, tan, fine; shell fragments, percentage increasing with depth.	86
Sand, gray, fine.	110
Sand, gray, fine; some shell fragments.	172
Sand, tan, fine to coarse; shell fragments; pebbles.	200
Sand, gray, fine; shell fragments.	210
Sand, gray, fine, interbedded with thin layers of sandy limestone.	223
Shell, tan, coarse; some fine sand.	228
Sand, tan, fine; shell, coarse; interbedded with thin layers of sandy limestone.	261
Sand, gray, fine to coarse; shell; interbedded with thin layers of sandy limestone.	282
Sand, grayish tan, fine to coarse; thin layers of sandy limestone.	298
Shell fragments interbedded with thin layers of sandy limestone.	345

Lithologic log of well PB-632

<u>Material</u>	<u>Depth, feet</u> <u>below land surface</u>
Sand, brown to white with depth, fine.	0- 30
Sand, fine; thin limestone beds; shell fragments.	42
Sand, fine; shell fragments.	48
Sandstone, limestone and shell beds; poorly graded sand.	63
Sand, gray, fine.	68
Sand, yellow, coarse; thin beds of sandstone; a little shell.	81
Sandstone.	82
Sand, white, coarse; thin beds of sandstone and shell.	88
Sand, gray to brown, poorly graded; some sandstone; some shell fragments.	122
Sand, gray, very fine; a little shell.	130
Sand, gray and black, very fine; some shell fragments.	152
Sand, gray, fine; many worn shell fragments.	164
Shell fragments, small; some fine sand.	180
Shell fragments; some poorly graded sand.	195
Sandstone, gray, hard; some fine sand and shell.	208
Sand, fine to medium; small shell fragments.	222
Sand, consolidated, brown, medium; some shell fragments.	242
Sandstone, light tan to white, fine to medium; some limestone and shell fragments.	272

Lithologic log of well PB-634

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, dark brown.	0- 8
Limestone, very hard.	12
Limestone, thin beds; sand.	22
Limestone and sandstone beds, very hard at 24, 26 and 27 feet.	39
Limestone and sandstone beds, soft; sand, white, fine.	43
Limestone layers; sand, fine, white.	53
Sandstone, hard.	55
Limestone, sandy; sand, fine.	60
Limestone, sandy; sand, tan, fine to coarse.	95
Sandstone, cream colored, medium to coarse grained, a little shell.	98
Sandstone, gray, fine to coarse grained; very hard at 106 feet.	112
Sandstone, tan, very hard, fine grained; layers of sand and shell.	116
Sandstone, tan, fine grained, very hard layers; a little marl; some shell, percentage increasing with depth.	160
Sandstone layers, soft to hard; limestone layers, very soft; some shell fragments.	188

Lithologic log of well PB-639

<u>Material</u>	<u>Depth, feet below land surface.</u>
Muck; sand, fine.	0- 10
Sand, white, fine.	20
Sand, tan, medium.	30
Sand, tan, fine; traces of shell.	35
Sand, tan, fine to very fine.	82
Limestone, sandy; shell in sand beds.	90
Shell rock; some limestone.	110
Limestone, shelly; layers of fine sand.	140
Limestone, sandy, interbedded with fine sand and shell.	174
Sand, tan, fine; some shell.	200
Sand, white, very fine; some shell; traces of dark clay.	260
Sand, medium; shell fragments.	280
Clay, green, sandy; some sand and shell.	330

Lithologic log of well PB-640

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck; fine, white sand.	0- 4
Sand, yellow, clayey; some sand rock.	6
Sand, white, fine; thin beds of clayey sand.	22
Sandstone beds; sand, blue and white, fine; large shell; hard layer at 25 feet.	30
Sandstone layers, dark, dense; sand, black and white; shell.	40
Sand, black and white, fine; some shell fragments.	50
Sand, consolidated, black and white, fine; many small shell fragments.	70
Sandstone, dark, dense interbedded with small shell fragments, percentage decreasing with depth.	120
Sandstone, dark, soft, interbedded with shell.	160
Sandstone, dark, soft, interbedded with fine sand; thin reddish clay bed at 175 feet.	220
Clay, green, sandy.	230

Lithologic log of well PB-641

<u>Material</u>	<u>Depth, feet below land surface</u>
No samples.	0-165
Sand and shell, cemented very soft.	185
Sand, fine; small shell fragments.	200
Limestone, shelly.	215
Limestone, shelly and sandy.	235
Limestone, tan, sandy and shelly.	245
Sand, tan, fine to medium; coarse shell, shell size increasing with depth.	265
Limestone, sandy and shelly; thin hard layers of black silty sandstone.	294
Sand, fine; shell fragments; lump of dark green sandy clay.	312

Lithologic log of well PB-649

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, tan, fine to coarse.	0- 5
Limestone, sandy.	6
Sand, tan, coarse to fine; shell fragments.	21
Clay, sandy; some shell fragments.	24
Sand, tan, fine; some shell fragments.	28
Limestone, gray, sandy, shelly.	55
Sand, gray, fine; shell fragments.	76
Limestone, gray, sandy, shelly.	79
Sand, gray, fine; shell fragments.	88
Limestone, soft, shelly.	92
Sand, gray, fine to coarse; shell fragments.	126
Limestone, soft, shelly.	129
Sand, gray, fine to coarse; shell fragments; some clay.	165
Sand, gray, fine to coarse; shell fragments; gray sandy clay.	184
Shell fragments, fine to coarse; greenish gray sandy clay lumps.	200

Lithologic log of well PB-650

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, tan, fine; some shell fragments.	0- 15
Shell, unconsolidated.	16
Sand, light tan, fine; shell fragments; a little clay.	21
Shell rock, sandy; and layers of gray sand.	27
Sand, light tan, fine; coarse shell fragments.	36
Sand, gray, fine; fine shell fragments.	58
Shell fragments; some fine gray sand.	80
Sand, gray, fine; shell fragments.	110
Shell fragments; some fine gray sand; hard layers at 122 feet.	140
Sand, gray, fine; shell fragments.	162
Sand, gray, fine; shell fragments; a little sandy clay.	180
Sand, gray, fine; fine shell.	190
Shell fragments, coarse; lumps of greenish gray clay.	193

Lithologic log of well PB-651

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck	0- 8
Sand, gray, fine; shell fragments.	18
Sand, gray, fine; marl.	22
Shell beds and fine tan sand consolidated; hard layers at: 22-27, 33-36 and 43-46 feet.	46
Sand, tan, fine; interbedded with shell fragments; sand content increasing with depth.	90
Shell fragments, poorly graded, interbedded with fine gray sand.	120
Shell fragments, poorly graded; sand, gray, fine; some clay.	140
Sand, gray, fine; some shell fragments.	160
Sand, gray, fine; shell fragments; a little clay.	180
Sand, gray, fine; shell fragments, percentage and size of fragments increasing with depth.	210
Shell fragments, coarse; some gray sand; greenish gray clay lumps.	230

Lithologic log of well PB-652

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine to medium; some muck beds.	0- 34
Sandstone, limey, cream colored; sandy limestone at 46 feet.	51
Sandstone, cream colored; layers of fine white sand.	69
Sandstone, cream colored; layers of fine sand and small shell fragments, size of fragments increasing with depth.	105
Sand, tan, fine; some small shell fragments.	111
Sandstone, soft; layers of fine sand and small shell fragments.	115
Sand, black and white, very fine; some small shell fragments, percentage of shell and size increasing with depth.	140
Sandstone, soft; considerable amount of shell fragments; black clayey muck layers at 143 and 148 feet.	155
Sandstone, white to dark, soft; some large shell fragments.	160
Sand, dark gray, fine; sandstone layer at 168, 170 and 185 feet; shell fragments, percentage and size varied with depth.	190
Sandstone, soft, dark gray, fine grained, becoming harder with depth, hard layers at 206 and 218 feet; shell fragments.	220
Limestone, sandy, hard layer at 221 to 223 feet; some shell, size increased with depth.	245
Sandstone, dark, soft; much clay; some small shell fragments.	250
Sandstone, dark, soft; clay bed at 260 feet; some chalky marl beds; a little shell.	270
Sandstone, dark, medium; marl at 282 feet; coarse shell.	310
Clay, sandy, dark gray; medium size shell fragments.	313

Lithologic log of well PB-653

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, medium; layers of hard pan and muck	0- 25
Sand, tan, medium.	36
Sand, consolidated, tan, medium, quite permeable.	45
Sand, dark tan, fine to medium; some small shell fragments, becoming larger with depth.	55
Sand, tan, medium, some black and white; small shell fragments becoming larger with depth.	65
Sand, black and white, fine; some small shell fragments; amount of shell and size increasing with depth.	135
Sandstone, soft, dark, fine; some limestone and marl; some small shell pieces; harder at 135 and 140 feet.	159
Sandstone, very hard, light tan; small shell fragments.	170
Sandstone, hard and soft, bedded with small shell fragments; some marl at 190 feet.	200
Sand, dark, very fine, consolidated; some coarse shell fragments and coral limestone.	215
Sand, dark tan, very fine; small shell fragments.	230
Sand, dark tan, very fine to medium; some silt and small shell fragments.	250
Sand, dark tan, very fine to medium; some small shell fragments and silt; several beds of soft sandstone.	310
Sand, dark tan, very fine to medium; some soft white sandy marl.	312

Lithologic log of well PB-654

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, medium; muck; clay, gray, sandy.	0- 22
Sand, tan, medium; muck; clay, gray, sandy.	33
Sandstone, dark gray, soft to medium hard; contains tiny shell fragments.	50
Sandstone, dark gray, hard.	55
Sandstone, dark gray, hard; contains large shell fragments.	80
Limestone, cavernous.	86
Limestone, shelly, hard, cavernous.	97
Limestone, shelly, hard.	112
Sandstone, hard and soft layers, dark gray; some marl at 120 feet.	152
Sand, dark gray, fine to medium; small shell fragments, getting larger with depth; some marl at 180 feet.	192
Sand, dark gray, medium; shell fragments.	215
Sand, dark gray, medium; some marl and clay beds, marl content increasing with depth.	250
Marl, sandy, very soft, bedded with gray sand and shell.	275
Clay, green, sandy.	282

Lithologic log of well PB-655

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine to medium; some shell fragments.	0- 5
Shell, medium size; some sandy clay.	10
Sand and black muck.	14
Sand, white, very fine to medium.	36
Shell rock, sandy; sandy clay at 43 feet.	46
Sand, light tan; some shell.	52
Limestone, dark, soft, shelly.	57
Sand, white, medium; some shell; hard layers at 62 and 65 feet.	67
Limestone, dark, soft and hard layers, sandy.	77
Limestone, soft, sandy and shelly; some layers of sand.	95
Limestone, porous, sandy and shelly, sand content increased with depth.	105
Sandstone, soft, some shell.	112
Sandstone, soft, shelly; several beds of shell.	132
Limestone, sandy and shelly; sand content increased with depth.	150
Sandstone very dark; some layers of sand and shell; shell content decreased then increased with depth; small amount of green sandy clay.	192
Clay, dark gray; some sandstone layers and large shell fragments.	197
Sand, tan, well graded; clay and shell fragments; some complete very small shells, clay and shell content decreasing with depth.	225
Marl, sandy; clay, dark gray, percentage increasing with depth; some large shell fragments.	262
Clay, green, sandy; some complete shells.	267

Lithologic log of well PB-657

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine; some muck.	0- 5
Shell bed, some sand.	10
Sand, white, fine; some fine shell fragments.	25
Sand, tan, fine; some fine shell fragments.	30
Sand, dark brown, fine; some clay and small shell fragments; white sand at 43 feet.	50
Sand, white and tan, fine to medium; some small shell fragments; clay at 60 and 70 feet.	70
Sandstone, tan; limestone with solution holes, very permeable.	80
Limestone, hard, sandy, with some fine shell; very permeable.	105
Sandstone, white and dark tan; some sand beds; harder at 115 feet.	120
Sandstone, cream colored; some small shell fragments.	135
Limestone, sandy, hard; some large shell fragments.	175
Sand, fine shell fragments, increasing in size with depth.	210
Limestone, sandy and shelly, soft; some fine shell.	225
Limestone, sandy and shelly.	245
Limestone, sandy and shelly; beds of dark clay.	272
Clay, dark green; shell fragments.	281

Lithologic log of well PB-658

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine to medium; some small shell	0- 10
Sand, dark brown, medium size; some shell.	25
Sand, tan, fine.	40
Sand, tan; thin clay layer.	50
Sand, white, very fine; clay layers at 65 and 75 feet.	85
Limestone, hard, gray, sandy, very permeable, probable cavities at 120 feet; some interbedded shell.	155
No sample, very permeable section just below 155 feet, probably solution riddled limestone.	240
Limestone, light gray, sandy, shelly.	250
Limestone, sandy; beds of sand and shell; amount of rock decreased with depth.	280
Clay, light green; sandy limestone; sand; shell.	340

Lithologic log of well PB-659

<u>Material</u>	<u>Depth, feet below land surface</u>
Sandstone, gray; shell, large, size decreasing with depth; some sand.	0- 20
Sandstone, gray; sand, fine; shell fragments.	30
Sand, white, fine; some shell.	45
Sandstone, gray, very hard at 47-48 feet; sand, fine; some shell.	55
Sandstone, very hard, dark gray; shell layers; some sand.	60
Sand, white, fine; some small shell and firm sandstone.	80
Sand, fine; small shell; several layers of very hard sandstone.	100
Sandstone layers; sand and shell.	110
Sand, white, fine, percentage increasing with depth; small shell fragments.	130
Shell, small; fine, white sand and sandy limestone.	140
Shell small; fine white sand and sandy limestone; a thin layer of clay.	160
Sand, very fine; very small shell pieces; occasional sandstone.	180
Sandrock, mostly; shell and some clay, percentage increasing with depth.	220
Clay, green, sandy.	245

Lithologic log of well PB-665

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, tan, fine.	0- 10
Limestone, light tan.	30
Sand, tan, fine.	40
Sand, tan, fine; some shell fragments.	60
Sand, tan, fine.	70
Sand, tan, fine; some marl.	80
Sand, tan, fine; a little tan limestone.	90
Limestone, tan and gray; some fine tan sand.	100
Limestone, gray; a little fine tan sand, percentage increasing with depth.	150
Sand, tan, fine.	170
Limestone, gray.	180
Limestone, gray; some fine tan sand.	220
Sand, tan, fine; a little shell showing.	250
Shell fragments; greenish gray clay.	255

Lithologic log of well PB-666

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, silica, tan; muck layer from 6 to 8 feet.	0- 25
Marl, tan; silica sand.	30
Sand, silica, tan.	45
Limestone, tan; some silica sand.	75
Sand, silica, tan; limestone fragments.	80
Limestone, tan.	150
Limestone, tan; silica sand.	165
Sand, silica, tan.	170
Limestone, tan.	210
Limestone, tan; some silica sand.	230
Sand, silica, tan; some limestone.	280
Limestone, tan; some silica sand.	340
Sand, silica, tan.	415

Lithologic log of well PB-667

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck, sandy.	0- 1
Sand, tan, fine.	27
Sand, tan, fine; some shell fragments.	47
Sand, black and white, very fine; some silt and small shell fragments.	53
Sand, tan and black; some small whole shells; shell fragments, percentage increasing with depth.	98
Sand, tan, fine; lots of shell fragments.	114
Limestone, sandy and shelly, hard layer 114 feet.	118
Limestone, sandy and shelly; considerable white marl.	133
Limestone, sandy; very fine dark sand; some shell.	154
Clay, green, sandy.	155
Limestone, sandy; lots of white marl; some coarse sand and shell fragments.	178
Sandstone, limy; some marl; a little shell, percentage increasing with depth.	188
Limestone, sandy and shelly; traces of marl, percentage increasing with depth.	213
Sandstone, hard; medium size shell; layer of sandy limestone; traces of marl.	238
Clay, green, sandy.	244
Limestone, sandy and shelly.	247
Clay, green, sandy.	250
Limestone, shelly, sandy; layers of firm white sandy marl.	265
Sand; shell; sandy black and white marl, percentage decreased with depth.	293
Marl, firm to soft, sandy; some rock; traces of shell.	325
Marl, white, firm, sandy; some shell.	335
Marl, green and white, very soft.	357

Lithologic log of well PB-668

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine; some muck.	0- 10
Sand, tan, well graded; traces of shell fragments.	21
Sand, cream colored, fine to medium.	35
Clay, black, sandy; large shell fragments.	37
Sand, fine; many large shell fragments; "quite permeable"; thin layer of sandy limestone.	43
Sand, cream colored, bedded with shell, shell size decreased with depth; soft layer at 50 feet.	55
Muck, black, silty.	56
Sand and small shell fragments bedded with layers of black, silty sandstone, shell fragments increased with depth.	70
Sand, gray, fine to medium; small amount of shell fragments; some dark silty sand.	85
Sand, medium gray, fine; a few shell fragments.	95
Sand, fine; beds of soft sandstone; large shell pieces.	110
Silt and very fine gray sand; very little shell	130
Muck, black, sandy; fine dark tan sand; some shell.	145
Marl or clay, dark, sandy; sand and shell pieces; layer of sandy limestone at 150 feet.	160
Sandstone, soft; some shell.	175
Marl and sandstone layers; some shell.	190
Limestone, sandy; some shell and marl.	205
Limestone, soft, bedded with sandstone; some shell fragments; some hard layers.	220
Limestone, soft; soft sandstone, shell fragments.	235
Sandstone, hard; some large shall fragments.	245
Limestone, shelly, sandy; green sandy clay at 245 and 250 feet.	269
Sand, tan, fine to coarse; small shell pieces.	270
Clay, green, containing sand and shell; limestone; sandstone.	300
Clay layers; white marl; shelly limestone.	320
Marl, gray, sandy; green clay; shell fragments; some sandstone.	345
Marl, gray, sandy; sandstone; trace of green clay.	358

Lithologic log of well PB-669

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand and muck.	0- 1
Sand, white, medium; muck bed at 10 feet.	20
Sand, cream colored, medium; some shell fragments.	43
Sand, tan, fine; tan clay bed, rust colored sand bed.	48
Sand, tan, fine; sandy green clay at 60 feet.	70
Sand, tan, fine; black clay layer at 75 feet; large shells at 80 feet.	85
Sand, white, fine; some clay and shell.	100
Sand, gray, fine; shell fragments.	130
Clay, sandy; large shell fragments.	136
Sand, some shell.	140
Limestone, gray, shelly; some marl.	145
Clay beds; shelly limestone.	155
Limestone, shelly; clay bed at 160 feet.	165
Limestone, soft to hard; some marl.	175
Limestone, soft; much shell.	190
Limestone, sandy, shelly; clay layer.	205
Limestone, soft to hard, some beds of clay.	220
Limestone, sandy; some small shell fragments and marl.	205
Sandstone, hard limestone, thin beds of clay.	220
Limestone, sandy; shell fragments; some marl.	235
Limestone; thin clay beds; some shell fragments.	250
Limestone, sandy.	265
Sandstone, very hard; contains some shell.	280
Sandstone; grayish blue marl.	300
Limestone, sandy; many shell fragments.	325
Clay, green, some sand and shell.	345

Lithologic log of well PB-670

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck, sandy.	0- 40
Muck, black; sand, fine.	50
Sand, tan; some muck; thin bed of clay.	67
Limestone; sand; trace of clay.	70
Limestone, sandy, shelly; appears permeable	85
Limestone, sandy; several beds of shell.	95
Sandstone layers; large shell fragments; sand.	110
Sandstone, very porous.	116
Sandstone, very hard; some shell beds.	120
Limestone, sandy; beds of large shell pieces and marl.	130
Limestone, very hard; some shell fragments; some marl.	140
Limestone, sandy; thick marl beds; bed of black clay; some shell.	155
Limestone, sandy, shelly; some marl; several layers of sandstone.	175
Limestone layers; small shell fragments; sand; some marl.	180
Limestone, shelly, sandy; some marl; quite permeable.	220
Sandstone, hard; some limestone; green sandy clay layer.	235
Sandstone, limy; marl; trace of clay.	250
Sandstone, limy; some marl and shell; permeable.	260
Limestone, sandy; layers of marl.	280
Marl, sandy; shell fragments; some limestone.	323
Clay, green, sandy.	325

Lithologic log of well PB-671

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck, sandy.	0- 1
Sand, white.	4
Limestone, sandy, shelly, soft.	10
Sand, white, fine; some large shell fragments.	15
Sand, brown, medium; some shell fragments.	21
Sand, tan, medium; small shell fragments.	26
Sand, tan, fine, bedded with brown sandy clay; some shell fragments	38
Sand, tan, fine; some shell fragments.	55
Sand, white, fine; some shell fragments.	67
Sandstone, limy, hard; some shell and sand.	85
Sandstone, limy, hard, layered or cavernous; very permeable.	100
Sandstone, limy, cavernous; some shell.	119

Lithologic log of well PB-672

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, fine; top soil.	0- 4
Limestone, shelly; some brown sandy clay.	8
Sand, white, fine; shell, percentage decreasing with depth.	21
Muck, layers; shell and fine white sand.	25
Sand, white, fine; some shell fragments; muck layer at 35 feet.	55
Sand, white, fine; some shell fragments; thin bed of clay.	66
Sandstone, soft.	69
Sandstone, hard, layered, contains cavities.	75
Sandstone, dark, cavernous, lime content increases with depth; numerous shell fragments; very permeable.	100
Sandstone, limy, shelly, layered; cavernous; very permeable.	125
Limestone, sandy, shelly.	160
Sandstone, soft, interbedded with sandy, shelly limestone.	185
Clay, green, sandy, with occasional layers of soft sandy, shelly limestone.	205
Limestone, sandy and shelly; interbedded with green sandy clay.	230
Clay, green, sandy.	234

Lithologic log of well PB-673

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck layer; fine white sand.	0- 5
Sand, black, mucky; some small whole shells.	10
Sand, brown, fine, mucky.	15
Sand, tan, fine; some brown to black muck.	37
Sand, tan, fine; traces of muck and shell.	58
Sand, white, fine to coarse; some small whole shells.	70
Sand, white, fine.	75
Sand, tan, fine to medium; bed of soft muck and limestone.	86
Sandstone, gray, limy, dense; some sand.	90
Limestone, coral; dark sandstone beds; shell beds.	97
Sandstone, limy, much shell, hard and soft layers, quite permeable.	114
Sandstone, limy; sand layers or void spaces; some shell.	140
Sandstone, limy; much shell; some white marl.	148
Sand and small shell; layer of tan limey sandstone; some soft sandy clay.	160
Sand, hard packed; limestone; sandstone; shell and marl.	175
Sand, fine to medium; many shell fragments; traces of limestone, clay and marl.	190
Sand; silt; shell; all fine material.	197
Marl, firm; quite a bit of fine sand; some sandstone.	210
Marl, white and bluish gray; some shell and sand.	230
Clay, green, sandy; small amount of sand and marl.	249

Lithologic log of well PB-674

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck soil; sand.	0- 10
Sand, red, medium to coarse; some muck.	20
Sand, tan, medium.	27
Sand, white, medium.	32
Shell rock, some marl.	37
Limestone, sandy, shelly; some marl.	45
Limestone, cream colored, shelly.	56
Sandstone, gray, limy; some shell.	70
Sandstone, gray, hard; appears permeable.	78
Sandstone layers, hard and soft; some shell; fairly permeable.	85
Sandstone, tan, hard and soft layers; much marl; some sandy limestone and shell.	115
Sandstone, gray, limy; layered; considerable marl; some shell.	130
Sandstone, gray, layered with sand and limestone; some marl and shell.	145
Sandstone, limy; limestone, sandy; some marl and shell beds, marl and shell beds increasing with depth.	200
Sandstone, shell and marl; marl content decreased with depth.	235
Clay, gray, sandy; some shell and sandstone.	250
Limestone, sandy and shelly, medium hard.	258
Clay, light gray; small amount of sandstone.	265
Marl, bluish gray; sandy, shelly limestone.	302

Lithologic log of well PB-675

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine, bedded with black muck.	0- 5
Sand, white, fine.	10
Sand, white, medium; some iron stains.	20
Sand, white, fine.	44
Limestone, soft, sandy, shelly; some large shell pieces.	56
Sand, tan, fine; shell fragments.	70
Sandstone, soft, harder below 80 feet; much sand and shell.	90
Sandstone, gray, hard; traces of marl and limestone.	100
Sandstone, very porous.	110
Sandstone; some shell and coarse brown sand.	130
Sandstone, very hard; bedded limestone and shell; highly permeable.	145
Sandstone, soft to hard; traces of marl; some shell at deeper depth.	160
Limestone, soft, sandy, some hard layers; traces of sand and shell.	190
Clay, brown, interbedded with sandy limestone.	195
Limestone, sandy; traces of marl.	225
Limestone, sandy; gray limy sandstone; some marl.	275
Limestone, soft, shelly; some sandstone.	300
Limestone, shelly; some bedded brown clay; some green sandy clay.	315
Sandstone, orange, shelly; soft clay; traces of sandy clay.	330
Limestone, shelly; traces of light colored clay and green sandy clay.	335
Clay, green, sandy, firm.	387

Lithologic log of well PB-676

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck; large shell fragments.	0- 5
Clay, dark; large shell fragments.	10
Shell, fragments, large; sand and white marl.	20
Limestone, hard, getting softer with depth; much large shell; some sand.	30
Limestone, porous, sandy; interbedded shell fragments.	60
Shell; sand; some limestone.	70
Shell; sand; much marl.	75
Limestone, sandy, shelly; sandstone layers.	115
Sand, shell, and limestone layers.	140
Limestone, soft, very porous; with sand and shell.	145
Limestone, sandy, shelly; much green and white marl.	165
Clay, green, sandy.	175

Lithologic log of well PB-677

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand; sandy muck; trace of shell.	0- 15
Shell, large; some sand.	27
Limestone, sandy, shelly; some dark sandstone.	35
Sandstone, dark; small shell fragments; some sandy limestone.	48
Limestone, sandy and shelly, soft.	65
Sand, fine; many small shell fragments.	85
Sand, fine; many shell fragments; trace of clay.	100
Limestone, sandy, soft; many shell fragments.	120
Limestone, sandy, soft; many shell fragments; traces of marl and sandy clay.	140
Limestone, sandy; many shell fragments.	150
Limestone, sandy, shelly; some white marl and green clay; shell and clay content increased with depth.	180
Shell fragments, large; green sandy clay.	185
Clay, green, sandy.	190

Lithologic log of well PB-678

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, fine, large shell fragments; orange and gray sandy clay; soft limestone.	0- 5
Shell and clay.	9
Limestone, soft; large shell fragments.	14
Limestone, hard and soft beds; shell fragments.	27
Shell fragments; traces of black mucky sandstone and limestone.	37
Shell beds; some fine sand; thin layers of limestone.	53
Limestone, sandy, hard.	56
Shell fragments; some black sandy limestone.	70
Shell fragments; some sand; thin layers of sandstone.	85
Shell fragments; black sandstone.	115
Shell fragments, very small; some sand.	120
Shell fragment, large, very permeable.	130
Sand and small shell fragments.	145
Sand, tan, fine to medium; some small shell fragments; traces of green clay.	160
Sand, dark tan, fine, silty; some small shell fragments.	175
Sand, fine; shell fragments; some white marl.	185
Clay, green, sandy.	189

Lithologic log of well PB-679

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine; thin muck layer at 1 foot.	0- 30
Sand, white, fine; some silt and tiny shell fragments.	37
Shell, whole and fragments; some green clay; some fine dark sand.	60
Shell, small; some sand and clay.	75
Shell fragments; some soft, sandy, shelly limestone; traces of clay.	85
Shell fragments; some soft sandy limestone; apparent permeable zone between 80 and 90 feet.	100
Shell fragments, small; soft limestone; traces of marl.	122
Sandstone, hard.	123
Shell fragments; shell; soft limestone; dark sandstone.	130
Shell fragments, small, bedded in soft green clay; some sand, marl and soft limestone.	150
Clay, green; layers of small shell fragments, limestone and sandstone.	165
Clay, green, sandy, soft.	174

Lithologic log of well PB-681

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, quartz, white, fine to medium.	0- 8
Sand, quartz, orange stained, medium.	12
Clay, reddish orange, sandy (iron stained).	15
Sand, white, cemented.	16
Sand, tan, fine to coarse.	31
Limestone, cream colored, sandy, shelly, very soft.	46
Limestone layers, tan, sandy and shelly; limestone nodules.	65
Limestone, sandy, shelly.	81
Limestone, sandy, shelly, percentage of sand increased with depth; very hard at 88 feet.	96
Sand, tan, very fine; tiny shell fragments; some larger shell.	111
Sand, fine, silty; very small shell chips.	116
Sand, very fine; many black shell chips.	121
Limestone, very soft; some beds of fine sand and shell fragments.	131
Sand, tan, fine; small shell fragments.	138
Limestone, hard, dense.	139
Shell fragments, black and white; some sand; traces of gray clay and white marl.	141
Sand, fine, silty; some loose shell and cemented sand.	146
Shell fragments mostly; some dark sandstone.	150
Sandstone layers, hard; some limestone, sand and shell.	156
Limestone, very dense; some shell; hard layer at 169-170 feet; traces of marl.	186
Limestone layers, white, sandy; hard, dark gray, sandy limestone; some sand and shell beds, traces of marl.	216
Sand, fine; some limestone and shell pieces.	227
Clay, green, sandy.	231
Sandstone, hard, limy; beds of soft sand and shell; small amount of sandy clay.	246

Lithologic log of well PB-690

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine.	0- 5
Clayey muck, red; fine sand.	7
Sand, white, fine.	12
Limestone and sand.	15
Limestone, very permeable.	21
Limestone, very hard, dense; some thin sand layers.	40
Limestone, very permeable.	41
Sandstone, cream colored, very hard.	42
Limestone, shelly, very hard; some cream colored sandstone and sand.	52
Limestone, sandy; some cream colored sand.	53
Limestone, sandy, quite hard.	65
Limestone, sandy, permeable, lost circulation.	67
Limestone, sandy, percentage of sand increasing with depth; very permeable at 74 to 77 feet.	79
Limestone, sandy; some sand and small shell fragments.	105
Limestone, sandy, very dense and hard.	117
Sandstone layers, hard; sand layers; percentage of sandstone increased with depth.	130
Sandstone, limy, very hard, dense.	135
Sand and thin layers of sandstone; traces of shell.	145
Sand interbedded with marl and shelly sandstone.	162
Sand, medium size and layers of hard sandstone and some marl.	175
Sand, gray, fine; bits of shell and occasional rock layers; some marl.	205
Sand, gray, very fine; traces of shell	243
Limestone beds; sandstone beds; marly sand and medium size shell	265
Sandstone, hard, marly	275

Lithologic log of well PB-692

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine.	0- 5
Sand, reddish, mucky.	8
Sand, white, fine.	15
Sand, tan; some shell; trace of limestone.	26
Limestone, sandy, shelly; some marl.	60
Limestone, sandy; layers of shell and marl; softer below 65 feet.	74
Limestone, sandy; shelly limestone; traces of marl.	84
Sandstone, shelly, firm; traces of marl and limestone; very hard below 99 feet.	126
Limestone, sandy, shelly.	147
Limestone, sandy; fine shell; some dark gray marl; percentage of shell and marl increased with depth.	175
Limestone, sandy, shelly; much marl.	200
Sand, dark gray, very fine; shell; some marl.	207
Shell fragments, small; marl and fine sand; some firm sandstone layers.	220
Sandstone, dense; layers of fine gray sand, small shell and marl.	246
Clay, dark greenish-gray.	249
Limestone, sandy, shelly; much marl; some clay.	275
Clay, marl and shell.	277
Sandstone, hard.	279

Lithologic log of well PB-693

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white to cream colored, fine.	0- 22
Sandstone, shelly; some thin sand beds.	27
Sandstone, cream colored, shelly; soft 37-45 feet.	48
Limestone, shelly; much marl below 53 feet.	58
Sandstone, hard, shelly; much marl.	69
Marl, white; some sand and sandstone.	79
Sandstone, soft.	94
Sandstone, shelly; some marl.	103
Sandstone, shelly; beds of sand; shell size and content increased with depth.	114
Sandstone, dense, fine grained; some marl, percentage of marl increased with depth.	129
Marl, sandy; occasional thin beds of sandstone.	168
Sand, fine; marl; some shell fragments.	219
Sand; some shell and marl; several layers of sandstone.	250
Sand; marl; occasional layer of sandstone becoming harder with depth.	275

Lithologic log of well PB-694

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine.	0- 5
Sand, tan, fine to medium; thin layers of compacted sandy muck.	15
Sand, tan, fine.	23
Limestone, hard, dense.	27
Limestone, soft, occasional hard layer; some shell.	31
Sandstone, soft; some shell; several hard layers.	38
Limestone, sandy; soft sandstone, percentage increasing with depth.	53
Sandstone; marl; some shell and sand; very hard drilling.	
Note: At site 300 feet south, hole was abandoned at this depth because formation was cavernous.	62
Sandstone; sand; marl; easier drilling.	69
Sand, medium; much marl.	96
Limestone, sandy; some sand and marl.	100
Sand marl.	107
Sandstone, hard; thin beds of sand and marl, hard layer at 113 feet.	129
Sandstone beds; layers of sandy limestone, sand and marl.	139
Sandstone, dense; some marl and sand; percentage of sandstone decreased with depth.	149
Sand; marl; some sandstone.	154
Marl, firm, some sand and sandstone.	168
Marl, soft; fine sand.	174
Sand, fine to very fine; some marl.	249

Lithologic log of well PB-695

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine to medium.	0- 12
Sand, fine to coarse; muck layers; some shell.	20
Sandstone, shelly; some marl at 25 to 30 feet.	40
Sandstone, soft.	49
Sandstone, shelly; occasional thin layers of marl.	65
Sandstone, some shell, soft.	94
Sandstone, hard; quite a bit of marl.	117
Sand, white, fine; some shell.	134
Sandstone and limestone layers; some layers of marl.	148
Limestone, soft; shell; marl.	181
Limestone, gray; marl and fine sand, percentage increasing with depth.	204
Sand, fine and gray marl; some soft, shelly limestone.	238
Limestone and marl, hard drilling.	249

Lithologic log of well PB-697

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, brown; a little fine shell.	0- 21
Sand, brown, grading to sand and shell with depth.	37
Sand, brown; coarse shell.	52
Sand, brown; shell fragments; few rock fragments.	67
Sand, brown; shell fragments.	112
Sand, gray, fine; shell fragments, percentage decreased with depth.	172
Sand; shell; some gray marl.	187
Sand; shell; marl; some gray sandstone, percentage increasing with depth.	217
Shell; gray sand; gray rock.	232
Shell fragments; some marl; some gray sand rock.	247
Shell fragments; marl rock.	262
Shell fragments; gray marl.	292
Clay, dark gray; shell fragments.	307
Shell fragments; greenish-gray clay lumps.	322

Lithologic log of well PB-699

<u>Material</u>	<u>Depth, feet below land surface</u>
Fill, sand and shell.	0- 9
Limestone, sandy, shelly.	25
Limestone, dark gray, sandy.	41
Limestone, dark gray.	90
Sand, fine to medium (lost mud).	95
Limestone, dark gray.	125
Limestone, white; many shells.	132
Limestone, gray; some shells.	172
Limestone, gray, sandy, shelly; some clay streaks.	192
Limestone, gray, very sandy; some hard layers.	201
Limestone, very sandy, gray.	225
Marl, gray, sandy, shelly.	261
Clay, green, sandy.	272
Clay, light green, silty, sandy.	276
Clay and silt, light green, hard.	297
Clay and silt, dark green, soft.	312
Clay, dark green, silty, firm.	357

Lithologic log of well PB-700

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, fine, white to dark brown with depth.	0- 10
Sand, light brown, fine; shell fragments.	20
Sand, dark brown, very fine; shell fragments.	50
Sand, very fine; some gray gravel and shell fragments.	60
Limestone, gray; hard layer at 69 feet.	70
Limestone, gray, hard.	80
Limestone, gray; some beds of shell fragments.	120
Limestone, gray, with some shelly limestone.	140
Limestone, gray, sandy; some shell fragments.	150
Limestone, gray, shelly; some gray sand and shell fragments.	200
Limestone, shelly; fine gray sand and shell fragments; some dark green sandy clay.	230
Clay, dark green, sandy; some shell fragments.	260

Lithologic log of well PB-708

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, light brown, fine to medium.	0- 25
Sand, tan, medium to coarse; some layers of sandstone and limestone.	45
Sand, gray, fine to coarse; several thin layers of cream colored limestone.	50
Sand, tan, fine to medium; several layers of limestone and shell fragments.	70
Sand, gray, fine to medium; shelly limestone and sandstone layers.	85
Sand, gray, fine to medium; limestone layers and some shell fragments.	95
Sand, gray, fine; some sandy limestone.	105
Limestone, cream colored, dense; many shell fragments.	110
Limestone, sandy, shelly, soft.	120
Shell fragments, gray and cream colored; some limestone layers.	125
Sand, gray, fine, silty; several limestone layers.	132
Shell fragments, gray; several limestone layers.	140

Lithologic log of well PB-709

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, tan, fine to medium.	0 - 24
Sand, tan, fine to coarse; some sandstone layers.	28
Sand, tan, fine to coarse; several layers of sandstone and limestone.	33
Sand, tan, fine to coarse; some sandstone.	45
Sand, tan, fine to coarse; many shell fragments.	53
Sand, tan, fine to coarse; some limestone and sandstone layers.	63
Sand, gray, fine to medium; some shell fragments.	80
Sand, gray, fine to coarse; several sandstone layers; some shell fragments.	100
Sand, tan, fine to medium; some large shell fragments; gray sandy limestone layers.	115
Sand, tan, fine; layers of sandy limestone.	127
Sand, quartz, fine to medium; several tan limestone layers.	132
Sand, salt and pepper, very fine; some tan limestone.	142
Shell fragments, black and white; some limestone.	150
Shell fragments; some shelly limestone.	160
Limestone, grayish tan; some shell fragments.	165
Shell fragments, dark gray; some limestone.	170
Sand, tan, fine to medium; some gray limestone and shell fragments.	175
Limestone, grayish tan, fine ground; some shell fragments.	189

Lithologic log of well PB-712

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, fine to medium; brown topsoil.	0- 5
Sand, light gray, fine to medium.	20
Sand, gray, fine to medium; some shell and dark clay.	40
Clay, dark gray; many shell fragments.	70
Clay, dark gray; medium sand; some shell fragments.	80
Sand, fine to medium; dark gray clay with shells.	90
Sandstone; fine to coarse sand, with gray clay and shells.	110
Sandstone; marl with shells, layered.	140
Sand, clay and limestone layers; some shell.	160
Limestone, gray; sand; shell.	170
Sand, gray; clay; shells.	200
Clay, gray green, sandy and shelly.	260
Clay, light to dark green, sandy.	270
Clay, dark green, sandy.	280

Lithologic log of well PB-789

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine.	0-0.5
Sand, black; muck.	3
Sand, tan.	8
Sand, gray, clayey.	24
Shells and shell fragments, tan to gray.	52
Shell fragments, large; some sandstone and dark gray clay.	65
Shell fragments; sandstone; gravel.	77
Sandstone, light gray; gray sand layers.	105
Limestone, hard; sandstone with shells.	112

Lithologic log of well PB-791

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, very fine; some shell.	0- 10
Sand, white, very fine; some large shell fragments; small amount of clay.	20
Sand, tan; some small shell fragments.	60
Sand, tan, fine; some shell fragments; a thin layer of sandstone.	80
Sandstone; some sand; trace of clay and shell fragments.	100
Sandstone, fairly dense; some sand and shell.	130

Lithologic log of well PB-792

<u>Material</u>	<u>Depth, feet below land surface</u>
Topsoil, sandy muck.	0- 2
Sand, red and white.	15
Clay, dark gray, sandy, firm.	20
Sand, white, fine; small shell fragments.	50
Limestone, sandy.	55
Sand, white; small shell fragments.	70
Sand, dark gray, very fine; trace of sandstone and and shell fragments.	90
Sand; shell; sandstone; traces of marl and clay.	107
Limestone, sandy; some shell.	112

Lithologic log of well PB-798

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, very fine.	0- 2
Shell fragments, medium size, some very fine white sand.	9
Clay, sandy.	10
Shell fragments; fine white sand.	45
Sand; shell; several beds of sandy, shelly limestone.	60
Limestone, sandy, shelly.	70
Sandstone, cavernous.	71
Sandstone beds; some white marl and fine sand.	76
Marl, white; dark gray clay.	80
Sandstone beds, permeable; some white marl and fine sand.	100
Sandstone beds; fine white sand; increasing amounts of marl.	120

Lithologic log of well PB-799

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white, fine.	0- 2
Sand, white, fine; layers of sandy muck.	10
Sand, white, fine.	30
Sand, tan, fine; trace of muck.	50
Sand, tan, fine; some small shell fragments.	60
Sand, dark gray, very fine; some small shell fragments and traces of sandstone.	80
Sand, very fine; some small shell fragments, percentage increased with depth.	125
Sandstone layers; limestone; white marl; some fine sand.	140
Sandstone layers; limestone; marl; several thin hard layers.	160
Sand, lots of white and gray marl; a few sandstone layers.	180
Sand, clayey; some marl; several thin layers of sandstone.	200
Sand, clayey; some marl.	220
Marl, bluish-gray, sandy; occasional beds of sandstone and limestone.	280

Lithologic log of well PB-800

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand layers, white, fine; red and black sandy muck.	0- 5
Sand, light orange, fine.	20
Sand, white, fine to medium; many small shell fragments.	35
Limestone, soft, composed of orange sand and shell.	45
Sand, fine; large shell fragments.	50
Sand, tan, fine; some soft, sandy, shelly limestone.	60
Limestone, dark gray, sandy, shelly, soft.	70
Sand, tan, fine to medium; many worn shell fragments.	80
Some thin layers of soft, sandy, shelly limestone; black muck bed at 85 feet.	100
Sand, gray, fine; shell, percentage increasing with depth.	140
Sand, gray shell; some white marl, percentage increased with depth; thin bed of orange, sandy clay at 155 feet; several thin beds of limestone below 160 feet.	180
Sand, dark gray, silty; thin beds of limestone, sandstone, marl, orange and gray clay; limestone, percentage increased with depth.	210
Sand, silty; shell fragments; beds of orange and black clayey sand; much marl.	240
Marl, bluish-gray; some sand and shell; traces of sandstone.	268
Sand, shell; marl; some light green sandy clay, percentage increased with depth.	305
Clay, brown, black, tan, sandy.	315
Sandstone; much grayish-blue, sandy clay.	340

Lithologic log of well PB-830

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand and muck, dark brown to black.	0- 3
Limestone, tan, very hard.	11
Limestone, tan, hard; some shell fragments.	19
Shell and sand.	41
Limestone, tan, hard; large shells and shell fragments.	43
Shell and sand; some gray clay.	151
Clay, light green, sandy, firm.	173
Clay, dark green, sandy; some shell fragments.	220

Lithologic log of well PB-832

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, brown to gray, fine to medium.	0- 4
Sand, gray, fine to medium; some gray clay.	26
Shells and shell fragments; some fine to medium sand; some clay.	40
Shells and shell fragments, tan to dark gray; some gray, coarse grained sandstone.	90
Limestone, light gray; tan to gray shell fragments; some fine grained gray sandstone layers.	153

Lithologic log of well PB-833

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, gray, fine to medium.	0- 5
Sand, brown, fine to medium; hard layer at 15 feet.	20
Sand, quartz, some brown, medium.	30
Shell fragments, tan to gray, large.	40
Limestone, tan, shelly; tan to gray shell fragments.	60
Sandstone, gray; tan to gray shell fragments.	100
Shell fragments, tan; some sandstone layers.	120
Sand, gray, fine; some shell fragments.	135
Limestone, gray, sandy, fine grained.	140
Limestone, gray, sandy; many shell fragments.	170
Limestone, tan, hard; some sandstone layers; some shell fragments.	200
Limestone, tan, hard; sandstone layer; gray shell fragments.	260
Limestone; sandstone; shell fragments; fine gray sand.	310
Limestone; sandstone; shell; fine gray sand; some grayish brown, sandy clay.	360
Same as above, some green, sandy clay between 410 and 420 feet.	420
Sandstone; limestone; shell fragments; some greenish gray, sandy clay.	470
Same as above, percentage of green, sandy clay increasing.	480
Sandstone, limestone; some gray, sandy clay.	520

Lithologic log of well PB-834-B

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, white and gray, fine to medium.	0- 5
Sand, brown, fine to medium.	10
Limestone, gray, sandy, very hard.	17
Limestone, tan; some sandstone layers.	20
Limestone, tan, sandy, cavernous at 21 feet.	50
Limestone, tan, sandy, hard.	100
Limestone, tan, sandy, hard; some shell fragments.	140
Limestone, tan, sandy, hard; layers of shells and shell fragments.	160
Limestone, tan, sandy; many shell fragments.	180
Sandstone, gray, fine grained; many shell fragments.	200

Lithologic log of well PB-835-B

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, brown, fine to medium.	0- 10
Limestone, tan, sandy; shell fragments; hard layer at 19 feet.	30
Limestone, tan, sandy, hard; some soft tan limestone and shell fragments.	60
Limestone, tan, sandy; many shell fragments.	100
Limestone, grayish tan, sandy; some shell fragments.	120

Lithologic log of well PB-836

<u>Material</u>	<u>Depth, feet below land surface</u>
Muck, black; some rock fill.	0- 5
Limestone, tannish-gray; some shell and shell fragments; cavernous at 13-14 feet.	15
Sandstone, gray, hard; many shell fragments.	25
Sandstone; shell.	40
Sandstone, gray; many shells and shell fragments.	90
Shells and shell fragments; some fine grained sandstone.	100
Limestone, tan, sandy; beds of shell fragments.	130
Limestone, tan to light green; many shell fragments.	140
Same as above with some green sandy clay.	200
Clay, green, sandy; some shell fragments.	240

Lithologic log of well PB-837

<u>Material</u>	<u>Depth, feet below land surface</u>
Sand, brown; rock fill; muck.	0- 10
Limestone, tan, sandy; shell fragments; marl.	20
Limestone, gray, sandy; some shell fragments.	30
Shell fragments; some sandstone.	50
Shells and shell fragments, tan to gray; some sandstone.	100
Same as above with dark green, sandy clay; cavernous at 125 to 127 feet.	140
Shell fragments; dark green sandy clay.	200

Lithologic log of well PB-838

<u>Material</u>	<u>Depth, feet below land surface</u>
Fill; fine white sand.	0- 3
Muck, black; some shell fragments.	10
Marl, white, soft; shell fragments.	14
Muck, dark brown; streaks of gray marl; some shell fragments.	20
Limestone, gray, sandy, very hard; many shell fragments.	34
Shell and shell fragments, tan; several layers of gray sandstone.	60
Limestone, gray, sandy, very hard; beds of large shell fragments; cavernous, 61 to 66 feet.	100
Limestone, greenish-gray, sandy, hard; beds of shell fragments.	200
Clay, dark green, sandy; some beds of shell.	240

Lithologic log of well PB-839

<u>Material</u>	<u>Depth, feet below land surface</u>
Topsoil; muck.	0- 4
Limestone, tan, hard; some shell fragments; some soft marl.	20
Marl, tan, soft; many shell fragments; some limestone.	40
Limestone, sandy, very hard; beds of shell fragments.	60
Limestone, dark gray, sandy, hard; many shell fragments; traces of marl.	160
Same as above with traces of greenish sandy clay.	180
Clay, dark green, sandy; some shell fragments.	220

Lithologic log of well PB-840

<u>Material</u>	<u>Depth, feet below land surface</u>
Fill rock, very hard.	0- 3
Muck, dark brown.	5
Limestone, tan, very hard, some shell fragments.	7
Limestone, gray to orange, very hard; some shell fragments.	10
Limestone, tan, soft; some shell fragments.	20
Limestone, tan to gray, soft; layers of marl shells and shell fragments.	36
Limestone, tan to gray, porous; many shells and shell fragments.	50
Sandstone, gray; shell fragments.	85
Sandstone, gray; many shell fragments; some gray marl.	140
Sandstone, gray; many shell fragments.	220
Sandstone, gray; many shell fragments; some dark green clay.	240
Clay, dark green, shelly, sandy; some sandstone.	260

Lithologic log of well PB-841

<u>Material</u>	<u>Depth, feet below land surface</u>
Fill.	0- 3
Muck, black; some shell fragments.	5
Limestone, rust, very hard; some gray marl; some shell fragments.	8
Limestone, gray; layers of shell fragments.	15
Limestone, tan to dark gray; many shell fragments.	45
Sandstone, gray; many shell fragments.	80
Sandstone, gray; shell fragments; marl; some green sandy clay.	120
Sandstone, dark gray to light green; many shell fragments; some grayish green clay.	230
Clay, dark green, sandy, firm; sandstone and shell fragments.	250

Lithologic log of well PB-842

<u>Material</u>	<u>Depth, feet below land surface</u>
Rock fill.	0 - 2
Muck, dark brown.	4
Limestone, rust colored, very hard.	12
Shell fragments; limestone; marl.	16
Sandstone, gray; some shell fragments; some marl.	20
Shell fragments; much marl; some rock fragments.	30
Clay, greenish gray; many shell fragments; some marl.	50
Sandstone, gray, hard; some greenish gray clay.	80
Sandstone, gray, hard; some shell fragments.	200
Sandstone, gray, hard; shell fragments, green sandy clay.	220
Clay, green, sandy; shell; some sandstone.	240

Lithologic log of well PB-843

<u>Material</u>	<u>Depth, feet below land surface</u>
Clay, gray, marly; layers of muck.	0- 8
Limestone, sandy and shelly; some marly clay.	10
Limestone, tan, soft; some beds of shell fragments.	15
Marl, tan, soft; many shell fragments.	20
Sandstone, gray, very hard; some shell fragments; some marl.	24
Sandstone, gray; some shell fragments.	40
Sandstone, gray, shelly; some shell fragments.	100
Sandstone, tan, shelly; some shell fragments.	110
Sandstone, tan to greenish gray; many shell fragments; some white marl.	180
Sandstone, tan to greenish gray; many shell fragments; some white marl; some soft green clay.	200
Clay, green, sandy; sandstone; shell fragments; percentage of clay decreased with depth.	240
Clay, dark green, sandy; beds of shell fragments; sandstone layers.	310
Shell fragments, tan to gray; some gray sandstone layers; some dark green sandy clay; hard layer at 363-366 feet.	370
Clay, green, fine; some shell fragments; some sandstone; percentage of clay decreased with depth.	500
Clay, green, firm; some shell fragments; some sandstone; easy drilling, 545 to 555 feet.	580

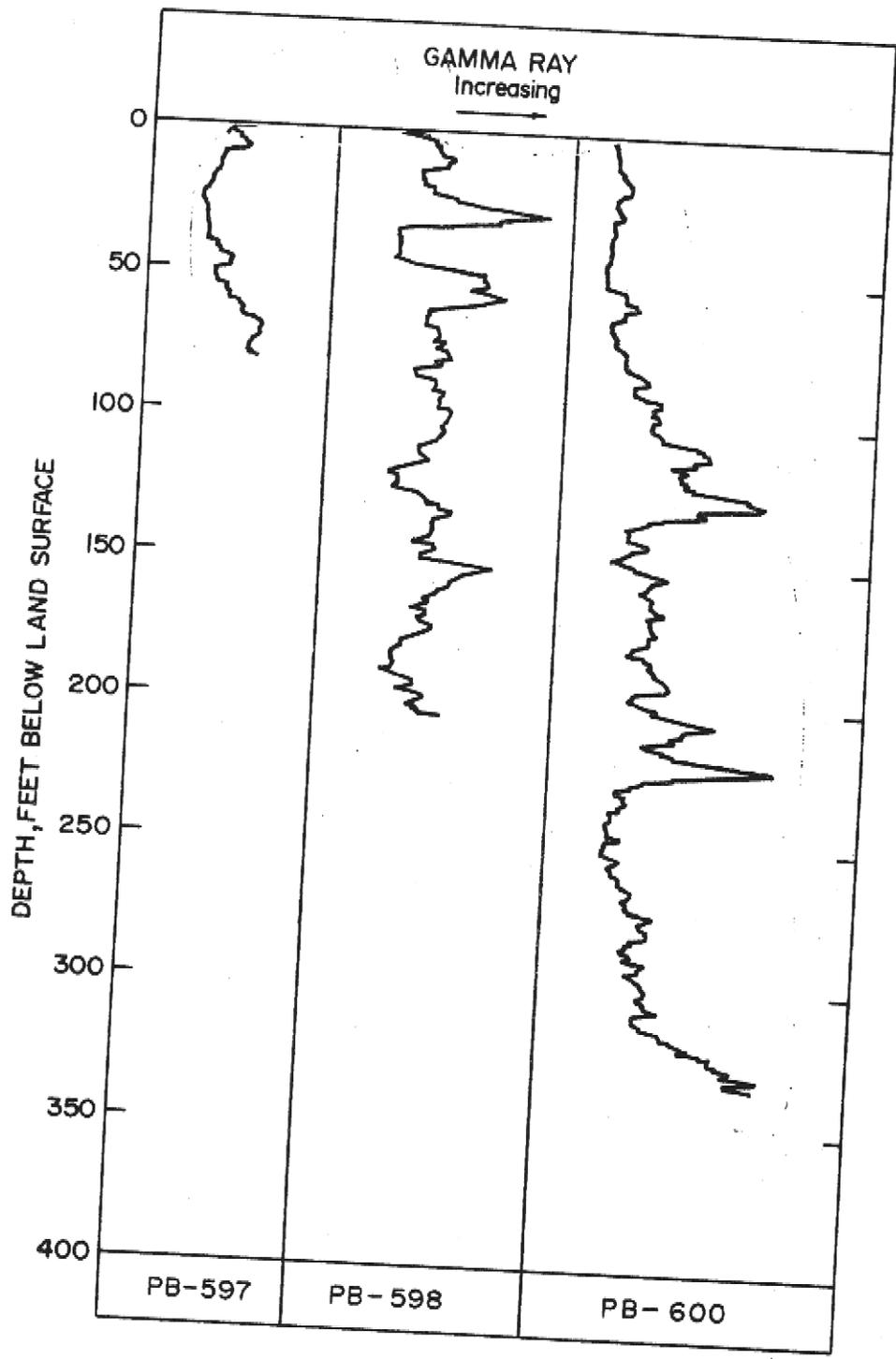
Lithologic log of well PB-844

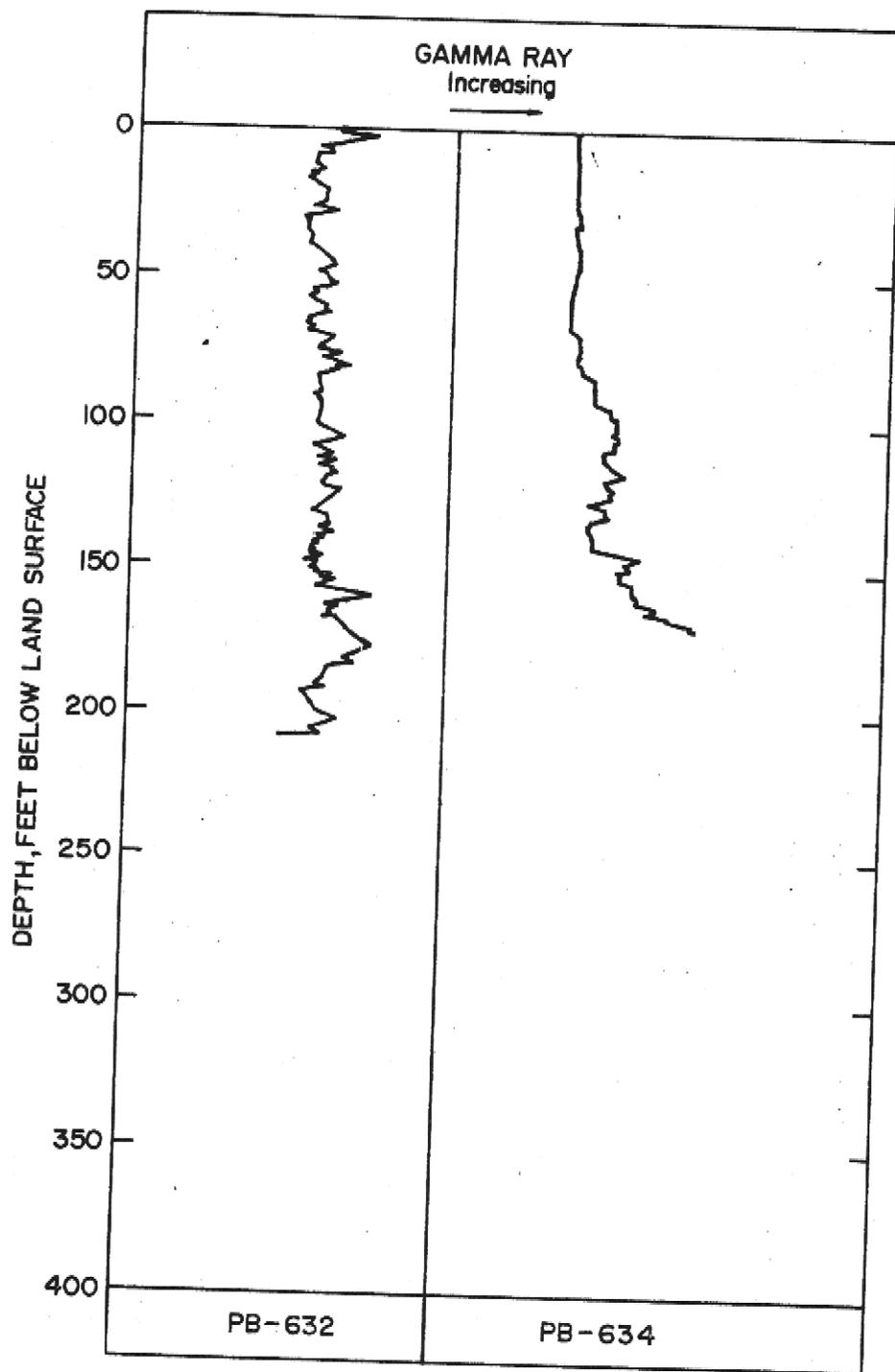
<u>Material</u>	<u>Depth, feet below land surface</u>
Topsoil.	0- 3
Sand, white, fine.	10
Sand, white, fine; some shell; muck layer at 18 feet.	20
Sand, brown, fine; muck layer at 25 feet.	30
Sand, gray, fine to very fine; some shell fragments, percentage of shell increased with depth.	90
Sandstone, soft; beds of sand and shell; trace of clay at 105 feet.	110
Limestone; white and gray marl; some sand and shell; trace of green clayey sand, 110-120 feet.	140
Sandstone; shell; much white and dark gray marl; traces of clay between 140 to 160 feet.	185
Cavity in sandstone.	187

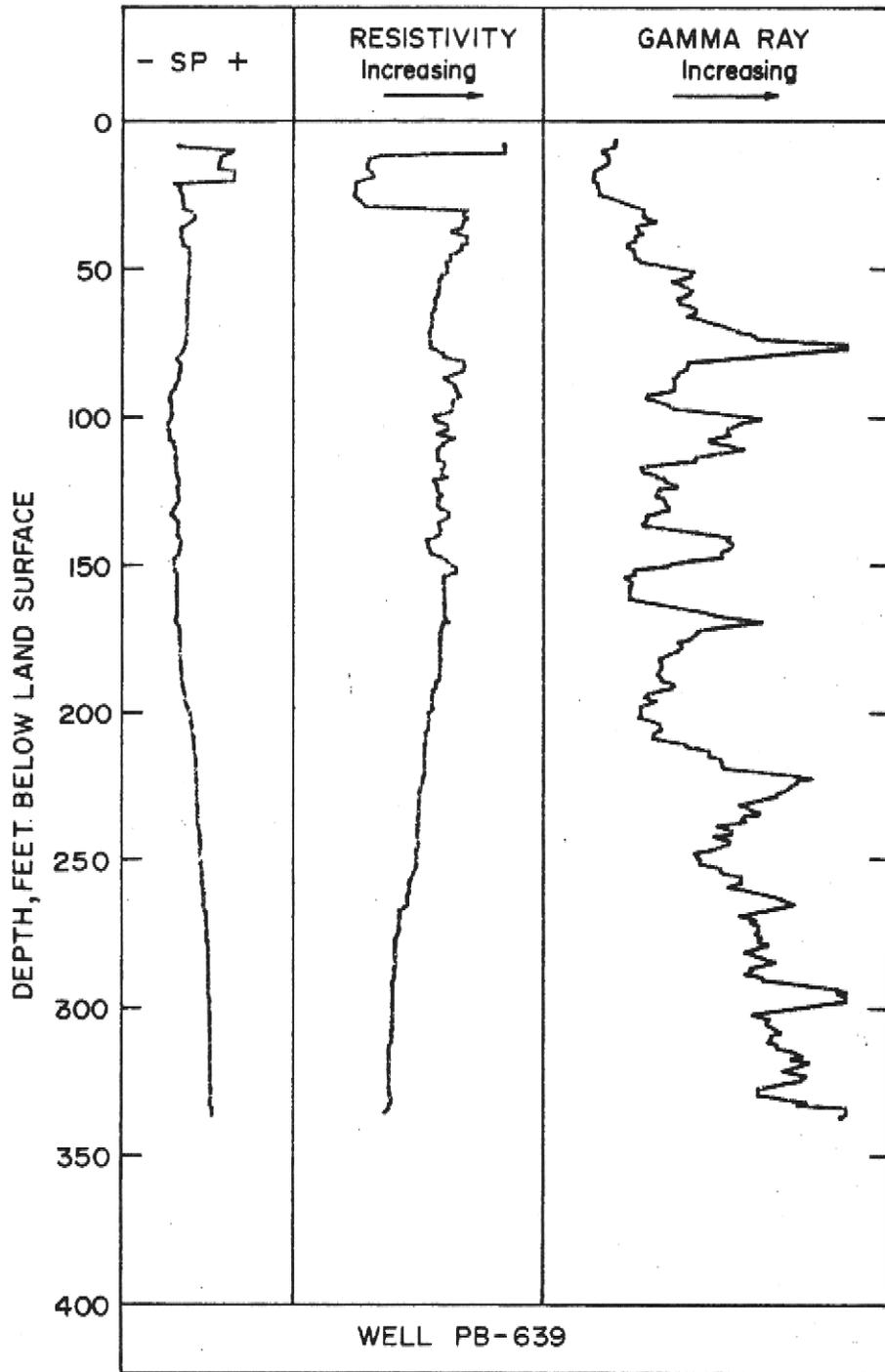
Lithologic log of well PB-845

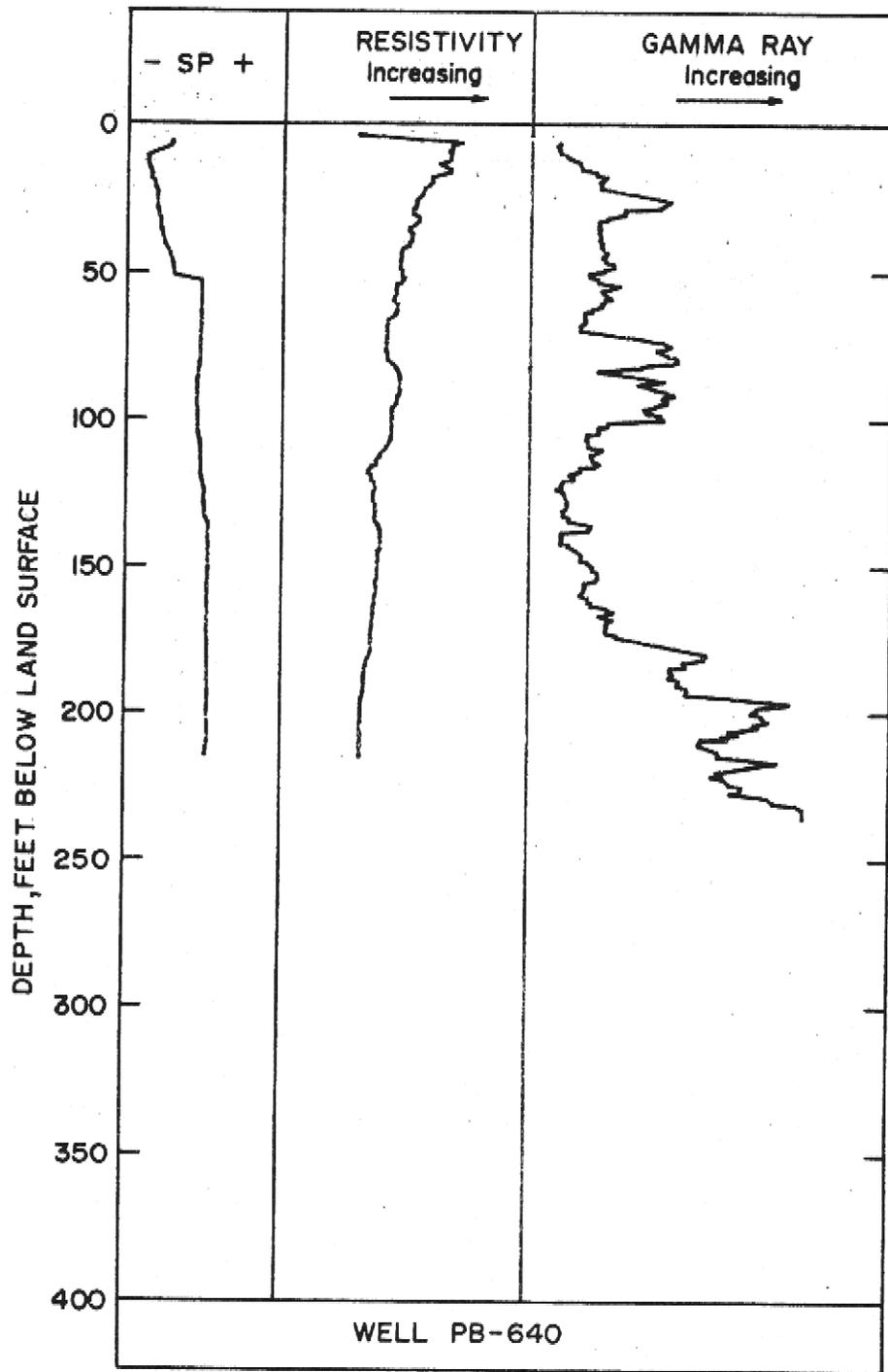
<u>Material</u>	<u>Depth, feet below land surface</u>
Topsoil.	0- 3
Sand, brownish black; much organic material.	8
Sand, white, fine; traces of shell.	20
Sand, tan, fine; much shell.	35
Sand, tan, fine; much shell; traces of sandstone; traces of dark green clayey sand at deeper depths.	60
Sandstone layers, permeable; some sand and shell; cavernous below 85 feet.	89

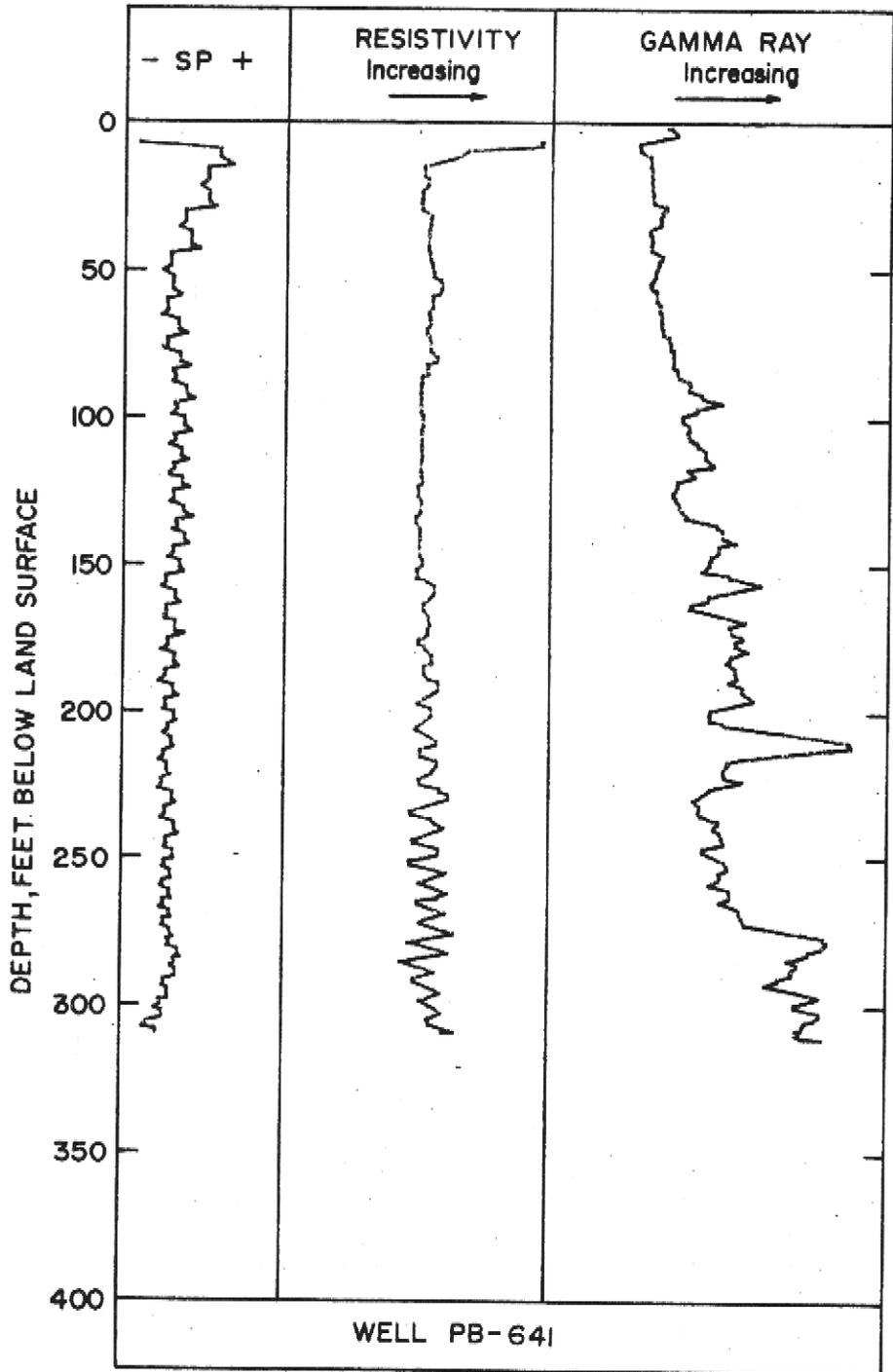
GEOPHYSICAL LOGS OF TEST HOLES

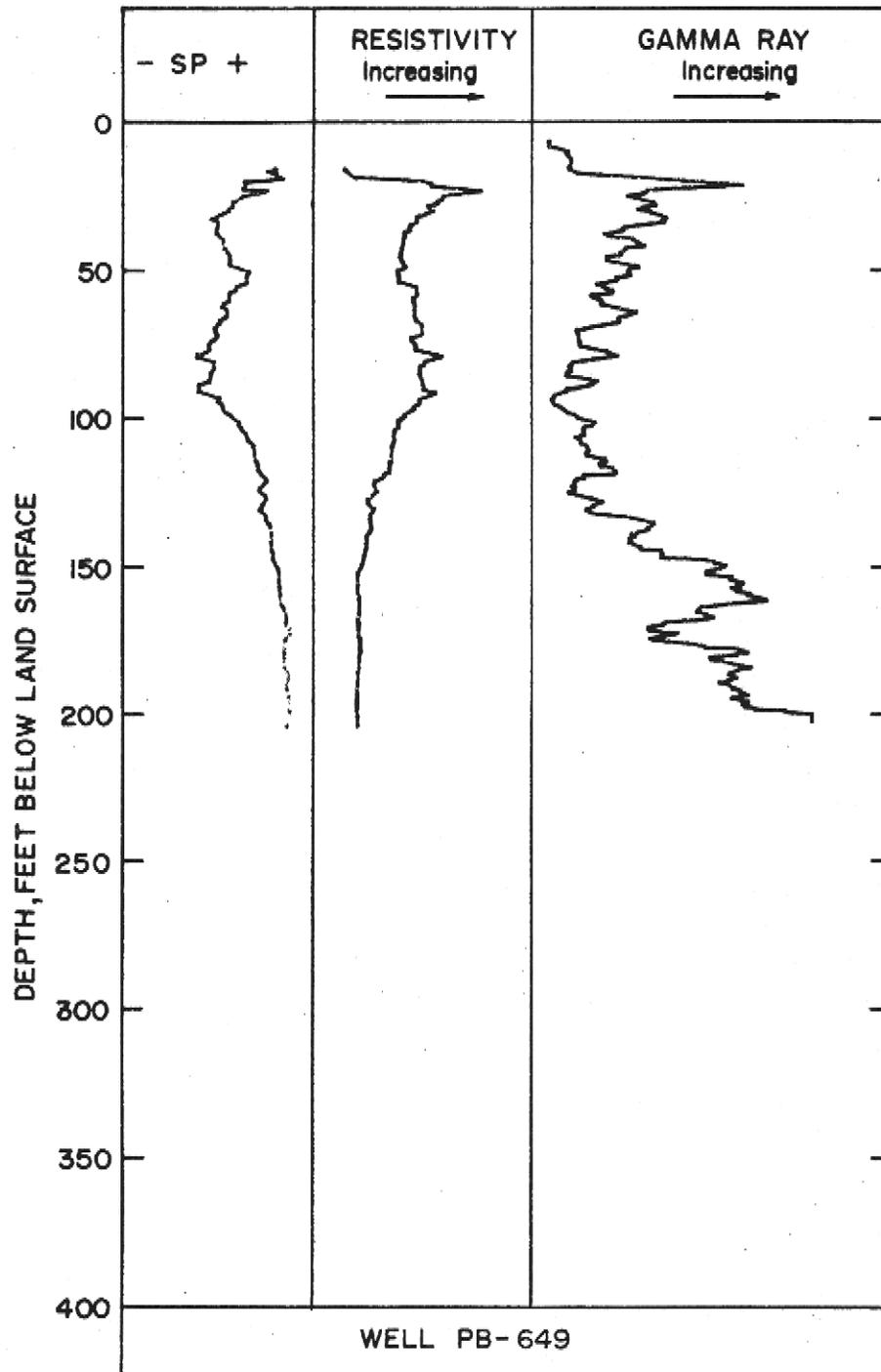


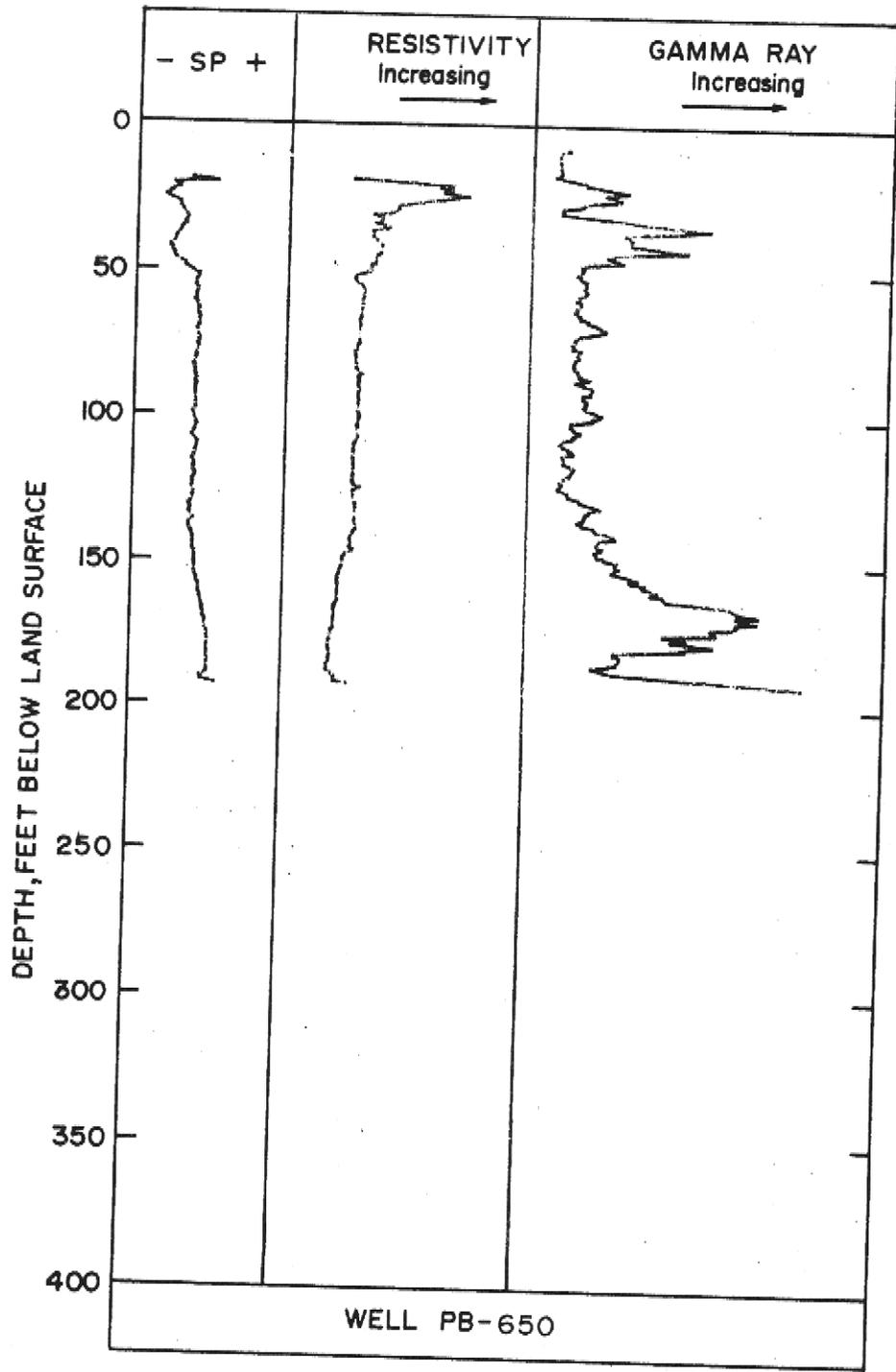


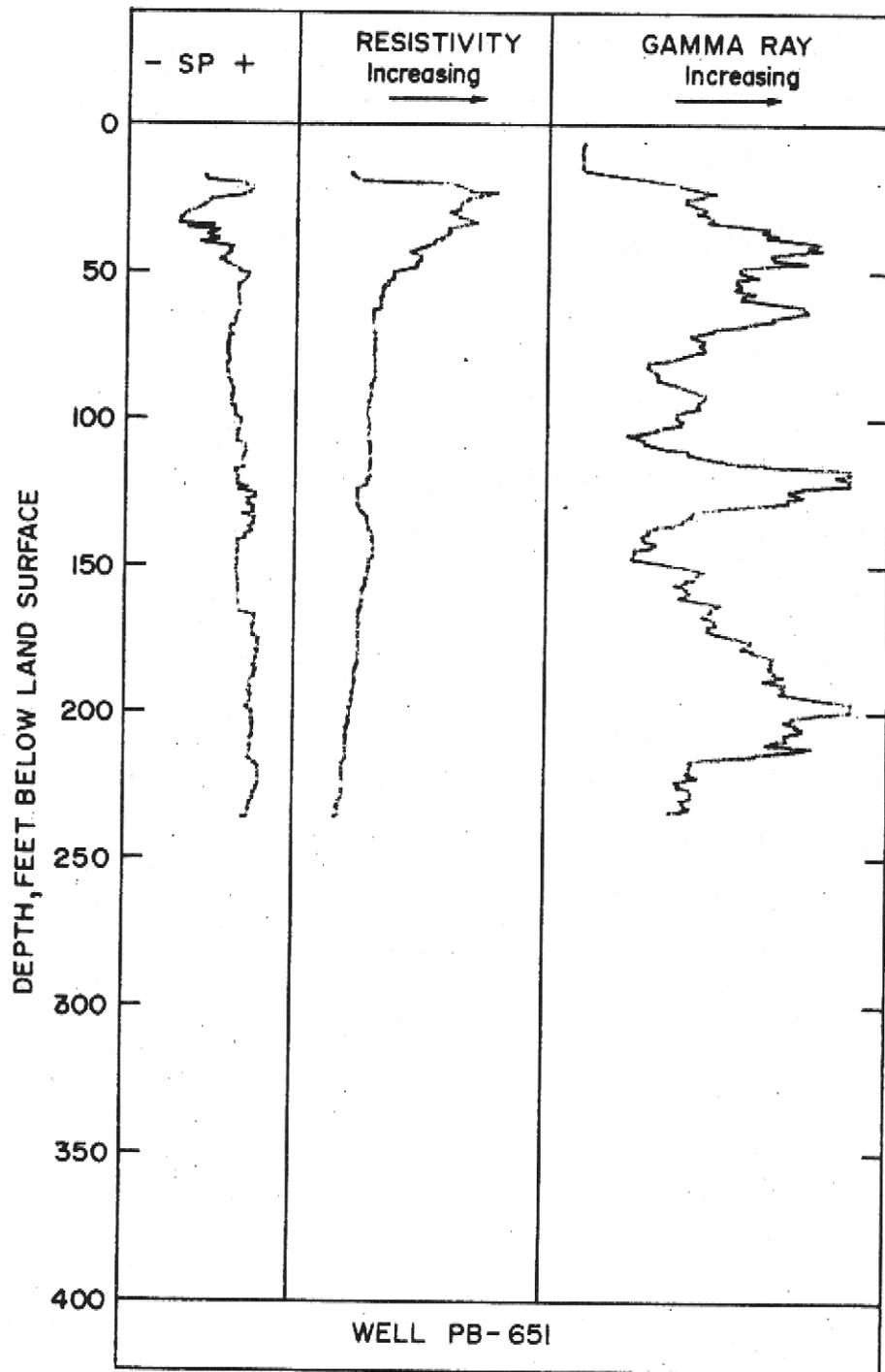


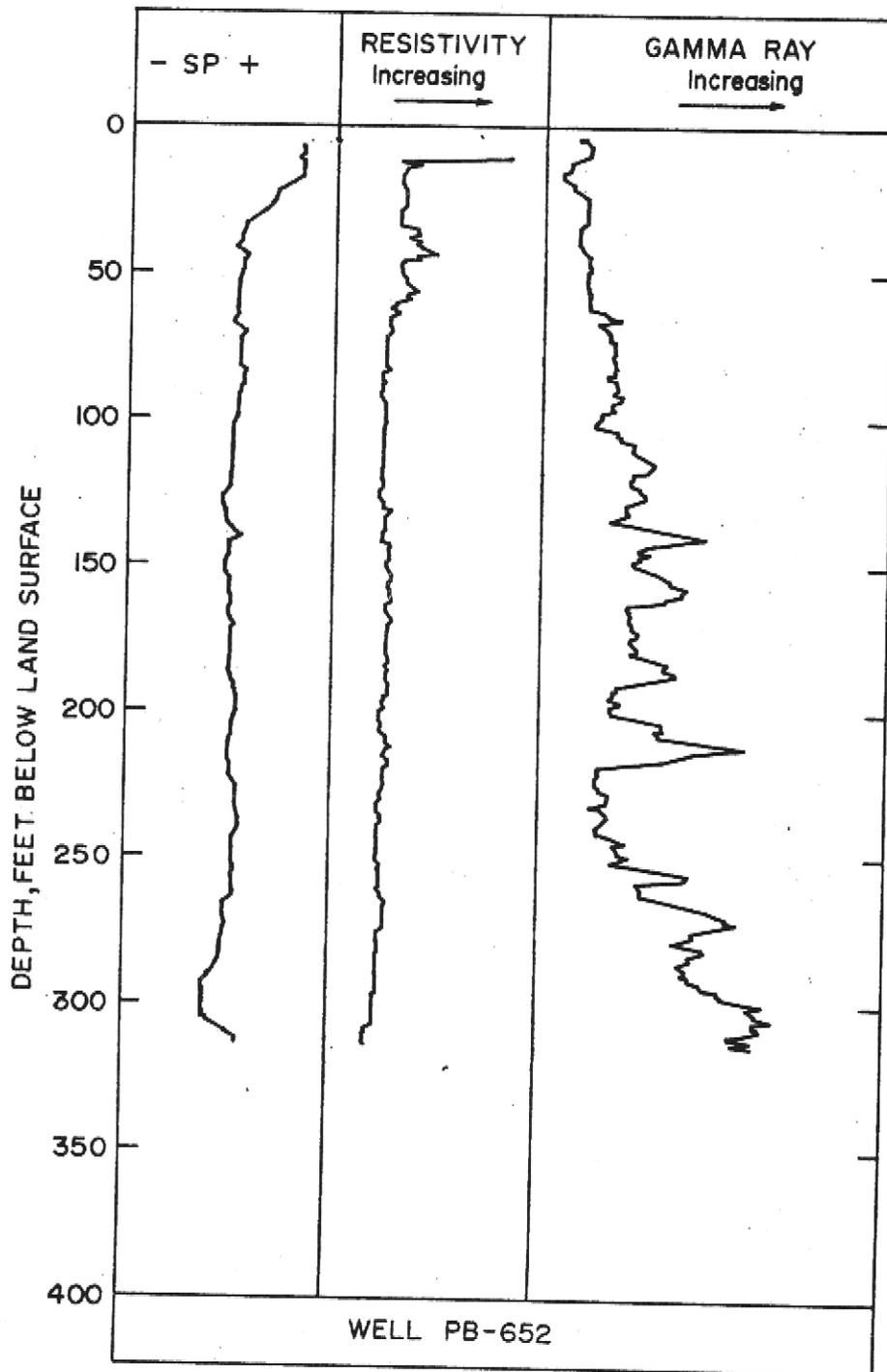


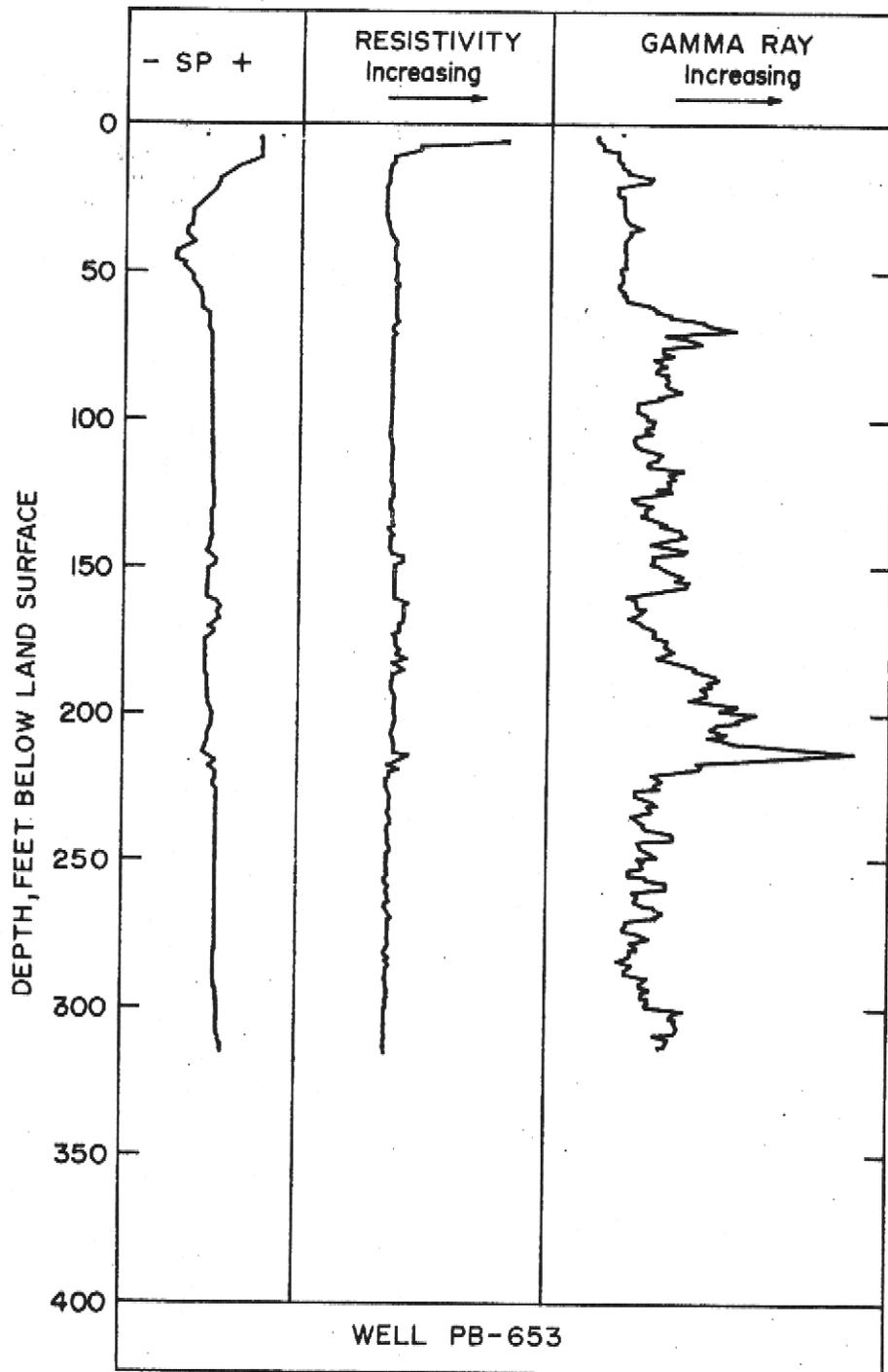


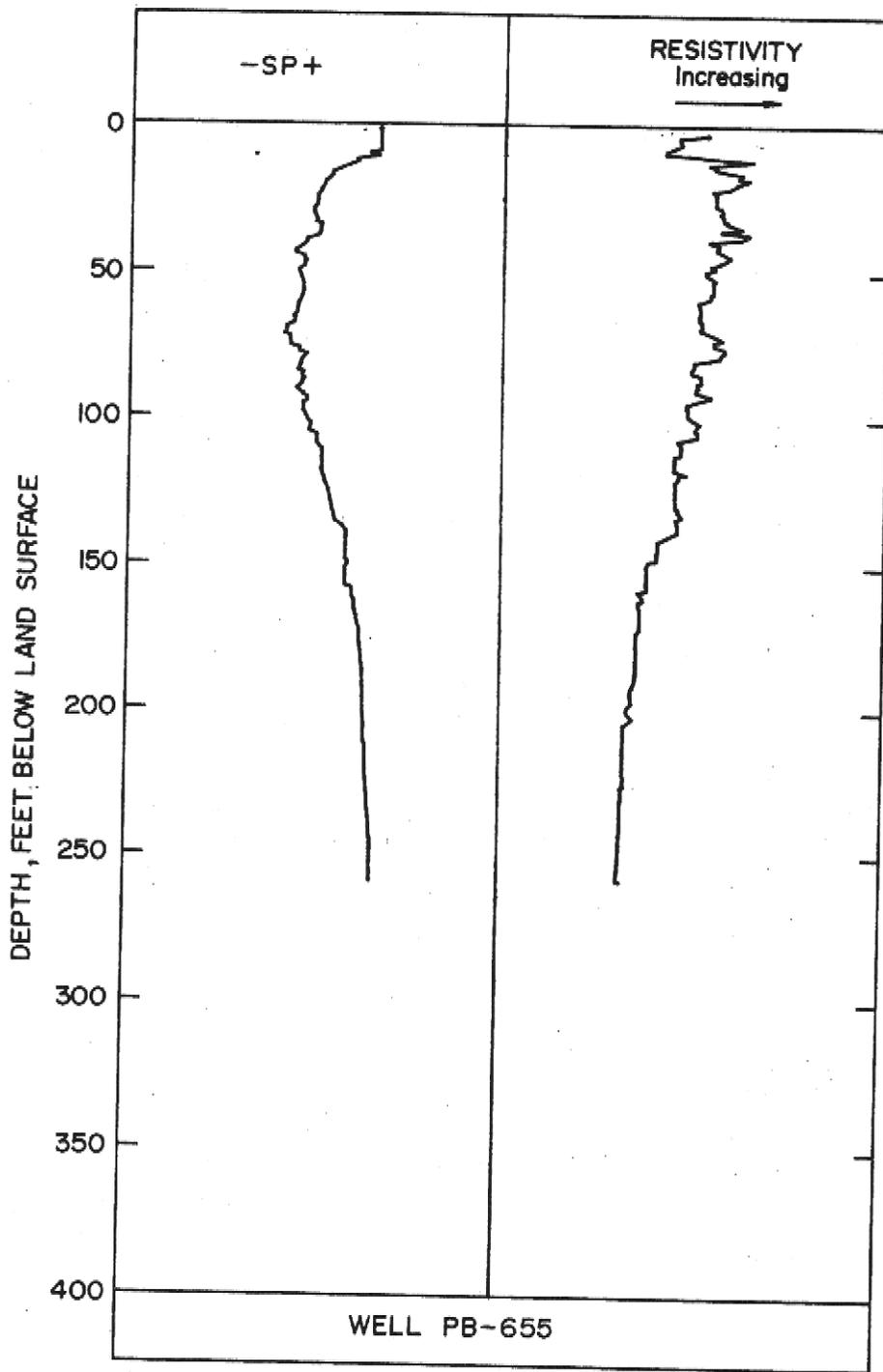


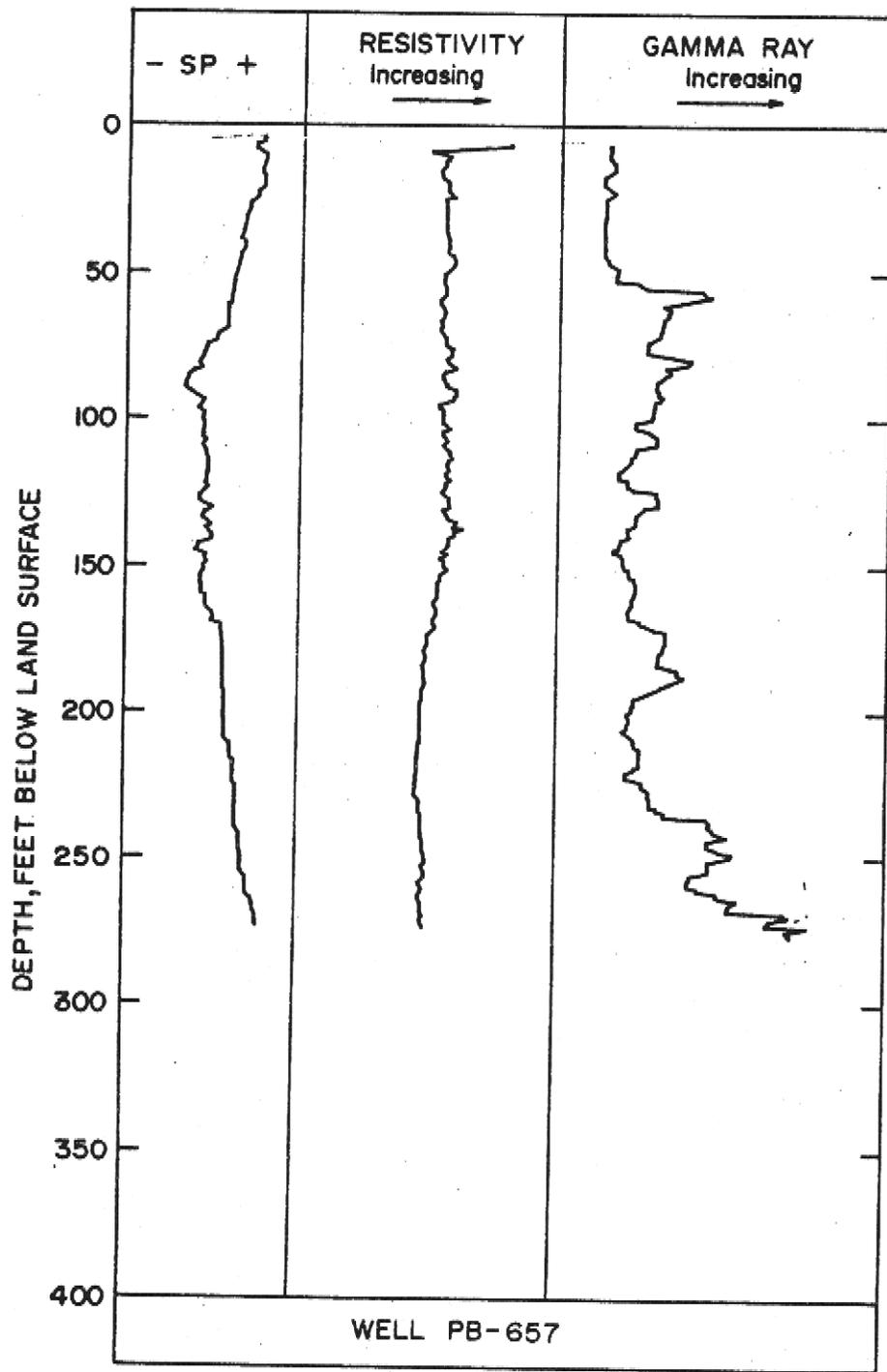


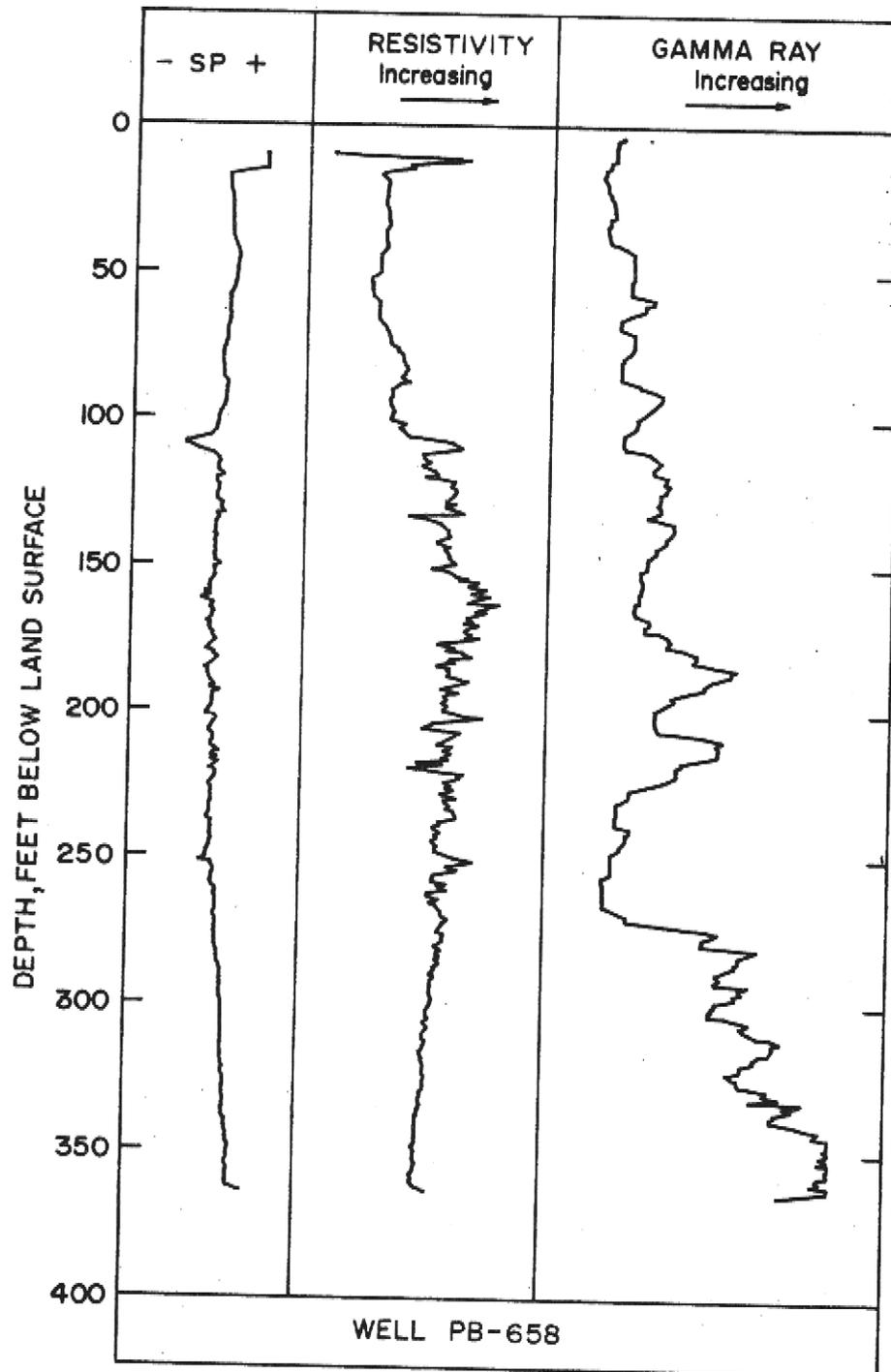


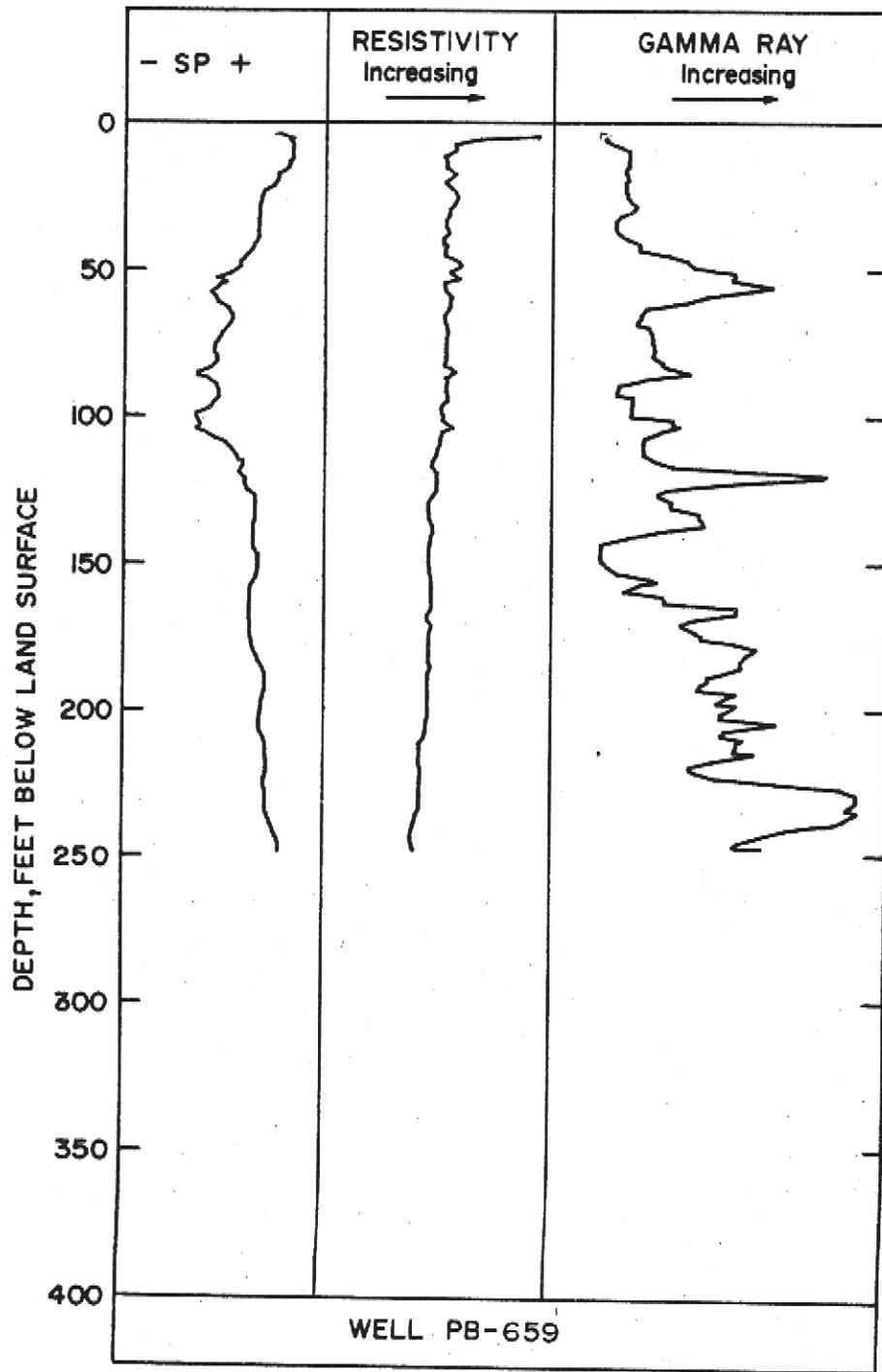


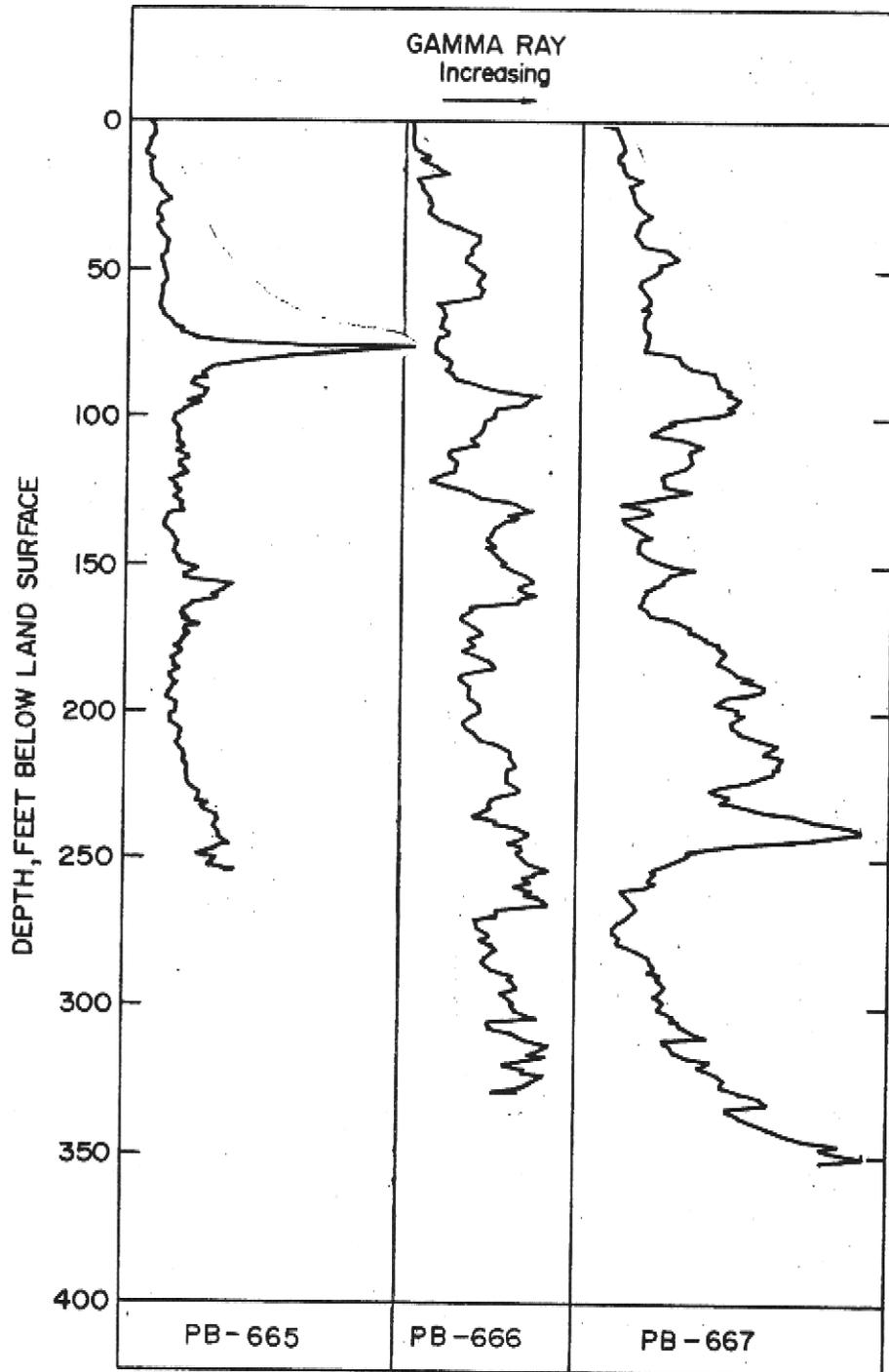


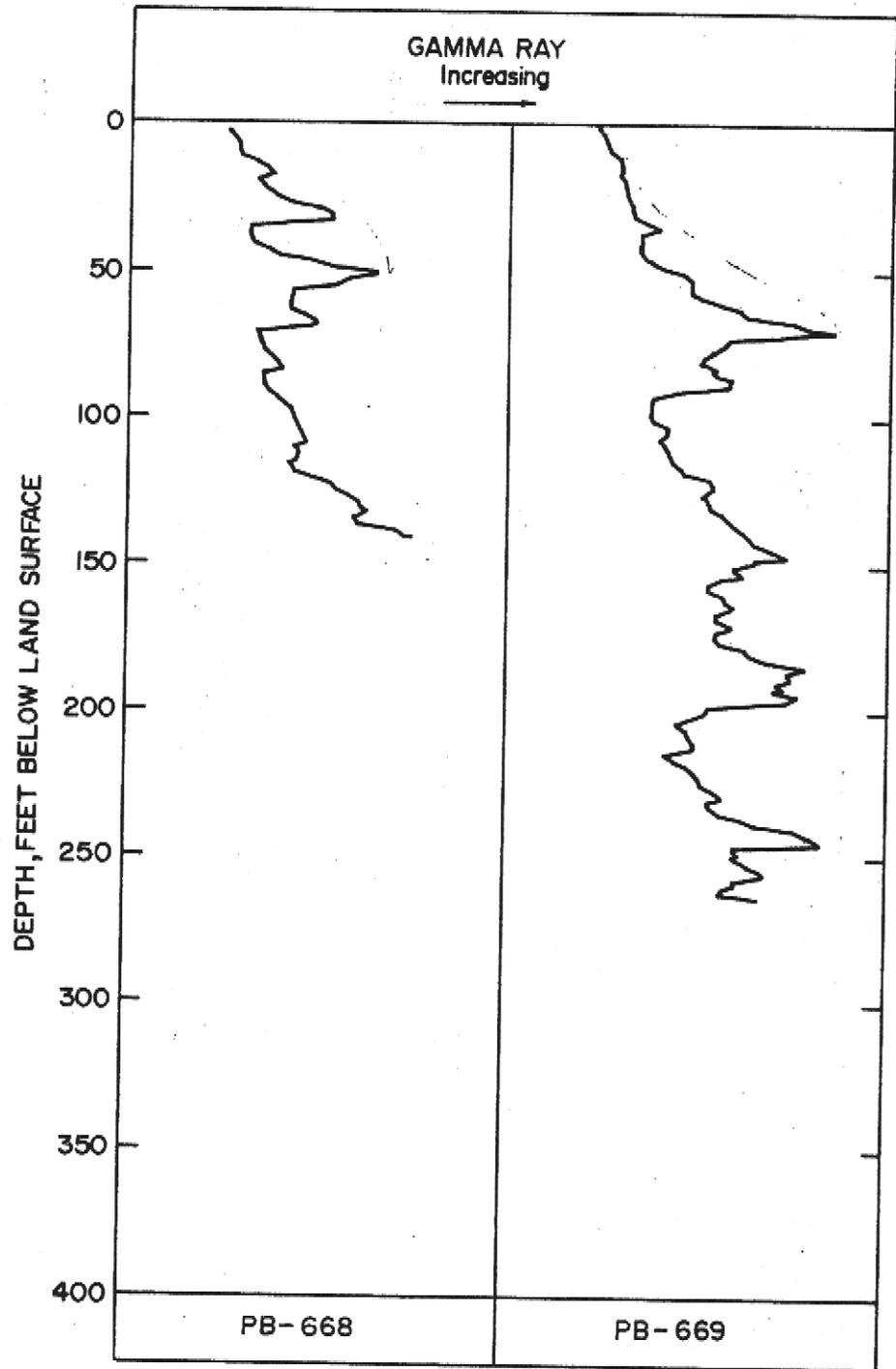


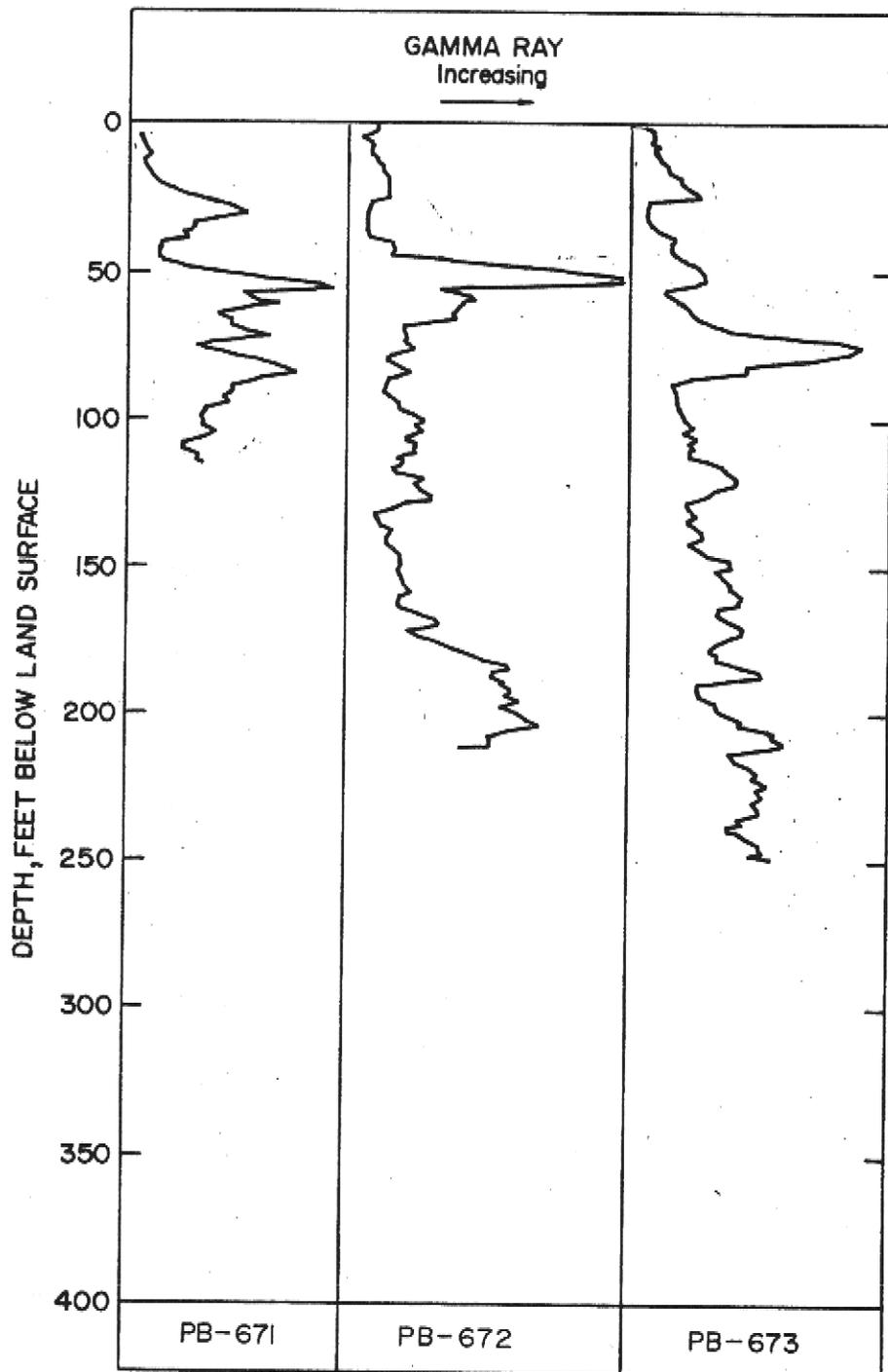


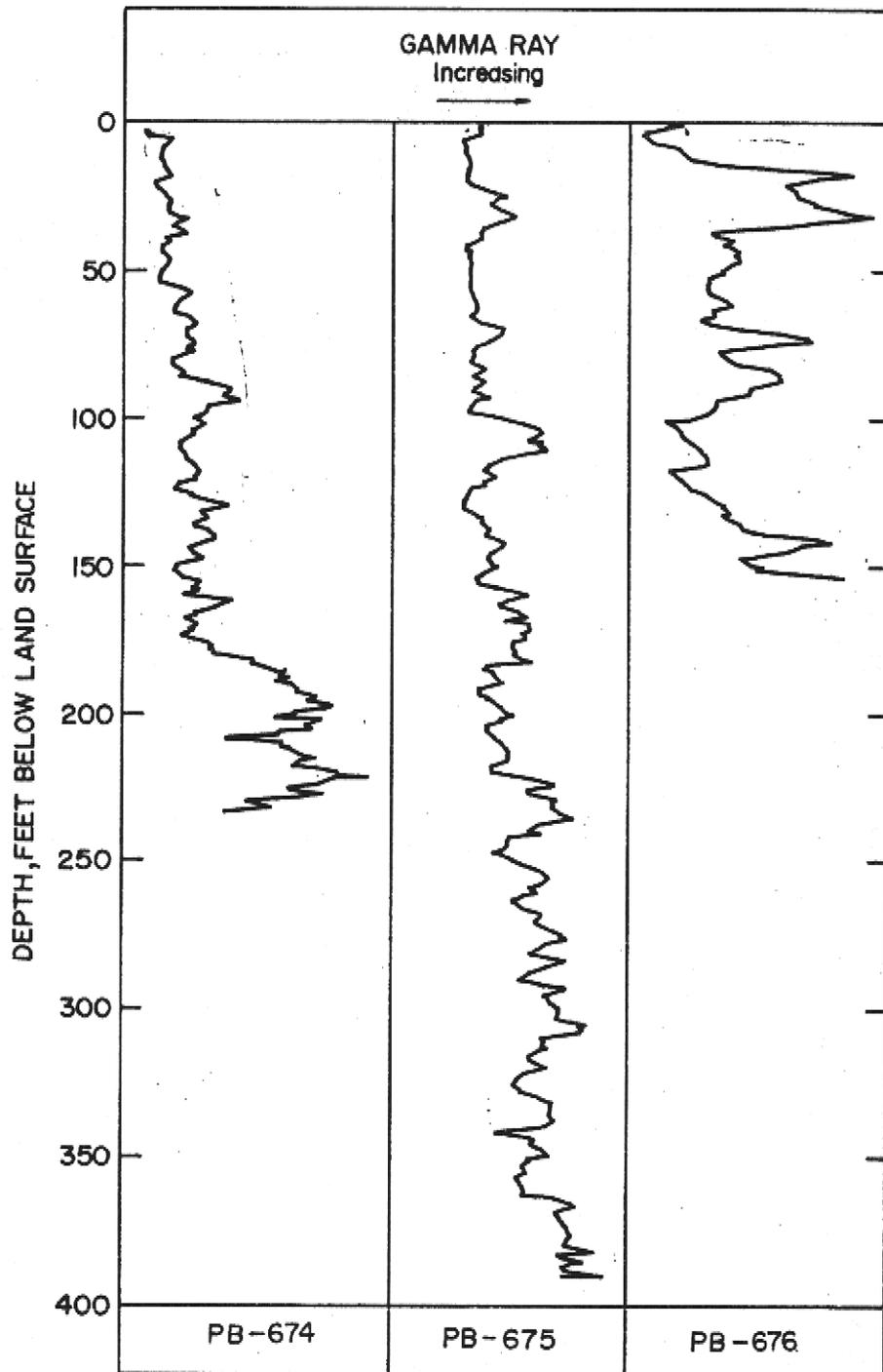


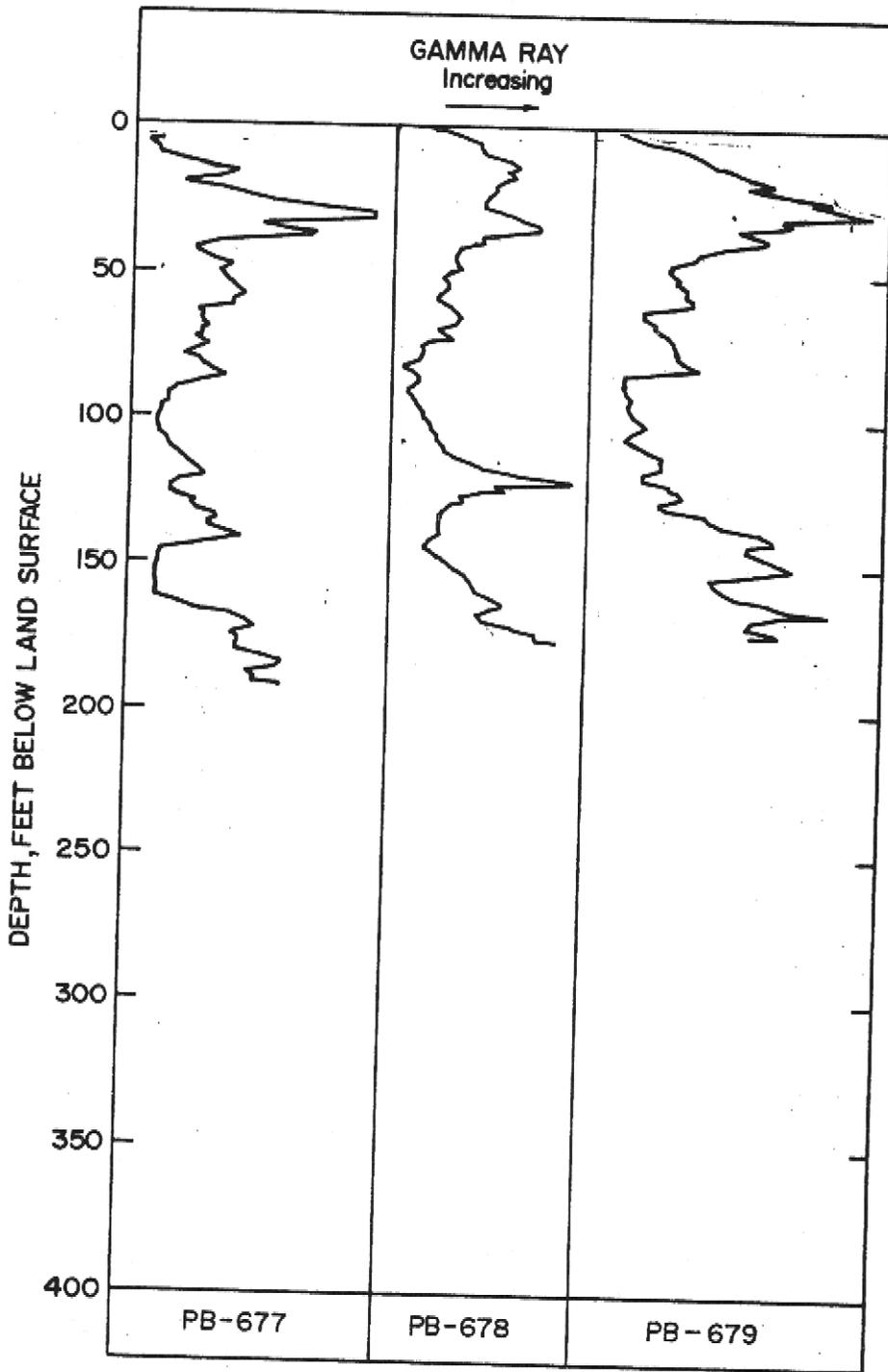


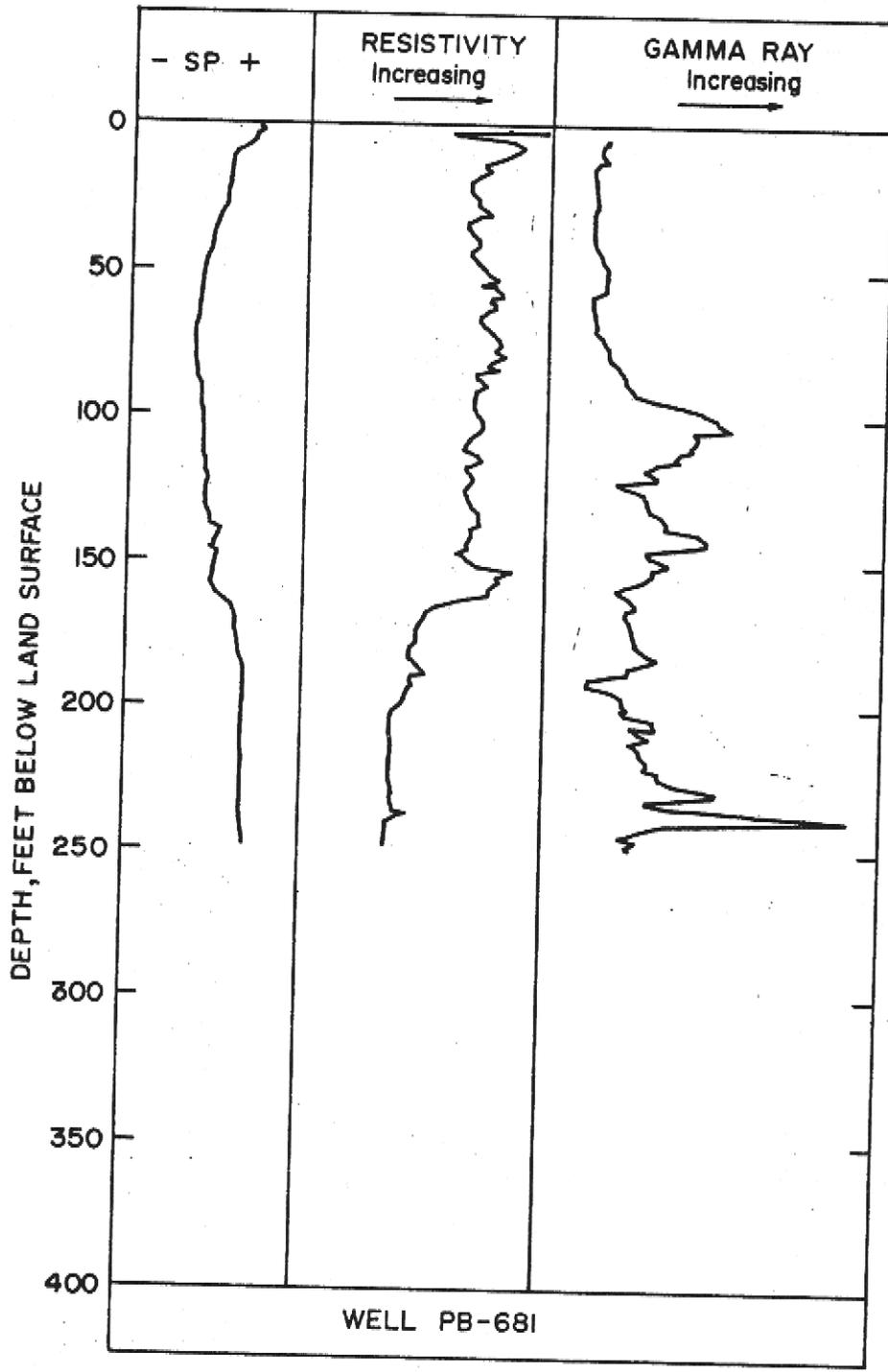


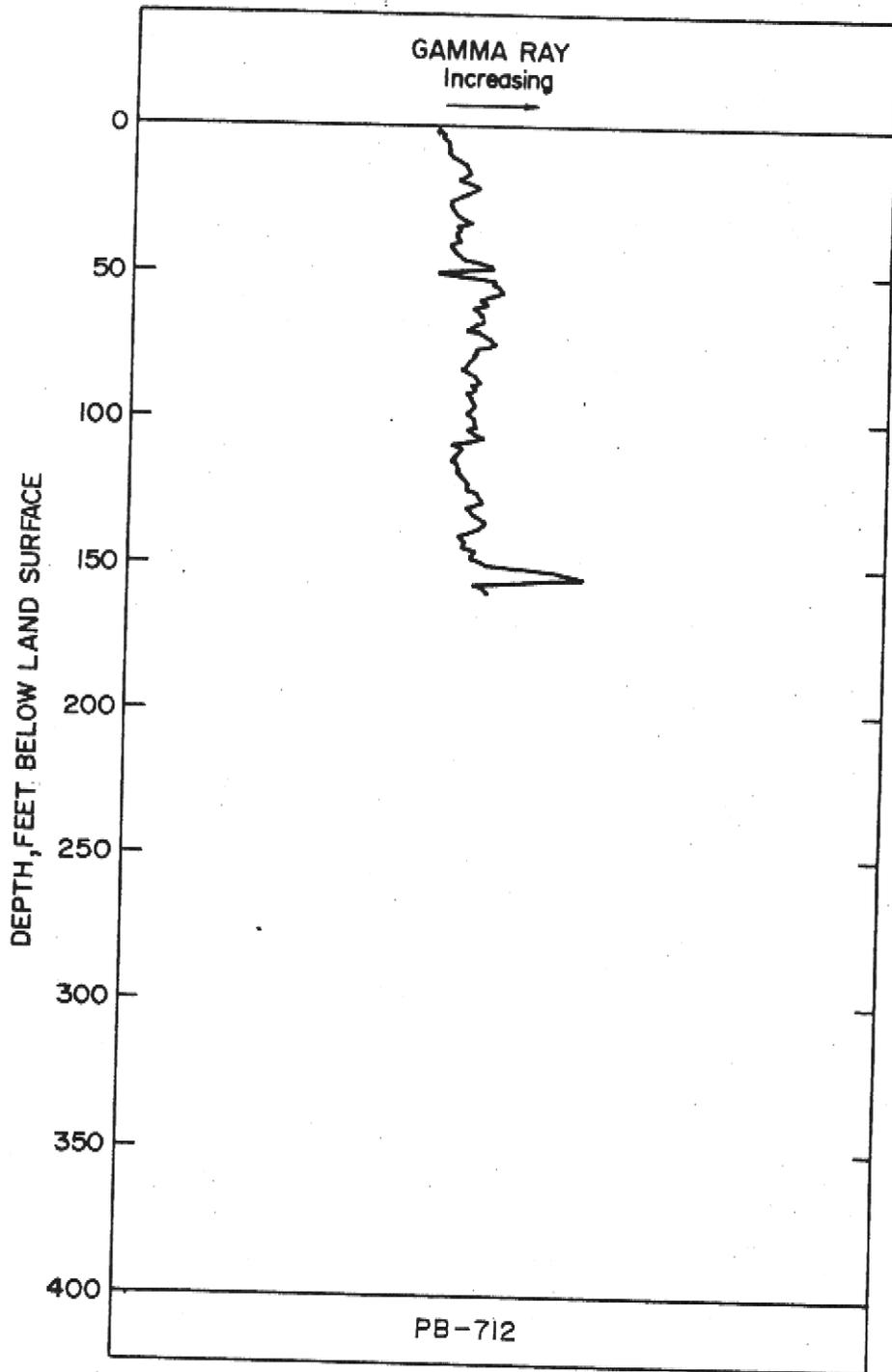


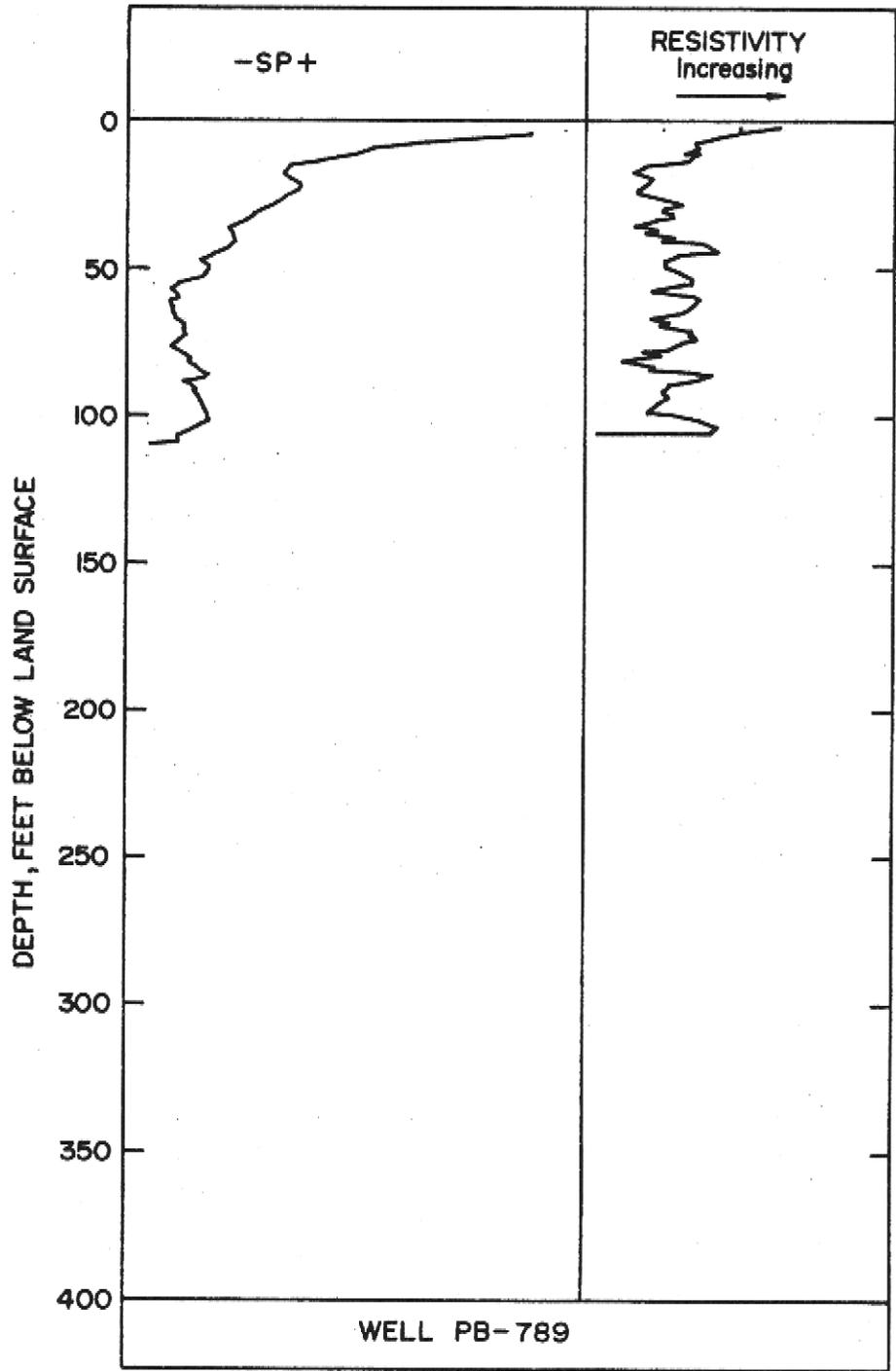












WELL PB-789

