DPST-86-674

SRP BASELINE HYDROGEOLOGIC INVESTIGATION — PHASE II

E. I. du Pont de Nemours & Co.
Savannah River Laboratory
Aiken, SC 29808

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY UNDER CONTRACT DE-AC09-76SR00001

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SRP BASELINE HYDROGEOLOGIC INVESTIGATION - PHASE II

INTRODUCTION AND SUMMARY

As discussed in the program plan for the SRP Baseline Hydrogeologic Investigation (Bledsoe, 1984a), this program has been implemented for the purpose of updating and improving the current state of knowledge and understanding of the hydrogeologic systems underlying the Savannah River Plant (SRP). The objective of the program is to install a series of observation well clusters (wells installed in each major water bearing formation at the same site) at key locations across the plant site in order to: 1) provide detailed information on the lithology, stratigraphy, and groundwater hydrology, and 2) provide observation wells to monitor the groundwater quality, head relationships, gradients, and flow paths.

The program has been divided into 3 phases in order to allow the results of one phase to be evaluated before proceeding to the next phase. Using a phased approach permits changes to be made, if necessary, to insure that the optimum amount and the highest quality of (Bledsoe, 1984b) data are being collected. In Phase I of the program, which was completed in 1984, a total of 20 wells were installed at 3 cluster sites (P-13, P-14, and P-15). The general locations of the Phase I clusters are shown on Figure 1. The Phase II program, which is discussed in this report, included the drilling of 8 deep coreholes and the installation of 56 observation wells located at 8 cluster sites. A summary of all wells installed

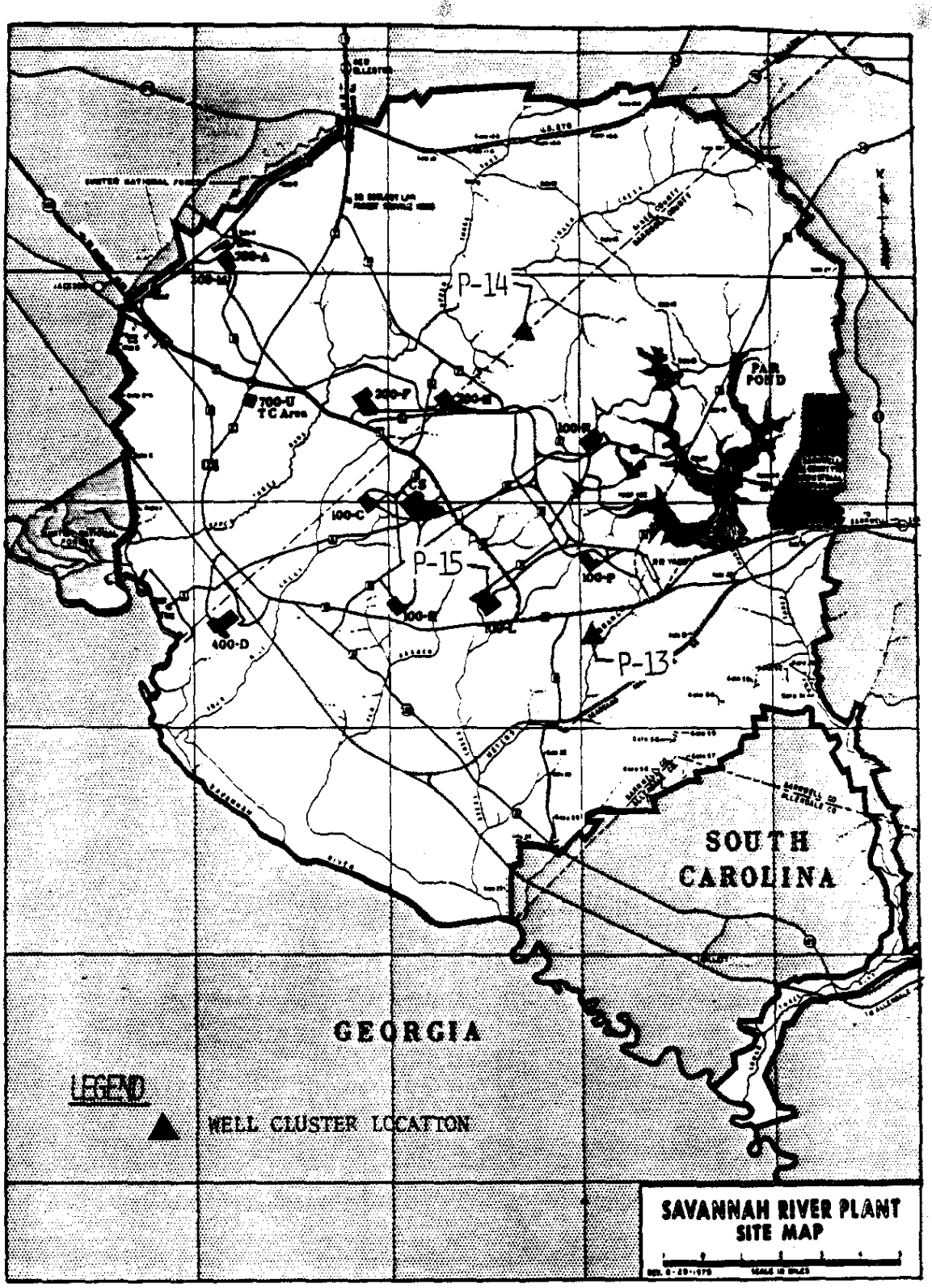


FIGURE 1. Location of Phase I Well Clusters

to date or included in the SRP Baseline Hydrogeologic Investigation the SRP Baseline Hydrogeologic Investigation is provided in Table 1. This table includes a list of all observation wells at the different cluster sites, the SRP coordinates for each well, and the elevation data for each well.

Both Phase I and Phase II of the program concentrated on the collection of data from areas of the plant where little or no data existed. Phase III, the final phase of the program, is designed mainly to fill-in existing data gaps. It is estimated that approximately 57 wells will be installed at 7 cluster sites in this phase.

The most complete investigation and discussion of the regional and site geology and groundwater hydrology was published by G. E. Siple (1967). This study has served as the data base for other more site specific investigations at SRP. The terminology for the hydrostratigraphic units as modified from Siple has been found to describe the hydrogeologic systems beneath the plant successfully in numerous groundwater studies at SRP. However, most of the stratigraphic names are declining in useage by other geologists and geologic agencies as more geologic dates are determined for the strata and more mapping data are made available. There is, however, no current concensus as to the correct stratigraphic nomenclature at SRP. Where appropriate, an attempt has been made to introduce new stratigraphic terminology in this report. The stratigraphic terminology is discussed in more detail in the section on Hydrogeology.

TABLE 1

SRP Baseline Hydrogeologic Investigation Observation Well Network

Well No.	SRP Coordinates North	SRP Coordinates East	Top of Casing	Top of Concrete Pad	Ground Surface
P-13D	35600.0	60000.0	255.87	253.53	-----
P-13C	35600.0	60000.0	255.46	253.28	-----
P-13B	35600.0	60000.0	255.23	253.03	-----
P-13A	35600.0	60000.0	255.04	252.87	-----
P-13TD	35600.0	60000.0	256.09	253.57	-----
P-13TC	35600.0	60000.0	255.43	253.33	-----
P-13TB	35600.0	60000.0	255.16	252.96	-----
P-13TA	35600.0	60000.0	255.10	252.59	-----
IDB-1C	72388.4	76400.9	297.18	------	293.9
P-14C	72420.0	76424.0	295.03	293.78	-----
IDB-1B	72396.1	76407.1	297.30	------	293.8
IDB-1A	72402.7	76412.7	296.78	------	293.9
P-14TC	72432.5	76432.1	295.91	293.49	-----
P-14TB	72453.9	76425.7	295.81	293.56	-----
P-14TA	72444.9	76439.6	295.73	293.44	-----
P-15D	47350.2	51130.3	255.05	253.19	-----
P-15C	47293.6	51408.4	255.48	253.17	-----
P-15B	47023.2	51532.1	255.54	253.09	-----
P-15A	46755.3	51376.3	255.48	253.07	-----
P-15TD	46737.8	51053.5	255.30	253.07	-----
P-15TC	47381.9	51271.0	255.34	253.01	-----
P-15TB	47304.9	50975.5	255.29	253.02	-----
P-15TA	47007.9	50863.7	255.41	253.07	-----
P-16D	98235.9	82312.1	263.84	261.87	261.2
P-16B	98230.2	82297.5	263.31	261.39	261.0
P-16A	98219.4	82271.0	261.77	260.11	259.6
P-16TD	98205.3	82275.9	262.25	260.25	259.8
P-16TC	98210.6	82290.0	262.67	260.76	260.4
P-16TB	98202.0*	82308.0*	263.10	261.25	260.5
P-16TA	98222.0	82318.1	263.58	261.77	261.3

* Coordinates approximate, well installed after survey completed.

TABLE 1, Contd

Well No.	SRP Coordinates North	SRP Coordinates East	Top of Casing	Top of Concrete Pad	Ground Surface
P-17D	63184.8	109794.5	334.54	332.57	332.2
P-17C	63190.8	109810.0	334.46	332.33	332.0
P-17B	63196.0	109823.6	334.31	332.37	332.0
P-17A	63201.3	109837.3	334.04	331.99	331.6
P-17TD	63215.3	109833.1	334.35	332.41	332.0
P-17TC	63210.0	109818.7	334.61	332.79	332.2
P-17TB	63204.7	109805.0	334.85	322.79	332.3
P-17TA	63199.1	109791.0	335.04	333.10	332.6
P-18D	67552.8	47666.6	298.73	296.78	296.3
P-18B	67578.9	47680.9	298.18	296.33	295.9
P-18A	67592.8	47688.1	298.37	296.32	295.9
P-18TD	67618.1	47678.0	297.87	296.04	295.6
P-18TC	67605.8	47669.6	298.70	296.78	296.3
P-18TB	67592.7	47660.6	298.68	296.74	296.2
P-18TA	67578.5	47652.8	298.67	296.70	296.3
P-19D	55301.9	60048.7	299.71	297.79	297.3
P-19C	55321.5	60056.1	300.29	298.16	297.7
P-19B	55336.4	60050.7	300.09	298.14	297.7
P-19A	55347.1	60031.3	299.84	297.81	297.4
P-19TD	55342.1	60016.8	299.33	297.46	296.8
P-19TC	55328.2	60022.2	299.59	297.79	297.1
P-19TB	55309.8	60029.4	299.53	297.48	297.0
P-19TA	55295.9	60034.6	299.35	297.45	296.8
P-10A	55280.0	60049.0	299.74	------	296.7
P-20D	56075.2	76784.5	289.59	287.53	287.1
P-20C	56067.7	76814.0	289.27	287.60	287.3
P-20B	56081.7	76816.7	289.45	288.05	287.6
P-20TD	56094.1	76768.1	289.83	287.92	287.4
P-21D	24660.9	40735.5	209.16	207.06	206.6
P-21B	24641.8	40757.6	209.82	207.78	207.5
P-21A	24649.7	40779.6	209.72	207.61	207.3
P-21TD	24667.4	40679.3	209.06	207.05	206.7
P-21TC	24670.9	40754.2	208.96	206.95	206.6
P-21TB	24674.6	40739.2	208.95	206.92	206.5
P-5A	24649.0	40617.0	208.64	------	206.4

TABLE 1, Contd

Well No.	SRP Coordinates North	SRP Coordinates East	Top of Casing	Top of Concrete Pad	Ground Surface
P-22D	20607.8	73559.3	217.25	215.31	215.0
P-22C	20610.3	73544.5	217.55	215.56	215.2
P-22B	20611.6	73529.8	217.92	216.04	215.6
P-22A	20614.9	73515.1	218.17	216.24	215.7
P-22TD	20600.8	73510.9	217.99	216.02	215.7
P-22TC	20597.9	73525.5	217.75	215.96	215.6
P-22TB	20595.4	73540.6	217.35	215.59	215.2
P-22TA	20593.4	73555.3	217.23	215.38	215.0
P-23D	48073.9	30942.6	186.78	184.93	184.5
P-23B	48101.2	30925.3	186.25	184.24	183.9
P-23A	48114.9	30914.5	186.13	184.00	183.5
P-23TE	48117.2	30894.7	185.24	183.17	182.8
P-23TD	48104.5	30903.2	185.20	183.25	182.8
P-23TC	48085.6	30900.0	185.10	183.23	182.8
P-23TB	48075.7	30923.3	185.94	184.03	183.6
P-23TA	48063.3	30931.3	186.22	184.30	183.8

SCOPE OF WORK

The Phase II program consisted of continuous geologic sampling (coring), geophysical logging, collecting undistrubed samples, physical testing of selected sediment samples, and construction of 56 observation wells at 8 widely spaced cluster sites (P-16 through P-23). The approximate locations of the eight clusters are shown on Figure 2. The program was supervised and managed by Professional Service Industries, Inc. (PSI) under contract to the Savannah River Laboratory (SRL). Field activities began in February 1985 and were completed in January 1986. Details of the program are contained in a four volume report submitted by PSI in July 1986 (PSI, 1986). The results of the investigation are summarized in this report.

One of the key objectives of the program was to install observation wells in each of the major water-bearing units on the basis of the modified Siple terminology. The target horizons for completion of wells at each cluster location included from deepest to shallowest: (1) bottom of the lower "Tuscaloosa" aquifer, (2) top of the lower "Tuscaloosa" aquifer, (3) bottom of the upper "Tuscaloosa" aquifer, (4) top of the upper "Tuscaloosa" aquifer, (5) bottom of the Congaree Formation, (6) top of the Congaree Formation, (7) bottom of the McBean Formation, and (8) the water table. A generalized cluster profile showing the relative depths and the well numbering scheme for the different wells is presented on Figure 3. The actual completion depths of the wells vary from

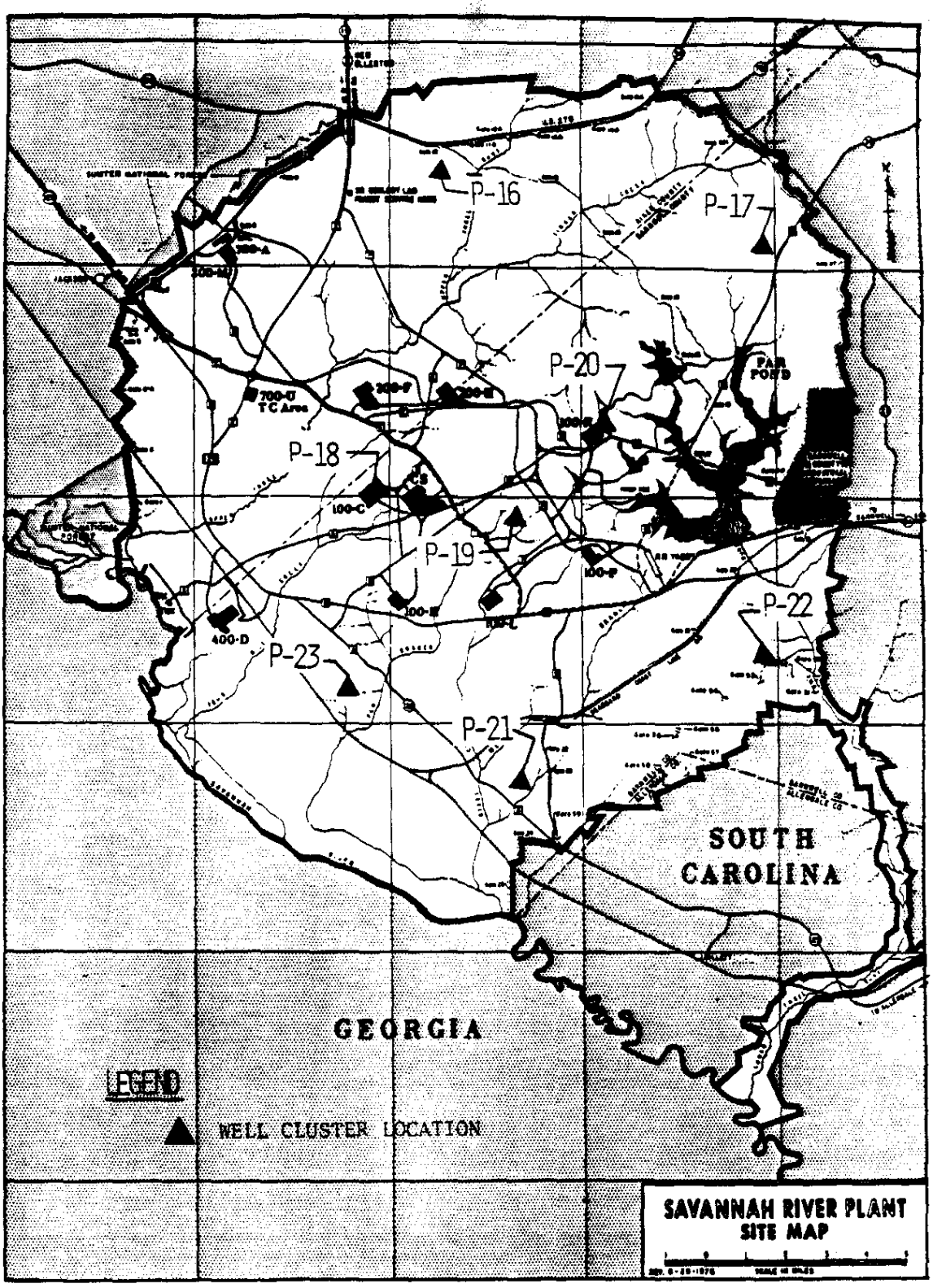


FIGURE 2. Location of Phase II Well Clusters

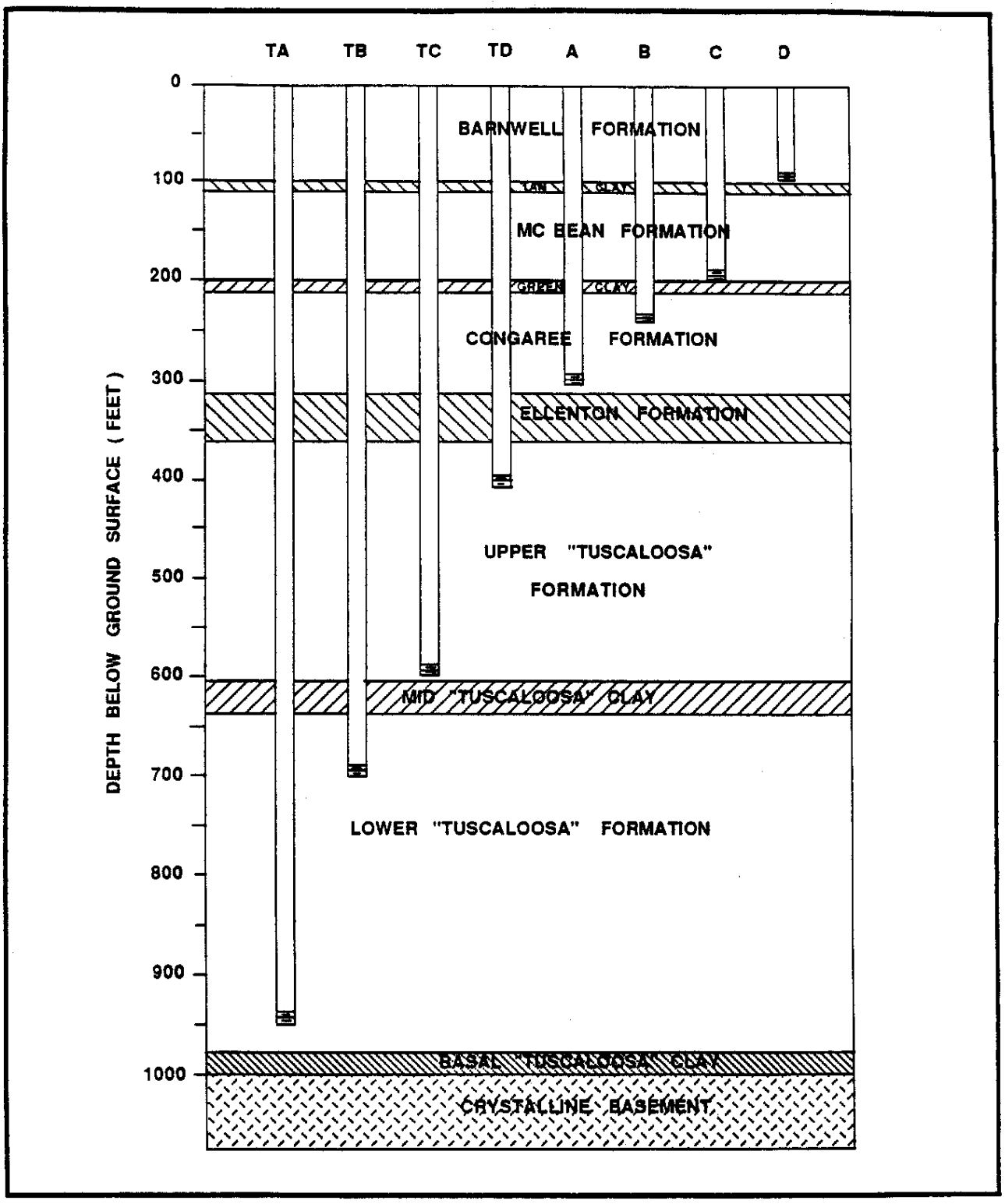


FIGURE 3. Typical Well Cluster Designation

cluster to cluster depending on the ground surface elevation and the specific geologic conditions encountered at each cluster location. Also the formation or hydrostratigraphic unit in which the wells are completed does not necessarily follow the idealized cluster profile and designation due to the complexity of the subsurface conditions and the introduction of current terminology. However, wells with the suffix TA, TB, TC, TD, and TE are screened generally within the Cretaceous age formations, while wells with the suffix A, B, C, and D are generally screened with the Tertiary age formations.

Geologic samples were collected at each cluster site by continuously coring the deepest boring (TA) from the ground surface to the total depth utilizing an HQ wireline core barrel. The coreholes ranged in depth from approximately 450 ft to 1200 ft. In all, a total of approximately 7145 ft of coring was attempted with an overall recovery rate of about 86 percent.

Following coring operations at each cluster, the corehole was stabilized and a suite of geophysical logs run by Century Geophysical Corporation working under contract to PSI. Geophysical logs run included gamma, single point resistivity, long and short normal resistivity, spontaneous potential, and caliper.

The actual zones screened at each cluster were chosen from examination of the core, lithologic logs, and geophysical logs. Where the interval to be screened was significantly above the bottom of the corehole, the open hole between the designed bottom

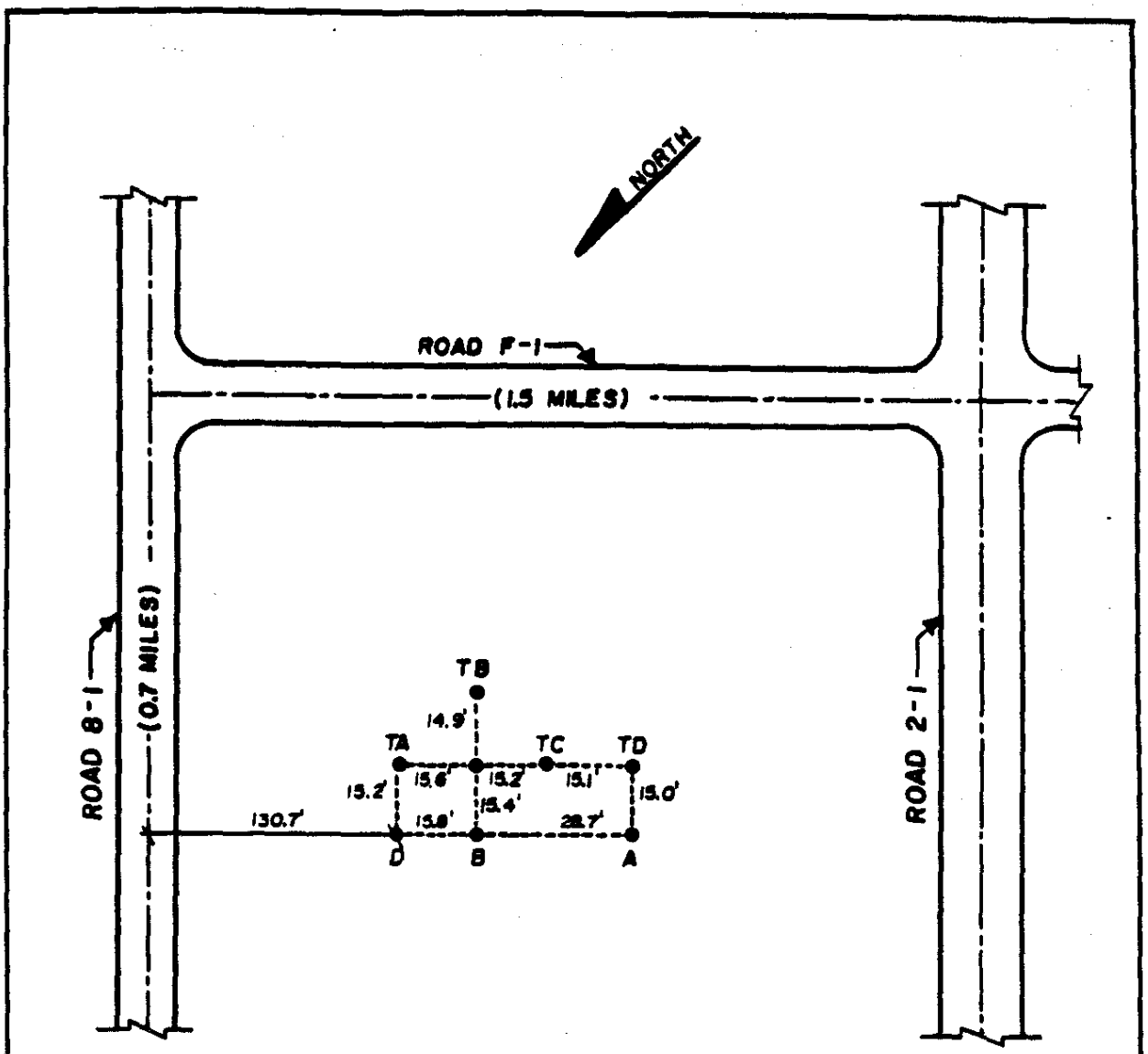
of the well and the bottom of the boring was backgrouted after geophysical logs were run and before the hole was reamed for well installation. Prior to installation of the water table well, the depth to the water table was determined by auger drilling techniques at each cluster site.

After identifying the major clay or clayey zones from examination of the core and lithologic logs, undisturbed samples for laboratory testing were collected at each cluster. These samples were collected usually during the drilling of the TB and TC wells in each cluster by utilizing either a Pitcher barrel or Shelby tube sampler. In all, a total of 39 samples were collected for laboratory testing. Laboratory testing was performed by PSI and included grain-size distribution, total porosity, vertical and horizontal hydraulic conductivity.

P-16 CLUSTER

The P-16 cluster is located in the extreme northern portion of the SRP site approximately 1200 ft south of U.S. Highway 278, adjacent to SRP Road 8-1. A detail location sketch showing the layout of the individual wells in the cluster is shown on Figure 4. Ground surface elevation at the site is approximately 260 ft above mean sea level.

The exploratory boring, P-16TA, was cored to a total depth of 660 ft below ground surface (approximate elevation -400 ft). A graphic log showing gross lithology and inferred stratigraphy along with the reduced geophysical logs is presented on Figure 5. The detailed lithologic log for P-16TA is presented in Appendix A.



NOTES:

(1) DIAGRAM NOT TO SCALE.
(2) MEASUREMENTS BETWEEN WELLS ARE FROM CENTER OF WELL TO CENTER OF WELL.
(3) MEASUREMENTS FROM WELL TO NEAREST ROAD ARE MADE FROM CENTER OF WELL TO CENTERLINE OF ROAD.
(4) WELLS ARE COMPLETED WITH A 5' x 5' x 6" CONCRETE PAD.

FIGURE 4. Location and Layout Map for Well Cluster P-16

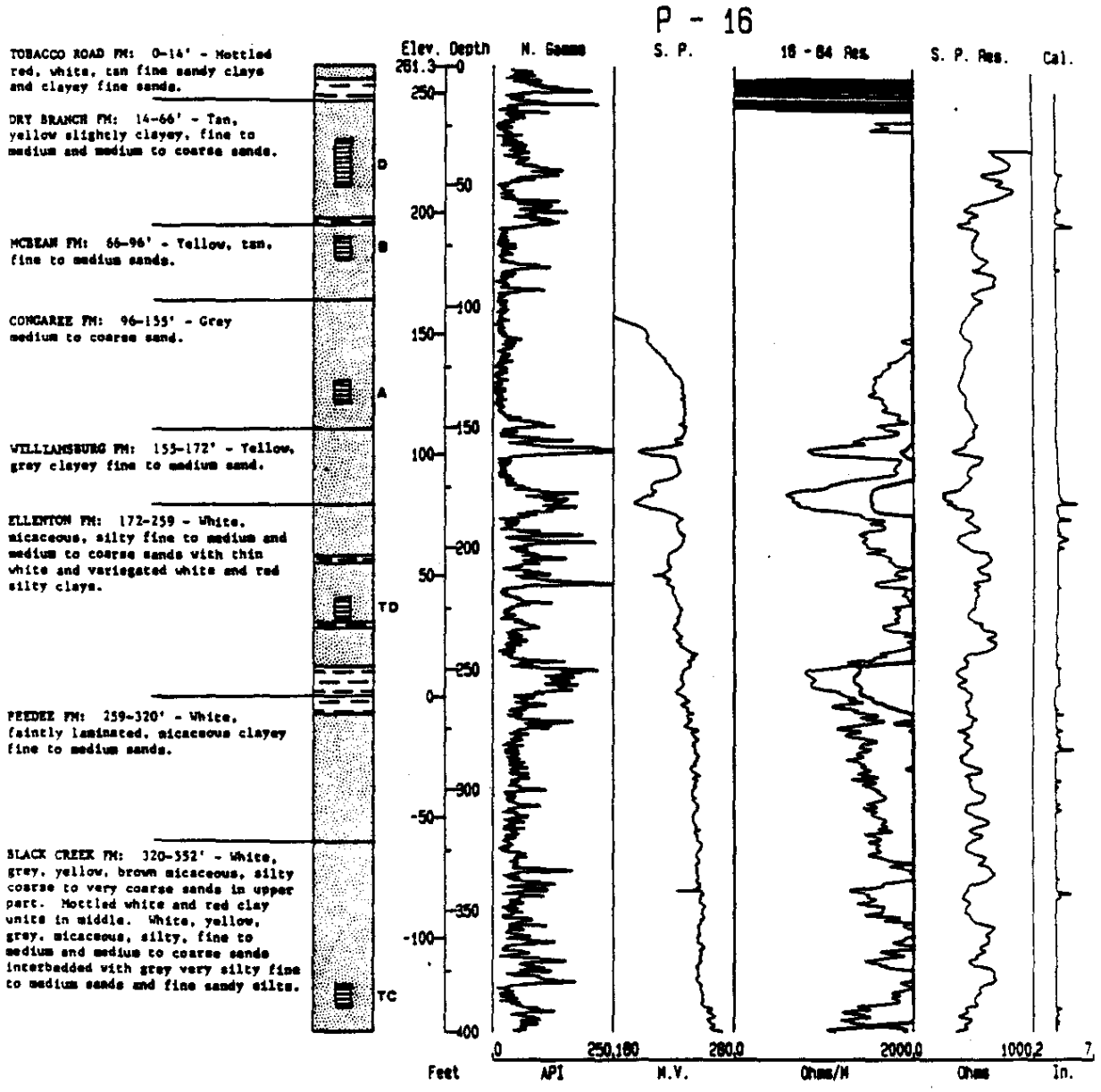


FIGURE 5. Graphic and Geophysical Logs for P-16TA

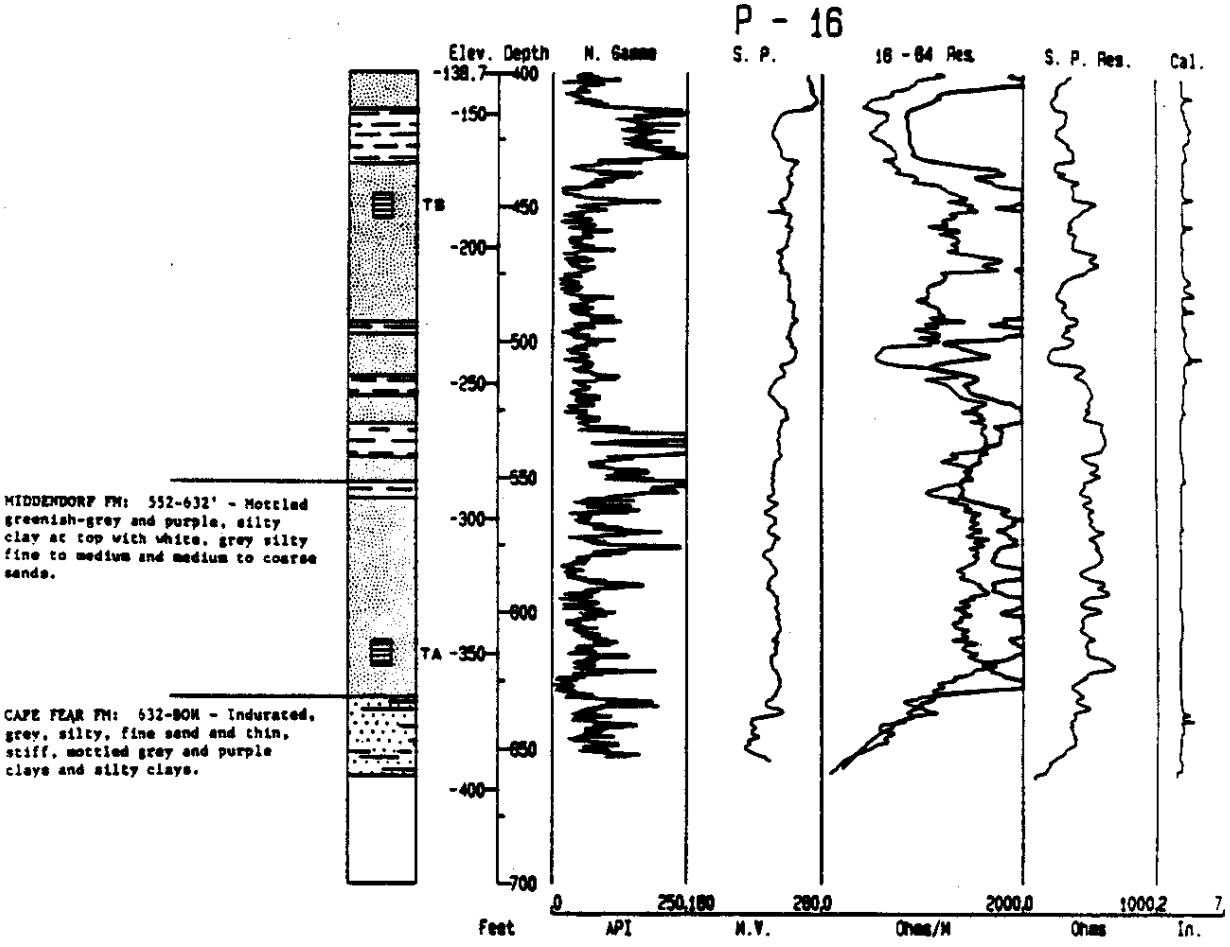


FIGURE 5, Contd

Based on the data collected from the P-16TA corehole, the screen zones for all of the wells to be installed at this cluster were chosen. In all a total of 7 wells were installed at this cluster. The bottom of the screen settings ranged in depth from about 50 ft for the water table well (P-16D) to approximately 620 ft below ground surface for the deepest well (P-16TA.)

A profile of the cluster showing the depth relationships of the wells and the location and thickness of the major clay and clayey units present is shown on Figure 6. The completion summary for the cluster is presented on Table 2. A summary of the screen zones and the inferred formation in which the screen is located is provided on Table 3.

Also shown on Figure 6 are the piezometric heads measured in each of the wells. These data were collected in March 1986. The water table is found at an elevation of about 214 ft, approximately 47 ft below the ground surface within the Upland Unit (Hawthorn Formation). There was no indication of perched water at this site. Below the water table surface, there is a slight decrease in the hydraulic head with increasing depth, at least to the lowest Tertiary well, P-16A. However, between the P-16A well which is screened in the Congaree Formation and well P-16TD which is screened within sands of the Ellenton Formation, there is a head reversal (increase) of about 7 ft in the piezometric surface from about elevation 213 ft to approximately 220 ft. Heads in the Cretaceous wells increase slightly with depth down to well P-16TB,

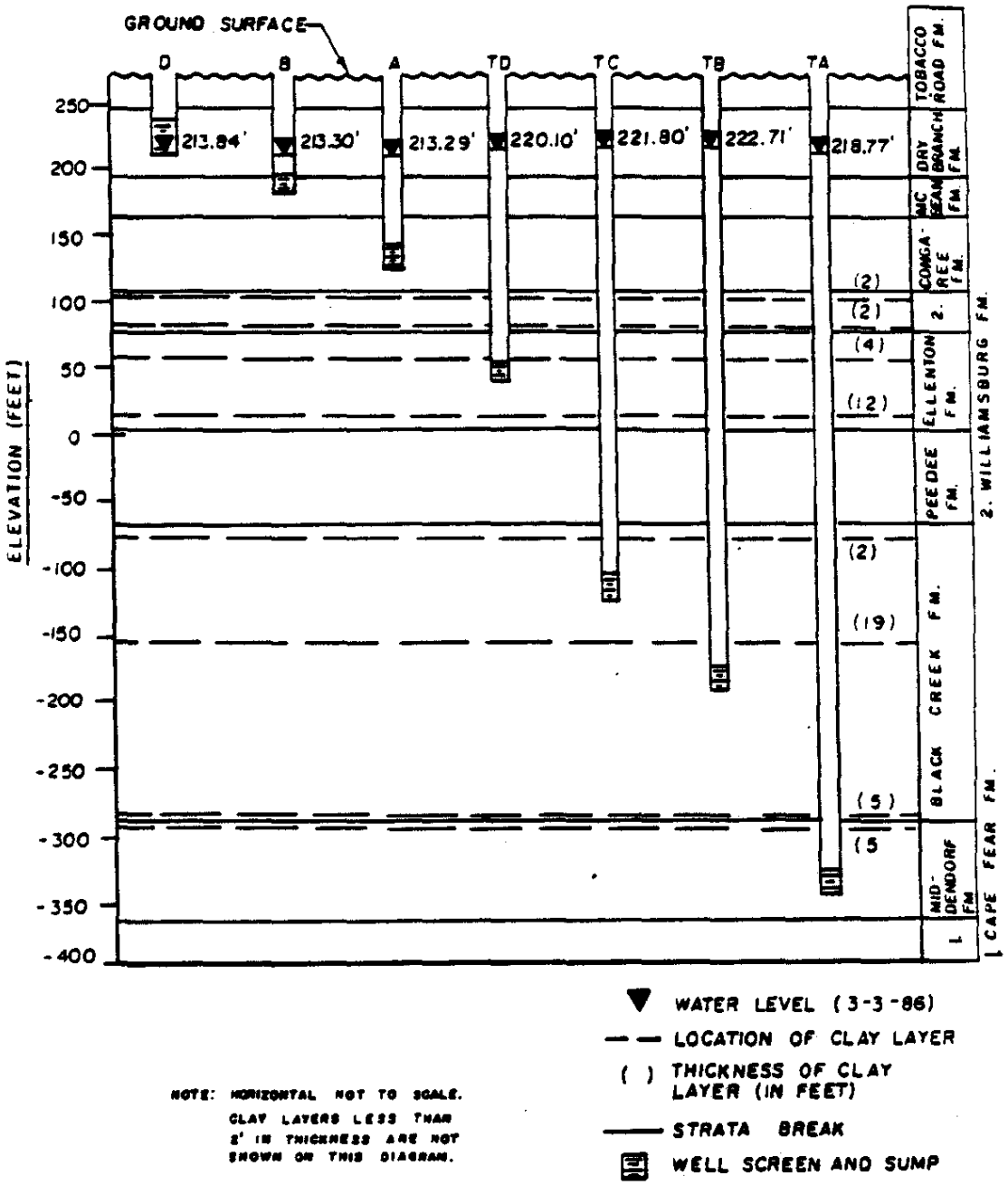


FIGURE 6. Profile of P-16 Well Cluster

TABLE 2

Cluster P-16 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	627	609.0 619.6	-4" Carbon Steel	#18 Slot Stainless Steel	602	595	625	261.3	263.58	N98222.0 E82318.1
TB	465	445.0 455.0	-4" Carbon Steel	#18 Slot Stainless Steel	438	428	460	260.5	263.10	N98202.0 E82308.0
TC	394	379.0 389.0	-4" Carbon Steel	#18 Slot* PVC	375	372	394	260.4	262.67	N98210.6 E82290.0
TD	237	220.0 230.0	4" Sch. 40 PVC	#18 Slot PVC	216	210	235	259.8	262.25	N98205.3 E82275.9
A	148	130.2 140.2	-4" Sch. 40 PVC	#18 Slot PVC	126	119	146	259.6	261.77	N98219.4 E82271.0
B	85	70.0 80.0	-4" Sch. -40 PVC	#18 Slot PVC	65	59	85	261.0	263.31	N98230.2
D	58	30.0 50.0	-4" Sch. 40 PVC	#18 Slot PVC	25	19	55	261.2	263.84	N98235.9 E82312.1

* 3 inch screen set inside 4 inch between 379 feet and 389 feet.

TABLE 3

Screened Intervals for Cluster P-16

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-16D	261.2	30-50	231-211	Dry Branch
P-16B	261.0	70-80	191-181	McBean
P-16A	259.6	130-140	131-120	Congaree
P-16TD	259.8	220-230	40-30	Ellenton
P-16TC	260.4	380-390	-120 to -130	Upper Black Creek
P-16TB	260.7	445-455	-184 to -194	Lower Black Creek
P-16TA	261.3	610-620	-349 to -359	Middendorf

Note: All measurements are in feet.

which is screened at a depth of about 445 ft below ground surface in the lower Black Creek Formation (upper "Tuscaloosa"). Between well P-16TB and the deepest well in the cluster, P-16TA, which is screened at a depth of about 610 ft in the Middendorf Formation (lower "Tuscaloosa"), however, there is a decrease in head of about 4 ft, from elevation 223 to 219 ft.

P-17 CLUSTER

The P-17 cluster is located approximately one mile southwest of the Williston barricade, about one-half mile west of SRP Road 8, and adjacent to SRP Road 8-1 (Figure 7). Ground surface elevation at the site is about 333 ft above mean sea level.

Considerable difficulty was encountered while drilling the deep corehole, P-17TA, and after several attempts coring operations were terminated at a depth of about 765 ft below ground surface. The planned completion depth of the corehole was 960 ft. In order to obtain information on the 205 ft of sediments below the bottom of the corehole, the borehole was advanced without coring to the designed termination depth of 960 ft (approximate elevation -627 ft) and geophysical logs run.

A graphic log along with the geophysical logs for the P-17TA corehole is shown on Figure 8. Detail lithologic descriptions of the core are provided in Appendix B.

Based on the data collected from the P-17TA boring, the screen depth for the deep observation well, P-17TA, was selected at approximately 860 ft below ground surface. Prior to installing the

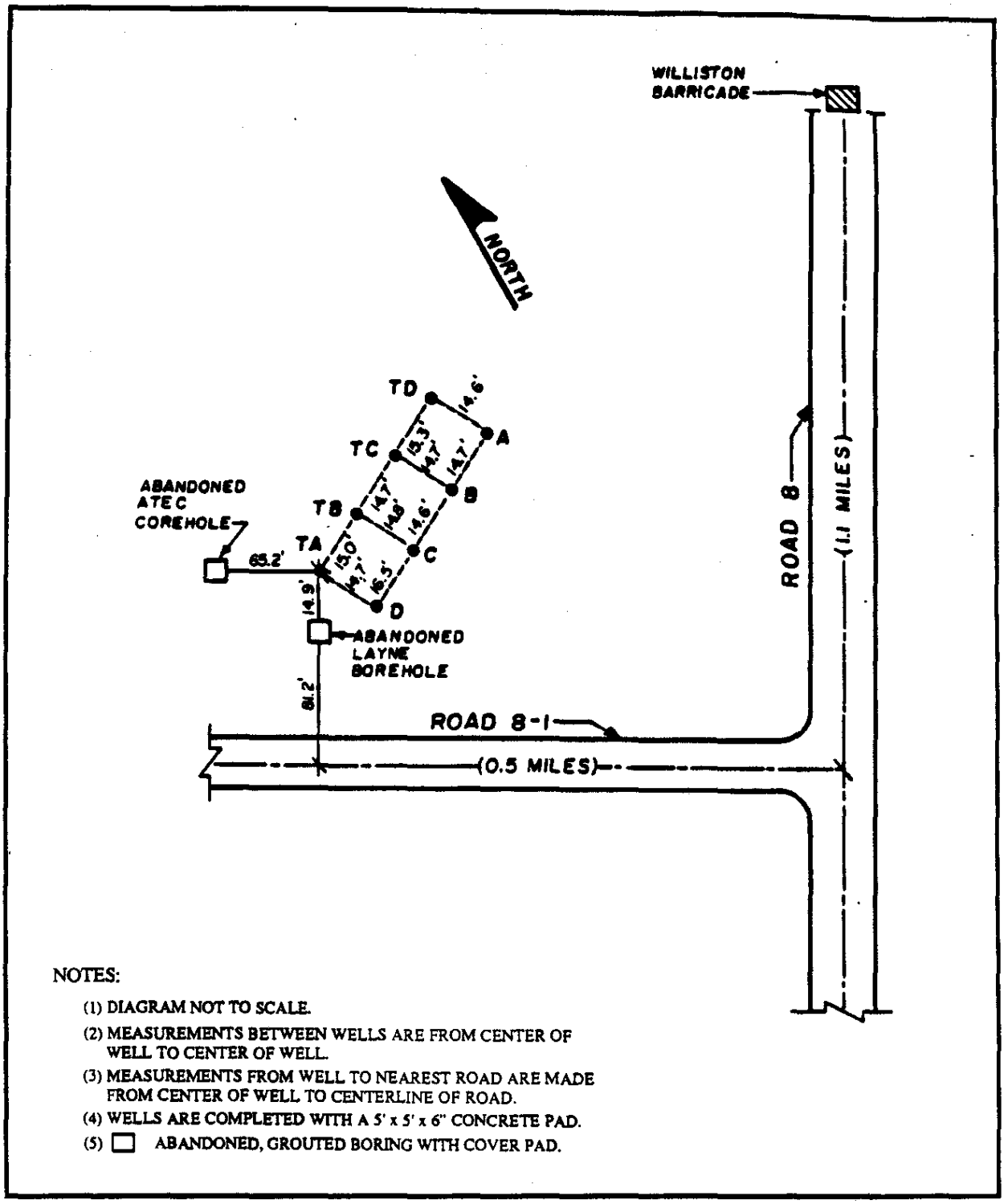


FIGURE 7. Location and Layout Map for Well Cluster P-17

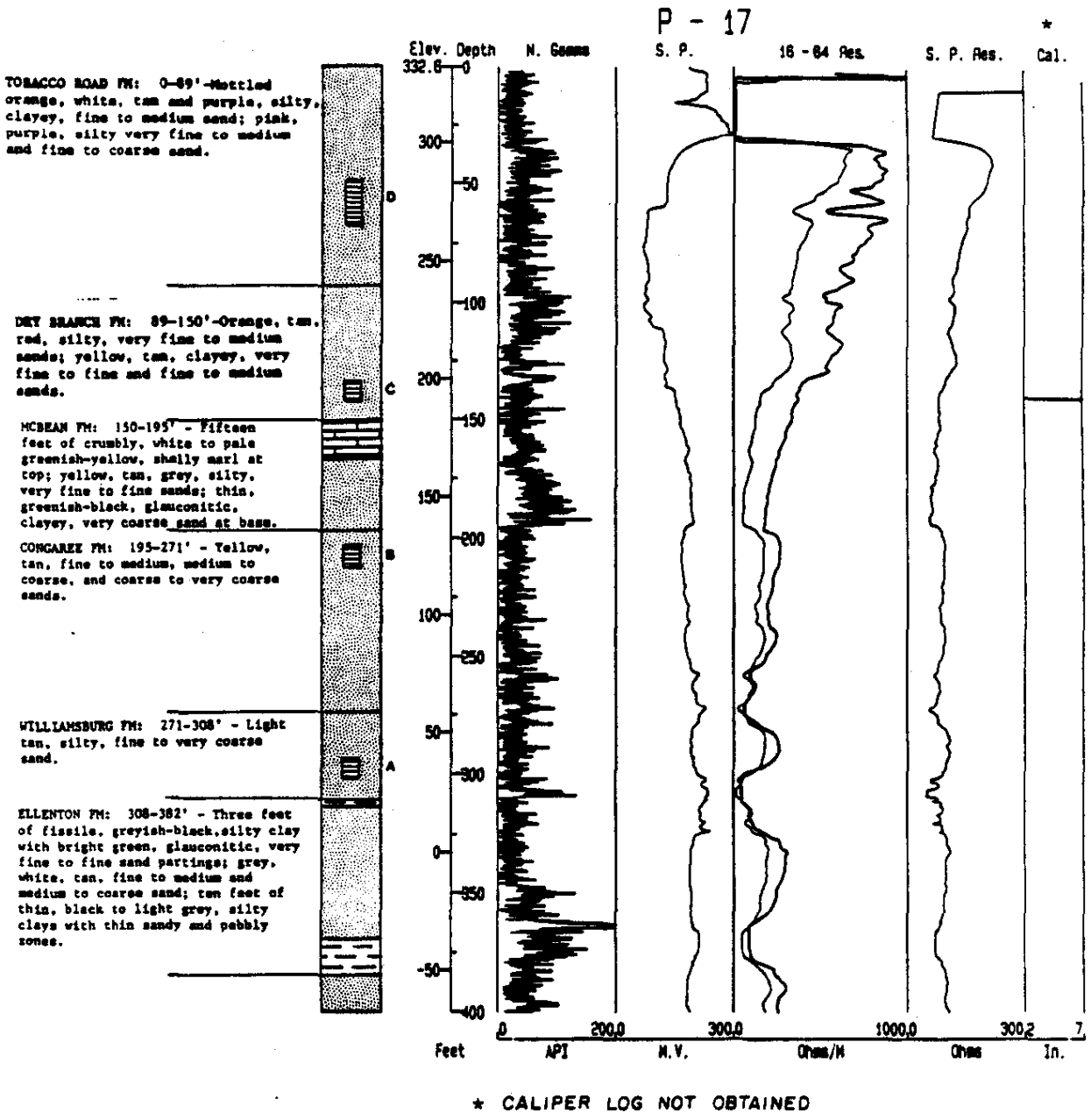


FIGURE 8. Graphic and Geophysical Logs for P-17TA

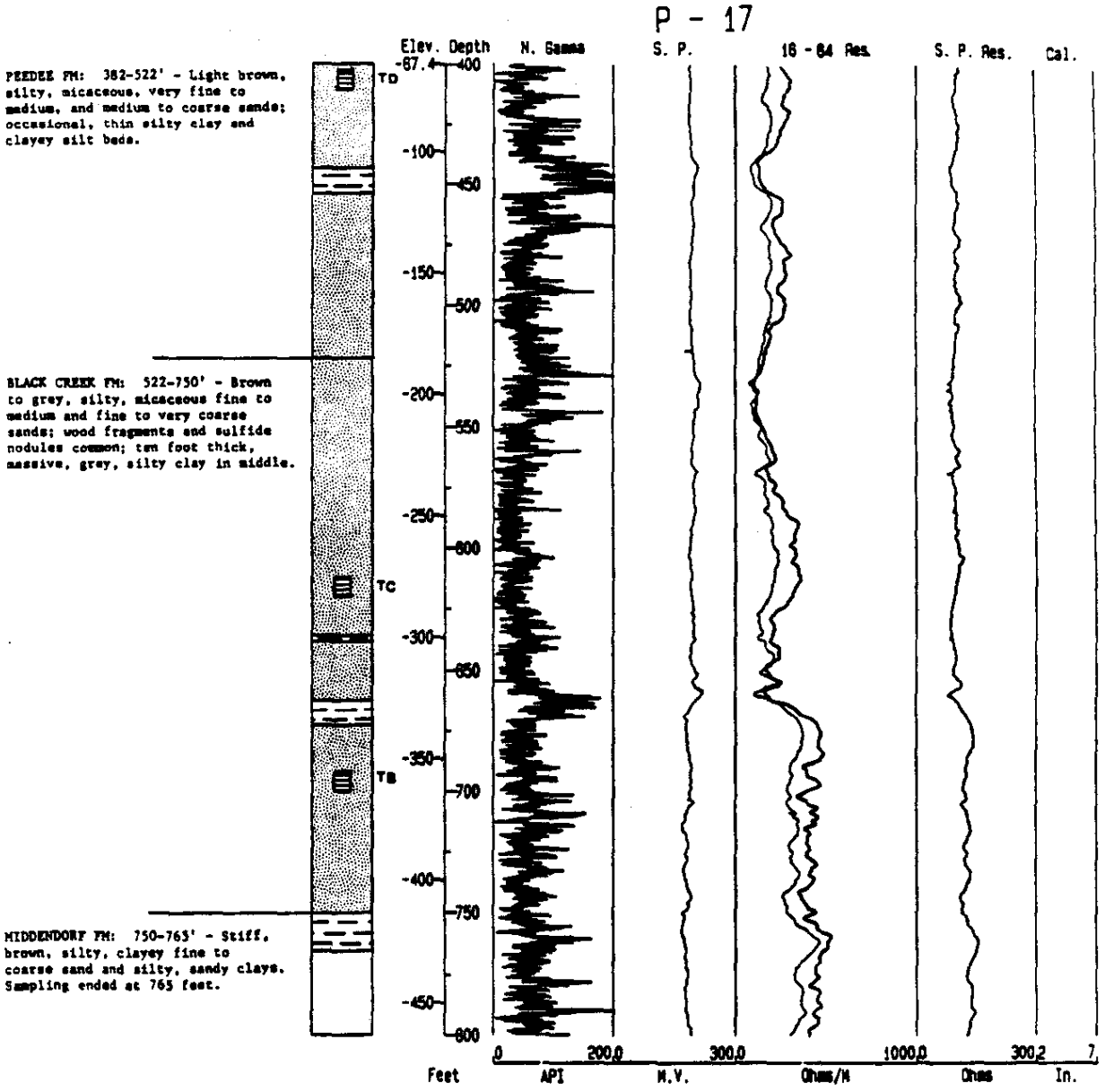


FIGURE 8, Contd

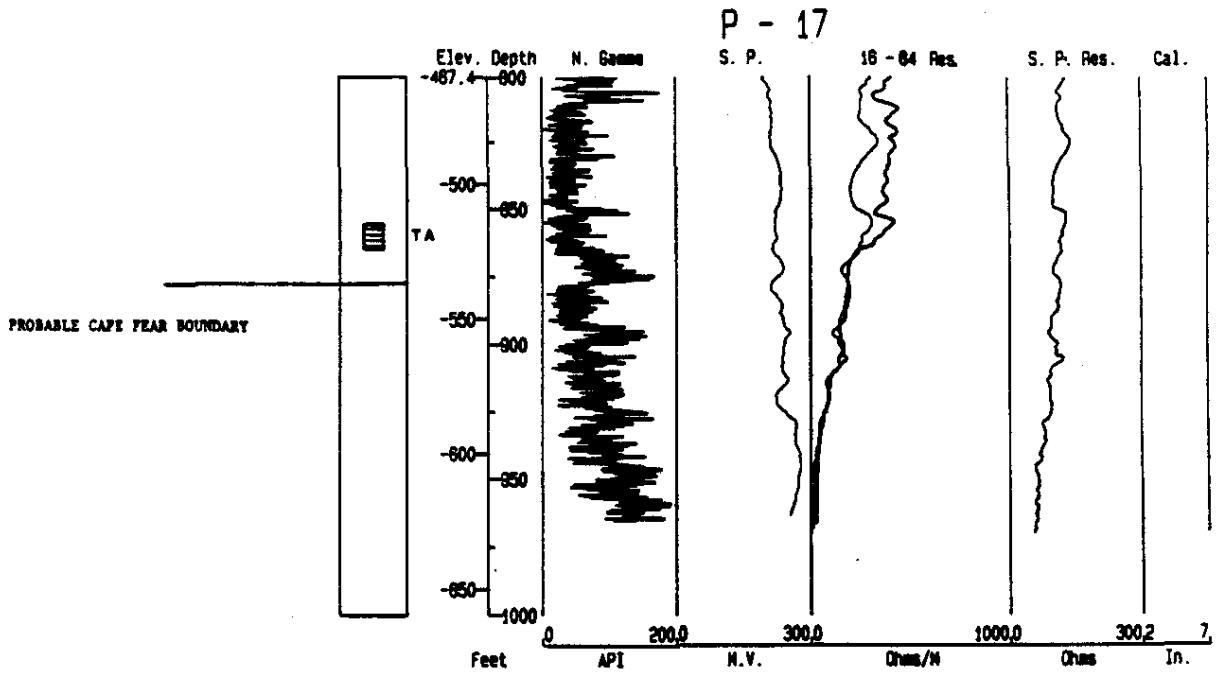


FIGURE 8, Contd

well, the approximately 100 ft of open hole below the bottom of the well and the bottom of the borehole was backgrouted. The locations of the screen zones for the remaining 7 wells installed at the site were selected based on data collected from the P-17TA boring. The 8 wells installed ranged in depth from about 65 ft for the water table well (P-17D) to 860 ft for the deepest well (P-17TA).

A profile of the cluster showing the relative depths of the different wells is presented on Figure 9. A summary of the wells is given on Table 4. Table 5 summarizes the location of the wells by geologic formation.

The water level elevations for each well in the cluster are also shown on Figure 9. The water table is found at approximate elevation 280 ft, or at a depth of about 53 ft below the ground surface within the Tobacco Road Formation (Barnwell). There was no indication of a perched water table at this site. In the Tertiary formations below the water table the hydraulic heads decrease with increasing depth from approximate elevation 277 ft in well P-17C, which is screened in the Dry Branch Formation (Barnwell), to approximate elevation 228 ft for wells P-17B and P-17A, which are screened in the upper Congaree and the lower Congaree/Williamsburg formations, respectively. Between well P-17C and P-17B there is a significant head drop (on the order of 50 ft) from approximate elevation 277 ft to elevation 228 ft. This head drop is probably supported by the clays within the McBean Formation which represent the "Green Clay" confining unit. Across the Ellenton Formation,

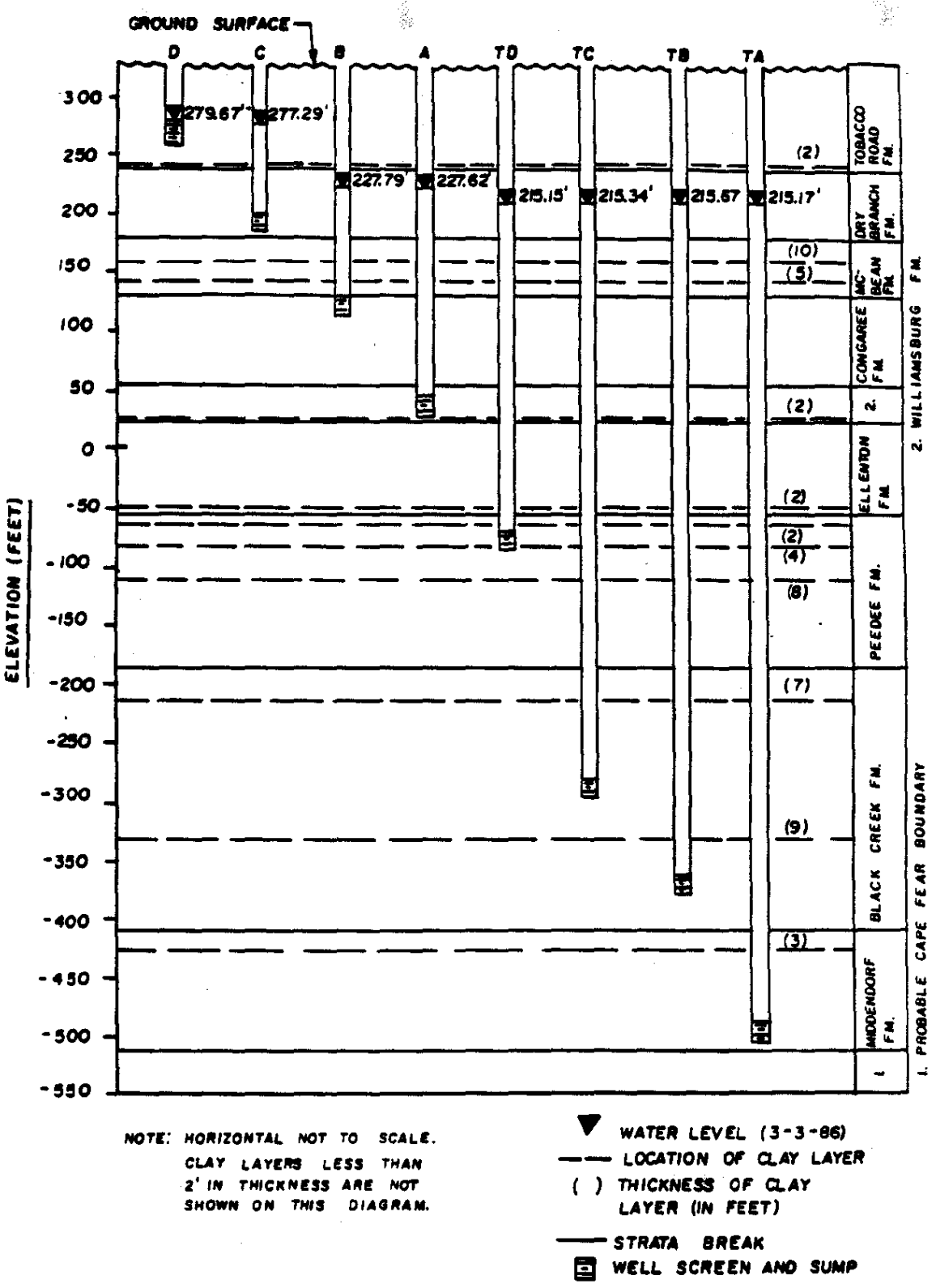


FIGURE 9. Profile of P-17 Well Cluster

TABLE 4

Cluster P-17 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	870	849.1 859.6	-4"Carbon Steel	#18 Slot Stainless Steel	846	839	865	332.6	335.04	N63199.1 E109791.0
TB	705	689.2 700.0	-4"Carbon Steel	#18 Slot Stainless Steel	685	678	705	332.3	334.85	N63204.7 E109805.0
TC	625	608.7 619.6	-4" Carbon Steel	#18 Slot Stainless Steel	603	595	625	332.2	334.61	N63210.0 E109818.7
TD	415	399.2 409.7	-4" Carbon Steel	#18 Slot Stainless Steel	395	388	415	332.0	334.35	N63215.3 E109833.1
A	303	289.9 300.0	4" Sch 40 PVC	#18 Slot PVC	287	281	303	331.6	334.04	N63201.3 E109837.3
B	215	200.0 210.0	-4" Sch 40 PVC	#18 Slot* PVC	196	185	215	332.0	334.31	N63196.0 E109823.6
C	145	130.0 140.0	-4" Sch 40 PVC	#18 Slot PVC	127	121	145	332.0	334.46	N63190.8 E109810.0
D	72	44.5 64.5	-4" Sch 40 PVC	#18 Slot PVC	42	36	70	332.2	334.54	N63184.8 E109794.5

* 3 inch screen set inside 4 inch between 197 feet and 214 feet.

TABLE 5

Screened Intervals for Cluster P-17

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-17D	332.2	45-65	287-267	Tobacco Road
P-17C	332.0	130-140	202-192	Dry Branch
P-17B	332.0	200-210	132-122	Congaree
P-17A	331.6	290-300	42-32	Williamsburg
P-17TD	332.0	400-410	-68 to -78	Peedee
P-17TC	332.2	610-620	-278 to -288	Upper Black Creek
P-17TB	332.3	690-700	-358 to -368	Lower Black Creek
P-17TA	332.6	850-860	-517 to -527	Middendorf

Note: All measurements are in feet.

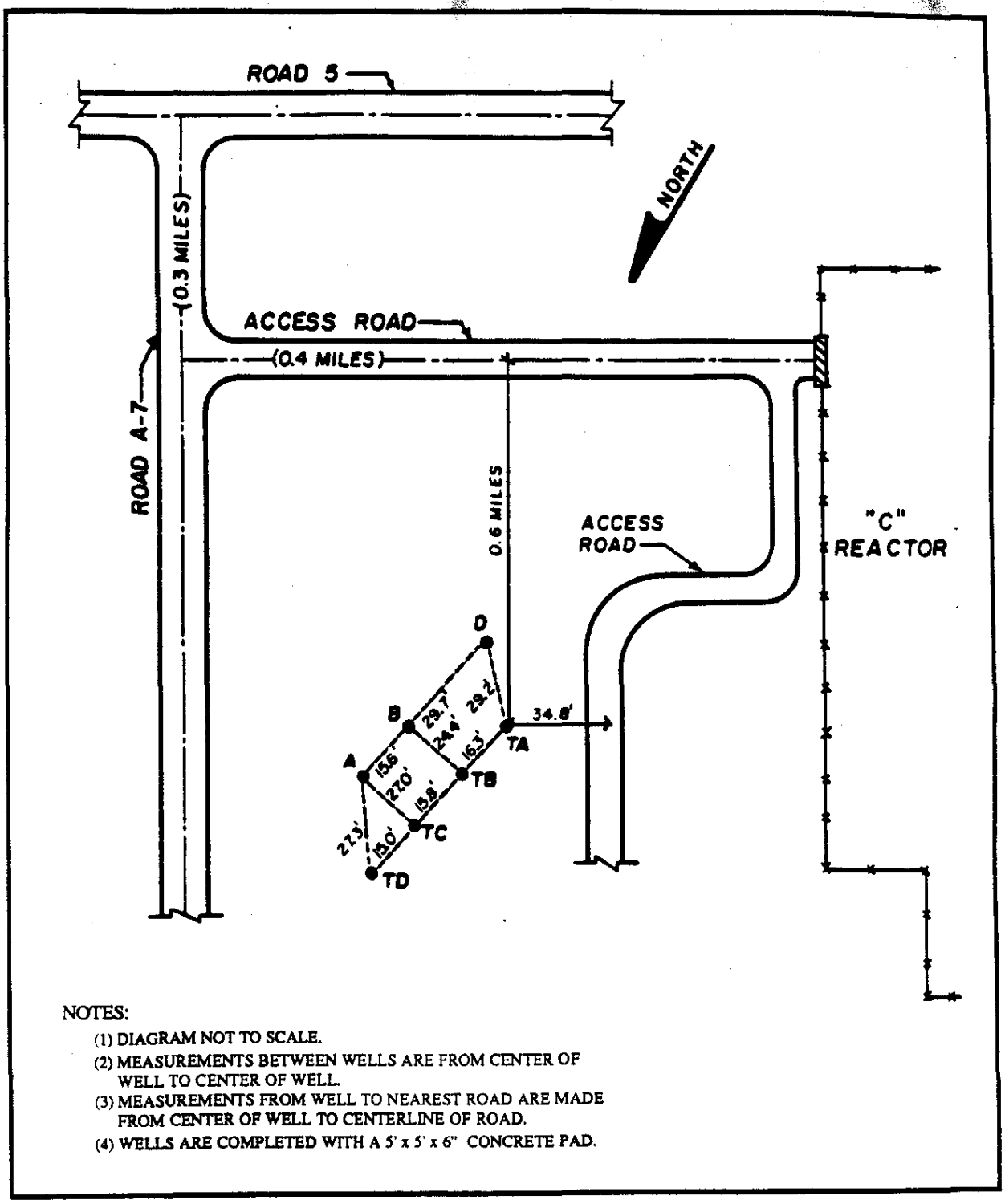
between the lower Congaree/Williamsburg and the uppermost Cretaceous well, P-17TD, which is screened in the Peedee Formation, there is a decline in the head of about 13 ft from elevation 228 ft to 215 ft in P-17TD. Heads in each of the four Cretaceous wells (P-17TD, TC, TB, TA) are very uniform at about elevation 215 ft.

P-18 CLUSTER

Th P-18 cluster is located in C Area in the immediate vicinity of well 52-C, the type locality for the Ellenton Formation designated by Siple. The location and layout of the individual wells in the cluster are shown on Figure 10. The ground surface elevation at the site is approximately 296 ft above mean sea level.

The deep exploratory boring, P-18TA, was continuously cored from the ground surface to a total depth approximately 950 ft below the ground surface (approx. elevation -654 ft). Since no known cores or samples exist for the Ellenton from the type locality, two additional cores were obtained from the formation during drilling at the site. The graphic log and the geophysical logs for the corehole are presented on Figure 11. Lithologic descriptions for the core are contained in Appendix C.

Based on the data collected from the corehole, a total of 7 wells were selected for this cluster site. These wells range from approximately 90 ft below the ground surface for the water table well (P-18D) to approximately 850 ft for the deepest well in the cluster ((P-18TA). Prior to installing P-18TA, the open hole below



NOTES:

(1) DIAGRAM NOT TO SCALE.

(2) MEASUREMENTS BETWEEN WELLS ARE FROM CENTER OF WELL TO CENTER OF WELL.

(3) MEASUREMENTS FROM WELL TO NEAREST ROAD ARE MADE FROM CENTER OF WELL TO CENTERLINE OF ROAD.

(4) WELLS ARE COMPLETED WITH A 5' x 5' x 6" CONCRETE PAD.

FIGURE 10. Location and Layout Map for Well Cluster P-18

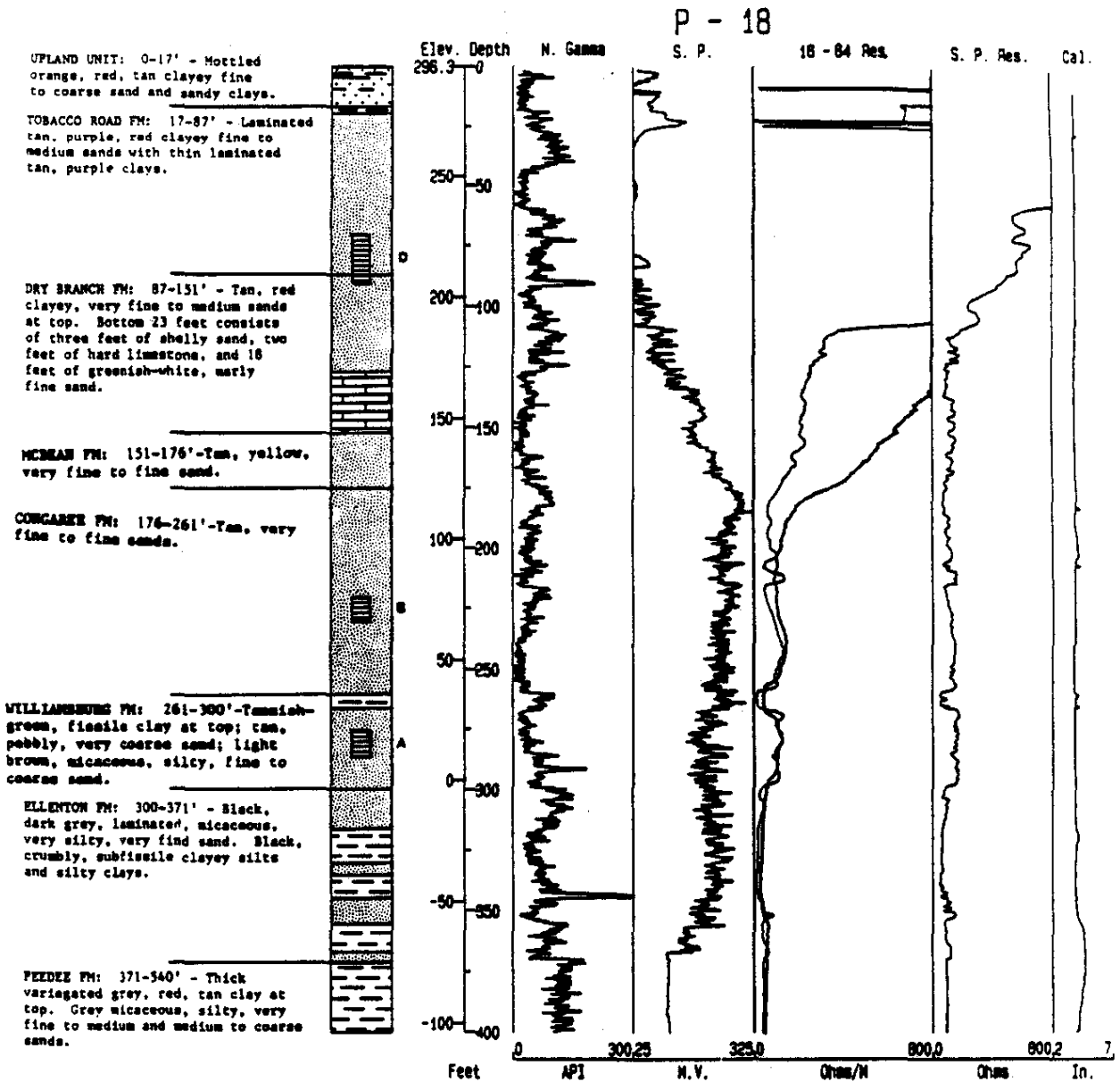


FIGURE 11. Graphic and Geophysical Logs for P-18TA

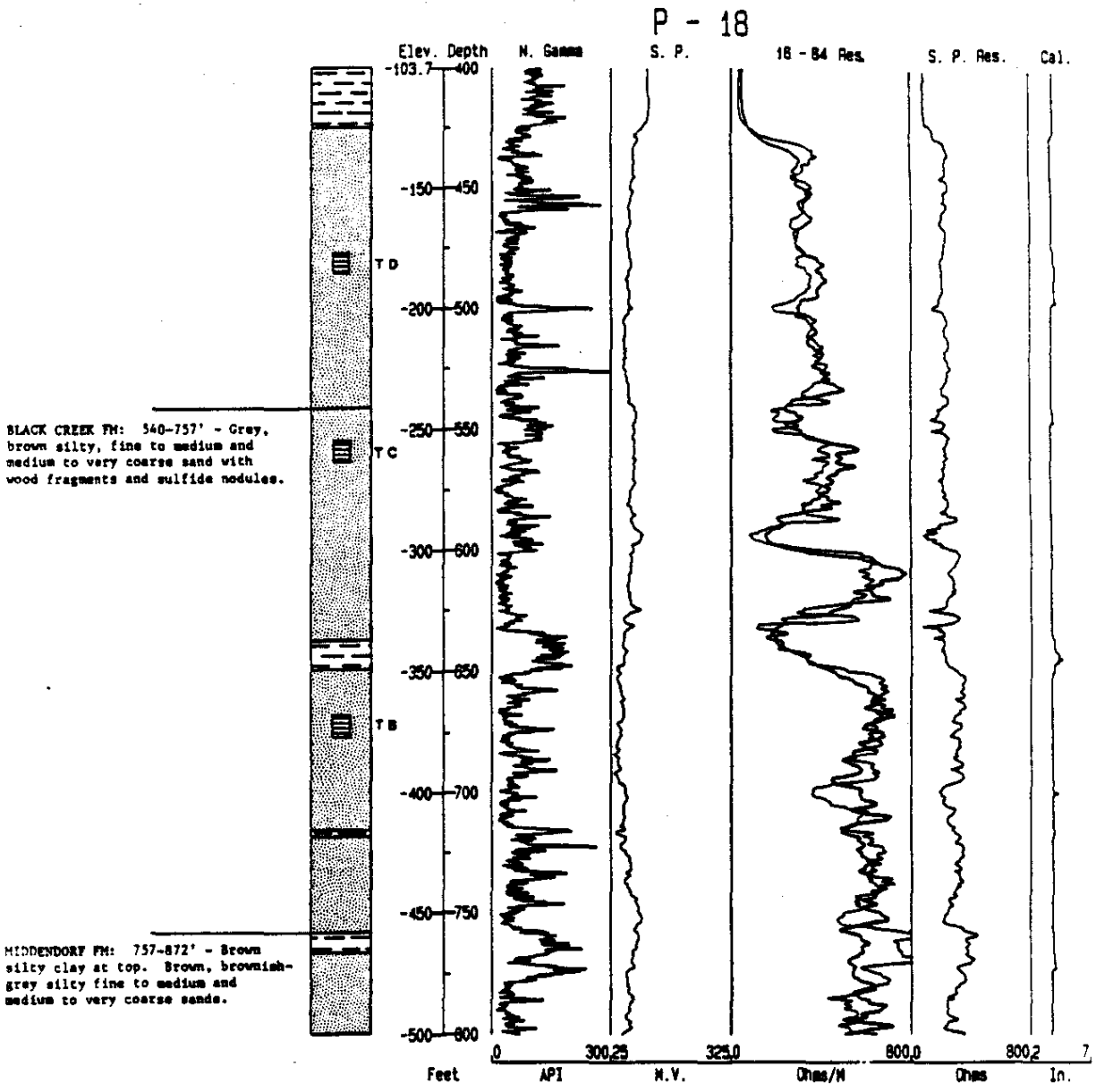


FIGURE 11, Contd

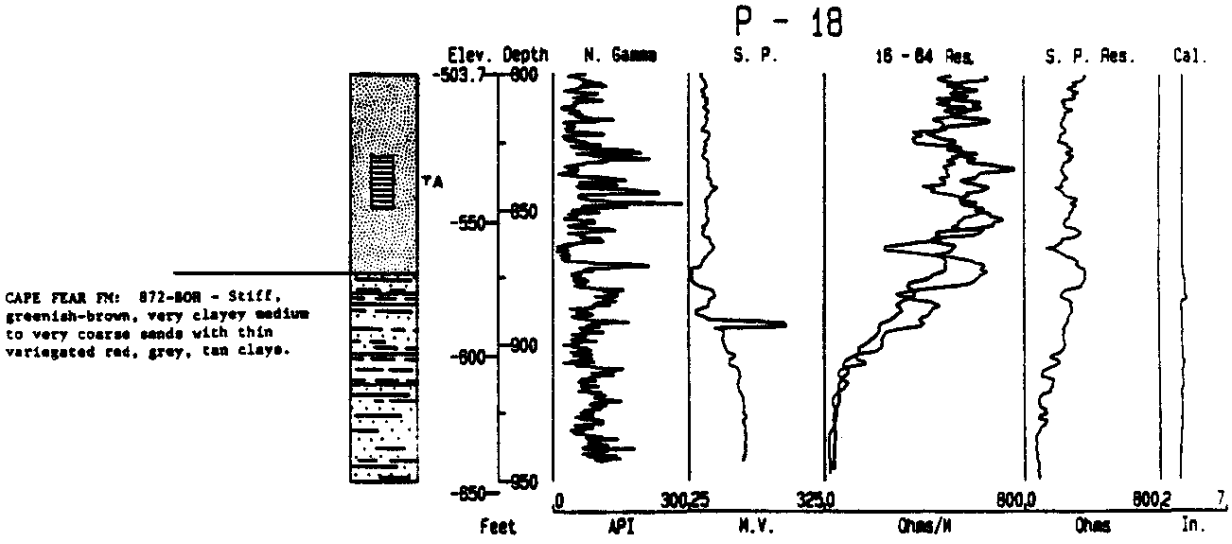


FIGURE 11, Contd

the bottom of the well and the bottom of the boring was back-grouted. A profile for the cluster is presented on Figure 12. The completion summaries for the wells are shown on Table 6. A summary of the formations and depths the wells are completed at are shown on Table 7.

The water table, as shown on Figure 12, is found at approximate elevation 224 ft (a depth of about 73 ft below the ground surface) within the Tobacco Road Formation (Barnwell). No perched water was observed at the site. With the exception of well P-18A, which is screened in a sand unit of the Williamsburg Formation immediately above the Ellenton clays, all of the wells at the cluster below the water table have piezometric heads which are about the same magnitude; i.e., about elevation 169 ft. The head in P-18A was measured at elevation 179 ft which is about 10 ft higher than wells above and below. The reason for this higher head in P-18A than in the well above (P-18B) is not known, especially since there were no significant clay units between the two wells. Due to the lithologic character of the sediments below the water table well, the second well (P-18B) at the site was installed in the middle of the Congaree Formation at a depth of approximately 230 ft below the ground surface. Between these two wells the head decreases from about elevation 224 ft at the water table to about elevation 169 ft in the Congaree, a decline of about 55 ft over the interval.

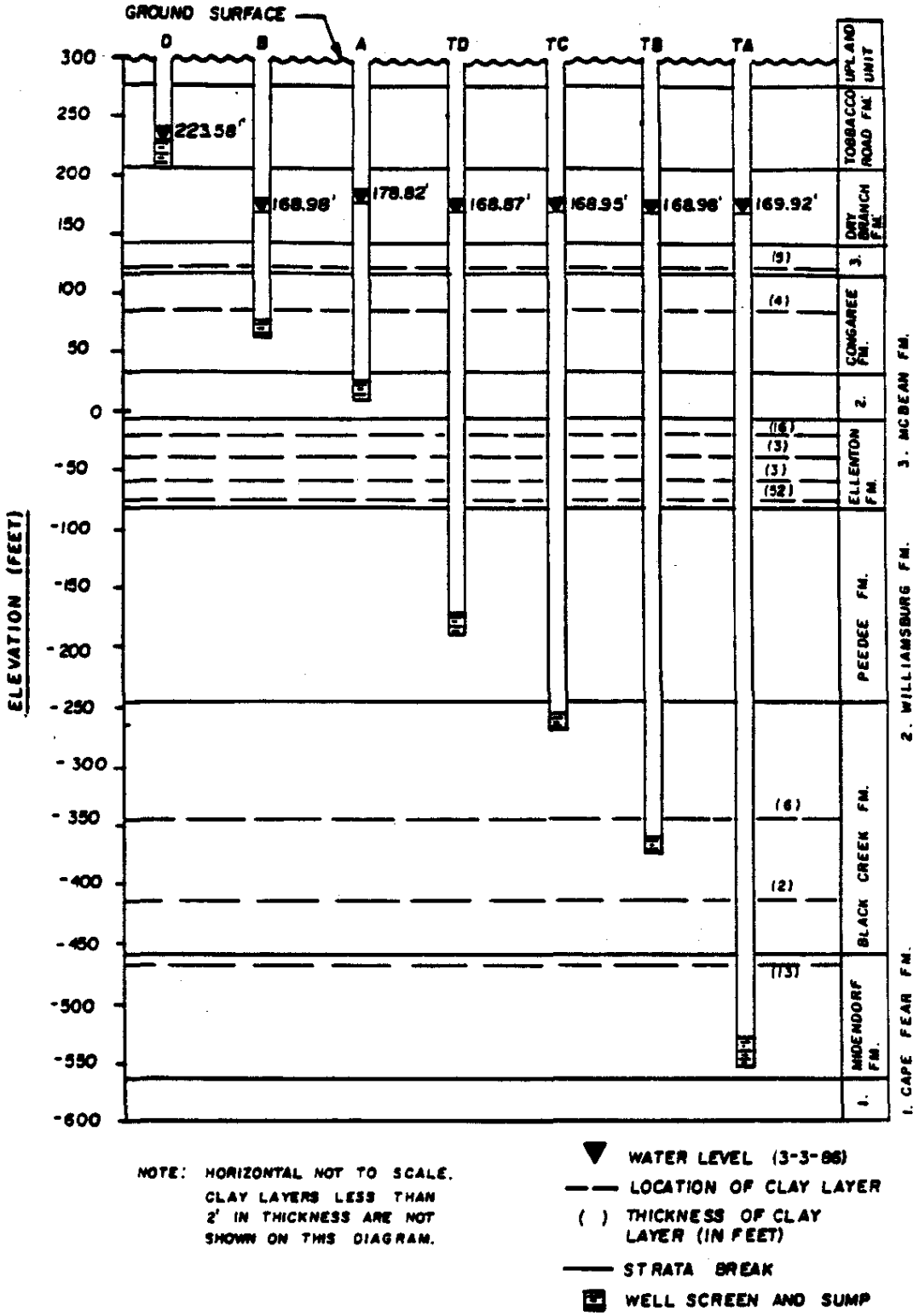


FIGURE 12. Profile of P-18 Well Cluster

TABLE 6

Cluster P-18 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	860	828.6 850.0	-4" Carbon Steel	#18 Slot Stainless Steel	821	813	855	296.3	298.67	N67578.5 E47652.7
TB	682	665.1 675.7	-4" Carbon Steel	#18 Slot Stainless Steel	662	656	681	296.2	298.68	N67592.7 E47660.6
TC	570	554.2 564.7	-4" Carbon Steel	#18 Slot Stainless Steel	551	545	570	296.3	298.70	N67605.8 E47669.6
TD	492	474.2 484.7	-4"Carbon Steel	#18 Slot Stainless Steel	471	465	490	295.6	297.87	N67618.1 E47678.0
A	290	274.5 284.5	-4" Sch 40 PVC	#18 Slot PVC	271	265	290	295.9	298.37	N67592.8 E47688.1
B	235	219.5 229.5	-4" Sch 40 PVC	#18 Slot PVC	216	210	235	295.9	298.18	N67578.9 E47680.9
D	93	69.9 89.9	-4"Sch 40 PVC	#18 Slot PVC	67	61	93	296.3	298.73	N67552.8 E47666.6

TABLE 7

Screened Intervals for Cluster P-18

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-18D	296.3	70-90	226-206	Tobacco Road
P-18B	295.9	220-230	76-66	Congaree
P-18A	295.9	275-285	21-11	Williamsburg
P-18TD	295.6	476-486	-180 to -190	Peedee
P-18TC	296.3	554-564	-258 to -268	Upper Black Creek
P-18TB	296.2	666-676	-370 to -380	Lower Black Creek
P-18TA	296.3	830-850	-534 to -554	Middendorf

Note: All measurements are in feet.

P-19 CLUSTER

Cluster P-19 is located in the center of the plant at the site of existing wells DRB-9 and P-10A. The cluster is approximately 0.8 mile west of SRP Road F and south of SRP Road 6. The location of the cluster and the layout of the individual wells in the cluster are shown on Figure 13. Ground surface elevation at the site is about 297 ft above mean sea level.

DRB-9 is a deep rock piezometer drilled to a depth of approximately 2700 ft below ground surface and set into the crystalline bedrock. P-10A is a Middendorf (lower "Tuscaloosa") observation well screened between depths of approximately 841-851 ft. Boring P-19TA was continuously cored from the ground surface to a total depth of 990 ft (approximate elevation -693 ft). A graphic log showing the lithology compared to the geophysical logs is shown on Figure 14. A detailed geologic log of the core is presented in Appendix D.

Based on the data collected from the corehole (P-19TA), a total of 8 zones were selected for setting observation wells. These wells range in depth from about 45 ft for the water table well (P-19D) to about 765 ft for the deepest well (P-19TA). A profile of the cluster showing the depth relationships of the different screen zones is shown on Figure 15. Also shown on Figure 15 are the locations of the major clays and clayey zones. A completion summary for the cluster is given on Table 8. Table 9 summarizes the location of the wells with respect to geologic formation.

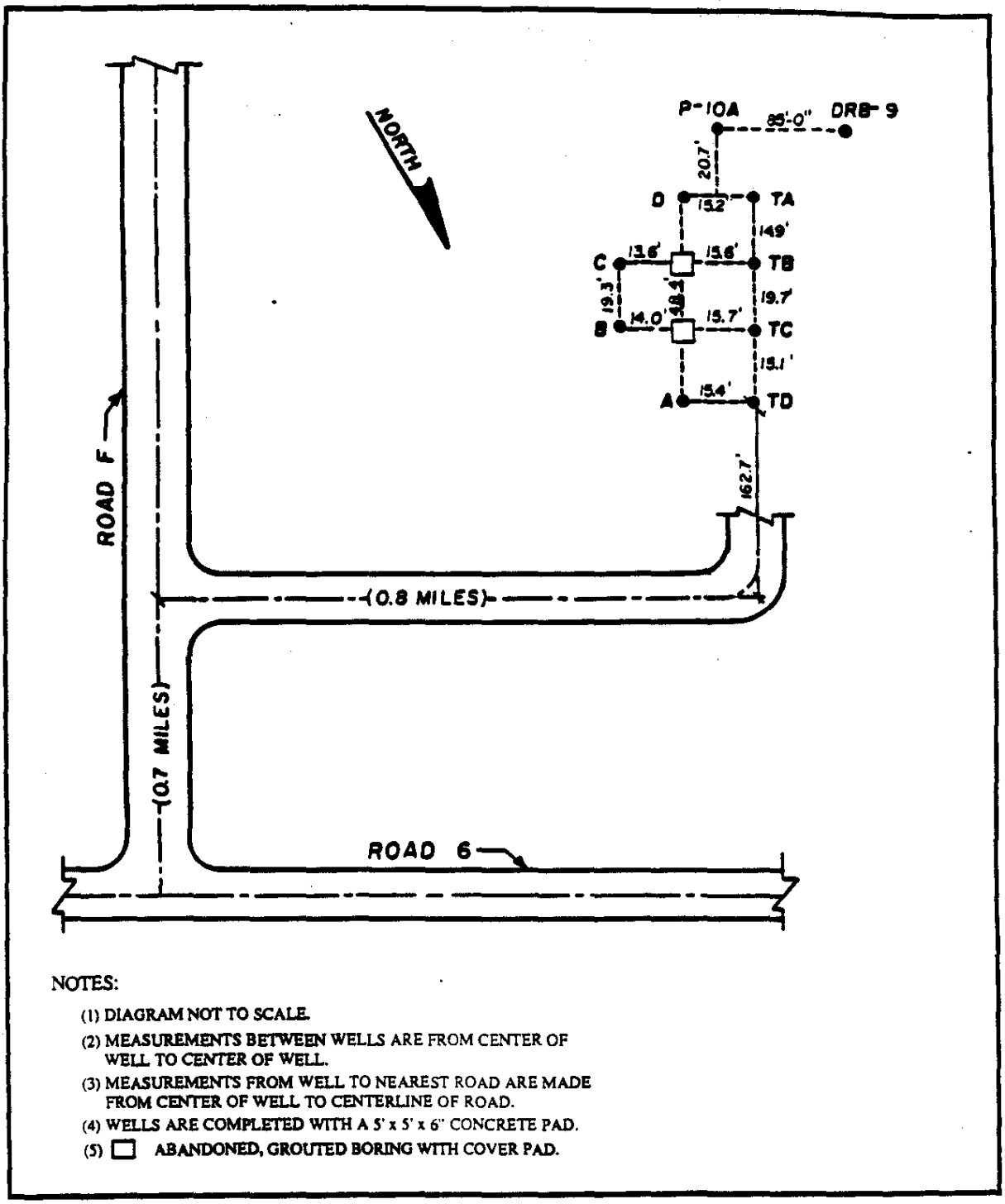


FIGURE 13. Location and Layout Map for Well Cluster P-19

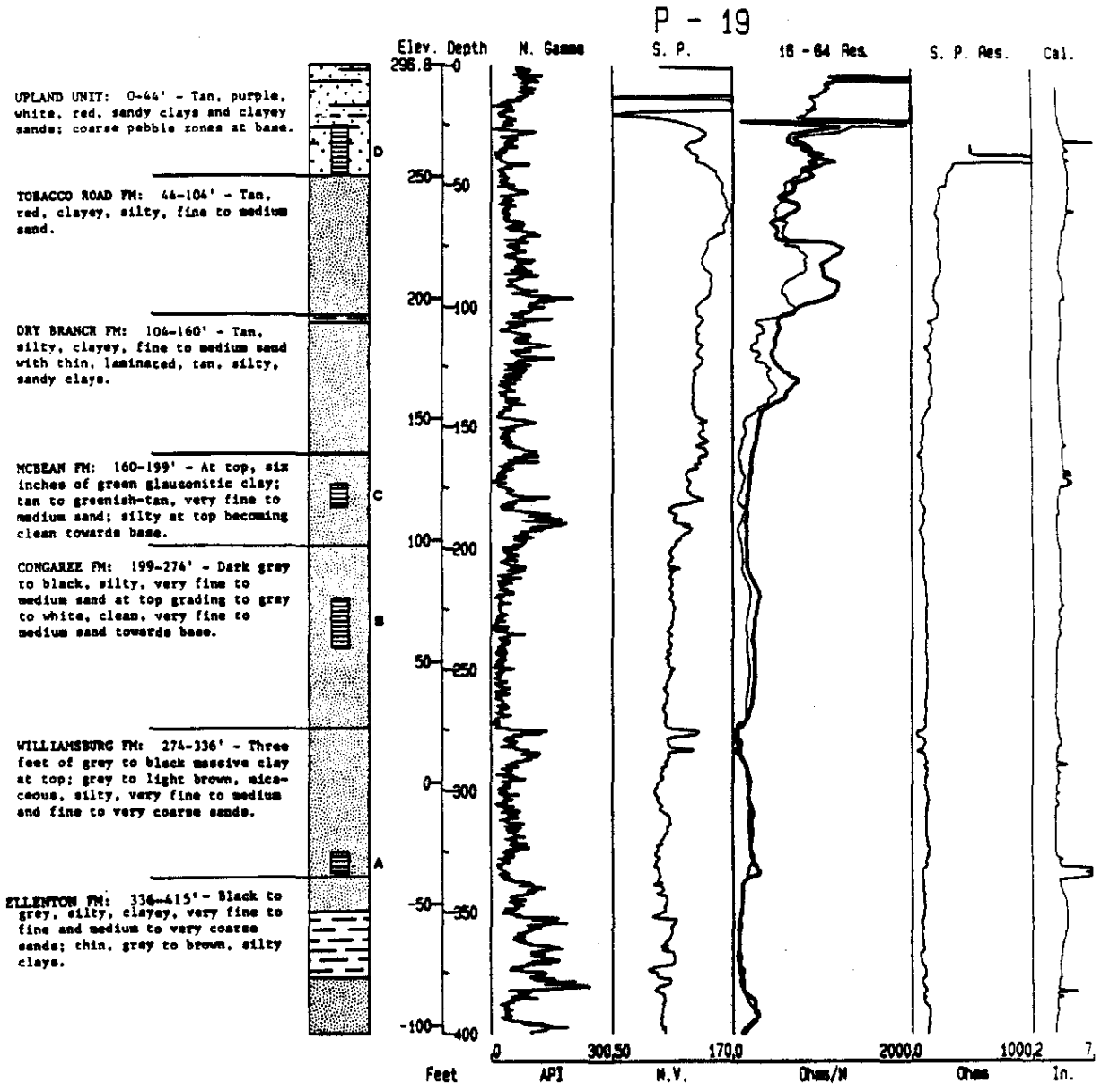


FIGURE 14. Graphic and Geophysical Logs for P-19TA

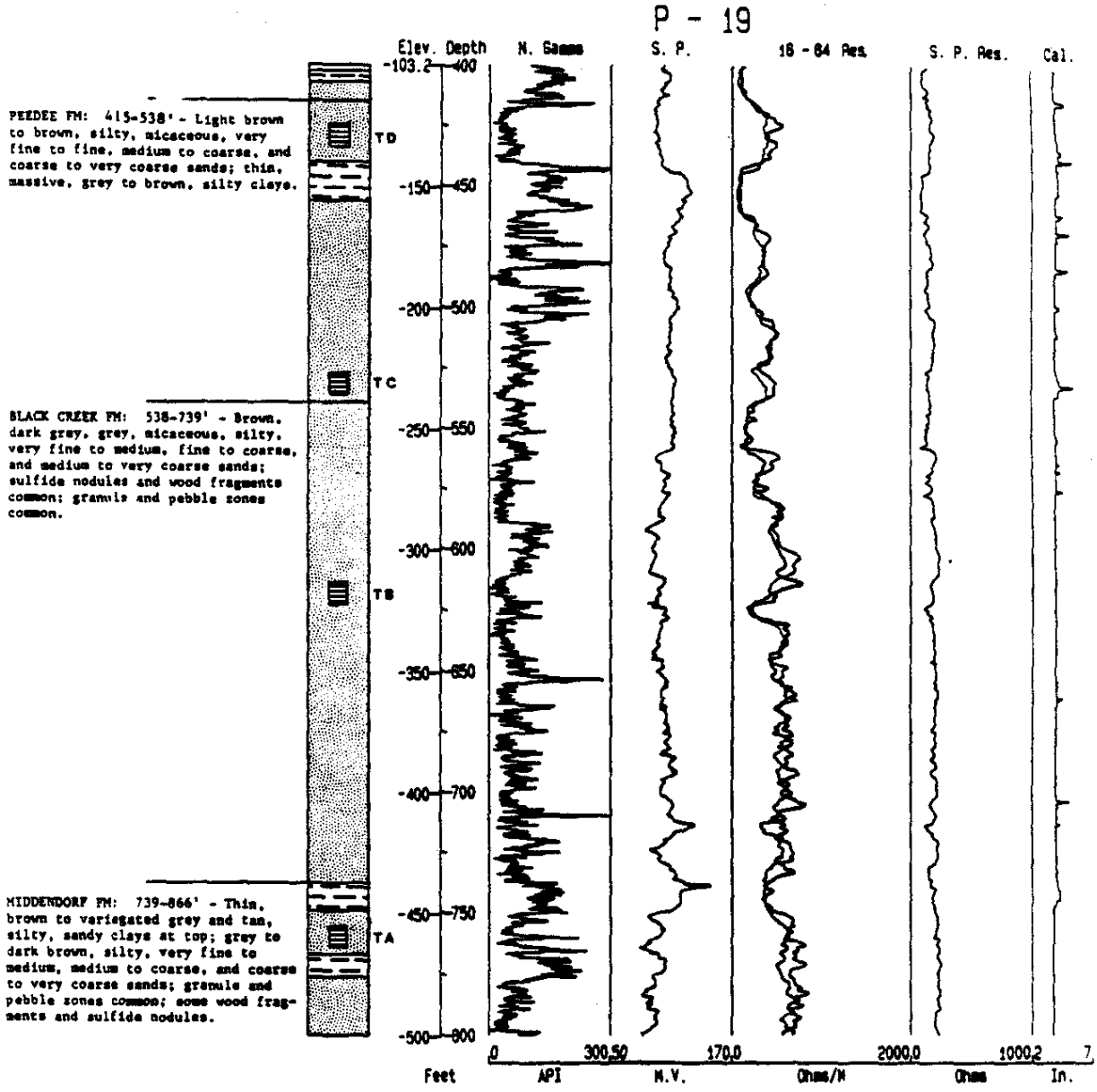


FIGURE 14, Contd

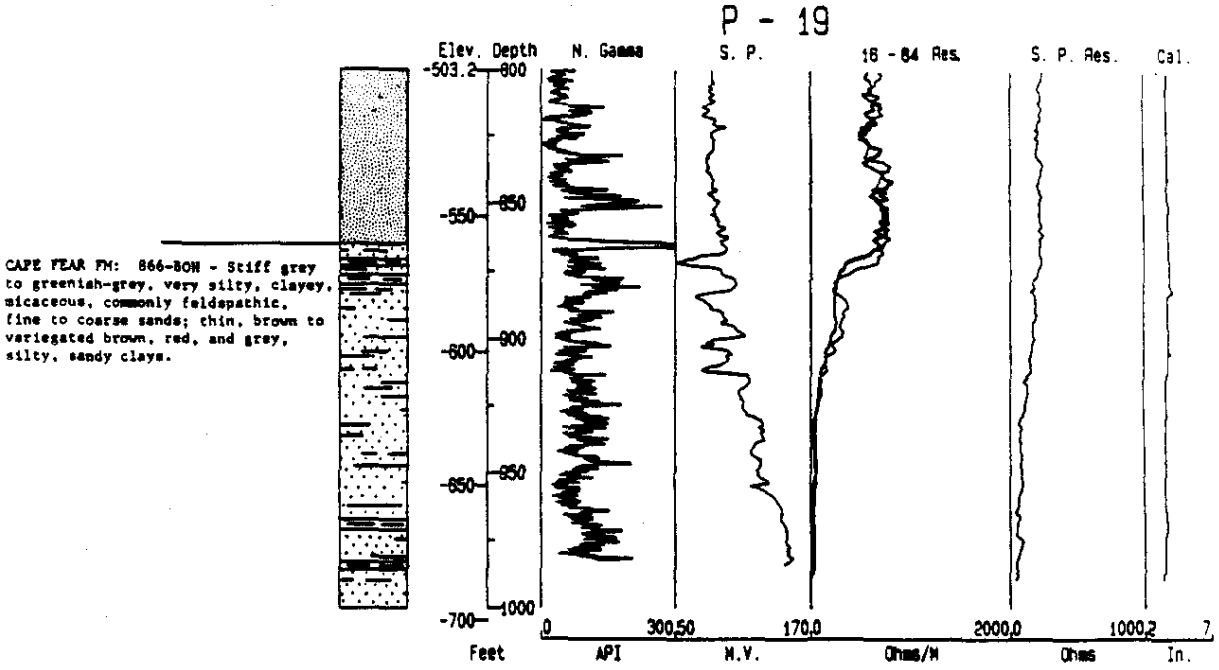


FIGURE 14, Contd

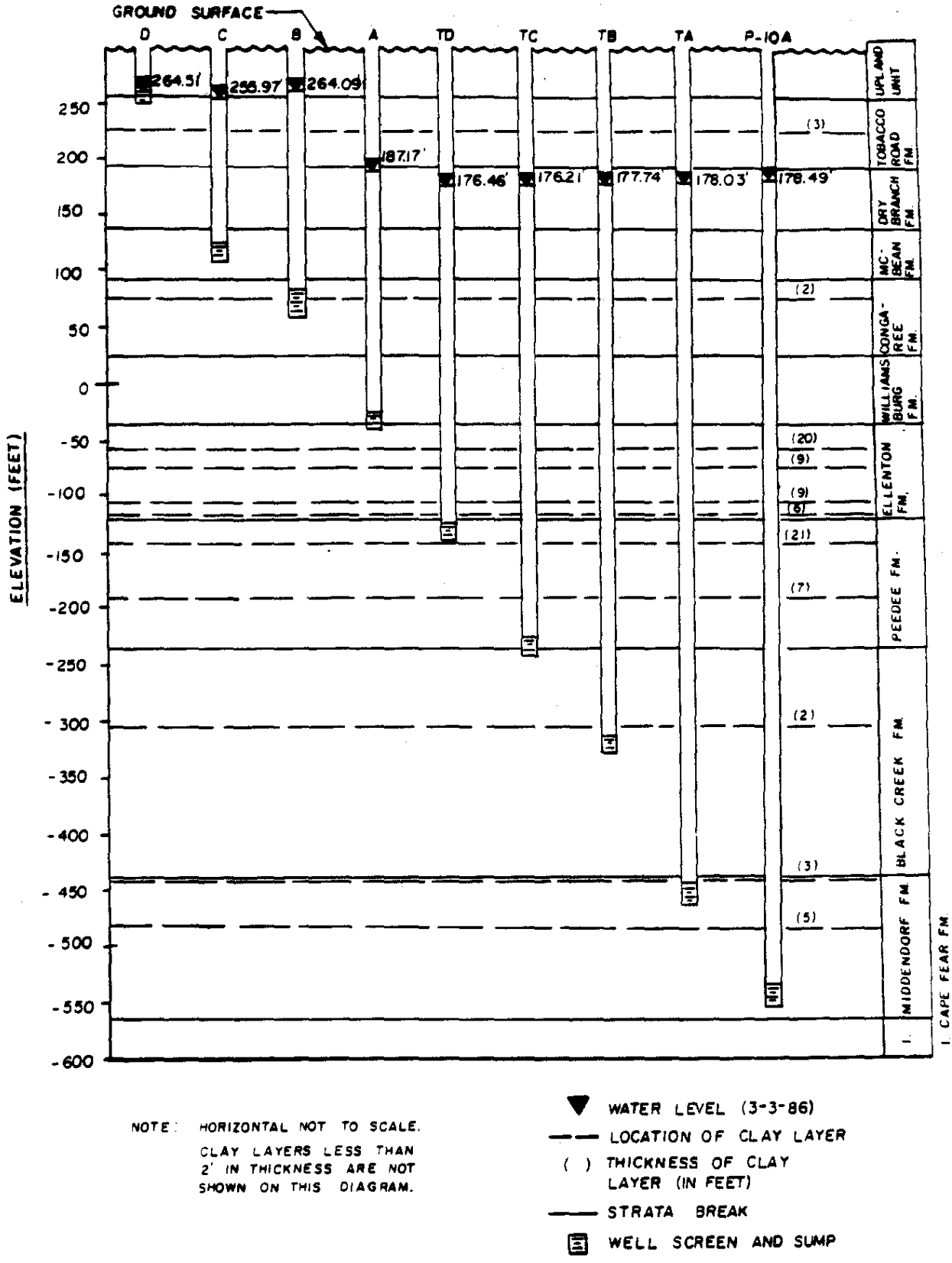


FIGURE 15. Profile of P-19 Well Cluster

TABLE 8

Cluster P-19 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	775	754.1 764.7	-4" Carbon Steel	#18 Slot Stainless Steel	751	745	770	296.8	299.35	N55295.9 E60034.6
TB	632	612.1 622.7	-4" Carbon Steel	#18 Slot Stainless Steel	608	600	628	297.0	299.53	N55309.8 E60029.4
TC	551	527.0 537.6	-4" Carbon Steel	#18 Slot* Stainless Steel	523	516	542	297.1	299.59	N55328.2 E60022.2
TD	440	424.0 434.7	-4" Carbon Steel	#18 Slot Stainless Steel	419	411	440	296.8	299.33	N55342.1 E60016.8
A	342	324.5 335.7	-4" Carbon Steel	#18 Slot Stainless Steel	315	308	341	297.4	299.84	N55347.1 E60031.3
B	252	220.0 240.0	-4" Sch. 40 PVC	#18 Slot PVC	216	207	245	297.7	300.09	N55336.4 E60050.7
C	192	173.0 183.1	-4" Sch. 40 PVC	#18 Slot PVC	167	160	188	297.7	300.29	N55321.5 E60056.1
D	50	24.5 44.5	-4" Sch. 40 PVC	#18 Slot PVC	19			297.3	299.71	N55301.9 E60048.7
P-10A	851	841.0 851.0	6" Black Iron	#20 Slot Steel				296.7	299.74	N55280.0 E60049.0

Note: P-10A installed as part of an earlier program.

TABLE 9

Screened Intervals for Cluster P-19

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-19D	297.3	23-45	272-252	Upland Unit
P-19C	297.7	173-183	125-115	McBean
P-19B	297.7	220-240	78-58	Congaree
P-19A	297.4	325-335	-28 to -38	Williamsburg
P-19TD	296.8	425-435	-128 to -138	Upper Peedee
P-19TC	297.1	527-537	-230 to -240	Lower Peedee
P-19TB	297.0	613-623	-316 to -326	Black Creek
P-19TA	296.8	755-765	-458 to -469	Middendorf
P-10A	296.7	841-851	-544 to -554	Middendorf

Note: All measurements are in feet.

With the existence of observation well P-10A at this site there are a total of 9 wells completed in the coastal plain sediments. Four of these wells are completed in the Tertiary formations and 5 are completed in the Cretaceous formations. The measured piezometric heads in each of these wells are presented in Figure 15. The water table at the site is found at a depth of about 33 ft below the ground surface, approximate elevation 265 ft within the Upland Unit (Hawthorn Formation). No perched water was encountered. Between the water table and the McBean Formation (P-19C) the hydraulic head decreases about 11 ft over a vertical distance of about 138 ft, from elevation 265 ft to approximate elevation 256 ft. However, between the McBean Formation (P-19C) and the Congaree Formation (P-19B screened at a depth of about 240 ft), there is an increase in the piezometric head of about 8 ft from elevation 256 ft to elevation 264 ft. Water levels in the well (P-19A) screened in the sand unit immediately overlying the clays of the Ellenton Formation are found at an elevation of about 187 ft, approximately 77 ft lower than in the Congaree well (P-19B). Across the Ellenton Formation the heads decrease from approximate elevation 187 ft to approximate elevation 176 ft. Heads in the wells completed in the Cretaceous section increase slightly with increasing depth from approximate elevation 176 ft in wells P-19TD and P-19TC to approximately 178 ft in wells P-19TB, P-19TA, and P-10A.

P-20 CLUSTER

The P-20 cluster is located in R Area approximately 185 ft off of SRP Road G-1. Figure 16 shows the detail location and individual well layout at the cluster. The approximate ground surface elevation at the site is 287 ft above mean sea level.

The deep exploratory boring (P-20TD) was continuously cored from the ground surface to a total depth of about 450 ft below ground surface (approximate elevation - 163 ft). The boring terminated in the Peedee Formation (upper "Tuscalossa" aquifer). The results of the coring and geophysical logging are presented on Figure 17. A detailed geologic log is provided in Appendix E.

In all a total of 4 wells were installed at the site. These wells range in depth from abut 65 ft for the water table well (P-20D) to about 445 ft for the deepest well in the cluster (P-20TD). A profile of the cluster wells is presented on Figure 18 along with the approximate locations of the major clay and clayey zones. Table 10 is a well completion summary for the cluster. A summary of the screen locations with respect to geologic formation is provided on Table 11.

With the exception of well P-20TD (Peedee Formation) all of the wells at the site are completed within the Tertiary formations. Well P-20TD is completed at a total depth of abut 445 ft in the Peedee Formation (upper "Tuscaloosa" of Siple). The water table is in the Tobacco Road Formation (Barnwell) at a depth of about 23 ft below the ground surface (approximate elevation 265 ft) in well

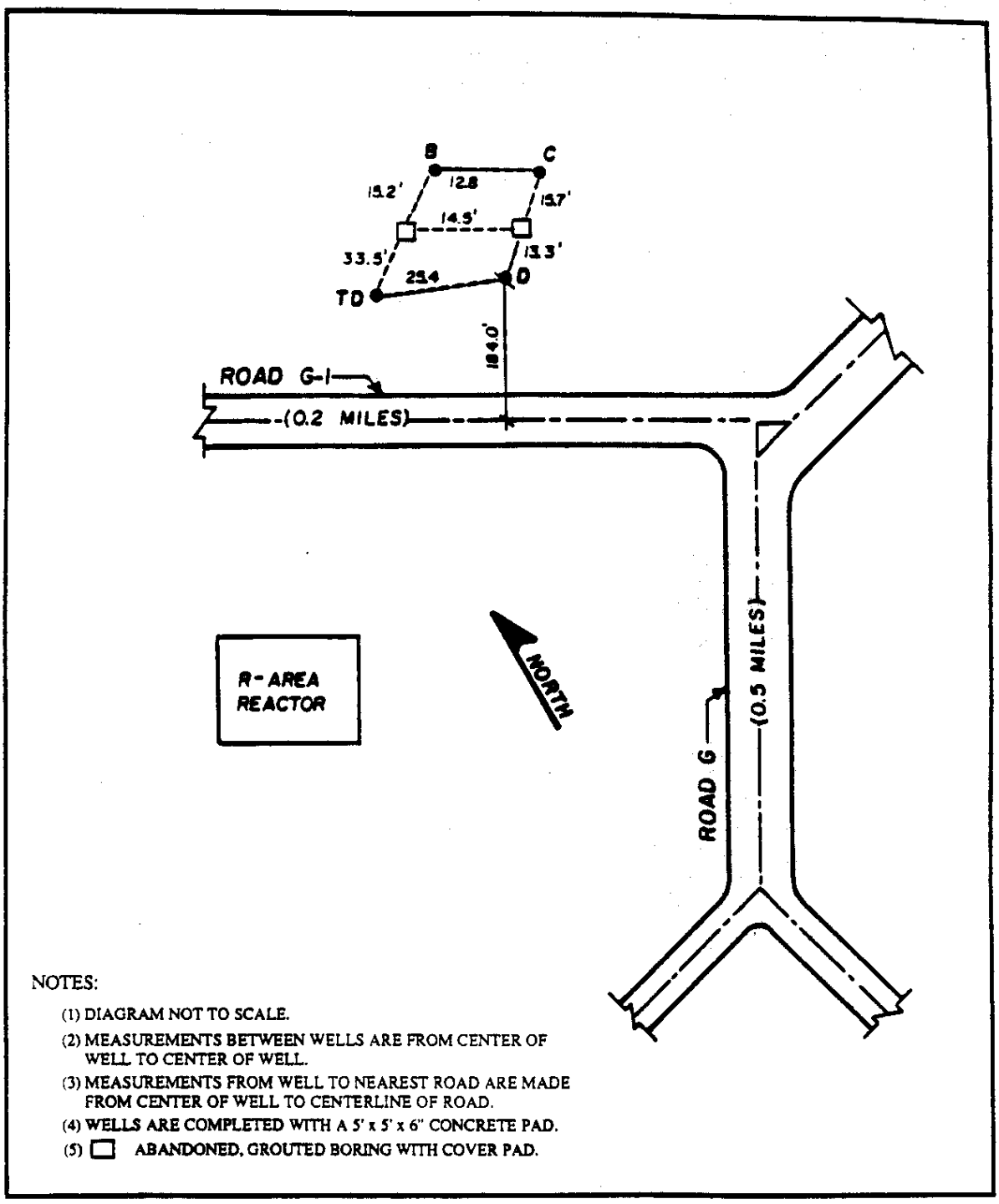


FIGURE 16. Location and Layout Map for Well Cluster P-20

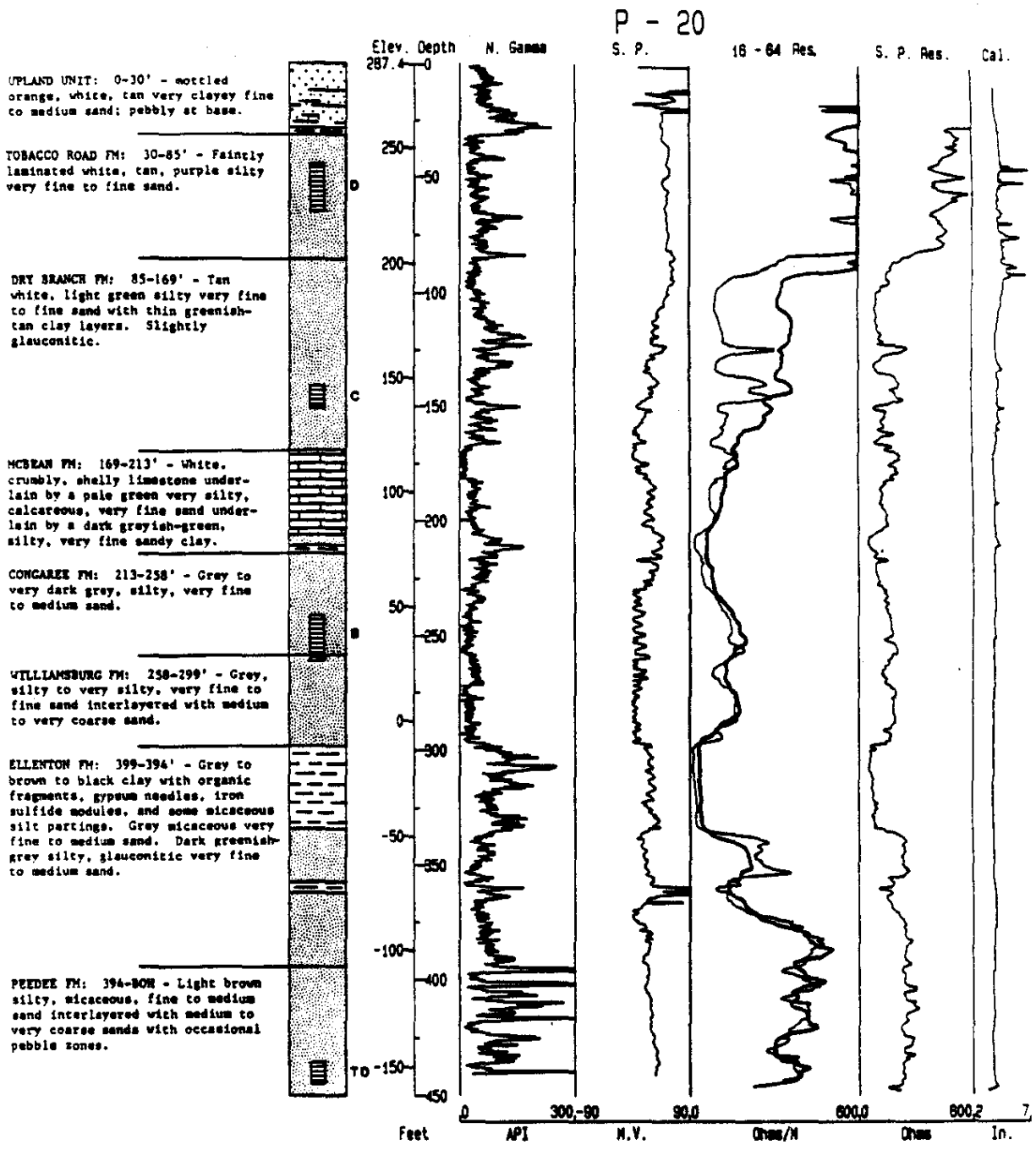


FIGURE 17. Graphic and Geophysical Logs for Well P-20TD

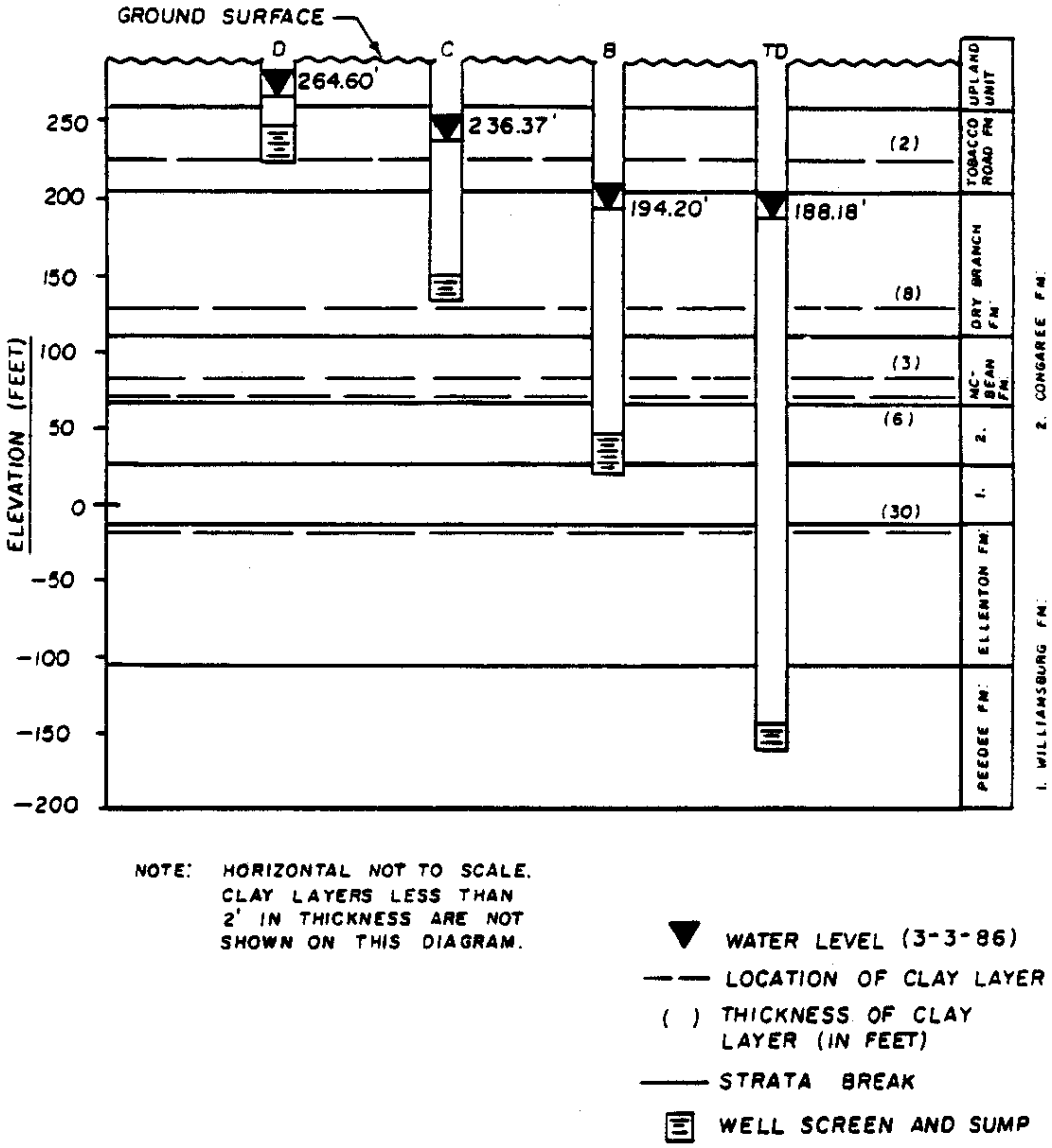


FIGURE 18. Profile of P-20 Well Cluster

TABLE 10

Cluster P-20 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TD	455	435.0 - 445.7	4" Carbon Steel	#18 Slot Stainless Steel	427	418	450	287.4	289.83	N56094.1 E76768.1
B	270	239.5 - 259.4	4" Sch 40 PVC	#18 Slot PVC	236	230	265	287.6	298.45	N56081.7 E76816.7
C	155	139.5 - 149.5	4" Sch 40 PVC	#18 Slot PVC	133	127	155	287.3	289.27	N56067.7 E76814.0
D	70	43.3 - 62.9	4" Sch 40 PVC	#18 Slot PVC	40	37	66	287.1	289.59	N56075.2 E76784.5

TABLE 11

Screened Intervals for Cluster P-20

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-20D	287.1	43-63	244-224	Tobacco Road
P-20C	287.3	140-150	147-137	Dry Branch
P-20B	287.6	240-260	48-28	Congaree
P-20TD	287.4	435-445	-148 to -158	Peedee

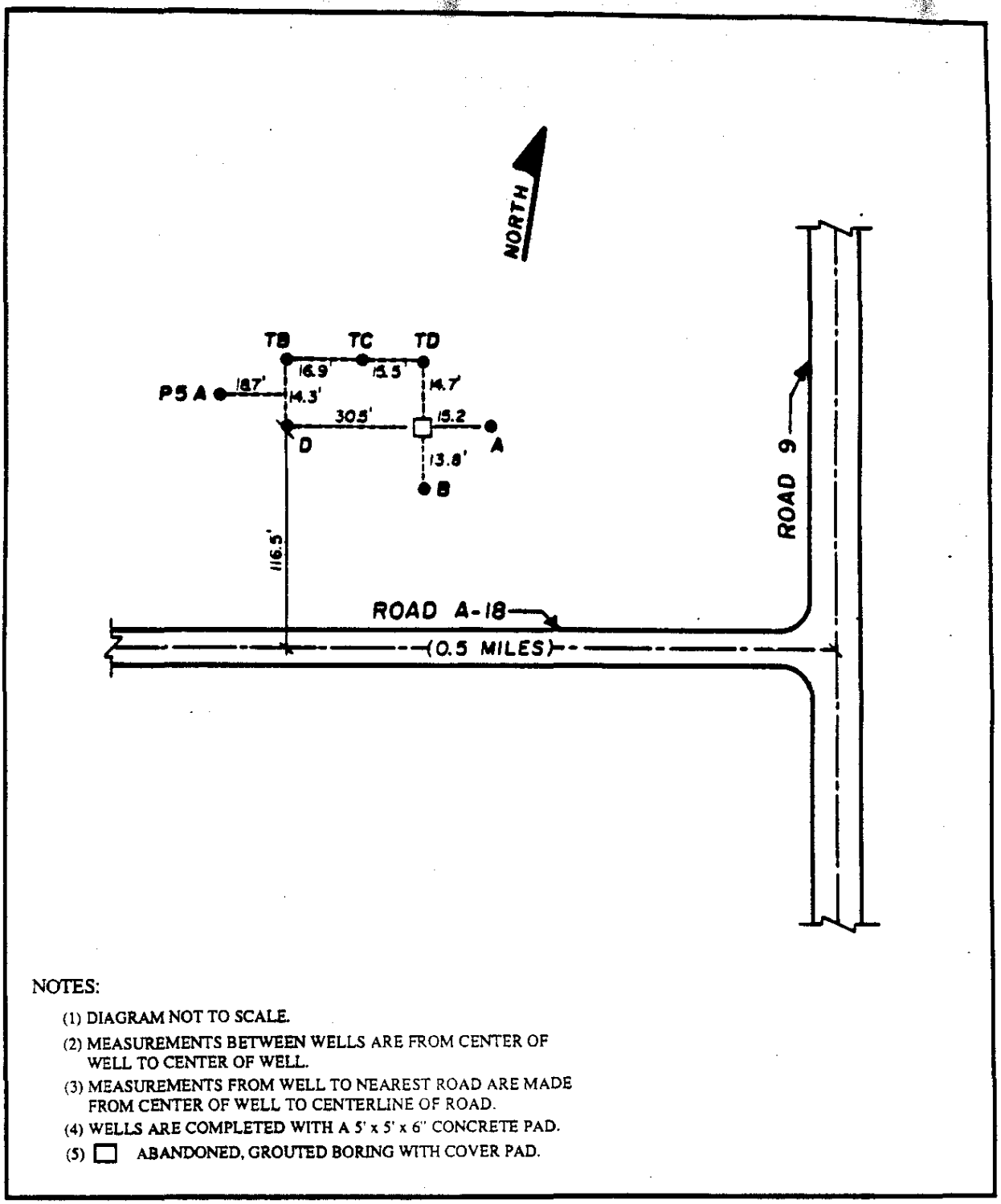
Note: All measurements are in feet.

P-20D. The hydraulic head in well P-20C which is screened in the Dry Branch Formation (Barnwell Formation of Siple) is at an elevation of about 236 ft, about 29 ft below the water table surface. The water level in well P-20B, which is screened in the Congaree/Williamsburg Formation, is at an elevation of about 243 ft, or about 7 ft above the level in well P-20C. Well P-20TD is completed within the first significant sand unit below the Ellenton Formation. There is a drop in head across the Ellenton of about 55 ft to approximate elevation 188 ft.

P-21 CLUSTER

Cluster P-21 is located in the southern portion of the SRP site, approximately 0.5 mile west of SRP Road 9 and adjacent to SRP Road A-18. Also located at the site are wells P-5R and P-5A. The detail location and individual well layout for the cluster is shown on Figure 19. Ground surface elevation at the site is about 206 ft above mean sea level.

Well P-5R is a deep rock piezometer that is set into the Triassic age rocks of the Dunbarton Basin. The total depth of the well is about 1300 ft below ground surface. P-5A is a Middendorf (lower "Tuscaloosa") observation well screened between approximately 973-983 ft. Exploratory boring P-21TA was cored from the ground surface through the Middendorf Formation ("Tuscaloosa") terminating in the Cape Fear Formation. The total depth of the boring was about 1150 ft below the ground surface (approximate elevation -944 ft). A graphic log of the P-21TA corehole along



NOTES:

(1) DIAGRAM NOT TO SCALE.

(2) MEASUREMENTS BETWEEN WELLS ARE FROM CENTER OF WELL TO CENTER OF WELL.

(3) MEASUREMENTS FROM WELL TO NEAREST ROAD ARE MADE FROM CENTER OF WELL TO CENTERLINE OF ROAD.

(4) WELLS ARE COMPLETED WITH A 5' x 5' x 6" CONCRETE PAD.

(5) ☐ ABANDONED, GROUTED BORING WITH COVER PAD.

FIGURE 19. Location and Layout Map for Well Cluster P-21

with the reduced geophysical logs is presented on Figure 20. Because of hole stability problems, gamma, spontaneous potential, and caliper logs were not obtained below a depth of about 600 ft in the uncased borehole. Detail lithologic descriptions of the sediments encountered are found in Appendix F.

After evaluating the data collected from the corehole (P-21TA), 6 zones for placement of observation wells were chosen. Because well P-5A was screened in the lower "Tuscaloosa" aquifer it was decided not to install a well in this horizon. Therefore, the open hole from the bottom of the corehole to the designed bottom of the deep well was backgrouted. The TA corehole was reamed and the TB well set at a depth of approximately 815 ft below ground surface. (Note: There is no TA well at the P-21 site. The TA notation has been maintained, however, for the designation of the deep corehole.) The 6 wells installed at the site range in depth from about 80 ft for the water table well (P-21D) to 815 ft for the deepest well in the cluster (P-21TB). A profile of the well cluster showing the relative screen locations for all the P-21 wells plus well P-5A along with the major clay units encountered while drilling P-21TA is presented on Figure 21. What is apparent from examination of Figure 21 is that the number and thickness of clay units within the Cretaceous section are much greater at this location than at sites updip. A summary of the completion data for the cluster is shown on Table 12. Table 13 presents the location of the screen zones with respect to the geologic formation.

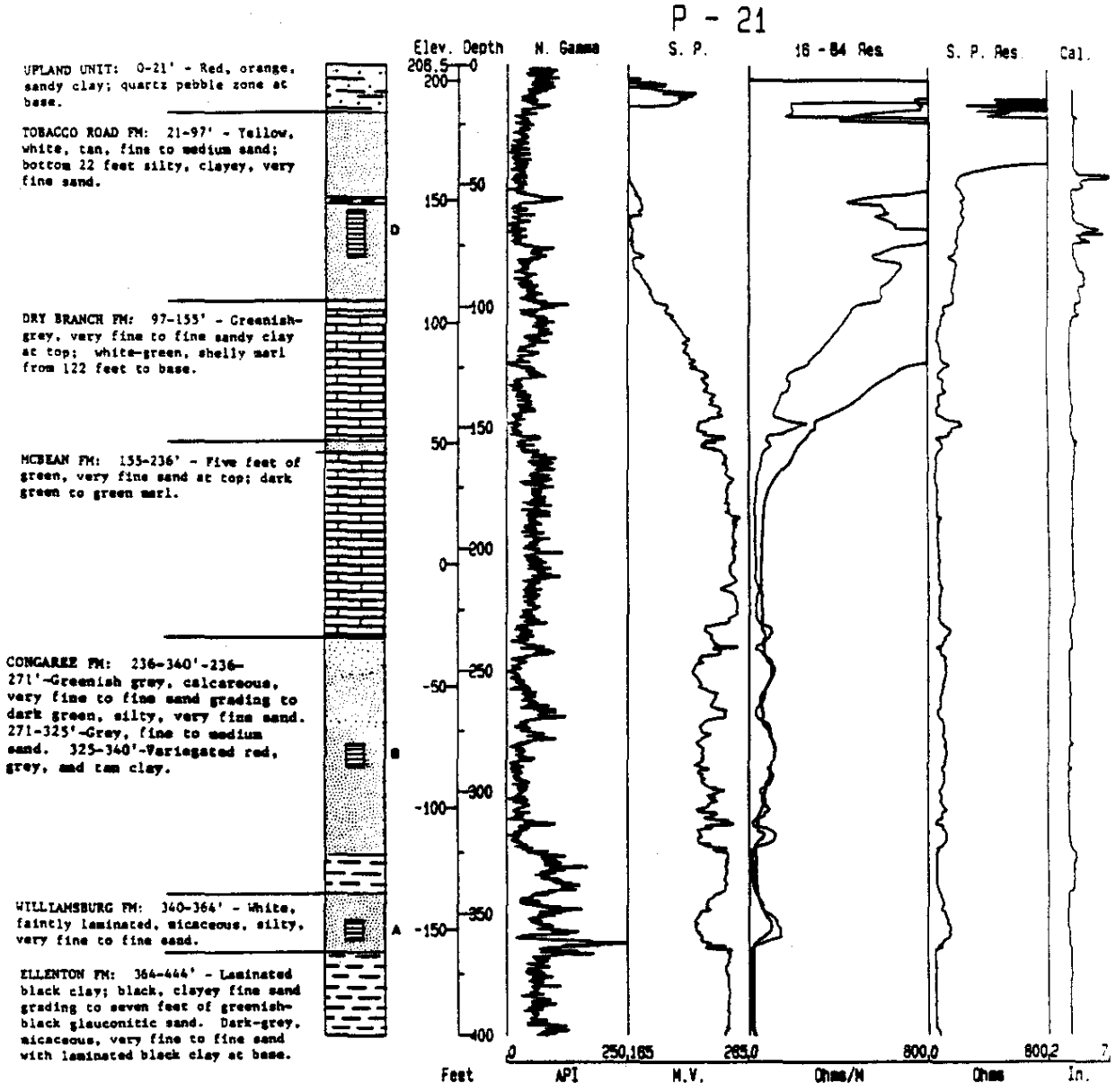


FIGURE 20. Graphic and Geophysical Logs for P-21TA

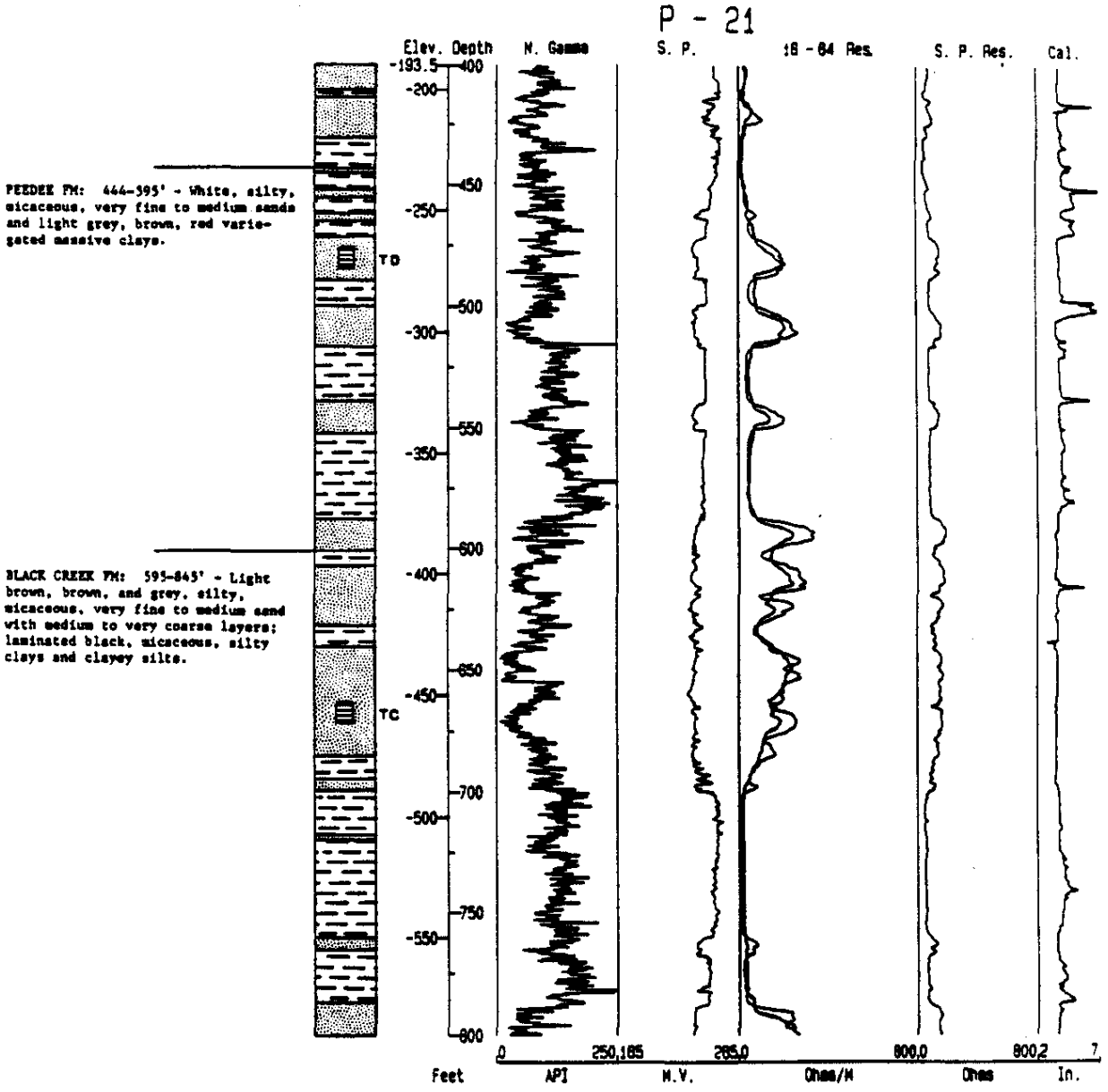


FIGURE 20, Contd

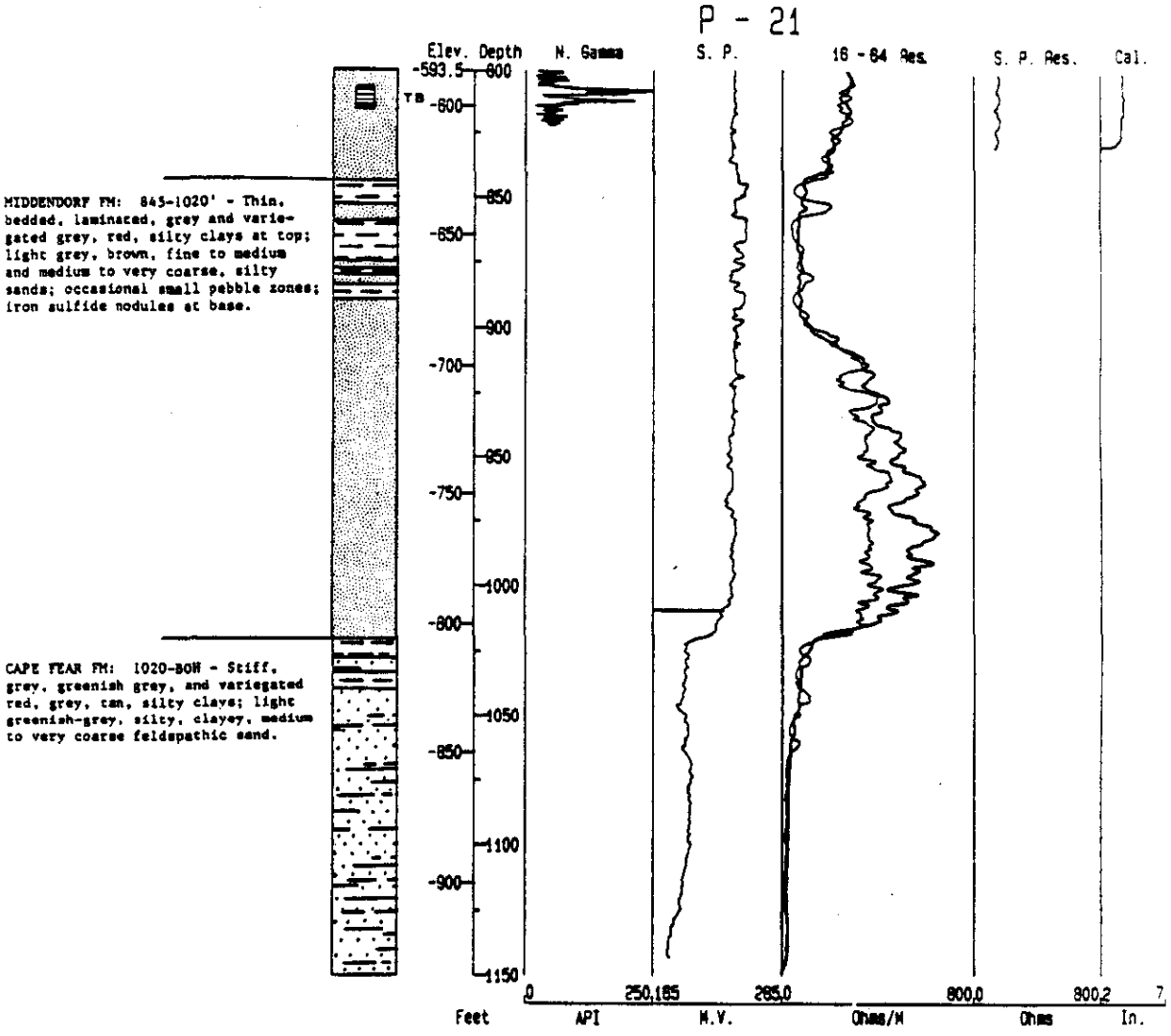


FIGURE 20, Contd

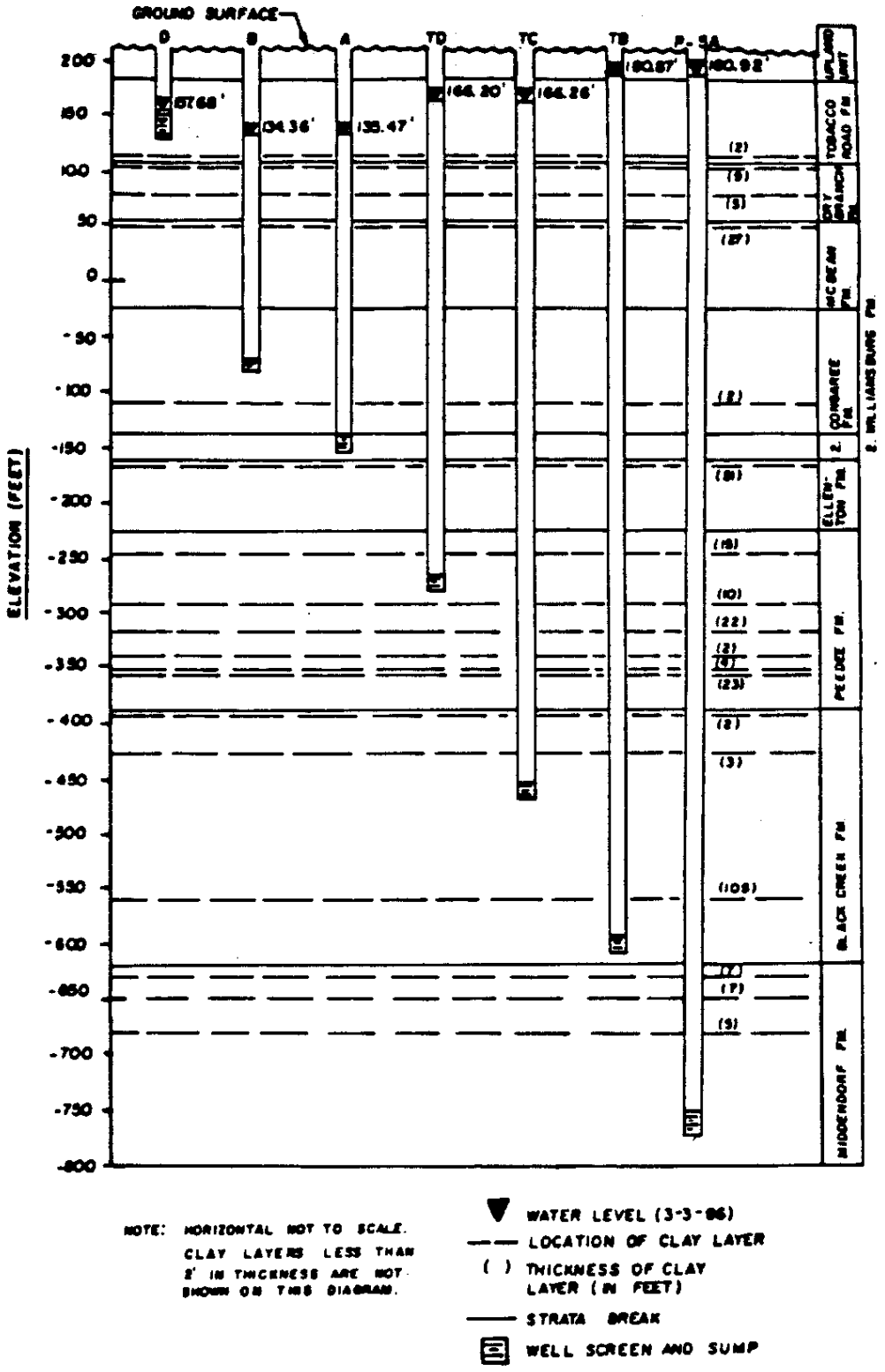


FIGURE 21. Profile of P-21 Well Cluster

TABLE 12

Cluster P-21 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TB	825	804.2 814.7	-4" Carbon Steel	#18 Slot Stainless Steel	800	785	820	206.5	208.95	N24674.6 E40739.2
TC	690	667.0 677.6	-4"Carbon Steel	#18 Slot Stainless Steel	660	650	683	206.6	208.96	N24670.9 E40754.2
TD	491	475.2 485.7	-4" Carbon Steel	#18 Slot Stainless Steel	462	452	491	206.7	209.06	N24667.4 E40769.3
A	370	351.2 361.7	-4" Carbon Steel	#18 Slot Stainless Steel	348	342	367	207.3	209.72	N24649.7 E40779.6
B	300	280.0 290.0	4" Sch 40 PVC	#18 Slot PVC	273	265	295	207.5	209.82	N24641.8 E40757.6
D	90	60.0 80.0	-4" Sch 40 PVC	#18 Slot	56	50	85	206.6	209.16	N24660.9 E40735.5
P-5A	984	973.5 983.5	7" Black Iron	#20 Slot Steel	-	-	-	206.4	208.64	N24673.2 E40718.6

Note: TB well was installed in the TA corehole.
P-5A installed as part of an earlier program.

TABLE 13
Screened Intervals for Cluster P-21

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-21D	206.6	60-80	147-127	Tobacco Road
P-21B	207.5	208-290	-72 to -82	Congaree
P-21A	207.3	352-362	-145 to -155	Williamsburg
P-21TD	206.7	475-485	-268 to -278	Peedee
P-21TC	206.6	668-678	-461 to -471	Upper Black Creek
P-21TB	206.5	805-815	-599 to -609	Lower Black Creek
P-5A	206.4	973-983	-767 to -777	Middendorf

Note: All measurements are in feet

At this site there are a total of 3 wells completed in the Tertiary formations and 4 completed in the Cretaceous formations. No perched zones were observed. The depth to the water table is about 50 ft in the Tobacco Road Formation (Barnwell). The water level decreases from approximate elevation 158 ft at the water table to about elevation 136 ft in the sands immediately overlying the Ellenton Formation. However, across the Ellenton there is a head reversal (increase in head) on the order of 30 ft, from elevation 136 ft in well P-21A to 166 ft in the upper most Cretaceous well, P-21TD. There is also an increase in head with increasing depth within the Cretaceous. The water levels in the lower Middendrof Formation (lower "Tuscaloosa") are about 15 ft higher than in the upper Middendorf (P-21TC) and the Black Creek Formation (upper "Tuscaloosa"), well P-21TD. Water levels in these two wells rise to within about 28 ft of the ground surface to an elevation about 181 ft.

P-22 CLUSTER

The P-22 cluster is located in the extreme southeastern portion of the SRP site, east of SRP Road B-6, approximately 2.8 miles south of the intersection of SRP Roads F and B. Figure 22 shows the detail location of the cluster along with the layout of the individual wells. The elevation of the ground surface at the site is about 215 ft above mean sea level.

The exploratory corehole (P-22TA) was cored from the ground surface to a total depth of about 1200 ft (approximate elevation -985 ft). The corehole penetrated the entire thickness of the

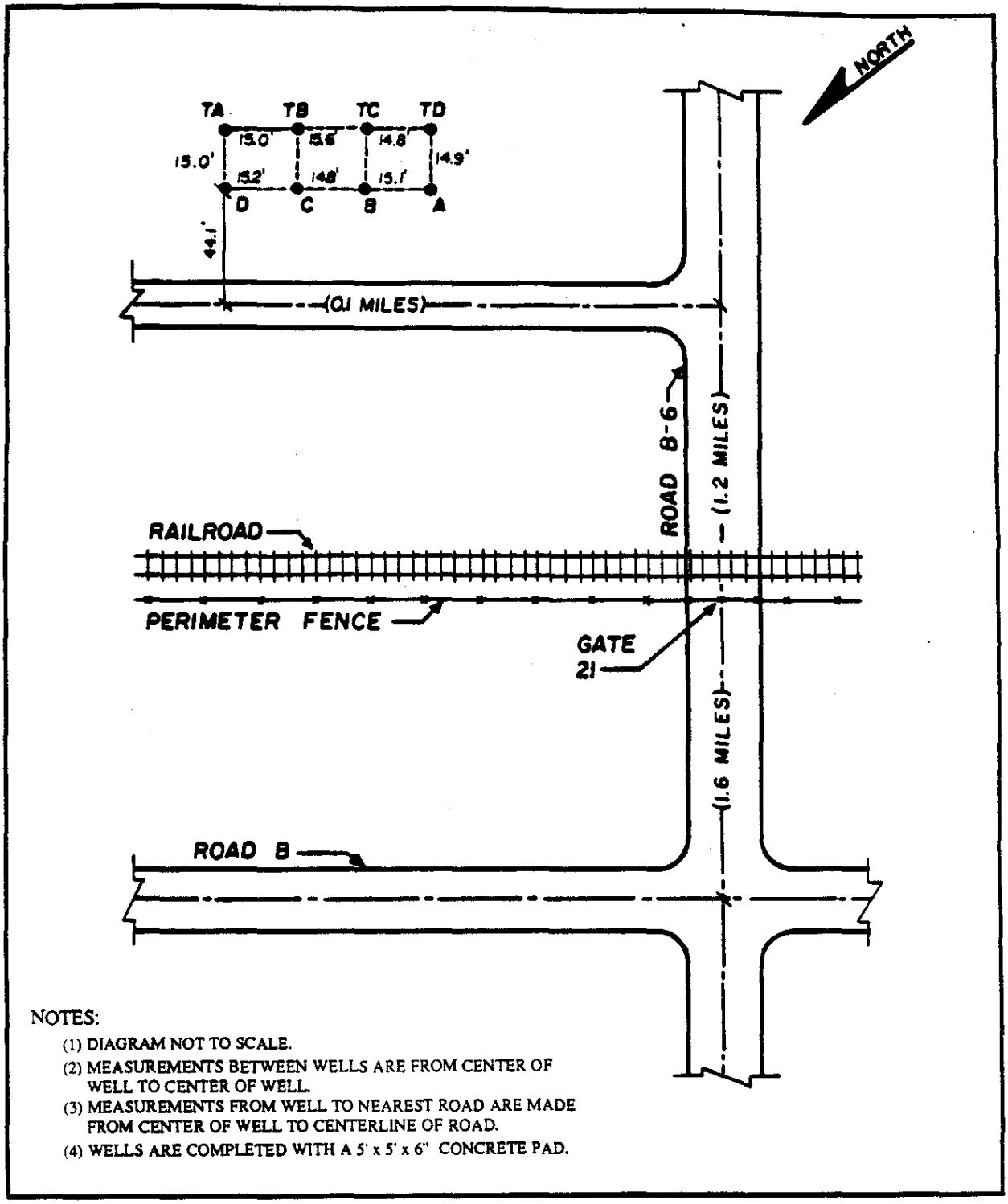


FIGURE 22. Location and Layout Map for Well Cluster P-22

"Tuscaloosa" aquifer and terminated in the Cape Fear Formation. The graphic log for the boring along with the reduced geophysical logs is shown on Figure 23. A detailed geologic log of the corehole is presented in Appendix G.

Based on the results of the coring and geophysical logs, a total of 8 wells were installed at the P-22 cluster site. Before installing the deepest well, the open hole between the bottom of the corehole and the planned bottom of the well was backgrouted. The depths of the 8 wells range from about 60 ft for the water table well (P-22D) to about 950 ft for the deepest well in the cluster (P-22TA). Figure 24 is a profile of the cluster showing the depth relationships of the different wells along with the significant clays. Table 14 is a completion summary for the cluster. A summary of the geologic formations in which the wells are screened is given in Table 15.

The completed cluster consists of 4 wells screened within the Tertiary sequence (P-22D, 22C, 22B, and 22A) and 5 wells screened within the Cretaceous sequence (P-22TD, 22TC, 22TB, 22TA, and P-5A). The water table is found at a depth of about 33 ft, approximate elevation 182 ft. No perched water was encountered during augering for the water table. There is a 12 ft drop in head between the water table well (P-22D) which is completed in the Tobacco Road Formation (Barnwell) and well P-22C, which is completed in the Dry Branch Formation (Barnwell) at a total depth of about 250 ft. The water level in well P-22B is at elevation

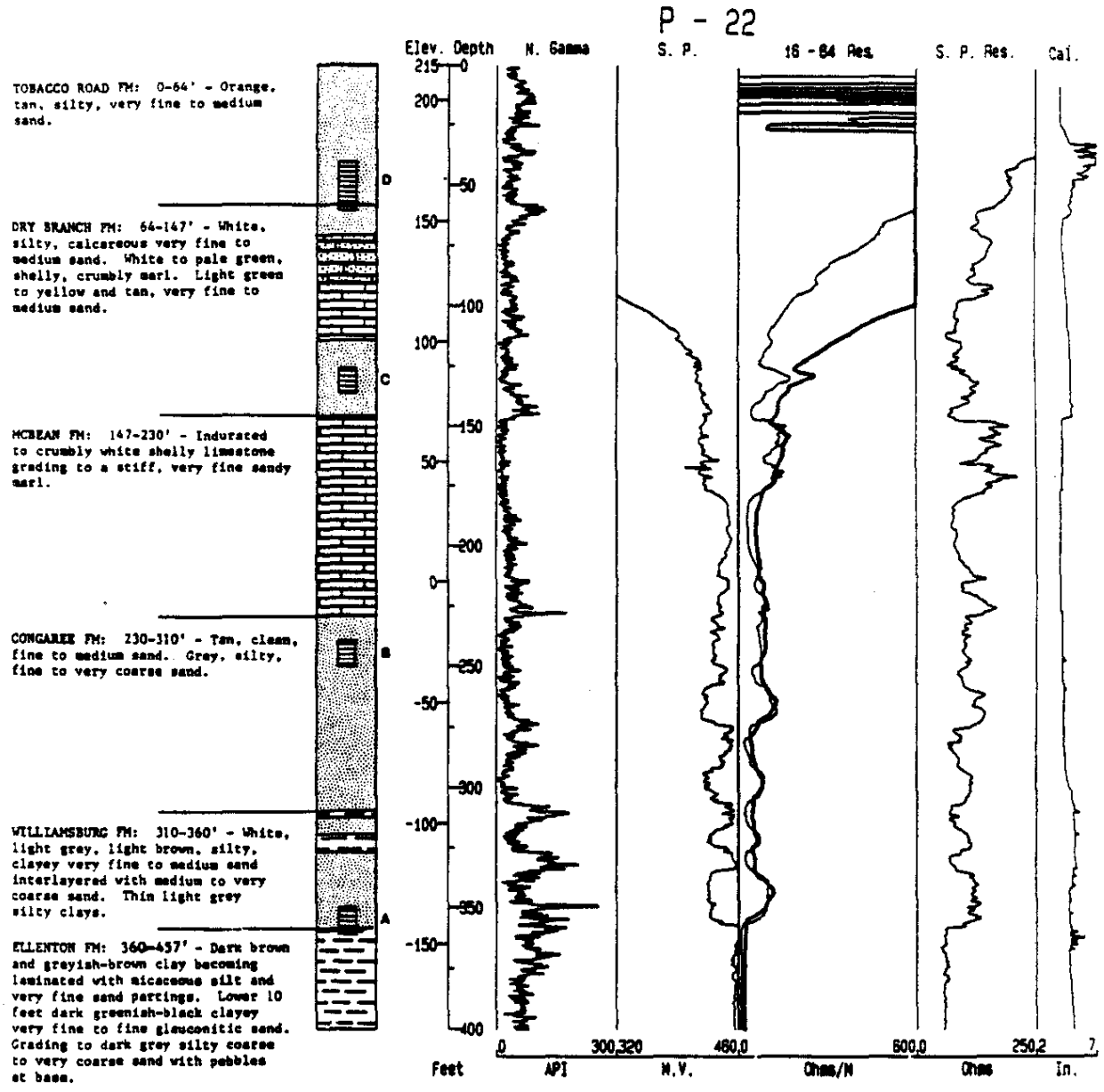


FIGURE 23. Graphic and Geophysical Logs for P-22TA

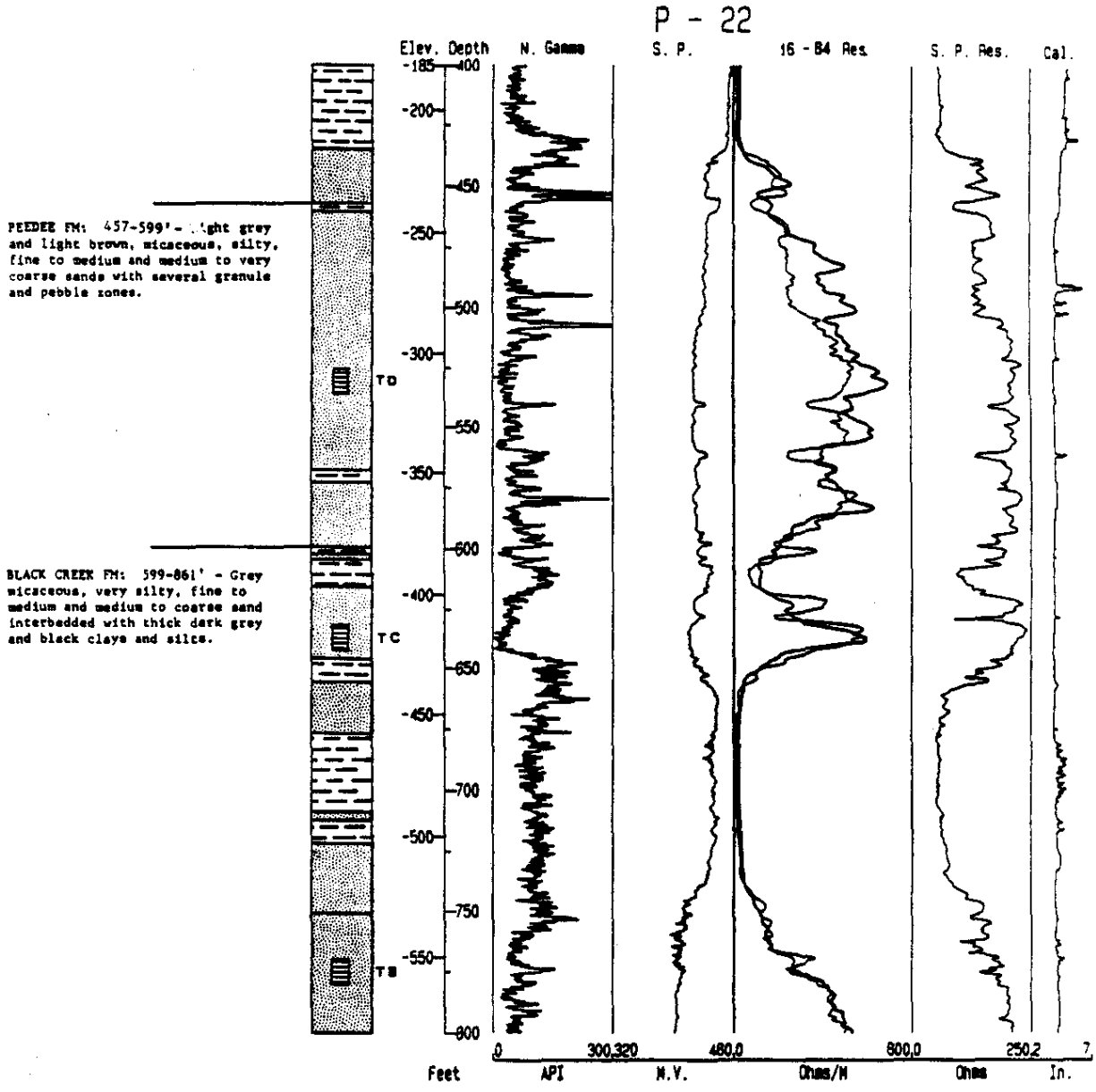


FIGURE 23, Contd

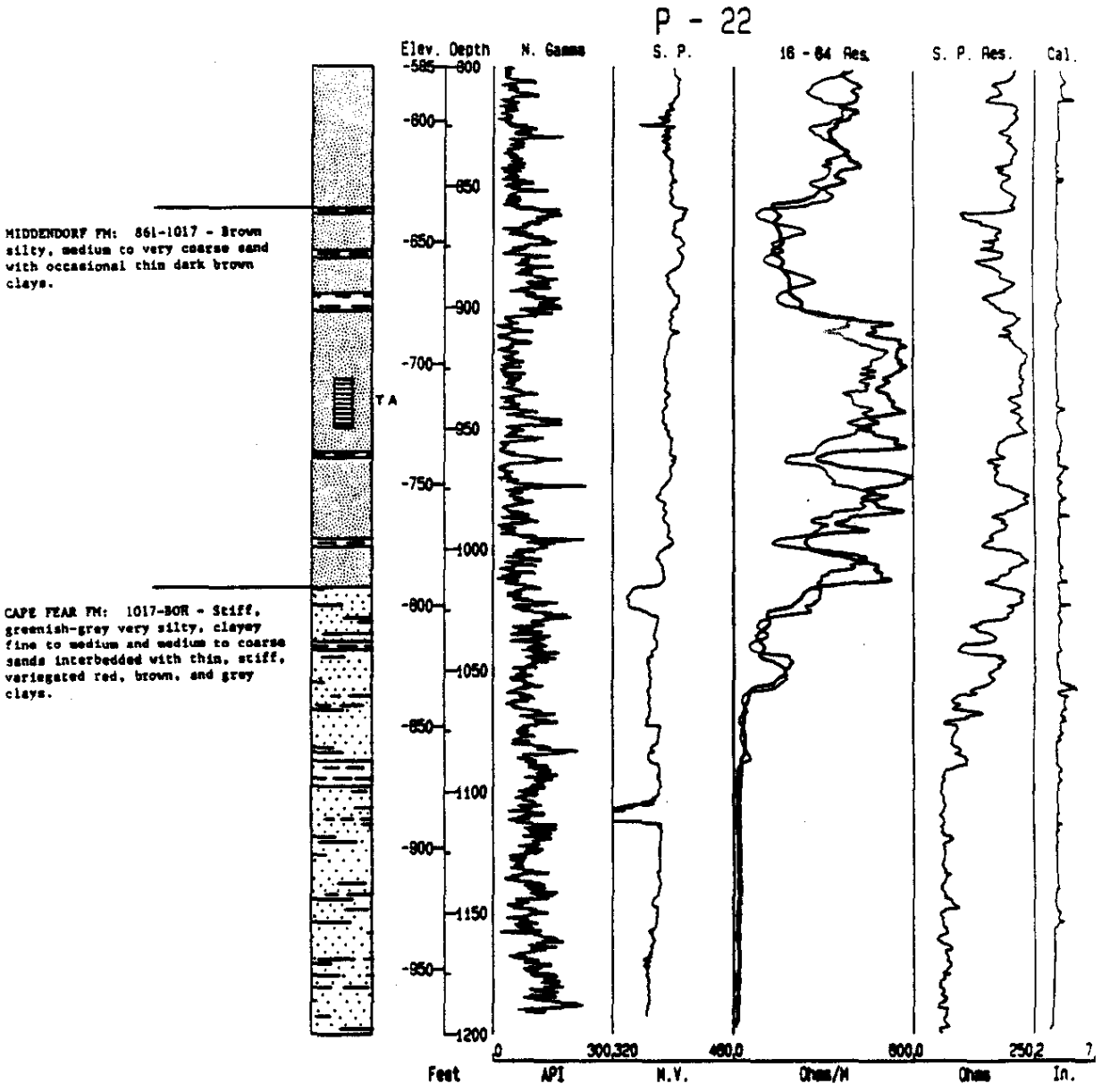


FIGURE 23, Contd

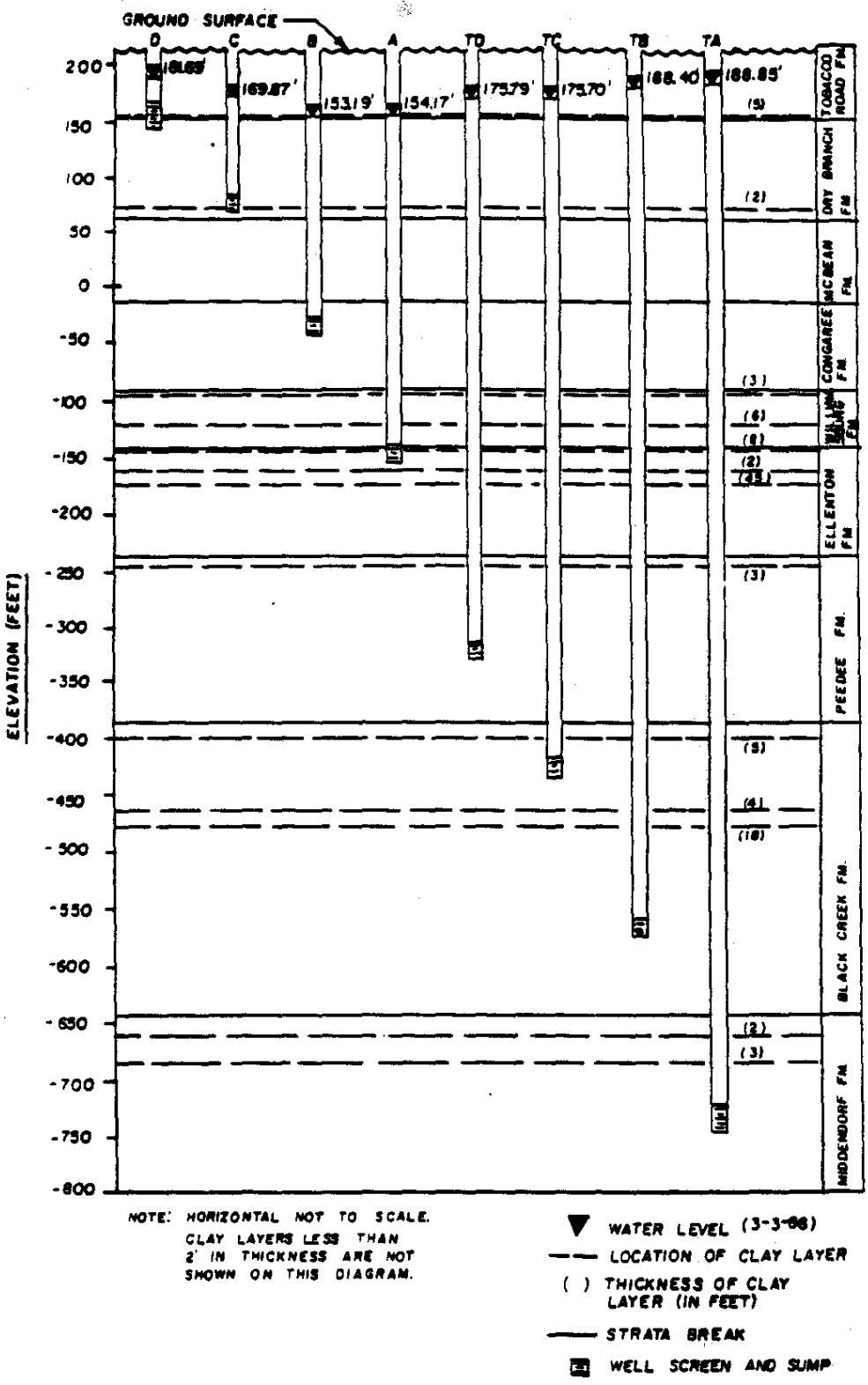


FIGURE 24. Profile of P-22 Well Cluster

TABLE 14

Cluster P-22 Well Completion Summary

Number	Total Depth (Ft)	Screened Interval (Ft)	Casing Type	Screen Type	Top of Gravel Pack (Ft)	Top of Sand Pack (Ft)	Base of Sump (Ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	960	930.0 951.1	-4" Carbon Steel	#18 Slot Stainless Steel	923	915	955	215.0	217.23	N20593.4 E73555.3
TB	786	769.2 779.7	4" Carbon Steel	#18 Slot* Stainless	766	760	785	215.2	217.35	N20595.4 E73540.6
TC	648	631.2 641.7	-4" Carbon Steel	#18 Slot Stainless Steel	628	622	647	215.6	217.75	N20597.9 E73525.5
TD	542	524.1 534.7	-4" Carbon Steel	#18 Slot Stainless Steel	521	515	540	215.7	217.99	N20600.8 E73510.9
A	366	349.1 359.7	4" Carbon Steel	#18 Slot Stainless Steel	346	340	365	215.7	218.17	N20614.9 E73515.1
B	255	239.4 249.5	4" Sch 40 PVC	#18 Slot PVC	236	230	255	215.6	217.92	N20611.6 E73529.8
C	141	125.5 135.5	4" Sch 40 PVC	#18 Slot PVC	122	116	141	215.2	217.55	N20610.3 E73544.5
D	66	39.4 59.5	4" Sch 40 PVC	#18 Slot PVC	36	30	65	215.0	217.25	N20607.8 E73559.3

* 3 inch screen set inside 4 inch between 763 feet and 773 feet.

TABLE 15

Screened Intervals for Cluster P-22

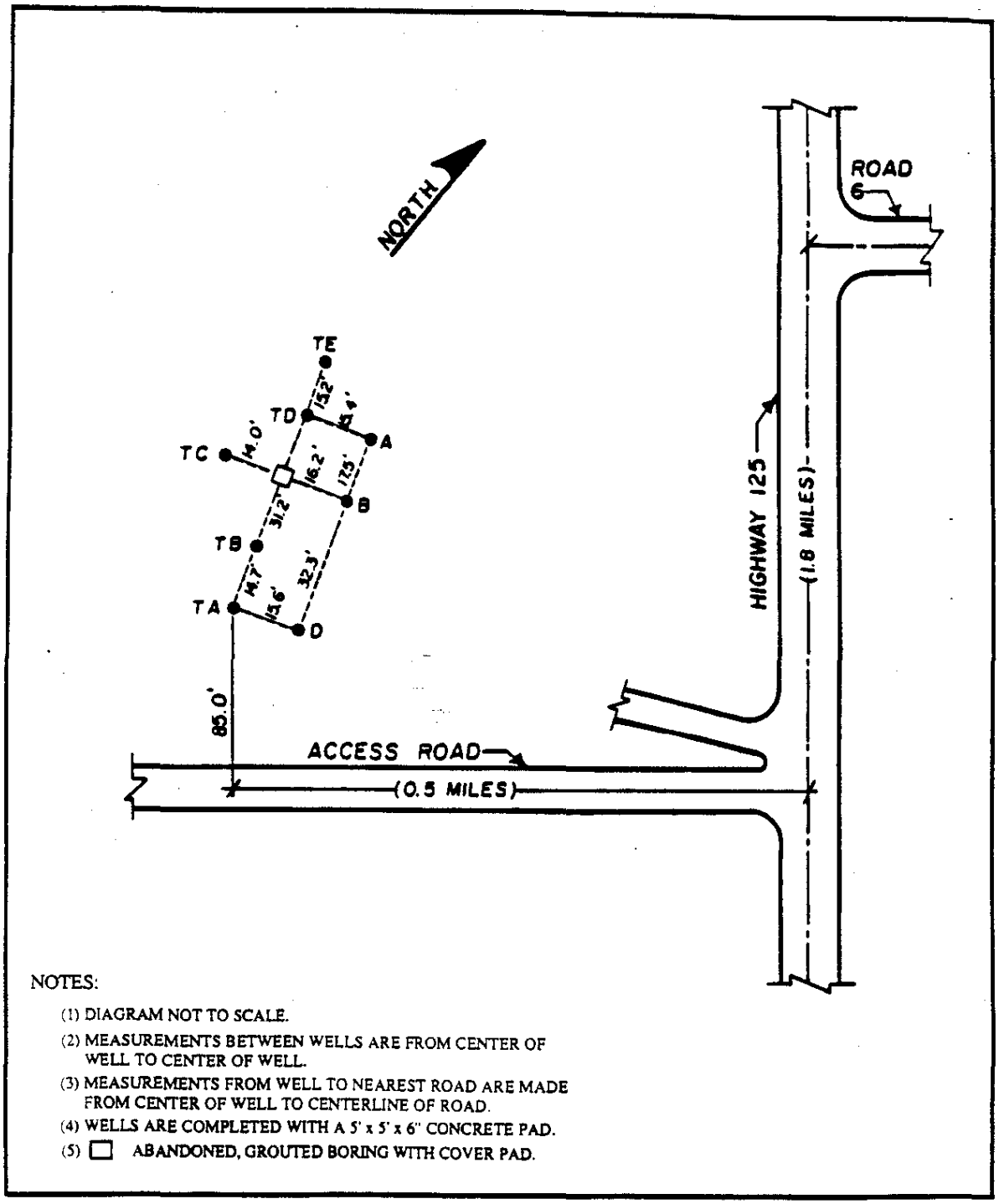
Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-22D	215.0	40-60	175-155	Tobacco Road
P-22C	215.2	126-136	89-79	Lower Dry Branch
P-22B	215.6	240-250	-24 to -34	Congaree
P-22A	215.7	350-360	-134 to -144	Williamsburg
P-22TD	215.7	525-535	-309 to -319	Peedee
P-22TC	215.6	632-642	-416 to -426	Upper Black Creek
P-22TB	215.2	770-780	-555 to -565	Lower Black Creek
P-22TA	215.0	930-950	-715 to -735	Middendorf

Note: All measurements are in feet.

170 ft. Between wells P-22C and P-22B, which is screened within the upper part of the Congaree Formation, the hydraulic head decreases about 17 ft to approximate elevation 153 ft. The water level in well P-22A, screened in a sand unit of the Ellenton Formation, is slightly higher than in well P-22B, elevation 154 ft versus 153 ft. However, across the Ellenton Formation there is a head reserval (increase in head) of about 22 ft between well P-22A and P-22TD, the uppermost Cretaceous well, which is screened at a total depth of about 535 ft below ground surface in what is interpreted to be the Peedee Formation. The piezometric surface in well P-22TD is found at approximate elevation 176 ft. The head in well P-22TC which is interpreted to be completed in the upper part of the Black Creek Formation is approximately the same as in P-22TD, about elevation 176 ft. The hydraulic head in the lower Black Creek and the Middendorf formations increases to about elevation 188 ft, an increase of about 12 ft above the uppermost Cretaceous wells. Water levels in the two deepest wells (P-22TB and P-22TA) rise to within about 28 ft of the ground surface.

P-23 CLUSTER

Cluster P-23 is located in the southwestern portion of the SRP site adjacent to an unnamed dirt road, approximately 0.5 mile west of S.C. Highway 125 and abut 3000 ft north of Pen Branch. The location and well layout for the cluster are shown on Figure 25. Ground surface elevation at the site is about 184 ft above mean sea level.



NOTES:

(1) DIAGRAM NOT TO SCALE.

(2) MEASUREMENTS BETWEEN WELLS ARE FROM CENTER OF WELL TO CENTER OF WELL.

(3) MEASUREMENTS FROM WELL TO NEAREST ROAD ARE MADE FROM CENTER OF WELL TO CENTERLINE OF ROAD.

(4) WELLS ARE COMPLETED WITH A 5' x 5' x 6" CONCRETE PAD.

(5) ☐ ABANDONED, GROUTED BORING WITH COVER PAD.

FIGURE 25. Location and Layout Map of Well Cluster P-23

Continuous geologic cores were obtained from the ground surface to a total depth of about 970 ft in the exploratory boring, P-23TA. Lithologic descriptions of the sediments encountered along with the geophysical logs obtained are shown on the graphic log of the boring, Figure 26. The detail lithologic descriptions are provided in Appendix H.

A total of 8 wells were installed at this site. The corehole was backgrouted before installing the well. The wells range in depth from approximately 55 ft for the water table well (P-23D) to about 820 ft for the deepest well (P-23TA). The profile for the well cluster is shown on Figure 27. Also shown on Figure 27 are the significant clay and clayey layers encountered in the core. Well completion data are presented on Table 16. Well completions with respect to geologic formations are summarized on Table 17.

Three of the 8 wells installed at this cluster are completed within the Tertiary sequence. The remaining 5 wells are screened within the Cretaceous formations. No perched water was encountered. The piezometric heads measured in each of the wells are shown on Figure 27. The water table is at an elevation of about 146 ft, about 38 ft below the ground surface in well P-23D. The hydraulic head decreases about 5 ft, to elevation 141 ft, between the water table well (P-23D) in the Dry Branch Formation (Barnwell) and the next well, P-23B, which is screened within the Congaree Formation at a total depth of about 140 ft below the ground surface. Well P-23A is completed in what is interpreted to be the

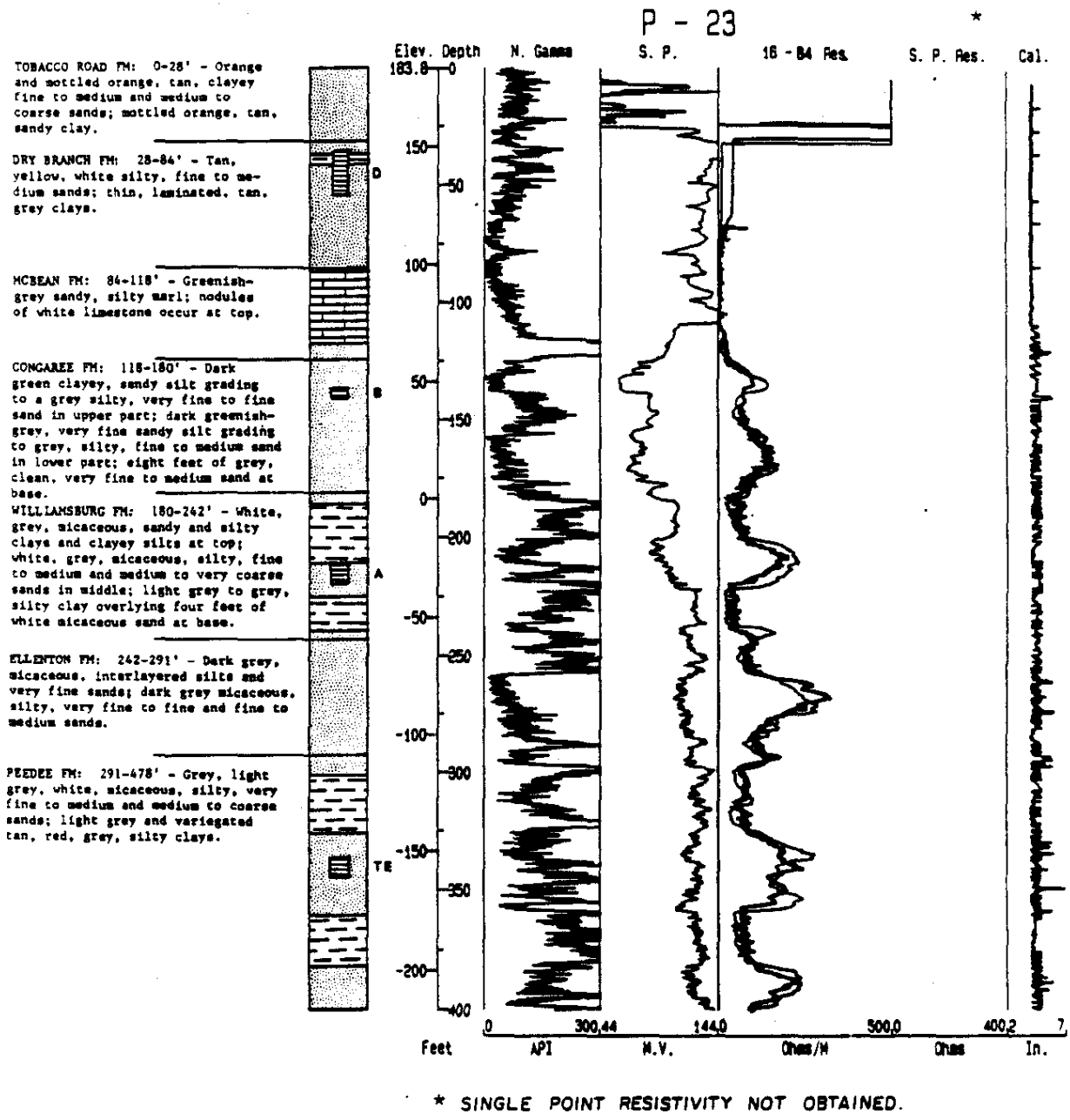


FIGURE 26. Graphic and Geophysical Logs for P-23TA

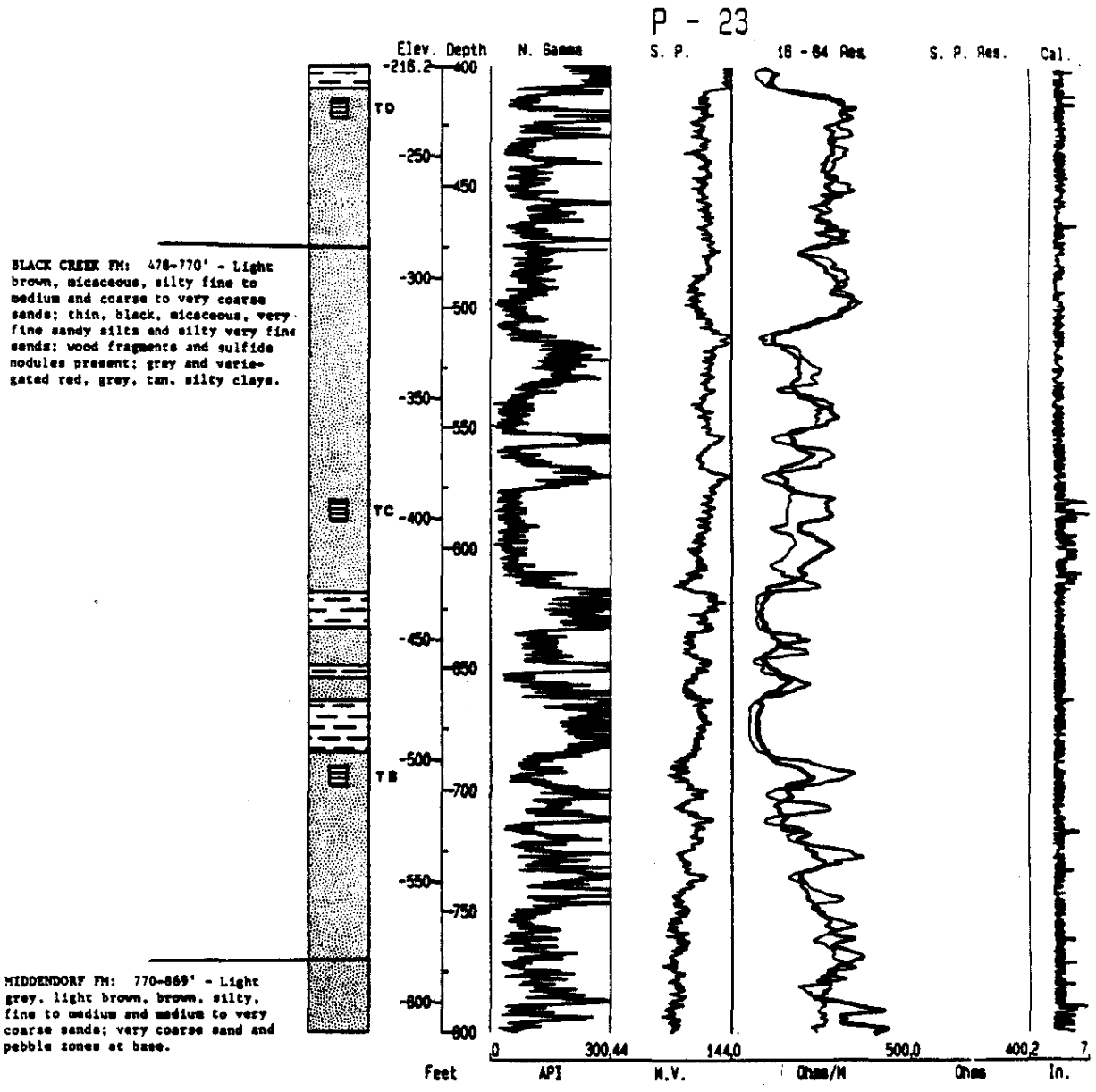


FIGURE 26, Contd

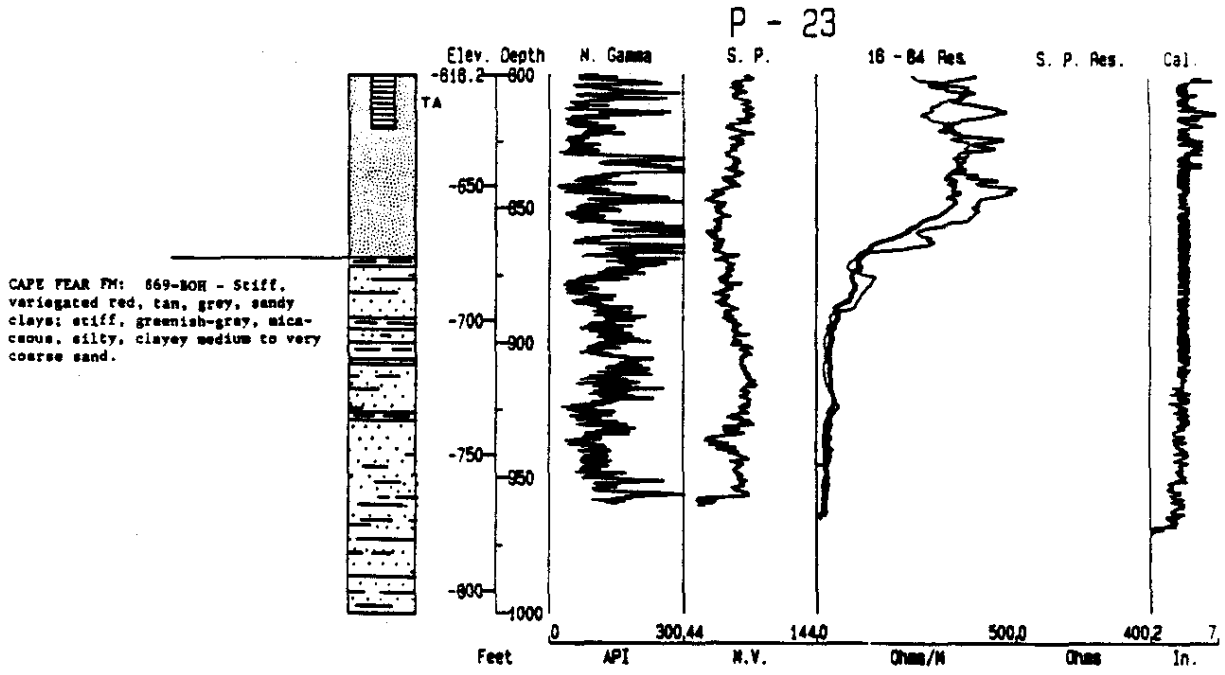


FIGURE 26, Contd

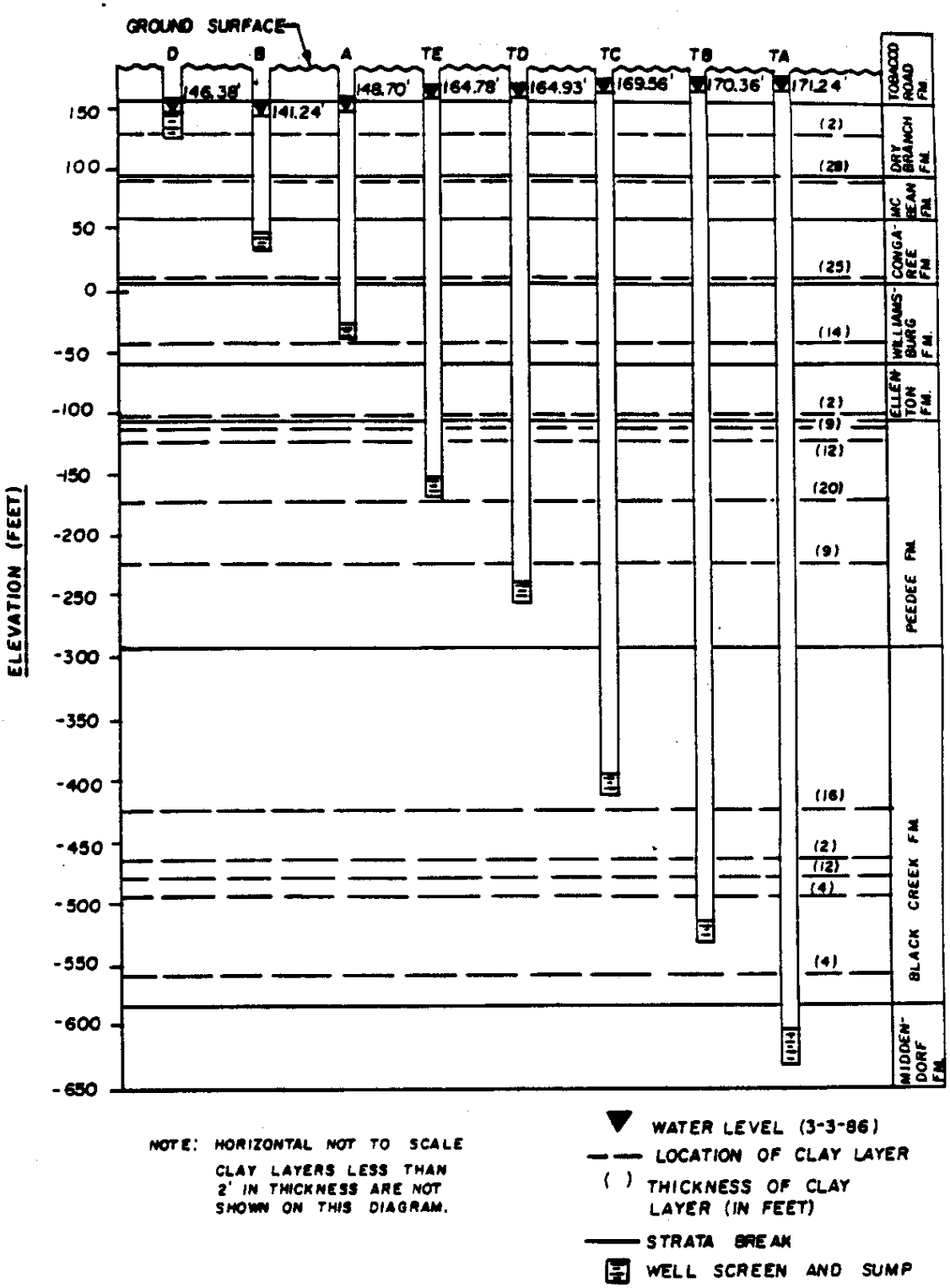


FIGURE 27. Profile of P-23 Well Cluster

TABLE 16

Cluster P-23 Well Completion Summary

Number	Total Depth (ft)	Screened Interval (ft)	Casing Type	Screen Type	Top of Gravel Pack (ft)	Top of Sand Pack (ft)	Base of Sump (ft)	Top of Ground Elevation	Top of Casing Elevation	Savannah River Plant Grid Coord.
TA	830	800.0 - 821.2	4" Carbon Steel	#18 Slot Stainless Steel	770	760	825	183.8	186.22	N48063.3 E30931.3
TB	711	690.0 - 700.7	4" Carbon Steel	#18 Slot Stainless Steel	670	654	705	183.6	185.94	N48075.7 E30923.3
TC	597	579.1 - 590.0	4" Carbon Steel	#18 Slot Stainless Steel	570	560	595	182.8	185.10	N48085.6 E30900.0
TD	432	414.1 - 425.0	4" Carbon Steel	#18 Slot Stainless Steel	405	397	430	182.8	185.20	N48104.5 E30903.2
TE	351	344.5 - 345.0	4" Carbon Steel	#18 Slot Stainless Steel	325	317	350	182.8	185.24	N48117.2 E30894.7
A	223	209.9 - 219.9	4" Sch 40 PVC	#18 Slot PVC	207	201	223	183.5	186.13	N48114.9 E30914.5
B	145	134.9 - 139.9	4" Sch 40 PVC	#18 Slot PVC	132	126	143	183.9	186.25	N48101.2 E30925.3
D	62	34.4 - 54.5	4" Sch 40 PVC	#18 Slot PVC	31	25	60	184.5	186.78	N48073.9 E30942.6

TABLE 17

Screened Intervals for Cluster P-23

Well	Ground Elevation	Approximate Depth of Screen Interval	Approximate Elevation of Screened Interval	Stratigraphic Interval
P-23D	184.5	35-55	149-129	Dry Branch
P-23B	183.9	135-140	49-44	Congaree
P-23A	183.5	210-220	-26 to -36	Williamsburg
P-23TE	182.8	335-345	-152 to -162	Upper Peedee
P-23TD	182.8	415-425	-232 to -242	Lower Peedee
P-23TC	182.8	580-590	-397 to -407	Upper Black Creek
P-23TB	183.6	690-700	-506 to -516	Lower Black Creek
P-23TA	183.8	800-820	-616 to -636	Middendorf

Note: All measurements are in feet.

Williamsburg Formation, which overlies the Ellenton Formation. The head in P-23A, which was measured at about elevation 149 ft, is about 9 ft higher than in well P-23B and 3 ft higher than the water level elevation at the water table. Across the Ellenton Formation, between well P-23A and P-23TE, which is screened in what is interpreted to be the Cretaceous age Peedee Formation, the head increases to about elevation 165 ft. Within the Cretaceous the heads continue to increase slightly with increasing depth to about elevation 171 ft in the deepest well P-23TA which is completed in the Middendorf Formation. The depth to water in well P-23TA is only about 13 ft below the ground surface.

WELL CONSTRUCTION AND COMPLETION

Upon completion of the exploratory boring drilled at each of the cluster sites, all available data for the site were reviewed and the locations of the zones to be screened were selected. The aim of the program, as discussed earlier, was to complete an observation well in each of the major hydrogeologic units as defined by the modified terminology of Siple (1967), and shown on the referenced cluster profile (Figure 3). The locations of the wells in the stratigraphic column are shown on the profiles of the completed clusters. Some of the statigraphic names used differ from Siple but reflect some of the current interpretations and usage.

All of the wells installed as part of the Phase II program are gravel pack designed, meaning that the boreholes were drilled to a large enough diameter (nominally 12-inches) to allow the placement

of a selected graded sand/gravel uniformly around the well screen. The selection of the filter material was based on the results of sieve analyses performed on composite samples from the zone to be screened in each well. The grain size distribution curves for the filter material used and the composite samples from the screen zone can be found in the PSI (1986) report. Prior to the drilling and installation of each well, all tools, equipment, casings, and screens were steam cleaned to prevent the possible introduction of contaminates into the well. Vertical alignment of each well was checked by means of an E-C Inclinometer, an instrument that is used to record the inclination of a borehole. (Specification called for the completed wells to be within a maximum deviation of 2 degrees of vertical at the bottom.)

Wells generally less than 300 ft in total depth were constructed of 4-inch diameter threaded flush joint TriLoc® Schedule 40 PVC casing and screens. Wells greater than about 300 ft were constructed with 4-inch threaded and coupled carbon steel (ASTM A-53) casing and Johnson® wire-wound stainless steel screens. Number 18 slot screens were used in all wells. Either a 3 or 5 ft sump was installed below the screen in each well. Stainless steel centralizers were placed at the bottom and the top of the screen, and approximately every 100 ft thereafter to center the well in the borehole.

After placement of the casing and screen in the borehole, the sand/gravel pack material, selected on the basis of the aquifer sieve analysis, was placed around and to a minimum of 3 ft above

the screen by means of a tremie. A minimum of 3 ft of finer sand was place above the sand/gravel pack, followed by a 3 ft (minimum) bentonite seal. The remaining annulus was filled with a grout mixture consisting of Class A Portland cement and 10 percent by volume bentonite. The grout was placed by pumping through a tremie from the top of the bentonite seal to the ground surface.

Each well was allowed to set at least 24-hours before beginning any development work. Initial development was accomplished by an alternating sequence of surging above the screen and then blowing the well with compressed air until the discharge water at the ground surface was free of suspended sediments. After initial development, submersible pumps were temporarily installed in each well, and the well pumped for several hours. The total number of hours spent on development and the total amount of water pumped from each well are summarized on Table 18.

Following development, each well was completed by installing a 6-inch steel protective surface casing with lockable cap over the well casing. A five (5) ft by five (5) ft by six (6) inch thick concrete surface pad with four, four (4) inch by five (5) ft long, steel posts filled with concrete set at each corner completed each well. A typical well completion diagram is shown on Figure 28. Detail completion diagrams for each well are contained in the PSI (1986) report along with casing tally sheets.

TABLE 18

Summary of Well Development

Well	Ground Elevation	Water* Depth	Water Elevation	Development Time (hr)	Pumping Time (hr)	Gallons Pumped
P-16D	261.2	50.00	213.84	19.5	10.25	81**
P-16B	261.0	50.01	213.30	12.0	10.0	2,600
P-16A	259.6	48.48	213.29	13.5	10.0	5,000
P-16TD	259.8	42.15	220.10	14.5	11.0	9,933
P-16TC	260.4	39.60	222.80	11.2	10.75	9,255
P-16TB	260.7	37.80	222.71	10.0	10.00	4,013
P-16TA	261.3	44.81	218.77	28.5	4.0	6,680
P-17D	332.2	54.87	279.67	13.0	10.0	24**
P-17C	332.0	57.17	277.29	11.5	11.0	6,073
P-17B	332.0	106.52	227.79	9.5	10.0	2,430
P-17A	331.6	106.42	227.62	10.5	10.0	8,222
P-17TD	332.0	119.20	215.15	13.5	10.0	5,616
P-17TC	332.2	119.27	215.34	13.5	13.5	3,095
P-17TB	332.3	119.18	215.67	14.0	6.5	4,239
P-17TA	332.6	119.87	215.17	12.0	Not Recorded	Not Recorded
P-18D	296.3	75.15	223.58	13.5	9.75	215**
P-18B	295.9	129.20	168.98	8.25	5.5	575**
P-18A	295.9	119.55	178.82	17.0	12.0	5,222
P-18TD	295.6	129.00	168.87	15.5	14.25	2,137
P-18TC	296.3	129.75	168.95	18.0	10.5	2,998
P-18TB	296.2	129.70	168.98	11.0	10.0	3,168
P-18TA	296.3	128.75	169.92	11.5	Not Recorded	Not Recorded
P-19D	297.3	35.20	264.51	37.5	11.75	712
P-19C	297.7	44.32	255.97	19.75	11.0	55**
P-19B	297.7	36.00	264.09	8.5	10.25	7,592
P-19A	297.4	112.67	181.17	12.5	9.75	4,300
P-19TD	296.8	122.87	176.46	15.0	10.25	3,504
P-19TC	297.1	123.38	176.21	16.0	10.0	2,776
P-19TB	297.0	121.79	177.74	22.5	10.25	420
P-19TA	296.8	121.32	178.03	26.0	Not Recorded	Not Recorded
P-20D	287.1	24.99	264.60	11.5	11.25	3,368
P-20C	287.3	52.90	236.37	8.5	12.25	5,902
P-20B	287.6	95.25	194.20	13.75	11.5	4,781
P-20TD	287.4	101.65	188.18	12.5	10.0	6,825

* All water depth measurements from top of casing.
** Flow-meter malfunction.

Note: All measurements are in feet

TABLE 18, Contd

Well	Ground Elevation	Water* Depth	Water Elevation	Development Time (hr)	Pumping Time (hr)	Gallons Pumped
P-21D	206.6	51.48	157.68	12.0	10.75	3,783
P-21B	207.5	75.46	134.36	10.0	11.0	5,825
P-21A	207.3	74.25	135.47	9.0	10.5	4,659
P-21TD	206.7	42.86	166.20	28.0	13.0	2,529
P-21TC	206.6	42.70	166.26	30.5	10.0	5,326
P-21TB	206.5	28.08	180.87	16.0	Not Recorded	Not Recorded
P-22D	215.0	35.56	181.69	12.0	10.0	2,239
P-22C	215.2	47.68	169.87	10.25	10.0	7,837
P-22B	215.6	64.73	153.19	8.0	10.0	6,249
P-22A	215.7	64.00	154.17	9.5	9.75	5,903
P-22TD	215.7	42.20	175.79	10.0	10.0	14,214
P-22TC	215.6	42.05	175.70	9.25	10.0	16,746
P-22TB	215.2	28.95	188.40	35.0	8.0	1,332
P-22TA	215.0	28.38	188.85	14.0	Not Recorded	Not Recorded
P-23D	184.5	40.40	146.38	19.0	10.0	1,732
P-23B	183.9	45.01	141.24	14.75	10.0	7,021
P-23A	183.5	37.43	148.70	10.0	9.0	4,857
P-23TE	182.8	20.46	164.78	14.0	10.0	1,241
P-23TD	182.8	20.27	164.93	15.75	10.0	7,109
P-23TC	182.8	15.54	169.56	19.25	10.0	6,613
P-23TB	183.6	15.58	170.36	14.75	10.0	6,388
P-23TA	183.8	14.98	171.24	12.0	24.0	Not Recorded

* All water depth measurements from top of casing.

Note: All measurements are in feet.

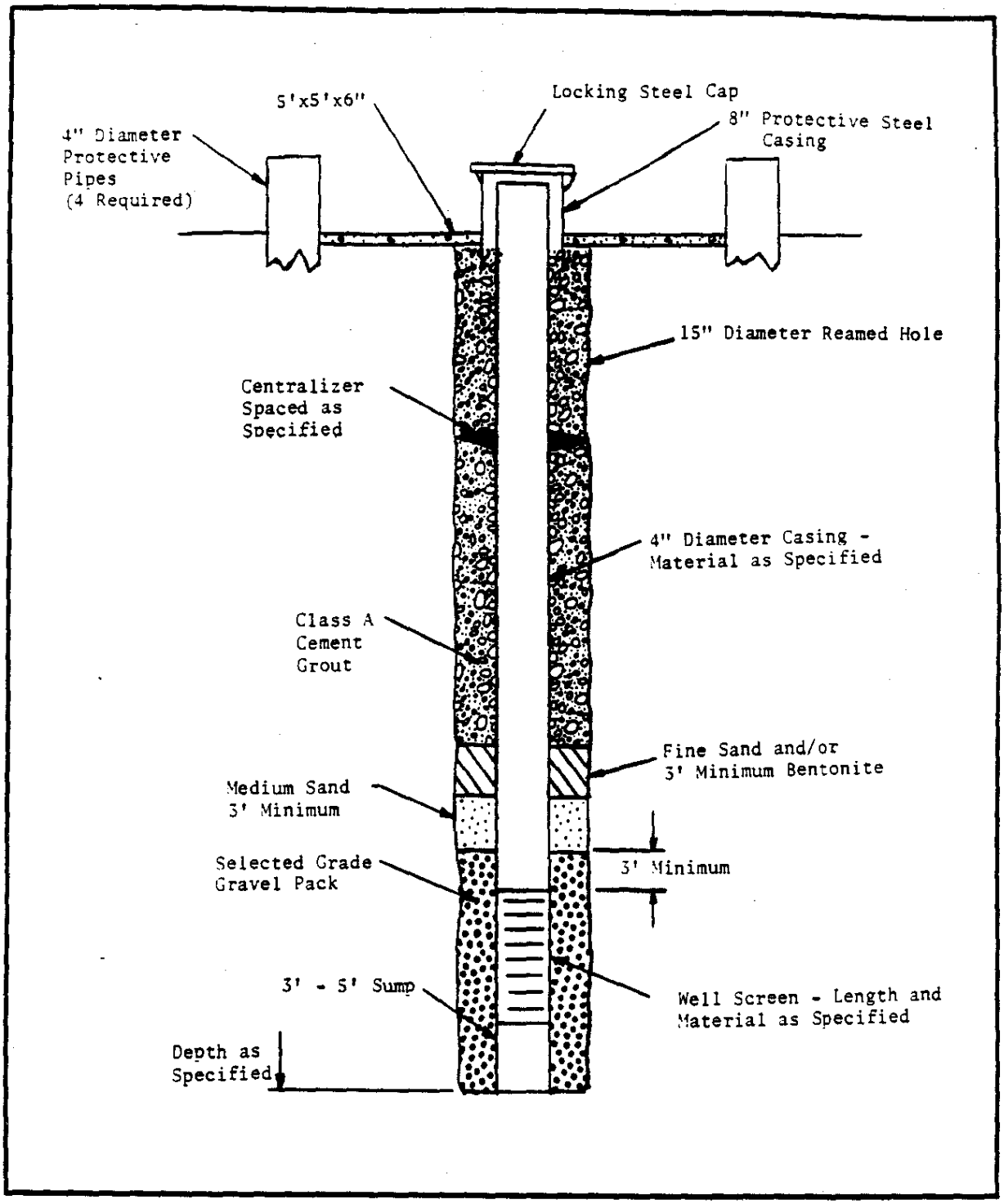


FIGURE 28. Typical Well Completion Diagram

HYDROGEOLOGY

Stratigraphy of the coastal plain deposits underlying and surrounding the SRP site is a subject of continuing debate. The most commonly used and cited stratigraphic terminology at the SRP site is one modified from Siple (1967). These formational names developed for the site by Siple do not agree with more recent work by others. However, these terms have and continue to be useful in describing the groundwater systems beneath the site. A tentative correlation of stratigraphic nomenclature is presented on Figure 29.

The formational boundaries as shown on the graphic logs in this report (Figures 5, 8, 11, 14, 17, 20, 23, and 26) were defined through a detailed lithologic examination of the core samples, comparison with the geophysical logs, and review of the current literature. Some formational boundaries are difficult to discern and will probably change as additional information and more detailed studies improve the overall understanding of the subsurface stratigraphy of both the site and the region.

The interpreted stratigraphy used in this report differs from that of Siple as follows. The Hawthorn Formation is herein referred to as the Upland Unit. The Upland Unit is successively underlain by the Tobacco Road and Dry Branch formations which generally correlate with the Barnwell Formation of Siple. Sediments previously assigned to the lower Congaree Formation and in some

SERIES	TERMINOLOGY THIS REPORT	MODIFIED SIPLE * TERMINOLOGY	COLQUHOUN **
MIOCENE	UPLAND UNIT	HAWTHORN	HAWTHORN
OLIGOCENE			COOPER GROUP
UPPER EOCENE	TOBACCO ROAD DRY BRANCH Tan Clay	BARNWELL Tan Clay	BARNWELL OCALA
MIDDLE EOCENE	Mc BEAN Green Clay CONGAREE	Mc BEAN Green Clay CONGAREE	ORANGEBURG GROUP AIKEN Mc BEAN WARLEY HILL CONGAREE
			BLACK MINGO GROUP
PALEOCENE	WILLIAMSBURG ELLENTON	ELLENTON	WILLIAMSBURG ELLENTON
UPPER CRETACEOUS	PEEDEE BLACK CREEK MIDDENDORF CAPE FEAR	UPPER TUSCALOOSA LOWER TUSCALOOSA	LUMBEE GROUP PEEDEE BLACK CREEK MIDDENDORF

* SIPLE (1967)

** COLQUHOUN (1983)

FIGURE 29. Correlation of Stratigraphic Nomenclature

cases perhaps to the uppermost Ellenton Formation are assigned to the Williamsburg Formation. These sediments are distinguished from the Congaree sands by the presence of mica, and a high silt or clay content. This unit was identified at all cluster sites. The Cretaceous age section, Siple's Tuscaloosa Formation, is divided into the Peedee Formation at the top, the Black Creek Formation, the Middendorf Formation, and the Cape Fear Formation at the bottom.

The sediments assigned to the Peedee Formation were identified at all sites and are distinguished by the light color of the sands as compared to the Black Creek Formation and by the medium gray to brown to variegated color of the clays. The unit previously known as the "Middle Tuscaloosa Clay" is interepreted as a clay or silt unit separating the Black Creek Formation into an upper and lower member. The top of the Middendorf appears to be a discontinuous thinner clay and/or silt unit which separates the lower Black Creek sands from the more distinctive Middendorf sands.

Considerable variation exists within the formations between the different sites; both in the dip and strike directions. The most obvious variation is the increase in the number and thickness of clay and carbonate units in the downdip direction. Color changes also occur in all formations in both the dip and strike directions.

Lithologically the Cape Fear Formation consists of stiff to indurated, greenish-gray to brown, very poorly sorted, micaceous, very silty, very clayey, fine to very coarse to pebbly, feldspathic

sands, and gray to variegated, silty fine sandy clays with very low porosity. The formation is characterized by very low resistivities on the geophysical logs. The Cape Fear was encountered at all sites with the exception of P-20 where the corehole terminated at a depth of 450 ft in the Peedee Formation, and at P-17 where coring was discontinued at a depth of 765 ft in the Middendorf Formation because of hole stability problems. However, geophysical logs run in the P-17TA borehole, which was continued to a depth of about 960 ft, show a pattern characteristic of the Cape Fear.

The Middendrof Formation which overlies the Cape Fear consists of gray to brown, silty, fine to medium and medium to coarse sands with scattered pebble zones. At the P-23 site, however, a gray to variegated, silty clay or clayey silt was encountered at the top of the Middendrof.

Overlying the Middendorf is the Black Creek Formation which can be divided into three distinct units: an upper sand, a middle clay and silt unit, and a lower sand. The sand consists of gray to brown, micaceous, silty, very fine to very coarse sands commonly containing wood fragments and sulfide nodules. The middle clay unit generally is a dark gray to black clay, silty clay, or clayey silt. The thickness of the Black Creek clay appears to increase greatly in the downdip direction. The clay unit was not identified in core collected at the P-19 site.

The Peedee Formation which overlies the Black Creek Formation is a light gray, micaceous, silty, very fine to medium to very coarse sand with thin gray to brown to variegated clays. At the

P-21 and P-23 cluster sites these clays become very thick and dominate the sequence.

The Tertiary System includes the Ellenton Formation of Paleocene age, the Williamsburg Formation of Paleocene-Eocene age, the Congaree, McBean, Dry Branch, Tobacoo Road Formations of Eocene age, and the Upland unit of Oligocene-Miocene(?) age.

The type locality for the Ellenton Formation was designated by Siple from drill cuttings collected from well 52-C (located in C-Area) which is approximately 4-miles northeast of the abandoned town of Ellenton and about 7.75-miles southeast of the town of Jackson, SC. The type section of Siple is 60 ft in thickness between depths of 310-370 ft below ground surface. According to Siple's description, the upper part of the formation consists of gray silty to sandy micaceous lignitic clay with gypsum, and the lower part of the formation is a clayey medium to coarse quartz sand with gravel. Based on geologic cores (as opposed to cuttings) collected from boring P-18TA drilled in the immediate vicinity of well 52-C, the Ellenton Formation consists of 71 ft (300-371 ft) of black, dark gray, laminated, micaceous, very silty, very fine sand interbedded with black, crumbly, subfissile clayey silts and silty clays, Figure 11. The Ellenton Formation, which has been dated as Paleocene age, consists, updip at the P-16 and P-17 sites, of white, tan, and gray micaceous, silty, fine to medium and medium to coarse sands with a few thin, white to grayish-black, laminated, silty, sandy clays. Downdip the sands become dark gray to black,

silty, fine to medium and medium to very coarse sand. The clays become thinly laminated, black to dark gray, silty clays with silty, micaceous, or very fine sandy partings and account for up to 50 to 70 percent of the section. At the P-20, P-21, and P-22 cluster sites, thick glauconitic, clayey sand zones occur in the middle of the sequence.

The Williamsburg Formation consists of white to light brown, micaceous, silty, very fine to medium and medium to very coarse sands. This sequence is largely white to light gray, micaceous, sandy, silty clay at the P-23 site.

The Congaree Formation consists of gray, yellow and tan, moderately well-sorted, clean, fine to very coarse sands at P-16, P-17, and P-18. At P-19, P-20, P-21, and P-22, the unit consists of gray to dark gray silty, very fine to medium sands. At P-23, dark green, clayey sandy silts and gray, silty, very fine to fine sands predomoninate.

Previous investigations have placed the boundary between the Congaree Formation and the overlying McBean Formation at a unit locally known as the "Green Clay" found at the base of the McBean. On geophysical logs this unit is expressed commonly as a recognizable natural gamma peak. At the P-16 site, the "Green Clay" is interpreted as a four-inch iron oxide cemented sand. At P-17 the unit appears as a six-inch greenish-black, glauconitic, clayey, very coarse sand that corresponds to a strong gamma peak on the geophysical logs. At P-18 and P-19 the "Green Clay" unit was not

identified at the contact between the Congaree and the McBean. At the P-20 site, a three-foot, dark grayish-green to black, silty clay was present and was expressed on the geophysical log as a strong gamma peak. At P-21, four feet of green marl was present at the base of the McBean corresponding to a gamma peak on the geophysical log. At P-22, a six foot core that should have crossed the boundary between the Congaree and the McBean was not recovered. However, the geophysical log does show a gamma peak in this interval. At P-23, a very strong gamma peak corresponding to a 21 foot interval of greenish-gray, silty marl is interpreted to represent the "Green Clay".

The McBean Formation above the "Green Clay" consists of yellow to tan, very fine to medium sands at P-16, P-18, and P-19. At P-17 and P-20, the McBean consists of a hard, white shelly limestone overlying a light greenish-brown, sandy marl. At P-21, the McBean is a thick, dark green to green, sandy marl.

The Dry Branch Formation consists of tan, yellow and white, silty to clayey, very fine to medium sands with some coarser zones, and thin, silty clay layers. At P-18, P-21, and P-22, the formation consists of greenish sandy and shelly marls.

Overlying the Dry Branch is the Tobacco Road Formation which is characterized by mottled or laminated, red, orange, white, tan and purple, clayey, very fine to medium and medium to coarse sands and sandy clays.

The Upland Unit is the youngest of the Tertiary age formations. This unit consists of mottled, red, orange, white, tan and purple, very clayey fine to medium to coarse sands and sandy clays with pebble-rich zones.

Within the stratigraphic sequence, there are numerous clay or clayey and silty lenses or units; however, few of these are laterally continuous across the entire SRP site. Nevertheless, it is obvious that certain intervals serve as effective aquitards, at least over short distances. The most continuous of the clay units are those associated with the Ellenton Formation. The profiles for each of the well clusters (Figures 6, 9, 12, 15, 18, 21, 24, and 27) show the depth relationships between the different wells in the cluster and the locations of all clay units generally greater than one foot in thickness as determined from the graphic and lithologic logs for each site. Also shown on these profiles are the water level elevations for each well in the cluster. In general, the piezometric heads within the different formations decrease with increasing depth below the water table down to the Congaree Formation. Heads in wells screened in the Cretaceous formations immediately underlying the Elenton Formation are higher than in wells screened in the Tertiary formation immediately above the Ellenton at clusters P-16, P-21, P-22, and P-23. At clusters P-17, P-19, and P-20, the heads in the Congaree are higher than in the upper Cretaceous formations. At the P-18 cluster, the measured heads in all wells below the water table are about the same,

differing by only a foot or so, with the exception of well P-18A which has a measured water level which is approximately 10 ft higher than wells above and below.

LABORATORY TESTING

Relatively undistrubed samples from the clay and clayey units of significant thickness were collected at each cluster site utilizing either a Pitcher barrel or Shelby tube sampling tool for the purpose of obtaining data on the physical characteristics of the low permeability sediments. In all a total of 39 samples were collected for testing. Laboratory testing was conducted by PSI, Florida Testing Division. Physical characteristics measured included dry unit weight, moisture content, specific gravity, total porosity, grain size distribution, and vertical and horizontal permeability. All laboratory tests were conducted in accordance with applicable ASTM specifications. The results of these tests are summarized on Table 19 with the exception of the grain size analyses which are provided in Appendix I.

The horizontal and vertical permeabilities were determined by the falling head method utilizing samples oriented in both the horizontal and vertical direction. The coefficient of permeability, k, is defined as the rate of discharge of water at a temperature of 68°F under conditions of laminar flow through a unit cross sectional area of sediment under a hydraulic gradient. In the falling head test, a stand-pipe of water is connected to the sample and allowed to flow for a period of time. Time and quantity flowing through the sample are then used to calculate permeability.

TABLE 19

Summary of Laboratory Test Results

Sample	Visual Description	Dry Unit Weight (PCF)	Moisture Content (%)	Passing No. 200 Sieve (%)	Specific Gravity	Permeability (cm/sec)	Total Porosity
P-16 65.0'- 67.0'	Tan sand, coarse and slightly silty	103.0**	11.2	7.0	2.65	1.9×10^{-3} Remolded*(R)	0.377
P-16 158.0'-161.0'	Tan and brown clayey sand with light tan and tan silty clay layers	73.7	40.8	40.0	2.64	1.7×10^{-7}(V) 5.3×10^{-7}(H)	0.553
P-16 177.0'-179.0'	Orange and tan sandy silt	114.0**	27.8	63.4	2.65	2.2×10^{-5}(R) Remonded*	0.311
P-16 179.0'-181.5'	Orange and tan sand with light tan silty clay layers and inclusions	107.6	24.2	40.4	2.63	2.5×10^{-6}(V) 1.1×10^{-5}(H)	0.345
P-16 (Bag sample) 248.0'-255.0'	Gray and light tan sandy clay, slightly silty	112.5**	28.5	70.3	2.58	7.1×10^{-8}(R) Remolded*	0.302
P-16 255.0'-257.0'	White clayey sand, slightly silty with mica and iron staining	109.8	16.7	22.5	2.61	6.5×10^{-7}(V) 9.5×10^{-7}(H)	0.326
P-16 415.0'-417.5'	Light gray clay with tan clayey sand seams	99.5	26.0	68.8	2.59	6.3×10^{-8}(V) 6.7×10^{-7}(H)	0.385
P-16 180.0'-182.0'	Dark gray clay with mica and slightly cemented	86.3	33.1	83.2	2.56	1.9×10^{-7}(V) *	0.460
P-17 308.0'-310.0'	Green clay, hard and layered	85.4	38.5	99.3	2.73	4.5×10^{-9}(V) 3.6×10^{-8}(H)	0.499

* Unable to obtain undisturbed specimen for testing.
Samples were remolded in order to indicate permeability properties.

** Density of remolded test sample.

TABLE 19, Contd

Sample	Visual Description	Dry Unit Weight (PCF)	Moisture Content (%)	Passing No. 200 Sieve (%)	Specific Gravity	Permeability (cm/sec)	Total Porosity
P-17 443.0'-445.0'	Light gray silty clay with sandy seams	104.9	22.9	81.3	2.71	1.2×10^{-7}(V) 2.4×10^{-7}(H)	0.380
P-17 662.0'-664.0'	Light gray silty clay	112.9	23.2	85.7	2.63	2.7×10^{-7}(V) *	0.312
P-18 180.0'-182.0'	Orange clayey sand with clay seams	95.4	21.5	36.9	2.58	2.7×10^{-8}(V) 2.0×10^{-8}(H)	0.408
P-18 261.0'-263.0'	Orange and tan clayey coarse sand with clay pockets	121.6	12.3	10.3	2.66	1.4×10^{-5}(V) 3.1×10^{-5}(H)	0.268
P-18 410.0'-412.0'	Greenish-gray and brown silty clay, marbled and slightly sandy	102.5	21.2	88.8	2.69	3.2×10^{-8}(V) 3.7×10^{-8}(H)	0.390
P-18 643.0'-645.0'	Hard, greenish-gray silty clay, slightly sandy	110.0	16.5	84.8	2.61	2.4×10^{-8}(V) *	0.325
P-19 190.0'-192.9'	Orange clayey sand with light tan silty clay lenses	101.6	21.5	22.8	2.66	1.2×10^{-8}(V) 2.8×10^{-6}(H)	0.388
P-19 282.0'-283.0'	Dark gray and tan clayey sand with occasional gray clay seams	108.0	22.0	22.9	2.68	3.4×10^{-6}(V) 3.5×10^{-5}(V)	0.355
P-19 355.0'-358.0'	Grayish-green sandy clay, hard	125.8	14.4	58.6	2.63	1.4×10^{-8}(V) 2.1×10^{-8}(H)	0.234
P-19 495.0'-497.0'	Orange and light brown clayey sand with gray clay, coarse sand and gravel inclusions	109.2	20.9	15.2	2.66	3.0×10^{-8}(V) 2.3×10^{-6}(H)	0.342

* Insufficient sample to obtain undisturbed specimen for horizontal testing.

TABLE 19, Contd

Sample	Visual Description	Dry Unit Weight (PCF)	Moisture Content (%)	Passing No. 200 Sieve (%)	Specific Gravity	Permeability (cm/sec)	Total Porosity
P-19 548.0'-550.0'	Gray clayey sand with vertical seam of gray clay	104.1	24.1	41.6	2.65	7.0×10^{-6}(V) 2.8×10^{-6}(H)	0.308
P-20 105.0'-107.0	Gray and brown clayey sand with Fe stains	66.1	58.3	33.2	2.82	3.4×10^{-8}(V) 1.1×10^{-7}(H)	0.625
P-20 210.0'-211.0'	Brown very silty sand with mica and well consolidated	92.2	28.4	49.2	2.66	9.1×10^{-7}(V) 1.1×10^{-6}(H)	0.445
P-21 160.0'-162.0'	Tan sandy silt	91.0	50.4	73.0	2.59	6.7×10^{-7}(V) 5.8×10^{-6}(H)	0.437
P-21 325.0'-327.0'	Gray fine silty sand	116.1	17.7	17.6	2.64	1.2×10^{-4}(V) 5.1×10^{-4}(H)	0.296
P-21 380.0'-382.0'	Dark gray to black shaley clay with fine sand seams	61.8	60.1	44.2	2.50	1.9×10^{-5}(V) 2.4×10^{-4}(H)	0.604
P-21 495.0'-497.0'	Gray silty clay with mica	116.4	15.1	37.6	2.61	2.2×10^{-7}(V) 2.7×10^{-7}(H)	0.286
P-21 522.0'-524.0'	Hard gray clay with iron staining	119.8	18.3	85.6	2.69	6.4×10^{-9}(V) 1.0×10^{-8}(H)	0.287
P-21 560.0'-562.0	Reddish-brown silty clay	101.4	25.9	96.8	2.59	3.3×10^{-8}(V) 3.0×10^{-8}(H)	0.373
P-22 61.0'-63.0'	Tan clayey sand	82.3	36.2	20.5	2.69	1.7×10^{-7}(V) 3.4×10^{-7}(H)	0.510
P-22 140.0'-142.0'	Tan clayey sand, slightly silty with traces of limerock	91.9	35.8	25.1	2.70	1.3×10^{-7}(V) 6.6×10^{-8}(H)	0.455
P-22 331.0'-333.0'	Light gray silty clay	88.5	32.2	95.3	2.65	5.0×10^{-8}(V) 4.3×10^{-8}(H)	0.465

TABLE 19, Contd

Sample	Visual Description	Dry Unit Weight (PCF)	Mositure Content (%)	Passing No. 200 Sieve (%)	Specific Gravity	Permeability (cm/sec)	Total Porosity
P-22 390.0'-392.0'	Hard dark gray silty clay, brittle and cemented	65.8	53.0	N/A	2.50	3.6×10^{-7}(V) *	0.578
P-22 612.0'-614.0'	Light and dark gray layered clay and silt with mica	98.2	21.4	90.7	2.60	4.2×10^{-8}(V) 9.9×10^{-8}(H)	0.395
P-23 97.0'-99.0'	Dark gray slightly silty brittle clay	50.9	82.6	75.6	2.76	1.3×10^{-7}(V) (H)**	0.705
P-23 185.0'-187.0'	Blue-gray silty clay	102.2	26.1	81.3	2.70	3.4×10^{-8}(V) 4.0×10^{-8}(H)	0.394
P-23 224.0'-226.0'	Gray slightly silty clay with pockets of pyrite	92.0	27.6	96.0	2.63	1.5×10^{-8}(V) 1.3×10^{-8}(H)	0.440
P-23 301.0'-303.0'	Blue-gray sandy clay	106.6	19.6	62.8	2.64	1.2×10^{-8}(V) 4.0×10^{-5}(H)	0.353
P-23 361.0'-363.0'	Layered gray and brown slightly silty and sandy clay	119.1	14.9	72.6	2.66	3.4×10^{-7}(V) 9.0×10^{-9}(H)***	0.283
P-23 401.0'-403.0'	Hard gray clayey silt	100.3	20.9	91.5	2.65	4.1×10^{-8}(V) 8.7×10^{-8}(H)	0.394

* Unable to obtain test specimen from sample for horizontal testing due to brittle nature. Grain size analysis would not be appropriate for this sample due to cemented nature and inability to be dispersed.

** Brown clay layers more numerous in horizontal sample.

*** Size of sample was not large enough to perform horizontal permeability.

Total porosity calculations were based on the relationship:

$$n = \frac{V_v}{V_t}$$

where n = porosity

V_v = volume of pore space

V_t = total volume of sample

In addition, unit weight, volume, and moisture content measurements are required in order to complete the calculation of total porosity. The moisture content is defined as the ratio of the weight of the water in the sample to the weight of the dry solids in the sample expressed as a percent. The moisture content test is conducted by weighing a sediment sample before and after drying in an oven at a temperature of 230°F.

Since there is no accepted test procedure for the determination of effective porosity, values for this parameter have not been presented. This recommendation was made by PSI after reviewing the procedure used in the past and researching the literature. Values of effective porosity submitted in the past by PSI were based on a computational procedure utilizing effective grain size, D_{10} diameter, permeability of the sample, and a constant, C, that was assumed to be a measure of void continuity for spherical grains. PSI believes that this relationship may have some degree of validity for clean, well-rounded sands with less than 2 to 3 percent fines, but not for the clays and clayey fractions.

Grain size distribution was determined according to methods specified in ASTM D422. The distribution of particle sizes larger

than 75 microns (retained on the No. 200 sieve) was determined by sieving, while the distribution of particle sizes smaller than 75 microns was determined by hydrometer analysis.

Specific gravity measurements, which are required to calculate particle size distribution using the hydrometer method, were determined as specified in ASTM D854.

CONCLUSIONS

The utilization of wireline coring techniques has proven to be extremely efficient and cost effective in obtaining geologic samples from depths of up to 1200 ft below the ground surface. Approximately 6350 ft of core for lithologic classification and physical and laboratory analysis were collected from the approximate 7145 ft attempted as part of Phase II. In addition 56 observation wells were installed in the major water-bearing formations at eight cluster sites.

Based on physical and microscopic examination of the cores and geophysical logs, preliminary formational picks have been made. Although formation names may change and contacts move up or down based on continuing geologic investigations, an attempt has been made to introduce and apply some of the current stratigraphic terminology into the description of the geologic framework developed by Siple. Utilizing the results of both Phase I and Phase II, preliminary geologic cross sections are being developed for the SRP site. These sections will be changed and/or modified as the Phase III borings are completed and geologic data become available from other

studies. The determination of paleontologic age dates from the different lithologic units will greatly enhance the understanding of the geology and the selection of formational contacts. The selection of samples for micro- and macrofossil age dating will be pursued under other programs.

Phase III, the last phase of the planned investigation, is scheduled to be completed in FY 87. This phase will include the drilling of approximately 56 wells to be located at 7 cluster sites. The approximate locations of the Phase III cluster sites are shown on **Figure 30.** A similar program being planned by the South Carolina Water Resources Commission will provide valuable geohydrologic data from off the SRP site for correlation with SRP data generated as part of the baseline investigation.

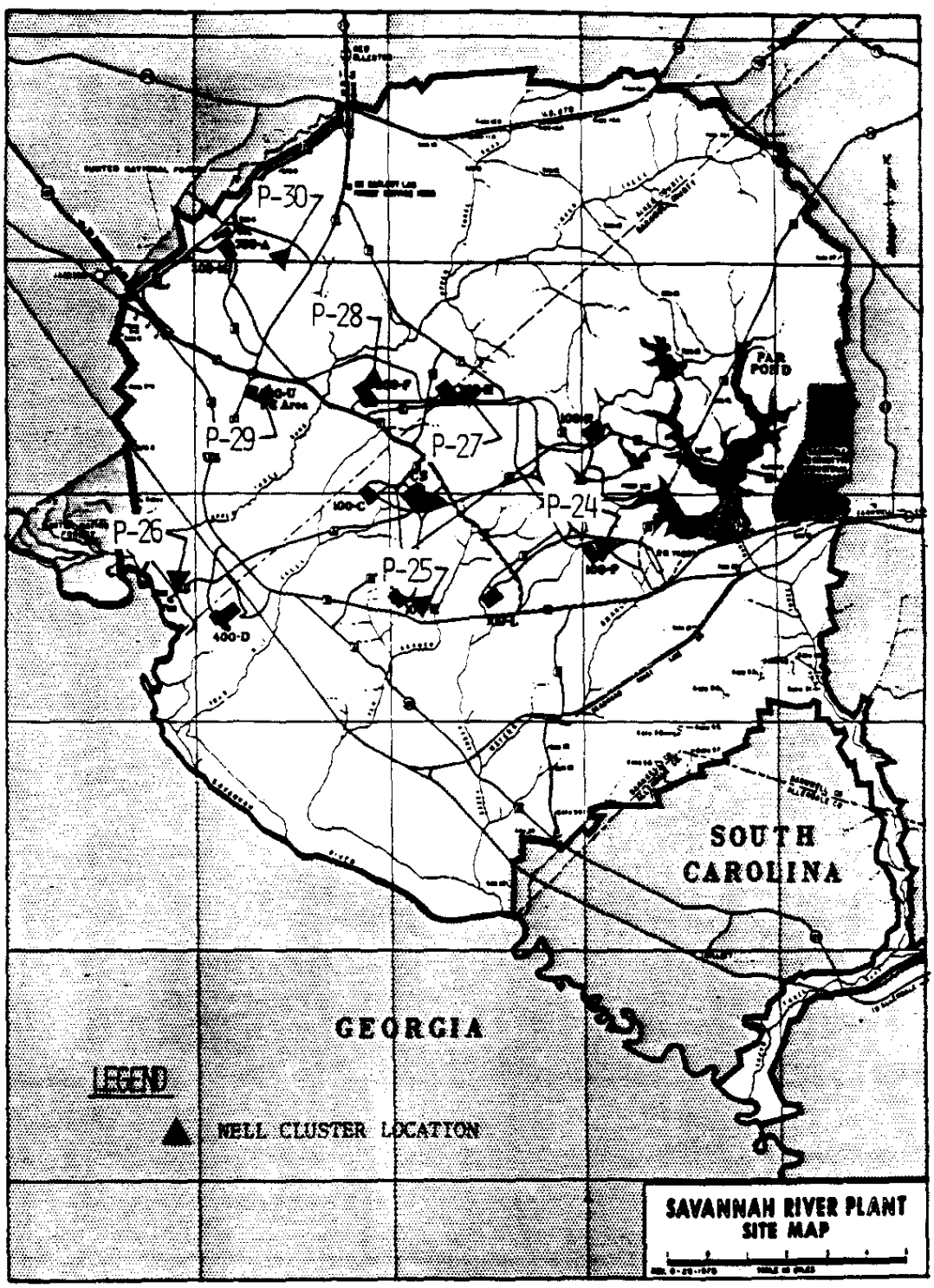


FIGURE 30. Locations of Proposed Phase III Well Clusters

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APPENDIX A

LITHOLOGIC LOG FOR P-16TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-16 TA

Depth (ft)	Thickness (ft)	Description
1 - 5	5	Clay; orangish brown; F-Y-3 (0-1) F-Y-2 (4-5)
5 - 7	2	Clay, silty; lignite; orangish red to whitish gray; F-Y-1 (6-7)
7 - 8	1	Clay, sandy; mottled sand; lignite orangish whitish yellow
8 - 11	3	Clay, silty; lignite; muscovite; reddish yellow
11 - 15	4	Sand, fine; moderately sorted; lignite; tannish orange to whitish tan; F-O-3 (14-15)
15 - 16	1	No recovery
16 - 17	1	Sand, medium; orangish yellow; F-Y-2
17 - 18	1	No recovery
18 - 19	1	Sand; fine; muscovite; lignite; orangish red; F-Y-1
19 - 20	1	No recovery
20 - 21	1	Clay; varigated; orangish yellow
21 - 22	1	Sand, fine; well sorted; yellow
22 - 23	1	Clay; varigated; reddish yellow; F-Y-1
23 - 25	2	No recovery
25 - 26	1	Clay, sandy; yellowish brown
26 - 28	2	No recovery
28 - 34	6	Sand, medium, silty; very poorly sorted; lignite; yellowish brown to reddish brown; F-Y-3 (32-34)
34 - 35	1	No recovery
35 - 37	2	Sand, medium, tannish brown
37 - 38	1	No recovery
38 - 40	2	Silt, sandy; well sorted; muscovite; lignite; tannish brown; F-Y-1

Depth (ft)	Thickness (ft)	Description
40 - 41	1	Clay, sandy; tannish brown; F-0-1
41 - 42	1	No recovery
42 - 43	1	Clay, sandy; tannish brown; F-0-2
43 - 52	9	No recovery
52 - 57	5	Sand, coarse; interbedded clay; very poorly sorted
57 - 58	1	No recovery
58 - 60	2	Sand, coarse; clayey; very poorly sorted; lignite; purplish yellow
60 - 62	2	No recovery
62 - 63	1	Sand, medium; clayey; muscovite; lignite; brownish purplish yellow; F-B-1
63 - 65	2	No recovery
65 - 66	1	Clay; yellowish brown
66 - 68	2	Sand, clayey; moderately sorted; medium, brown; F-Y-1
68 - 71	3	Sand, medium; silty; interbedded clay; muscovite; lignite; tan
71 - 72	1	No recovery
72 - 80	8	Sand, medium; silty; interbedded clay; lignite; tan to yellowish white; F-0-2 (72-75); F-Y-1 (76-80)
80 - 82	2	Sand, medium; clayey; well sorted; interbedded clay; lignite; purplish white
82 - 84	2	Sand, silty; well sorted; lignite; mottled brown; brownish white; F-Y-2
84 - 85	1	No recovery
85 - 86	1	Clay; lignite; varigated; yellowish purplish

Depth (ft)	Thickness (ft)	Description
86 - 91	5	Sand, medium; silty; well sorted; lignite; yellowish purplish white to yellowish brown; F-O-3 (86-88)
91 - 92	1	No recovery
92 - 94	2	Sand, coarse; well sorted; lignite; whitish yellowish brown; F-B-1
94 - 95	1	No recovery
95 - 96	1	Sand; mottled brown; reddish brown
96 - 98	2	No recovery
98 - 100	2	Sand; lignite; mottled brown; whitish tannish gray; F-Y-1
100 - 102	2	No recovery
102 - 111	9	Sand, medium; moderately sorted; lignite; white to whitish gray; F-O-1 (106-111)
111 - 112	1	No recovery
112 - 114	1	Sand, interbedded clay; lignite; whitish tan; F-B-2
114 - 115	1	No recovery
115 - 124	9	Sand, medium; poorly sorted; interbedded clay; lignite; yellowish tannish white; F-B-3 (118-124)
124 - 125	1	No recovery
125 - 130	5	Sand, medium; poorly sorted; trace heavy minerals; lignite; mottled; brown; purplish white
130 - 132	2	No recovery
132 - 134	2	Sand, coarse; well sorted; lignite; purplish white; F-O-1
134 - 135	1	No recovery
135 - 136	1	Sand, coarse; lignite; whitish tan
136 - 138	2	No recovery

Depth (ft)	Thickness (ft)	Description
138 - 140	2	Sand, coarse; well sorted; lignite; white
140 - 142	2	No recovery
142 - 144	2	Sand, coarse; interbedded clay; whitish purple
144 - 145	1	No recovery
145 - 147	2	Sand, coarse; very poorly sorted; interbedded clay; lignite brownish white
147 - 148	1	No recovery
148 - 149	1	Clay, sandy; lignite; yellowish red
149 - 152	3	Sand, medium; silty; very poorly sorted; muscovite; lignite; brown to yellow
152 - 157	5	Sand, medium; clayey; very poorly sorted; lignite; yellowish brown to yellowish purple
157 - 158	1	Clay, sandy; muscovite; lignite; yellowish purple
158 - 160	2	Clay, silty; muscovite; yellowish purple
160 - 162	2	No recovery
162 - 164	2	Clay, silty; yellowish purple
164 - 168	4	Sand, fine; silty; well sorted; lignite; yellow
168 - 174	6	Sand, medium; well sorted; lignite; tannish white
174 - 175	1	No recovery
175 - 176	1	Sand, fine; mottled brown; well sorted; green
176 - 178	2	Clay; brownish gray
178 - 182	4	No recovery
182 - 184	2	Clay; brownish yellow
184 - 185	1	Sand, fine; muscovite; lignite; varigated; yellowish orangish purple

Depth (ft)	Thickness (ft)	Description
185 - 186	1	Silt, muscovite; lignite; yellowish orangish purple
186 - 192	6	Sand, medium; moderately sorted; muscovite; lignite; trace gypsum; purplish white to white
192 - 193	1	Sand, clayey; whitish tan; trace gypsum
193 - 194	1	Silt, sandy; trace gypsum; muscovite; lignite; whitish brown
194 - 203	9	Sand, medium; silty; well sorted; trace gypsum; muscovite; lignite; whitish purple to white
203 - 208	5	Clay, sandy; poorly sorted; muscovite; lignite; whitish purple
208 - 211	3	Sand, medium; clayey; poorly sorted; whitish purple; muscovite
211 - 212	1	No recovery
212 - 213	1	Silt, clayey; micaceous; lignite; whitish purple
213 - 214	1	Sand, medium; silty; muscovite; lignite; whitish purplish yellow
214 - 218	4	Sand, medium; clayey; muscovite; lignite; whitish purple
218 - 227	9	Sand, coarse; silty; moderately sorted; muscovite; lignite; whitish purple to whitish yellow
227 - 228	1	No recovery
228 - 230	2	Sand, coarse; white
230 - 232	2	No recovery
232 - 235	3	Silt; muscovite; lignite; white
235 - 240	5	Silt, sandy; well sorted; interbedded clay; muscovite; lignite; white to whitish brown
240 - 246	6	Sand, medium; silty; moderately sorted; interbedded clay; muscovite; lignite; brownish white

Depth (ft)	Thickness (ft)	Description
246 - 247	1	Silt; interbedded clay; tannish whitish purple
247 - 249	2	Sand, medium; clayey; interbedded clay; muscovite; lignite; tannish whitish purple
249 - 251	2	Clay; pinkish whitish purple
251 - 252	1	No recovery
252 - 259	7	Clay; muscovite; grayish pink
259 - 260	1	Silt, clayey; muscovite; whitish purple
260 - 262	2	Clay, silty; muscovite; whitish purple
262 - 264	2	Sand, medium; silt; moderately sorted; muscovite; lignite; white
264 - 265	1	Silt; fissile; miscovite; lignite; white
265 - 267	2	Silt, sandy; muscovite; lignite; white to whitish yellow
267 - 280	13	Sand, medium; silty; interbedded clay; muscovite; lignite; white
280 - 288	8	Sand, fine; clayey; moderately sorted; muscovite; lignite; white
288 - 298	10	Sand, fine; silty, clayey; moderately sorted; muscovite; lignite; white
298 - 300	2	Clay, silty; sandy; white
300 - 312	12	Sand, medium; silty, clayey; well sorted; muscovite; lignite; white
312 - 315	3	Sand, fine; silty; well sorted; lignite; muscovite; white
315 - 320	5	Sand, fine; silty, clayey; well sorted; lignite; muscovite; white
320 - 322	2	Silt, clayey; sandy; lignite; muscovite; white to whitish yellow
322 - 327	5	Sand, clayey; kaolinite; muscovite; lignite; white

Depth (ft)	Thickness (ft)	Description
327 - 329	2	Sand, medium; silty; well sorted; muscovite; lignite; light tannish white
329 - 331	2	Sand, clayey; kaolinite; muscovite; lignite; tannish white
331 - 335	4	Sand, fine; silty; very poorly sorted; kaolinite; muscovite; lignite; light tannish white
335 - 337	2	Sand, clayey; muscovite; kaolinite; limonite; white
337 - 339	2	Clay, sandy; well sorted; muscovite; kaolinite; lignite; tannish white
339 - 341	2	Sand; well sorted; clay balls; light tannish white
341 - 342	1	Clay, silty; muscovite; light tannish white
342 - 343	1	Sand, coarse; clayey; clay balls; lignite; muscovite; light tannish white
343 - 345	2	Clay; light tannish
345 - 346	1	Sand, coarse; silty; light tannish white
346 - 348	2	No recovery
348 - 350	2	Sand, coarse; muscovite; lignite; kaolinite; light tannish white
350 - 351	1	Sand, silty; light
351 - 352	1	No recovery
352 - 354	2	Sand, coarse; moderately sorted; clay balls; light tannish white
354 - 360	6	Sand, coarse, silty; clay balls; muscovite; lignite; light tannish white
360 - 366	6	Sand, coarse; well sorted; lignite; yellowish white
366 - 371	5	Sand, coarse; silty; moderately sorted; interbedded clay; lignite; muscovite; light tannish white
371 - 372	1	No recovery
372 - 378	6	Sand, coarse; silty; well sorted; clay balls; lignite; muscovite; white

Depth (ft)	Thickness (ft)	Description
378 - 380	2	Clay, silty; sandy; muscovite; lignite; light tannish white
380 - 395	15	Sand, coarse; interbedded clay; muscovite; lignite; yellowish white
395 - 401	6	Silt, sandy; well sorted; trace gypsum; lignite; muscovite; purplish yellowish white
401 - 407	6	Sand, medium; silty; very poorly sorted; muscovite; lignite; dark yellowish brown
407 - 408	1	No recovery
408 - 412	4	Sand, silty; poorly sorted; interbedded clay; muscovite; lignite; yellowish brownish purple
412 - 413	1	Sand, clayey; trace sulfides; dark reddish brown
413 - 421	8	Clay; fissile; muscovite; whitish purplish blue
421 - 422	1	No recovery
422 - 423	1	Clay; fissile; gray
423 - 425	2	No recovery
425 - 432	7	Clay; fissile; muscovite; purplish gray
432 - 434	2	Sand, coarse; silty; well sorted; trace sulfides; dark reddish gray
434 - 437	3	Sand, coarse; clayey; sulfides; muscovite; yellowish whitish red
437 - 438	1	No recovery
438 - 439	1	Clay, silty; sandy; muscovite; purplish whitish yellow
439 - 442	3	No recovery
442 - 443	1	Sand, fine; silty; interbedded clay; purplish tannish yellow
443 - 445	2	No recovery

Depth (ft)	Thickness (ft)	Description
445 - 447	2	Sand, coarse; interbedded clay; lignite; muscovite; tannish white
447 - 448	1	Clay, silty; sandy; tannish whitish purple
448 - 453	5	Sand, coarse; clayey; interbedded clay; well sorted; muscovite; lignite; tannish white
453 - 456	3	Sand, coarse; interbedded clay; well sorted; muscovite; lignite; brownish tan
456 - 461	5	Sand, medium; silty; moderately sorted; interbedded clay; muscovite; lignite; tannish purplish brown
461 - 462	1	No recovery
462 - 469	7	Sand, coarse; silty; interbedded clay; well sorted; muscovite; lignite; yellowish tannish white
469 - 474	5	Sand, coarse; clayey; interbedded clay; muscovite; lignite; tannish white
474 - 476	2	Sand, silty; moderately sorted; purplish tannish brown
476 - 480	4	Sand, coarse; well sorted; interbedded clay; muscovite; lignite; orangish tan
480 - 481	1	Sand, fine; silty; muscovite; lignite; varigated; pinkish whitish brown
481 - 482	1	No recovery
482 - 484	2	Sand, coarse; moderately sorted; muscovite; lignite; orangish tan
484 - 491	7	Sand, silty; yellowish white; moderately sorted; muscovite; lignite
491 - 492	1	No recovery
492 - 493	1	Sand, silty; varigated; tannish brownish purple
493 - 494	1	Clay, silty; mottled sand; muscovite; lignite; pinkish light gray

Depth (ft)	Thickness (ft)	Description
494 - 498	4	Sand, fine; silty, clayey; muscovite; lignite; orangish grayish tan
498 - 504	6	Silt, sandy; well sorted; muscovite; lignite; orangish brown
504 - 507	3	Clay; light purplish tan
507 - 509	2	Sand, clayey; well sorted; interbedded clay; muscovite; lignite; tannish white
509 - 511	2	Sand, medium; silt; well sorted; purplish whitish tan
511 - 519	8	Sand, medium; clayey; well sorted; interbedded clay; muscovite; lignite; purplish reddish white to grayish white
519 - 526	7	Sand, medium; silty; poorly sorted; lignite; muscovite; purplish yellowish white
526 - 528	2	No recovery
528 - 531	3	Sand, medium; silty; well sorted; muscovite; lignite; dark purplish white
531 - 532	1	No recovery
532 - 542	10	Silt, sandy; well sorted; trace gypsum; muscovite; lignite; light grayish white
542 - 543	1	Sand, medium; silty; moderately sorted; purplish light greenish white
543 - 545	2	Clay, sandy; mottled sand; muscovite; lignite; light greenish purple
545 - 547	2	Sand, medium; clayey; well sorted; mottled sand; light greenish purple
547 - 548	1	Clay; fissile; light grayish tan
548 - 549	1	Clay, sandy; muscovite; lignite; light greenish purple
549 - 551	2	Sand, medium; clayey; muscovite; lignite; purplish light gray

Depth (ft)	Thickness (ft)	Description
551 - 552	1	No recovery
552 - 557	5	Clay; fissile; muscovite; gray
557 - 558	1	Sand, fine; silty; poorly sorted; gypsum; white
558 - 559	1	Clay, silty; sandy; light gray
559 - 562	3	Sand, medium; silty; poorly sorted; gypsum; sulfides; muscovite; lignite; light tannish white
562 - 563	1	Sand, coarse; clayey; gypsum; sulfides; light gray
563 - 569	6	Sand, coarse; silty; lignite; sulfides; moderately sorted; light purplish white
569 - 571	2	Clay, silty; sulfides; muscovite; lignite; light purplish white
571 - 575	4	Sand, medium; silty; poorly sorted; clay balls; sulfides; lignite; muscovite; tannish purplish white
575 - 576	1	Silt, sandy; gypsum; sulfides; lignite; muscovite; light purplish white
576 - 578	2	Sand, medium; silty; sulfides; lignite; tannish purplish white
578 - 579	1	Clay, sandy; sulfides; light purplish white
579 - 581	2	Silt, sandy; sulfides; light purplish white
581 - 614	33	Sand, medium to coarse; silty; well to moderately sorted; sulfides; muscovite; lignite; whitish purple to whitish yellow
614 - 616	2	Sand, coarse; well sorted; muscovite; lignite; white
616 - 617	1	Silt, sandy; muscovite; lignite; light grayish white
617 - 618	1	Clay, silty; sandy; white
618 - 622	4	No recovery

Depth (ft)	Thickness (ft)	Description
622 - 625	3	Sand, medium, silty; moderately sorted; sulfides; muscovite; lignite; whitish brown
625 - 629	4	Sand, coarse; well sorted; light pinkish white
629 - 632	3	Sand, medium, silty; sulfides; muscovites; lignite; purplish white
632 - 635	3	Clay; tannish purple
635 - 640	5	Sand, fine; well sorted; sulfides, muscovite; light gray
640 - 641	1	Clay, silty; tannish purple
641 - 642	1	No recovery
642 - 643	1	Clay; sulfides; muscovite; tannish purple
643 - 644	1	Silt, clayey; tannish purple
644 - 645	1	Clay, silt, sandy; lignite; sulfides; muscovite; tannish purple
645 - 646	1	Silt, sandy; tannish purple
646 - 647	1	Sand, medium, clayey; moderately sorted; sulfides; muscovite; lignite; tannish purplish yellow
647 - 648	1	Sand, coarse; poorly sorted; yellowish tan
648 - 649	1	Silt, sandy; well sorted; brownish yellowish gray
649 - 650	1	Sand, medium, silty; muscovite, light tannish yellow
650 - 652	2	Sand, medium, clayey; poorly sorted; lignite; muscovite; light bluish gray
652 - 653	1	Silt, sandy; well sorted; lignite; muscovite; light greenish gray
653 - 655	2	Sand, medium, silty; poorly sorted; muscovite; light greenish gray
655 - 656	1	Silt, sandy; light greenish gray
656 - 658	2	Clay, silty, sandy, dark brownish red

Depth (ft)	Thickness (ft)	Description
658 - 660	2	Clay; light gray to grayish red
660 - 662	2	No recovery

APPENDIX B

LITHOLOGIC LOG FOR P-17TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-17 TA

Depth (ft)	Thickness (ft)	Description
0 - 5	5	Sand, medium; silty; lignite; light brownish gray; F-O-1 (2-4)
5 - 6	1	Clay, sandy; moderately sorted; lignite; grayish yellowish brown
6 - 7	1	Sand, medium; silty; lignite; orangish tan
7 - 8	1	No recovery
8 - 10	2	Sand, medium; clayey; well sorted light purple; F-B-1
10 - 11	1	Sand, medium; silty; moderately sorted; interbedded clay; muscovite; orangish tannish purple
11 - 24	13	Sand, medium; clayey; interbedded clay; varigated; lignite; purplish tannish orange
24 - 31	7	Sand, coarse; silty; well sorted; pinkish brown to light brown; F-B-1 (28-31)
31 - 33	2	Clay, sandy; moderately sorted; muscovite; purplish yellow; F-B-1
33 - 38	5	Sand, coarse; silty; moderately sorted; muscovite; lignite; pinkish white; F-B-1
38 - 39	1	Silt, clayey; muscovite; pinkish white
39 - 42	3	No recovery
42 - 50	8	Clay, sandy; lignite; dark purple
50 - 52	2	Sand, coarse; clayey; well sorted; muscovite; dark pinkish purple
52 - 53	1	Clay, silty; mottled sand; muscovite; dark pinkish purple
53 - 63	10	Sand, medium; clayey; well sorted; dark pinkish purple to dark purple; F-O-1 (56-80)
63 - 64	1	Silt, clayey; brownish yellow
64 - 67	3	Sand, coarse; clayey; pinkish red; F-O-1

Depth (ft)	Thickness (ft)	Description
67 - 71	4	Sand, coarse; silty; very poorly sorted; pinkish red; F-O-1
71 - 72	1	No recovery
72 - 75	3	Sand, medium; silty; well sorted; pinkish red
75 - 77	2	No recovery
77 - 89	12	Sand, medium; well sorted; pinkish red to pinkish brown; F-O-1
89 - 90	1	Sand, medium; clayey; brownish yellow; F-B-1
90 - 92	2	Clay, sandy; mottled brown; mottled sand; tannish yellow; F-B-1
92 - 93	1	Sand, clayey; well sorted; tannish yellow
93 - 95	2	Sand, coarse; well sorted muscovite; brownish yellow; F-B-1
95 - 97	2	No recovery
97 - 102	5	Sand, coarse; silty; moderately sorted; muscovite; lignite; tan; F-O-1
102 - 103	1	Sand, clayey; interbedded clay; lignite; tan
103 - 104	1	Clay; lignite; tan
104 - 106	2	Sand, medium; clayey; lignite; tan; interbedded clay
106 - 107	1	Clay, silty; muscovite; lignite; tan
107 - 108	1	No recovery
108 - 110	2	Clay, silty; lignite; tan
110 - 116	6	Sand, coarse; silty; well sorted; lignite; tan
116 - 120	4	Sand, coarse; clayey; moderately sorted; muscovite; lignite; tan; mottled brown
120 - 126	6	Sand, medium; moderately sorted; lignite; tannish brown; mottled brown
126 - 127	1	No recovery
127 - 128	1	Sand, medium; silty; lignite; light brownish tan; F-O-1

Depth (ft)	Thickness (ft)	Description
128 - 130	2	Sand, medium; moderately sorted; lignite; brown
130 - 132	2	No recovery
132 - 135	3	Sand, medium; well sorted; lignite; brown
135 - 137	2	Sand, medium; silty; well sorted; interbedded clay; lignite; fossils, silicified; brown
137 - 138	1	No recovery
138 - 141	3	Sand, fine; silty; mottled brown; interbedded clay; fossils, silicified; lignite; brown
141 - 142	1	No recovery
142 - 146	4	Sand, medium; silty; mottled brown; lignite; brown to yellowish brown; varigated
146 - 148	2	Sand, medium; clayey; moderately sorted; interbedded clay; fossils; lignite; brownish tan
148 - 149	1	Sand, medium; silty; poorly sorted; dark brown
149 - 150	1	Silt; lignite; light greenish brown; F-Y-3
150 - 152	2	Clay, silty; lignite; whitish light green; F-Y-3
152 - 154	2	Silt, clayey; trace fossils; whitish light green
154 - 155	1	Limestone, clayey; lignite; fossils; whitish light green; F-Y-3
155 - 156	1	No recovery
156 - 164	8	Limestone, clayey; fossils; lignite; whitish light green; F-Y-3
164 - 165	1	Limestone; fossils lignite; whitish light green
165 - 166	1	No recovery
166 - 170	4	Silt, sandy; well sorted; muscovite; lignite; greenish brown to brownish green; F-0-2
170 - 176	6	Sand, medium; silty; muscovite; lignite; mottled brown; yellowish brownish green; F-B-1 (174-175)

Depth (ft)	Thickness (ft)	Description
176 - 180	4	Clay, sandy; interbedded clay; muscovite; lignite; yellowish brownish green
180 - 186	6	Clay; glauconite; lignite; muscovite; green
186 - 187	1	Clay, sandy; glauconite; lignite; muscovite; green
187 - 190	3	No recovery
190 - 192	2	Clay, silty; fissile; glauconite; lignite; green
192 - 194	2	Clay; fissile; cross-bedded; glauconite; muscovite; green
194 - 196	2	Clay; sandy; glauconite; muscovite; dark green
196 - 200	4	Sand, medium; silty; well sorted; lignite; greenish brown to orangish brown; F-B-1
200 - 210	10	Sand, medium; very poorly sorted; interbedded clay; mottled brown; lignite; orangish tan
210 - 212	2	Sand, coarse; silty; well sorted; muscovite; lignite; orangish brown
212 - 214	2	No recovery
214 - 218	4	Sand, medium; silty; well sorted; muscovite; lignite; orange
218 - 220	2	No recovery
220 - 226	6	Sand, fine; silty; well sorted; calcareous; muscovite; lignite; orange; F-B-2
226 - 228	2	No recovery
228 - 229	1	Sand, medium; lignite; orange
229 - 230	1	No recovery
230 - 233	3	Sand, medium; muscovite; lignite; interbedded clay; mottled brown; orangish yellowish tan
233 - 244	11	Sand, medium; silty; well sorted; lignite; chert; orangish yellow to orangish tan

Depth (ft)	Thickness (ft)	Description
244 - 252	8	Sand; very poorly sorted; lignite; muscovite; orangish tan to orangish brown
252 - 255	3	Sand, medium; silty; very poorly sorted; muscovite; lignite; orangish tan
255 - 256	1	No recovery
256 - 258	2	Sand, medium; silty; muscovite; lignite; orangish tan
258 - 260	2	Sand, silty; clayey; very poorly sorted; interbedded clay; muscovite; lignite; orangish brown
260 - 265	5	Sand, coarse; very poorly sorted; interbedded clay; lignite; tannish brown; F-Y-2
265 - 266	1	No recovery
266 - 271	5	Sand, coarse; very poorly sorted; lignite; interbedded clay; mottled brown; tannish brown
271 - 272	1	Sand, medium; silty; mottled brown; tannish brownish orange; F-B-1
272 - 273	1	Clay, sandy; lignite; tannish greenish gray
273 - 276	3	No recovery
276 - 285	9	Sand, very poorly sorted; lignite; mottled brown; tannish brown; F-B-3 (276-280)
285 - 286	1	No recovery
286 - 289	3	Sand, coarse; lignite; tannish brown
289 - 292	3	Sand, silty; very poorly sorted; lignite; light yellowish tan
292 - 308	16	Sand, medium; very poorly sorted; lignite; interbedded clay; light yellowish tan to light orangish tan; F-O-1 (292-294)
308 - 311	3	Clay; mottled sand; glauconite; dark greenish gray

Depth (ft)	Thickness (ft)	Description
311 - 327	18	Sand, coarse; moderately sorted; trace sulfides; lignite; light gray to gray
327 - 333	6	Sand, medium; silty; moderately sorted; interbedded clay; trace muscovite; orangish brown
333 - 337	4	Sand, medium; silty; poorly sorted; interbedded clay; light orangish brown
337 - 344	7	Sand, medium; muscovite; lignite; light orangish brown
344 - 348	4	Sand, medium; silty; sulfides; lignite; interbedded clay; light orangish brown
348 - 350	2	Sand, medium; clayey; clay balls; sulfides; lignite; orangish tan
350 - 351	1	Sand, silty; well sorted; lignite; muscovite; light yellowish tan
351 - 352	1	No recovery
352 - 355	3	Sand, medium; silty; well sorted; muscovite; lignite; light yellowish tan
355 - 361	6	Sand, medium; silty; well sorted; micaceous; lignite; light yellowish brown
361 - 362	1	No recovery
362 - 367	5	Sand, medium; silty; very poorly sorted; micaceous; lignite; light yellowish tan
367 - 368	1	No recovery
368 - 369	1	Sand, clayey; interbedded clay; sulfides; lignite; dark grayish black
369 - 370	1	Clay; sulfides; light gray
370 - 372	2	No recovery
372 - 374	2	Clay; muscovite; light gray
374 - 375	1	No recovery
375 - 376	1	Clay; lignite; light gray

Depth (ft)	Thickness (ft)	Description
376 - 378	2	No recovery
378 - 379	1	Clay; light gray
379 - 382	3	No recovery
382 - 386	4	Clay, silty; mottled sand; muscovite; lignite; whitish gray
386 - 388	2	Sand, medium, clayey; moderately sorted; micaceous; lignite; whitish gray
388 - 389	1	Sand, silty; whitish gray
389 - 390	1	Sand, clayey; whitish gray
390 - 392	2	Sand, medium; silty; interbedded clay; muscovite; lignite; whitish gray
392 - 395	3	No recovery
395 - 396	1	Sand, clayey; lignite; whitish gray
396 - 398	2	Silt, clayey; micaceous; lignite; whitish gray
398 - 400	2	Sand, clayey; moderately sorted; lignite; muscovite; whitish gray
400 - 401	1	Clay, silty; muscovite; whitish gray
401 - 403	2	Sand, coarse; silty; well sorted; sulfides; heavy minerals; whitish gray
403 - 405	2	Sand, silty; clayey; micaceous; whitish gray
405 - 408	3	Sand, medium; very poorly sorted; muscovite; lignite; whitish gray
408 - 413	5	Sand, medium; silty; very poorly sorted; muscovite; lignite; whitish gray
413 - 414	1	Clay; lignite; muscovite; whitish gray
414 - 417	3	Clay, silty; whitish gray
417 - 418	1	Clay, sandy; lignite; muscovite; whitish gray
418 - 427	9	Sand, coarse; silty; interbedded clay; muscovite; whitish gray to light gray

Depth (ft)	Thickness (ft)	Description
427 - 428	1	Silt, sandy; lignite; muscovite; light gray
428 - 429	1	Silt, sandy; clayey; light gray
429 - 434	5	Sand, fine; silty; well sorted; sulfides; muscovite; light gray
434 - 435	1	Sand, fine; silty, clayey; sulfides; muscovite; light gray
435 - 437	2	Silt, clayey; sulfides; muscovite; light gray
437 - 443	6	Sand, fine; silty, clayey; well sorted; sulfides; lignite; muscovite; light gray
443 - 452	9	Clay; muscovite; whitish gray
452 - 457	5	Sand, coarse; clayey; well sorted; sulfides; heavy minerals; lignite; whitish gray
457 - 474	17	Sand, medium; silty; moderately sorted; interbedded clay; sulfides; heavy minerals; lignite; muscovite; whitish gray
474 - 475	1	Silt, clayey; sandy; interbedded clay; sulfides; gray
475 - 478	3	Sand, medium; very poorly sorted; interbedded clay; lignite; muscovite; gray
478 - 482	4	No recovery
482 - 490	8	Sand, coarse; silty; well sorted; sulfides; interbedded clay; lignite; muscovite; gray to whitish gray
490 - 494	4	Sand, coarse; clayey; moderately sorted; lignite; muscovite; gray
494 - 495	1	Clay, silty; sulfides; gray
495 - 496	1	Clay, silty; sandy; heavy minerals; lignite; grayish tan
496 - 501	5	Sand, coarse; silty; sulfides; lignite; muscovite; whitish gray
501 - 502	1	No recovery

Depth (ft)	Thickness (ft)	Description
502 - 511	9	Sand, medium; silty; well sorted; micaceous; lignite; sulfides; whitish gray
511 - 527	16	Silt, sandy; muscovite; well sorted; grayish tan
527 - 533	6	Silt; lignite; muscovite; dark gray
533 - 534	1	Sand, silty; well sorted; micaceous; dark gray
534 - 537	3	Silt; lignite; muscovite; dark gray
537 - 546	9	Sand, medium; silty; moderately sorted; trace sulfides; muscovite; lignite; dark gray
546 - 547	1	No recovery
547 - 550	3	Clay, silty; fissle; black
550 - 551	1	Silt, sandy; gray
551 - 554	3	Clay, silty; fissile; lignite; muscovite; black
554 - 556	2	Clay, silty; sandy; fissile; grayish black
556 - 559	3	Sand, medium; silty; well sorted; gray
559 - 563	4	Silt, sandy; micaceous; lignite; gray
563 - 567	4	Silt; micaceous; lignite; gray
567 - 573	6	Sand, medium; silty; micaceous; lignite; gray
573 - 580	7	Silt, sandy; gray
580 - 591	11	Sand, medium; silty; moderately sorted; muscovite; lignite; gray
591 - 592	1	No recovery
592 - 601	9	Sand, medium; silty; interbedded clay; muscovite; gray
601 - 602	1	No recovery
602 - 603	1	Sand, silty; gray
603 - 609	6	Sand, very coarse; clayey; well sorted; micaceous; gray

Depth (ft)	Thickness (ft)	Description
609 - 627	18	Sand, medium; silty; well sorted; muscovite; lignite; whitish gray
627 - 629	2	Silt, sandy; gray
629 - 631	2	Sand, coarse; muscovite; gray
631 - 632	1	No recovery
632 - 633	1	Sand, clayey; gray
633 - 634	1	Sand, very coarse; silty; gray
634 - 635	1	Clay; fissile; gray
635 - 636	1	Sand, silty; interbedded clay; gray
636 - 637	1	No recovery
637 - 640	3	Silt; interbedded clay; micaceous; lignite; gray
640 - 645	5	Silt, sandy; micaceous; lignite; gray
645 - 648	3	Sand, medium; silty; moderately sorted; micaceous; lignite; gray
648 - 649	1	Sand, clayey; interbedded clay; dark gray
649 - 654	5	Sand, medium; silty; poorly sorted; gray
654 - 656	2	Silt, micaceous; lignite; gray
656 - 662	6	Sand, medium; silty; poorly sorted; muscovite; lignite; dark gray
662 - 663	1	Silt, clayey; dark gray
663 - 666	3	Clay; gray
666 - 667	1	No recovery
667 - 671	4	Clay; gray
671 - 672	1	No recovery
672 - 673	1	Clay; gray

Depth (ft)	Thickness (ft)	Description
673 - 677	4	No recovery
677 - 680	3	Sand, medium; silty, clayey; well sorted; lignite; muscovite; light gray
680 - 684	4	Sand, medium; poorly sorted; light; gray
684 - 685	1	Silt, clayey; muscovite; lignite; light gray
685 - 698	13	Sand, medium; silty; micaceous; lignite; light gray to gray
698 - 699	1	Sand, silty; clayey; interbedded clay; gray
699 - 700	1	Sand, coarse; muscovite; lignite; gray
700 - 702	2	No recovery
702 - 703	1	Sand, clayey; moderately sorted; dark gray
703 - 706	3	Sand, coarse; silty; muscovite; lignite; gray
706 - 710	4	Sand, medium; very poorly sorted; muscovite; gray
710 - 712	2	No recovery
712 - 717	5	Sand, coarse; silty; moderately sorted; muscovite; lignite; gray
717 - 721	4	Sand, medium; well sorted; muscovite; lignite; gray
721 - 722	1	No recovery
722 - 728	6	Sand, medium; silty; moderately sorted; gray
728 - 729	1	Silt, clayey; interbedded clay; muscovite; gray
729 - 731	2	Sand, silty; well sorted; gray
731 - 732	1	No recovery
732 - 733	1	Clay, sandy; gray
733 - 735	2	Silt, sandy; muscovite; lignite; gray

Depth (ft)	Thickness (ft)	Description
735 - 737	2	Silt, clayey; tannish gray
737 - 739	2	Silt, sandy; micaceous; gray
739 - 742	3	Sand, medium; silty; moderately sorted; muscovite; gray
742 - 746	4	Sand, coarse; well sorted; muscovite; lignite; gray
746 - 750	4	Sand, medium; silty; interbedded clay; lignite; gray
750 - 751	1	Sand, silty; clayey; gray
751 - 755	4	Silt, clayey; interbedded clay; muscovite; lignite; gray
755 - 761	6	Sand, medium; silty,clayey; well sorted; lignite; muscovite; light gray to gray
761 - 762	1	Clay; gray
762 - 765	3	Clay, silty; sandy; gray
765 - 768	3	No recovery

APPENDIX C

LITHOLOGIC LOG FOR P-18TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains;
from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-18 TA

Depth (ft)	Thickness (ft)	Description
0 - 2	2	Sand, fine; silty; tannish brown; F-Y-1
2 - 5	3	Clay, sand; reddish brown
5 - 6	1	No recovery
6 - 7	1	Clay, sandy; mottled brown; brownish orangish white
7 - 8	1	No recovery
8 - 9	1	Clay, sandy; mottled sand; brownish orangish white
9 - 10	1	No recovery
10 - 17	7	Clay, sandy; mottled sand; brownish orange
17 - 19	2	Clay; varigated; grayish purplish brown
19 - 20	1	Clay, sandy; trace muscovite; grayish orangish brown
20 - 21	1	Clay, silty; trace muscovite; mottled brown; tannish brownish white
21 - 22	1	Clay; fissile; trace muscovite; purplish brown
22 - 24	2	Sand, medium; clayey; well sorted; yellowish brown to purple
24 - 26	2	Clay, sandy; well sorted; orangish tannish yellow
26 - 27	1	Sand, medium; clayey
27 - 29	2	Clay, silty; muscovite; purplish gray
29 - 30	1	Silt, clayey; muscovite; varigated; tannish dark yellowish purple
30 - 32	2	No recovery
32 - 33	1	Silt; micaceous; orangish tan
33 - 35	2	Silt, clayey; cross-bedded; varigated; purplish dark reddish tan
35 - 36	1	Clay; trace muscovite; varigated; dark reddish purple
36 - 38	2	No recovery
38 - 39	1	Clay; varigated; purple

Depth (ft)	Thickness (ft)	Description
39 - 40	1	Sand, medium clayey; well sorted; interbedded clay; purple
40 - 41	1	Clay, sandy; well sorted; micaceous; varigated; purplish dark red
41 - 43	2	No recovery
43 - 44	1	Sand, medium; clayey; well sorted; micaceous; varigated; purplish orange
44 - 45	1	Sand, medium; silty; mottled brown; purplish orangish yellow
45 - 56	11	Sand, medium; well sorted; purplish orange to grayish purple
56 - 65	9	No recovery
65 - 66	1	Clay, silty; mottled sand; trace muscovite; purplish dark red
66 - 68	2	Clay, sandy; well sorted; varigated; trace muscovite; purplish dark red
68 -72	4	No recovery
72 - 73	1	Sand, fine; clayey; light purplish dark red
73 - 75	2	Clay, sandy; well sorted; mottled sand; dark brownish purple
75 - 77	2	Sand, medium; clayey; silty; well sorted; interbedded clay; purple
77 - 78	1	Sand, medium; silty; interbedded clay; purple
78 - 79	1	Clay, sandy; dark reddish white
79 - 81	2	Sand, fine; silty; clayey; well sorted; interbedded clay; purplish dark red
81 - 82	1	Clay, silty; sandy; well sorted
82 - 83	1	Silty; trace muscovite; dark reddish white
83 - 84	1	Silt, sandy; purple
84 - 85	1	Silt, clayey; trace muscovite; purplish dark brownish orange

Depth (ft)	Thickness (ft)	Description
85 - 86	1	Silt, sandy; well sorted; purplish dark red
86 - 87	1	Silt, clayey; mottled brown; tannish light purple
87 - 89	2	Sand, medium; silty; well sorted; trace muscovite and organics; light orangish tan
89 - 91	2	Clay, sandy; mottled sand; light brownish orange
91 - 94	3	Sand, medium, clayey; well sorted; lignite; orangish brown
94 - 95	1	No recovery
95 - 97	2	Sand, medium; well sorted; light to dark red
97 - 98	1	No recovery
98 - 107	9	Sand, medium; silty; well sorted; trace heavy minerals; lignite; red to tan; F-O-1 (100-104)
107 - 110	3	Sand, medium; clayey; well sorted; lignite; tan
110 - 112	2	No recovery
112 - 116	4	Sand, medium; silty; well sorted; interbedded clay; lignite; tan; F-O-1 (114-116)
116 - 117	1	No recovery
117 - 119	2	Silt, sandy; interbedded clay; lignite; orangish tan
119 - 123	4	Sand, medium; silty; interbedded clay; lignite; tannish red to orangish tan
123 - 124	1	Clay, silty; sandy; lignite; mottled black; light greenish white
124 - 128	4	Limestone, clayey; silty; lignite; fossils; light greenish white; F-W-3
128 - 129	1	Limestone, clayey; fossils; lignite; white
129 - 137	8	Limestone, clayey; fossils; lignite; light greenish white; F-W-3
137 - 139	2	Limestone; fossils; lignite; muscovite; whitish light green; F-W-2

Depth (ft)	Thickness (ft)	Description
139 - 140	1	Limestone, clay; silty; fossils; lignite; light green; F-W-3
140 - 141	1	Limestone; interbedded clay; fossils; lignite; white
141 - 142	1	No recovery
142 - 151	9	Limestone; fossils; white lignite; white; F-W-3
151 - 152	1	Sand, medium; calcareous; well sorted; fossils; muscovite; lignite; light brown; F-Y-3
152 - 153	1	Sand, medium; clayey; calcareous; lignite; light greenish gray; F-Y-3
153 - 155	2	Sand, medium; well sorted; interbedded clay; calcareous; lignite; tannish light brown
155 - 157	2	No recovery
157 - 168	11	Sand, medium; lignite; orangish tan
168 - 169	1	Silt, sandy; well sorted; lignite; orangish tan
169 - 170	1	Silt, clayey; cross-bedded; interbedded clay; lignite; orangish tan
170 - 172	2	No recovery
172 - 174	2	Silt, clayey; lignite; orangish tan
174 - 177	3	No recovery
177 - 184	7	Clay, silty; cross-bedded; lignite; tannish yellow
184 - 196	12	Silt; muscovite; lignite; tannish yellow to orangish tan
196 - 197	1	No recovery
197 - 200	3	Silt; muscovite; lignite; orangish tan
200 - 202	2	No recovery
202 - 207	5	Silt; muscovite; lignite; orangish tan; F-Y-1
207 - 209	2	Sand, fine; silty; well sorted; micaceous; lignite; orangish tan

Depth (ft)	Thickness (ft)	Description
209 - 211	2	Sand, fine; well sorted; muscovite; lignite; tan to tannish orangish
211 - 212	1	No recovery
212 - 216	4	Sand, fine; silty; muscovite; lignite; mottled brown; tannish orangish yellow
216 - 217	1	No recovery
217 - 229	12	Sand, fine; silty; well sorted; lignite; orangish brown
229 - 232	3	Sand, medium; well sorted; lignite; orangish tan
232 - 235	3	Sand, fine; silty; well sorted; lignite; orangish yellow
235 - 237	2	No recovery
237 - 240	3	Sand, fine; silty; well sorted; lignite; tannish yellow
240 - 260	20	Sand, fine to medium; well sorted; lignite; orangish tannish yellow to orangish tan; F-B-1
260 - 263	3	Clay; fissile; mottled sand; cross-bedded; lignite; tannish yellow; F-O-1 (260-262)
263 - 265	2	Clay, sandy; mottled sand; tannish orangish brown
265 - 267	2	No recovery
267 - 271	4	Sand, medium; very poorly sorted; lignite; orangish tan; F-B-1
271 - 272	1	No recovery
272 - 281	9	Sand, medium; very poorly sorted; lignite; orangish tan; F-B-1
281 - 282	1	No recovery
282 - 286	4	Sand, medium; very poorly sorted; lignite; orangish tan
286 - 287	1	No recovery
287 - 290	3	Sand, medium; well sorted; lignite; muscovite; whitish tan; F-B-1

Depth (ft)	Thickness (ft)	Description
290 - 291	1	Sand, silty; well sorted; lignite; muscovite; whitish tan
291 - 292	1	Sand, medium; well sorted; lignite; muscovite; orangish tan
292 - 293	1	Sand, silty; well sorted; lignite; muscovite; tannish white
293 - 294	1	Silt, clayey; lignite; brownish tan
294 - 297	3	Sand, medium; silty; clayey; well sorted; muscovite; lignite; grayish brown
297 - 299	2	Sand, medium; silty; well sorted; micaceous; lignite; orangish brown
299 - 303	4	Silt, clayey; abundant muscovite; lignite dark gray
303 - 305	2	Clay, silty; micaceous; lignite; dark gray
305 - 306	1	No recovery
306 - 312	6	Silt, clayey; lignite; muscovite; dark gray
312 - 317	5	Silt, clayey; lignite; muscovite; dark gray
317 - 321	4	Clay, silty; lignite; muscovite; dark gray
321 - 322	1	No recovery
322 - 330	8	Clay; fissile; lignite; dark gray
330 - 332	2	No recovery
332 - 334	2	Clay silty; muscovite; lignite; dark gray
334 - 337	3	Silt, clayey; dark gray
337 - 338	1	Clay; lignite; dark gray
338 - 340	2	Clay, silty; fissile; mottled sand, dark gray
340 - 342	2	No recovery
342 - 343	1	Clay, silty; fissile; lignite; dark gray
343 - 345	2	No recovery
345 - 351	6	Sand, medium; silty; well sorted; muscovite; lignite; gray to light gray

Depth (ft)	Thickness (ft)	Description
351 - 352	1	No recovery
352 - 353	1	Sand, coarse; well sorted; light gray
353 - 354	1	Sand, silty; lignite; muscovite; light gray
354 - 355	1	No recovery
355 - 356	1	Sand, silty; clayey; mottled sand; whitish gray
356 - 357	1	Clay; whitish gray
357 - 358	1	Silt, clayey; sandy; lignite; whitish gray
358 - 360	2	Clay, silty; micaceous; whitish gray
360 - 362	2	Silt, clayey; lignite; muscovite; whitish gray
362 - 363	1	Clay; lignite; muscovite; grayish white
363 - 369	6	Silt, clayey; micaceous; lignite; whitish gray
369 - 370	1	Silt, sandy; well sorted; whitish gray
370 - 371	1	Sand, silty; well sorted; interbedded clay; whitish gray
371 - 372	1	Silt, clayey; lignite; interbedded clay; whitish clay
372 - 425	53	Clay; lignite; brownish grayish yellow to brownish grayish red
425 - 426	1	Clay, silty; sandy; light gray
426 - 427	1	No recovery
427 - 428	1	Silt, clayey; sandy; well sorted; muscovite; lignite; light gray
428 - 430	2	Silt, sandy; well sorted; light gray
430 - 432	2	Sand, medium, silty; well sorted; light gray; micaceous; lignite
432 - 436	4	Silt, sandy; well sorted; micaceous; lignite; light gray
436 - 437	1	Sand, medium; silty; well sorted; micaceous, light gray

Depth (ft)	Thickness (ft)	Description
437 - 439	2	Silt, sandy; well sorted; lignite; light gray
439 - 440	1	Sand, silty; micaceous; lignite; light gray
440 - 460	20	Silt, sandy; well sorted; micaceous; lignite; light gray
460 - 461	1	No recovery
461 - 462	1	Sand, medium; silty; well sorted; micaceous; light gray
462 - 463	1	Silt, sandy; light grayish brown
463 - 466	3	No recovery
466 - 472	6	Silt, sandy; well sorted; muscovite; lignite; light gray
472 - 474	2	Silt; micaceous; light gray
474 - 476	2	Silt, sandy; micaceous; light gray
476 - 484	8	Sand, coarse; silty; well sorted; muscovite; light gray
484 - 486	2	No recovery
486 - 489	3	Silt, sandy; well sorted; lignite; muscovite; light gray
489 - 491	2	No recovery
491 - 492	1	Silt, sandy; muscovite; light gray
492 - 496	4	No recovery
496 - 498	2	Silt, sandy; clayey; muscovite; lignite; light gray
498 - 501	3	No recovery
501 - 502	1	Sand, silty; well sorted; light gray
502 - 510	8	Silt, clayey; sandy; muscovite; lignite; light gray
510 - 511	1	No recovery
511 - 515	4	Silt, clayey; sandy; muscovite; light gray

Depth (ft)	Thickness (ft)	Description
515 - 528	13	Silt, sandy; well sorted; muscovite; light gray
528 - 530	2	Sand, coarse; silty; well sorted; micaceous; light gray
530 - 531	1	No recovery
531 - 532	1	Sand, coarse; silty; well sorted; muscovite ; gray
533 - 536	3	No recovery
536 - 541	5	Silt; well sorted; muscovite; light gray
541 - 542	1	Silt, clayey; sandy; muscovite; abundant lignite; light grayish brown
542 - 546	4	No recovery
546 - 549	3	Sand, medium; silty; well sorted; lignite; muscovite; light gray
549 - 550	1	Silt; muscovite; lignite; light gray
550 - 554	4	Silt, clayey; sandy; interbedded clay, micaceous; lignite; light grayish brown
554 - 560	6	Sand, medium; silty; poorly sorted; muscovite; lignite; light brownish gray
560 - 561	1	No recovery
561 - 565	4	Sand, medium; silty; well sorted; lignite; muscovite; light brownish gray
565 - 566	1	No recovery
566 - 575	9	Sand, medium; silty; well sorted; lignite; muscovite; light brownish gray
575 - 576	1	No recovery
576 - 580	4	Sand, medium; silty; poorly sorted; muscovite; lignite; muscovite; gray
580 - 581	1	No recovery
581 - 585	4	Sand, medium; silty; poorly sorted; muscovite; lignite; gray

Depth (ft)	Thickness (ft)	Description
585 - 594	9	Silt, sandy; well sorted; trace muscovite; lignite; dark gray
594 - 596	2	No recovery
596 - 599	3	Sand, coarse; silty; well sorted; interbedded clay lignite; gray
599 - 602	3	Silt, sandy; well sorted; lignite; muscovite; gray
602 - 610	8	Sand, medium; silty; moderately sorted; lignite; muscovite; light grayish brown
610 - 611	1	No recovery
611 - 615	4	Sand, medium; silty; well sorted; lignite, muscovite; light brown
615 - 616	1	No recovery
616 - 619	3	Sand, medium; silty; moderately sorted; light brown
619 - 621	2	No recovery
621 - 623	2	Sand, medium; silty; well sorted; micaceous; lignite; grayish brown
623 - 625	2	No recovery
625 - 626	1	Sand, medium; very poorly sorted; gray
626 - 631	5	Silt, sandy; well sorted; micaceous; lignite; gray
631 - 633	2	Sand, medium; silty; well sorted; muscovite; gray
633 - 634	1	Silt, sandy; well sorted; micaceous; tannish gray
634 - 635	1	Silt, sandy; well sorted; muscovite; lignite; gray
635 - 643	8	Silt, clayey; fissile; interbedded clay; lignite; muscovite; dark gray
643 - 645	2	Clay, silty; lignite; muscovite; light gray
645 - 647	2	Clay; light gray
647 - 649	2	Clay, silty; micaceous; light gray

Depth (ft)	Thickness (ft)	Description
649 - 650	1	Sand, coarse; silty; well sorted; tannish gray
650 - 652	2	No recovery
652 - 657	5	Silt, sandy; well sorted; micaceous; lignite; tannish gray
657 - 663	6	Sand, coarse; silty; well sorted; micaceous; lignite; tannish gray
663 - 670	7	Silt, sandy; well sorted; micaceous; tannish gray
670 - 677	7	Sand, medium; silty; moderately sorted; lignite; muscovite; tannish gray
677 - 680	3	Silt, sandy; well sorted; muscovite; lignite; tannish gray
680 - 685	5	Sand, coarse; silty; well sorted tannish gray
685 - 687	2	Sand, silty; clayey; interbedded clay; muscovite; lignite; gray
687 - 688	1	Silt, clayey; interbedded clay; tannish gray
688 - 695	7	Silt, sandy; well sorted; interbedded clay; muscovite; lignite; gray
695 - 701	6	Sand, medium; silty; moderately sorted; micaceous; lignite; gray
701 - 702	1	No recovery
702 - 706	4	Sand, medium; silty; interbedded clay; micaceous; gray
706 - 707	1	No recovery
707 - 710	3	Sand, medium; silty; muscovite; lignite; gray
710 - 712	2	No recovery
712 - 713	1	Silt, sandy; clayey; interbedded clay; trace sulfides; tannish gray
713 - 715	2	No recovery
715 - 717	2	Clay; trace sulfides; brownish gray to whitish gray

Depth (ft)	Thickness (ft)	Description
717 - 718	1	No recovery
718 - 722	4	Sand, coarse to medium; silty; interbedded clay; micaceous; lignite; well sorted; gray
722 - 724	2	Silt, sandy; well sorted; light gray
724 - 725	1	No recovery
725 - 728	3	Silt, sandy; well sorted; micaceous; lignite; light gray
728 - 734	6	Sand, medium; silty; well sorted; whitish gray
734 - 736	2	Sand, medium; silty; clayey; interbedded clay; muscovite; whitish gray
736 - 738	2	Silt, sandy; well sorted; lignite; muscovite; whitish gray
738 - 741	3	Sand, medium; silty; well sorted; micaceous; whitish gray
741 - 742	1	No recovery
742 - 744	2	Silt, sandy; well sorted; micaceous; whitish gray
744 - 746	2	Sand, medium; silty; well sorted; lignite; muscovite; light gray
746 - 747	1	No recovery
747 - 751	4	Sand, medium; silty; well sorted; trace sulfides; whitish gray
751 - 752	1	No recovery
752 - 755	3	Sand, medium; silty; micaceous; lignite; light gray
755 - 757	2	No recovery
757 - 758	1	Silt, sandy; light gray
758 - 760	2	Silt; gray
760 - 762	2	No recovery

Depth (ft)	Thickness (ft)	Description
762 - 767	5	Clay, silty; micaceous; lignite; gray
767 - 773	6	Clay, silty; sandy; well sorted; gray
773 - 776	3	Clay, silty; micaceous; gray
776 - 777	1	No recovery
777 - 780	3	Silt, sandy; well sorted; micaceous; lignite gray
780 - 782	2	No recovery
782 - 788	6	Sand, fine; silty; well sorted; lignite; muscovite; light gray
788 - 792	4	No recovery
792 - 796	4	Sand, fine; muscovite; light brownish gray
796 - 802	6	No recovery
802 - 803	1	Sand, clayey; light gray
803 - 805	2	Sand, medium; trace sulfides; light gray
805 - 806	1	Silt, sandy; well sorted; trace sulfides; light gray
806 - 807	1	Sand, fine; micaceous; trace sulfides; light gray
807 - 808	1	No recovery
808 - 819	11	Sand, coarse; well sorted; muscovite; lignite; gray
819 - 820	1	Sand, silty; lignite; muscovite; light gray
820 - 822	2	No recovery
822 - 831	9	Sand, coarse; well sorted; lignite; muscovite; light gray to light brown
831 - 832	1	No recovery
832 - 835	3	Sand, medium; well sorted light gray
835 - 837	2	No recovery
837 - 838	1	Sand, medium; very poorly sorted; micaceous; lignite; light gray

Depth (ft)	Thickness (ft)	Description
838 - 840	2	Sand, medium; silty; trace sulfides; muscovite; light gray
840 - 842	2	No recovery
842 - 860	18	Sand, medium; silty; micaceous; lignite; gray
860 - 862	2	Sand, medium; clayey; interbedded clay; lignite; dark gray
862 - 866	4	Sand, coarse; muscovite; lignite; gray
866 - 869	3	Sand, medium; silty; micaceous; lignite; light gray
869 - 871	2	Sand, medium; silty, clayey; moderately sorted; gray
871 - 872	1	Silt, sandy; micaceous; tannish gray
872 - 873	1	Sand, medium; gray
873 - 881	8	Sand, medium; silty, clayey; moderately sorted; lignite; muscovite; gray to light gray
881 - 882	1	Silt, sandy; clayey; dark gray; trace sulfides
882 - 883	1	Clay, silty; dark gray
883 - 885	2	No recovery
885 - 887	2	Silt, clayey; sandy; micaceous; lignite; light gray
887 - 888	1	No recovery
888 - 897	9	Silt, sandy; well sorted; muscovite; lignite; light gray
897 - 905	8	Sand, medium; silty; clayey; well sorted; lignite; muscovite; light gray
905 - 907	2	Clay, silty; red to light gray
907 - 908	1	No recovery
908 - 909	1	Silt, clayey; sandy; muscovite; lignite; light gray
909 - 911	2	Clay, silty; reddish brown
911 - 912	1	No recovery

Depth (ft)	Thickness (ft)	Description
912 - 913	1	Clay; reddish brown
913 - 915	2	Clay, sandy; interbedded clay; muscovite; lignite; reddish brown
915 - 916	1	Sand, medium; silty; clayey; well sorted; muscovite; reddish yellowish gray
916 - 917	1	No recovery
917 - 919	2	Sand, medium; silty; clayey; reddish brown
919 - 920	1	Clay; reddish brown
920 - 922	2	No recovery
922 - 923	1	Clay; reddish brown
923 - 926	3	Clay, silty; sandy; trace gypsum, muscovite; lignite; gray
926 - 927	1	No recovery
927 - 929	2	Clay, silt; sandy; poorly sorted; trace gypsum; muscovite; gray
929 - 932	3	Clay, silty; sandy; yellowish reddish gray
935 - 941	6	Clay, silty; muscovite; grayish yellow to gray
941 - 947	6	Clay; gray
947 - 950	3	Sand, medium; silty; clayey; well sorted; micaceous; gray
950 - 952	2	Sand, medium; silty; well sorted; gray

APPENDIX D

LITHOLOGIC LOG FOR P-19TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-19 TA

Depth (ft)	Thickness (ft)	Description
0 - 6	6	Clay, sand; very poorly sorted; tannish orange; F-0-3
6 - 10	4	Clay, silty; varigated; purplish reddish tan; F-8-1 (35-40)
10 - 11	1	No recovery
11 - 15	4	Clay; muscovite; varigated; purplish reddish white
15 - 19	4	Silt; micaceous; varigated; reddish brownish to orangish red
19 - 20	1	Clay; varigated; trace muscovite; reddish whitish brown
20 - 21	1	No recovery
21 - 26	5	Sand, coarse; varigated; interbedded clay; feldspars; light purplish tannish brown to light purple
26 - 27	1	Sand, coarse; clayey; very poorly sorted; quartz pebbles; interbedded clay
27 - 29	2	Clay, sandy; interbedded clay; quartz pebbles; brownish tan
29 - 42	13	Sand, coarse; clayey; interbedded clay; mottled; quartz pebbles; brownish tannish red to reddish brown
42 - 47	5	No recovery
47 - 49	2	Sand, medium; moderately sorted; interbedded clay; yellowish purplish brown
49 - 50	1	Sand, coarse; mottled; feldspars; interbedded clay; light purplish brown ; F-8-1
50 - 51	1	No recovery
51 - 53	2	Sand, medium; interbedded clay; purplish brown
53 - 55	2	Clay, silty; sandy; mottled; reddish brown
55 - 57	2	Sand, medium; silty; well sorted; interbedded clay

Depth (ft)	Thickness (ft)	Description
57 - 59	2	Sand, medium; well sorted; interbedded clay; light purplish brownish red; F-0-1
59 - 61	2	Sand, medium; silty; interbedded clay; light purplish brownish red; F-0-2
61 - 68	7	Sand, coarse; clayey; very poorly sorted; interbedded clay; light purplish brownish red; F-0-1
68 - 70	2	Sand, coarse; silty; purplish reddish brown
70 - 71	1	Sand, coarse; moderately sorted; light purplish reddish brown
71 - 75	4	Clay, silty; well sorted; mottled; yellowish brown
75 - 76	1	Sand, fine; moderately sorted; mottled; yellowish brown; F-0-2
76 - 77	1	Sand, medium; silty; mottled; interbedded clay; trace lignite; yellowish brown; F-Y-2
77 - 78	1	Sand, medium; moderately sorted; interbedded clay; mottled; trace lignite; yellowish brown; F-Y-2
78 - 85	6	Sand, medium; clayey; moderately sorted; interbedded clay; mottled; yellowish brownish red; F-Y-2
85 - 87	2	Sand, medium; silty; cross-bedded; yellowish reddish brown; F-Y-3
87 - 89	2	Clay, silty; mottled; dark yellowish brown
89 - 94	5	Sand, coarse; silty; very poorly sorted; reddish brown; F-0-3 (91-94)
94 - 97	3	Sand, medium; poorly sorted; reddish brown; F-0-3
97 - 104	7	Sand, medium; silty; poorly sorted; trace lignite; reddish brown; F-Y-3 (97-101)
104 - 118	14	Sand, medium; silty; moderately sorted; trace lignite; mottled brown; tannish brown; F-0-3 (104-105)
118 - 121	3	Sand, medium; very poorly sorted; mottled brown; tannish brown

Depth (ft)	Thickness (ft)	Description
121 - 125	4	Sand, coarse; very poorly sorted; trace lignite; orangish tan; F-B-1 (121-123)
126 - 127	1	Sand, coarse; silty; trace muscovite and lignite; orangish tan
127 - 132	5	Sand, medium; very poorly sorted; trace lignite; orangish tan; F-O-1 (129-131)
132 - 150	18	Sand, medium to fine, silty; tannish brown; trace lignite; F-Y-1 (146-150)
150 - 151	1	No recovery
151 - 153	2	Sand, fine; silty; well sorted; mottled brown; tannish orangish brown; F-O-3
153 - 155	2	Sand, fine; well sorted; trace lignite; tannish orangish brown: F-O-3
155 - 159	4	Sand, fine; silty; well sorted; trace lignite; tannish orangish brown; mottled brown; F-Y-2
159 - 161	2	Silt, clayey; sandy; mottled brown; interbedded clay; glauconite; trace lignite and muscovite; calcareous sand; tannish orangish green to light tan; F-Y-2
161 - 166	5	Sand, fine; clayey; well sorted; mottled brown; trace lignite; calcareous sand; light tan
166 - 167	1	Sand, fine; silty; well sorted; trace lignite; orangish tan
167 - 169	2	Sand, fine; well sorted; trace lignite; mottled brown; orangish tan; F-O-1
169 - 181	11	Sand, medium; silty; moderately sorted; trace lignite and calcareous sand; mottled brown; orangish tan
181 - 189	8	Sand, medium; very poorly sorted; orangish tannish brown; F-B-1
189 - 191	2	Sand, coarse; clayey; very poorly sorted; mottled; orangish tannish brown; F-O-3 (189-190)
191 - 192	1	Sand, coarse; silt; mottled brown; orangish tannish brown; F-Y-2

Depth (ft)	Thickness (ft)	Description
192 - 196	4	Sand, fine; mottled brown; trace muscovite; orangish tannish brown; F-Y-1
196 - 200	4	Sand, fine; silty; very poorly sorted; trace gypsum, muscovite and lignite; mottled brown; orangish tannish brown; F-Y-2
200 - 208	8	Sand, fine; silty; moderately sorted; black
108 - 213	5	Sand, coarse; trace gypsum and lignite; black
213 - 215	2	No recovery
215 - 216	1	Sand, medium; trace gypsum; black; F-B-1
216 - 218	2	Sand, medium; silty; very poorly sorted; dark gray
218 - 221	3	No recovery
221 - 222	1	Sand, coarse; trace glauconite; dark gray
222 - 223	1	No recovery
223 - 224	1	Sand, coarse; very poorly sorted; dark gray
224 - 231		No recovery
241 - 242	1	Sand, fine; trace sulfides, gypsum and lignite; grayish white
242 - 251	9	No recovery
251 - 253	2	Sand, medium; gray
253 - 255	2	Sand, fine; silty; well sorted; trace gypsum and lignite; gray
255 - 261	6	No recovery
261 - 262	1	Sand, fine; well sorted; trace sulfides, glauconite and lignite; calcareous sand; F-O-1
262 - 271	9	No recovery
271 - 272	1	Sand; very poorly sorted; trace heavy minerals, gypsum, muscovite and lignite; gray; calcareous gray

Depth (ft)	Thickness (ft)	Description
272 - 275	3	No recovery
275 - 278	3	Clay, sandy; interbedded clay; mottled; calcareous clay; gray; F-0-2 (275-276)
278 - 280	2	Sand, coarse; clayey; very poorly sorted; interbedded clay; gray
280 - 281	1	Sand, coarse; very poorly sorted; gray; F-0-3
281 - 282	1	No recovery
282 - 283	1	Clay; trace muscovite; gray; F-0-3
283 - 285	2	Sand, fine; silty; clayey; well sorted; trace muscovite; F-0-1
285 - 289	4	No recovery
289 - 291	2	Clay, silty; sandy; gray
291 - 293	2	Sand, fine; clayey; well sorted; muscovite; lignite; gray; F-0-1
293 - 295	2	No recovery
295 - 299	4	Clay, silty; trace muscovite and lignite; gray
299 - 301	2	Sand, fine; silty; clayey; well sorted; muscovite; lignite; gray
301 - 302	1	Clay, sandy; muscovite; gray
302 - 305	3	Sand, fine; clayey; mottled brown; trace heavy minerals; muscovite; lignite; gray
305 - 306	1	Sand, coarse; very poorly sorted; trace muscovite and lignite; gray
306 - 307	1	No recovery
307 - 309	2	Sand, fine; silty; muscovite; lignite; gray
309 - 311	2	Sand, fine; silty; clayey; poorly sorted; muscovite; lignite; gray
311 - 316	5	Sand, fine; silty; muscovite; lignite; gray

Depth (ft)	Thickness (ft)	Description
316 - 317	1	No recovery
317 - 322	5	Sand, fine; silty; well sorted; lignite; muscovite, gray
322 - 323	1	Silt, sandy; well sorted; micaceous; gray
323 - 325	2	Sand, fine; silt; well sorted; micaceous; gray
325 - 327	2	Silt, sandy; well sorted muscovite; lignite; gray
327 - 332	4	Sand, fine; silty; very poorly sorted; mottled brown; muscovite; trace lignite; gray
332 - 333	1	No recovery
333 - 336	3	Sand, fine; silty; well sorted; muscovite; lignite; gray
336 - 337	1	No recovery
337 - 343	6	Sand, fine; silty; well sorted; grayish black to black
343 - 350	7	Sand, medium; clayey; very poorly sorted; interbedded clay; light grayish black to whitish gray
350 - 353	3	Clay, sandy; very poorly sorted; interbedded clay; whitish gray
353 - 358	5	Clay; trace muscovite; mottled sand; whitish gray
358 - 359	1	Clay, sandy; well sorted; mottled sand, whitish gray
359 - 360	1	Clay; micaceous; whitish gray
360 - 363	3	Clay, sandy; well sorted; trace muscovite; whitish gray
363 - 365	2	Clay; trace muscovite and lignite, whitish gray
365 - 366	1	Clay sandy; well sorted; whitish gray
366 - 367	1	No recovery
367 - 371	4	Clay; trace muscovite; whitish gray
371 - 375	4	Sand, coarse; clay; very poorly sorted; interbedded clay; whitish clay

Depth (ft)	Thickness (ft)	Description
375 - 378	3	Clay; muscovite; lignite; whitish gray
378 - 382	4	Clay, sandy; well sorted; muscovite; lignite; whitish gray
382 - 385	3	Clay, silty; sand; muscovite; lignite; whitish gray
385 - 388	3	Sand, fine; clayey; well sorted; muscovite; lignite; whitish gray
388 - 389	1	No recovery
389 - 391	2	Clay, sandy; micaceous; lignite; whitish gray
391 - 396	5	Sand, coarse; silty; very poorly sorted; trace gypsum; whitish gray
396 - 399	3	Sand, coarse; very poorly sorted; micaceous; lignite; whitish gray
399 - 401	2	Sand, coarse; silty; very poorly sorted; micaceous; lignite; whitish gray
401 - 402	1	Sand, fine; clayey; very poorly sorted; whitish gray
402 - 409	7	Clay; trace muscovite and lignite; black to whitish gray; fissile
409 - 410	1	Clay, silty; well sorted; micaceous; fissile; dark gray
410 - 411	1	Clay; fissile; trace muscovite and lignite; black
411 - 413	2	Silty, sandy; well sorted; gray
413 - 414	1	Clay, silty; sandy; fissile; micaceous; lignite; black
414 - 418	4	Clay, sandy; fissile; trace chert, muscovite and lignite; grayish black
418 - 419	1	Clay; fissile; calcareous; whitish gray
419 - 420	1	Clay, sandy; trace chert; muscovite and lignite; calcareous; whitish gray

Depth (ft)	Thickness (ft)	Description
420 - 421	1	No recovery
421 - 431	10	Sand, medium; very poorly sorted; muscovite; lignite; calcareous; gray to whitish gray
431 - 432	1	Sand, medium; clay; very poorly sorted; micaceous; lignite; calcareous; whitish gray
432 - 433	1	No recovery
433 - 434	1	Clay, sandy; very poorly sorted; muscovite; lignite; calcareous; whitish gray
434 - 439	5	Sand, medium; clay; very poorly sorted; muscovite; lignite; calcareous; grayish white
439 - 440	1	No recovery
440 - 441	1	Sand, medium; clay; very poorly sorted; micaceous; lignite; calcareous; grayish white
445 - 460	15	Clay; fissile; trace muscovite and lignite; whitish gray to whitish tan
460 - 461	1	Clay, silty; whitish tan; trace gypsum; calcareous
461 - 463	2	Clay, sandy; calcareous; muscovite; lignite; whitish gray
463 - 466	3	Sand, coarse; clayey; whitish gray
466 - 467	1	No recovery
467 - 471	4	Sand, coarse; trace gypsum; calcareous; micaceous; lignite; whitish gray
471 - 475	4	Sand, fine; clayey; very poorly sorted; micaceous; lignite; whitish gray
475 - 476	1	Sand, fine; very poorly sorted; whitish gray
476 - 477	1	No recovery
477 - 479	2	Sand, fine; clayey; very poorly sorted; light gray

Depth (ft)	Thickness (ft)	Description
479 - 480	1	Sand, fine; trace sulfides and gypsum; micaceous; light gray
480 - 483	3	Sand, fine; clayey; trace gypsum and sulfides; micaceous; lignite; gray
483 - 484	1	Sand, fine; very poorly sorted; gray
484 - 487	3	No recovery
487 - 493	6	Sand, coarse to fine; very poorly sorted; trace gypsum, muscovite and lignite; light gray to blue gray
493 - 501	8	Clay, silty; fissile; micaceous; lignite; blue gray to gray
501 - 511	10	Sand, fine; silty; clayey; moderately sorted; trace lignite; micaceous; gray
511 - 513	2	Sand, fine; silty; well sorted; lignite; muscovite; gray
513 - 514	1	No recovery
514 - 516	2	Silt, clayey; trace gypsum and sulfides; gray
516 - 517	1	Sand, fine; silty; well sorted; trace sulfides; micaceous; lignite; gray
517 - 518	1	No recovery
518 - 519	1	Sand, silty; micaceous; gray
519 - 520	1	Sand, fine; silty; clayey; well sorted; lignite; micaceous; gray
520 - 521	1	No recovery
521 - 523	2	Sand, medium; silty; moderately sorted; trace sulfides; light gray
523 - 524	1	No recovery
524 - 525	1	Sand, medium; very poorly sorted; trace heavy minerals and gypsum; light gray

Depth (ft)	Thickness (ft)	Description
525 - 528	3	Sand, medium; silty; interbedded clay; mottled; black; trace gypsum; lignite; muscovite; grayish black
528 - 529	1	Sand, coarse; clayey; very poorly sorted; lignite; muscovite; trace heavy minerals and gypsum
529 - 531	2	No recovery
531 - 532	1	Sand, coarse; poorly sorted; light gray
532 - 534	2	No recovery
534 - 535	1	Sand; moderately sorted; micaceous; light gray
535 - 536	1	No recovery
536 - 537	1	Sand, coarse; micaceous; lignite; light gray
537 - 538	1	No recovery
538 - 539	1	Sand, coarse; very poorly sorted; micaceous; lignite; light gray
539 - 541	2	Sand, coarse; clayey; fissile; trace sulfides; micaceous; gray
541 - 544	3	Silt, clayey; fissile; trace heavy minerals, gypsum and sulfides; micaceous; lignite; gray
544 - 545	1	Sand, fine; silty; well sorted; fissile; micaceous; gray
545 - 546	1	Silt, clayey; fissile; trace heavy minerals and sulfides; micaceous; gray
546 - 548	2	Sand, fine; silty; very poorly sorted; fissile; mottled; micaceous; gray
548 - 551	3	Silt; fissile; mottled; micaceous; lignite; gray
551 - 554	3	Silt, sandy; well sorted; fissile; interbedded clay; micaceous; lignite; gray
554 - 561	7	Sand, coarse; very poorly sorted; trace sulfides and gypsum; grayish black

Depth (ft)	Thickness (ft)	Description
561 - 564	3	Sand, coarse; clayey; very poorly sorted; fissile; trace sulfides, gypsum and heavy minerals; muscovite; lignite; grayish black
564 - 568	4	No recovery
568 - 576	8	Sand, coarse; very poorly sorted; trace gypsum, sulfides; muscovite; lignite; grayish black
576 - 578	2	Sand, coarse; clayey; very poorly sorted; micaceous; grayish black
578 - 584	6	Sand, coarse; very poorly sorted; trace heavy minerals and sulfides; muscovite and lignite; grayish black to gray
584 - 591	7	Sand, coarse; silty; very poorly sorted; micaceous; lignite; grayish black to blackish gray
591 - 592	1	Sand, fine; clayey; moderately sorted; muscovite; black
592 - 593	1	Clay, sandy; black
593 - 594	1	Sand, fine; silty; muscovite; lignite; black
594 - 595	1	Silt, sandy; black
595 - 596	1	Clay, sandy; micaceous; black
596 - 597	1	Sand, fine; silty; micaceous; black
597 - 598	1	No recovery
598 - 599	1	Sand, fine; silty; moderately sorted; black
599 - 600	1	Silt, sandy; lignite; muscovite; black
600 - 601	1	Sand, fine; silty; black
601 - 602	1	Clay, sandy; black
602 - 603	1	Sand, fine; silty; trace sulfides; muscovite; lignite; black
603 - 605	2	Clay, sandy; well sorted; black

Depth (ft)	Thickness (ft)	Description
605 - 608	3	Sand, clayey; well sorted; trace sulfides; micaceous; lignite; black
608 - 613	5	Sand, fine; silty; well sorted; black
613 - 617	4	Sand, coarse; very poorly sorted; micaceous; lignite; gray
617 - 618	1	No recovery
618 - 620	2	Sand, coarse; gray
620 - 621	1	No recovery
621 - 622	1	Sand, coarse; silty; poorly sorted; trace heavy minerals and gypsum
622 - 625	3	Sand, coarse; micaceous; lignite; blackish gray
625 - 630	5	Sand, coarse; silty; very poorly sorted; muscovite; lignite; blackish gray
630 - 631	1	No recovery
631 - 633	2	Sand, coarse; silty; clayey; micaceous; lignite; dark gray
633 - 634	1	No recovery
634 - 637	3	Sand, coarse; silty; clayey; very poorly sorted; trace gypsum; muscovite; lignite; dark gray
637 - 646	9	Sand, coarse; clayey; very poorly sorted; muscovite; lignite; dark gray to grayish white
646 - 651	5	Sand, silty; clayey; very poorly sorted; interbedded clay; grayish white to gray
651 - 654	3	Clay, silty; sandy; trace gypsum, sulfides and muscovite; grayish tan
654 - 655	1	Sand, coarse; silty; clayey; very poorly sorted; whitish tan
655 - 666	11	Sand, medium; clayey; very poorly sorted; trace gypsum; muscovite; lignite; grayish white

Depth (ft)	Thickness (ft)	Description
666 - 668	2	Silt, clayey; sandy; fissile; trace sulfides; grayish white to blue
668 - 670	2	Sand, medium; clayey; very poorly sorted; micaceous; lignite; grayish white
670 - 671	1	No recovery
671 - 677	6	Sand, very coarse; clayey; micaceous; lignite; tannish gray to gray
677 - 681	4	Sand, coarse; very poorly sorted; grayish white
681 - 684	3	Sand, clayey; micaceous; tannish gray
684 - 685	1	Clay, silty; trace sulfides; lignite; micaceous; grayish white
685 - 687	2	Sand, medium; interbedded clay; grayish white
687 - 688	1	No recovery
688 - 693	5	Sand, coarse; silty; clayey; very poorly sorted; interbedded clay; muscovite; lignite; grayish white
693 - 695	2	Sand, coarse; clayey; very poorly sorted; whitish gray
695 - 697	2	Clay, sandy; interbedded clay; trace sulfides; gray to grayish blue
697 - 698	1	Sand, medium; silty; clayey; poorly sorted; micaceous; lignite; tannish white
701 - 707	6	Sand, medium; silty; clayey; poorly sorted; micaceous; lignite; tannish gray
707 - 708	1	No recovery
708 - 711	3	Sand, coarse; very poorly sorted; trace sulfides; micaceous; lignite; gray
711 - 713	2	Sand, clayey; silty; micaceous; gray
713 - 714	1	Clay, silty; sandy; micaceous; lignite; dark gray

Depth (ft)	Thickness (ft)	Description
714 - 716	2	Sand, medium; silty; gray
716 - 717	1	Sand, medium; very poorly sorted; micaceous; lignite; light gray
717 - 718	1	No recovery
718 - 719	1	Clay, silty; sandy; fissile; dark gray
719 - 721	2	Sand, medium; silty; very poorly sorted; trace sulfides; micaceous; lignite; tannish gray
721 - 724	3	Clay, silty; light gray
724 - 726	2	Sand, medium; silty; moderately sorted; micaceous; lignite; grayish tan
726 - 727	1	Sand, medium; clayey; muscovite; gray
727 - 728	1	Sand, silty; very poorly sorted; trace sulfides; gray
728 - 731	3	Sand, medium; clayey; very poorly sorted; micaceous; lignite; whitish gray
731 - 734	3	Sand, medium; silty; moderately sorted; gray
734 - 737	3	Sand, medium; clayey; very poorly sorted; micaceous; lignite; gray
737 - 740	3	Sand, coarse; very poorly sorted; lignite; muscovite, gray
740 - 744	4	Clay, silty; lignite; brownish gray
744 - 747	3	No recovery
747 - 751	4	Silt, clayey; well sorted; mottled; grayish brownish yellow
751 - 752	1	Sand, medium; whitish gray
752 - 757	5	Sand, coarse; clayey; micaceous; lignite; whitish; gray
757 - 758	1	Sand, coarse; very poorly sorted; gray

Depth (ft)	Thickness (ft)	Description
758 - 760	2	Sand, coarse; very poorly sorted; gray
761 - 763	2	Clay, silty; sandy; well sorted; trace muscovite and lignite; grayish brown
763 - 764	1	Sand, fine; silty; well sorted; micaceous; lignite tannish gray
764 - 766	2	Clay, silty; brownish gray
766 - 767	1	No recovery
767 - 771	4	Sand, medium; silty; trace sulfides; grayish brown
771 - 776	5	Silt, clayey; trace gypsum and sulfides; micaceous; lignite; grayish tan
776 - 780	4	Silt, sandy; well sorted; trace gypsum; whitish gray
780 - 782	2	Silt, clayey; well sorted; whitish gray
782 - 783	1	No recovery
783 - 784	1	Silt, sandy; well sorted; trace sulfides; gray
784 - 785	1	Sand, medium; silty; moderately sorted; grayish tan
785 - 786	1	Sand, medium; trace sulfides; micaceous; white
786 - 787	1	Sand, clayey; trace sulfides; lignite; muscovite; grayish tan
787 - 793	6	Sand, medium; trace sulfides; micaceous; lignite; mottled black; white to grayish black
793 - 797	4	No recovery
797 - 799	2	Sand, coarse; very poorly sorted; lignite; light tannish gray
799 - 800	1	Silt; lignite; muscovite; gray
800 - 805	5	Sand, coarse; very poorly sorted; micaceous; lignite; light gray

Depth (ft)	Thickness (ft)	Description
805 - 806	1	Sand, medium; silty; very poorly sorted; light gray
806 - 807	1	No recovery
807 - 819	12	Sand, coarse; silty; very poorly sorted; micaceous; lignite; gray to light gray
819 - 820	1	No recovery
820 - 826	6	Sand, coarse; silty; very poorly sorted; micaceous; lignite; light gray to gray
826 - 828	2	Sand, coarse; very poorly sorted; micaceous; light gray
828 - 830	2	No recovery
830 - 831	1	Sand, coarse; silty; gray
831 - 833	2	Sand, coarse; clayey; silty; very poorly sorted; interbedded clay; gray
833 - 837	4	Sand, coarse; silty; very poorly sorted; trace sulfides; muscovite; lignite; whitish gray
837 - 839	2	Sand, coarse; clayey; very poorly sorted; whitish gray
839 - 842	3	Sand, coarse; muscovite; lignite; whitish gray to grayish white
842 - 843	1	Sand, coarse; silty; very poorly sorted; muscovite; lignite; grayish white
843 - 846	3	Sand, coarse; clayey; very poorly sorted; muscovite; lignite; tannish white
846 - 847	1	Sand, coarse; very poorly sorted; muscovite; tannish white
847 - 849	2	Sand, coarse; silty; very poorly sorted; interbedded pebbles and clay; muscovite; lignite; whitish tan
849 - 851	2	Sand, coarse; very poorly sorted; interbedded pebbles and clay; whitish tan
851 - 852	1	Sand, silty; interbedded pebbles and clay; trace sulfides; micaceous; lignite; grayish tan

Depth (ft)	Thickness (ft)	Description
852 - 853	1	Sand, coarse; very poorly sorted; grayish tan
853 - 854	1	Sand, medium; clayey; trace sulfides; grayish tan
854 - 855	1	Sand, silty; interbedded pebbles and clay; grayish tan
855 - 856	1	No recovery
856 - 860	4	Sand, coarse; very poorly sorted; whitish tan
860 - 862	2	Sand, coarse; clayey; very poorly sorted; interbedded pebbles; whitish tan
862 - 863	1	Sand; very poorly sorted; sulfides; grayish tan
863 - 864	1	Sand, coarse; clayey; very poorly sorted; muscovite; lignite; whitish tan
864 - 866	2	Sand, coarse; trace sulfides; micaceous; lignite; gray to dark gray
866 - 868	2	Sand, coarse; silty; very poorly sorted; tannish gray to whitish gray
868 - 871	3	Sand, medium to coarse; clayey; interbedded clay; light grayish tan to light gray
871 - 875	4	Clay, sandy; interbedded pebbles and clay; muscovite; light whitish gray to light gray
876 - 882	6	Clay; trace chert and muscovite; brownish yellow to grayish yellow
882 - 887	5	Clay, sandy; trace gypsum; muscovite; lignite; light gray
887 - 889	2	Sand, coarse; clayey; very poorly sorted; trace sulfides; lignite; muscovite; light gray
889 - 890	1	Sand, coarse; silty; clayey; micaceous; lignite; clay
890 - 894	4	No recovery
894 - 899	5	Sand, coarse; very poorly sorted; lignite; gray to white

Depth (ft)	Thickness (ft)	Description
899 - 900	1	Sand, coarse; silty; very poorly sorted; trace sulfides; micaceous; lignite; white
900 - 903	3	Silt; trace sulfides; muscovite; lignite; white to gray
903 - 906	3	Silt; sandy; lignite; muscovite; gray
906 - 907	1	No recovery
907 - 922	15	Sand, coarse to medium; clayey; mottled sand; very poorly to moderately sorted; micaceous; lignite; yellowish grayish white to yellowish whitish red to gray
922 - 923	1	Silt, sandy; moderately sorted; gray
923 - 927	4	Sand, medium; clayey; moderately sorted; muscovite; lignite; gray
927 - 928	1	Silt, clayey; muscovite; gray
928 - 929	1	Sand, fine; clayey; moderately sorted; gray
929 - 930	1	Clay; varigated; grayish reddish yellow
930 - 932	2	No recovery
932 - 934	2	Silt, sandy; very poorly sorted; micaceous; lignite; gray
934 - 935	1	Sand, coarse; silty; varigated; very poorly sorted; grayish reddish yellow
935 - 936	1	Sand, coarse; clayey; very poorly sorted; micaceous; lignite; grayish reddish yellow
936 - 938	2	Sand, coarse; silty; very poorly sorted; micaceous; lignite; gray
938 - 940	2	Silty, clayey; muscovite; light gray
940 - 946	6	Sand, fine; silty; poorly sorted; trace sulfides; lignite; muscovite; light gray to grayish
946 - 947	1	Silt, sandy; well sorted; micaceous; lignite; grayish brown

Depth (ft)	Thickness (ft)	Description
947 - 957	10	Sand, fine; silty; interbedded clay; well sorted; micaceous; lignite; gray to grayish brown
957 - 961	4	Sand, fine; silty; well sorted; trace sulfides; glauconite; micaceous; lignite; grayish green
961 - 963	2	Conglomerate, clayey; poorly sorted; glauconite; muscovite; lignite; green
963 - 964	1	Clay; glauconite; greenish gray
964 - 965	1	Clay; silty; glauconite; lignite; muscovite; greenish gray
965 - 967	2	Sand, fine; silty; very poorly sorted; lignite; muscovite; grayish yellowish brown to grayish brown
967 - 968	1	Silt; brownish gray
968 - 969	1	Silt, sandy; micaceous; gray
969 - 971	2	Clay, silty; very poorly sorted; micaceous; reddish yellowish gray to brownish red
971 - 972	1	No recovery
972 - 973	1	Clay, silty; micaceous; lignite; brownish red
973 - 983	10	Sand, coarse; silty; very poorly sorted; trace glauconite; muscovite; light gray to light grayish green
983 - 986	3	Clay, sandy; mottled red; glauconite; lignite
986 - 991	5	Sand, medium; silty; poorly sorted; mottled red; glauconite; muscovite; lignite

APPENDIX E

LITHOLOGIC LOG FOR P-20TD

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-20 TD

Depth (ft)	Thickness (ft)	Description
0 - 1	1	No recovery
1 - 3	2	Sand, medium; silty; poorly sorted; brownish red; F-B-1
3 - 7	4	Sand, medium; silty; clayey; interbedded clay; brownish red; F-B-1
7 - 8	1	Sand, medium clayey; well sorted; dark brownish red; F-B-1
8 - 9	1	Sand, medium; silty; well sorted; brownish red
9 - 12	3	Sand, medium; silty; clayey; interbedded clay; well sorted; tannish reddish orange; F-B-1
12 - 14	2	Clay, silty; sandy; lignite; tannish reddish brown
14 - 15	1	Clay; whitish brownish red
15 - 16	1	Clay, silty; yellowish reddish brown
16 - 25	9	Clay; yellowish reddish brown to purplish yellowish brown; F-B-1 (20-25)
25 - 28	3	No recovery
28 - 30	2	Clay; trace muscovite; orangish yellow; F-B-1
30 - 32	2	No recovery
32 - 33	1	Clay; mottled; muscovite; whitish brownish purple
33 - 34	1	No recovery
34 - 37	3	Clay, silty; trace muscovite; orangish purplish yellow; F-B-1 (34-35)
37 - 38	1	No recovery
38 - 39	1	Clay, sandy; well sorted; muscovite; purplish red; F-B-1
39 - 40	1	Clay, silty; purple; F-B-1

Depth (ft)	Thickness (ft)	Description
40 - 41	1	Silt, clayey; interbedded clay; lignite; muscovite; purple; F-B-1
41 - 42	1	Clay, silty; trace muscovite and lignite; purple
42 - 43	1	Silt, purple
43 - 44	1	No recovery
44 - 47	3	Sand, fine; silty; well sorted; micaceous; lignite purple
47 - 49	2	Silt; micaceous; lignite; whitish purplish orange to yellowish purple
49 - 50	1	Sand, coarse; silty; moderately sorted; micaceous; brownish orange; F-B-1
50 - 51	1	Clay, silty; brownish orangish tan
51 - 53	2	Sand, medium; clayey; well sorted; interbedded clay; micaceous; lignite; yellowish brown
53 - 59	6	Sand, medium; silty; well sorted; micaceous; lignite; whitish yellowish brown; F-B-1 (56-57)
59 - 60	1	Silt, clayey; muscovite; lignite; yellowish brown
60 - 61	1	Sand, medium; silty; well sorted lignite; muscovite; whitish yellowish brown; F-B-1
61 - 62	1	No recovery
62 - 63	1	Silt; micaceous; lignite; whitish yellow; F-B-1
63 - 64	1	Silt, sandy; well sorted; yellowish white; F-B-1
64 - 65	1	Silt, clayey; interbedded clay; micaceous; lignite; yellowish whitish brown; F-B-1
65 - 66	1	Silt, interbedded clay; micaceous; whitish yellow
66 - 67	1	Silt, clayey; lignite; muscovite; purplish pinkish orange
67 - 69	2	Clay, silty; micaceous; lignite; yellowish reddish purple to purplish red

Depth (ft)	Thickness (ft)	Description
69 - 70	1	Clay; purplish red
70 - 72	2	Sand, medium; silty; well sorted; muscovite; lignite; orangish reddish brown
72 - 73	1	Clay, silty; muscovite; lignite; orangish reddish white
73 - 74	1	Clay, silty; sandy; purplish red
74 - 75	1	Silt, sandy; well sorted; micaceous; lignite; orangish red; F-B-1
75 - 84	9	Sand, fine; silty; well sorted; micaceous; lignite; purplish orangish brown to grayish white
84 - 85	1	Clay, silty; glauconite; muscovite; lignite; grayish green; F-B-1
85 - 86	1	Sand, fine; well sorted; glauconite; muscovite; green; F-0-2
86 - 87	1	Sand, fine; silty; well sorted; micaceous; lignite; grayish white; F-0-2
87 - 88	1	Silt, sandy; gray; F-B-1
88 - 91	3	Silt; glauconite; muscovite; lignite; greenish gray to green; F-0-2
91 - 93	2	Sand, fine; silty; glauconite; muscovite; lignite; greenish gray to green; F-0-2
93 - 95	2	Sand, fine; clayey; interbedded clay; glauconite; greenish tannish gray; F-B-1
95 - 96	1	Sand, fine; silty; very poorly sorted; glauconite; muscovite; lignite; greenish orangish brown; F-0-1
96 - 97	1	No recovery
97 - 98	1	Sand, fine; poorly sorted; glauconite; lignite; muscovite; interbedded clay; greenish grayish orange
98 - 102	4	No recovery

Depth (ft)	Thickness (ft)	Description
101 - 105	4	Sand, medium; clayey; well sorted; micaceous; lignite; gray; F-0-1
105 - 107	2	Clay, sandy; well sorted; mottled; grayish brown to gray; F-0-1
107 - 110	3	Clay; mottled; muscovite; lignite; grayish brown to brownish grayish tan; F-0-2
110 - 114	4	Clay, sandy; well sorted; mottled; glauconite; greenish gray to gray; F-0-2
114 - 116	2	Sand, medium; silty; clayey; glauconite; greenish gray; F-Y-2
116 - 118	2	Sand, medium; clayey; well sorted; glauconite; lignite; greenish reddish brown; F-0-3
118 - 119	1	Clay, sandy; well sorted; glauconite; lignite; green; F-0-3
119 - 120	1	Sand, medium; well sorted; glauconite; lignite; greenish gray; F-0-3
120 - 122	2	Sand, medium; clayey; moderately sorted; glauconite; lignite; light greenish gray; F-W-2
122 - 123	1	Sand, medium; silty; well sorted; interbedded clay; glauconite; light greenish gray; F-W-2
123 - 124	1	Clay, sandy; glauconite; muscovite; lignite; light greenish gray; F-B-1
124 - 125	1	Clay, silty; muscovite; lignite; light green
125 - 126	1	Silt, sandy; lignite; dark brown black
126 - 127	1	Silt; interbedded clay; lignite; orangish brown
127 - 128	1	Silt, sandy; interbedded clay; well sorted; dark brownish black
128 - 131	3	Sand, fine; silty; interbedded clay; lignite; brownish gray; F-0-2 (130-131)
131 - 133	2	Sand, medium; clayey; poorly sorted; dark brownish tan; F-0-1
133 - 134	1	Clay, silty; lignite; brownish gray; F-0-1

Depth (ft)	Thickness (ft)	Description
134 - 135	1	Clay, sandy; moderately sorted; lignite; brownish gray
135 - 137	2	Sand, fine; clayey; well sorted; interbedded clay; orangish tan
137 - 140	3	Sand, fine; silty; well sorted; orangish tan
140 - 141	1	Sand, medium; well sorted; lignite; orangish tan
141 - 142	1	No recovery
142 - 144	2	Sand, medium; very poorly sorted; interbedded clay; brownish tannish orange; F-O-1
144 - 145	1	Sand, medium; silty; well sorted; interbedded clay; light grayish white; lignite; F-O-1
145 - 146	1	Sand, medium; well sorted; lignite; light grayish white; F-O-1
146 - 147	1	No recovery
147 - 150	3	Sand, coarse; silty; moderately sorted; lignite; dark brownish orangish tan; F-O-1
150 - 152	2	No recovery
152 - 153	1	Clay, sandy; moderately sorted; lignite; light grayish orangish tan
153 - 157	4	No recovery
157 - 158	1	Clay; glauconite; lignite; whitish gray
158 - 159	1	Clay, silty; well sorted; interbedded clay; glauconite; lignite; greenish tan
159 - 160	1	Silt; glauconite; lignite; light green
160 - 162	2	No recovery
162 - 163	1	Sand, medium; silty; well sorted; brownish tannish orange
163 -165	2	Clay, silty; muscovite; lignite; light grayish brown; F-W-1 (164-165)

Depth (ft)	Thickness (ft)	Description
165 - 166	1	Silt, clayey; micaceous; lignite; light brown
166 - 167	1	Clay, silty; mottled; micaceous; lignite; brownish orange; F-8-1
167 - 168	1	Silt, clayey; micaceous; lignite; tannish black
168 - 169	1	Silt; whitish tannish brown
169 - 170	1	Silt, calcareous; dark brownish blackish white
170 - 171	1	Limestone; fossils; lignite; pinkish white
171 - 172	1	No recovery
172 - 173	1	Limestone; mottled; lignite; whitish yellow
173 - 174	1	Limestone, silty; lignite; whtte; F-Y-3
174 - 177	3	Limestone, sandy; well sorted; lignite; white
177 - 179	2	Clay, calcareous; lignite; white; F-Y-3
179 - 180	1	No recovery
180 - 181	1	Limestone, sandy; moderately sorted; lignite; white; F-Y-3
181 -185	4	Limestone, silty; lignite; white; F-Y-3
185 - 187	2	No recovery
187 - 190	3	Limestone, clayey; silty; lignite; white; F-Y-3
190 - 191	1	Limestone; lignite; tannish whitish yellow
191 - 193	2	No recovery
193 - 194	1	Clay, calcareous; lignite; tannish white
194 - 197	3	No recovery
197 - 200	3	Limestone, clayey; silty; fossils; lignite; tannish brown to gray; F-Y-2
200 - 203	3	Silt, calcareous; fossils; lignite; gray; F-Y-1

Depth (ft)	Thickness (ft)	Description
203 - 207	4	Silt, clayey; calcareous; fossils; lignite; glauconite; gray to grayish green; F-Y-3
207 - 208	1	Sand, fine; clayey; well sorted; mottled; fossils; glauconite; grayish green; F-B-2
208 - 213	5	Clay; glauconite; fossils; grayish green
213 - 214	1	Clay, silty; muscovite; black; F-B-2
214 - 215	1	Clay; fossils; muscovite; black; F-B-4
215 - 217	2	Silt, clayey; mottled; lignite; black; F-O-1
217 - 228	11	Silt, lignite; black; F-O-1 (221-224)
228 - 230	2	Silt, clayey; lignite; black
230 - 231	1	Silt, lignite; black; F-B-1
231 - 232	1	Sand, silty; well sorted; lignite; black
232 - 233	1	Silt; lignite; black; F-O-1
233 - 235	2	Sand, medium; silty; well sorted; lignite; black; F-O-2
235 - 239	4	Sand, medium; well sorted; lignite; black
239 - 240	1	No recovery
240 - 253	13	Sand, medium; trace interbedded clay; black to blackish gray; F-O-2 (240-250)
253 - 254	1	No recovery
254 - 256	2	Sand, coarse; well sorted; gray; F-O-1
256 - 257	1	No recovery
257 - 260	3	Sand, medium; moderately sorted; gray; F-O-1
260 - 263	3	Sand, fine; silty; very poorly sorted; dark gray; F-O-2 (260-261)
263 - 264	1	Silt, sandy; well sorted; dark gray; F-B-2

Depth (ft)	Thickness (ft)	Description
264 - 266	2	Silt, clayey; gray; F-B-2
266 - 270	4	Silt; lignite; gray; F-B-1
270 - 273	3	Sand, fine; silty; well sorted; lignite; gray
273 - 276	3	Sand, medium; very poorly sorted; lignite; gray
276 - 278	2	No recovery
278 - 283	5	Sand, medium, silty; very poorly sorted; lignite; gray to grayish black
283 - 284	1	Sand, medium; lignite; gray
284 - 285	1	Sand, medium; silty; lignite; grayish black
285 - 286	1	Silt, sandy; poorly sorted; lignite; grayish black
286 - 287	1	Sand, medium; very poorly sorted; gray
287 - 288	1	Sand, medium; silty; gray
288 - 290	2	No recovery
290 - 296	6	Sand, medium to fine; silty; very poorly to moderately sorted; trace lignite and heavy minerals; gray
296 - 297	1	No recovery
297 - 299	2	Sand, medium; silty; well sorted; trace lignite; gray
299 - 300	1	Clay; fissile; muscovite; gray
300 - 302	2	Clay, silty; sandy; sulfides; glauconite; grayish green to green
302 - 303	1	Silt, clayey; sulfides; gray
303 - 314	11	Clay, silty; muscovite; lignite; gray
314 - 323	9	Clay; fissile; trace lignite and muscovite; gray to black

Depth (ft)	Thickness (ft)	Description
323 - 324	1	Clay, sandy; well sorted; trace lignite; muscovite; black
324 - 326	2	Clay; trace lignite; black
326 - 327	1	No recovery
327 - 330	3	Clay; fissile; abundant lignite; muscovite; black
330 - 332	2	No recovery
332 - 334	2	Silt, clayey; muscovite; trace lignite; gray
334 - 337	3	No recovery
337 - 338	1	Silt; muscovite; trace lignite; gray
338 - 339	1	Silt, sandy; muscovite; trace lignite; gray
339 - 350	11	Silt; muscovite; trace lignite; gray
350 - 351	1	Silt, sandy; gray
351 - 352	1	Silt; gray
352 - 356	4	Sand, medium; silty; well sorted; gray
356 - 357	1	No recovery
357 - 358	1	Sand, medium; silty; well sorted; interbedded clay; muscovite; lignite; blackish gray
358 - 360	2	No recovery
360 - 361	1	Clay; fissile; trace muscovite and lignite; grayish black
361 - 362	1	Clay, silty; fissile; trace muscovite and lignite; grayish black
362 - 363	1	No recovery
363 - 364	1	Sand, medium; silty; interbedded clay; muscovite; lignite; black
364 - 366	2	Sand, medium; silty, clayey; glauconite; muscovite; lignite; greenish black to green
366 - 367	1	No recovery

Depth (ft)	Thickness (ft)	Description
367 - 373	6	Sand, medium; clayey; moderately to well sorted; glauconite; muscovite; green
373 - 377	4	Silt, sandy; well sorted; interbedded clay; glauconite; greenish gray to gray
377 - 380	3	Silt; lignite; muscovite; grayish black
380 - 386	6	Sand, medium; silty; well sorted; micaceous; lignite; dark gray
386 - 388	2	Sand, coarse; well sorted; sulfides; muscovite; lignite; dark gray
388 - 390	2	Sand, medium; silty; sulfides; muscovite; lignite; gray
390 - 391	1	Sand, medium; very poorly sorted; micaceous; lignite, gray
391 - 394	3	Sand, medium, silty; very poorly sorted; muscovite, lignite; gray
394 - 397	3	Sand, medium; gray
397 - 398	4	Sand, medium; clayey; interbedded clay; dark gray
398 - 406	8	Sand, medium; well sorted; trace interbedded clay; sulfides; muscovite; lignite; grayish white to light gray
406 - 407	1	Sand, medium; silty; sulfides, micaceous; dark gray
407 - 408	1	Sand, interbedded clay; sulfides; micaceous; lignite, gray
408 - 409	1	Silt, clayey; dandy; micaceous; lignite; light tan
409 - 410	1	Silt, clayey; micaceous; lignite light tan
410 - 413	3	Sand, medium; very poorly sorted; micaceous; light tannish gray
413 - 414	1	No recovery
414 - 416	2	Sand, medium; very poorly sorted; light tannish gray
416 - 417	1	No recovery

Depth (ft)	Thickness (ft)	Description
417 - 423	6	Sand, medium; micaceous; lignite; light tannish gray
423 - 424	1	No recovery
424 - 425	1	Sand, coarse; interbedded clay; well sorted; micaceous; lignite; light tannish gray
425 - 430	5	Silt; micaceous; lignite; light gray to gray
430 - 431	1	Clay, silty; gray
431 - 433	2	Silt; muscovite; lignite; gray
433 - 435	2	Sand, medium; silty; well sorted; micaceous; gray
435 - 436	1	Sand, medium; well sorted; lignite; muscovite; gray
436 - 437	1	No recovery
437 - 439	2	Sand, coarse; well sorted; interbedded clay; light gray
439 - 441	2	Sand, coarse; silty; micaceous; lignite; light gray
441 - 442	1	No recovery
442 - 446	4	Sand, coarse; well sorted; interbedded clay; micaceous; lignite; light gray
446 - 447	1	No recovery
447 - 449	2	Clay; fissile; mottled; muscovite; lignite; blackish gray to blackish brown
449 - 450	1	Sand, medium; silty; interbedded clay; gray
450 - 451	1	No recovery

APPENDIX F

LITHOLOGIC LOG FOR P-21TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-21 TA

Depth (ft)	Thickness (ft)	Description
0 - 16	16	Clay, sandy; moderately to poorly sorted; lignite; dark reddish brown to brownish orange
16 - 21	5	Sand; clayey; very poorly sorted; lignite; trace muscovite; brownish red to dark red; F-B-3 (20-21)
21 - 23	2	Sand, coarse; silty; mottled; brownish red to reddish brown
23 - 37	14	Sand; medium; moderately sorted; trace lignite; reddish yellow to tannish yellow; F-Y-3 (34-36)
37 - 38	1	No recovery
38 - 75	37	Sand; medium; whitish tan to whitish yellow; trace lignite; moderately to very poorly sorted
75 - 78	3	Sand, fine; silty; moderately sorted; yellowish tan; F-O-1 (75-77)
78 - 80	2	Clay, silty; sandy; moderately sorted; lignite; tan to brownish tan
80 - 98	18	Sand, medium; silty; lignite; moderately sorted; light tannish brown to light yellowish tan
98 - 101	3	Clay, sandy; very poorly sorted; lignite; dark brownish tannish black to tannish black
101 - 103	2	Sand, fine; silty; lignite; whitish tan to light tannish gray
103 - 104	1	No recovery
104 - 105	1	Sand, fine; clayey; well sorted; light tannish gray; F-Y-2
105 - 108	3	Clay, silty, sandy; well sorted; light tannish gray; F-B-1
108 - 110	2	Silt, clayey; lignite; micaceous; light grayish green; F-Y-3 (108-109)
110 - 113	3	Clay, silty; fissile; glauconite; micaceous; lignite; light gray green

Depth (ft)	Thickness (ft)	Description
113 - 114	1	Silt, clayey; glauconite; calcareous; fossils; lignite; micaceous; light grayish green
114 - 115	1	Clay, silty; sandy; fossils; calcareous; lignite; micaceous; light greenish gray ; F-Y-1
115 - 118	3	Silty, clayey, calcareous; micaceous; lignite; fossils; glauconite; light grayish green
118 - 119	1	Clay, silty; micaceous; lignite; fossils; glauconite; light grayish green ; F-Y-3
119 - 120	1	Clay, calcareous, silty; very poorly sorted; lignite; fossils; light grayish green ; F-Y-3
120 - 121	1	Silt, sandy; very poorly sorted; lignite; fossils; calcareous; light grayish green
121 - 122	1	Limestone, silty; micaceous; lignite; fossils; glauconite; greenish white ; F-Y-3
122 - 124	2	Limestone, clayey; micaceous; glauconite; lignite; fossils; greenish white ; F-Y-3
124 - 125	1	Limestone; trace muscovite and lignite; fossils; glauconite; greenish white ; F-Y-3
125 - 126	1	Sand, medium, clayey; trace lignite; calcareous; fossils; greenish white ; F-Y-3
126 - 127	1	Sand, medium; silty; very poorly sorted; glauconite; lignite; fossils; calcareous; greenish white ; F-Y-3
127 - 129	2	Silt, sandy; micaceous; very poorly sorted; lignite; calcareous; fossils; greenish white
129 - 132	3	Sand, medium; silty; very poorly sorted; micaceous; fossils; lignite; calcareous; glauconite; greenish white; F-Y-3
132 - 134	2	Limestone; fossiliferous; lignite; whitish tan
134 - 135	1	No recovery
135 - 136	1	Limestone; clayey; fossiliferous; lignite; whitish gray; F-Y-3

Depth (ft)	Thickness (ft)	Description
136 - 137	1	Clay; fossils; glauconite; grayish green
137 - 139	2	No recovery
139 - 145	6	Clay; fossiliferous; glauconite; greenish blue
145 - 147	2	Limestone; fossiliferous; micaceous; glauconite; trace lignite; whitish gray
147 - 148	1	No recovery
148 - 153	5	Limestone; fossiliferous; lignite; white
153 - 154	1	Limestone; clayey; lignite; green; fossils
154 - 155	1	No recovery
155 - 156	1	Clay; calcareous; glauconite; greenish white
156 - 160	4	Sand, fine; silty; well sorted; micaceous; heavy minerals; fossils; greenish brown
160 - 161	1	Clay; fissile; trace muscovite and lignite; fossils; light green; F-Y-2
161 - 162	1	No recovery
162 - 163	1	Clay, silty; sand; fissile; calcareous; trace muscovite and lignite; dark grayish green
163 - 180	17	Clay, silty; fissile; calcareous; trace muscovite; lignite and glauconite; light grayish green; F-B-3 (163-175)
180 - 182	2	No recovery
182 - 188	6	Clay; calcareous; trace lignite and muscovite; dark grayish green; F-B-3 (182-186)
188 - 190	2	Limestone; interbedded clay; trace lignite and muscovite; light greenish gray to green; F-B-2
190 - 191	1	No recovery
191 - 241	50	Limestone; interbedded clay; fossiliferous; trace glauconite, muscovite and lignite; greenish gray
241 - 242	1	No recovery
242 - 243	1	Silt, clayey; sandy; well sorted; fissile; mottled; dark green; F-B-3

Depth (ft)	Thickness (ft)	Description
243 - 245	2	No recovery
245 - 271	26	Sand, medium; silty; moderately sorted; trace muscovite; lignite and glauconite; grayish green to greenish gray;
271 - 272	1	No recovery
272 - 276	4	Sand, medium; silty; very poorly sorted; trace sulfides and lignite; greenish gray; F-Y-3
276 - 277	1	Sand, medium; very poorly sorted; trace lignite; greenish gray; F-Y-3
277 - 278	1	Sand, medium; silty; very poorly sorted; greenish gray; F-Y-3
278 - 286	8	Sand, medium; very poorly sorted; lignite; greenish gray to light greenish gray
286 - 287	1	Sand, medium; silty; very poorly sorted; lignite; greenish gray
287 - 296	9	Sand, coarse; very poorly sorted; lignite; greenish gray to gray; F-Y-1 (290-292)
296 - 311	15	Sand, coarse; silty; very poorly sorted; lignite; gray to greenish gray; trace glauconite, sulfides and fossils; F-B-2 (308-310)
311 - 312	1	No recovery
312 - 314	2	Clay, silty; fissile; lignite; dark grayish green; F-Y-1
314 - 325	11	Sand, fine; silty; very poorly sorted; trace glauconite, lignite and sulfides; greenish gray; F-B-2 (320-324)
325 - 326	1	Clay, silty; sulfides; lignite; light gray
326 - 328	2	Clay; grayish tannish red; F-B-1
328 - 333	5	Limestone; grayish tannish red to whitish yellowish purple; F-B-3 (330-333)

Depth (ft)	Thickness (ft)	Description
333 - 335	2	Limestone, silty; trace lignite; grayish yellowish purple: F-B-3
335 - 340	5	Limestone; lignite; grayish yellowish red
340 - 342	2	No recovery
342 - 350	8	Silt, clayey; micaceous; lignite; light gray to whitish gray; F-B-1 (342-348)
350 - 359	9	Sand, fine; silty; well to moderately sorted; micaceous; trace lignite; whitish gray to white
359 - 360	1	Sand, coarse; moderately sorted; micaceous; trace lignite; white
360 - 362	2	Sand, coarse; clayey; moderately sorted; micaceous; interbedded clay; white
362 - 365	3	Sand, fine; silty; moderately to poorly sorted; interbedded clay; fissile; micaceous; lignite; light gray
365 - 368	3	Clay, silty; fissile; micaceous; lignite; black
368 - 396	28	Silt, clayey; fissile; micaceous; lignite; black
396 - 398	2	No recovery
398 - 406	8	Sand, medium; silty; very poorly sorted; fossiliferous; trace glauconite, sulfides, and lignite; blackish gray to blackish grayish green
406 - 408	2	Sand, medium; clayey; very poorly sorted; glauconite; sulfides; micaceous; lignite; greenish black to blackish green
408 - 409	1	Clay, sandy; very poorly sorted; glauconite; lignite; blackish green
409 - 412	3	Sand, fine; silty; very poorly sorted; glauconite; sulfides; lignite; gray
412 - 413	1	Clay, silty; fissile; glauconite; sulfides; lignite; dark gray
413 - 414	1	Sand, fine; clayey; well sorted; fissile; sulfides; dark gray

Depth (ft)	Thickness (ft)	Description
414 - 428	14	Sand, medium; silty; micaceous; heavy minerals; sulfides; lignite; gray to dark gray
428 - 431	3	Silt, sandy; moderately sorted; dark gray
431 - 435	4	Silt, clayey; fissile; glauconite; micaceous; lignite; dark gray
435 - 436	1	Silt, sandy; very poorly sorted; fissile; glauconite; micaceous; dark gray
436 - 437	1	Silt, clayey; fissile; mottled; glauconite; micaceous; lignite; dark green
437 - 438	1	Silt, sand; very poorly sorted; fissile; mottled; glauconite; micaceous; lignite; dark green
438 - 439	1	Sand, very fine; silty; poorly sorted; glauconite; micaceous; lignite; dark green
439 - 441	2	Silt, sandy; poorly sorted; fissile; glauconite; micaceous; lignite; dark
441 - 444	3	Silt, clayey; fissile; glauconite; micaceous; lignite; dark green
444 - 445	1	Silt, sandy; very poorly sorted; mottled; sulfides; glauconite; micaceous; lignite; dark green
445 - 452	7	Sand, medium; clayey; very poorly sorted; trace sulfides, gypsum; muscovite and lignite; light gray
452 - 453	1	Clay, sandy; very poorly sorted; gypsum; lignite; gray
453 - 455	2	No recovery
455 - 463	8	Clay; trace muscovite; grayish reddish yellow; varigated
463 - 464	1	Clay, sandy; poorly sorted; mottled; micaceous; grayish red; varigated
464 - 470	6	Clay; varigated, micaceous; grayish yellowish red
470 - 471	1	Clay, sandy; moderately sorted; micaceous; grayish yellowish red
471 - 472	1	No recovery

Depth (ft)	Thickness (ft)	Description
472 - 474	2	Sand, very fine; clayey; moderately sorted; interbedded clay; micaceous; lignite; light gray
474 - 484	10	Sand, very fine, silty; moderately to very poorly sorted; interbedded clay; micaceous; lignite; light gray
484 - 486	2	Sand, coarse; clayey; moderately sorted; micaceous; lignite; light gray
486 - 488	2	No recovery
488 - 489	1	Sand, coarse; clayey; moderately sorted; muscovite; lignite; light gray
489 - 499	10	Clay; varigated; grayish yellow to purplish yellowish gray
499 - 500	1	Clay, sandy; moderately sorted; micaceous; light gray
500 - 502	2	No recovery
502 - 504	2	Silt, sandy; moderately sorted; micaceous; lignite; light gray
504 - 505	1	No recovery
505 - 507	2	Sand, medium; clayey; very poorly sorted; micaceous; lignite; light gray
507 - 508	1	No recovery
508 - 510	2	Silt, sandy; very poorly sorted; sulfides; micaceous; lignite; light gray
510 - 514	4	Sand, fine; silty; very poorly sorted; muscovite; lignite; grayish brown
514 - 515	1	Silt, sandy; very poorly sorted; micaceous; lignite; gray
515 - 516	1	Sand, medium; silty; very poorly sorted; muscovite; lignite; grayish brown
516 - 518	2	Sand, medium; clayey; very poorly sorted; interbedded clay; micaceous; lignite; grayish brown

Depth (ft)	Thickness (ft)	Description
518 - 531	13	Clay; micaceous; trace lignite; varigated; grayish yellowish red
531 - 532	1	No recovery
532 - 537	5	Clay; varigated; trace muscovite and lignite; reddish yellowish gray
537 - 538	1	No recovery
538 - 539	1	Clay; varigated; trace muscovite and lignite; grayish yellow
539 - 541	2	Clay, silty; trace muscovite and lignite; gray
541 - 542	1	No recovery
542 - 551	9	Sand, medium; silty; very poorly sorted; interbedded clay; micaceous; lignite; gray
551 - 553	2	Clay, sandy; moderately sorted; micaceous; gray
553 - 554	1	Clay; micaceous; gray
554 - 555	1	No recovery
555 - 557	2	Clay; trace muscovite and lignite; grayish red
557 - 559	2	No recovery
559 - 561	2	Clay; varigated; trace muscovite; grayish reddish yellow
561 - 562	1	No recovery
562 - 564	2	Clay; grayish red
564 - 565	1	No recovery
565 - 573	8	Clay; varigated; trace muscovite; grayish red to grayish reddish yellow
573 - 574	1	Clay, silty; calcareous; trace muscovite; dark gray
574 - 575	1	No recovery
575 - 577	2	Clay; calcareous; trace sulfides and muscovite; gray

Depth (ft)	Thickness (ft)	Description
577 - 578	1	No recovery
578 - 580	2	Clay, silty; calcareous; trace sulfides and muscovite; gray
580 - 582	2	No recovery
582 - 587	5	Clay; calcareous; trace muscovite and lignite; gray
587 - 588	1	No recovery
588 - 589	1	Clay, silty; calcareous; interbedded clay; micaceous; lignite; grayish white
589 - 592	2	No recovery
592 - 595	3	Sand, medium; clayey; very poorly sorted; micaceous; lignite; white
595 - 597	2	Sand, medium; silty; poorly sorted; trace muscovite, sulfides and lignite; light tannish white
597 - 599	2	Sand, medium; clayey; poorly sorted; trace muscovite and lignite; light tannish white
599 - 600	1	Clay, silty; trace muscovite and sulfides; lignite; grayish black
600 - 602	2	Silt, clayey; trace sulfides, glauconite and muscovite; lignite; dark gray green to gray
602 - 605	3	Clay, silty; interbedded clay; trace sulfides, heavy minerals and muscovite; lignite; grayish black
605 - 606	1	Silt; trace heavy minerals, lignite and musconite; gray
606 - 608	2	Sand, very coarse; clayey; trace glauconite and muscovite; lignite; light gray to light grayish black
608 - 619	11	Sand, medium; silty; moderately sorted; trace muscovite and lignite; light gray to tannish white
619 - 620	1	Clay, silty; fissile; trace muscovite and lignite; black

Depth (ft)	Thickness (ft)	Description
620 - 622	2	Sand, coarse; clayey; poorly sorted; micaceous; lignite; gray
622 - 628	6	Sand, medium; silty; poorly sorted; micaceous; gray
628 - 630	2	Sand, medium; clayey; moderately sorted; fissile; micaceous; lignite; grayish black
630 - 632	2	Clay, sandy; fissile; glauconite; sulfides; micaceous; lignite; grayish black
632 - 634	2	Clay, silty; fissile; glauconite; sulfides; micaceous; lignite; blackish gray
634 - 636	2	Sand, very coarse; silty; very poorly sorted; micaceous; trace sulfides and lignite; blackish gray
636 - 639	3	Silt, clayey; fissile; glauconite; sulfides; muscovite; lignite; dark gray
639 - 641	2	Sand, very coarse; silt; very poorly sorted; micaceous; lignite; gray
641 - 642	1	No recovery
642 - 643	1	Clay, silty; light gray
643 - 645	2	No recovery
645 - 648	3	Sand, coarse; silty; poorly sorted; micaceous; lignite; grayish tan
648 - 649	1	Sand, coarse; poorly sorted; gray
649 - 651	2	Clay, sandy; micaceous; lignite; gray
651 - 654	3	Sand, very coarse; clayey; moderately sorted; micaceous; gray
654 - 655	1	No recovery
655 - 660	5	Silt, sandy; well sorted; glauconite; micaceous; lignite; dark gray
660-661	1	Clay, silty; dark gray

Depth (ft)	Thickness (ft)	Description
661 - 664	3	Sand, medium; silty; well sorted; trace sulfides, muscovite and lignite; dark gray
664 - 666	2	Sand, coarse; clayey; very poorly sorted; interbedded clay; sulfides; gray
666 - 668	2	Sand, very coarse; silty; very poorly sorted; sulfides; micaceous; gray
668 - 675	7	Sand, very coarse; clayey; poorly sorted; interbedded clay; chert; sulfides; micaceous; gray to grayish tan
675 - 677	2	Sand, very coarse; poorly sorted; light tan
677 - 679	2	Sand, very coarse; silty; poorly sorted; micaceous; lignite; light tan
679 - 685	6	Silt, sandy; well sorted; interbedded clay; glauconite; muscovite; lignite; light gray
686 - 688	2	No recovery
688 - 690	2	Clay, silty; interbedded clay; micaceous; lignite; light gray to blackish gray
690 - 692	2	No recovery
692 - 694	2	Clay, silty; micaceous; dark gray
694 - 695	1	No recovery
695 - 697	2	Silt, clayey; interbedded clay; lignite; blackish gray
697 - 698	1	No recovery
698 - 700	2	Clay, silty; gray
700 - 714	14	Silt, clayey; fissile; sulfides; glauconite; trace muscovite; blackish gray to blackish green
714 - 715	1	No recovery
715 - 720	5	Silt, clayey; fissile; micaceous; sulfides; glauconite; lignite; blackish green

Depth (ft)	Thickness (ft)	Description
720 - 726	6	Sand, medium; silty; well sorted; glauconite; muscovite; lignite; dark green
726 - 731	5	Sand, medium; silty; well sorted; glauconite; muscovite; lignite; dark green
731 - 736	5	Silt, clayey; glauconite; lignite; muscovite; dark green to blackish green
736 - 750	14	Sand, medium; silty; well to moderately sorted; glauconite; trace heavy minerals; muscovite; lignite; dark green
750 - 767	17	Sand, medium; clayey; moderately to well sorted; glauconite; muscovite; lignite; trace heavy minerals; dark green
767 - 771	4	Sand, very coarse; silty; very poorly sorted; interbedded clay; muscovite; lignite; gray to grayish green
771 - 772	1	Clay; sulfides; micaceous; blackish gray
772 - 776	4	Clay, silty; trace sulfides; micaceous; lignite; dark grayish black
776 - 777	1	No recovery
777 - 779	2	Clay; dark gray
779 - 782	3	No recovery
782 - 783	1	Clay; muscovite; dark gray
783 - 784	1	No recovery
784 - 785	1	Clay; micaceous; light gray
785 - 786	1	No recovery
786 - 788	2	Clay; micaceous; light gray
788 - 789	1	No recovery
789 - 790	1	Silt, clayey; interbedded clay; muscovite; lignite; light gray
790 - 792	2	Silt, sandy; well sorted; interbedded clay; micaceous; lignite; gray

Depth (ft)	Thickness (ft)	Description
792 - 810	18	Sand, coarse to very coarse; silty; poorly sorted; micaceous; trace sulfides and lignite; gray
810 - 812	2	No recovery
812 - 831	19	Sand, medium to coarse; very poorly sorted; micaceous; lignite; trace sulfides; gray to light gray
831 - 834	3	Sand, medium; very poorly sorted; micaceous; lignite; light gray
834 - 836	2	Clay, sandy; moderately sorted; micaceous; laminated; light grayish white
836 - 838	2	No recovery
838 - 839	1	Clay, sandy; interbedded clay; muscovite; lignite; light grayish white
839 - 842	3	No recovery
842 - 843	1	Sand, medium; silty; poorly sorted; muscovite; lignite; light grayish tan
843 - 845	2	Sand, medium; clayey; poorly sorted; light grayish tan
845 - 846	1	Clay; gray
846 - 848	2	No recovery
848 - 850	2	Clay; micaceous; grayish green to gray
850 - 852	2	Silt, clayey; micaceous; trace glauconite; light gray
852 - 858	6	Sand, medium, silty; well to moderately sorted; micaceous; trace lignite; light grayish white
858 - 861	3	Clay; muscovite; grayish pink to gray
861 - 862	1	No recovery
862 - 864	2	Clay; muscovite; trace lignite; gray to dark purplish gray
864 - 865	1	No recovery
865 - 866	1	Clay; muscovite; lignite; purplish gray

Depth (ft)	Thickness (ft)	Description
866 - 868	2	No recovery
868 - 869	1	Sand, medium; silty; well sorted; micaceous light gray
869 - 872	3	Sand, medium; clayey; micaceous; lignite; light gray
872 - 874	2	Clay; muscovite; grayish yellow
874 - 875	1	Sand, medium; silty; poorly sorted; micaceous
875 - 876	1	Sand, medium; clayey; poorly sorted; grayish yellowish brown
876 - 877	1	Clay; muscovite; lignite; grayish yellow
877 - 879	2	Clay, silty; micaceous; yellowish gray to light gray
879 - 880	1	Clay, sandy; micaceous; lignite; light gray
880 - 882	2	No recovery
882 - 883	1	Sand, medium; clayey; moderately sorted; light gray
883 - 884	1	Clay; yellowish gray
884 - 885	1	Silt, clayey; micaceous; gray
885 - 886	1	Sand, very fine; clayey; well sorted; micaceous; light gray
886 - 889	3	Clay; varigated; trace muscovite; gray to purplish brown gray
889 - 892	3	No recovery
892 - 893	1	Clay; muscovite; light gray
893 - 895	2	No recovery
895 - 896	1	Clay, silty; micaceous; light gray
896 - 897	1	Silt, clayey; well sorted; micaceous; lignite; light gray

Depth (ft)	Thickness (ft)	Description
897 - 899	2	Clay, silty; micaceous; light gray
899 - 902	3	No recovery
902 - 904	2	Sand, fine; silty; well sorted; interbedded clay; micaceous; lignite; grayish tan
904 - 905	1	No recovery
905 - 914	9	Sand, fine; silty; well sorted; interbedded clay; trace muscovite; lignite; grayish tan
914 - 915	1	No recovery
915 - 917	2	Sand, fine; silty; well sorted; interbedded clay; trace muscovite; lignite; grayish tan
917 - 918	1	No recovery
918 - 922	4	Sand, fine; silty; well sorted; interbedded clay; trace muscovite and lignite; grayish tan
922 - 924	2	Clay; micaceous; grayish tan
924 - 925	1	Sand, medium; silty; poorly sorted; micaceous; lignite; grayish tan
925 - 928	3	Sand, fine; moderately sorted; interbedded clay; micaceous; lignite; white
928 - 935	7	Sand, medium; very poorly sorted; interbedded clay; trace sulfides; micaceous; whitish gray
935 - 938	3	Sand, medium; silty; moderately sorted; interbedded clay; muscovite; lignite; whitish gray
938 - 939	1	Sand, fine; silty; poorly sorted; white
939 - 940	1	Clay, sandy; burrowed; micaceous; lignite; whitish gray
940 - 941	1	Sand, medium; very poorly sorted; whitish gray
941 - 945	4	Sand, medium; silty; poorly sorted; interbedded clay; micaceous; lignite; grayish tan

Depth (ft)	Thickness (ft)	Description
945 - 947	2	Sand, medium; interbedded clay; micaceous; whitish gray
947 - 948	1	No recovery
948 - 951	3	Sand, medium; interbedded clay; micaceous; lignite; whitish gray
951 - 952	1	No recovery
952 - 961	9	Sand, medium; interbedded clay; micaceous; lignite; whitish gray
961 - 962	1	No recovery
962 - 966	4	Sand, coarse; silty; poorly sorted; micaceous; lignite; grayish tan
966 - 967	1	Sand, medium; trace sulfides and lignite; micaceous; grayish tan
967 - 968	1	No recovery
968 - 969	1	Sand, medium; trace sulfides and lignite; grayish tan
969 - 970	1	Sand, medium; silty; trace sulfides; grayish tan
970 - 986	16	Sand, medium; very poorly sorted; interbedded clay, clay balls; trace sulfides; micaceous; lignite; whitish gray
986 - 988	2	Sand, coarse; silty; clay balls; lignite; muscovite; light whitish gray
988 - 989	1	Sand, coarse; very poorly sorted; clay balls; light whitish gray
989 - 990	1	Sand, medium; silty; very poorly sorted; clay balls micaceous; lignite; light whitish gray
990 - 991	1	Sand, medium; clayey; clay balls; light whitish gray
991 - 992	1	No recovery
992 - 1020	28	Sand, medium to coarse; moderately to very poorly sorted; micaceous; lignite; light brownish gray to light grayish brown
1020 - 1021	1	Clay; light gray

Depth (ft)	Thickness (ft)	Description
1021 - 1022	1	No recovery
1022 - 1024	2	Clay; trace muscovite; and lignite; light gray
1024 - 1025	1	No recovery
1025 - 1026	1	Clay; light gray
1026 - 1032	6	Clay, sandy; trace muscovite and lignite; light grayish purple to light gray
1032 - 1037	5	Clay; gray to grayish purple
1037 - 1038	1	No recovery
1038 - 1040	2	Clay; varigated; trace muscovite; grayish red
1040 - 1042	2	No recovery
1042 - 1046	4	Sand, medium; silty; very poorly sorted; trace gypsum; lignite; muscovite ; whitish gray
1046 - 1047	1	Sand, medium; silty, clayey; very poorly sorted; trace gypsum; lignite; muscovite; dark gray
1047 - 1048	1	Silt, clayey; sandy; gypsum; lignite; muscovite; dark gray
1048 - 1050	2	Sand, medium; silty; very poorly sorted; gypsum; lignite; muscovite; grayish brown
1050 - 1054	4	Sand, medium; silty, clayey; very poorly sorted; interbedded clay; gypsum; lignite, muscovite; grayish brown to gray
1054 - 1055	1	Clay, silty; gypsum; lignite; muscovite; varigated; brownish reddish gray
1055 - 1056	1	Clay; gypsum; varigated; yellowish reddish gray
1056 - 1057	1	No recovery
1057 - 1062	5	Clay; varigated; mottled; gypsum; grayish reddish yellow to grayish purple
1062 - 1064	2	Silt, clayey; gray
1064 - 1065	1	Sand, fine; silty; varigated; grayish reddish yellow

Depth (ft)	Thickness (ft)	Description
1065 - 1066	1	Clay, silty; varigated; grayish yellowish purple
1066 - 1090	24	Clay, sandy; trace muscovite; lignite and gypsum; reddish grayish yellow to reddish green
1090 - 1095	5	Sand, medium; silty; moderately sorted; gypsum; light green to reddish green
1095 - 1097	2	Silt, clayey; trace gypsum; reddish green to light green
1097 - 1098	1	Clay, sandy; poorly sorted; gypsum; varigated; dark greenish reddish yellow
1098 - 1099	1	Silt, clayey; green
1099 - 1100	1	Clay; gypsum; dark green
1100 - 1102	2	Silt, clayey; light green
1102 - 1104	2	Sand, fine; silty; light green
1104 - 1105	1	Silt, sandy; light greenish brown
1105 - 1113	8	Sand, medium; silty; gypsum; trace muscovite; light greenish brown to gray
1113 - 1115	2	Silt; gypsum; micaceous; dark gray to grayish yellowish red
1115 - 1116	1	Silt, clayey; micaceous; gypsum; grayish reddish yellow
1116 - 1117	1	Clay, silty; sandy; moderately sorted; gypsum; muscovite; grayish reddish yellow
1117 - 1119	2	Sand, medium; silty; well sorted; gypsum; muscovite; light greenish gray to dark yellowish gray
1119 - 1120	1	Silt, clayey; gypsum; grayish yellowish red
1120 - 1121	1	Clay, silty; micaceous; gypsum grayish yellowish red

Depth (ft)	Thickness (ft)	Description
1121 - 1123	2	Silt; micaceous; gypsum; grayish greenish yellow
1123 - 1125	2	Silt, clayey; micaceous; green to light green
1125 - 1128	3	Silt, sandy; well sorted; micaceous; lignite; light green
1128 - 1129	1	Clay, silty; sandy; very poorly sorted; interbedded clay; micaceous; lignite; dark gray
1129 - 1135	6	Sand, fine; silty; well to moderately sorted; gypsum; burrowed; muscovite; lignite; gray
1135 - 1136	1	Silt, clayey; micaceous; gypsum; lignite; light grayish green
1136 - 1137	1	No recovery
1137 - 1139	2	Silt, clayey; micaceous; gypsum; lignite; light grayish green
1139 - 1140	1	Silt, sandy; well sorted; gypsum; muscovite; light green
1140 - 1148	8	Sand, coarse; silty; very poorly sorted; chert; pyrite; trace gypsum; greenish gray

APPENDIX G

LITHOLOGIC LOG FOR P-22TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P-22 TA

Depth (ft)	Thickness (ft)	Description
0 - 2	2	Sand, fine; well sorted; tan
2 - 5	3	Sand, fine; silty; tannish brown; F-0-1 (4-5)
5 - 9	4	Sand, fine; clayey; well sorted; orangish tan; interbedded clay; lignite
9 - 10	1	No recovery
10 - 11	1	Sand, fine; clayey; interbedded clay; orangish red
11 - 12	1	No recovery
12 - 17	5	Sand, fine; silty, clayey; well sorted; yellowish brown to brownish reddish tan
17 - 18	1	No recovery
18 - 20	2	Sand, medium; silty, clayey; brownish reddish tan
20 - 27	7	Sand, fine; silty; interbedded clay; reddish brown to brownish yellow; F-B-3 (22-27)
27 - 29	2	Silt; reddish brown; F-0-1
29 - 35	6	Sand, fine; clayey; interbedded clay; reddish brown
35 - 37	2	Sand, medium; moderately sorted; interbedded clay; yellowish brown
37 - 41	4	Sand, coarse; clayey; interbedded clay; yellowish brown
41 - 42	1	No recovery
42 - 50	8	Sand, medium; silty, clayey; interbedded clay; yellowish brown to tannish brown
50 - 53	3	Sand, medium; silty; lignite; tannish brown
53 - 58	5	Sand, medium: silty, clayey; well sorted; interbedded clay; tannish brown; F-B-1

Depth (ft)	Thickness (ft)	Description
58 - 60	2	Sand, medium; silty; interbedded clay; lignite; tannish brown
60 - 64	4	Clay, sandy; mottled; lignite; brown; F-B-2
64 - 66	2	Clay, silty; sandy; lignite; mottled brown
66 - 67	1	No recovery
67 - 68	1	Sand, medium; calcareous; interbedded clay; lignite; whitish brown
68 - 69	1	Sand, medium; silty; lignite; brown; F-O-1
69 - 83	14	Limestone, sandy; lignite; whitish brown to white
83 - 87	4	Sand, medium; calcareous; well sorted; lignite; white; F-Y-2
87 - 92	5	Limestone; interbedded clay; fossils; lignite; white
92 - 97	5	Limestone, clayey; interbedded clay; fossils; lignite; white; F-Y-4
97 - 102	5	Limestone, silty; clayey; interbedded clay; fossils; lignite; white; F-Y-2
102 - 105	3	Silt, calcareous; clayey; interbedded clay; fossils; whitish green; F-Y-3
105 - 111	6	Limestone, silty; fossils; lignite; muscovite; whitish greenF-Y-3
111 - 113	2	Silt, calcareous, clayey; interbedded clay; fossils; lignite; whitish green
113 - 115	2	Limestone, silty; clayey; fossils; lignite; whitish green; F-Y-3
115 - 117	2	No recovery
117 - 119	2	Sand, fine; calcareous; well sorted; lignite; whitish green; F-Y-2
119 - 124	5	Sand, fine; interbedded clay; well sorted; lignite; green; F-B-1

Depth (ft)	Thickness (ft)	Description
124 - 125	1	Clay; green; F-B-1
125 - 136	11	Sand, medium; silty; well sorted; lignite; tan to tannish brown; F-B-1 (125-130)
136 - 137	1	Sand, fine; silty, clayey; interbedded clay; lignite; tannish brown
137 - 143	6	Sand, fine; silty; well sorted; lignite; tannish brown; F-B-1 (142-143)
143 - 147	4	Clay, silty; calcareous; lignite; muscovite; light tan; F-Y-3
147 - 148	1	Sand, fine; silty; calcareous; lignite; tan; F-Y-3
148 - 151	3	Limestone; fossiliferous; lignite; brown to white; F-Y-3
151 - 152	1	No recovery
152 - 153	1	Limestone; fossiliferous; white; F-Y-3
153 - 155	2	No recovery
155 - 156	1	Limestone; fossils; white; F-Y-3
156 - 160	4	No recovery
160 - 161	1	Limestone; fossils; white; F-B-3
161 - 162	1	No recovery
162 - 165	3	Limestone, silty; fossils; lignite; white
165 - 166	1	Limestone; fossils; white
166 - 167	1	No recovery
167 - 169	2	Limestone; interbedded clay; fossils; lignite; brownish white
169 - 170	1	No recovery
170 - 175	5	Limestone; fossils; lignite; light brownish white
175 - 176	1	No recovery

Depth (ft)	Thickness (ft)	Description
176 - 187	11	Limestone, clayey; sandy; light tannish white; lignite; F-W-2
187 - 189	2	Limestone, clayey; sandy; light tannish white; lignite; F-W-2
189 - 193	4	Limestone; lignite; light tannish white; F-Y-3
193 - 194	1	Limestone, clayey; silty; lignite; tannish white
194 - 199	5	Limestone; lignite; light tannish white; F-Y-3
199 - 200	1	Limestone, clayey; silty; lignite; light tannish white; F-Y-2 (200-215)
200 - 215	15	Limestone; lignite; light tannish white to white
215 - 219	4	Limestone, clayey; silty; fossils; lignite; light yellow white; F-Y-3 (200-229)
219 - 229	10	Limestone; fossils; lignite; light yellowish white
229 - 236	7	No recovery
236 - 237	1	Sand, fine; silty; very poorly sorted; calcareous, lignite; dark yellow
237 - 248	11	Sand, fine; well sorted; calcareous; lignite; white to yellowish white; F-B-1
248 - 249	1	Sand, medium; silty; calcareous; lignite; light yellow; F-B-3
249 - 252	3	Sand, fine; well sorted; calcareous; lignite; yellow
252 - 257	5	Sand, fine; silty; lignite; yellow; F-O-1
257 - 260	3	Silt, sandy; well sorted; yellow; F-O-1
260 - 265	5	Sand, medium; well sorted; yellowish white
265 - 273	8	No recovery
273 - 277	4	Sand, medium; lignite; calcareous; yellowish white to brownish yellowish red; F-O-1

Depth (ft)	Thickness (ft)	Description
277 - 280	3	Sand, fine; clayey; glauconite; lignite; grayish green
280 - 283	3	No recovery
283 - 284	1	Silt, sandy; interbedded clay; glauconite; lignite; grayish green
284 - 286	2	Sand, fine; silty; clayey; glauconite; lignite; grayish green
286 - 288	2	Sand, fine; silty; glauconite; lignite; grayish green
288 - 290	2	Sand, fine; silty; clayey; glauconite; lignite; grayish green
290 - 291	1	Sand, medium; silty; well sorted; glauconite; lignite; grayish green
291 - 294	3	Silt, sandy; glauconite; lignite; grayish green
294 - 307	13	Sand, medium; silty; very poorly sorted; glauconite; grayish green to greenish gray; F-Y-4
307 - 308	1	No recovery
308 - 310	2	Sand, coarse; silty; very poorly sorted; glauconite; greenish gray
310 - 312	2	Clay, silty; micaceous; lignite; grayish white
312 - 313	1	No recovery
313 - 314	1	Sand, medium; silty; interbedded clay; lignite; micaceous; grayish white
314 - 315	1	Clay, silty; micaceous; grayish white
315 - 318	3	Clay, silty; sandy; micaceous; grayish white
318 - 320	2	Silt, sandy; interbedded clay; micaceous; grayish white; F-0-1
320 - 323	3	Sand, medium; silty; interbedded clay; micaceous; grayish white

Depth (ft)	Thickness (ft)	Description
323 - 325	2	Clay, sandy; muscovite; lignite; grayish white
325 - 327	2	Sand, coarse; silty; interbedded clay; tannish white
327 - 328	1	Clay, silty; lignite; tannish white
328 - 330	2	Sand, medium; silty; moderately sorted; micaceous; lignite; light gray
330 - 331	1	Clay, silty; micaceous; lignite; grayish white
331 - 334	3	Clay; trace muscovite; grayish white
334 - 337	3	Clay, silty; micaceous; lignite; grayish white
337 - 338	1	Silt, sandy; micaceous; yellowish gray
338 - 343	5	Sand, coarse; silty; well sorted; interbedded clay; micaceous; lignite; light tannish white
343 - 345	2	Silt, sandy; interbedded clay; light tannish white; F-B-1
345 - 350	5	Sand, fine; silty; interbedded clay; sulfides; muscovite; light gray
350 - 353	3	No recovery
353 - 357	4	Sand, medium; silty; well sorted; interbedded clay; micaceous; lignite; light gray
357 - 358	1	No recovery
358 - 360	2	Sand, medium; silty; interbedded clay; micaceous; lignite; gray
360 - 370	10	Clay; micaceous; lignite; gray to light green
370 - 372	2	Silt, sandy; interbedded clay; micaceous; lignite; light gray to purple
372 - 373	1	Clay, silty; fissile; micaceous; black
373 - 374	1	Silt, clayey; black

Depth (ft)	Thickness (ft)	Description
374 - 375	1	Silt, sandy; interbedded; muscovite; black
375 - 378	3	Silt, clayey; fissile; trace organics; black
378 - 381	3	Clay, silt; fissile; lignite; black
381 - 382	1	No recovery
382 - 406	24	Clay, silty; fissile; trace muscovite and lignite; black
406 - 407	1	No recovery
407 - 411	4	Clay, silty; fissile; trace muscovite and lignite; black
411 - 412	1	No recovery
412 - 428	16	Clay, silty; fissile; trace sulfides, muscovite and lignite; black
428 - 432	4	No recovery
432 - 434	2	Clay, silty; glauconite; fissile; black
434 - 441	7	Sand, coarse; clay; well sorted; glauconite; green
441 - 442	1	Clay, silt; glauconite; light gray
442 - 443	1	Sand, coarse; silty; moderately sorted; trace muscovite; light gray
443 - 445	2	Sand, medium; clayey; moderately sorted; micaceous; light gray
445 - 457	12	Sand, medium; silty; interbedded clay; lignite; micaceous; white to light gray
457 - 460	3	Clay; trace muscovite; gray
460 - 461	1	Clay, sandy; gray
461 - 462	1	Sand, medium; clay; well sorted; micaceous; white
462 - 468	6	Sand, medium; silty; well sorted; light gray; interbedded clay; lignite

Depth (ft)	Thickness (ft)	Description
468 - 470	2	Sand, medium; clayey; light gray
470 - 473	3	Sand, coarse; silty; well sorted; interbedded clay; micaceous; light gray
473 - 474	1	Silt, sandy; interbedded clay; lignite; light gray
474 - 483	9	Sand, coarse; silty; well sorted; interbedded clay; micaceous; lignite; light gray
483 - 486	3	Sand, coarse; well sorted; interbedded clay; micaceous; light gray
486 - 487	1	Silt, sandy; micaceous, light gray
487 - 493	6	Sand, very coarse; silty; interbedded clay; light tannish gray
493 - 397	4	Silt, sandy; micaceous; light tannish gray
497 - 500	3	Sand, medium; micaceous; lignite; interbedded clay; light gray
500 - 501	1	Sand, medium; silty; well sorted; light gray; muscovite; lignite
501 - 502	1	No recovery
502 - 503	1	Sand, medium; silty; clayey; well sorted; micaceous; lignite; light gray
503 - 504	1	Sand, medium; silty; micaceous; light gray
504 - 507	3	No recovery
507 - 512	5	Sand, coarse; silty; well sorted; micaceous; lignite; light gray
512 - 516	4	Sand, medium; silty; light gray
516 - 517	1	Silt, sandy; lignite; light gray
517 - 519	2	Sand, medium; silty; micaceous; light gray
519 - 522	3	Silt, sandy; lignite; light gray

Depth (ft)	Thickness (ft)	Description
522 - 523	1	Sand, medium; silty; micaceous; light gray
523 - 529	6	Silt, sandy; micaceous; lignite; light gray
529 - 531	2	Sand, coarse; well sorted; micaceous; light gray
531 - 532	1	No recovery
532 - 535	3	Sand, very coarse; well sorted; light gray
535 - 537	2	No recovery
537 - 538	1	Sand, coarse; silty; well sorted; lignite; light gray
538 - 542	4	No recovery
542 - 548	6	Sand, coarse; silty; well sorted; micaceous; burrowed; lignite; light tannish white
548 - 549	1	Sand, coarse; well sorted; light tannish white
549 - 550	1	Silt; micaceous; light grayish tan
550 - 552	2	Sand, medium; silty; well sorted; lignite; micaceous; light tannish white
552 - 554	2	Sand, medium; well sorted; lignite; micaceous; white
554 - 556	2	Sand, medium; silty; light tannish white
556 - 561	5	Sand, very coarse; micaceous; lignite; white to light tannish white
561 - 562	1	No recovery
562 - 564	2	Clay, silty; lignite; sulfides; light gray
564 - 565	1	Clay, silty; sandy; lignite; light gray
565 - 566	1	Sand, medium; silty; interbedded clay; micaceous; lignite; light gray
566 - 569	3	Sand, medium; well sorted; micaceous; light tannish gray

Depth (ft)	Thickness (ft)	Description
569 - 576	7	Sand, medium; silty; well sorted; micaceous; lignite; interbedded clay; gray to light gray
576 - 577	1	No recovery
577 - 585	8	Sand, coarse; silty; muscovite; lignite; light gray
585 - 587	2	No recovery
587 - 590	3	Sand, very coarse; silty; well sorted; interbedded clay; light gray
590 -592	2	No recovery
592 - 599	7	Sand, medium; silty; interbedded clay; micaceous; lignite; gray
599 - 600	1	Clay, silt; laminated; black
600 - 601	1	Silt, clayey; lignite; micaceous; black
601 - 602	1	Sand, medium; silty; laminated; lignite; grayish black
602 - 603	1	Clay, sandy; grayish black
603 - 605	2	No recovery
605 - 607	2	Clay, silty; dark gray
607 - 608	1	Silt; interbedded clay; micaceous; lignite; gray
608 - 610	2	Silt, clayey; dark gray
610 - 616	6	Clay, silty; micaceous; lignite; dark gray to black
616 - 617	1	No recovery
617 - 618	1	Clay, silty; dark gray
618 - 622	4	No recovery
622 - 623	1	Silt, clayey; micaceous; gray
623 - 627	4	No recovery

Depth (ft)	Thickness (ft)	Description
627 - 630	3	Sand, medium; silty; well sorted; lignite; light gray
630 - 631	1	Silt, sand; lignite; light gray
631 - 637	6	Sand, medium; silty; well sorted; micaceous; lignite; light gray
637 - 640	3	Sand, coarse; well sorted; light gray
640 - 641	1	Sand, coarse; silty; micaceous; lignite; light gray
641 - 642	1	No recovery
642 - 645	3	Sand, coarse; silty; well sorted; interbedded clay; micaceous; light gray
645 - 647	2	Sand, medium; silty; very poorly sorted; micaceous; trace lignite; light gray
647 - 662	15	Silt; interbedded clay; micaceous; lignite; dark gray
662 - 678	16	Silt; laminated; glauconite; lignite; micaceous; dark gray to black
678 - 682	4	Silt, clayey; fissile; micaceous; lignite; black
682 - 687	5	Clay, silty; fissile; glauconite; micaceous; lignite; black
687 - 691	4	Silt, clayey; glauconite; micaceous; fissile; black
691 - 710	19	Clay, silty; fissile; micaceous; lignite; black
710 - 712	2	Silt, clayey; sandy; micaceous; lignite; black
712 - 720	8	Silt, clayey; fissile; micaceous; black
720 - 722	2	Silt; micaceous; lignite; black
722 - 727	5	No recovery
727 - 755	28	Silt; micaceous; lignite; dark gray

Depth (ft)	Thickness (ft)	Description
755 - 759	4	Silt, sandy; interbedded clay; micaceous; lignite; dark gray
759 - 760	1	Sand, medium; silty; clayey; interbedded clay; dark gray
760 - 762	2	No recovery
762 - 771	9	Sand, medium; silt; moderately sorted; pyrite; gypsum; micaceous; lignite; gray
771 - 772	1	No recovery
772 - 781	9	Sand, medium; silty; poorly sorted; gypsum; pyrite; lignite; gray
781 - 787	6	No recovery
787 - 791	4	Sand, very coarse; silty; interbedded clay; trace sulfides; gray to light tannish gray
791 - 792	1	No recovery
792 - 806	14	Sand, medium; silty; well sorted; micaceous; lignite; sulfides; light tannish gray to gray
806 - 809	3	Sand, very coarse; well sorted; gray to light gray
809 - 818	9	Sand, medium; silty; well sorted; micaceous; light grayish tan; micaceous; lignite
818 - 821	3	Sand, medium; micaceous; lignite; light grayish tan
821 - 822	1	No recovery
822 - 823	1	Sand; well sorted; sulfides; light gray
823 - 824	1	Sand, coarse; silty; well sorted; sulfides; light gray
824 - 825	1	No recovery
825 - 828	3	Sand, medium; silty; well sorted; micaceous; light gray; lignite
828 - 830	2	No recovery

Depth (ft)	Thickness (ft)	Description
830 - 831	1	Silt, sandy; light tannish gray; micaceous; lignite
831 - 832	1	Sand, medium; silty; well sorted; light gray, micaceous; lignite
832 - 833	1	Silt, sandy; micaceous; light tannish gray
833 - 836	3	Sand, medium; silty; well sorted; lignite; micaceous; light tannish gray
836 - 837	1	No recovery
837 - 838	1	Sand, medium; silty; well sorted; lignite; micaceous; light tannish gray
838 - 840	2	Silt, sandy; moderately sorted; lignite; micaceous; light tannish gray
840 - 842	2	No recovery
842 - 848	6	Sand, medium; silty; well sorted; micaceous; lignite; light gray
848 - 849	1	Sand, medium; well sorted; micaceous; lignite; light gray
849 - 850	1	Silt, sand; well sorted; light gray
850 - 852	2	No recovery
852 - 860	8	Sand, medium; silty; well sorted; micaceous; lignite; light gray
860 - 861	1	Clay, sandy; silty; light gray
861 - 862	1	No recovery
862 - 864	2	Clay, silty; fissile; light gray
864 - 867	3	No recovery
867 - 868	1	Sand, medium; silty; well sorted; micaceous; lignite; light gray
868 - 872	4	No recovery

Depth (ft)	Thickness (ft)	Description
872 - 873	1	Sand, medium; silty; well sorted; micaceous; lignite; light gray
873 - 876	3	Clay, silty; micaceous; lignite; light gray
876 - 877	1	No recovery
877 - 880	3	Sand, medium; silty; very poorly sorted; micaceous; lignite; light gray
880 - 881	1	Sand, fine; silty; clayey; moderately sorted; laminated; light gray
881 - 882	1	Silt, sandy; clayey; moderately sorted; laminated; micaceous; light gray
882 - 890	8	Sand, medium; silty; clayey; moderately sorted; interbedded clay; micaceous; lignite; light gray to light tannish gray
890 - 897	7	Sand, medium; silty; well sorted; light tannish gray; micaceous; lignite
897 - 901	4	Clay, silty; sandy; lignite; light gray
901 - 902	1	No recovery
902 - 903	1	Clay, sandy; silty; light tannish gray
903 - 905	2	Silt, sandy; well sorted; lignite; light tannish gray
905 - 907	2	Sand, medium; silty; well sorted; lignite; light tannish gray
907 - 911	4	Sand, medium; moderately sorted; micaceous; lignite; light tannish gray
911 - 912	1	Clay, silty; sandy; fissile; micaceous; lignite; blackish gray
912 - 913	1	Sand, medium; well sorted; gray
913 - 914	1	Sand, medium; silty; well sorted; micaceous; lignite; light gray
914 - 915	1	Sand, medium; well sorted; micaceous; lignite; light gray

Depth (ft)	Thickness (ft)	Description
915 - 922	7	Sand, medium; well sorted; micaceous; lignite; gray
922 - 937	15	Sand, medium; poorly to well sorted; lignite; micaceous; gray
937 - 939	2	Sand, medium; silty; well sorted; lignite; micaceous; gray
939 - 942	3	Sand, medium; moderately sorted; micaceous; gray
942 - 946	4	Sand, medium; silty; well sorted; lignite; micaceous; gray
946 - 947	1	No recovery
947 - 949	2	Sand, very coarse; well sorted; micaceous; gray
949 - 950	1	Silt, sandy; clayey; micaceous; gray
950 - 951	1	Silt, sandy; well sorted; interbedded clay; micaceous; gray
951 - 953	2	Sand, medium; silty; moderately sorted; interbedded clay; whitish gray; micaceous
953 - 954	1	Sand, medium; clayey; moderately sorted; interbedded clay; micaceous; whitish gray
954 - 956	2	Sand, medium; poorly sorted; interbedded clay; white to gray; lignite
956 - 957	1	No recovery
957 - 960	3	Sand, coarse; well sorted; lignite; white
960 - 961	1	Sand, medium; silty; well sorted; micaceous; lignite; white
961 - 962	1	No recovery
962 - 964	2	Clay; fissile; micaceous; grayish brown
964 - 965	1	Sand, coarse; silty; well sorted; lignite; grayish brown
965 - 967	2	No recovery
967 - 969	2	Sand, coarse; well sorted; lignite; white
969 - 970	1	Sand, medium; silty; well sorted; micaceous; whitish gray

Depth (ft)	Thickness (ft)	Description
970 - 972	2	No recovery
972 - 974	2	Sand, coarse; well sorted; lignite; micaceous; whitish gray
974 - 975	1	Sand, medium; silty; well sorted; interbedded clay; micaceous; gray
975 - 977	2	No recovery
977 - 982	5	Silt, sandy; well sorted; lignite; micaceous; white
982 - 983	1	Sand, very coarse; well sorted; lignite; white
983 - 987	4	Sand, fine; silty; well sorted; trace lignite; micaceous; whitish gray to whitish tan
987 - 988	1	Silt, sandy; well sorted; whitish tan
988 - 989	1	Sadn, coarse; micaceous; trace lignite; white
989 - 990	1	Sand, medium; silty; very poorly sorted; micaceous; grayish brown
990 - 991	1	Clay; sulfides; lignite; gray
991 - 992	1	Sand, coarse; well sorted; sulfides; lignite; gray
992 - 997	5	No recovery
997 - 998	1	Sand, coarse; well sorted; sulfides; trace lignite; whitish gray
998 - 1000	2	Clay; gray
1000 - 1001	1	Sand, coarse; silty; micaceous; gray
1001 - 1002	1	Clay, sandy; well sorted; trace lignite; gray
1002 - 1004	2	Sand, coarse; clayey; well sorted; white; micaceous
1004 - 1007	3	Sand, medium; silty; well sorted; micaceous; whitish gray

Depth (ft)	Thickness (ft)	Description
1007 - 1008	1	Sand, coarse; silty;, clayey; well sorted; lignite; micaceous; whitish gray
1008 - 1010	2	Sand, medium; silty; well sorted; lignite; muscovite; whitish gray
1010 - 1012	2	No recovery
1012 - 1018	6	Sand, medium; silty; moderately sorted; sulfides; whitish gray
1018 - 1020	2	Sand, medium; silty; clayey; well sorted; sulfides; whitish gray
1020 - 1021	1	Sand, medium; silty; well sorted; micaceous; whitish gray
1021 - 1025	4	Sand, medium; clayey; well sorted; interbedded; clay; micaceous
1025 - 1028	3	Sand, fine; silty; well sorted; lignite; micaceous; whitish gray
1028 - 1029	1	Silt, lignite; micaceous; whitish gray
1029 - 1030	1	Clay; lignite; micaceous; brownish gray
1030 - 1031	1	Silt; micaceous; brownish gray
1031 - 1032	1	Clay, sandy; interbedded clay; lignite; micaceous; brown
1032 - 1033	1	Clay, silty; micaceous; reddish brown
1033 - 1034	1	Silt, clayey; well sorted; lignite; micaceous; gray
1034 - 1037	3	No recovery
1037 - 1040	3	Clay, silty; micaceous; gray to reddish brown
1040 - 1042	2	No recovery
1042 - 1045	3	Clay; fissile; lignite; reddish brownish tan to reddish tan

Depth (ft)	Thickness (ft)	Description
1045 - 1047	2	Clay, silty; lignite; micaceous; light gray
1047 - 1049	2	Silt, clayey; micaceous; light gray
1049 - 1057	8	No recovery
1057 - 1060	3	Sand, medium; moderately sorted; gypsum; trace heavy minerals; lignite; gray
1060 - 1061	1	Clay; lignite; trace muscovite; light gray
1061 - 1062	1	No recovery
1062 - 1064	2	Clay; lignite; micaceous; light gray
1064 - 1067	3	No recovery
1067 - 1070	3	Silt, sandy; clayey; lignite; micaceous; laminated; light gray
1070 - 1072	2	No recovery
1072 - 1073	1	Clay; reddish gray
1073 - 1090	17	Sand, medium; silty; clayey; well to poorly sorted; laminated; glauconite; gypsum; muscovite; lignite; trace heavy minerals; light green to light greenish gray
1090 - 1091	1	Sand, coarse; silty; well sorted; gypsum; glauconite; lignite; muscovite; light greenish gray
1091 - 1094	3	Clay, silty; sandy; light greenish gray to brownish gray; interbedded clay; glauconite; lignite
1094 - 1097	3	Clay, silty; interbedded clay; glauconite; lignite; micaceous; brownish gray to dark gray
1097 - 1100	3	Clay, silty; sandy; gypsum; micaceous; lignite; grayish brown to grayish red
1101 - 1102	1	Clay; gypsum; lignite; reddish gray
1102 - 1108	6	Clay, sandy; mottled; gypsum; micaceous; lignite; greenish gray to green; glauconite

Depth (ft)	Thickness (ft)	Description
1108 - 1111	3	Sand, medium; clayey; moderately sorted; glauconite; micaceous; greenish red
1111 - 1117	6	Clay, sandy; well sorted; glauconite; gypsum; lignite; micaceous; green to grayish brown
1117 - 1118	1	Clay, silty; grayish brown
1118 - 1120	2	Clay, silty; sandy; well sorted; glauconite; grayish brownish red to greenish white
1120 - 1122	2	Silt, sandy; moderately sorted; gypsum; whitish gray
1122 - 1125	3	Clay, sand; poorly sorted; glauconite; gypsum; greenish yellow to green
1125 - 1131	6	Sand, medium; clayey; very poorly sorted; gypsum; glauconite; lignite; greenish yellow to green
1131 - 1132	1	No recovery
1132 - 1137	5	Sand, medium; clayey; gypsum; glauconite; micaceous; lignite; green to greenish gray
1137 - 1138	1	Sand, fine; well sorted; gypsum; glauconite; micaceous; grayish green
1138 - 1142	4	Sand, fine; silty, clayey; well sorted; mottled; glauconite; grayish green
1142 - 1149	7	Sand, fine; silty; well sorted; gypsum; micaceous; lignite; gray
1149 - 1150	1	Clay; micaceous; lignite; grayish tan
1150 - 1152	2	Silt; micaceous; grayish tan
1152 - 1154	2	Clay; micaceous; lignite; light greenish gray
1154 - 1156	2	Silt, sandy; very poorly sorted; light green
1156 - 1157	1	Sand, fine; silty; very poorly sorted; micaceous; light green
1157 - 1160	3	Clay, sandy; glauconite; gypsum; greenish gray to green

Depth (ft)	Thickness (ft)	Description
1160 - 1161	1	Clay; gray
1161 - 1162	1	No recovery
1162 - 1166	4	Clay; gray
1166 - 1168	2	Silt; micaceous; gray
1168 - 1170	2	Sand, medium; silty; clayey; well sorted; interbedded clay; glauconite; micaceous; grayish brown
1170 - 1172	2	Silt; interbedded clay; glauconite; micaceous; grayish brown
1172 - 1174	2	Clay; gray
1174 - 1175	1	Silt, sandy; well sorted; lignite; micaceous; grayish brown
1175 - 1177	2	Clay, silty; gray
1177 - 1182	5	Silt; lignite; trace muscovite; gray
1182 - 1186	4	Silt, clayey; glauconite; micaceous; green to greenish yellowish brown
1186 - 1187	1	No recovery
1187 - 1188	1	Silt, sandy; very poorly sorted; interbedded clay; glauconite; lignite; grayish green
1188 - 1190	2	Silt, clayey; interbedded clay; grayish green; glauconite
1190 - 1192	2	Silt; glauconite; grayish green
1192 - 1194	2	Silt, sandy; very poorly sorted; glauconite; gray to dark gray
1194 - 1195	1	Clay, sandy; poorly sorted; glauconite; micaceous; greenish gray
1195 - 1196	1	Silt; interbedded clay; glauconite; lignite; micaceous; green

Depth (ft)	Thickness (ft)	Description
1196 - 1197	1	Clay, silty; glauconite; green
1197 - 1199	2	Silt, sandy; very poorly sorted; interbedded clay; glauconite; green to whitish yellow
1199 - 1201	2	Clay, silty; micaceous; lignite; grayish reddish yellow to grayish red
1201 - 1202	1	Clay, silty; sandy; micaceous; lignite; grayish red
1202 - 1204	2	No recovery

APPENDIX H

LITHOLOGIC LOG FOR P-23TA

LEGEND

F - fluorescence

B - blue

Y - yellow

O - orange

R - red

G - green

( ) - interval that displays fluorescence, in feet

NOTE: The number of grains which fluoresced in a 3" by 3" tray were counted and catagorized as follows:

1) less than three grains

2) three to ten grains

3) more than ten grains

EXAMPLE: F-0-3 (32-37)
fluorescence; orange; greater than ten grains; from thirty two to thirty seven feet.

LITHOLOGIC LOG, P23 TA

Depth (ft)	Thickness (ft)	Description
0 - 2	2	Sand, medium; silty; well sorted; tannish gray; trace sulfides; F-8-3
2 - 4	2	Sand, medium; silty; moderately sorted; orangish brown; trace sulfides; F-8-3
4 - 5	1	Sand, medium; silty, clayey; well sorted; interbedded clay; trace sulfides; brownish grayish red
5 - 6	1	Sand, fine; clayey; well sorted; interbedded clay; brownish grayish red; F-Y-1
6 - 7	1	Sand, fine; silty; moderately sorted; brownish red
7 - 8	1	Sand, fine; clayey; moderately sorted; interbedded clay; brownish grayish red
8 - 9	1	Sand, medium; silty; clayey; well sorted, orangish brownish red
9 - 10	1	Sand, medium; clayey; well sorted; brownish reddish orange
10 - 12	2	Sand, medium; clayey; well sorted; brownish dark red
12 - 14	2	Sand, medium; silty; clayey; well sorted; brownish dark red; F-8-1 (12-18)
14 - 22	8	Sand, medium; silty; clayey; well sorted; dark red
22 - 23	1	Clay, silty; brownish dark red; F-0-1
23 - 24	1	Sand, fine; silty; clayey; well sorted; dark red
24 - 28	4	Sand, fine; clayey; well sorted; dark red
28 - 29	1	Sand, fine; silty; well sorted; yellowish tan
29 - 30	1	Sand, fine; silty; clayey; moderately sorted; tannish yellowish, dark red
30 - 31	1	Sand, fine; silty; well sorted; yellowish dark red

Depth (ft)	Thickness (ft)	Description
31 - 32	1	Sand, fine; silty; well sorted; tannish dark red
32 - 33	1	Sand, fine; silty; well sorted; orangish red
33 - 35	2	Sand, fine; silty; well sorted; tannish yellowish red; F-B-1 (34-37)
35 - 36	1	Sand, fine; silty; well sorted; tannish brown
36 - 37	1	Clay, sandy; mottled; tannish grayish light red
37 - 38	1	Clay; mottled; trace muscovite; tannish gray
38 - 39	1	Clay; mottled; trace muscovite; tannish grayish brown
39 - 40	1	Clay, sandy; mottled tannish grayish brown
40 - 41	1	Sand, coarse; silty; trace muscovite; blackish tannish brown
41 - 42	1	Sand, coarse; silty; well sorted; tannish light brown
42 - 43	1	Sand, coarse; silty; well sorted; interbedded clay; tannish brownish light red
43 - 44	1	Sand, coarse; silty; well sorted; interbedded clay; mottled; tannish black
44 - 45	1	Clay, silty; sandy; interbedded clay; light tannish brown
45 - 46	1	Clay, silty; sandy; interbedded clay; light tannish brown
46 - 47	1	No recovery
47 - 49	2	Sand, fine; silty; well sorted; trace muscovite; orangish brown
49 - 50	1	Sand, fine; silty; clayey; well sorted; trace heavy minerals; tannish brown
50 - 51	1	Clay, silty; sandy; trace muscovite; tannish brownish orange

Depth (ft)	Thickness (ft)	Description
51 - 52	1	No recovery
52 - 53	1	Clay; trace muscovite; lignite; tannish brown
53 - 56	3	Clay, sandy; trace muscovite; lignite; tannish brown; F-B-1
56 - 57	1	No recovery
57 - 58	1	Clay, sandy; tannish brown; F-Y-1
58 - 59	1	Sand, medium; clayey; poorly sorted; whitish brownish tan; F-Y-1
59 - 62	3	No recovery
62 - 63	1	Sand, fine; silty; moderately sorted; lignite; trace muscovite; whitish tan
63 - 64	1	Sand, medium; silty; moderately sorted; lignite; tannish brownish orange
64 - 65	1	Clay, sandy; trace lignite; tannish orange
65 - 66	1	Clay; trace lignite; tan; F-B-1
66 - 67	1	Clay, sandy; trace lignite; whitish tannish green
67 - 68	1	Sand, fine; silty; poorly sorted; trace lignite; tannish yellowish gray
68 - 69	1	Sand, medium; silty; poorly sorted; trace lignite; tannish yellow
69 - 70	1	Sand, medium; silty; moderately sorted; trace heavy minerals; trace lignite; whitish grayish yellow
70 - 73	3	Sand, fine; silty; well sorted; interbedded clay; trace muscovite; tannish brown; F-B-1
73 - 74	1	Sand, medium; silty; moderately sorted; trace lignite; tannish brown; F-Y-1
74 - 76	2	Sand, medium; silty; well sorted; interbedded clay; blackish tan
76 - 78	2	Sand, medium; silty; well sorted; blackish gray

Depth (ft)	Thickness (ft)	Description
78 - 79	1	Sand, coarse; silty; blackish grayish brown
79 - 80	1	Sand, medium; clayey; moderately sorted; blackish grayish orange; F-Y-1
80 - 81	1	Clay, sandy; mottled, blackish brownish tan
81 - 82	1	Sand, fine; clayey; moderately sorted; mottled
82 - 84	2	Sand, medium; clayey; poorly sorted; trace lignite; tannish brownish yellow; F-B-2
84 - 86	2	Limestone; trace lignite; tannish brown; F-O-1
86 - 88	2	No recovery
88 - 89	1	Limestone; trace lignite; whitish orangish tan
89 - 94	5	Limestone, sandy; trace fossils; trace lignite; trace muscovite; whitish tannish brown; F-O-1
94 - 95	1	No recovery
95 - 117	22	Clay, calcareous; green; F-B-2 (95-123)
117 - 118	1	No recovery
118 - 123	5	Clay, slightly calcareous; fissile; dark green
123 - 124	1	Clay, medium; sandy; mottled; dark greenish black
124 - 127	3	Sand, medium; silty; well sorted; black; F-O-2
127 - 133	6	Sand, medium; silty; well sorted; trace lignite; blackish gray; F-O-1
133 - 135	2	Sand, coarse; well sorted; blackish gray; F-O-1
135 - 136	1	Sand, coarse; silty; well sorted; gray
136 - 140	4	Sand, coarse; well sorted; gray
140 - 149	9	Silt; trace muscovite; black
149 - 153	4	Silt, sandy; trace muscovite; trace lignite; black

Depth (ft)	Thickness (ft)	Description
153 - 154	1	Sand, medium; silty; poorly sorted; trace muscovite; trace lignite; black
154 - 155	1	Sand, medium; silty; poorly sorted; interbedded clay; trace lignite; blackish gray
155 - 157	2	Sand, medium; poorly sorted; blackish gray
157 - 160	3	Sand, medium; poorly sorted; gray
160 - 162	2	No recovery
162 - 169	7	Sand, medium; poorly sorted; trace sulfides; trace heavy minerals; gray
169 - 170	1	Sand, medium; poorly sorted; sulfides; lignite: gray; F-Y-1
170 - 172	2	Sand, medium; silty; well sorted; trace lignite; gray; F-B-3
172 - 173	1	Sand, medium; well sorted; micaceous; trace lignite; gray; F-B-3
173 - 175	2	Sand, medium; silty; well sorted; trace muscovite; trace lignite; gray
175 - 176	1	Sand, medium; silty; moderately sorted; interbedded clay; trace muscovite; trace lignite; dark gray
176 - 178	2	Sand, medium; poorly sorted; trace lignite; dark gray
178 - 179	1	Clay, sandy; burrowed; sulfides; trace muscovite; dark grayish black
179 - 180	1	Sand, medium; clayey; very poorly sorted; sulfides; trace muscovite; trace lignite; light tannish gray
180 - 182	2	Sand, coarse; clayey; moderately sorted; trace muscovite; trace lignite; light gray
182 - 184	2	Sand, medium; clayey; well sorted; micaceous; trace lignite; whitish gray
184 - 185	1	Sand, medium; clayey; very poorly sorted; micaceous; trace pyrite, kaolin and lignite

Depth (ft)	Thickness (ft)	Description
185 - 201	16	Clay; kaolin; trace sulfides and lignite; micaceous; white to whitish light brown; F-B-1
201 - 202	1	Clay, silty; micaceous; trace lignite; white
202 - 203	1	Sand, medium; clayey; moderately sorted; micaceous; white; F-0-2 (204-214)
203 - 204	1	Clay, silty; sandy; micaceous; white
204 - 206	2	Sand, medium; silty; poorly sorted; micaceous; white
206 - 207	1	Silt, sandy; micaceous; trace lignite; white
207 - 208	1	Silt, clayey; micaceous; trace lignite; white
208 - 209	1	Sand, coarse; silty; poorly sorted; sulfides; micaceous; trace lignite; white
209 - 211	2	Sand, coarse; well sorted; sulfides; micaceous; trace lignite; white
211 - 212	1	Sand, medium; silty; moderately sorted; micaceous; trace lignite; white
212 - 213	1	Sand, very coarse; well sorted; micaceous; trace lignite; white
213 - 214	1	Sand, fine; clayey; moderately sorted; interbedded clay; micaceous; lignite; gray
214 - 216	2	Sand, coarse; very poorly sorted; lignite; micaceous; gray
216 - 217	1	No recovery
217 - 220	3	Sand, medium; poorly sorted; micaceous; trace lignite; gray
220 - 221	1	Sand, medium; silty; well sorted; micaceous; lignite; gray
221 - 222	1	No recovery
222 - 223	1	Sand, medium; sulfides; micaceous; lignite; gray
223 - 224	1	Clay, sandy; sulfides; micaceous; lignite

Depth (ft)	Thickness (ft)	Description
224 - 237	13	Clay; sulfides; gray
237 - 238	1	Clay, sandy; sulfides; lignite; gray
238 - 241	3	Silt, sandy; sulfides; micaceous; lignite; dark gray
241 - 247	6	Silt, sandy; sulfides; micaceous; lignite; dark gray
247 - 248	1	Silt, sandy; micaceous; lignite; gray
248 - 251	3	Silt; micaceous; lignite; gray
251 - 254	3	Silt, clayey; micaceous; dark gray
254 - 255	1	Clay, silty; micaceous; dark gray
255 - 256	1	Clay, silty; sandy; micaceous; dark gray
256 - 259	3	Silt, clayey; micaceous; dark gray
259 - 263	4	Silt, sandy; trace muscovite; gray to dark gray
263 - 267	4	No recovery
267 - 268	1	Silt, sandy; trace muscovite; medium; gray
268 - 270	2	No recovery
270 - 271	1	Silt, sandy; trace muscovite; dark gray
271 - 272	1	No recovery
272 - 277	5	Silt, sandy; well sorted; trace muscovite; dark gray
277 - 280	3	Silt, sandy; micaceous; gray
280 - 288	8	Silt; micaceous; interbedded clay; trace lignite; gray
288 - 291	3	Clay, silty; trace muscovite; medium to dark gray
291 - 296	5	Sand, medium; silty; poorly sorted; interbedded clay; trace muscovite; light gray
296 - 297	1	No recovery
297 - 300	3	Sand, medium; silty; moderately sorted; trace muscovite; light gray

Depth (ft)	Thickness (ft)	Description
300 - 307	7	Clay; trace muscovite; light gray to whitish gray
307 - 310	3	Clay, sandy; trace muscovite; whitish gray
310 - 312	2	Sand, medium; silty; clayey; trace msucovite; whitish gray
312 - 316	4	Clay, sandy; trace muscovite; whitish gray
316 - 322	6	Clay; yellowish grayish brown
322 - 325	3	Clay; gray
325 - 328	3	Sand, medium; clayey; silty; micaceous, trace lignite; whitish gray
328 - 329	1	Sand, fine; silty; micaceous; whitish gray
329 - 330	1	Silt, sandy; micaceous; whitish gray
330 - 332	2	Sand, medium; silty; poorly sorted; micaceous; whitish gray
332 - 334	2	Silty, sandy; micaceous; whitish gray
334 - 336	2	Sand, medium; silty; micaceous; whitish gray
336 - 337	1	Sand, medium; silty, clayey; micaceous; whitish gray
337 - 340	3	Sand, medium; silty; micaceous; whitish gray
340 - 341	1	Clay, silty; sandy; micaceous; whitish gray
341 - 343	2	Sand, medium; silty; micaceous; whitish gray
343 - 347	4	Sand, medium; poorly sorted; interbedded clay; burrowed; trace muscovite; whitish gray
347 - 356	9	Sand, medium; silty; moderately sorted; interbedded clay; trace muscovite; whitish gray
356 - 357	1	Silt, sandy; micaceous; light gray
357 - 359	2	Sand, medium; silty; micaceous; whitish gray
359 - 361	2	Silt, sandy; trace muscovite and kaolin; whitish gray

Depth (ft)	Thickness (ft)	Description
361 - 379	18	Clay; trace muscovite; light gray to tannish yellowish gray
379 - 381	2	Clay, sandy; mottled; gray
381 - 382	1	Clay; dark grayish brown
382 - 396	14	Sand, medium; silty; well sorted; micaceous; trace kaolin and lignite; grayish white
396 - 397	1	Clay, sandy; mottled; micaceous; trace kaolin and lignite; grayish white
397 - 399	2	Sand, medium; clayey; moderately sorted; micaceous; trace kaolin and lignite; grayish white
399 - 400	1	Sand, medium; moderately sorted; micaceous; trace kaolin and lignite; grayish white
400 - 401	1	Sand, fine; silty; moderately sorted; interbedded clay; micaceous; lignite; trace kaolin
401 - 410	9	Clay; micaceous; fissile; trace lignite; dark grayish yellow to gray
410 - 411	1	Clay, sandy; mottled; micaceous; trace lignite; grayish white
411 - 420	9	Sand, coarse; well sorted; micaceous; trace lignite and kaolin; white to whitish tan
420 - 422	2	No recovery
422 - 425	3	Sand, coarse; well sorted; trace muscovite; grayish to tannish white
425 - 429	4	Sand, coarse; silty; micaceous; trace kaolin and lignite; grayish white
429 - 430	1	Sand, medium; well sorted; micaceous; grayish white
430 - 431	1	Sand, medium; silty; poorly sorted; micaceous; white
431 - 432	1	Silt, sandy; micaceous; trace lignite; and kaolin; grayish white
432 - 433	1	Sand, medium; silty; well sorted; micaceous

Depth (ft)	Thickness (ft)	Description
433 - 434	1	Silt, sandy; micaceous; trace kaolin and lignite
434 - 435	1	Sand, medium; silty; well sorted; micaceous; trace kaolin and lignite; grayish white
435 - 436	1	Sand, medium; well sorted; grayish white
436 - 442	6	Sand, medium; silty; well sorted; micaceous; trace lignite and kaolin ; grayish white
442 - 443	1	Silt; micaceous; grayish white
443 - 444	1	Sand, fine; silty; micaceous; trace lignite; and kaolin; grayish white
444 - 445	1	Silt; micaceous; grayish white
445 - 453	8	Sand, fine; silty; micaceous; poorly sorted; grayish white
453 - 454	1	Sand, fine; poorly sorted; micaceous; trace lignite and kaolin; grayish white
454 - 455	1	Sand, medium; silty; well sorted; micaceous; grayish white
455 - 457	2	Sand, medium; well sorted; micaceous; grayish white
457 - 467	10	Sand, coarse; silty; well sorted; interbedded clay; micaceous; lignite; grayish white
467 - 473	6	Sand, medium; well sorted; micaceous; trace kaolin and lignite; grayish white
473 - 478	5	Sand, medium; silty; well sorted; micaceous; whitish gray
478 - 482	4	Sand, fine; silty; moderately sorted; micaceous; lignite; dark gray
482 - 486	4	Silt, sandy; micaceous; lignite; dark gray
486 - 488	2	Sand, medium; silty; well sorted; micaceous; lignite; light gray
488 - 490	2	Silt, sandy; micaceous; lignite; whitish gray
490 - 493	3	Sand, medium; silty; well sorted; micaceous; lignite; whitish gray
493 - 496	3	Silt, sandy; micaceous; dark gray

Depth (ft)	Thickness (ft)	Description
496 - 498	2	Sand, medium; silty; well sorted; micaceous; trace lignite; whitish gray
498 - 501	3	Sand, coarse; well sorted; micaceous; lignite; whitish gray
501 - 503	2	Sand, coarse; silty; micaceous; dark gray
503 - 506	3	Sand, medium; moderately sorted; trace muscovite and lignite; dark gray
506 - 507	1	Sand, medium; silty; micaceous; dark gray
507 - 510	3	Sand, coarse; well sorted; micaceous; dark gray
510 - 511	1	Sand, coarse; silty; trace muscovite and lignite; dark gray
511 - 513	2	Sand, coarse; well sorted; micaceous; lignite; dark gray
513 - 514	1	Sand, coarse; silty; micaceous; lignite; light gray
514 - 517	3	Sand, coarse; well sorted; micaceous; lignite;dark gray
517 - 520	3	Silt; trace lignite; micaceous; dark gray
520 - 527	7	Silt, sandy; micaceous; trace lignite; dark gray
527 - 528	1	Sand, fine; silty; well sorted; micaceous; dark gray
528 - 532	4	Silt, sandy; trace muscovite and lignite; dark gray
532 - 536	4	Sand, medium; silty; micaceous; dark gray
536 - 543	7	Silt, sandy; well sorted; dark gray
543 - 550	7	Sand, coarse; silty; well sorted; whitish gray
550 - 551	1	Sand, coarse; well sorted; whitish gray
551 - 554	3	Sand, medium; silty; well sorted; whitish gray
554 - 555	1	Sand, coarse; well sorted; whitish gray
555 - 556	1	Silt, clayey; muscovite; lignite; dark gray

Depth (ft)	Thickness (ft)	Description
556 - 557	1	No recovery
557 - 558	1	Clay, silty; micaceous; lignite; dark gray
558 - 559	1	Silt, clayey; lignite; dark gray
559 - 562	3	Silt, sandy; micaceous; lignite; kaolin; gray
562 - 567	5	Sand, fine; silty; well sorted; micaceous; light gray
567 - 571	4	Silt, sandy; micaceous; lignite; dark gray
571 - 572	1	Silt; micaceous; lignite; dark gray
572 - 576	4	Silt, clayey; fissile; micaceous; dark gray
576 - 577	1	Silt, clayey; sandy; micaceous; lignite; dark gray
577 - 579	2	Sand, coarse; silty, clayey; well sorted; trace muscovite and lignite; dark gray
579 - 581	2	Sand, coarse; trace muscovite; light gray
581 - 582	1	No recovery
582 - 584	2	Sand, coarse; well sorted; trace muscovite; light gray
584 - 585	1	Sand, coarse; silty; well sorted; light gray
585 - 587	2	No recovery
587 - 596	9	Sand, coarse; well sorted; trace muscovite and lignite; light gray to gray
596 - 597	1	No recovery
597 - 600	3	Sand, coarse; well sorted; trace lignite and muscovite; light gray
600 - 602	2	No recovery
602 - 611	9	Sand, coarse; well sorted; lignite; trace muscovite; light gray to light grayish black

Depth (ft)	Thickness (ft)	Description
611 - 612	1	No recovery
612 - 613	1	Sand, coarse; lignite; trace muscovite; light grayish black
613 - 614	1	Sand, coarse; clayey; well sorted; trace muscovite; dark gray
614 - 615	1	No recovery
615 - 618	3	Sand, coarse; silty; poorly sorted; micaceous; trace lignite; gray
618 - 619	1	Sand, medium; micaceous; trace lignite; moderately sorted; gray
619 - 620	1	Clay; fissile; micaceous; black
620 - 636	16	Clay, silty; fissile; micaceous; trace lignite; grayish black
636 - 637	1	Silt; micaceous; trace lignite; gray
637 - 639	2	Sand, medium; well sorted; micaceous; trace lignite; gray
639 - 640	1	Silt, sandy; micaceous; trace lignite; gray
640 - 641	1	Silt, micaceous; trace lignite; gray
641 - 642	1	No recovery
642 - 649	7	Silt; well sorted; micaceous; trace lignite; gray to dark gray
649 - 650	1	Sand, coarse; clayey; well sorted; interbedded clay; trace muscovite and lignite; dark gray
650 - 653	3	Clay; fissile; trace muscovite; gray
653 - 654	1	Silt; micaceous; gray
654 - 656	2	Sand, fine; silty; well sorted; trace lignite and sulfides; micaceous; gray
656 - 657	1	Sand, medium; micaceous; sulfides; gray

Depth (ft)	Thickness (ft)	Description
657 - 658	1	Sand, fine; silty; poorly sorted; sulfides; micaceous; trace lignite; gray
658 - 660	2	Silt; micaceous; gray to dark gray
660 - 662	2	No recovery
662 - 663	1	Sand, medium; moderately sorted; micaceous; gray
663 - 665	2	Sand, medium; clayey; very poorly sorted
665 - 678	13	Clay; gray to grayish dark reddish orange
678 - 682	4	No recovery
682 - 687	5	Clay; grayish dark reddish yellow
687 - 688	1	Sand, medium; silty; clayey; well sorted; micaceous; trace kaolin and lignite; light gray
688 - 689	1	Silt; trace muscovite, kaolin and lignite; light gray
689 - 691	2	Sand, medium; silty; clayey; well sorted; micaceous; trace kaolin and lignite; light gray
691 - 698	7	Sand, coarse; silty; well sorted; micaceous; trace kaolin and lignite; light gray
698 - 700	2	Sand, coarse; well sorted; micaceous; light gray
700 - 701	1	Sand, medium; clayey; lignite; grayish white
701 - 702	1	Clay, sandy; micaceous; dark grayish brown
702 - 705	3	Silt, clayey; gray
705 - 707	2	No recovery
707 - 708	1	Sand, medium; clayey; well sorted; brownish gray
708 - 711	3	Sand, medium; silty; well sorted; brownish gray
711 - 712	1	Silt, sandy; clayey; trace lignite and muscovite; brown
712 - 713	1	Sand, medium; silty; clayey; moderately sorted; brownish gray

Depth (ft)	Thickness (ft)	Description
713 - 714	1	Silt, clayey; fissile; grayish brown
714 - 717	3	No recovery
717 - 719	2	Sand, medium; silty; well sorted; trace muscovite; grayish brown
719 - 722	3	No recovery
722 - 725	3	Clay; silty; sandy; light greenish gray
725 - 730	5	Sand, medium; silty; poorly sorted; whitish gray
730 - 731	1	Silt, sandy; moderately sorted; kaolin; whitish gray
731 - 732	1	No recovery
732 - 736	4	Sand, medium; silty; well sorted; trace muscovite, kaolin and lignite; whitish gray
736 - 738	2	Silt, clayey; fissile; gray
738 - 739	1	Silty, clayey; sandy; whitish gray
739 - 740	1	Clay, silty; whitish gray
740 - 741	1	Clay; whitish gray
741 - 742	1	Clay, silty; sandy; trace muscovite and lignite; whitish gray
742 - 744	2	Clay, silty; whitish gray
744 - 746	2	Silt, sandy; trace kaolin, muscovite and lignite; whitish gray
746 - 748	2	Sand, fine; silty; well sorted; gray
748 - 751	3	Sand, medium; silty, clayey; poorly sorted; micaceous; dark gray
751 - 752	1	No recovery
752 - 759	7	Sand, medium; silty; poorly sorted; grayish white

Depth (ft)	Thickness (ft)	Description
759 - 760	1	Silt, sandy; grayish white
760 - 764	4	Sand, medium; silty; grayish white
764 - 767	3	No recovery
767 - 769	2	Sand, medium; silty; grayish white
769 - 772	3	No recovery
772 - 774	2	Sand, coarse; well sorted; trace muscovite and kaolin; gray
774 - 777	3	No recovery
777 - 778	1	Sand, medium; very poorly sorted; gray
778 - 780	2	Sand, medium; silty; gray
780 - 782	2	No recovery
782 - 783	1	Clay, sandy; lignite; dark gray
783 - 784	1	Clay, dark gray
784 - 787	3	No recovery
787 - 789	2	Sand, medium; trace lignite; gray
789 - 790	1	Sand, medium; silty; gray
790 - 792	2	No recovery
792 - 793	1	Sand, medium; whitish gray
793 - 795	2	No recovery
795 - 797	2	Sand, medium; silty; poorly sorted; trace muscovite and lignite, whitish gray
797 - 798	1	No recovery
798 - 801	3	Sand; trace muscovite; gray
801 - 802	1	Sand, medium; silty; gray
802 - 804	2	Sand, medium; poorly sorted; trace kaolin; gray
804 - 805	1	Sand, medium; silty, clayey; lignite, whitish gray

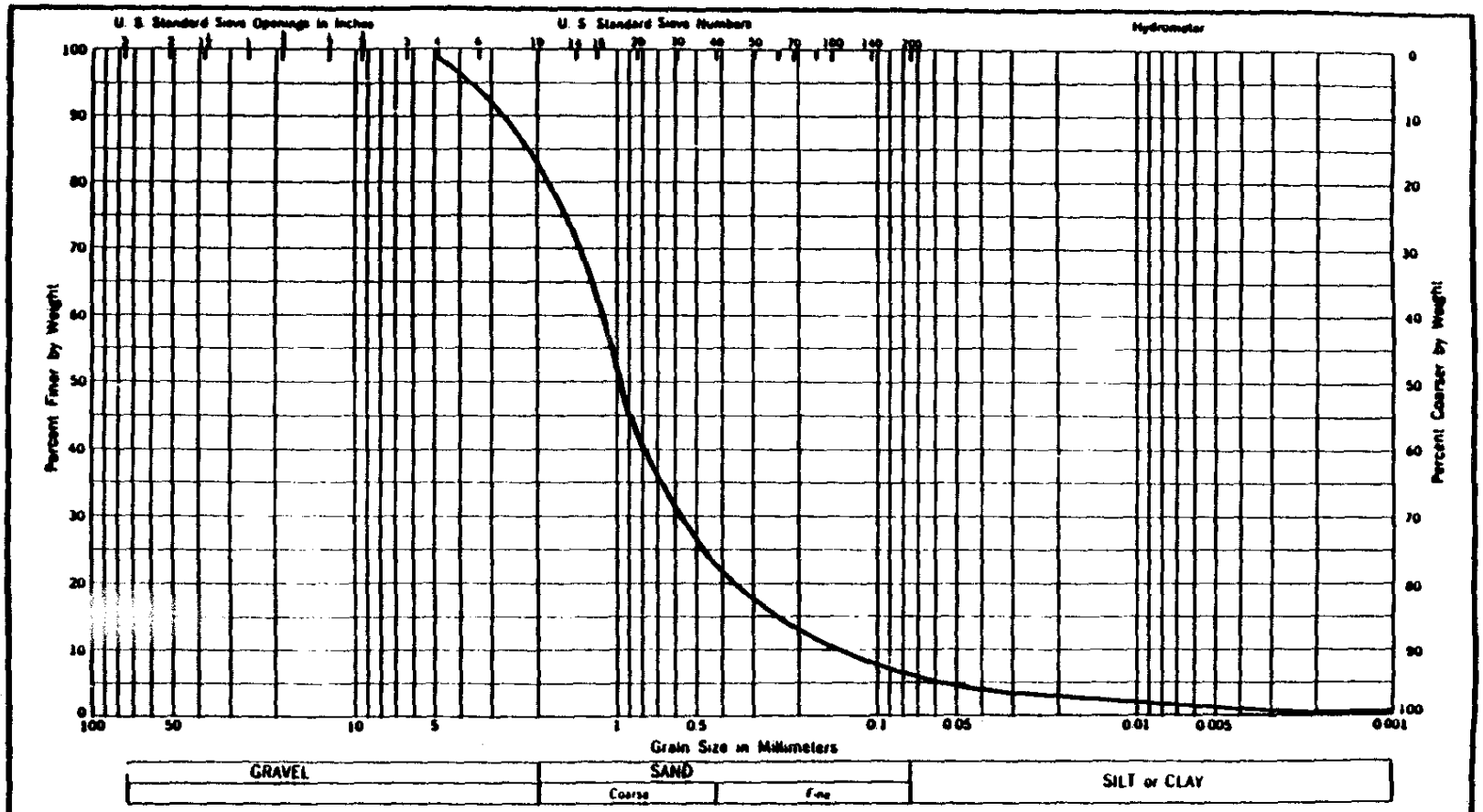
Depth (ft)	Thickness (ft)	Description
805 - 807	2	Sand, medium; very poorly sorted; grayish white
807 - 808	1	Sand, medium; silty; lignite; trace muscovite; grayish white
808 - 811	3	Sand, coarse; micaceous; trace kaolin and lignite; grayish white
811 - 812	1	No recovery
812 - 816	4	Sand, medium; poorly sorted; micaceous; gray
816 - 817	1	Sand, medium; clayey; trace muscovite, kaolin and lignite; grayish white
817 - 819	2	Sand, medium; lignite; grayish white
819 - 821	2	Sand, medium; silty; micaceous; grayish white
821 - 822	1	No recovery
822 - 826	4	Sand, medium; silty; micaceous; grayish white
326 - 832	6	Sand, medium; grayish white
832 - 838	6	Sand, medium; clayey; poorly sorted; interbedded clay; burrowed; gray
838 - 840	2	Sand, medium; moderately sorted; interbedded clay; gray
840 - 841	1	Sand, medium; silty; micaceous; grayish white
841 - 842	1	No recovery
842 - 848	6	Sand, very coarse; well sorted; interbedded pebbles; grayish white
848 - 852	4	Sand, very coarse; clayey; grayish white
852 - 855	3	Sand, medium; silty; micaceous; grayish white
855 - 858	3	Sand, very coarse; poorly sorted; lignite; gray to grayish black
858 - 862	4	Sand, medium; silty; clayey; very poorly sorted; gray
862 - 866	4	Sand, medium; silty; gray
866 - 870	4	Clay; grayish tan

Depth (ft)	Thickness (ft)	Description
870 - 872	2	No recovery
872 - 873	1	Clay; grayish yellowish red
873 - 880	7	Clay, sandy; gray
880 - 882	2	Sand, medium; silty
882 - 889	7	Sand, medium; clayey; well sorted; gray
889 - 890	1	Clay, silty; sandy; grayish reddish yellow
890 - 891	1	Clay; grayish brownish red; laminated
891 - 892	1	No recovery
892 - 894	2	Clay; grayish brownish red
894 - 895	1	Sand, coarse; clayey; well sorted; interbedded clay; grayish brownish red
895 - 897	2	No recovery
897 - 898	1	Sand, coarse; clayey; interbedded clay; grayish brownish yellow
898 - 902	4	Clay; brownish grayish purple
902 - 905	3	Clay, sandy; brownish grayish red
905 - 912	7	Sand, medium; clayey; poorly sorted; light greenish red; gypsum
912 - 929	17	Sand, medium; silty; micaceous; gypsum; interbedded pebbles; brown to greenish gray
929 - 931	2	Clay, silty; micaceous; dark gray
931 - 932	1	No recovery
932 - 937	5	Silt, clayey; fissile; micaceous; gray
937 - 942	5	Silt, sandy; gray
942 - 944	2	Sand, fine; clayey; well sorted; tannish gray
944 - 947	3	Sand, fine; silty; poorly sorted; interbedded pebbles; gray

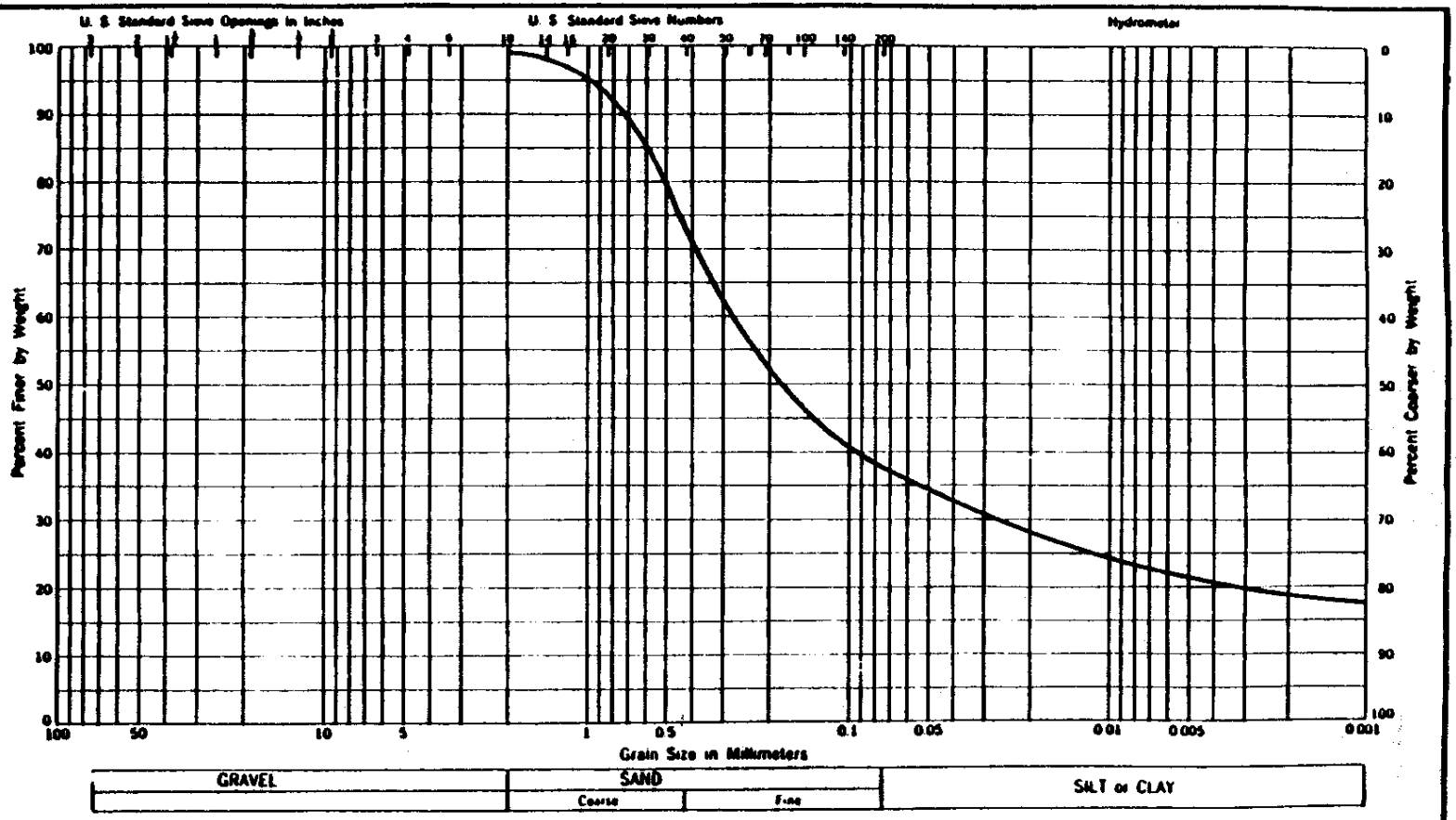
Depth (ft)	Thickness (ft)	Description
947 - 948	1	Clay, sandy; yellowish reddish brown
948 - 966	18	Sand, medium; silty; poorly sorted; brownish gray to grayish brown
966 - 971	5	Sand, medium; silty; clayey; poorly sorted; grayish brown

APPENDIX I

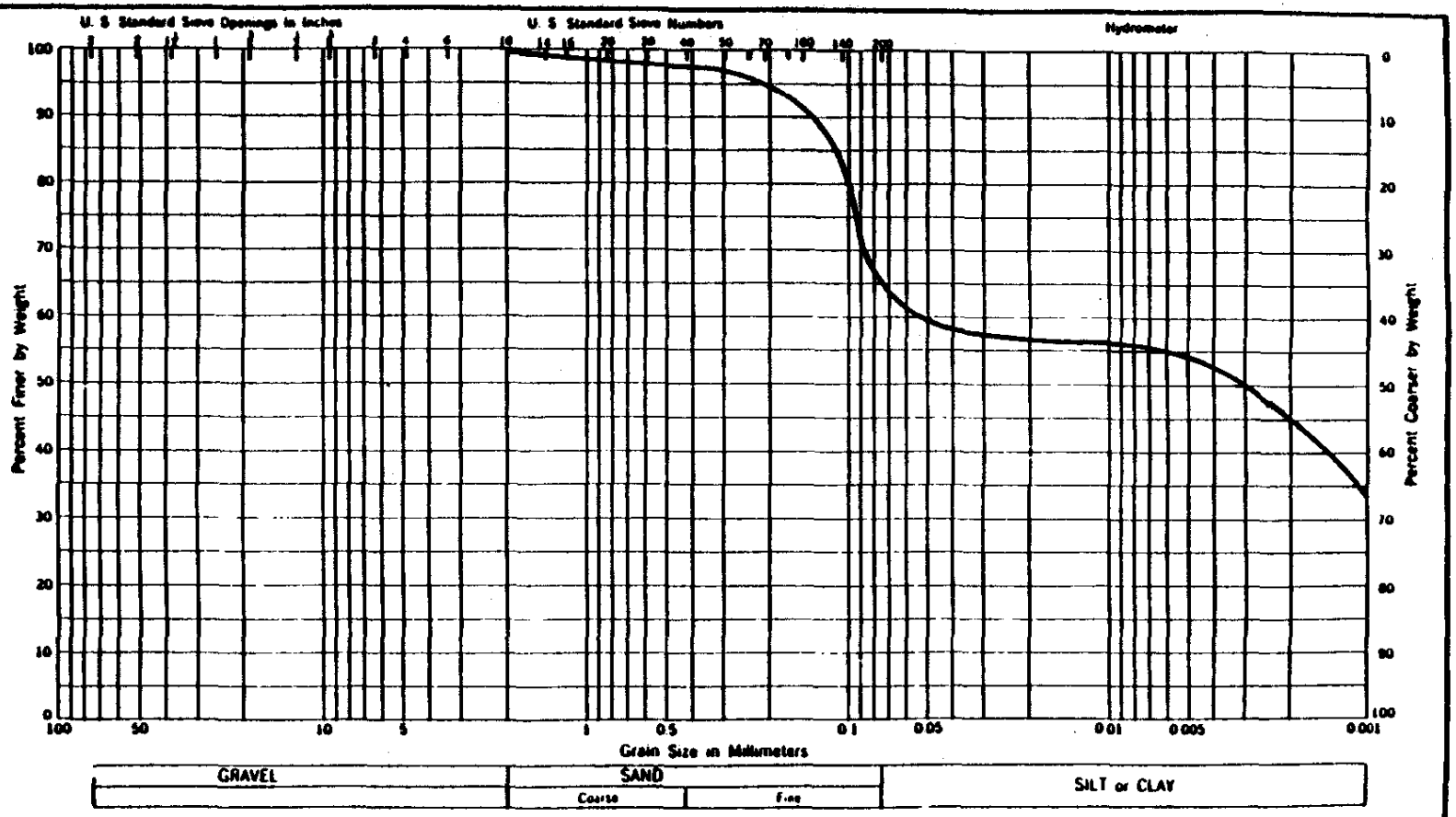
GRAIN SIZE ANALYSES



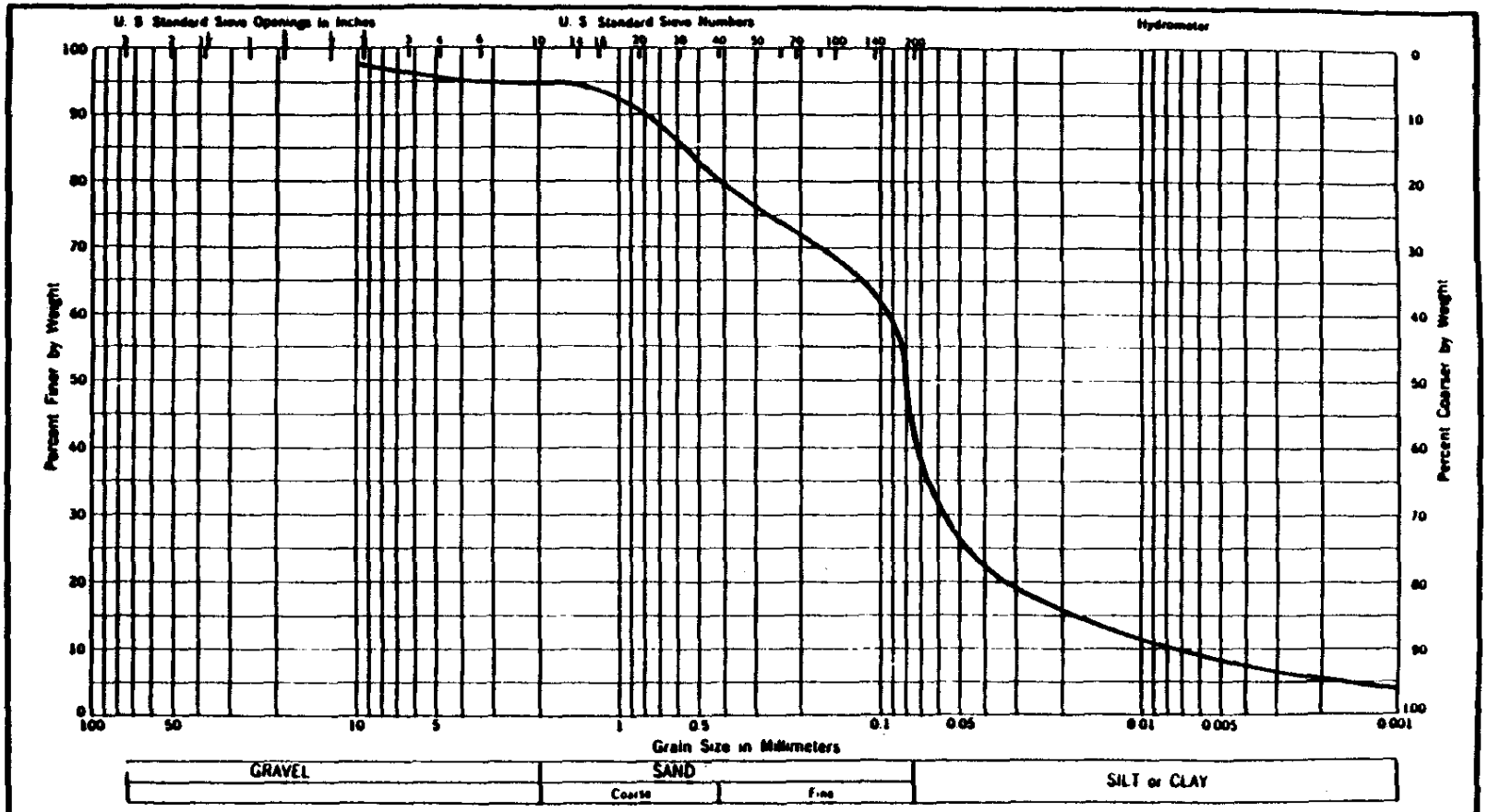
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	65-67'	Tan sand, coarse and slightly silty	Hydrogeologic Study, Phase II PSI File No. 372-55001



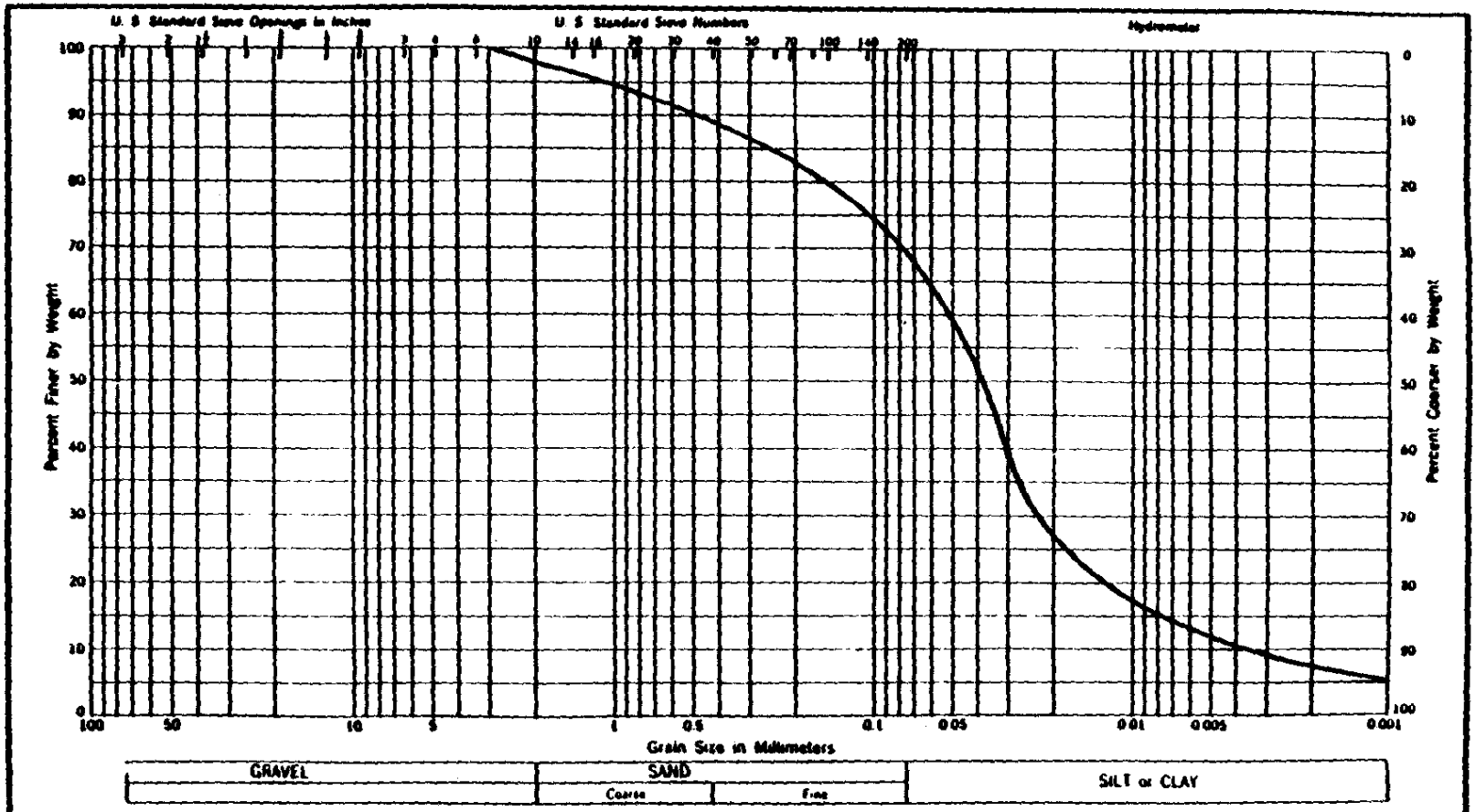
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	158-161'	Tan and brown clayey sand with light tan and tan silty clay layers	Hydrogeologic Study, Phase II PSI File No. 372-55001



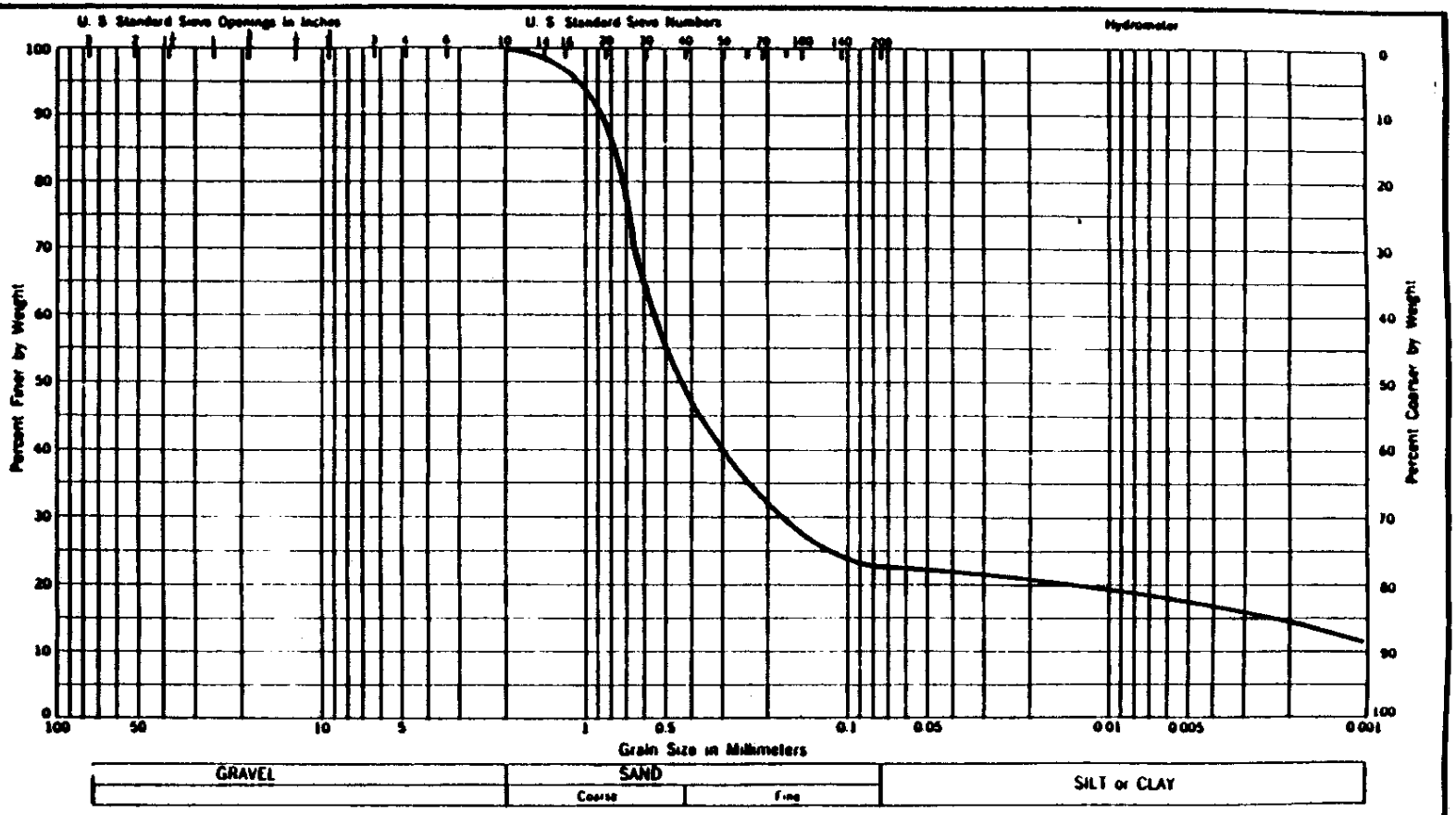
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	177-179'	Orange and tan sandy silt	Hydrogeologic Study, Phase II PSI File No. 372-55001



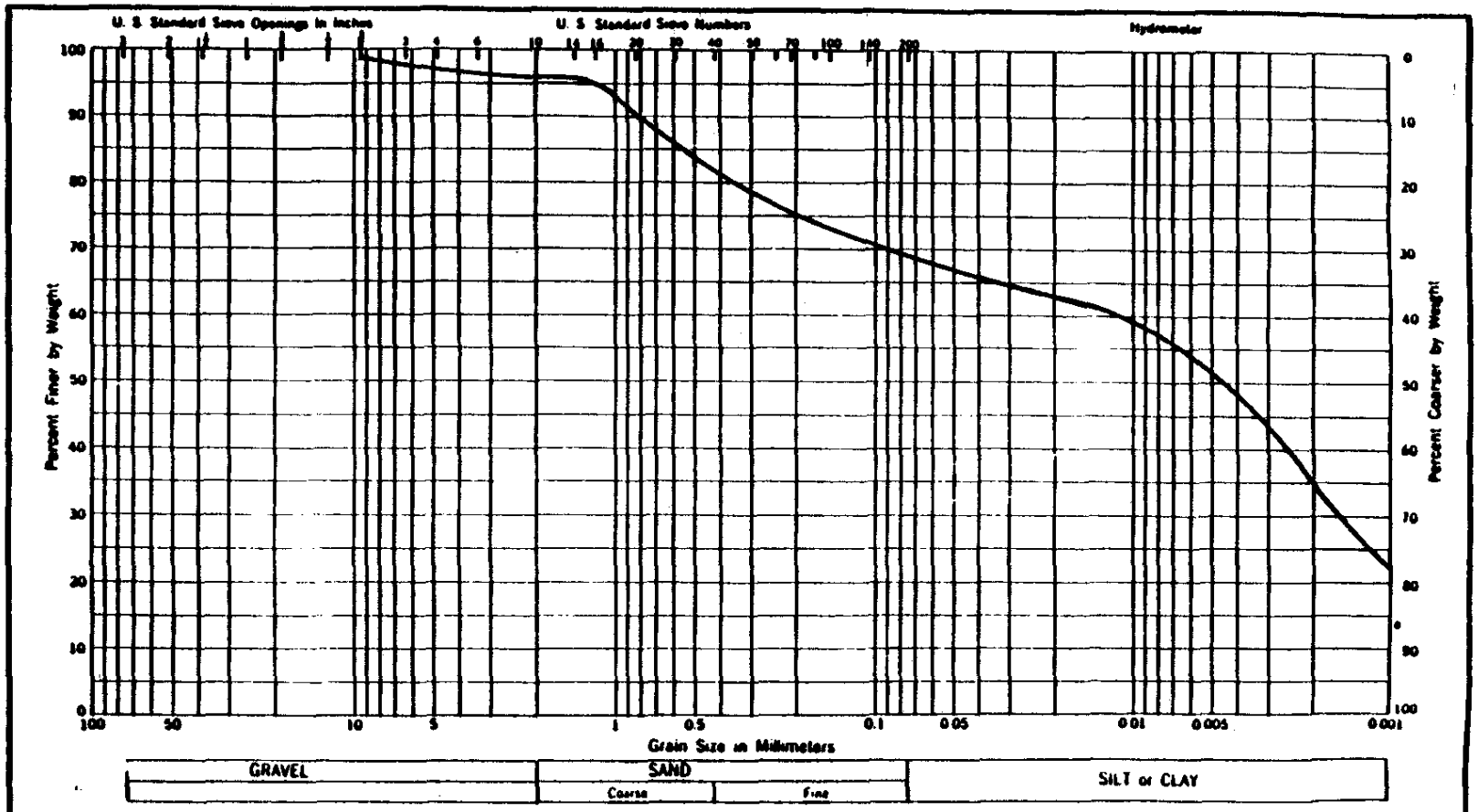
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	179-181.5'	Orange and tan sand with light tan silty clay layers and inclusions	Hydrogeologic Study, Phase II PSI File No. 372-55001



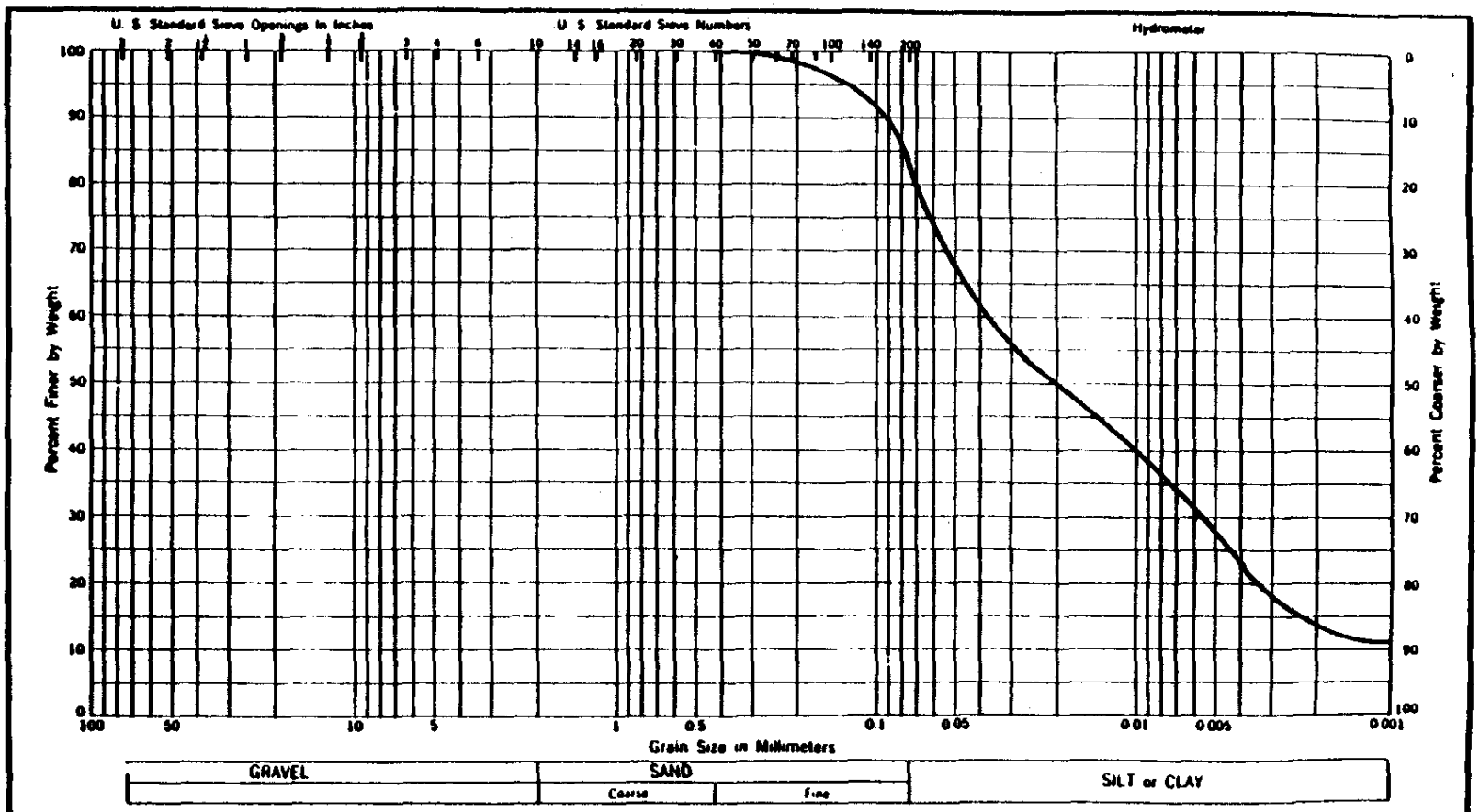
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	248-255'	Gray and light tan sandy clay, slightly silty	Hydrogeologic Study, Phase II PSI File No. 372-55001



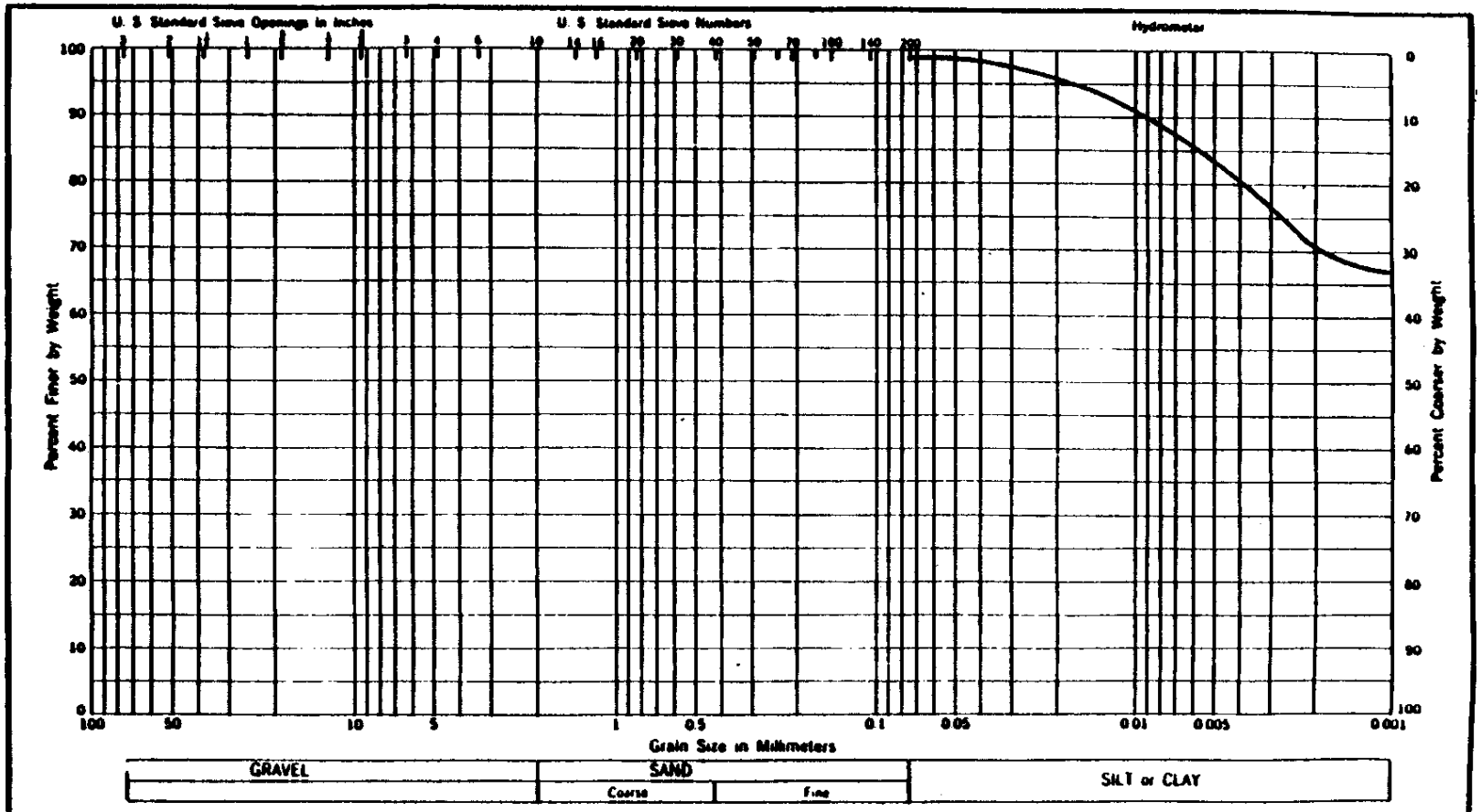
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	255-257'	White clayey sand, slightly silty with mica and iron staining	Hydrogeologic Study, Phase II PSI File No. 372-55001



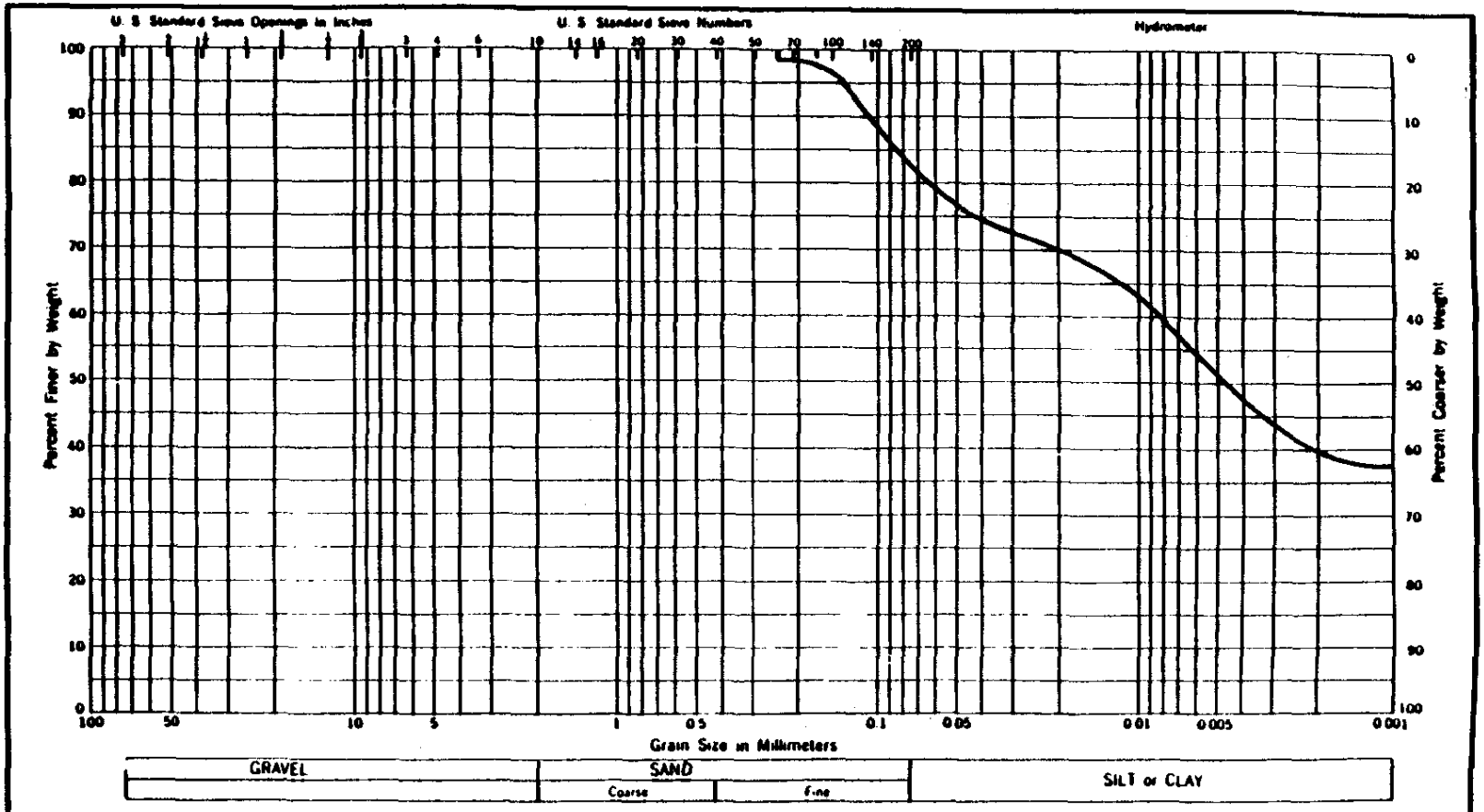
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-16	415-417.5'	Light gray clay with tan clayey sand seams	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-17	180-182'	Dark gray clay with mica and slightly cemented	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-17	308-310'	Green clay, hard and layered	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-17	443-445'	Light gray silty clay with sandy seams	Hydrogeologic Study, Phase II PSI File No. 372-55001

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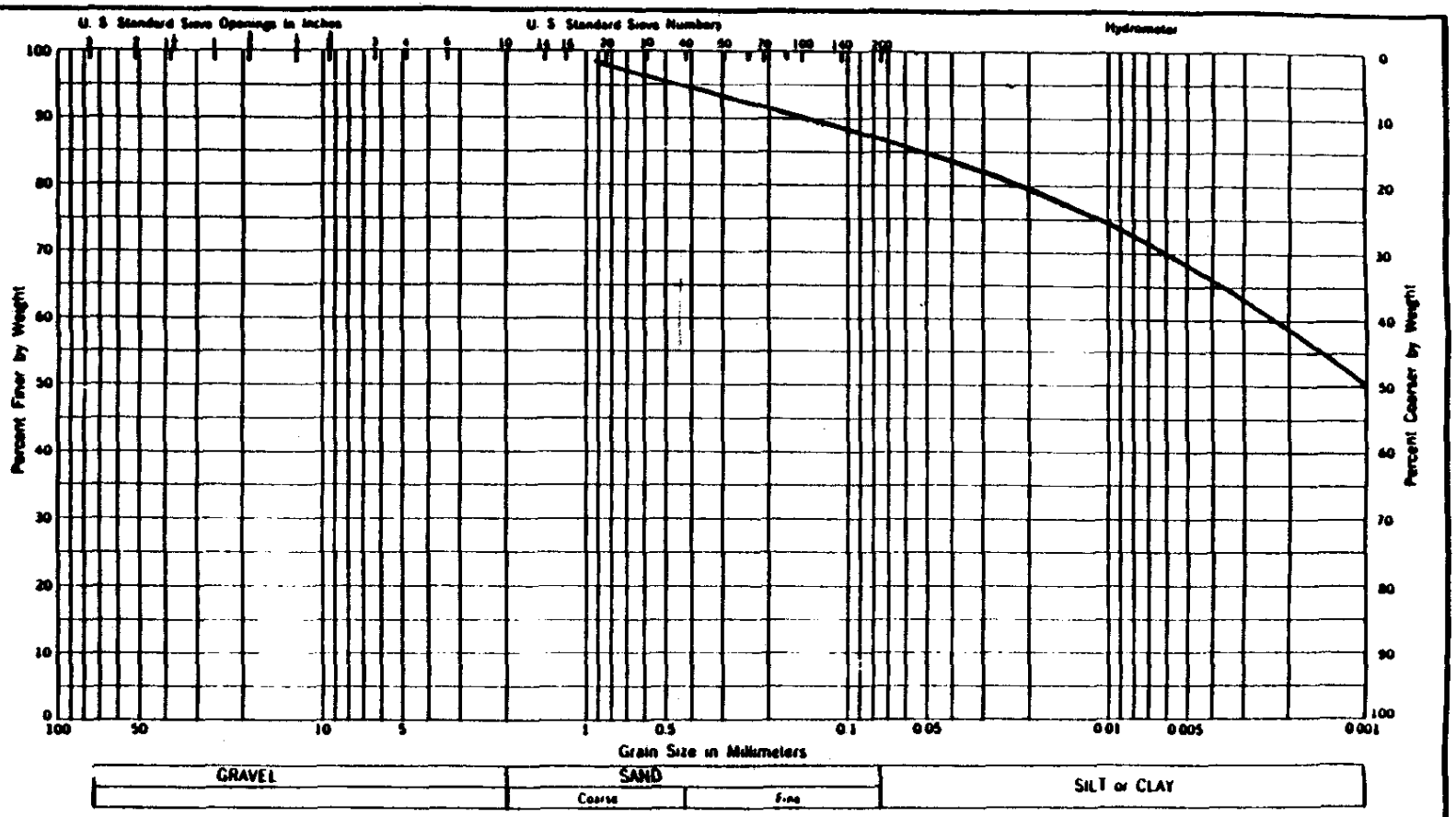
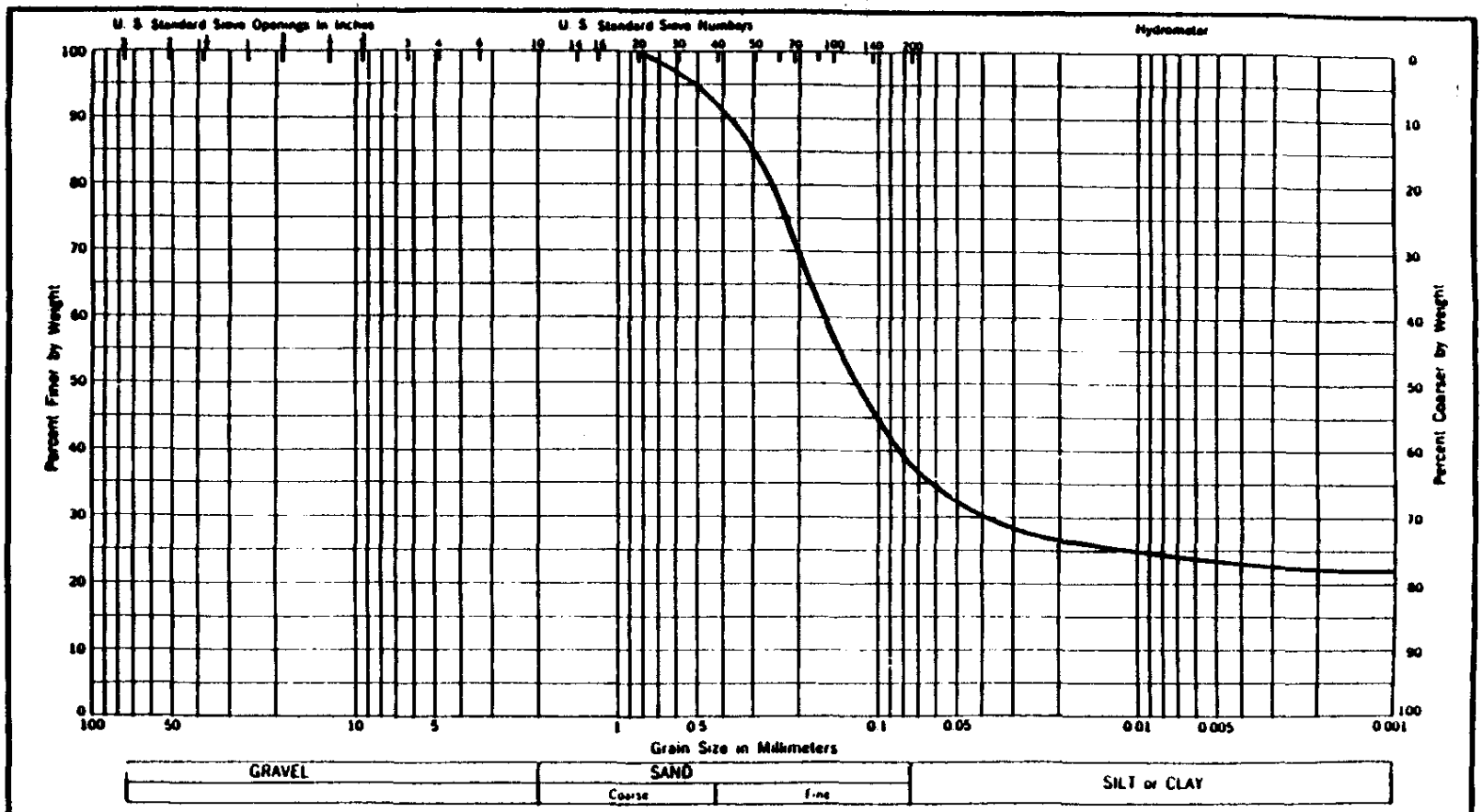
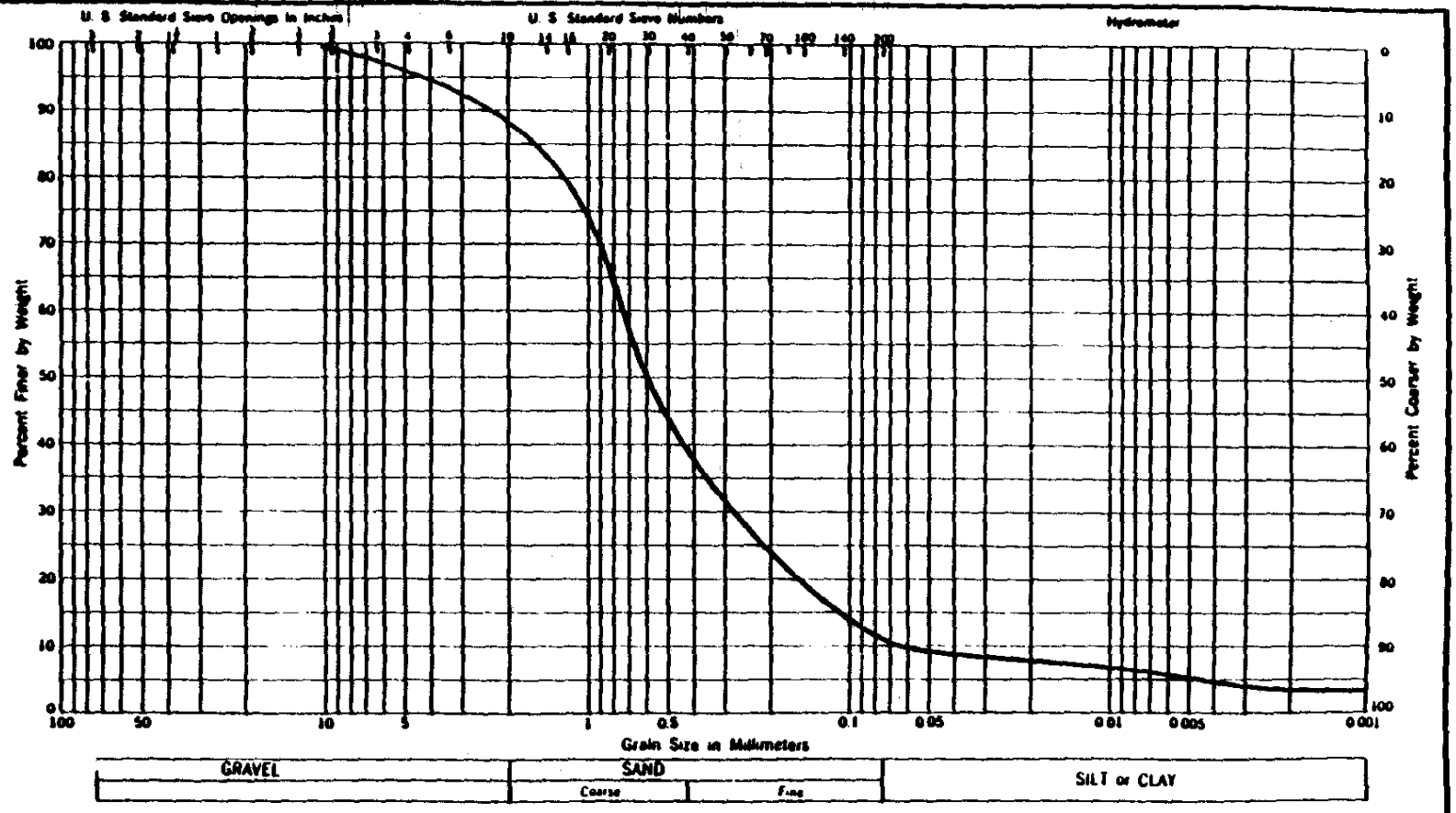


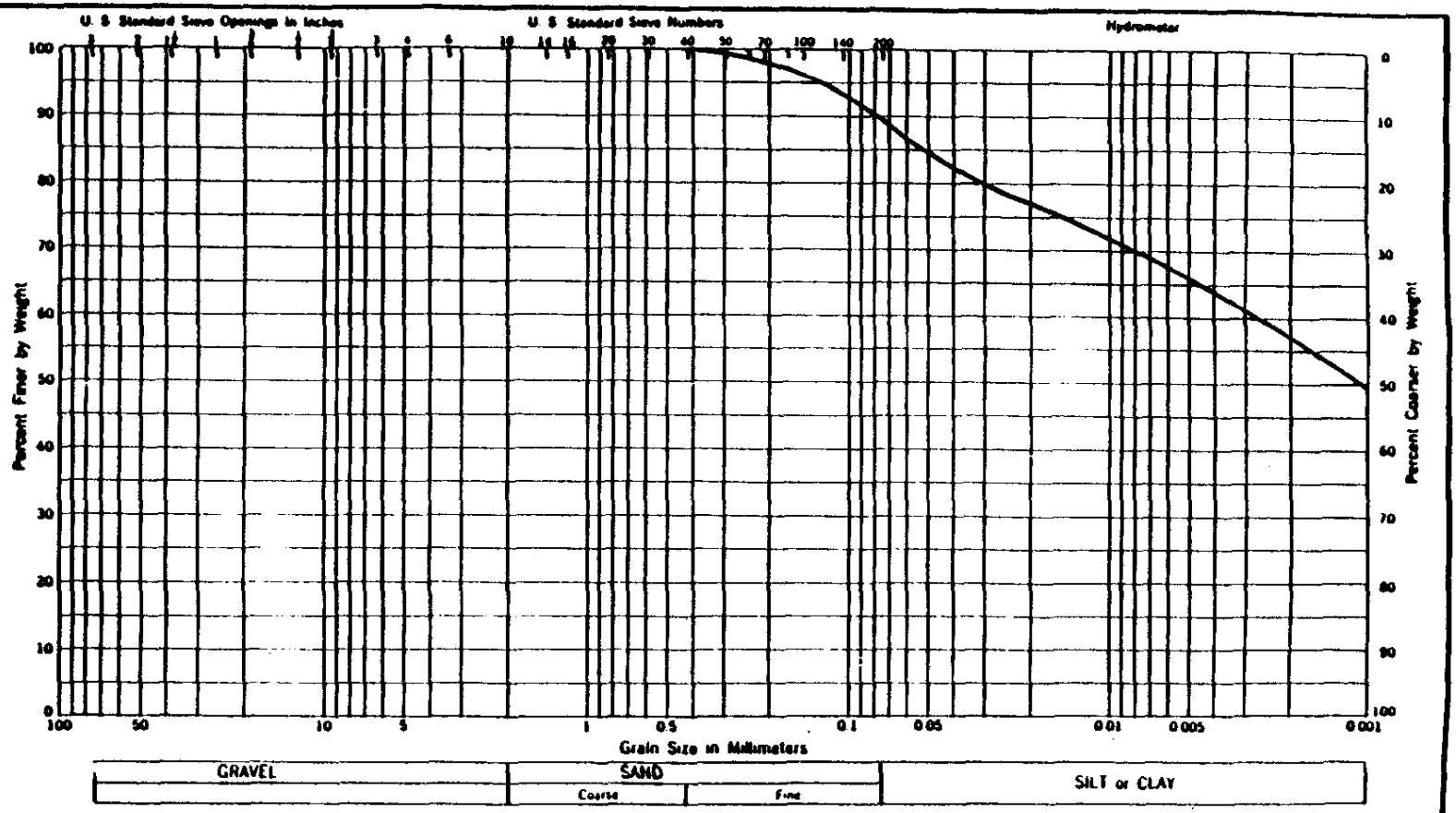
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-17	662-664'	Light gray silty clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



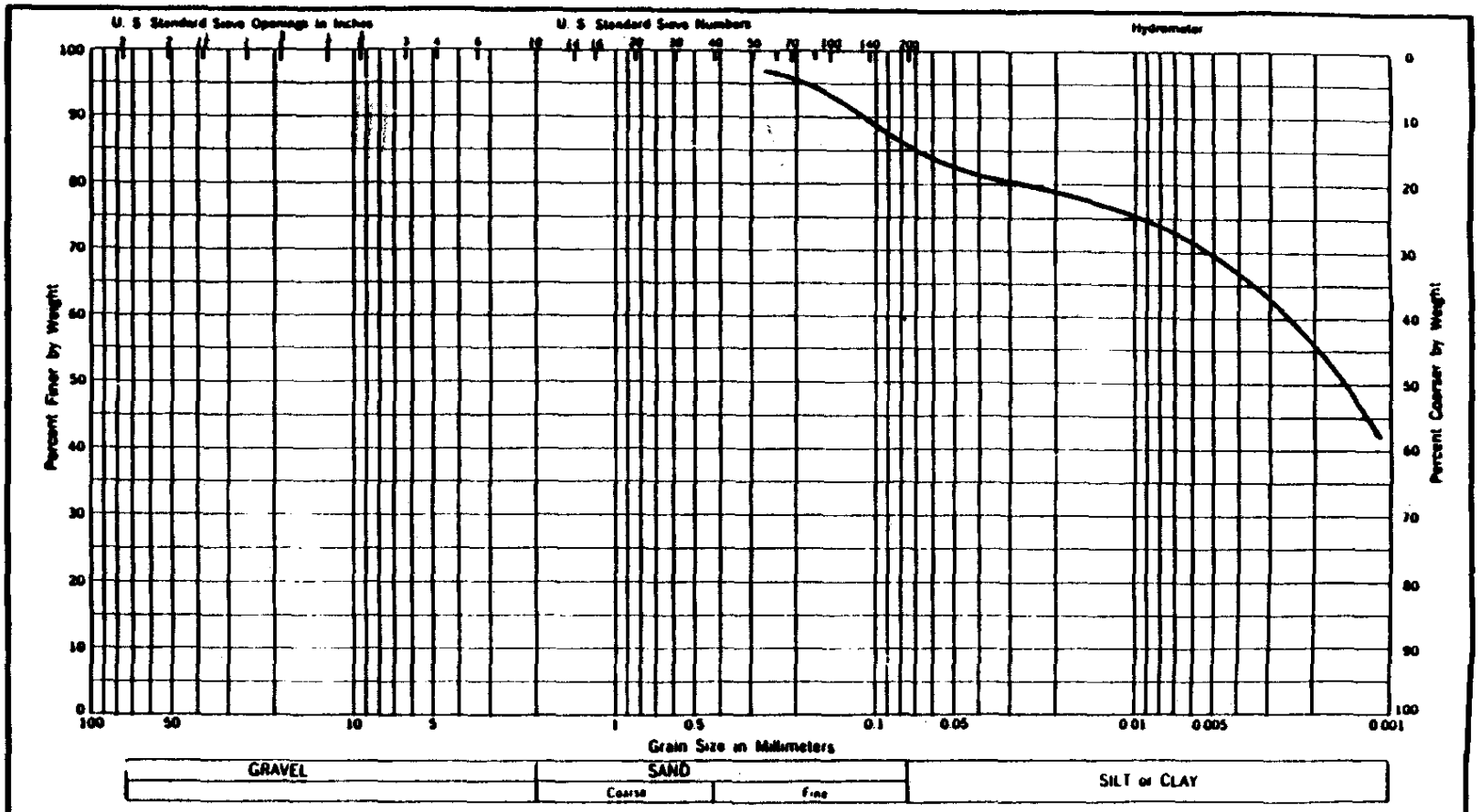
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-18	180-182'	Orange clayey sand with clay seams	Hydrogeologic Study, Phase II PSI File No. 372-55001



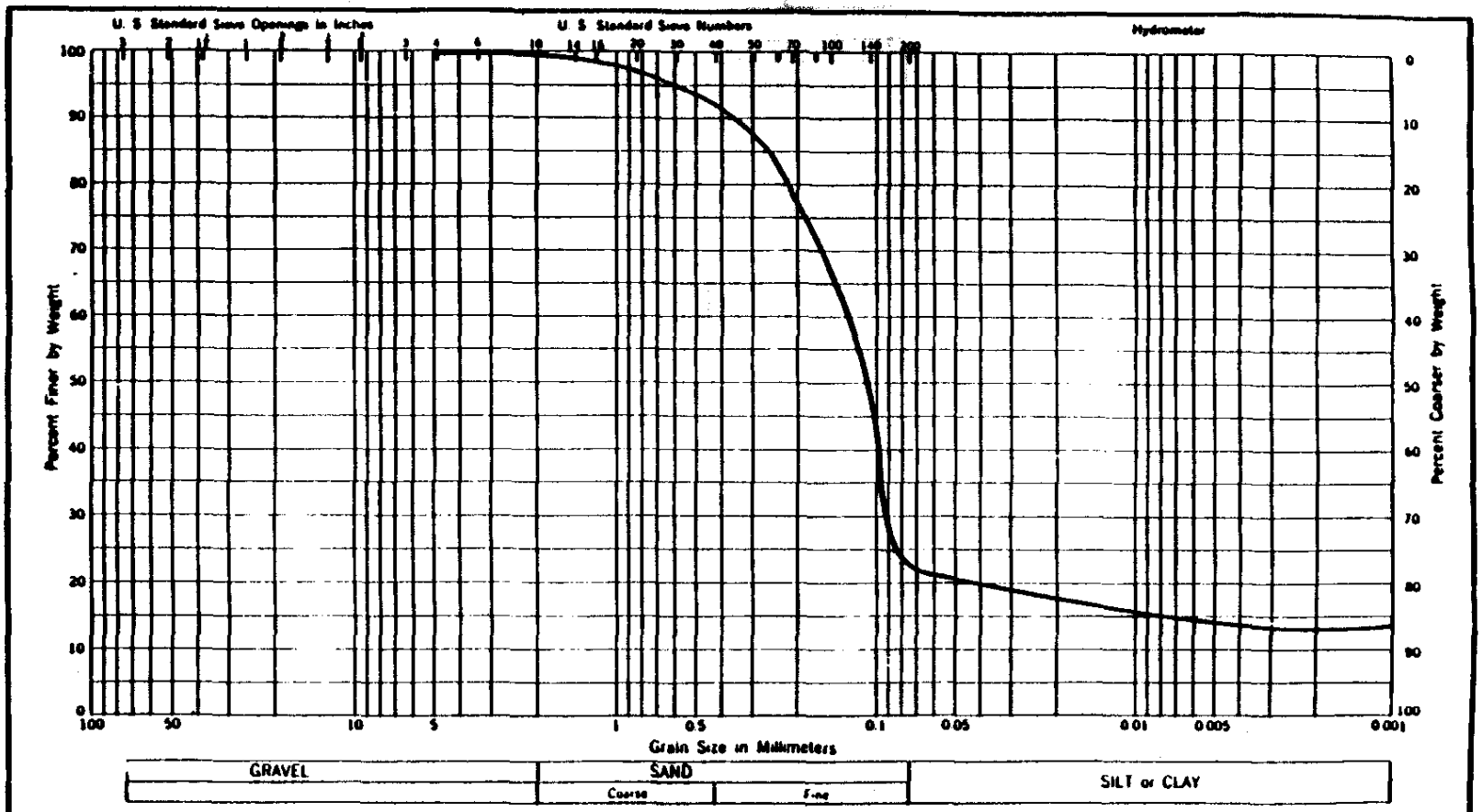
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-18	261-263'	Orange and tan clayey coarse sand with clay pockets	Hydrogeologic Study, Phase II PSI File No. 372-55001



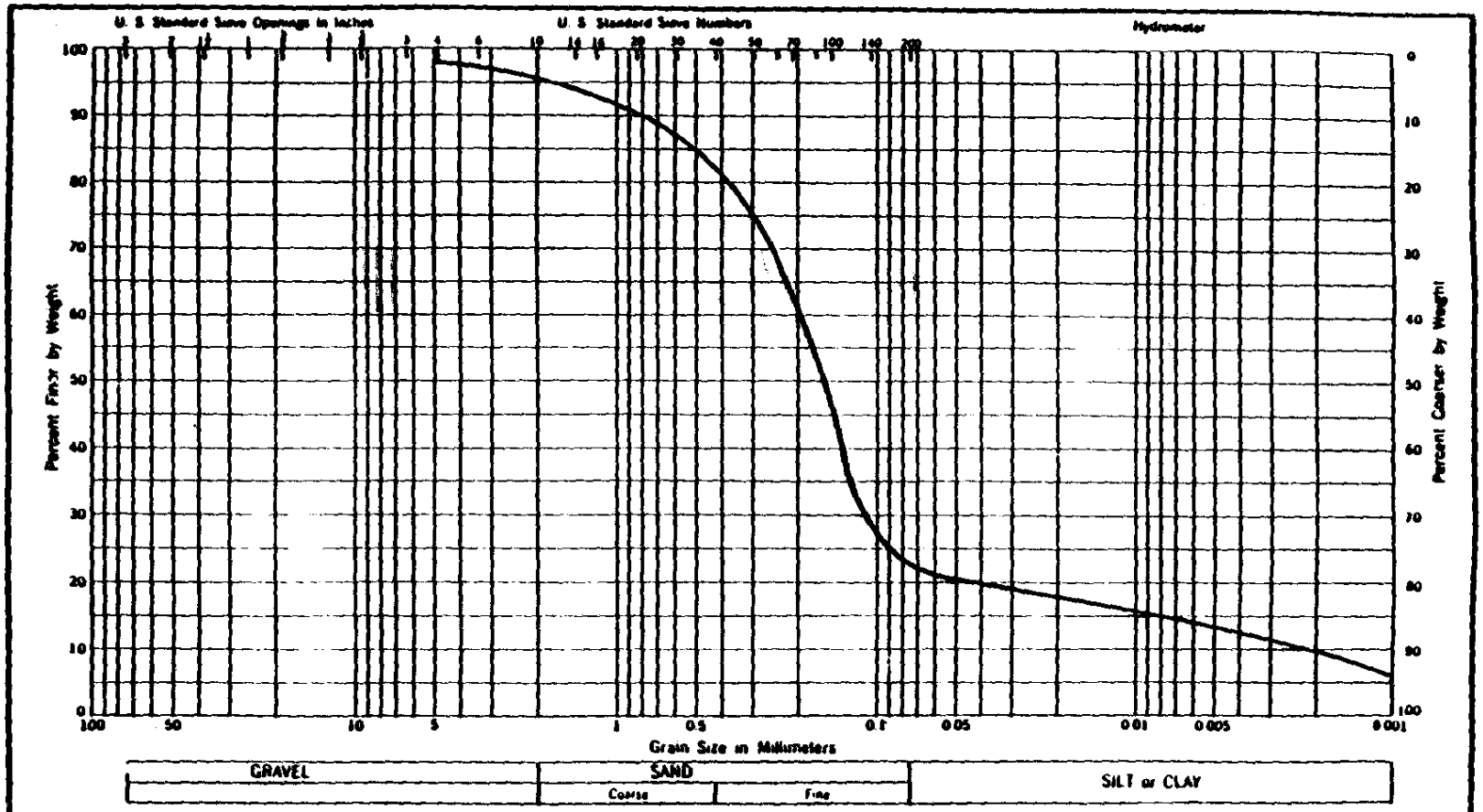
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-18	410-412	Greenish gray and brown silty clay, marbled and slightly sandy	Hydrogeologic Study, Phase II PSI File No. 372-55001



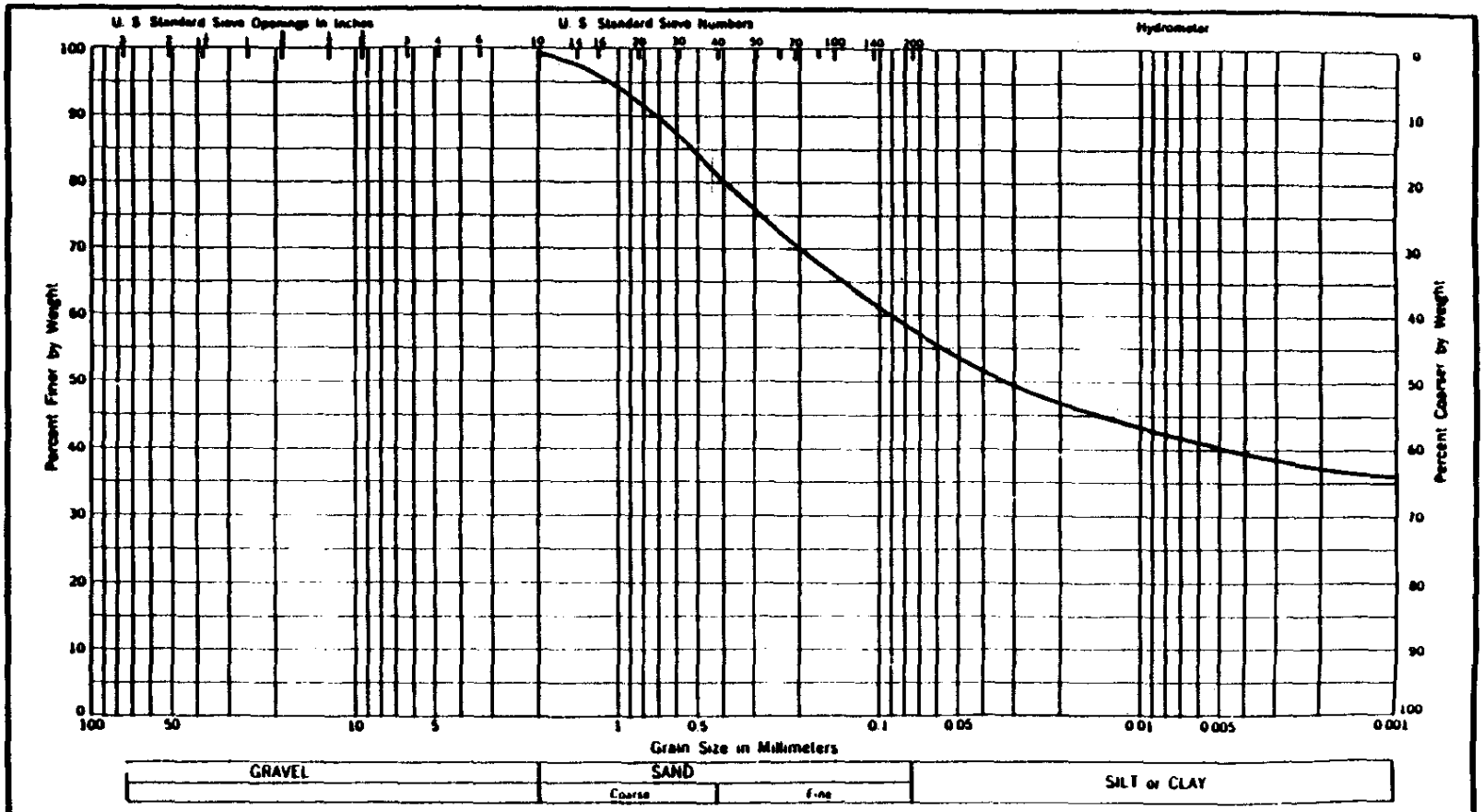
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-18	643-645'	Hard greenish-gray silty clay, slightly sandy	Hydrogeologic Study, Phase II PSI File No. 372-55001



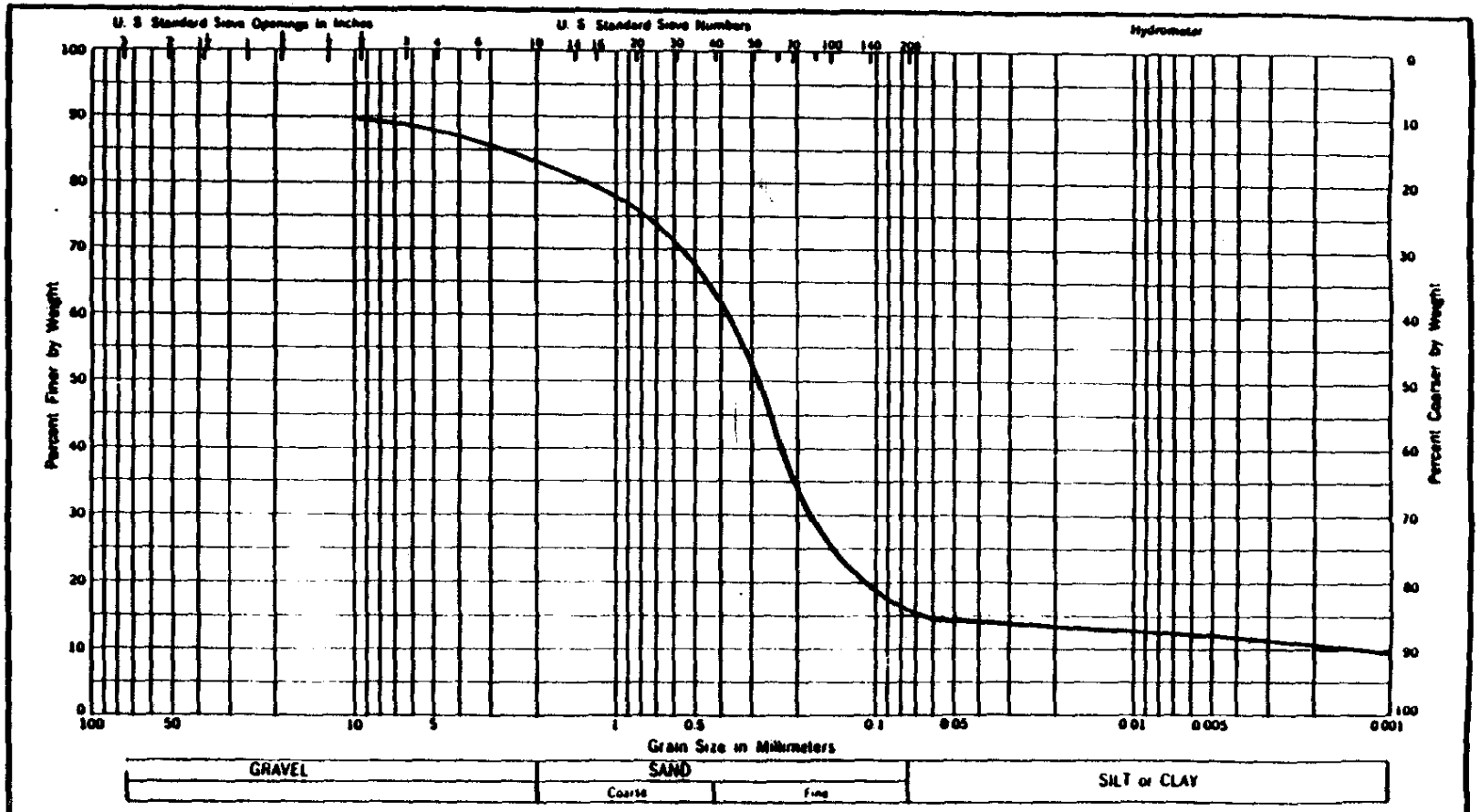
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-19	190- 192.9'	Orange clayey sand with light tan silty clay lenses	Hydrogeologic Study, Phase II PSI File No. 372-55001



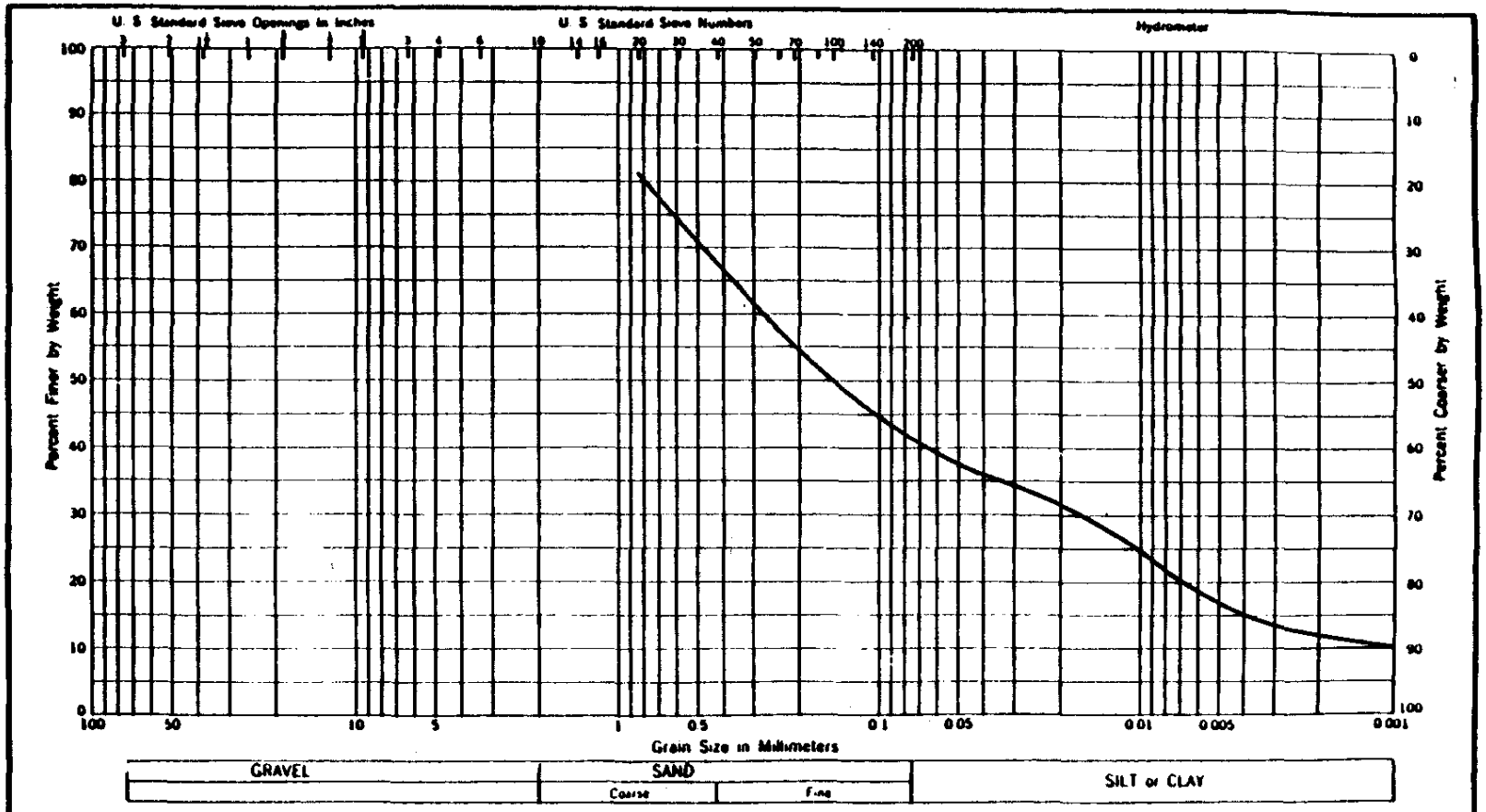
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-19	282-283'	Dark gray and tan clayey sand with occasional gray clay seams	Hydrogeologic Study, Phase II PSI File No. 372-55001



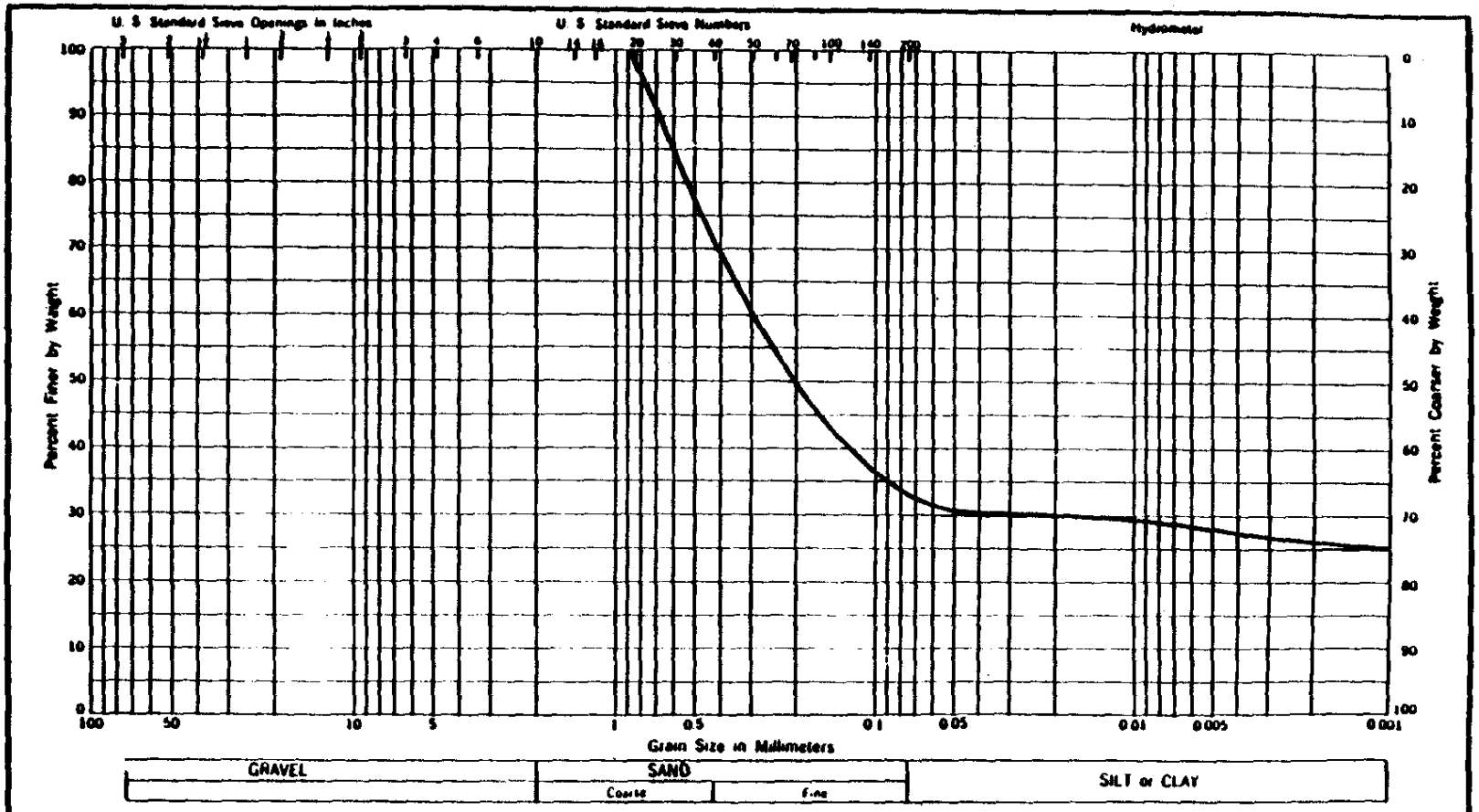
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-19	355-358'	Grayish-green sandy clay, hard	Hydrogeologic Study, Phase II PSI File No. 372-55001



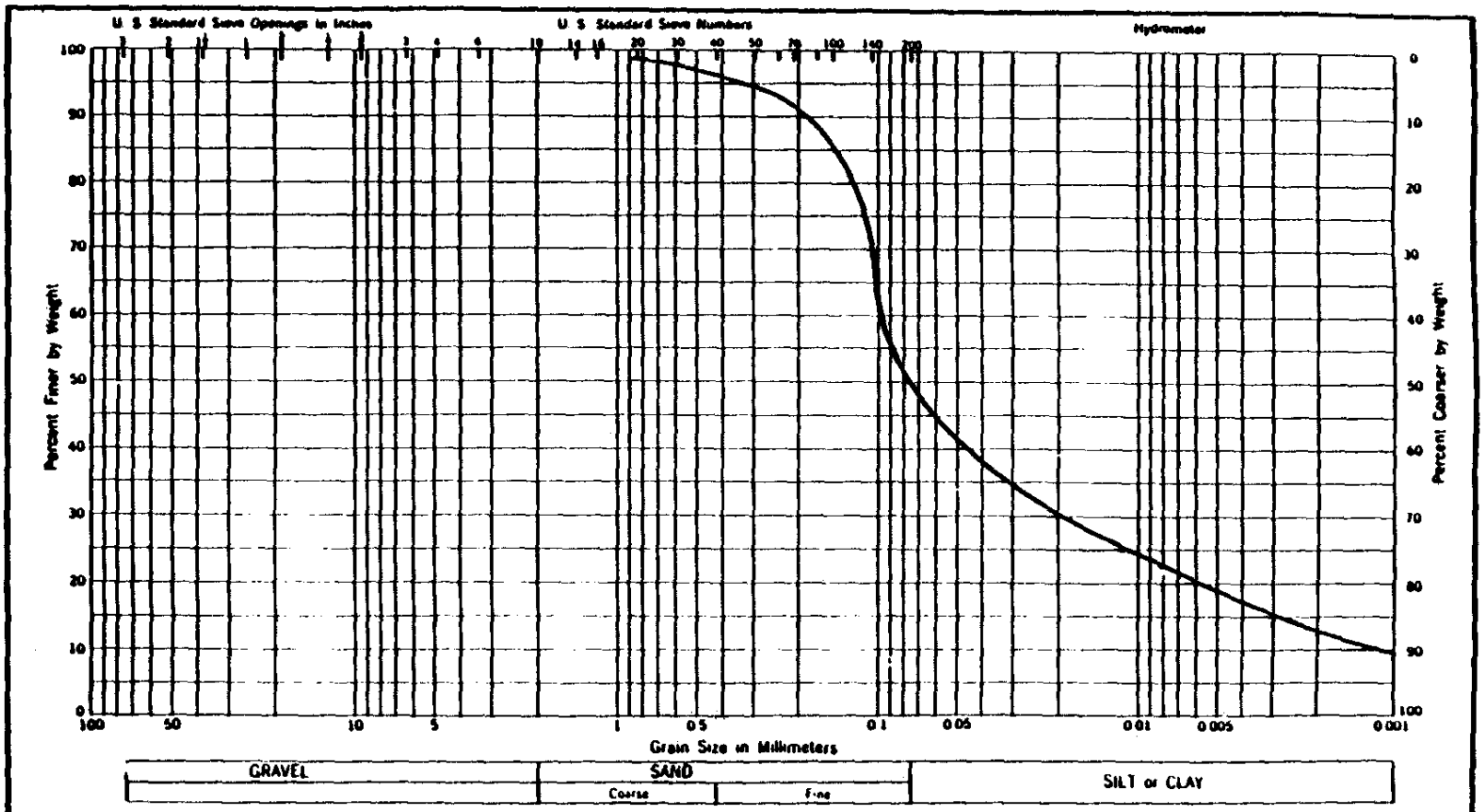
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-19	495-497'	Orange and light brown clayey sand with gray clay, coarse sand and gravel inclusions	Hydrogeologic Study, Phase II PSI File No. 372-55001



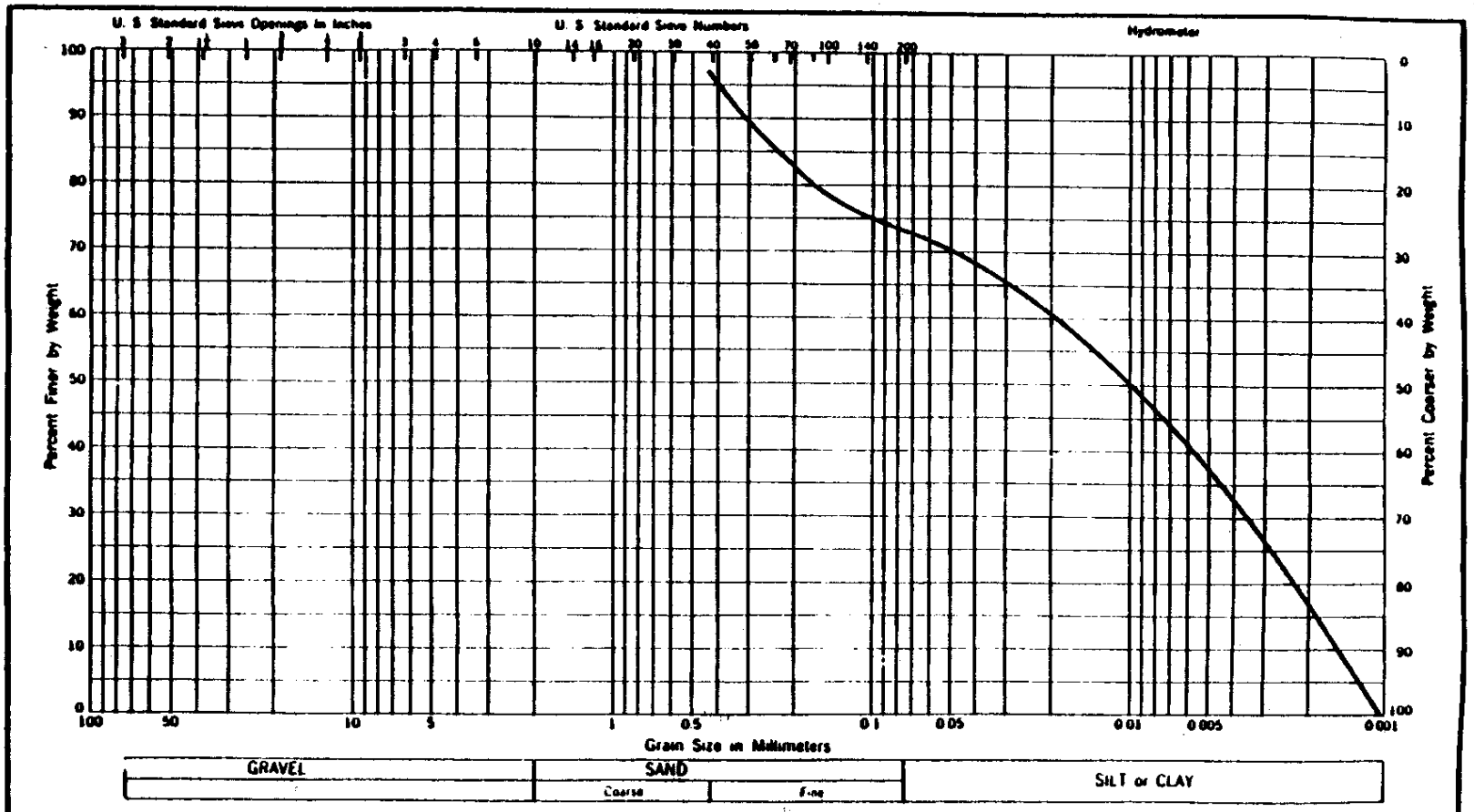
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-19	548-550'	Gray clayey sand with verticle seam of gray clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



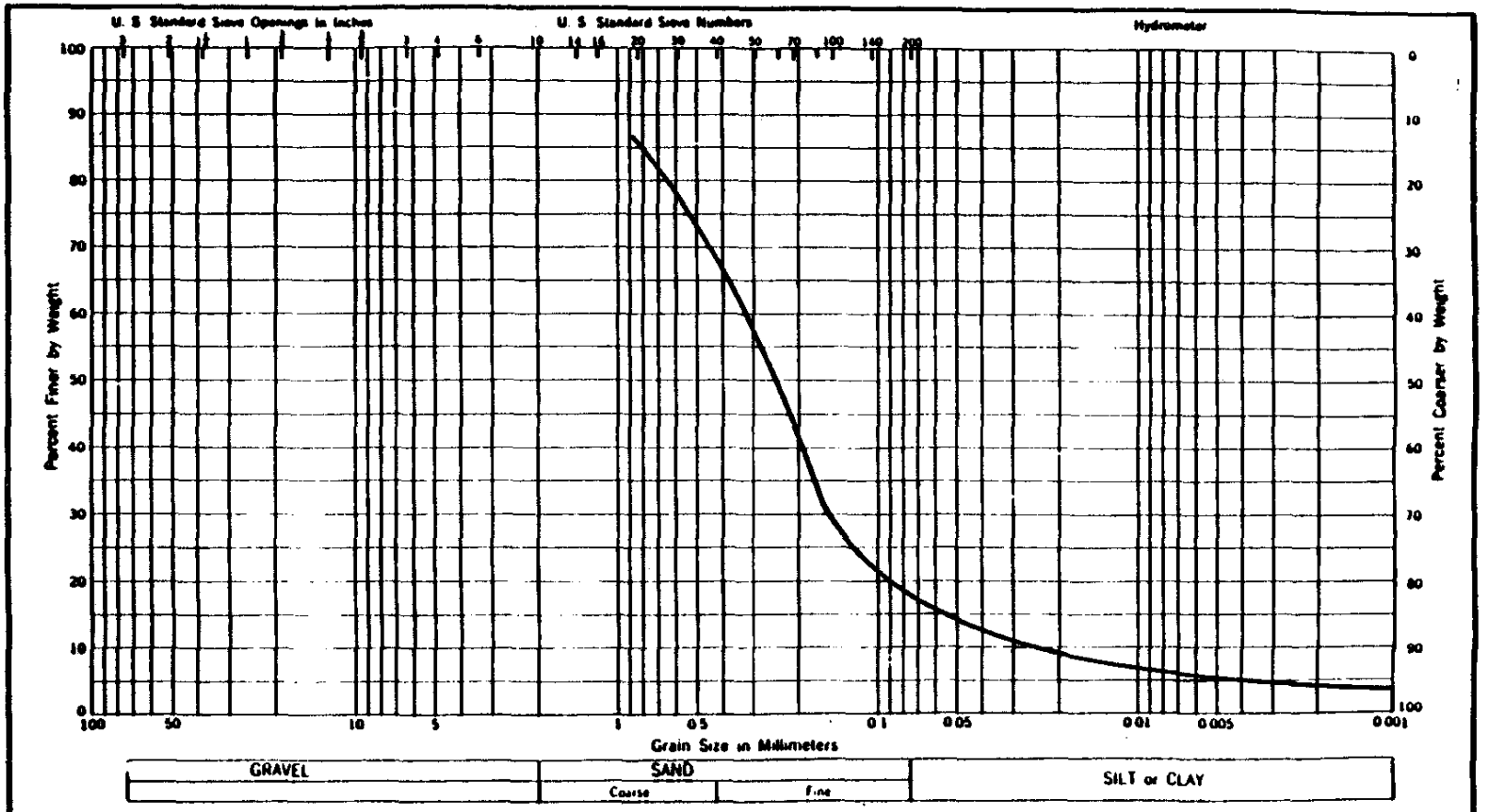
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-20	105-107'	Gray and brown clayey sand with Fe stains	Hydrogeologic Study, Phase II PSI File No. 372-55001



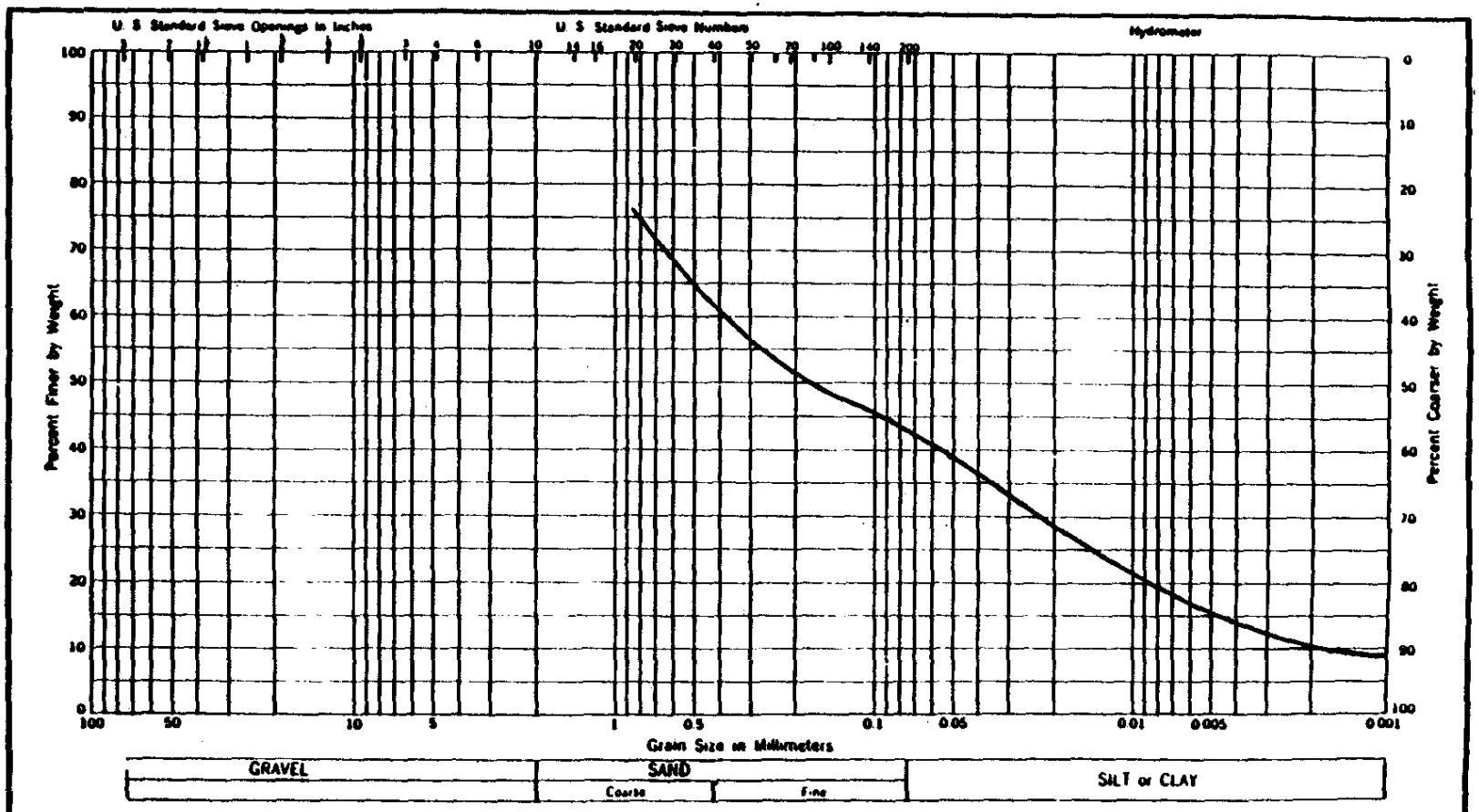
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-20	210-211'	Brown very silty sand with mica; well consolidated	Hydrogeologic Study, Phase II PSI File No. 372-55001



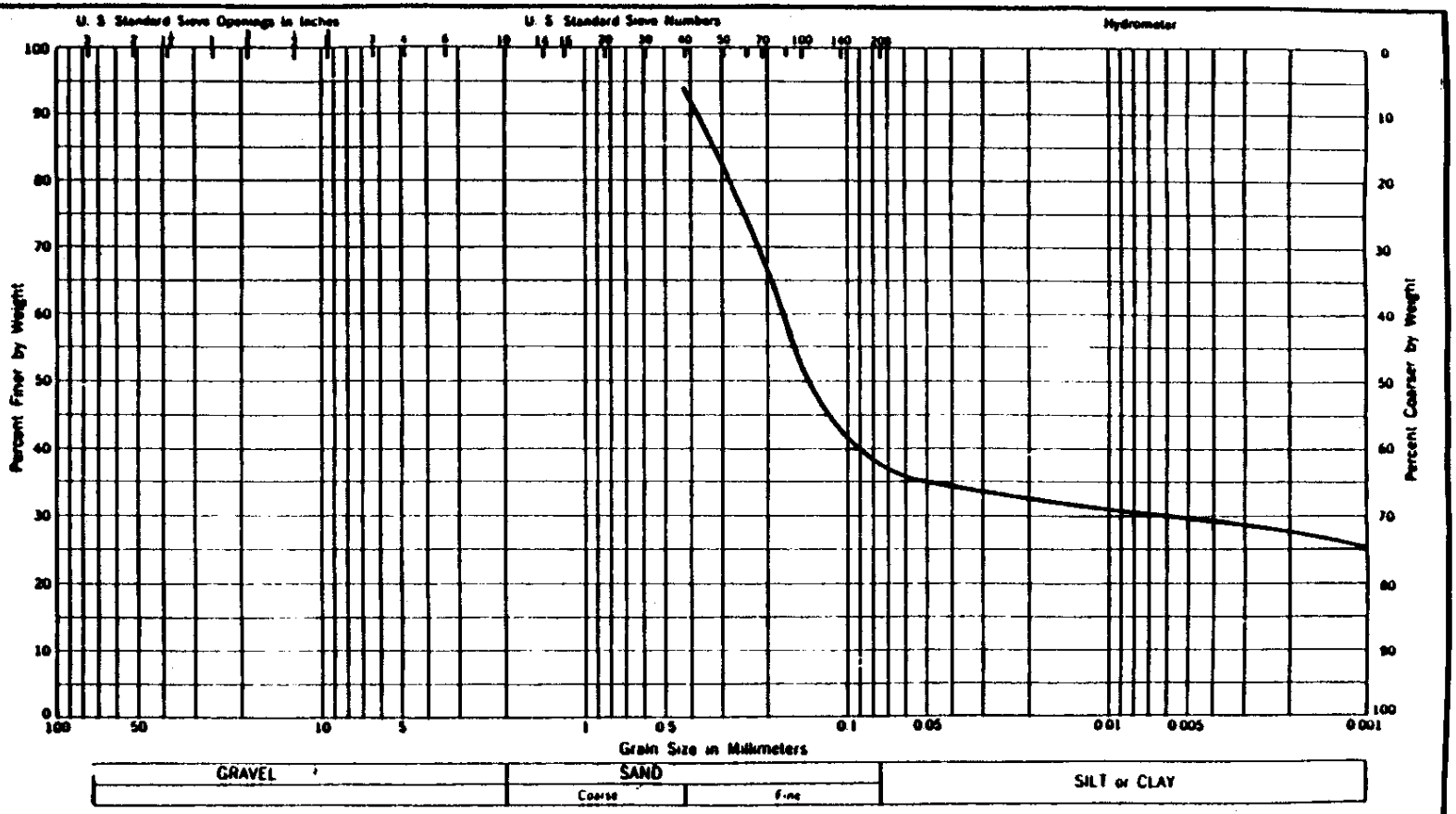
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	160-162'	Tan sandy silt	Hydrogeologic Study, Phase II PSI File No. 372-55001



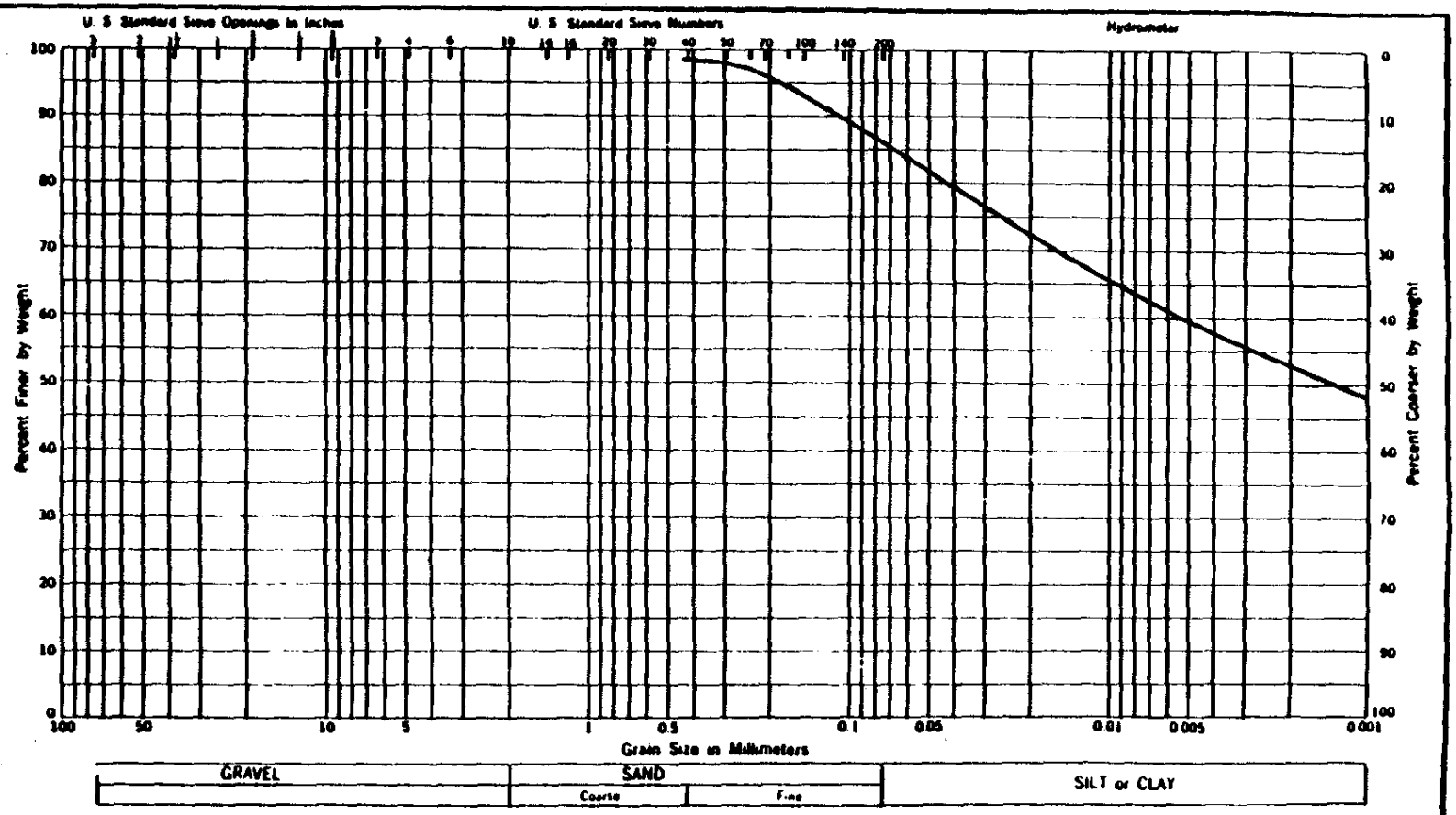
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	325-327'	Gray fine silty sand	Hydrogeologic Study, Phase II PSI File No. 372-55001



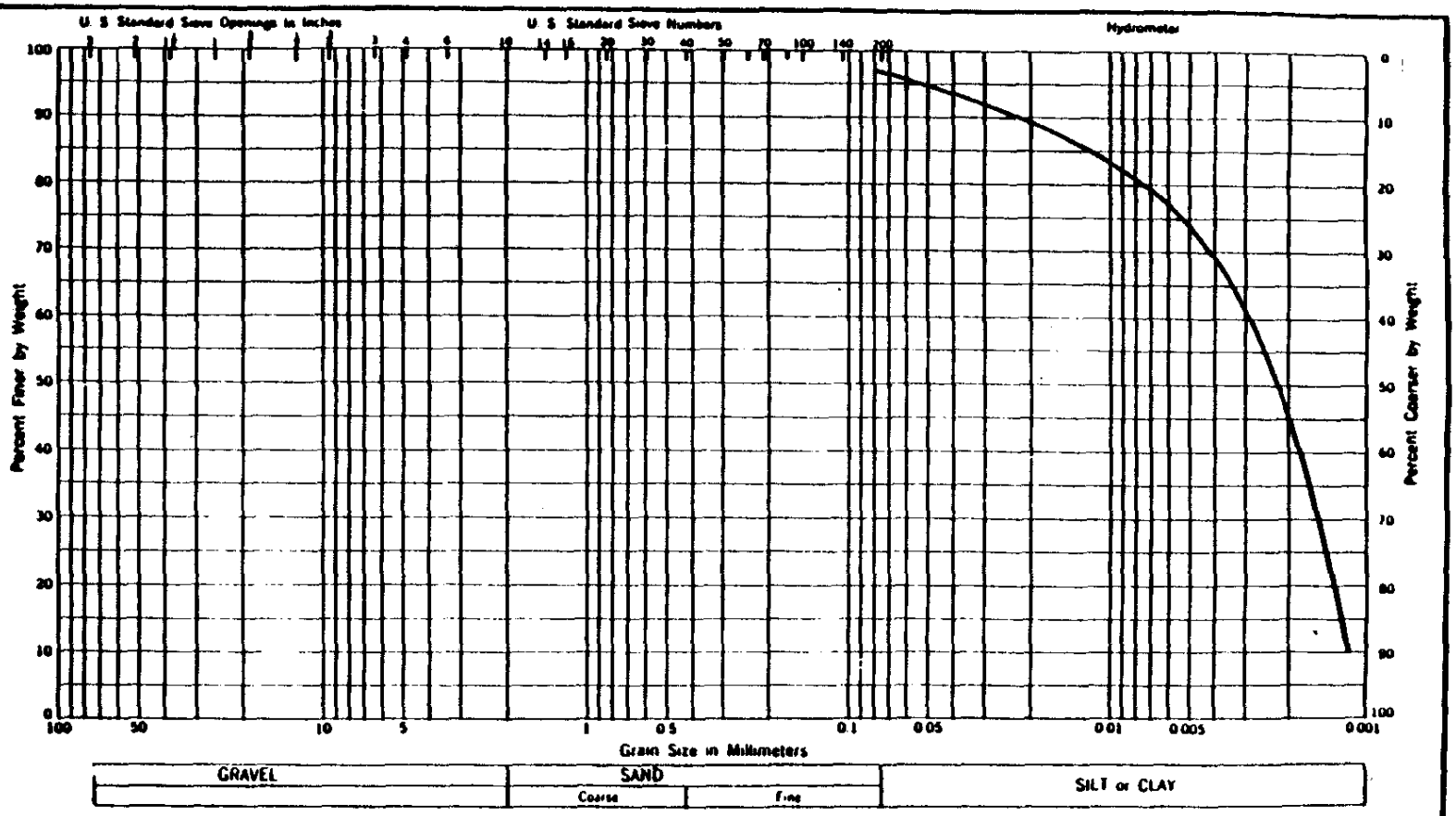
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	380-382'	Dark gray to black shaley clay with fine sand seams	Hydrogeologic Study, Phase II PSI File No. 372-55001



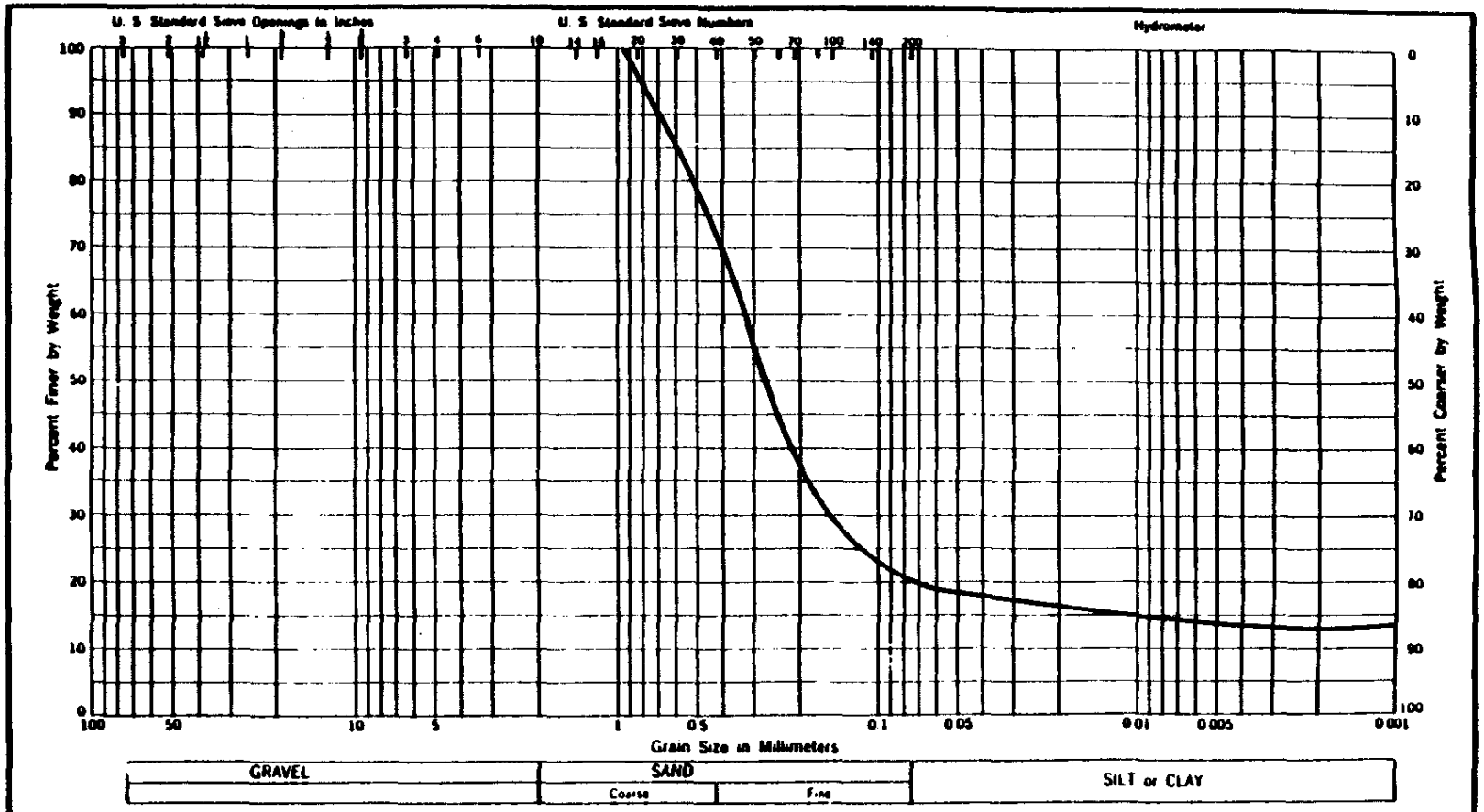
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	495-497'	Gray silty clay with mica	Hydrogeologic Study, Phase II PSI File No. 372-55001



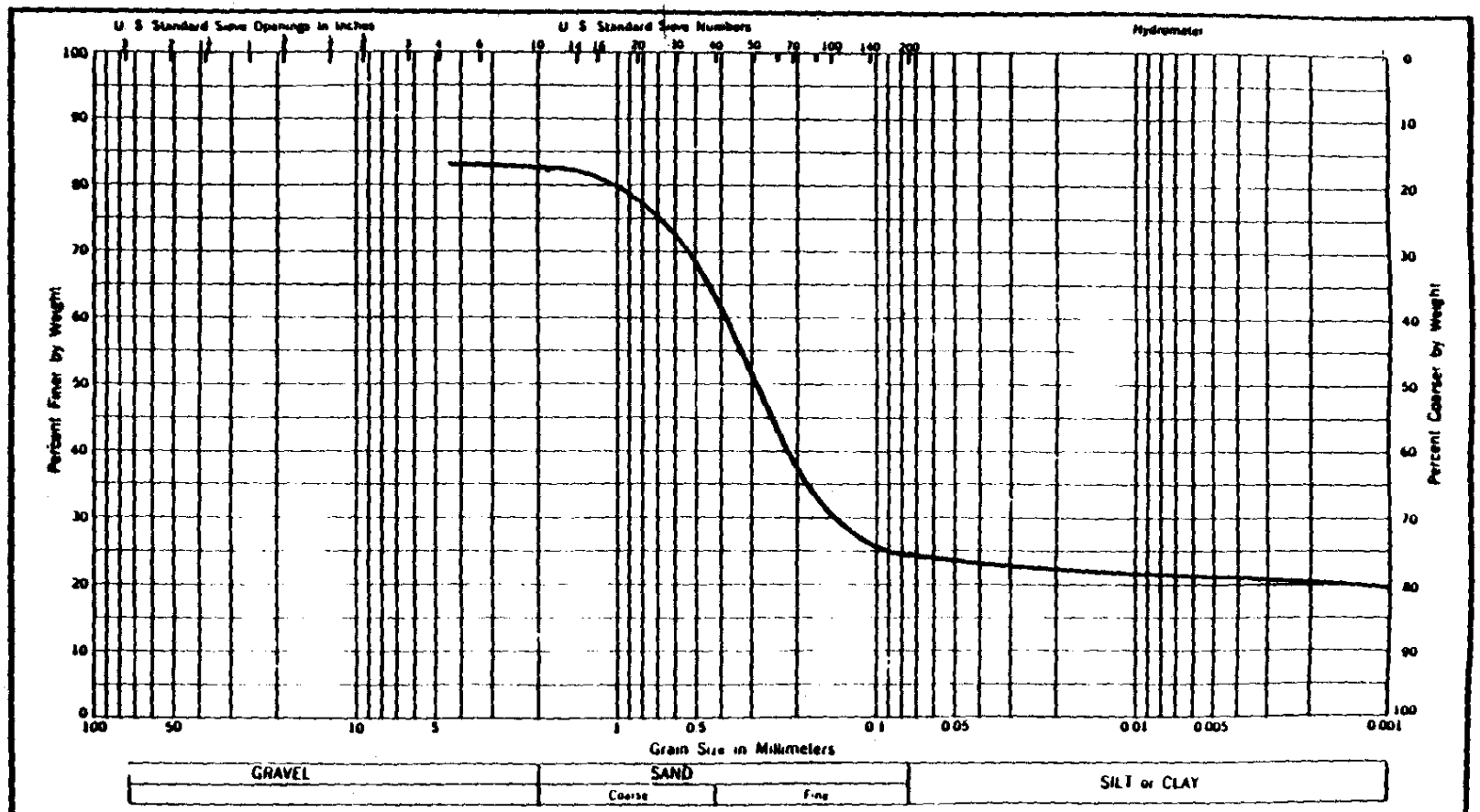
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	522-524'	Hard gray clay with iron staining	Hydrogeologic Study, Phase II PSI File No. 372-55001



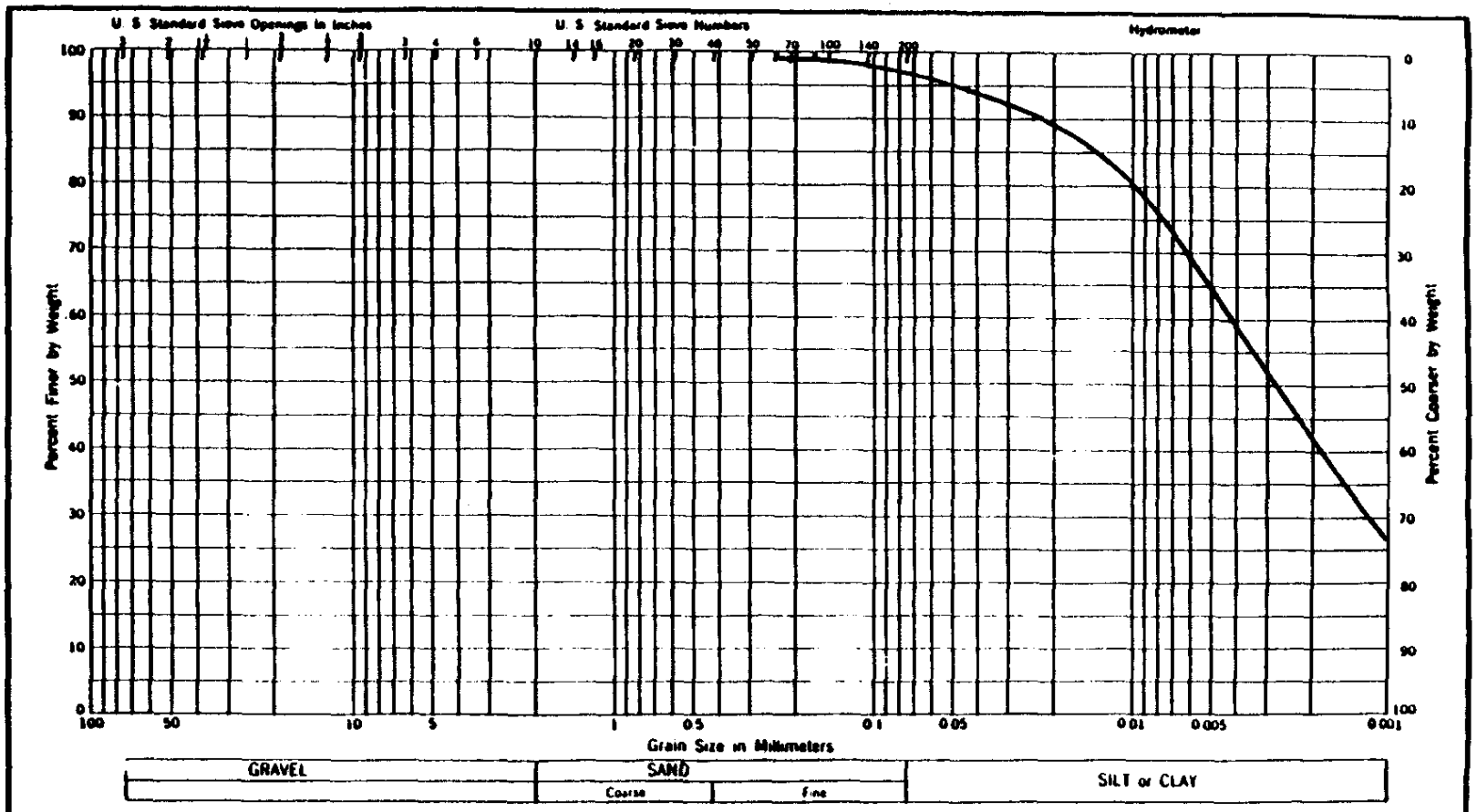
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-21	560-562'	Reddish-brown silty clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



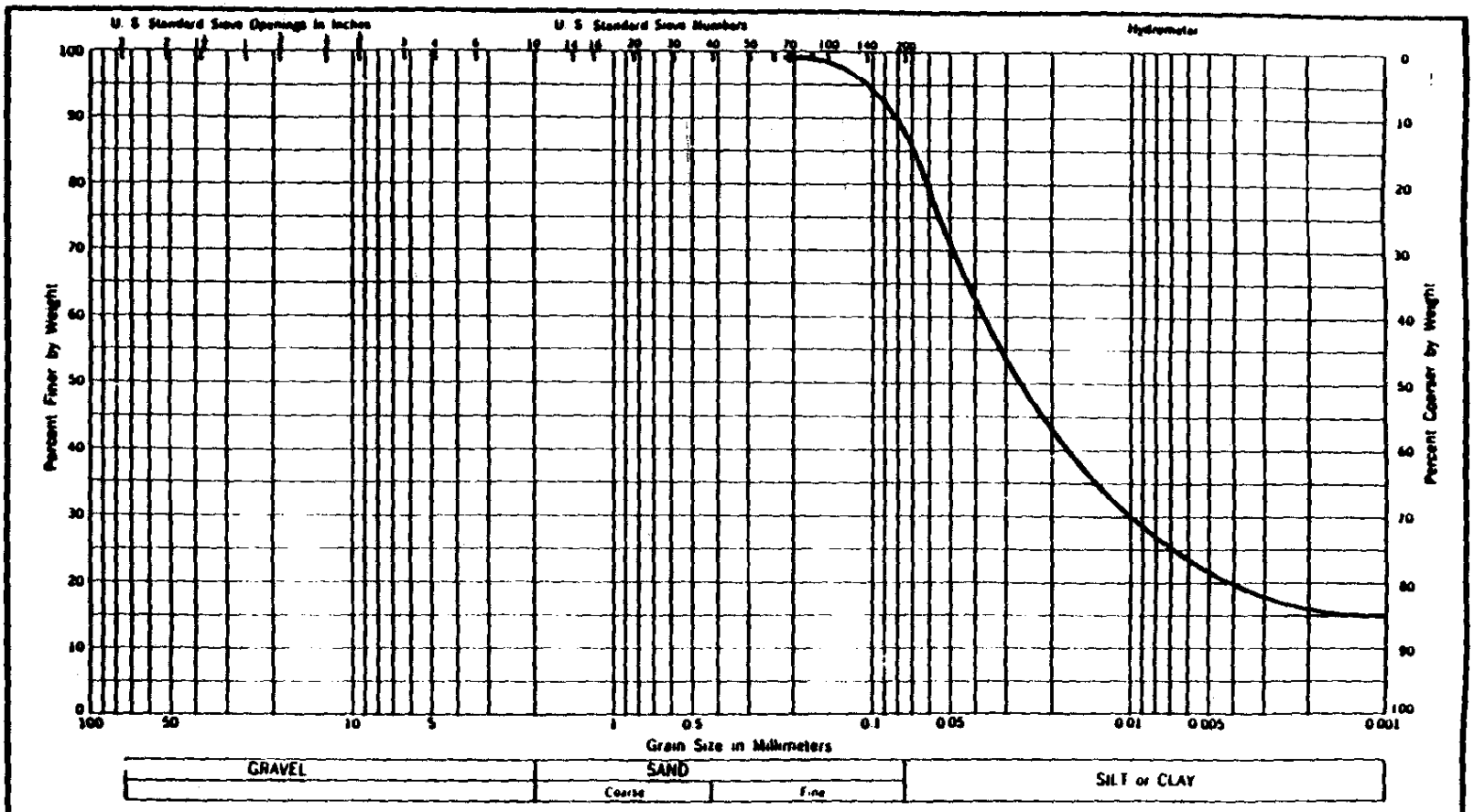
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-22	61- 63'	Tan clayey sand	Hydrogeologic Study, Phase II PSI File No. 372-55001



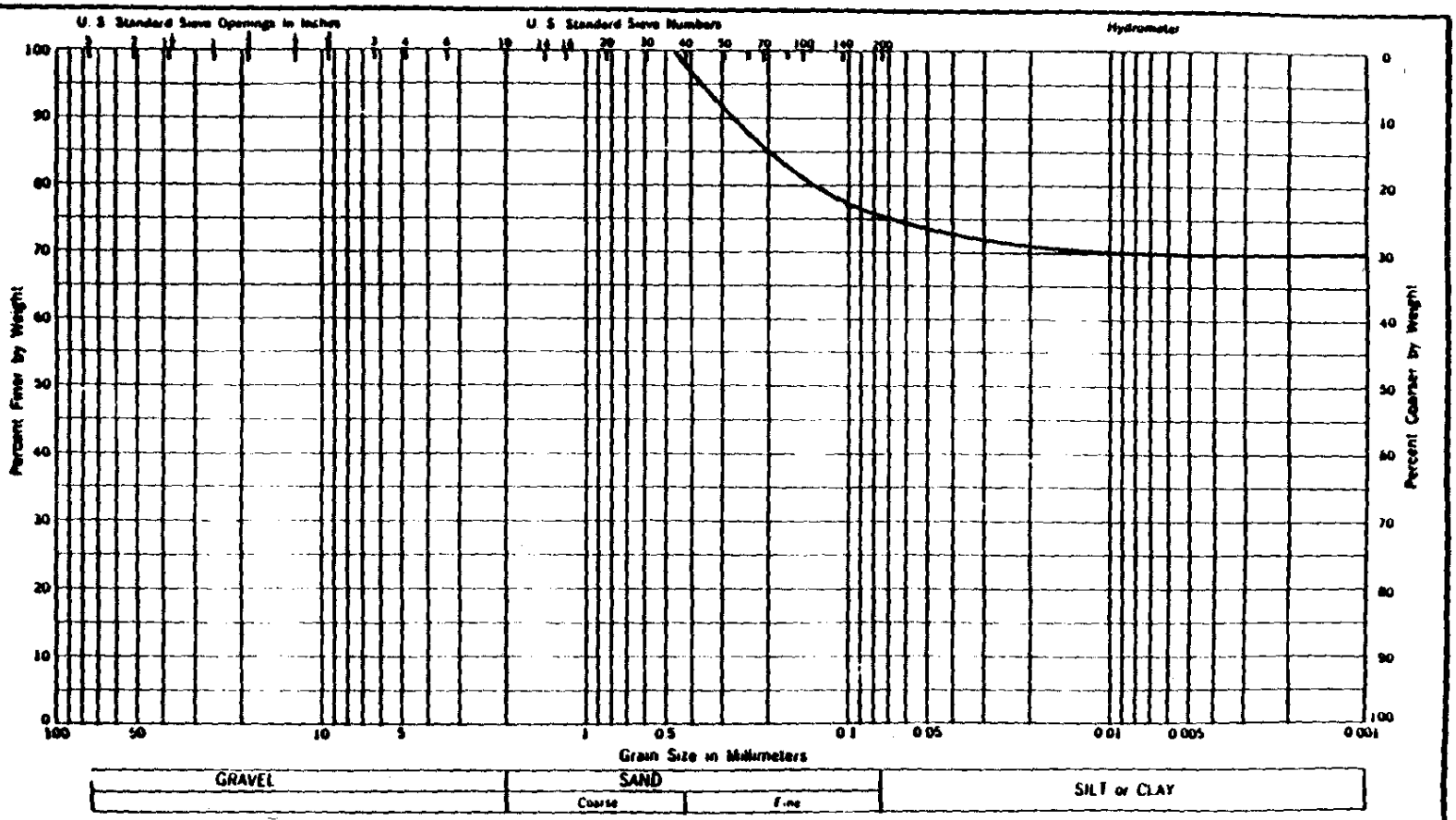
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-22	140-142'	Tan clayey sand, slightly silty with traces of limestone	Hydrogeologic Study, Phase II PSI File No. 372-55001



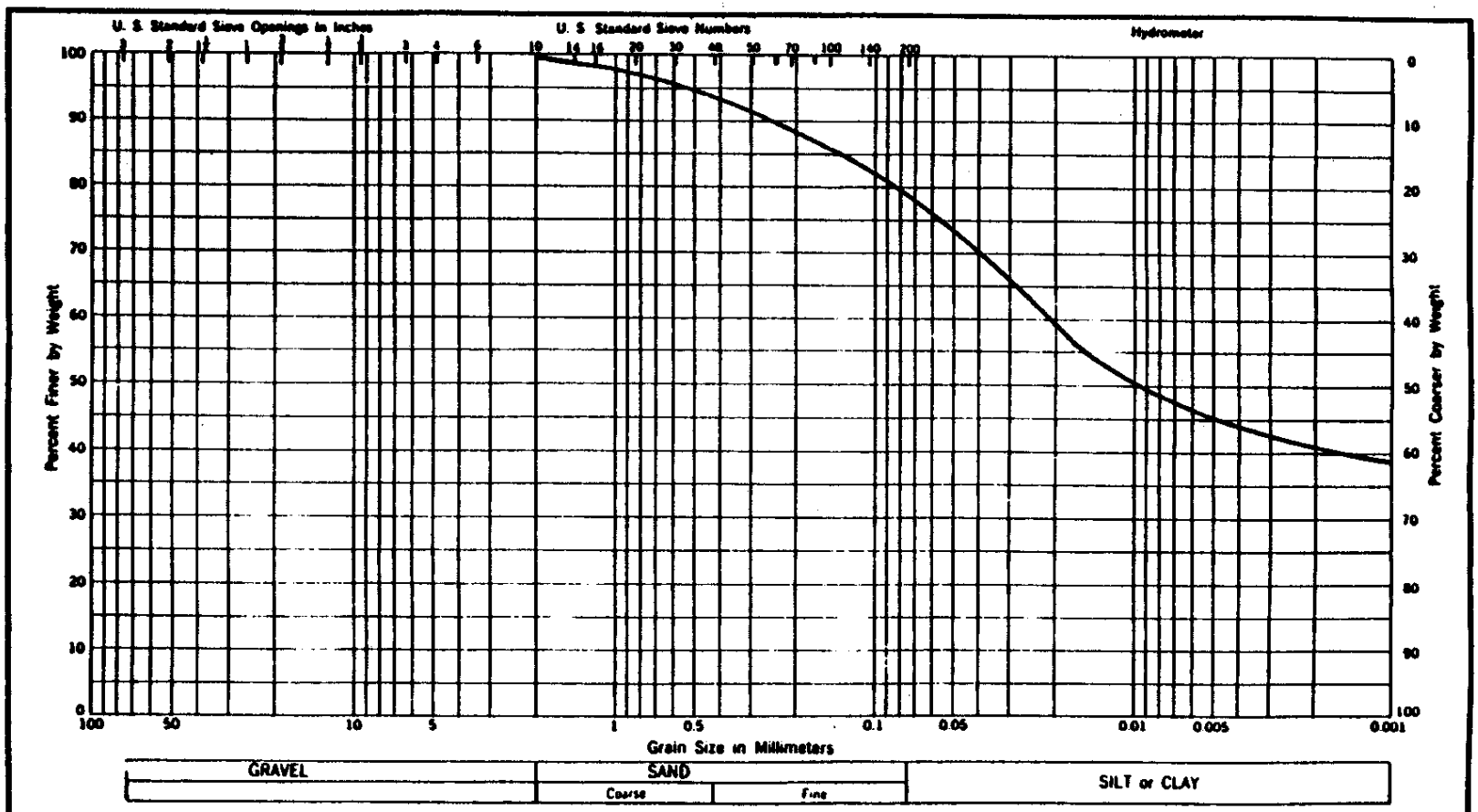
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-22	331- 333'	Light gray silty clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



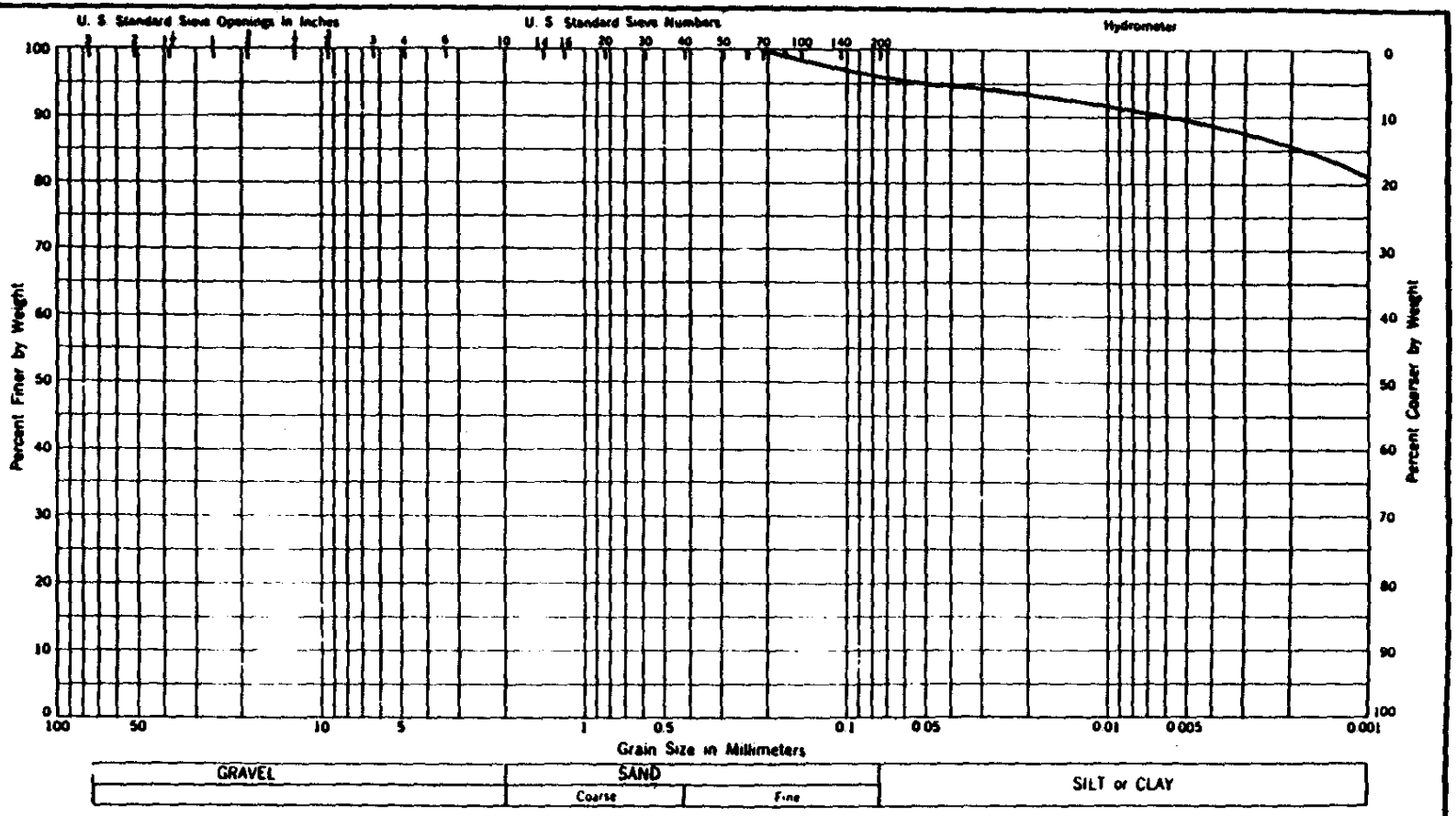
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-22	612-614'	Light and dark gray layered clay and silt with mica	Hydrogeologic Study, Phase II PSI File No. 372-55001



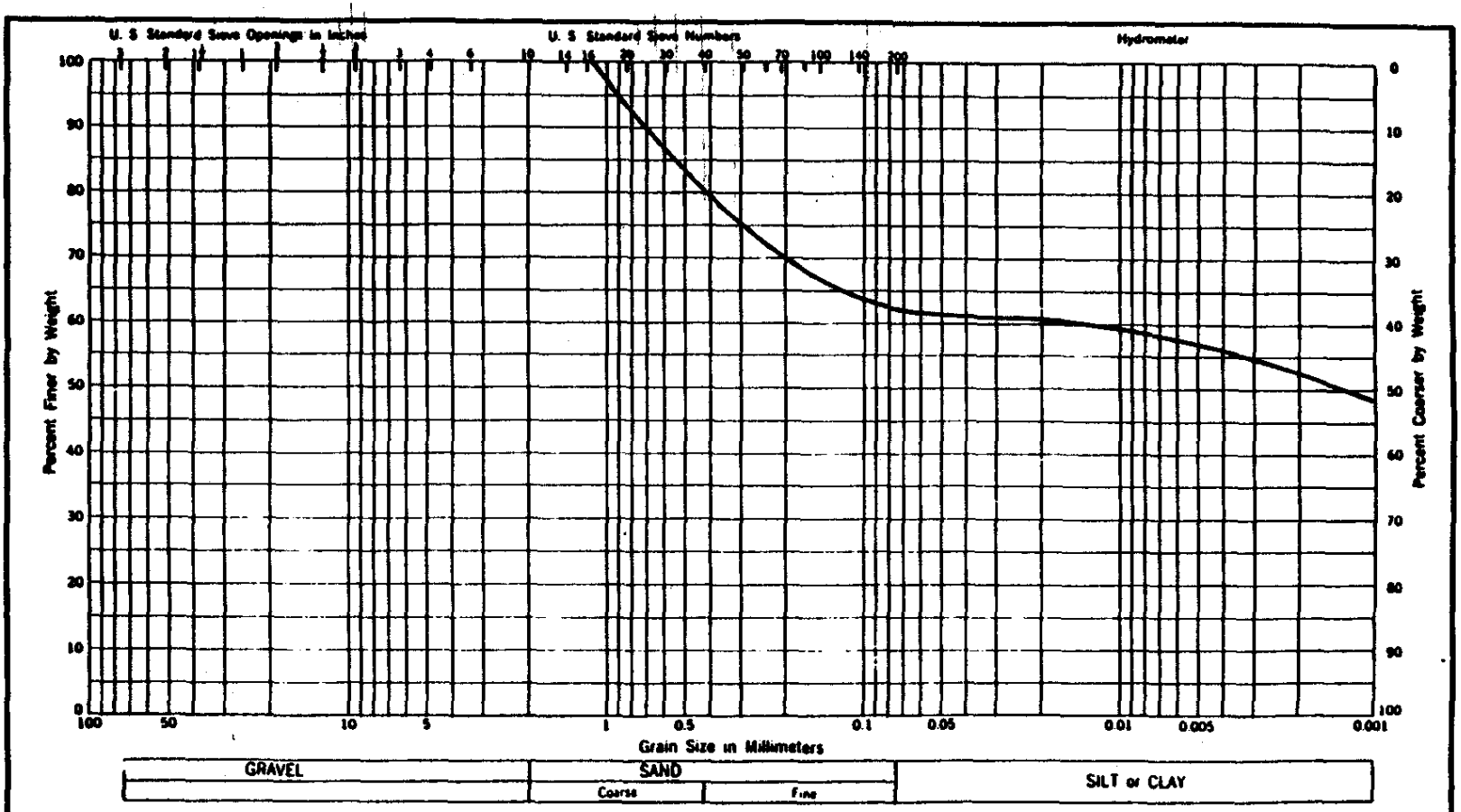
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	97-99'	Dark gray slightly silty brittle clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



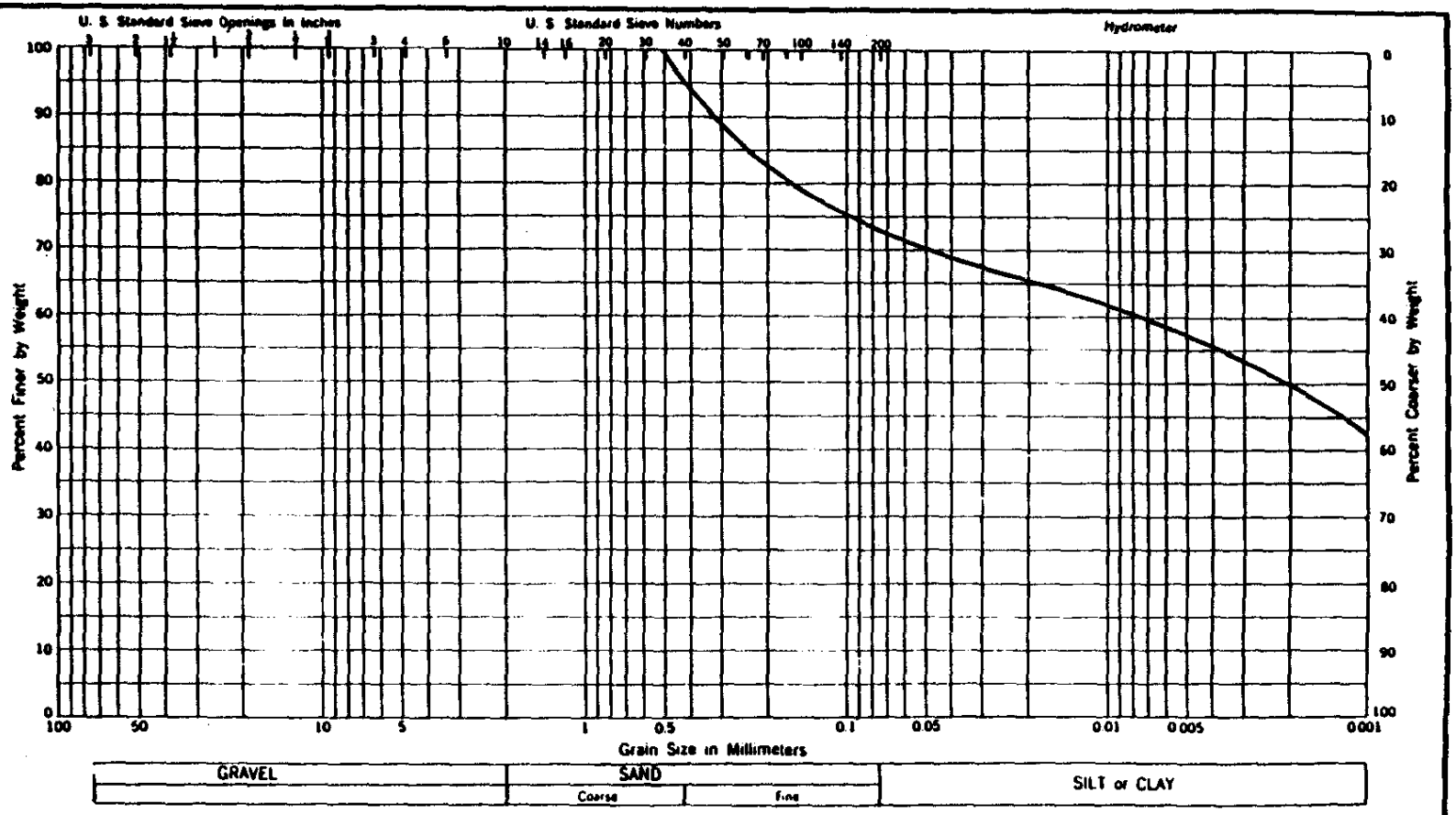
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	185-187'	Blue-gray silty clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



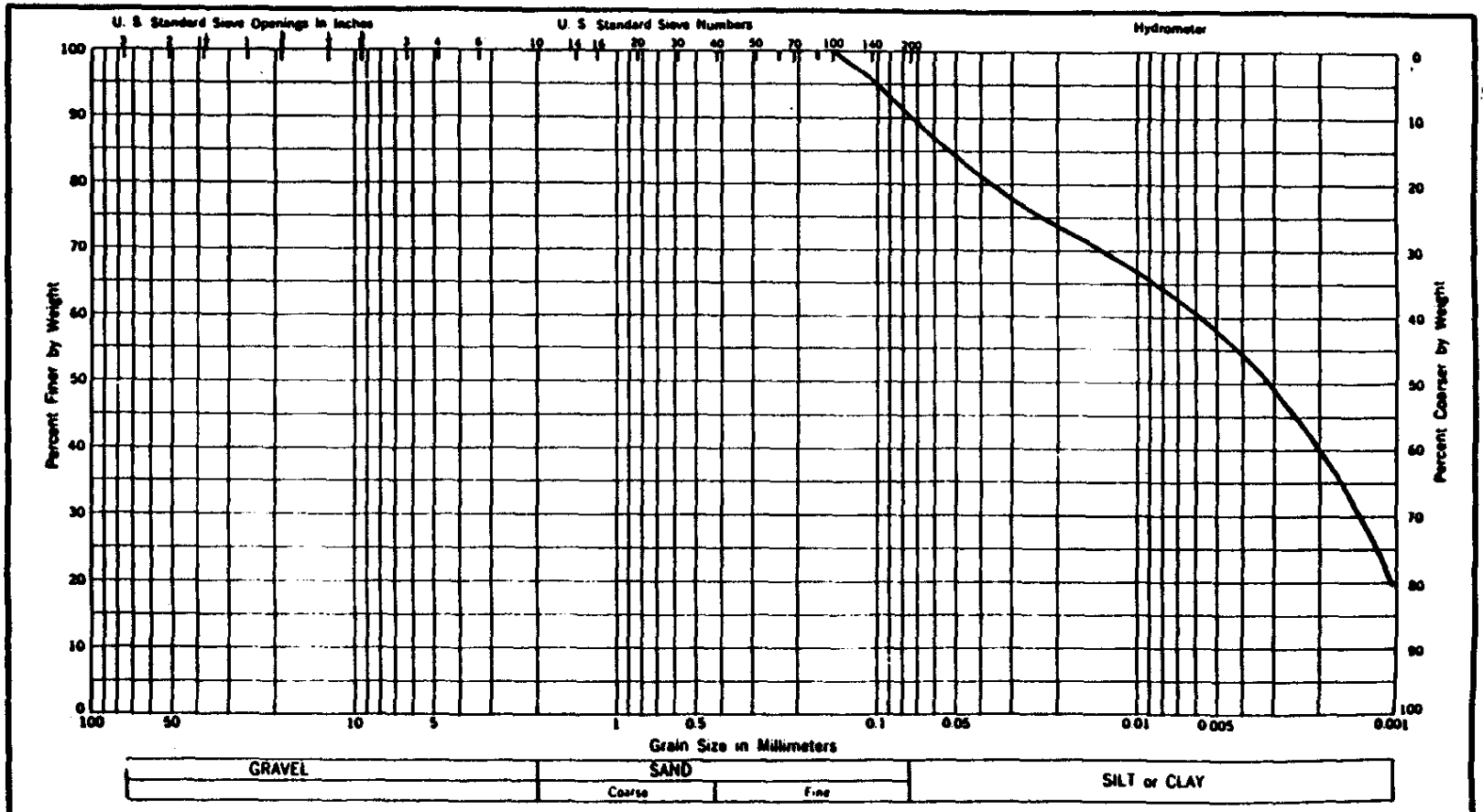
WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	224-226'	Gray, slightly silty clay with pockets of pyrite	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	301-303'	Blue-gray sandy clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	361-363'	Layered gray and brown slightly silty and sandy clay	Hydrogeologic Study, Phase II PSI File No. 372-55001



WELL CLUSTER	DEPTH	CLASSIFICATION	PROJECT
P-23	401-403'	Hard gray clayey silt	Hydrogeologic Study, Phase II PSI File No. 372-55001

Distribution, SRP Baseline Hydrogeologic Investigation - Phase II
DPST-86-674, November 1987.

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SRL Records (4)