

NASCHITTI PROSPECT

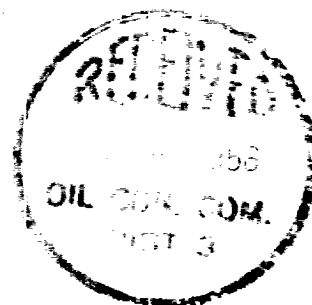
NAVAJO TRIBE # 1

SE SE SW Sec. 36, T. 22N., R. 17W.

423' TSL & 2202' FWL

SAN JUAN COUNTY, NEW MEXICO

OCT



SPUDDED AUGUST 24, 1956

COMPLETED SEPTEMBER 9, 1956

SAMPLE ANALYSIS BY VELMAR O. GUSTAFSON

NOTE: The following samples caught one per joint of drill pipe.

- 0 - 42 Sand, white to gray, very fine to fine grain, sub-rounded; some coal; some sand, gray. Very poor sample.
- 42 - 75 As above.
- 75 - 102 Shale, gray (little tan, limonitic); some sand, as above; little coal. Very poor sample.
- 102 - 151 As above; increase shale, gray.
- 151 - 164 As above; increase shale, gray.
- 164 - 194 Shale, gray (containing occasional carbonaceous particles); little sand, white to clear, very fine grain, sub-rounded; little coal.
- 194 - 225 As above; coal increase.
- 225 - 245 As above; coal decrease.

NOTE: While reaming at 120' hole began to flow small amount of water. Drilled out from under surface casing at 1:36 A.M. Tuesday, August 28, 1956.

NOTE: Samples caught every 10 feet below 245'.

- 245 - 250 Shale, gray, sticky, clayey; some sand, clear, white, gray, fine grain, sub-rounded; some coal.
- 250 - 260 Sandstone, gray, salt and pepper, fine grain, sub-angular to sub-rounded, calcareous.
- 260 - 270 Shale, gray, silty to sandy, clayey, bentonitic.
- 270 - 280 Shale, as above, some slightly carbonaceous; some sandstone, gray, salt and pepper, fine grain, sub-angular to sub-rounded, friable to very hard, pyritic.
- 280 - 290 Shale, as above; little sandstone, as above, friable.
- 290 - 300 As above; shale, very bentonitic; containing trace resinous material, light yellow to light brown, which fluoresces light yellowish-blue, no cut fluorescence.
- 300 - 310 Shale, gray, some slightly carbonaceous, bentonitic; trace of resinous material, as above.
- 310 - 320 Shale, gray, silty to sandy, bentonitic, carbonaceous with resinous material associated with carbonaceous material.

- 320 - 330 As above, less carbonaceous, less silty to sandy.
- 330 - 340 Shale, gray, silty to sandy, very slightly bentonitic.
- 340 - 350 Shale, gray, silty to sandy, bentonitic, carbonaceous.
- 350 - 360 Shale, gray, green to gray, brown, slightly silty to sandy, carbonaceous.
- 360 - 370 Shale, gray, little brown, some silty to sandy.
- 370 - 380 As above.
- 380 - 390 Shale, gray, little brown, slightly silty to sandy, slightly bentonitic.
- 390 - 400 Shale, gray, very silty to sandy (almost a fine grain sandstone) bentonitic.
- 400 - 410 Sandstone, gray, salt and pepper, very shaly, bentonitic, fine grain, sub-angular to sub-rounded. (this 10' is the same as 10' above with slight increase in sand content.)
- 410 - 420 Shale, gray, very silty to sandy, bentonitic (as in 10' above with increased shale content).
- 420 - 430 Shale, gray bentonitic; little coal.
- 430 - 440 Shale, gray, very silty to sandy, slightly bentonitic; little sandstone, gray to dark gray, well integrated; trace pyrite.
- 440 - 450 Sandstone, gray, salt and pepper, very shaly, bentonitic, fine to medium grain, sub-angular to sub-rounded, calcareous.
- 450 - 460 Shale, green to gray, very slightly bentonitic, some sandy.
- 460 - 470 Sandstone, brown to gray, fine grain, sub-angular, very well integrated, calcareous, some carbonaceous; little shale, gray, silty to sandy, calcareous.
- 470 - 480 Sandstone, gray, salt and pepper, fine grain, sub-angular to sub-rounded, good porosity, friable, calcareous, bentonitic; little shale, gray; trace sandstone, brown to gray, well integrated.
- 480 - 490 Shale, gray, green to gray to dark gray and brown to green, carbonaceous, little silty; trace sandstone, gray, fine grain, sub-rounded, slightly calcareous.
- 490 - 500 As above.
- 500 - 510 Shale, gray, little brown, slightly bentonitic; trace sandstone, dark gray, fine grain, sub-rounded, well integrated, pyritic.

510 - 520 Shale, gray, bentonitic, little silty.

520 - 530 As above.

530 - 540 As above (?). Very Poor Sample.

540 - 550 As above (?). Very, very Poor Sample.

550 - 560 Shale, gray, some silty; sandstone, gray, fine grain, sub-angular to sub-rounded, some friable, some well integrated and pyritic, few large angular pieces of quartz; little coal. Poor Sample.

560 - 570 Poor sample containing about equal amounts of sandstone, gray, fine grain, sub-angular to sub-rounded, friable; shale, gray, some silty, bentonitic; coal.

570 - 580 Shale, gray, some silty, bentonitic; little coal; trace sandstone, dark gray, fine grain, well integrated, pyritic.

580 - 590 Shale, as above; trace coal.

590 - 600 Shale, as above.

600 - 610 Shale, as above; trace sandstone, gray, fine grain, sub-rounded, shaly; trace resinous material fluorescing light blue to yellow.

610 - 620 Shale, gray, bentonitic, some slightly silty; trace coal.

620 - 630 Shale, as above.

630 - 640 Shale, as above; little sandstone, gray, fine grain, sub-angular to sub-rounded, some friable, some well integrated.

640 - 650 Shale, as above; trace sandstone, gray, fine grain, sub-angular to sub-rounded, friable; trace coal.

650 - 660 As above; sandstone increase, some sandstone calcareous; slight coal increase.

660 - 670 Sandstone, as above; some shale, as above.

670 - 680 Sandstone, gray, very fine to fine grain, shaly, sub-angular to sub-rounded, friable to moderately well integrated bentonitic; shale, as above; trace limestone, gray, argillaceous, silty.

680 - 690 As above, no limestone; trace coal.

690 - 700 As above.

700 - 710 Shale, gray, bentonitic, some slightly silty to sandy; trace coal.

- 710 - 720 Sandstone, gray, very fine to fine grain, sub-angular, to sub-rounded, friable to moderately well integrated, argillaceous to very argillaceous, bentonitic; some shale, gray, some silty, bentonitic.
- 720 - 730 As above.
- 730 - 740 Shale, as above; some sandstone, as above (?). Very Poor Sample.
- 740 - 750 Sandstone, as above, some pyritic; little shale, as above; trace coal.
- 750 - 760 Sandstone, gray, very fine to fine grain, sub-angular to sub-rounded, friable to moderately well integrated, some argillaceous, bentonitic, some pyritic; little shale, gray, bentonitic, some silty.
- 760 - 770 Shale, gray, bentonitic, some silty to sandy.
- 770 - 780 As above.
- 780 - 790 Shale, as above; sandstone, gray, very fine to fine, grain, sub-angular to sub-rounded, friable, bentonitic.
- 790 - 800 Shale, gray, bentonitic, silty to sandy; some sandstone, as above.
- 800 - 810 Shale, gray, bentonitic, some silty to sandy. Very Poor Sample.
- 810 - 820 As above.
- 820 - 830 As above, more silty (?). Very Poor Sample.
- 830 - 840 As above, less silty (?). Very Poor Sample.
- 840 - 850 As above, more silty (?). Very Poor Sample.
- 850 - 860 Sandstone, gray, salt and pepper, fine to medium grain, sub-angular to sub-rounded, calcareous, friable to well integrated; some shale, gray to dark gray.
- 860 - 870 As above, shale increase (?). Poor Sample
- 870 - 880 Shale, as above; some sandstone, as above.
- 880 - 890 Sandstone, as above; little shale, as above, some silty to sandy, some carbonaceous.
- 890 - 900 Sandstone, gray, salt and pepper, fine grain, sub-angular to sub-rounded, calcareous, moderately to well integrated; some shale, gray to dark gray, slightly bentonitic; trace shale, carbonaceous.

900 - 910 As above, little sandstone, carbonaceous and pyritic; trace coal.
 910 - 920 Shale, gray, bentonitic, some silty to sandy; little sandstone, as above; trace chalcedony.
 920 - 930 Shale, as above; trace sandstone, as above with pyrite. Poor Sample.
 930 - 940 As above, no pyrite.
 940 - 950 As above.
 950 - 960 As above, trace coal.
 960 - 970 As above, more sandy; no coal.
 970 - 980 Shale, as above; some sandstone, as above.
 980 - 990 As above, less sandstone. Very Poor Sample.
 990 - 1000 As above, slight sandstone increase; more bentonitic (both shale and sandstone.)
 1000 - 1010 Shale, as above; trace sandstone, as above.
 1010 - 1020 As above.
 1020 - 1030 As above, sample slightly more sandy. Very Poor Sample.
 1030 - 1040 Sandstone, gray, fine grain, sub-angular to sub-rounded, slightly bentonitic, friable to moderately well integrated; little shale, gray, bentonitic, some silty to sandy.
 1040 - 1050 As above, shale increase; trace sandstone, pyritic.
 1050 - 1060 Sandstone, as above and shale, as above; little coal.
 1060 - 1070 As above, slight sandstone increase; trace sandstone, pyritic; less coal.
 1070 - 1080 Shale, as above; some sandstone, as above.
 1080 - 1090 Sandstone, gray, fine grain, sub-angular to sub-rounded, calcareous, friable to moderately well integrated; some shale, gray, bentonitic, some silty to sandy.
 1090 - 1100 As above.
 1100 - 1110 As above, shale increase.
 1110 - 1120 Shale, gray, slightly bentonitic, some silty; trace sandstone, as above.

- 1120 - 1130 Sandstone, gray, very fine to fine grain, sub-angular to rounded, friable, bentonitic; some shale, as above.
- 1130 - 1140 Shale, as above; trace sandstone, as above.
- 1140 - 1150 As above.
- NOTE: Quality of samples is generally poor because of heavy drilling mud and bentonitic character of the samples.
- 1150 - 1160 Coal with yellow resinous (?) material which fluoresces light blue under ultraviolet light; little sandstone, gray, fine grain, some carbonaceous, some pyritic; little shale.
- 1160 - 1170 Shale, gray, bentonitic, some silty.
- 1170 - 1180 As above.
- 1180 - 1190 Coal, as above; some shale, as above; some sandstone, as above.
- 1190 - 1200 Sandstone, as above; some shale, as above; little coal.
- 1200 - 1210 Shale, as above; little coal; trace sandstone, as above. Very Poor Sample
- 1210 - 1220 Shale, as above; trace coal and sandstone, as above.
- 1220 - 1230 As above.
- 1230 - 1240 As above.
- 1240 - 1250 Sandstone, gray, very fine to fine grain, sub-rounded, argillaceous; some shale, gray, slightly bentonitic.
- 1250 - 1260 Shale, gray, bentonitic; trace sandstone, as above and coal.
- 1260 - 1270 Shale, gray, bentonitic, silty to sandy (?); sandstone, as above (?). Very Poor Sample.
- 1270 - 1280 Sandstone, gray, very fine to fine grain, sub-rounded, argillaceous, some carbonaceous and pyritic; shale, gray slightly bentonitic, silty to sandy.
- 1280 - 1290 As above, increase sandstone.
- 1290 - 1300 Shale, gray, some silty to sandy; some sandstone, gray, very fine to fine grain, sub-rounded; trace coal. Very Poor Sample.
- 1300 - 1310 As above, trace limestone, brown, dense.

- 1310 - 1320 Coal; some sandstone, gray, fine grain, sub-angular to sub-rounded, friable, some carbonaceous, calcareous; little shale, gray, bentonitic.
- 1320 - 1330 Shale, gray, bentonitic, some silty; trace sandstone, gray, very fine grain, argillaceous; trace coal.
- 1330 - 1340 Shale, gray, as above; shale, carbonaceous and coal. (?) Very Poor Sample.
- 1340 - 1350 Shale, gray, bentonitic; little sandstone, as above; little coal. (?) Very, very Poor Sample.
- 1350 - 1360 Sandstone, gray, very fine grain, sub-angular to sub-rounded, calcareous, some carbonaceous; some shale, gray, some silty; trace coal.
- 1360 - 1370 As above.
- 1370 - 1380 Shale, as above; little sandstone, as above; trace coal.
- 1380 - 1390 Shale, gray, bentonitic, some silty; trace coal and sandstone, as above.
- 1390 - 1400 Shale, gray, bentonitic, some silty to sandy.
- 1400 - 1410 Coal; little shale, carbonaceous and shale, gray, as above.
- 1410 - 1420 Coal and shale, gray, bentonitic, some silty.
- 1420 - 1430 Shale, as above and coal; little sandstone, gray, fine grain, calcareous.
- 1430 - 1440 Shale, gray, bentonitic, some silty; trace coal.
- 1440 - 1450 Shale, as above; some sandstone, gray, fine grain, sub-angular to sub-rounded, bentonitic.
- 1450 - 1460 Shale, gray to dark gray and black, some bentonitic, some carbonaceous; coal; sandstone, gray to dark gray, sub-angular to sub-rounded, friable, calcareous.
- 1460 - 1470 As above, coal decrease.
- 1470 - 1480 As above.
- 1480 - 1490 As above.
- 1490 - 1500 Shale, gray, bentonitic; some coal; trace sandstone, as above.
- 1500 - 1510 Sandstone, gray, fine grain to very fine grain, bentonitic, friable and shale, gray, bentonitic; little coal. Very Poor Sample.

1510 - 1520	As above.
1520 - 1530	As above.
1530 - 1540	As above.
1540 - 1550	As above; some gray shale containing plant fragments.
1550 - 1560	As above.
1560 - 1570	As above; slight coal increase.
1570 - 1580	Sandstone, gray, very fine to fine grain, some calcareous; shale, gray, bentonitic; little coal.
1580 - 1590	As above; sandstone increase.
1590 - 1600	As above; sandstone decrease.
1600 - 1610	As above.
1610 - 1620	As above; slight sandstone increase.
1620 - 1630	As above; slight sandstone increase.
1630 - 1640	As above; large shale increase.
1640 - 1650	Sandstone, gray, fine grain, slightly calcareous; little shale, gray and coal.
1650 - 1660	As above.
1660 - 1670	As above; slight shale increase.
1670 - 1680	Shale, gray, some bentonitic, some very calcareous and silty; little sandstone, as above; trace coal.
1680 - 1690	As above; less sandstone.
1690 - 1700	As above.
1700 - 1710	As above.
1710 - 1720	Shale, gray, some bentonitic, some calcareous and silty; trace sandstone, gray, fine grain, slightly calcareous and coal.
1720 - 1730	As above.
1730 - 1740	As above.

NOTE: Sample quality is generally poor, becoming good below 1630'.

1740 - 1750	Shale, gray, bentonitic, some slightly silty; little sandstone, gray, fine grain, slightly calcareous; trace coal.
1750 - 1760	As above, slight sandstone increase.
1760 - 1770	As above.
1770 - 1780	As above; trace sandstone, pyritic.
1780 - 1790	As above; sandstone increase; trace shale, green, silty.
1790 - 1800	As above; sandstone increase.
1800 - 1810	As above; shale increase; no green shale.
1810 - 1820	As above; sandstone increase.
1820 - 1830	As above; sandstone, mottled brown.
1830 - 1840	Sandstone, gray, very fine to fine grain, calcareous, well integrated; some shale, gray, fissile; trace coal.
1840 - 1850	As above; slight shale increase; trace shale, carbonaceous; trace sandstone, pyritic.
1850 - 1860	As above, shale increase; no sandstone, pyritic.
1860 - 1870	As above; trace coal.
1870 - 1880	As above; large sandstone increase.
1880 - 1890	Shale, gray, some silty; some sandstone, gray, very fine to fine grain, calcareous, well integrated.
1890 - 1900	As above.
1900 - 1910	As above; sandstone increase.
1910 - 1920	As above; shale increase.
1920 - 1930	As above; sandstone increase.
1930 - 1940	As above; trace large quartz fragments.
1940 - 1950	As above; no quartz.
1950 - 1960	Sandstone, gray, very fine to fine grain, calcareous, some pyritic, well integrated; shale gray, some silty.
1960 - 1970	As above; shale increase.

1970 - 1980	As above; sandstone increase.
1980 - 1990	As above; shale increase.
1990 - 2000	As above; shale increase.
2000 - 2010	As above; sandstone increase.
2010 - 2020	As above.
2020 - 2030	As above.
2030 - 2040	Shale, gray, some slightly silty, some slightly calcareous; sandstone, gray, very fine to fine grain, calcareous, some pyritic, well integrated.
2040 - 2050	As above; shale increase.
2050 - 2060	Shale, as above; trace sandstone, as above.
2060 - 2070	As above.
2070 - 2080	As above.
2080 - 2090	As above; slight sandstone increase.
2090 - 2100	As above; slight sandstone decrease.
2100 - 2110	As above; large sandstone increase.
2110 - 2120	Sandstone, gray, fine grain, calcareous, well integrated, trace pyritic and shale, gray, some silty, slightly calcareous, slightly bentonitic, trace carbonaceous.
2120 - 2130	As above.
2130 - 2140	As above.
2140 - 2150	As above; slight shale increase.
2150 - 2160	As above; slight shale increase.
2160 - 2170	As above; sandstone increase.
2170 - 2180	As above; slight shale increase.
2180 - 2190	As above; slight shale increase.
2190 - 2200	As above; slight sandstone increase.
2200 - 2210	As above; shale increase; trace scale, brown.

- 2210 - 2220 As above; no shale, brown.
- 2220 - 2230 Sandstone, gray to brown, fine grain, calcareous, well integrated, trace carbonaceous, trace pyritic; shale, gray, some silty to sandy, calcareous, trace carbonaceous.
- 2230 - 2240 As above; slight sandstone increase; trace coal.
- 2240 - 2250 As above; slight coal increase.
- 2250 - 2260 Shale, gray, some silty, calcareous, trace carbonaceous; sandstone, gray, very fine to fine grain, calcareous, trace carbonaceous; trace coal.
- 2260 - 2270 As above; large sandstone increase.
- 2270 - 2280 As above.
- 2280 - 2290 As above; trace limestone, white, dense.
- 2290 - 2300 As above; shale increase; no limestone.
- 2300 - 2310 As above; sandstone increase; trace pink quartz.
- 2310 - 2320 Shale, gray, some silty, slightly calcareous, slightly bentonitic, trace carbonaceous; sandstone, gray, very fine to fine grain, calcareous, trace carbonaceous; trace coal.
- 2320 - 2330 As above; shale increase.
- 2330 - 2340 As above; large sandstone increase.
- 2340 - 2350 As above.
- 2350 - 2360 As above; slight shale increase; trace sandstone, very hard, tight.
- * 2360 - 2370 As above; shale increase; some large unconsolidated quartz grains.
- 2370 - 2380 As above; sandstone increase; no large quartz grains.
- 2380 - 2390 As above; large shale increase.
- 2390 - 2400 As above; some large quartz grains.
- 2400 - 2410 As above.
- 2410 - 2420 As above.
- 2420 - 2430 Shale, gray to dark gray, trace brown, some silty, little carbonaceous; sandstone, gray, very fine to fine grain, calcareous, (one piece of sandstone has piece of aragonite imbedded in it); trace pyritic, trace carbonaceous.

* SEE NOTE ON PAGE 12

- 2430 - 2440 As above; shale increase.
- 2440 - 2450 As above; trace coal; trace large unconsolidated piece quartz.
- 2450 - 2460 Sandstone, gray, very fine to fine grain, calcareous; shale,
- gray, to dark gray, some silty, little slight carbonaceous;
trace large quartz grains.
- 2460 - 2470 As above; large increase in sand, medium to very coarse grain,
sub-angular, unconsolidated.
- 2470 - 2480 As above; shale increase; some sandstone, very hard, tight.
- 2480 - 2490 As above; large sandstone increase--mostly of the coarse grain,
unconsolidated kind (water bearing?).
- 2490 - 2500 As above; slight shale increase.
- 2500 - 2510 As above; sandstone increase, mostly coarse grain.
- 2510 - 2520 As above; slightly more fine grain sandstone (?).
- 2520 - 2530 As above; shale increase.

* NOTE: Hole made large volume (est. 50 BPH) of water at 2367'; over 100 barrels of mud were required to displace water in the hole. The hole would have had a capacity of only a little over 100 barrels at that depth. Therefore, the water almost certainly came from near the bottom of the hole (Upper Gallup). Assuming the 13 lb./gallon mud used to kill the water flow to be just heavy enough to produce an equilibrium between mud pressure and formation pressure, the formation pressure may be calculated to be approximately 1600# per square inch. (Depth in feet x mud weight in lbs./gal. x .052)

- 2530 - 2540 Shale, gray to dark gray, some silty, some calcareous, some slightly carbonaceous; little sandstone, gray to dark gray, very fine to fine grain, calcareous (one piece sandstone has vein (?) aragonite).
- 2540 - 2550 As above; both shale and sandstone more carbonaceous.
- 2550 - 2560 As above; increase in sandstone, as above, hard and tight.
- 2560 - 2570 Shale, gray to dark gray, some limonitic stained, some silty, some carbonaceous; sandstone, gray, fine to coarse grain, calcareous, little pyritic (much is loose sand in sample); trace coal.
- 2570 - 2580 Shale, as above; trace sandstone, as above.

- 2580 - 2590 Shale, gray (mostly dark gray), some silty, more carbonaceous than above; some coal; trace sandstone, as above.
- 2590 - 2600 Shale, as above; sandstone, as above; coal.
- 2600 - 2610 Shale, gray (mostly light gray), some silty to sandy, not carbonaceous nor calcareous, many large pieces in sample; trace sandstone, as above; trace coal and shale, carbonaceous.
- 2610 - 2620 As above.
- 2620 - 2630 As above.
- 2630 - 2640 Shale, as above; sandstone represented in sample by large unconsolidated quartz grains medium to coarse, sub-angular to sub-rounded. (water bearing?)
- 2640 - 2650 Sandstone, gray, fine to coarse grain (generally more fine grain than 10' above), fine grain is well cemented and calcareous, coarse grain is friable and non-calcareous; coal and shale, carbonaceous.
- 2650 - 2660 As above; shale increase.
- 2660 - 2670 As above; sandstone increase.
- 2670 - 2680 Sandstone, gray, fine grain to coarse grain, non-calcareous, well integrated; shale gray to dark gray, some slightly silty; trace coal and shale, carbonaceous; trace sand, coarse grain, unconsolidated.
- 2680 - 2690 As above; large sandstone increase.
- 2690 - 2700 As above; increase in carbonaceous material.
- 2700 - 2710 As above.
- 2710 - 2720 As above; large shale increase; trace sandstone, pyritic.
- 2720 - 2730 As above; sandstone increase, mostly coarse unconsolidated sand.
- 2730 - 2740 As above; increase in sandstone, very fine grain.
- 2740 - 2750 As above; shale increase.
- 2750 - 2760 Shale; as above; trace sandstone, very fine to fine grain, as above.
- 2760 - 2770 As above.
- 2780 - 2790 As above; slight sandstone increase (mostly dark gray).

2790 - 2800 As above.

2800 - 2810 As above; increase in shale, dark gray, carbonaceous.

2810 - 2820 Shale, gray to dark gray, some slightly silty; coal and shale, carbonaceous; little sandstone, gray, fine to coarse grain, sub-angular to sub-rounded, some calcareous (mostly large unconsolidated sand grains).

2820 - 2830 Shale, as above; coal and shale, carbonaceous; little sandstone, as above; little limestone, white, dense.

2830 - 2840 Shale, gray to dark gray, some silty (slightly); little sandstone, gray, fine to coarse grain, sub-angular to sub-rounded, some calcareous, many large unconsolidated sand grains; coal and shale, carbonaceous; trace limestone, white, dense.

2840 - 2850 As above; increase in limestone.

2850 - 2860 As above; slight increase in sandstone (trace pyritic sandstone).

2860 - 2870 As above; increase in sandstone (mostly fine grain, unconsolidated).

2870 - 2880 As above; sandstone, consolidated.

2880 - 2890 As above; less sandstone.

2890 - 2900 Shale, as above; little sandstone, as above; trace limestone, white, dense.

2900 - 2910 As above.

2910 - 2920 As above; sandstone increase.

2920 - 2930 As above; less sandstone, more carbonaceous.

2930 - 2940 As above; sandstone increase; large limestone increase.

2940 - 2950 As above; limestone decrease; much shale is light green.

2950 - 2960 As above; sandstone decrease (sandstone is more integrated).

2960 - 2970 As above; sandstone increase (mostly in well integrated very calcareous variety).

2970 - 2980 Shale, gray to dark gray, much carbonaceous, little slightly silty; little sandstone, gray to dark gray, very fine to fine grain, calcareous, well integrated.

2980 - 2990	As above; sandstone increase; trace limestone, brown to clear, crystalline.
2990 - 3000	As above; shale increase (most shale in this sample is dark gray).
3000 - 3010	Shale, gray to dark gray (<u>mostly dark</u>) much carbonaceous, little slightly silty; sandstone, gray to dark gray (most dark), very fine to fine grain, calcareous, well integrated.
3010 - 3020	As above; some shale, brown (claystone).
3020 - 3030	As above.
3030 - 3040	As above.
3040 - 3050	As above; slight sandstone increase; trace limestone, white, dense. (vein?)
3050 - 3060	As above; slight decrease in sandstone; trace limestone, as above.
3060 - 3070	As above; slight sandstone decrease; no limestone; shale, less carbonaceous.
3070 - 3080	As above; trace limestone, brown, dense.
3080 - 3090	As above; no limestone.
3090 - 3100	Shale, gray to dark gray; trace sandstone, gray, very fine to fine grain, calcareous.
3100 - 3110	As above.
3110 - 3120	Shale, as above and sandstone, as above; trace limestone, white, vein?
3120 - 3130	As above; sandstone decrease; no limestone.
3130 - 3140	As above; sandstone decrease.
3140 - 3150	As above.
3150 - 3160	As above; sandstone increase.
3160 - 3170	As above; sandstone decrease; trace limestone, white to brown-gray, dense.
3170 - 3180	Shale, gray to dark gray, trace sandstone, as above.
3180 - 3190	As above; slight sandstone increase; limestone, white to light gray, marly.
3190 - 3200	As above; sandstone increase; no limestone.

- 3200 - 3210 As above; sandstone increase; trace limestone, white, dense.
- 3210 - 3220 As above; sandstone decrease; no limestone.
- 3220 - 3230 As above; slight sandstone increase; trace limestone, white, dense; little shale, very slightly calcareous.
- 3230 - 3240 Shale, gray to dark gray, little slightly calcareous;; little sandstone, gray, very fine to fine grain (trace large unconsolidated sand grains), calcareous; trace limestone, white, dense.
- 3240-3250 Shale, as above; sandstone, as above, slight increase; little limestone, tan, marly; trace limestone, white, dense; trace anhydrite, gray.
- 3250 - 3260 As above; slight sandstone decrease; tan limestone decrease; white limestone increase.
- 3260 - 3270 Shale, as above; little sandstone, as above; trace anhydrite, gray.
- 3270 - 3280 Shale, gray to dark gray, little calcareous; little sandstone, gray, very fine to fine grain, calcareous; trace limestone, white, dense.
- 3280 - 3290 As above; slight sandstone increase; trace shale, pyritic.
- 3290 - 3300 As above; slight sandstone increase; trace sandstone, pyritic; trace limestone, brown, argillaceous.
- 3300 - 3310 Shale, as above, trace pyritic; sandstone, as above, much unconsolidated sand, fine to coarse grain, angular to sub-angular; trace limestone, brown.
- 3310 - 3320 As above; no limestone, brown.
- 3320 - 3330 As above.
- 3330 - 3340 Shale, as above; little sandstone, gray, very fine to fine grain, calcareous; trace coal.
- 3340 - 3350 As above; increase in sandstone, unconsolidated.
- 3350 - 3360 Shale, gray to dark gray; little sandstone, gray, very fine to fine grain, calcareous, trace pyritic.
- 3360 - 3370 As above; slight sandstone decrease; trace coal.
- 3370 - 3380 As above; slight sandstone increase; trace limestone, pink, some argillaceous.

3380 - 3390 As above; trace shale, green to gray, bentonitic.

3390 - 3400 As above.

3400 - 3410 As above; slight sandstone increase.

3410 - 3420 Shale, gray to dark gray, some slightly calcareous and bentonitic; sandstone, gray, very fine to fine grain, calcareous.

3420 - 3430 Sandstone, as above, clean and porous (water ?), some brown; shale, as above; trace limestone, white to pink (vein ?); trace pyritic sandstone and shale.

3430 - 3440 As above; sandstone increase; no pyritic shale or sandstone.

3440 - 3450 As above; slight sandstone decrease; trace pyritic sandstone and shale.

3450 - 3460 As above; slight sandstone decrease.

3460 - 3470 As above; sandstone decrease; no limestone, no pyritic sandstone or shale.

3470 - 3480 As above; slight sandstone decrease.

3480 - 3490 As above; sandstone increase.

3490 - 3500 As above; sandstone decrease.

3500 - 3510 As above; sandstone decrease; little coal.

3510 - 3520 Shale, gray to dark gray; sandstone, gray, fine grain, slightly calcareous, little pyritic; coal.

3520 - 3530 As above; increase in sandstone, mostly unconsolidated (water?).

3530 - 3540 As above; increase sandstone, unconsolidated.

3540 - 3550 As above; sandstone decrease; trace coal.

3550 - 3560 As above; slight increase in sandstone, unconsolidated.

3560 - 3570 As above; slight sandstone increase.

3570 - 3580 As above; large decrease in sandstone; one large piece green shale.

3580 - 3590 As above; large increase in sandstone, mostly unconsolidated.

3590 - 3600 Shale, gray to dark gray, little sandstone, gray, fine grain, calcareous; trace limestone, brown, dense; trace coal; trace green gray shale.

- 3600 - 3610 Shale, as above; sandstone, as above, mostly unconsolidated (water?).
- 3610 - 3620 Shale, gray to dark gray; sandstone, gray, fine grain, calcareous with calcareous seams; trace blue-gray shale; trace green-gray shale; trace green-gray sandstone; trace brown siltstone and sandstone.
- 3620 - 3630 Shale, gray to dark gray; sandstone, gray, fine grain, calcareous; trace bright green sandstone; trace shale, gray to green.
- 3630 - 3635 Shale, gray to dark gray; trace sandstone, gray, fine grain, calcareous; trace shale, blue-gray; trace sandstone, green.
- 3635 - 3640 As above.
- 3640 - 3645 Shale, gray to dark gray; little shale, green; trace sandstone, gray, fine grain, calcareous.
- TD: 3645'.