

OPERATOR: Columbia Gas Transmission Corp.
 FARM: Penn-Virginia Corp. #2
 WELL NO. 20053-T
 LOCATION: Wise County
 4200' S of 36° - 57' - 30"
 5100' W of 82° - 50'
 ELEVATION: 2995.03' GR.
 TOTAL DEPTH: 7081'
 DRILLING COMMENCED: May 26, 1975
 WELL COMPLETED: July 11, 1975
 RESULT: Dry Hole

WELL LOG

DEPTH
(feet)

0-150	No samples.
150-160	Sandstone - very light to light gray (N8-N7), medium to coarse, angular to subangular, poor sorting; siliceous; moderately clean; sparse large muscovite flakes; very sparse chlorite; coal.
160-200	No sample.
200-210	Sandstone - medium gray (N5); very fine to fine, subangular, moderately sorted; siliceous, dirty - 45% fine rock fragments; fine laminae of carbonaceous material; sparse local mica.
210-220	Sandstone - as 200-210.
220-230	Sandstone - as above.
230-240	Sandstone - as above.
240-250	Sandstone - as above.
250-260	Sandstone - as above; 30%± rock fragments - siderite, biotite? or dark rock fragments, mica.
260-270	No sample.
270-280	Sandstone - light gray (N7); very fine to fine, subangular, moderately poor sorting; siliceous; 15% large particles of mica, chlorite, siderite and carbonaceous matter; hard.
280-290	Sandstone - as 270-280.
290-300	Sandstone - as above.
300-310	Sandstone - as above; becoming locally darker gray due to locally abundant carbonaceous matter.
310-330	No sample.

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DEPTH
(feet)

- 330-340 Sandstone - light gray (N7); very fine to medium, subangular, moderately poor sorting; siliceous; hard; 15%± large rock fragments - micas, siderite.
- 340-350 Shale - medium dark to dark gray (N4-N3); fissile; massive; carbonaceous material - plant fragments; local mica; coal.
- 350-360 Sandstone - as 330-340; thin, sandy coal.
- 360-370 Sandstone - as 330-340; thin, sandy coal interlaminated.
- 370-380 Sandstone - as 330-340; fine to coarse grained, some very coarse grains; grains of coal.
- 380-390 Sandstone - as 370-380.
- 390-400 Sandstone - as 370-380; no coal; sparse feldspar.
- 400-410 Sandstone - as 370-380; sparse large fragments of siltstone and medium gray sandstone.
- 410-420 Sandstone - as 370-380; some quartz grains appear to be milky and light smoky; "bronze mica"; fuschite.
- 420-430 Shale - as 340-350; coal.
- 430-440 Sandstone/Siltstone - 50% each, interbedded; medium gray (N5); Sandstone - very fine to fine, subangular, moderate sorting; siliceous; "dirty" - 35%± fine, dark rock fragments; mica; and Siltstone, sandy, massive, abundant, very fine quartz grains; fine coal laminae and carbonaceous masses.
- 440-450 Sandstone/Siltstone - as 430-440.
- 450-460 Sandstone/Siltstone - as 430-440; coal fragments.
- 460-470 Sandstone - light gray (N7); fine to medium, subangular, moderate sorting; siliceous; hard; 5-15% large fragments of siderite and micas; fragments of darker sandstone; coal on shale fragments - 1 fragment with thick section of coal, showing internal bright banding conchoidal fracture, and sulfur bands.
- 470-480 Sandstone - medium to medium dark gray (N5-N); as 460-470; abundant carbonaceous material in fine laminae throughout sandstone; abundant fragments of dark rock.
- 480-490 Sandstone - light gray (N7) and medium dark gray (N4) - 50% each; light gray as 460-470 and medium dark gray as 470-480; interbedded; large mica fragments; carbonaceous material.
- 490-500 Sandstone - interbedded as 480-490.

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500-510 Sandstone - light gray (N7); as 460-470; large mica flakes.

510-520 Sandstone - as 460-470; large mica flakes and carbonaceous material on bedding surfaces, sparse amounts of large grains of siderite, mica, rock fragments and carbonaceous material; sparse clear, coarse sized quartz grains - one with (partial) crystal faces and sparse frosting; angular grains also.

520-530 Sandstone - as ; sparse mica and rock fragments.

530-540 Sandstone - as above.

540-550 Sandstone - as above.

550-560 Sandstone - as above.

560-570 Sandstone - as above.

570-580 Siltstone - medium gray (N5); massive, hard; carbonaceous; coal with plant impressions, concoidal fractures; mica mixed in with coal and carbonaceous material on bedding surface.

580-590 Sandstone/Siltstone - siltstone as 570-580 interbedded with medium dark gray sandstone; carbonaceous material on bedding surfaces; Sandstone - medium gray, fine to medium, subangular, moderately poor sorting; siliceous; 15%± rock fragments, mica and siderite.

590-600 Sandstone/Siltstone - as above; coal.

600-610 No sample.

610-620 Sandstone - light gray to medium light gray (N6); fine to medium, subangular, moderate to moderately poor sorting; siliceous; abundant mica; carbonaceous material with mica in laminae; abundant rock material; sparse siltstone fragments.

620-630 Sandstone - as 610-620; sparse siltstone fragments.

630-640 Sandstone - as 610-620; no siltstone.

640-650 Sandstone - as 610-620.

650-660 Sandstone - as 610-620.

660-670 Sandstone - as 610-620.

670-680

680-690 Siltstone - medium gray (N5); massive, hard, carbonaceous.

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690-700 Siltstone - as 680-690.

700-710 Sandstone - light gray (N7); fine to coarse, subangular, moderate sorting; siliceous; sparse fine rock fragments; 40%± Siltstone - as 680-690; coal.

710-720 Sandstone - as 700-710; 40%± Siltstone.

720-730 Sandstone - as 700-710; 20%± siltstone.

730-740 Sandstone - as 700-710; sparse very coarse grains, coal (wood structure) fragments and grains in sandstone.

740-750 Sandstone - as 700-710; coal - large, dull, blocky fragments with bright banding; sparse fragments bright, concoidal fracture.

750-760 Siltstone - medium gray (N5); massive, sparsely sandy in local areas grading into silty sandstone; carbonaceous by fine particles in both siltstone and sandstone; sandstone is very fine, subangular, appears poorly sorted due to siltiness and abundance of coal and dark rock fragments.

760-770 No sample.

770-780 Siltstone - as 750-760; coal.

780-790 Sandstone - very light gray (N8); very fine to medium, angular and subangular, moderately well sorted; siliceous; brittle; moderate amounts of mica; local areas of rock fragments; 15% siltstone; coal, bright, concoidal fracture.

790-800 Sandstone - as 780-790; iron stains; rock fragments; porous (?) or calcareous.

800-810 Sandstone - as 790-800.

810-820 Sandstone - as 790-800; no siltstone; calcareous.

820-830 Sandstone - as 790-800; calcareous - possibly as cement; 40%± Siltstone - medium dark gray (N4); massive; carbonaceous.

830-840 Sandstone - as 820-830; coal.

840-850 Sandstone - as 820-830.

850-860 Siltstone - as in 820-830; micaceous.

860-870 Siltstone - as 820-830.

870-880 Siltstone - as 820-830; locally finely sandy with black, fine rock fragments.

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880-890	Siltstone - as 820-830; sparse amounts of sandy siltstone.
890-900	Sandstone - medium dark gray (N4); very fine to fine, subangular, moderately fine sorting; siliceous; hard; silty; abundant fine rock material; coal; local abundant mica.
900-910	Sandstone - as 890-900; coal.
910-920	Sandstone - very light gray (N8); very fine to medium, subangular, moderate sorting; siliceous; hard; 15%± fine rock fragments and mica - muscovite, green and bronze; sparse coal fragments; sparse feldspar.
920-930	Sandstone - as 910-920.
930-940	Sandstone - as 910-920; sparse medium dark gray siltstone; coal; grains of <u>rose quartz</u> (?).
940-950	Sandstone - as 910-920; coal fragments.
950-960	Sandstone - as 910-920; rose quartz.
960-970	Sandstone - as 910-920; coal on siltstone fragments with <u> </u> and plant fragments abundant; mica on bedding surfaces.
970-980	Sandstone - as 910-920; rose quartz, 5% rock fragments and muscovite mica.
980-990	Sandstone - as 970-980.
990-1000	Sandstone - as 970-980.
1000-1010	Sandstone - as 970-980.
1010-1020	Sandstone - as 970-980.
1020-1030	Sandstone - as 910-920; no rock fragments; mica.
1030-1040	Sandstone - as above.
1040-1050	Sandstone - as above.
1050-1060	Sandstone - as above.
1060-1070	Sandstone - medium dark gray (N4); very fine to medium, subangular, moderate to poor sorting; siliceous; abundantly silty grading locally to a sandy siltstone; carbonaceous fragments; sparse mica.

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DEPTH
(feet)

1070-1080 Sandstone - medium gray (N5); as 1060-1070; sparse coarse quartz grains; moderate siltstone laminae on interbed faces.

1080-1090 Sandstone - as above.

1090-1100 Sandstone - light olive gray (5Y 6/1); fine to coarse, sub-angular to subrounded, with sparse angular grains, moderately poor sorting; siliceous; micas-chlorite.

1100-1120 No sample.

1120-1130 Sandstone - as 1090-1100.

1130-1140 Sandstone - as above.

1140-1160 No samples.

1160-1170 Sandstone - as 1090-1100; masses of carbonaceous matter, siltstone fragments and mica.

1170-1180 Sandstone - as 1160-1170; local coal and mica fragments.

1180-1190 Sandstone - as 1160-1170; sparse coal.

1190-1200 No sample.

1200-1210 Sandstone - medium light gray (N6); fine to coarse, subangular with sparse angular grains, moderate sorting; siliceous; silty; micaceous; coal; 10%± shale fragments (dark gray).

1210-1220 Sandstone - as above.

1220-1230 Sandstone - as above.

1230-1240 Sandstone - as above.

1240-1250 No sample.

1250-1260 Sandstone/Siltstone - sandstone as above; interbedded (?) with Siltstone (dark gray), hard.

1260-1270 Siltstone - dark gray (N3); hard; finely sandy; carbonaceous locally and sparse mica.

1270-1280 Siltstone - as 1260-1270.

1280-1290 Siltstone - as above; no carbonaceousness.

1290-1300 Siltstone - as above.

1300-1410 No samples.

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1410-1420 Siltstone - as 1260-1270.

1420-1430 Siltstone - as above.

1430-1440 Siltstone - as above.

1440-1450 Siltstone - as above.

1450-1460 Sandstone - medium gray (N5); fine to medium grained, subangular, moderate sorting; siliceous; brittle; silty; sparse mica; sparse coal in fragments and fine fragments of plant debris.

1460-1470 Sandstone - as 1450-1460.

1470-1480 Sandstone - as above.

1480-1490 Sandstone - as above.

1490-1500 Sandstone - as above; fine to coarse grained; moderate amounts of mica in flakes of "coarse grained" (Wentworth scale) size.

1500-1580 No samples.

1580-1590 Siltstone - dark gray (N3); hard; very fine sand grains; occasional larger sand grains, carbonaceous.

1590-1600 Siltstone - as 1580-1590.

1600-1610 Siltstone - as above.

1610-1620 Siltstone - as above.

1620-1630 Siltstone - as above, no sand.

1630-1640 No samples.

1640-1650 Sandstone/Siltstone - 50% each; sandstone - very light gray (N8), fine to coarse grained, subangular to sparse rounded, moderately sorted; siliceous; clean; interbedded with Siltstone, dark gray (N3); hard; carbonaceous.

1650-1660 Sandstone/Siltstone - as 1640-1650.

1660-1670 Sandstone/Siltstone - as above.

1670-1800 No samples.

1800-1810 Siltstone - medium dark gray (N4); hard; micaceous on bedding surface; locally sandy.

1810-1820 Siltstone - as 1800-1810; coal; sparse coarse quartz grains.

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(feet)

1820-1830	
1830-1840	Siltstone - as above.
1840-1850	Siltstone - as above.
1850-1860	Siltstone interbedded with Sandstone - 50% siltstone as above; 50% sandstone - medium gray (N5); fine to coarse, subrounded, poorly sorted; siliceous; 20% rock fragments; iron oxide fragments; coal fragments; brownish gray (5YR 4/1) siltstone fragments; mica; feldspar.
1860-1870	Siltstone/Sandstone - as above; coal fragments.
1870-1880	Siltstone/Sandstone
1880-1890	Siltstone/Sandstone
1890-1900	Siltstone - as above.
1900-2000	No samples.
2000-2010	Siltstone/Sandstone - sandstone as 1850-1860; green mica and <u>Siltstone</u> , as above.
2010-2020	Siltstone/Sandstone - as 2000-2010.
2020-2030	Siltstone/Sandstone - as above.
2030-2040	No samples.
2040-2050	Siltstone - medium dark gray (N4); hard.
2050-2060	Siltstone - as above.
2060-2070	?
2070-2080	No sample.
2080-2090	Sandstone - medium gray (N5); fine to medium, subangular, moderate sorting; siliceous; mica; rock fragments; 10% siltstone fragments.
2090-2100	Sandstone - as 2080-2090.
2100-2110	Sandstone - as above.
2110-2120	No samples.

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2120-2130	Siltstone - medium dark gray (N4); firm, massive; coal - blocky, dull with plant impressions.
2130-2140	Siltstone - as 2120-2130.
2140-2150	Siltstone - as above, moderate amounts crushed sandstone.
<u>2150-2160</u>	<u>Siltstone - as 2120-2130; no coal.</u>
2160-2170	
2170-2180	Siltstone - as above.
2180-2190	Siltstone - as above.
2190-2200	Siltstone - as above.
2200-2500	No samples.
2590-2600	Sandstone - very light gray (N8); very fine to medium, angular to subangular, *moderate sorting; siliceous; <u>clean</u> ; *sparse rounded grains with abraded surfaces; sparse rock and mica fragments.
2600-2610	Sandstone - as above.
2610-2620	Sandstone - white! (N9); medium to coarse, angular to subangular; <u>hard</u> ; <u>clean</u> .
2620-2630	Sandstone - as above; coal; fine to coarse.
2630-2640	Sandstone - color as 2610-2620; fine to coarse, subangular, moderate sorting; siliceous; hard; clean.
2640-2650	Sandstone - as above.
2650-2660	Sandstone - as above.
2660-2670	Sandstone - as above.
2670-2680	Sandstone - as above; sparse coal, mica fragments.
2680-2690	Sandstone - as above; coal.
2690-2700	Sandstone - as 2610-2620; fine to coarse; angular to subangular; no coal.
2700-2710	No sample.
2710-2720	Sandstone - as 2610-2620; rounded, very coarse grains, poor sorting; siltstone fragments (medium gray) showing slickensides.

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(feet)

2720-2730 Sandstone - white (N9); medium to very coarse, with pebble fragments, angular to subangular, moderately poor sorting; siliceous; clean; hard; feldspar fragments (?); 3-5% siltstone fragments, not in sandstone.

2730-2740 Sandstone - as above.

2740-2750 Sandstone - as above.

2750-2760 Sandstone - light gray to very light gray (N7 - N8), as above; pebble fragments and small entire pebbles; 1-3% fine siltstone fragments in sandstone.

2760-2770 Sandstone - as above.

2770-2780 Sandstone - as 2720-2730.

2780-2790 Sandstone - as above.

2790-2800 Sandstone - as above; 5% siltstone, medium gray; coal.

2800-2810 Sandstone - as 2790-2800; siltstone - grayish black (N2); soft, massive, some fissility; highly carbonaceous.

2810-2820 Siltstone - medium dark gray (N4); massive; soft.

2820-2830 Sandstone/Siltstone - 40% Sandstone, light gray (N7), fine to coarse grained, angular and subangular, poorly sorted; siliceous; subgraywacke; sparse visible feldspar; 15-20% iron oxide and black rock fragments; sparse coal; 10% Sandstone - same color, fine to medium, subangular, moderate sorting; siliceous; 10% very fine rock fragments; and 50% Siltstone - grayish black (N2); some fissility; carbonaceous; soft, grading into siltstone with visible sand grains and mica (flakes); coal (sparse).

2830-2840 Sandstone/Siltstone - sandstone, as 10% type of 2820-2830; siltstone as 2820-2830; coal.

2840-2850 Sandstone/Siltstone - as above; no coal.

2850-2860 No sample.

2860-2870 Siltstone - medium dark gray (N4); massive; soft; carbonaceous on bedding planes; very fine mica in sparse, local amounts.

2870-2880 Siltstone - as 2860-2870.

2880-2890 Siltstone - as above.

2890-2900 Siltstone - as above.

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(feet)

2900-2910	Siltstone - as above.
2910-2920	Siltstone - as above.
2920-2930	Siltstone - as above.
2930-2940	Siltstone - as above.
2940-2960	No samples.
2960-2970	Siltstone - as above.
2970-2980	Sandstone, silty - medium light gray (N6); very fine grained, subangular, moderately well sorted; siliceous; silty; with fragments of brownish gray (5YR 6/1), medium and dark gray siltstones.
2980-2990	Sandstone - light gray (N7); fine to medium, subangular, moderate sorting; siliceous; hard; clean; sparse siltstone fragments.
2990-3000	Siltstone - dark gray (N3); firm, carbonaceous.
3000-3010	Siltstone - as 2990-3000.
3010-3020	Sandstone - light to very light gray (N8-N9); fine to coarse grained, subangular, moderately well sorted; siliceous; clean; brittle; 1% fine rock fragments.
3020-3030	Sandstone - as above; silty.
3030-3040	No samples.
3040-3050	Sandstone - as above.
3050-3060	Sandstone - as above.
3060-3110	No samples.
3110-3120	Siltstone - medium dark gray (N4); massive; soft.
3120-3130	Siltstone - as above.
3130-3150	No samples.
3150-3160	Sandstone - very light gray (N8), fine to medium, subangular, moderate sorting; siliceous; clean; very sparse rock fragments; coal.
3160-3300	No samples.

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3300-3310	Sandstone - light gray (N7); fine to coarse, subangular with some angular, moderately poor sorting; siliceous; 10% rock fragments; sparse coal.
3310-3320	Sandstone - as above.
3320-3330	Sandstone/Siltstone - 50% each, sandstone and grayish black (N2), hard, massive siltstone.
3330-3340	No samples.
3340-3350	Sandstone - very light gray (N8); fine to medium, subangular and sparse subrounded, moderately well sorted; siliceous; brittle; sparse rock; coal fragments.
3350-3360	Sandstone - as above; silt; mica.
3360-3370	Sandstone - as above.
3370-3380	Sandstone - as above.
3380-3390	Sandstone - as above.
3390-3400	Sandstone - as above.
3400-3410	Sandstone - as above.
3410-3420	Siltstone - grayish black (N2); massive; hard; coal.
3420-3430	Siltstone - dark gray (N3); massive; hard; sparse fine mica.
3430-3440	Siltstone - as above.
3440-3450	Siltstone - as above; 20% <u>Sandstone</u> , as 3340-3350.
3450-3460	Sandstone - light gray (N7); fine to medium with some coarse grains, subangular, moderate sorting; siliceous; 20%± very fine rock fragments; mica.
3460-3470	Sandstone - as 3450-3460.
3470-3480	Sandstone - as above.
3480-3490	Sandstone - as above; angular and subangular.
3490-3500	Sandstone - as above.
3500-3600	No samples.
3600-3610	Sandstone - pale yellowish brown (10YR 6/2) (iron-stained from drill bits); fine to coarse, angular and subangular, poorly sorted; siliceous; brittle; 10% rock fragments.

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(feet)

3610-3620 Siltstone - medium gray (N5); massive, hard, rare mica on bedding surfaces.

3620-3650 No sample.

3650-3660 Sandstone - as 3600-3610; moderately sorted; coal.

3660-3670 Sandstone - as above.

3670-3680 Sandstone - white to very light gray (N9-N8), but lightly iron-stained; fine to coarse, subangular with some angular, moderately sorted; siliceous; brittle; clean; very sparse mica.

3680-3690 Sandstone - as above.

3690-3700 Sandstone - as above; sparse amount of coarse grains.

3700-3710 Sandstone - as above.

3710-3720 No sample.

3720-3730 Sandstone - as above.

3730-3740 Sandstone - as above.

3740-3750 Sandstone - as above; sparse coal fragments.

3750-3760 Sandstone - as above; fine to medium.

3760-3770 Sandstone - as above; heavily (?) iron stained.

3770-3780 Sandstone - as 3760-3770.

3780-3790 Sandstone - as above.

3790-3800 Sandstone - as above; very heavily iron stained around fragments which here seem to be non-steel but rather magnetite (is magnetic).

3800-3810 Sandstone - as above, 3760-3770.

3810-3830 No samples.

3830-3840 Sandstone - as above; fine to medium with very rare coarse grains.

3840-3900 No samples.

3900-3910 Sandstone - light yellowish brown (iron staining) (10YR 6/2); fine to medium, subangular, moderate sorting; siliceous; brittle; sparse rock fragments.

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(feet)

3910-3920	Sandstone - as 3900-3910.
3920-3930	Sandstone - as above.
3930-3940	Sandstone - as above.
3940-3950	Sandstone - light gray (N7); as above.
3950-3960	Sandstone - 60%; as 3950-3960; 40% <u>Siltstone</u> - medium gray (N5); micaceous.
3960-3970	Sandstone - as above.
3970-3980	No sample.
3980-3990	Siltstone - medium dark gray (N4); massive; firm; locally carbonaceous.
3990-4000	Siltstone - as above.
4010-4020	Siltstone - as above.
4020-4040	No samples.
4040-4050	Siltstone - as above.
4050-4060	Siltstone - as above.
4060-4070	Siltstone - as above.
4070-4080	Siltstone - as above.
4080-4090	Siltstone - as above; soft.
4090-4100	Siltstone - as 3980-3990.
4100-4110	Siltstone - as above.
4110-4120	Siltstone - as above; locally sandy; very sparse, very fine mica.
4120-4130	Siltstone - as 4110-4120.
4130-4140	Siltstone - as above.
4140-4150	Siltstone - as above.
4150-4160	Siltstone - as above.
4160-4170	Siltstone - as above; fragments of grayish red (10R 4/2) siltstone; soft.

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4170-4180 Siltstone - as 4140-4150.

4180-4190 Siltstone - medium dark gray (N4); massive; firm; locally carbonaceous.

4190-4260 Siltstone - as 4180-4190.

4260-4270 Siltstone - grayish red (10R 4/2) and dark brown (5YR 2/4); massive; soft.

4270-4280 Siltstone - as above; calcareous.

4280-4290 Siltstone - as above.

4290-4300 Siltstone - as above; fragments of medium dark gray siltstone also.

4300-4310 Siltstone - as above.

4310-4320 Siltstone/Sandstone - siltstone; as above and Sandstone graywacke; dark gray (N3); fine to very fine, subangular, moderately well sorted; siliceous; hard; silty; mica; fine rock fragments; 50% each.

4320-4330 Siltstone/Sandstone - as above; 40% each and 10% as follows: mottled gray and grayish red siltstone, grayish red siltstone, sandy.

4330-4340 Siltstones - 50% grayish red (10R 4/2), calcareous; soft, and dark gray (N3), massive; hard; sandy.

4340-4350 Siltstone/Sandstone - 50% each; siltstone, as at 4330-4340; and Sandstone, white (N9); fine to medium, subangular, moderate sorting; siliceous; hard!; clean.

4350-4360 Siltstone/Sandstone - as above.

4360-4370 Siltstone - medium dark gray (N4); massive, soft.

4370-4380 Siltstone - as above; locally calcareous in medium dark gray siltstone.

4380-4390 Siltstone - as 4370-4380.

4390-4400 Siltstone - dark to medium dark gray (N3-N4); massive; firm; calcareous; locally micaceous; and 30%± Sandstone - medium light gray (N6); fine to medium, subangular, moderate sorting; siliceous; brittle; moderate amounts of grayish red siltstone.

4400-4410 Siltstones - as above.

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4410-4420	Siltstone - as above.
4420-4430	Siltstone - as above.
4430-4440	Siltstone - as above.
4440-4450	Siltstone - as above.
4450-4460	Sandstone - light brownish gray (5YR 6/1) (iron-stained); fine to medium, subangular with some subrounded, moderate sorting; siliceous; 30%± fine siltstone fragments.
4460-4470	Siltstone - dark gray (N3); massive; hard; sparse fine mica; calcareous.
4470-4480	No sample.
4480-4490	Sandstone - as 4450-4460; silty; fine to coarse grained; 10-15% calcareous siltstone.
4490-4500	Sandstone - as above.
4500-4510	Sandstone - as above.
4510-4520	Sandstone - as above.
4520-4530	Sandstone - as above.
4530-4540	Sandstone - as above.
4540-4550	Sandstone - as above.
4550-4560	Sandstone - as above.
<u>4560-4570</u>	Sandstone - as above.
4570-4580	No sample.
4580-4590	Sandstone - as above; still with dark gray siltstone, calcareous.
4590-4600	No sample.
4600-4610	Sandstone - as 4580-4590.
4610-4620	Sandstone - as above.
4620-4630	Sandstone - as above; siltstone grading into subgrawacke type sandstone (medium dark gray).
4630-4640	No sample.

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4640-4650 Sandstone - as above, grading into sandy siltstone.

4650-4660 Sandstone - as 4640-4650.

4660-4670 Sandstone - as 4640-4650.

4670-4680 Siltstone - as above, dark gray.

4680-4690 Siltstone - as above.

4690-4700 Siltstone - dark gray (N3); hard; moderately calcareous; massive; moderate amount of sand, mica; sparse fissility; carbonaceous; 10% Siltstone, grayish red (10R 4/2); soft; 10-15% Sandstone, very light gray (N8); fine to medium, subangular, moderately well sorted; siliceous; hard; clean.

4700-4710 Siltstone - as 4690-4700.

4710-4730 No samples.

4730-4740 Siltstone - as above.

4740-4750 Siltstone - as above.

4750-4760 Siltstone - as above; 1-3% Sandstone; thin laminae of Limestone - medium dark gray (N4); micritic, argillaceous; and reworked rounded fragments of dark gray calcareous siltstone in light gray, sandy siltstone matrix - some dark fragments appear to be fossil fragments.

4760-4770 Siltstone - dark gray (N3); massive, locally sandy; carbonaceous; locally calcareous and argillaceous limestone fragments.

4770-4780 Siltstone - as above.

4780-4790 Siltstone - as above.

4790-4800 No sample.

4800-4810 Siltstone - as 4750-4760; increasing amounts of white limestone fragments in calcareous siltstone; light brownish gray limestone fragments.

4810-4820 Siltstone, calcareous - dark gray and brownish gray (N3 and 5YR 4/1); massive; soft; calcareous; locally fossiliferous; sandy; fragments of dark brownish gray (5YR 3/1) limestone; argillaceous; broken fragments of fossils; pyrite.

4820-4830 Siltstone, calcareous - as 4810-4820.

4830-4840 Siltstone, calcareous - as above; sparse grayish red siltstone.

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4840-4850	Siltstone, calcareous - as above.
4850-4860	Siltstone, calcareous - as above.
4860-4870	Siltstone, calcareous - as above.
4870-4880	Siltstone, calcareous - as above.
4880-4890	Siltstone, calcareous - as above, limestone fragments in micritic matrix; light gray.
4890-4900	Siltstone, calcareous - as 4880-4890.
4900-4910	Siltstone, calcareous - as above; crinoid stems; clear yellowish gray calcite fragments; fragment of siltstone - light gray and grayish red; fragments of soft grayish-green siltstone.
4910-4920	Siltstone, calcareous, and Limestone - 50% each; Siltstones - dark gray, calcareous; greenish gray, soft; light brownish gray; grayish red, soft; and <u>Limestone</u> - brownish gray (5YR 5/1); locally argillaceous; broken fragments of limestone in micritic matrix; brownish-gray fragments in light gray micritic matrix; locally fossiliferous; calcite fragments.
4920-4930	Siltstone, calcareous - as 4910-4920.
4930-4940	Siltstone, calcareous - as above; 60% limestones; only dark gray siltstone.
4940-4950	Limestone, argillaceous, and Siltstone - 70% limestone, argillaceous, as 4910-4920; oolitic limestone in light brownish gray fine grained limestone (5YR 6/1) fragments; siltstone, dark gray; massive, calcareous.
4950-4960	Limestone, argillaceous/Siltstone, calcareous - as 4940-4950; oolitic light brownish gray limestone and dark gray, calcareous siltstone.
4960-4970	Limestone, argillaceous/Siltstone, calcareous - as above; not oolitic; medium grained, light brownish gray limestone.
4970-4980	Limestone, argillaceous/Siltstone, calcareous - as above.
4980-4990	Limestone, argillaceous/Siltstone, calcareous - as above.
4990-5000	Limestone - brownish gray (5YR 4/1) and light brownish gray (5YR 6/1); fine to medium grained (?) micritic; some fragments intraclastic; calcite fragments; some dark gray calcareous siltstone fragments.
5000-5010	Limestone - as 4990-5000.

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5010-5020 Limestone - as 4990-5000; fragment of grayish red and white mottled limestone; medium grained, with fragments of white crystalline matter and fossiliferous fragments (crinoids).

5020-5030 Limestone - as above, + fossils, too?

5030-5040 Limestone - as above.

5040-5050 Limestone - as above.

5050-5060 Limestone - as above; some interclasts in dark gray.

5060-5070 Limestone - as above; oolites in light brownish gray matrix; some limestone fragments with

5070-5080 Limestone - as above.

5080-5090 Limestone - light brownish gray (5YR 6/1); oolitic; micritic; light gray (N7); micritic to medium grained matrix with some intraclasts and fossil fragments; dark gray silty fragments.

5090-5100 Limestone - as above; yellowish gray (5Y 8/1); fine grained with some clear fragments (fossil?); dark gray fragments are now Siltstone, calcareous; finely dispersed granular matter (silt?) and carbonaceous material.

5100-5110 Limestone - as above.

5110-5120 Limestone - as above.

5120-5130 Limestone - light gray; micritic; light brownish gray; oolitic and fossiliferous in micritic matrix; sparse dark gray siltstone, calcareous.

5130-5140 Limestone - as above.

5140-5150 Limestone - as above.

5150-5160 Limestone - as above; no oolites.

5160-5170 Limestone - as 5150-5160.

5170-5180 Limestone - light gray and light brownish gray; micritic; massive.

5180-5190 Limestone - as 5170-5180; 3% dark gray siltstone, calcareous.

5190-5200 Limestone - as 5180-5190.

5200-5210 No sample.

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(feet)

5210-5220 Limestone - white; oolitic; micritic; light brownish gray; micritic; dark gray siltstone fragments; sparse grayish red siltstone fragments.

5220-5230 Limestone - as 5210-5220.

5230-5240 Limestone - as above.

5240-5250 Limestone - as above; no white; oolitic fragments; no grayish red siltstone fragments.

5250-5260 Limestone - as above.

5260-5270 Limestone - as above.

5270-5280 Limestone - as above.

5280-5290 Limestone - as above; sparse oolites in white limestone; 10% dark gray siltstone and grayish red siltstone.

5290-5300 Limestone - as above.

5300-5310 Siltstones - medium to light gray (N5-N7); firm; massive; locally sandy; sparse grayish red siltstone fragments.

5310-5320 Siltstones - dark gray and light gray (N3 and N7); soft; carbonaceous; and firm sandy siltstone grading to a silty sandstone, locally.

5320-5330 Siltstone and Sandstone - 50% each; Siltstone - dark gray (N3); firm; carbonaceous locally, massive; and Sandstone - light gray (N7); very fine to fine grained, subangular, moderately well sorted; siliceous; silty; soft to brittle.

5330-5340 Siltstone and Sandstone - as above.

5340-5350 Siltstone and Sandstone - as above.

5350-5360 Siltstone and Sandstone - as above.

5360-5370 Siltstone and Sandstone - as above.

5370-5380 Siltstone and Sandstone - as above.

5380-5390 Siltstone and Sandstone - as above.

5390-5400 Siltstone and Sandstone - as above.

5400-5410 Siltstone and Sandstone - as 5320-5330; dark gray siltstone shows local sandy areas - fine to medium sized grains; mica flakes in sandstone.

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(feet)

5410-5420	Siltstone and Sandstone - as 5400-5410.
5420-5430	Siltstone and Sandstone - as 5320-5330; slickensides in dark gray siltstone; fragments of grayish red soft siltstone.
5430-5440	No sample.
5440-5450	Siltstone and Sandstone - as above.
5450-5460	Siltstone and Sandstone - as above (5320-5330); local shaley areas in dark gray siltstone; mica in sandstone.
5460-5470	Siltstone and Sandstone - as 5450-5460.
5470-5480	Siltstone and Sandstone - as above.
5480-5490	Siltstone and Sandstone - as above.
5490-5500	Siltstone and Sandstone - as above.
5500-5510	Siltstone and Sandstone - as above.
5510-5520	Siltstone - medium to dark gray (N5-N3); firm, massive.
5520-5530	Siltstone - as 5510-5520.
5530-5540	Siltstone - as above; increasing carbonaceousness in dark gray siltstone; sparse grayish red fragments.
5540-5560	Siltstone - dark gray (N3); carbonaceous locally, firm, massive, hard.
5560-5580	No samples.
5580-5590	Siltstone - as above.
5590-5620	Siltstone - as above.
5620-5660	Siltstone - as above; locally shaley and fissile.
5660-5700	Siltstone - medium gray (N5); massive, non-fissile; grayish red fragments.
5700-5710	Siltstone - as above.
5710-5720	Siltstone - as above.
5720-5730	Siltstone - as above.
5730-5740	Siltstone - grayish black (N2); massive interbedded with fissile; carbonaceous, shaly siltstone.

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(feet)

5740-5750 Siltstone - as 5730-5740.

5750-5760 Siltstone - as above.

5760-5770 Siltstones - medium dark gray, light gray; massive, firm.

5770-5780

5780-5790 Siltstone - as above.

5790-5800 Siltstone - medium dark gray (N4); massive, local slickensides, local fine particles of carbonaceous matter; 1-3% fragments with color banding (light and dark gray), bands of sandiness to non-sandy and grains to fine laminae of carbonaceous matter.

5800-5810 Siltstone - as above.

5810-5820 Siltstone - as above.

5820-5830 Siltstone - as above; more of the lighter colored siltstone.

5830-5840 Siltstones - as above; increasing brown gray.

5840-5850 Siltstones - dark gray; brownish gray, sparse light gray (N3, 5YR 4/1); as above.

5850-5860 Siltstones - as above; 1-3% brownish gray.

5860-5870 Siltstone - as above; change in sequence.

5870- Siltstone - dark gray (N3) and 30% brownish gray (5YR 4/1); massive, hard; sparsely and very finely micaceous; some bedding structures, sparsely and locally carbonaceous.

5970-6080 Siltstone - as above, decrease in brownish gray siltstone to 1-3%.

6080-6100 Siltstone - dark gray (N3) and medium dark gray (N4); massive; hard; local very sparse mica.

6100-6400 Siltstone - as 6080-6100; sparse slickensides.

6400-6500 Siltstone - as above.

6500-6600

6600-6700

6700-6800

6800-6900

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DEPTH
(feet)

6900-7000

7000-7080

J. K. Polzin