

OPERATOR: Columbia Gas Transmission Corp.
FARM: Ervin O'Quinn, et al
WELL NO. 20016
LOCATION: Dickenson County
2100' N of 37° - 12' - 30"
2800' E of 82° - 15'
ELEVATION: 1731.26' GR.
TOTAL DEPTH: 4772'
DRILLING COMMENCED: August 4, 1975
WELL COMPLETED: August 13, 1975
RESULT: Dry Hole

DI-131

WELL LOG

DEPTH
(feet)

0-10	Sandstone - very light olive gray (5Y 7/1), fine to coarse, moderate sorting, subangular, clear quartz grains; silty; siliceous cement weakly bonded; local feldspar; micaceous; 1-3% finely ground dark rock fragments; moderate to slight porosity.
10-20	As 0-10.
20-30	As 0-10.
30-40	As 0-10; iron staining.
40-50	As 0-10.
50-60	As 0-10.
60-70	As 0-10.
70-80	As 0-10; 3% mica.
80-90	As 0-10; 3% mica; iron oxide fragments.
90-100	Siltstone - medium gray (5); soft; locally sandy and micaceous.
100-120	As 90-100.
120-130	As 90-100.
130-150	No samples.
150-160	Sandstone - light olive gray (5Y 6/1), fine to medium - as 0-10; sparsely feldspathic; local and slight calcareousness and 1% siltstone as 90-100.
160-170	As 150-160.

DEPTH
(feet)

170-180	As 150-160.
180-190	Siltstone, silty - as 90-100; grading to a shale, sandy - soft, fissile.
190-200	As 180-190.
200-210	As 180-190.
210-220	As 180-190.
220-230	As 180-190.
230-240	As 180-190.
240-250	Sandstone (crushed) - light gray (N7); as 0-10; cement not discernable; increasing feldspar; 10% combined micas and finely ground.
250-260	As 240-250.
260-270	As 240-250.
270-280	Sandstone/Siltstone (interbedded) - medium gray (N5), as 240-250 for sandstone and as 180-190 for siltstone; 50% each; mica.
280-290	Sandstone - as 240-250; brownish gray (5YR 2/1); 10% mica-muscovite; fine to medium; local areas of feldspathic grains.
290-300	As 280-290.
300-310	Sandstone/Siltstone - as 270-280; coal; mica.
310-320	As 270-280 .
320-330	<u>As 270-280</u> ; siltstone is increasingly sandy and micaceous.
330-340	As 320-330.
340-350	As 320-330.
350-360	Sandstone - light gray (N7), as 240-250; <u>calcareous</u> ; 1% mica and rock fragments.
360-370	As 350-360; very sparse coal fragments.
370-380	Shale - medium gray (N5) to medium dark gray (N4); hard; fissile; 1-5% finely crushed sandstone, as above.
380-390	Shale/Sandstone - as 370-380.

DEPTH
(feet)

390-400	As 370-380.
400-410	As 370-380.
410-420	As 370-380.
420-430	As 370-380.
430-440	As 370-380.
440-450	As 370-380; dark gray (N3) mostly, finer texture.
450-460	Sandstone - light gray (N7), fine to medium, moderate sorting, angular to subangular clear quartz grains; brittle; siliceous to feldspathic cement; moderate porosity; mica; occasional rock fragment.
460-470	As 450-460.
470-480	As 450-460.
480-490	Siltstone, sandy and micaceous - medium dark gray (N4), hard; grading to shales and sandstones locally; mostly siltstone.
490-500	Siltstone, sandy - as 480-490; medium gray; local mica.
500-510	As 480-490.
510-520	As 480-490; sandstone fragment as 450-460.
520-530	As 480-490.
530-540	As 480-490.
540-550	As 480-490.
550-560	Sandstone/Siltstone (whole sample calcareous) - light olive gray (5Y 6/1); 80%± sandstone, as 450-460; not siliceous; calcareous with calcite fragments; silty; coal on sandstone fragment with pyrite also; local mica; and 20%± highly variable siltstone; sandy - grading as in 480-490; not calcareous; medium dark to dark gray.
560-570	As 550-560.
570-580	As 550-560; 30% finely ground siltstone-shale fragments.
580-590	As 570-580.
590-600	As 570-580.

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600-610 As 570-580; 40%± siltstone-shale; highly variable in color and form; shale is soft; siltstone hard.

610-620 As 600-610; coal fragments; fossil fragments.

620-630 Siltstone/Shale - medium dark gray to dark gray (N4-N3); siltstone is sandy and highly variable, hard; shale is soft to hard, sandy locally; sample is sparsely calcareous - calcite grains/fragments of sandstone, calcareous, and rare calcareousness in shales.

630-640 As 620-630; fragments sandstone - "white".

640-650 As 620-630.

650-660 Sandstone - light gray (N7), as 450-460; not calcareous.

660-670 As 450-460.

670-680 As 450-460; chlorite mica less than 1%.

680-690 Siltstone/Shale - as 620-630.

690-700 As 620-630.

700-710 As 620-630.

710-720 Siltstone/Sandstone - as 620-630; siltstone only; 15%± sandstone, fine to coarse, as 650-660.

720-730 As 710-720; mica in large flakes.

730-740 As 710-720.

740-750 Siltstone/Shale - as 680-690; shale is grayish black (N2); hard; 10% siltstone.

750-760 Shale/Siltstone - as 740-750;

760-770 As 740-750.

770-780 Shale/Siltstone/Sandstone - 80%± shale, as 740-750; 10% sandstone, as 650-660 (siltstone is 10% of total).

780-790 As 770-780; brownish gray shale fragments.

790-800 Siltstone/Sandstone - as 770-780; 30% sandstone.

800-810 As 770-780.

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810-820	Sandstone - light gray (N7); sandstone as 650-660, in granular fragments in silty/crushed shale? matrix.
820-830	As 800-810.
830-840	Siltstone/Shale/Sandstone - as 770-780; coal - small, sparse fragments.
840-850	Siltstone/Shale - as ; 80% shale; coal; 20%± siltstone.
850-860	As 840-850; coal.
860-870	Shale - grayish black (N2), hard to soft, fissile, massive, with siltstone fragments, dark gray (N3) - highly variable; sparse sandstone fragments; coal fragments.
870-880	As 860-870.
880-890	As 860-870.
890-900	Shale - as 860-870, coal fragments still, on shale and with plant fragments.
900-910	As 890-900.
910-920	As 890-900.
920-930	As 890-900.
930-940	Coal - entire sample.
940-950	As 930-940.
950-960	Sandstone (graywacke) - light olive gray (5Y 6/1), <u>fine to medium, moderate to poorly sorted, angular, clear and smokey (?) or calcite quartz grains; hard; calcareous, either in cement or fragments; micas; rock fragments - shales and other; feldspar.</u>
960-970	As 950-960; 1-3% shale, as 890-900.
970-980	<u>As 890-900; 5%.</u>
980-990	<u>As 890-900; 10%.</u>
990-1000	As 950-960; 20% shale.
1000-1010	Sandstone/Shale - as <u>950-960;</u> 30% shale; less calcareous.
1010-1020	<u>As 1000-1010.</u>
1020-1030	As 1000-1010.

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1030-1040	As 1000-1010.
1040-1050	As 1000-1010.
1050-1060	Sandstone/Shale-Siltstone - as 1000-1010; mica also.
1060-1070	Shale - medium gray (N5); hard, fissile; fragment of coal.
1070-1080	As 1060-1070.
1080-1090	As 1060-1070.
1090-1100	Shale/Sandstone - as 1060-1070; 5% sandstone as 950-960; cleaner, still calcareous - shale isn't.
1100-1110	As 1090-1100.
<u>1110-1120</u>	Shale/Sandstone - as 1090-1100; 20% sandstone.
1120-1130	As 1090-1100; 10% sandstone.
1130-1140	As 1090-1100; 5% sandstone.
1140-1150	<u>As 1090-1100.</u>
1150-1160	<u>As 1090-1100.</u>
1160-1170	<u>As 1090-1100.</u>
1170-1180	<u>As 1090-1100.</u>
1180-1190	<u>As 1090-1100.</u>
1190-1200	<u>As 1090-1100;</u> brownish gray shale fragments.
1200-1210	Sandstone - very light gray (N8), fine to medium, moderate sorting, subangular clear quartz grains; siliceous cement; brittle; "clean"; local feldspar; local mica-muscovite; 10% worn siltstone.
1210-1220	As 1200-1210; very fine to medium; silty.
1220-1230	As above, 1210-1220.
1230-1240	As 1200-1210.
1240-1250	As 1200-1210.
1250-1260	As 1210-1220; (silty and very fine).
1260-1270	As 1210-1220.

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1270-1280	<u>As 1210-1220.</u>
1280-1290	<u>As 1210-1220.</u>
1290-1300	<u>As 1210-1220.</u>
1300-1310	As 1200-1210; (not silty).
1310-1320	As
1320-1330	Sandstone - very light, brownish gray (5YR 6/1), very fine to medium with some coarse grains, moderate sorting; silty; siliceous?; brittle; 10% fine, worn siltstone.
1330-1340	Sandstone - as 1320-1330; pale yellowish brown (10YR 7/2); no siltstone; moderate amount silt.
1340-1350	As 1330-1340; fine to coarse.
1350-1360	As 1340-1350.
1360-1370	As 1340-1350.
1370-1380	As 1340-1350; fine to very coarse; <u>Ostracod</u> ; feldspar, sparse.
1380-1390	As 1340-1350.
1390-1400	As 1340-1350; fine to very coarse; abundant silt.
1400-1410	As 1390-1400.
1410-1420	Sandstone - light gray, as 1390-1400 (fine to very coarse grained, silty sandstone with traces of finely ground siltstone).
1420-1430	As 1410-1420; large fragment siltstone, sandy - medium dark gray.
1430-1440	As 1410-1420; calcareous.
1440-1450	As 1410-1420; calcareous; coal; local mica.
1450-1460	As 1410-1420.
1460-1470	Shale - grayish black (N2); soft; fissile.
1470-1480	Shale - as 1460-1470.
1480-1490	As 1460-1470; harder fragments.
1490-1500	As 1460-1470; medium dark gray siltstone fragments; calcareous fragments.

DEPTH
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1500-1510	Sandstone, silty (crushed) - light gray (N7), fine to medium, moderate sorting, subangular clear quartz grains; calcareous; fine rock fragments; local mica; <u>coal</u> .
1510-1520	Sandstone/Shale - as 1500-1510; 10% shale as 1460-1470.
1520-1530	Shale/Sandstone - as 1460-1470; sparse sandstone.
1530-1540	As
1540-1550	Shale/Siltstone - as 1460-1470; 10-15% siltstone, dark gray (N3); hard; calcareous grains.
1550-1560	As 1540-1550.
1560-1570	As 1540-1550; coal; local mica.
1570-1580	As 1540-1550; mica.
1580-1590	As 1540-1550; mica.
1590-1600	As 1540-1550; mica.
1600-1610	Siltstone/ <u>Shale</u> - 1540-1550.
1610-1620	As 1540-1550.
1620-1630	As 1540-1550.
1630-1640	As 1540-1550.
1640-1650	As 1540-1550.
1650-1660	As 1540-1550; sparse sandstone grains.
1660-1670	As 1540-1550.
1670-1680	As 1540-1550.
1680-1690	As 1540-1550.
1690-1700	As 1540-1550.
1700-1710	As 1540-1550.
1710-1720	As 1540-1550.
1720-1730	As 1540-1550.
1730-1740	As 1540-1550.

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<u>DEPTH</u> <u>(feet)</u>	
1740-1750	As 1540-1550.
1750-1760	As 1540-1550.
1760-1770	As 1540-1550.
1770-1780	As 1540-1550.
1780-1790	As 1540-1550.
1790-1800	Sandstone - light gray (N7), very fine to coarse with some pebble fragments; moderate to poor sorting, angular clear and milky quartz grains; clean - no cement - probably siliceous; local feldspar; 15% siltstone/shale fragments.
1800-1810	As 1790-1800.
1810-1820	As 1790-1800.
1820-1830	As 1790-1800.
1830-1840	As 1790-1800.
1840-1850	As 1790-1800.
1850-1860	As 1790-1800.
1860-1870	As 1790-1800.
1870-1880	As 1790-1800; siliceous cement.
1880-1890	As 1790-1800; iron staining.
1890-1900	As 1790-1800; silty.
1900-1910	As 1790-1800.
1910-1920	As 1790-1800.
1920-1930	As 1790-1800.
1930-1940	Sandstone/Siltstone, interbedded - as 1790-1800 and 1540-1550; <u>coal</u> ; fossil imprints; 50% each sandstone/siltstone.
1940-1950	Siltstone - as 1540-1550; massive siltstone; 10% sandstone; sparse coal fragments.
1950-1960	Siltstone - as 1540-1550.
1960-1970	Siltstone/Sandstone - 40% siltstone as 1540-1550; 20% shale, grayish black (N2); hard, massive, fissile; 40% sandstone, as 1790-1800, but not conglomeratic.

DEPTH
(feet)

1970-1980 Siltstone/Sandstone - 50% each, as 1960-1970.

1980-1990 As 1970-1980.

1990-2000 As 1970-1980; massive, large, hard siltstone fragments.

2000-2010 Shale - grayish black (N2), hard, massive, fissile.

2010-2020 As 2000-2010.

2020-2030 As 2000-2010.

2030-2040 As 2000-2010.

2040-2050 As 2000-2010.

2050-2060 No sample.

2060-2070 As 2000-2010.

2070-2080 Sandstone/Shale - 80% sandstone, medium light gray (N6), fine to medium, poor sorting, subangular and angular clear quartz grains; siliceous; local feldspar; mica; and 20% shale as 2000-2010 with 1-3% grading into a siltstone of similar nature.

2080-2090 Sandstone/Shale - 50% each, as 2070-2080.

2090-2100 Shale - grayish black (N2), thin, fissile, moderately hard.

2100-2110 As 2090-2100.

2110-2120 As 2090-2100.

2120-2130 As 2090-2100; massive.

2130-2140 As 2090-2100.

2140-2150 Shale/Shale, calcareous - shale as 2090-2100 and medium gray (N5); shale calcareous; fossiliferous - sparsely.

2150-2160 Shales/Siltstone/Sandstone - 1/3 each; shales as 2140-2150; siltstone as 1540-1550; sandstone as 2020-2080; sample is calcareous.

2160-2170 Siltstone/Shale/Sandstone - as 2150-2160; but 60% siltstone; 30%± shales and 10%± sandstone, crushed.

2170-2180 Siltstone/sandstone - as 2150-2160; no shale, but sample still calcareous.

2180-2190 As 2150-2160.

DEPTH
(feet)

2190-2200 As 2150-2160; some siltstone, calcareous, and some sandy (1-3%±).

2200-4000 No samples.

4000-4010 Limestone - medium gray (N5), light olive gray (5Y 7/1), very light gray (N8) limestones, fine grained, crushed and 1% grayish red shale, soft.

4010-4020 As 4000-4010.

4020-4030 No sample.

4030-4040 Limestone/sandstone - medium gray and light gray; as 4000-4010.

4040-4050 As 4000-4010.

4050-4060 As 4000-4010; siltstone.

4060-4070 No sample.

4070-4080 Limestone/Siltstone - as 4000-4010; 40% siltstone, medium dark gray (N4); hard, sandy, worn; pyrite.

4080-4090 No sample.

4090-4100 Siltstone/Limestone - 80% siltstone, as 4070-4080; and 20%± limestones - as 4030-4040; iron oxide staining.

4100-4110 As 4090-4100; 1% grayish red (10R 4/2) shale, soft.

4110-4120 As 4100-4110.

4120-4130 As 4100-4110.

4130-4140 Shale/Limestone - as 4090-4100.

4140-4150 Shale - 90%, medium dark gray, and light gray, sandy, moderately hard, worn; 9% limestone, as 4090-4100; 1% grayish red shale.

4150-4160 As 4140-4150.

4160-4170 As 4140-4150.

4170-4180 As 4140-4150.

4180-4190 As 4140-4150.

4190-4200 Shale - as 4140-4150; light gray sandstone, 1%; 1% each dark gray and grayish red shales; 1-3% coarse grained, fragmented limestone.

4200-4210 As 4190-4200.

DEPTH
(feet)

4210-4220	As 4190-4200.
4220-4230	As 4190-4200.
4230-4240	Limestone/Shale/Sandstone - 60% light gray limestone, finely crushed, fine grained fragments; 30% shales as 4130-4140; sandstone, crushed, 10%± light gray (N8), medium sized, subangular grains of quartz - no fragments.
4240-4250	As 4230-4240; 1% sandstone.
4250-4260	Shale - grayish black (N2); worn, hard; fissile; <u>not</u> calcareous.
4260-4270	As 4250-4260; <u>some</u> fragments limestone.
4270-4280	As 4250-4260.
4280-4290	No sample.
4290-4300	As 4250-4260.
4300-4310	As 4250-4260.
4310-4320	As 4250-4260.
4320-4330	No sample.
4330-4340	As 4250-4260.
4340-4350	As 4250-4260.
4350-4360	As 4250-4260.
4360-4370	As 4250-4260.
4370-4390	No samples.
4390-4400	As 4250-4260; mica - very sparse.
4400-4410	As 4250-4260.
4410-4420	As 4250-4260.
4420-4430	As 4250-4260.
4430-4440	As 4250-4260.
4440-4450	No sample.
4450-4460	As 4250-4260.
4460-4470	As 4250-4260.

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4470-4480 As 4250-4260.

4480-4490 No sample.

4490-4500 As 4250-4260.

4500-4510 Shale/Siltstone - dark gray siltstone and grayish black shale, as 4250-4260; increasing amounts of siltstone; some with very fine grains of sand (quartz); 1-3% light gray limestone fragments; grayish red shale.

4510-4520 No sample.

4520-4530 As 4500-4510; still local calcareousness.

4530-4540 As 4500-4510; increasing calcareousness.

4540-4550 As 4500-4510; no calcareousness; 1-3% grayish red shale.

4550-4560 Shale - grayish black (N2); soft; fissile; weathered.

4560-4570 As 4550-4560.

4570-4580 No sample.

4580-4590 As 4550-4560.

4590-4600 As 4550-4560.

4600-4610 As 4550-4560.

4610-4620 No sample.

4620-4630 Siltstones/Shale - medium light gray (N6), light gray (N7) and pale yellowish brown (10YR 6/2) siltstone, about equal portions each; hard; chert fragments; and dark gray shale, soft, 20%±.

4630-4640 No sample.

4640-4650 No sample.

4650-4660 As 4620-4630; 45%± light gray siltstone.

4660-4670 No sample.

4670-4680 Shale - dark gray (N3); soft to moderately hard, weathered.

4680-4690

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4700-4710	No sample.
4710-4720	Shale - 60% light gray and 40% dark gray shales; light gray (N7) is harder than dark gray.
4720-4730	No sample.
4730-4740	Siltstone grading to Shale - light gray siltstone, <u>hard</u> , firm, grading into shales as above.
4740-4750	No sample.
4750-4760	Siltstone - as 4730-4740.
4760-4770	Siltstone - as 4730-4740.

J. K. Polzin