

OPERATOR: Columbia Gas Transmission Corp.
FARM: James M. Owens, et al
WELL NO. 20008
LOCATION: Dickenson County
5200' N of 37° - 12' - 30"
1500' E of 82° - 15
ELEVATION: 1875.78' GR.
TOTAL DEPTH: 4869'
DRILLING COMMENCED: July 23, 1975
WELL COMPLETED: August 26, 1975
RESULT: Gas Well

DI-132

WELL LOG

DEPTH
(feet)

0-300	No samples.
300-310	<u>Siltstone - medium gray (N5), hard, massive, local mica.</u>
310-320	As 300-310.
320-330	As 300-310; local calcareous areas.
330-340	As 300-310.
340-350	As 300-310; some sandy siltstones and some (less than 1%) grading into shales.
350-360	As 340-350.
360-370	As 340-350.
370-380	As 340-350.
380-390	As 340-350.
390-400	As 340-350; coal; sandy and micaceous in areas.
400-410	Sandstone - medium light gray (N6.5), fine to medium (but "eyeballs" as "coarse"), poorly sorted, subangular, clear quartz grains; siliceous and brittle; locally feldspathic; small grains of calcite; 10%-5% mica, increasing on surfaces; 1-3% weathered rock fragments locally variable.
410-500	No samples.
500-510	Sandstone - light gray (N7); fine to medium; well sorted, subangular, clear quartz grains; assumed siliceous; <u>brittle</u> ; less than 1% in fine, weathered rock fragments and mica.

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510-540 No samples.

540-550 As 500-510.

550-560 As 500-510; sparse coal.

560-730 No samples.

730-740 Shale, calcareous - dark gray (N3); moderately soft; fissile; calcareous.

740-750 As 730-740.

750-760 As 730-740.

760-780 No sample.

780-790 As 730-740; hard; grading into a fine hard siltstone.

790-800 Sandstone, calcareous/Shale - 50% each; very light gray sandstone (N8), fine to medium, moderate sorting, subangular with some subrounded, clear quartz crystals; calcareous and Shale - dark gray (N3), hard; coal - sparse.

800-810

810-820 Shale-Siltstone/Sandstone - as 790-800; 80% shale grading into medium light gray (N5) siltstone, sandy - firm, coarse textured and 20% Sandstone, calcareous.

820-830 As 790-800.

830-840 Sandstone/Siltstone - as 790-800; 60% sandstone.

840-850 As 790-800; 70% sandstone.

850-860 Sandstone - light olive gray (5Y 6/1); fine to coarse, moderate sorting, subangular, clear and milky quartz grains; no cement; local feldspar; and 20% shale - dark gray and grayish brown (5YR 4/1); soft; finely crushed.

860-870 As 850-860.

870-880 As 850-860.

880-900 As 850-860.

900-910 Siltstone-Shale/Sandstone - 80% siltstone grading into shale - dark gray, soft; micaceous in areas; sandy in siltstone areas; local calcareousness; 20% sandstone as 850-860.

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910-920 Shale/Sandstone - as 900-910; 50% each; decreasing siltstone.

920-930 As 900-910; 60% shale.

930-940 As 900-910; 70% shale.

940-950 Shale/Sandstone - as 900-910; 80% shale.

950-960 As 900-910.

960-970 As 900-910.

970-980 Sandstone/Shale - Sandstone as 850-860 and 15%± finely ground shale, as 900-910.

980-990 As 900-910.

990-1000 As 900-910.

1000-1010 As 900-910.

1010-1020 Coal - entire sample.

1020-1030 Sandstone/Shale - 80% shale/20% sandstone - as 900-910; local calcite grains; mica.

1030-1040 Shale/Sandstone - as 1020-1030.

1040-1050 Shale - grayish black (N2); soft.

1050-1060 As 1040-1050.

1060-1070 As 1040-1050.

1070-1080 As 1040-1050.

1080-1090 As 1040-1050.

1090-1100 As 1040-1050; sparse sandstone fragments and calcite grains.

1100-1110 No sample.

1110-1120 Sandstone - light gray (N7), medium to coarse, moderate sorting, subangular, clear quartz grains; siliceous; hard; feldspathic; local mica; 20%± fine weathered shale.

1120-1130 As 1110-1120.

1130-1140 As 1110-1120.

1140-1150 As 1110-1120.

1150-1160 As 1110-1120.

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1160-1170	As 1110-1120.
1170-1180	As 1110-1120.
1180-1190	As 1110-1120; 10%.
1190-1200	As 1180-1190.
1200-1210	As 1180-1190.
1210-1220	As 1180-1190.
1220-1230	As 1180-1190; <u>pebble</u> fragments and fragments siltstone, sandy.
1230-1240	As 1220-1230; local areas of heavy mica concentrations; fragment green rock; fragment disturbed underclay with slickenside; fragments of sandstone with "dirty" or graywacke appearance.
1240-1250	As 1180-1190.
1250-1260	As 1180-1190.
1260-1270	As 1180-1190.
1270-1280	As 1180-1190; 20% shale fragments; increasing feldspathicness.
1280-1290	As 1270-1280; 10% shale.
1290-1300	As 1270-1280.
1300-1310	As 1270-1280.
1310-1320	As 1270-1280.
1320-1330	Siltstones grading into shale - medium dark gray (N4), sandy siltstone, hard, massive to soft, fissile (5%) shale; 1-3% sandstone fragments; coal.
1330-1340	Siltstone - as 1320-1330; some sandstone fragments.
1340-1350	As 1320-1330.
1350-1360	As 1320-1330; 15% sandstone.
1360-1370	As 1320-1330; 20% sandstone.
1370-1380	As 1320-1330.
1380-1390	As 1320-1330; coal.
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1400-1410	Sandstone (crushed) - light gray (N7.5), fine to medium, moderately well sorted, subangular, clear quartz grains; no cement - probably siliceous; brittle; local feldspar; sparse shale fragments.
1410-1420	As 1400-1410.
1420-1430	As 1400-1410.
1430-1440	As 1400-1410; silty.
1440-1450	As 1400-1410.
1450-1460	As 1400-1410.
1460-1470	As 1400-1410.
1470-1480	As 1400-1410; iron oxide stains.
1480-1490	As 1400-1410.
1490-1500	As 1400-1410.
1500-1510	As 1400-1410.
1510-1520	As 1400-1410, fine to coarse; mostly medium grained.
1520-1530	As 1400-1410; coarse with some fine.
1530-1540	As 1400-1410; fine to coarse.
1540-1550	As 1530-1540.
1550-1560	No sample.
1560-1570	As 1530-1540.
1570-1580	As 1530-1540.
1580-1590	Sandstone/Siltstone - sandstone as above, silty and 30% siltstone, sandy, medium gray (N5); hard; fossiliferous.
1590-1600	As 1580-1590.
1600-1610	As 1580-1590; 20% siltstone grading into 1% shale - soft; local mica.
1610-1620	As 1600-1610.
1620-1630	As 1600-1610; 30% but finely crushed siltstone-shale.
1630-1640	

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<u>1640-1650</u>	Shale, calcareous - dark gray (N3), hard; fissile.
1650-1660	As 1640-1650.
1660-1670	As 1640-1650.
1670-1680	Siltstone, sandy (ground) - medium gray (N5), variable with fine to medium quartz grains, disturbed bedding.
1680-1690	As 1670-1680.
1690-1700	As 1670-1680; very slightly calcareous.
1700-1800.	No samples.
1800-1810	Siltstone - medium gray (N5), moderately hard, variable, sandy and micaceous in areas; grains of calcite.
1810-1820	As 1800-1810.
1820-1830	As 1800-1810.
1830-1840	As 1800-1810.
1840-1850	As 1800-1810.
1850-1860	As 1800-1810.
1860-1870	As 1800-1810; increasing calcareousness.
1870-1880	As 1860-1870.
1880-1890	As 1860-1870; dark gray shales; calcite fragments.
1890-1900	Siltstone, sandy - as 1880-1890.
1900-1910	As 1880-1890.
1910-1920	As 1880-1890.
1920-1930	As 1880-1890; 1-3% grayish black.
1930-1940	As 1880-1890.
1940-1950	As 1880-1890; almost all gray-black.
1950-1960	As 1880-1890; dark gray.
1960-1970	As 1880-1890.
1970-1980	As 1880-1890; grayish black.

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1980-1990	As 1800-1810; <u>grayish black.</u>
1990-2000	Sandstone - light olive gray (5Y 6/1); fine to pebble, poorly sorted, subangular, clear to white quartz grains with fresh angular quartz pebble fragments; siliceous; hard to brittle; sparse local feldspar; and 20% siltstone - medium gray - undistinguishing in any respect.
2000-2010	As 1990-2000.
2010-2020	As 1990-2000.
2020-2030	As 1990-2000.
<u>2030-2040</u>	As 1990-2000.
2040-2050	As 1990-2000.
2050-2060	As 1990-2000.
2060-2070	As 1990-2000.
2070-2080	As 1990-2000.
2080-2090	As 1990-2000.
2090-2100	As 1990-2000.
2100-2310	No samples.
2310-2320	Shale, calcareous - medium dark gray (N4), soft, crushed, slightly calcareous.
2320-2330	As 2310-2320.
2330-2340	As 2310-2320.
2340-2350	As 2310-2320.
2350-2360	As 2310-2320.
2360-2370	As 2310-2320.
2370-2380	Shale/Siltstone - grayish red (10R 4/2), and 30% medium dark gray - as 2310-2320, with red shale being softer and calcareous and gray being more resistant and <u>not</u> calcareous.
2380-2390	As 2370-2380.
2390-2400	As 2370-2380; fragments of black shale.

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2400-2410 As 2390-2400.

2410-2420 50% each, as 2390-2400.

2420-2430 As 2390-2400.

2430-2440 90% medium gray shale, as 2390-2400; still calcareous.

2440-2450 As 2430-2440.

2450-2460 No sample.

2460-2470 As 2430-2440.

2470-2480 As 2430-2440; 80% medium dark gray, some black shale interbedded with medium dark gray, finely sandy; calcite fragments.

2480-2490 Sandstone - pale yellowish brown (10YR 6/2), very fine to fine with 1% medium, well sorted, subangular clear quartz grains; silty; fine rock fragments; calcite fragments; very light greenish gray siltstone fragments.

2490-2500 As 2480-2490, fine to medium, moderate sorting; larger red/gray shale fragments; coarse sized, moderate orange pink (5YR 8/4) calcite fragments.

2500-2510 Siltstone/Sandstone - 50% light greenish gray (5GY 6/1) fragments and 50% sandstone as 2490-2500.

2510-2520 As 2500-2510; increasing grayish black siltstone.

2520-2530 Siltstone/Sandstone - as 2500-2510; 50% grayish black (N2) siltstone; 50% as 2500-2510.

2530-2540 Siltstone, calcareous - light gray (N7), greenish gray, grayish black, grayish red (10R 5/4), in approximately equal portions - fragments of medium light gray (N6), 15%+ sandstone as 2500-2510 with sparse iron oxide; siltstones grading into one another and also sandy to silty in local areas; generally hard.

2540-2550 Siltstone/Limestone - siltstones as 2530-2540; 60% very light gray (N8) limestone, fine grained; 30% greenish gray and grayish black siltstones and 10%+ fine sandstone fragments; 1% grayish red shale, soft.

2550-2560 As 2540-2550.

2560-2570 Sandstone/Siltstone - as 2500-2510; not calcareous.

2570-2580 As 2500-2510.

2580-2590 As 2500-2510; moderate iron oxide staining; local calcite.

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2590-2600 Siltstone - medium gray (N5); medium light (N4) and medium dark (N6) gray siltstones - moderately hard; some silty to sandy; calcareous; 3% grayish red shale; 1% grayish black shale coal; fossiliferous in siltstone.

2600-2610 As 2590-2600; no coal.

2610-2620 As 2590-2600; coal.

2620-2630 As 2590-2600; coal on underclay.

2630-2640 As 2590-2600.

2640-2650 As 2590-2600; coal.

2650-2660 Sandstone/Siltstone - sandstone as 2500-2510; 20% very fine siltstone, greenish gray with some grayish red shales; calcareous.

2660-2670 As 2650-2660.

2670-2680 As 2650-2660.

2680-2690 Siltstone - Shale - medium dark gray (N4), moderate hardness; grading into a soft shale of same color.

2690-2700 Siltstone, sandy - with coal stringers, siltstone as 2680-2690; 1% lighter and darker shales.

2700-2710 As 2690-2700; underclay.

2710-2720 As 2690-2700.

2720-2730 As 2690-2700.

2730-2740 As 2690-2700.

2740-2750 As 2690-2700.

2750-2760 As 2690-2700.

2760-2770 As 2690-2700.

2770-2780 Sandstone - grayish red (10R 4/2); (light gray, actually - crushed grayish red shale powder coloring sample); 20% dark gray shale.

2780-2790 Sandstone/Shales - sandstone as 2500-2510; calcareous; 50% sandstone as 2500-2510 and 50% shales - medium gray, dark gray, grayish red - worn, generally soft fragments; calcareous.

2790-2800 As 2780-2790.

2800-2810 As 2780-2790; crystal fragments of calcite.

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2810-2820 As 2780-2790.

2820-2830 Shale/Limestone - 50% shale, as 2780-2790; pyrite; local carbon; 50% limestone - light olive gray and medium gray (N5) - argillaceous, fine grained.

2830-2840 Limestone - light gray, light olive gray and medium light gray - fine grained, darker colors more argillaceous; light olive gray is fossiliferous; some medium dark gray which is coarse, argillaceous and fossiliferous; local carbon; local pyrite; some weathered shales.

2840-2850 As 2830-2840.

2850-2860 Limestone/Siltstone - grayish black (N2) siltstone - massive, silty, local mica; and limestone as 2830-2840; very light gray, medium grained with black impurities.

2860-2870 As 2850-2860.

2870-2880 Sandstone/Limestone/Siltstone - 20% sandstone as 2500-2510 (fine to medium quartz grains only); 30%± limestone variegated as 2850-2860 and 2840-2850; 50%± siltstones grading into shales; grayish red shale, 1%; pyrite; iron oxide staining; greenish gray siltstone as well as medium to dark grays.

2880-2890 As 2870-2880.

2890-2900 As 2870-2880.

2900-2910 Siltstone/Sandstone/Limestone - as 2870-2880; 50% fine sandstone; 40%± grayish green siltstone; 10% very light gray limestone.

2910-2920 Shale - grayish red (10YR 4/2), soft, weathered, shale; 20% greenish gray siltstone, firm, resistant; local mica.

2920-2930 As 2910-2920.

2930-2940 Siltstone - medium gray, sandy, silty; 10% finely ground, very light gray limestone and crushed sandstone.

2940-2950 As

2950-2970 No samples.

2970-2980 Siltstones - medium gray; grayish red; sparse greenish gray fragments; very slight calcareousness; sandy locally.

2980-2990 As 2970-2980.

2990-3000 As 2970-2980.

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*3000-3100 No samples.

3100-3110 As 2970-2980.

3110-3120 As 2970-2980.

3120-3130 As 2970-2980.

3130-3140 As 2970-2980.

3140-3150 Sandstone - moderate yellowish brown (10YR 5/4), largely coarse grains with sparse amount fine to medium sized grains, well sorted, subrounded, clear quartz grains; no cement; silty (sparsely); 3% fine shale/siltstone fragments.

3150-3160 As 3140-3150.

3160-3170 As 3140-3150.

3170-3180 As 3140-3150.

3180-3190 As 3140-3150; 10% fragments; local feldspar.

3190-3200

3200-3300 No samples.

3300-3310 Sand - grayish orange (10YR 6/4), fine to medium, moderate sorting, subangular, clear quartz grains; no cement; silty; iron oxide stains; 1% fine rock fragments.

3310-3320 As 3300-3310.

3320-3330 No sample.

3330-3340 As 3300-3310; pale yellowish brown (10YR 6/2).

3340-3350 No sample.

3350-3360 As 3300-3310.

3360-3370 As 3300-3310.

3370-3380 As 3300-3310.

3380-3390 As 3300-3310.

3390-3400 As 3300-3310.

3400-3410 Siltstones, argillaceous and calcareous - medium dark gray, gritty; dark greenish gray, gritty; dark gray, highly calcareous; all siltstones calcareous and silty.

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3410-3420 As 3400-3410.

3420-3430 Siltstone, calcareous/Limestone, silty and recrystallized - as 3400-3410; 10%± medium to dark gray (N5-N3) limestone with silt sized grains and recrystallized areas; local carbon; local pyrite; 3-5% quartz grains of mixed sizes, probably from sandstone of above; small fragments of very light gray to white limestone - fine grained.

3430-3440 As 3420-3430; siltstones increasingly impure - sandy, carbonaceous; some compact and pure siltstone; 1%±? limestones; grayish red shale.

3440-3450 As 3430-3440.

3450-3460 As 3430-3440.

3460-3470 As 3430-3440.

3470-3480 Siltstone (highly variable) - dark gray (N3), hard, compact, firm; coarse grained sandy siltstones of medium dark gray; sandstone fragments; limestone fragments.

3480-3490 As 3470-3480.

3490-3500 As 3470-3480.

3500-3510 As 3470-3480.

3510-3520 As 3470-3480.

3520-3530 As 3470-3480.

3530-3540 As 3470-3480.

3540-3550 As 3470-3480.

3550-3560 As 3470-3480.

3560-3570 As 3470-3480.

3570-3580 As 3470-3480.

3580-3590 As 3470-3480.

3590-3600 As 3470-3480.

3600-3610 Limestone - medium gray (N5); silty; fine to medium grained.

3620-3630 As 3600-3610; iron stained.

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3630-3640	As 3600-3610.
3640-3650	As 3600-3610; sparse amount light gray limestone.
3650-3900	No samples.
3900-3910	Limestone - light olive gray (5Y 6/1), fine grained, very sparse crystalline areas.
3910-3920	As 3900-3910; 1% very light gray limestone.
3920-3930	As 3900-3910; 10% very light gray limestone.
3930-3940	As 3920-3930.
3940-3950	As 3920-3930; fossiliferous.
3950-3960	As 3920-3930; sparsely fossiliferous.
3960-3970	As 3920-3930; no fossils.
3970-3980	As 3920-3930.
3980-3990	As 3920-3930.
3990-4000	Limestone - light and very light brownish gray (5YR 6/1).
4000-4010	As 3990-4000.
4010-4020	As 3990-4000; light gray, 5%.
4020-4030	As 3990-4000.
4030-4040	As 3990-4000.
4040-4050	As 3990-4000.
4050-4060	As 3990-4000.
4060-4070	No sample.
4070-4080	As 3990-4000.
4080-4090	As 3990-4000.
4090-4100	As 3990-4000.
4100-4110	As 3990-4000.
4110-4120	No sample.

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4120-4130 As 3990-4000.

4130-4140 As 3990-4000.

4140-4150 As 3990-4000.

4150-4160 As 3990-4000.

4160-4170 Light gray limestone, fine grained with 5%± medium light gray.

4170-4180 Siltstone/Sandstone - 50%± each; mixed siltstones, medium light gray, dark gray; sandy, hard and light gray (N7) sandstone - fine to coarse, poor sorting, subrounded clear quartz grains; no cement; silty, from siltstones; 1% grayish red shale (10R 4/2); calcareous, probably from above limestone.

4180-4190 As 4170-4180.

4190-4200 As 4170-4180.

4200-4300 No samples.

4300-4310 Shale - grayish black (N2); firm, fissile; iron oxide stained.

4310-4320 As 4300-4310.

4320-4330 As 4300-4310, 1% brownish gray shale, soft; 10% light gray siltstone; 1% limestones light, medium grays.

4330-4340 As 4320-4330.

4340-4350 As 4320-4330.

4350-4360 As 4320-4330; 1% light gray siltstone.

4360-4370 As 4320-4330.

4370-4380 As 4320-4330.

4380-4390 As 4300-4310.

4390-4580 No samples.

4580-4590 Shale - grayish black (N2), moderately firm, not calcareous.

4590-4600 As 4580-4590.

4600-4610 As 4580-4590; some medium dark gray and 1%± very light gray limestone.

4610-4620 As 4600-4610.

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4620-4630	As 4600-4610.
4630-4640	As 4600-4610.
4640-4650	As 4600-4610.
4650-4660	As 4600-4610.
4660-4670	As 4600-4610.
4670-4680	As 4600-4610.
4680-4690	As 4600-4610.
4690-4700	As 4600-4610.
4700-4710	
4710-4720	
4720-4730	
4730-4740	Siltstone - light and medium gray (N7, N6); siltstone, hard; 10% shale as 4580-4590.
4740-4750	As 4730-4740.
4750-4760	(crushed) heavily stained by iron oxide.
4760-4770	Sandstone? - as 4750-4760; still stained.
4770-4780	
4780-4790	Siltstone - grayish black (N2), soft, sandy locally; 20% crushed sandstone, fine, no sorting seen, subangular; no cement; limestone fragments.
4790-4800	As 4780-4790.
4800-4810	As 4780-4790.
4810-4820	As 4780-4790.
4820-4830	Siltstone (iron stained) - medium gray (N5); sandy, hard.
4830-4840	As 4820-4830.
4840-4850	As 4820-4830.

J. K. Polzin