Harrison County
Green Township
Section 28-S

McCormick
Birney #1
Permit No. 103
Sample No. 2287
Elevation (KB) 1127 feet

Depth (ft)

4620 - 4630 Shale, dark-gray to dark-brownish-gray, pyritic; calcareous in small part. Shale, light-gray, slightly pyritic; trace

4630 - 4640 Shale, dark gray to dark brownish gray as above, 60%. Limestone, medium- to dark-brownish-gray, micrograined, siliceous; argillaceous in part; a few fossil fragments (brachiopod and crinoids); 40%. Chert, white to light-gray; trace. ONONDAGA LIMESTONE AT 4628 FEET (GRD)

4640 - 4650 Shale as above, 50%. Limestone as above, 50%. Chert, white to light-gray; trace

4650 - 4660 Limestone, light- to medium-brown; micrograined with some medium- to very coarse-grained fossil fragments (crinoids and other unidentified); some quartz void filling (especially associated with fossil fragments); a small amount of spar; 85%. Limestone as above, 10%. Chert, white to light-gray; 5%

4660 - 4680 Limestone, light to medium brown as above, recrystallized in part, slightly dolomitic, siliceous in part, 75%. Chert, white to light-gray and light-brown, fossiliferous; 25%

4680 - 4690 Siltstone, medium- to dark-gray, argillaceous, slightly pyritic, siliceous, slightly calcareous; a very few fossil fragments; 50%. Limestone, light- to medium-brownish-gray- to gray, micrograined, very slightly dolomitic; a very few fossil fragments (predominantly brachiopod shell fragments); 25%. Chert, white- to light-gray; 25%

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4690 - 4700 Limestone as above, very siliceous in part, very fossiliferous in small part, 50%. Chert, white to light-gray, fossilifeorus;

calcareous in part; 40%. Siltstone as above, 10%

4700 - 4710 Limestone, light- to medium-brownish-gray, micrograined, slightly dolomitic; a few medium- to coarse-grained fossil fragments; a small amount of spar; siliceous in large part; silty in part; 75%. Chert, white to light-gray, fossiliferous; 25%

4710 - 4720 Chert, white to light-gray to light-brown, fossiliferous; 60%. Limestone, light- to medium-brownish-gray, micrograined, very slightly dolomitic, very slightly fossiliferous; silty in part; siliceous in large part; 40%

4720 - 4740 Limestone, light- to medium-gray, micrograined, very dolomitic, slightly silty; a few medium- to very coarse-grained fossil fragments; slightly galuconitic in part; siliceous in part; 70%. Chert, white to light-gray, fossiliferous; 30%

4740 - 4750 Limestone, medium-gray to brownish-gray, micrograined, slightly dolomitic; silty and very slightly glauconitic in part; argillaceous and pyritic in part; slightly siliceous in part; 75%. Chert, light- to medium-gray; 25%

4750 - 4770 Limestone as above, 50%. Chert, light- to medium-gray; 50%

4770 - 4780 Chert, white and light- to medium-gray; 70%. Limestone, light- to medium-brownish-gray, micrograined, very slightly dolomitic; slightly silty in part; slightly argillaceous and pyritic in part; siliceous in part; 30%

4780 - 4800 Chert, white to light-gray; 50%. Limestone as above, silty and very slightly glauconitic in small part, 50%

4800 - 4810 Sandstone, white, medium- to coarse-grained, subangular to subrounded; slightly calcareous in part; 45%. Limestone as above, 50%. Chert, white to light-gray; 15%. Sandstone, gray to brownish-gray, very fine- to medium-grained, angular to subrounded, silty, very slightly calcareous, very glauconitic, slightly argillaceous

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and pyritic in part; siliceous in large part; 10%. ORISKANY SANDSTONE AT 4806 FEET (GRD)

4810 - 4820 Sandstone, white, medium- to coarse-grained, subangular to subrounded; 65%. Limestone as above, 20%. Sandstone, gray to brownish gray as above, 10%. Chert, white to light-gray; 5%

4820 - 4830 Sandstone, light- to medium-gray, fine-grained (lighter colored gray sandstone is fine- to medium-grained), angular to subangular, very slightly calcareous, very siliceous; a few brachiopod shell fragments; some argillaceous, organic and pyritic material between grains

4830 - 4840 Sandstone as above, light gray to medium brownish gray, fine to medium grained, slightly calcareous, 95%. Limestone, light-brownish-gray, micrograined, sandy (very fine- to fine-grained); 5%

4840 - 4850 Sandstone, light-gray to medium-brownish-gray, very fine- to fine-grained, angular to subangular; very calcareous in part; siliceous in part; a few brachiopod shell fragments; some organic, argillaceous, and pyritic material between grains; 85%. Chert, white to light-gray; 15%

4850 - 4860 Limestone, light-gray, micorgrained, very sandy (very fine- to fine-grained sand); a few fossil fragments; a few zones of argillaceous and pyritic material; siliceous in part; 70%. Chert, white to light-gray; 15%. Sandstone as above, 15%. HELDERBERG AT 4846 FEET (GRD)

4860 - 4890 Limestone as above, slightly glauconitic in part, a few brachiopod shell fragments; 90%. Chert, white and light-gray; 10%. Sandstone, white, medium-grained, subangular to subrounded, slightly calcareous; trace

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4890 - 4900 Limestone, medium-gray to dark-brownish-gray, micrograined; a few

medium- to very coarse-grained fossil fragments (especially brachiopod shells); slightly argillaceous and pyritic in part; silty in part; siliceous in large part; 85%. Chert, white and light- to medium-brownish-gray; 15%

4900 - 4920 Limestone, light- to medium-gray and medium- to dark-grayish-brown, micrograined, slightly silty, very siliceous; argillaceous and pyritic in small part; very few fossil fragments; 80%. Chert, light- to medium-gray and medium-brown; slightly calcareous in part; 20%

4920 - 4930 Limestone as above, light to medium gray and medium to dark brownish gray, very siliceous, 75%. Chert, light- to medium-gray to brownish-gray, slightly pyritic; slightly calcareous in part; 25%

4930 - 4940 Limestone, medium- to dark-brownish-gray to brown, micrograined, slightly silty, very slightly dolomitic, very siliceous; slightly argillaceous and very slightly pyritic in part; 65%. Chert, light- to medium-gray to brownish-gray and dark-brown; 35%

4940 - 4960 Limestone, medium- to dark-gray, micrograined, silty and very slightly glauconitic, very siliceous, argillaceous and pyritic, a few coarse- to very coarse-grained fossil fragments (including crinoids and brachiopod shell fragments); 95%. Chert, light- to medium-gray, fossiliferous; 5%

4960 - 4970 Limestone as above, many more fossil fragments (including some ostracods), fragments fine- to very coarse-grained, most fragments medium- to coarse-grained, 95%. Chert, light- to medium-gray, fossiliferous; 5%

4970 - 4980 Limestone, medium- to dark-gray to brownish-gray; medium- to very coarse-grained fossil fragments (especially crinoids) with some micrite; argillaceous and pyritic in part; silty in small part; siliceous in small part

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4980 - 4990 Limestone, medium- to dark-brownish-gray; medium- to very coarse-grained fossil fragments (crinoids, brachiopod shell, ostracods) in some micrite; argillaceous and pyritic in small part; slightly silty in part; very slightly dolomitic in part; slightly siliceous in part

4990 - 5000 Limestone as above, fine- to very coarse-grained fossil fragments, siliceous in part, argillaceous and pyritic in part, 95%. Chert, medium-gray, fossiliferous; 5%

5000 - 5010 Limestone as above, a small amount of spar, micritic in small part, siliceous. Chert, medium-gray; trace

5010 - 5020 Limestone as above, medium and dark gray, some coral fossil fragments, micro granular in part; very silty in part

5020 - 5030 Limestone as above, silty in part. Chert, medium-gray; trace

5030 - 5040 Limestone, light- to medium-gray to brownish-gray, micrograined, slightly dolomitic, very slightly siliceous; a few recrystallized ostracod shells; a few shaley partings; 95%. Limestone as above, 5%

5040 - 5050 Limestone, light to medium gray to brownish gray as above, a few fossil fragments, many ostracod shells concentrated in a few chips, 95%. Limestone, medium to dark gray as above, 5%

5050 - 5060 Limestone, light- to medium-gray and medium-brownish-gray; primarily micrograined with some .2-.3mm intraclasts surrounded by spar; a few chips contain some coarse- to very coarse-grained fossil fragments in spar; dolomitic in part; a few shaley partings; very slightly siliceous in part; a few ostracod shells

5060 - 5070 Limestone, light- to medium-brownish-gray and medium-brown, micrograined, dolomitic; a few .2-.3mm intraclasts in spar (especially in medium-brown limestone); recrystallized in part(?); a few ostracod shells; a few argillaceous and pyritic partings

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5070 - 5080 Limestone as above, slightly dolomitic, some .2-.4mm intraclasts in spar, a few medium- to coarse-grained fossil fragments in spar and micrite

5080 - 5090 Limestone as above, .2-.3mm intraclasts, very few medium- to coarse-grained fossil fragments, recrystallized in part

5090 - 5100 Limestone as above, 70%. Dolomite, white, microcrystalline, very silty; 30%

5100 - 5130 Limestone, light- to medium-brownish-gray- and grayish-brown, micrograined, slightly dolomitic, slightly silty; a few .2-.4mm intraclasts; a few fossil fragments (some brachiopods); much calcite vug filling; 90%. Dolomite as above, 10%

5130 - 5140 Limestone, light- to medium-brownish-gray, micrograined, silty, a few medium- to very coarse-grained fossil fragments; some calcite vug fillings in part; slightly dolomitic in part; 70%. Limestone, medium- to dark-brownish-gray, micrograined, silty, pyritic, siliceous, slightly dolomitic; 20%. Dolomite as above, 5%. Chert, gray; 5%

5140 - 5150 Limestone, light to medium brownish gray as above, very fossiliferous in part (fragments .4-.3mm in diameter; fragments include crinoids), siliceous and pyritic in part, 80%. Limestone, medium to dark brownish gray as above, 20%

5150 - 5160 Limestone, medium-gray; medium- to very coarse-grained fossil fragments (crinoids, brachiopods, etc.) in a slightly calcareous, pyritic, silty, argillaceous, matrix; siliceous in part; 90%. Dolomite, brown, microcrystalline, very slightly calcareous, slightly silty and argillaceous; 10%

5160 - 5170 Limestone as above, increase in fossil fragments. Dolomite as above, 10%

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5170 - 5180 Dolomite, light-brown, microcrystalline, very anhydritic (white

and brown anhydrite; anhydrite about 30% of sample); 90%. Limestone as above, 10%. G UNIT AT 5152 FEET (GRD)

By J. Hermann

1974

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Harrison County
Green Township
Permit No. 103

Roy Birney #1
Jerry Moore Inc.
Sample No. 2287

6715-6720	Sh gry, & sh, reddish brn, sdy
6720-6725	AA
6725-6730	AA
6730-6735	AA
6735-6740	AA
6740-6745	Sh AA & ss, wht, f g, tt, hd, aggregated, some dark minerals
6745-6750	AA
6750-6755	Ss, wht, vfg, agg; trc sh, lt brn
6755-6760	Ss AA
6760-6765	Ss AA
6765-6770	Ss AA
6770-6775	Ss, wht, vfg, small amt disagg
6775-6780	Ss AA
6780-6785	Ss AA
6785-6790	Ss, wht, vfg, hd, tt, totally agg
6790-6795	Ss, wht, vfg, hd, small amt disagg
6795-6800	Ss AA w/lt brn siltstn & lt med gry sh
6800-6805	AA
6805-6810	Ss AA & sh, med gry
6810-6815	Sh, med gry w/some ss AA
6815-6820	Sh, med gry
6820-6825	Sh, med drk gry, some sdy
6825-6830	Sh AA w/some wht vfg ss
6830-6835	AA

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6835-6840	AA
6840-6845	AA
6845-6850	Sh, med gry
6850-6855	AA w/some sdy sh
6855-6860	AA
6860-6865	AA
6865-6870	AA
6870-6875	Sh, med gry, some sdy
6875-6880	Sh, med gry to drk gry, sdy
6880-6885	AA
6885-6890	Sh, drk gry, sdy
6890-6895	AA
6895-6900	Sh, med drk gry, silty
6900-6905	AA
6905-6910	AA
6910-6915	AA
6915-6920	AA
6920-6925	AA
6925-6930	AA
6930-6980	Sh AA - in 5' pkgs
6980-7000	Sh, med gry, silty; trc chert - cavings?
7000-7030	Sh, gry, coated w/red dust
7030-7040	Sh, red, - Medina; silty to sdy
7040-7050	Sh AA

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7050-7060	Sh AA
7060-7070	Sh AA
7070-7080	Sh AA
7080-7090	Sh AA
7090-7100	Dusky red sh AA
7100-7110	Sh, drk gry, silty, sdy
7110-7120	Sh, dusky red w/some med gry sh
7120-7103	Red sh AA
7130-7140	Red sh AA
7140-7150	Red sh AA mxd w/some gry sh
7150-7160	AA
7160-7170	Red sh AA
7170-7180	Red sh AA
7180-7190	Red sh AA
7190-7220	Samples missing
7220-7230	Sh, brick red
7230-7390	Sh, brick red - uniform throughout - 10' pkgs
7390-7400	Sh, red AA w/some med gry sh
7400-7410	AA
7410-7420	AA
7420-7430	AA
7430-7440	Sh, brick red, minor amt gry sh
7440-7450	AA
7450-7460	Sh, med gry, sli amt red sh
7460-7470	Sh, med gry

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7470-7510	Sh AA
7510-7600	Sh, med gry
7600-7800	AA, calc
7800-7900	Air drilled? unwashed - or mud?
7900-8000	Sh, med gry, calc
8000-8100	Air drilled or mud?
8100-8270	Sh, med gry, calc 10' samples down to 8270
8270-8540	Sh AA, calc 8270 down aro 30' samples
8540-8612	Sh, med gry, w/ 8540 starts 10' samples ls, lt-med gry, f-med x
8612-8800	Ls, lt-med gry, f-med x 8612-GRN; fossil frag seen 8720-30
8800-8810	No samples
8810-8830	Ls AA
8830-8840	No samples
8840-9050	Ls, lt med gry, finely succrosic, to microcrystalline; trc fossil frag. Blk River 8810-GRN
9050-9370	Ls, med gry, vfx to f x, varies to drk gry in lower part
9370-9380	Dolo, lt gry, med x - misplaced sample
9380-9450	Ls, drk gry, f x

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Description by
R. DeLong

2340 - 2350	Dolomite, very light-gray, very light- and light-brown, microcrystalline (dolosiltite) and very finely crystalline, sandy (fine- and medium-grained sand). Sandstone as above, minor
2350 - 2400	Dolomite as above, sandy; grading in minor amount into sandstone
2400 - 2410	Dolomite as above. Sandstone as above
2410 - 2440	Sand, fine- and medium-grained. Dolomite, very light- and light-brown, microcrystalline (dolosiltite), sandy to very sandy
2440 - 2460	Sandstone, light-brown, pinkish-brown, very fine- and fine-grained. Dolomite as above, heavy trace
2460 - 2470	As above, sandstone very slightly glauconitic
2470 - 2500	Sandstone, very fine-grained. Siltstone, light-gray, pinkish-yellow, brownish-gray, glauconitic
2500 - 2530	As above, some fine-grained sand
2530 - 2550	Sandstone and siltstone as above. Dolomite, light- and medium-brown, microcrystalline (dolosiltite), silty, sandy (very fine-grained sand)
2550 - 2560	Sand, fine- and medium-grained. Dolomite, very light- and light-brown, microcrystalline (dolosiltite), sandy (fine- and medium-grained sand); minor
2560 - 2570	Sand, fine- to coarse-grained (predominantly medium). Sandstone, pinkish-gray, very fine- and fine-grained, slightly glauconitic. Dolomite as above, minor. Cavings
2570 - 2590	As above, predominantly dolomite
2590 - 2600	Sandstone, light-pinkish-yellow, very fine- and fine-grained, very slightly glauconitic. Dolomite, light-gray to medium-brown, microcrystalline (dolosiltite), pelletal, sandy (very fine- to medium-grained sand). Dolomite, light-gray, microcrystalline (dolosiltite), very sandy; grading into sandstone (very fine- to medium-grained). Cavings
2600 - 2630	As above, predominantly light-pinkish-yellow to very light-brown sandstone. MT. SIMON SANDSTONE at 2590 feet (very gradational contact)
2630 - 2640	Sand, fine- to coarse-grained. Sandstone, light-pinkish-yellow, very fine- and fine-grained, very slightly glauconitic. Dolomite, light-gray and medium-brown, microcrystalline (dolosiltite), pelletal, sandy to very sandy. Cavings
2640 - 2650	Sandstone, light-brown to yellowish-gray, very fine- and fine-grained; cavings
2650 - 2690	Sandstone as above, some medium-grained sand. Dolomite, light-gray and brown, microcrystalline, pelletal, sandy; grading into sandstone. Cavings
2690 - 2720	Sandstone as above. Dolomite as above, trace. Cavings
2720 - 2730	Sandstone, light-gray, pinkish-yellow, brownish-gray, fine- and medium-grained; argillaceous in part
2730 - 2800	Sandstone as above, fine- to coarse-grained (predominantly fine)
2800 - 2810	Sandstone as above, much coarse-grained sand
2810 - 2820	Sand, coarse-grained. Sandstone, light-pinkish-yellow, very light-gray, fine- and medium-grained; minor
2820 - 2835	As above. Shale, dark-green, chloritic, micaceous (reddish-brown mica); heavy trace. PRECAMBRIAN at 2840 feet (est.)

Harrison County
Green Township
Section 28S

Sanford E. McCormick #1
Birney
Permit No. 103
Sample No. 2287
Elevation (KB) 1127 feet

Depth (ft)	
9430 - 9450	Limestone, dark-grayish-brown, lithographic (micrite), fossiliferous; numerous silt-sized dolomite crystals. Shale, dark-grayish-brown, slightly calcareous, minor to trace
9450 - 9460	As above. Siltstone, light-brown to grayish-brown, siliceous; trace. Chert, light-brown; trace
9460 - 9470	Limestone as above. Siltstone as above, trace. Chert, black; trace
9470 - 9490	Limestone, light- to medium-brown, lithographic (micrite), fossiliferous; in part with dolomite crystals as in sample from 9430 to 9450 feet. Limestone, light- to medium-brown, microcrystalline (calcisiltite), dolomitic; minor. Siltstone as above, trace. Chert, black; trace from 9480 to 9490 feet
9490 - 9500	Limestone as above, light to medium brownish gray in part. Limestone as above, calcisiltite. Siltstone, light-green, argillaceous; trace
9500 - 9510	No samples
9510 - 9520	Limestone, medium- to dark-brown, lithographic
9520 - 9530	Minute amount, very fine in size, misplaced
9530 - 9550	Dolomite, light-brown, micrograined (dolomicrite and dolosiltite), slightly argillaceous and silty. Limestone as above, minor. Chert, very dark-brown; trace. Shale, dark-grayish-brown, trace. Wells Creek Dolomite
9550 - 9560	Dolomite as above. Dolomite, dark-brown, very argillaceous. Chert, as above, trace. Pyrite, trace
9560 - 9570	No samples
9570 - 9580	Shale, medium-gray to dark-brown, dolomitic to very dolomitic; silty in part; grading into dolomite
9580 - 9590	As above. Sand, very fine- to fine-grained, rounded; trace. Dolomite, very light-gray, microcrystalline (dolomicrite), slightly glauconitic; trace
9590 - 9600	As in sample from 9570 to 9580 feet
9600 - 9610	No samples
9610 - 9620	As in samples from 9570 to 9580 feet
9620 - 9630	Dolomite, light- and medium-brownish-gray, microcrystalline (dolomicrite), silty; in part sandy (very fine- to coarse-grained sand)
9630 - 9640	Sand, fine- to coarse-grained (predominantly medium), subangular and subrounded; frosted in part. Dolomite as above, argillaceous in part. Sandstone, colorless and light-gray and brownish-gray, fine- to coarse-grained, siliceous; trace
9640 - 9650	As above, predominantly very fine- and fine-grained sandstone
9650 - 9660	Sand as in sample from 9630 to 9640 feet. Sandstone, white and light-gray and brownish-gray, very fine- and fine-grained
9660 - 9670	Dolomite, light-grayish-brown, microcrystalline (dolosiltite), very slightly silty. Sand and sandstone as above, trace. KNOX DOLOMITE at 9647 feet (GRN)
9670 - 9680	As above. Dolomite, in part sandy to very sandy (predominantly rounded medium-grained sand)
9680 - 9690	Dolomite as above, slightly sandy, finely crystalline in part. Chert, white, light-gray and silty, slightly argillaceous

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light-brown; sandy in part; few pellets
9690 - 9700 Dolomite as above, mostly dolosiltite. Chert as above, trace
9700 - 9720 Dolomite, very light-grayish-brown and gray, microcrystalline (dolomicrite). Dolomite, very light- and light-gray, very finely to medium-crystalline; cherty matrix; sandy in part (very fine- to medium-grained sand). Chert, light-gray; trace
9720 - 9730 Dolomite as above. Chert, light-gray and white; heavy trace
9730 - 9740 Dolomite as in sample from 9700 to 9720 feet, light gray and light brown. Chert, white, translucent; heavy trace
9740 - 9750 Dolomite, very light- and medium-brown, light-medium-gray, as above, cherty matrix. Shale, medium-gray, waxy-looking; trace
9750 - 9770 Dolomite, very light-grayish-brown, very finely to medium-crystalline; cherty as above (very fine samples to 9760 feet)
9770 - 9780 Dolomite as above, very light-grayish-brown and medium-brown. Dolomite, light-brown, slightly grayish, microcrystalline (dolomicrite and dolosiltite); minor. Chert, very light-gray; pinkish in part; pseudomorphs after calcite or dolomite; heavy trace
9780 - 9790 As above, chert containing scattered pellets
9790 - 9810 Dolomite as above, trace, nonpelletal
9810 - 9840 Dolomite as above, in part with very cherty matrix. Sand, medium- and coarse-grained, rounded and frosted; trace
9840 - 9850 Dolomite, very light-brown, very finely crystalline; sandy in part (fine- to coarse-grained sand). Dolomite, light- and medium-brownish-gray, microcrystalline (dolosiltite), pyritic; trace
9850 - 9860 As above, very light-brown dolomite in large part dolomicrite
9860 - 9870 As in sample from 9840 to 9850 feet. Chert, white; dolomite crystals; trace
9870 - 9880 Dolomite, very light-brown to medium-grayish-brown, microcrystalline (dolomicrite and dolosiltite). Chert, white; heavy trace
9880 - 9890 Dolomite as above. Chert, very light-gray; trace
9890 - 9900 Dolomite, very light-grayish-brown to medium-brownish-gray, microcrystalline (dolomicrite and dolosiltite). Sandstone, colorless to white, fine- and medium-grained, siliceous; trace
9900 - 9910 Dolomite as above, very finely crystalline in part, slightly sandy (fine-grained sand). Sandstone as above, trace
9910 - 9930 As above. Chert, very light-gray; trace
9930 - 9950 As above, much chert in matrix of dolomite. Chert, recrystallized; heavy trace
9950 - 9960 Dolomite as above. Chert, milky-white, very light-gray; recrystallized in part (colorless)
9960 - 9970 Dolomite, very light- and light-brown, very finely crystalline; very cherty matrix in part. Pyrite and chert, white, colorless; trace
9970 - 9980 No samples
9980 - 9990 Dolomite, very light-brown to medium-brownish-gray, microcrystalline (dolosiltite) and very finely crystalline. Chert, very light-gray. Pyrite, trace
9990 - 10,010 Dolomite as above, chert in matrix. Chert, very light-gray, brown, and white; trace
10,010 - 10,020 Dolomite as above. Chert as above, heavy trace
10,020 - 10,060 Limestone and shale cavings. Predominant lithology other than cavings: dolomite, very light- to medium-grayish-brown and brownish-gray, very finely crystalline,
10,060 - 10,080 Dolomite as above, sucrosic in part
10,080 - 10,120 As above. Quartz, colorless (recrystallized chert?). Chert, medium-brown; trace
10,120 - 10,140 Dolomite, light- and medium-brown, finely and medium-crystalline
10,140 - 10,150 Dolomite as above, slightly sandy (rounded and frosted medium-grained sand); few pellets and oolites
10,150 - 10,170 Dolomite as above, cavings. Sandstone, white, colorless, very light-brown, siliceous, fine- to coarse-grained; minor rounded and frosted grains. ROSE RUN sandstone at 10,133 feet (GRN)
10,170 - 10,180 Sandstone as above, some with cherty matrix. Dolomite, very light- to dark-brown, very finely crystalline and microcrystalline (dolosiltite), siliceous. Chert, white and very light-gray, sandy; probably oolitic in part; heavy trace
TD 10,180 feet

Highland County
Fairfield Township
2 miles north of Leesburg

Kewanee Oil Co. #1 Pavey
Permit No. 1
Sample No. 822
Elevation (KB) 1043 feet

Depth (ft)
1700 - 1715 Limestone, very light-gray and light- and medium-brown, lithographic. Limestone, medium-gray, micrograined, argillaceous; trace
1715 - 1725 As above. Dolomite, light-brown, very finely sucrosic; heavy trace
1725 - 1755 Dolomite as above. Limestone as above, minor
1755 - 1760 As above. Shale, light-green to grayish-green; trace
1760 - 1780 Limestone as above. Dolomite as above, minor. Shale, light- and medium-green; minor
1780 - 1795 As above, shale sandy (very fine-grained sand) in part. Siltstone, very light-gray and light-greenish-gray, sandy (very fine-grained sand); trace
1795 - 1800 Dolomite, light-brown, micrograined, silty. Limestone, shale, dolomite, siltstone as above, minor
1800 - 1805 Shale, light- and medium-green to greenish-gray. Limestone, dolomite, siltstone as above, minor. Dolomite, light-brown, microsucrosic to very finely sucrosic; heavy trace. KNOX DOLOMITE at 1803 feet (GRN)
1805 - 1810 As above, predominantly sucrosic dolomite
1810 - 1820 Dolomite, light-brown, microcrystalline (dolosiltite); very finely sucrosic in part
1820 - 1825 Dolomite as above, light gray in part
1825 - 1830 Dolomite as above, some chert in matrix. Chert, white; with very fine dolomite crystals; trace
1830 - 1835 Dolomite, light-gray and light-brown, microcrystalline (dolosiltite), very finely sucrosic. Dolomite, white, microcrystalline (dolosiltite), silty. Sandstone, very light-gray, very fine- to medium-grained (rounded and frosted grains in part), siliceous; trace
1835 - 1840 Sandstone as above. Dolomite as above. Dolomite, light-brown, finely and medium-crystalline. ROSE RUN sandstone from 1834 to 1838 feet?
1840 - 1845 Dolomite, very light- and light-brown and very light-gray, microcrystalline (dolosiltite), slightly glauconitic, sandy (rounded and frosted fine- and medium-grained sand). Sandstone as above, trace

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NO AFFIRMATION CONCERNING THE COMPLETENESS
AND ACCURACY OF THIS INFORMATION.

Weatherford LABORATORIES

Geochemical Services Group
143 Vision Park Blvd. Shenandoah, Texas 77384
Telephone: 281-681-2200 **Fax:** 281-681-0326

Client:
Attn: PK
Well Name: Roy Birney No. 1

Vitrinite Reflectance Report

Weatherford Project: HH-47677

Introduction:

Two polished whole rock cuttings samples (8390-8420 and 8480-8510') are analyzed for vitrinite reflectance thermal maturity (%Ro), a very basic estimate of relative abundances of visual kerogen types and other kerogen characteristics. Maturity data indicate that these samples are in the 'Dry gas window' zone (Table 1). Amorphous kerogen dominates over terrestrial kerogen in these samples.

Discussion:

The 2 Ro values are 2.19% and 2.25% respectively. Vitrinite is sparse in these samples and the desired 40 vitrinite particle readings per sample are not obtained in the upper sample. Vitrinite reflectance data quality is considered to be reasonably good overall.

Minor solid bitumen particles are noted in these samples. Their presence is a clue that liquid hydrocarbon generation has likely occurred in the past

Framboidal pyrite is common in the upper sample (Table 3). This may be indicative of marine influence. The sulfate reducing bacterial activity on organic matter in marine deposits reportedly can result in this type of pyrite. It is normally most common in hydrogen rich (reducing) marine source rocks. No obvious marine fossils are noted in these samples.

Vitrinite and TAI values are generally divided into the following categories of thermal maturity:

Immature:	0.02% to 0.60%	TAI up to 2+ (2.3)
Oil window maturity:	0.60% to 1.10%	TAI 2+(2.3) up to 3+(3.3)
Condensate and /or wet-gas window:	1.10% to 1.40%	TAI 3+ (3.3)
Dry gas window:	1.40% to 3.0 or 4.0%	TAI 4-(3.7) and higher

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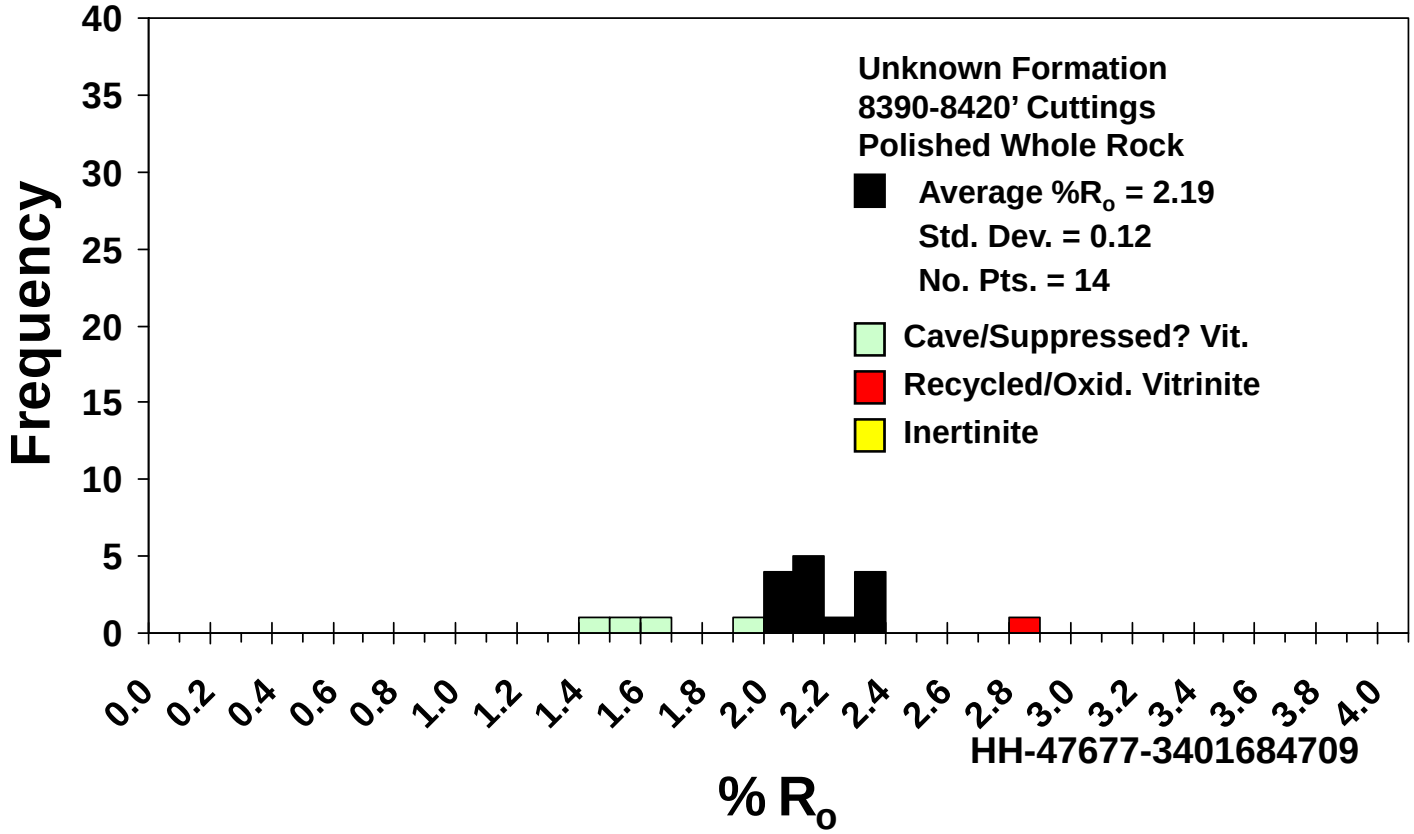
Roy Birney No.1



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Roy Birney No.1

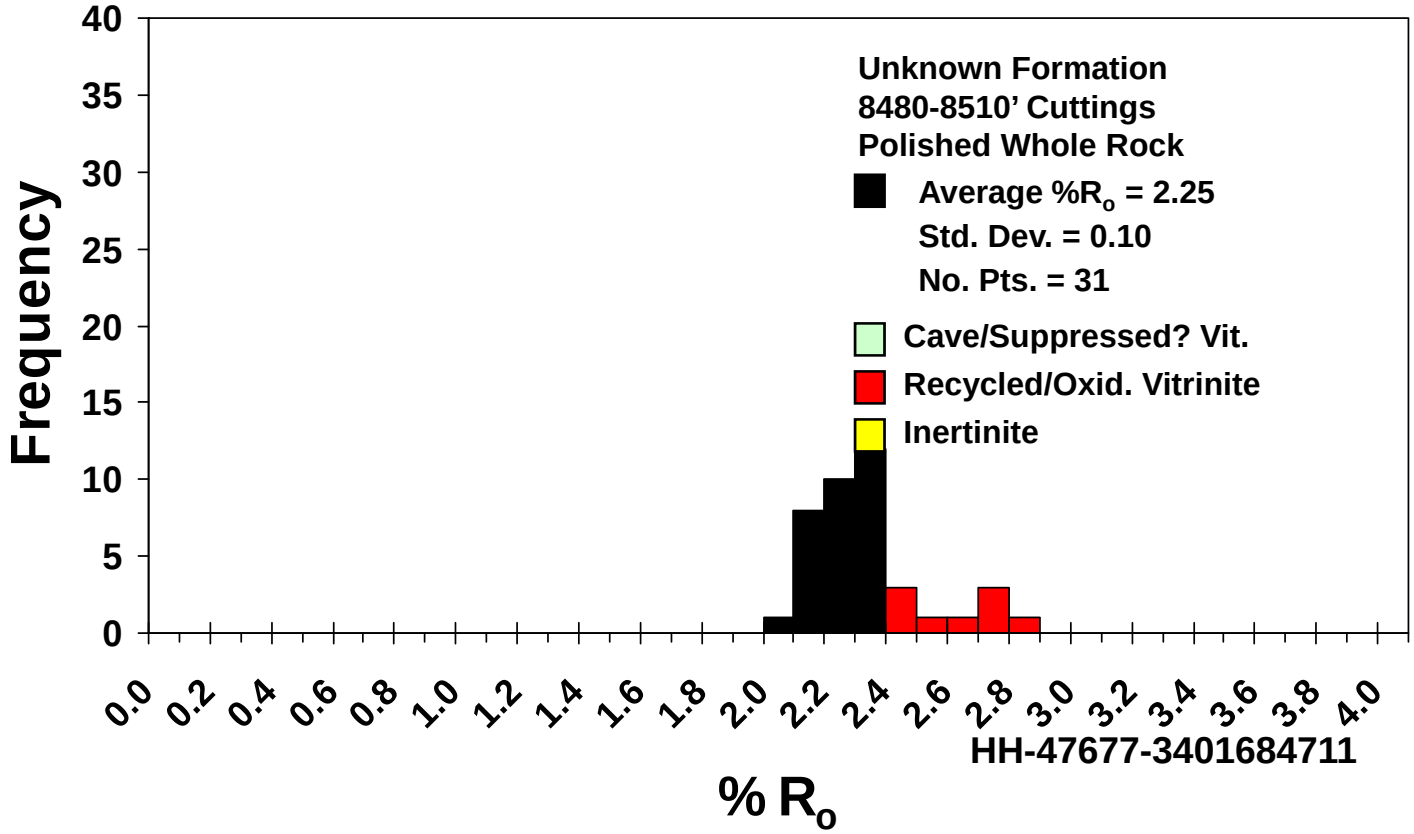

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Table 1
Dispersed Organic Matter Thermal Alteration, Kerogen Type and Total Compositional Analysis

									% Source Material							Preservation				Recovery			% Kerogen Comp.							Vitrinite				
WFT ID	Well Name	Client ID	Depth 1	Depth 2	Depth Units	Type	Color	TAI	Amorphous Debris	Finely Dissem. OM	Herb. Plant Debris (Vit.)	Woody Plant Debris	Coaly Fragments	Algal Debris	Palynomorphs	Good	Fair	Poor	Very poor	Good	Very Poor	Barren	Indigenous Vitrinite	Caved Vitrinite	Recycled/Oxidized Vitrinite	Inertinite	Solid Bitumen	Drilling Additive/Contamination	Amorphous Kerogen	# of Readings	Total Sample Ro (%)	# of Indigeonus Readings	Indigenous Ro (%)	*Comments*
3401684709	Roy Birney No.1	1	8390	8420	ft	Cutting			99		1					X							1	tr	tr	tr	1		98	19	2.11	14	2.19	
3401684711	Roy Birney No.1	2	8480	8510	ft	Cutting			98		2					X							1	tr	1	tr	1		97	40	2.33	31	2.25	

tr = trace

TAI Scale: 1=Unaltered
1+ or 1.5
2=Slight alteration
2+ or 2.5
3=Moderate alteration
3+ or 3.5
4=Strong alteration
4+ or 4.5
5=Severe alteration

Color Abbreviations:

GLY	Green-Light Yellow	B	Brown
Y	Yellow	DBDG	Dark Brown-Dark Gray
YO	Yellow-Orange	DGBL	Dark Gray-Black
OB	Orange-Brown	BLK	Black
LB	Light Brown		

Table 3. Pyrite types and abundance in kerogen

1 = very rare
2 = rare
3 = common
4 = abundant
5 = very abundant

WFT ID	Well Name	Client ID	Depth 1	Depth 2	Depth Units	Type	Pyrite types		
							Finely Disseminated	Euhedral	Framboidal
3401684709	Roy Birney No.1	1	8390	8420	ft	Cutting	3	4	3
3401684711	Roy Birney No.1	2	8480	8510	ft	Cutting	3	4	2

Table 4. Individual Reflectance Readings

Sample ID	3401684709		3401684711	
Client ID	Roy Birney No.1		Roy Birney No.1	
Well Name	Roy Birney No.1		Roy Birney No.1	
Top Depth	8390		8480	
	All Data	Indigenous Data	All Data	Indigenous Data
	1.48	2.03	2.04	2.04
	1.59	2.07	2.1	2.1
	1.65	2.08	2.11	2.11
	1.92	2.09	2.12	2.12
	2.03	2.11	2.13	2.13
	2.07	2.15	2.13	2.13
	2.08	2.16	2.14	2.14
	2.09	2.16	2.15	2.15
	2.11	2.17	2.17	2.17
	2.15	2.29	2.2	2.2
	2.16	2.31	2.2	2.2
	2.16	2.34	2.21	2.21
	2.17	2.36	2.24	2.24
	2.29	2.36	2.24	2.24
	2.31		2.25	2.25
	2.34		2.26	2.26
	2.36		2.26	2.26
	2.36		2.26	2.26
	2.86		2.27	2.27
			2.31	2.31
			2.31	2.31
			2.31	2.31
			2.34	2.34
			2.34	2.34
			2.34	2.34
			2.35	2.35
			2.37	2.37
			2.37	2.37
			2.37	2.37
			2.39	2.39
			2.41	2.41
			2.43	
			2.46	
			2.49	
			2.57	
			2.66	
			2.7	
			2.73	
			2.77	
			2.89	
Average %R_o	**2.11**	**2.19**	**2.33**	**2.25**
Standard Dev.		**0.12**		**0.10**
# of Points	**19**	**14**	**40**	**31**

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TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

Well Name : ROY BIRNEY NO.1	Operator :	State :	Weatherford Labs Project
	API # :	County :	HH-47677 / HH-47677

Client ID	Depth (ft)			Formation	Sample Type	Sample Prep	*	TOC	SRA			Tmax	Calc	Meas.	HI	OI	S2/S3	S1/TOC	PI	Notes		Lab ID
	Top	Bottom	Median						S1	S2	S3	(°C)	% Ro	% Ro				*100		Checks	Pyrogram	
1	8390	8420	8405		Cutting	NOPR		0.45	0.08	0.24	0.38	432	0.616	2.19	53	84	1	18	0.25	SRA TOC	n:lts2sh:hts2sh	3401684709
2	8480	8510	8495		Cutting	NOPR		2.63	0.29	0.74	0.32	474	1.372	2.25	28	12	2	11	0.28	SRA TOC	hts2p:lts2sh	3401684711

Notes:

"-1" – not measured or invalid value for T_{max}
TOC - Total Organic Carbon, wt. %
S1 - volatile hydrocarbon (HC) content, mg HC/ g rock
S2 - remaining HC generative potential, mg HC/ g rock
S3 - carbon dioxide content, mg CO_2 / g rock

* - comments regarding contamination
** - low S2, Tmax is unreliable
Meas. %Ro - measured vitrinite reflectance
HI - Hydrogen index = S2 x 100 / TOC, mg HC/ g TOC
OI - Oxygen Index = S3 x 100 / TOC, mg CO_2/ g TOC
PI - Production Index = S1 / (S1+S2)

Pyrogram:
f - flat S2 peak
n - normal
ltS2sh - low temperature S2 shoulder
ltS2p - low temperature S2 peak
htS2p - high temperature S2 peak

SRA - Programmed pyrolysis on SRA instrument
RE - Programmed pyrolysis on Rock-Eval instrument
EXT - Extracted Rock
NOPR - Normal Preparation

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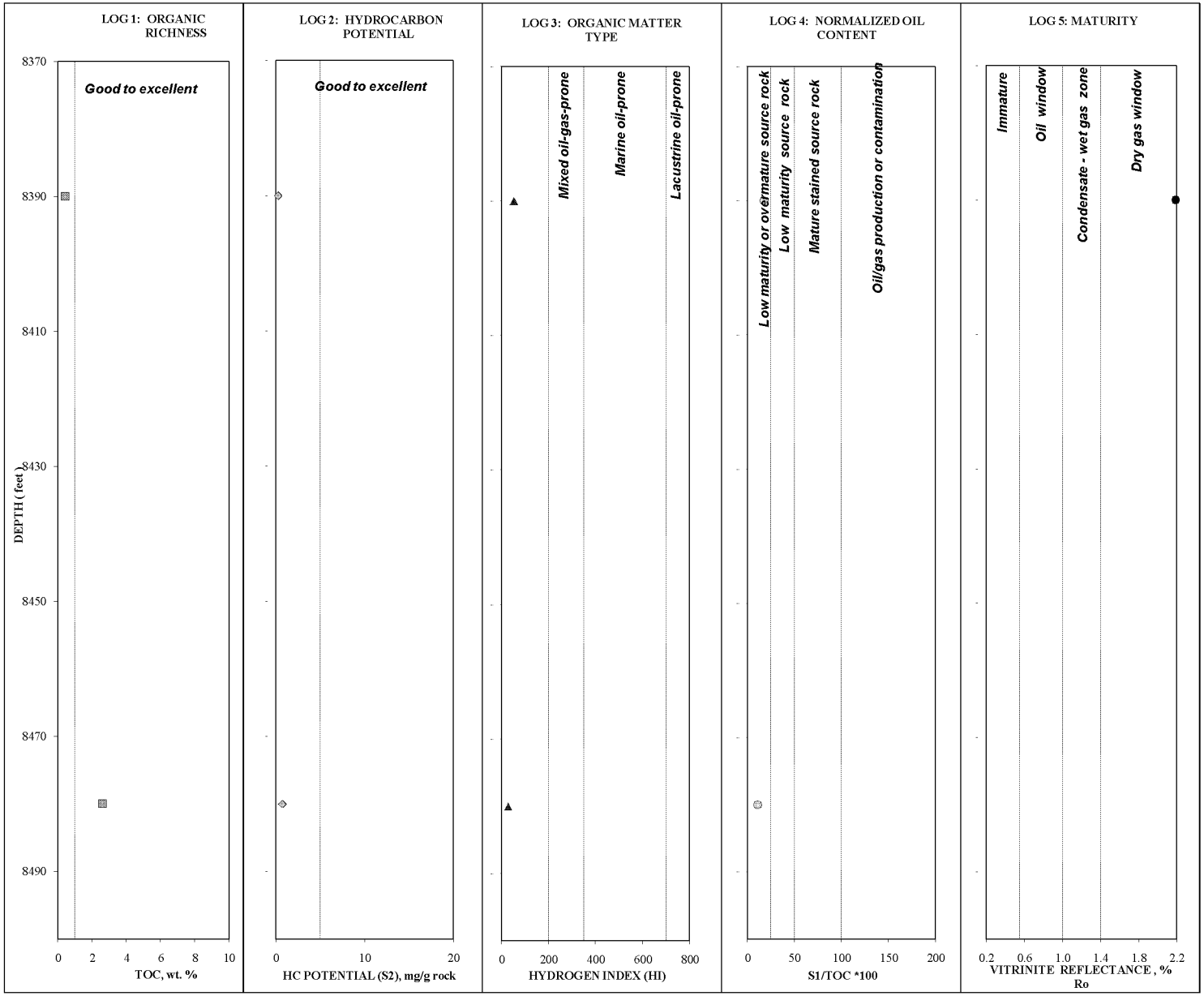
GEOCHEMICAL LOGS - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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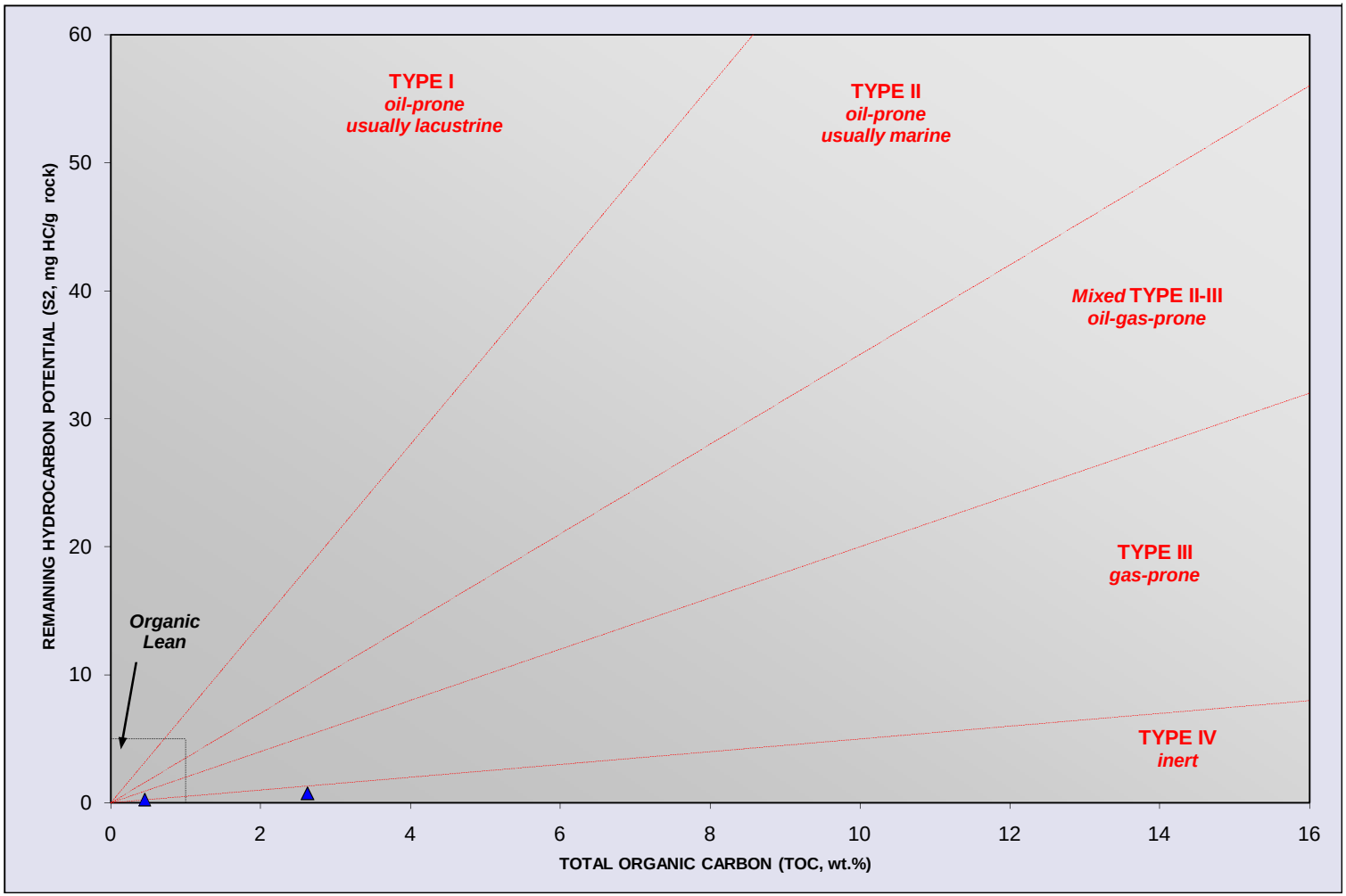
KEROGEN QUALITY PLOT - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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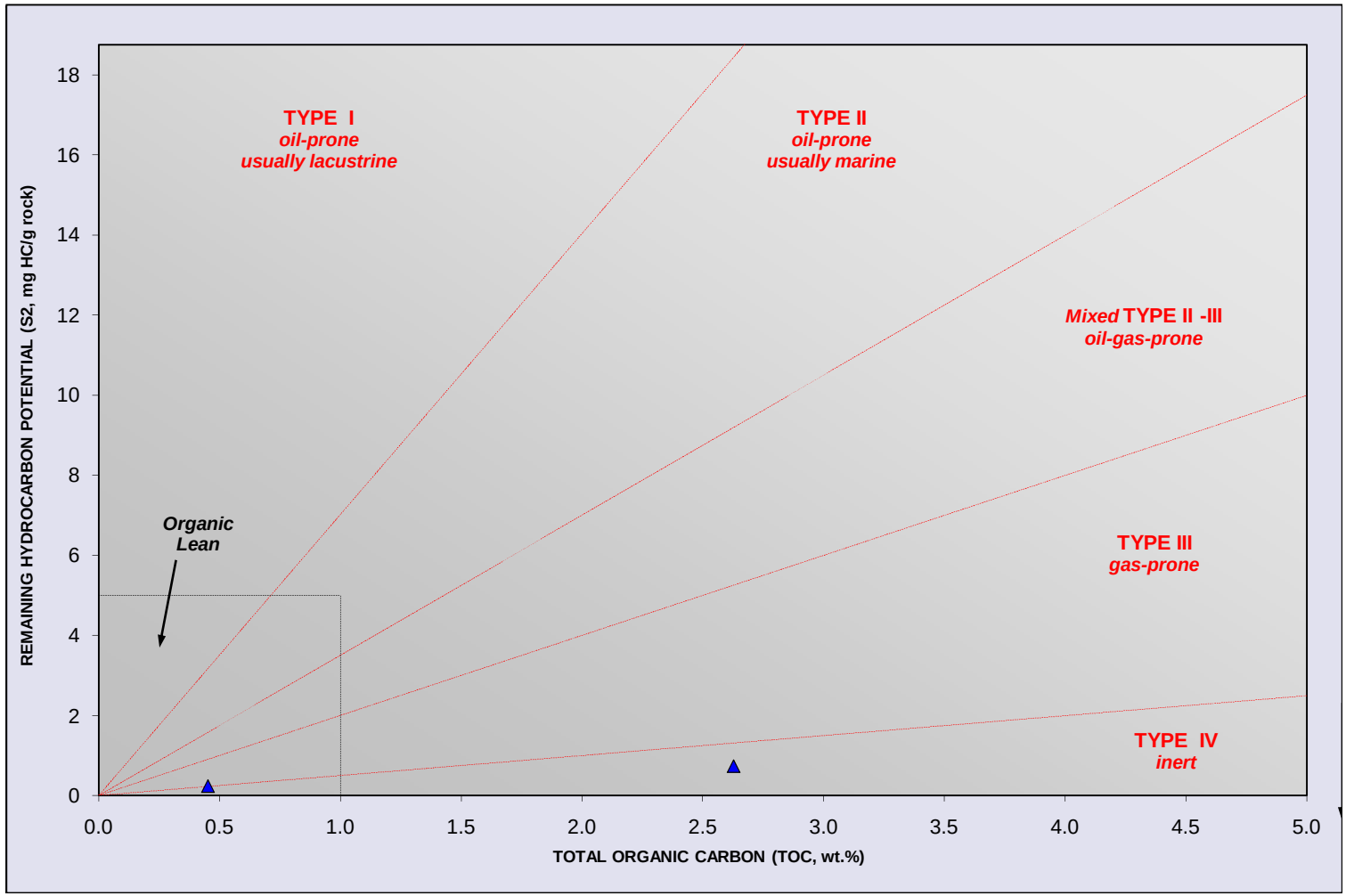

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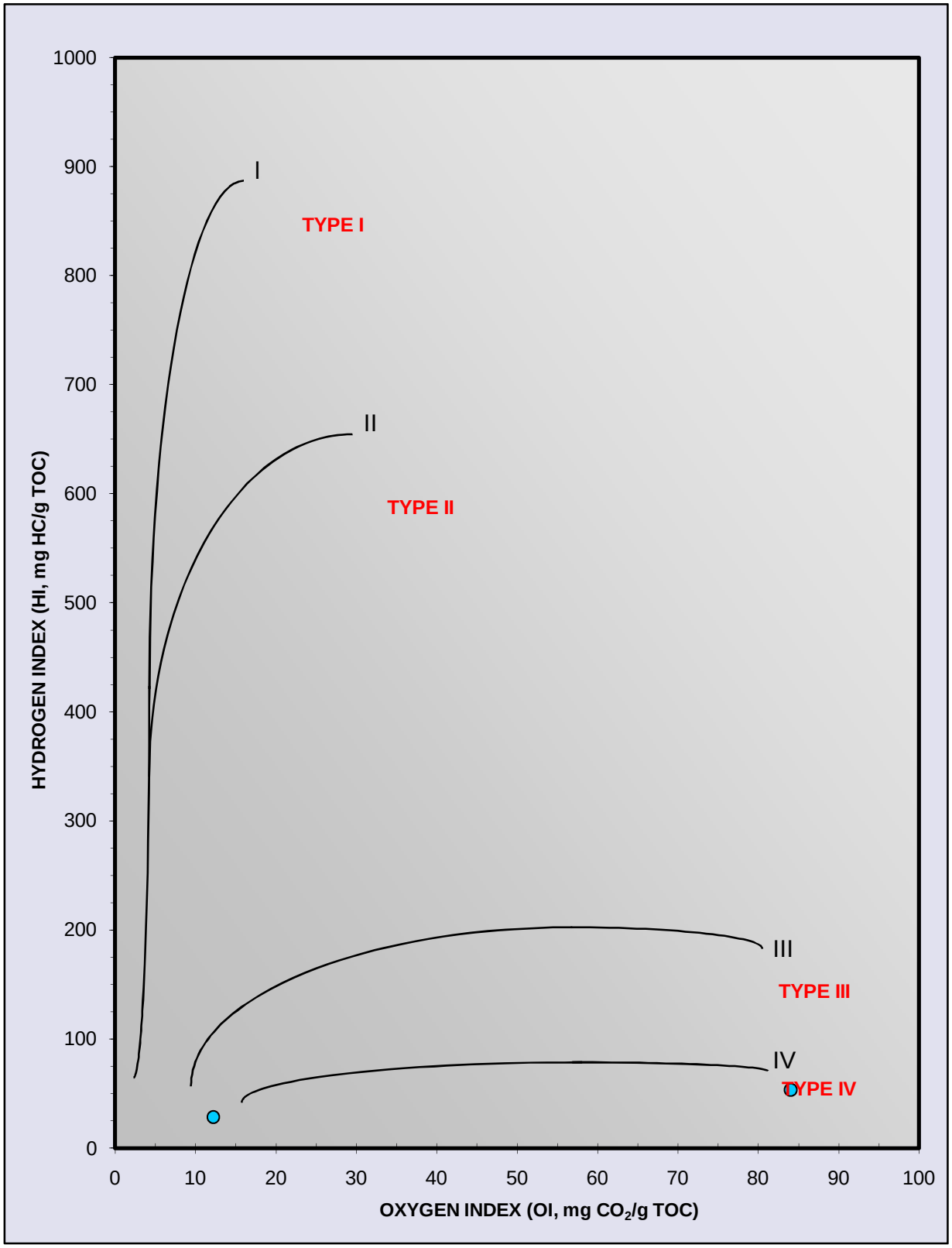
KEROGEN TYPE - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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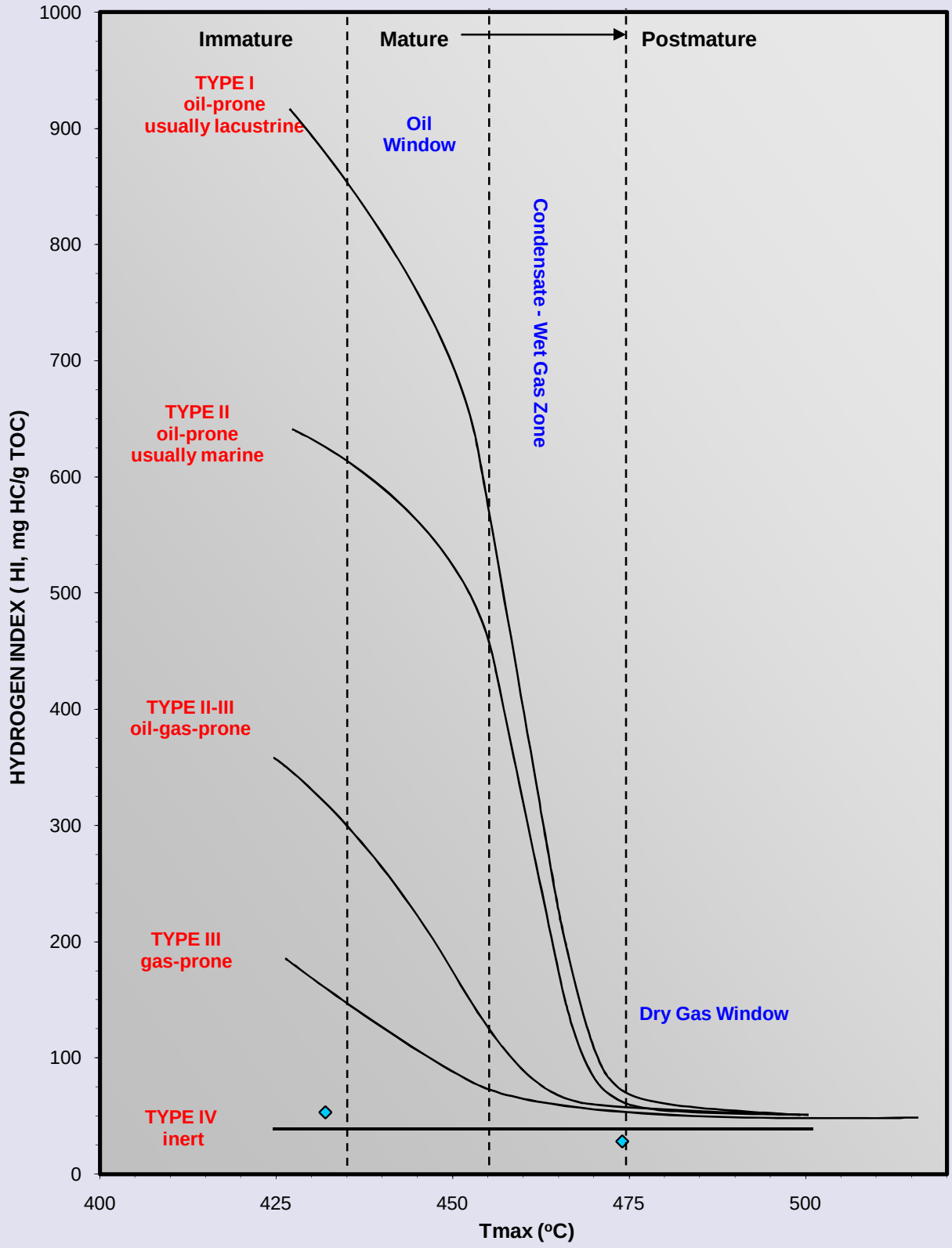
KEROGEN TYPE AND MATURITY (Tmax) - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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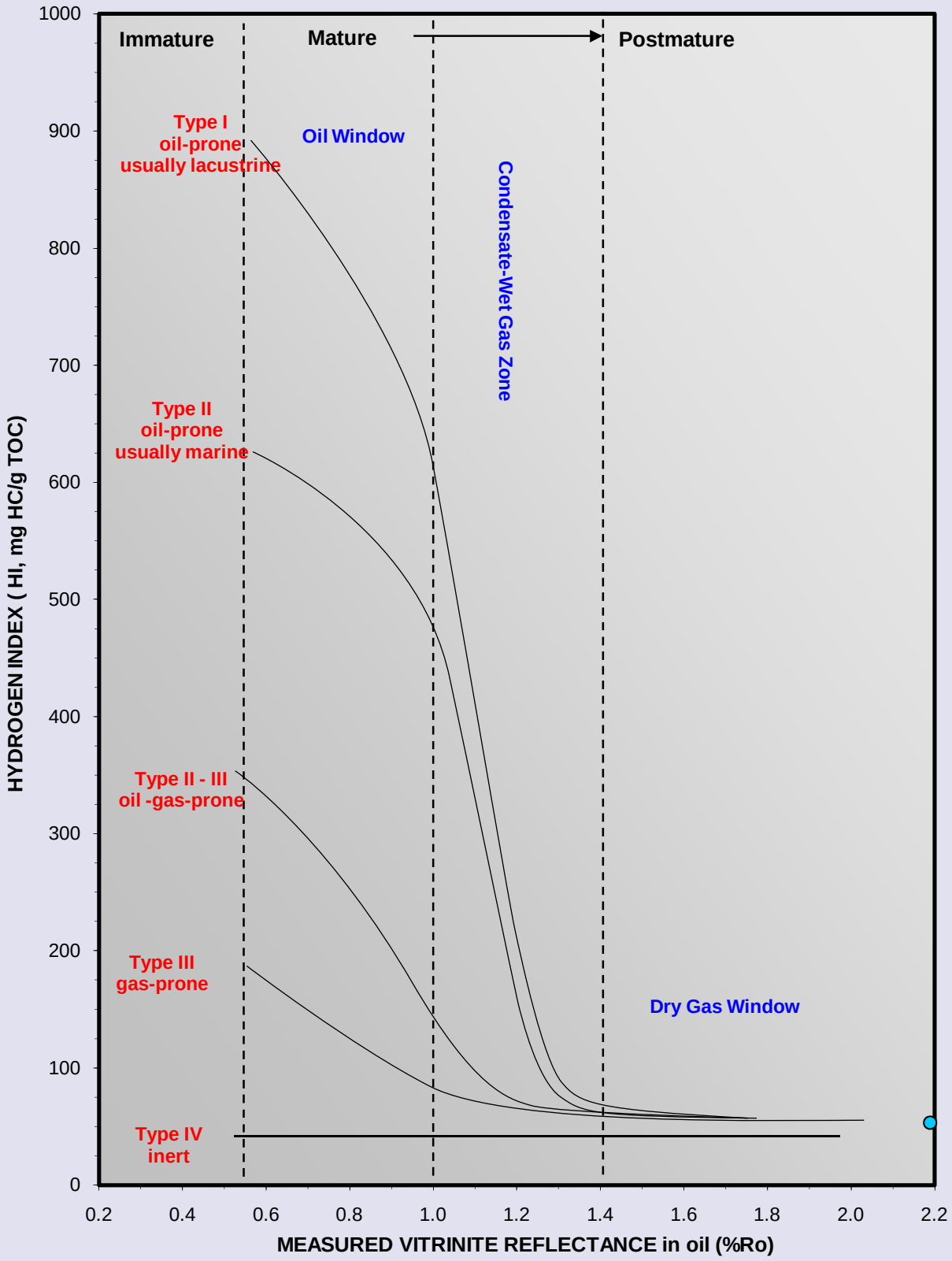
KEROGEN TYPE AND MATURITY (%Ro) - ROY BIRNEY NO.1

Company: **Project# : HH-47677 / HH-47677**



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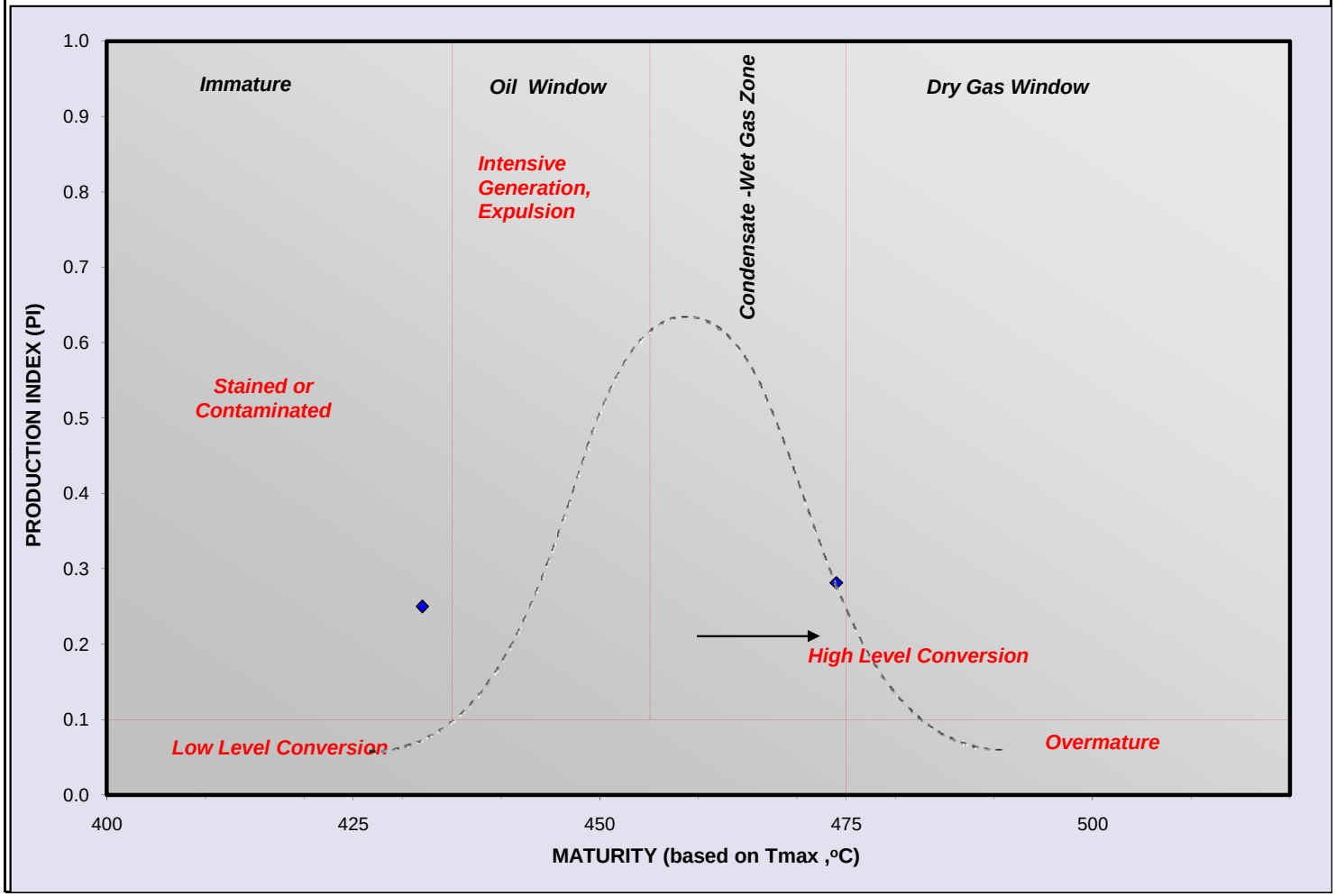
Fax: 281-681-0326 • Email: Geocheminfo@weatherfordlabs.com

Weatherford LABORATORIES

KEROGEN CONVERSION AND MATURITY (Tmax) - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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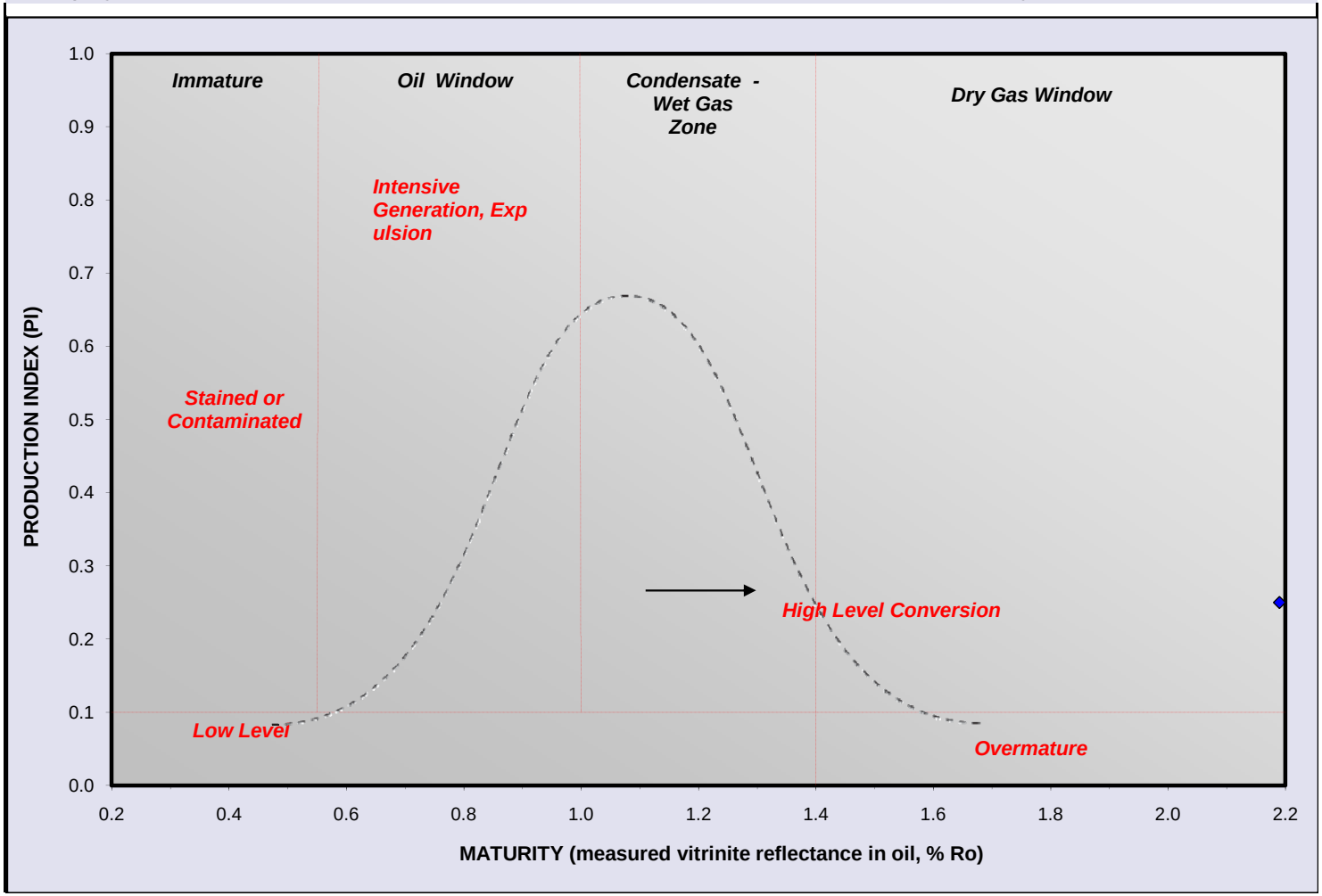
KEROGEN CONVERSION AND MATURITY (%Ro) - ROY BIRNEY NO.1

Company: **Project #: HH-47677 / HH-47677**



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S# 2287

GeoMark
Petroleum Services Division

Source Rock Analyses

TOC, Rock-Eval and Maturity Testing

R. Birney #1
Harrison County, Ohio

September 1, 2010

218 Higgins Street
Humble, TX 77338
832.644.1184

GeoMark Research, Ltd.

9748 Whithorn Drive
Houston, TX 77095
281.856.9333

Dennis Prezbindowski
Petroleum Consulting Inc

GeoMark

SOURCE ROCK ANALYSES

GeoMark Research, Ltd.

R. Birney #1, Harrison County, Ohio

Sample ID										Source Rock Analyses													
Project / Sample ID	API #	Well Name	Sampling Date	Sampling Time	Formation Name	Upper Depth (ft)	Lower Depth (ft)	Median Depth (ft)	Sample Type	Percent Carbonate (wt%)	Leco TOC (wt% HC)	Rock-Eval S1 (mg HC/g)	Rock-Eval S2 (mg HC/g)	Rock-Eval S3 (mg CO2/g)	Tmax (°C)	Measured %Ro (Vitrinite Refl.)	Calculated %Ro (RE-TMAX)	Hydrogen Index (S2x100/TOC)	Oxygen Index (S3x100/TOC)	S2/S3 Conc. (mg HC/mg CO2)	S1/TOC Norm. Oil Content	Production Index (S1/(S1+S2)	Experimental Notations
RJRE-100808-001	34067201030000	R. Birney #1				8,220.00	8,230.00	8,225.00	Cuttings	23.70	0.24	0.04	0.04	0.24			-7.16	17	100	0	17	0.50	s2 too low for reliable Tmax
RJRE-100808-002	34067201030000	R. Birney #1				8,230.00	8,240.00	8,235.00	Cuttings	23.87	0.24	0.06	0.07	0.28			-7.16	29	117	0	25	0.46	s2 too low for reliable Tmax
RJRE-100808-003	34067201030000	R. Birney #1				8,240.00	8,270.00	8,255.00	Cuttings	20.59	0.27	0.07	0.05	0.28			-7.16	19	104	0	26	0.58	s2 too low for reliable Tmax
RJRE-100808-004	34067201030000	R. Birney #1				8,270.00	8,300.00	8,285.00	Cuttings	18.31	0.30	0.06	0.03	0.26			-7.16	10	87	0	20	0.67	s2 too low for reliable Tmax
RJRE-100808-005	34067201030000	R. Birney #1				8,300.00	8,330.00	8,315.00	Cuttings	17.72	0.36	0.10	0.15	0.31			-7.16	42	86	0	28	0.40	s2 too low for reliable Tmax
RJRE-100808-006	34067201030000	R. Birney #1				8,330.00	8,360.00	8,345.00	Cuttings	17.81	0.34	0.10	0.11	0.28			-7.16	32	82	0	29	0.48	s2 too low for reliable Tmax
RJRE-100808-007	34067201030000	R. Birney #1				8,360.00	8,390.00	8,375.00	Cuttings	22.13	0.37	0.08	0.05	0.26			-7.16	14	70	0	22	0.62	s2 too low for reliable Tmax
RJRE-100808-008	34067201030000	R. Birney #1				8,390.00	8,420.00	8,405.00	Cuttings	21.68	0.40	0.10	0.09	0.22			-7.16	23	55	0	25	0.53	s2 too low for reliable Tmax
RJRE-100808-009	34067201030000	R. Birney #1				8,420.00	8,450.00	8,435.00	Cuttings	22.27	0.63	0.14	0.20	0.29			-7.16	32	46	1	22	0.41	s2 too low for reliable Tmax
RJRE-100808-010	34067201030000	R. Birney #1				8,450.00	8,480.00	8,465.00	Cuttings	22.89	0.70	0.14	0.14	0.27			-7.16	20	39	1	20	0.50	s2 too low for reliable Tmax
RJRE-100808-011	34067201030000	R. Birney #1				8,480.00	8,510.00	8,495.00	Cuttings	47.68	2.87	0.75	0.79	0.27	505		1.93	28	9	3	26	0.49	
RJRE-100808-012	34067201030000	R. Birney #1				8,510.00	8,520.00	8,515.00	Cuttings	47.49	2.86	0.64	0.73	0.25	503		1.89	26	9	3	22	0.47	
RJRE-100808-013	34067201030000	R. Birney #1				8,520.00	8,540.00	8,530.00	Cuttings	50.19	3.20	0.73	0.98	0.32	513		2.07	31	10	3	23	0.43	
RJRE-100808-014	34067201030000	R. Birney #1				8,540.00	8,550.00	8,545.00	Cuttings	48.88	3.08	0.83	1.26	0.55	490		1.66	41	18	2	27	0.40	Low Temp S2 Shoulder
RJRE-100808-015	34067201030000	R. Birney #1				8,550.00	8,560.00	8,555.00	Cuttings	55.49	3.52	1.01	0.95	0.30	507		1.97	27	9	3	29	0.52	
RJRE-100808-016	34067201030000	R. Birney #1				8,560.00	8,570.00	8,565.00	Cuttings	66.00	2.30	0.63	0.65	0.27	494		1.73	28	12	2	27	0.49	Low Temp S2 Shoulder
RJRE-100808-017	34067201030000	R. Birney #1				8,570.00	8,580.00	8,575.00	Cuttings	58.32	1.65	0.39	0.44	0.30	511		2.04	27	18	1	24	0.47	
RJRE-100808-018	34067201030000	R. Birney #1				8,580.00	8,590.00	8,585.00	Cuttings	60.15	2.70	0.71	0.70	0.46	505		1.93	26	17	2	26	0.50	
RJRE-100808-019	34067201030000	R. Birney #1				8,590.00	8,600.00	8,595.00	Cuttings	69.31	2.07	0.55	0.43	0.24	507		1.97	21	12	2	27	0.56	
RJRE-100808-020	34067201030000	R. Birney #1				8,600.00	8,610.00	8,605.00	Cuttings	67.34	2.17	0.60	0.47	0.29	513		2.07	22	13	2	28	0.56	
RJRE-100808-021	34067201030000	R. Birney #1				8,610.00	8,620.00	8,615.00	Cuttings	75.43	0.98	0.24	0.36	0.32	515		2.11	37	33	1	24	0.40	
RJRE-100808-022	34067201030000	R. Birney #1				8,620.00	8,630.00	8,625.00	Cuttings	68.31	0.65	0.17	0.19	0.32			-7.16	29	49	1	26	0.47	s2 too low for reliable Tmax

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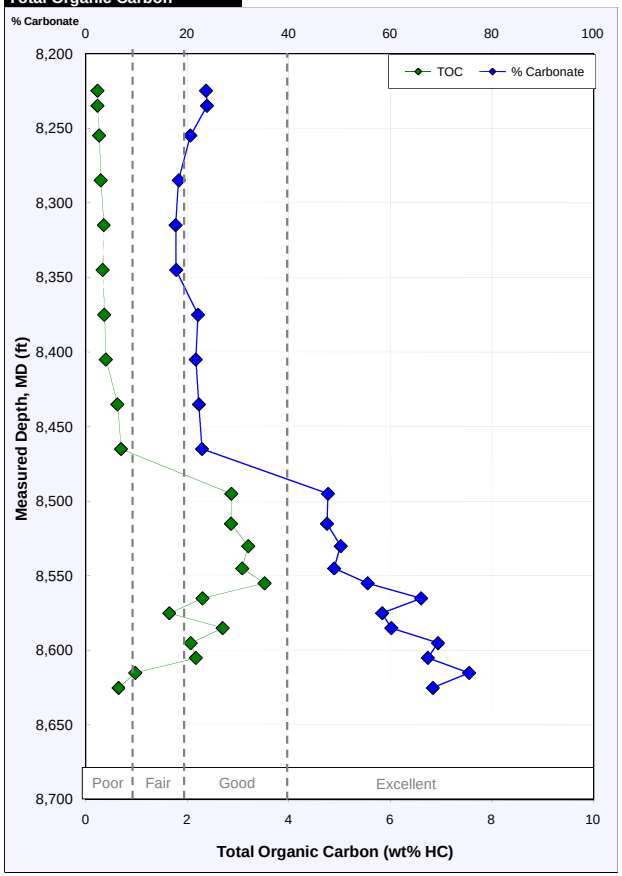
SOURCE ROCK ANALYSES

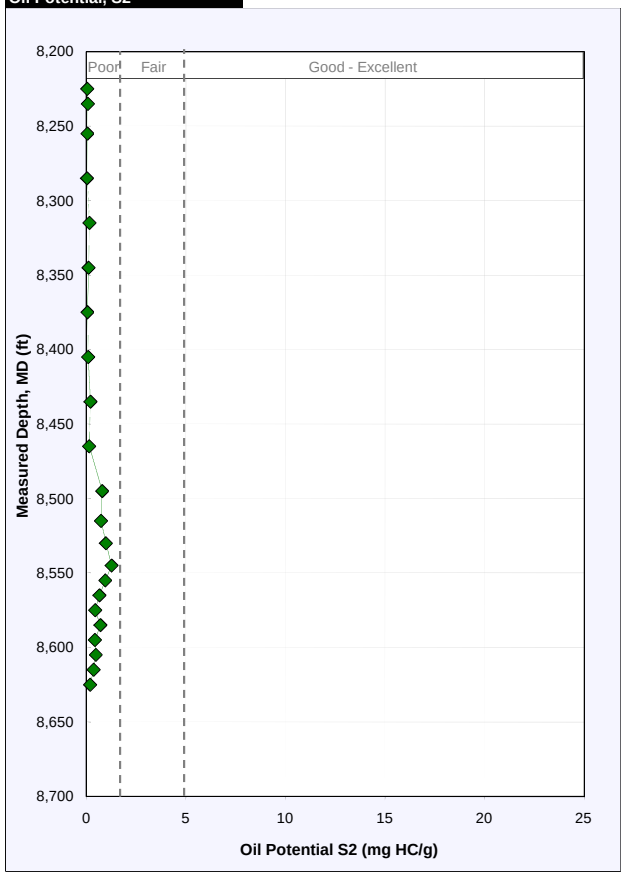
GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

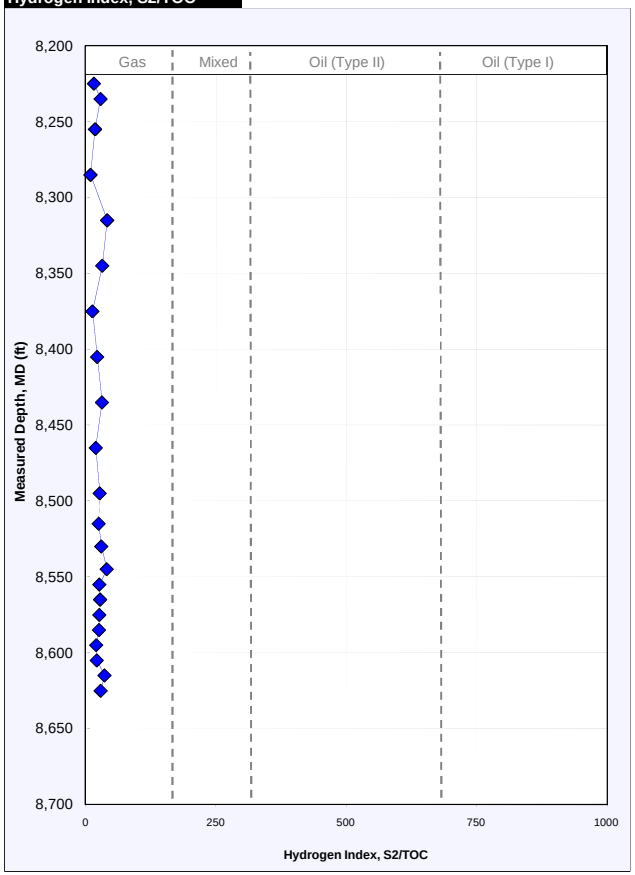
Total Organic Carbon



Oil Potential, S2



Hydrogen Index, S2/TOC



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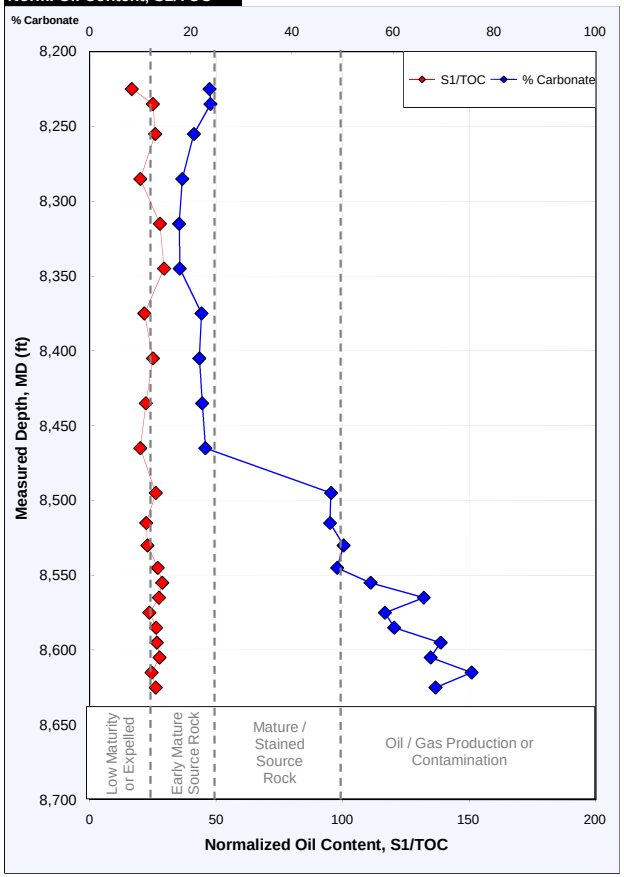
SOURCE ROCK ANALYSES

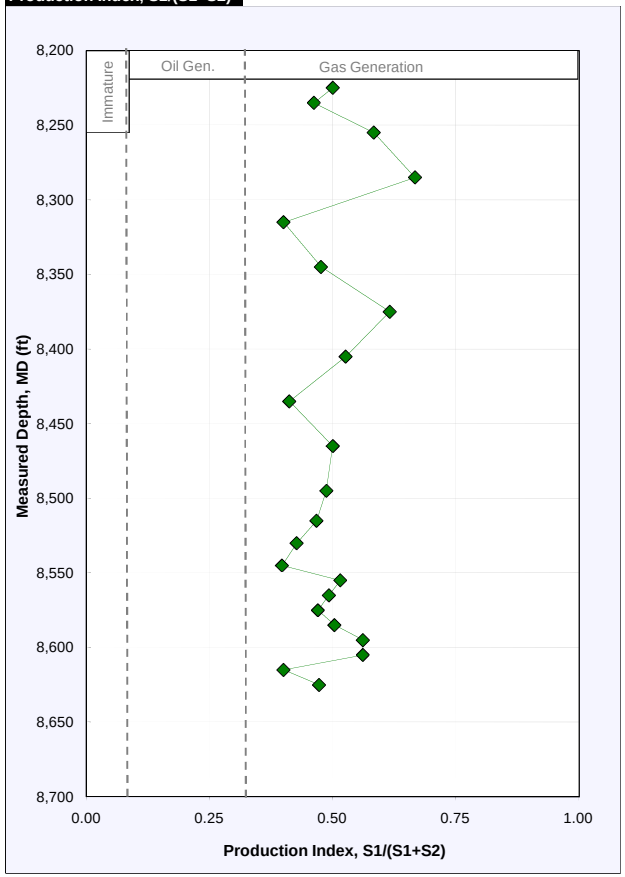
GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

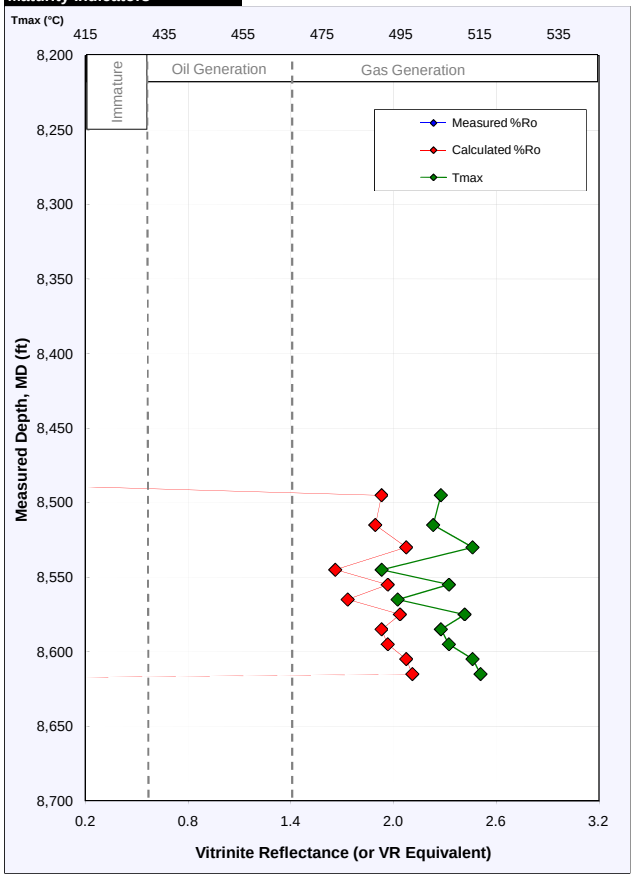
Norm. Oil Content, S1/TOC



Production Index, S1/(S1+S2)



Maturity Indicators

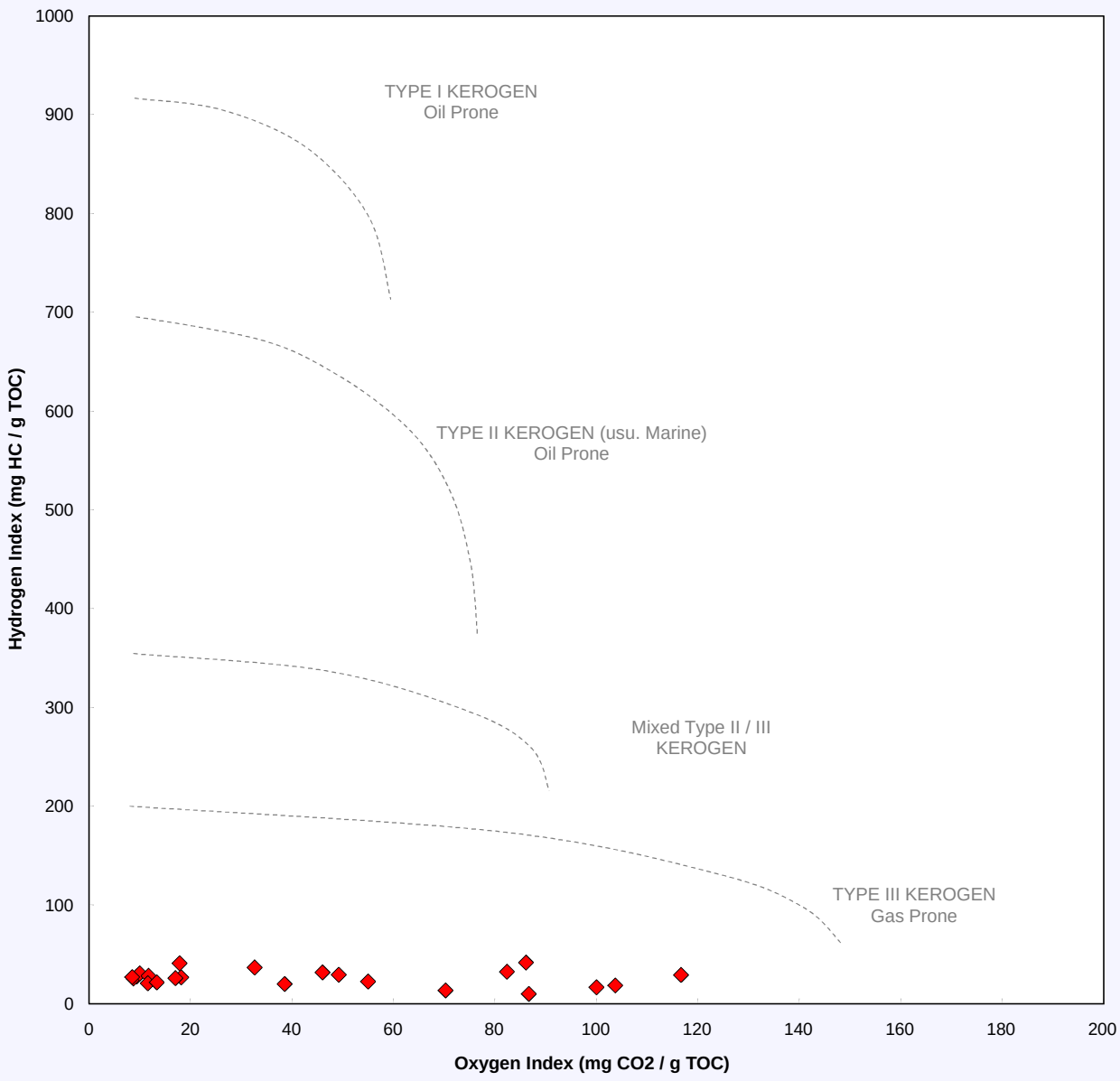


SOURCE ROCK ANALYSES

GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

Pseudo Van Krevelen Plot



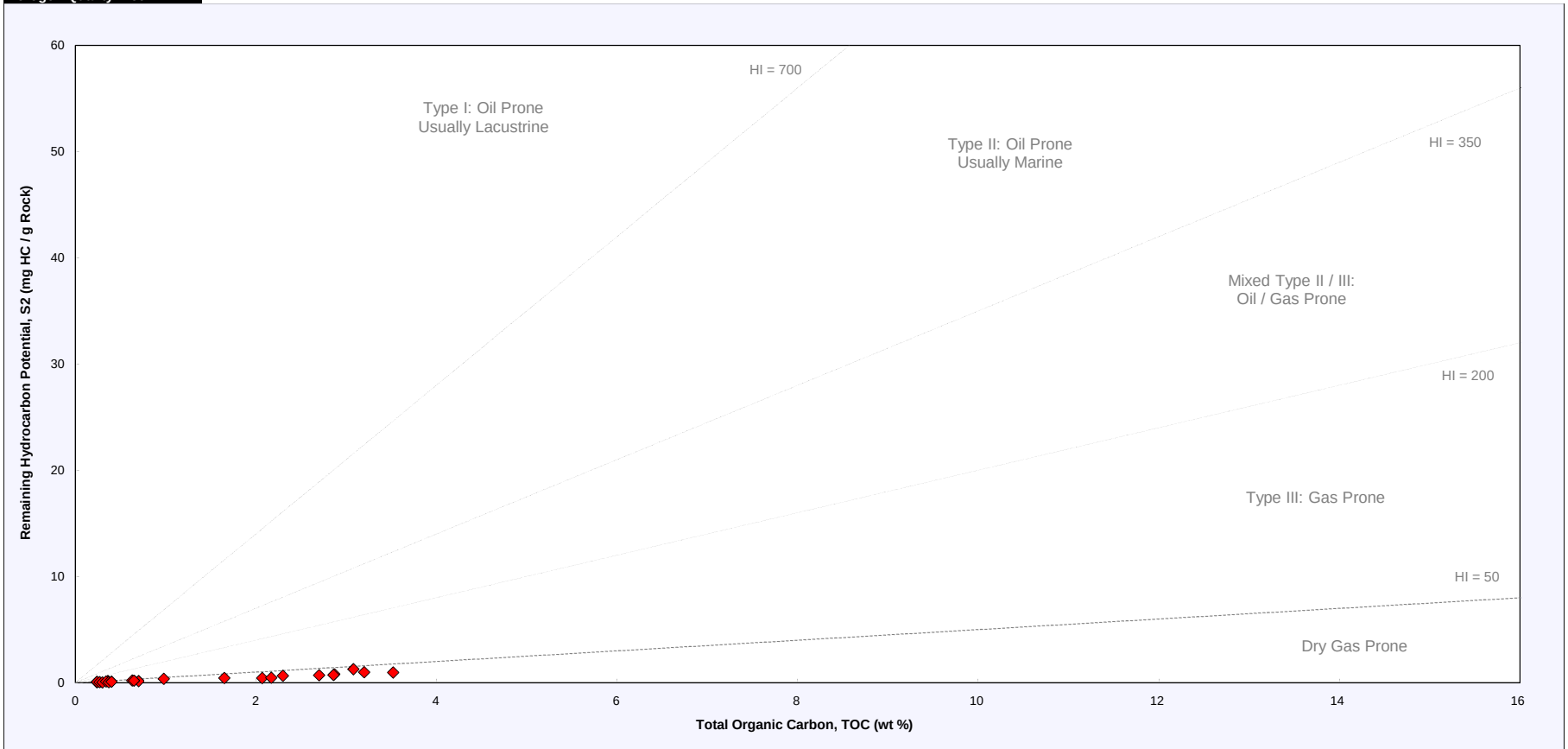
GEOMARK

SOURCE ROCK ANALYSES

GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

Kerogen Quality Plot

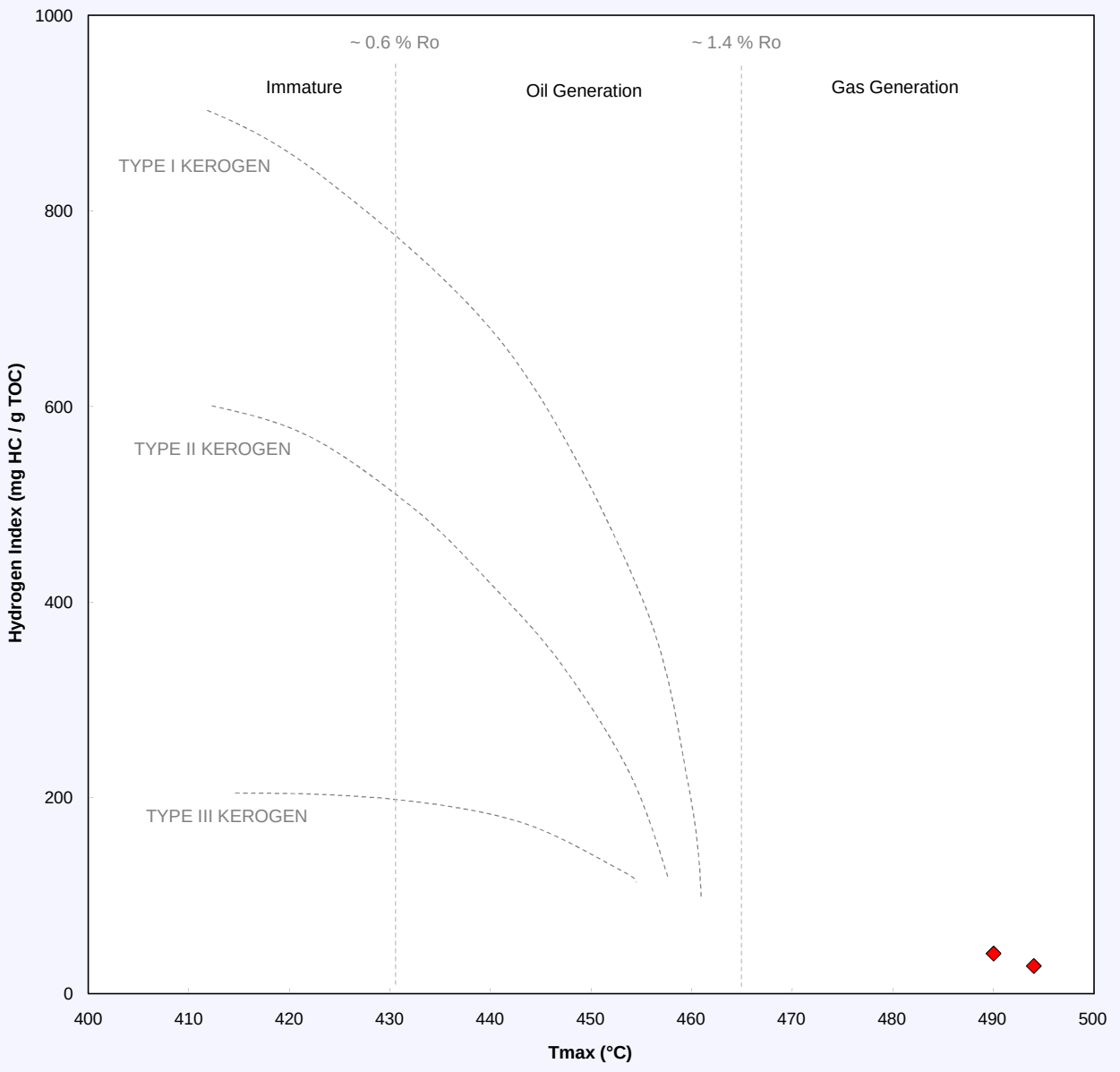


SOURCE ROCK ANALYSES

GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

Kerogen Type and Maturity



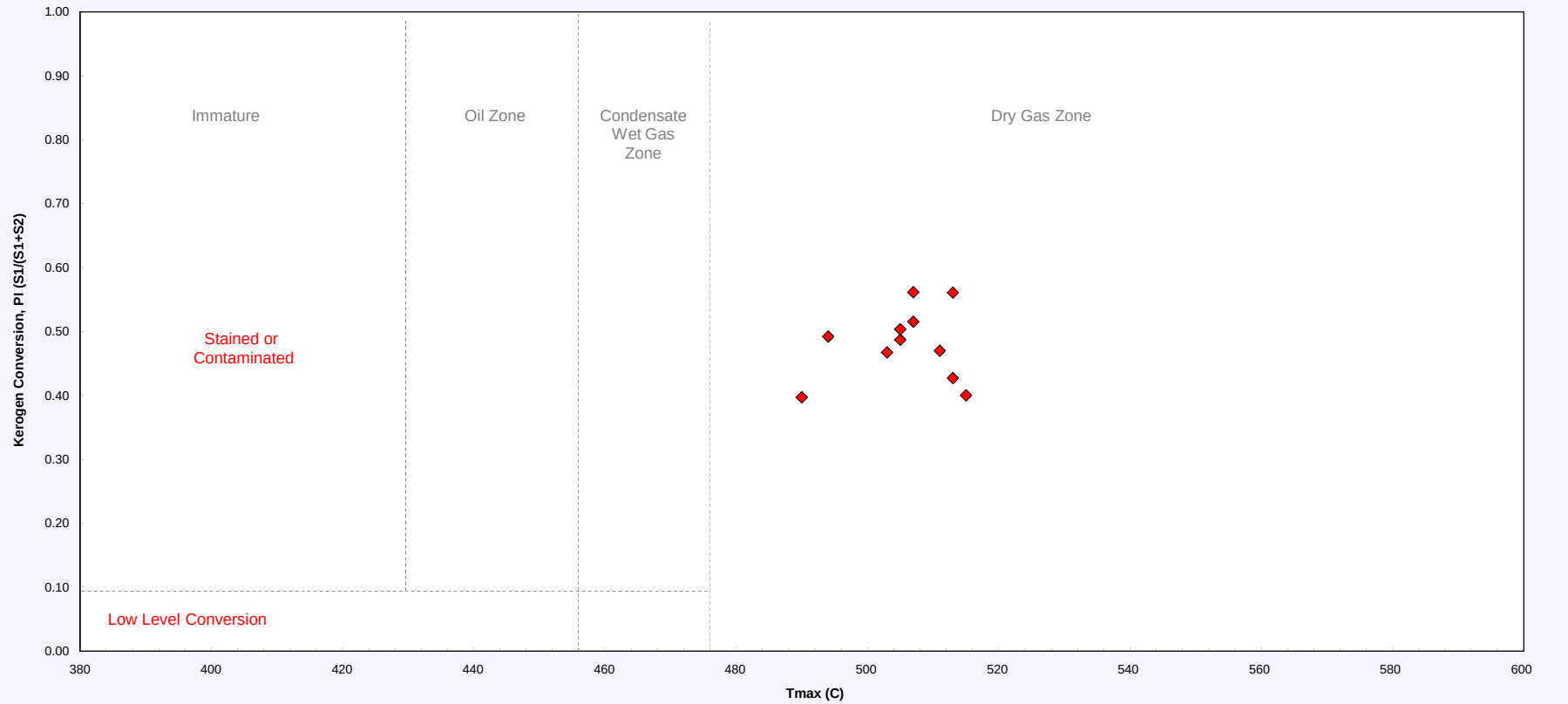
GEOMARK

SOURCE ROCK ANALYSES

GEOMARK RESEARCH, LTD.

R. Birney #1, Harrison County, Ohio

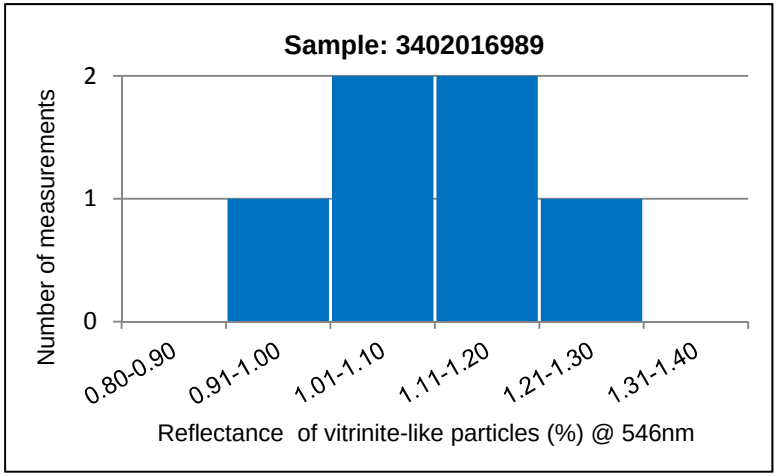
Kerogen Quality Plot



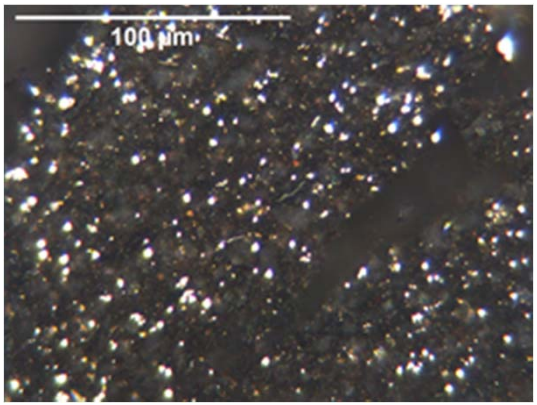
Weatherford LABORATORIES

Vitrinite Reflectance and MOA

Project: HH-50970
Well: Utica Shale Multi Well Cuttings



3402016989	Depth = 8390-8450
Minimum R_o (%)	0.97
Maximum R_o (%)	1.25
Number of points	6
Standard deviation	0.101
Mean R_o of vitrinite-like particles (%)	**1.14**



Comments: Amorphous organic matter (amorphinite) is the dominant organic matter type. It occurs as non-fluorescent granular material, often forming interconnected network. Solid bitumen is distinct but usually very thin, too small to measure. Vitrinite–like particles were used to measure reflectance and based on 6 measurements, the average R_o is 1.14%. In transmitted light, amorphous organic matter is light brown, indicating TAI 3. Pollen and spores have not been found. These reflectance values and TAI suggest that the organic matter is late mature and within the condensate – wet gas generation zone.

Ordered $R_{o\ random}$ Values

0.97 1.10 1.10 1.20 1.20 1.25

Visual kerogen analysis (volume %, mineral matter free basis)

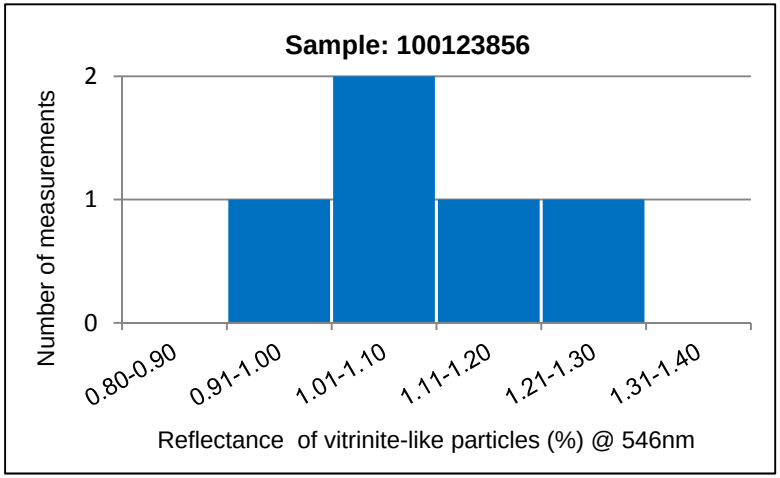
Sample ID	Alginite (%)	Amorphous OM (%)	Other Liptinite (%)	vitrinite -like (%)	Inertinite %	Liptinite Fluores. (%)	Solid Bitumen (%)	Oil prone (%)	Gas prone (%)	Pollen/ Spores	TAI (Staplin, 1969)
3402016989	0	95	0	trace	0	0	5	0	95	absent	3

Hess Corp.

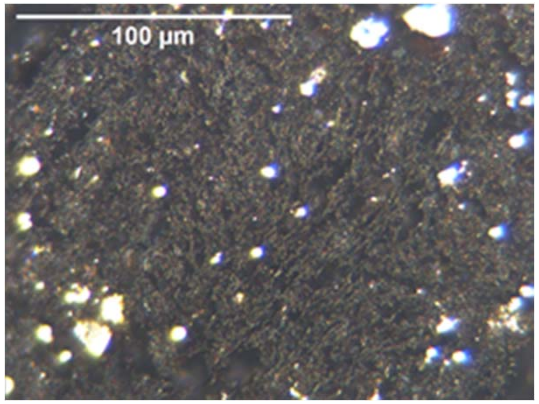
Weatherford LABORATORIES

Vitrinite Reflectance and MOA

Project: HH-50970
Well: Utica Shale Multi Well Cuttings



100123856	Depth = 8540-8550
Minimum R_o (%)	0.97
Maximum R_o (%)	1.23
Number of points	5
Standard deviation	0.104
Mean R_o of vitrinite-like particles (%)	**1.07**



Comments: Amorphous organic matter (amorphinite) is the dominant organic matter type. It occurs non-fluorescent granular material, often forming interconnected network. Solid bitumen is distinct but usually very thin and only occasionally occurs as larger particles with reflectance 0.87 to 1.08%. Occasionally it is anisotropic. Vitrinite–like particles were used to measure reflectance and based on 5 measurements (only 5 particles were found), the average R_o is 1.07%. In transmitted light, amorphous organic matter is light brown, indicating TAI 3. Pollen and spores have not been found. These reflectance values and TAI suggest that the organic matter is late mature and within the condensate – wet generation zone.

Ordered $R_{o\ random}$ Values

0.97 1.01 1.02 1.11 1.23

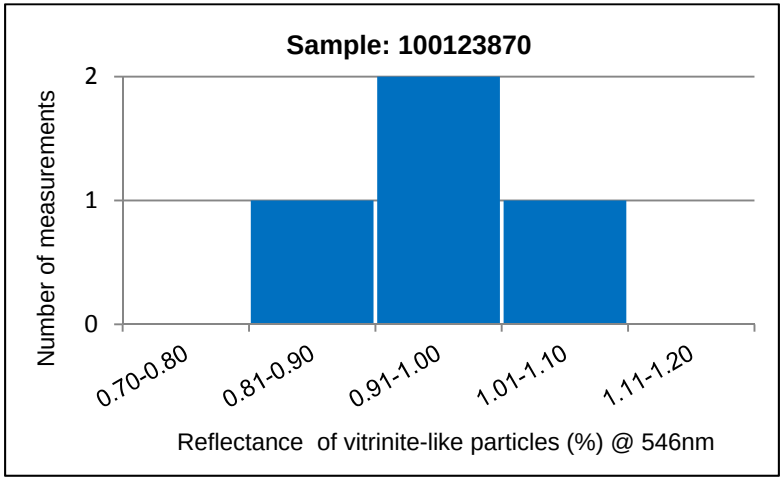
Visual kerogen analysis (volume %, mineral matter free basis)

Sample ID	Alginite (%)	Amorphous OM (%)	Other Liptinite (%)	vitrinite -like (%)	Inertinite %	Liptinite Fluores. (%)	Solid Bitumen (%)	Oil prone (%)	Gas prone (%)	Pollen/ Spores	TAI (Staplin, 1969)
100123856	0	95	0	trace	0	0	5	0	95	absent	3

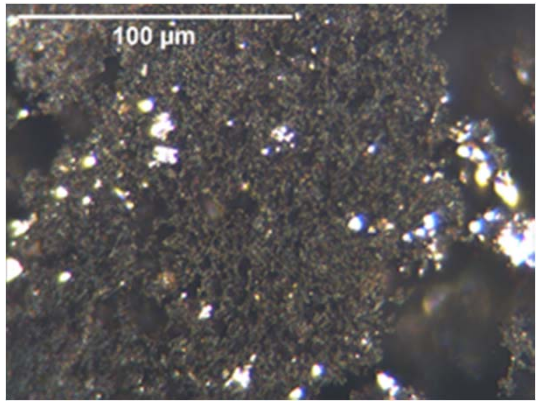
Weatherford LABORATORIES

Vitrinite Reflectance and MOA

Project: HH-50970
Well: Utica Shale Multi Well Cuttings



100123870	Depth = 8610-8620
Minimum R_o (%)	0.90
Maximum R_o (%)	1.01
Number of points	4
Standard deviation	0.048
Mean R_o of vitrinite-like particles (%)	**0.97**



Comments: Amorphous organic matter (amorphinite) is the dominant organic matter type. It occurs as non-fluorescent granular material. It passes into solid bitumen that is distinct but usually very thin, too small to measure. Vitrinite–like particles were used to measure reflectance and based on 4 measurements (only 4 particles were found), the average R_o is 0.97%. In transmitted light, amorphous organic matter is light brown, indicating TAI 3. Pollen and spores have not been found. These reflectance values and TAI suggest that the organic matter is close to the mature/late mature transition and within the oil and generation zone.

Ordered $R_{o\ random}$ Values

0.90 0.97 0.99 1.01

Visual kerogen analysis (volume %, mineral matter free basis)

Sample ID	Alginite (%)	Amorphous OM (%)	Other Liptinite (%)	vitrinite -like (%)	Inertinite %	Liptinite Fluores. (%)	Solid Bitumen (%)	Oil prone (%)	Gas prone (%)	Pollen/ Spores	TAI (Staplin, 1969)
100123870	0	75	0	trace	0	0	25	0	75	absent	3

Weatherford LABORATORIES

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

Well Name :	Utica Shale Multi Well Cuttings	Operator : API # :	State : County :	Project No. :

ODGS samp#	Client ID	api well number	Operator	Depth () Top	Depth () Bottom	Depth () Median	Formation	Age	Sample Type	Sample Prep	*	Leco TOC	RE S1	RE S2	RE S3	Tmax (°C)	**	Ro,%	HI	OI	S2/S3	S1/TOC	PI	Notes Checks	Notes Pyrogram	Lab ID
2287	BIRNEY ROY	34067201030000		8390	8420	8405			Cutting	NOPR		0.33	0.09	0.11	0.42	487	**		33	127	0.3	27	0.45	TOC	f	100123844
2287	BIRNEY ROY	34067201030000		8420	8450	8435			Cutting	NOPR		0.58	0.12	0.18	0.67	448	**		31	115	0.3	21	0.41		f	100123846
2287	BIRNEY ROY	34067201030000		8450	8480	8465			Cutting	NOPR		0.69	0.10	0.17	0.51	508	**		25	74	0.3	15	0.37	RE	f	100123848
2287	BIRNEY ROY	34067201030000		8480	8510	8495			Cutting	NOPR		2.55	0.79	0.79	0.50	492			31	20	1.6	31	0.50	TOC RE	hts2p:lts2sh	100123850
2287	BIRNEY ROY	34067201030000		8510	8520	8515			Cutting	NOPR		2.88	0.66	0.66	0.55	510			23	19	1.2	23	0.50	RE	hts2p:lts2sh	100123852
2287	BIRNEY ROY	34067201030000		8520	8540	8530			Cutting	NOPR		2.79	0.79	0.96	0.59	501			34	21	1.6	28	0.45		hts2p:lts2sh	100123854
2287	BIRNEY ROY	34067201030000		8540	8550	8545			Cutting	NOPR		2.78	1.10	1.50	1.14	353			54	41	1.3	39	0.42	TOC	lts2p:hts2sh	100123856
2287	BIRNEY ROY	34067201030000		8550	8560	8555			Cutting	NOPR		3.12	1.04	0.85	0.68	468			27	22	1.3	33	0.55		hts2p:lts2sh	100123858
2287	BIRNEY ROY	34067201030000		8560	8570	8565			Cutting	NOPR		2.85	0.98	1.30	1.15	351			46	40	1.1	34	0.43		lts2p:hts2sh	100123860
2287	BIRNEY ROY	34067201030000		8570	8580	8575			Cutting	NOPR		1.55	0.44	0.49	0.55	515	**		32	36	0.9	29	0.47	TOC RE	hts2p:lts2sh	100123862
2287	BIRNEY ROY	34067201030000		8580	8590	8585			Cutting	NOPR		2.43	0.68	0.66	0.62	516			27	25	1.1	28	0.51	TOC	hts2p:lts2sh	100123864
2287	BIRNEY ROY	34067201030000		8590	8600	8595			Cutting	NOPR		1.82	0.63	0.46	0.44	509	**		25	24	1.0	35	0.58		hts2p:lts2sh	100123866
2287	BIRNEY ROY	34067201030000		8600	8610	8605			Cutting	NOPR		1.91	0.64	0.41	0.36	512	**		22	19	1.1	34	0.61	TOC	hts2p:lts2sh	100123868
2287	BIRNEY ROY	34067201030000		8610	8620	8615			Cutting	NOPR		0.93	0.28	0.40	0.42	403	**		43	45	1.0	30	0.41	TOC	n:lts2sh:hts2sh	100123870

Notes:

"-1" – not measured or invalid value for Tmax
TOC - Total Organic Carbon, wt. %
S1 - volatile hydrocarbon (HC) content, mg HC/ g rock
S2 - remaining HC generative potential, mg HC/ g rock
S3 - carbon dioxide content, mg CO2 / g rock

* - comments regarding contamination
** - low S2, Tmax is unreliable
Meas. %Ro - measured vitrinite reflectance
HI - Hydrogen index = S2 x 100 / TOC, mg HC/ g TOC
OI - Oxygen Index = S3 x 100 / TOC, mg CO2/ g TOC
PI - Production Index = S1 / (S1+S2)

Pyrogram:

f - flat S2 peak
n - normal
hS2sh - high temperature S2 shoulder
lhS2sh - low temperature S2 shoulder
lhS2p - low temperature S2 peak
hhS2p - high temperature S2 peak

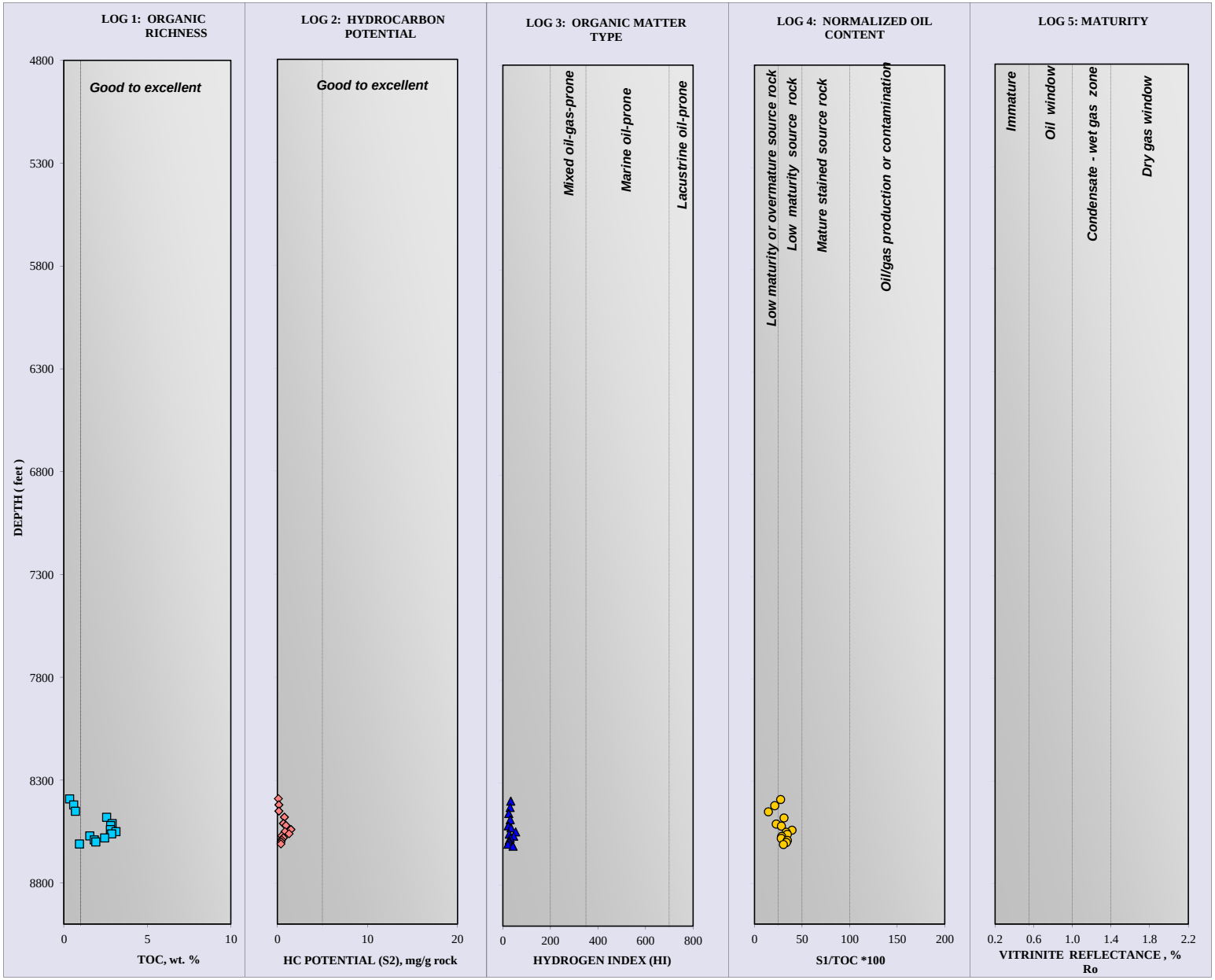
LECO – TOC on Leco Instrument
RE - Programmed pyrolysis or TOC on Rock-Eval instrument
SRA – Programmed pyrolysis by SRA Instrument
EXT - Extracted Rock
NOPR - Normal Preparation

Hess Corp.

Weatherford LABORATORIES

GEOCHEMICAL LOGS - Utica Shale Multi Well Cuttings

Company: **Project #:**

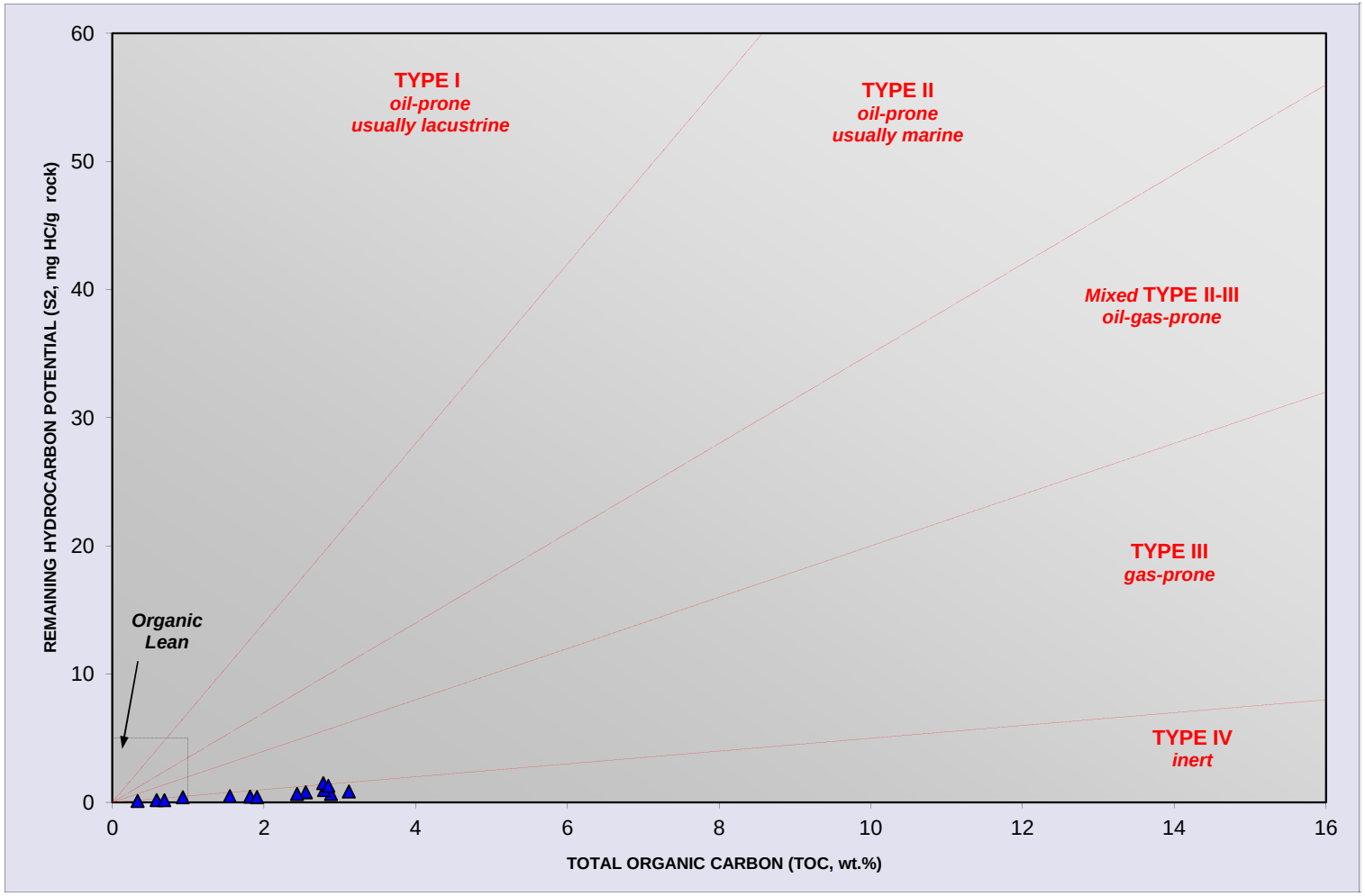


Geochemical Services Group, 143 Vision Park Blvd., Shenandoah, Texas 77384 • 281- 681-2200 • Fax: 281-681-0326 • Email: Geocheminfo@weatherfordlabs.com

Weatherford LABORATORIES

KEROGEN QUALITY PLOT - Utica Shale Multi Well Cuttings

Company: **Project #:**



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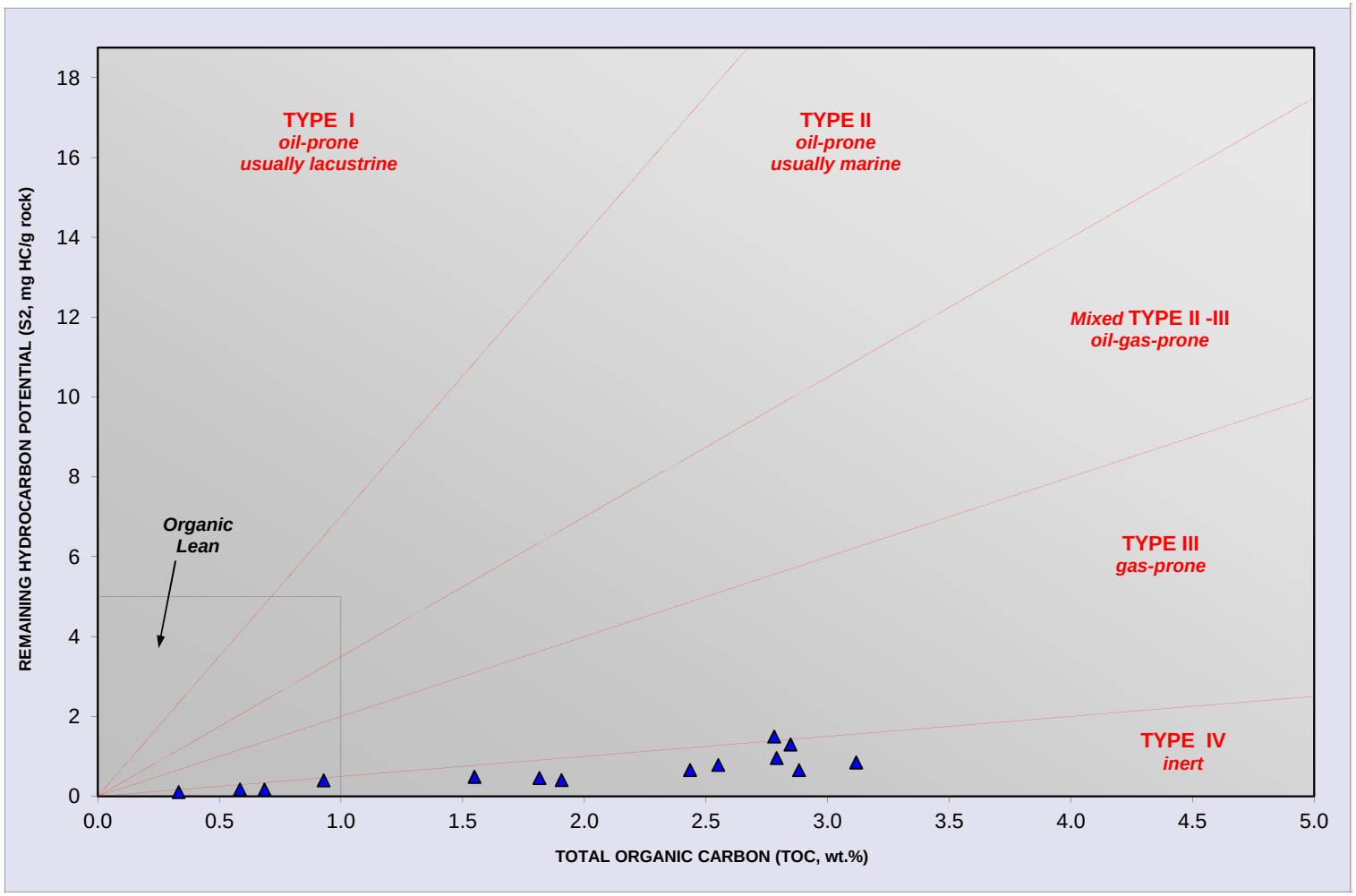
KEROGEN QUALITY PLOT - Utica Shale Multi Well Cuttings

Company: **Project #:**



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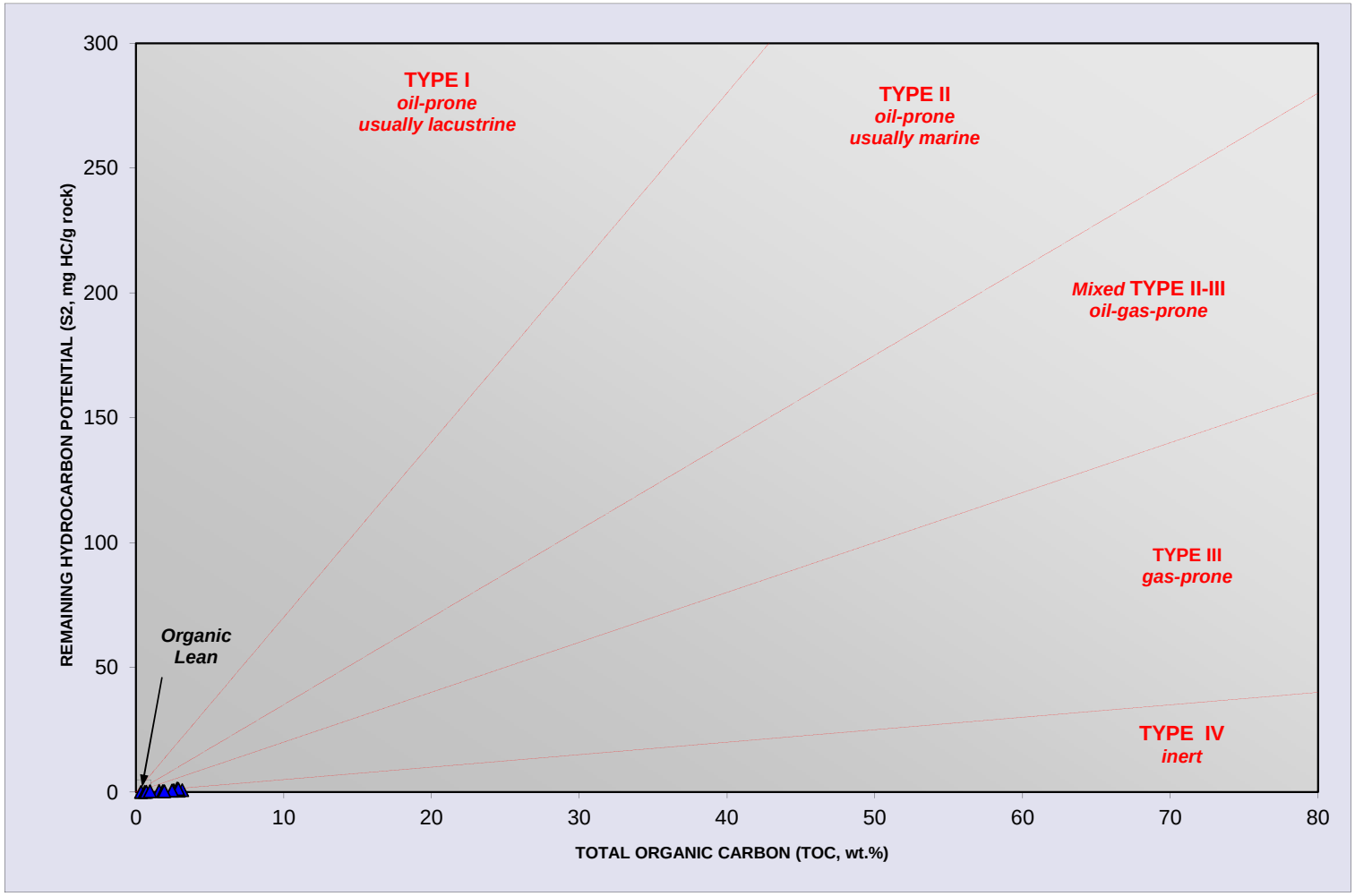
KEROGEN QUALITY PLOT - Utica Shale Multi Well Cuttings

Company: HESS CORP. **Project #: HH-50970 / HH-50970**



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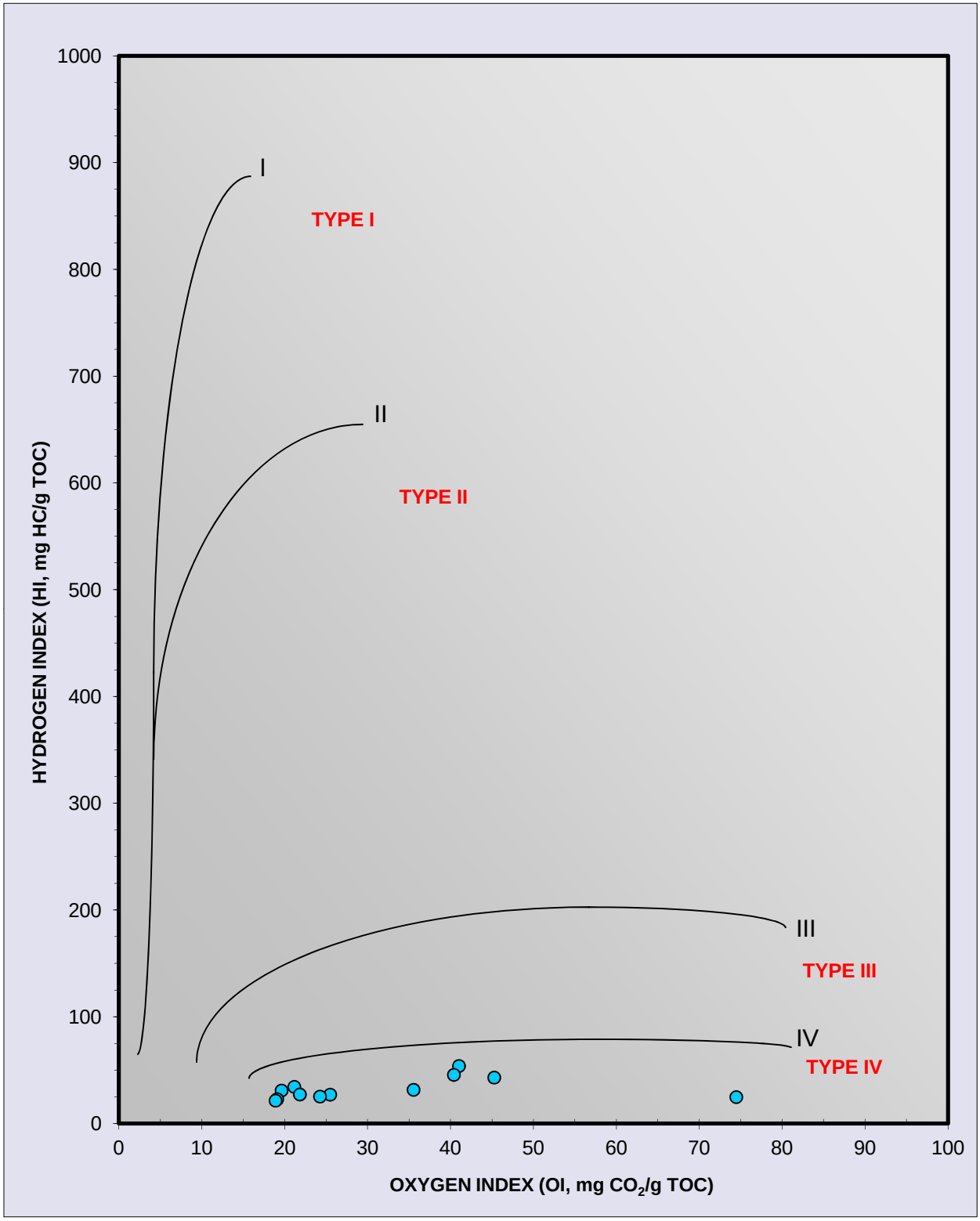
KEROGEN TYPE - Utica Shale Multi Well Cuttings

Company: **Project #:**



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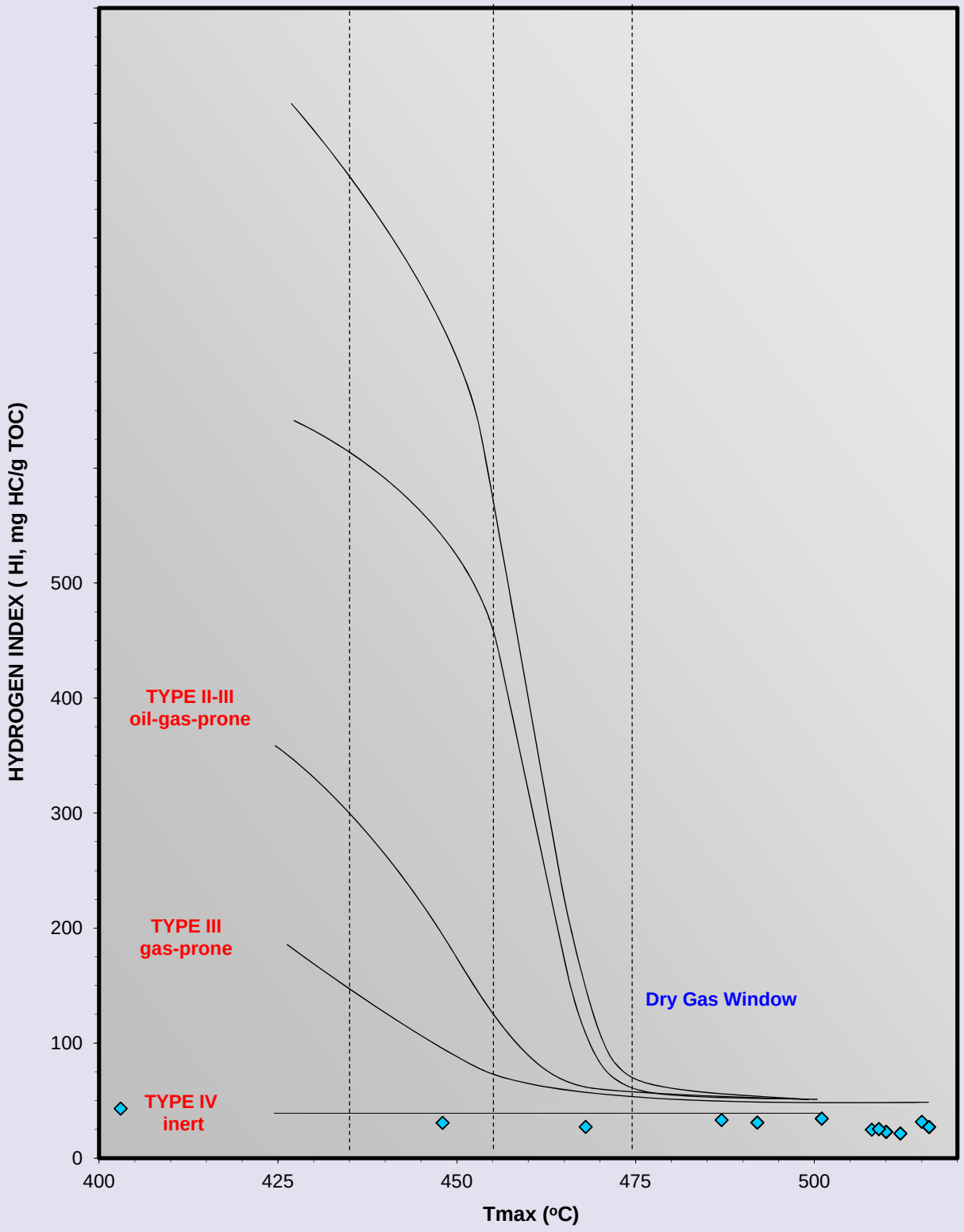
KEROGEN TYPE AND MATURITY (Tmax) - Utica Shale Multi Well Cuttings

Company: **Project #:**



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Fax: 281-681-0326 • Email: Geocheminfo@weatherfordlabs.com

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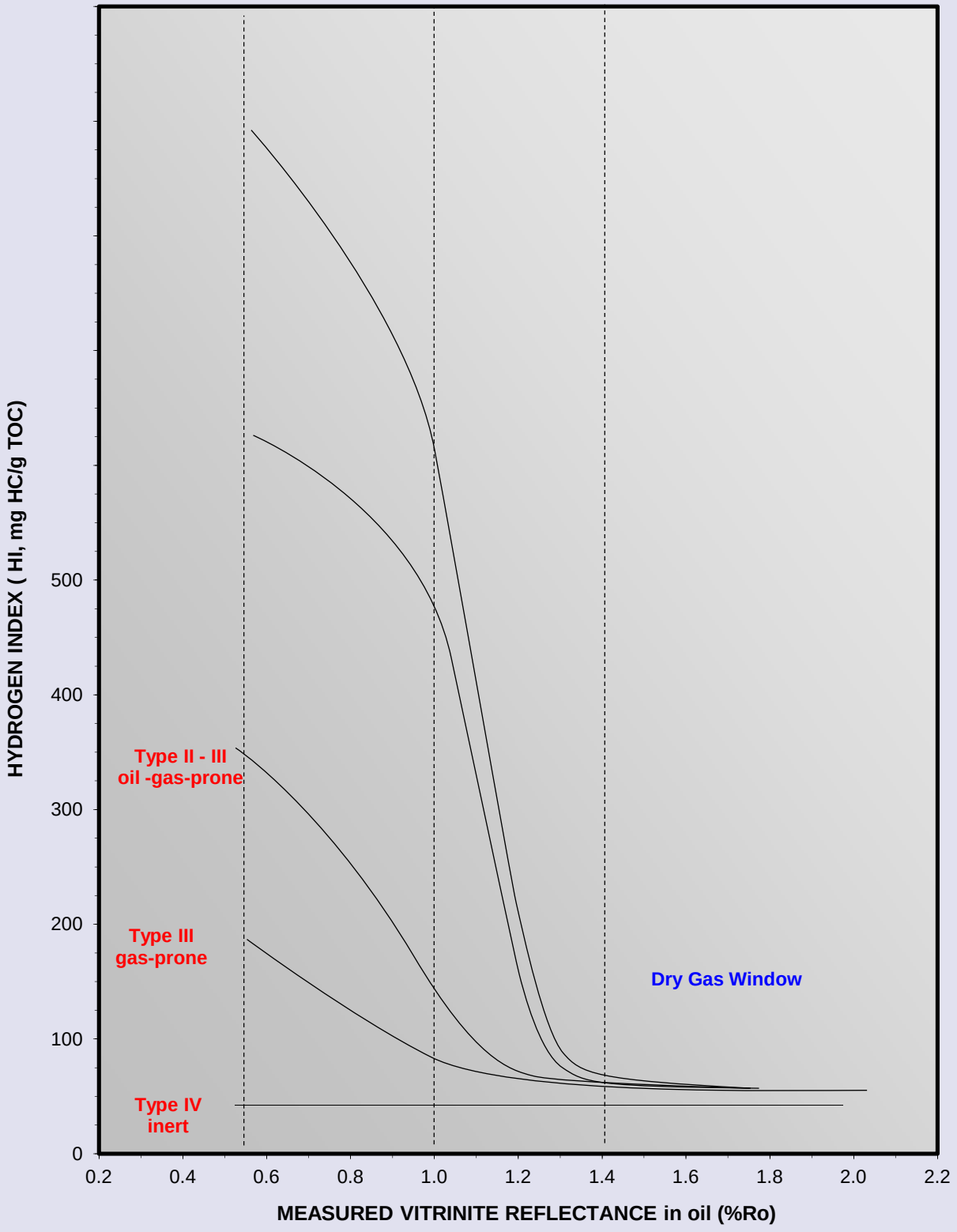
KEROGEN TYPE AND MATURITY (%Ro) - Utica Shale Multi Well Cuttings

Company: **Project# :**



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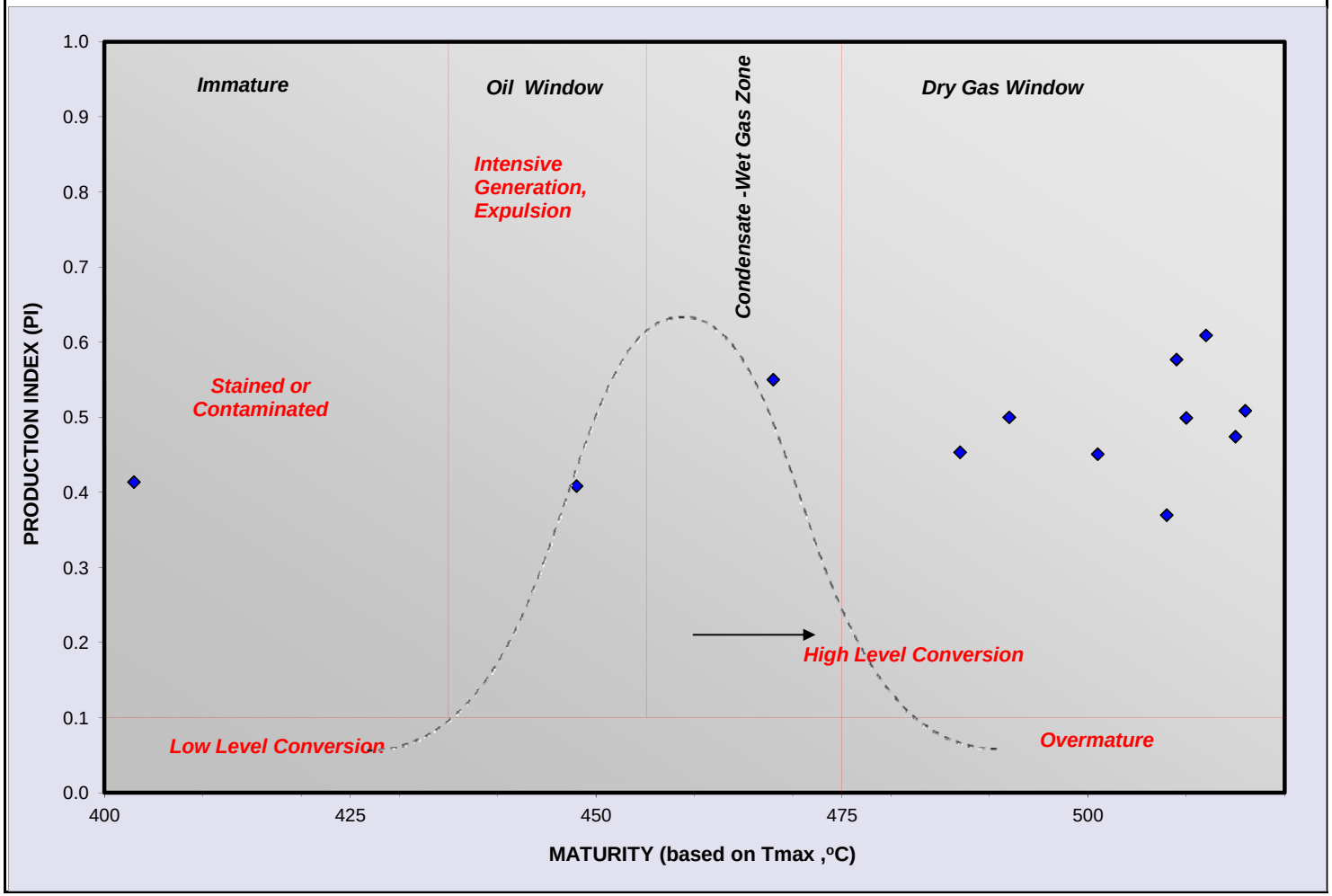
KEROGEN CONVERSION AND MATURITY (Tmax) - Utica Shale Multi Well Cuttings

Company: **Project #:**



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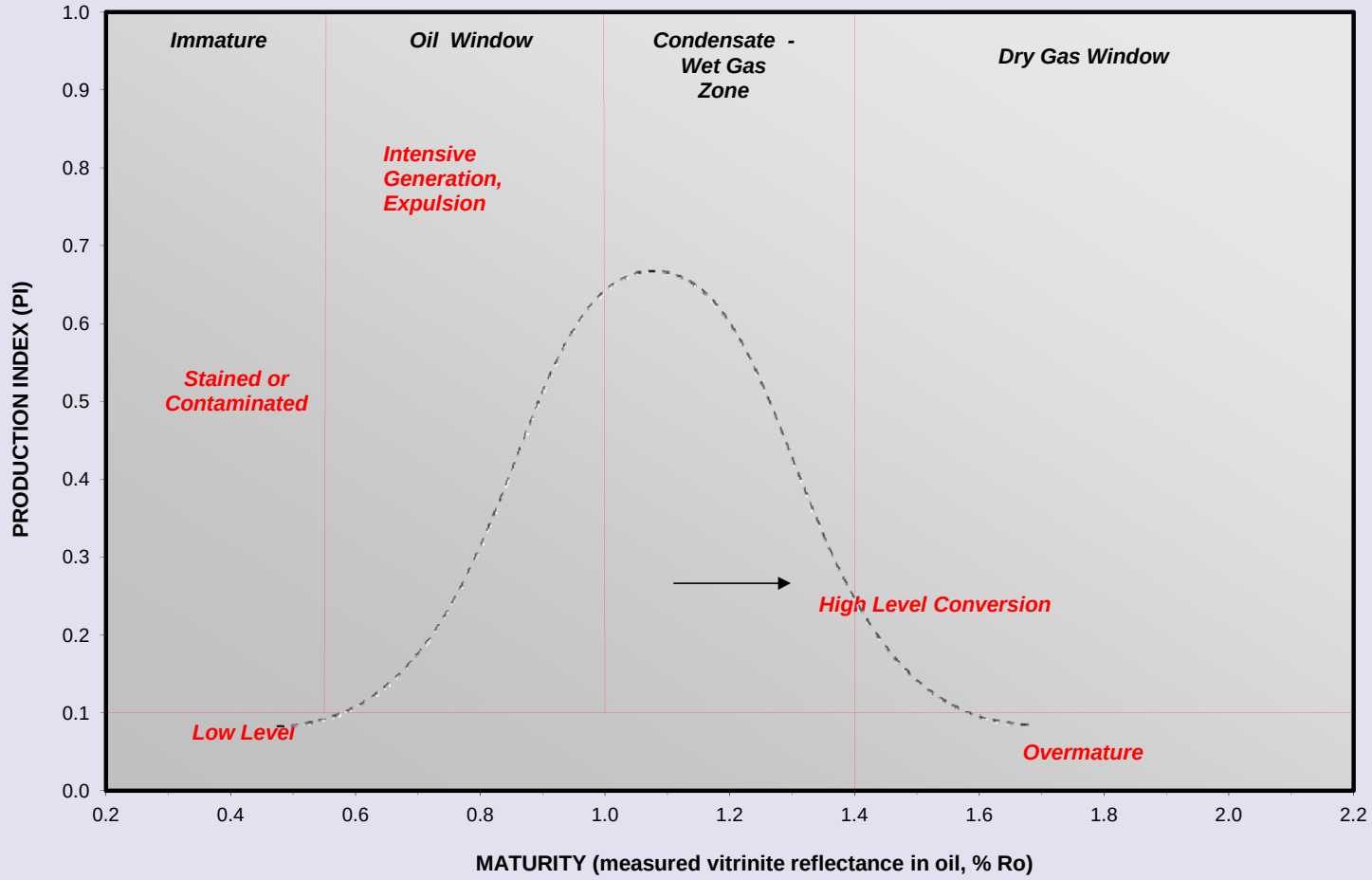
KEROGEN CONVERSION AND MATURITY (%Ro) - Utica Shale Multi Well Cuttings

Company: **Project #:**



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Weatherford LABORATORIES

S# 2287

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

CMR ENERGY, LP

Well Name :	Multiple Well Study	**Operator :** J. Kurek **SRA ID :** Fletch Junior	**State :** OH **County :** Undisclosed	**Weatherford Labs Project**	CO-53295

	Weatherford Labs ID	Well Name	Client ID	Median Depth (feet)	Sample Type	Sample Prep	*	TOC	S1	S2	S3	Tmax (°C)	**	Meas. % Ro	HI	OI	S2/S3	S1/TOC *100	PI	Notes Check	Notes Pyrogram	Lab ID
34007202060000	1-1	French & Papp 1	007-20206	5710.0	Cuttings	NOPR		1.05	0.64	1.59	0.39	444			151	37	4	61	0.29			53295-1-1.RAW
34007202060000	1-2	French & Papp 1	007-20207	5850.0	Cuttings	NOPR		1.61	0.91	2.45	0.38	440			152	24	6	57	0.27			53295-1-2.RAW
34007202060000	1-3	French & Papp 1	007-20208	5890.0	Cuttings	NOPR		1.42	0.79	2.18	0.36	440			154	25	6	56	0.27			53295-1-3.RAW
34007202060000	1-4	French & Papp 1	007-20209	5935.0	Cuttings	NOPR		1.30	0.75	1.94	0.33	434			149	25	6	58	0.28			53295-1-4.RAW
34007202060000	1-5	French & Papp 1	007-20210	6005.0	Cuttings	NOPR		1.38	0.66	2.04	0.36	438			148	26	6	48	0.24			53295-1-5.RAW
34007202060000	1-6	French & Papp 1	007-20211	6035.0	Cuttings	NOPR		0.41	0.19	0.76	0.21	434			188	52	4	47	0.20			53295-1-6.RAW
34007202060000	1-7	French & Papp 1	007-20212	6085.0	Cuttings	NOPR		0.37	0.26	0.97	0.33	446			263	89	3	70	0.21			53295-1-7.RAW
34133240270000	2-1	Wantz R Unit 1-2161	133-24027	5655.0	Cuttings	NOPR		0.53	0.24	0.76	0.19	430			142	36	4	45	0.24			53295-2-1.RAW
34133240270000	2-2	Wantz R Unit 1-2162	133-24028	5755.0	Cuttings	NOPR		0.66	0.32	1.00	0.19	430			151	29	5	48	0.24			53295-2-2.RAW
34133240270000	2-3	Wantz R Unit 1-2163	133-24029	5785.0	Cuttings	NOPR		1.46	1.06	2.47	0.22	440			169	15	11	73	0.30			53295-2-3.RAW
34133240270000	2-4	Wantz R Unit 1-2164	133-24030	5815.0	Cuttings	NOPR		1.32	0.79	2.40	0.28	450			182	21	9	60	0.25			53295-2-4.RAW
34133240270000	2-5	Wantz R Unit 1-2165	133-24031	5895.0	Cuttings	NOPR		0.94	0.58	1.48	0.31	439			157	33	5	62	0.28			53295-2-5.RAW
34133240270000	2-6	Wantz R Unit 1-2166	133-24032	5915.0	Cuttings	NOPR		1.67	1.40	2.99	0.34	443			179	20	9	84	0.32			53295-2-6.RAW
34151250860000	3-1	Barley 1-2397	151-25086	6845.0	Cuttings	NOPR		0.63	0.33	1.14	0.64	427			181	102	2	52	0.22			53295-3-1.RAW
34151250860000	3-2	Barley 1-2397	151-25087	6855.0	Cuttings	NOPR		2.32	1.39	3.36	0.32	440			145	14	11	60	0.29			53295-3-2D.RAW
34029206480000	4-1	Murray 3	029-20648	7395.0	Cuttings	NOPR		0.38	0.12	3.50	0.12	439			919	31	29	31	0.03			53295-4-1.RAW
34029206480000	4-2	Murray 3	029-20648	7505.0	Cuttings	NOPR		0.54	0.13	0.42	0.22	432	**		78	41	2	24	0.24			53295-4-2.RAW
34029206480000	4-3	Murray 3	029-20648	7555.0	Cuttings	NOPR		1.51	0.42	0.80	0.17	437			53	11	5	28	0.34			53295-4-3.RAW
34019218500000	5-1	Bryan Unit 1	019-21850	7655.0	Cuttings	NOPR		1.47	0.36	0.78	0.41	430			53	28	2	24	0.32			53295-5-1.RAW
34019218500000	5-2	Bryan Unit 1	019-21850	7685.0	Cuttings	NOPR		1.26	0.32	0.76	0.47	429			60	37	2	25	0.30			53295-5-2.RAW
34019218500000	5-3	Bryan Unit 1	019-21850	7745.0	Cuttings	NOPR		1.54	0.38	0.85	0.32	433			55	21	3	25	0.31			53295-5-3.RAW
34019218500000	5-4	Bryan Unit 1	019-21850	7805.0	Cuttings	NOPR		1.68	0.52	0.98	0.33	433			58	20	3	31	0.35			53295-5-4.RAW
34019218500000	5-5	Bryan Unit 1	019-21850	7835.0	Cuttings	NOPR		1.22	0.28	0.95	0.45	429			78	37	2	23	0.23			53295-5-5.RAW
34019218500000	5-6	Bryan Unit 1	019-21850	7875.0	Cuttings	NOPR		1.55	0.51	1.18	0.38	429			76	25	3	33	0.30			53295-5-6.RAW
34067201030000	6-1	Roy Birney 1	067-20103	8375.0	Cuttings	NOPR		0.44	0.13	0.27	0.43	337	**		61	98	1	29	0.33			53295-6-1.RAW
34067201030000	6-2	Roy Birney 1	067-20103	8465.0	Cuttings	NOPR		0.68	0.15	0.47	0.38	413	**		69	56	1	22	0.24			53295-6-2.RAW
34067201030000	6-3	Roy Birney 1	067-20103	8495.0	Cuttings	NOPR		2.80	0.66	1.30	0.37	441			46	13	4	24	0.34			53295-6-3.RAW
34067201030000	6-4	Roy Birney 1	067-20103	8515.0	Cuttings	NOPR		2.80	0.63	1.19	0.37	439			43	13	3	23	0.35			53295-6-4.RAW
34067201030000	6-5	Roy Birney 1	067-20103	8545.0	Cuttings	NOPR		2.65	0.67	1.50	0.37	435			57	14	4	25	0.31			53295-6-5.RAW
34067201030000	6-6	Roy Birney 1	067-20103	8575.0	Cuttings	NOPR		1.61	0.37	0.58	0.67	429			36	42	1	23	0.39			53295-6-6.RAW

Notes:

"-1" – not measured or invalid value for T_{max}
TOC - Total Organic Carbon, wt. %
S1 - volatile hydrocarbon (HC) content, mg HC/ g rock
S2 - remaining HC generative potential, mg HC/ g rock
S3 - carbon dioxide content, mg CO_2 / g rock

* - comments regarding contamination
** - low S2, Tmax is unreliable
Meas. %Ro - measured vitrinite reflectance
HI - Hydrogen index = S2 x 100 / TOC, mg HC/ g TOC
OI - Oxygen Index = S3 x 100 / TOC, mg CO_2/ g TOC
PI - Production Index = S1 / (S1+S2)

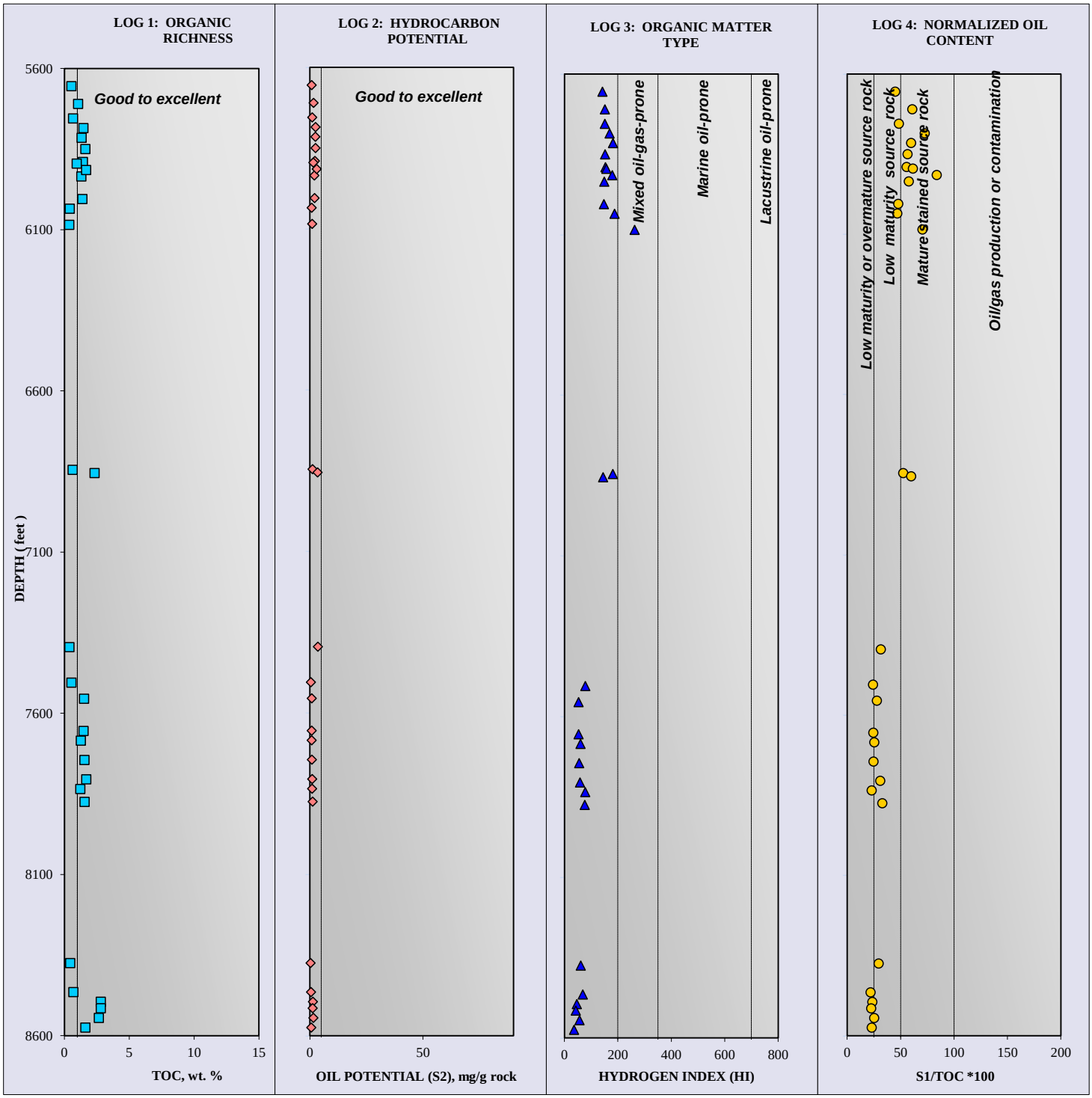
Pyrogram:
f - flat S2 peak
n - normal
ltS2sh - low temperature S2 shoulder
ltS2p - low temperature S2 peak
htS2p - high temperature S2 peak

RE - Programmed pyrolysis on Rock-Eval instrument
EXT - Extracted Rock
NOPR - Normal Preparation

Ardent Resources - Bob Heim

GEOCHEMICAL LOGS - Multiple Well Study

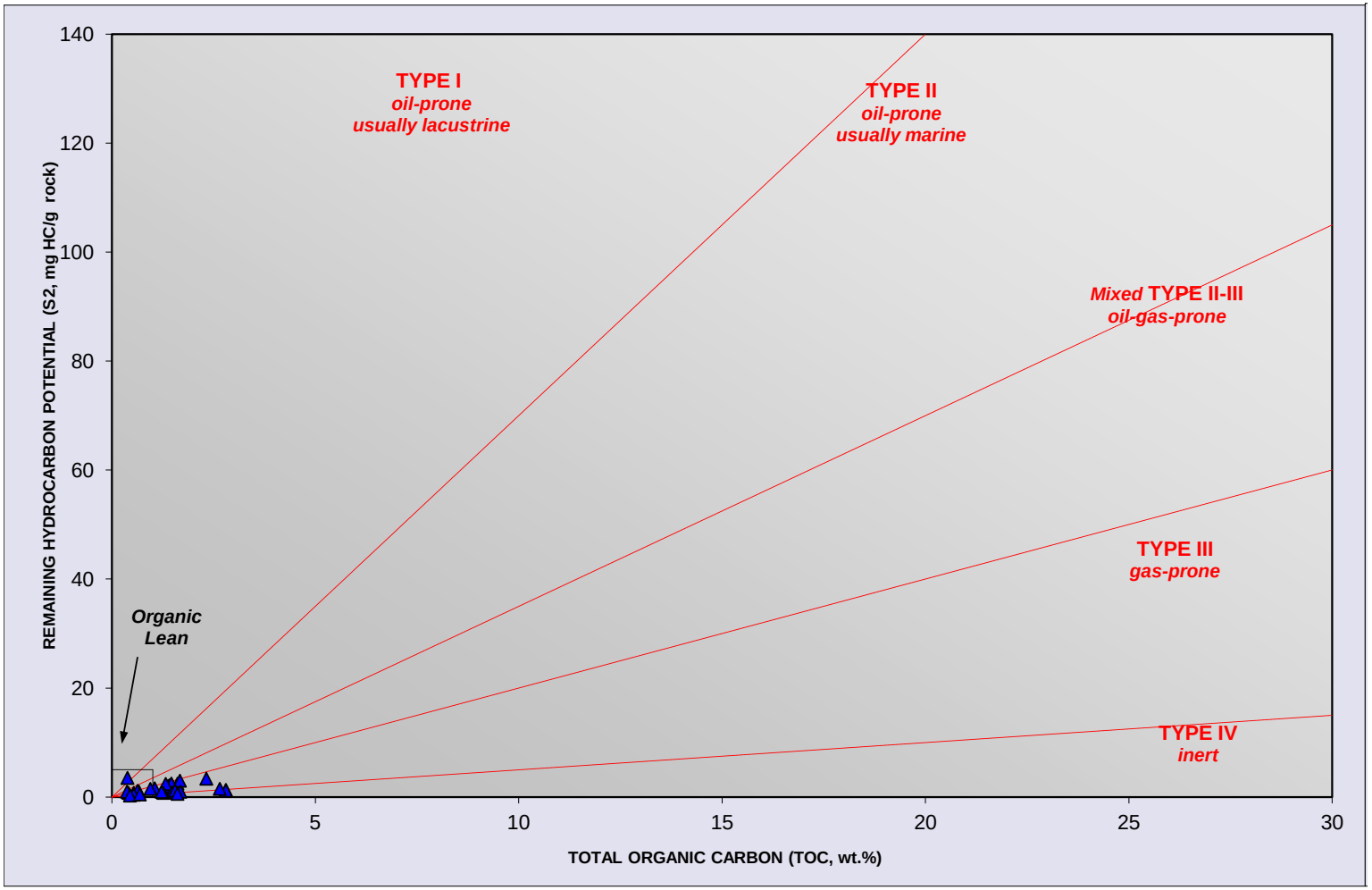
Company: CMR ENERGY, LP **Project #: CO-53295**



Weatherford LABORATORIES

KEROGEN QUALITY PLOT - Multiple Well Study

Company: CMR Energy, LP **Project #: CO-53295**



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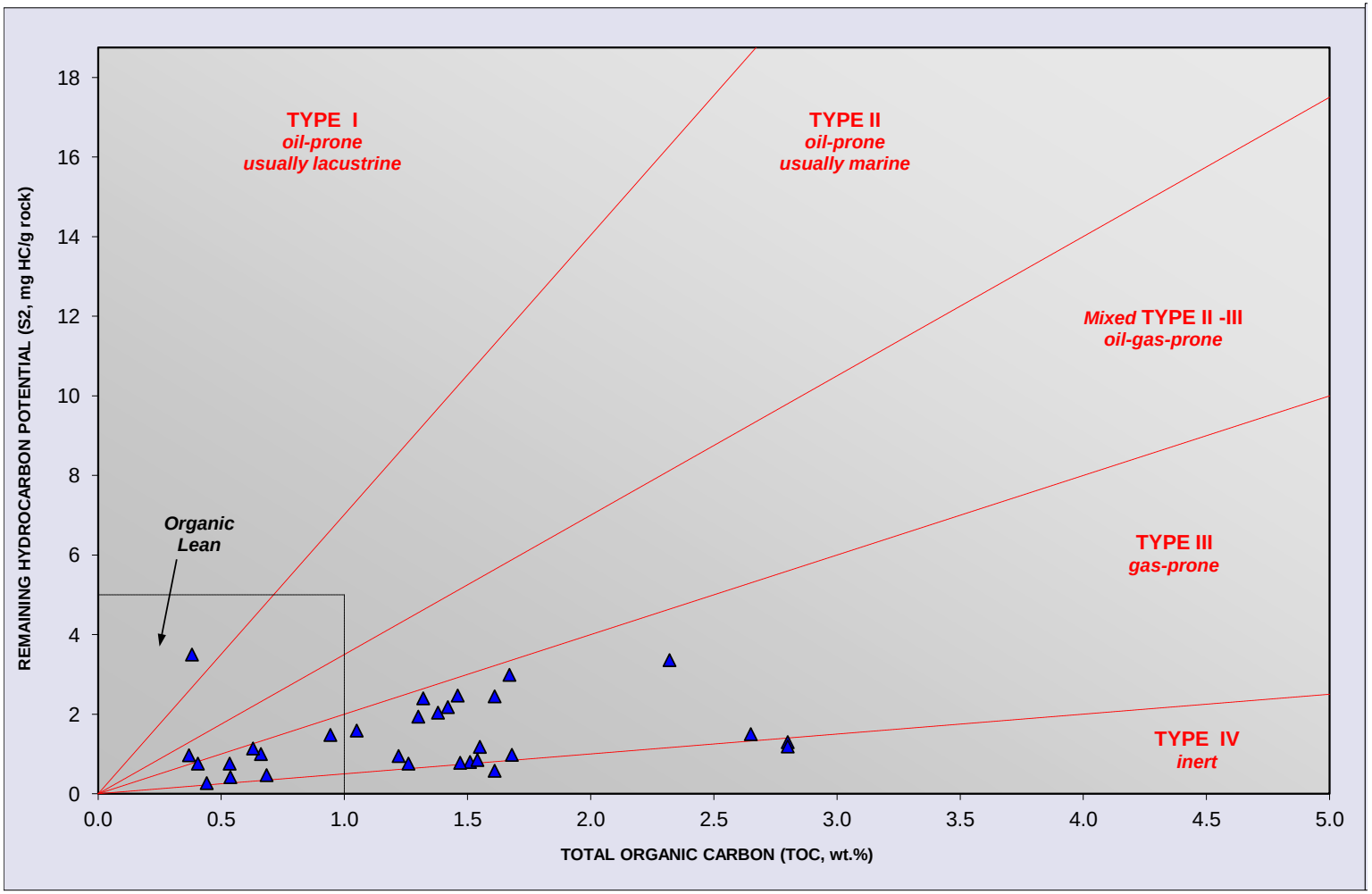
KEROGEN QUALITY PLOT - Multiple Well Study

Company: CMR Energy, LP **Project #: CO-53295**



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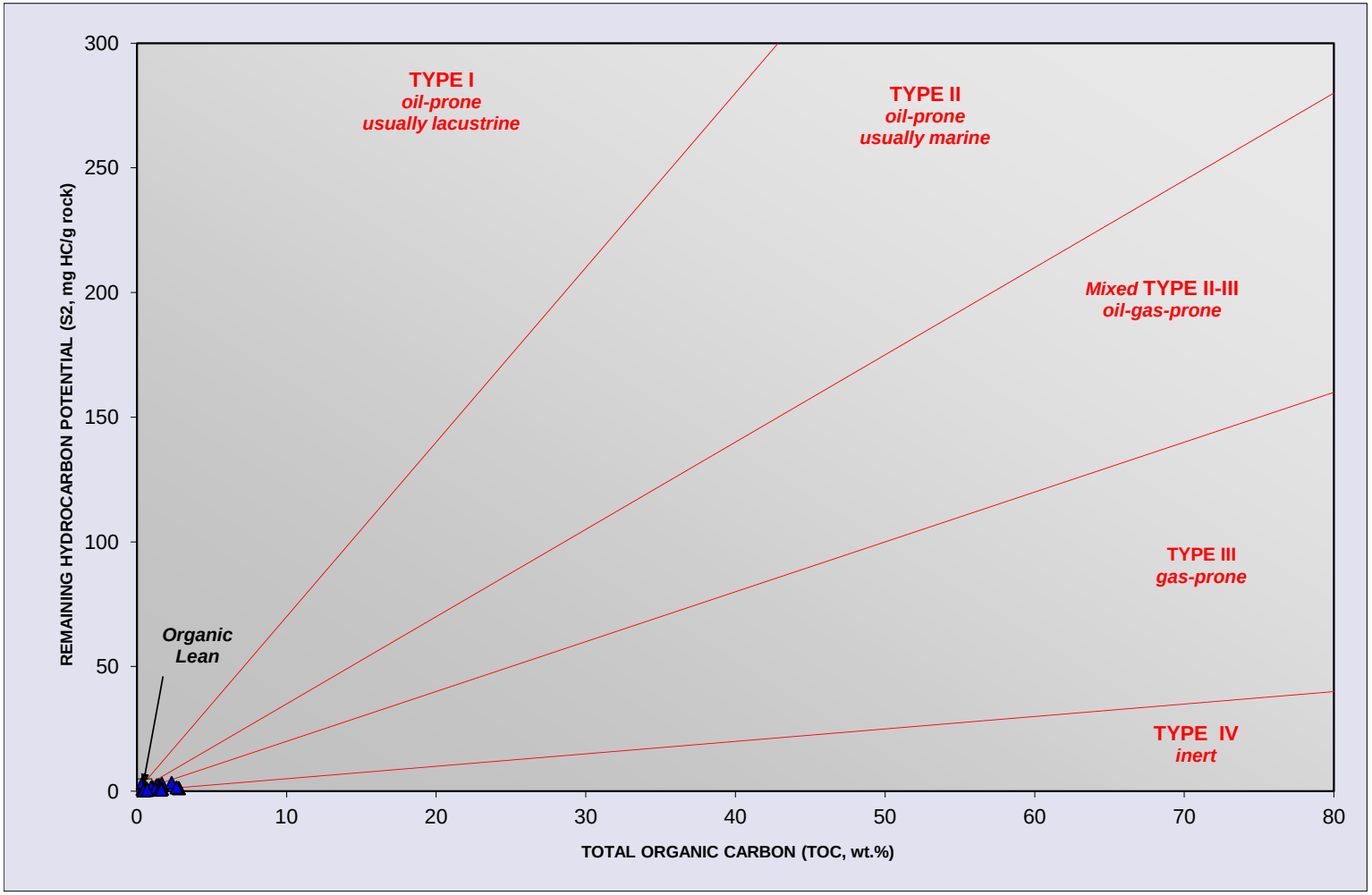
KEROGEN QUALITY PLOT - Multiple Well Study

Company: CMR Energy, LP **Project #: CO-53295 / CO-53295**



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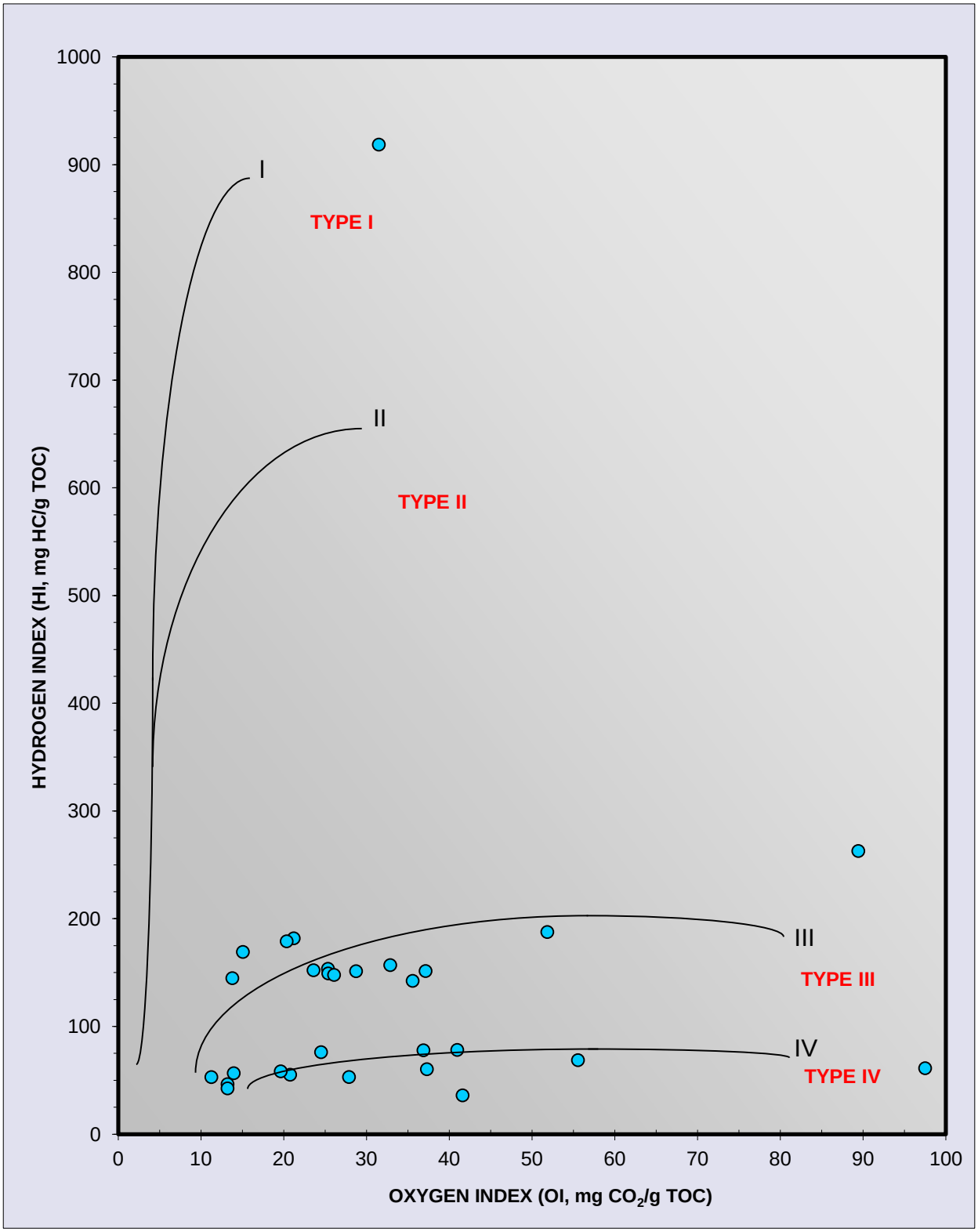
KEROGEN TYPE - Multiple Well Study

Company: CMR Energy, LP **Project #: CO-53295**



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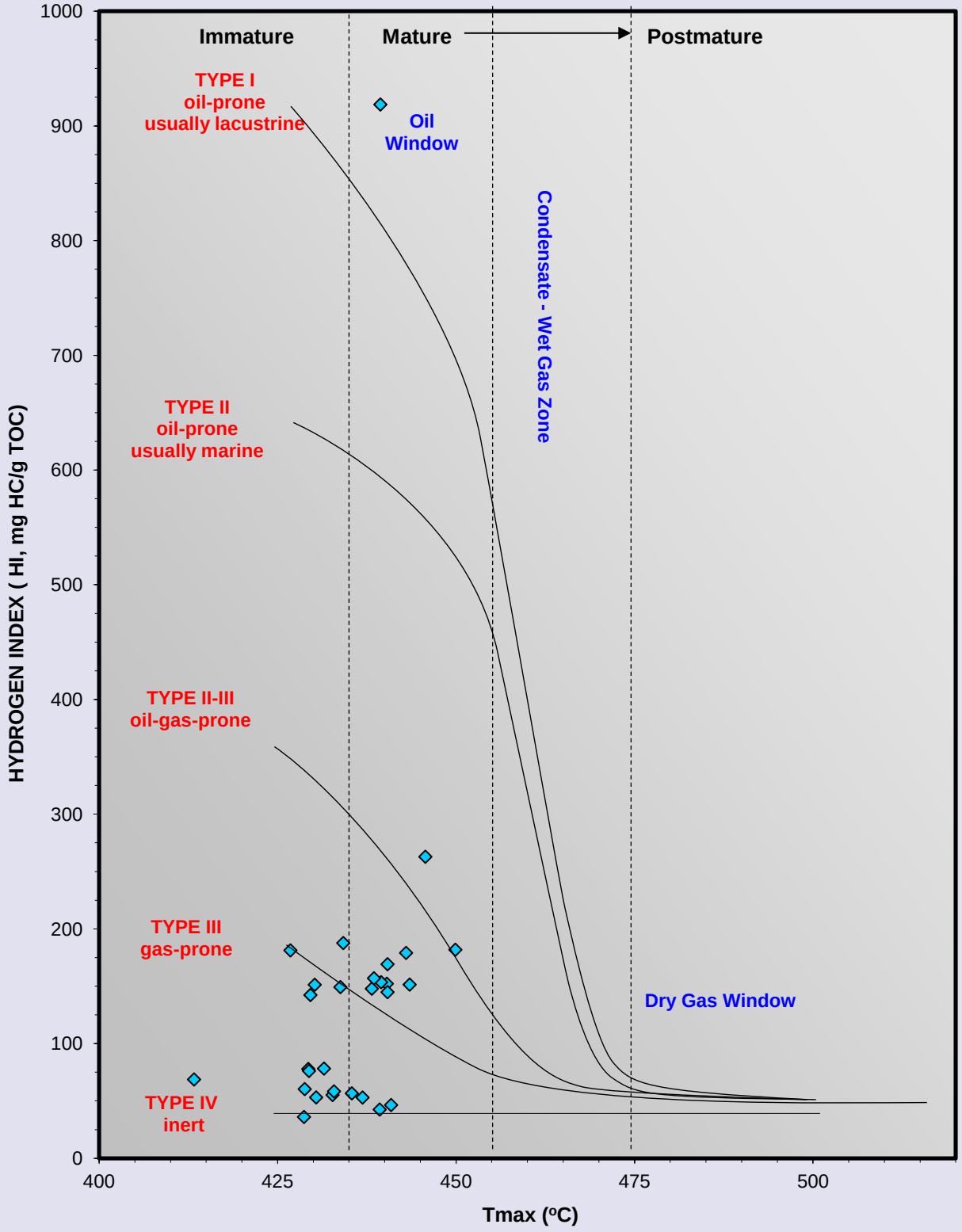
KEROGEN TYPE AND MATURITY (Tmax) - Multiple Well Study

Company: CMR Energy, LP **Project #:** CO-53295



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Fax: 720-898-8222

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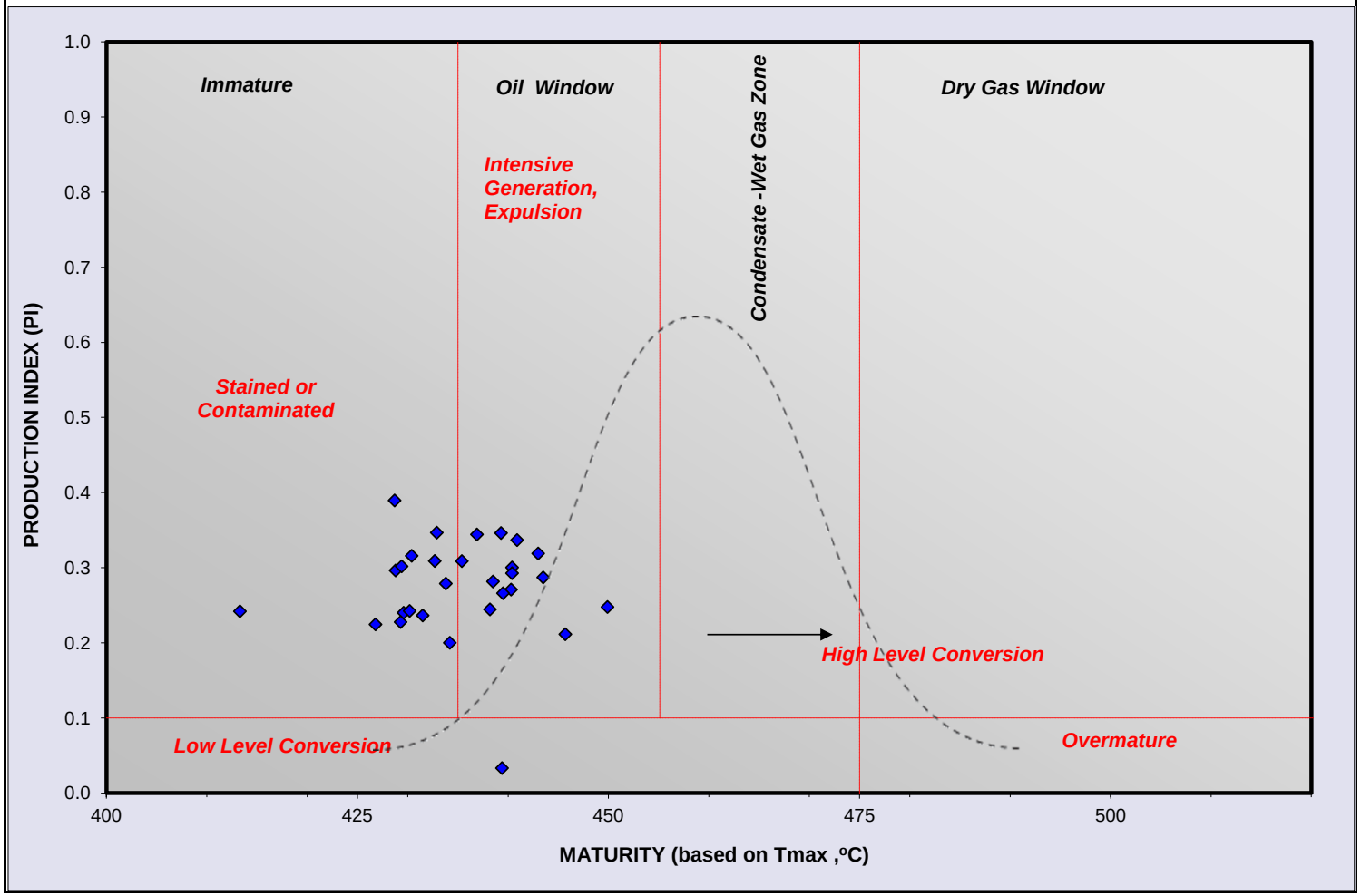
KEROGEN CONVERSION AND MATURITY (Tmax) - Multiple Well Study

Company: CMR Energy, LP **Project #: CO-53295**



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S# 2138 S# 4727 S# 2580 S# 3876
S# 4157 S# 4117 S# 2335 S# 4454
S# 4216 S# 3919 S# 2699 S# 4751
S# 2366 S# 4068 S# 3968 S# 3974
S# 4161 S# 2329 S# 2027 S# 2520
S# 2287 S# 1910 S# 3957

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

CMR ENERGY, LP

Well Name : Multiple Well Study
Operator : J. Kurek
SRA ID : Fletch Junior
State : OH
County : Undisclosed
Weatherford Labs Project CO-53295

Weatherford Labs ID	Well Name	Client ID	Median Depth (feet)	Formation	Sample Type	Sample Prep	*	TOC	S1	S2	S3	Tmax (°C)	**	Meas. % Ro	HI	OI	S2/S3	S1/TOC *100	PI	Notes Checks	Notes Pyrogram	Lab ID
1-1	French & Papp 1	007-20206	5710.0	Undisclosed	Cuttings	NOPR		1.05	0.64	1.59	0.39	444			151	37	4	61	0.29			53295-1-1.RAW
1-2	French & Papp 1	007-20207	5850.0	Undisclosed	Cuttings	NOPR		1.61	0.91	2.45	0.38	440			152	24	6	57	0.27			53295-1-2.RAW
1-3	French & Papp 1	007-20208	5890.0	Undisclosed	Cuttings	NOPR		1.42	0.79	2.18	0.36	440			154	25	6	56	0.27			53295-1-3.RAW
1-4	French & Papp 1	007-20209	5935.0	Undisclosed	Cuttings	NOPR		1.30	0.75	1.94	0.33	434			149	25	6	58	0.28			53295-1-4.RAW
1-5	French & Papp 1	007-20210	6005.0	Undisclosed	Cuttings	NOPR		1.38	0.66	2.04	0.36	438			148	26	6	48	0.24			53295-1-5.RAW
1-6	French & Papp 1	007-20211	6035.0	Undisclosed	Cuttings	NOPR		0.41	0.19	0.76	0.21	434			188	52	4	47	0.20			53295-1-6.RAW
1-7	French & Papp 1	007-20212	6085.0	Undisclosed	Cuttings	NOPR		0.37	0.26	0.97	0.33	446			263	89	3	70	0.21			53295-1-7.RAW
2-1	Wantz R Unit 1-2161	133-24027	5655.0	Undisclosed	Cuttings	NOPR		0.53	0.24	0.76	0.19	430			142	36	4	45	0.24			53295-2-1.RAW
2-2	Wantz R Unit 1-2162	133-24028	5755.0	Undisclosed	Cuttings	NOPR		0.66	0.32	1.00	0.19	430			151	29	5	48	0.24			53295-2-2.RAW
2-3	Wantz R Unit 1-2163	133-24029	5785.0	Undisclosed	Cuttings	NOPR		1.46	1.06	2.47	0.22	440			169	15	11	73	0.30			53295-2-3.RAW
2-4	Wantz R Unit 1-2164	133-24030	5815.0	Undisclosed	Cuttings	NOPR		1.32	0.79	2.40	0.28	450			182	21	9	60	0.25			53295-2-4.RAW
2-5	Wantz R Unit 1-2165	133-24031	5895.0	Undisclosed	Cuttings	NOPR		0.94	0.58	1.48	0.31	439			157	33	5	62	0.28			53295-2-5.RAW
2-6	Wantz R Unit 1-2166	133-24032	5915.0	Undisclosed	Cuttings	NOPR		1.67	1.40	2.99	0.34	443			179	20	9	84	0.32			53295-2-6.RAW
3-1	Barley 1-2397	151-25086	6845.0	Undisclosed	Cuttings	NOPR		0.63	0.33	1.14	0.64	427			181	102	2	52	0.22			53295-3-1.RAW
3-2	Barley 1-2397	151-25087	6855.0	Undisclosed	Cuttings	NOPR		2.32	1.39	3.36	0.32	440			145	14	11	60	0.29			53295-3-2D.RAW
4-1	Murray 3	029-20648	7395.0	Undisclosed	Cuttings	NOPR		0.38	0.12	3.50	0.12	439			919	31	29	31	0.03			53295-4-1.RAW
4-2	Murray 3	029-20648	7505.0	Undisclosed	Cuttings	NOPR		0.54	0.13	0.42	0.22	432	**		78	41	2	24	0.24			53295-4-2.RAW
4-3	Murray 3	029-20648	7555.0	Undisclosed	Cuttings	NOPR		1.51	0.42	0.80	0.17	437			53	11	5	28	0.34			53295-4-3.RAW
5-1	Bryan Unit 1	019-21850	7655.0	Undisclosed	Cuttings	NOPR		1.47	0.36	0.78	0.41	430			53	28	2	24	0.32			53295-5-1.RAW
5-2	Bryan Unit 1	019-21850	7685.0	Undisclosed	Cuttings	NOPR		1.26	0.32	0.76	0.47	429			60	37	2	25	0.30			53295-5-2.RAW
5-3	Bryan Unit 1	019-21850	7745.0	Undisclosed	Cuttings	NOPR		1.54	0.38	0.85	0.32	433			55	21	3	25	0.31			53295-5-3.RAW
5-4	Bryan Unit 1	019-21850	7805.0	Undisclosed	Cuttings	NOPR		1.68	0.52	0.98	0.33	433			58	20	3	31	0.35			53295-5-4.RAW
5-5	Bryan Unit 1	019-21850	7835.0	Undisclosed	Cuttings	NOPR		1.22	0.28	0.95	0.45	429			78	37	2	23	0.23			53295-5-5.RAW
5-6	Bryan Unit 1	019-21850	7875.0	Undisclosed	Cuttings	NOPR		1.55	0.51	1.18	0.38	429			76	25	3	33	0.30			53295-5-6.RAW
6-1	Roy Birney 1	067-20103	8375.0	Undisclosed	Cuttings	NOPR		0.44	0.13	0.27	0.43	337	**		61	98	1	29	0.33			53295-6-1.RAW
6-2	Roy Birney 1	067-20103	8465.0	Undisclosed	Cuttings	NOPR		0.68	0.15	0.47	0.38	413	**		69	56	1	22	0.24			53295-6-2.RAW
6-3	Roy Birney 1	067-20103	8495.0	Undisclosed	Cuttings	NOPR		2.80	0.66	1.30	0.37	441			46	13	4	24	0.34			53295-6-3.RAW
6-4	Roy Birney 1	067-20103	8515.0	Undisclosed	Cuttings	NOPR		2.80	0.63	1.19	0.37	439			43	13	3	23	0.35			53295-6-4.RAW
6-5	Roy Birney 1	067-20103	8545.0	Undisclosed	Cuttings	NOPR		2.65	0.67	1.50	0.37	435			57	14	4	25	0.31			53295-6-5.RAW
6-6	Roy Birney 1	067-20103	8575.0	Undisclosed	Cuttings	NOPR		1.61	0.37	0.58	0.67	429			36	42	1	23	0.39			53295-6-6.RAW

Notes:

"-1" – not measured or invalid value for T_{max}
TOC - Total Organic Carbon, wt. %
S1 - volatile hydrocarbon (HC) content, mg HC/ g rock
S2 - remaining HC generative potential, mg HC/ g rock
S3 - carbon dioxide content, mg CO_2 / g rock

* - comments regarding contamination
** - low S2, Tmax is unreliable
Meas. %Ro - measured vitrinite reflectance
HI - Hydrogen index = S2 x 100 / TOC, mg HC/ g TOC
OI - Oxygen Index = S3 x 100 / TOC, mg CO_2/ g TOC
PI - Production Index = S1 / (S1+S2)

Pyrogram:
f - flat S2 peak
n - normal
ltS2sh - low temperature S2 shoulder
ltS2p - low temperature S2 peak
htS2p - high temperature S2 peak

RE - Programmed pyrolysis on Rock-Eval instrument
EXT - Extracted Rock
NOPR - Normal Preparation

Overton Energy - George Alcorn, 2012

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LABORATORIES

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

POINT PLEASANT ENERGY, LLC

Well Name : Buckeye Project
Operator : R. Schlauder
SRA ID : Fletch Junior
State : OH
County : Undisclosed
Weatherford Labs Project CO-53295

Weatherford Labs ID	Client ID	Median Depth (feet)	Formation	Sample Type	Sample Prep	*	TOC	S1	S2	S3	Tmax (°C)	**	Meas. % Ro	HI	OI	S2/S3	S1/TOC *100	PI	Notes Checks	Notes Pyrogram	Lab ID
7-1	Eaton Unit 2-3089	5155.0	Undisclosed	Cuttings	NOPR		1.61	0.91	1.97	0.49	441			122	30	4	57	0.32			53295-7-1G.RAW
7-2	Eaton Unit 2-3090	5220.0	Undisclosed	Cuttings	NOPR		1.43	0.74	1.70	0.51	445			119	36	3	52	0.30			53295-7-2G.RAW
7-3	Eaton Unit 2-3091	5250.0	Undisclosed	Cuttings	NOPR		1.21	0.70	1.35	0.64	440			112	53	2	58	0.34			53295-7-3G.RAW
7-4	Eaton Unit 2-3092	5290.0	Undisclosed	Cuttings	NOPR		1.70	0.99	2.06	0.47	451			121	28	4	58	0.32			53295-7-4G.RAW
7-5	Eaton Unit 2-3093	5310.0	Undisclosed	Cuttings	NOPR		1.49	0.93	2.01	0.36	450			135	24	6	62	0.32			53295-7-5G.RAW
8-1	Maitino Farms Comm #1 #3788-001	5495.0	Undisclosed	Cuttings	NOPR		1.32	0.59	1.94	0.33	442			147	25	6	45	0.23			53295-8-1G.RAW
8-2	Maitino Farms Comm #1 #3788-001	5565.0	Undisclosed	Cuttings	NOPR		2.03	1.86	3.40	0.32	439			167	16	11	92	0.35			53295-8-2G.RAW
8-3	Maitino Farms Comm #1 #3788-001	5655.0	Undisclosed	Cuttings	NOPR		2.17	1.65	3.06	0.31	447			141	14	10	76	0.35			53295-8-3G.RAW
8-4	Maitino Farms Comm #1 #3788-001	5705.0	Undisclosed	Cuttings	NOPR		2.35	2.44	3.98	0.30	443			169	13	13	104	0.38			53295-8-4G.RAW
8-5	Maitino Farms Comm #1 #3788-001	5735.0	Undisclosed	Cuttings	NOPR		2.44	2.76	4.27	0.28	441			175	11	15	113	0.39			53295-8-5G.RAW
8-6	Maitino Farms Comm #1 #3788-001	5775.0	Undisclosed	Cuttings	NOPR		2.31	2.93	4.56	0.29	446			197	13	16	127	0.39			53295-8-6G.RAW
9-1	Russell-O Reilly #1	5815.0	Undisclosed	Cuttings	NOPR		2.20	1.73	2.86	0.48	444			130	22	6	79	0.38			53295-9-1G.RAW
9-2	Russell-O Reilly #1	5825.0	Undisclosed	Cuttings	NOPR		1.97	1.33	2.67	0.40	447			136	20	7	68	0.33			53295-9-2G.RAW
9-3	Russell-O Reilly #1	5835.0	Undisclosed	Cuttings	NOPR		1.65	1.12	2.38	0.32	428			144	19	7	68	0.32			53295-9-3G.RAW
9-4	Russell-O Reilly #1	5845.0	Undisclosed	Cuttings	NOPR		1.38	0.96	1.67	0.27	442			121	20	6	70	0.37			53295-9-4G.RAW
9-5	Russell-O Reilly #1	5855.0	Undisclosed	Cuttings	NOPR		2.28	1.90	3.23	0.42	436			142	18	8	83	0.37			53295-9-5G.RAW
10-1	W.R. Troug #2-1564	6015.0	Undisclosed	Cuttings	NOPR		1.79	1.57	3.10	0.50	438			173	28	6	88	0.34			53295-10-1G.RAW
10-2	W.R. Troug #2-1564	6105.0	Undisclosed	Cuttings	NOPR		2.03	1.84	3.31	0.52	433			163	26	6	91	0.36			53295-10-2G.RAW
10-3	W.R. Troug #2-1564	6145.0	Undisclosed	Cuttings	NOPR		2.26	2.16	3.86	0.50	431			171	22	8	96	0.36			53295-10-3G.RAW
10-4	W.R. Troug #2-1564	6155.0	Undisclosed	Cuttings	NOPR		2.67	2.78	4.58	0.50	434			172	19	9	104	0.38			53295-10-4G.RAW
10-5	W.R. Troug #2-1564	6195.0	Undisclosed	Cuttings	NOPR		2.65	2.63	4.22	0.50	439			159	19	8	99	0.38			53295-10-5G.RAW
10-6	W.R. Troug #2-1564	6205.0	Undisclosed	Cuttings	NOPR		2.51	2.69	4.24	0.49	439			169	20	9	107	0.39			53295-10-6G.RAW
11-1	W. Brenner #1	6510.0	Undisclosed	Cuttings	NOPR		1.91	1.20	2.31	0.39	443			121	20	6	63	0.34			53295-11-1G.RAW
11-2	W. Brenner #1	6615.0	Undisclosed	Cuttings	NOPR		1.16	0.84	1.33	0.41	440			115	35	3	72	0.39			53295-11-2G.RAW
11-3	W. Brenner #1	6645.0	Undisclosed	Cuttings	NOPR		2.34	1.81	4.55	0.46	413			194	20	10	77	0.28			53295-11-3G.RAW
11-4	W. Brenner #1	6675.0	Undisclosed	Cuttings	NOPR		2.72	2.44	3.73	0.49	438			137	18	8	90	0.40			53295-11-4G.RAW
11-5	W. Brenner #1	6705.0	Undisclosed	Cuttings	NOPR		2.54	2.24	3.63	0.48	438			143	19	8	88	0.38			53295-11-5G.RAW
11-6	W. Brenner #1	6735.0	Undisclosed	Cuttings	NOPR		2.75	2.18	3.51	0.35	450			128	13	10	79	0.38			53295-11-6G.RAW
11-7	W. Brenner #1	6755.0	Undisclosed	Cuttings	NOPR		3.80	2.76	4.86	0.44	453			128	12	11	73	0.36			53295-11-7G.RAW
12-1	B. Westfell Comm. 1-?	6165.0	Undisclosed	Cuttings	NOPR		2.65	2.99	4.86	0.68	424			183	26	7	113	0.38			53295-12-1G.RAW
12-2	B. Westfell Comm. 1-?	6225.0	Undisclosed	Cuttings	NOPR		1.83	2.10	3.36	0.56	425			184	31	6	115	0.38			53295-12-2G.RAW
12-3	B. Westfell Comm. 1-?	6285.0	Undisclosed	Cuttings	NOPR		1.84	2.05	3.34	0.78	423			182	42	4	111	0.38			53295-12-3G.RAW
12-4	B. Westfell Comm. 1-?	6315.0	Undisclosed	Cuttings	NOPR		3.11	3.54	5.40	0.81	429			174	26	7	114	0.40			53295-12-4G.RAW
12-5	B. Westfell Comm. 1-?	6345.0	Undisclosed	Cuttings	NOPR		2.84	3.33	5.26	0.80	427			185	28	7	117	0.39			53295-12-5G.RAW
12-6	B. Westfell Comm. 1-?	6375.0	Undisclosed	Cuttings	NOPR		3.01	3.61	5.21	0.78	432			173	26	7	120	0.41			53295-12-6G.RAW
13-1	Hoffman Unit #1	6905.0	Undisclosed	Cuttings	NOPR		0.58	0.22	0.42	0.23	421	**		72	40	2	38	0.34			53295-13-1G.RAW
13-2	Hoffman Unit #1	6995.0	Undisclosed	Cuttings	NOPR		1.09	0.49	1.08	0.22	439			99	20	5	45	0.31			53295-13-2G.RAW
13-3	Hoffman Unit #1	7055.0	Undisclosed	Cuttings	NOPR		0.98	0.35	0.67	0.57	451			68	58	1	36	0.34			53295-13-3G.RAW
13-4	Hoffman Unit #1	7115.0	Undisclosed	Cuttings	NOPR		1.75	1.20	1.90	0.29	448			109	17	7	69	0.39			53295-13-4G.RAW
13-5	Hoffman Unit #1	7155.0	Undisclosed	Cuttings	NOPR		2.75	1.67	2.70	0.52	456			98	19	5	61	0.38			53295-13-5G.RAW

Weatherford®
LABORATORIES

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

POINT PLEASANT ENERGY, LLC

Well Name : Buckeye Project
Operator : R. Schlauder
SRA ID : Fletch Junior
State : OH
County : Undisclosed
Weatherford Labs Project CO-53295

Weatherford Labs ID	Client ID	Median Depth (feet)	Formation	Sample Type	Sample Prep	*	TOC	S1	S2	S3	Tmax (°C)	**	Meas. % Ro	HI	OI	S2/S3	S1/TOC *100	PI	Notes Checks	Notes Pyrogram	Lab ID
13-6	Hoffman Unit #1	7195.0	Undisclosed	Cuttings	NOPR		2.72	2.02	2.94	0.38	448			108	14	8	74	0.41			53295-13-6G.RAW
14-1	Mrugala, Mike & Mary #1	7505.0	Undisclosed	Cuttings	NOPR		1.96	0.54	0.75	0.23	459			38	12	3	28	0.42			53295-14-1G.RAW
14-2	Mrugala, Mike & Mary #1	7545.0	Undisclosed	Cuttings	NOPR		1.72	0.50	0.67	0.25	457			39	15	3	29	0.43			53295-14-2G.RAW
14-3	Mrugala, Mike & Mary #1	7605.0	Undisclosed	Cuttings	NOPR		1.59	0.46	0.65	0.24	459			41	15	3	29	0.41			53295-14-3G.RAW
14-4	Mrugala, Mike & Mary #1	7655.0	Undisclosed	Cuttings	NOPR		2.72	0.99	1.20	0.33	479			44	12	4	36	0.45			53295-14-4G.RAW
14-5	Mrugala, Mike & Mary #1	7705.0	Undisclosed	Cuttings	NOPR		2.53	0.95	1.29	0.36	472			51	14	4	38	0.42			53295-14-5G.RAW
14-6	Mrugala, Mike & Mary #1	7735.0	Undisclosed	Cuttings	NOPR		2.68	1.08	1.29	0.40	472			48	15	3	40	0.46			53295-14-6G.RAW
15-1	Clarence Williams #1	8255.0	Undisclosed	Cuttings	NOPR		2.05	0.48	0.71	0.57	339			35	28	1	23	0.40			53295-15-1G.RAW
15-2	Clarence Williams #1	8321.0	Undisclosed	Cuttings	NOPR		2.08	0.74	1.72	0.64	408			83	31	3	36	0.30			53295-15-2G.RAW
15-3	Clarence Williams #1	8350.5	Undisclosed	Cuttings	NOPR		1.71	0.44	0.74	0.33	345			43	19	2	26	0.37			53295-15-3G.RAW
15-4	Clarence Williams #1	8425.5	Undisclosed	Cuttings	NOPR		2.97	1.21	2.21	0.51	448			74	17	4	41	0.35			53295-15-4G.RAW
16-1	E. J. Plott & Co. Inc. #1-3224	5935.0	Undisclosed	Cuttings	NOPR		1.49	0.99	2.54	0.40	446			170	27	6	66	0.28			53295-16-1G.RAW
16-2	E. J. Plott & Co. Inc. #1-3224	5995.0	Undisclosed	Cuttings	NOPR		1.33	1.04	2.75	0.32	448			207	24	9	78	0.27			53295-16-2G.RAW
16-3	E. J. Plott & Co. Inc. #1-3224	6055.0	Undisclosed	Cuttings	NOPR		1.15	1.02	1.74	0.32	450			151	28	5	89	0.37			53295-16-3G.RAW
16-4	E. J. Plott & Co. Inc. #1-3224	6085.0	Undisclosed	Cuttings	NOPR		1.81	2.11	3.62	0.41	448			200	23	9	117	0.37			53295-16-4G.RAW
16-5	E. J. Plott & Co. Inc. #1-3224	6115.0	Undisclosed	Cuttings	NOPR		2.49	3.16	5.19	0.37	449			208	15	14	127	0.38			53295-16-5G.RAW
16-6	E. J. Plott & Co. Inc. #1-3224	6145.0	Undisclosed	Cuttings	NOPR		2.27	2.65	4.67	0.44	450			206	19	11	117	0.36			53295-16-6G.RAW
17-1	Clark, Etal Unit #1	7150.0	Undisclosed	Cuttings	NOPR		1.83	0.82	1.42	0.43	459			78	23	3	45	0.37			53295-17-1G.RAW
17-2	Clark, Etal Unit #1	7210.0	Undisclosed	Cuttings	NOPR		1.38	0.61	0.86	0.41	463			62	30	2	44	0.41			53295-17-2G.RAW
17-3	Clark, Etal Unit #1	7270.0	Undisclosed	Cuttings	NOPR		1.32	0.57	0.90	0.36	465			68	27	3	43	0.39			53295-17-3G.RAW
17-4	Clark, Etal Unit #1	7310.0	Undisclosed	Cuttings	NOPR		2.37	1.36	1.97	0.44	471			83	19	4	57	0.41			53295-17-4G.RAW
17-5	Clark, Etal Unit #1	7330.0	Undisclosed	Cuttings	NOPR		3.14	1.97	2.72	0.42	472			87	13	6	63	0.42			53295-17-5G.RAW
17-6	Clark, Etal Unit #1	7370.0	Undisclosed	Cuttings	NOPR		2.40	1.45	2.09	0.45	470			87	19	5	60	0.41			53295-17-6G.RAW
18-1	Ervin Keim #2	6075.0	Undisclosed	Cuttings	NOPR		0.35	0.13	0.39	0.40	441	**		112	115	1	37	0.25			53295-18-1G.RAW
18-2	Ervin Keim #2	6135.0	Undisclosed	Cuttings	NOPR		0.66	0.25	0.82	0.35	439			125	53	2	38	0.23			53295-18-2G.RAW
18-3	Ervin Keim #2	6195.0	Undisclosed	Cuttings	NOPR		1.22	0.60	2.00	0.37	448			164	30	5	49	0.23			53295-18-3G.RAW
18-4	Ervin Keim #2	6225.0	Undisclosed	Cuttings	NOPR		1.26	0.61	2.01	0.41	446			160	33	5	48	0.23			53295-18-4G.RAW
18-5	Ervin Keim #2	6285.0	Undisclosed	Cuttings	NOPR		1.15	0.52	1.86	0.39	449			162	34	5	45	0.22			53295-18-5G.RAW
18-6	Ervin Keim #2	6315.0	Undisclosed	Cuttings	NOPR		2.03	1.68	4.33	0.37	446			213	18	12	83	0.28			53295-18-6G.RAW
19-1	Clyde Van Horn #1	7515.0	Undisclosed	Cuttings	NOPR		0.44	0.13	0.31	0.66	420	**		71	151	0	30	0.30			53295-19-1G.RAW
19-2	Clyde Van Horn #1	7635.0	Undisclosed	Cuttings	NOPR		1.39	0.59	1.05	0.65	445			76	47	2	42	0.36			53295-19-2G.RAW
19-3	Clyde Van Horn #1	7665.0	Undisclosed	Cuttings	NOPR		1.93	0.88	1.56	0.71	449			81	37	2	46	0.36			53295-19-3G.RAW
19-4	Clyde Van Horn #1	7695.0	Undisclosed	Cuttings	NOPR		2.57	1.06	1.93	0.61	452			75	24	3	41	0.35			53295-19-4G.RAW
19-5	Clyde Van Horn #1	7705.0	Undisclosed	Cuttings	NOPR		2.82	1.18	2.09	0.64	453			74	23	3	42	0.36			53295-19-5G.RAW
19-6	Clyde Van Horn #1	7725.0	Undisclosed	Cuttings	NOPR		2.52	1.36	2.15	0.57	470			85	23	4	54	0.39			53295-19-6G.RAW
20-1	Badertscher Unit	6175.0	Undisclosed	Cuttings	NOPR		0.68	0.35	0.96	0.54	438			142	80	2	52	0.27			53295-20-1G.RAW
20-2	Badertscher Unit	6185.0	Undisclosed	Cuttings	NOPR		1.18	0.58	1.91	0.60	444			162	51	3	49	0.23			53295-20-2G.RAW
20-3	Badertscher Unit	6205.0	Undisclosed	Cuttings	NOPR		0.85	0.39	1.21	0.63	445			143	74	2	46	0.24			53295-20-3G.RAW
20-4	Badertscher Unit	6235.0	Undisclosed	Cuttings	NOPR		1.87	1.19	3.11	0.53	442			166	28	6	64	0.28			53295-20-4G.RAW
20-5	Badertscher Unit	6245.0	Undisclosed	Cuttings	NOPR		2.32	1.25	3.43	0.57	450			148	25	6	54	0.27			53295-20-5G.RAW

Weatherford®
LABORATORIES

TOTAL ORGANIC CARBON, PROGRAMMED PYROLYSIS DATA

POINT PLEASANT ENERGY, LLC

Well Name : Buckeye Project
Operator : R. Schlauder
SRA ID : Fletch Junior
State : OH
County : Undisclosed
Weatherford Labs Project CO-53295

Weatherford Labs ID	Client ID	Median Depth (feet)	Formation	Sample Type	Sample Prep	*	TOC	S1	S2	S3	Tmax (°C)	**	Meas. % Ro	HI	OI	S2/S3	S1/TOC *100	PI	Notes Checks	Notes Pyrogram	Lab ID
21-1	Stoneking Comm #1	6875.0	Undisclosed	Cuttings	NOPR		0.45	0.10	0.30	0.51	407	**		66	113	1	22	0.25			53295-21-1G.RA
21-2	Stoneking Comm #1	6905.0	Undisclosed	Cuttings	NOPR		0.36	0.08	0.27	0.38	413	**		74	105	1	22	0.23			53295-21-2G.RA
21-3	Stoneking Comm #1	6925.0	Undisclosed	Cuttings	NOPR		0.41	0.08	0.27	0.37	452	**		66	91	1	20	0.23			53295-21-3G.RA
21-4	Stoneking Comm #1	6975.0	Undisclosed	Cuttings	NOPR		0.36	0.09	0.28	0.35	412	**		77	96	1	25	0.24			53295-21-4G.RA
21-5	Stoneking Comm #1	7025.0	Undisclosed	Cuttings	NOPR		0.82	0.24	0.75	0.54	430			92	66	1	29	0.24			53295-21-5G.RA
21-6	Stoneking Comm #1	7055.0	Undisclosed	Cuttings	NOPR		1.68	0.61	1.52	0.55	452			90	33	3	36	0.29			53295-21-6G.RA
22-1	Turner William/Lvenham (Tate) #1A	6365.0	Undisclosed	Cuttings	NOPR		0.24	0.06	0.21	0.33	443	**		89	140	1	26	0.22			53295-22-1G.RA
22-2	Turner William/Lvenham (Tate) #1A	6405.0	Undisclosed	Cuttings	NOPR		0.20	0.05	0.19	0.34	456	**		95	169	1	25	0.21			53295-22-2G.RA
22-3	Turner William/Lvenham (Tate) #1A	6455.0	Undisclosed	Cuttings	NOPR		0.18	0.05	0.17	0.33	334	**		94	182	1	28	0.23			53295-22-3G.RA
22-4	Turner William/Lvenham (Tate) #1A	6465.0	Undisclosed	Cuttings	NOPR		0.17	0.04	0.14	0.28	346	**		83	166	1	24	0.22			53295-22-4G.RA
22-5	Turner William/Lvenham (Tate) #1A	6515.0	Undisclosed	Cuttings	NOPR		0.67	0.55	1.19	0.48	448			177	72	2	82	0.32			53295-22-5G.RA
22-6	Turner William/Lvenham (Tate) #1A	6535.0	Undisclosed	Cuttings	NOPR		0.44	0.34	0.73	0.58	445			165	131	1	77	0.32			53295-22-6G.RA
23-1	Carl Matheny Unit #2	8355.0	Undisclosed	Cuttings	NOPR		0.20	0.06	0.17	0.48	374	**		83	235	0	29	0.26			53295-23-1G.RA
23-2	Carl Matheny Unit #2	8365.0	Undisclosed	Cuttings	NOPR		0.20	0.05	0.15	0.45	369	**		75	224	0	25	0.25			53295-23-2G.RA
23-3	Carl Matheny Unit #2	8395.0	Undisclosed	Cuttings	NOPR		0.21	0.05	0.14	0.46	359	**		67	221	0	24	0.26			53295-23-3G.RA
23-4	Carl Matheny Unit #2	8455.0	Undisclosed	Cuttings	NOPR		0.17	0.04	0.12	0.34	384	**		72	204	0	24	0.25			53295-23-4G.RA
23-5	Carl Matheny Unit #2	8485.0	Undisclosed	Cuttings	NOPR		0.19	0.02	0.09	0.38	349	**		47	198	0	10	0.18			53295-23-5G.RA
23-6	Carl Matheny Unit #2	8515.0	Undisclosed	Cuttings	NOPR		0.20	0.04	0.11	0.42	341	**		56	213	0	20	0.27			53295-23-6G.RA
23-7	Carl Matheny Unit #2	8535.0	Undisclosed	Cuttings	NOPR		0.18	0.02	0.09	0.54	351	**		51	309	0	11	0.18			53295-23-7G.RA
23-8	Carl Matheny Unit #2	8555.0	Undisclosed	Cuttings	NOPR		0.19	0.03	0.08	0.48	347	**		43	257	0	16	0.27			53295-23-8G.RA
23-9	Carl Matheny Unit #2	8575.0	Undisclosed	Cuttings	NOPR		1.10	0.27	0.31	0.38	328	**		28	35	1	25	0.47			53295-23-9GD.RA

Notes:

"-1" – not measured or invalid value for T_{max}
TOC - Total Organic Carbon, wt. %
S1 - volatile hydrocarbon (HC) content, mg HC/ g rock
S2 - remaining HC generative potential, mg HC/ g rock
S3 - carbon dioxide content, mg CO_2 / g rock

* - comments regarding contamination
** - low S2, Tmax is unreliable
Meas. %Ro - measured vitrinite reflectance
HI - Hydrogen index = S2 x 100 / TOC, mg HC/ g TOC
OI - Oxygen Index = S3 x 100 / TOC, mg CO_2/ g TOC
PI - Production Index = S1 / (S1+S2)

Pyrogram:
f - flat S2 peak
n - normal
ltS2sh - low temperature S2 shoulder
ltS2p - low temperature S2 peak
htS2p - high temperature S2 peak

RE - Programmed pyrolysis on Rock-Eval instrument
EXT - Extracted Rock
NOPR - Normal Preparation

Weatherford
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

Client: Point Pleasant Energy, LLC
Well: Buckeye Project
Area:
Sample Type: Cuttings

File No: 53295
Date: 08/14/11
Analyst: R. King

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS			Brittleness Index
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other	
French & Papp 1													
1-1	5,710	6	5	1	20	6	7	4	4	47	12	41	87.0
1-2	5,850	25	4	1	18	3	4	4	2	39	30	31	91.7
1-3	5,890	26	5	1	19	4	5	4	1	35	32	33	93.5
1-4	5,935	37	6	0	18	3	3	3	0	30	43	27	96.4
1-5	6,005	67	3	1	6	1	1	8	0	13	71	16	92.2
1-6	6,035	74	3	0	11	1	2	5	1	3	77	20	94.8
1-7	6,085	63	3	1	12	1	1	3	0	16	67	17	97.0
Wantz R Unit 1-2161													
2-1	5,655	9	8	1	29	3	6	2	4	38	18	44	91.9
2-2	5,755	6	8	0	25	6	6	3	9	37	14	49	83.6
2-3	5,785	12	5	0	24	3	5	4	3	44	17	39	89.5
2-4	5,815	14	5	1	23	4	6	4	3	40	20	40	90.1
2-5	5,895	12	8	0	27	4	5	3	7	34	20	46	87.2
2-6	5,915	23	8	0	20	3	4	2	3	37	31	32	93.4
Barley 1-2397													
3-1	6,845	10	9	0	23	5	4	2	3	44	19	37	92.5
3-2	6,855	58	2	0	8	2	2	6	0	22	60	18	93.5
Murray 3													
4-1	7,395	11	4	0	26	4	7	2	10	36	15	49	84.0
4-2	7,505	7	5	1	20	5	7	3	16	36	13	51	73.8
4-3	7,555	11	2	1	21	6	7	5	4	43	14	43	86.4
Bryan Unit 1													
5-1	7,655	13	3	1	20	4	6	5	4	44	17	39	86.2

Weatherford
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

Client: Point Pleasant Energy, LLC
Well: Buckeye Project
Area:
Sample Type: Cuttings

File No: 53295
Date: 08/14/11
Analyst: R. King

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS			Brittleness Index
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other	
5-2	7,685	15	3	1	19	5	8	5	4	40	19	41	87.1
5-3	7,745	19	3	0	19	3	5	4	2	45	22	33	90.8
5-4	7,805	35	3	1	18	1	4	3	2	33	39	28	93.8
5-5	7,835	20	2	1	22	6	8	3	3	35	23	42	92.1
5-6	7,875	11	2	0	25	5	8	3	3	43	13	44	91.1
Roy Birney 1													
6-1	8,375	13	4	1	18	4	8	3	4	45	18	37	89.1
6-2	8,465	15	2	0	19	3	5	3	2	51	17	32	91.4
6-3	8,495	38	2	0	17	1	4	2	1	35	40	25	96.2
6-4	8,515	38	2	0	19	4	5	4	2	26	40	34	93.2
6-5	8,545	39	3	1	17	2	5	4	1	28	43	29	94.2
6-6	8,575	41	3	1	14	2	4	4	1	30	45	25	94.0

Weatherford®
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

Client: Point Pleasant Energy
Well: Buckeye Project
Area:
Sample Type: Cuttings

File No: 53295
Date: 09/08/11
Analyst: J. Kurek & B. Hankin

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS		
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other
7-1	5,150	17	5	1	22	2	4	5	1	43	23	34
7-2	5,220	20	11	1	18	2	3	4	1	40	32	28
7-3	5,250	24	10	0	19	3	4	2	1	37	34	29
7-4	5,290	45	4	1	11	3	3	3	0	30	50	20
7-5	5,310	72	5	1	8	1	1	3	0	9	78	13
8-1	5,490	4	3	0	21	2	5	4	2	59	7	34
8-2	5,560	25	4	0	19	4	5	4	1	38	29	33
8-3	5,650	25	5	1	21	3	3	3	1	38	31	31
8-4	5,700	47	5	1	16	1	2	4	0	24	53	23
8-5	5,730	64	4	0	9	1	2	3	1	16	68	16
8-6	5,770	55	1	1	13	1	1	2	0	26	57	17
9-1	5,810	38	5	0	15	4	2	3	1	32	43	25
9-2	5,820	44	4	1	15	2	3	2	1	28	49	23
9-3	5,830	63	2	1	9	2	2	3	0	18	66	16
9-4	5,840	69	2	1	8	2	2	2	3	11	72	17
9-5	5,850	59	3	1	7	1	1	5	0	23	63	14
10-1	6,000	16	4	0	19	4	5	5	1	46	20	34
10-2	6,090	22	5	1	19	4	3	3	1	42	28	30
10-3	6,140	24	5	0	19	2	4	3	1	42	29	29
10-4	6,150	43	1	1	15	3	2	1	1	33	45	22
10-5	6,190	30	45	4	1	14	1	2	2	0	79	21
10-6	6,200	44	1	1	15	3	3	1	1	31	46	23

Weatherford
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

Client: Point Pleasant Energy
Well: Buckeye Project
Area:
Sample Type: Cuttings

File No: 53295
Date: 09/08/11
Analyst: J. Kurek & B. Hankin

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS		
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other
11-1	6,450	17	5	1	20	2	4	4	2	45	23	32
11-2	6,600	24	3	0	20	3	4	3	2	41	27	32
11-3	6,630	23	6	1	17	4	4	2	1	42	30	28
11-4	6,660	45	5	0	14	2	3	4	1	46	50	24
11-5	6,690	46	4	0	14	2	3	2	0	29	50	21
11-6	6,720	59	4	0	8	1	2	2	0	24	63	13
11-7	6,750	53	5	1	9	3	2	5	1	21	59	20
12-1	6,150	11	3	1	19	4	5	7	2	48	15	37
12-2	6,210	18	2	0	20	3	5	4	3	45	20	35
12-3	6,270	24	1	0	18	3	4	4	1	45	25	30
12-4	6,300	36	3	0	16	2	3	2	1	37	39	24
12-5	6,330	37	4	1	17	2	3	4	2	30	42	28
12-6	6,360	53	2	1	10	2	1	3	1	27	56	17
13-1	6,900	9	3	1	22	4	7	3	3	48	13	39
13-2	6,990	16	4	0	20	3	6	5	4	42	20	38
13-3	7,050	16	9	1	20	3	5	3	6	37	26	37
13-4	7,110	38	3	0	18	1	3	1	1	35	41	24
13-5	7,150	37	4	1	15	2	5	4	1	31	42	27
13-6	7,190	56	4	0	10	1	2	1	0	26	60	14
14-1	7,500	12	3	1	20	2	5	7	2	48	16	36
14-2	7,540	16	3	1	19	5	7	4	2	43	20	37

Weatherford
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

Client: Point Pleasant Energy
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File No: 53295
Date: 09/08/11
Analyst: J. Kurek & B. Hankin

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS		
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other
14-3	7,600	27	4	0	18	3	4	5	1	38	31	31
14-4	7,650	38	5	0	16	4	4	5	1	27	43	30
14-5	7,700	54	5	1	16	2	2	3	1	16	60	24
14-6	7,730	46	4	1	10	2	3	5	1	28	51	21
15-1	8,250	15	3	1	19	5	6	5	3	43	19	38
15-2	8,304	68	10	2	0	12	1	3	2	0	80	20
15-3	8,335	20	3	1	19	2	5	3	2	45	24	31
15-4	8,408	53	4	1	12	1	3	5	1	20	58	22
15-5	8,441									0	0	0
16-1	5,920	19	3	1	19	3	5	4	0	46	23	31
16-2	5,980	21	5	0	18	2	5	3	1	45	26	29
16-3	6,040	48	4	1	12	1	3	2	1	28	53	19
16-4	6,070	35	3	0	17	3	4	3	1	34	38	28
16-5	6,100	52	4	1	10	1	2	3	1	26	57	17
16-6	6,140	43	4	1	11	1	3	4	1	32	48	20
17-1	7,140	19	3	1	21	4	4	6	1	41	23	36
17-2	7,200	21	4	1	19	4	5	6	2	38	26	36
17-3	7,260	23	4	1	20	5	3	3	2	39	28	33
17-4	7,300	41	3	0	16	4	4	3	2	27	44	29
17-5	7,320	46	3	0	15	3	3	4	1	25	49	26
17-6	7,360	37	4	1	13	1	3	3	1	37	42	21

Weatherford
LABORATORIES

WEATHERFORD LABORATORIES
WELLSITE X-RAY DIFFRACTION
(WEIGHT %)

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Area:
Sample Type: Cuttings

File No: 53295
Date: 09/08/11
Analyst: J. Kurek & B. Hankin

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS		
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other
18-1	6,060	11	2	1	21	5	7	4	3	46	14	40
18-2	6,120	17	3	1	17	2	5	4	2	49	21	30
18-3	6,180	18	3	1	18	3	4	5	2	46	22	32
18-4	6,210	26	1	0	19	2	4	3	2	43	27	30
18-5	6,270	22	2	1	18	4	5	3	3	42	25	33
18-6	6,300	45	4	1	11	1	2	4	0	32	50	18
19-1	7,500	13	2	1	18	3	5	4	2	52	16	32
19-2	7,620	12	2	0	16	4	4	1	4	57	14	29
19-3	7,650	39	5	1	14	3	4	2	1	31	45	24
19-4	7,690	43	4	1	13	2	3	6	1	27	48	25
19-5	7,700	36	39	3	1	12	1	2	5	0	78	22
19-6	7,720	24	50	4	1	11	2	3	4	0	78	22
20-1	6,170	16	3	0	18	5	5	3	3	47	19	34
20-2	6,180	29	3	0	16	3	4	3	2	40	32	28
20-3	6,200	41	21	3	1	18	4	6	3	0	65	35
20-4	6,230	34	2	0	11	3	3	4	1	42	36	22
20-5	6,240	31	48	3	0	11	2	2	2	0	82	18
21-1	6,860	20	4	1	17	3	6	3	3	43	25	32
21-2	6,890	16	3	1	19	5	5	2	2	47	20	33
21-3	6,920	19	3	1	18	4	5	3	3	44	23	33
21-4	6,970	17	3	0	19	4	6	3	2	46	20	34
21-5	7,020	24	2	0	17	4	4	4	2	43	26	31

Weatherford
LABORATORIES

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(WEIGHT %)

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File No: 53295
Date: 09/08/11
Analyst: J. Kurek & B. Hankin

Sample Number	Sample Depth (ft)	CARBONATES			OTHER MINERALS					TOTALS		
		Calcite	Fe-Dol	Siderite	Quartz	K-spar	Plag.	Pyrite	Anhydrite	Clays	Carb.	Other
21-6	7,050	28	3	1	19	3	4	3	3	36	32	32
22-1	6,360	28	3	1	18	4	7	2	2	35	32	33
22-2	6,400	21	1	0	19	4	3	1	2	49	22	29
22-3	6,450	30	3	1	17	3	5	2	2	37	34	29
22-4	6,460	13	4	1	22	4	7	2	2	45	18	37
22-5	6,510	52	1	1	9	1	2	4	1	29	54	17
22-6	6,530	54	3	0	15	2	3	2	0	21	57	22
23-1	8,350	23	1	0	16	4	3	0	2	51	24	25
23-2	8,360	23	4	1	16	3	4	4	2	43	28	29
23-3	8,390	19	3	1	16	3	4	4	3	47	23	30
23-4	8,450	7	3	1	21	5	4	3	3	53	11	36
23-5	8,480	27	4	1	19	3	7	2	2	35	32	33
23-6	8,510	7	1	0	22	7	5	1	2	55	8	37
23-7	8,530	8	3	1	23	5	6	3	3	48	12	40
23-8	8,550	12	4	1	19	5	5	1	2	51	17	32
23-9	8,570	8	3	0	13	3	2	0	4	67	11	22
	AVERAGE											

*Interstratified mixed-layer illite/smectite

Ohio Department of Natural Resources
Division of Geological Survey

H.R. Collins Laboratory & Geological Sample Repository

I, George Alcorn, have been granted permission to remove samples from the Ohio Division of Geological Survey (ODGS) well cuttings sample collection (see enclosed list of samples). I understand that the requested cutting samples are the property of the ODGS and according to the conditions outlined in the ODGS Cuttings-Use Policy any unused samples will be promptly returned to Gregory A. Schumacher, Coordinator of the H.R. Collins Laboratory. All unused samples, analytical results, and a copy of any published or unpublished reports will be forwarded to the ODGS by November 9, 2011.

I also acknowledge that all postage and handling costs associated with the return of samples, analytical results, and your report (s) are my responsibility.

Signature _____ Date 8/9/2011

George Alcorn
4265 San Felipe
Suite 1040
Houston, TX 77027

Witnessed by:

Signature _____ Date 8-9-11

Gregory A. Schumacher
Geologist and H.R. Collins Laboratory Coordinator
3307 South Old State Rd.
Delaware, OH 43015-7635