



Well History

Freedom Ranch Unit FRU 197-33B5
API: 051031142500
Rio Blanco County, Colorado

EPOCH Well Services, Inc.
New Iberia, Louisiana

ExxonMobil
Development

 EPOCH

Well History

Exxon Mobil Production Company

**Freedom Ranch Unit FRU 197-33B5
Rio Blanco County, Colorado**



EPOCH Well Services, Inc.

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General Overview and Geology Exxon Mobil Production Company

**Freedom Ranch Unit FRU 197-33B5
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Introduction

Epoch Well Services (Epoch) of New Iberia, LA has been providing mud logging and contract geology services to the Exxon Mobil Drilling Group (Exxon Mobil) in the Piceance Basin of northwestern Colorado since late 2002. As part of these services, Epoch was requested to provide mud logging and geologic services for the Freedom Ranch Unit FRU 197-33B5 production well. The well was drilled as the fifth hole in a series of directional wells for production on the Piceance Creek Unit pad. The well is located in the Piceance Basin at the following coordinates:

- Latitude 39.921295000" N
- Longitude 108.282534000" W

The well was spudded on April 24, 2010. Drilling operations were conducted from spud through to a total depth of 12,445' (MD) on May 14, 2010. Drilling operations were conducted by Helmerich & Payne using a Flex 4 rig (#321). Epoch personnel logged and collected samples starting at 4,530' through to 12,445' MD. Drilling fluid engineering services were provided by Baroid Fluid Services. The well was drilled with conventional water-based mud (Low Solids Non-Dispersed) from surface through TD.

The well was cased and cemented according to the following:

- 15.5-inch casing from surface to 150 feet;
- 10.75-inch casing at 4,524 feet;
- 4.5-inch casing at 12,442 feet.

Epoch provided the following services for this drilling operation:

- General mud logging and geologic services including sample collection and description, and preparation of a lithologic log;
- Determination of total gas recovered using a QGM™ gas trap and quantified using a proprietary Epoch Total Hydrocarbon Analyzer equipped with a Flame Ionization Detector;
- Determination of gas chromatography using a proprietary Epoch Gas Chromatography unit also equipped with a Flame Ionization Detector which quantified the hydrocarbon species of methane, ethane, propane, iso- and normal butane, and iso- and normal pentane;
- CO₂ determination;
- Interaction with Exxon Mobil on-site and Houston-based personnel to determine formation tops and provide support as required through drilling.

General Geology

The Piceance Creek Basin is a discrete basin of sediments formed as a result of uplift associated with late-Cretaceous to Tertiary Laramide orogenic activity. The Piceance Creek Basin encompasses late Cretaceous and Tertiary continental rocks that are assigned to a variety of stratigraphic units. These units form a complex system characterized by early deposition of primarily marine and marginal-marine sediments associated with transgression-regression of a large inland sea followed by intricate inter-fingering of fluvial, marginal lacustrine and lacustrine environments. The stratigraphic nomenclature used for the FRU 197-33B5 well incorporates terminology as developed by Exxon Mobil and provided to Epoch.

Geologically, Epoch encountered 4 separate formations ranging in age from Eocene to Cretaceous. These formations, in order of their occurrence from surface, along with their assigned age periods are listed as follows:

- Wasatch Formation – Eocene;
- Ohio Creek Formation - Paleocene
- Williams Fork Formation – Cretaceous;
- Iles Formation – Cretaceous.

The Williams Fork and Iles Formations are assigned to the Mesa Verde Group.

The Wasatch, Williams Fork, and Iles Formations can be broken down into constituent members as follows:

- Wasatch A, B, C, D, F, G, and I Members;
- Williams Fork 850, 800, 700, 600, 500, 400, 300, 200 and Cameo Members;
- Rollins, Cozzette, and Corcoran Members of the Iles Formation.

According to Exxon Mobil nomenclature, below the Wasatch Formation the various formations and members are combined into 6 separate stratigraphic groups for classification of general reservoir type. The groupings are described as follows:

- Williams Fork 800 Member to Ohio Creek – Proximal Braided Reservoirs
- Williams Fork 200 to Williams Fork 700 Members – Distal Braided Reservoirs;
- Cameo Member – Meandering Stream Reservoirs;
- Rollins Member – Marine Reservoirs;
- Corcoran Coastal Plain and Cozzette Members – Meandering Stream Reservoirs;
- Corcoran Marine and Sejo Members – Marine Reservoirs.

Exxon Mobil has further defined the stratigraphic sequence within the Piceance Basin according to sequence type classification. The relevant classifications are described as follows:

- AS – Abandonment Surface
- SB – Sequence Boundary
- FS – Flooding Surface
- MFS – Maximum Flooding Surface

In accordance with this classification scheme, the sequence tops and correlated stratigraphic name are presented in the table on the following page. All formation and member tops were identified from the mud log and are presented in measured depth (MD). It will be noted that some of the stratigraphic units as identified by Exxon Mobil are not included in this table. Those units omitted from this presentation occur within formations or members and, for reasons of simplicity, were not included.

FRU 197-33B5 Formation Tops

Formation/Member Name	Stratigraphic Unit Top	Depth (MD/TVD)
Wasatch Formation		
Wasatch "G"		5,441' / 5,281'
Wasatch "I"		5,988' / 5,828'
Ohio Creek Formation		
	950 Abandonment Surface (AS)	7,205' / 7,045'
Williams Fork Formation		
WF 850	900 Sequence Boundary (SB)	7,478' / 7,318'
WF 800	850 Abandonment Surface (AS)	7,699' / 7,539'
WF 700	800 Sequence Boundary (SB)	7,918' / 7,768'
WF 600	690 Abandonment Surface (AS)	8,132' / 7,972'
WF 500	600 Sequence Boundary (SB)	8,350' / 8,190'
WF 400	490 Abandonment Surface (AS)	8,904' / 8,744'
WF 300	400 Sequence Boundary (SB)	9,645' / 9,485'
WF 200	290 Abandonment Surface (AS)	10,686' / 10,526'
Cameo	210 Sequence Boundary (SB)	10,958' / 10,798'
Iles Formation		
Rollins Member	200 Sequence Boundary (SB)	11,240' / 11,080'
Trans Cozzette		11,410' / 11,250'
Cozzette Member	180 Flooding Surface (FS)	11,462' / 11,302'
Corcoran Coastal Plain	140 Flooding Surface (FS)	11,780' / 11,620'
Corcoran Marine	140 Sequence Boundary (SB)	12,393' / 12,232'

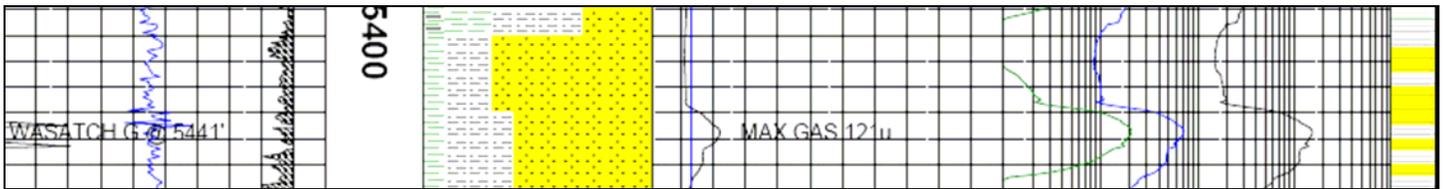
Upper Wasatch Formation

The Upper Wasatch Formation was encountered from the point of drilling out from surface casing (4,530' MD). Overall, the Upper Wasatch Formation consists of variably colored shale, sandstone, siltstone, and carbonates. Relevant data concerning drilling of the Upper Wasatch are presented as follows:

Upper Wasatch Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	248.756	330.000	128.618
Minimum	14.717	330.000	0.000
Mean	124.361	330.000	11.123
Standard Deviation	34.908	0.000	14.813

The only significant gas show in the Upper Wasatch appeared at the base of the formation at 5,437' in association with a thick sandstone bed with interbedded siltstone and shale. This gas show produced a maximum gas of 121 units.



Chromatography through the Upper Wasatch only showed C-1 throughout the drilled interval with C-2 and C-3 being observed during the high gas shows throughout the interval.

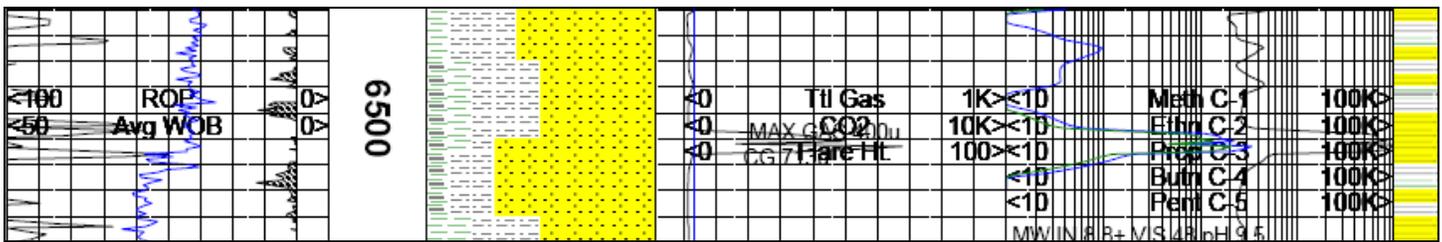
Lower Wasatch Formation

The lower Wasatch Formation is assigned from the occurrence of the top of the Wasatch "G" (5,441' MD / 5,281' TVD) through to the top of the Ohio Creek Formation (7,205' MD / 7,045' TVD). The Wasatch "G" consists of moderately to strongly kaolinitic sandstone which displays variable physical characteristics of hardness and overall appearance in accordance with the relative amount of kaolinite present. Kaolinite in this unit typically occurs as a matrix material; observed occurrences of kaolinite as a replacement of discrete clasts are rare. Lithologies in the lower Wasatch generally consist of interbedded shale, siltstone, sandstone, and less commonly, claystone.

Lower Wasatch Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	445.104	330.000	678.441
Minimum	22.864	330.000	9.834
Mean	114.924	330.000	27.360
Standard Deviation	36.920	0.000	40.296

The only significant gas show in the Lower Wasatch occurred at 6511' with a maximum gas show 400 units. It was associated with a thick sandstone body interbedded with siltstone, shale, and carbonaceous shale beds.



Chromatography through the Lower Wasatch included C-1, with C-2 through C-4 being observed during the high gas shows throughout the drilled interval.

Ohio Creek Formation/950 Abandonment Surface

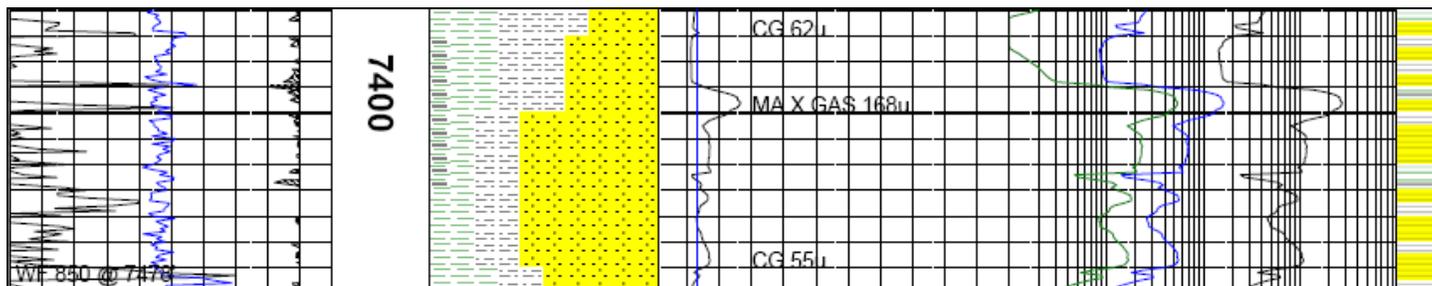
As noted above, the Ohio Creek Formation top was encountered at 7,205' / 7045' TVD. The Ohio Creek Formation is generally considered to mark the boundary between the Tertiary Wasatch Formation and the Cretaceous Mesa Verde Group. It is interpreted as an erosion surface and consists of slightly strongly kaolinitic sandstone where kaolinite occurs as a component in the matrix. A second sandstone unit encountered below the kaolinitic sandstone displays a general paucity of kaolinite and is characterized as a firm to hard, grain supported, dominantly quartz sandstone.

Relevant data concerning the Ohio Creek are presented as follows:

Ohio Creek Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	188.088	330.000	167.664
Minimum	29.752	330.000	10.293
Mean	96.979	330.000	34.702
Standard Deviation	23.470	0.000	31.043

On the FRU 197-33B5 well, the Ohio Creek formation did not produced many high gas shows. The only significant gas show appeared at the base of the formation, at 7,405' with a maximum gas show of 168 units. It was produced by a thick sandstone body interbedded with siltstone, shale, and carbonaceous shale beds.



Chromatography through the Ohio Creek Formation included C-1 with, C-2 and C-3 being observed during the high gas shows throughout the drilled interval.

900 Sequence Boundary/Williams Fork 850

The 900 sequence boundary, marking the top of the Mesa Verde Group and the Williams Fork 850 Formation occurred at 7,478' MD / 7,318' TVD. The Williams Fork 850 is dominated by sandstone, with lesser amounts of shale and siltstone. The sandstone encountered through this unit varies from grayish-white through grayish-green and dark gray and displays the following general characteristics:

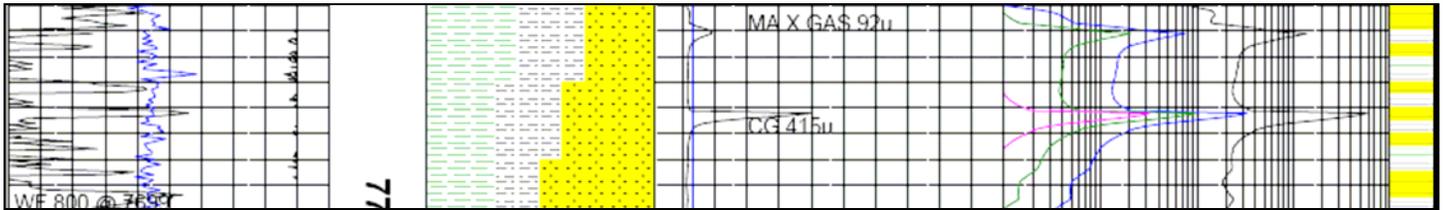
- Fine grained to very fine grained;
- Grain supported with carbonate-clay matrix;
- Surrounded to sub angular, clear to translucent quartz with moderate sphericity overall;
- Occasionally to commonly kaolinitic;
- Occasional dis-aggregation to loose sand grains in the sample tray.

The sandstones encountered in this unit are typical of the sandstones encountered through the entire drilled Mesa Verde Group section. Rates of Penetration, Total Gas, and CO₂ data for the WF 850 are presented as follows:

Williams Fork 850 Formation Statistics

	ROP (Ft/Hr)	CO ₂ (ppm)	Total Gas (Units)
Maximum	140.499	330.000	402.385
Minimum	38.451	330.000	11.210
Mean	87.383	330.000	23.332
Standard Deviation	22.243	0.000	37.092

The Williams Fork 850 formation was marked by the one and only high gas show appearing as a connection gas, with a maximum gas of 415 units at 7,465'. It was associated with a large sandstone bed with interbedded siltstone, and shale layers.



Chromatography through the Williams Fork 850 Formation included C-1 and C-2 with, C-3 being observed during the high gas shows throughout the drilled interval.

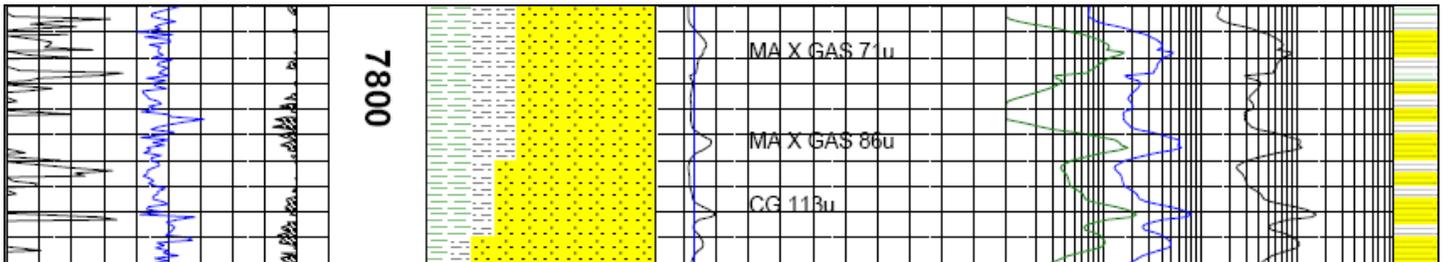
850 Abandonment Surface/Williams Fork 800

The 850 AS, which marks the top of the Williams Fork 800 was encountered at a depth of 7,699' MD / 7,539' TVD. A sandstone unit marks the upper contact. Relevant statistics for the WF 800 are listed below:

Williams Fork 800 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	174.140	330.000	99.917
Minimum	35.090	330.000	11.626
Mean	94.594	330.000	28.384
Standard Deviation	27.324	0.000	17.113

The only significant gas show from the Williams Fork 800 was recorded at 7,823' reaching 86 units. It was produced from a large sandstone bed with interbedded siltstone, and shale. Shortly after a connection gas appears producing 113 units.



Chromatography through the Williams Fork 800 Formation included C-1 and C-2 with, C-3 being observed during the high gas shows throughout the drilled interval.

800 Sequence Boundary/Williams Fork 700

The 800 SB was encountered at 7,918' MD / 7,768' TVD. Like the Williams Fork 800, this sequence consists of dominantly sandstone with shale and siltstone interbedded down the section. The following features characterized the shale that interbedded through this unit:

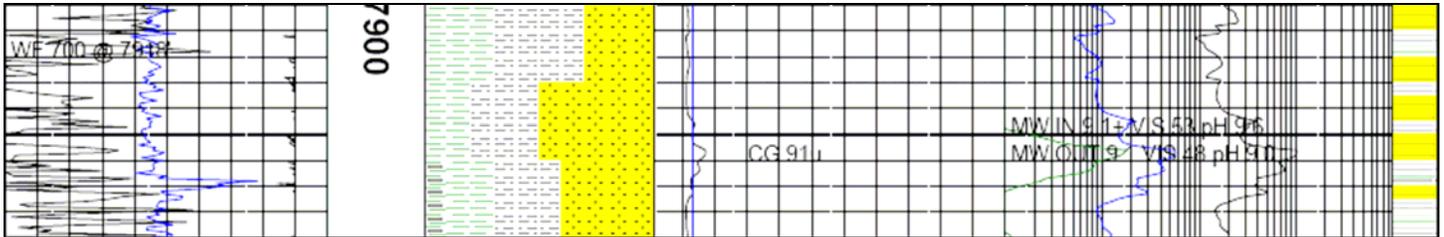
- Dark brown to dark gray color;
- Soft to slightly firm;
- Dull, earthy luster with occasional waxy zones;
- Occasionally silty zones.

Data for the WF 700 are summarized as follows:

Williams Fork 700 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	156.733	330.000	255.571
Minimum	35.111	330.000	11.204
Mean	86.398	330.000	29.350
Standard Deviation	24.358	0.000	23.130

The only significant gas show from the Williams Fork 700 was recorded at 7,946' reaching 91 units. This recorded gas peak was from a connection gas. It was produced from a large sandstone bed with interbedded siltstone, and shale.



Chromatography through the Williams Fork 700 Formation included C-1 and C-2 with, C-3 being observed during the high gas shows throughout the drilled interval.

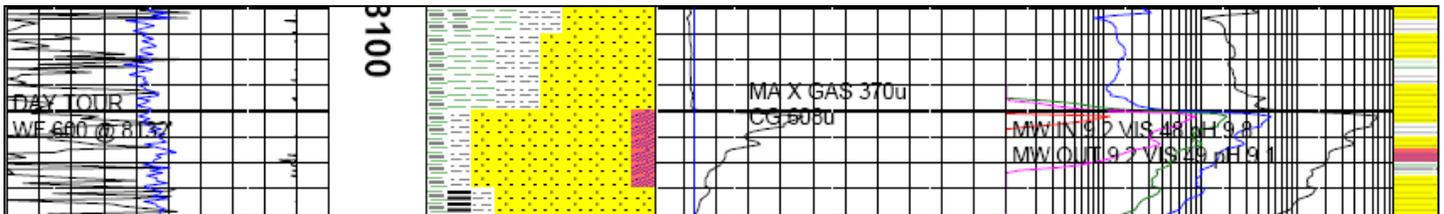
690 Abandonment Surface/Williams Fork 600

The 690 AS, marking the top of the Williams Fork 600 Member was encountered at 8,132' MD/ 7,972' TVD. The WF 600 was logged as sandstone with lesser amounts of shale and moderate amounts of siltstone. Relevant data for the WF 600 are summarized as follows:

Williams Fork 600 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	167.93	330.00	370.26
Minimum	41.55	330.00	6.62
Mean	80.41	330.00	58.08
Standard Deviation	26.19	0.00	61.84

The only significant gas show in the Williams Fork 600 was 608 units occurring at 8,132', which was from a connection gas. It is associated with a large sandstone bed interbedded with siltstone, and carbonaceous shale.



Chromatography through the Williams Fork 600 Formation included C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

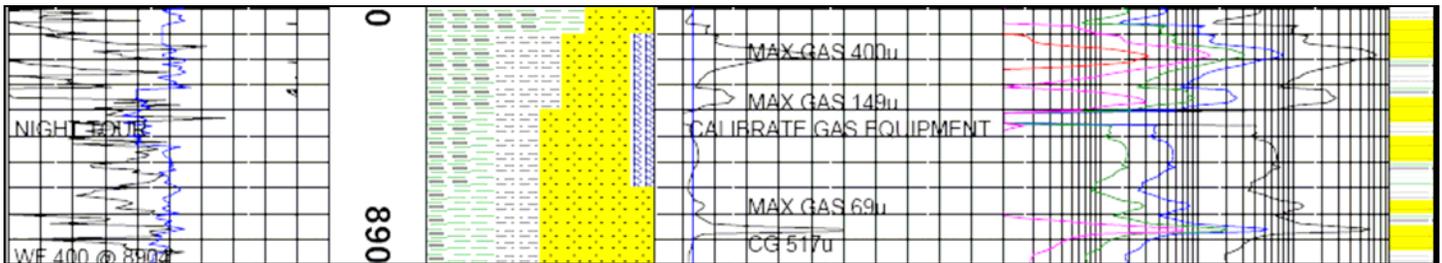
600 Sequence Boundary/Williams Fork 500

The 600 SB occurred at a depth of 8,350' MD / 8,190' TVD. The 600 SB also marks the top of the Williams Fork 500 formation. As with previous Williams Fork units, this unit is also dominated by sandstone. Data for the WF 500 are summarized as follows:

Williams Fork 500 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	202.817	330.000	503.989
Minimum	27.237	330.000	0.000
Mean	76.409	330.000	43.542
Standard Deviation	27.285	0.000	59.521

The only significant gas show in the Williams Fork 500 occurred at 8,828' with a maximum gas of 400 units. The gas shows was associated with a thick sandstone bed interbedded with siltstone, and carbonaceous shale layers.



Chromatography through the WF 500 displayed C-1 through C-3 through out the formation with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

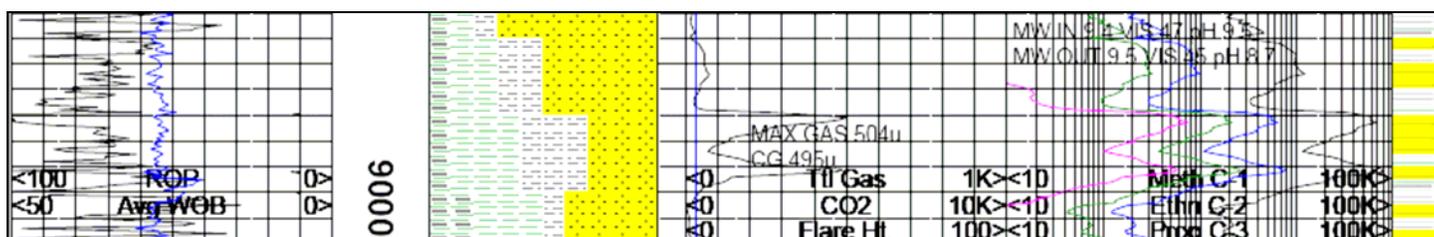
490 Abandonment Surface/ Williams Fork 400

The 490 Abandonment Surface was encountered 8,904' MD / 8,744' TVD and marks the top of the Williams Fork 400 member. Sandstone, kaolinitic sandstone, and shale are common through the WF400. Data concerning the WF 400 are summarized as follows:

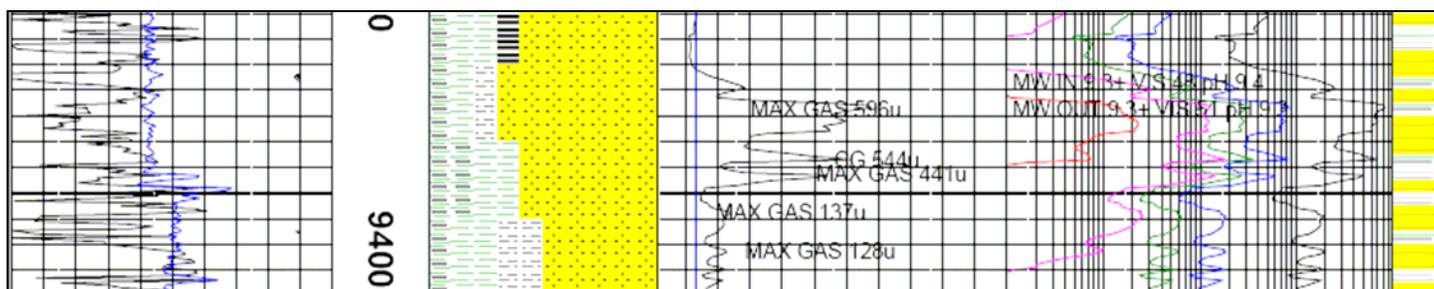
Williams Fork 400 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	138.005	330.000	595.752
Minimum	28.533	330.000	7.446
Mean	70.026	330.000	119.760
Standard Deviation	19.415	0.000	125.563

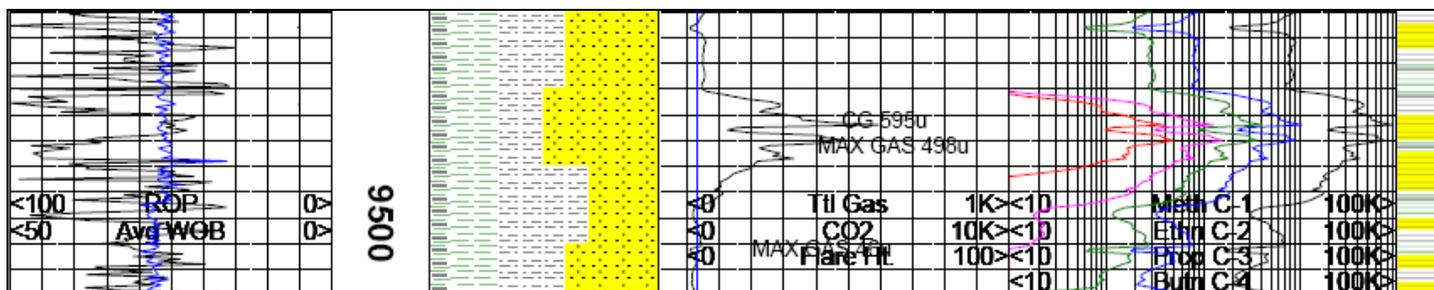
The first significant shows from the Williams Fork 400 were produced from interbedded sandstone, siltstone, shale, and carbonaceous shale beds. It occurred at 8,941', with a maximum peak of 504 units.



The next and most significant gas shows from the Williams Fork 400 was observed at 9,347', peaking at 596 units. This show correlates with interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



The last significant high gas recorded in the Williams Fork 400 was recorded at 9,470' with a maximum gas of 498 units. It was also produced from interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



Chromatography through the WF 400 displayed C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

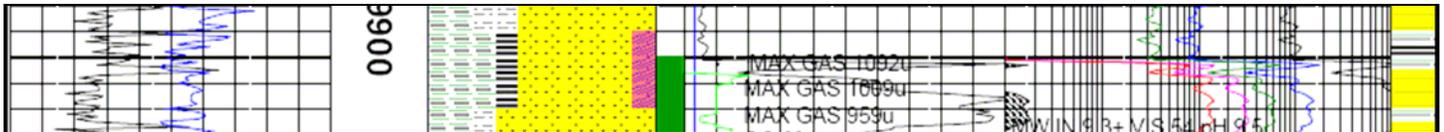
400 Sequence Boundary/ Williams Fork 300

The Williams Fork 300 member has an upper boundary of 9,645' MD / 9,485' TVD and is determined by the 400 SB. The WF300 generally features interbedded sandstone/kaolinitic sandstone, shale, and carbonaceous shale. Data concerning the WF 300 are presented as follows:

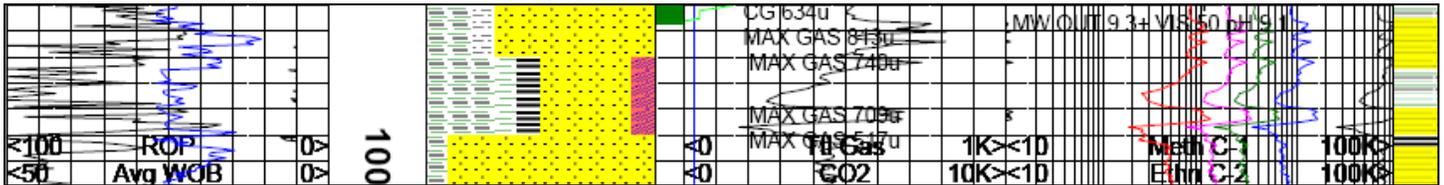
Williams Fork 300 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	401.857	330.000	1091.705
Minimum	2.613	330.000	0.000
Mean	64.678	330.000	241.696
Standard Deviation	48.742	0.000	187.562

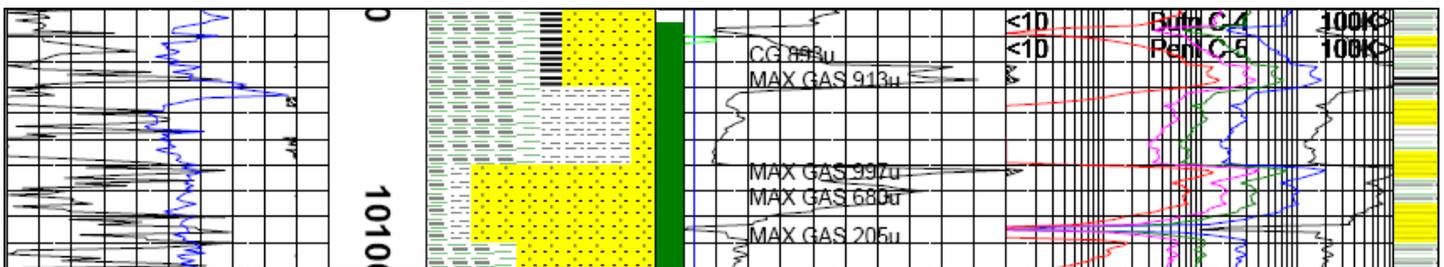
The William Fork 300 formation produced many high gas peaks through out the formation. Eight gas peaks produced above 700 units and are listed below. The first gas shows from the Williams Fork 300 were noted at 9,913', 9,919', and 9,926' peaking at 1092, 1009, and 959 units respectively. These peaks were associated with a large sandstone body with interbedded siltstone, coal, and carbonaceous shale layers.



The next significant gas shows of 813, 740, and 709 units recorded at 9,953', 9,962', and 9,981' respectively, in association with thick sandstone, siltstone, carbonaceous shale, and coal bodies.



The final significant gas show was recorded at 10,048' and 10083', and reached gas peaks of 913 and 997 units, respectively. This gas was associated with thick sandstone body with interbedded siltstone and carbonaceous shale beds.



Chromatography through the WF 300 included displayed C-1 through C-4, with C-5 being observed during the high gas shows throughout the drilled interval.

290 Abandonment Surface/ Williams Fork 200

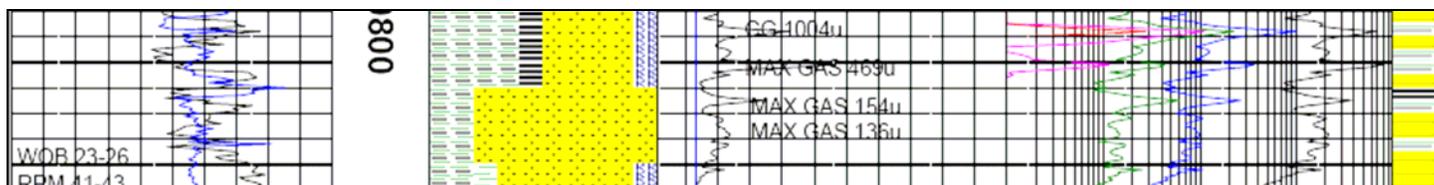
The 290 AS occurred at a depth of 10,686' MD / 10,526' TVD. The Williams Fork 200 member, whose top is marked by the 290 AS, encompasses interbedded sandstone, shale, carbonaceous shale, siltstone and coal.

Data for the WF 200 are summarized as follows:

Williams Fork 200 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	72.761	2476.801	1212.846
Minimum	13.517	330.000	0.000
Mean	34.719	350.839	149.265
Standard Deviation	11.307	185.028	189.656

The first high gas show from the Williams Fork 200 was noted at 10,821', and recorded a high gas peak of 469 units. This show was associated with a interbedded sandstone, coal, and carbonaceous shale beds.



The next and final significant gas shows produced 1167 and 1212 units, and was recorded at 10,916' and 10,935' respectively, in association with a thick sandstone body with interbedded siltstone, shale, coal, and carbonaceous shale beds.



Chromatography through the WF 200 included displayed C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

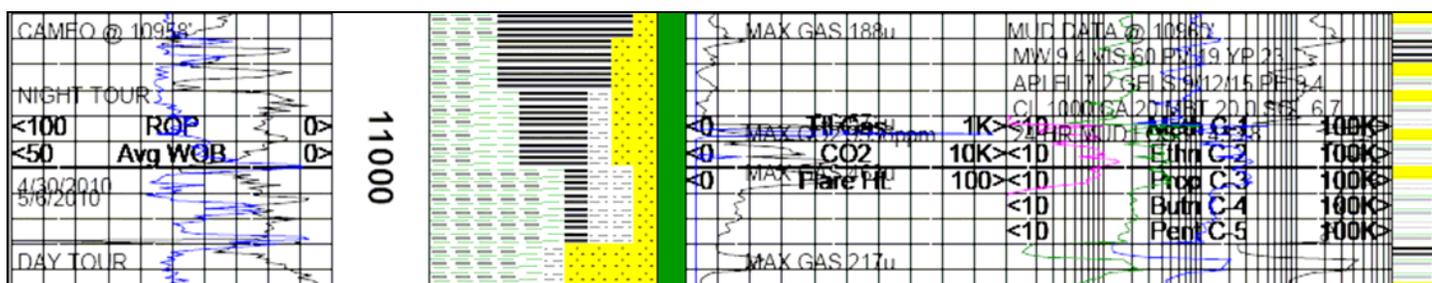
210 Sequence Boundary/Cameo Formation

The 210 SB, marking the top of the Cameo Formation, occurred at a depth of 10,958' MD/ 10,798' TVD. The rocks of the Cameo Formation include sandstone, shale, and siltstone along with a significant number of coal units. Data for the Cameo Formation are summarized as follows:

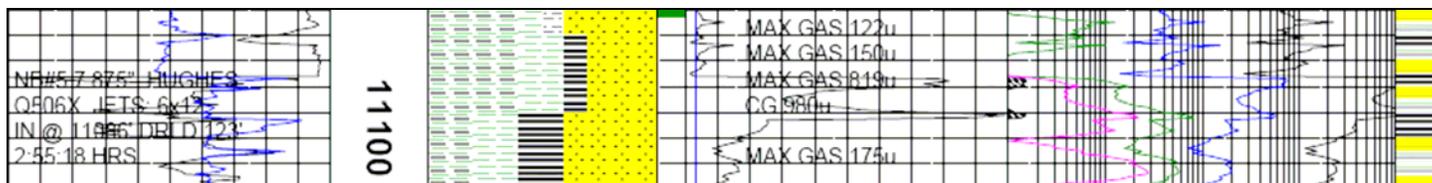
Cameo Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	160.557	9538.647	992.714
Minimum	3.138	330.000	10.175
Mean	34.903	376.945	188.828
Standard Deviation	22.456	570.247	172.509

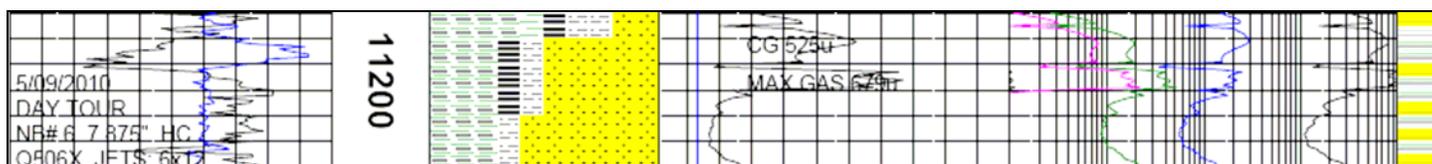
The first significant gas from the Cameo formation appeared at 11,016', peaking at 463 units. It was produced by interbedded layers of sandstone, siltstone, shale, carbonaceous shale, and coal.



Another high gas show came in at 11,038', and recorded a peak gas of 819 units. The gas show was produced by interbedded layers of coal, carbonaceous shale, shale, and sandstone.



The last significant gas from the Cameo formation was at 11,206' with a gas peak of 679 units. This gas was produced by interbedded layers of sandstone, siltstone, carbonaceous shale, and coal.



Chromatography through the Cameo Formation included C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

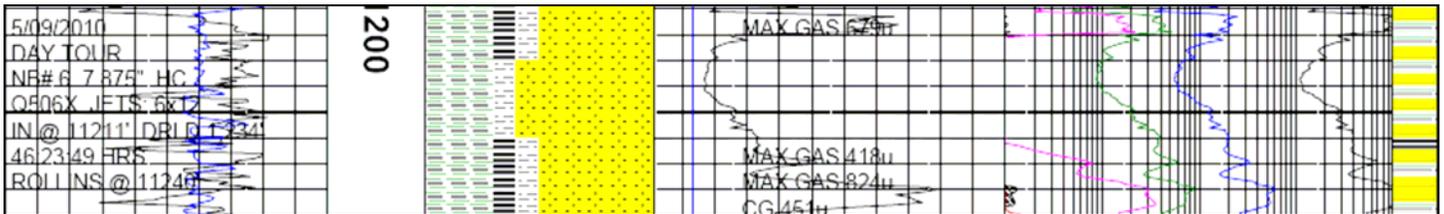
200 Sequence Boundary/Rollins Formation

The 200 SB occurred at 11,240' MD/ 11,080' TVD and marks the top of the Rollins Formation. The top of the Rollins is dominated by thick, relatively clean sandstone. Data for the Rollins Formation are summarized as follows:

Rollins Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	70.676	330.000	788.603
Minimum	12.858	330.000	29.797
Mean	39.699	330.000	162.494
Standard Deviation	11.470	0.000	141.523

The only significant gas show of the Rollins Formation recorded at 11,270'. It recorded a maximum gas of 824 units, and was associated with thick sandstone body interbedded with siltstone, coal, and carbonaceous shale beds.



Chromatography through the Rollins Formation included C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

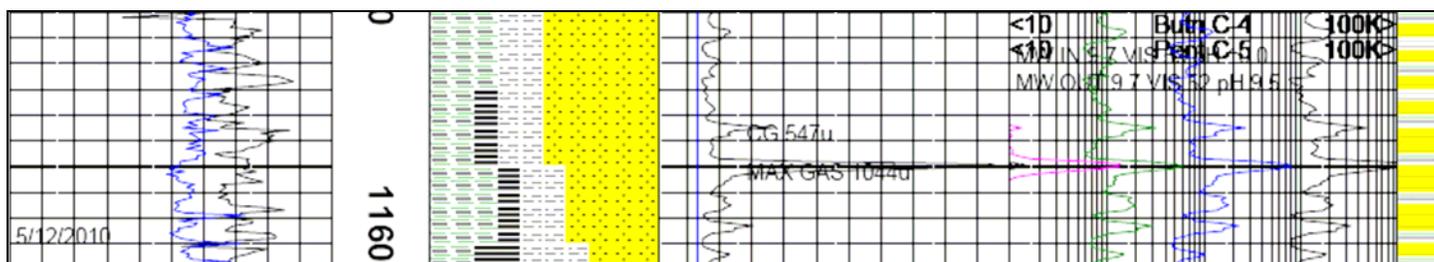
180 Flooding Surface/Cozzette Formation

The top of the Cozzette Formation, at 11,462' MD/ 11,302' TVD is marked by the 180 FS. The Cozzette is composed of poorly consolidated sandstone, kaolinitic sandstone, shale, carbonaceous shale, and siltstone. Drilling and gas data for the Cozzette Formation are summarized as follows:

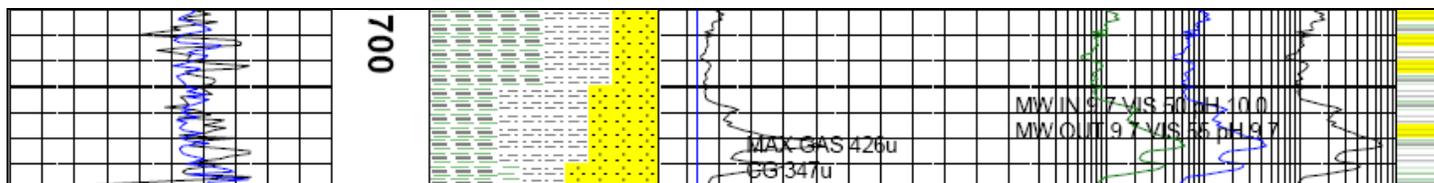
Cozzette Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	77.081	330.000	968.892
Minimum	12.138	86.842	39.082
Mean	36.049	329.235	118.057
Standard Deviation	12.243	13.636	101.439

The first and most significant gas shows of the Cozzette Formation recorded at 11,580'. It recorded a maximum gas of 1,044 units, and was associated with interbedded sandstone, siltstone, carbonaceous shale, and coal beds.



The last significant gas show in the formation occurred at 11,753', yielding 426 units. This gas show was in connection with interbedded sandstone, siltstone, and carbonaceous shale beds.



Chromatography through the Cozzette Formation included C-1 through C-3, with C-4 being observed during the high gas shows throughout the drilled interval.

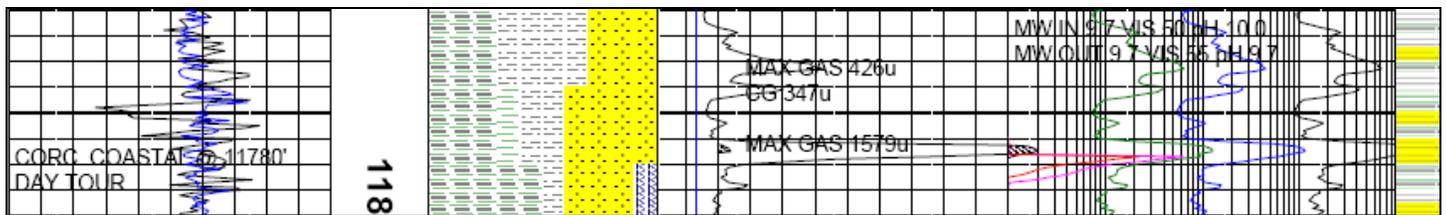
140 Flooding Surface/Corcoran Coastal Plain

The top of the Corcoran Coastal Plain, marked by the 140 Flooding Surface, was encountered at 11,780' MD / 11,620' TVD. This section encompasses a thick sequence of sandstone, shale, and carbonaceous shale. Drilling data for this section are summarized as follows:

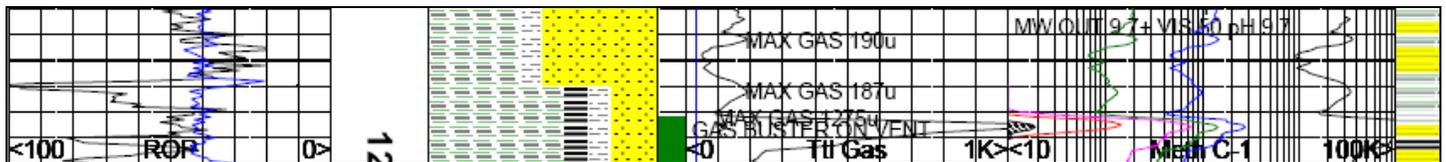
Corcoran Coastal Plain Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	147.462	330.000	1586.650
Minimum	4.773	330.000	0.000
Mean	39.059	330.000	207.513
Standard Deviation	18.557	0.000	237.935

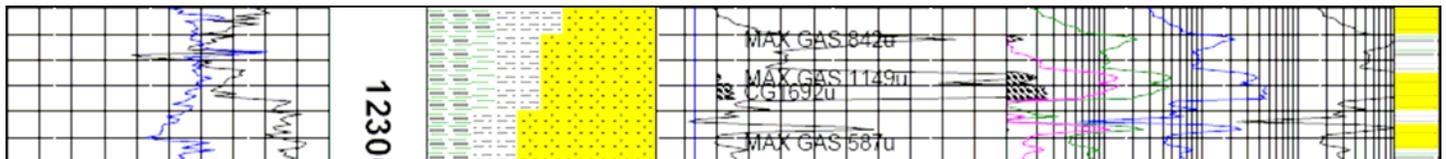
The Corcoran Coastal Plain formation produced many high gas peaks through out the formation. The first and most significant formation gas appeared at 11,784', with a high gas of 1579 units. It was produced by interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



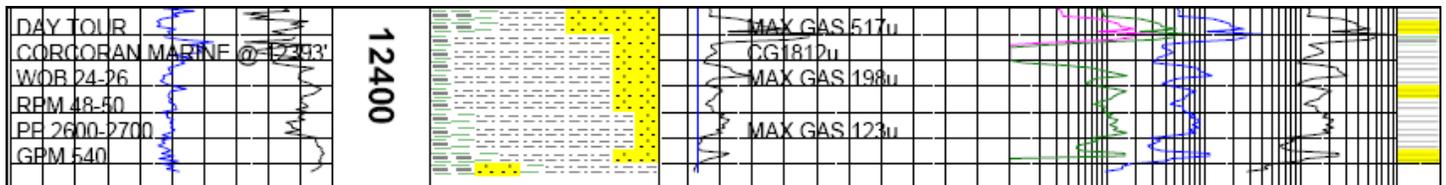
The next gas show recorded at 11,985'. It recorded a maximum gas of 1,275 units, and was associated with thick a thick carbonaceous shale body with interbedded coal, siltstone, and sandstone beds.



The next three gas shows were recorded at 12,271', 12,286', and 12,307'. It recorded maximum gases of 842, 1,149, and 587 units respectively, and was associated with interbedded siltstone, sandstone, and carbonaceous shale beds.



The last significant gas show of the Corcoran Coastal Plain, recorded at the base of the formation appeared at 12,390', producing 517 units. It was associated with interbedded siltstone, sandstone, and carbonaceous shale beds.



Chromatography through the Corcoran Coastal Plain included C-1 through C-3, with C-4 and C-5 being observed during the high gas shows throughout the drilled interval.

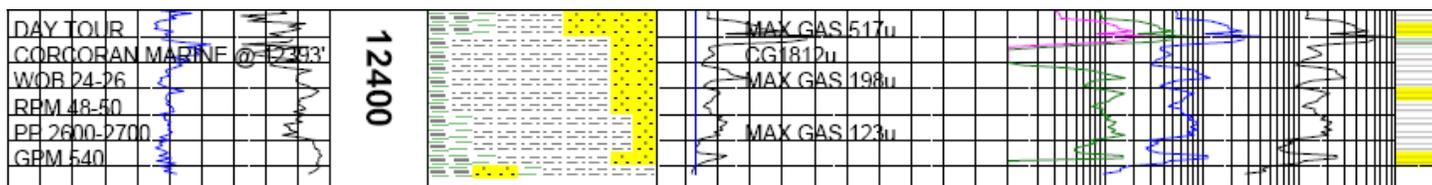
140 Sequence Boundary/Corcoran Marine Formation

The Corcoran Marine top was drilled at 12,393' MD / 12,232' TVD. This unit was composed dominantly of shale and siltstone with minor sandstone. The well was completed within the Corcoran Marine at a depth of 12,240' MD / 12,200' TVD. Data for the Corcoran Marine are summarized as follows:

Corcoran Marine Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	27.269	330.000	197.928
Minimum	2.659	330.000	21.919
Mean	9.432	330.000	82.665
Standard Deviation	5.578	0.000	36.631

The most significant gas show recorded in the Corcoran Marine Formation occurred at 12,407', reaching a peak gas of 198 units. It is associated with the top bed of the siltstone layer found through the formation.



Chromatography through the Corcoran Marine included C-1 through C-3, with C-4 being observed during the high gas shows throughout the drilled interval.

Other Data Plots

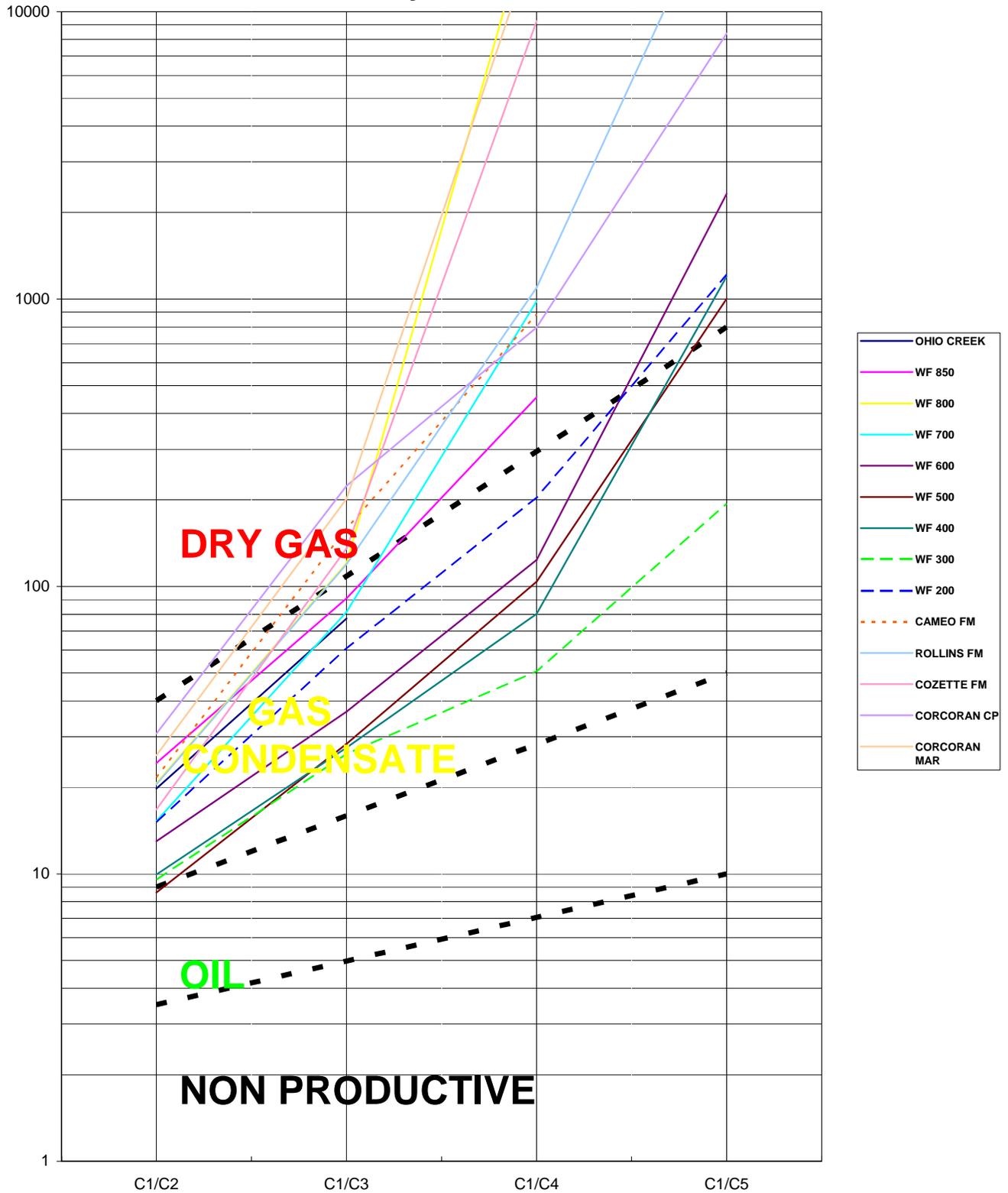
The following series of data plots summarize data concerning rate of penetration, total gas, and CO₂ as discussed in the above sections. Data are referenced to the formation top for each of the formations described above. The data are intended to illustrate general trends for each of these parameters relative to depth.

**Exxon Mobil
Freedom Ranch Unit 197-33B5**

Pixler Plot

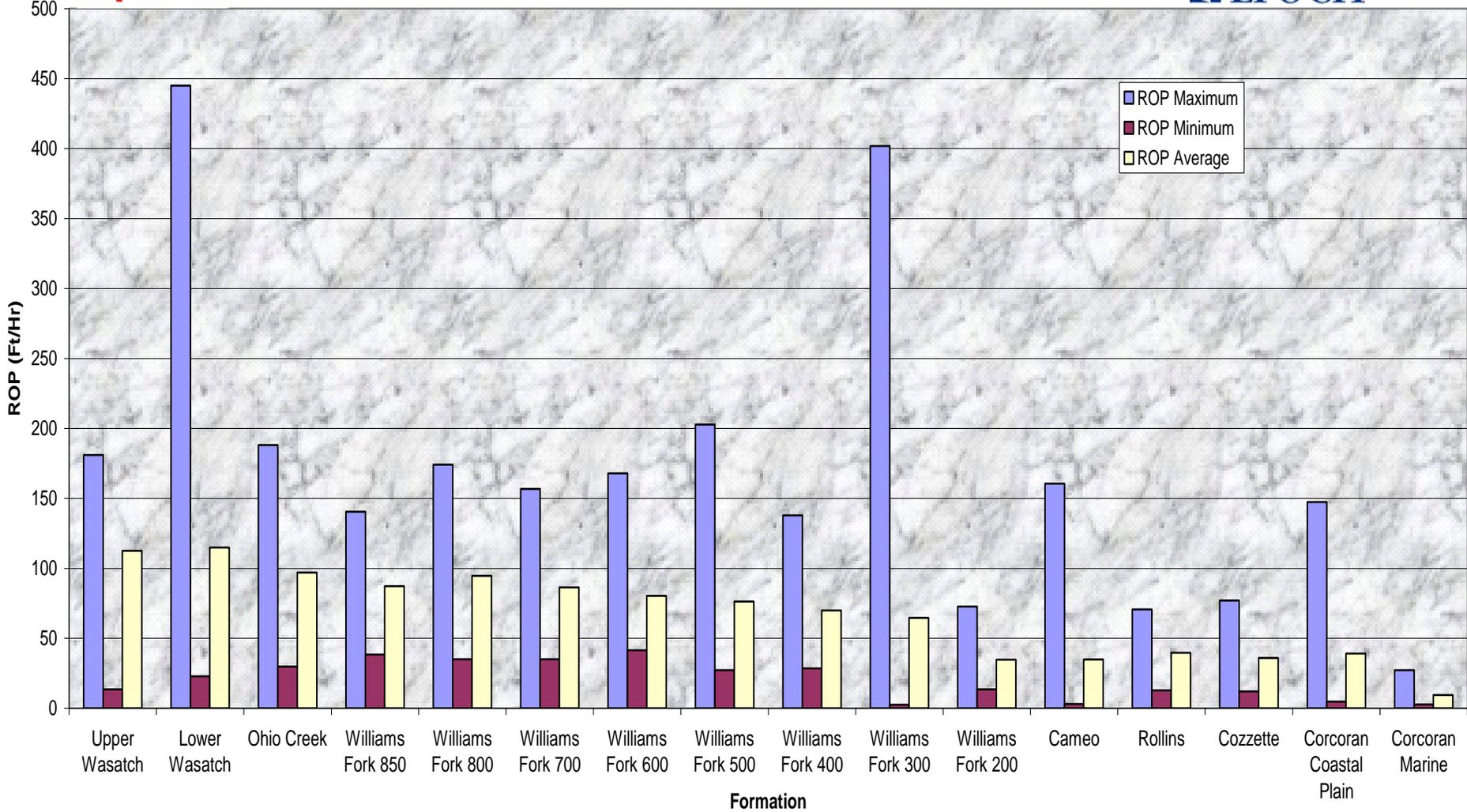
FRU 197-33B5

Pixler Plot Of Average Chromatography
Data By Formation

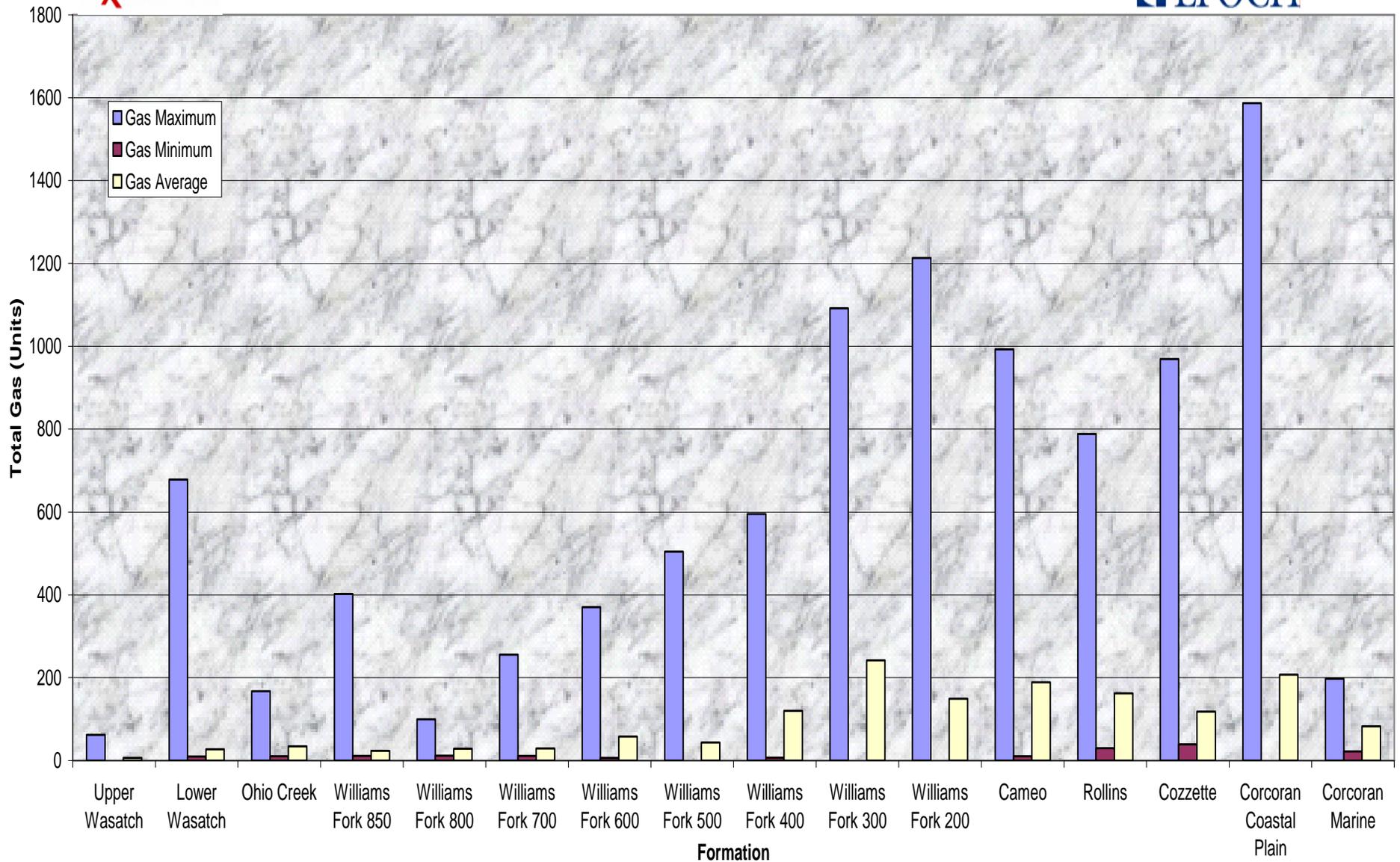


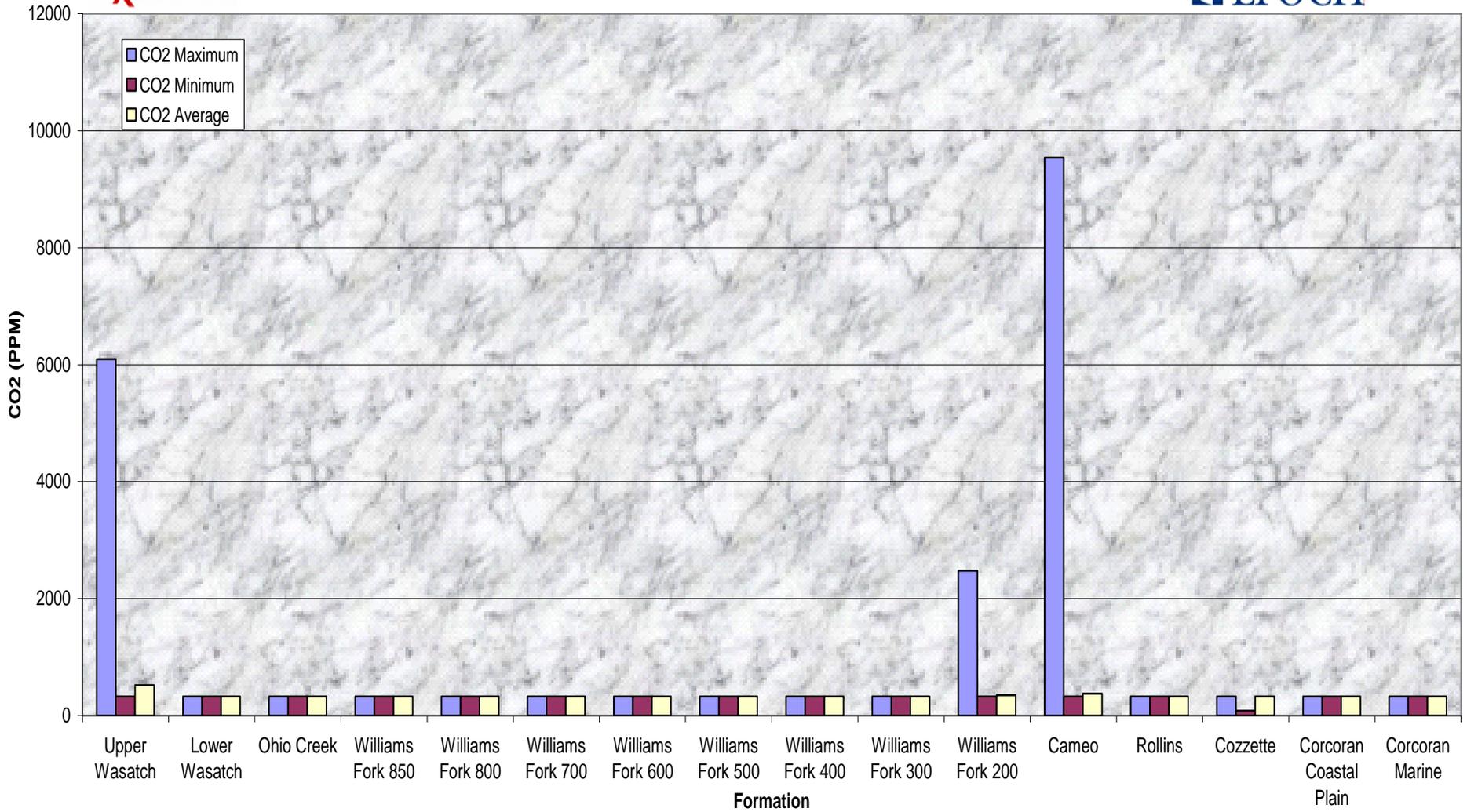
Exxon Mobil
Freedom Ranch Unit 197-33B5
Other Data Plots

FRU 197-33B5
Rate of Penetration Statistics



FRU 197-33B5
 Total Gas Statistics By Formation





Exxon Mobil
Freedom Ranch Unit 197-33B5
Formation Descriptions

4540' Shale = Light gray to light olive gray; brittle to crumbly to crunchy tenacity; predominately planar to occasionally blocky fracturing; cuttings tend to be platy to flaky to occasionally elongated tabular in habit; dull to semi greasy to earthy luster; silty to smooth to clayey texture; visible nacholite crystals in most of sample; 5-10% paleosols visible in sample.

4650' Sandstone = Translucent to white to semi-yellowish gray; mostly quartz framework with 2-3% dark lithics visible in sample; coarse to medium to fine grain size; fair to poorly sorted; sub-round to round grains; moderate to high sphericity; a few samples have a frosted appearance; a few consolidated grains due to bit action; calcite cementation due to moderate reaction in dilute HCL; grain supported; no visible hydrocarbons in sample.

4780' Siltstone = Light brownish gray to slight pinkish gray to pale brown; stiff to crunchy to occasionally brittle tenacity; irregular to hackly to semi blocky fracturing; platy to flaky to slight tabular cuttings habit; dull to frosted to semi sparkling luster; silty to gritty to occasional gritty texture; no other visible bedding features.

4880' Shale = Crumbly to crunchy to brittle tenacity; planar to blocky to occasional hackly fracturing; cuttings tend to be platy to flaky to slight tabular to semi wedge-like in habit; semi greasy to slight waxy to dull earthy luster; smooth to clayey texture; no other visible bedding features.

4970' Limestone = Very light gray to light brownish gray to white; high reaction in dilute HCL; stiff to tough to crunchy tenacity; irregular to semi blocky to splintery fracturing; wedge like to bladed to tabular cuttings habit; vitreous to waxy to slight sparkling luster; smooth to crystal'n texture; no other visible bedding features.

5070' Siltstone = Very light gray to light brownish gray to brownish gray; stiff to crunchy tenacity; irregular to hackly to semi planar fracturing; tabular to platy to flaky cuttings habit; dull to sparkling to slight frosted to semi greasy luster; gritty to occasionally granular to predominately silty texture; 1-5% paleosols visible in sample.

5170' Sandstone = White to translucent to semi light brownish gray; mostly quartz frame work with 1-5% dark lithics visible in sample; medium to fine to predominately coarse grain size; fair to well to very well sorted; sub-angular to sub-round grains; moderate to high sphericity; no visible bedding or other distinguishable surface features present in sample; no accessory minerals present in sample.

5280' Shale = Very light gray to light gray to occasional medium light gray; moderately dense to slightly crunchy tenacity; irregular to sub-blocky to sub-planar to hackly fracture; mostly massive to sub-tabular to wedge like to elongated cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly silty texture; no visible laminae or other distinguishable structural features present in sample; accessory mineral pyrite present in sample.

5420' Wasatch F Sandstone = White to off white to very light gray to translucent with occasional moderate green hues; quartz dominate frame work; consists of calcitic cementation with light to moderate reaction to dilute HCL; matrix contains 1 to 3% dark lithic fragments; mostly loose grains with few supporting grains; fine to medium-fine grained; fair to well sorting; sub-angular to sub-rounded to rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone; no other surface features present; accessory mineral pyrite present in sample.

5580' Siltstone = Very Light gray to light gray to occasional moderate reddish brown; slightly dense to slightly brittle to slightly crumbly tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly gritty to very slightly granular texture; poor grade siltstone visible grading with poor grade sandstone and shale visible interbedded in siltstone, present in sample; accessory mineral pyrite present in sample.

5730' Shale = Very light gray to light gray to medium light gray with occasional grayish red purple mottling; slightly dense to slightly crumbly tenacity; irregular to sub-blocky to sub-planar fracture; moderately massive to elongated to wedge like cuttings habit; dull to earthy dull to occasional semi-waxy to semi-frosted luster; moderately smooth to slightly silty texture; no visible laminae or other distinguishable structural features present; accessory mineral pyrite present in sample.

5870' Carbonaceous Shale = Brownish black to olive black to dark brownish gray; moderately dense to slightly tough tenacity; sub-planar to sub-tabular to earthy fracture; occasional massive to sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional slightly semi-sparkling luster; very slightly gritty to very slightly clayey texture; poor grade siltstone visible bedding with poor grade shale, no other distinguishable structural features present; accessory mineral pyrite present in sample.

6010' Wasatch I Sandstone = Off white to very light gray to very light brownish gray with black and dark brownish gray hues; quartz dominate frame work; quartz cuttings range from smoky to off white; consists of calcitic cementation; moderately high reaction to dilute HCL; matrix contains 3 to 5% dark lithic fragments; medium-coarse to very coarse grained; fair to poor sorting; sub-angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone, very small amount of coal visible degassing, and fracture evidence in sample; accessory minerals pyrite and calcite present in sample.

6190' Siltstone = Light gray to light brownish gray; slightly dense to slightly tough tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly gritty texture; no other visible bedding features.

6280' Carbonaceous Shale = Brownish gray to olive gray to occasionally light olive gray; crunchy to crumbly to predominate brittle tenacity; planar to hackly to semi blocky fracturing; cuttings tend to be platy to flaky to elongated tabular in habit; dull earthy to slight greasy to occasionally sparkling luster; gritty to silty to occasional granular texture; visible pyrite crystals; visible bands of carbonaceous material; grades into a light gray shale.

6410' Sandstone = Light brownish gray to white to translucent to semi yellowish gray; mostly quartz framework with 1-2% dark lithics visible in sample; very coarse to coarse to medium to very fine grain; very well to well to fair sorted; sub-angular to sub round to round grains; low to moderate sphericity; coarse grain samples have a slight polish appearance; fine grain sandstones have a slight frosted appearance; unconsolidated grain due to bit action; grain supported; calcite cementation due to moderate reaction to dilute HCL; no visible hydrocarbons in sample.

6570' Siltstone = Very light gray to light bluish gray to occasional light yellowish gray; stiff to crunchy tenacity; hackly to irregular fracturing; cuttings tend to be wedge-like to platy to slight blade in habit; dull earthy to slight greasy to semi frosted luster; granular to gritty to silty texture; no other visible bedding features.

6670' Coal = Black to grayish black to slight brownish black; brittle to crumbly to crunchy tenacity; conchoidal to splinter to irregular fracturing; wedge-like to slightly nodular to occasionally bladed cuttings habit; dull to sparkling to semi-greasy to predominately waxy luster; clayey to semi silty to mostly smooth texture; visible degassing in most of sample; visible crystals of pyrite.

6780' Shale = Very light gray to light olive gray; crumbly to brittle tenacity; hackly to irregular to blocky fracturing; cuttings tend to be platy to flaky to elongated tabular; earthy to dull to semi greasy luster; predominately clayey to smooth texture; no visible bedding in sample; no visible accessory minerals present.

6880' Sandstone = Very light gray to light yellowish gray to white to translucent; coarse to very coarse to medium grain size; calcite cementation due to high reaction in dilute HCL; mostly quartz framework 3-4% dark lithics visible in sample; well to fair to poorly sorted; sub angular to sub round grains; high to moderate to occasional low sphericity; grain supported; firm friable to hard to friable; no visible hydrocarbons in sample; 10-15% paleosols visible in sample.

7020' Shale = Light bluish gray to light gray to light greenish gray; brittle to crumbly to crunchy tenacity; planar to irregular to slight blocky fracturing; cuttings tend to be platy to flaky to semi wedge-like in habit; slight greasy to semi waxy to predominately dull earthy luster; smooth to clayey texture; no other visible bedding features; no accessory minerals visible in sample.

7130' Siltstone = Very light gray to light bluish gray to light gray; crunchy to crumbly to occasionally brittle tenacity; irregular to predominately hackly to slight planar fracturing; cuttings tend to be platy to flaky to slight nodular to predominately elongate tabular in habit; dull earthy to slight greasy to frosted luster; gritty to slightly granular to silty texture; no other visible bedding features.

7250' Ohio Creek Sandstone = Off white to with to transparent with black and moderate brown hues; quarts dominant frame work; quartz cuttings range from smoky to translucent; mostly loose grain with grain supported sandstone cuttings; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 5 to 8% dark lithic fragments; medium-fine to medium-coarse grain; moderately fair to poor sorting; sub-angular to sub-rounded angularity; low to moderate sphericity; no visible bedding or other distinguishable surface features present; no accessory minerals present in sample.

7420' Carbonaceous Shale = Brownish black to olive black to dark brownish gray; moderately tough to slightly dense tenacity; irregular to sub-blocky to sub-planar to earthy fracture; occasional massive to sub-tabular to sub-nodular to occasional elongated cuttings habit; dull to earthy dull to occasional very light semi-sparkling luster; semi-smooth to slightly clayey texture; very thin laminae visible, poor grade shale visible bedding with carbonaceous shale; accessory mineral pyrite, and several large cuttings of calcite visible in sample.

7570' Shale = Very light gray to light gray to medium light gray; moderately tough to moderately dense tenacity; irregular to sub-planar to earthy hackly fracture; massive to wedge like to elongated cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly silty to slightly clayey texture; poor grade siltstone visible grading with poor grade sandstone, no other distinguishable structural features present; accessory mineral pyrite present in sample.

7710' Siltstone = Very light gray to light gray to medium light gray to occasional very light bluish gray; slightly dense to occasional crumbly to slightly tough tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional very semi-sparkling luster; slightly gritty to very slightly granular texture; poor grade siltstone visible grading with poor grade sandstone, no other distinguishable structural features present; no accessory minerals present in sample.

7860' Sandstone = Off white to white to translucent with black hues; quartz dominant frame work; mostly loose grains with few grain supporting cuttings; consists of calcitic cementation with light to moderate reaction to dilute HCL; matrix contains 3 to 5% dark lithic fragment in grain supported cuttings; medium-fine to fine grained; sub-angular to sub-rounded to rounded angularity; low to moderate sphericity; no visible bedding or other distinguishable surface features present; accessory mineral present attached to small carbonaceous shale cutting in sample.

8020' Shale = Very light gray to light gray; slightly tough to moderately dense tenacity; irregular to sub-blocky to sub-planar to earthy hackly fracture; occasional massive to elongated to wedge like cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly clayey to slightly silty texture; poor grade siltstone visible grading with poor grade sandstone, small amount of carbonaceous shale visibly degassing in

8150' Sandstone = White to translucent to very light gray; mostly quartz framework with 2-5% dark lithics visible in sample; very coarse to medium to fine grain sandstones; fair to well sorted; sub-angular to sub-round grains; moderate to high sphericity; fine grain sandstones have a slight frosted appearance; friable to moderate hard; unconsolidated grains due to bit action; grain supported; no visible hydrocarbons in sample; grades into a coarse grain carbonaceous shale bed; calcite cementation due to high reaction in dilute HCL; large crystals of calcite visible in sample.

8310' Shale = Pale brown to yellowish gray to grayish yellow green; brittle to crumbly tenacity; planar to slight blocky to semi hackly fracturing; cuttings tend to platy to flaky in habit; dull earthy to occasionally greasy luster; clayey to smooth texture; no other visible bedding in sample.

8400' Siltstone = Very light gray to light bluish gray to medium gray; stiff to crunchy to occasional brittle tenacity; irregular to predominately hackly to occasionally planar fracturing; platy to flaky to slight tabular cuttings habit; slight frosted to sparkling to semi dull luster; gritty to silty to gritty to slight granular texture; visible fracture fill in silty sample pieces.

8520' Carbonaceous Shale = Dark gray to brownish gray to olive gray; crunchy to crumbly to occasional brittle tenacity; blocky to planar to splintery fracturing; fractured along the carbonaceous material; cuttings tend to be platy to semi wedge-like to occasionally slightly nodular; sparkling to slight waxy to semi greasy luster; granular to gritty to silty with a occasional clayey texture; visible bands of carbonaceous material; 1-2% kaolinitic sands visible in sample.

8650' Sandstone = Translucent to white to very light gray; mostly quartz framework with 3-6% dark lithics visible in sample; very coarse to coarse size; fair to moderate sorted; sub-round to sub-angular grains; low to moderate sphericity; grains have a slight polish appearance; unconsolidated grains due to bit action; friable to firm friable to moderate hard; calcite cementation due to moderate reaction in dilute HCL; grain supported; no visible hydrocarbons in sample; thin fractures found in coarse grain sandstones; no accessory minerals present.

8800' Carbonaceous Shale = Medium gray to brownish gray to olive gray; brittle to stiff to crunchy tenacity; predominately hackly to planar to occasional blocky fracturing; cuttings tend to be platy to flaky to wedge-like in

habit; frosted to dull to earthy dull to occasional semi-sparkling luster; moderately clayey to very slightly gritty texture; very thin laminae visible in sample, no other distinguishable structural features present in sample; no accessory minerals present in sample.

8940' Shale = Very light gray to light gray to occasional medium light gray; very slightly dense to moderately brittle to moderately crumbly tenacity; irregular to earthy hackly to occasional sub-blocky fracture; wedge like to elongated to mostly smaller cuttings habit; dull to earthy dull to occasional semi-waxy to semi-frosted luster; moderately smooth to slightly silty to very slightly clayey texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

9090' Siltstone = Light gray to medium light gray to occasional very light gray; moderate tough to slightly dense tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; occasional clayey to slightly gritty to very slightly granular texture; poor grade siltstone visible bedding and grading with poor grade sandstone; no accessory minerals present in sample.

9220' Sandstone = Off white to white to very light brownish gray with black hues; quartz dominant frame work; mostly loose grains with few grain supported cuttings; consists of calcitic cementation; moderately high reaction to dilute HCL; matrix contains 3 to 5% dark lithic fragments; medium-fine to medium-coarse grained; fair to poor sorting; sub-angular to sub- rounded angularity; low to moderate sphericity; very small amount of coal and carbonaceous material visible degassing, poor grade siltstone visible bedding with poor grade sandstone; no accessory minerals present in sample.

9390' Carbonaceous Shale = Brownish black to olive black to very dark brownish gray; moderately tough to slightly dense tenacity; irregular to sub-planar to earthy to earthy-hackly fracture; occasional massive to elongated to sub-tabular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; moderately clayey to semi-smooth to slightly silty texture; very thin laminae visible, small amount of coal and carbonaceous shale visibly degassing in sample, no other distinguishable structural features present in sample; no accessory minerals present in sample.

9550' Shale = Very light greenish gray to light bluish gray to very light gray; brittle to crumbly to slight crunchy tenacity; occasionally irregular to mostly planar to hackly fracturing; cuttings tend to be platy to flaky to semi tabular in habit; slight greasy to dull earthy luster; clayey to smooth texture; no other visible bedding features.

9660' Sandstone = White to very light gray to light brownish gray; mostly quartz frame work with 4-6% dark lithics visible in sample; mostly coarse grain to medium to fine grain sandstones; poor to fair sorted; sub round to round grains; high to moderate sphericity; grains have a polish appearance; unconsolidated grains due to bit action; grain supported with a few matrix supported; calcite cementation due to moderate reaction in dilute HCL; no visible hydrocarbons due to lack of fluoresce under UV light; thin beds of coal through out the sample.

9810' Carbonaceous Shale = Light olive gray to olive gray to brownish gray; brittle to crunchy to crumbly tenacity; predominate hackly to planar to slight blocky fracturing; cuttings tend to be wedge like to slight nodular to semi tabular in habit; slight greasy to frosted to occasional metallic luster; granular to gritty to silty texture; visible beds of carbonaceous material; visible degassing along carbonaceous beds; grades into a coarse grain sandstone.

9940' Coal = Olive black to brownish black to grayish black; brittle to malleable to stiff tenacity; irregular to semi blocky to predominately conchoidal fracturing; cuttings tend to be mostly nodular to occasionally wedge-like to tabular in habit; predominately waxy to greasy to semi sparkling luster; smooth to matte to gritty texture; visible degassing in most of the sample; visible pyrite in sample.

10060' Shale = Very light greenish gray to light gray to medium gray; crunchy to crumbly tenacity; predominately planar to hackly to semi blocky fracturing; cuttings tend to be platy to flaky in habit; dull earthy to occasionally waxy luster; clayey to smooth texture; no other visible bedding features.

10150' Siltstone = Very light brownish gray to light gray to white; crunchy to crumbly to semi brittle tenacity; hackly to irregular to sub-planar to earthy fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional very slightly semi-sparkling luster; slightly gritty to very slightly granular to occasional clayey texture; poor grade siltstone visible grading with poor grade sandstone; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

10300' Sandstone = Very light gray to off white to very light tan-brown gray to light brownish gray with black and moderate brown hues; quartz dominate frame work; mostly grain supported with few loose grains; consists of calcitic cementation with light to moderate reaction to dilute HCL; matrix contains 3 to 5% dark lithic fragments; fine to medium-coarse grained; fair to poor sorting; sub-angular to sub-rounded angularity; low to moderate sphericity; poor grade sandstone visible grading with poor grade siltstone, very small amount of coal and carbonaceous shale visibly degassing in sample; no accessory minerals present in sample.

10480' Carbonaceous Shale = Brownish black to olive black to very dark brownish gray; slightly tough to moderately dense to occasional slightly crunchy tenacity; irregular to sub-blocky to sub-planar to earthy to hackly fracture; occasional massive to elongated to sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly smooth to slightly clayey to very slightly gritty texture; poor grade sandstone visible bedding with carbonaceous shale, and poor grade siltstone visible grading with poor grade sandstone, very small amount of coal visibly degassing in sample; no accessory minerals present.

10660' Sandstone = Light brownish gray to yellowish gray to white to slight translucent; mostly quartz framework with 7-8% dark lithics visible in sample; coarse to medium to occasional fine grain sandstones; very poor to poor to fair sorted; sub-angular to sub-round grains; sphericity is moderate to high; grain supported; no visible hydrocarbons; high reaction in dilute HCL indicating calcite cementation; grains are semi frosted in appearance; visible beds of thin coal in coarse grain sandstones.

10800' Coal = Grayish black to olive black to brownish black; stiff to malleable to crunchy tenacity; hackly to splintery to conchoidal fracturing; cuttings tend to be nodular to bladed to wedge-like in habit; dull to sparkling to slight metallic to semi greasy waxy luster; smooth to crystal'n to semi matte texture; thin laminae of pyrite is visible in sample; visible degassing in most of sample.

10950' Shale = Very light greenish gray to light gray to pale blue; brittle to crumbly tenacity; cuttings tend to be platy to flaky in habit; dull earthy to earthy dull to occasional semi-waxy to semi-frosted luster; moderately smooth to slightly silty to very slightly clayey texture; no visible laminae or other structural features present; no accessory minerals present in sample.

11080' Carbonaceous Shale = Brownish black to grayish black; crunchy to crumbly to occasional malleable tenacity; planar to hackly fracturing; platy to flaky to semi tabular cuttings habit; dull earthy to semi frosted to slight sparkling luster; smooth to predominately silty to semi gritty texture; visible beds of carbonaceous material; visible degassing in most of sample.

11210' Rollins Sandstone = White to light brownish gray to occasionally translucent; mostly quartz framework with 5-6% dark lithics visible in sample; very coarse to predominately fine grain to medium grain size; fair to well to very well sorted; sub-angular to sub round to round grains; moderate to high sphericity; few grains have a slight polish appearance; unconsolidated grains due to bit action; calcite cementation due to moderate reaction in dilute HCL; grain supported; no visible hydrocarbons in sample under fluoresces.

11360' Siltstone = Very light gray to light brownish gray to light greenish gray; crunchy to crumbly to semi brittle tenacity; irregular to slight hackly to semi planar fracturing; tabular to wedge-like cuttings habit; dull earthy to semi frosted to occasional waxy luster; silty to slight gritty texture; no other visible accessory minerals present in the sample.

11470' Carbonaceous Shale = Olive black to dark brownish black; moderately dense to very slightly tough tenacity; irregular to sub-planar to sub-blocky to earthy-hackly fracture; sub-tabular to sub-nodular to occasional wedge like cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly clayey to very slightly gritty texture; poor grade siltstone visible bedding with poor grade carbonaceous shale, very small amount of coal visibly degassing in sample; no accessory minerals present in sample.

11620' Sandstone = Off white to pale white to very light tan-brown to very light brownish gray with black and moderate brown hues; quartz dominate frame work; quartz cuttings range from smoky to occasional slightly translucent; consists mostly silicic cementation with very light to no effervescing; matrix contains 3 to 5% dark lithic fragments; mostly grain supported with few loose grains; medium-fine to medium-coarse grained; moderately fair to poor sorting; sub-angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone; accessory mineral pyrite present in sample.

11800' Siltstone = Very light gray to light brownish gray to light yellowish gray; crunchy to crumbly to semi brittle tenacity; grades into a medium to coarse grain sandstone; splintery to planar to predominately hackly fracturing;

cuttings tend to be platy to flaky to slightly tabular in habit; semi greasy to slight frosted to occasionally dull luster; silty to gritty to occasionally granular texture; no other visible bedding features.

11930' Carbonaceous Shale = Dark brownish gray to dark gray to olive gray; crunchy to crumbly to slight malleable tenacity; irregular to planar fracturing; cuttings tend to be platy to tabular to semi wedge-like in habit; waxy to semi frosted to dull earthy luster; gritty to silty to slight granular in texture; visible pyrite crystals throughout the sample; visible bands of carbonaceous material along bedding planes.

12050' Sandstone = Translucent to white to very light brownish gray; very coarse to coarse to predominately medium grain size; mostly quartz framework with 4-6% dark lithics visible in the sample; slight reaction in dilute HCL indicating calcitic dolomite cementation; grain supported; unconsolidated grains due to bit action; firm friable to moderate hard to hard; sub-angular to angular to sub-round grains; moderate to low to occasional high sphericity; grains have a slight frosted appearance; bands of kaolinitic sands visible in sample, no other distinguishable surface features present; no accessory minerals present in sample.

12230' Siltstone = Light gray to medium light gray to very light brownish gray; slightly dense to moderately tough tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly gritty to very slightly granular texture; poor grade sandstone visible grading with poor grade siltstone, poor grade sandstone visible bedding with poor grade carbonaceous shale, no other surface features present in sample; no accessory minerals present in sample.

12380' Sandstone = Translucent to white to very light gray; mostly quartz framework with 2-3% dark lithics visible in sample; coarse to medium to fine grain; fair to well to very well sorted; sub-angular to sub-round to predominately round grains.

TD FRU 197-33B5 ON 05/13/2010 @ 12445'

**Exxon Mobil
Freedom Ranch Unit 197-33B5**

Daily Activity Summary

**NOTE – Data for This Section Provided By Exxon Mobil, Baker Hughes,
Hemlerich & Payne, and Onsite Epoch Personnel**

- 4/16/2010** Skid from well B10 to B5. Conduct safety meeting on skidding rig. Skid from B10 to B5, skid top and bottom sections. Rig up riser turn buckles, flow line, mud line top and bottom. Service test lines and install well head with Camron. Conduct 30 minute hazard hunt. Conduct safety meeting on picking up directional tools. Pick up directional tools and stabilizer Monel Gyro tool telescope. Break circulation and drill from 150' to 190'. Surface test MWD and Gyro tool. Slide from 190' to 202'.
- 4/17/2010** Drill from 202' to 220'. Gyro pulse survey. Drill and slide from 220' to 252'. Take another Gyro pulse survey. Drill and slide from 252' to 591'. Pull out of hole from 591' to 130'. Rig service – 3 shots in upper bonnet seal, and drag chain inspection. Trip in hole from 130' to 591'. Remove trip nipple and install rotating head. Drill and slide from 591' to 2399'.
- 4/18/2010** Drill and slide from 2399' to 3161'. Rig service – 6 shots in upper bonnet seal. Drill and slide from 3161' to 3369'. Circulate sweep around and pump slug. Blow down back to pumps. Trip out of hole from 3369' to 766'. Trip out of hole to BHA. Lay down directional tools and Gyro tools. Break bit, pick up new motor telescope, and make bit scribe new motor.
- 4/19/2010** Drill and slide from 2399' 3161'. Rig service – 6 shots in upper bonnet seal. Drill and slide from 3161' to 3369'. Circulate sweep around and pump slug. Blow down back to pumps. Trip out of hole from 3369' to 766'. Trip out BHA, lay down directional tools, and Gyro tools. Break bit, pick up new motor telescope, and make bit scribe new motor.
- 4/20/2010** Drill and slide from 3710' to 3969'.
- 4/21/2010** Drill and slide from 3969' to 4015'. Take MWD survey, pump dry job, and trip out. Pick up scorpion and break out bit. Lay down motor, pick up new motor, bit, and orient motor and MWD. Service top drive, and inspect drag chain. Trip in hole from 106' to 3860'. Wash down from 3860' to 4015'. Drill and slide from 4015' to 4282'.
- 4/22/2010** Drill and slide from 4282' to 4530'. Take MWD survey at TD. Pump high viscosity sweep and circulate back to surface. Pump dry job and trip out to 752'. Lay down heavy weight drill pipe and drill collars. Lay down directional tools, pick up scorpion, break out bit, and lay down motor. Slip and cut drill line 88 feet. Remove bales and elevators. Rig up CRT and casing equipment. Service top drive – 6 shots in bonnet seal. Hold pre-job meeting, and pick up shoe track. Run 71 joints of 10.75" casing to 3212'.
- 4/23/2010** Install DV tool (did not make up), lay down DV tool and two joints. Pick up two joints and DV tool, pull trip nipple, and install stripping rubber. Run casing from 3212' to 4525', and circulate casing bottoms up. Rig down CRT, blow down top drive, and stand pipe. Install cement head. Pick up casing bales and elevators. Pre-job meeting with Halliburton for cementing. Rig up cement manifold and lines to cement head. Pressure test lines. Circulate casing through DV tool while waiting on cement. Pre-job safety meeting with Halliburton for cement job. Pump second stage cement, and rig down Halliburton. Pick up riser, cut casing, and remove rotating head. Weld on well head, and install casing valves. Set BOP stack on riser.
- 4/24/2010** Set BOP on, and nipple up to riser. Set on rotating head. Install choke line, tighten rotating head set screw, flow line flange. Install turnbuckles and accumulator lines. Function test BOP and install pollution pans. Install drilling bales and elevators, and calibrate blocks. Pick up test plug, set in well head, and rig up BOP tester. Conduct pre-job safety meeting with IPS tester. Test BOP. Pull test plug. Conduct man down drill. Set wear bushing. Conduct JSA on picking up BHA, and trip in to 1278'. Circulate and pressure test casing above DV tool at 1500 PSI for 15 minutes. Wash down from 1278' to 1306', tag DV tool at 1306', drill out DV tool from 1306' to 1309'. Trip in hole from 1309' to 4326', and circulate bottoms up at 4326'.
- 4/25/2010** Test casing at 1500 PSI for 30 minutes. Drill cement float, cement, shoe, and tag at 4408'. Drill 10 feet of new formation to 4540'. Circulate and even out mud weight. Conduct formation integrity test at 4530' (4370' TVD). Drill from 4540' to 4902'. Service top drive – 9 shots in bonnet seal, 2 shots in wash pipe, and inspect drag chain. Drill from 4902' to 6310'.

- 4/26/2010** Drill from 6310' to 7090' and take teledrift survey at 7015' (1 degree). Service top drive – 7 shots in bonnet seal, and 2 shots in wash pipe. Drill from 7090' to 7223'. Circulate high viscosity sweep around before entering the Ohio Creek Formation. Continue drilling ahead from 7223' to 7570'. Take teledrift survey at 7570' (1 degree), and continue to drill ahead from 7570' to 8200'.
- 4/27/2010** Drill ahead from 8200' to 8712'. Service top drive – 3 shots in bonnet seal, and 2 shots in wash pipe. Continue to drill ahead from 8712' to 9620'.
- 4/28/2010** Drill ahead from 9620' to 10045'. Service top drive – 8 shots in bonnet seal, 2 shots in wash pipe, and inspect drag chain. Continue to drill ahead from 10045' to 10675'.
- 4/29/2010** Drill ahead from 10675' to 10904'. Pump high viscosity sweep and continue to drill ahead from 10904' to 10999'. Service top drive – 7 shots in bonnet seal, and 2 shots in wash pipe. Drill ahead from 10999' to 11010'. Circulate and condition mud, weight up to 9.7, pump high viscosity sweep, and rack back 2 stands. Hold JSA on back reaming out of hole. Back ream from 10810' to 9938'. Circulate bottoms up and pump high viscosity sweep at 9938'. Work tight hole from 9864' to 9840'.
- 4/30/2010** Work tight hole from 9853', and attempt to use the positive displacement method from 9853'. Back ream out to 5855', and pull on elevators from 5855' to 4902'. Trip out of hole from 4902' to 4520'. Circulate bottoms up at shoe, rack back 2 stands, and pull rotating rubber. Hold JSA with Halliburton on picking up packer. Service top drive. Circulate and spot 60 barrels pill. Pick up and set packer. Pull wear bushing and set test plug. Change upper pipe rams on BOP. Conduct JSA on pressure testing BOP. Pressure test upper pipe rams, and rig down tester. Pull test plug and install wear bushing. Run in hole to retrieve packer. Circulate through packer to get bottoms up, and circulate through choke.
- 5/01/2010** Circulate bottoms up through choke. Hold safety meeting, open annular, monitor well on trip tanks. Break out and lay down RTTS packer. Pump dry job. Monitor well on trip tanks. No gain or loss. Trip out from 4233' to 744', pick up scorpion, and break out tight stand of heavy weight drill pipe. Pick up and install rotating head. Trip back to 4516', circulate at 4520', and increase mud weight from 9.9 to 10.2.
- 5/02/2010** Conduct safety meeting, wash and ream in the hole from 4503' to 5388'. Pump 100 barrel high viscosity sweep and circulate to surface. Wash and ream from 5388' to 5959'. Service top drive – 6 shots in bonnet seal, 2 shots in wash pipe, and inspect drag chain. Wash and ream from 5959' to 7010'.
- 5/03/2010** Wash and ream from 7010' to 7053'. Rack back stand, and back ream out to 7106'. Pump 2 high viscosity sweeps. Continue to wash and ream from 7106' to 7165', while working tight hole from 7165' to 7141'. Wash and ream from 7095' to 8280'. Service top drive – 8 shots in bonnet seal.
- 5/04/2010** Wash and ream from 8280' to 8466', and circulate out gas. Wash and ream from 8466' to 8911'. Service top drive – shots in bonnet seal, 2 shots in wash pipe, and inspect drag chain. Wash and ream from 8911' to 9254', while working tight hole from 9254' to 8860' to regain circulation at 8860'. After regaining circulation at 8860', circulate bottoms up and pump 80 barrel high viscosity sweep. Continue to wash and ream from 8860' to 9577', and pump another 80 barrel high viscosity sweep.
- 5/05/2010** Wash and ream from 9577' to 10150', and pump sweep around every stand. Rig service – shots in bonnet seal. Continue to wash and ream from 10150' to 11010'. Drill from 11010' to 11057'.
- 5/06/2010** Drill from 11057' to 11086'. Pump high viscosity sweep around and circulate bottoms up to relax the well. Trip out of hole using positive displacement method from 11005' to 10780', while working tight hole from 10780' to 10247'. Pull out of hole from 10247' to 4435' while using PDM. Circulate bottoms up, and slip and cut 112' of drill line. Pump 80 barrel pill, and continue to pull out of hole from 4435' to 3386'. Conduct rig service.

- 5/07/2010** Trip out of hole from 3386' to 800'. Trip out BHA and heavy weight drill pipe. Lay down collars and remove wear bushing. Run stand of heavy weight drill pipe in hole, rig up test plug and testers. Test BOP's. Rig down tester stand and back heavy weight drill pipe. Install wear bushing, pick up new BHA, and trip in hole from 893' to 4518'. Circulate bottoms up, and continue to trip in from 4518' to 7960'. Wash and ream from 7960' to 8328'.
- 5/08/2010** Wash and ream from 8328' to 11087', and circulate hole clean. Drill from 11087' to 11211', while working tight hole from 11187' to 11076'. Worked free, wash and ream to bottom from 11076' to 11097'. Wash and ream from 11097' to 11202', and work stuck pipe at 11202'. Post jarring inspection. Work stuck pipe at 11202', and conduct post jarring inspection. Continue to work stuck pipe at 11202'.
- 5/09/2010** Work stuck pipe. Service rig – derrick inspection, and top drive inspection. Conduct safety meeting with free point wire line. Rig up free point truck, run tool, and rig down. Work tight hole and worked free. Regain circulation from 11203' to 11045'. Circulate bottoms up and pump high viscosity sweep around. Continue to sweep out hole, and circulate bottoms up. Pump and spot heavy pill. Pull out of hole from 11086' to 4452', and circulate bottoms up. Pump and spot heavy pill, and pull out of hole from 4452'.
- 5/10/2010** Brake off bit and near bit, and replace with new. Trip in hole with BHA while inspecting all drill collars, heavy weight drill collars with Magna Sonic. Trip in hole from 893' to 4518', on trip tanks. Circulate bottoms up. Cut and slip 85' of drill line. Rig service – change hydraulic and gear oil in top drive. Trip in hole from 4518' to 10521'. Pump 50 barrel high viscosity sweep, and work pipe from 10521' to 10616'. Wash and ream from 10616' to 11087', pump a high viscosity sweep, and circulate.
- 5/11/2010** Wash and ream from 11087' to 11211', and pump around high viscosity sweep. Drill from 11211' to 11375'. Rig service – 4 shots in bonnet seal. Drill from 11375' to 11806'.
- 5/12/2010** Drill from 11803' to 12202'. Rig service – shot in bonnet seal. Drill from 12202' to 12413'.
- 5/13/2010** Drill from 12413' to 12445', and circulate sweep around. Conduct rescue heights practice drill. Trip out of hole while wash and ream from 12380' to 10951'. Circulate bottoms up at transition zone. Spot 130 barrels of 12.0 pounds per gallon mud. Wash and ream from 10964' to 9818'. Pull out of hole from 9818' to 4516'. Circulate bottoms up, and spot 80 barrels of 13.0 mud. Pull out hole from 4516'.
- 5/14/2010** Trip out and lay down BHA, stabilizers, collar, near bit, and break bit. Remove wear bushing, rig down rig bails and elevators. Conduct safety meeting on casing. Begin running casing to 4429'. Circulate bottoms up at shoe, and continue to run casing from 4429' to 10909'. Circulate bottoms up.
- 5/15/2010** Circulate bottoms up to circulate out gas. Run casing from 10909' to 11675', and circulate bottoms up. Run casing from 11675' to 12361', wash and ream from 12361' to 12445'. Circulate bottoms up, rig down CRT, and rig up cementers. Pump 50 barrels of poly flake. Pressure test cement lines, and pump cement. Rig down cement. Wait on cement.

**Exxon Mobil
Freedom Ranch Unit 197-33B5**

Survey Data and Plots

EXXONMOBIL



PICEANCE CREEK, COLORADO

SURVEY SUMMARY

Freedom Ranch Unit 197-33B5

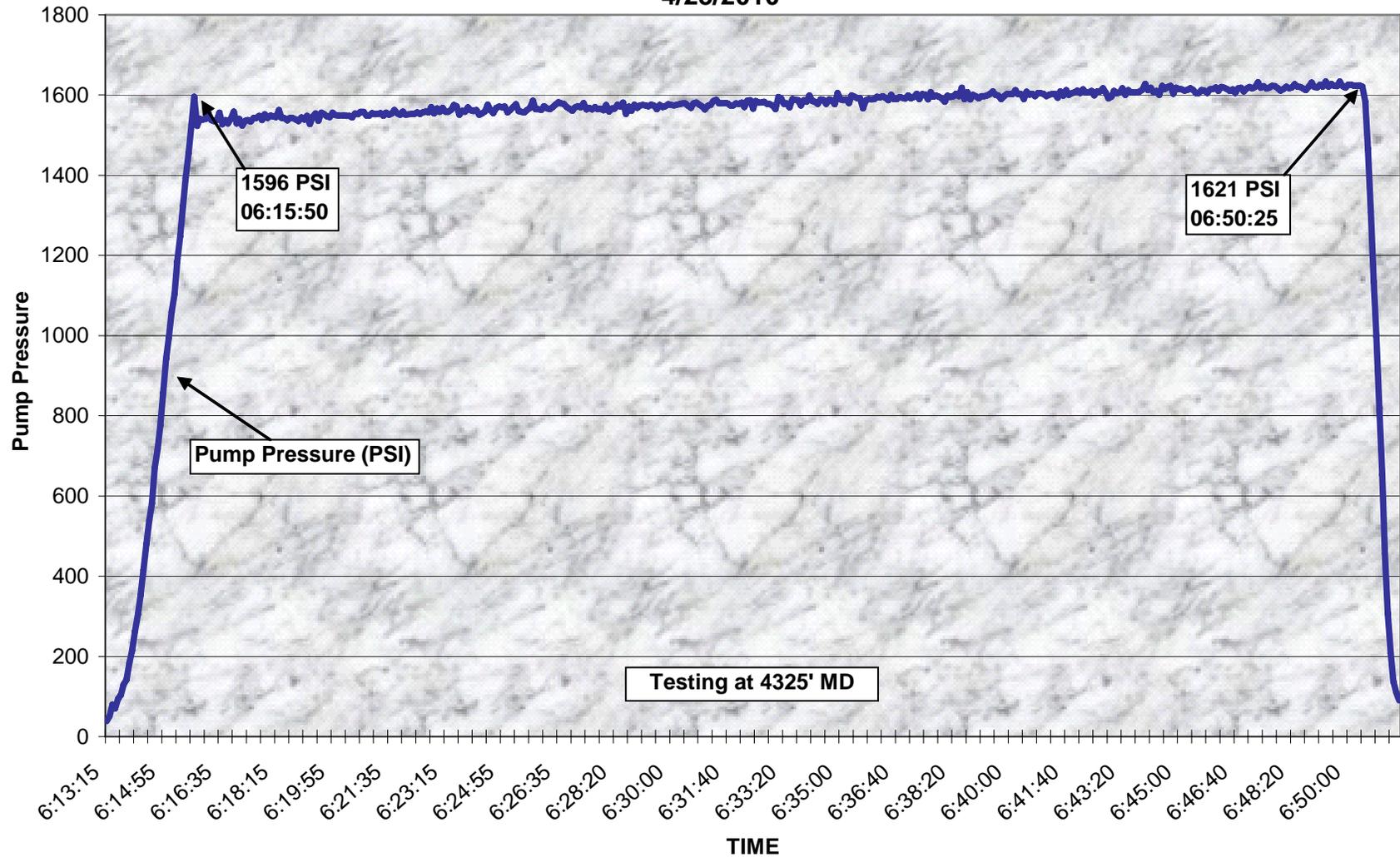
MEASURED DEPTH	INCL	AZIMUTH	TVD	VERTICAL SECTION	COORDINATES		DOGLEG SEVERITY
					N/S	E/W	
0	0	0	0	0	0	0	0
30	0	0	30	0	0	0	0
138	0.275	348.5555	137.9996	-0.24456	0.25403	-0.05143	0.25463
168	0.5555	342.819	167.9988	-0.45385	0.46353	-0.10867	0.94405
198	0.3135	329.1075	197.9979	-0.67727	0.6729	-0.19377	0.87235
227	0.2585	211.7705	226.9977	-0.72645	0.68536	-0.26895	1.68766
257	0.7425	174.563	256.9965	-0.51958	0.43432	-0.28616	1.86307
318	2.1725	170.152	317.9752	0.91759	-1.09839	-0.05095	2.34973
381	3.4485	166.797	380.8982	3.83932	-4.11971	0.58608	2.0413
444	4.763	164.729	443.7352	8.16616	-8.48781	1.7078	2.09936
542	7.403	164.311	541.1748	18.18427	-18.4929	4.4872	2.69424
632	9.2125	162.8975	630.2267	30.78355	-30.9619	8.17409	2.02317
722	11.2915	161.0715	718.7852	46.40856	-46.1839	13.15151	2.33777
819	13.2165	158.327	813.5715	66.65338	-65.4734	20.32786	2.07286
915	14.806	154.246	906.7147	89.71048	-86.7216	29.71139	1.94859
1011	16.0655	149.6205	999.2536	115.2146	-109.231	41.75984	1.83367
1106	17.457	151.9965	1090.216	142.5937	-133.153	55.09891	1.6324
1202	18.8375	152.2605	1181.439	172.4544	-159.586	69.07434	1.44056
1296	19.2665	151.221	1270.29	203.1077	-186.61	83.60415	0.58187
1358	19.15246	150.1254	1328.838	223.4997	-204.395	93.59468	0.60983
1454	19.05621	149.6267	1419.551	254.9171	-231.571	109.363	0.19737
1550	19.54597	149.1304	1510.155	286.6477	-258.876	125.5269	0.53802
1646	19.66974	148.6918	1600.588	318.8628	-286.464	142.1623	0.20032
1742	19.61007	148.0961	1691.003	351.1254	-313.944	159.0719	0.21763
1837	19.67202	148.0931	1780.476	383.0512	-341.052	175.9485	0.06521
1933	19.7808	148.1334	1870.842	415.4479	-368.565	193.065	0.1142
2028	19.64435	147.8176	1960.275	447.4839	-395.732	210.0569	0.18221
2124	19.49913	147.1406	2050.728	479.6273	-422.848	227.3448	0.28051
2219	19.22907	146.3143	2140.354	511.096	-449.184	244.6243	0.40494
2315	18.53737	144.2467	2231.188	542.0878	-474.723	262.3092	1.0024
2409	18.31658	145.0579	2320.369	571.7056	-498.957	279.4999	0.35997
2506	18.16505	145.6728	2412.494	601.9986	-523.938	296.7562	0.25254
2601	19.0357	147.6777	2502.532	632.2664	-549.26	313.391	1.13699
2695	19.40525	147.9952	2591.292	663.2024	-575.457	329.8635	0.40857
2790	19.68922	147.9317	2680.817	694.9802	-602.401	346.7245	0.29975
2885	20.17936	147.7431	2770.125	727.3601	-629.82	363.9667	0.52035
2980	20.24539	147.5167	2859.275	760.17	-657.542	381.5395	0.10775
3075	20.20307	147.8385	2948.417	792.999	-685.294	399.099	0.12528
3171	19.72787	147.1955	3038.648	825.7636	-712.946	416.7012	0.54527

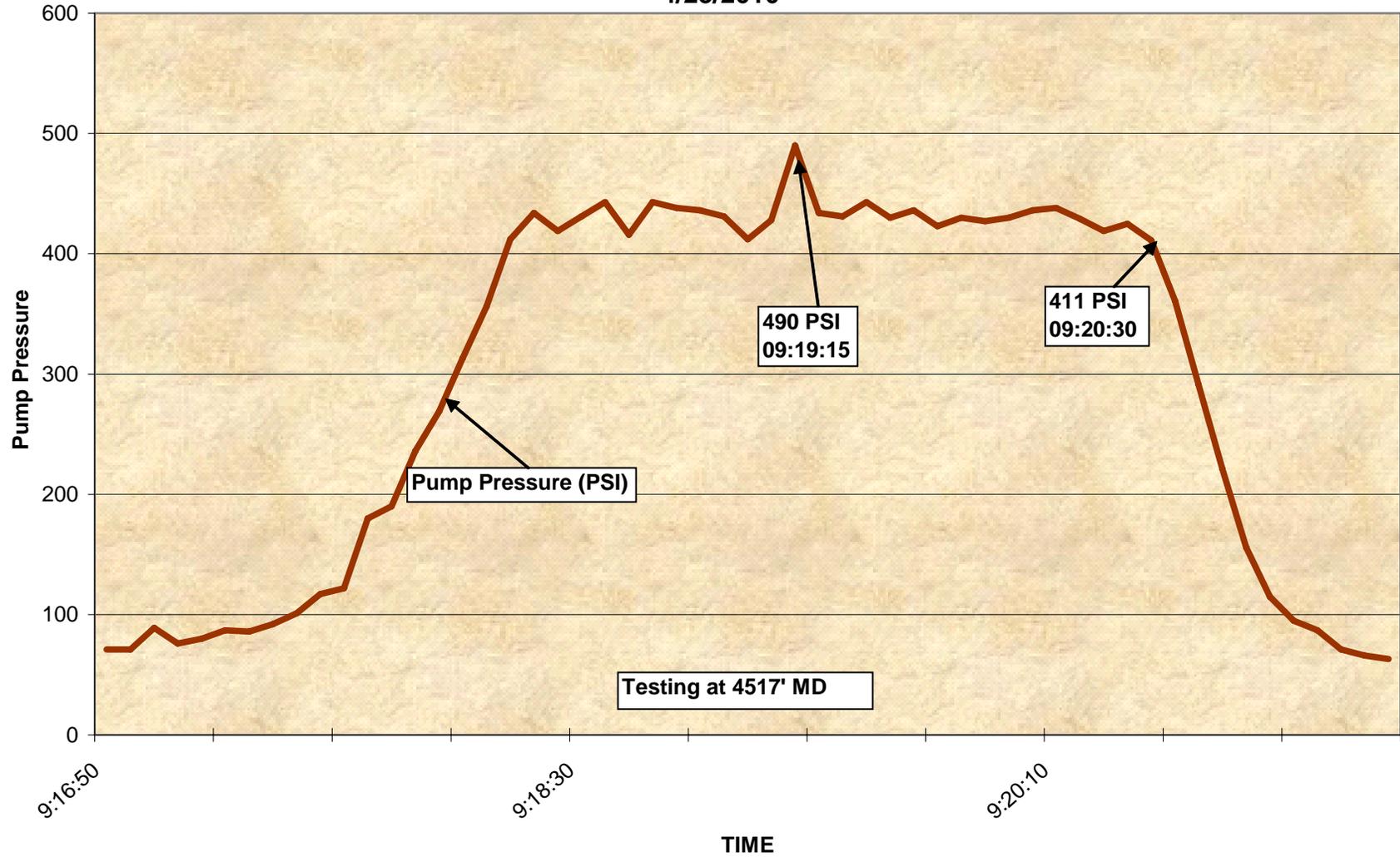
Note: All survey data provided by Schlumberger

**Exxon Mobil
Freedom Ranch Unit 197-33B5
Pressure Tests**



ExxonMobil FRU197-33B5
30 Min. 10.75" CPT 4325' MD
4/25/2010





Exxon Mobil
Freedom Ranch Unit 197-33B5
Drilling Fluid Reports

FREEDOM RANCH UNIT FRU 197-33B5

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	4/24/2010	4/25/2010	4/26/2010	4/27/2010	4/28/2010	4/29/2010	4/30/2010
Sample Temperature (deg F)	90	105	105	105	110	115	NA
Sample Depth	4530	4981	7090	NA	10140	10960	11013
Mud Weight (lb/gal)	9.2	9.2	8.9	9.4	9.35	9.4	9.65
FV (sec/quart)	47	57	53	50	57	60	43
PV(cP)	8	11	11	10	17	19	12
YP (lb/100 ft2)	14	19	27	29	27	23	17
Gels (10 sec lb/100ft2)	5	8	8	8	10	9	8
Gels (10 min lb/100ft2)	10	30	30	25	15	12	10
Gels (10 30 min lb/100ft2)	15	44	40	35	22	15	12
API FL (cc/30 min)	10.0	9.6	8.8	9.6	7.2	7.2	8.0
Cake (API)	2	2	2	2	1	1	1
pH	9.7	9.7	9.7	9.4	9.9	9.4	9.1
PM	2.00	2.0	1.0	1.20	1.55	0.85	0.55
Pf	0.10	0.15	0.20	0.20	0.10	0.05	0.05
MF	0.90	1.50	1.20	1.00	0.80	1.25	0.80
Excess Lime (lb/bbl)	0.50	0.48	0.21	0.26	0.38	0.21	0.13
Hardness (mg/l)	20	20	20	20	20	20	20
Chlorides (mg/l)	1000	1000	900	900	1000	1000	900
MBT (lb/bbl)	25.0	25.0	20.0	17.5	17.5	20.0	15.0
Retort Water (%)	93.3	93.5	95.6	93.0	93.0	92.5	94.0
Sand (%)	0.25	0.20	0.10	0.10	0.40	0.40	0.10
Corrected Solids (%)	6.4	6.2	4.1	6.7	6.2	6.7	5.7

FREEDOM RANCH UNIT FRU 197-33B5
WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	5/1/2010	5/2/2010	5/3/2010	5/4/2010	5/6/2010	5/7/2010	5/8/2010
Sample Temperature (deg F)	NA	90	90	90	95	120	90
Sample Depth	11013	11013	11013	11013'	11013'	11031'	11086
Mud Weight (lb/gal)	9.75	10.0	9.7	9.7	9.8	9.7	9.9
FV (sec/quart)	47	52	59	48	53	51	55
20PV(cP)	13	15	18	12	9	13	15
YP (lb/100 ft2)	17	23	27	20	36	33	28
Gels (10 sec lb/100ft2)	8	9	10	10	13	9	10
Gels (10 min lb/100ft2)	10	13	14	15	16	12	16
Gels (10 30 min lb/100ft2)	12	15	17	18	22	16	21
API FL (cc/30 min)	7.6	8.2	8.4	8.2	7.2	6.8	6.4
Cake (API)	1	1	1	1	2	1	1
pH	9.3	9.2	9.1	9.5	10.20	10.50	10.4
PM	0.55	0.70	0.60	0.95	0.75	1.00	0.95
Pf	0.05	0.05	NA	0.05	0.10	0.10	0.10
MF	1.00	1.00	0.70	0.95	0.90	1.20	0.95
Excess Lime (lb/bbl)	0.13	0.17	0.16	0.23	0.17	0.24	0.22
Hardness (mg/l)	20	20	20	20	20	20	20
Chlorides (mg/l)	900	900	1200	1100	1200	1200	700
MBT (lb/bbl)	15.0	17.5	17.5	17.5	17.5	17.5	17.5
Retort Water (%)	93.0	92.0	92.5	93.0	92.8	93.3	93.0
Sand (%)	0.10	0.20	0.30	0.10	0.25	0.20	0.30
Corrected Solids (%)	6.7	7.7	7.2	6.7	6.9	6.4	6.7

FREEDOM RANCH UNIT FRU 197-33B5

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	5/9/2010	5/10/2010	5/11/2010	5/12/2010	5/13/2010	5/14/2010	5/15/2010
Sample Temperature (deg F)	100	105	90	100	110	NA	NA
Sample Depth	11165	11211	11211	11381	12186	12445	12445
Mud Weight (lb/gal)	9.7	9.7	9.7	9.7	9.7	9.75	9.75
FV (sec/quart)	55	48	53	53	59	59	55
PV(cP)	17	17	12	10	22	17	18
YP (lb/100 ft ²)	27	18	34	35	29	23	25
Gels (10 sec lb/100ft ²)	10	6	9	10	10	11	9
Gels (10 min lb/100ft ²)	15	10	15	16	17	13	13
Gels (10 30 min lb/100ft ²)	18	14	19	20	28	15	16
API FL (cc/30 min)	6.4	8.0	6.8	6.4	8.0	7.8	8.0
Cake (API)	1	2	1	1	2	1	1
pH	10.0	7.8	9.5	9.7	9.7	9.9	9.7
PM	1.00	0.55	0.70	1.00	0.85	0.80	0.75
Pf	0.15	NA	0.05	0.15	0.05	0.05	0.05
MF	1.30	2.00	1.60	1.00	0.75	0.85	0.80
Excess Lime (lb/bbl)	0.22	0.14	0.17	0.22	0.21	0.20	0.18
Hardness (mg/l)	20	NA	20	20	20	20	20
Chlorides (mg/l)	800	800	800	800	1100	100	1100
MBT (lb/bbl)	20.0	17.5	17.5	20.0	22.5	20.0	20.0
Retort Water (%)	92.0	92.0	92.0	92.0	91.5	91.0	92.0
Sand (%)	0.20	0.25	0.25	0.20	0.60	0.60	0.50
Corrected Solids (%)	7.2	7.2	7.2	7.0	7.2	7.7	7.2

Exxon Mobil
Freedom Ranch Unit 197-33B5

Bit History

Exxon Mobil
Freedom Ranch Unit 197-33B5

Losses and Gas Buster Data

