



Well History

Freedom Ranch Unit FRU 197-33B10
API: 051031142300
Rio Blanco County, Colorado

EPOCH Well Services, Inc.
New Iberia, Louisiana

ExxonMobil
Development

CANRIG

Well History

Exxon Mobil Production Company

**Freedom Ranch Unit FRU 197-33B10
Rio Blanco County, Colorado**



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General Overview and Geology Exxon Mobil Production Company

**Freedom Ranch Unit FRU 197-33B10
Rio Blanco County, Colorado**



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 197-33B9 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 39.921283000" N
- Longitude 108.282576000" W

The well was spudded on April 13, 2010. Drilling operations were conducted from spud through to a total depth of 12,667' (MD) on August 15, 2010. Drilling operations were conducted by Helmerich & Payne using a Flex 4 rig (#321). Canrig personnel logged and collected samples starting at 4,124' through to 12,300' 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 4,114 feet;
- 4.5-inch casing at 12,657 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 197-33B10 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 197-33B10 Formation Tops

Formation/Member Name	Stratigraphic Unit Top	Depth (MD/TVD)
Wasatch Formation		
Wasatch "G"		5,724' / 5,348'
Wasatch "I"		6,023' / 5,644'
Ohio Creek Formation		
	950 Abandonment Surface (AS)	7,458' / 7,079'
Williams Fork Formation		
WF 850	900 Sequence Boundary (SB)	7,744' / 7,365'
WF 800	850 Abandonment Surface (AS)	7,974' / 7,595'
WF 700	800 Sequence Boundary (SB)	8,182' / 7,803'
WF 600	690 Abandonment Surface (AS)	8,373' / 7,994'
WF 500	600 Sequence Boundary (SB)	8,632' / 8,253'
WF 400	490 Abandonment Surface (AS)	9,147' / 8,768'
WF 300	400 Sequence Boundary (SB)	9,864' / 9,485'
WF 200	290 Abandonment Surface (AS)	10,912' / 10,533'
Cameo	210 Sequence Boundary (SB)	11,244' / 10,865'
Iles Formation		
Rollins Member	200 Sequence Boundary (SB)	11,485' / 11,106'
Trans Cozzette		11,692' / 11,313'
Cozzette Member	180 Flooding Surface (FS)	11,739' / 11,360'
Corcoran Coastal Plain	140 Flooding Surface (FS)	12,042' / 11,663'
Corcoran Marine	140 Sequence Boundary (SB)	12,650' / 12,271'

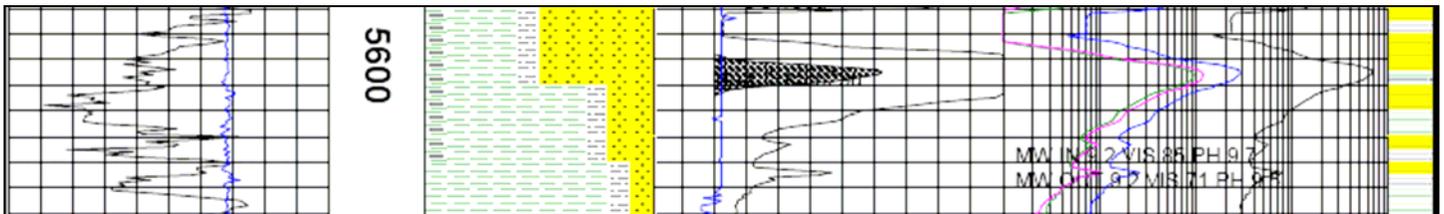
Upper Wasatch Formation

The Upper Wasatch Formation was encountered from the point of drilling out from surface casing (4,124' 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	191.184	1380.495	623.458
Minimum	18.901	0.000	4.036
Mean	104.160	422.145	17.715
Standard Deviation	26.123	288.403	43.225

The only significant gas show in the Upper Wasatch appeared at 5,603' in association with a thick sandstone body interbedded with siltstone, shale, and carbonaceous shale beds. This gas show produced a maximum gas of 623 units.



Chromatography through the Upper Wasatch only showed C-1 throughout the drilled interval with C-2, C-3, and C-4 being observed during the high gas shows throughout the interval.

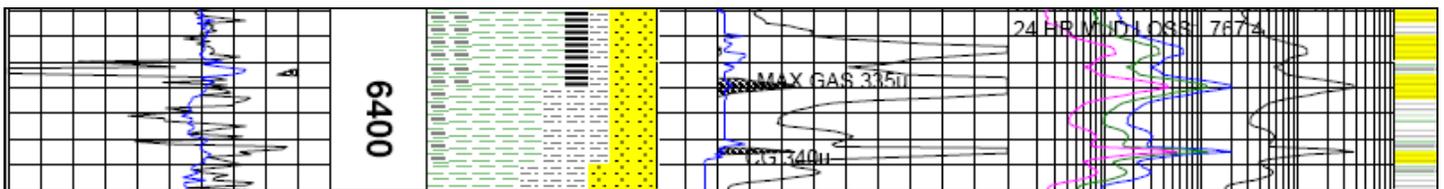
Lower Wasatch Formation

The lower Wasatch Formation is assigned from the occurrence of the top of the Wasatch "G" (5,724' MD /5,348' TVD) through to the top of the Ohio Creek Formation (7,458' MD / 7,079' 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, clay-stone.

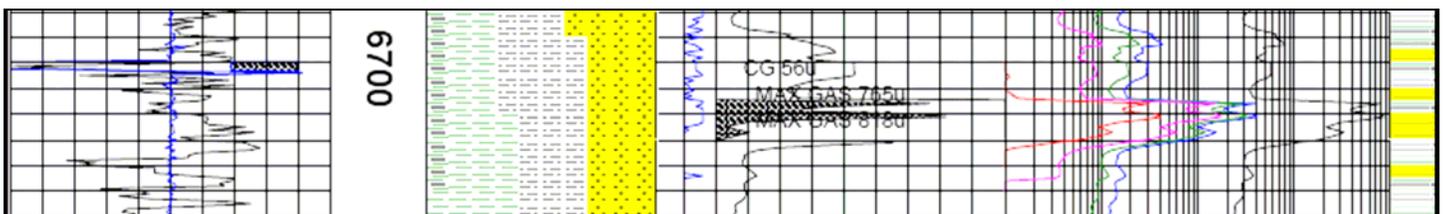
Lower Wasatch Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	331.034	8847.834	1116.791
Minimum	7.931	0.000	6.825
Mean	93.283	497.581	68.400
Standard Deviation	30.964	507.446	129.419

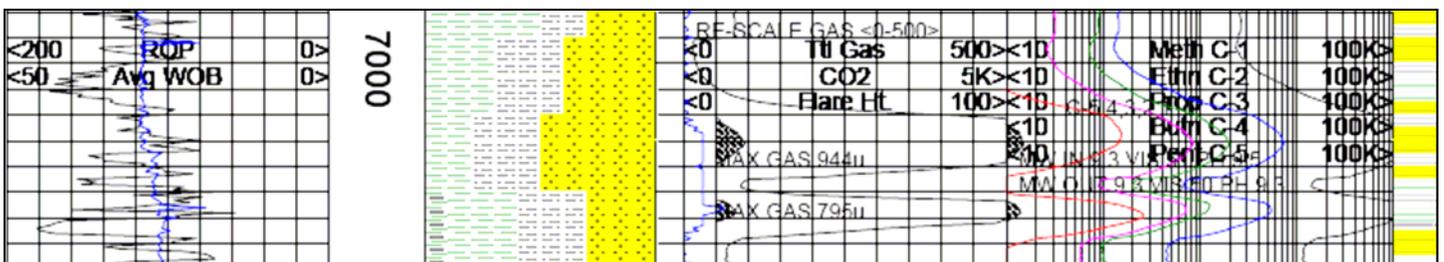
The first significant gas show of the Wasatch G formation occurred at 6,390' with a maximum gas of 335 units. It was associated with interbedded sandstone, siltstone, shale, carbonaceous shale, and coal layers.



The next significant gas show occurred at 6,715' and 6721' with a maximum gas show of 765 and 818 units respectively. It was associated with interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



The last significant gas shows of the Lower Wasatch occurred at 7,031' and 7058' with a maximum gas shows of 944 and 795 units respectively. It was associated with interbedded layers of sandstone, siltstone and shale.



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

Ohio Creek Formation/950 Abandonment Surface

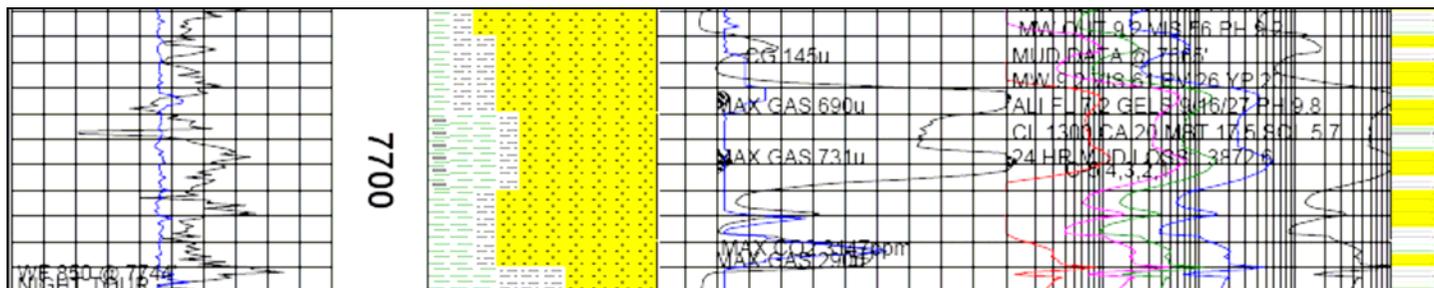
As noted above, the Ohio Creek Formation top was encountered at (7,458' MD / 7,079' TVD). The Ohio Creek Formation is generally considered to mark the boundary between the Tertiary Wasatch Formation and the Cretaceous Mesa Verde Group. It is interpreted as an erosion surface and consists of slightly 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	158.089	3147.320	1540.886
Minimum	21.567	347.068	12.620
Mean	72.609	918.565	163.245
Standard Deviation	22.193	504.007	257.812

The only significant gas shows of the Ohio Creek formation occurred at 7,674' and 7,698' with a maximum gas of 690 and 731 units, respectively. It was associated with a large sandstone body with interbedded siltstone, shale, and carbonaceous shale layers.



Chromatography through the Ohio Creek included C-1 through C-3, with C-4 and C-5 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 (7,744' MD / 7,365' 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:

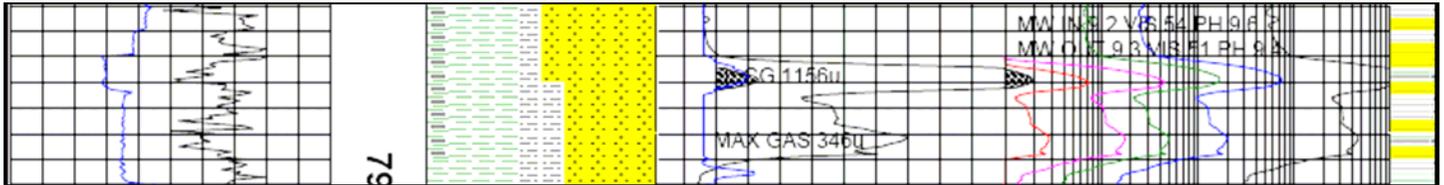
- Fine grained to very fine grained;
- Grain supported with carbonate-clay matrix;
- Surrounded to sub angular, clear to translucent quartz with moderate sphericity overall;
- Occasionally to commonly kaolinitic;
- Occasional dis-aggregation to loose sand grains in the sample tray.

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	119.193	3464.016	2166.349
Minimum	30.828	297.064	17.154
Mean	71.654	857.839	215.332
Standard Deviation	18.894	461.008	340.989

The only significant gas show of the Williams Fork 850 occurred at 7,881', with a maximum gas show of 346 units. It was associated with a large sandstone body and interbedded layers of siltstone, shale, and carbonaceous shale.



Chromatography through the Williams Fork 850 Formation included C-1 through C-3 being observed throughout the drilled interval, with C-4 and C-5 appearing during the high gas shows.

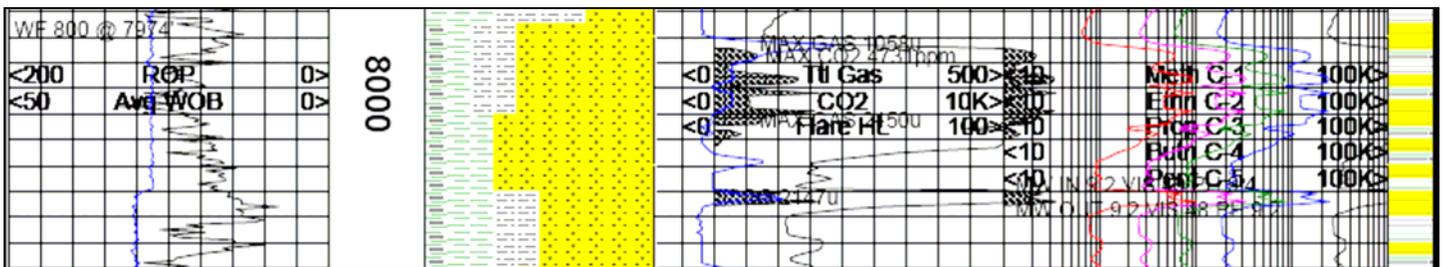
850 Abandonment Surface/Williams Fork 800

The 850 AS, which marks the top of the Williams Fork 800 was encountered at a depth of (7,974' MD / 7,595' TVD). A sandstone unit marks the upper contact. Relevant statistics for the WF 800 are listed below:

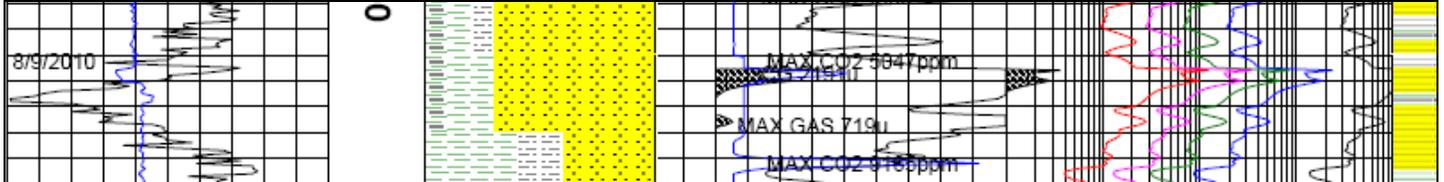
Williams Fork 800 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	197.770	9164.529	2190.824
Minimum	31.402	430.409	95.928
Mean	87.092	1622.744	478.406
Standard Deviation	28.160	1047.215	460.949

The first significant gas shows from the Williams Fork 700 recorded at 7,987' and 8,009' reaching 1058 and 2150 units, respectively. It was produced from a large sandstone body with interbedded siltstone, shale, and carbonaceous shale beds.



The last significant gas show occurred at 8,156 reaching 719 units. It was produced by a large sandstone body interbedded with shale, and carbonaceous shale beds.



Chromatography through the Williams Fork 800 Formation included C-1 through C-5 occurring at high gas peaks.

800 Sequence Boundary/Williams Fork 700

The 800 SB was encountered at (8,182' MD / 7,803' 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:

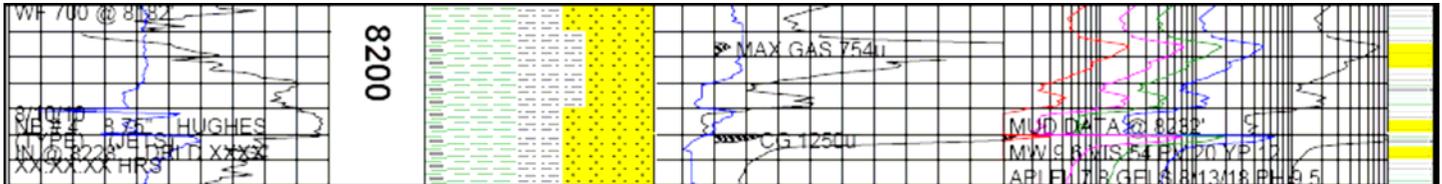
- Dark brown to dark gray color;
- Soft to slightly firm;
- Dull, earthy luster with occasional waxy zones;
- Occasionally silty zones.

Data for the WF 700 are summarized as follows:

Williams Fork 700 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	154.308	4414.101	1548.179
Minimum	4.019	31.270	30.075
Mean	70.526	987.148	204.515
Standard Deviation	27.449	644.868	267.225

The only significant gas show of the Williams Fork 700 formation occurred at 8,196', which peaked at 754 units. The formation was composed of interbedded layers of sandstone, siltstone, shale, and carbonaceous shale.



Chromatography through the Williams Fork 700 Formation included C-1 through C-4 being observed throughout the drilled interval with C-5 occurring at connection gas peaks.

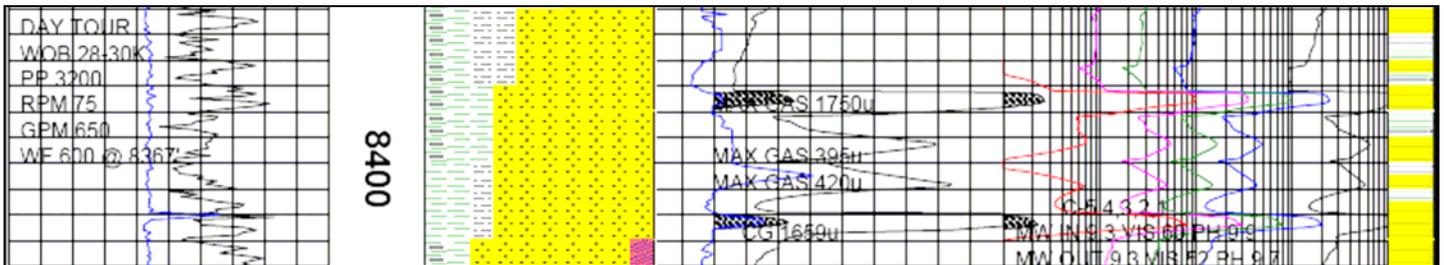
690 Abandonment Surface/Williams Fork 600

The 690 AS, marking the top of the Williams Fork 600 Member was encountered at (8,373' MD/ 7,994' 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:

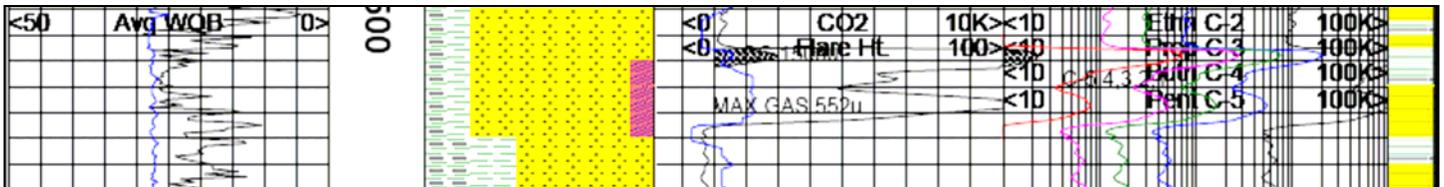
Williams Fork 600 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	124.01	12731.52	1749.64
Minimum	17.72	31.27	29.42
Mean	72.94	1490.31	230.88
Standard Deviation	20.48	1158.75	350.86

The first and most significant gas show in the Williams Fork 600 was at 1750 units occurring at 8,375'. It is associated with a large sandstone body with interbedded layers of shale and carbonaceous shale.



The last significant gas show occurred at 8,588', producing a gas of 552 units. It was associated with a large sandstone body with interbedded layers of shale and carbonaceous shale.



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

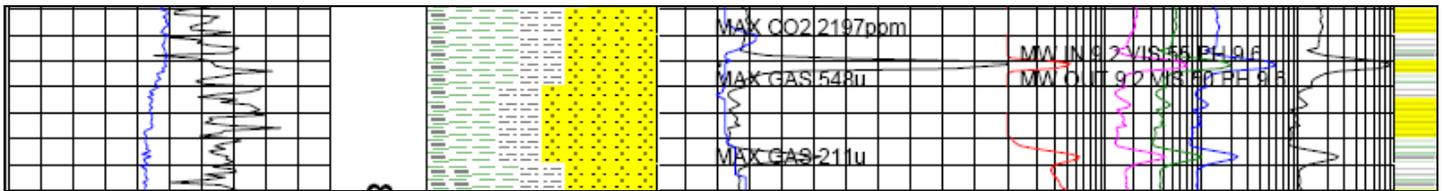
600 Sequence Boundary/Williams Fork 500

The 600 SB occurred at a depth of (8,632' MD / 8,253' 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	138.000	16765.215	1569.800
Minimum	25.992	297.064	30.132
Mean	67.723	1540.088	173.104
Standard Deviation	18.503	1277.319	285.233

The only significant gas shows in the Williams Fork 500 occurred at 8,842' with maximum gas of 548 units. The gas show was associated with interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



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

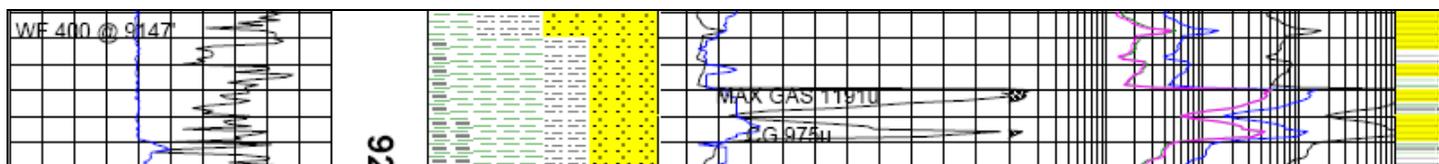
490 Abandonment Surface/ Williams Fork 400

The 490 Abandonment Surface was encountered (9,147' MD / 8,768' 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:

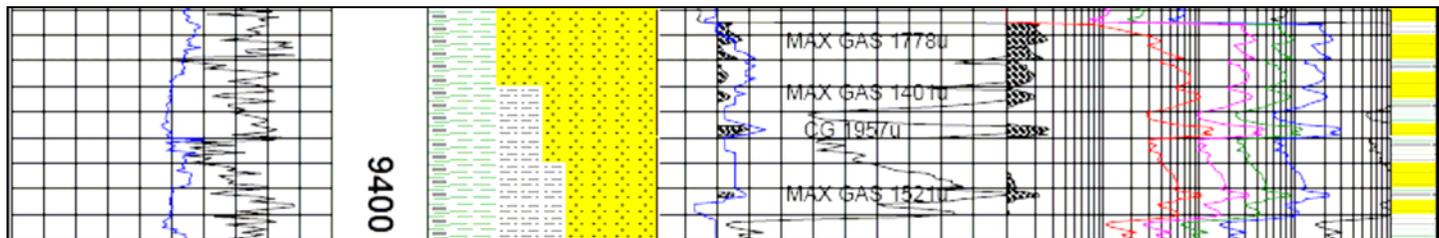
Williams Fork 400 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	115.603	15581.774	2250.473
Minimum	15.311	297.064	15.447
Mean	53.032	1375.662	346.268
Standard Deviation	19.198	840.400	453.865

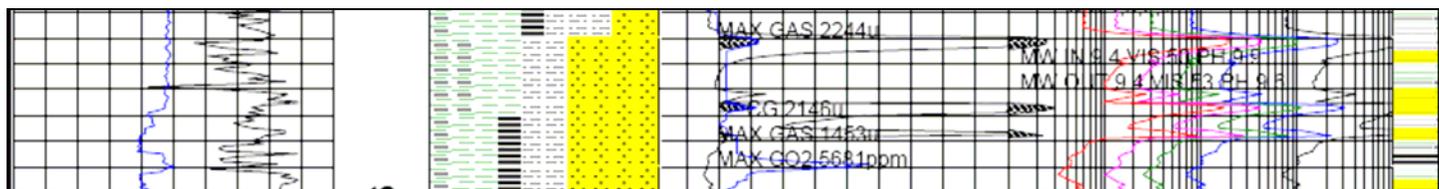
The William Fork 400 formation produced many high gas peaks through out the formation. Listed below are the most significant gas peaks for this formation. The first significant shows from the Williams Fork 400 produced from interbedded layers of sandstone, shale, siltstone, and carbonaceous shale. This gas produced 1191 units, at 9,172'.



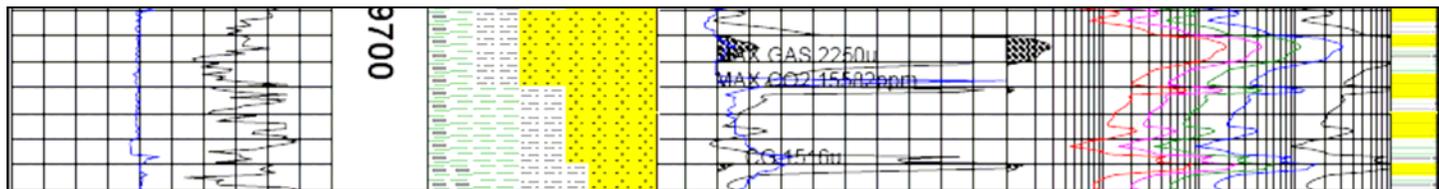
The next significant gas shows from the Williams Fork 400 was observed at 9,342', 9,365', and 9,402', and peaked at 1778, 1401, and 1521 units, respectively. This show correlates with interbedded sandstone, siltstone, shale, and carbonaceous shale.



Another significant gas show was observed at 9,632' and 9,668', and peaked at 2244 and 1453 units, respectively. This show correlates with interbedded sandstone, siltstone, shale, carbonaceous shale, and coal beds.



The final and most significant high gas recorded in the Williams Fork 400 was recorded at 9,703' with a maximum gas of 2250 units. It was produced from interbedded layers of sandstone, siltstone, shale, and carbonaceous shale.



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

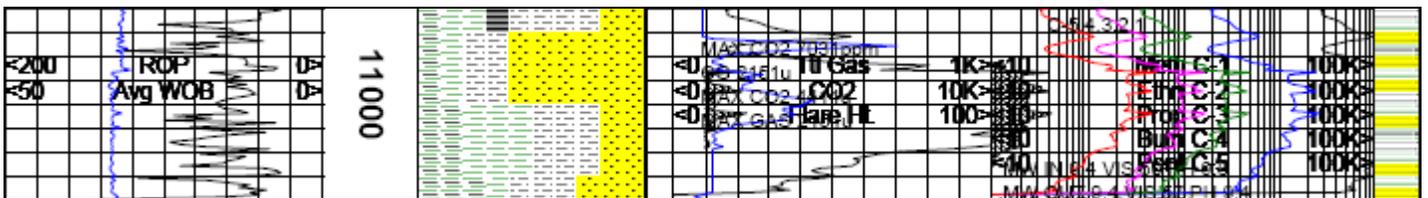
290 Abandonment Surface/ Williams Fork 200

The 290 AS occurred at a depth of (10,912' MD / 10,533' 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:

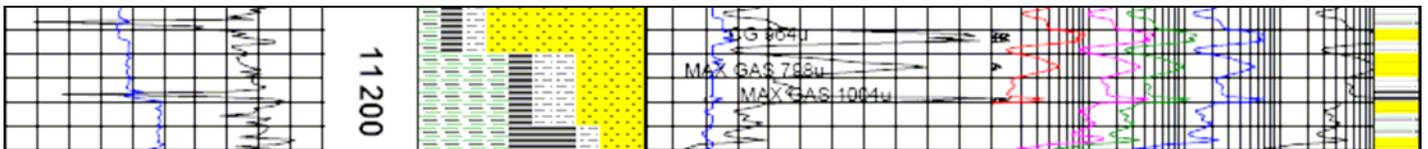
Williams Fork 200 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	181.552	7031.004	2304.715
Minimum	14.930	663.763	37.758
Mean	60.427	1560.346	426.702
Standard Deviation	29.402	701.931	379.251

The Williams Fork 200 formation produced two high gas peaks throughout the formation, with the exception of connections. The maximum gas shows from the Williams Fork 200 was noted at 10,997' with a reading of 2,176 units. This reading is from a 40' interval of thick sand near the top of the formation. It should also be noted that this sand bed is located just beneath a coal interval.



The other significant peak of 1,004 units was observed at 11,209'. This show was associated with a transitioning from thick sandstone to carbonaceous shale beds with interbedded coal layers. It should be noted that this peak occurred relatively close to a connection gas.



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

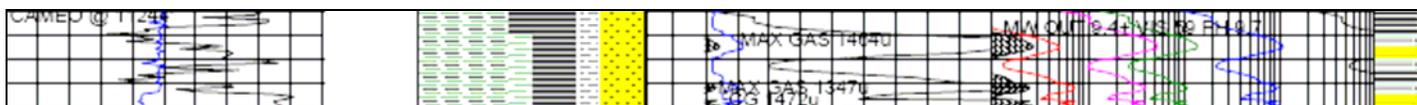
210 Sequence Boundary/Cameo Formation

The 210 SB, marking the top of the Cameo Formation, occurred at a depth of (11,244' MD/ 10,865' 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	137.473	2513.930	1674.755
Minimum	8.748	930.454	39.295
Mean	46.852	1498.071	353.914
Standard Deviation	29.770	284.391	318.845

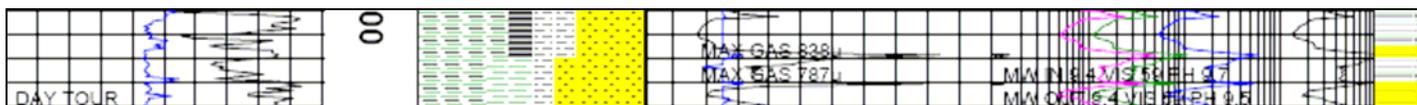
The Cameo formation produced a few high gas peaks throughout the formation. The first significant gas appeared at 11,255' with a peak of 1,464 units. The peak was produced by large carbonaceous shale with interbedded coals found near the top of the formation. Another peak of 1,347 was recorded at 11,272', which was just before a connection.



The maximum gas peak of the formation was recorded at 11,307' with a gas reading of 1,499 units. This peak is attributed with thick carbonaceous shale beds with interbedded coal layers.



The last significant gas peak recorded from the formation of 832 units was observed at 11,429'. This gas peak is associated with thick intermittent sandstone and carbonaceous shale beds. It should be noted that this peak occurred just below a coal interval.



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

200 Sequence Boundary/Rollins Formation

The 200 SB occurred at (11,485' MD/ 11,106' 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	145.637	3730.706	916.674
Minimum	15.229	1247.149	85.398
Mean	40.635	1952.527	207.521
Standard Deviation	17.748	389.865	135.204

The Rollins formation did not produce many gas peaks and recorded relatively low gas compared to other wells on the pad. The only significant peak not related to connection gas was recorded at 11,530' with a reading of 423 units.



Chromatography through the Rollins Formation included C-1 through C-4 being observed through out the drilled interval with C-5 occurring at high gas shows.

Trans-Cozzette Formation

The Trans-Cozzette occurred at (11,692' MD/ 11,313' TVD), and marks the transition zone between the Rollins Formation and the Cozzette Coastal Formation. It generally is a fine grain sandstone or siltstone bed at the base of the Rollins Formation. The following features characterized the sandstone that is present through this unit:

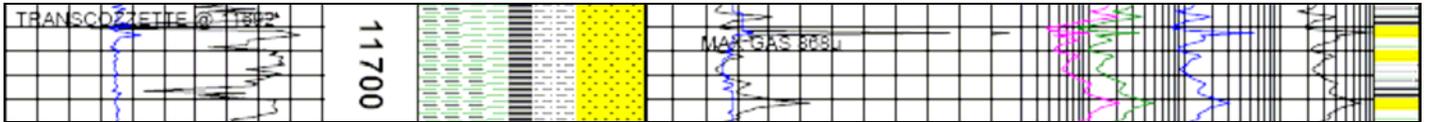
- Light brownish gray to light yellowish gray;
- Moderate hard to firm friable;
- Fine to medium to occasionally coarse grain;
- Occasionally silty zones.
- 5-6% visible carbonaceous material

Drilling and gas data for the Cozzette Formation are summarized as follows:

Trans-Cozzette Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	112.609	2513.930	868.238
Minimum	14.342	1563.844	115.963
Mean	41.402	1815.995	209.385
Standard Deviation	19.775	172.018	117.260

The Trans-Cozzette produced a high gas peak of 868 units at 11,693'. The peak is associated with interbedded layers of sandstone, carbonaceous shale, coal; shale and siltstone.



Chromatography through the Rollins Formation included C-1 through C-4 throughout the drilled interval.

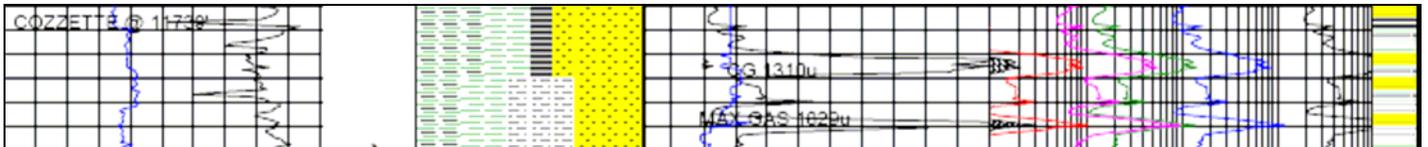
180 Flooding Surface/Cozzette Formation

The top of the Cozzette Formation, at (11,739' MD/ 11,360' 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	112.426	5047.492	1828.830
Minimum	10.411	930.454	1.962
Mean	34.165	1464.000	208.598
Standard Deviation	15.757	570.514	253.455

The Cozzette formation did not produce as many or as high of gas peaks compared to other wells on the pad. The maximum gas peak recorded occurred at 11,780' with a reading of 1,829 units. The peak occurred after a connection gas from an interval of interbedded sandstone, shale, siltstone and carbonaceous shale. It should be noted that there was a coal interval just above the recorded peak.



Chromatography through the Cozzette Formation included C-1 through C-4 throughout with C-5 appearing for the high gas and during the connection gas.

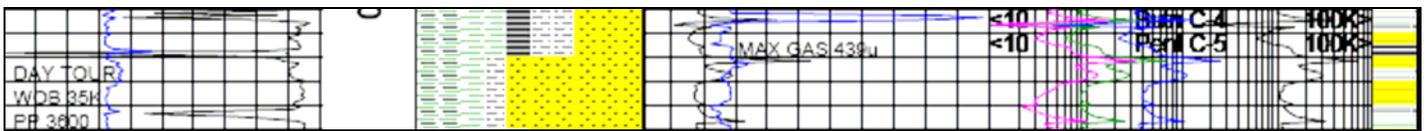
140 Flooding Surface/Corcoran Coastal Plain

The top of the Corcoran Coastal Plain, marked by the 140 Flooding Surface, was encountered at (12,042' MD / 11,663' TVD). This section encompasses a thick sequence of sandstone, shale, and carbonaceous shale. Data for the Corcoran Coastal Plain are summarized as follows:

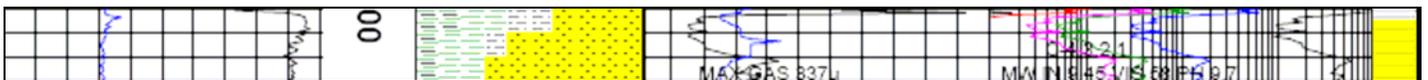
Corcoran Coastal Plain Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	220.872	9797.920	1812.779
Minimum	5.680	297.064	11.121
Mean	32.964	2031.966	197.330
Standard Deviation	25.386	864.100	234.602

The Corcoran Coastal Plain produced low gas readings throughout the formation with the exception of connection gases. The highest gas peak not connected with connections was 439 units at 12,542'. This gas peak is attributed to a thick sand bed just below a coal interval.



The next significant show for the formation was recorded at 12,632' with a reading of 337 units. The gas peak is attributed to the large sand bed at the bottom of the formation.



Chromatography through the Corcoran Coastal Plain included C-1 through C-4 throughout the formation with C-5 registering for the connection gases.

140 Sequence Boundary/Corcoran Marine Formation

The Corcoran Marine top was drilled at (12,650' MD / 12,271' 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 12,667' MD / 12,288' TVD. Drilling was stopped short due to the bit dying and lack of significant gas reading. Data for the Corcoran Marine are summarized as follows:

Corcoran Marine Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	11.522	1963.880	114.654
Minimum	3.477	1563.844	40.035
Mean	6.093	1817.571	54.732
Standard Deviation	2.140	134.511	17.680

The largest gas peak of the formation was recorded at 12,661' with a reading of 114 units near the top of the formation.



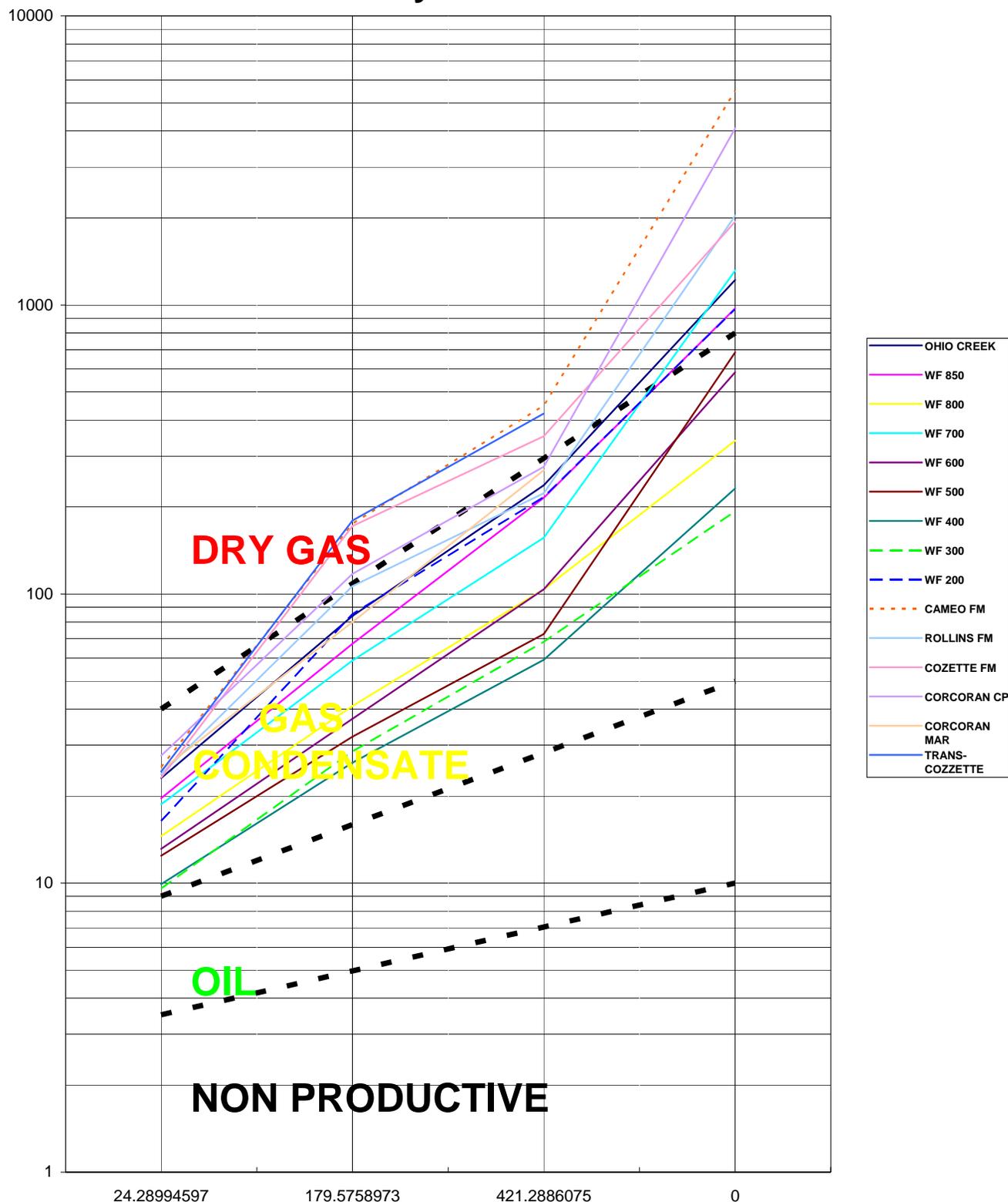
Chromatography through the Corcoran Marine included C-1 through C-4 throughout the drilled interval.

**Exxon Mobil
Freedom Ranch Unit 197-33B10**

Pixler Plot

FRU 197-33B10

Pixler Plot Of Average Chromatography Data By Formation

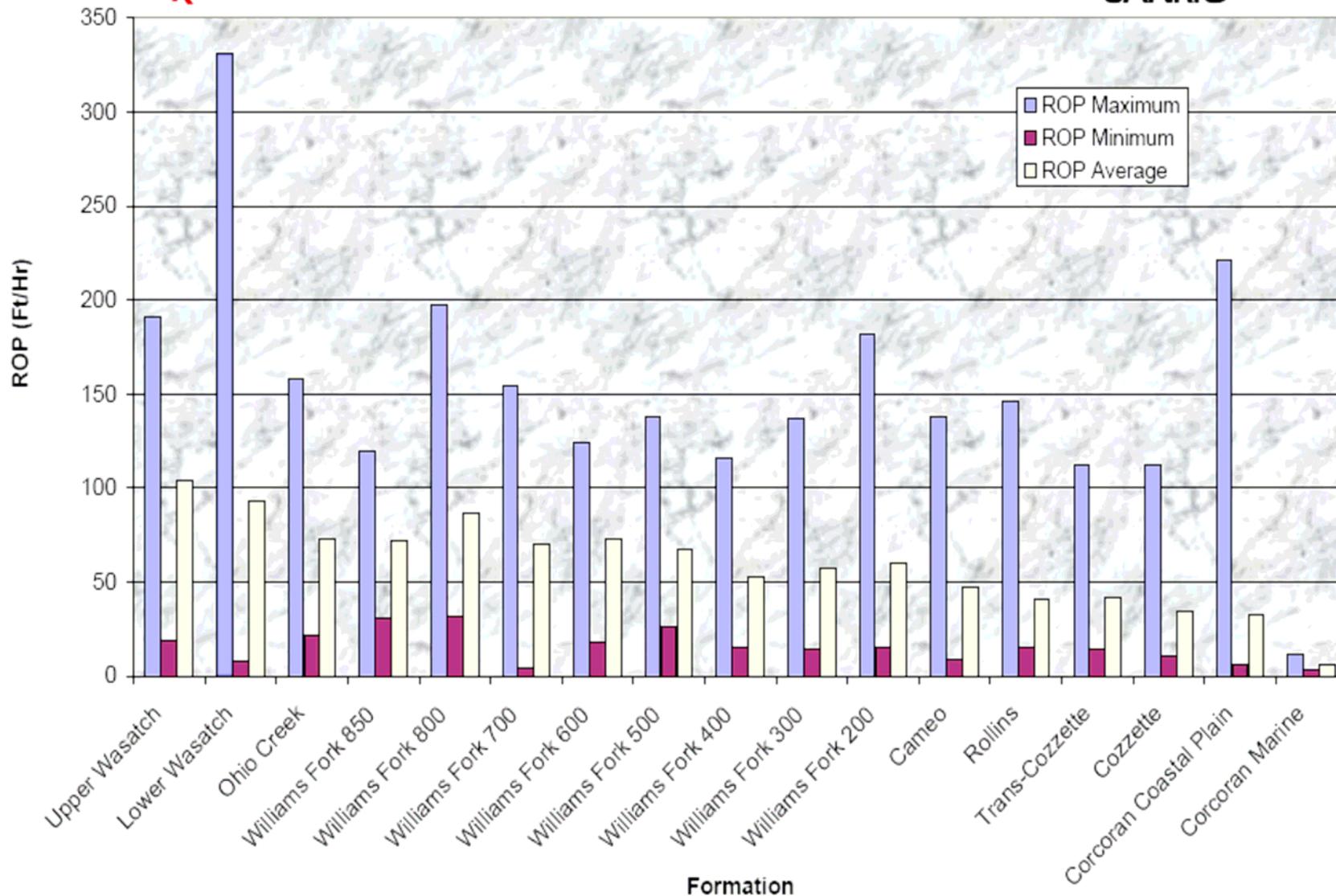


Exxon Mobil
Freedom Ranch Unit 197-33B10
Other Data Plots

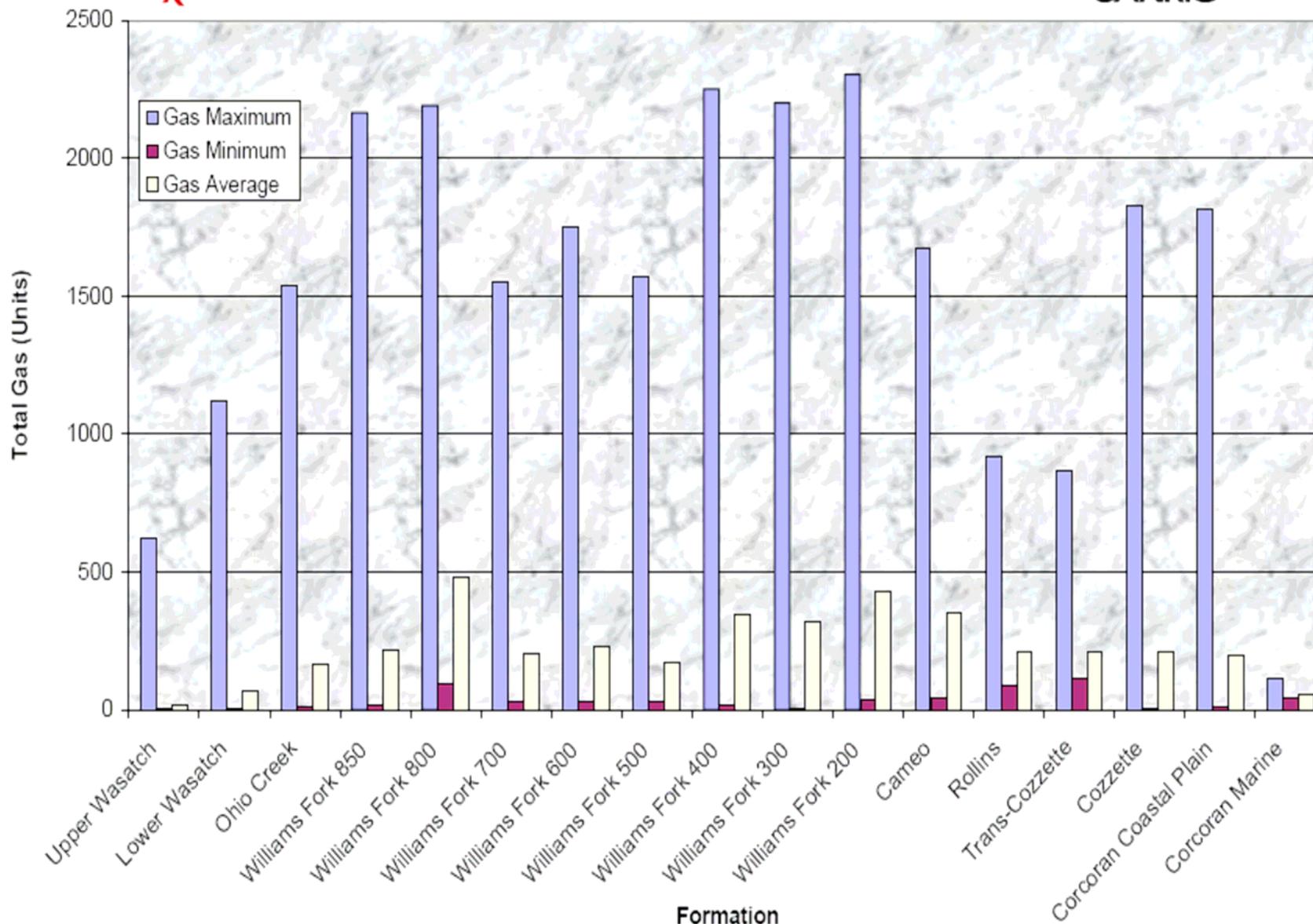
FRU 197-33B10
Rate of Penetration Statistics

ExxonMobil

CANRIG



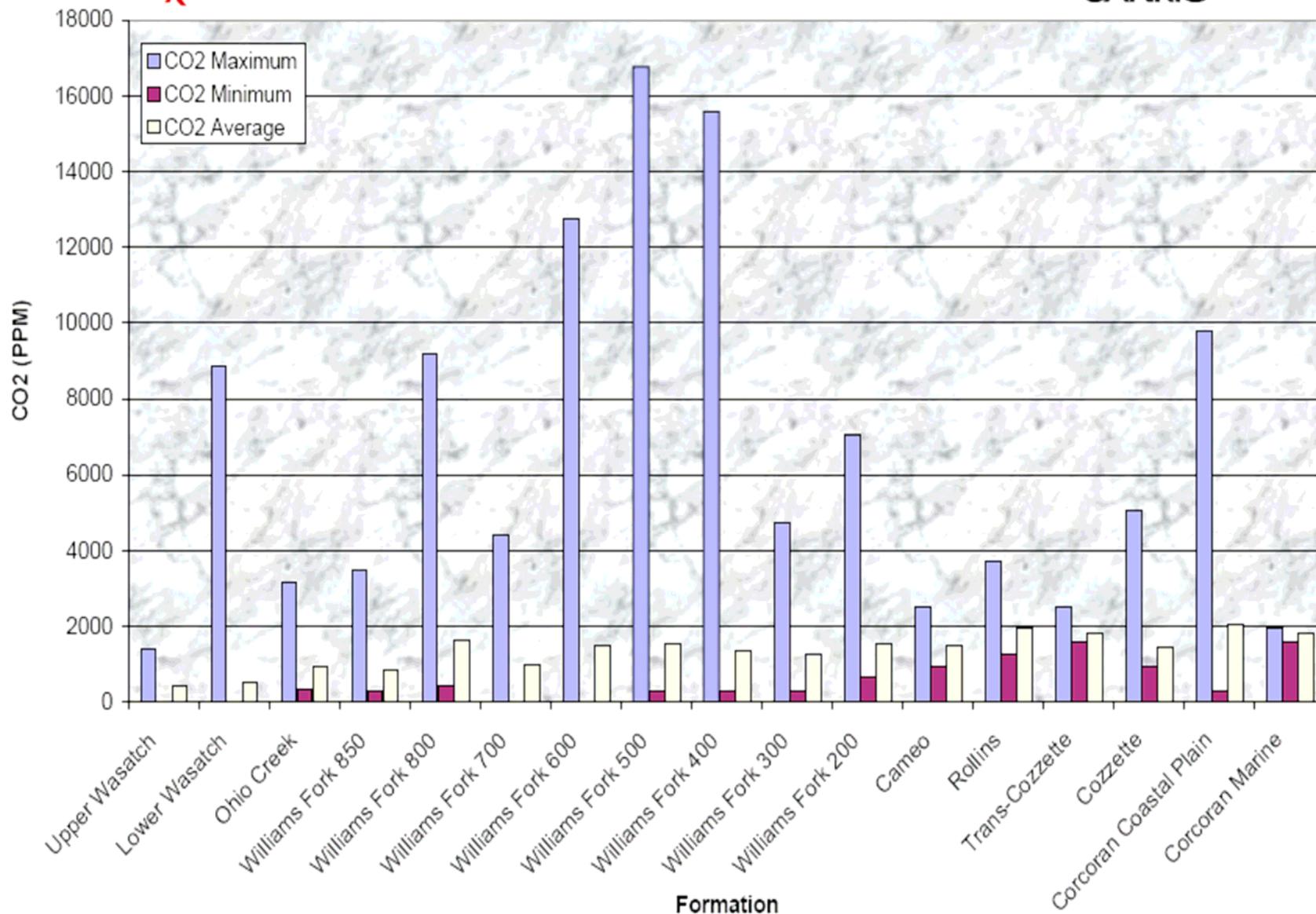
Total Gas Statistics By Formation



FRU 197-33B10
CO2 Statistics

ExxonMobil

CANRIG



Exxon Mobil
Freedom Ranch Unit 197-33B10
Formation Descriptions

4140' Shale = Very light gray to light gray to medium light gray; very slightly dense to moderately brittle to moderately crumbly tenacity; irregular to sub-blocky to earthy fracture; occasional massive to wedge like to sub-tabular cuttings habit; dull to earthy dull to occasional semi-waxy to semi-frosted luster; moderately smooth to slightly clayey to very slightly silty texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

4280' Sandstone = Off white to white to very light gray with few black hues; quartz dominate frame work; predominately grain supported with few loose grains; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 3 to 6% dark lithic fragments; medium-coarse to coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone very poorly grading with poor grade sandstone visible, no other distinguishable bedding or other surface features present in sample; no accessory minerals present in sample.

4450' Siltstone = Very light gray to light gray; slightly brittle to slightly crunchy to very slightly dense tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly clayey to very slightly gritty texture; no visible structural features.

4550' Shale = Medium light gray to grayish purple to light olive brown; brittle tenacity; fractures from planar to blocky; cuttings are tabular to slightly platy; dull earthy to slightly waxy luster; smooth to silty texture with occasional gritty texture; grading from siltstone; light olive brown pieces tend to be more silty to slightly gritty; thin structure.

4660' Siltstone = Moderate yellowish brown to moderate olive brown to medium gray; brittle to slightly crumbly tenacity; fractures from mostly blocky to irregular; cuttings are tabular to occasionally massive cuttings; earthy luster; texture is gritty to silty; thick to massive structure.

4750' Sandstone = White to very light gray; quartz framework; fine grained with well sorting; sub rounded with moderate sphericity; moderate hardness; slight to moderate reaction with HCL suggests calcareous cement; grain supported; no visible bedding; may be grading to siltstone.

4840' Shale = Medium light gray to grayish purple to moderate yellow; tenacity is brittle to crumbly; planar to blocky fracturing; cuttings are platy to tabular; waxy to dull luster; silty to smooth texture; thin structure.

4910' Siltstone = Medium gray to moderate olive brown; tenacity is crumbly to slightly brittle; blocky to irregular to slightly planar fracturing; cuttings are tabular; luster is dull to earthy to occasionally slightly sparkling; gritty to silty to slightly clayey texture; thick structure.

5000' Sandstone = Light gray to light olive gray to white with occasional translucence; fine to medium grained with fair to well sorting; sub round to sub angular with moderate sphericity; hard to firmly friable; moderate reaction with HCL suggests calcite cement; grain supported; light olive brown specimens tend to be more fine grained, with grading into siltstone.

5110' Shale = Pale blue to medium light gray to grayish purple with occasional moderate yellow streaks; planar to irregular fracturing; cuttings are platy to slightly tabular; dull earthy luster; smooth to silty texture; thin structure; moderate yellow specimens appear to be grading from siltstone; fracture fill observed in some shale containing calcite veins running through.

5220' Siltstone = Medium light gray to light brownish gray to light olive brown; brittle to crumbly to slightly pulverulent tenacity; fractures from blocky to irregular; tabular cuttings; earthy dull to slightly frosted luster; clayey to silty to occasionally gritty texture; thick structure.

5310' Sandstone = Light gray to light brownish gray to light olive gray; quartz framework with less than 5% black lithic clasts interbedded; medium to occasional coarse grains; fair to semi poor sorting sub angular with moderate to low sphericity; firmly friable to hard; grain supported; weak to mild reaction with HCL suggest some calcite cement; no visible bedding.

5420' Shale = Very light gray to light gray to medium light gray to light yellowish orange to occasional light grayish red purple and light gray mottling; moderately brittle to crumbly tenacity; irregular to sub-blocky to sub-planar to earthy fracture; occasional massive to wedge like to occasional elongated to sub-tabular cuttings habit; dull to earthy dull to occasional semi-waxy to semi-frosted luster; moderately smooth to moderately clayey to

very slightly silty texture; poor grade siltstone visible grading with poor grade sandstone, no other laminae or other distinguishable structural features present; no accessory mineral present in sample.

5600' Carbonaceous Shale = Brownish gray to dark brownish gray to brownish black to olive black; slightly dense to slightly crunchy to very slightly crumbly tenacity; irregular to sub-blocky to earthy hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; semi-greasy to dull to earthy dull luster; slightly clayey to slightly silty texture; very thin coal laminae visible in shale cutting, siltstone visible bedding with carbonaceous shale, no other distinguishable structural features present; accessory mineral pyrite visibly in contact with carbonaceous shale cuttings in sample.

5770' Wasatch G Sandstone = White to very light gray to translucent with few black and occasional brilliant green hues; quartz dominate frame work; predominately loose grains with few grain supported cuttings; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 3 to 5% dark and brilliant green fragments; medium-fine to medium-coarse to coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone, very small amount of coal visibly effervescing in sample, no other bedding or distinguishable surface features present; accessory mineral pyrite visibly in contact with sandstone cutting in sample.

5980' Siltstone = Very light gray to light gray; very slightly dense to slightly brittle to very slightly crumbly tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly clayey to very slightly gritty texture; poor grade siltstone visible grading with poor grade sandstone, very small amount of carbonaceous shale visible effervescing in sample, no other laminae or distinguishable structural features present; accessory mineral pyrite present in sample.

6140' Shale = Very light gray to light gray to medium light gray; moderately dense to slightly crunchy to occasional crumbly tenacity; irregular to sub-blocky to occasional sub-planar fracture; massive to wedge like to occasional elongated cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly clayey to very slightly silty texture; very small amount of coal bedding contact visible with shale cutting, very small amount of carbonaceous shale visible effervescing in sample, no other distinguishable structural features present.

6330' Carbonaceous Shale = Brownish gray to dark brownish gray to brownish black to olive black; moderately dense to slightly crunchy to very slightly brittle tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; occasional massive to wedge like to occasional elongated to sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly clayey to very slightly gritty texture; very thin coal laminae visible in shale cutting, carbonaceous shale visible bedding with sandstone, no other structural features present in sample; accessory mineral pyrite present in sample.

6510' Sandstone = Off white to white to very light yellowish gray with few black hues; quartz dominate frame work; predominately grain supported with few loose grains; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 1 to 3% dark lithic fragments; medium-coarse to very coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone, carbonaceous shale cutting visible bedding with poor grade sandstone, no other bedding or other distinguishable surface features present in sample; accessory mineral pyrite present in sample.

6700' Siltstone = Very light gray to light gray to occasional medium light gray; moderately dense to very slightly tough tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly clayey to 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 laminae or other distinguishable structural features present; accessory mineral pyrite present in sample.

6880' Carbonaceous Shale = Brownish black to grayish black to brownish gray; brittle to slightly crumbly tenacity; planar to slightly blocky fracturing; cuttings are wedge like to tabular; earthy to dull to slightly greasy luster; silty to clayey texture; thin structure.

6960' Shale = Medium gray to medium bluish gray to greenish gray; brittle to crunchy tenacity; fractures from planar to slightly splintery; cuttings range from platy to tabular; waxy dull luster; texture is smooth to silty; laminae to thin structure.

7040' Sandstone = Very light gray to medium gray with occasional light brownish gray hues; quartz framework; fine to medium fine grained with fair to semi well sorting; sub rounded to sub angular with moderate sphericity; moderate hardness; grain supported; mild reaction with HCL suggests some calcareous cement; no visible bedding; trace amounts of pyrite in sample as an accessory.

7150' Siltstone = Brownish gray to medium dark gray with occasional greenish gray hues; tenacity is dense to brittle; fractures from irregular to slightly blocky; cuttings are tabular to slightly massive earthy to frosted luster; texture is gritty to silty to occasionally clayey; thick structure; can be seen grading to shale.

7250' Shale = Medium gray to pale blue to greenish gray; tenacity is crunchy to brittle; irregular to planar to occasionally splintery fracturing; cuttings are platy to scaly to slightly tabular; luster is waxy to dull; smooth to silty texture; thin structure; trace amounts of pyrite observed on some of some of the specimens.

7350' Carbonaceous Shale = Brownish gray to brownish black; brittle to crumbly tenacity; blocky to semi planar fracturing; cuttings are wedge like to tabular; luster is earthy with a very slight sparkle; texture is clayey to smooth; thin structure; interbedded with siltstone and shale and sandstone.

7440' Sandstone = Very light gray to white to translucent; dominate quartz framework with trace fine grained black lithic clasts interbedded; fine to medium with poor sorting; sub angular to sub rounded with low sphericity; easily friable to firmly friable; abundant loose grains in sample; moderate to strong reaction with HCL suggests calcite cement with matrix support; no visible bedding; pyrite present as an accessory mineral; losses associated with sample depth.

7570' Shale = Greenish gray to medium bluish gray to medium gray; crunchy to slightly dense tenacity; planar fracturing; tabular to platy cuttings; dull earthy to waxy luster; texture is smooth to silty; laminae to thin structure.

7650' Siltstone = Medium dark gray to olive gray to moderate olive brown; tenacity is brittle to crunchy; fractures from irregular to blocky to occasionally planar; cuttings are tabular to wedge like; luster is earthy to dull to slightly waxy; gritty to silty texture; thin structure.

7740' Carbonaceous Shale = Dark brownish gray to brownish black to olive black; moderately dense to slightly tough to occasional crumbly tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly clayey to very slightly gritty texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

7880' Sandstone = Off white to white to very light gray to occasional translucent with black, moderate brown, and occasional moderate green hues; quartz dominate frame work; predominately grain supported with few loose grains; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 5 to 8% dark lithic fragments; quartz cuttings range from smoky to translucent; medium-coarse to coarse to very coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading and bedding with poor grade sandstone, poor grade sandstone visible bedding with poor grade carbonaceous shale cutting, very small amount of accessory mineral pyrite present in sample.

8090' Shale = Very light gray to light gray to medium light gray to occasional medium dark gray and light bluish gray; moderately dense to slightly tough to occasional crunchy tenacity; irregular to sub-blocky to sub-planar to earthy fracture; occasional massive to wedge like to elongated cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly clayey to very slightly silty texture; poor grade sandstone visibly in contact very coal cutting in sample, no other distinguishable structural features present in sample; no accessory minerals present in sample.

8260' Siltstone = Very light gray to light gray to occasional medium light gray; moderately dense to very slightly tough to occasional crunchy tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional semi-platy cuttings habit; dull to earth dull luster; very slightly gritty texture; no visible structural features present.

8370' Sandstone = White to medium gray with occasional translucence; dominate quartz framework with approximately 5% fine black lithic clasts interbedded; fine to medium to occasionally coarse grained with fair to poor overall sorting; sub angular to sub rounded with low to moderate sphericity' firmly friable to moderate

hardness; calcite cement as suggested by a moderate reaction with HCL; some carbonaceous material bands present in specimen; fracture fill observed as calcite veins running through specimen.

8520' Carbonaceous Shale = Brownish black to black; tenacity is dense to brittle to occasionally slightly crumbly; fractures from blocky to irregular; cuttings are nodular to wedge like; resinous to earthy luster; smooth to clayey to slightly silty texture; thin structure.

8600' Shale = Medium dark gray to medium bluish gray with occasional moderate yellow pigments; tenacity is brittle to slightly crumbly; fractures from planar to somewhat splintery; dull waxy luster; texture is smooth to slightly silty; laminae to thin structure.

8680' Siltstone = Brownish gray to dark gray; tenacity is dense to crunchy; fractures mostly from blocky to irregular; cuttings are tabular to slightly massive luster ranges from earthy to dull to slightly frosted; texture is gritty to occasionally silty; specimen is grading from sandstone; no visible structure; trace amounts of pyrite on a few of the specimens.

8790' Sandstone = Medium light gray to white to brownish gray; dominate quartz framework with approximately 10% black lithic clasts interbedded along with thin layers of carbonaceous shale; medium to fine grained with fair sorting sub angular to sub rounded with low sphericity; firmly friable to moderate hardness; strong reaction with HCL suggests calcite cement; mostly grain supported with few occurrences with matrix calcite support; pyrite present as an accessory mineral.

8930' Shale = Medium light gray to pale blue to moderate yellow; very brittle tenacity; planar to irregular fracturing cuttings are platy to flaky; luster is waxy to dull; smooth to silty texture; laminae to thin structure; moderate yellow colored shale tends to be more silty than smooth.

9020' Carbonaceous Shale = Dark brownish gray to brownish black to olive black; slightly dense to very slightly crunchy tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional sub-platy to wedge like cuttings habit; dull to earthy dull to occasional semi-sparkling luster; semi-smooth to slightly clayey to very slightly gritty texture; very small amount of coal in visible bedding contact with carbonaceous shale cutting, poor grade siltstone visibly in contact with poor grade carbonaceous shale cutting, no other laminae or other distinguishable structural features present; accessory mineral pyrite present in sample.

9210' Siltstone = Very light gray to light gray to occasional medium light gray; slightly dense to very slightly crumbly to slightly brittle tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional semi-platy 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, very small amount of carbonaceous shale visibly effervescing in sample, no other laminae or other distinguishable structural features present; accessory mineral pyrite present in sample.

9380' Sandstone = Off white to white to very light gray to very light brownish gray with black and moderate brown hues; quartz dominate frame work; predominately loose grains with few grain supported cuttings; quartz cuttings range from moderately smoky to few translucent; consists of calcitic cementation with light to moderate reaction to dilute HCL; matrix contains 7 to 9% dark lithic fragments; medium-coarse to coarse to occasional very coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone, no other surface features present; no accessory minerals present in sample.

9570' Carbonaceous Shale = Brownish gray to grayish black to dark gray; tenacity is brittle to slightly crumbly; fractures from planar to semi blocky; cuttings are wedge like to platy; earthy to waxy to slightly resinous luster; texture is clayey to silty; thin structure.

9650' Coal = Black; tenacity is crumbly to slightly pulverulent; fractures from irregular to blocky to semi planar and occasionally conchoidal; cuttings are nodular; resinous to polished to slightly earthy luster; texture is smooth to clayey; thin structure.

9730' Siltstone = Brownish gray to medium dark brown with moderate brown hues; tenacity is dense to brittle; fractures from blocky to irregular; cuttings are mostly tabular to occasionally slightly platy; earthy to waxy luster; texture is gritty to silty; grading from sandstone; contains trace amounts of carbonaceous shale interbedded.

9830' Sandstone = White to light gray to brownish gray; dominate quartz framework with approximately 10% black lithic clasts interbedded; fine to coarse grain size with poor sorting; angular to sub angular with low sphericity; moderate hard to friable with abundant loose grains; calcite cement with calcite matrix as suggested by a strong reaction with HCL; no visible bedding structure; trace amounts of pyrite present as an accessory mineral; some of the finer specimens seem to be grading into siltstone.

9980' Shale = Medium gray to medium dark gray to dark greenish gray; tenacity is brittle to crunchy; fractures from planar to slightly splintery; cuttings are platy to tabular; dull waxy luster; texture is smooth silty; thick laminae structure.

10060' Carbonaceous Shale = Dark brownish gray to brownish black to olive black; slightly dense to slightly crunchy to very slightly crumbly tenacity; irregular to sub-blocky to occasional sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; semi-smooth to semi-clayey to very slightly gritty texture; poor grade siltstone visible grading with poor grade sandstone and poor grade carbonaceous shale, very thin coal laminae visible in shale cutting, no other structural features visible in sample; accessory mineral pyrite present in sample.

10240' Siltstone = Light gray to medium light gray to occasional light brownish gray; very slightly tough to moderately dense to slightly crunchy tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly gritty to very slightly granular; very small amount of coal and carbonaceous shale cuttings visibly effervescing, poor grade siltstone visible grading with poor grade sandstone, very thin coal laminae visible in shale cutting, no other distinguishable structural features present; accessory mineral pyrite present in sample.

10420' Sandstone = Very light gray to very light brownish gray to light brownish gray with black and moderate brown hues; quartz dominate frame work; predominately grain supported with few loose grains; consists of calcitic cementation with moderately high reaction to dilute HCL; matrix contains 5 to 7% dark lithic fragments; medium-coarse to very coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; very small of shale visibly bedding and visibly effervescing in sample, no other surface features present; no accessory minerals present in sample.

10590' Carbonaceous Shale = Brownish black to dark gray; tenacity is very brittle to crumbly; fractures from semi splintery to irregular to slightly planar; cuttings are tabular to platy; earthy to dull to waxy luster; texture is clayey to silty; thin to slightly thick structure.

10680' Shale = Medium dark gray to medium bluish gray with moderate yellow hues; tenacity is brittle to crunchy; planar to splintery to occasionally slightly blocky fracturing; cuttings are elongated to platy; earthy to waxy luster; texture is smooth to silty; thick structure.

10770' Siltstone = Medium dark gray to brownish gray to moderate olive brown; tenacity is dense to slightly brittle; fractures from blocky to irregular; cuttings are slightly massive to tabular to wedge like earthy to waxy luster; texture is gritty to silty to occasionally slightly granular; thin structure.

10860' Sandstone = White to medium gray to light brownish gray; dominate quartz framework with approximately 10% black to brownish black lithic clasts interbedded; fine to coarse grained with poor to semi fair sorting; sub angular to sub rounded with low sphericity; moderate hardness; mild reaction with HCL suggests some calcite cement matrix; occasional pieces display grain support; contains thin coal veins; no visible bedding; trace amounts of pyrite present as an accessory mineral.

10990' Coal = Black to grayish black; tenacity is brittle to crumbly; fractures from irregular to planar; cuttings are nodular to wedge like; luster is slightly earthy to resinous to polished; texture is smooth to clayey; thin structure; gas associated with sample.

11070' Carbonaceous Shale = Dark brownish gray to brownish black to olive black; moderately dense to slightly crunchy to very slightly brittle tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to semi-platy to wedge like cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly clayey to very slightly gritty texture; poor grade carbonaceous shale visible bedding with poor grade sandstone and coal, poor grade siltstone visible grading with poor grade sandstone, very small amount of coal visibly effervescing in sample. no other distinguishable structural features present; no accessory minerals present in sample.

11260' Shale = Very light gray to light gray to occasional very light bluish gray; slightly dense to slightly crunchy to brittle to occasional crumbly tenacity; irregular to sub-blocky to earthy fracture; occasional 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 texture; 30% of sample consisted of coal which was visibly effervescing, very thin coal laminae visible in carbonaceous shale cutting, no other distinguishable structural features present; no accessory minerals visibly present in sample.

11430' Siltstone = Medium dark gray to brownish gray to olive gray; tenacity is dense to slightly brittle; fractures from irregular to blocky to occasionally slightly planar; cuttings are wedge like to tabular; frosted to earthy to waxy luster; texture is gritty to silty; thin structure.

11520' Sandstone = White to very light gray to translucent; dominate quartz framework with trace amounts of dark gray lithic clasts; fine grained with well sorting; sub angular with low to moderate sphericity; firmly friable to moderate hardness; abundant loose grains in sample; very slight reaction with HCL suggests mostly silica cement; no visible bedding; contains some carbonaceous shale interbedded.

11640' Shale = Medium gray to light olive brown to occasionally dusky red; tenacity is dense to brittle; fractures from planar to blocky to irregular; cuttings display a platy to tabular to occasionally flaky habit; earthy to dull luster; texture is smooth to silty; thin structure.

11720' Coal = Black to grayish black; tenacity is very brittle to crumbly; fractures from blocky to semi planar to irregular; cuttings are nodular; polished to resinous to slightly earthy luster; smooth to clayey texture; thin structure interbedded with carbonaceous shale and siltstone and sandstone.

11810' Carbonaceous Shale = Brownish black to grayish black; tenacity is brittle to crunchy to semi-dense; sub-tabular to sub-nodular to occasional wedge like to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; poor grade sandstone visible bedding with poor grade carbonaceous shale cutting, very thin coal laminae visible in shale cutting, no other distinguishable structural features present; trace amounts of accessory mineral pyrite present in sample.

11950' Siltstone = Light gray to light brownish gray to very light brownish gray; very slightly dense to semi-brittle to semi-crunchy tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly clayey to very slightly gritty texture; poor grade siltstone visible grading with poor grade sandstone, no other structural features present; accessory mineral pyrite present in sample.

12090' Sandstone = Medium gray to brownish gray to moderate olive brown; quartz framework with approximately 10% brownish black lithic clasts interbedded fine to medium sized grains with fair sorting; sub angular to surrounded with moderate sphericity; hard to moderate hardness; no reaction with HCL suggests siliceous cement; grain supported; abundant loose grains in sample; no visible bedding structure; contains some carbonaceous shale and shale interbedded; grading into siltstone.

12230' Carbonaceous Shale = Brownish black to grayish black; tenacity is slightly dense to brittle; fractures mostly from irregular to blocky to slightly splintery; cuttings are tabular to platy luster is earthy to resinous; silty to smooth texture; thin to semi thick structure.

12320' Siltstone = Dark gray to grayish black to occasionally very dusky red; tenacity is tough to dense; irregular to blocky fracturing; cuttings are tabular to wedge like; waxy to earthy luster; silty to slightly gritty texture; thin structure.

12400' Shale = Very light gray to light gray to occasional very light bluish gray; very slightly dense to slightly brittle to very slightly crumbly tenacity; irregular to sub-planar to occasional sub-blocky fracture; sub-platy to wedge like to mostly small cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to very slightly silty to semi-clayey texture; no visible laminae or other distinguishable structural features present; trace amount of accessory mineral pyrite present in sample.

12550' Sandstone = Light brownish gray to medium light gray to occasionally white; dominate quartz framework; fine grained with well sorting; sub angular to surrounded with moderate sphericity; hard to moderate hard to occasionally firmly friable; no reaction with HCL; no visible surface features present; no accessory minerals present in sample.

**Exxon Mobil
Freedom Ranch Unit 197-33B10**

Daily Activity Summary

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

- 4/12/2010** Skid rig from 33B9 to 33B10 well. Rig up riser, flow line, turn buckles, set well head with Camron, rig down casing bail, and rig up bails and elevators. Pressure test service lines up to 3200 PSI for five minutes. Conduct safety meeting with Schlumberger on picking up directional tools. Make up but, pick up directional tools, scribe motor, and Gyro tools. Make up stabilizer and change out shallow test tools.
- 4/13/2010** Pick up BHA and drill from 150' to 189'. Conduct shallow hole test on MWD and Gyro tools. Drill and slide from 189' to 589' while taking Gyro surveys every 60'. Pump high vis seep and circulate. Pull out of hole from 589' to 128' with heavy weight drill pipe. Conduct rig service – 3 shots in upper bonnet seal. Trip in hole from 128' to 589', with drill collars. Remove trip nipple and install rotating head. Drill and slide from 589' to 729' while taking surveys every 90'. Continue to drill and slide from 729' to 1887'.
- 4/14/2010** Drill and slide from 1887' to 3187'. Conduct rig service – 4 shots in upper bonnet seal. Continue to drill and slide from 3187' to 3945'.
- 4/15/2010** Drill from 3945' to 4124'. Pump high vis sweep and circulate. Pull out of hole from 4124' to 128'. Lay down directional tools and bit. Conduct rig service – 5 shots in upper bonnet seal. Rig up CRT, make track shoe and run casing from 564' to 2028'. Circulate mud and continue running casing from 2028' to 2789'. Install DV tool and rotating head rubber. Run casing from 2789' to 3997'. Wash casing to bottom from 3997' to 4114'. Circulate bottoms up at 80 SPM at 3800 strokes. Rig down CRT and rig up cement head. Conduct safety meeting on cementing. Pump first stage cement.
- 4/16/2010** Continue to displace cement with 286 barrels of mud, drop opening tool, and wait for 15 minutes. Wait on cement and circulate through DV tool while working on the same. Pump second stage cement, rig down cement head, manifold, and cement lines. Lay down the same. Run 1" tubing to 446'. Pump cement for top job. Lay down 1" tubing, lift riser to cut off casing. Cut casing, remove casing bails, and elevators. Reinstall rig bails and elevators. Hold JSA for preparation to skid rig from 33B10 to 33B5.
- 8/4/2010** Prepare to skid, bleed kookey lines down, unhook flow line, choke line, and mud line. Skid rig from 33B9 to 33B10. Set stack onto well head. Start to torque Cameron quick connect and bolt up flow line. Nipple up stack, install choke line, turn buckles, flow line, mud line, drip pan, hook up roglless line, walk pipe wrangler, and set V-door down. Run stand of heavy weight drill pipe in hole, rig up test plug, and tester. Test BOPs. Rig down tester test plug and stand back heavy weight drill pipe stand. Install wear bushing.
- 8/5/2010** Conduct JSA and pick up 90 joints of 5" drill pipe. Install trip nipple and lay out BHA. Hold JSA on picking up BHA, and make up directional tools. Conduct shallow hole test with power drive. Pick up BHA and 7.25" drill collars. Conduct shallow hole MWD test. Install rotating head and lay out trip nipple. Conduct casing pressure test at 1198' above DV tool at 1500 PSI for 15 minutes. Conduct rig service. Drill out cement and DV tool, tag up at 1320'. Trip in hole from 1320' to 4018' and circulate bottoms up. Conduct casing pressure test for 30 minutes at 1500 PSI. Drill out cement and float, tag float at 4018'. Drill cement and drill out shoe, tag up at 4112'. Drill from 4124' to 4134' and conduct formation integrity test for 5 minutes at 469 PSI. Pit test 12 pounds per gallon at 469 PSI. Drill from 4134' to 4567'.
- 8/6/2010** Drill from 4567' to 5482'. Conduct rig service – greased upper bonnet. Continue drilling ahead from 5482' to 6302'.
- 8/7/2010** Drill from 6302' to 6340'. Pump 80 barrel sweep and spot 50 barrel LCM, and pump 35 barrel slug. Trip out of hole from 6340' to change out jars, lay down directional tools, and bit. Conduct JSA on picking up BHA, pick up new BHA and trip in to 799'. Install rotating head and trip in from 799' to 4037'. Rig service – drag chain inspection. Slip and cut 64' of line. Trip in hole from 4037' to 5806'. Wash and ream from 5806' to 6335'. Drill ahead from 6340' to 6991'.
- 8/8/2010** Drill ahead from 6991' to 7752'. Conduct rig service. Drill ahead from 7752' to 7783'.
- 8/9/2010** Circulate and pump 35 barrel slug. Trip out of hole from 8228' to 799', and strap out drill pipe. Pull rotating head, and trip out of hole from 799', change out bit and float. Trip in hole from 799',

install rotating head, and continue to trip in to 4132'. Conduct rig service. Continue to trip in hole from 4132' to 6245' on trip tanks. Wash and ream from 6245' to 7185'. Trip in hole from 7185' to 7560' on trip tanks. Wash and ream from 7560' to 8228'. Replace blower motor on the number 2 pump. Drill ahead from 8228' to 8387'.

8/10/2010 Drill ahead from 8387' to 9559'.

8/11/2010 Drill ahead from 9559' to 9655'. Conduct rig service – 8 shots in upper bonnet seal. Continue drilling ahead from 9655' to 10599'.

8/12/2010 Drill from 10599' to 11081'. Conduct rig service – 9 shots in upper bonnet seal. Change out cap gasket on number 1 mud pump and number two suction. Continue drilling from 11081' to 11526'.

8/13/2010 Drill from 11526' to 11833'. Conduct rig service – 5 shots in upper bonnet seal. Change out numbers 2 and 3 suction, number 1 discharge valve, and set on number 1 mud pump. Pull out of hole from 11833' to 10915' (searching for wash in pipe). Lay down washed joint of pipe and trip in hole from 10915' to 11833'. Drill ahead from 11833' to 12103'.

8/14/2010 Drill ahead from 12103' to 12422'. Conduct rig service – 7 shots in upper bonnet seal. Continue drilling ahead from 12422' to 12432' and circulate. Trip out of hole from 12432' to 11750', while searching from wash in pipe. Lay down washed joint of pipe and trip in hole from 11750' to 12432'. Drill ahead from 12432' to 12572'.

8/15/2010 Drill ahead from 12572' to 12667', pump high vis sweep, and circulate out to relax well.

8/16/2010 Trip out of the hole. Back ream from 12667' to 12057'. Circulate at 12057' and spot 80 bbls. Of 12.5 PPG mud at 50 SPM. Continue to trip out and lay down BHA. Rig up CRT. Run Casing to 6655'.

8/17/2010 Run casing from 6655' to 12653'. Circulate bottoms up and rig down CRT. Pump 50 bbl. of Poly Flake with 371 bbls. of 9.6 PPG mud. Cementing 70 bbl spacer. Pump 1086 bbls of 12.0 PPG cement. Pumped 179 bbls of 8.4 PPG 2% NaCl water.

8/18/2010 Finish cement job. Skid the rig over the FRU 197-33B7 well and prepare to start laying down 5" drill pipe.

Exxon Mobil
Freedom Ranch Unit 197-33B10
Survey Data and Plots

EXXONMOBIL

PICEANCE CREEK, COLORADO

Freedom Ranch Unit 197-33B10


SURVEY SUMMARY

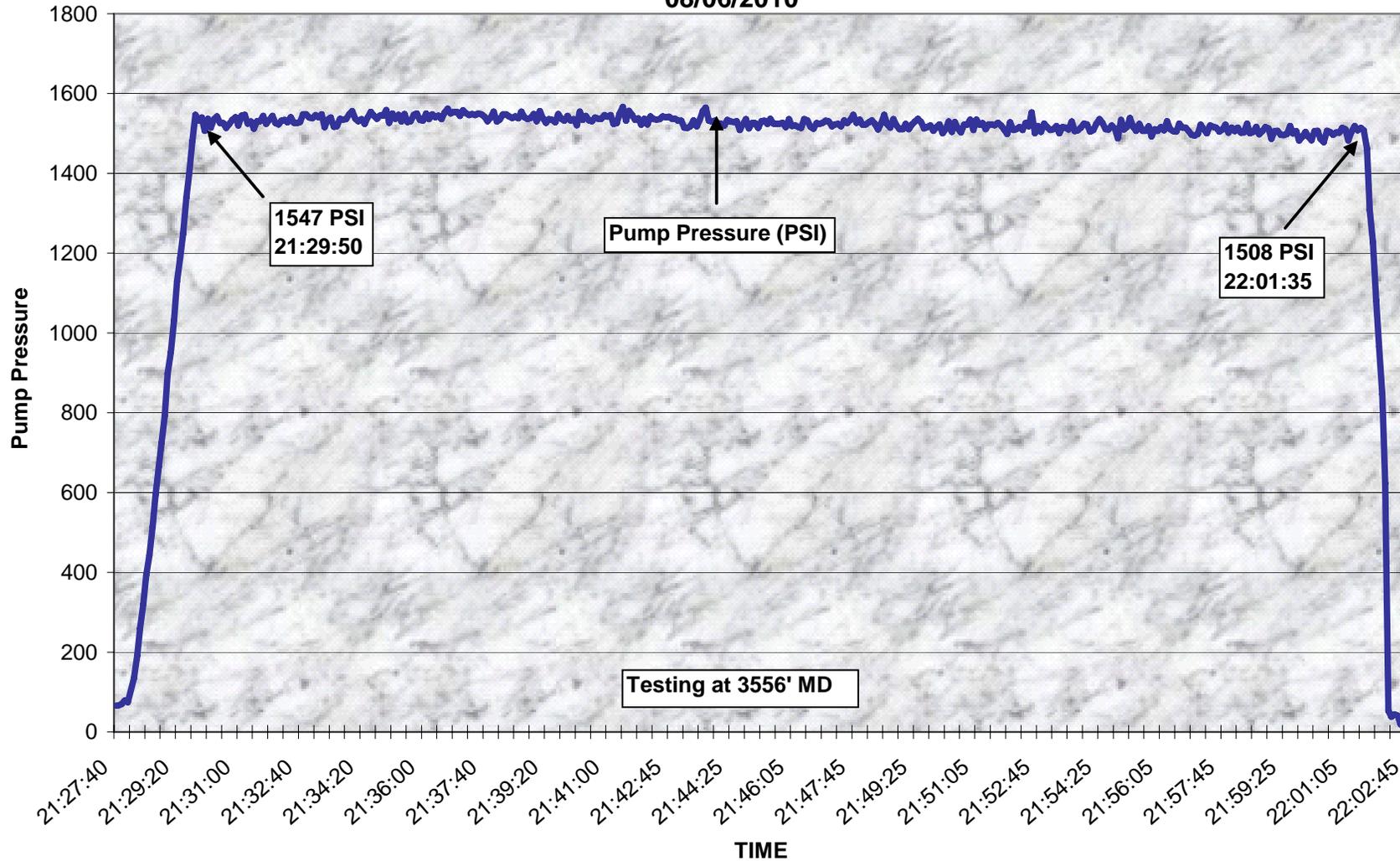
MEASURED DEPTH	INCL	AZIMUTH	TVD	VERTICAL SECTION	COORDINATES		DOGLEG SEVERITY
					N/S	E/W	
0	0	0	0	0	0	0	0
30	0	0	30	0	0	0	0
134	0.3025	292.033	133.9995	0.22458	0.10299	-0.25449	0.29087
196	0.275	8.365	195.9989	0.30406	0.3116	-0.38456	0.57664
259	0.682	276.9685	258.9972	0.60101	0.50667	-0.73474	1.17705
319	1.5675	268.0805	318.9851	1.7416	0.5225	-1.90939	1.4998
380	2.8325	252.8235	379.9394	4.0636	0.04944	-4.18332	2.26743
443	4.0645	254.9685	442.8241	7.84779	-0.98935	-7.82696	1.96591
544	6.237	253.9345	543.4103	16.90515	-3.43624	-16.5571	2.15287
634	7.7715	254.0005	632.7359	27.86516	-6.46656	-27.1049	1.70502
726	9.5535	255.15	723.6829	41.70937	-10.138	-40.4649	1.94598
822	11.4125	258.8515	818.0775	59.1662	-14.0165	-57.4856	2.05864
914	13.2495	261.321	907.9518	78.77667	-17.3676	-76.8398	2.07695
1012	15.0645	257.559	1002.974	102.7111	-21.8064	-100.38	2.07551
1106	16.786	258.648	1093.363	128.4952	-27.1102	-125.619	1.85869
1202	18.2765	256.712	1184.902	157.406	-33.2991	-153.862	1.66701
1296	19.1895	257.504	1273.922	187.5937	-40.0296	-183.29	1.00824
1361	19.88	257.39	1335.18	209.3272	-44.7538	-204.505	1.06392
1455	21.71	256.69	1423.053	242.6976	-52.2462	-237.023	1.96465
1551	23.71	255.83	1511.606	279.7546	-61.0597	-273.02	2.11179
1646	25.83	256.54	1597.861	319.5513	-70.5538	-311.67	2.2534
1742	27.3	256.87	1683.723	362.4821	-80.4234	-353.452	1.53894
1837	27.38	257.57	1768.112	406.1114	-90.0743	-396.001	0.34873
1933	27.59	257.99	1853.276	450.4117	-99.4517	-439.302	0.29769
2029	27.62	258.54	1938.348	494.8829	-108.499	-482.856	0.26731
2124	27.44	258.63	2022.591	538.7745	-117.189	-525.898	0.19447
2220	26.47	258.05	2108.161	582.276	-125.98	-568.515	1.04686
2315	25.78	257.6	2193.455	624.1016	-134.8	-609.406	0.75567
2410	24.71	256.46	2279.381	664.6157	-143.886	-648.888	1.23709
2506	23.6	255.9	2366.974	703.8953	-153.265	-687.035	1.18062
2601	22.69	254.61	2454.328	741.2179	-162.761	-723.145	1.0965
2696	22.44	254.32	2542.055	777.6388	-172.524	-758.268	0.28805
2790	22.75	254.53	2628.84	813.7207	-182.221	-793.058	0.34077
2886	23.13	254.41	2717.247	851.104	-192.239	-829.109	0.39882
2980	23.3	254.69	2803.636	888.1254	-202.11	-864.823	0.21562
3076	23.33	254.01	2891.797	926.082	-212.359	-901.41	0.28208
3171	23.08	253.95	2979.112	963.4648	-222.69	-937.388	0.26433
3267	23.18	254.45	3067.395	1001.133	-232.957	-973.674	0.22958
3363	23.76	255.73	3155.453	1039.345	-242.789	-1010.62	0.80433

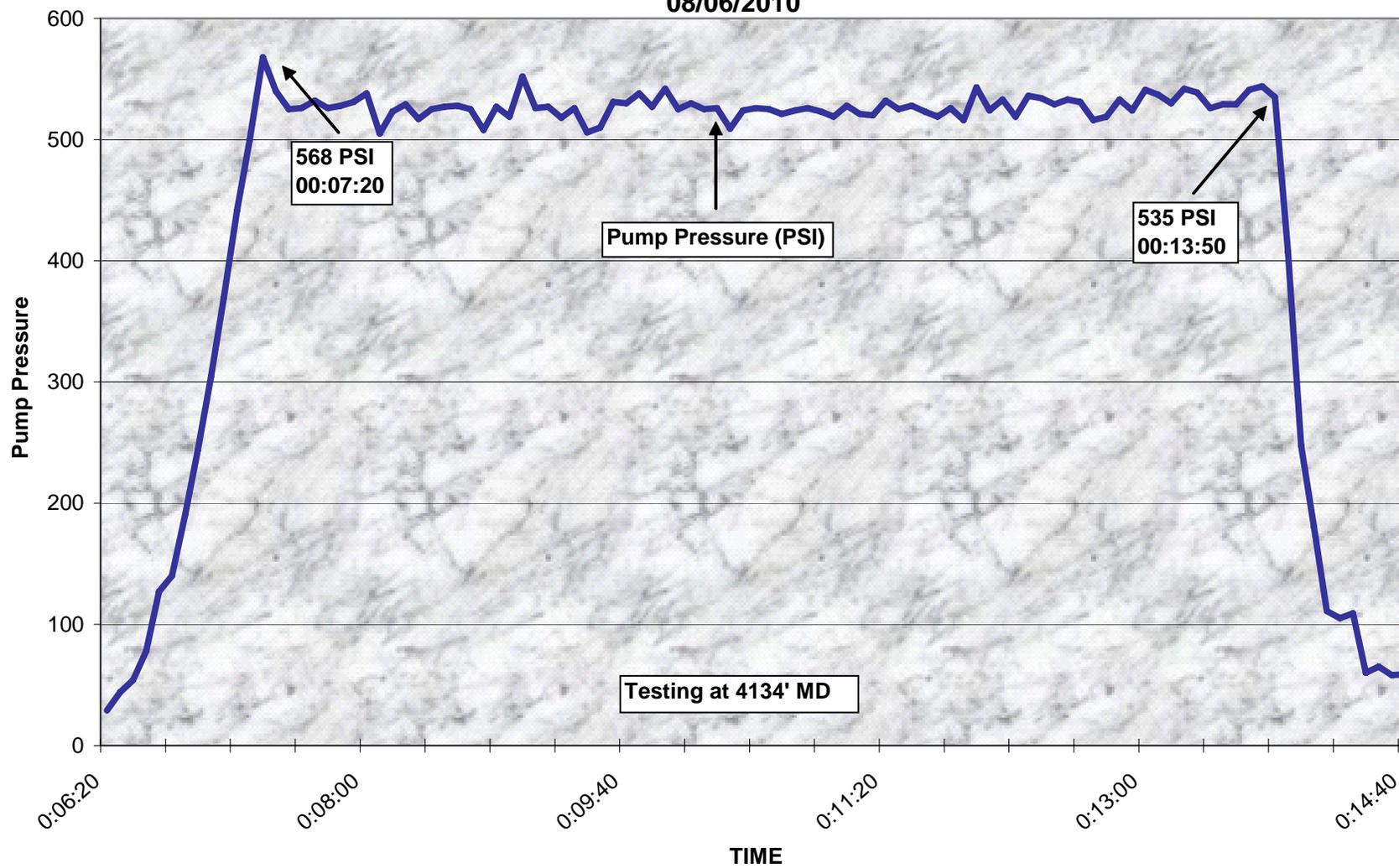
Note: All survey data provided by Schlumberger

**Exxon Mobil
Freedom Ranch Unit 197-33B10
Pressure Tests**



ExxonMobil FRU197-33B10
30 Min. 10.75" FIT 3556' MD
08/06/2010





Exxon Mobil
Freedom Ranch Unit 197-33B10
Drilling Fluid Reports

FREEDOM RANCH UNIT FRU 197-33B10

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	8/4/2010	8/5/2010	8/6/2010	8/7/2010	8/8/2010	8/9/2010	8/10/2010
Sample Temperature (deg F)	96	86	121	88	120	105	130
Sample Depth	4124	4124	5460	6335	7665	8232	8992
Mud Weight (lb/gal)	9.6	9.2	9.25	9.2	9.2	9.6	9.4
FV (sec/quart)	45	47	71	52	61	54	59
PV(cP)	14	13	20	16	26	20	25
YP (lb/100 ft2)	20	25	23	15	20	12	19
Gels (10 sec lb/100ft2)	6	7	11	6.8	9	8	11
Gels (10 min lb/100ft2)	11	13	36	8	16	13	17
Gels (10 30 min lb/100ft2)	13	15	49	11	27	18	21
API FL (cc/30 min)	7.4	7.6	7.4	16	7.2	7.8	6.0
Cake (API)	1	1	2	2	2	2	2
pH	9.1	9.4	9.7	9.6	9.8	9.5	9.7
PM	0.75	0.80	1.10	0.90	1.10	0.90	1.15
Pf	0.05	0.05	NA	0.05	0.05	0.05	0.05
MF	0.75	0.80	0.20	0.25	0.20	0.30	0.25
Excess Lime (lb/bbl)	0.18	0.20	0.29	0.22	0.27	0.22	0.29
Hardness (mg/l)	20	20	40	40	20	20	40
Chlorides (mg/l)	1300	1300	1300	1300	1300	1300	1300
MBT (lb/bbl)	15.0	15.0	22.5	20.0	17.5	17.5	17.5
Retort Water (%)	92.0	94.0	93.0	94.0	94.0	92.5	93.0
Sand (%)	0.25	0.25	0.50	0.25	0.25	0.20	0.25
Corrected Solids (%)	7.7	5.7	6.7	5.7	5.7	7.2	6.7

FREEDOM RANCH UNIT FRU 197-33B10

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	8/11/2010	8/12/2010	8/13/2010	8/14/2010	8/15/2010	8/16/2010	8/17/2010
Sample Temperature (deg F)	128	140	146	140	145	130	130
Sample Depth	9944	11048	11833	12357	12660	12667	12667
Mud Weight (lb/gal)	9.4	9.4	9.4	9.4	9.4	9.60	9.60
FV (sec/quart)	52	59	60	59	58	57	50
20PV(cP)	20	22	21	18	21	20	19
YP (lb/100 ft2)	22	22	22	28	24	24	25
Gels (10 sec lb/100ft2)	10	9	10	9	8	8	7
Gels (10 min lb/100ft2)	17	13	15	13	10	15	12
Gels (10 30 min lb/100ft2)	23	18	21	17	14	18	14
API FL (cc/30 min)	6.0	6.8	6.4	6.4	6.8	6.6	7.4
Cake (API)	2	2	2	1	1	½	½
pH	9.6	9.6	10.0	9.6	9.7	9.60	9.50
PM	1.00	1.10	1.10	0.95	0.85	0.90	0.85
Pf	0.05	0.05	0.10	0.10	0.10	0.10	0.10
MF	0.25	0.60	0.50	0.70	1.60	1.20	1.40
Excess Lime (lb/bbl)	0.25	0.27	0.26	0.22	0.20	0.21	0.20
Hardness (mg/l)	20	40	40	20	20	20	20
Chlorides (mg/l)	1400	1400	1300	1300	1300	1300	1300
MBT (lb/bbl)	20.0	20.0	20.0	17.5	17.5	17.5	17.5
Retort Water (%)	93.0	92.0	92.0	92.2	91.5	91.0	91.2
Sand (%)	0.40	0.50	0.50	0.30	0.35	0.30	0.30
Corrected Solids (%)	6.7	7.0	7.0	6.7	7.2	7.9	8.1

Exxon Mobil
Freedom Ranch Unit 197-33B10
Bit History



BIT HISTORY

FRU 197-33B10

BIT #	RUN #	Mfr.	Size	Type	Jets (Qty/Size)		Depth In	Depth Out	Footage	Hours
1	1	SECURITY	14.75"	FX75M	7	12	150'	4124'	3974'	
2	1	HRC	8.75"	Q505X	4 2	12 13	4124'	6340'	2216'	24:36:12
3	1	HUGHES	8.75"	Q506FX	6	12	6340'	8228	1888	29:45:07
4	1	HUGHES	8.75"	Q506FX	6	12	8228'	12667'	4439'	114:55:14

Exxon Mobil
Freedom Ranch Unit 197-33B10
Ballooning Data

DEPTH (ft)	VOLUME (bbls)	Flow Out %	Connection Gas (u)	Background Gas (u)	Mud Weight	Mud Losses (bbls)
4148	53	0	5	5	9.15	0
4245	33	0	36	11	9.15	17
4341	37	0	18	8	9.2	21
4435	38	0	13	9	9.25	19
4534	33	0	9	8	9.25	11
4629	0	0	9	8	9.3	11
4724	0	0	8	6	9.3	0
4813	0	0	10	7	9.3	9
4910	0	0	9	7	9.3	45
5006	1	0	9	8	9.3	7
5102	0	0	12	7	9.3	13
5199	0	0	13	7	9.3	6
5289	0	0	12	7	9.3	35
5384	1	0	70	12	9.3	0
5480	1	0	97	13	9.3	27
5575	0	0	108	32	9.25	0
5670	6.3	0	60	27	9.2	18
5768	0	0	127	34	9.15	13
5860	6.3	2	17	11	9.2	9
5961	4.5	2	16	10	9.2	13
6057	7.1	2	706	16	9.2	9
6154	3.7	4	1166	33	9.2	12
6250	21.6	1	168	56	9.1	15
6416	15.8	2	340	39	9.2	7
6510	13.4	2	352	46	9.25	18
6605	20.5	2	124	37	9.15	13
6703	143.2	1	56	42	9.25	17
6799	31	1	603	26	9.2	15
6895	39.9	1	314	18	9.2	300
6991	18	8	940	15	9.2	165
7088	48	16	633	42	9.2	32
7185	63	18	1464	20	9.2	68

* When flow is zero, 11 bbls are subtracted to compensate for flow line draining.

DEPTH (ft)	VOLUME (bbls)	Flow Out %	Connection Gas (u)	Background Gas (u)	Mud Weight	Mud Losses (bbls)
7276	48	17	990	17	9.2	56
7372	47	18	876	16	9.2	28
7468	20	4	1546	20	9.2	113
7560	35	14	1157	30	9.2	72
7656	35	12	150	23	9.2	63
7753	35	2	1012	34	9.2	17
7853	39.1	2	1156	77	9.2	19
7946	40.9	1	2039	181	9.2	11
8042	32	2	2147	247	9.2	16
8137	39.4	3	2191	261	9.2	18
8232	19.6	2	1250	86	9.25	17
8323	60.2	1	1548	89	9.25	152
8419	42	12	1657	115	9.3	150
8515	39	21	1508	56	9.2	53
8611	45	22	1580	34	9.2	42
8703	33	20	1371	40	9.2	15
8799	28	23	1615	60	9.2	38
8897	38	20	1181	83	9.2	45
8993	79.5	2	1309	61	9.4	37
9093	53.2	2	1500	48	9.4	13
9185	45.1	2	975	53	9.4	9
9281	55.7	2	1092	43	9.4	17
9376	16	2	1957	485	9.4	12
9472	57.3	2	1501	121	9.4	11
9568	34	14	1912	100	9.4	123
9664	34	22	2267	96	9.4	162
9746	33	26	1516	78	9.4	128
9842	33	27	2271	94	9.4	130
9939	38	17	2297	99	9.4	93
10035	40	20	1345	110	9.4	19
10132	48	2	1200	127	9.4	17
10228	38	2	1923	113	9.4	21

* When flow is zero, 11 bbls are subtracted to compensate for flow line draining.

DEPTH (ft)	VOLUME (bbls)	Flow Out %	Connection Gas (u)	Background Gas (u)	Mud Weight	Mud Losses (bbls)
10325	46	2	1324	124	9.4	27
10421	42	2	1289	114	9.45	41
10517	38	2	1477	123	9.45	106
10612	27	20	1371	115	9.4	147
10706	39	0	1509	141	9.4	58
10803	26	23	1134	114	9.4	101
10899	57	14	1397	145	9.4	120
10996	45	27	2184	167	9.4	140
11092	0	0	740	219	9.4	97
11185	54	20	964	237	9.45	43
11282	37	19	1472	284	9.4	15
11372	29	0	1103	126	9.4	28
11468	43	18	1691	141	9.4	67
11564	27	21	791	113	9.4	93
11660	45	19	854	152	9.4	141
11756	43	16	2219	145	9.4	0
11848	38	16	904	111	9.45	21
11944	47	13	1196	167	9.4	15
12041	50	8	214	67	9.4	8
12136	32	22	977	68	9.4	125
12232	32	21	1336	102	9.45	127
12328	25	25	1132	87	9.45	42
12424	30	13	1558	105	9.4	0
12516	43	14	1813	78	9.4	18
12612	40	16	1814	68	9.4	26

* When flow is zero, 11 bbls are subtracted to compensate for flow line draining.

Exxon Mobil
Freedom Ranch Unit 197-33B10
Losses and Gas Buster Data

