



## Well History

Freedom Ranch Unit FRU 197-33B9  
API: 051031142200  
Rio Blanco County, Colorado

EPOCH Well Services, Inc.  
New Iberia, Louisiana

**ExxonMobil**  
*Development*

**CANRIG**

# **Well History**

## **Exxon Mobil Production Company**

**Freedom Ranch Unit FRU 197-33B9  
Rio Blanco County, Colorado**



## Table of Contents

General Overview	4
Introduction	5
General Geology	6
Formation Tops	7
Wasatch Formation	8
Mesa Verde Group	10
950 AS/Ohio Creek Sandstone	10
900 SB/Williams Fork "850"	11
850 SB/Williams Fork "800"	12
800 SB/Williams Fork "700"	13
690 AS/Williams Fork "600"	14
600 SB/Williams Fork "500"	15
490 AS/Williams Fork "400"	16
400 SB/Williams Fork "300"	17
290 AS/Williams Fork "200"	18
210 SB/Cameo Formation	19
200 SB/Rollins Formation	20
180 FS/Cozzette Formation	22
140 FS/Corcoran Coastal Plain	23
140 SB/Corcoran Marine	24
Pixler Plot	25
ROP Trend Graph	28
Total Gas Trend Graph	29
CO2 Gas Trend Graph	30
Drilled Formation Descriptions	31
Daily Drilling History	38
Survey Data	42
Pressure Tests	45
Drilling Fluid History	48
Bit History	52
Ballooning Data	54
Mud Losses Data	58

# **General Overview and Geology Exxon Mobil Production Company**

**Freedom Ranch Unit FRU 197-33B9  
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 39.921322000" N
- Longitude 108.282561000" W

The well was spudded on April 8, 2010. Drilling operations were conducted from spud through to a total depth of 12,300' (MD) on August 1, 2010. Drilling operations were conducted by Helmerich & Payne using a Flex 4 rig (#321). Canrig personnel logged and collected samples starting at 3,950' 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 149 feet;
- 10.75-inch casing at 3,940 feet;
- 4.5-inch casing at 12,255 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;
- CO<sub>2</sub> 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 197-33B9 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 Sego 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 197-33B9 Formation Tops

Formation/Member Name	Stratigraphic Unit Top	Depth (MD/TVD)
<b>Wasatch Formation</b>		
Wasatch "G"		5,429' / 5,298'
Wasatch "I"		5,764' / 5,633'
<b>Ohio Creek Formation</b>		
	950 Abandonment Surface (AS)	7,192' / 7,061'
<b>Williams Fork Formation</b>		
WF 850	900 Sequence Boundary (SB)	7,514' / 7,383'
WF 800	850 Abandonment Surface (AS)	7,748' / 7,617'
WF 700	800 Sequence Boundary (SB)	7,935' / 7,804'
WF 600	690 Abandonment Surface (AS)	8,129' / 7,998'
WF 500	600 Sequence Boundary (SB)	8,377' / 8,246'
WF 400	490 Abandonment Surface (AS)	8,914' / 8,783'
WF 300	400 Sequence Boundary (SB)	9,636' / 9,505'
WF 200	290 Abandonment Surface (AS)	10,668' / 10,537'
Cameo	210 Sequence Boundary (SB)	10,982' / 10,851'
<b>Iles Formation</b>		
Rollins Member	200 Sequence Boundary (SB)	11,265' / 11,134'
Trans Cozzette		11,470' / 11,339'
Cozzette Member	180 Flooding Surface (FS)	11,511' / 11,380'
Corcoran Coastal Plain	140 Flooding Surface (FS)	11,812' / 11,681'
Corcoran Marine	140 Sequence Boundary (SB)	NA

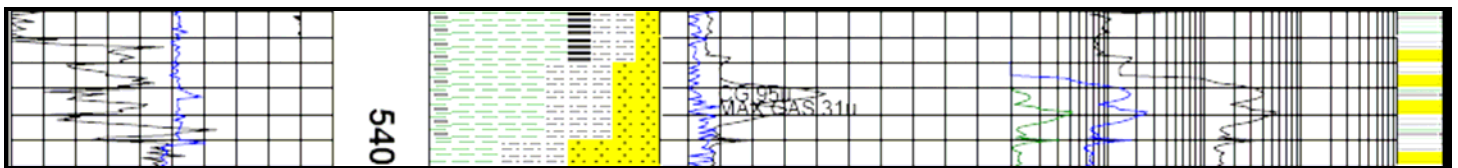
## Upper Wasatch Formation

The Upper Wasatch Formation was encountered from the point of drilling out from surface casing (3,950' 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	228.557	1248.894	42.713
Minimum	20.437	2.635	1.182
Mean	111.043	406.289	6.867
Standard Deviation	21.923	178.315	4.588

The only significant gas show in the Upper Wasatch appeared at 5,388' in association with a thin carbonaceous shale body interbedded with siltstone and sandstone. This gas show produced a maximum gas of 31 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.



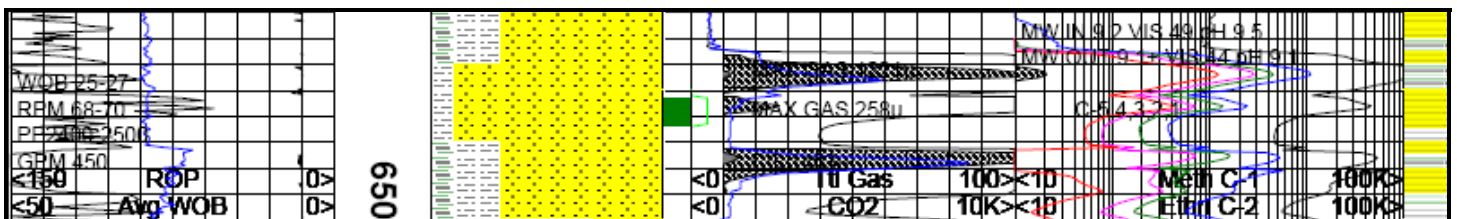
## Lower Wasatch Formation

The lower Wasatch Formation is assigned from the occurrence of the top of the Wasatch "G" (5,429' MD / 5,298' TVD) through to the top of the Ohio Creek Formation (7,192' MD / 7,061' 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.

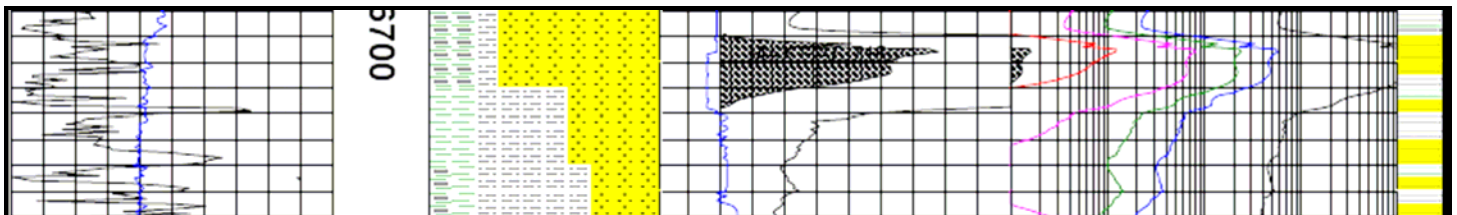
### Lower Wasatch Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	575.632	8558.685	2476.640
Minimum	30.565	11.859	4.430
Mean	116.663	1059.718	64.541
Standard Deviation	35.213	647.693	155.640

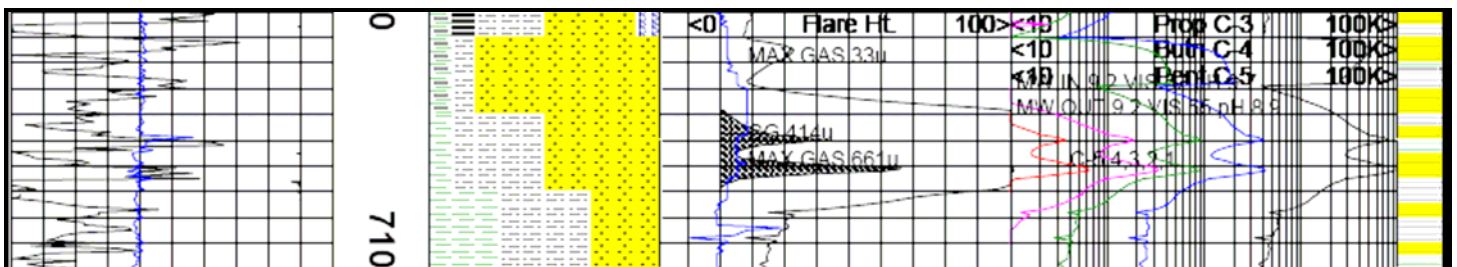
The first significant and most significant gas show of the Wasatch G formation occurred at 6,453' with a maximum gas of 1221 units. It was associated with a large sandstone body with interbedded siltstone layers.



The next significant gas show occurred at 6,706' with a maximum gas show of 715 units. It was associated with interbedded sandstone, siltstone, and carbonaceous shale beds.



The last significant gas show of the Lower Wasatch occurred at 7,071' with a maximum gas show of 661 units. It was associated with a large sandstone body with interbedded layers of siltstone.



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

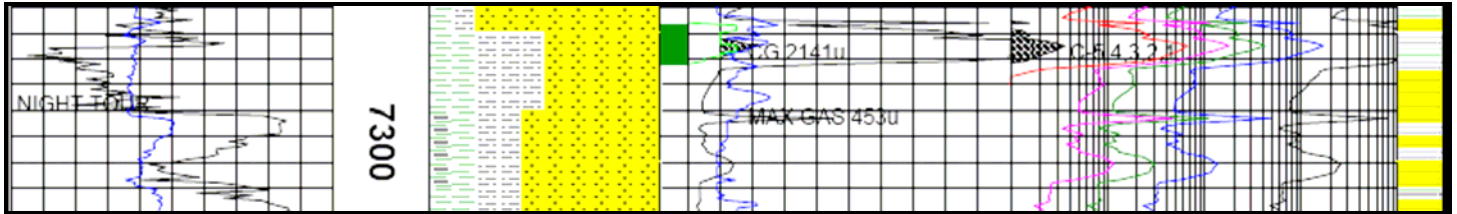
As noted above, the Ohio Creek Formation top was encountered at (7,192' MD / 7,061' TVD). The Ohio Creek Formation is generally considered to mark the boundary between the Tertiary Wasatch Formation and the Cretaceous Mesa Verde Group. It is interpreted as an erosion surface and consists of slightly 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	148.760	3013.899	2091.716
Minimum	20.353	595.253	15.743
Mean	82.667	1204.590	220.367
Standard Deviation	30.134	506.605	318.434

The only significant gas show of the Ohio Creek formation occurred at 7,292' with a maximum gas of 453 units. It was associated with a large sandstone body with interbedded siltstone and carbonaceous shale layers.



Chromatography through the Ohio Creek included C-1 through C-4, with 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 (7,514' MD / 7,383' 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:

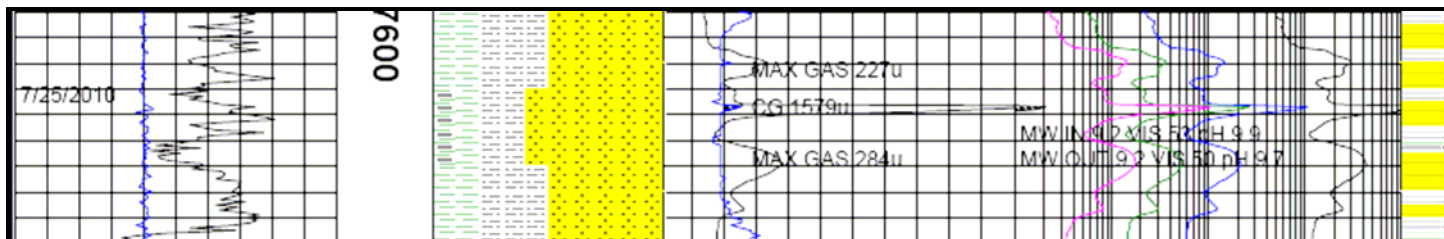
- Fine grained to very fine grained;
- Grain supported with carbonate-clay matrix;
- Surrounded to sub angular, clear to translucent quartz with moderate sphericity overall;
- Occasionally to commonly kaolinitic;
- Occasional dis-aggregation to loose sand grains in the sample tray.

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 CO<sub>2</sub> data for the WF 850 are presented as follows:

### Williams Fork 850 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	263.312	2125.417	1578.996
Minimum	21.920	562.346	23.905
Mean	65.064	1138.074	114.678
Standard Deviation	27.641	313.562	156.983

The only significant gas show of the Williams Fork 850 occurred at 7649', with a maximum gas show of 284 units. It was associated with interbedded layers of sandstone, siltstone, and carbonaceous shale.



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

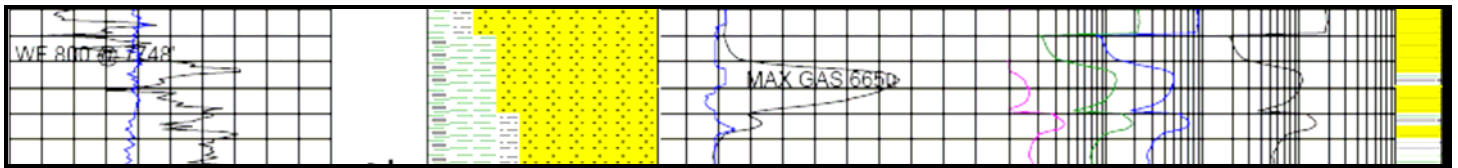
## 850 Abandonment Surface/Williams Fork 800

The 850 AS, which marks the top of the Williams Fork 800 was encountered at a depth of (7,748' MD / 7,617' 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	215.879	2783.552	1136.658
Minimum	36.817	595.253	83.280
Mean	99.807	1464.466	292.292
Standard Deviation	39.160	494.038	255.962

The only significant gas show from the Williams Fork 700 was recorded at 7,758' reaching 665 units. It was produced from interbedded sandstone and carbonaceous shale beds.



Chromatography through the Williams Fork 800 Formation included C-1 through C-4 being observed throughout the drilled interval with C-5 occurring at high gas peaks.

## 800 Sequence Boundary/Williams Fork 700

The 800 SB was encountered at (7,935' MD / 7,804' 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:

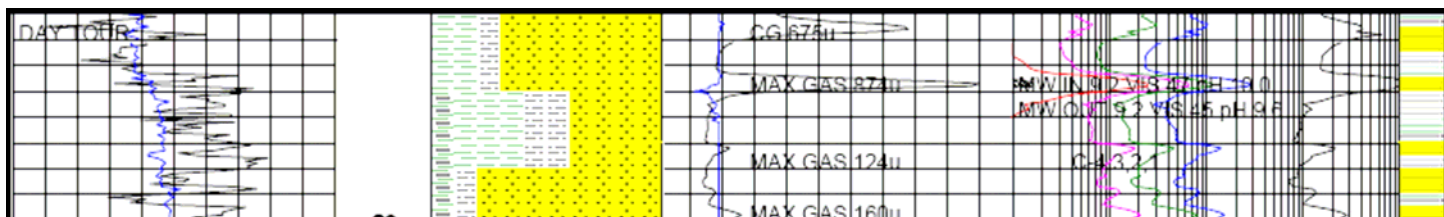
- Dark brown to dark gray color;
- Soft to slightly firm;
- Dull, earthy luster with occasional waxy zones;
- Occasionally silty zones.

Data for the WF 700 are summarized as follows:

### Williams Fork 700 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	182.852	1845.709	897.578
Minimum	31.287	148.757	9.351
Mean	80.391	983.507	172.849
Standard Deviation	27.409	291.556	161.448

The only significant gas show of the Williams Fork 700 formation occurred at 8,037', which peaked at 874 units. The formation was composed of a thick sandstone body with interbedded siltstone beds.



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.

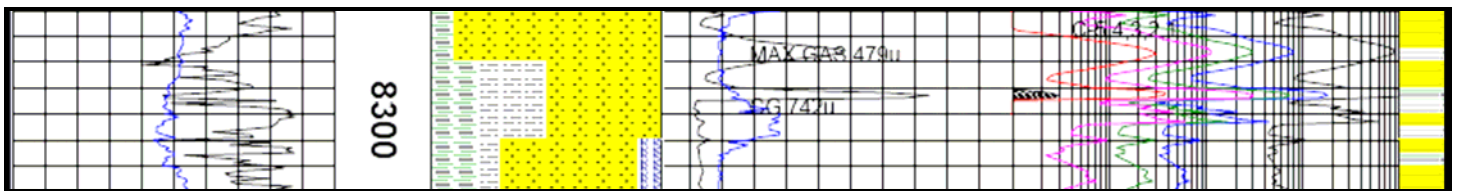
## 690 Abandonment Surface/Williams Fork 600

The 690 AS, marking the top of the Williams Fork 600 Member was encountered at (8,1294' MD/ 7,998' 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	139.55	15633.63	775.84
Minimum	8.49	677.52	5.75
Mean	47.91	2105.05	90.61
Standard Deviation	20.25	2968.28	136.86

The only significant gas show in the Williams Fork 600 was 479 units occurring at 8277'. It is associated with a large sandstone body with interbedded layers of 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.

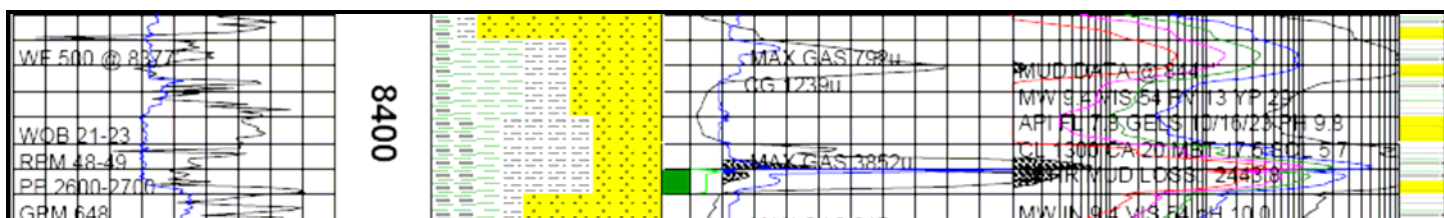
## 600 Sequence Boundary/Williams Fork 500

The 600 SB occurred at a depth of (8,377' MD / 8,246' 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:

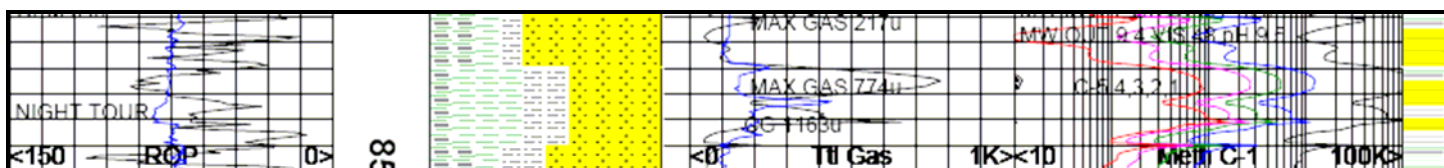
**Williams Fork 500 Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	182.852	14399.632	3852.689
Minimum	9.064	74.379	15.210
Mean	56.257	1271.302	213.659
Standard Deviation	26.431	727.707	407.211

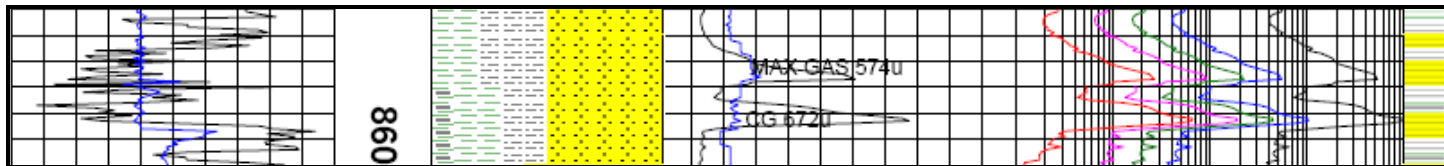
The first significant gas shows in the Williams Fork 500 occurred at 8,380' and 8,420' with maximum gas of 792 and 3852 units, respectively. The gas shows was associated with interbedded sandstone, siltstone, shale, and carbonaceous shale beds.



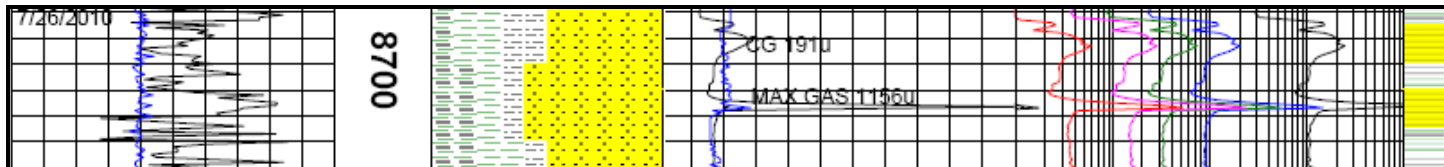
The next significant gas show of the Williams Fork 500 occurred at 8,465' with a maximum gas of 774 units. The gas shows was associated with interbedded sandstone, siltstone, and carbonaceous shale beds.



Another significant gas show of the Williams Fork 500 occurred at 8,577' with a maximum gas of 574 units. The gas shows was associated with a large sandstone bed with interbedded siltstone.



The last significant gas show of the Williams Fork 500 occurred at 8,717' with a maximum gas of 1156 units. The gas shows was associated with large sandstone body with interbedded siltstone and carbonaceous shale beds.



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



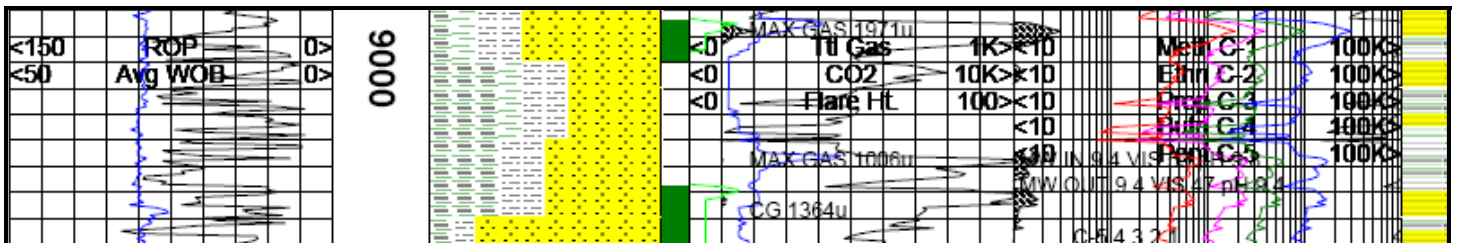
## 490 Abandonment Surface/ Williams Fork 400

The 490 Abandonment Surface was encountered (8,914' MD / 8,783' 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:

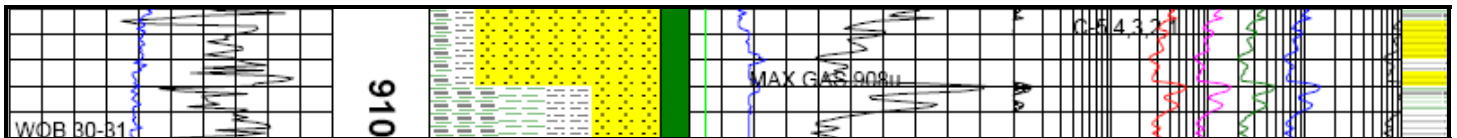
**Williams Fork 400 Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	134.973	8328.338	3338.275
Minimum	5.290	512.986	30.708
Mean	52.475	1493.014	473.890
Standard Deviation	21.924	702.773	433.255

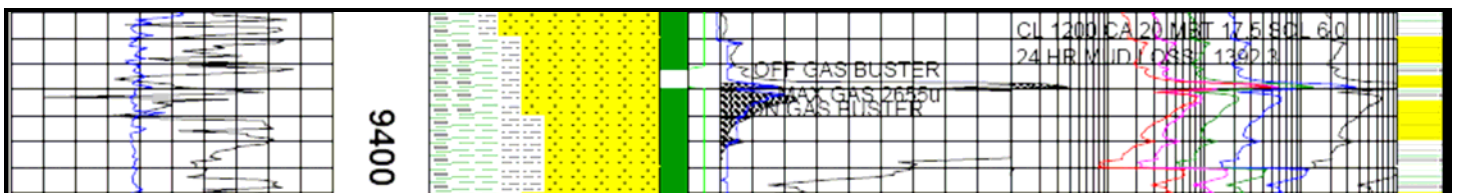
The William Fork 400 formation produced many high gas peaks through out the formation. Listed below are the most significant gas peaks for this formation. The first significant shows from the Williams Fork 400 produced from a large sandstone bed with interbedded layers of siltstone and carbonaceous shale. This gas produced 1971 and 1006 units, at 8988' and 9038', respectively.



The next significant gas shows from the Williams Fork 400 was observed at 9,090', and peaked at 908 units. This show correlates with a large sandstone bed with interbedded layers of siltstone and carbonaceous shale.



The final and most significant high gas recorded in the Williams Fork 400 was recorded at 9,384' with a maximum gas of 2655 units. It was also produced from a large sandstone bed with interbedded layers of siltstone and carbonaceous shale.



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



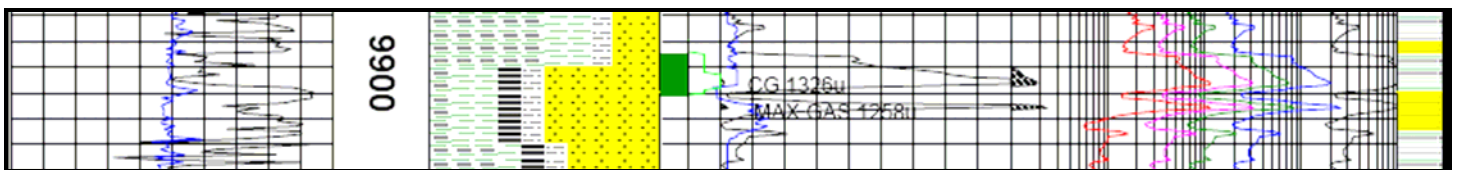
## 400 Sequence Boundary/ Williams Fork 300

The Williams Fork 300 member has an upper boundary of (9,636' MD / 9,505' 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:

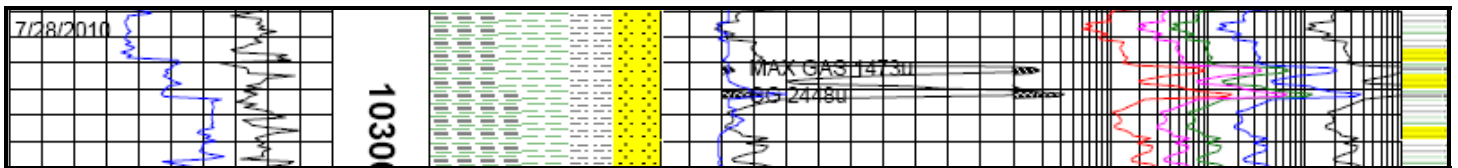
### Williams Fork 300 Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	121.984	19664.711	4199.743
Minimum	7.445	595.253	4.865
Mean	41.694	1859.243	477.334
Standard Deviation	18.948	1952.068	518.005

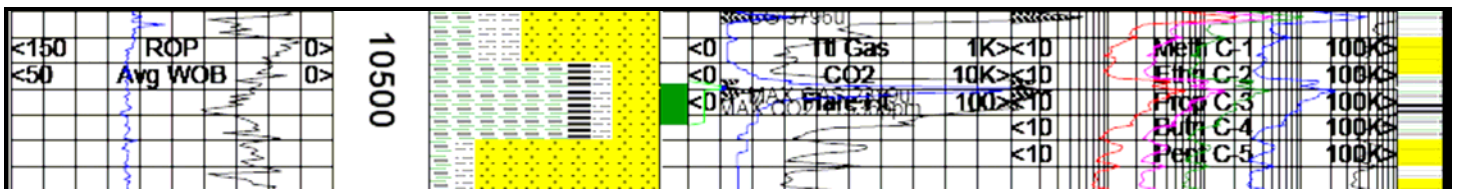
The William Fork 300 formation produced many high gas peaks as you moved farther down in the formation. The first gas shows from the Williams Fork 300 was noted at 9,916' peaking at 1,258 units. This peak was associated with interbedded sandstone, siltstone, carbonaceous shale, and coal beds.



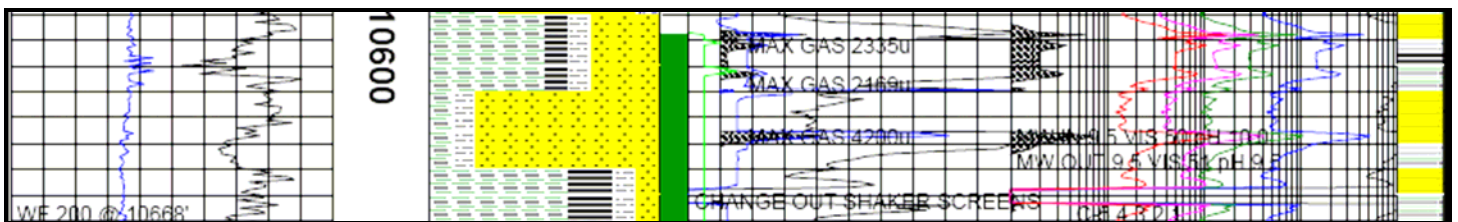
The next significant gas show of 1,473 units was recorded at 10,282'. It was in association with interbedded sandstone, siltstone and carbonaceous shale beds.



Another significant gas show of 2,319 units was recorded at 10,511'. It was associated with a very large carbonaceous shale bed with interbedded sandstone and coal layers.



The final significant gas shows recorded at 10,602', 10,619', and 10,638'. The gas shows reached peaks of 2,335, 2,169, and 4,200 units, respectively. This gas was associated with interbedded sandstone, carbonaceous shale, and coal layers.



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

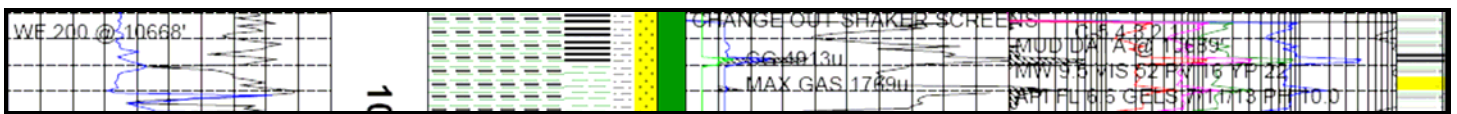
## 290 Abandonment Surface/ Williams Fork 200

The 290 AS occurred at a depth of (10,668' MD / 10,537' 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:

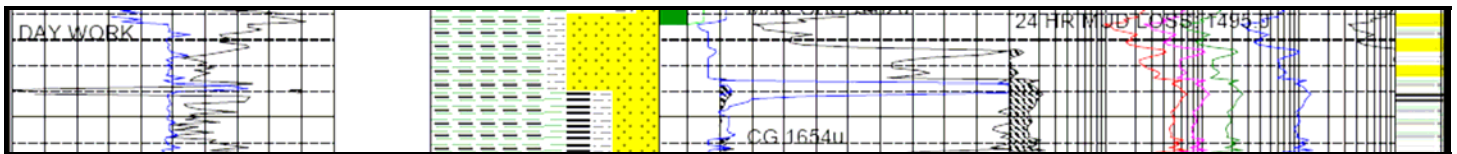
**Williams Fork 200 Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	202.423	21392.936	3808.074
Minimum	12.719	339.270	206.030
Mean	48.909	2748.657	941.797
Standard Deviation	18.509	4226.735	403.297

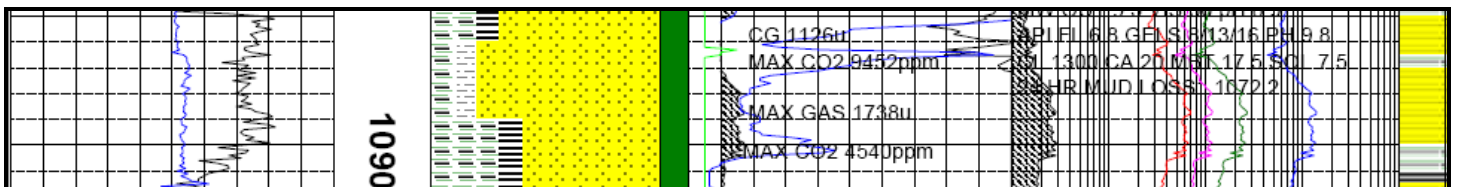
The William Fork 200 formation produced many high gas peaks through out the formation. The first high gas shows from the Williams Fork 200 was noted at 10,691', reaching a high gas peak of 1,769 units. This show was associated with a large carbonaceous shale bed with interbedded coals found at the top of the formation.



The next significant gas shows produced at 10,741', reaching an high gas peak of 1,387 units. This show was associated with the top of another large carbonaceous shale bed with interbedded sandstone and coals.



The final significant gas shows produced 1,738 units, and was recorded at 10,887', in association with the top of a large sandstone bed with interbedded carbonaceous shale. This large sandstone was located in the middle of the formation.



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

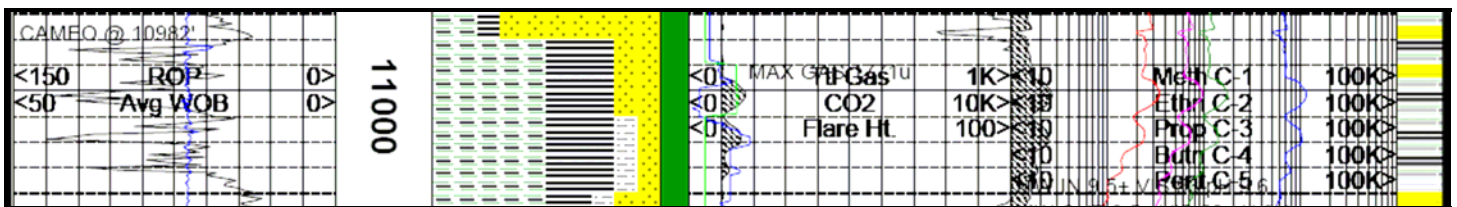
## 210 Sequence Boundary/Cameo Formation

The 210 SB, marking the top of the Cameo Formation, occurred at a depth of (10,982' MD/ 10,851' 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:

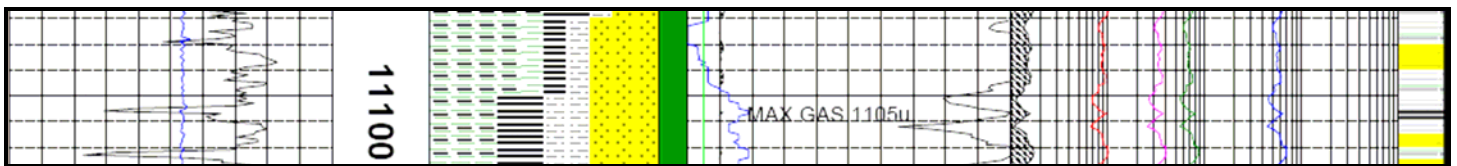
**Cameo Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	134.268	5995.479	1801.461
Minimum	22.886	25.036	627.672
Mean	53.882	1169.064	1052.496
Standard Deviation	21.425	853.147	248.836

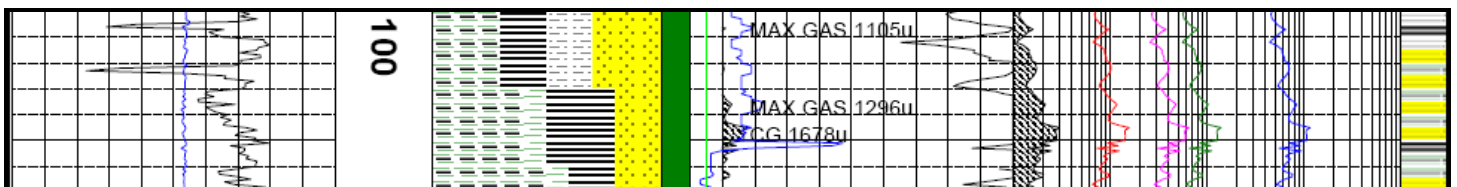
The Cameo formation produced many high gas peaks through out the formation. The first significant gas from the Cameo formation appeared at 11,002', peaking at 1,771 units. It was produced by large carbonaceous shale with interbedded coals found at the top of the formation.



Another high gas show came in at 11,107', and recorded a peak gas of 1,105 units. It was produced by a thin coal bed located in 40' carbonaceous shale and siltstone bed.



The next significant gas show occurred at 11,137' with a high gas peak of 1,296 units. It is associated with interbedded sandstone and carbonaceous shale bed.



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

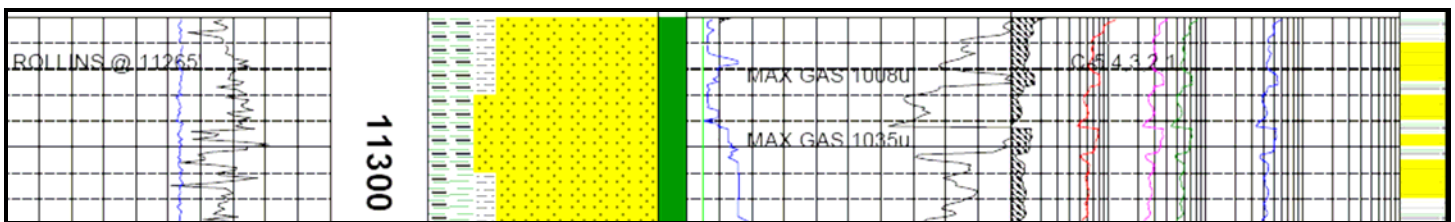
## 200 Sequence Boundary/Rollins Formation

The 200 SB occurred at (11,265' MD/ 11,134' 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:

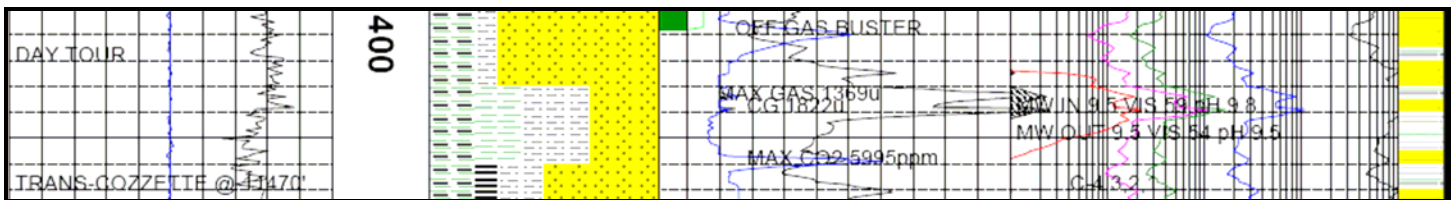
**Rollins Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	73.855	6938.180	1763.787
Minimum	17.755	504.656	186.274
Mean	38.704	1436.063	679.007
Standard Deviation	8.999	935.206	275.477

The Rollins formation produced many high gas peaks through out the formation. The first significant gas show of the Rollins Formation recorded at 11,275'. It recorded a maximum gas of 1,008 units, and was associated with a large sandstone body at the top of the formation with interbedded carbonaceous shale layers. It was followed by another large gas of 1,035 units at 11,296'.



The last significant gas show of the Rollins Formation recorded at 11,434'. It recorded a maximum gas of 1,369 units, and was associated with another sandstone bed with interbedded carbonaceous shale layers.



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 (11,470' MD/ 11,339' 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:

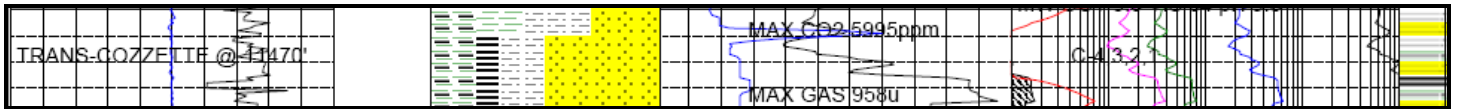
- Light brownish gray to light yellowish gray;
- Moderate hard to firm friable;
- Fine to medium to occasionally coarse grain;
- Occasionally silty zones.
- 5-6% visible carbonaceous material

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

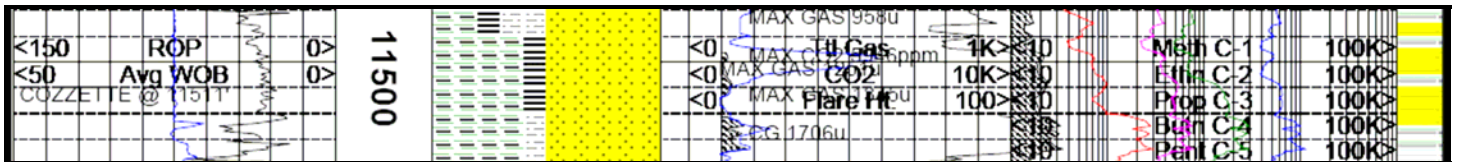
### Trans-Cozzette Formation Statistics

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	58.776	5945.863	1345.016
Minimum	21.415	1281.971	496.735
Mean	36.884	2378.361	920.295
Standard Deviation	7.734	1368.871	220.800

The Trans-Cozzette produced two high gas peaks through out the formation, and is listed below. The first significant gas show in the Trans-Cozzette occurred at 11,485'. It peaked at a maximum gas of 958 units. It is associated with a thin sandstone bed with interbedded coal and carbonaceous shale.



Final gas show occurred at 11,509' with a maximum gas show of 1,345 units. It is associated with an interbedded carbonaceous shale and sandstone bed at the base of the transition zone.



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



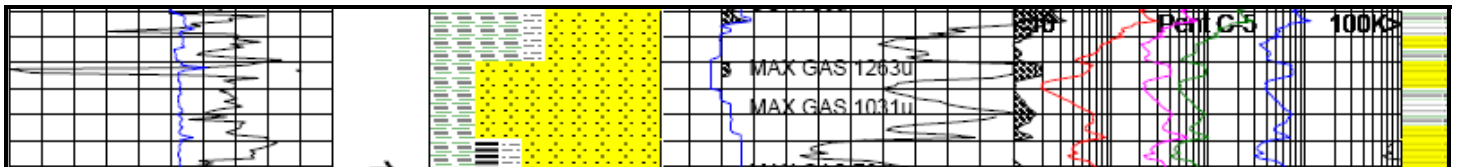
## 180 Flooding Surface/Cozzette Formation

The top of the Cozzette Formation, at (11,511' MD/ 11,380' 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:

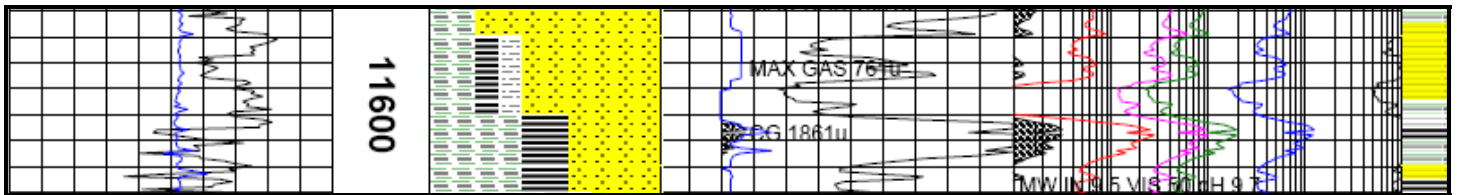
**Cozzette Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	113.165	9369.357	1834.368
Minimum	13.784	624.951	74.001
Mean	32.313	1455.654	632.875
Standard Deviation	11.460	734.430	369.037

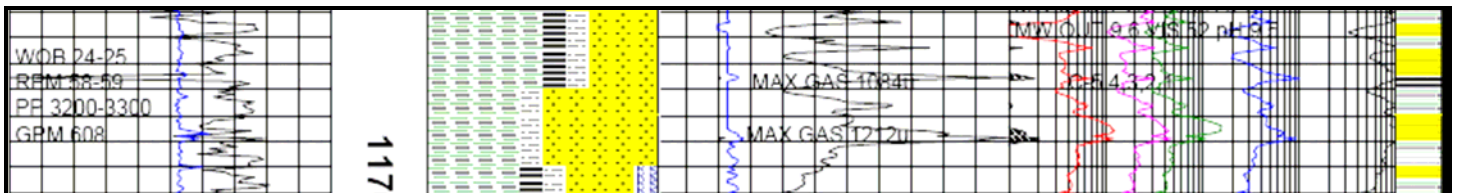
The Cozzette formation produced many high gas peaks through out the formation. The first significant gas shows of the Cozzette Formation recorded at 11,550' and 11,570'. It recorded a maximum gas of 1,263 and 1,031 units respectively, and was associated with a large sandstone body with interbedded layers of carbonaceous shale.



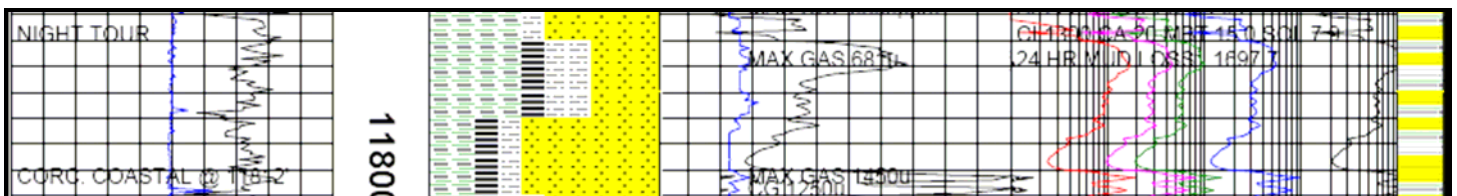
The next significant gas show of the Cozzette formation recorded at 11,595'. It recorded a maximum gas of 761 units, and was associated with interbedded sandstone, siltstone, carbonaceous shale, and coal beds.



Another significant gas shows recorded at 11,667' and 11,680'. It recorded a maximum gas of 1,084 and 1,212 units respectively, and was associated with a large carbonaceous shale body with interbedded sandstone, siltstone, and coal layers.



The last significant gas shows recorded at 11,769. It recorded a maximum gas of 681 units, and was associated with interbedded sandstone, siltstone, carbonaceous shale, and coal layers.



Chromatography through the Cozzette Formation included C-1 through C-5 appearing at high gas shows.

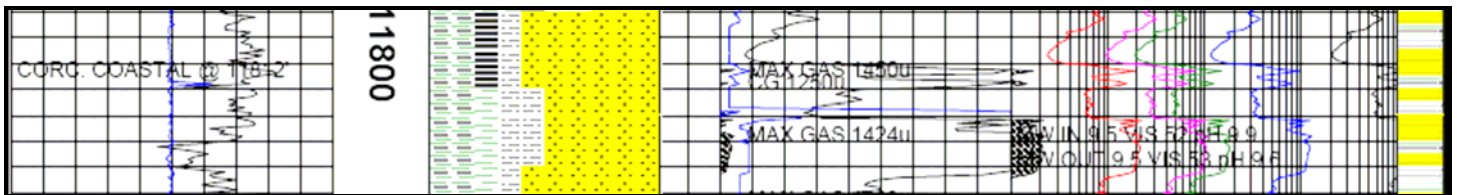
## 140 Flooding Surface/Corcoran Coastal Plain

The top of the Corcoran Coastal Plain, marked by the 140 Flooding Surface, was encountered at (11,812' MD / 11,681' TVD). This section encompasses a thick sequence of sandstone, shale, and carbonaceous shale. The well was completed within the Corcoran Coastal Plain at a depth of 12,300' MD / 12,169' TVD. Data for the Corcoran Coastal Plain are summarized as follows:

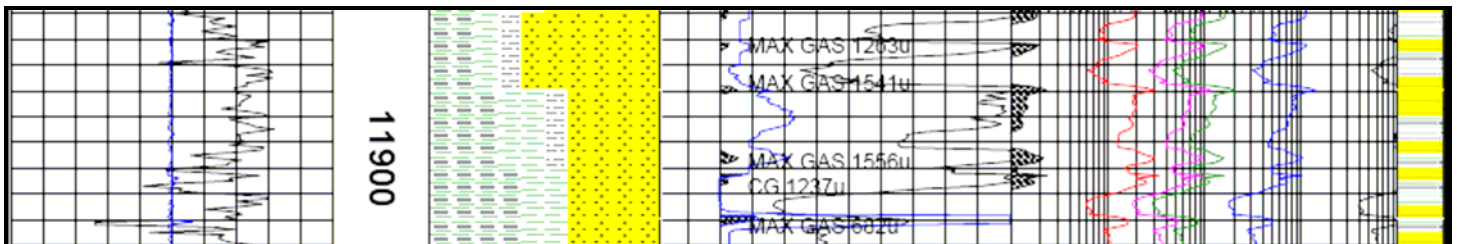
**Corcoran Coastal Plain Formation Statistics**

	ROP (Ft/Hr)	CO2 (ppm)	Total Gas (Units)
Maximum	127.873	22104.098	1762.180
Minimum	6.320	420.054	33.224
Mean	29.025	2790.229	631.729
Standard Deviation	15.182	2295.893	346.333

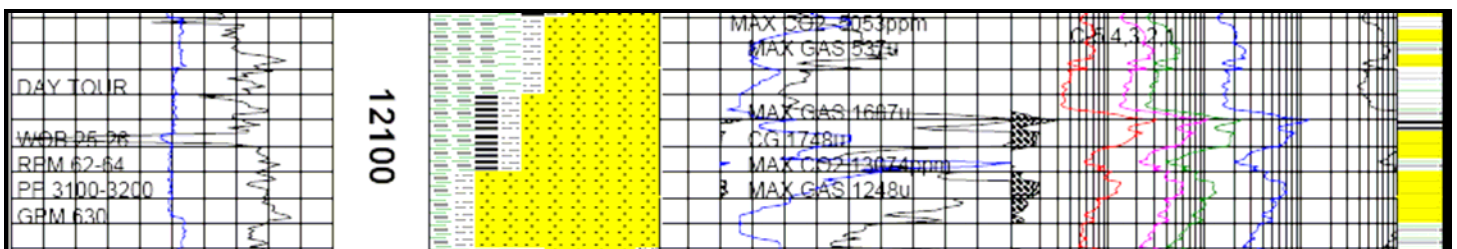
The Corcoran Coastal Plain formation produced many high gas peaks through out the formation. The first significant formation gas appeared at 11,813' and 11,838', with a high gas of 1,450 and 1,424 units, respectively. It was produced by a large sandstone body interbedded with siltstone, shale, carbonaceous shale, and coal at the top of the formation.



The next gas shows recorded at 11,880' and 11,907'. It recorded a maximum gas of 1,541 and 1,556 units respectively. It was associated with interbedded sandstones, siltstone, shale, and carbonaceous shale beds.



The last and most significant gas show was recorded at 12,100'. It recorded a maximum gas of 1,687 units, and was associated with a large sandstone bed interbedded with siltstone, carbonaceous shale and coal layers.



Chromatography through the Corcoran Coastal Plain included C-1 through C-5 occurring during high gas shows.

#### **140 Sequence Boundary/Corcoran Marine Formation**

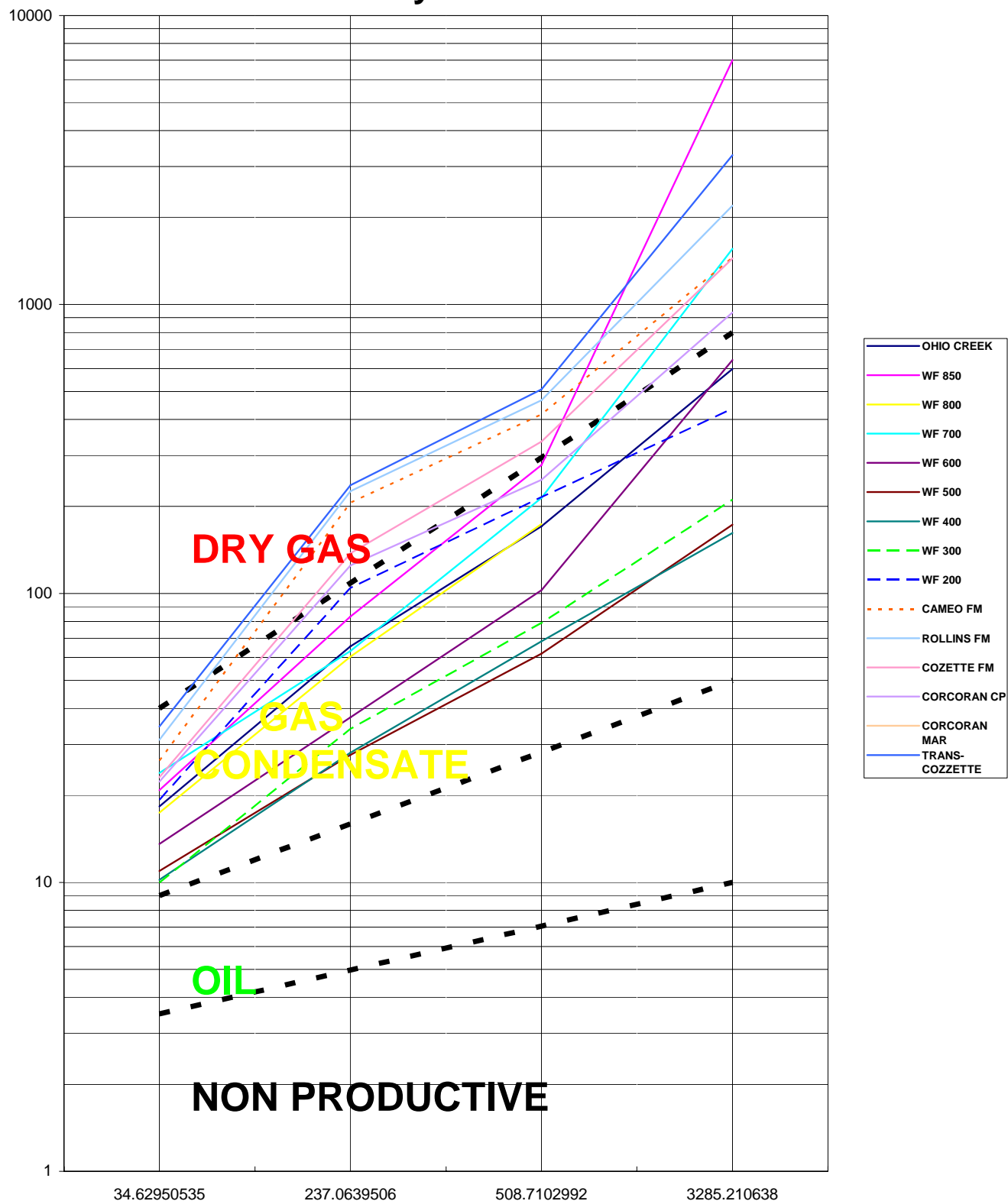
The Corcoran Marine top was not drilled on this well. This unit is typically composed dominantly of shale and siltstone with minor sandstone.



**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Pixler Plot**

**FRU 197-33B9**

# **Pixler Plot Of Average Chromatography Data By Formation**

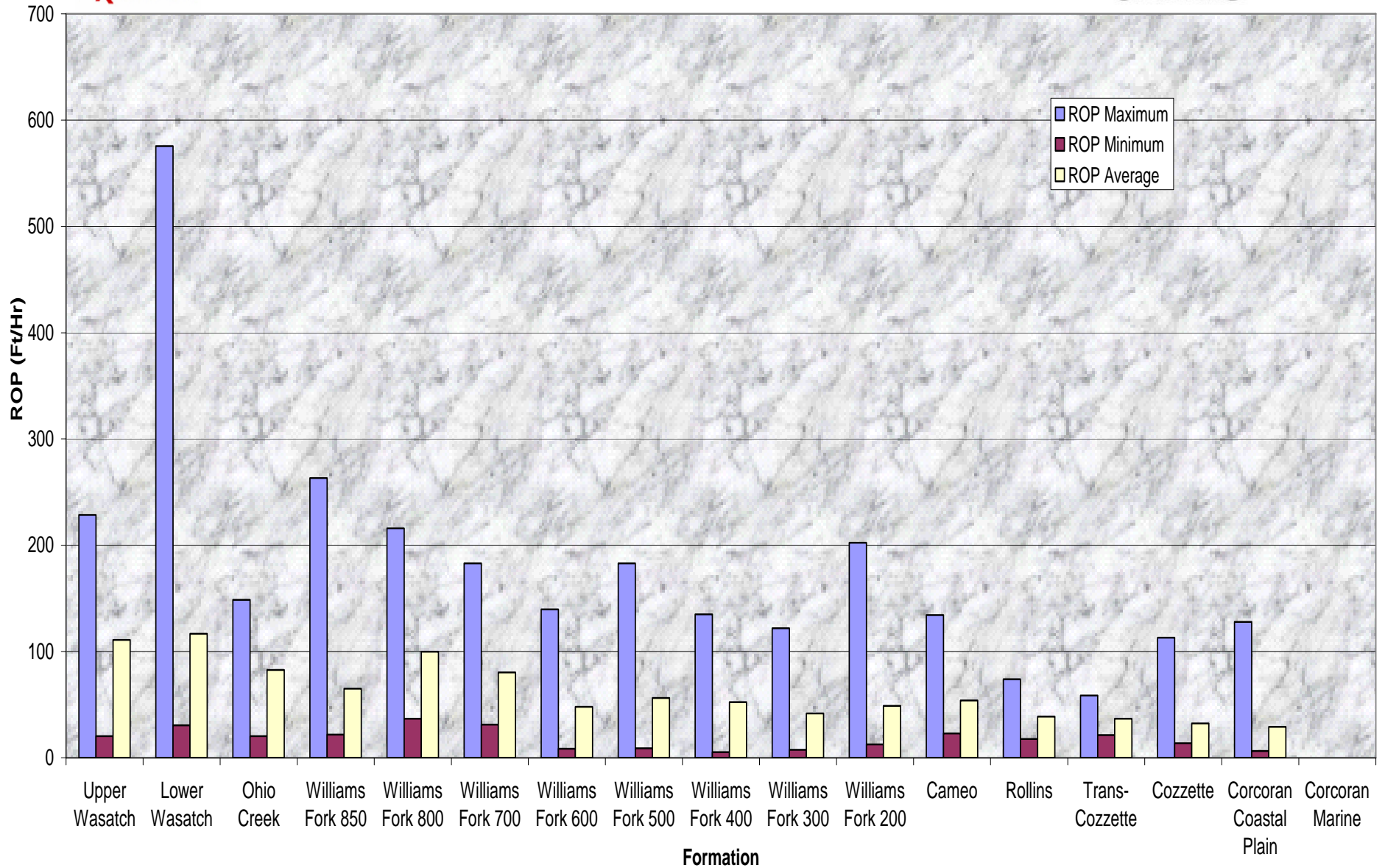


**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Other Data Plots**

FRU 197-33B9  
Rate of Penetration Statistics

ExxonMobil

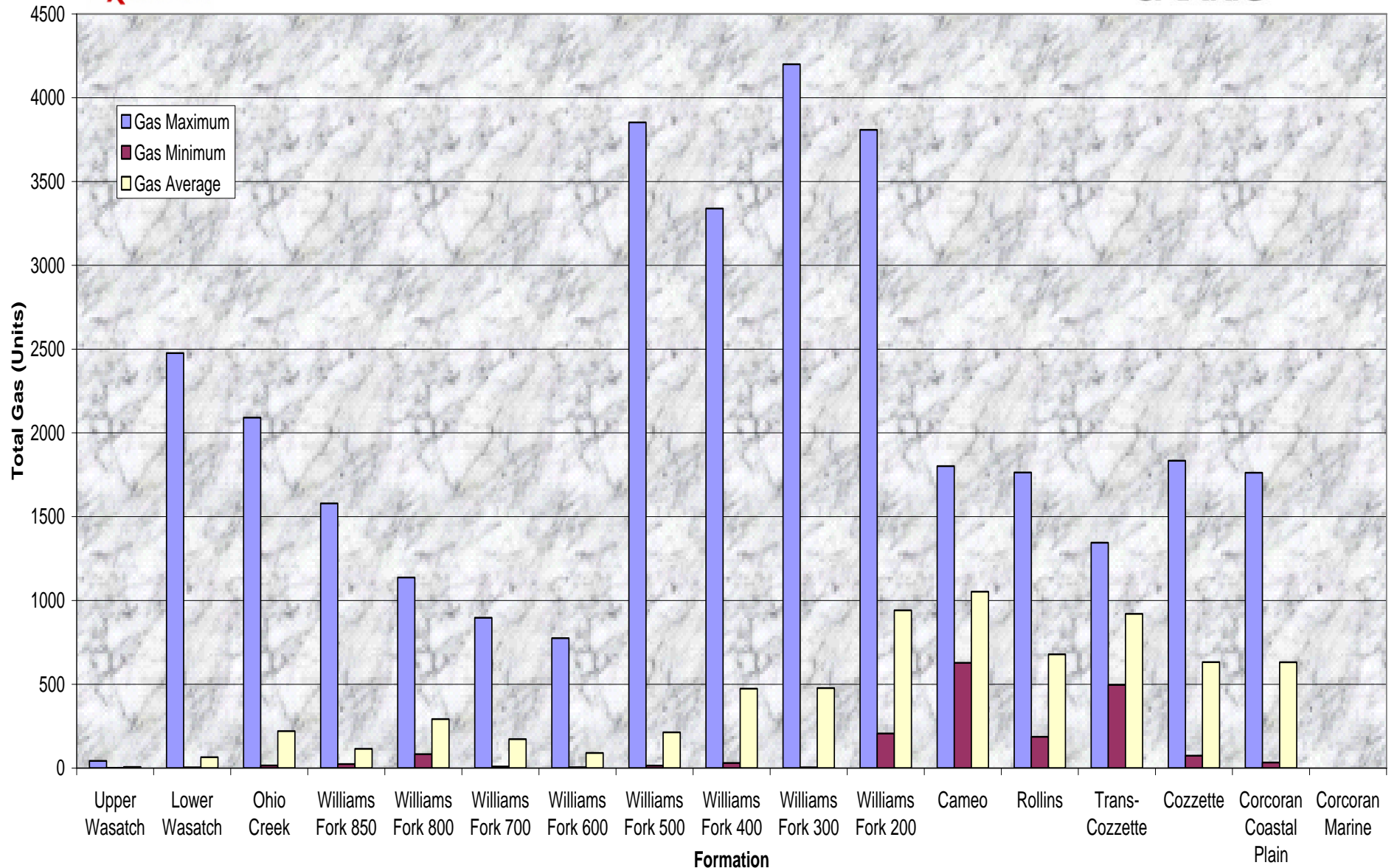
CANRIG

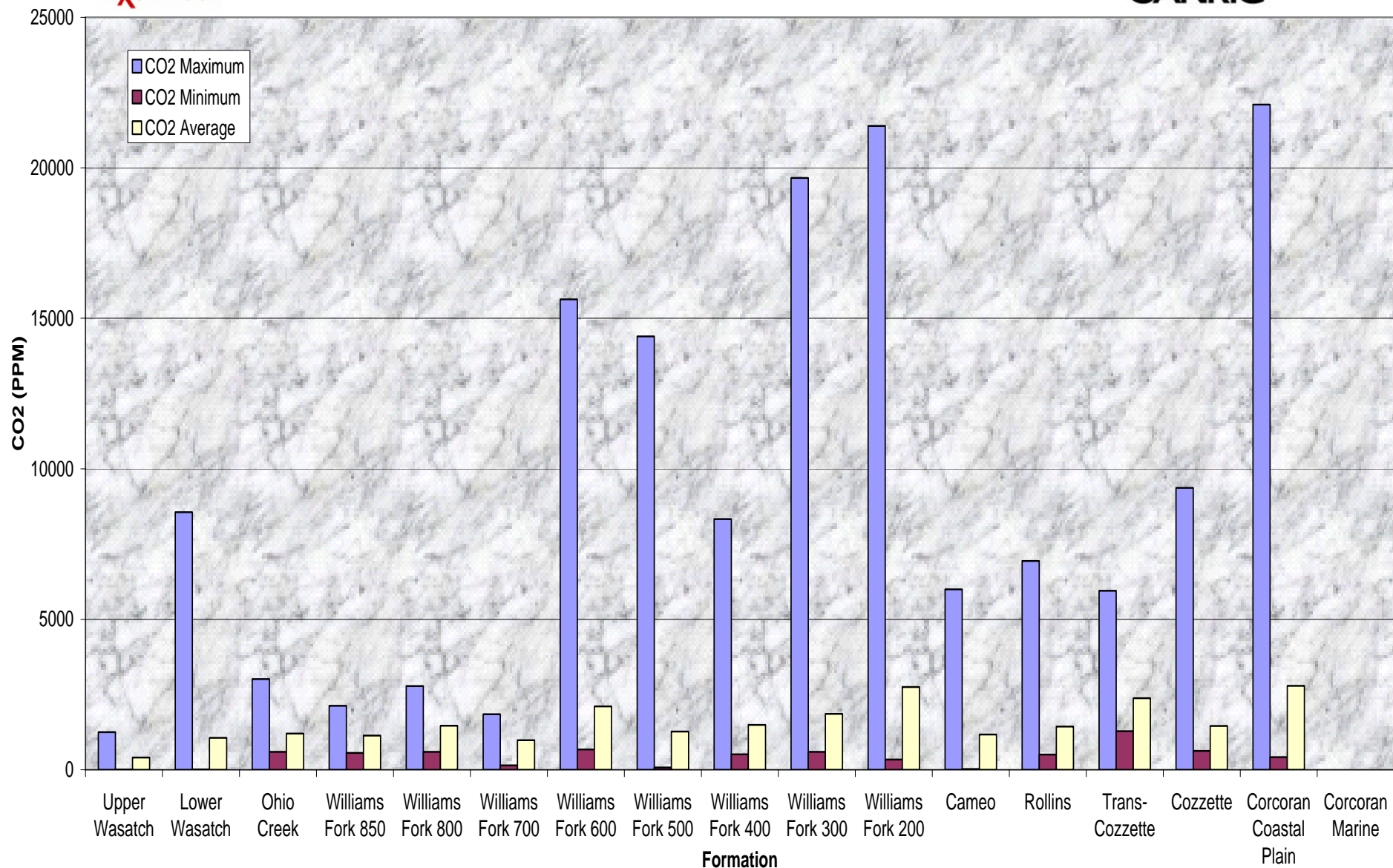


FRU 197-33B9  
Total Gas Statistics By Formation

ExxonMobil

CANRIG





**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Formation Descriptions**

**3980' Shale** = Very light gray to light gray to occasional medium light gray; very slightly dense to mostly brittle to crumbly tenacity; irregular to sub-blocky to sub-planar to earthy hackly fracture; occasional 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 slightly silty texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

**4120' Sandstone** = Off white to very light brownish gray to yellowish gray with moderate brown and black hues; quartz dominate frame work; mostly grain supported with very few loose grains; consists of calcitic cementation with 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; poor grade siltstone visible grading with poor grade sandstone, no other distinguishable surface features present; no accessory minerals present in sample.

**4290' Siltstone** = Very light gray to light gray to light brownish gray; slightly dense to moderately brittle to slightly crunchy tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular to occasional platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; very slightly gritty to very slightly granular texture; poor grade siltstone visible grading with poor grade sandstone; cuttings in sample are slightly clayey; no other distinguishable structural features present in sample; no accessory minerals present in sample.

**4450' Shale** = Very light gray to light gray to medium light gray; mostly brittle to crumbly to very slightly dense tenacity; irregular to sub-blocky to sub-planar to earthy fracture; occasional massive to wedge like to elongated to occasional curved cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy 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.

**4590' Sandstone** = Off white to very light brownish gray with black and moderate brown hues; quartz dominate frame work; predominately grain supported with very few loose grains; consists of calcitic cementation with moderate reaction to dilute HCl; matrix contains 2 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; poor grade siltstone visible grading with poor grade sandstone, no other distinguishable surface features present in sample.

**4740' Siltstone** = Light gray to very light brownish gray to occasional moderate dusky red; very slightly dense to slightly crunchy to moderately brittle tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional semi-wedge like cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly gritty to very slightly granular texture; poor grade siltstone visible bedding with poor grade sandstone, no other distinguishable structural features present; no accessory minerals present in sample.

**4890' Shale** = Very light gray to light gray to medium light gray to medium gray to occasional dark yellowish orange with occasional mottling of grayish red purple; moderately dense to occasional crumbly to very slightly brittle tenacity; irregular to sub-planar to occasional sub-blocky to earthy fracture; occasional massive to wedge like to elongated to sub-platy cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to very slightly clayey texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

**5060' Sandstone** = Very light brownish gray to light tanish-brown gray to occasional pale reddish brown gray with few black and moderate brown hues; quartz dominate frame work; consists of calcitic cementation with moderate reaction to dilute HCl; matrix contains 1 to 3% dark lithic fragments; predominately composed of grain supported cuttings with very few loose grains; medium-fine to medium-coarse grained; fair to moderately poor sorting; sub-angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading with poor grade sandstone, sample contains large amount of clayey material, no other distinguishable surface features present; no accessory minerals present in sample.

**5260' Siltstone** = Very light gray to light gray to light brownish gray; slightly dense to very slightly crunchy to occasional brittle tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to mostly smaller cuttings habit; dull to earthy dull to occasional very slightly semi-sparkling luster; very slightly gritty to slightly clayey texture; no visible laminae or other distinguishable structural features present; no accessory minerals present in sample.

**5400' Wasatch G Sandstone** = Off white to white to very light tanish-brownish gray with few black hues; quartz dominate frame work; grain supported with mostly loose grains; consists of calcitic cementation with moderately high reaction to dilute HCl; matrix contains 1 to 3% dark lithic fragments; fine to medium-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 in sample, no other distinguishable surface features present in sample; accessory mineral pyrite present in sample.

**5570' Carbonaceous Shale** = Dark brownish gray to brownish black to olive black; moderately dense to slightly crunchy tenacity; irregular to sub-blocky to sub-planar 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 smooth to slightly clayey to very slightly gritty texture; poor grade siltstone visible bedding with shale cutting, no other distinguishable structural features present in sample; accessory mineral pyrite present in sample.

**5720' Shale** = Light gray to very yellowish gray to medium light gray to occasional moderate brown and grayish red purple; slightly tough to moderately dense to occasional crunchy tenacity; irregular to sub-blocky to sub-planar to earthy fracture; moderately massive to wedge like to elongated to sub-platy cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to very slightly clayey to slightly silty texture; very small amount of carbonaceous shale and coal visibly effervescing in sample, poor grade siltstone visible grading with poor grade sandstone, no other distinguishable structural features present; accessory mineral pyrite present in sample.

**5910' Siltstone** = Light gray to medium light gray to occasional medium gray; moderately tough to moderately dense tenacity; irregular to sub-planar to sub-blocky to earthy-hackly fracture; sub-tabular to sub-nodular to occasional elongated to sub-platy cuttings habit; dull to earthy dull to occasional semi-sparkling luster; slightly gritty to very slightly granular texture; poor grade shale visible bedding and interbedding with poor grade siltstone, very thin coal laminae visible in small carbonaceous shale cutting, no other distinguishable structural features present; accessory mineral pyrite present in sample.

**6080' Sandstone** = Very light brownish gray to light tanish-brown gray to very light gray with moderate brown and black hues; quartz dominate frame work; predominately grain supported with very few loose grains; consists of calcitic cementation with moderately high reaction to dilute HCl; matrix contains 5 to 11% dark lithic fragments; medium-fine to medium-coarse grained; fair to very poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; bedding contact visible between poor grade sandstone and carbonaceous shale, poor grade siltstone visible grading with poor grade sandstone, no other distinguishable surface features present; accessory mineral pyrite present in sample.

**6280' Carbonaceous Shale** = Light olive gray to medium gray to brownish gray; crunchy to crumbly to slightly brittle tenacity; irregular to slight hackly fracturing; cuttings tend to be platy to slight elongated wedge-like to semi tabular in habit; dull earthy to semi sparkling to slight greasy luster; gritty to silty texture; thinly bedded carbonaceous material.

**6390' Siltstone** = Very light gray to light gray to medium gray; crunchy to stiff to semi crumbly tenacity; predominately planar to slight hackly to occasional blocky fracturing; cuttings tend to be tabular to semi wedge like in habit; semi frosted to slight greasy to waxy luster; gritty to silty texture; no other visible bedding features.

**6490' Sandstone** = Light greenish gray to white to very light gray to translucent; mostly quartz framework with 3-5 % dark lithics visible in sample; visible chlorite crystals in sample; very coarse to coarse to medium grain size; fair to well sorted; sub round to round grains; low to moderate sphericity; visible pits in surface of grains; firm friable to friable to moderate hard; calcite cementation due to high reaction in dilute HCl; grain supported; no visible hydrocarbons in sample; 2-3% visible calcite fracture-fill.

**6640' Shale** = Very light gray to light brownish gray to predominately yellowish gray; brittle to crumbly tenacity; mostly planar to slight hackly fracturing; cuttings tend to be platy to elongated tabular to semi bladed in habit; dull earthy to semi greasy to slight waxy luster; smooth to semi clayey to matte texture; no other visible bedding features.

**6740' Siltstone** = Very light gray to medium gray; crunchy to stiff to semi crumbly tenacity; predominately hackly to planar to occasionally blocky fracturing; cuttings tend to be wedge like to semi tabular in habit; dull earthy to semi greasy luster; gritty to silty texture; grades into medium grain sandstone.

**6830' Sandstone** = Translucent to very light gray to light brownish gray; predominately quartz framework with 2-3% dark lithics visible in sample; fine to medium to coarse grain size; grain supported; low to moderate sphericity; grains have a slight polish appearance; sub-angular to sub-round; well to very well sorted; calcite cementation due to moderate reaction in dilute HCl; no visible hydrocarbons in sample.

**6950' Limestone** = Reacts strongly to dilute HCl; stiff to tough tenacity; planar to semi hackly to blocky fracturing; cuttings tend to be wedge-like to tabular to slight nodular in habit; waxy to dull earthy to semi greasy luster; crystalline to matte to smooth texture; no other visible bedding features.

**7040' Siltstone** = Very light gray to light greenish gray to light bluish gray; crunchy to stiff to tough tenacity; irregular to semi planar fracturing; cuttings tend to be platy to tabular to semi wedge like in habit; slight greasy to sparkling to occasionally dull earthy luster; silty to gritty to semi granular texture; no other visible bedding features.

**7150' Shale** = Light greenish gray to light bluish gray to light gray; crumbly to brittle to occasionally crunchy tenacity; predominately planar to slightly blocky to semi hackly fracturing; cuttings tend to be wedge-like to semi platy to flaky in habit; dull earthy to semi greasy luster; smooth to matte texture grades into a thin carbonaceous shale.

**7250' Ohio Creek Sandstone** = Very light gray to translucent to white; coarse to very coarse grain; mostly quartz with 1-3% dark lithics visible in sample; unconsolidated; predominately loose grains to few grain supported cuttings; consists of calcitic cementation with moderate effervescing reaction to dilute HCl; medium-fine to medium-coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; very thin coal laminae visible in shale cutting, no other distinguishable surface features present in sample; accessory mineral pyrite visible in contact with sandstone and large amount of calcite cuttings present in sample.

**7440' Carbonaceous Shale** = Dark brownish gray to brownish black to olive black; slightly dense to slightly crunchy tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional elongated cuttings habit; dull to earthy dull to occasional very slightly semi-sparkling luster; slightly clayey to very slightly gritty texture; very thin coal laminae visible in carbonaceous shale cutting, no other distinguishable structural features present in sample; accessory mineral pyrite present in sample.

**7590' Siltstone** = Light gray to medium light gray to occasional light brownish gray; slightly tough to moderately dense to slightly crunchy 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 clayey to very slightly gritty texture; very thin coal laminae visible in shale cutting, poor grade siltstone visible grading with poor grade sandstone, no other distinguishable structural features present; accessory mineral pyrite present in sample.

**7750' Shale** = Very light gray to light gray to medium light gray to occasional light bluish gray; slightly tough to moderately dense tenacity; irregular to sub-blocky to sub-planar to earthy fracture; occasional massive to wedge like to elongated to occasional platy 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 thin laminae visible in shale cutting, occasional mottling of shale visible, no other distinguishable structural features present in sample; accessory mineral pyrite present in sample.

**7920' Sandstone** = Off white to white to very light gray to translucent; quartz dominate frame work; predominately loose grained with few grain supported cuttings; consists of calcitic cementation with light reaction to dilute HCL; matrix contains 1 to 3% dark lithic fragments; medium to medium-coarse grained; fair to very poor sorting; sub-angular to rounded to sub-rounded angularity; low to moderate sphericity; grains have a slight polish appearance; friable to firm friable; no visible hydrocarbons in the sample.

**8070' Shale** = Very light greenish gray to very light gray; crunchy to brittle to semi crumbly tenacity; predominately planar to slight hackly fracturing; cuttings tend to be platy to flaky to semi bladed in habit; dull earthy to semi greasy to slight waxy luster; smooth to clayey to slight matte texture; no other visible bedding features.

**8170' Carbonaceous Shale** = Grayish black to medium dark gray to light olive gray to medium bluish gray; crunchy to crumbly to brittle tenacity; hackly to semi blocky to predominately planar to splintery fracturing; cuttings tend to be platy to thinly tabular to semi wedge like in habit; dull earthy to semi greasy to occasionally sparkling to slight frosted luster; predominately granular to gritty to occasionally smooth to clayey texture; visible degassing along carbonaceous laminae; visible bands of carbonaceous material.

**8320' Sandstone** = White to translucent to very light gray to light brownish gray; mostly quartz framework with 3-4% dark lithics visible in sample; unconsolidated grains due to bit action; firm friable to moderate hard to

predominately friable; sub-round to well rounded grains; low to moderate sphericity; grains have a slight polish appearance; fair to poorly sorted; very coarse to coarse to medium to granular grain size; calcite cementation due to moderate reaction in dilute HCL; no visible hydrocarbons in sample; grain supported; grades into a silty carbonaceous shale.

**8480' Siltstone** = Light gray to medium light gray to medium gray to light brownish gray to occasional brownish gray; slightly tough to moderately dense tenacity; irregular to sub-planar to earthy-hackly fracture; occasional massive to elongated to sub-tabular to sub-nodular cuttings habit; dull to earthy dull to occasional slightly semi-sparkling luster; slightly clayey to very slightly gritty texture; poor grade siltstone visible grading and bedding with poor grade sandstone, very small amount of coal visible effervescing in sample, no other distinguishable structural features present; accessory mineral pyrite and several medium sized rhombic calcite crystals present in sample.

**8670' Shale** = Very light gray to light gray to medium light gray to occasional medium gray and light bluish gray; moderately dense to slightly crumbly to crunchy tenacity; irregular to sub-planar to earthy fracture; massive to wedge like to elongated to occasional platy cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to slightly silty texture; very thin coal laminae visible in shale cutting, very small amount of carbonaceous shale visibly effervescing, no other distinguishable structural features present; accessory mineral pyrite present in sample.

**8840' Carbonaceous Shale** = Dark brownish gray to brownish black to olive black; moderately dense to slightly crunchy 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 semi-sparkling to semi-greasy luster; visible carbonaceous bands through out sample.

**8950' Sandstone** = Very light gray to light brownish gray to very light olive gray; mostly quartz framework with 4-5% dark lithics visible in sample; coarse to medium to occasionally fine grain size; poor to fair sorted; sub-round to sub-angular to angular grains; moderate to high sphericity; grains have a slight frosted to semi pitted appearance; firm friable to moderate hard; unconsolidated grains due to bit action; grain supported; no visible hydrocarbons in sample; calcite cementation due to moderate reaction in dilute HCL.

**9080' Siltstone** = Light greenish gray to light bluish gray to occasionally light brownish gray; stiff to crunchy tenacity; blocky to predominately hackly to semi planar fracturing; cuttings tend to be platy to flaky to semi elongated tabular in habit; dull earthy to slight greasy to semi frosted luster; gritty to silty to semi clayey texture; no other visible bedding features.

**9190' Shale** = Very light gray to very light brownish gray to bluish gray; crumbly to brittle tenacity; predominately planar to hackly to slightly irregular cuttings habit; dull earthy to semi waxy to slight greasy luster; matte to slight silty to smooth to clayey texture; no other visible accessory minerals in sample.

**9290' Sandstone** = White to translucent to very light gray; mostly quartz framework with 4-5% dark lithics visible in sample; predominately grain supported with fair amount of loose grains present; medium-fine to medium-coarse grained; fair to moderately well sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible grading and bedding with poor grade sandstone, very small amount of carbonaceous shale visible effervescing in sample, no other bedding or other distinguishable surface features present; no accessory minerals present in sample.

**9460' Carbonaceous Shale** = Dark brownish gray to brownish black to occasional olive black; slightly tough to moderately dense tenacity; irregular to sub-blocky to sub-planar to earthy-hackly fracture; sub-tabular to occasional sub-nodular to occasional elongated cuttings habit; dull to earthy dull to semi-greasy to occasional semi-sparkling luster; sub-clayey to very slightly gritty texture; very thin coal laminae visible in shale cutting, no other distinguishable structural features present in sample; accessory mineral pyrite present in contact with carbonaceous shale cutting, present in sample.

**9630' Siltstone** = Light gray to medium light gray to occasional medium gray; slightly dense to slightly tough tenacity; irregular to sub-planar to earthy hackly fracture; sub-tabular to sub-nodular to occasional sub-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, no other distinguishable structural features present; no accessory minerals present in sample.

**9770' Shale** = Very light greenish gray to very light bluish gray to olive gray; irregular to predominately planar to semi hackly fracturing; crumbly to crunchy to brittle tenacity; cuttings tend to be platy to flaky to semi elongated tabular in habit; dull earthy to semi greasy to slight waxy luster; smooth to clayey to semi matte texture; no other visible bedding features; a few nacholite crystals visible due to cavings.

**9890' Coal** = Black to medium grayish black to olive black to predominately brownish gray to brownish black; crunchy to crumbly to brittle tenacity; irregular to blocky to predominately conchoidal fracturing; cuttings tend to be nodular to wedge like to semi bladed in habit; dull to frosted to sparkling to semi greasy to waxy luster; smooth to matte to slight gritty to clayey texture; visible degassing through out the sample; visible pyrite bands.

**10020' Carbonaceous Shale** = Olive gray to light brownish gray to brownish gray; brittle to crumbly to crunchy tenacity; hackly to planar fracturing; cuttings tend to be wedge like to semi tabular in habit; dull to frosted to semi sparkling luster; gritty to silty texture; visible beds of carbonaceous material in sample.

**10110' Sandstone** = Light gray to light brownish gray to occasional 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 8 to 11% 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 visible grading with poor grade sandstone, no other distinguishable surface features present; no accessory minerals present in sample.

**10280' Siltstone** = Very light gray to light gray to occasional medium light gray to yellowish gray to very light brownish gray; moderately tough to moderately dense tenacity; irregular to sub-planar to earthy-hackly fracture; sub-tabular to sub-nodular to occasional massive cuttings habit; dull to earthy dull to semi-sparkling luster; slightly gritty to very slightly granular texture; poor grade siltstone visible bedding and grading with poor grade sandstone, no other

**10410' Carbonaceous Shale** = Olive gray to grayish black to medium gray; brittle to crumbly to crunchy tenacity; hackly to irregular to slight blocky fracturing; cuttings tend to be platy to slight nodular to semi wedge like to slight tabular in habit; predominately frosted to sparkling to semi greasy to occasionally dull earthy luster; gritty to semi granular to silty texture; thin laminae of carbonaceous material; visible degassing from most of sample.

**10540' Sandstone** = Light brownish gray to light gray to white to occasionally translucent; mostly quartz framework with 7-8% dark lithics visible in sample; visible bands of carbonaceous material; very coarse to coarse to medium grain size; poor to fair to occasionally very poorly sorted; angular to sub-angular grains; moderate to high sphericity; grains have a slight frosted appearance; firm friable to moderate hard; unconsolidated grains due to bit action; grain supported; calcite cementation due to high reaction in dilute HCl; no visible hydrocarbons in sample.

**10730' Siltstone** = Mottled grayish to light yellowish to light bluish gray; crunchy to stiff to tough tenacity; blocky to predominately planar to hackly fracturing; cuttings tend to be platy to flaky to slight elongated tabular in habit; semi sparkling to slight frosted to semi greasy luster; silty to semi granular to gritty texture; grades into a fine grain sandstone; no other visible bedding features.

**10850' Coal** = Grayish black to brownish black to olive black to black; stiff to slight malleable to semi crunchy tenacity; irregular to blocky to semi conchoidal fracturing; cuttings tend to be wedge-like to elongated tabular to slight bladed in habit; dull waxy to semi greasy to slight sparkling luster; occasional smooth to semi-silty to semi abrasive texture; coal cuttings observed to be effervescing moderately high; poor grade siltstone visible bedding with poor grade carbonaceous shale cuttings, no other distinguishable laminae or other distinguishable structural features present; no accessory mineral present in sample.

**11030' Carbonaceous Shale** = Dark brownish gray to brownish black to olive black; slightly tough to moderately dense to semi-crunchy tenacity; irregular to sub-blocky to sub-planar to earthy fracture; sub tabular to sub-nodular to occasional very slightly semi-platy cuttings habit; dull to earthy dull to occasional semi-sparkling to semi-greasy luster; slightly clayey to very slightly gritty texture; poor grade carbonaceous shale visible bedding with poor grade sandstone, fair amount of coal visibly effervescing in sample, no other laminae or other distinguishable structural features present; no accessory minerals present in sample.

**11210' Rollins Sandstone** = White to off white to translucent with few black hues; quartz dominate frame work; predominately loose grains with very few grain supported cuttings; consists of silica cementation with little to no

reaction to dilute HCl; matrix contains 1 to 3% dark lithic fragments; medium to medium-coarse grained; fair to poor sorting; sub-angular to angular to sub-rounded angularity; low to moderate sphericity; poor grade siltstone visible bedding with poor grade sandstone, very small amount of coal visible effervescing in sample, no other visible bedding or other distinguishable surface features present; no accessory minerals present in sample.

**11390' Carbonaceous Shale** = Grayish black to olive gray to brownish gray; crunchy to crumbly to occasionally stiff tenacity; predominately hackly to planar to semi blocky fracturing; cuttings tend to be platy to flaky to semi wedge like to occasionally bladed in habit; dull earthy to semi sparkling to slight greasy luster; gritty to semi granular to silty texture; visible bands of carbonaceous material; visible degassing along the bands.

**11520' Siltstone** = Very light brownish gray to light yellowish gray; crunchy to stiff to tough tenacity; irregular to slight planar to semi hackly fracturing; cuttings tend to be elongated tabular to wedge like to semi bladed in habit; semi sparkling to slight frosted to greasy luster; gritty to slightly granular to silty texture; no other visible bedding features.

**11630' Coal** = Grayish black to brownish black to black; stiff to slightly malleable to semi crunchy tenacity; predominately conchoidal to blocky to slight splintery fracturing; cuttings tend to be wedge-like to tabular to semi bladed in habit; sparkling to waxy to slightly dull to occasionally slightly metallic luster; smooth to slight clayey to occasionally silty texture; visible pyrite in sample; visible degassing along most of sample.

**11750' Corcoran Coastal Plain Sandstone** = Light yellowish gray to white to very light 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 2 to 4% dark lithic fragments; medium-fine to coarse grained; fair to very poorly sorted; 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 distinguishable surface features present in sample; no accessory minerals present in sample.

**11940' Shale** = Very light gray to light gray to occasional very light pale yellowish orange; slightly dense to slightly brittle to slightly crumbly tenacity; irregular to sub-planar to earthy fracture; moderately wedge like to sub-platy to mostly smaller cuttings habit; dull to earthy dull to occasional semi-frosted to semi-waxy luster; moderately smooth to moderately clayey to very slightly silty texture; poor grade siltstone visible bedding with poor grade carbonaceous shale, very small amount of coal visible effervescing in sample, no other surface features present; no accessory minerals present in sample.

**12110' Carbonaceous Shale** = Olive gray to medium dark gray to brownish gray; visible bands of carbonaceous material; crunchy to crumbly tenacity; planar to slight hackly to blocky fracturing; cuttings tend to be platy to flaky to semi tabular in habit; dull earthy to semi sparkling to slight greasy luster; predominately gritty to semi granular to silty to occasionally smooth texture; visible degassing in some of the sample; visible hydrocarbons under fluoresces at 12180' -12210'.

**TD FRU 197-33B9 ON 08/1/2010 @ 12300' MD**

**Exxon Mobil  
Freedom Ranch Unit 197-33B9**

**Daily Activity Summary**

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

- 4/08/2010** Skid the rig from FRU197-33B7 to FRU197-33B9. Rig up riser, flow line, turnbuckles, and set the well head with Camron. Set the starter flange and elevators. Test the service lines. Make up the bit to the mud motor with Scorpion. Hold a safety meeting with directional and MWD hands on picking up their tools. Make up stabilizer, gyro, telescope, monel, scribe motor for Gyro and MWD tools. Conduct a shallow test on all tools. Drill and slide from 149' to 282'.
- 4/09/2010** Drill and slide from 282' to 593'. Pull out of the hole from 593' to 130' to change out heavy weight drill pipe for drill collars. Trip in the hole starting from 130' to 593', and install the rotating head. Drill and slide from 593' to 873', and service the rig with 5 shots in the upper bonnet seal. Continue to drill and slide from 873' to 2,215'.
- 4/10/2010** Drill and slide from 2,273' to 3,352', and service the rig with 3 shots in the bonnet seal. Drill from 3,352' to 3,711'. Replace the gasket cap on pump #1. Drill from 3,711' to 3,727'. Replace the gasket cap with liquid steel on pump #1 and suction #3. Drill and slide from 3,727' to 3,829'.
- 4/11/2010** Stand by on pumps with no change. Pulled the CP thread ring off on #3 POD on pump #1. Welder repaired wash in module face, and repaired wash on thread ring. Service the rig, and drill from 3,829' to 3,950'. Pull out of the hole from 3,950' to 127'. Lay down directional tools and bit. Clean and clear the rig floor. Remove the drilling bales and elevators, and rig up casing running tool. Fill up the top drive, and all pressures good. Conduct a safety meeting on running casing. Run casing from surface to 2,639'. Install the DV tool, and install the rotating head rubber. Run casing from 2,639' to 3,945'. Circulate a bottoms up at 60spm at 3,657 strokes. Conduct a safety meeting on cementing. Rig down the casing running tool, and rig up the cement head.
- 4/12/2010** Pressure test the cement lines to 250psi and 5000psi. Pump 50bbls of water, and pump 264bbls of lead cement at 12.7ppg. Then pump 72bbls of tail cement at 15.8ppg, and drop the top plug down well. Displace the cement with 369bbls of mud, and drop opening tool. Wait for 15min, and then open the tool. Wait on cement, and circulate through the DV tool while working on the same. Pump 50bbls of water, and then pump 220bbls of lead cement at 12.7ppg. Then drop the top plug, and displace with 124bbls of mud. The cement head and the manifold were rig down. Run 1" tubing to 320', and circulate a bottoms up through the 1" tubing. Run 1" tubing from 320' to 603', and circulate a bottoms up through the 1" tubing. Pump 30bbls of cement at 15.8ppg for top job. Finish pumping the top job, with 35bbls at first, 25bbls at second, and 3bbls of cement back to surface. Rig down the 1" grout string and the cementers tools. Pick up the riser, and cut the casing. Prep for a rig skid.
- 7/19/2010** Conduct a safety meeting on rig skid. Pick up the V-Door, and break off the choke line. Break the flow line from the flow line stand, and stroke the cylinders. Start rigging down the fill up hose, Geronimo line, riser, and miscellaneous lines. Pick up the Blow out Preventer stack. Skid the rig from FRU197-33B6 to FRU197-33B9. Start rigging up the flow line to the flow line stand. Start moving the pipe wrangler to the B9 well. Set up the riser, and torque up the quick connect. Hook up the mud lines, choke lines, water lines, and trip tank lines. Walk over the pipe wrangler, and hook up the water tank side of the flow line. Rig up the Geronimo line, and set the V-Door. Remove the flow line from the rotating head, and scope in. Conduct a safety meeting on changing out the annular element. Remove the cap from the annular, and change out the element on the annular. Install the cap onto the annular as per Exxon Mobil. Hook up the flow line, turn buckles, and drip pan. Lay down drill pipe.
- 7/20/2010** Lay down drill pipe, and pick up 5 stands. Set the test plug in well. Conduct a Job Safety Assessment meeting. Test BOPs with low at 250psi for 5min, and high at 5,000psi for 15min. First test the lower pipe rams, and then the upper rams. Then tested the lower IBOP, and the manual choke and kill. Then tested the upper pipe rams, upper IBOP, and HCR choke and kill. Then tested the upper pipe rams manual kill, check valve, choke line, and choke manifold valves (1, 11, 5, and 2). Then the upper pipe rams and choke manifold valves (8, 9, and 10) were tested. Next the Annular and the stand pipe were tested. Then the annular and mud lines back to the pumps were also tested. Last two tests were on the blind rams and the Texas Ironworks dart valves. Perform accumulator function test, and rig down test assembly. Install wear bushing. Rig service – change hydraulic and gear oil in top drive. Pre-job safety meeting on picking up directional tools. Pick up directional tools, 12 drill collars, jars, and 11 heavy weight

drill pipe. Install rotating head and pick up 16 joints of drill pipe. Fill drill pipe and circulate. Conduct shallow MWD test while working on same. Repair air pump on accumulator.

- 7/21/2010** Pick up drill pipe with good air pump capacity test. Break circulation and pressure test casing above DV tool for 5 minutes at 1500 PSI. Drill out DV tool and trip in hole from 1300' to 3808'. Fill pipe and circulate bottoms up. Perform casing pressure test for 30 minutes at 1550 PSI, and drill out cement float collars and shoe from 3808' to 3955'. Drill 10' of new formation from 3955' to 3965', and circulate bottoms up. Perform pressure integrity test, and drill ahead from 3965' to 3971' with power drive BHA. Continue drilling ahead from 3971' to 5017'. Pump high vis sweep.
- 7/22/2010** Circulate pump, 80 barrel high vis sweep and trip out of hole from 5017' to 4375', while working tight hole at 4275'. Back ream from 4375' to 3960'. Trip out of hole from 3960' to 824' and rack back BHA. Break bit and lay down power drive. Pick up new power drive and make up bit. Run BHA in hole. Install rotating head and test MWD tool. Trip in hole from 825' to 3871'. Fill pipe and circulate bottoms up. Service top drive and continue to trip in hole from 3871' to 4733'. Wash and ream from 4733' to 5017'. Circulate down link power drive and drill from 5017' to 5492'. Pump high vis sweep, circulate, and down link power drive. Spot 50 barrel of LCM on bottom, monitor well, and pull out of hole from 5492' to 2159'.
- 7/23/2010** Trip out of hole from 2159' to 825' and rack back BHA. Lay down directional tools and break bit. Pick up 8.75" packed assembly and trip in hole. Install rotating head and trip in hole from 859' to 3050'. Rig service – 7 shots in upper bonnet seal. Cut and slip 96' of drill line. Trip in hole from 3910' to 5492', and wash down last 700'. Drill from 5492' to 6450'.
- 7/24/2010** Drill from 6450' to 7151'. Service top drive – 8 shots in bonnet seal. Drill from 7151' to 8083'.
- 7/25/2010** Drill from 8083' to 8384'. Service top drive – 9 shots in bonnet seal. Drill from 8384' to 8717'. Change out swivel packing on top drive. Continue drilling from 8717' to 8931'.
- 7/26/2010** Drill from 8931' to 9209'. Circulate while removing mill lube from blinding shaker screens. Drill from 9209' to 9338'. Service top drive, and change saver sub. Continue drilling from 9338' to 9815'.
- 7/27/2010** Drill from 9815' to 10101'. Service top drive – 12 shots in bonnet seal. Drill from 10101' to 10385'. Circulate gas out through choke, and change out flow show gasket. Drill from 10385' to 10415'.
- 7/28/2010** Drill from 10415' to 10708', and circulate sweep around. Back ream out of hole from 10467' to 9107'. Displace 80 barrels and trip out of hole from 9107' to 6848'. Work tight hole and ream from 6848'. Work tight hole and ream from 6848' to 6003'.
- 7/29/2010** Trip out of hole from 6000' to 3950'. Monitor well and spot 60 barrel 12.5 PPG pill. Trip out of hole and trip out cross over jars, and bit. Trip in hole to 3908'. Rig service, drag chain inspection. Rig up pump in sub. Cut and slip drill line 64', and trip in hole to 7932'. Circulate 2000 stroke to clean hole. Wash and ream in hole from 7932' to 8134'. Trip in hole from 8134' to 8761'. Continue to wash and ream from 8761' to 9207'.
- 7/30/2010** Wash and ream from 9147' to 10708'. Drill ahead from 10708' to 10959'. Service top drive, change out gear oil, and 7 shots in upper bonnet seal. Drill ahead from 10959' to 11450'.
- 7/31/2010** Drill ahead from 11450' to 11722'. Rig service - change out hydraulic oil, and greased upper bonnet. Drill from 11722' to 12118'.
- 8/1/2010** Drill ahead from 12118' to 12294'. Rig service - greased upper bonnet. Continue drilling from 12294' to 12300'. Rack back stand dust system up to 9.8 DE balloon well at 30 strokes per minute. Wash and ream out of hole from 12234' to 10289'. Trip out of hole from 10289' to 10001'. Spot 12.5 PPG pill down hole.
- 8/2/2010** Trip out of hole from 10001' to 3950' and lay down 30 stands of 5" drill pipe. Pump bottoms up at 3950' and 80 barrel 12.5 PPG pill. Trip out of hole from 3950' to BHA. Lay down collars,



stabilizers, tele-drift, and near bit trans sub. Pull wear bushing, rig down bails and elevators. Rig CRT. Conduct rig service. Install dully hanger and run casing to 2184'.

**8/3/2010**

Run casing from 2184 to 12255" and circulate bottoms up. Hold pre-job JSA with Halliburton for cementing. Pressure test cement lines. Cement well. Rig down Halliburton cementers. Skid rig from 33B9 to 33B6.

**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Survey Data and Plots**

**EXXONMOBIL****PICEANCE CREEK, COLORADO****Freedom Ranch Unit 197-33B9**

  
**SURVEY SUMMARY**

MEASURED DEPTH	INCL	AZIMUTH	TVD	VERTICAL SECTION	COORDINATES		DOGLEG SEVERITY
					N/S	E/W	
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30.00	0.000	0.000	30.000	0.000	0.000	0.000	0.000
138.00	0.358	113.535	137.999	-0.311	-0.135	0.309	0.331
199.00	0.391	112.474	198.998	-0.680	-0.290	0.675	0.055
258.00	0.237	233.270	257.998	-0.771	-0.440	0.764	0.933
319.00	0.968	269.103	318.994	-0.156	-0.523	0.148	1.293
348.00	1.386	260.655	347.988	0.434	-0.584	-0.443	1.557
413.00	2.635	264.994	412.946	2.693	-0.842	-2.707	1.934
477.00	4.098	269.059	476.834	6.442	-1.008	-6.459	2.315
542.00	5.676	268.184	541.596	11.974	-1.148	-11.994	2.431
634.00	7.854	269.356	632.950	22.803	-1.363	-22.828	2.372
724.00	9.790	268.069	721.881	36.593	-1.689	-36.626	2.162
821.00	11.875	270.857	817.148	54.812	-1.818	-54.849	2.215
915.00	13.453	274.058	908.860	75.403	-0.899	-75.427	1.837
1010.00	14.757	272.667	1000.994	98.531	0.446	-98.537	1.418
1106.00	14.982	270.923	1093.780	123.161	1.215	-123.157	0.522
1201.00	15.169	271.539	1185.510	147.869	1.747	-147.860	0.259
1296.00	15.026	268.547	1277.233	172.602	1.768	-172.596	0.834
1391.00	15.362	272.287	1368.914	197.486	1.958	-197.480	1.090
1487.00	15.356	270.835	1461.486	222.909	2.651	-222.896	0.401
1582.00	15.279	269.252	1553.112	248.000	2.671	-247.989	0.448
1678.00	15.741	272.474	1645.617	273.661	3.068	-273.647	1.018
1774.00	15.648	272.590	1738.038	299.619	4.215	-299.590	0.103
1869.00	15.868	272.238	1829.468	325.409	5.301	-325.366	0.253
1965.00	15.884	269.999	1921.807	351.666	5.814	-351.618	0.638
2029.00	15.890	275.020	1983.365	369.162	6.580	-369.104	2.147
2124.00	16.040	275.350	2074.701	395.220	8.942	-395.127	0.185
2220.00	15.780	274.010	2167.024	421.478	11.092	-421.353	0.469
2314.00	14.840	269.410	2257.691	446.276	11.862	-446.142	1.633
2410.00	14.290	267.150	2350.606	470.388	11.146	-470.269	0.824
2506.00	13.400	264.870	2443.816	493.272	9.562	-493.182	1.087
2601.00	13.710	266.640	2536.171	515.445	7.918	-515.384	0.545
2695.00	14.130	267.740	2627.410	538.009	6.813	-537.970	0.528
2790.00	14.480	267.460	2719.464	561.443	5.829	-561.422	0.376
2885.00	14.620	267.370	2811.417	585.264	4.752	-585.264	0.149
2981.00	14.640	266.790	2904.305	609.456	3.517	-609.479	0.154
3075.00	14.520	269.940	2995.279	633.087	2.840	-633.124	0.853
3171.00	14.300	269.810	3088.259	656.973	2.788	-657.014	0.232
3267.00	14.270	269.490	3181.291	680.655	2.643	-680.701	0.088

Note: All survey data provided by Schlumberger



**CANRIG**  
**SURVEY SUMMARY**

## Freedom Ranch Unit 197-33B9

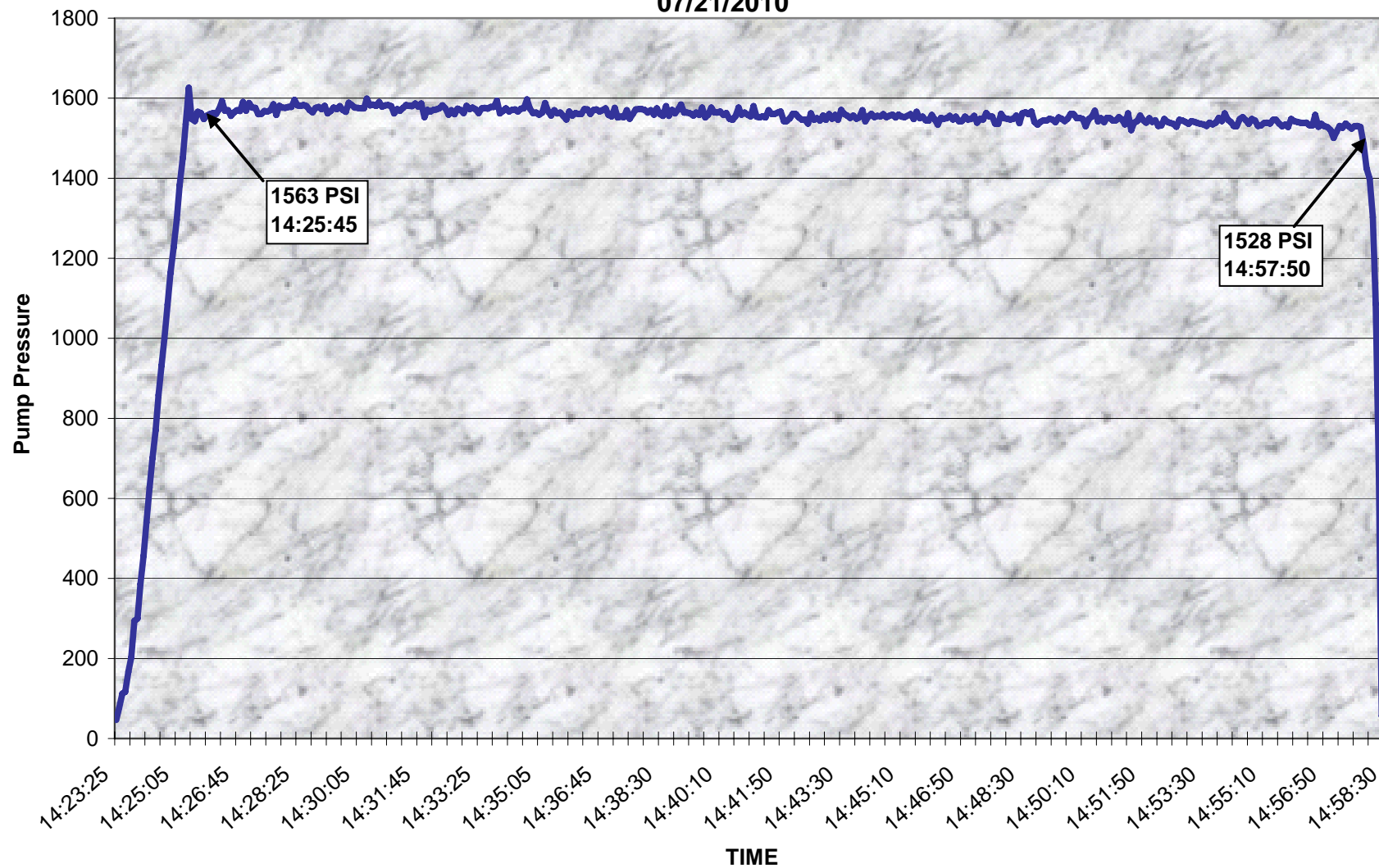
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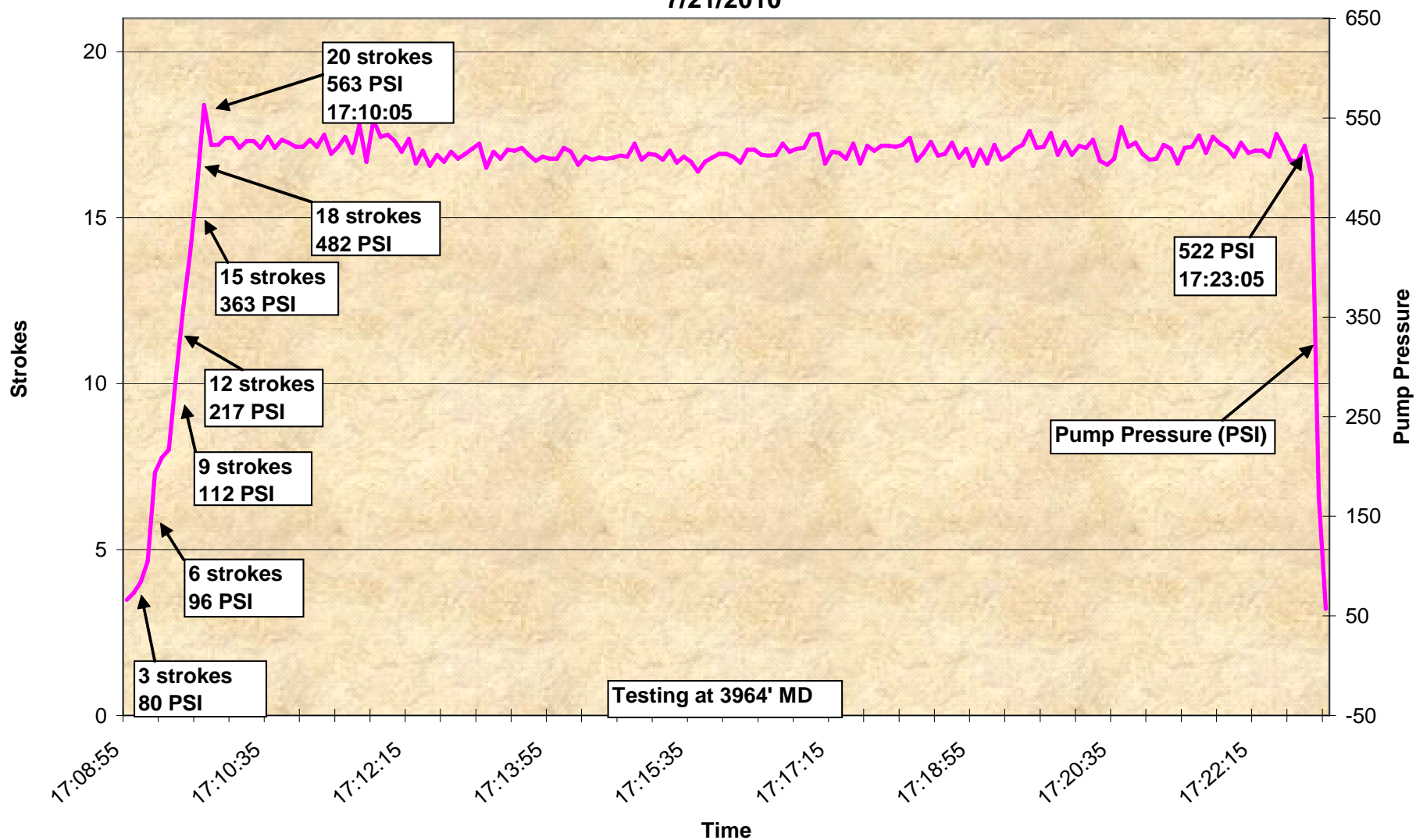
**Note:** All survey data provided by Schlumberger

**Exxon Mobil  
Freedom Ranch Unit 197-33B9  
Pressure Tests**



ExxonMobil FRU197-33B9  
30 Min. 10.75" CPT 3776' MD  
07/21/2010





**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Drilling Fluid Reports**



## FREEDOM RANCH UNIT FRU 197-33B9

### WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	7/20/2010	7/21/2010	7/22/2010	7/23/2010	7/24/2010	7/25/2010	7/26/2010
Sample Temperature (deg F)	90	84	92	84	112	113	124
Sample Depth	3950	3950	5017	5492	7184	8441	9328
Mud Weight (lb/gal)	9.2	9.2	9.2	9.2	9.2	9.4	9.4
FV (sec/quart)	50	47	23	50	52	54	50
PV(cP)	14	11	16	15	16	13	13
YP (lb/100 ft <sup>2</sup> )	24	21	20	19	26	29	25
Gels (10 sec lb/100ft <sup>2</sup> )	7	6	8	7	10	10	10
Gels (10 min lb/100ft <sup>2</sup> )	11	9	16	14	15	16	13
Gels (10 30 min lb/100ft <sup>2</sup> )	14	12	25	19	21	23	18
API FL (cc/30 min)	7.0	7.6	7.0	7.0	7.6	7.8	6.4
Cake (API)	1	1	2	2	2	2	2
pH	9.7	9.5	9.7	9.5	9.5	9.8	9.8
PM	0.95	1.00	0.95	0.95	0.85	0.90	0.90
Pf	0.30	0.20	0.15	0.15	0.05	0.05	0.05
MF	1.80	2.10	0.55	0.50	0.40	0.55	0.30
Excess Lime (lb/bbl)	0.17	0.21	0.21	0.21	0.21	0.22	0.22
Hardness (mg/l)	20	20	40	40	60	20	20
Chlorides (mg/l)	1300	1300	1300	1300	1300	1300	1200
MBT (lb/bbl)	17.5	17.5	20.0	20.0	17.5	17.5	17.5
Retort Water (%)	93.3	93.8	93.4	94.0	94.5	94.0	93.2
Sand (%)	0.20	0.20	0.30	0.30	0.30	0.30	0.35
Corrected Solids (%)	6.2	5.8	6.2	5.6	5.2	5.7	6.0

## FREEDOM RANCH UNIT FRU 197-33B9

### WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	7/27/2010	7/28/2010	7/29/2010	7/30/2010	7/31/2010	8/1/2010	8/2/2010
Sample Temperature (deg F)	134	125	90	100	105	120	120
Sample Depth	10089	10689	10714	10831	11728	12269	12299
Mud Weight (lb/gal)	9.5	9.5	9.8	9.5	9.5	9.5	9.8
FV (sec/quart)	50	52	54	53	57	52	53
20PV(cP)	16	16	17	14	17	17	17
YP (lb/100 ft <sup>2</sup> )	25	22	25	28	28	26	26
Gels (10 sec lb/100ft <sup>2</sup> )	8	7	8	8	9	8	8
Gels (10 min lb/100ft <sup>2</sup> )	9	11	11	13	14	13	14
Gels (10 30 min lb/100ft <sup>2</sup> )	14	13	13	16	17	15	16
API FL (cc/30 min)	6.4	6.6	7.6	6.8	6.4	6.4	6.6
Cake (API)	2	1	1	1	1	1	1
pH	9.6	10.0	9.6	9.8	9.8	9.8	9.6
PM	0.85	1.00	0.95	0.90	0.90	0.90	0.85
Pf	NA	0.05	0.05	0.05	0.05	0.05	0.05
MF	0.30	0.45	0.40	0.70	0.80	0.70	0.75
Excess Lime (lb/bbl)	0.22	0.25	0.24	0.22	0.22	0.22	0.21
Hardness (mg/l)	40	20	20	20	20	20	20
Chlorides (mg/l)	1300	1300	1300	1300	1300	1300	1300
MBT (lb/bbl)	17.5	17.5	17.5	17.5	15.0	15.0	15.0
Retort Water (%)	93.0	92.0	91.0	92.0	91.2	91.2	91.5
Sand (%)	0.35	0.35	0.30	0.25	0.25	0.30	0.40
Corrected Solids (%)	6.4	7.2	8.4	7.5	7.9	8.0	8.1



## FREEDOM RANCH UNIT FRU 197-33B9

### WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid Fluid Services

Property	8/3/2010	8/4/2010	8/5/2010	8/6/2010	8/7/2010	8/8/2010	8/9/2010
Sample Temperature (deg F)	100						
Sample Depth	12300						
Mud Weight (lb/gal)	9.6						
FV (sec/quart)	50						
20PV(cP)	17						
YP (lb/100 ft <sup>2</sup> )	27						
Gels (10 sec lb/100ft <sup>2</sup> )	7						
Gels (10 min lb/100ft <sup>2</sup> )	12						
Gels (10 30 min lb/100ft <sup>2</sup> )	14						
API FL (cc/30 min)	7.2						
Cake (API)	1						
pH	9.5						
PM	0.80						
Pf	005						
MF	0.85						
Excess Lime (lb/bbl)	0.20						
Hardness (mg/l)	20						
Chlorides (mg/l)	1300						
MBT (lb/bbl)	15.0						
Retort Water (%)	15.0						
Sand (%)	0.25						
Corrected Solids (%)	8.0						

**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Bit History**



## FRU 197-33B9

[illegible]

**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Ballooning Data**

DEPTH (ft)	VOLUME (bbls)	Flow Out %	Connection Gas (u)	Background Gas (u)	Mud Weight	Mud Losses (bbls)
4065	4.7	NA	13	8	9.2	3.7
4159	6.8	NA	17	5	9.2	1.9
4250	5.8	NA	4	3	9.2	26.6
4349	3.9	NA	13	3	9.25	18.7
4446	7.7	NA	22	3	9.3	19.3
4542	8	NA	16	3	9.3	17.4
4639	7.5	NA	10	6	9.3	10.9
4736	7	NA	10	12	9.3	22.8
4825	12.9	NA	11	11	9.3	44.5
4923	11.9	NA	20	7	9.3	37.6
5019	14.2	NA	24	6	9.25	46.9
5110	5	NA	23	8	9.25	7.3
5206	4.3	NA	6	6	9.25	8.6
5295	2.9	NA	32	9	9.3	24.1
5395	7.3	NA	95	8	9.3	28.7
5526	4.1	NA	21	7	9.2	73.4
5622	18.5	NA	15	6	9.2	38.6
5717	6	NA	11	7	9.3	17.9
5814	1.3	1	81	41	9.2	8.4
5910	2.7	1	273	53	9.2	32.1
6005	0.8	0	124	21	9.2	37.3
6097	3.8	1	87	8	9.2	27.6
6194	1.4	0	49	27	9.2	39.4
6290	4.1	0	68	32	9.2	0
6387	5.4	0	71	31	9.2	74
6483	TRANSFER	0	1463	38	9.2	36
6578	12	0	352	51	9.2	124
6676	14	1	123	35	9.2	129
6773	17	4	167	26	9.2	85
6867	36	2	246	21	9.2	43
6963	23	3	265	18	9.2	39
7059	28	2	414	18	9.2	44

\* 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)
7159	22	2	3067	23	9.2	48
7254	16	2	2141	408	9.25	42.3
7339	30	2	1125	37	9.2	24.9
7434	19.5	2	1287	67	9.2	78.8
7530	23.1	2	1000	53	9.2	39.2
7627	35.8	1	1579	87	9.2	67.7
7723	7.7	1	665	86	9.2	139.9
7820	33.6	3	1294	112	9.2	0
7916	31.4	1	604	144	9.2	45.1
8005	29.5	3	591	107	9.2	27.9
8102	TRANSFER	2	586	100	9.2	257
8198	36	5	821	23	9.3	206
8294	45	3	732	47	9.3	208
8385	25	3	1239	179	9.3	277
8483	39	15	1163	179	9.4	31.4
8578	34.2	11	672	42	9.4	0
8672	25.5	6	191	70	9.4	0
8768	29.9	6	560	88	9.4	0
8864	62.5	3	2598	186	9.4	35.7
8960	35	4	1017	206	9.4	268
9057	56	5	1364	421	9.4	263
9147	43	5	1391	304	9.4	251
9242	40	16	931	253	9.4	182
9338	17.1	3	1763	287	9.4	27.1
9435	19.7	4	2486	312	9.4	73.5
9525	59.4	16	2466	209	9.4	32.7
9621	31.4	14	529	137	9.4	41.6
9716	38.2	4	2570	198	9.4	54.6
9512	46	5	1658	120	9.4	128
9908	34	11	1326	127	9.4	189
10003	49	18	2194	103	9.4	265
10101	37	12	904	102	9.4	98.4

\* 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)
1097	31.9	14	4069	149	9.5	77.1
10293	68.2	3	2448	217	9.5	30.7
10389	5.2	0	2056	653	9.5	196
10484	25	0	3796	478	9.5	91
10583	22	0	3850	275	9.5	57
10680	25	0	4013	374	9.5	48
10761	40	22	1654	620	9.5	138
10865	54	24	1126	717	9.5	53
10961	30.1	19	1547	837	9.5	34
11060	40.7	33	1671	976	9.55	17
11153	42.1	36	1678	829	9.55	11
11248	50.1	27	1490	799	9.5	16
11345	36.8	28	1764	586	9.5	26
11439	39.1	29	1822	287	9.5	100
11534	51	23	1706	983	9.6	86
11625	45	20	1861	292	9.6	106
11720	39	17	1773	340	9.6	57
11821	34.1	24	1250	352	9.5	19
11914	45.7	22	1237	438	9.5	11
12010	59.8	22	1436	378	9.5	16
12106	49.9	20	1748	453	9.5	113
12202	49	19	1785	240	9.5	80
12299	41	17	1831	161	9.5	10

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

**Exxon Mobil**  
**Freedom Ranch Unit 197-33B9**  
**Losses and Gas Buster Data**

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