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Well History

Piceance Creek Unit PCU 297-11A4
Rio Blanco County, Colorado

EPOCH Well Services, Inc.
New Iberia, Louisiana

ExxonMobil
Development

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ExxonMobil

ExxonMobil Production Company

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, Colorado**

 **EPOCH**

EPOCH Well Services, Inc.

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Introduction and Geology

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, Colorado**



EPOCH Well Services, Inc.

Introduction

Epoch Well Services (Epoch) of New Iberia, LA has been providing mud logging and contract geology services to the ExxonMobil Drilling Group (ExxonMobil) 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 Piceance Creek Unit (PCU) 297-11A4 well. The well was drilled as the seventh production hole in a "batch" of nine directional wells on the Piceance Creek Unit 297-11A pad. The 297-11A4 well is located in the Piceance Basin at the following coordinates:

- Latitude 39.891458330
- Longitude 108.238944400

The well was spudded on May 17, 2008. Drilling operations were conducted from spud through to a total depth of 13165' (MD) on 03/05/2009. Drilling operations were conducted by Helmerich & Payne using a Flex 4 rig (#326). Epoch personnel logged and collected samples starting at 5150' through to 13165' MD. Drilling fluid engineering services were provided by Baroid. The well was drilled with conventional water-based mud spud mud to 5150' and LSND (Low Solids Non-Dispersed) from 5150' through TD at 13165'.

The well was cased and cemented according to the following:

- 16-inch casing from surface to 150 feet.
- 10.75-inch casing at 5150 feet.
- 7.625-inch casing at 8956 feet.
- 4.5- inch casing at 13160 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; and CO₂;
- Personnel - Two Senior Mud logging Geologists were onboard the rig at all times during the well with two Sample Catchers being assigned during actual drilling phases to ensure timely and accurate sample collection, processing and presentation as the Geology of the well dictated. Interaction with ExxonMobil on-site and Houston-based personnel to determine formation tops and provide support as required through drilling.

Epoch Well Services, Inc. wishes to thank you for the opportunity to provide services on this well and look forward to being of service to you again in the future.

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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 297-11A4 well incorporates terminology as developed by ExxonMobil 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 Mesaverde 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 ExxonMobil 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.

ExxonMobil 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 ExxonMobil 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.

PCU 297-11A4 Formation Tops

Formation/Member Name	Stratigraphic Unit Top	Depth (MD/TVD)
Wasatch Formation		
Wasatch G		5690' / 5435'
Ohio Creek Formation		
	950 Abandonment Surface (AS)	7540' / 7285'
Williams Fork Formation		
WF 800	850 Abandonment Surface (AS)	8130' / 7875'
WF 700	800 Sequence Boundary (SB)	8380' / 8125'
WF 500	600 Sequence Boundary (SB)	8800' / 8545'
WF 400	490 Abandonment Surface (AS)	9485' / 9230'
WF 200	290 Abandonment Surface (AS)	11280' / 11025'
Cameo	210 Sequence Boundary (SB)	11535' / 11280'
Iles Formation		
Rollins Member	200 Sequence Boundary (SB)	11820' / 11565'
Cozzette Member	180 Flooding Surface (FS)	12010' / 11755'
Corcoran Coastal Plain	140 Flooding Surface (FS)	12290' / 12035'
Corcoran Marine	140 Sequence Boundary (SB)	12940' / 12685'
* Wasatch I, WF 850, WF 600 tops not confirmed by XOM geologists.		



Correlation and Gas Character

Piceance Creek Unit PCU 297-11A4

Rio Blanco County, CO.



Well Services, Inc.

ExxonMobil
PCU 297-11A4

Correlation and Gas Character

Correlation of formation tops from the Wasatch G to the Corcoran Marine for the PCU 297-11A4 has been confirmed by ExxonMobil geologists using correlating logs from nearby well pads, as well as the other wells drilled on this pad. The surface and intermediate sections of the hole were drilled using directional tools and a max inclination of 25.98° was reached at a depth of 3001' MD. The inclination was eventually reduced to a minimum of 4.50° at 8970'. Overall the well was stratigraphically similar to that of wells drilled in the nearby area. Note: all depths in the following discussion are MD.

Wasatch Formation

The lower Wasatch Formation is assigned from the occurrence of the top of the Wasatch "G" 5690' to the top of the Ohio Creek Formation 7310'. Lithologies in the lower Wasatch generally consist of interbedded shale, siltstone, and sandstone. The first 90' consists of 60% sandstone with a maximum formation gas of 220 units. Shales increase to 70% at 5780' and dominate the remainder of the Wasatch G. Maximum formation gas of 363 units at 5800'. A 20% coal interval enters at 6500' with a gas show of 325 units. Sandstone increases between depths of 7040' to 7130' with maximum gas of 556 units at 7050'. Wiper gas high of 1103 units at 7400'. CO2 high of 86691 ppm at 5900'.

Ohio Creek Formation

The Ohio Creek formation came in at 7540'. High percentages of shale dominate the lithology up to 7640' where sandstone increases to fifty percent. Carbonaceous shale at ten percent is logged at 7670', sandstone decreases and a wiper gas of 3869 units is recorded. A sandstone interval at 7700' produced a max gas spike of 387 units. The remainder of the Ohio Creek formation consists of small percentages of carbonaceous shale, shale, sandstone and increasing percentages of siltstone. A connection gas high of 832 units was logged at 7880'.

Williams Fork 800 Member

The Williams Fork 800 began at 8130' with a sixty percent sandstone decreasing to twenty percent at 8150'. An increase in siltstone at this depth produces a maximum gas reading of 474 units and a connection gas of 497 units. A coal seam enters at 8210' at which depth a background gas of 245 units is recorded. Twenty percent coal and sixty percent sandstone comprise the remainder of the Williams Fork 800 Member producing a maximum gas spike of 592 units.

Williams Fork 700 Member

The top of the Williams Fork 700 started at 8380' in lithology consisting of shale, seventy percent sandstone and a ten percent coal seam. Maximum background gas recorded at 255 units. Unconsolidated sandstone is abundant in the Williams Fork 700 with gas peaks of 370 units at 8507'.

and CO2 high of 1144 ppm recorded at 8520'. An interval of carbonaceous shale is seen beginning at 8600' and connection gas high of 1887 units at 8630' and background gas high of 358 units are recorded. At the bottom of the Williams Fork 700, a siltstone interval appears and maximum gas reading of 410 units is logged.

Williams Fork 500 Member

The top of the Williams Fork 500 was encountered at 8800'. The maximum formation gas of the Williams Fork 500 was 1902 units at 9462'. The maximum connection gas of 1489 units came in at 9330'. Drill rate increased slightly to an average of 47.4 feet per hour. No elevated carbon dioxide readings were recorded. Sandstone and siltstone were the dominant lithologies seen in the 500, although carbonaceous shale and shale were present throughout the 500 as well.

Williams Fork 400 Member

The Williams Fork 400 started at 9485'. The first significant gas spike, 1408 units, was produced by a sandstone interval with an associated drilling break around 9595'. After this spike gas shows and connection gases increased and the gas buster was used twelve times through the WF400. Another sandstone at 9750' produced a max gas spike of 810 units. The maximum formation gas recorded was 2173 units at 10543' and was attributed to a carbonaceous shale interval. A sandstone around 10620' produced a gas spike of 1697 units. This interval also displayed a significant increase in ROP. A maximum connection gas of 1434 units was recorded at 11272' at the base of the formation. The average amount of gas remained fairly constant compared to the WF500, 310 units to 341 units.

Williams Fork 200 Member

The Williams Fork 200 came in at a depth of 11280'. A gas spike of 1434 units occurred at the boundary of the WF400 and WF200 and was attributed to connection gas but also likely part formation gas. A carbonaceous shale/coal interval around 11320' produced a gas spike of 787 units. A formation gas high of 1428 units was recorded at 11394' and attributed to a coal seam. A maximum connection gas of 1580 units came in at 11474'. A sandstone section at 11490' produced a max gas spike of 1086 units. Significant drilling breaks were observed in the WF200 but the average ROP increased only slightly over the WF400. Average total gas through the WF200 was much higher than the WF 400, 611 to 310 units. The gas buster was used once at 11366' and a 10' flare was observed.

Cameo Member

The top of the Cameo was encountered at a depth of 11535' and came in with 10 percent coal in the sample. Sandstone maintains forty percent and less throughout the Cameo Member as percentages of carbonaceous shale and coal increase. The gas buster was used twice with a 5' flare recorded at 11775'. Connection gas high of 2153 units was recorded at 11575'. The first formation gas spike of 1485 units was read at 11620' and the final gas spike came in at the bottom of this section with 2148 units at 11820'. Coal increased to 20 percent at 11640' producing a maximum gas reading of 1060 units. These gas shows are closely associated with the coal seams and carbonaceous shale sections.

Rollins Member

The top of the Rollins was drilled at a depth of 11820' coming in with 50 percent sandstone and 10 percent carbonaceous shale. Connection gas of 871 units at 11870' was logged in a seventy percent sandstone interval. Sandstone decreases and siltstone increases at 11940' where gas buster is engaged and connection gas of 825 units was read. No flare recorded.

Cozzette Member

The Cozzette Member top came in at a depth of 12010' with 70 percent sandstone, 10 percent siltstone and 10 percent carbonaceous shale. An increase in carbonaceous shale to 20 percent came in at 12030' along with a connection gas of 734 units at 12050'. At 12047' the gas buster was engaged with no flare recorded. Maximum gas of 538 units is read at 12105'. Siltstone increases to forty percent and a ten percent coal seam comes in at 12150' as sandstone again increases to fifty percent. The last section of the Cozzette Member is comprised of a twenty percent carbonaceous shale along with increasing percentages of sandstone and siltstone. The final connection high gas of 754 units is recorded at 12245' and maximum formation gas of 524 units is read at 12285'. Background gas is low throughout this formation.

Corcorran Coastal Plain Member

The Corcorran Coastal Plain member top was drilled at 12290'. Throughout the Corcorran Coastal Plain Member, sequences of sandstone, siltstone and carbonaceous shales were logged along with 2 intervals of thinly bedded coals. Three significant gas shows occur in this section. The first maximum background gas of 2156 units at 12780' along with CO2 high of 4943 ppm. The gas buster is engaged five times during this section with no flare recorded. A Maximum gas reading of 1048 units at 12810' and the final high gas show of 917 units was read at 12855'.

Corcorran Marine Member

The top of the Corcorran Marine was encountered at 12940' with 60 percent siltstone, 30 percent sandstone, 10 percent shale and producing low background gas. The Corcorran Marine is dominated by siltstone of massive structure. The gas buster was engaged at 12923' where a connection gas high is recorded at 1639 units. The final connection gas high of 1519 units occurs at 13020'. This section produced low background gas.



Lithology Descriptions

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, CO.**



Upper Wasatch (5150' – 5689')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
5150	5689	199.60	0.00	91.98	156014.53	330.00	5366.66	344.77	0.00	23.31

5150' Shale = light to medium gray with light purple and yellowish hues; dense crunchy tenacity; earthy to hackly fracture; wedgelike cuttings habit; waxy luster; smooth to silty texture.

5210' Shale = light gray, grayish yellow, some purple hues; platy to sub tabular cuttings habit; irregular to hackly fracture dull earthy luster; smooth to gritty texture; crunchy tenacity.

5270' sandstone = white, light gray, light bluish gray; moderately well sorted; easily friable; sub round to subangular; fine to very fine grains; low sphericity; moderate reaction to HCL.

5330' Shale = light to medium gray, light grayish red, some with light purple hues crumbly to pulverulent tenacity; earthy fracture; some elongated, mostly wedgelike cuttings habit; earthy luster; clayey to silty texture; fissile structure.

5410' Siltstone = reddish brown to medium gray some with purplish hues; platy to sub tabular cuttings habit; irregular to hackly fracture; gritty texture with dull earthy to sparkly luster; grades to silty shale.

5480' Sandstone = light gray, some mottled with yellowish and purplish hues; upper medium to fine grains, some individual grains are translucent to opaque; sub angular to sub round with low to moderate sphericity; grain supported in calcareous and clay matrix.

5560' Shale = medium bluish gray to medium gray, some brownish gray, some dusky yellow; dense tenacity; irregular fracture; mostly wedgelike, some curved cuttings; dull to waxy luster; clayey texture; no visible structure.

5630' Shale = medium to medium dark gray, dark gray, slight yellowish gray; brittle to dense tenacity; irregular fracture; wedgelike cuttings habit; dull luster; clayey texture, some gritty to silty.

Lower Wasatch (5690' – 7539')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
5690	7539	127.98	2.98	65.81	86691.30	330.00	4705.50	613.53	0.45	77.10

5690' Sandstone = white to very light gray; friable to firmly friable; very fine grain; very well sorted; subangular to subrounded; moderate to high sphericity; predominately clay and silica cemented, some calcite; grain supported matrix; some dark gray lithics.

5770' Sandstone = white to very light gray; very fine to fine grain; well sorted; predominately subangular to subrounded, some angular, some round; moderate to high sphericity; friable to firmly friable, some easily; mostly clay cement some calcite; dark gray lithics.

5850' Shale = medium gray, grayish red, very dusky purple; dark yellowish orange; brittle to dense tenacity; irregular fracture; dull luster; silty to clayey texture.

5910' Siltstone = light greenish gray, pale green; pulverulent tenacity; earthy fracture; platy cuttings habit; earthy luster; gritty to silty texture; some grading to lower very fine sandstone.

5970' Shale = light pale bluish green to light bluish gray; crunchy to brittle

tenacity; irregular to planar fracture; platy cuttings habit; waxy to dull luster; granular texture; thick structure; grading to siltstone.

6040' Carbonaceous shale = brownish black to grayish black, trace black; brittle to crunchy tenacity; irregular to

planar, trace splintery fracture; dull earthy to waxy to trace vitreous luster; smooth to silty, gritty texture; laminae to thin structure; grading to siltstone.

6130' Shale = medium light gray to bluish gray, dense to brittle tenacity; irregular to slightly sub blocky fracture; platy to massive cutting habit; dull earthy to waxy with a trace vitreous luster; gritty to silty texture; thick structure.

6210' Carbonaceous shale = dark grayish black, black, some brownish black; dense to crunchy, moderately firm; irregular to splintery fracture; massive to platy cuttings habit; vitreous to waxy luster; silty to clayey texture, thin to laminae structure, trace degassing in sample tray.

6310' Shale = medium gray to dark gray with some grayish black; brittle to dense tenacity; irregular to sub blocky trace blocky fracture; wedgelike to platy cuttings habit; dull earthy to waxy luster; silty to gritty texture grading to siltstone; massive to thick structure.

6400' Siltstone = light bluish gray to light greenish gray; brittle to dense tenacity; irregular to sub blocky fracture; wedgelike to massive cuttings habit; dull luster; gritty to abrasive texture; thick structure; trace black carbonaceous shale.

6480' Sandstone = very light gray, some clear, some frosted; very fine to fine grain; well sorted; subangular to subrounded; low sphericity; entirely unconsolidated grains in sample.

6540' Shale = medium gray to medium dark gray, brownish black, pale yellowish brown; mostly pulverulent, some dense tenacity, earthy fracture; wedgelike, some platy cuttings habit; earthy to dull luster; silty to clayey texture; slight pyrite.

6610' Sandstone = very light gray to light gray; very fine grain; very well sorted; subangular to subrounded; moderate to high sphericity; mostly friable to firm friable, some easily and some unconsolidated grains; calcite cemented; some gray lithics.

6690' Siltstone = olive gray to brownish black some dark gray; dense to tough tenacity; irregular fracture; wedgelike cuttings habit; frosted luster; gritty to silty texture; massive structure.

6750' Carbonaceous shale = brownish black, some black; crunchy tenacity; hackly fracture; nodular cuttings habit; greasy luster; silty texture; laminae structure

6800' Shale = light bluish gray to medium bluish gray, medium light to medium gray mostly dense to tough tenacity, some pulverulent; earthy fracture; wedgelike cuttings; dull luster; clayey texture.

6870' Shale = grayish blue to light bluish gray, some medium gray to dark medium gray; crumbly to dense tenacity; irregular, subblocky to blocky fracture; wedgelike to flaky cuttings habit; dull waxy to earthy luster; clayey smooth grading to gritty texture; thick to massive structure; traces speckled black carbonaceous shale in samples.

6980' Carbonaceous shale = greenish black to grayish black, trace black, some brownish black; pulverulent to dense brittle tenacity; subblocky to irregular fracture; wedgelike to platy cuttings habit; dull earthy, slight waxy, trace vitreous luster; smooth clayey grading to gritty abrasive texture; thin to slightly thick massive structure; trace degassing in sample tray.

7100' Sandstone = off white, white, transparent, trace opaque, some very light grayish brown; medium to fine grain; fair to well sorted; subangular to subround angularity; low to moderate sphericity; some frosted surface features; predominately grain supported, some silica matrix cementation, trace calcareous cement; traces black carbonaceous speckled shale.

7220' Shale = medium bluish gray to medium gray, dark gray, brownish gray; pulverulent, some dense to tough tenacity;

mostly earthy fracture; wedgelike cuttings, some platy; earthy to dull luster predominately silty texture, some clayey mostly massive structure.

7300' Shale = light to medium bluish gray, grayish red purple, brownish gray, slight grayish orange; pulverulent to crunchy tenacity; earthy fracture; wedgelike cuttings habit; dull luster; silty to clayey texture; massive structure.

7370' Siltstone = bluish gray, reddish gray, some medium dark gray; brittle tenacity; irregular fracture; wedgelike cuttings habit; frosted luster; gritty to silty texture; massive structure; some grading to very fine grain sandstone.

7440' Shale = medium gray to medium bluish gray, medium light gray, very dusky purple; pulverulent to crunchy tenacity; earthy fracture; wedgelike cuttings; dull to waxy luster; clayey texture.

7500' Shale = greenish gray, medium bluish gray, very dusky purple; pulverulent tenacity; irregular fracture; wedgelike, some curved cuttings habit; waxy luster; clayey to smooth texture; massive structure; slight carbonaceous in sample.

Ohio Creek (7540' – 8129')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
7540	8129	90.18	38.51	68.42	330.00	330.00	330.00	81.06	8.02	39.70

7570' Sandstone = light greenish gray, white to very light gray, yellowish gray; easily friable to friable, some firmly friable; very fine to medium grain with some coarse loose grains; poor to fair sorting; subround to rounded; moderate to high sphericity; some silica cement, some kaolinite; carbonaceous and lithic pieces.

7670' Sandstone = off white, transparent, light pale greenish gray; medium to fine grain; well sorted; subangular to subround angularity; some frosted surface feature; consolidated, friable to very friable; predominately grain supported; silica matrix cement, trace calcareous cement; trace speckled carbonaceous black shale and traces lithic.

7780' Shale = pale bluish gray to light gray, medium light gray, trace light olive gray brown; crumbly to dense tenacity; irregular to subblocky fracture; platy to wedgelike cuttings habit; dull earthy to waxy luster; gritty to silty texture; thick structure traces speckled lithic.

7870' Shale = pale bluish green to medium grayish green, trace pale grayish blue; pulverulent to brittle dense tenacity; irregular to subblocky to blocky fracture; wedgelike to platy, trace massive cuttings habit; waxy to dull earthy smooth texture; thick massive structure.

7960' Sandstone = very pale blue, light bluish gray, off white, transparent; very fine to fine some medium grain; fair to well sorting; subangular to subround angularity; low sphericity; trace frosted surface features; friable to very friable; silica matrix cement, some weak calcareous cement; grain supported; black speckled carbonaceous shale imbedded.

8070' Siltstone = light gray bluish green, light gray; crumbly to dense tenacity; irregular to subblocky fracture; wedgelike to massive cuttings habit; waxy to dull earthy luster; gritty to granular texture; thick to massive structure; grading to sandstone.

WF 800 (8130' – 8379')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
8130	8379	110.19	26.49	67.25	330.00	330.00	330.00	1888.39	15.88	161.65

8160' Sandstone = very light gray, slight light gray, slight yellowish gray; quartz framework; very fine to fine grain; well sorted; angular to subangular; moderate to high sphericity; friable to firmly friable; calcite cementing, some clay; abundant carbonaceous and lithic clasts.

8250' Siltstone = light bluish to medium bluish gray, some very light to light gray; crunchy tenacity; blocky fracture; wedgelike, some equant cuttings habit; frosted luster; gritty to silty texture; thick or banded structure.

8320' Sandstone = frosted very light gray; very fine to coarse grains; poorly sorted; subangular to subrounded; very low sphericity; entirely unconsolidated grains in sample.

WF 700 (8380' – 8799')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
8380	8799	91.50	19.68	47.85	1144.05	330.00	372.55	1022.92	32.89	112.23

8380' Sandstone = frosted very light gray, some light brownish gray to brownish gray; gray is very fine to coarse and poorly sorted, brown is very fine and well sorted; subangular to subrounded; gray low sphericity, brown high; gray largely unconsolidated, some firm; grain supported matrix with silica cementing; abundant carbonaceous material in sample.

8490' Shale = medium gray to medium bluish gray, light greenish gray, some brownish gray; pulverulent tenacity, some dense to tough; earthy fracture; dull luster; silty to clayey texture; wedgelike cuttings habit; some chert in sample.

8560' Sandstone = off white, very light gray, frosted, some light brownish gray; very fine to fine grain; medium well to well sorted; subangular to subround angularity; traces moderate sphericity; predominately consolidated; very friable silica matrix cement, some calcareous cement, trace grain support; black speckled carbonaceous shale throughout.

8670' Shale = medium bluish gray, light gray, light grayish blue; pulverulent brittle tenacity; subblocky to blocky, some irregular fractures; wedgelike to platy cuttings habits; waxy to a dull gray earthy luster; smooth and clayey, trace of gritty texture predominately thick slightly massive structure; grading to a siltstone.

8770' Siltstone = very light gray to light gray; pulverulent to crumbly; subblocky to slight blocky fracture; wedgelike cuttings habit; frosted; gritty to granular texture.

WF 500 (8800' – 9484')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
8800	9484	101.02	0.48	53.42	330.00	330.00	330.00	1902.42	1.49	340.86

8830' Sandstone = very light gray to light gray with gray and dark gray specks; very fine to fine grain; well sorted; subangular to subrounded; moderate to high sphericity; easily friable to friable; calcite and silica cemented; grain supported matrix.

8910' Shale = light gray to medium gray; brittle tenacity; irregular to subblocky blocky fracture; wedgelike cuttings habit; waxy to dull luster; smooth texture.

TD intermediate section @ 8970' in WF500 on 11-24-2008

Start drilling production hole on 02-28-2009 at 10:45am

9030' Carbonaceous shale = brownish black to grayish black color; crunchy tenacity; blocky fracture; nodular to tabular cuttings habit; fine cuttings size, less than 1mm; resinous to greasy luster; silty to smooth texture; massive structure; does not react with HCL.

9110' Sandstone = white to very light gray; friable when consolidated; clasts range from upper very fine to lower medium; angular to subround; moderately sorted; composed of 90% quartz, 10% medium to dark gray lithics; calcite cement; very slight reaction to dilute HCL.

9190' Shale = light gray to medium gray, light bluish gray; crumbly to pulverulent tenacity; earthy fracture; platy to wedgelike cuttings habit; resinous to earthy luster; smooth to silty texture; thin structure.

9260' Carbonaceous shale = black, brownish black, olive black; tough, dense tenacity; irregular to blocky fracture; platy to wedgelike cuttings habit; earthy luster; smooth to silty texture; massive structure.

9330' Siltstone = brownish gray to medium dark gray; some tough, some pulverulent tenacity; blocky fracture; equant, some wedgelike cuttings habit; earthy to dull luster; gritty to silty texture; massive structure.

9400' Sandstone = very light gray to white, transparent grains throughout; quart framework; upper fine to lower medium grain size; fair sorting; angular to subround; moderate sphericity; abundant unconsolidated grains; some carbonaceous material.

9480' Shale = light to medium dark gray; crunchy to crumbly tenacity; irregular to earthy fracture; wedgelike to elongated cuttings habit; waxy to earthy luster; clayey to silty texture; laminae structure.

WF 400 (9485' – 11279')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
9485	11279	105.16	12.87	55.30	3343.43	330.00	344.90	2173.47	40.23	331.41

9550' Siltstone = medium dark gray to brownish gray color; dense to crunchy tenacity; planar fracture; tabular to elongated to nodular cuttings habit; cuttings size less than 1mm; silty texture; predominantly massive structure with a trace amount of carbonaceous laminae in places; fair reaction with HCL.

9640' Sandstone = light gray to medium light gray color; medium grain to fine grain to very fine grain size; well to fair sorting; subangular to subround grains; moderate sphericity; grain supported; predominantly quartz grains; trace reaction with HCL; friable to firm; lose grains in tray due to pdc bit; trace amount of fracture fill seen.

9740' Shale = medium gray to medium bluish color; crumbly to brittle tenacity; irregular fracture; wedgelike to bladed cuttings habit; dull to waxy luster; smooth to clayey texture; massive structure; no reaction with HCL.

9810' Siltstone = brownish gray to medium dark gray color; dense to tough tenacity; irregular fracture; wedgelike to nodular cuttings habit; cuttings very in size from less than 1mm to as large as 3mm; earthy luster; silty texture; massive structure; fair reaction with 10% HCL.

9900' Sandstone = light gray color; medium to fine grain size; grain supported; fair sorting; subround to subangular grains; moderate sphericity; predominantly unconsolidated in tray due to pdc bit; quartz grains with trace amount of feldspar and accessory minerals; trace amount of cuttings with ground surfaces due to mechanical abrasion.

10000' Siltstone = brownish gray color; brittle to crunchy tenacity; irregular to blocky fracture; nodular to tabular cuttings habit; earthy to sparkling luster; silty to gritty texture; trace of carbonaceous laminae; no reaction to HCL.

10070' Shale = medium gray to medium dark gray; dense brittle tenacity; planar to hackly fracture; wedgelike to bladed cuttings habit; dull earthy luster; smooth to silty texture; massive, fissile structure.

10140' Sandstone = white to very light gray with abundant transparent grains, salt and pepper appearance; easily friable clasts; predominately unconsolidated grains; very fine to upper fine grain size; well sorted; angular to subround; calcite cement.

10220' Carbonaceous shale = dark gray, brownish black; brittle to crunchy tenacity; hackly to earthy fracture; tabular to wedgelike cuttings with some equant; waxy dull luster; smooth to silty texture; trace amount coal; fissile structure.

10290' Siltstone = light brownish gray to dark brownish gray; dense brittle tenacity; irregular, earthy fracture; nodular to equant cuttings habit; resinous waxy luster; gritty to granular texture; very fine grains; no reaction to HCL.

10360' Sandstone = white, light gray, some very light bluish gray; very fine to upper fine grain size; moderately well sorted; angular to subround; moderate to low sphericity; quartz framework; low reaction to HCL.

10430' Sandstone = white, translucent, transparent; unconsolidated grains; subangular to subround; upper very fine to upper fine grain size; well sorted; carbonaceous material present.

10490' Carbonaceous shale = dark gray to olive black; crumbly to pulverulent tenacity; earthy fracture; platy to tabular with some wedgelike cuttings habit; waxy to earthy luster; smooth to silty texture.

10550' Sandstone = white, light gray, light brownish gray; firm friable; very fine to fine grains; well sorted; subangular to subround; moderate sphericity; matrix supported; low reaction to HCL.

10610' Siltstone = brownish gray color; dense tenacity; irregular fracture; wedgelike cuttings habit; earthy luster; silty texture; massive structure; no reaction with HCL.

10670' Sandstone = light gray color; fine to very fine to medium grain size; fair to poor sorting; subrounded grains; moderate sphericity; grain supported; predominantly unconsolidated in tray due to pdc bit; mechanical abrasion, ground surfaces; slight reaction with HCL.

10750' Carbonaceous shale = brownish black color; dense to brittle; irregular to splintery fracture; wedgelike to platy cuttings habit; earthy to greasy luster; silty texture; trace of carbonaceous laminae; no reaction with HCL.

10820' Sandstone = brownish gray color; fine grain size; well sorted; subangular; moderate sphericity; firm hardness; grain supported; 60% quartz, 40% opaque minerals; no structures visible; no reaction with HCL.

10890' Siltstone = grayish brown color; dense tenacity; irregular to blocky fracture; wedgelike cuttings habit; earthy to dull luster; silty texture; massive structure; no reaction with HCL.

10950' Shale = medium gray to light bluish color; dense to crunchy tenacity; hackly to irregular to conchoidal fracture; wedgelike to bladed cuttings habit; waxy to dull luster; smooth texture; massive structure; no reaction with HCL.

11030' Carbonaceous shale = brownish black to black color; dense tenacity; blocky to conchoidal fracture; wedgelike to nodular cuttings habit; greasy luster; smooth texture; slickensidal structure; out gassing is visible; does not react with HCL.

11110' Sandstone = white to very light gray with salt pepper appearance; friable to firm when consolidated; very fine to fine grain size; well sorted; subangular to subround; abundant loose grains; matrix supported; moderate calcite supported.

11190' Carbonaceous shale = dark gray, brownish black, olive black; dense, brittle tenacity with some crumbly; irregular blocky fracture; nodular to equant cuttings habit; waxy, dull luster; clayey to silty texture; massive structure; some grading into siltstone.

11270' Sandstone = white, very light gray, light brownish gray, all with dark gray and black lithics; predominately unconsolidated grains, clasts easily friable; very fine to fine grains; well sorted; subangular to subround; grain supported, low reaction to HCL.

WF 200 (11280' – 11534')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
11280	11534	102.86	24.04	66.12	330.00	330.00	330.00	1580.89	102.75	610.61

11350' Coal = black, olive black; dense brittle tenacity; irregular, blocky fracture; tabular to equant cuttings habit; vitreous luster; smooth texture; thick structure; visible out gassing in tray.

11410' Shale = light gray to medium gray; dense brittle tenacity; irregular to blocky fracture; wedgelike to elongated cuttings habit; dull, earthy luster; clayey to silty texture; fissile structure.

11480' Sandstone = white, very light gray to light brownish gray; dark to black lithics throughout; firm to friable; very fine to fine grain size; angular to subround; matrix supported, no reaction to HCL.

Cameo (11535' – 11819')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
11535	11819	102.22	21.65	59.74	330.00	330.00	330.00	2153.12	103.27	571.60

11550' Carbonaceous shale = olive black, brownish black; tough, dense, brittle tenacity; irregular blocky fracture; tabular, platy, some elongated cuttings habit; dull earthy luster; smooth to silty texture; massive, fissile structure.

11630' Sandstone = white, very light gray with dark gray and black lithics; very fine to fine grain size; angular to subround; firm friable; well sorted; calcite cemented. moderate reaction to HCL.

11690' Coal = black color; dense to crunchy tenacity; blocky to conchoidal fracture; tabular to wedgelike cuttings habit; greasy luster; smooth texture; massive structure; out gassing is present.

11760' Siltstone = olive gray color; dense to tough tenacity; irregular fracture; wedgelike to nodular cuttings habit; earthy luster; silty texture; massive structure; slight reaction with HCL.

Rollins Member (11820' – 12009')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
11820	12009	99.44	15.95	43.17	1144.06	330.00	348.57	1060.13	42.34	189.68

11820' Sandstone = brownish gray to medium light gray color; fine to very fine grained; well to fair sorting; subangular to subrounded grains; moderate to high sphericity; firm to friable; half cuttings half grains in tray; grain supported; trace reaction with HCL.

11910' Carbonaceous shale = brownish black to grayish black color; dense tenacity; irregular fracture; nodular to wedgelike cuttings habit; earthy luster; silty texture; predominantly massive with some carbonaceous laminae in places; no reaction with 10% HCL.

11990' Shale = medium bluish gray to brownish gray color; dense to crunchy to brittle tenacity; conchoidal to hackly fracture; wedgelike to bladed to nodular cuttings habit; waxy to dull luster; smooth texture; massive structure.

Cozzette Member (12010' – 12289')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
12010	12289	108.30	14.59	49.01	1144.06	330.00	332.91	802.32	40.34	210.57

12060' Carbonaceous shale = brownish black to grayish black color; dense tenacity; irregular fracture; nodular to wedgelike cuttings habit; earthy luster; silty texture; predominantly massive with some carbonaceous laminae in places; no reaction with 10% HCL.

12140' Sandstone = very light gray to white, salt and pepper appearance; very fine to fine grain size; well sorted; angular to subround; matrix supported; quartz framework, low reaction to HCL.

12200' Sandstone = very light gray to white with black lithics throughout; very fine to lower fine grains; predominately unconsolidated grains; well sorted; subangular to subround. low reaction to HCL.

12270' Carbonaceous shale = dark gray to olive black; crunchy to crumbly tenacity; hackly to earthy fracture; tabular to wedgelike to equant cuttings habit; dull earthy luster; smooth to silty texture; laminae structure.

Corcoran Coastal Plain (12290' – 12939')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
12290	12939	111.58	7.14	35.84	4942.98	330.00	385.60	2155.81	20.78	250.43

12340' Shale = bluish gray, light to medium gray; dense, brittle tenacity; blocky hackly fracture; wedgelike to nodular cuttings habit; waxy earthy luster; clayey to silty texture; massive structure.

12410' Carbonaceous shale = olive black, brownish black; crumbly to pulverulent tenacity; hackly to earthy fracture; tabular to bladed cuttings habit; earthy luster; clayey to silty texture; thin structure.

12480' Siltstone = brownish gray color; dense tenacity; irregular to planar fracture; wedgelike to tabular to nodular cuttings habit; earthy to greasy luster; silty texture; massive structure; no reaction with HCL.

12550' Coal = black color; dense to brittle tenacity; blocky fracture; tabular to wedgelike cuttings habit; greasy luster; smooth to gritty texture; massive structure; degassing is visible; high to medium grade coal.

12620' Sandstone = medium light gray to medium dark gray; fine to very fine grained; well sorted; subrounded grains; with moderate to high sphericity; polished surfaces due to mechanical abrasion; firm to friable; some loose grains but predominately small cuttings in tray measuring 1mm to 2mm in size; grain supported with slight reaction to HCL.

note: 12720' through 12780' may not be representative samples due to the emptying of the possum belly; cuttings are larger in size then the samples before and after.

12780' Sandstone = white, pale yellowish brown clear to translucent, black to dark gray lithics; very fine to fine grain size; well sorted; angular to sub round; low sphericity; firm friable when consolidated, abundant loose grains; quartz framework; calcite cement; no reaction to HCL.

Corcoran Marine (12940' – 13165' TD)

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Average	Max	Min	Average	Max	Min	Avg
12940	13165	43.97	4.72	23.38	330.00	330.00	330.00	1518.57	49.56	129.28

12940' Shale = medium bluish gray to medium gray to medium bluish gray color; tough to crunchy tenacity; hackly fracture; wedgelike cuttings habit; waxy to dull luster; smooth to clayey texture; massive structure.

13010' Siltstone = brownish gray color; dense to crunchy tenacity; irregular fracture; wedgelike cuttings habit; earthy to greasy luster; silty to gritty texture; massive structure; no reaction with HCL.

TD production section on 03/05/2009 12:15 @ 13165' MD.

ExxonMobil

Pixler Plot

Piceance Creek Unit PCU 297-11A4

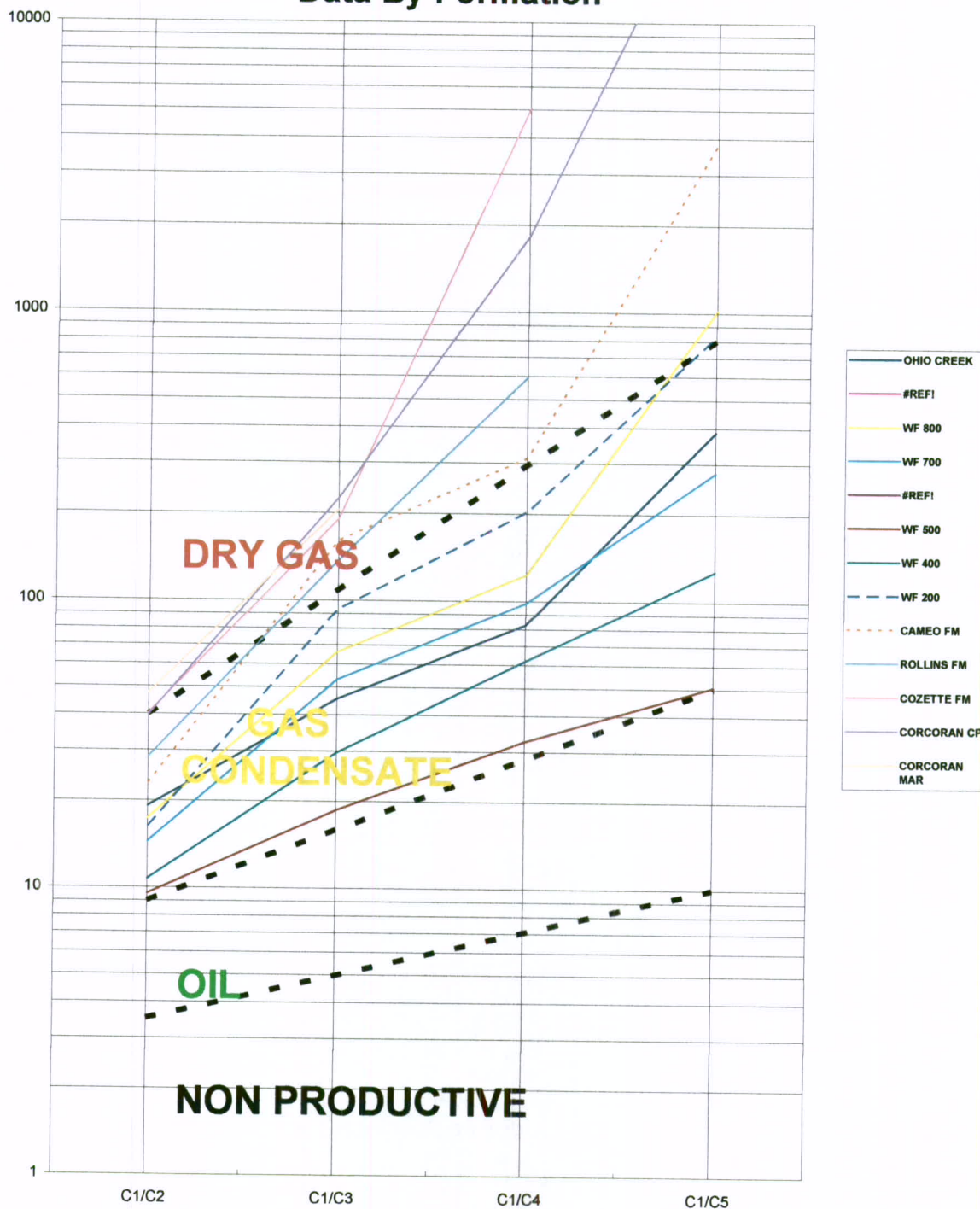
Rio Blanco County, CO.

 EPOCH

Well Services, Inc.

PCU 297-11 A4

Pixler Plot Of Average Chromatography Data By Formation





Other Data Plots

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, CO.**

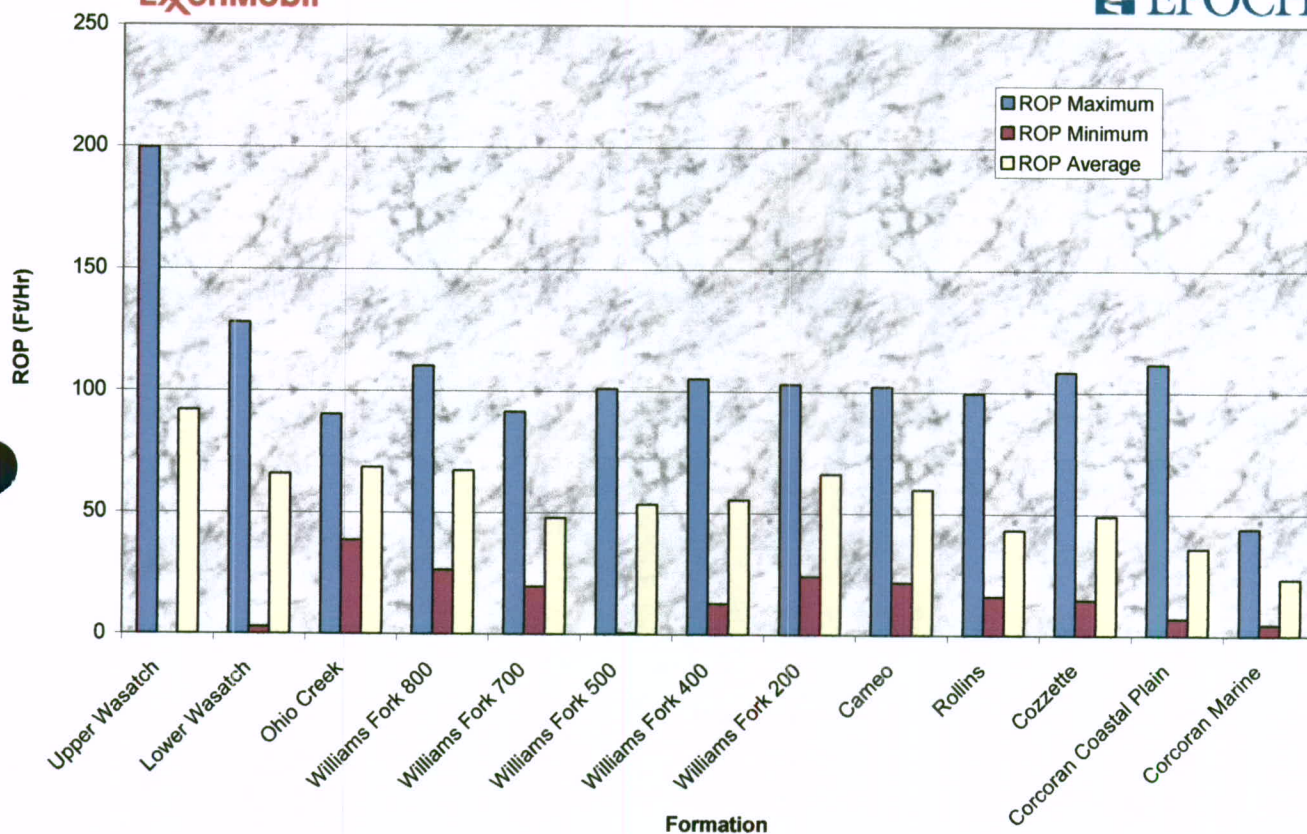


Well Services, Inc.

ExxonMobil

PCU 297-11A4
Rate of Penetration Statistics

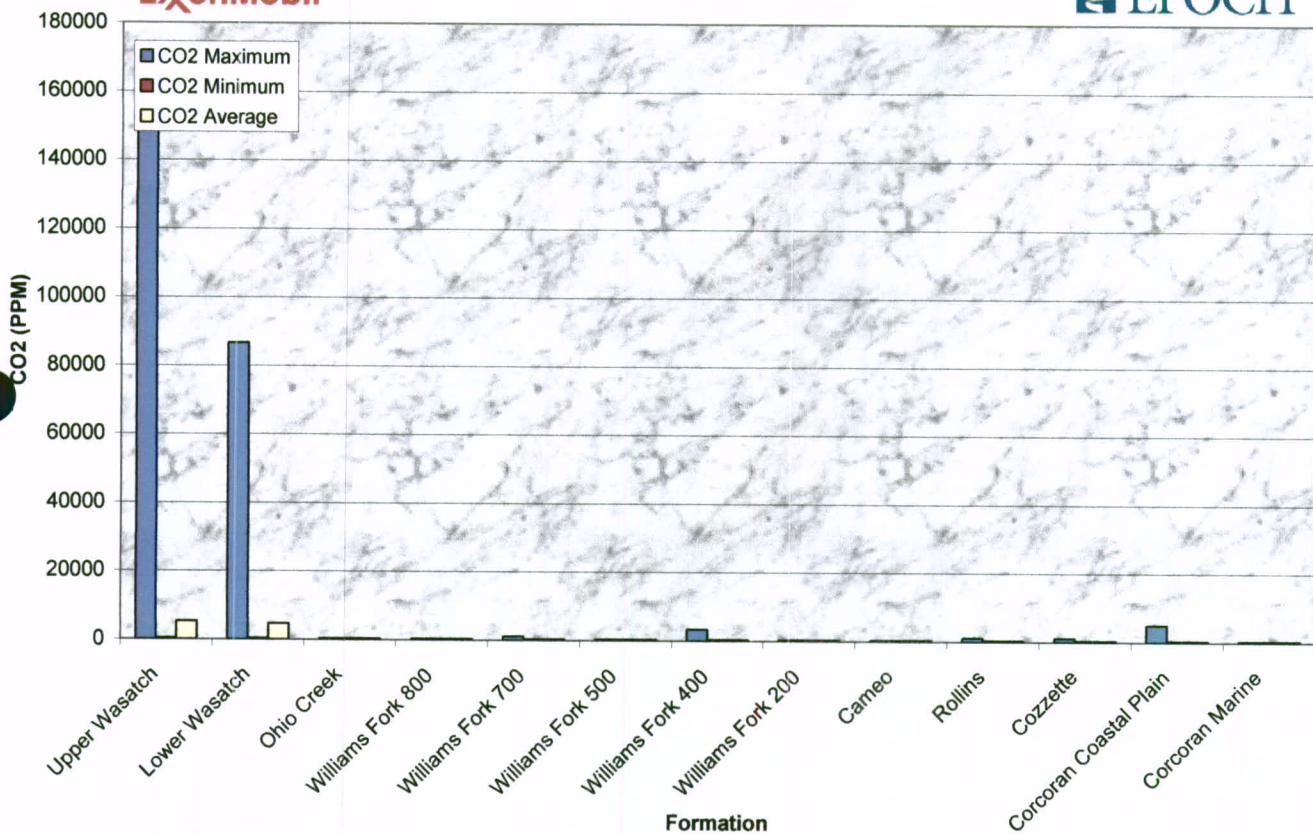
EPOCH



PCU 297-11A4
CO2 Statistics

ExxonMobil

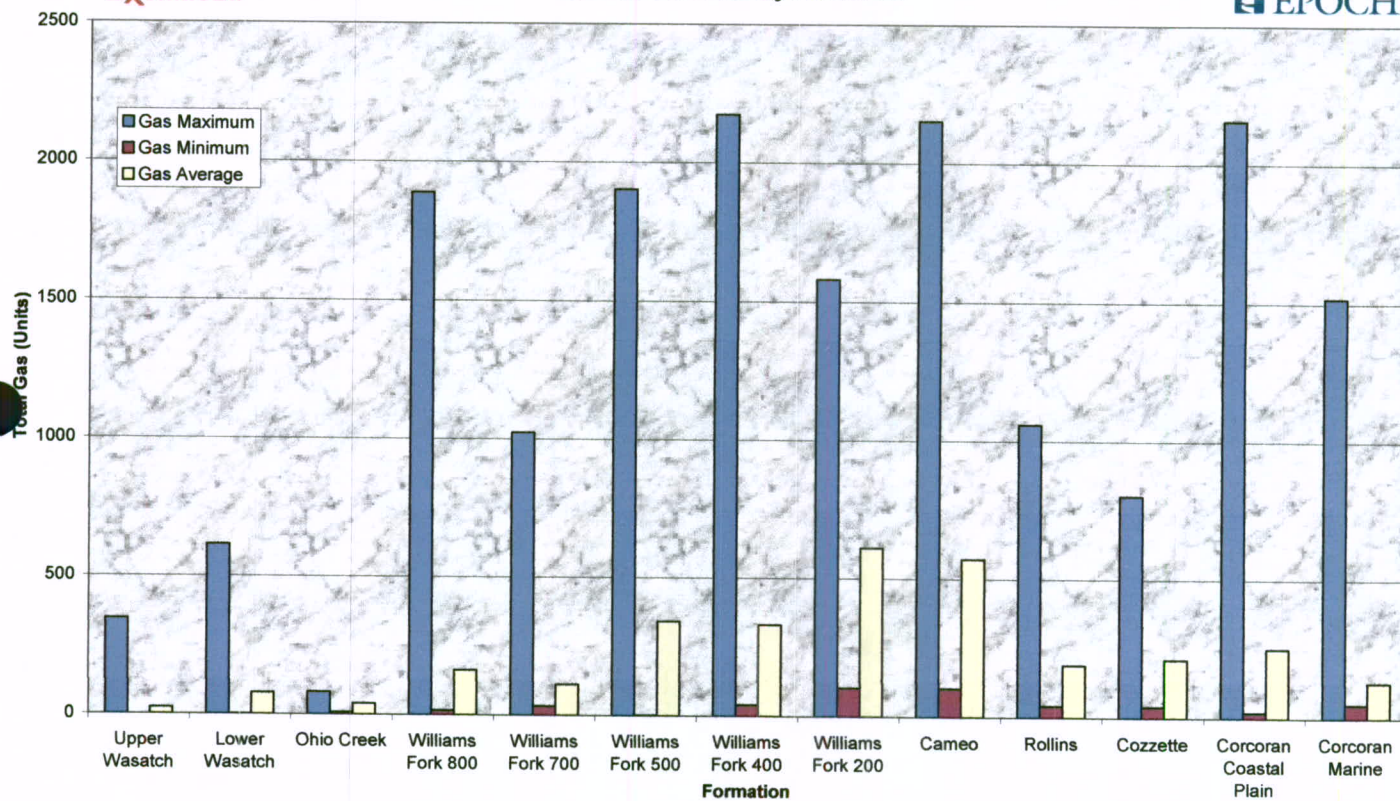
EPOCH



ExxonMobil

PCU 297-11A4
Total Gas Statistics By Formation

EPOCH





Mud Losses Summary

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, CO.**



[illegible]



Daily Activity Summary

**NOTE : Data For This Section Provided By H&P
From Daily Tour Sheet**

**Piceance Creek Unit PCU 297-11A4
Rio Blanco County, CO.**



5/17/2008 Finish skidding rig onto well, nipple/rig up, set up wrangler and pipe racks, mix spud mud. No gas readings to report.

5/18/2008 Level derrick, finish rig up, pick up BHA, rig up gyro tools. Drill from 149' to 295'. No CO2 to report.

5/19/2008 Drill from 295' to 980'. Trip and inspect BHA, inspect heavy weight, inspect collars, rig down gyro tools, drilling. No CO2 to report.

5/20/2008 Drill from 980' to 2945'. Change rotating head, pumping 2-20 bbl sweeps every 90 ft. High CO2 41975 ppm. High Total Gas 1785 u.

5/21/2008 Drill from 2945' to 3561'. Trip for new bit. High CO2 2500 ppm. Average CO2 702 ppm.

5/22/2008 Trip into hole with new bit #2. Wash and ream, drill from 3561' to 3937'. High CO2 1144 ppm, average 443 ppm.

5/23/2008 Drill from 3561' to 4735'. Work on pump #2. High CO2 1958 ppm.

5/24/2008 Drill from 4735' to 5150, TD surface hole. Trip out of hole and back ream, lost 67,000 in string weight, left 10 stands and 1 double in hole. No CO2 to report.

5/25/2008 Trip out of hole, pick up collars and fishing tool. Trip into hole, circ on top of fish, wash down fill, tagged fish at 3399'. Circulate and condition mud, trip out of hole. No CO2 to report. High background gas while circulating was 81 u.

5/26/2008 Trip out of hole, pick up collars and fishing tool. Trip into hole, circ on top of fish, wash down fill, tagged fish at 4665'. Circulate and condition mud. Trip out of hole; CO2 to report 14988ppm. High background gas while circulating; 31u.

5/27/2008 Trip out of hole with fish, lay down collars and fishing tool. CO2 report 330ppm. No background gas. Setting up for casing run at report time.

5/28/2008 Run into hole with casing, cement casing. CO2 report 10,100ppm. No background gas at report time.

5/29/2008 Finished cementing casing. Moving rig to 11A1 well bore. CO2 report 330ppm. No background gas at report time.

11/13/2008 Skid rig, nipple up BOP. no gas no CO2.

11/14/2008 Rig up flow line, tested BOP, rig down BOP test equipment, cut drill line, change out orbit valve, no gas no CO2.

11/15/2008 Make up bit, TIH 1478' tag up cement, test casing, drilled out DV tool, tested casing below DV tool 1500 psi 30 minutes, trip gas 2733u, BG, 2u, CO2 330 ppm.

11/16/2008 POOH to 736', TIH to 4950', drilled cement, float collar @ 4956', shoe @ 5049', drilled to 5160' FIT test, drilled to 5586', circulated bottoms up, short trip to 4918', trip in circulated in DSF mud wiper gas 2549u, CO2 10027ppm.

11/17/2008 Drilled to 5967', circulated, POOH to 5013', circulated, FIT test, TIH 5720', drilled to 5967', 110bbl loss @ 6145', drilled to 6253', circulated bottoms up, trip to 5776, wiper gas 330u BG 4u, CO2 45391ppm.

11/18/2008 Work tight hole, POOH to 5013', TIH to 5872, circulate, wash & ream to 6036', work tight pipe, drilled to 6540', trip out to 6444'. wiper gas 394u, BG 52u, CO2 11998ppm.

11/19/2008 Wash & ream to 6444', drilled to 7260', CG high 702u, wiper gas 1033u, BG 70u CO2 330ppm.

11/20/2008 Drilled to 7650', loss circulation @ 7600', pump sweep, drilled to 8250', BG 45u, CG high 703u, Wiper gas 3916u, CO2 330 ppm.

11/21/2008 Drilled to 8919', wiper gas 2186u, CG 614u, BG 68u, CO2 1144 ppm.

11/22/2008 Drilled to 8930', TOH 7780', circulated, TOH to shoe, TIH to bottom, CG 443u, BG 35u, CO2 330 ppm.

11/23/2008 Wash and ream from 8730' to 8930', drilled to 8970' TD well for intermediate casing, CG 202u, BG 60u, CO2 330 ppm.

11/24/2008 Wash and ream, circulate high viscosity sweeps, TIH from shoe to 7685'. CG N/A, Wiper gas 107u, BG 28u, CO2 330 ppm.

11/25/2008 Wash and ream to 8970', TOH to set intermediate casing, Wiper gas 38u, BG 4u, CO2 330ppm.

11/26/2008 TIH with intermediate casing, trip gas 1012u, BG 4u, CO2 330 ppm.

02/26/2009 Skid rig from well A-3 to well A-4 and rig up.

02/27/2009 T.I.H. and lay down 90 joints of drill pipe, performed rig service. Trip in from 8558' to 8850', circulate and perform casing pressure test @ 8844'.

02/28/2009 Drill out cement, circulate and perform F.I.T. test continue drilling to 9625'.

03/01/2009 Drill to 10135, rig service, continue drilling to 10696'.

03/02/2009 Drill to 11177, rig service, continue drilling to 11770'.

03/03/2009 Drill, circulate, rig service, drill to 12575'.

03/04/2009 Drill, rig service, drill to 13030'.

03/05/2009 Drill to TD @13165', circulate and stage pumps down to relax well. Condition and circulate at reduced rate. Begin to T.O.H.

03/06/2009 Bit stuck while TOH but loosened up after about 2 hours. Finished TOH and started tripping back in for a wiper trip.

03/07/2009 Finish wiper trip washing and reaming to bottom. Circulate and trip out, then rig up Weatherford tools for Compact Memory Log.

03/08/2009 Finish TIH, then begin tripping out at a rate of 4 minutes per stand while running electric log.

03/09/2009 Finish running Compact Memory Log (CML) and TOH, rig up CRT, start casing run.

03/10/2009 Circulate and condition mud, rig up CRT and begin casing run.

03/11/2009 Circulate and condition mud, rig up cement equipment and cement. Rig down and prepare to skid to well PCU 297-11A5.



Survey Data

Piceance Creek Unit PCU 297-11A4

Rio Blanco County, CO.





RIO BLANCO, COLORADO
Piceance Creek Unit 297-11A4



SURVEY SUMMARY

Depth (ft)	Inc Angle (deg)	Azimuth (ft)	VS (ft)	TVD Section (ft)	Vertical		DSL (ft)(deg)
					+N/S- (ft)	+E/W- (ft)	
0	0	0	0	0	0	0	0
51	0.18	13.1	0.01	51.00	.03	0.01	0.87
81	0.17	40.06	0.03	81.00	0.09	0.03	0.41
111	0.06	177.90	0.04	111.00	0.09	0.04	0.40
140	0.22	223.49	0.00	140.00	0.03	0.00	0.63
171	0.63	214.08	-0.13	171.00	-0.15	-0.13	1.34
201	0.96	209.27	-0.34	201.00	-0.51	-0.35	1.12
231	0.69	203.68	-0.53	230.99	-0.89	-0.54	0.94
261	0.39	222.63	-0.67	260.99	-1.13	-.068	1.15
291	0.26	215.66	-0.78	290.99	-1.26	-.079	0.45
321	0.19	205.77	-0.84	320.99	-1.36	-0.85	0.27
380	0.08	271.63	-0.92	379.99	-1.45	-.094	0.29
479	0.39	142.15	-0.78	478.99	-1.71	-.080	0.45
506	0.87	136.86	-0.58	505.99	-1.93	-0.60	1.79
592	2.94	129.67	1.59	591.94	-3.82	1.54	2.42
625	3.99	128.84	3.15	624.88	-5.08	3.09	3.19
718	5.60	124.85	9.45	717.55	-9.70	9.33	1.77
790	5.98	117.60	15.70	789.18	-13.45	15.54	1.14
886	6.64	104.69	25.55	884.60	-17.17	25.34	1.63
982	7.29	98.00	36.98	979.90	-19.43	36.74	1.08
1079	8.61	86.73	50.33	1075.97	-19.78	50.08	2.10
1175	10.28	83.04	65.99	1170.66	-18.42	65.76	1.85
1270	11.64	86.61	83.95	1263.93	-16.83	83.74	1.60
1366	13.10	91.50	104.49	1357.70	16.54	104.29	1.87
1463	15.62	96.00	128.49	1451.67	-18.19	128.27	2.84
1559	17.19	98.23	155.42	1543.76	-21.57	155.17	1.76
1655	18.75	94.65	184.55	1635.07	-24.87	184.59	1.99
1752	20.50	90.89	217.42	1726.44	-26.38	217.11	2.22
1847	22.16	87.08	251.94	1814.93	-25.73	251.64	2.28
1943	24.20	85.43	289.61	1903.18	-23.24	289.34	2.23
2039	25.23	85.87	329.59	1990.38	-20.20	329.36	1.09
2136	25.35	85.96	370.88	2078.09	-17.25	370.70	0.13
2233	24.82	87.32	411.90	2165.94	-14.83	411.75	0.81
2328	24.60	87.81	451.55	2252.24	-13.14	451.42	0.32
2424	24.79	87.41	491.50	2339.46	-11.47	491.50	0.26



RIO BLANCO, COLORADO
Piceance Creek Unit 297-11A4



SURVEY SUMMARY

Depth (ft)	Inc Angle (deg)	Azimuth (ft)	VS (ft)	TVD Section (ft)	Vertical		DSL (ft)(deg)
					+N/S- (ft)	+E/W- (ft)	
2520	24.67	88.18	537.71	2426.66	-9.92	531.63	0.36
2615	24.46	89.00	571.17	2513.06	-8.95	571.11	0.42
2711	25.49	90.33	611.70	2600.08	-8.42	611.64	1.22
2808	25.88	89.88	653.74	2687.50	-8.80	653.68	0.45
2904	25.93	90.30	695.67	2773.85	-8.77	695.62	0.09
3001	25.98	90.20	738.13	2861.07	-8.85	738.07	0.09
3098	25.76	90.81	780.45	2948.35	-9.22	780.39	0.36
3195	25.42	91.47	822.34	3035.83	-10.06	822.28	0.46
3290	25.68	93.41	863.29	3121.54	-11.80	863.21	0.92
3384	25.80	93.67	904.07	3206.22	-14.32	903.96	0.18
3481	25.64	94.16	946.70	3293.60	-17.20	945.96	0.27
3574	25.82	93.40	986.41	3377.38	-19.86	986.24	0.40
3669	23.93	90.73	1026.35	3463.47	-21.33	1026.19	2.31
3766	21.63	86.51	1063.86	3553.00	-20.49	1063.69	2.91
3862	19.12	86.64	1097.19	3642.99	-18.49	1097.05	2.62
3958	17.28	87.73	1127.12	3734.18	-17.01	1126.99	1.95
4055	11.16	88.38	1154.95	3827.09	-16.06	1154.84	1.22
4152	14.49	89.92	1180.53	3920.65	-15.66	1180.43	1.72
4246	13.20	91.21	1203.03	4011.92	-15.87	1202.97	1.41
4342	11.81	92.63	1223.81	4105.64	-16.55	1223.70	1.48
4439	10.33	93.02	1242.42	4200.83	-17.47	1242.30	1.53
4535	8.62	86.60	1258.20	4295.52	-17.49	1258.08	2.09
4631	7.00	76.54	1271.04	4390.63	-15.70	1270.95	2.20
4729	5.41	66.00	1281.03	4488.06	-12.43	1280.98	1.99
4826	4.21	52.34	1287.98	4584.72	-8.40	1287.97	1.70
4922	3.03	33.38	1292.11	4680.53	-4.13	1292.16	1.74
5017	2.14	16.46	1293.95	4775.43	-0.33	1294.04	1.22
5113	1.18	342.68	1294.13	4871.39	2.33	1294.26	1.39
6445	2.00	326.00	1276.65	6202.88	34.70	1277.18	0.07
7680	3.00	326.00	1245.97	7436.69	79.36	1247.05	0.08
7876	4.00	326.00	1239.16	7632.32	89.28	1240.36	0.51
8631	4.50	326.00	1207.30	8385.24	135.66	1209.07	0.07
8970	4.5	326.00	1192.15	8723.19	157.71	1194.20	0.00



Drilling Fluid Reports

Piceance Creek Unit PCU 297-11A4

Rio Blanco County, CO.



PICEANCE CREEK UNIT PCU 297-11A4

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	5/18/2008	5/19/2008	5/20/2008	5/21/2008	5/22/2008	5/23/2008	5/24/2008
Sample Temperature (deg F)	--	87	118	100	100	130	145
Sample Depth	120	755	2075	3522	3556	4405	5150
Mud Weight (lb/gal)	8.7	8.8	8.85	8.8	8.7	9.2	9.5
FV (sec/quart)	48	59	58	64	60	88	51
PV(cP)	9	15	13	15	14	15	15
YP (lb/100 ft2)	15	24	26	24	26	30	7
Gels (10 sec lb/100ft2)	8	11	11	12	11	12	4
Gels (10 min lb/100ft2)	17	21	26	31	33	40	57
Gels (10 30 min lb/100ft2)	--	33	34	42	42	48	100
API FL (cc/30 min)	--	--	--	--	--	--	--
Cake (API)	--	3	3	3	3	3	3
pH	9.3	9.3	9.4	9.1	9.0	10.0	10.0
PM	0.30	0.30	0.70	0.80	0.70	0.65	0.70
Hardness (mg/l)	40	40	40	20	40	40	20
Chlorides (mg/l)	1100	1100	1100	1100	1000	1000	1100
MBT (lb/bbl)	15.0	17.5	20.0	--	22.5	20.0	25.0
Sand (%)	--	--	--	--	0.20	1.00	0.25
Corrected Solids (%)	2.7	3.5	3.8	3.5	2.7	6.2	8.7
CO2	330	330	41975	2500	1144	1958	330

PICEANCE CREEK UNIT PCU 297-11A4

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	5/25/2008	5/26/2008	5/27/2008	5/28/2008	11/14/2008	11/15/2008	11/16/2008
Sample Temperature (deg F)	--	--	--	--	--	--	110
Sample Depth	5150	5150	5150	5150	5050	5050	5350
Mud Weight (lb/gal)	9.4	9.2	8.8	9.0	9.10	9.10	8.90
FV (sec/quart)	45	45	37	37	38	38	48
PV(cP)	12	11	6	5	6	6	10
YP (lb/100 ft ²)	11	13	4	5	9	9	20
Gels (10 sec lb/100ft ²)	8	8	2	2	6	6	9
Gels (10 min lb/100ft ²)	16	17	30	30	14	14	23
Gels (10 30 min lb/100ft ²)	30	32	45	45	19	19	40
API FL (cc/30 min)	--	--	--	--	14.0	14.0	13.8
Cake (API)	3	3	3	3	2	3	3
pH	9.0	9.5	10.0	8.0	8.8	8.8	11.4
PM	0.60	0.60	0.60	0.60	0.50	0.50	2.20
Hardness (mg/l)	40	40	40	40	80	80	80
Chlorides (mg/l)	1000	1000	1000	1000	--	2500	2500
MBT (lb/bbl)	9.0	25.0	22.5	22.5	12.5	12.5	15.0
Sand (%)	0.25	0.20	0.20	0.15	0.25	0.25	0.25
Corrected Solids (%)	9.7	9.2	5.7	5.2	4.2	4.2	3.7
CO ₂	330	14988	330	10100	330	330	10027

PICEANCE CREEK UNIT PCU 297-11A4**WATER BASED MUD REPORT**

Mud Engineering Services Provided By Baroid

Property	11/17/2008	11/18/2008	11/19/2008	11/20/2008	11/21/2008	11/22/2008	11/23/2008
Sample Temperature (deg F)	130	--	75	95	108	110	106
Sample Depth	5964	6253	6725	7585	8533	8930	8930
Mud Weight (lb/gal)	9.5	8.60	9.10	9.0	9.20	9.20	9.3
FV (sec/quart)	60	54	60	58	61	58	61
PV(cP)	15	10	17	17	17	17	18
YP (lb/100 ft ²)	48	15	25	24	26	25	22
Gels (10 sec lb/100ft ²)	--	8	10	10	11	10	11
Gels (10 min lb/100ft ²)	78	15	30	32	33	32	30
Gels (10 30 min lb/100ft ²)	63	26	43	44	46	44	40
API FL (cc/30 min)	100.0	12.0	13.0	12.0	10.0	10.0	12.0
Cake (API)	--	3	3	3	3	3	3
pH	7.80	10.3	10.5	9.90	10.5	9.0	9.0
PM	0.20	0.55	0.90	0.82	0.80	0.70	0.75
Hardness (mg/l)	440	40	40	20	20	20	10
Chlorides (mg/l)	2500	2500	2000	2500	2500	2300	2000
MBT (lb/bbl)	--	15.0	20.0	20.0	17.5	17.5	17.5
Sand (%)	1.0	--	0.10	0.20	0.25	0.25	0.25
Corrected Solids (%)	8.7	1.7	4.7	4.2	4.7	4.7	5.7
CO ₂	45391	11998	330	330	1144	330	330

PICEANCE CREEK UNIT PCU 297-11A4

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	11/24/2008	11/25/2008	11/26/2008	02/27/2009	02/28/2009	03/01/2009	03/02/2009
Sample Temperature (deg F)	108	110	105	---	105	115	127
Sample Depth	8971	8971	8971	8958	9195	10135	11190
Mud Weight (lb/gal)	9.3	9.3	9.3	9.20	9.20	9.55	9.55
FV (sec/quart)	61	60	55	41	40	42	46
PV(cP)	17	18	15	10	11	13	14
YP (lb/100 ft ²)	25	23	20	9	4	13	17
Gels (10 sec lb/100ft ²)	10	10	9	5	4	5	5
Gels (10 min lb/100ft ²)	34	32	30	17	15	17	17
Gels (10 30 min lb/100ft ²)	43	42	39	19	24	20	25
API FL (cc/30 min)	11.0	11.0	10.0	10.4	9.8	8.8	7.5
Cake (API)	3	3	3	2	2	2	2
pH	9.5	10.5	9.80	10.0	11.0	10.10	9.60
PM	0.80	0.80	0.80	1	.95	0.70	0.80
Hardness (mg/l)	20	20	30	40	40	40	40
Chlorides (mg/l)	2000	1800	2500	3000	3000	2600	2500
MBT (lb/bbl)	20.0	20.0	17.5	12.5	12.5	12.5	15.0
Sand (%)	0.20	0.20	0.20	---	0.10	0.50	.50
Corrected Solids (%)	5.2	5.2	5.2	4.7	4.7	6.7	1.5
CO ₂	330	330	330	330	330	3343	330

PICEANCE CREEK UNIT PCU 297-11A4

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	03/03/2009	03/04/2009	03/05/2009	03/06/2009	03/07/2009	03/08/2009	03/09/2009
Sample Temperature (deg F)	118	124	125	---	---	---	---
Sample Depth	12150		13165	13165	13165	13165	13165
Mud Weight (lb/gal)	9.40	9.50	9.70	9.70	9.90	9.85	9.75
FV (sec/quart)	41	43	47	42	42	45	39
PV(cP)	11	11	11	11	11	12	11
YP (lb/100 ft ²)	12	13	15	14	14	17	13
Gels (10 sec lb/100ft ²)	5	5	6	5	5	5	4
Gels (10 min lb/100ft ²)	14	13	14	13	13	14	10
Gels (10 30 min lb/100ft ²)	18	19	23	23	22	23	21
API FL (cc/30 min)	8.8	8.0	8.0	8.2	8.5	10.0	10.0
Cake (API)	2	2	2	2	2	2	2
pH	10.0	10.00	11.10	11.50	10.80	10.70	10.50
PM	.70	.075	1.10	1.25	1.0	.90	.85
Hardness (mg/l)	40	40	40	40	40	40	40
Chlorides (mg/l)	2500	2600	2500	2800	2700	2700	2700
MBT (lb/bbl)	15.0	15.0	15.0	15.0	17.5	15.0	15.0
Sand (%)	.25	.30	.25	.25	.20	.20	.15
Corrected Solids (%)	1.5	6.2	7.2	7.4	8.1	8.0	7.7
CO ₂	330	4943 ppm	330	330	330	330	330

PICEANCE CREEK UNIT PCU 297-11A4

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	03/10/2009	03/11/2009					
Sample Temperature (deg F)	---	---					
Sample Depth	13165	13165					
Mud Weight (lb/gal)	9.70	9.80					
FV (sec/quart)	39	37					
PV(cP)	10	10					
YP (lb/100 ft ²)	13	10					
Gels (10 sec lb/100ft ²)	4	5					
Gels (10 min lb/100ft ²)	9	11					
Gels (10 30 min lb/100ft ²)	17	17					
API FL (cc/30 min)	10.0	10.0					
Cake (API)	2	2					
pH	8.90	10.40					
PM	.55	.80					
Hardness (mg/l)	40	40					
Chlorides (mg/l)	2800	2800					
MBT (lb/bbl)	15.0	15.0					
Sand (%)	.20	.25					
Corrected Solids (%)	7.2	7.7					
CO2	330	330					



Bit History

Piceance Creek Unit PCU 297-11A4

Rio Blanco County, CO.



Well Services, Inc.



Bit History

PCU 297-11 A4

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Pressure Test Plots

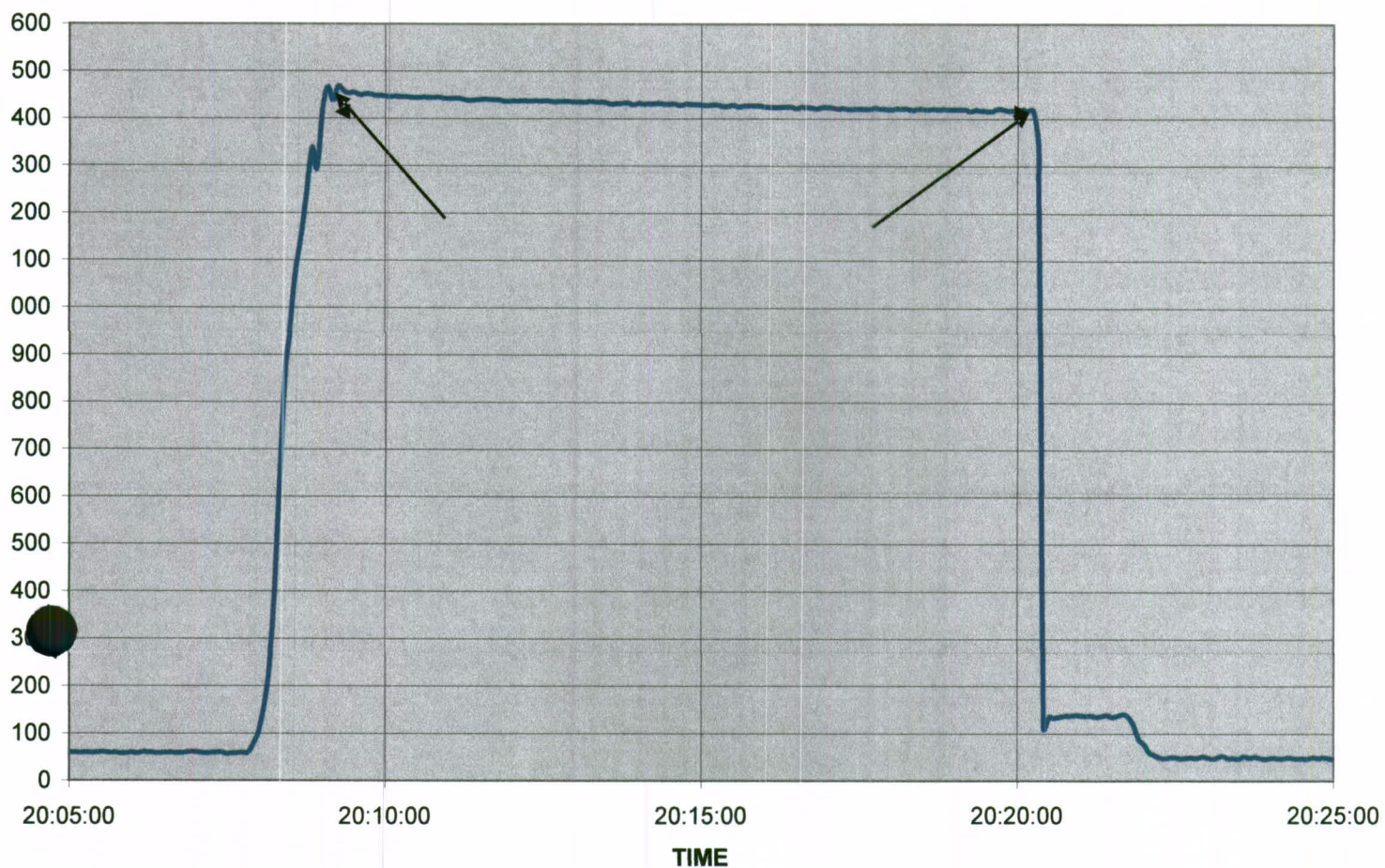
Piceance Creek Unit PCU 297-11A4

Rio Blanco County, CO.



ExxonMobil

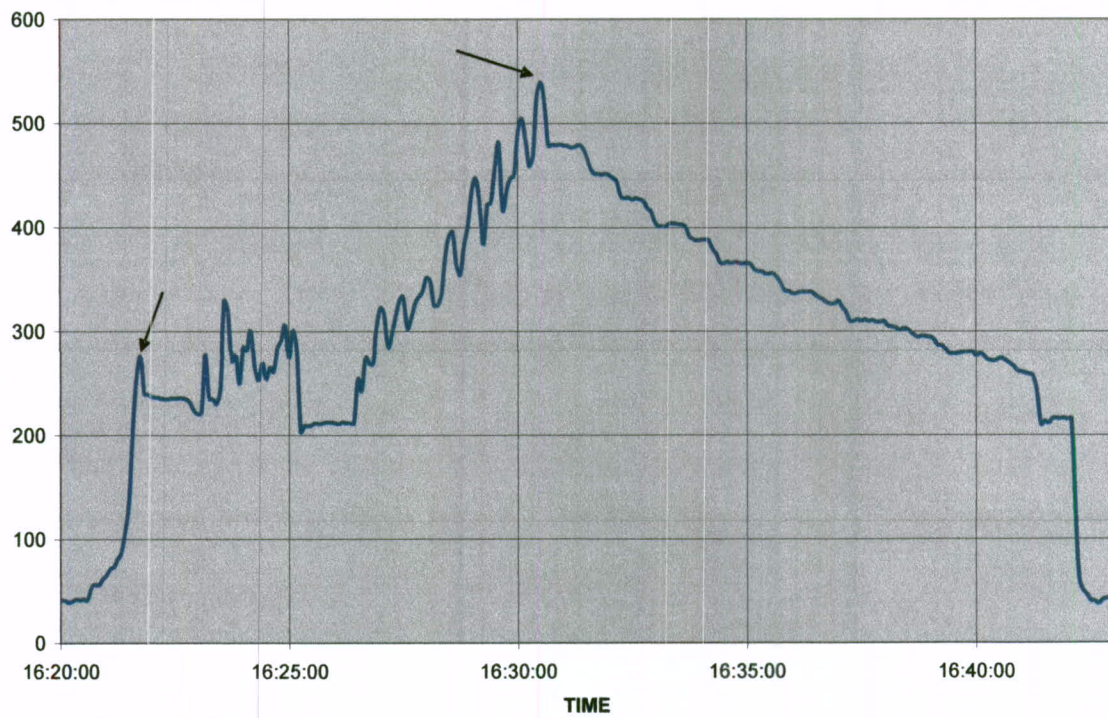
EPOCH



ExxonMobil

ExxonMobil
PCU 297-11A4
Squeeze No. 1
11/17/2008

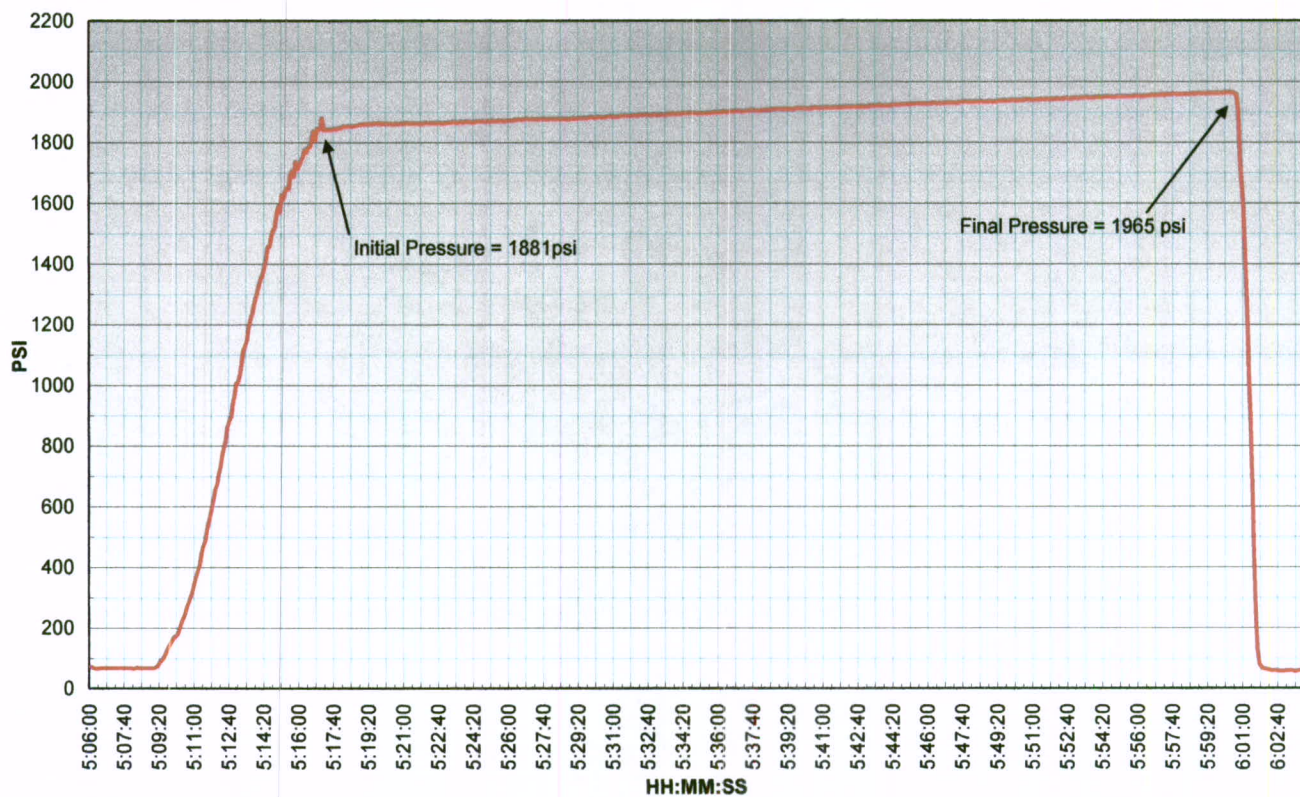
EPOCH



ExxonMobil

ExxonMobil
PCU 297-11A4
Casing Pressure Test @ 8845' (MD) 02-28-2009

CANRIG
DRILLING TECHNOLOGY LTD.



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FIT Test @ 8980' (MD) 02-28-2009

CANRIG
Drilling Technology Ltd.

