



Well History

Piceance Creek Unit PCU 297-12A1-ST1
API 05-103-11157-01
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 297-12A1-ST1

Rio Blanco County, Colorado

 **EPOCH**

EPOCH Well Services, Inc.

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Introduction and Geology

**Piceance Creek Unit PCU 297-12A1-ST1
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) 297-12A1ST1 production well. The well was drilled as the second production hole in a series of nine directional wells for production on the Piceance Creek Unit 297 pad. The well is located in the Piceance Basin at the following coordinates:

- Latitude 39.8890710 N
- Longitude 108.2372410 W

The well was spudded on September 22, 2008 by a separate rig which drilled to 4141' and set surface casing. Drilling operations were then continued from surface casing to a total depth of 13,338' (MD) on 09/24/2009. Drilling operations were conducted by Helmerich & Payne using a Flex 4 rig (#326). Epoch personnel logged and collected samples starting at 4112' through to 13,338' MD. Drilling fluid engineering services were provided by Halliburton. The well was drilled with conventional water-based mud spud mud to 4141' and LSND (Low Solids Non-Dispersed) from 4141' through TD at 13,338'.

The drill string stuck at 6228' and a sidetrack was drilled starting at 4436'. The well name was changed to PCU 297-12A1-ST1.

The well was cased and cemented according to the following:

- 16-inch casing from surface to 125 feet
- 10.75-inch casing at 4,111 feet
- 7.00-inch casing at 9,131 feet
- 4.50-inch casing at 13,338 feet.

Epoch provided the following services for this drilling operation:

- General mud logging and geologic services including sample collection and description, and preparation of a lithologic log;
- Determination of total gas recovered using a QGM™ gas trap and quantified using a proprietary Epoch Total Hydrocarbon Analyzer equipped with a Flame Ionization Detector;
- Determination of gas chromatography using a proprietary Epoch Gas Chromatography unit also equipped with a Flame Ionization Detector which quantified the hydrocarbon species of methane, ethane, propane, iso- and normal butane, and iso- and normal pentane;
- CO₂ determination;
- 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 297-12A1-ST1 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 Segoe 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.

Formation/Member Name	Stratigraphic Unit Top	Depth (MD/TVD)
Wasatch Formation		
Lower Wasatch		5847' / 5471'
Ohio Creek Formation		
	950 Abandonment Surface (AS)	7702' / 7328'
Williams Fork Formation		
WF 800	850 Abandonment Surface (AS)	8254' / 7880'
WF 700	800 Sequence Boundary (SB)	8515' / 8141'
WF 500	600 Sequence Boundary (SB)	8960' / 8586'
WF 400	490 Abandonment Surface (AS)	9685' / 9302'
WF 200	290 Abandonment Surface (AS)	11,370' / 10,984'
Cameo	210 Sequence Boundary (SB)	11,675' / 11,288'
Iles Formation		
Rollins Member	200 Sequence Boundary (SB)	12,024' / 11,637'
Cozette Member	180 Flooding Surface (FS)	12,238' / 11,850'
Corcoran Coastal Plain	140 Flooding Surface (FS)	12,525' / 12,137'
Corcoran Marine	140 Sequence Boundary (SB)	13,130' / 12,741'



Correlation and Gas Character

Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH Well Services, Inc.**

ExxonMobil
PCU 297-12A1-ST1

Correlation and Gas Character

Correlation of formation tops from the Wasatch G to the Corcoran Marine for the PCU 297-12A1-ST1 has been confirmed by ExxonMobil geologists using correlating logs from nearby well pads, as well as the other wells drilled on this pad. LWD was conducted in the surface hole only. Directional drilling reached a max inclination of 26.34° at 4161' MD and was brought to 19.84° at 5075'. Overall the well was stratigraphically similar to that of wells drilled in the nearby area.

Wasatch Formation

The upper Wasatch was encountered when drilling out of the surface casing at 4111'. It consisted of interbedded sandstone, siltstone and shale. Background gas was in the 3 to 15 unit range. There were 4 gas shows, including CO₂, ranging from 58 to 548 units, and 16339ppm throughout the Wasatch Formation. This section was drilled with 8.9 to 9.1 PPG mud with minimal mud loss.

The Wasatch "G" at 5847' marked the top of the lower Wasatch. It consisted of interbedded sandstone, siltstone and shale with minor carbonaceous shale and coal. The G section consisted of 20 to 70% sandstone with the balance being siltstone and shale. There were two gas spikes above 200 units between 5887' and 5966'. These were in 60 foot thick sandstones. The interval was drilled with 9.3 PPG mud.

The Wasatch I was noted at 6162' with a marked decrease in sandstone to the 10 to 50% range in the top 500 feet of the section. There were nine moderately high gas spikes from sandstone and thin coal layers in the 5900' to 6950' interval. The shows were from moderate percent kaolinitic sandstones, 10-30 feet thick sandstone beds, and thin coal seams. These gas shows ranged from 226 to 533 units. The interval was drilled with 8.9 to 9.1 PPG mud.

Ohio Creek Formation

The Ohio Creek formation was drilled at 7702' in lithology primarily consisting of 80% sandstone, 10% siltstone, 10% shale. Low to moderate gas readings were observed at the top of the formation. There were two max gas shows above 200 units. The first max gas spike of 214u came in at 7934' in 70% sandstone. The remaining gas spike came in with 60% and 80% sandstones. Connection gases averaged around 17units. Mud weights ranged from 8.90 to 9.10 PPG.

Williams Fork 800 Member

The top of the Williams Fork 800 was drilled at 8254'. This formation came in with 20% siltstone and shale respectively, and 60% sandstone producing a max gas spike of 395u. Sandstone increased throughout this section to 70%. There were seven gas shows above 200 units. The max gas high of 395u came in at 8350'. This section consisted of 60% sandstone with remaining percentages of siltstone and shale. Mud weight of 9.20 PPG was used in this section.

Williams Fork 700 Member

The top of the Williams Fork 700 was encountered at 8515'. The lithology was 40%-60% sandstone, 10%-30% siltstone and shale, 10%-20% carbonaceous shale, and 10% coal. Three gas shows over 200 units were recorded. A max gas of 990 units came in at 8650'. Mud weight of 9.20 to 9.20+ PPG was used in this section.

Williams Fork 500 Member

The top of the Williams Fork 500 was drilled at 8960'. The lithology was 10% to 80% sandstone, 10%-40% siltstone, 10%-20% carbonaceous shale, 10%-30% shale, and 10% alternating coal seams. There were 14 max gas readings above 200 units with the highest gas total reaching 1535 units at 9642'. This gas values was due to unconsolidated kaolinitic sands with evidence of calcite fracturing. Four connection gases over 1000 units occurred at 9321, 9411', 9516', and at 9614'. Mud weights of 9.10 to 9.20 PPG were used in this section.

Williams Fork 400 Member

The top of the Williams Fork 400 member was placed at 9685' MD. The percentage of sandstone varied from 30 to 80 percent. There were a total of 8 gas spikes of 300 units of more in sandstone throughout the interval. One gas spike of 1253 units at 10235' was from a coal seam. High connection gases were common with a maximum value of 1296 units at 10090'. Mud weight was maintained at 9.2 to 9.3+ ppg.

Williams Fork 200 Member

The Williams Fork 200 came in at a depth of 11370' with a formation and connection gas of 1231u with the gas buster being activated. A ninety foot interval in the upper WF 200 containing carbonaceous shale stringers and coal produced two max gas spikes of 1231u and 1241u. Several max gas and connection gases exceeded 600u in the lower WF 200 section with mud weight average of 9.3 to 9.4 ppg. Background gases were relatively high throughout the member averaging over 155u.

Cameo Member

The Cameo was encountered at a depth of 11675' with 10%-20% carbonaceous shale, 10%-30% coal, 10% to 50% siltstone, and 10% to 60% sandstone. There were 8 gas spikes over 400 units throughout the formation with a max gas of 1213 units at 11920'. The final max gas spike came in at 12018' with 1129 units out of a sandstone interval just before the Rollins formation. The average mud weight of 9.35 was maintained throughout the Cameo Section. Background gas was relatively high with most areas over 155 units.

Rollins Member

The Rollins member came in at 12024' with approximately 50% sandstone in the samples. The percentage of sandstone decreased to 40% by 12100' then rose to 0% by 12160' where it again

gradually decreased to 40% by the bottom of the member. The sandstone was variably inter-bedded with siltstone, shale and carbonaceous shale. A minor amount of coal was observed in the middle and near the bottom of the interval. There were two significant gas shows in sandstone: 1169u at 12063' and 1256u at 12110' near the center of the interval. There were high connection gases throughout the interval. They ranged from 1120u to 1297u. Mud weight was held between 9.3 and 9.4 ppg throughout the interval.

Cozette Member

The Cozette member top was drilled at 12238' MD. The samples contained 40% sandstone at the top and decreased to 10% by 12450'. Towards the top of the formation there were minor coal seams followed by larger seams ranging up to 30%. The balance of the Lithology consisted of variable amounts of siltstone, shale, sandstone, coal and carbonaceous shale. There were three gas shows from a combination of sandstone and coal above 450 units. The first was at the top of the formation of 481 units at 12238'. The second was 628 units at 12318'. The third gas was 1243 units at 12408'. Connection gas was high throughout the interval with a maximum value of 1278 units. A mud weight of 9.4 ppg was maintained throughout.

Corcoran Coastal Plain

The top of the Corcoran Coastal Plain was drilled at 12525' MD. The sample, at the formation top, contained 40% siltstone, 20% sandstone, 20% coal, 10% shale, and 10% carbonaceous shale. Coal seams were noted throughout. The balance of the lithology consisted of interbedded siltstone, sandstone, shale, coal, and minor carbonaceous shale. There were nine gas spikes that exceeded 500 units. The first was 1256 units at 12458'. The maximum value occurred at 12739' with a value of 1432 units. Connections gases were high throughout. The maximum connection gas was 21252 units at 12839'. Mud weight was maintained at 9.3 to 9.4 ppg throughout. Mud losses were 822 bbls through this section.

Corcoran Marine

The top of the Corcoran Marine was drilled at 13,130'. It consisted of 30% sandstone, 20% siltstone, 30% shale and 20% carbonaceous shale. Siltstone increased to 60% to 80% to TD with between 10 and 20% sandstone and the remainder shale. There were no gas shows in the interval. Connection gases remained high with a maximum value of 1176 units. The interval was drilled with 9.4 ppg mud. Mud losses were around 822 bbls. The well was TD at 13338'



Lithology Descriptions

Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH Well Services, Inc.**

Upper Wasatch (4111' – 5846')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
4111	5848	230.20	0.00	48.56	330.00	330.00	330.00	548.78	1.26	13.11

Descriptions from original hole

4110' Shale = dark yellowish brown, medium to dark olive gray; firm to moderately hard; crumbly to moderately tough; irregular, planer and wedgelike cuttings habit; matte to occasionally slightly resinous luster dominantly smooth texture; slightly to very calcareous; locally silty, grading in part and inter bedded with siltstone; poor to moderate fissility.

4220' Siltstone = dark yellowish brown to medium gray; firm to moderately hard; crumbly to occasionally tough; irregular and subblocky or wedgelike cuttings habit; matte luster with scattered sparkles; moderately calcareous

4290' Sandstone = pale yellowish light brown, light off white, light pale grayish brown; some clear to slight translucent; quartz framework; upper to lower fine grain size; poor to fair sorting; consolidated in part; predominately subangular angularity; semi frosted surface features; easily friable to firm friable; clay matrix cement; weak grain supported; traces calcite cement; weak HCL reaction; very poor visual inter granular porosity; traces dark brownish siltstone interbedded.

4330' Shale = dark yellowish orange, light moderate yellowish brown, traces dark yellowish brown; pulverulent, crunchy tenacity; earthy to sub blocky slight irregular fracture; wedgelike tabular cuttings habit; dull earthy slight waxy luster, gritty to clayey texture; massive structure.

4520' Shale = light bluish gray, light purple gray, moderate grayish orange; crumbly dense tenacity; earthy, subblocky to blocky slight irregular fracture; wedgelike, tabular, subblocky cuttings habit; dull earthy luster; gritty to smooth texture; thick massive structure; trace siltstone interbedded.

4610' Siltstone = light grayish orange hues; crumbly, crunchy tenacity; sub blocky, irregular fractures; wedgelike, tabular cuttings habit; dull earthy, frosted luster, granular to clayey texture; thick massive structure.

4680' Sandstone = very light grayish white, slight off white, light bluish gray; predominately quartz framework; lower fine grain size; poor sorted; subangular to angular angularity; low sphericity; trace frosted surface feature; friable to firm friable; silica matrix cement, trace calcite cementation, some HCL reaction; trace lithic and siltstone interbedded.

4790' Shale = light bluish gray, light pale yellowish brown, very light gray; pulverulent, crumbly tenacity; sub blocky, blocky slight irregular fracture; wedgelike, equate cuttings habit; dull earthy , waxy luster; granular, clayey texture; thick structure; grading to a gritty siltstone.

4880' Siltstone = purplish brown, light to medium gray; firm to moderately hard; crumbly to occasionally tough; irregular and subblocky or wedgelike cuttings habit; matte luster with scattered sparkles; moderately calcareous; scattered carbonaceous specks; locally common very fine sand, occasionally sandy, grades in part to very fine sandstone.

4990' Sandstone = very light gray to white; occasionally with slight brownish hues; firm clasts range from very fine lower to fine lower; subangular to subround; moderately sorted; quartz rich, scattered to common dark gray to black lithics; clay matrix; light calc cement; locally silty, grades to and is interbedded with siltstone.

5090' Shale = dark yellowish brown, medium to dark olive gray; firm to moderately hard; crumbly to moderately tough; irregular, planer and wedgelike cuttings habit; matte to occasionally slightly resinous luster dominantly smooth texture; slightly to very calcareous; locally silty, grading in part and interbedded with siltstone; poor to moderate fissility.

5200' Siltstone = moderate yellowish brown, light grayish brown; slightly firm to moderately hard, semi crumbly tenacity; subblocky to slight irregular fracture; wedgelike massive cuttings habit; dull earthy resinous luster; gritty to clayey texture; massive structure, no HCL reaction.

5290' Shale = light yellowish gray, moderate yellowish brown, light grayish brown; crumbly to slightly firm tenacity; sub blocky, earthy to slightly irregular fracture; wedgelike, tabular cutting habit; dull waxy, earthy in part luster; gritty to silty texture; thick massive structure, grading to gritty siltstone.

5380' Siltstone = moderately yellowish grayish orange, pale yellowish brown, light dusky yellowish brown; semi crumbly, firm to moderately hard tenacity; sub blocky, blocky semi irregular fracture; wedgelike, equant cuttings habit; dull waxy semi frosted luster; gritty grading to semi silty texture; massive semi thick structure; traces of sandstone imbedded.

5490' Sandstone = light grayish orange, some dull off white, light bluish moderate gray; upper fine grain size; poor sorted subangular to subround angularity; traces frosted surface features; easily friable to moderate firm; clay matrix cement, trace silica cement; very weak calcite cement; weak grain support; traces siltstone imbedded.

5590' Shale = moderate yellowish brown, trace light bluish gray; pulverulent, crumbly tenacity; subblocky, blocky fracture; wedgelike, tabular cuttings habit; dull waxy luster; gritty to clayey texture; massive structure; grading to siltstone.

5670' Siltstone = light grayish brown, light grayish yellow; brittle to dense tenacity; sub blocky, blocky fracture; wedgelike tabular cuttings habit; dull frosted resinous luster; silty to slight gritty texture; massive structure; grading to sandstone.

5750' Siltstone = pale light brown, grayish orange, pale brown; soft to slightly firm, some crumbly tenacity; earthy semi irregular, subblocky fracture; wedgelike, subblocky cutting habit; dull earthy, gritty texture; massive structure.

5830' Sandstone = white to very light gray, occasionally light greenish gray; common "peppered" appearance; friable to hard; clasts range from very fine lower to fine upper, rarely medium lower; moderately sorted; subangular to subround; dominantly quartz with minor lithics; a few pieces with common carbonaceous matter; mostly grain supported; clay matrix; light to moderate calcite cement; grades in part to and is interbedded with siltstone.

Descriptions from sidetrack

4460' Shale = dark yellowish to brownish orange, traces light yellowish brown; pulverulent, crumbly to some firm tenacity, sub blocky, irregular in part fracture; wedge like, elongated cuttings habit; dull, earthy, semi waxy luster; clayey to smooth texture; massive to thick structure.

4550' Siltstone = light orangish gray, light yellowish brown; crumbly to slight brittle tenacity; blocky to sub blocky fractures; wedge like, sub blocky cuttings habit; dull earthy luster; silty to slightly gritty texture; semi thick structure..

4650' Sandstone = light gray to very light gray, occasionally bluish gray; easily friable to firm; very fine lower to fine lower; subangular to angular; moderately sorted; dominantly quartz with minor lithics; scattered frosted grains; clay matrix; variable matrix/grain supported; light calcite cement; interbedded with siltstone and shale.

4750' Shale = pale yellowish brown, very light bluish gray, light yellowish gray; crumbly, slight pulverulent tenacity; sub blocky, blocky semi irregular fracture; wedge like, occasionally tabular cuttings habit; predominately dull, earthy, some waxy luster; clayey, slight silty texture; thick massive structure.

4850' Siltstone = light to medium gray, purplish brown; firm to moderately hard; crumbly to occasionally tough; subblocky, irregular and wedge like cuttings; dull luster with scattered sparkles; slightly to moderately calcareous; scattered to common very fine sand disseminated throughout.

4940' Sandstone = very light gray to off white occasionally light brownish gray; lower to upper very fine grain, some traces fine grain; poor to fair sorting; sub angular to subround angularity; friable in part; predominately clay matrix, traces weak calcareous cement; scattered speckled dark gray to black lithics; traces interbedded with siltstone.

5050' Shale = dark yellowish brown, moderate grayish yellow; brittle to moderate dense tenacity, subblocky, blocky to slight irregular fracture; wedge like elongated, sub platy cuttings habit; dull, earthy, semi waxy luster; clayey slightly silty texture; thick massive structure.

5140' Siltstone = light to moderate yellowish brown, traces grayish brown; crumbly, brittle in part; sub blocky, blocky with occasional irregular fracture; wedge like cuttings habit; dull resinous luster; silty to gritty texture; thick structure.

5210' Sandstone = light to medium gray with slight brownish orange hues; firm; very fine lower to fine lower; angular to subround; moderately sorted; dominantly quartz with minor lithics; clay matrix; variable matrix/grain supported; moderate calcite cement; interbedded with siltstone and shale.

5300' Shale = moderate yellowish brown, light yellowish gray; firm to moderately hard; crumbly to moderately tough; planer, irregular and wedge like cuttings; dull to slightly resinous luster; dominantly smooth texture; slightly to occasionally very calcareous; interbedded with siltstone and sandstone.

5390' Siltstone = moderate to pale yellowish brown, grayish orange; firm to moderately hard; crumbly to tough; irregular and subblocky cuttings; dull luster with scattered micro sparkles; gritty texture; calcareous; scattered black pinpoint specks; interbedded with sandstone and shale.

5480' Sandstone = grayish orange, off white in part, some light pale yellowish brown predominately fine grain, traces very fine grain; fair to well sorted; sub angular to subround angularity; low sphericity; trace frosted surface feature; easily friable to friable; clay matrix cement, traces silica cement, very weak calcareous cement reaction to HCL, mostly grain supported; traces black speckled lithics imbedded.

5600' Shale = light yellowish gray, moderate yellowish brown; firm to moderately hard; crumbly to moderately tough; irregular, planer, wedge like cuttings; dull to slightly resinous luster; dominantly smooth texture; slightly to occasionally very calcareous; occasionally silty, grading to and interbedded with siltstone; poor to moderate fissility.

5700' Shale = pale light brownish gray, light yellowish gray; pulverulent, semi brittle tenacity; sub blocky, blocky, slight irregular fracture; modular, wedge like, sub blocky cuttings habit; dull earthy, waxy in part luster; clayey, semi smooth texture; thick massive structure.

5790' Sandstone = light gray, very light bluish gray, traces light greenish gray; predominately quartz framework; very fine lower to fine upper grain size; fair to well sorted; low sphericity; sub angular to sub rounded in part; predominately quartz with speckled lithics; some frosted surface features; friable to firm friable; dominantly grain supported, some clay matrix, traces calcite cement; traces black speckled carbonaceous shale imbedded.

Lower Wasatch (5848' – 7702')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
5847	7701	113.20	20.60	65.61	14982.99	330.00	2293.88	533.26	2.604	66.23

Descriptions from original hole

5970' Sandstone = very light gray, light bluish gray; predominately quartz framework; lower to slightly upper very fine grain; well sorted; subangular to some subround angularity; low sphericity; frosted in part; friable to firm friable; predominately grain supported, traces of calcite cement; traces black lithics speckled imbedded; very tight, no visual porosity.

6080' Shale = dark to dusky yellowish brown, light to medium gray, occasional light greenish gray; firm to hard; crumbly to tough; tabular, blocky and platy cuttings; matte to slightly shiny luster smooth to silty texture; non to slightly calcareous; rarely with high carbonaceous content.

6170' Siltstone = dark reddish brown, traces very dusky red, light yellowish brown; pulverulent, crunchy tenacity; subblocky to blocky slight irregular fracture; wedgelike, equant cuttings habit; dull earthy luster; gritty texture; massive structure; grading to a sandstone.

Descriptions from sidetrack

5920' Sandstone = very light gray, off white, very pale bluish gray; predominately quartz framework; lower very fine grain to some upper fine grain; well sorted; predominately sub angular, traces sub round angularity; very low sphericity; frosted surface features in part; friable to firm friable; silica matrix, trace calcite cement; traces black speckled carbonaceous shale imbedded.

6040' Shale = moderate dusky brown, light pale reddish brown, some greenish gray; pulverulent to crumbly tenacity, sub blocky, blocky with trace irregular fractures; wedge like cuttings habit; earthy dull luster; silty to clayey texture; massive to semi thick structure.

6130' Siltstone = dark reddish brown, occasionally dusky reddish brown; firm to moderately hard; crumbly to tough; irregular and subblocky cuttings; matte luster with scattered sparkles; gritty texture; moderately calcareous; locally common very fine sand grains; interbedded with sandstone and shale.

6230' Sandstone = very light gray, light gray, very pale bluish gray; predominantly quartz with scat lithics; very fine grain to some upper fine grain; moderately well sorted; predominately sub angular, traces sub round; clay matrix; calcite cemented; estimated fair porosity and permeability.

6320' Shale = light to medium gray, medium to dark brownish gray, rarely light greenish gray; firm to moderately hard; crumbly to tough; irregular, blocky and wedge like cuttings habit; matte to occasionally slightly resinous luster; smooth to moderately silty texture; moderately to very calcareous; occasionally very carbonaceous; interbedded with sandstone and siltstone.

6440' Siltstone = dark to dusky yellowish brown, occasionally dark grayish brown; firm to moderately hard; crumbly to tough; irregular and subblocky cuttings; matte luster with scattered sparkles; gritty texture; moderately calcareous; locally common very fine sand grains disseminated throughout; interbedded with sandstone and shale.

6540' Sandstone = light charcoal gray, off white, some very light bluish gray; predominately quartz framework; lower very fine to upper fine grain size; poor to fair sorted; dominantly sub angular, traces subrounded angularity; very low sphericity; trace frosted in part; firm friable to slightly hard; consolidated some very tight; calcareous cement, some silica matrix; tight grain support; fair HCL reaction; disseminated fine black speckled lithics embedded.

6680' Shale = moderate yellowish brown, occasional light greenish gray; crunchy pulverulent, trace firm tenacity; sub blocky, blocky to irregular fracture; wedge like, elongated, sub blocky cuttings habit; dull semi waxy luster; silty to clayey texture; sub thick to massive structure.

6770' Siltstone = grayish red, dark yellowish brown; friable to firm friable; sub blocky, blocky, some irregular fracture; wedge like, tabular cuttings habit; dull resinous luster; gritty silty texture, thick structure; traces very fine sandstone imbedded.

6850' Sandstone = light bluish gray, moderate light gray, trace off white; dominantly quartz framework; lower to upper very fine grain; fair to well sorted; sub angular to some sub rounded angularity; traces frosted surface features; firm friable to dense; silica matrix, trace calcareous cement; some black disseminated speckled lithics.

6950' Shale = pale light bluish gray, moderate medium bluish gray, to medium light gray; crunchy, brittle, slight dense tenacity; sub blocky, blocky fracture; elongated, wedge like cuttings habit; dull earthy semi waxy luster; silty smooth texture; semi massive structure.

7040' Siltstone = medium to dark brownish gray, occasionally with slight greenish hues; firm to moderately hard; crumbly to tough; irregular and subblocky cuttings; dull luster with scattered sparkles; gritty texture; moderately calcareous; scattered to common very fine sand disseminated throughout; interbedded with sandstone and shale.

7140' Sandstone = very light gray to light gray overall; "peppered" appearance; clasts range from very fine lower to fine upper; angular to subround; moderately sorted; mostly quartz with common dark gray to black lithics; white clay matrix; grain supported; light calcite cement; estimated poor to fair porosity and permeability; interbedded with shale and siltstone.

7250' Shale = medium to dark brownish gray, dark reddish brown, occasionally light greenish gray; firm to moderately hard; crumbly to tough; irregular, blocky and wedge like cuttings habit; matte to occasionally slightly resinous luster; smooth to moderately silty texture; moderately to very calcareous; occasionally very carbonaceous; interbedded with sandstone and siltstone.

7370' Siltstone = dark reddish brown, light to medium gray, occasional greenish hues; firm to moderately hard; crumbly to tough; irregular and subblocky cuttings; earthy luster with scattered sparkles; grainy texture; moderately calcareous; scattered to common very fine sand disseminated throughout; interbedded with sandstone and shale.

7470' Sandstone = light gray to very light gray overall; "peppered" appearance; clasts range from very fine lower to fine upper; angular to subround; moderately sorted; dominantly quartz with common dark gray to black lithics; white clay matrix; grain supported; light calcite cement; estimated poor to fair porosity and permeability; interbedded with shale and siltstone.

7580' Shale = light to medium brownish gray, light to medium olive gray; occasionally greenish gray; moderately hard to firm; tough to crumbly; blocky, irregular and wedge like cuttings habit; matte to occasionally slightly resinous luster; smooth to moderately grainy texture; moderately calcareous; fair fissility.

7670' Sandstone = light gray, very light gray off white; predominately quartz framework; lower very fine some upper fine grain; poor to well sorted; angular to slight sub rounded angularity; trace frosted surface features; easily friable, semi friable; clay matrix, trace calcite cement; trace black speckled lithics interbedded; poor visual intergranular porosity.

Ohio Creek (7702' – 8254')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
7702	8253	114.80	0.00	61.24	1758.16	330.00	404.79	318.81	7.19	47.85

7780' Siltstone = moderately dark gray, some dark olive black, greenish black; friable to friable firm, brittle in part sub blocky, blocky semi irregular fractures; wedge like, elongated cuttings habit; dull, earthy, slight resinous sparkling luster; gritty silty texture; massive structure; traces sandstone and shale interbedded.

7880' Sandstone = very light gray, off white, clear to translucent; predominately quartz framework; upper fine to lower medium grain size, well to very well sorted; angular, sub angular, to some sub round angularity; traces frosted surface features; easily friable; predominately silica cement, trace white clay cement; very weak grain supported; black speckled carbonaceous shale imbedded.

8000' Shale = light to medium brownish gray, light to medium olive gray; occasionally greenish gray, occasionally dark reddish brown; firm to moderately hard; blocky, tabular and wedge like cuttings; crumbly to tough; matte to slightly resinous luster; smooth to moderately silty texture; calcareous; interbedded with sandstone and siltstone; moderately fissile.

8110' Sandstone = light gray, pale greenish gray; common "peppered" appearance; easily friable to firm; clasts range from very fine lower to fine upper; angular to subround; moderately well sorted; dominantly quartz with scattered to common dark gray and black lithics; white clay matrix; mostly grain supported; calcite cement.

8210' Siltstone = light to medium brownish gray, light greenish gray; firm to moderately hard; moderately tough; irregular, subblocky and wedge like cuttings; dull, earthy luster with scattered sparkles; gritty, abrasive texture; calcareous; scattered black pinpoint specks; scattered to common very fine sand grains disseminated throughout; interbedded with shale and sandstone.

WF 800 (8254' – 8514')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
8254	8514	78.60	20.10	64.47	1686.75	330.00	527.71	395.80	13.74	115.25

8330' Shale = dark to dusky yellowish brown; light to medium greenish gray, light to medium gray, occasionally dark reddish brown; firm to moderately hard; blocky, tabular and wedge like cuttings; crumbly to tough; matte to slightly resinous luster; smooth to moderately silty texture; slightly calcareous; moderately fissile; interbedded with siltstone and sandstone.

8440' Sandstone = light gray, occasionally pale greenish gray; common "peppered" appearance; easily friable to firm; clasts range from very fine lower to fine upper; angular to subround; moderately well sorted; dominantly quartz with scattered to common dark gray and black lithics; white clay matrix; mostly grain supported; calcite cement.

WF 700 (8515' – 8959')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
8515	8959	87.60	15.30	52.39	3314.87	330.00	463.02	991.35	17.77	87.96

8540' Sandstone = light gray, light greenish gray, clear to translucent; predominately quartz framework; lower to upper fine grain; fair to well sorted; dominantly sub angular, trace sub round, low sphericity; frosted surface features; easily friable, some unconsolidated possible due to PDC bit; silica matrix cement, trace white clay cement, very weak grain support; disseminated black speckled carbonaceous shale imbedded.

8670' Shale = dark grayish red, medium light gray, dark yellowish orange; crumbly, pulverulent, semi hard tenacity; sub blocky, blocky, slight irregular fracture; wedge like, tabular, sub massive cuttings habit; dull, earthy, slight resinous luster; gritty to silty some clayey texture; semi massive structure; grading to siltstone.

8770' Carbonaceous shale = dusky reddish brown, dark brownish black; crunchy, firm tenacity, predominately irregular fracture; wedge like, flaky cuttings habit; gritty, vitreous luster; clayey texture; thin structure.

8840' Sandstone = very light gray, off white, light grayish brown with dark brown lithics; lower to upper fine grain size; poor to fair sorted; sub angular to sub rounded angularity; v low sphericity, frosted surface features; friable to firm friable, dense; silica matrix cement, trace calcite cement; poor visual inter granular porosity; dark brown, black speckled lithic interbedded.

8960' Siltstone = light to medium gray, light to medium brownish gray; firm to moderately hard; moderately tough; irregular, subblocky and wedge like cuttings; dull, earthy luster with scattered sparkles; gritty, abrasive texture; calcareous; scattered black pinpoint specks; scattered to common very fine sand grains disseminated throughout.

WF 500 (8960' – 9684')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
8960	9684	137.50	0.70	44.91	3586.22	330.00	379.03	1544.51	10.02	133.32

9070' Shale = medium to dark grayish brown, occasionally dark reddish brown; firm to moderately hard; blocky and tabular cuttings; dull luster; smooth texture; slightly calcareous; moderately fissile.

9150' Sandstone = white light gray brownish gray; few medium to finer grains; fair to well sorted; subangular subrounded; moderately sphericity; abundant unconsolidated to very friable sandstone; calcite cement with minor silica grains; glauconitic staining on sands and traces of coal; interbedded siltstone layers; moderate to high gas in sands

9250' Siltstone = dark gray to grayish black; brittle to crumbly; irregular fracture; nodular to wedgelike cuttings ; slight resinous to dull earthy luster; silty to clayey texture; appears grading to shales; 5-8% kaolinitic sands present; moderate to lower gas in siltstones

9340' Shale = light to medium gray; crunchy to crumbly; elongated to traces of platy cuttings; irregular to splintery fractures; earthy dull to slight waxy luster; slightly silty to smooth; appears grading to siltstone; 5% Coal observed; 5-8% kaolinitic sands; higher gas in coals and sands

9450' Sandstone = white light gray to light brownish gray; fine grains; well sorting; subangular to rounded; high sphericity; abundant unconsolidated to very friable grains; calcite cement with 50% silica matrix; kaolinitic sands and traces of coal observed; higher gas values observed in kaolinitic sands and coal seams

9550' Shale = light medium gray occasionally trace yellow brown; mod hard firm; blocky irregular fracture; massive cuttings habit; dull to earthy occasionally waxy luster; smooth to clayey texture

9610' Sandstone = Clear white; predominately medium unconsolidated quartz; subangular to subrounded; moderately well sorted; easily friable; Calcite cement with trace Kaolinitic sands; mod high sphericity; shales interbedded; high gas in sands

WF 400 (9685' – 11369')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
9685	11369	105.30	0.00	45.14	1915.26	0.00	329.76	2855.91	0.00	162.13

9520' Shale = medium light gray occasionally dark gray to slightly pale yellow; mod hard firm; dull earthy occasionally waxy luster; smooth to silty gritty texture; non calcareous; grading to grayish brown siltstone.

9580' Sandstone = clear white; fine to very fine; predominately abundant clear loose medium quartz grains; subangular subrounded; mod well sorted; predominately grain supported; calcite cement; high sphericity; occasionally trace black lithics clasts fragments; slightly trace Kaolinitic; high gas readings in shale.

9850' Shale = light medium gray occasionally trace yellow brown; moderately hard to firm; blocky irregular fracture; massive cuttings habit; dull earthy occasionally waxy luster; smooth to clayey texture; silty occasionally gritty texture; interbedded sands yielding high gas smooth to clayey texture.

9900' Sandstone = light gray to off white and clear; fine to medium grains; subangular to subrounded; moderately well sorted; dominant grain support; abundant clear unconsolidated medium quartz grains; calcite cement; traces of kaolinitic sand; siltstone and shale interbedded; moderate gas.

10000' Siltstone = medium to dark gray; to slightly dense; splintery to planar fractures; elongated to nodular cuttings; little resinous to earthy luster; silty texture; interbedded in sandstone layers; appears grading to shale; less than 3% individual quartz grains observed; lower gas values.

10070' Carbonaceous shale = medium to dark gray; dense to crumbly; wedgelike to nodular cuttings; earthy to slight resinous luster; smooth to silty texture; 5% kaolinitic sands observed; siltstone appears grading to shale; moderate gas values.

10150' Sandstone = white; light gray to grayish white; very fine to fine grains well sorting for consolidated grains; 10 to 20% unconsolidated grains; less than 3% kaolinitic sands; subrounded to rounded high sphericity; easily friable; slight Calcite cement; coal and shale interbedded; higher gas values with coal seams

WF 200 (11370' – 11674')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
11370	11674	93.90	16.20	51.94	330.00	330.00	330.00	1263.36	0.00	335.21

11370' Sandstone= white to brownish gray; slightly hard to friable; subrounded to subangular; well sorted; predominately Grain supported; slight calcite cement with higher silica cement; moderate sphericity; traces of black carbonaceous; fragments; clear white crystalline free calcite fill; interbedded dark gray shales and black carbonaceous shales; high gas readings in sands.

11450' Shale = dark gray to light gray; hard to brittle tenacity; irregular to splintery fractures; massive tabular to elongated cuttings habit; dull earthy luster; smooth silty texture; interbedded dark black coal beds; high gas in coal beds.

11540' Coal = black crumbly brittle tenacity irregular blocky fracture; massive wedge like cuttings habit; smooth vitreous semi-metallic luster; smooth texture; interbedded with brownish black carbonaceous shale and siltstones; high gas readings in coal beds with traces of clear crystalline calcite fill fractures giving way to higher gas readings in zones with fracture fill observed.

11660' Siltstone = brownish gray to brown; hard to firm; blocky irregular fracture; massive platy cuttings habit; dull earthy luster; gritty granular texture; grading to very fine grain brownish gray and friable sandstones; high gas.

Cameo (11675' –12023')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
11675	12023	115.10	26.50	60.23	330.00	330.00	330.00	1260.38	46.02	449.68

11720' Coal = black to brownish black; brittle crumbly tenacity; irregular blocky fracture; massive wedgelike cuttings habit; metallic vitreous luster; smooth texture; interbedded brownish black carbonaceous shales and sandstones; high gas in thin coal beds.

11810' Sandstone = clear to white; loose medium quartz grains; subrounded to subangular; well sorted; primarily grain supported; high sphericity; traces of black carbonaceous fragments embedded; interbedded coal beds with high gas readings in sands.

11890' Siltstone = light to dark grayish black with occasional brown hues; brittle to crumbly; elongated to tabular cuttings; slight waxy to earthy luster; silty to gritty texture; interbedded in shales and sandstone; moderate gas values.

11950' Carbonaceous shale = dark grayish black to medium gray; dense to brittle; irregular to conchoidal fractures; massive to wedgelike cuttings; earthy to slight resinous luster; silty to smooth texture; moderate gas with coal seams.

Rollins Member (12024' – 12237')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
12024	12237	127.00	23.90	47.40	330.00	330.00	330.00	1275.96	31.43	190.81

12030' Sandstone = brown to grayish white with unconsolidated white crystals; fine to very fine grains; well sorted; rounded; high sphericity; very firm to friable; high silica content; abundant quartz crystals; grain supported with small percentage of calcite cement present; 5% kaolinitic sands; 5 to 8% coal observed; moderate to high gas values with sandstones and coal seams.

12150' Siltstone = dark gray to light grayish brown; brittle to crunchy; irregular to conchoidal fractures; massive to wedgelike cuttings; dull to slight sparkly luster; gritty to silty texture 5 to 8% coal observed; siltstone appears grading to darker shales; moderate gas in siltstone with higher gas in coal.

Cozzette Member (12238' – 12524')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
12238	12524	120.30	26.40	52.89	330.00	330.00	330.00	1261.82	3.59	223.16

12250' Coal = dark grayish black to black; brittle to pulverulent; irregular to planar fractures; tabular to elongated; slight waxy to earthy luster; smooth texture; interbedded in carbonaceous shales and siltstones; siltstones are grading to shales; 5% kaolinitic sands observed; higher gas values in coal seams.

12340' Carbonaceous shale = dark grayish black brittle to crunchy; irregular to splintery fractures; elongated to tabular cuttings; earthy to slight polished luster; slightly gritty to silty texture; occurs with siltstones and sandstones; alternating thickness; moderate gas values.

12430' Siltstones = brownish gray to gray; hard firm; platy irregular fracture; massive cuttings habit; dense to crumbly tenacity; dull earthy and occasional sparkling luster; gritty to granular texture; interbedded black brownish carbonaceous shales; embedded thin coal beds giving high gas readings.

Corcoran Coastal Plain (12525' – 13129')

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
12525	13129	1187.00	0.00	35.39	601.35	0.00	327.17	1387.30	0.00	286.08

12530' Coal = black; crumbly tenacity; irregular blocky fracture; massive wedgelike cuttings habit; vitreous to glassy metallic luster; smooth texture interbedded with carbonaceous shales and siltstones; high gas readings associated with coal beds.

12600' Sandstone = white; very fine to fine grains; hard to friable; subrounded to subangular; well sorted; dominant grain support; silica cement matrix; high sphericity; no reaction to HCL traces of black carbonaceous fragments interbedded coal seams with high gas readings.

12700' Coal = dark black glassy; hard to brittle; blocky irregular fracture; massive wedgelike cuttings habit; metallic to vitreous luster; smooth texture; interbedded with carbonaceous shales and siltstones; high gas readings in thin coal beds.

12770' Siltstone = dark grayish brown to dark gray; very tough with silica cement to slightly brittle; irregular fractures; tabular to wedgelike cuttings; slight polished to earthy luster; silty to gritty texture; less than 5% coal observed and tending to increase for next sample; moderate gas values with higher readings in coal seams.

12860' Sandstone = white; light to medium gray fine to very fine grains; very well sorting; firmly friable to hard; well rounded to rounded; very high sphericity; 30% of unconsolidated sands with 5% kaolinitic; dominant silica matrix and cement; occurrences of black lithics less than 3% in samples; moderate gas values in sands and higher readings in coals.

12980' Carbonaceous Shale = dark grayish black to dark brownish black; slightly dense to crumbly; irregular to conchoidal fractures; massive to tabular cuttings; slight polished to dull earthy luster; smooth to silty texture; siltstone appears grading to dark shales; moderate gas in shales.

13060' Sandstone = white to brownish gray; hard to friable; fine to very fine grain; subrounded to subangular; dominant grain support; silica cement matrix; trace of black carbonaceous fragments embedded; moderate sphericity; high gas.

Corcoran Marine (13130 – 13338' TD)

Interval		ROP			CO2			TLGAS		
From	To	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg
13130	13338	69.50	6.90	31.75	330.00	330.00	330.00	1223.45	32.23	127.48

13140' Siltstone = light grayish brown; hard to firm; irregular blocky fracture; massive to platy to wedge like cuttings habit; sparkling frosted luster; gritty to granular texture; interbedded with dark gray platy elongated fracture shales; low gas readings in siltstones.

13220' Shale = dark gray to gray; hard to firm; platy irregular fracture; massive platy tabular cuttings habit; dull waxy luster; smooth to silty; grading to light brownish gray; hard to blocky gritty granular sparkling siltstone; low gas readings in shale and siltstones.

TD well @ 13338'MD/12948'TVD on 9/24/2009 03:38:00 hrs

ExxonMobil

Pixler Plot

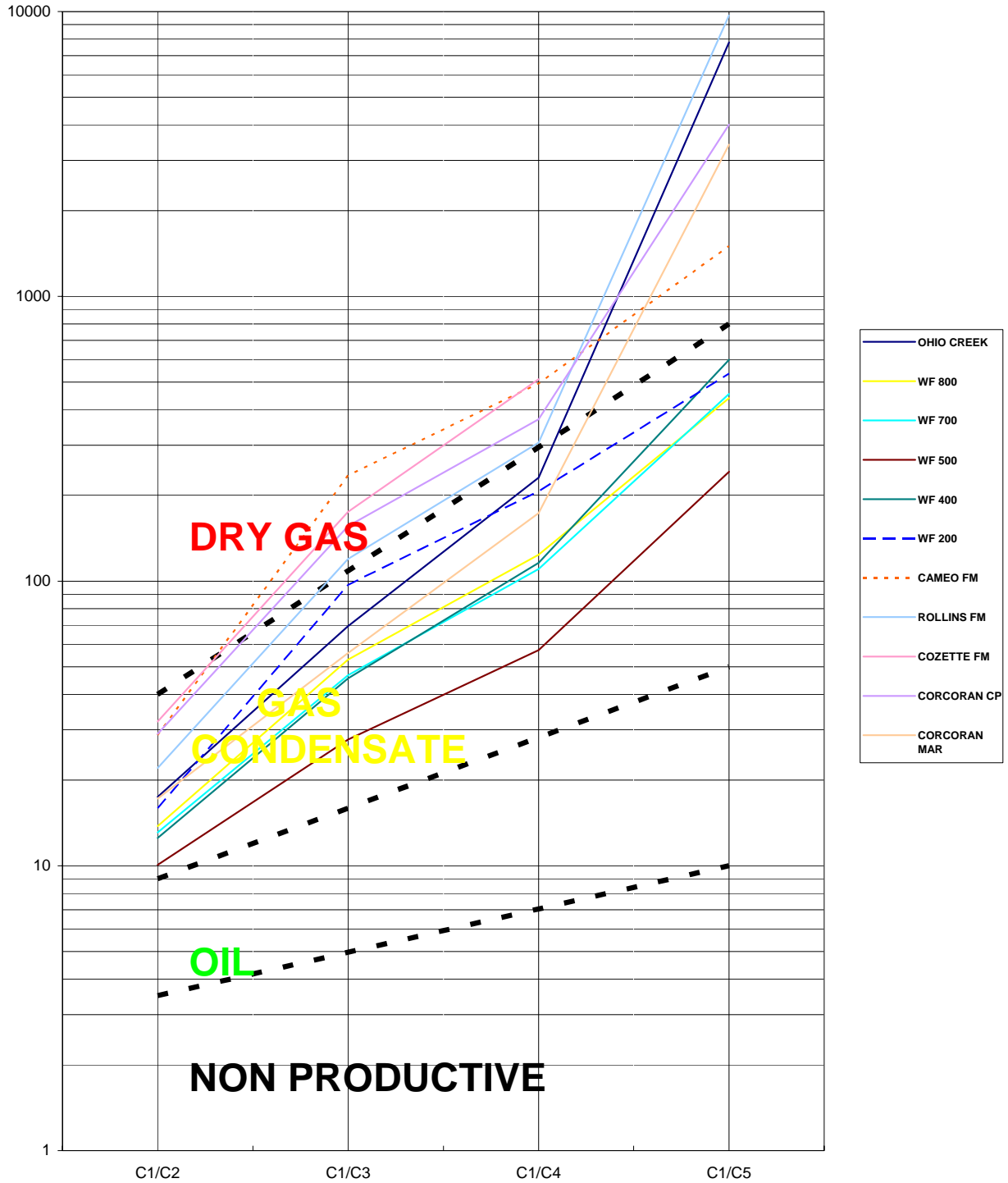
Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH** Well Services, Inc.

PCU 297-12A1-ST1

Pixler Plot Of Average Chromatography
Data By Formation



ExxonMobil

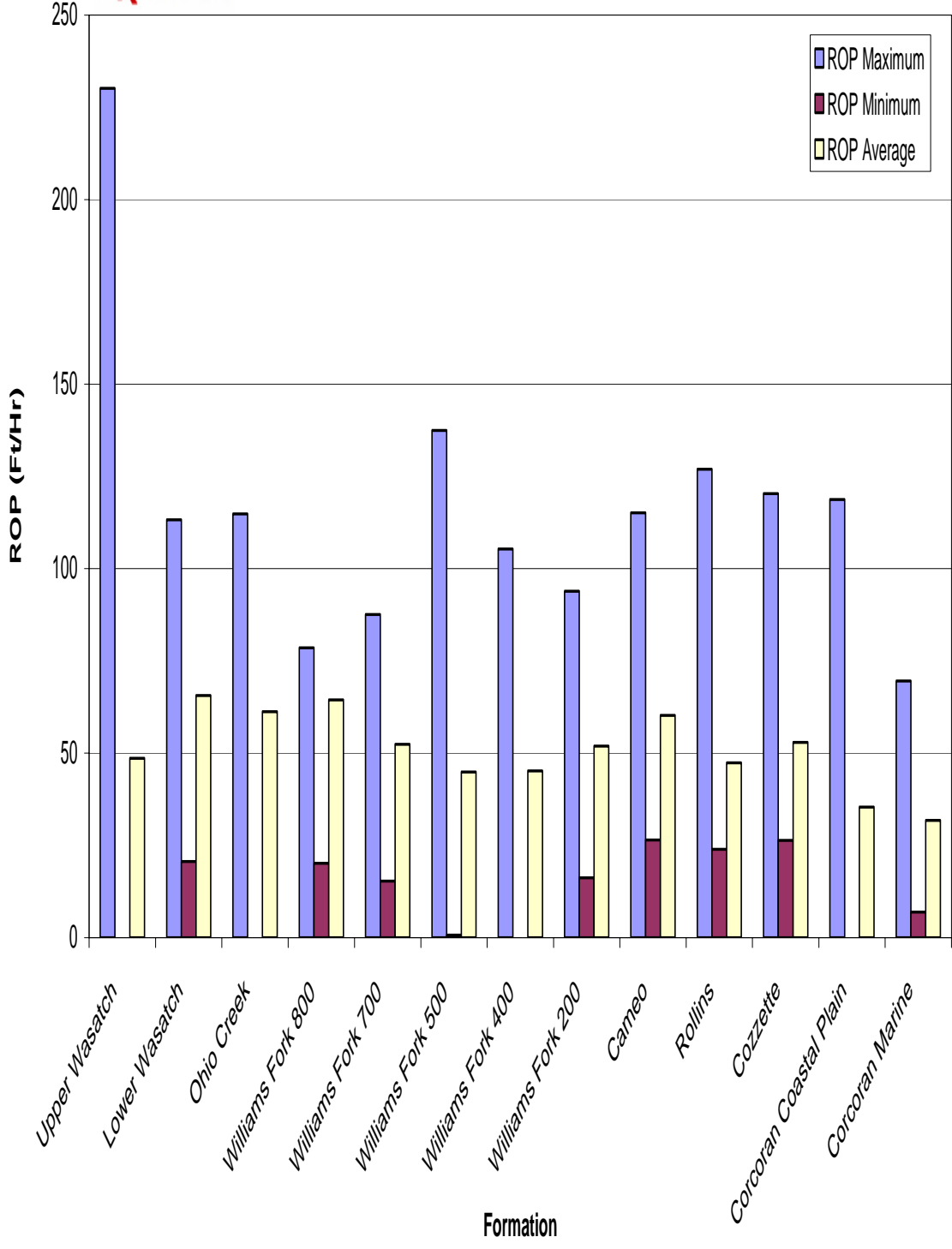
Other Data Plots

Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

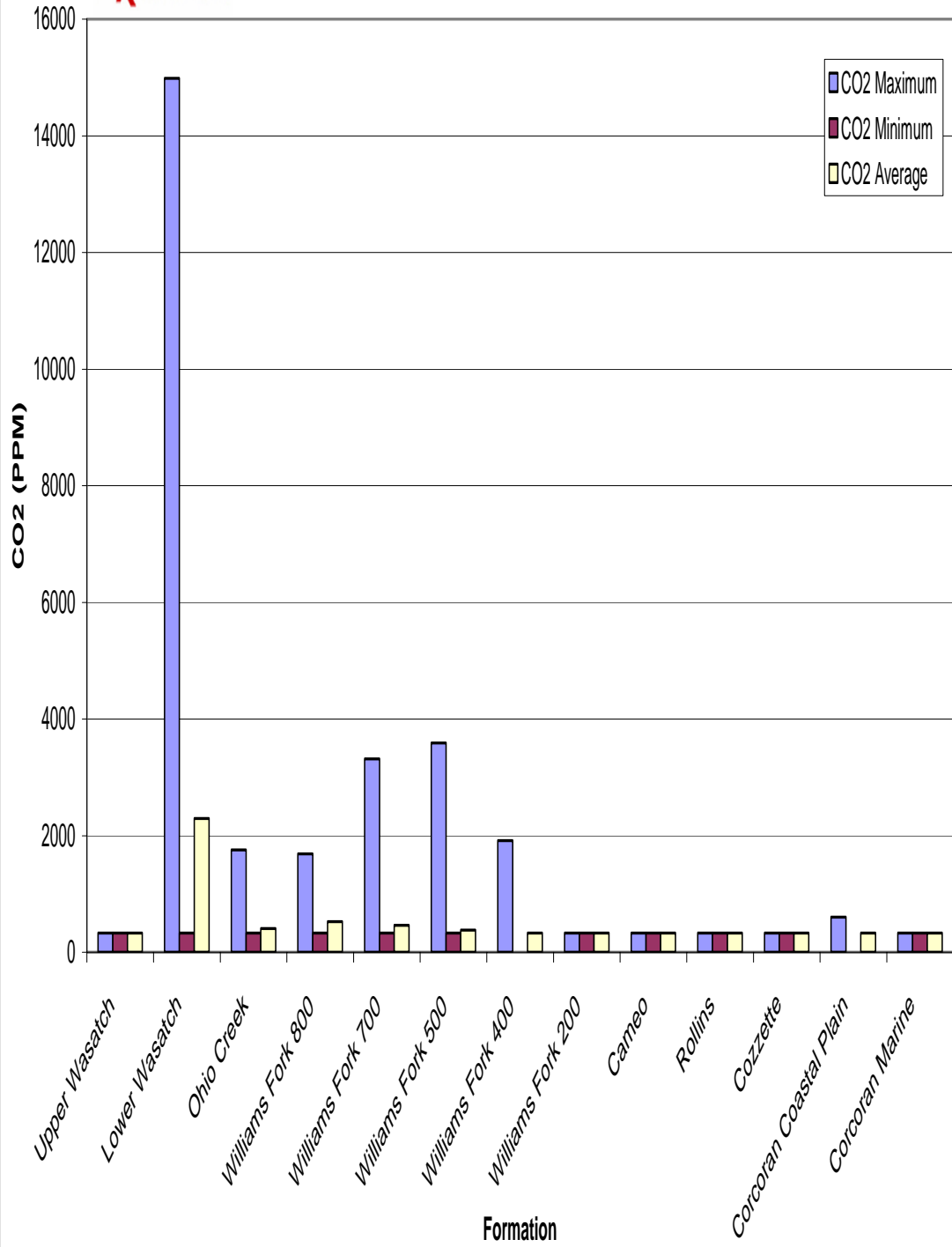
 **EPOCH** Well Services, Inc.

PCU 297-12A8
Rate of Penetration Statistics



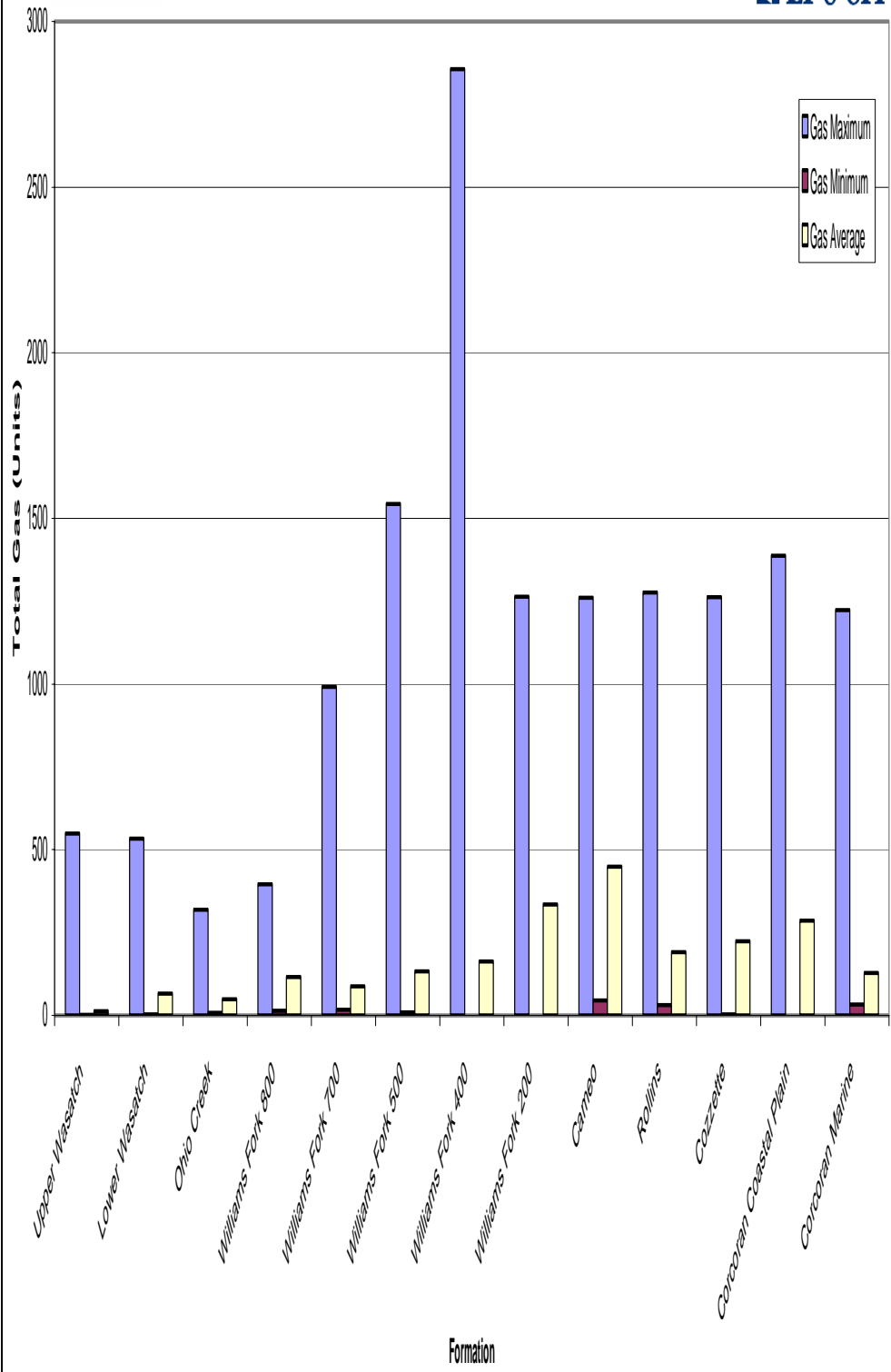
ExxonMobil

PCU 297-12A8
CO2 Statistics





PCU 297-12A8
Total Gas Statistics By Formation





Ballooning Surveillance Summary

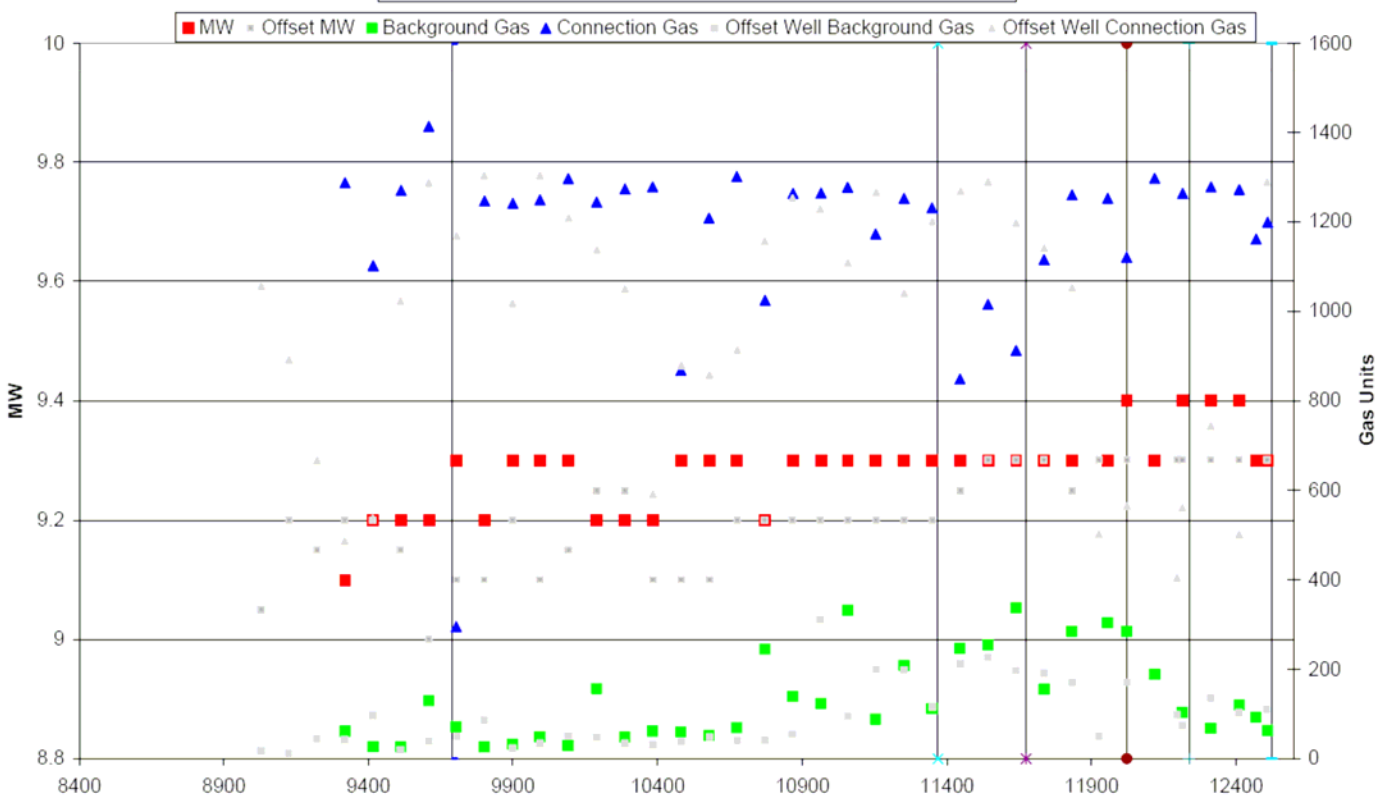
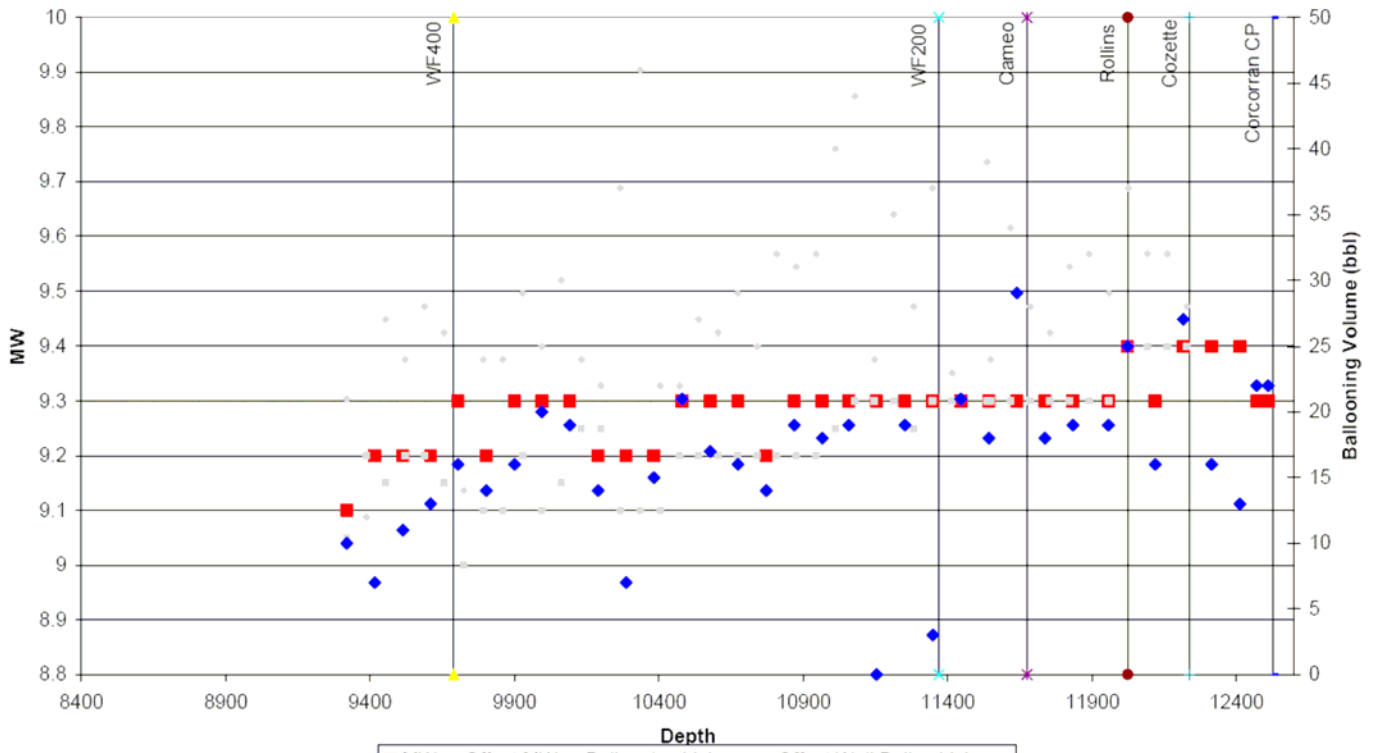
Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH** Well Services, Inc.

PCU 297-12A1-ST1

MW & Ballooning Volume vs. Depth





Mud Losses Summary

**Piceance Creek Unit PCU 297-12A1-ST1
Rio Blanco County, CO.**

 **EPOCH Well Services, Inc.**



Daily Activity Summary

**NOTE: data for this section provided by H&P
From Daily Tour Sheet**

**Piceance Creek Unit PCU 297-12A1-ST1
Rio Blanco County, CO.**

 **EPOCH** Well Services, Inc.

Daily Activity Summary

06/15/09

Skid rig from A-6 to A-1. Nipples up stack and flow line. Rig up and prepare to test BOP. Test BOP stack. Pick up bit and directional drilling tools. Tripped in the hole; inspected drill collars.

06/16/09

Continue to trip in hole to 4033'. Test casing. Wash and ream shoe track and drill ten feet of new formation to 4151'. Circulate out. Perform F.I.T. Drill ahead to 4650'.

06/17/09

Drill from 4650' to 5009'. Circulate out while working on TOTCO computer. Drill ahead from 5009' to 5639' BG gas reading 8-10u, CO2 330 ppm.

06/18/09

Drill ahead from 5639' to 5730'. Displace mud with DSF mud system. Drill ahead to 6283'. Max gas 197units. Circulate out. Pull two stands. Pipe stuck. Attempt to jar pipe loose.

06/19/09

Continue to work with stuck pipe. Displace DSF mud with water base mud.

06/20/09

Continue to work with stuck pipe. Did 3 point and coming out with part of drilling string.

06/21/09

Back off drilling string at 5868', TIH to pick up fishing tools, bottom hole has 58u.

06/22/09

Jarring on fished drilling string without breaking it loose, TOH to prepare for placing a cement plug above the stuck drilling string.

06/23/09

TIH to the top of the stuck drilling sting and set cement plug to prepare to drill a side track around the stuck drill string.

The following information is from the sidetrack.

06/25/09

Timed drilled for kick off from 4466' to 4500' bg gas 10u, CO2 330 ppm.

06/26/09

TOH to replace bit and readjust directional motor. TIH to kick off side track, BG 10u, CO2 330 ppm.

06/27/09

TOH for a new bit and to adjust the directional motor, max gas 528u, CO2 330 ppm

06/28/09

Make up new bit and pick up directional motor, TIH to 743' test motor, TIH to 4974' drilling ahead, CO2 330 ppm.

06/29/09

Drilling and sliding to 5731', max gas 22u, CO2 330 ppm.

06/30/09

Drilling and sliding to 5774', TVD 5400', TOH, break bit, lay down directional motor, max gas 60u, CO2 330 ppm.

07/01/09

Make up bit, BHA, TIH to 4746', POOH to 341', plug jets, clean cement out of bit, CO2 330 ppm.

07/02/09

TIH, jet plug off, POOH to clean jet. TIH drilling ahead, CO2 12241 ppm.

07/03/09

Drilling ahead to 6434', short 3 stand wiper trip, drilling ahead to 6719' short wiper trip, max gas 349u, CO2 330 ppm.

07/04/09

Drilling ahead to 8054', several 3 stand wiper trips, max gas 533u, CO2 6229 ppm.

07/05/09

Drilling ahead to 8780', several 3 stand wiper trips, max gas 990u, CO2 1015 ppm.

07/06/09

Drilled to 9131' with several wiper trip intervals; circulated bottom's up; back reamed to 6052' where it packed off and lost circulation; pumped several lcm sweeps and worked the pipe to regain circulation; regained circulation and continued to work pipe, CO2 3315 ppm.

07/07/09

Back reamed up from 6035' to shoe. Circulated and conditioned mud and built up mud volume Washed and reamed down to 6500', back reamed up to 5465', CO2 601 ppm.

07/08/09

Back reaming up to shoe at 4111'. POOH and rigged up casing tools. TIH with casing to 5675', CO2 3042 ppm.

07/09/09

Wash and ream casing; worked tight spots. CRT dies changed after slipping. TIH with casing to 9116', CO2 872 ppm.

07/10/09

Circulate to clean hole, rig down casing tools and rig up cementing tools. Cement. Rig down and prepare for rig skid, CO2 1144 ppm.

09/18/09

Skid rig over from 12A5 well Nipple up tested BOP picked up new bit TIH to 8964 Tested 7" casing for 30 minutes at 2000 psi. Drilling out float collar cement

09/19/09

Finished drilling out shoe and 10' new formation to 9143'; Circulated B/U performed FIT to 9.9 ppg equivalent. Drilling ahead loosing 36 bbl/hr pumping 10bbl LCM sweeps as needed

09/20/09

Drilling ahead loosing mud started adding Baracarb and Baraseal and Walnut to slow down loses; Pumping 10bbl LCM sweeps as needed CO2 330 Max gas 1296Ue

09/21/09

Drilling ahead having some seepage controlling it by adding 12ppg walnut medium fine grain and Baracarb; minimal CO2 330 Max gas of 1310U

09/22/09

Drilling ahead at 12482' circulating at times getting high gas out of hole; Continue to loose mud having to add 12ppb Baracarb and walnut medium fine to control loses

09/23/09

Drilling ahead to around 13050; Loosing mud pumped LCM sweeps to heal hole; Drilled to 13215 adding Baracarb and walnut to mud system. Maximum gas 1289U max co2 330 ppm

09/24/09

Drilled to TD 13338'MD; Pumped LCM sweeps to heal hole; Circulated out gas and hole; Weighted up to 9.8ppg mud circulated that around; POOH using positive displacement method; Hole became tite around 12465'; Wash and back ream out of hole; POOH to 10230' using positive displacement method; Back reaming out from 10230 to 9116'; Circulated B/U before POOH again

09/25/09

Monitor well while building up 50bbls 12.0ppg pill. Spotted pill Pool to 1209' pulled out rotating rubber. Finished POOH pulled wear bushing rigged up casing equipment and CRT tool. Trip into hole with 4.5" production casing

09/26/2009

Tripped into hole with 4.5" casing to 9030'. Establish returns losing mud no circulation around. Tripping into hole to 13278' Rig down CRT tool Rigged up cement equipment Circulated bottom's up and pumped cement. Set well head and nipple down prepare to skid rig over to 12A2 well

ExxonMobil

Survey Data

Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH** Well Services, Inc.



RIO BLANCO, COLORADO
Piceance Creek Unit 297-12A1

SURVEY SUMMARY

MD Depth (ft/KB)	Inc Angle (°)	Azimuth (°)	TVD Depth (ft)	Vertical Section (ft)	DLS (°/100ft)	Vertical				
						+N/S- (ft)	+E/W- (ft)			
4076.20	26.28	46.07	3802.28	1330.05	0.34	896.76	982.28			
4161.00	26.34	45.10	3878.30	1367.61	0.51	923.06	1009.12			
4239.00	26.02	45.28	3948.29	1402.00	0.42	947.31	1033.54			
4334.00	26.08	46.41	4033.64	1443.70	0.53	976.37	1063.47			
4429.00	25.95	49.40	4119.02	1485.35	1.39	1004.30	1094.38			
4525.00	25.69	49.05	4205.44	1527.15	0.31	1031.61	1126.04			
4621.00	25.44	48.81	4292.04	1568.56	0.28	1058.82	1157.27			
4716.00	25.68	48.03	4377.74	1609.54	0.44	1086.03	1187.93			
4811.00	25.96	46.36	4463.26	1650.92	0.82	1114.14	1218.28			
4908.00	25.52	44.73	4550.63	1693.01	0.86	1143.64	1248.35			
5004.00	24.10	44.16	4637.77	1733.23	1.50	1172.39	1276.56			
5100.00	21.92	45.34	4726.13	1770.71	2.32	1199.05	1302.97			
5195.00	20.35	45.39	4814.74	1804.93	1.65	1223.12	1327.34			
5290.00	18.24	45.64	4904.40	1836.30	2.22	1245.11	1349.73			
5386.00	16.70	46.33	4995.96	1865.11	1.62	1265.14	1370.45			
5483.00	15.12	46.78	5089.25	1891.69	1.63	1283.43	1389.75			
5576.00	13.61	46.27	5179.34	1914.76	1.63	1299.30	1406.50			
5672.00	11.72	45.59	5273.00	1935.80	1.97	1313.94	1421.63			
5768.00	9.77	45.29	5367.31	1953.69	2.03	1326.49	1434.38			
5864.00	6.88	49.05	5462.29	1967.58	3.06	1335.99	1444.52			
5960.00	5.89	51.25	5557.69	1978.24	1.06	1342.84	1452.70			
6054.00	4.26	49.23	5651.32	1986.54	1.74	1348.14	1459.11			
6152.00	2.14	50.51	5749.16	1992.01	2.16	1351.68	1463.28			
6248.00	0.06	288.82	5845.14	1993.78	2.26	1352.84	1464.21			
Sidetrack	surveys	below.								
4076.20	26.28	46.07	3802.28	1330.05	0.34	896.76	982.28			
4161.00	26.34	45.10	3878.30	1367.61	0.51	923.06	1009.12			
4239.00	26.02	45.28	3948.29	1402.00	0.42	947.31	1033.54			
4334.00	26.08	46.41	4033.64	1443.70	0.53	976.37	1063.47			
4429.00	25.95	49.40	4119.02	1485.35	1.39	1004.30	1094.38			
4503.00	26.09	48.55	4185.52	1486.43	0.54	1025.61	1118.87			
4570.00	25.61	48.83	4245.82	1514.91	0.74	1044.89	1140.81			
4665.00	21.95	46.61	4332.74	1552.37	3.97	170.61	1169.18			
4728.00	20.77	40.76	4391.42	1575.07	3.86	10.87.17	1185.03			
4789.00	20.96	40.54	4448.42	1596.72	0.34	1103.65	1199.18			
4846.00	20.60	37.22	4501.71	1616.90	2.16	1119.38	1211.87			
4885.00	20.72	35.89	4538.20	1630.66	1.24	1130.44	1220.07			
4980.00	21.04	33.04	4626.97	1664.50	1.12	1158.35	1239.22			
5075.00	19.84	31.29	4715.97	1697.61	1.42	1186.42	1256.89			



RIO BLANCO, COLORADO
Piceance Creek Unit 297-12A1

SURVEY SUMMARY

MD Depth (ftKB)	Inc Angle (°)	Azimuth (°)	TVD Depth (ft)	Vertical Section (ft)	DLS (°/100ft)	Vertical			
						+N/S- (ft)	+E/W- (ft)		
5172.00	17.36	27.56	4807.91	1728.34	2.83	1213.32	1272.14		
5268.00	14.90	30.54	4900.13	1754.81	2.70	1236.65	1285.04		
5363.00	12.56	29.80	4992.41	1777.25	2.47	1256.14	1296.38		
5457.00	10.10	30.13	5084.57	1795.62	2.62	1272.14	1305.60		
5553.00	7.68	32.15	5179.41	1810.40	2.54	1284.85	1313.24		
5649.00	3.94	29.83	5274.90	1820.08	3.90	1293.15	1318.29		
5719.00	3.53	31.26	5344.75	1824.62	0.60	1297.97	1320.61		
5774.00	3.53	31.26	5399.65	1828.00	0.00	1299.97	1322.37		

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Drilling Fluid Reports

**Piceance Creek Unit PCU 297-12A1-ST1
Rio Blanco County, CO.**

 **EPOCH** Well Services, Inc.



PICEANCE CREEK UNIT PCU 297-12A1-ST1

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	06/15/2009	06/16/2009	06/17/2009	06/18/2009	06/19/2009	06/20/2009	06/21/2009
Sample Temperature (deg F)	-	115	135	161	85	---	102
Sample Depth	4126	4390	5370	6279	6282	6282	5865
Mud Weight (lb/gal)	8.8	8.95	9.2	9.70	8.80	8.90	8.95
FV (sec/quart)	41	40	51	---	58	49	56
PV(cP)	7	10	16	19	19	16	13
YP (lb/100 ft2)	11	12	23	34	18	18	27
Gels (10 sec lb/100ft2)	5	8	9	---	9	7	2
Gels (10 min lb/100ft2)	17	35	39	---	28	15	45
Gels (30 min lb/100ft2)	25	51	55	---	36	29	55
API FL (cc/30 min)	12.5	12.0	---	88.0	10.1	9.6	10.2
Cake (API)	2/-	2/-	3/-	---	3/-	3/-	2/-
pH	9.3	10.8	10.4	---	8.70	8.10	10.40
Pm	0.55	0.20	1.20	---	0.65	0.40	0.90
Hardness (mg/l)	20	-	40	---	20	20	40
Chlorides (mg/l)	2600	2400	2300	2400	2500	2500	2500
MBT (lb/bbl)	15.0	15.0	25.0	---	17.2	15.0	20.0
Sand (%)	-	-	0.25	---	---	---	---
Corrected Solids (%)	2.7	2.7	6.2	10.1	2.7	3.7	3.7
CO2	-	-	330	26489	330	4400	8741



PICEANCE CREEK UNIT PCU 297-12A1-ST1

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	06/22/2009	06/23/2009	06/24/2009	06/25/2009	06/26/2009	06/27/2009	06/28/2009
Sample Temperature (deg F)	108	100	---	115	110	118	115
Sample Depth	6282	6282	---	4473	4648	4660	4904
Mud Weight (lb/gal)	9.00	9.0	---	8.6	8.6	8.65	8.85
FV (sec/quart)	54	40	---	51	55	56	63
PV(cP)	14	7	---	11	18	16	18
YP (lb/100 ft2)	23	11	---	17	20	25	21
Gels (10 sec lb/100ft2)	19	8	---	9	8	9	9
Gels (10 min lb/100ft2)	40	28	---	30	26	28	30
Gels (30 min lb/100ft2)	54	35	---	40	49	39	43
API FL (cc/30 min)	10.0	9.5	---	12.4	10.0	9.0	---
Cake (API)	2/-	2/-	---	---	2/-	2/-	2/-
pH	9.90	11.0	---	11.70	12.0	11.6	10.9
PM	0.85	2.10	---	4.00	1.80	1.35	1.45
Hardness (mg/l)	40	120	---	10	10	10	10
Chlorides (mg/l)	2500	2500	---	2500	2500	2700	2600
MBT (lb/bbl)	20.0	20.0	---	20.0	20.0	20.0	20.0
Sand (%)	0.25	0.20	---	0.25	0.10	0.20	0.20
Corrected Solids (%)	4.7	4.7	---	1.7	1.7	2.2	3.2
CO2	-330	330	---	330	330	330	330



PICEANCE CREEK UNIT PCU 297-12A1-ST1

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	06/29/2009	06/30/2009	07/01/2009	07/02/2009	07/03/2009	07/04/2009	07/05/2009
Sample Temperature (deg F)	134	137	121	---	122	110	127
Sample Depth	5435	5740	5774	6148	6650	7700	8700
Mud Weight (lb/gal)	9.15	9.10	9.010	9.2	9.2	9.10	9.20
FV (sec/quart)	54	53	55	40	50	57	57
PV(cP)	16	14	15	10	10	15	16
YP (lb/100 ft2)	21	25	23	10	20	21	21
Gels (10 sec lb/100ft2)	8	9	11	4	11	11	12
Gels (10 min lb/100ft2)	37	35	28	12	24	24	24
Gels (30 min lb/100ft2)	---	46	42	25	48	38	51
API FL (cc/30 min)	10.8	10.0	9.8	11.8	11.4	9.7	9.2
Cake (API)	2/-	2/-	2/-	2/-	2/-	2/-	2/-
pH	9.8	10.3	10.10	8.6	10.10	10.2	10.3
PM	1.10	0.97	0.70	0.55	0.80	0.80	0.80
Hardness (mg/l)	10	10	20	20	20	20	20
Chlorides (mg/l)	2500	2500	2500	2300	2200	2000	2000
MBT (lb/bbl)	20.0	22.5	22.5	17.5	20.0	17.5	17.5
Sand (%)	0.35	0.35	0.20	---	---	---	0.25
Corrected Solids (%)	4.4	4.2	4.7	5.7	5.2	334.40	4.7
CO2	330	330	330	330	330	6229	1015

PICEANCE CREEK UNIT PCU 297-12A1-ST1

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	07/06/2009	07/07/2009	07/08/2009	07/09/2009	07/11/2009	09/18/2009	09/19/2009
Sample Temperature (deg F)	120	108	---	89	---		113
Sample Depth	9131	9131	9131	9131	9131	9131	9600
Mud Weight (lb/gal)	9.3	9.1	9.2	9.3	8.85	9.20	9.2
FV (sec/quart)	60	60	55	52	45	39	41
PV(cP)	16	18	17	12	---	11	12
YP (lb/100 ft ²)	24	25	23	19	---	11	14
Gels (10 sec lb/100ft ²)	11	11	9	8	---	4	5
Gels (10 min lb/100ft ²)	27	25	29	19	---	10	1
Gels (30 min lb/100ft ²)	58	34	42	34	---	14	18
API FL (cc/30 min)	9.9	8.6	11.0	12.0	---	9.6	8.0
Cake (API)	2/-	2/-	2/-	2/-	---	2/-	2/-
pH	10.5	10.3	8.7	10.2	---	8.30	9.50
PM	0.45	0.80	0.35	0.60	---	0.33	0.80
Hardness (mg/l)	20	40	30	20	---	10	10
Chlorides (mg/l)	2000	1900	2000	2000	---	1600	1700
MBT (lb/bbl)	---	17.5	17.5	20.0	---	12.5	15.0
Sand (%)	0.25	---	0.25	0.10	---	0.25	0.30
Corrected Solids (%)	5.7	4.2	4.7	5.2	2.8	3.6	3.9
CO ₂	3315	601	3042	872	1144	330	330



PICEANCE CREEK UNIT PCU 297-12A1-ST1

WATER BASED MUD REPORT

Mud Engineering Services Provided By Baroid

Property	09/20/2009	09/21/2009	09/22/2009	09/23/2009	09/24/2009	09/25/2009	09/26/2009
Sample Temperature (deg F)	98	113	111	115	115		
Sample Depth	10450	11413	12482	13120	13338	13338	13338
Mud Weight (lb/gal)	9.3	9.3	9.4	9.4	9.8	9.8	9.80
FV (sec/quart)	43	44	46	45	46	48	44
PV(cP)	13	14	14	14	15	14	13
YP (lb/100 ft2)	16	16	18	15	12	12	13
Gels (10 sec lb/100ft2)	5	6	6	5	5	5	5
Gels (10 min lb/100ft2)	11	12	10	12	14	11	13
Gels (30 min lb/100ft2)	18	21	16	21	23	15	18
API FL (cc/30 min)	8.0	6.2	7.0	8.0	8.0	8.3	8.4
Cake (API)	2/-	2/-	2/-	2/-	2/-	2/-	2/-
pH	9.90	10.2	10.7	10.00	9.90	9.90	9.80
PM	0.75	0.70	0.98	1.00	0.65	0.65	0.65
Hardness (mg/l)	10	10	20	20	20	20	20
Chlorides (mg/l)	1600	1500	1600	1500	1500	1500	1500
MBT (lb/bbl)	15.0	15.0	15.0	12.5	12.5	12.5	12.5
Sand (%)	.40	.40	0.42	0.50	0.50	0.50	.50
Corrected Solids (%)	4.4	4.5	5.3	5.7	7.2	7.2	7.2
CO2	330	330	660	330	330	330	330

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Bit History

**Piceance Creek Unit PCU 297-12A1-ST1
Rio Blanco County, CO.**

 **EPOCH** Well Services, Inc.



Bit History PCU 297-12A1-ST1

Bit #	Ser #	Mfr.	Size	Type	Jet Sizes		Depth In	Depth Out	Footage	Avg ROP	Hours
1	SURFACE										
2	SURFACE										
3	7011849	HUGHES	9 7/8"	HC504	4X13	2X12	4436	4648	212	10.09	21
4	PL1453	SMITH	9.875"	PL1453	4X16		4648	4908	260	10.29	25.25
5	7013555	HUGHES	9.875"	HC 504 ZX	2X12	4X13	4908	5774	866	23.15	37.41
6	JY5482	SMITH	9.875"	M1616	2X12	4X13	5774	9131	3357	57.47	58.41
7	7125169	HUGHES	6.125"	QD406	3X13		9131	13338	4207	34.84	120.75

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Pressure Test Graphs

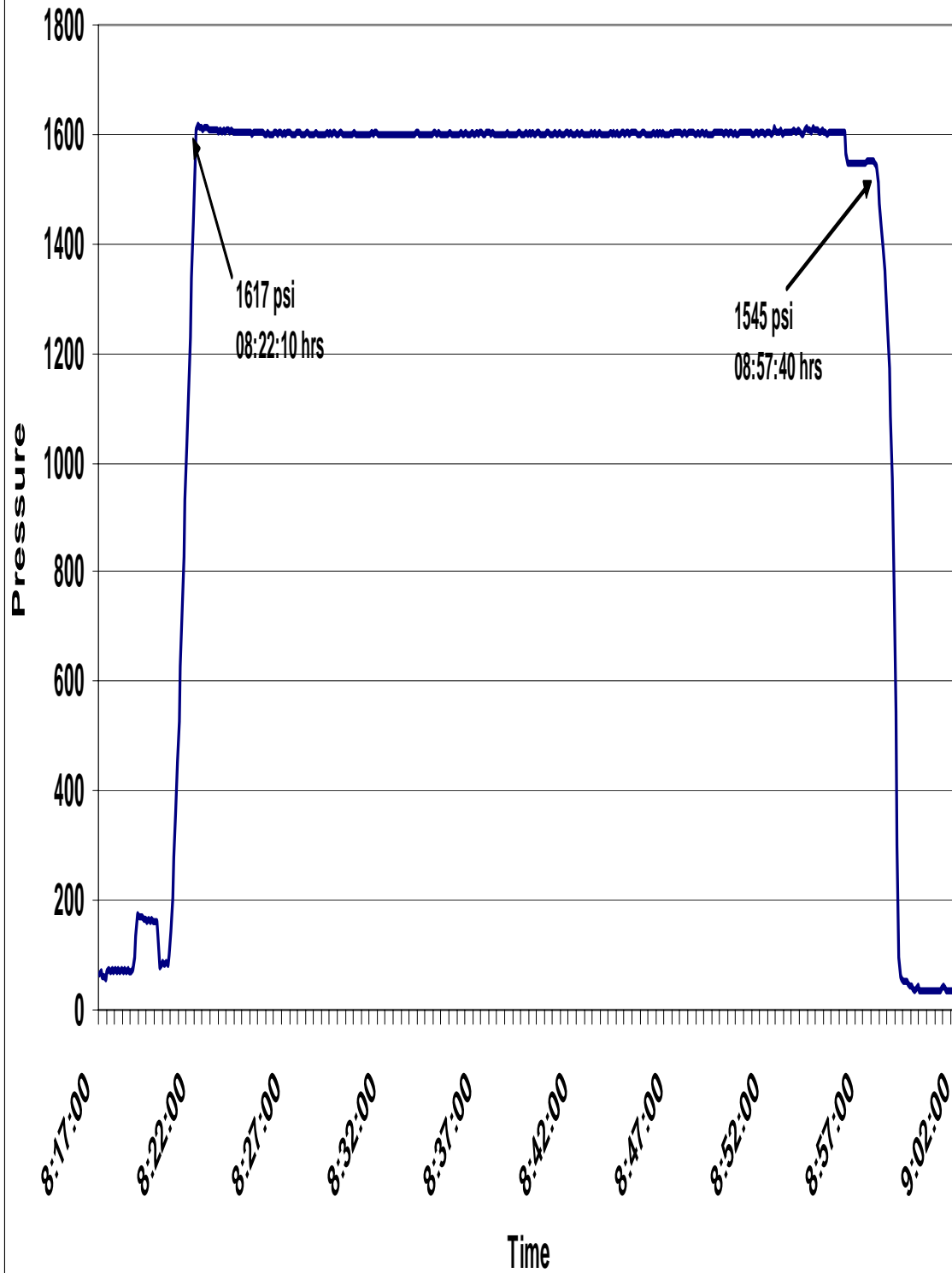
Piceance Creek Unit PCU 297-12A1-ST1

Rio Blanco County, CO.

 **EPOCH** Well Services, Inc.

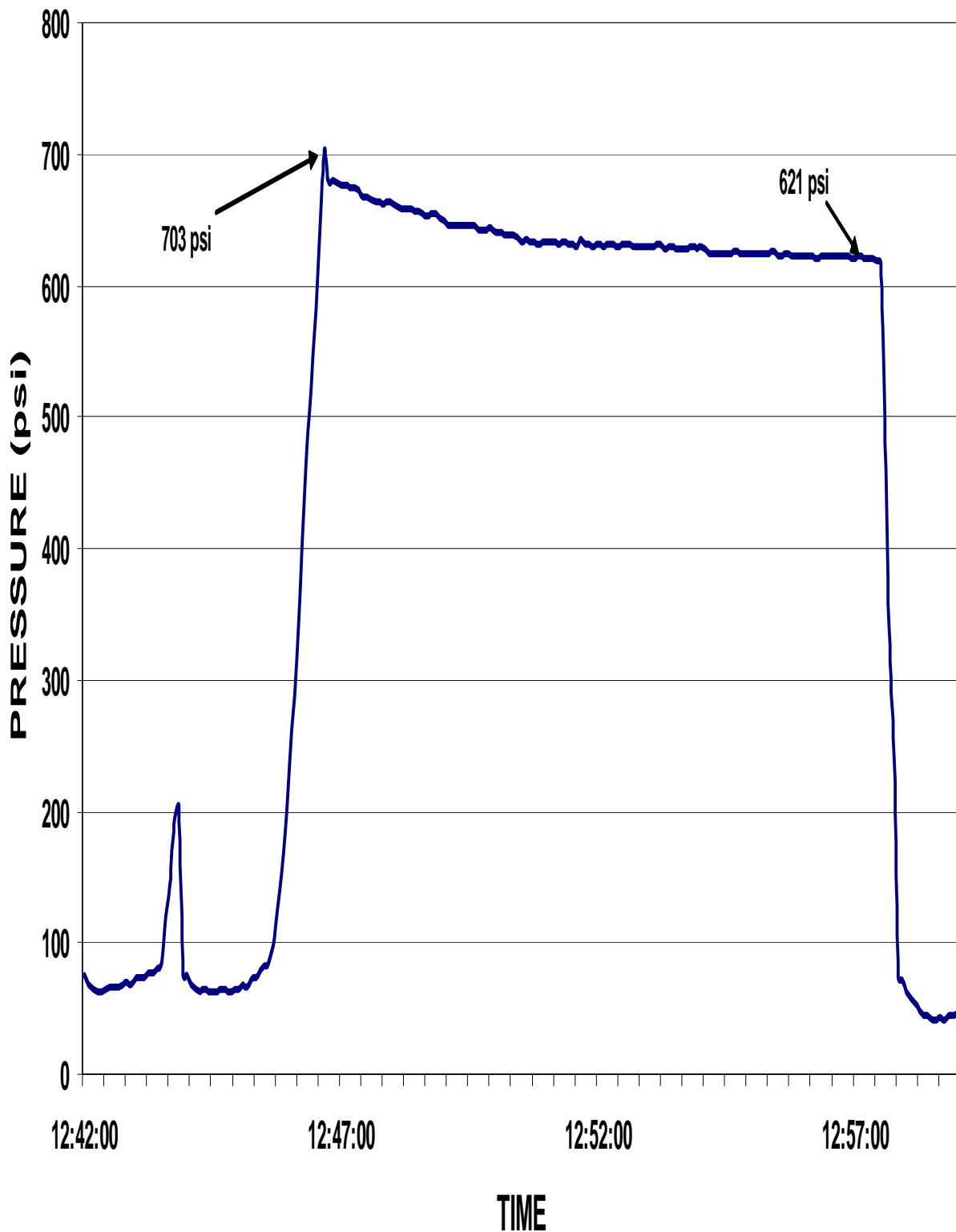
ExxonMobil PCU 297-12A1
Surface Casing Pressure Test

06/16/2009



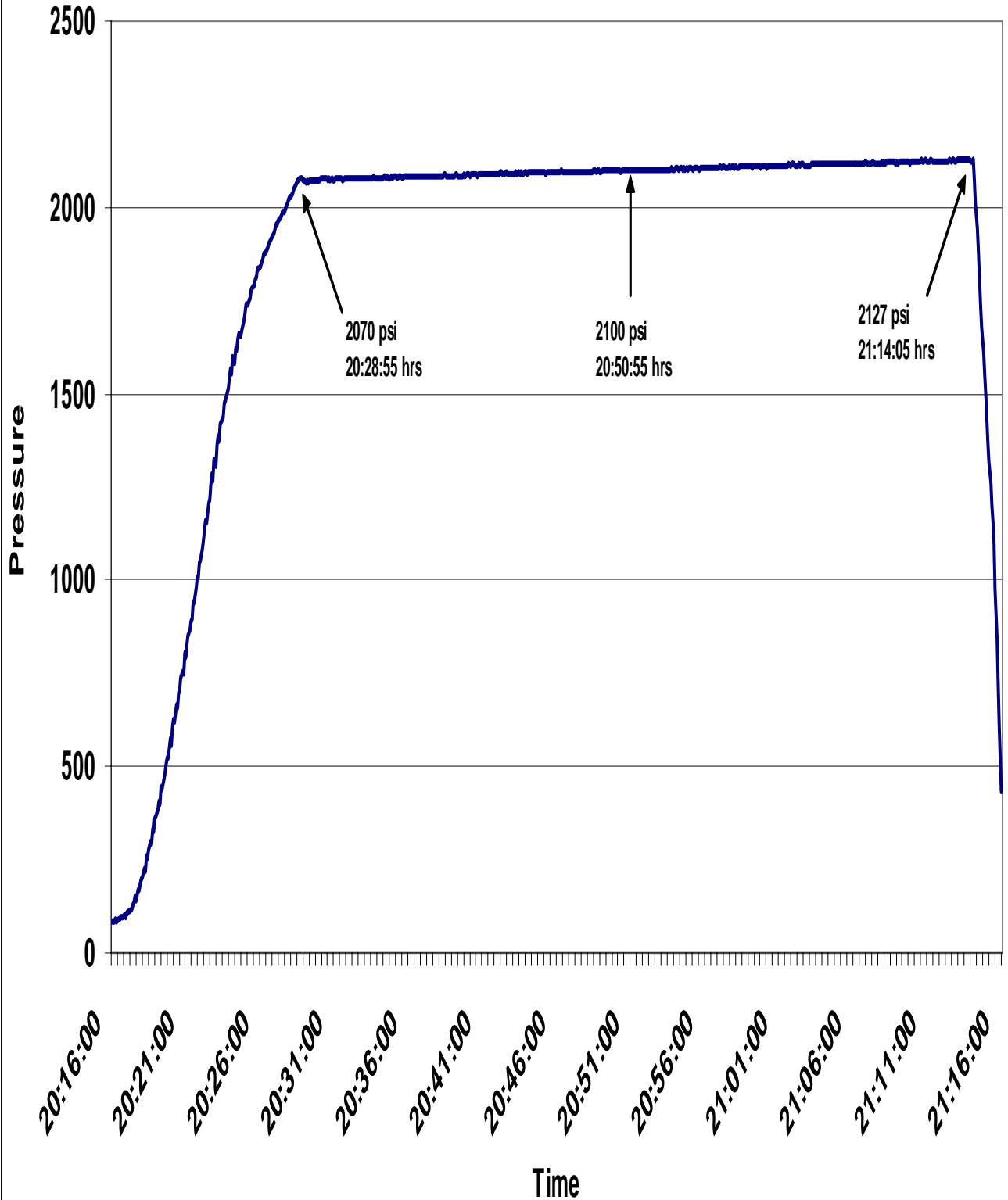
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Surface Casing FIT

06/16/2009



ExxonMobil PCU 297-12A1 ST1
Intermediate Casing Pressure Test

09/18/2009



ExxonMobil PCU 297-12A1-ST1
Intermediate Casing FIT

09/19/2009

