HALLIBURTON | Sperry Drilling

PCGK : Pressure Case Gamma
PCDC: Pressure Case Directional

Powered by INSITE™

1 : 600 / 1 : 240

Country : USA
Field : Wattenburg
Location : Lat: 40° 31' 24.89" North Long: 104° 23' 16.58" West
Well : Crow Creek State AC36-77HN
Company : Noble Energy
Rig : H&P 315

Company : **Noble Energy**
Rig : **H&P 315**
Well : **Crow Creek State AC36-77HN**
Field : **Wattenburg**
Country : **USA**
API Number : **05-123-37131**

LOCATION
Latitude : **40° 31' 24.89" North**
Longitude : **104° 23' 16.58" West**
UTM Easting = **3,309,147.834 ft**
UTM Northing = **1,435,519.565 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level**
Elevation : **4788.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **4812.00 ft**
GL **4788.00 ft**
WD **N/A**

Depth Logged : **648.97 ft** To **6,619.27 ft**
Date Logged : **28-Sep-13** To **01-Oct-13**
Total Depth MD : **7,006.00 ft** TVD : **6,619.27 ft**
Spud Date : **27-Sep-13**

Unit No. : **11610113**
Job No. : **CA-XX-0900758848**
Plot Type : **Final**
Plot Date : **02-Oct-13**

Run No.	Borehole Record (TVD) Size	From	To
0100	8.750 in	648.97 ft	5,926.35 ft
0200	8.750 in	5,926.35 ft	6,619.27 ft
0300	6.125 in	6,619.27 ft	SURFACE

Run No.	Borehole Record (TVD) Size	From	To

Casing Record (TVD) Size	Weight	From	To
7.000 in	26.00 lbpf	SURFACE	6,619.05 ft

WELL INFORMATION

MWD Run Number	100	200
Date run completed	30-Sep-13	01-Oct-13
Rig Bit Number	0100	0200
Bit Size (in)	8.750	8.750
Tool Nominal OD (in)	6.750	6.750
Log Start Depth (TVD, ft)	648.97	5,926.35
Log End Depth (TVD, ft)	5,926.35	6,619.27
Drill or Wipe	Drill	Drill
Drill/Wipe Start Date and Time	28-Sep-13 18:30	30-Sep-13 10:05
Drill/Wipe End Date and Time	29-Sep-13 22:20	01-Oct-13 00:45
Min Inc (deg) @ Depth (TVD, ft)	0.09 @ 1,742.93	0.22 @ 5,932.35
Max Inc (deg) @ Depth (TVD, ft)	14.30 @ 3,048.86	81.40 @ 6,613.86
Bit TFA(in2) / Bit Type	0.77 / PDC	0.75 / PDC
Flow Rate (gpm)	580.53	560.81
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A
Fluid Type	Native/Spud Mud	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.98 / 33.00	10.45 / 37.00
Filtrate CL (ppm)	1,400.00	1,200.00
pH / Fluid Loss (mptm)	9.40 / 0	9.10 / 10
PV (cP) / YP (lhf2)	9 / 7.00	11 / 11.00
% Solids / % Sand	3.7 / 0.20	9.1 / .2
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A

Max Tool Temp (degF) / Source	170.37 / PCM	170.37 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler			
Customer Representative	Martin Suarez	Martin Suarez			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404299	11404299			
Insert Serial Number	11680895	11680895			
Date and Time Initialized	27-Sep-13 20:52	27-Sep-13 20:52			
Date and Time Read	01-Oct-13 08:42	01-Oct-13 08:35			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	54.64	52.08			
Software Version	6.21	6.21			
Sub Serial Number	11404299	11404299			
Sonde Serial Number	11638477	11638477			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	98.74	115.03			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.64	47.08			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404299	11404299			
Insert/Sonde Serial Number	11292594	11292594			

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the Rig drill floor.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded (memory data) unless otherwise stated.
- ROPA: Average Rate of Penetration is real time data.
- PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.

4. The following smoothing parameters have been applied to the data:
- All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
- All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.

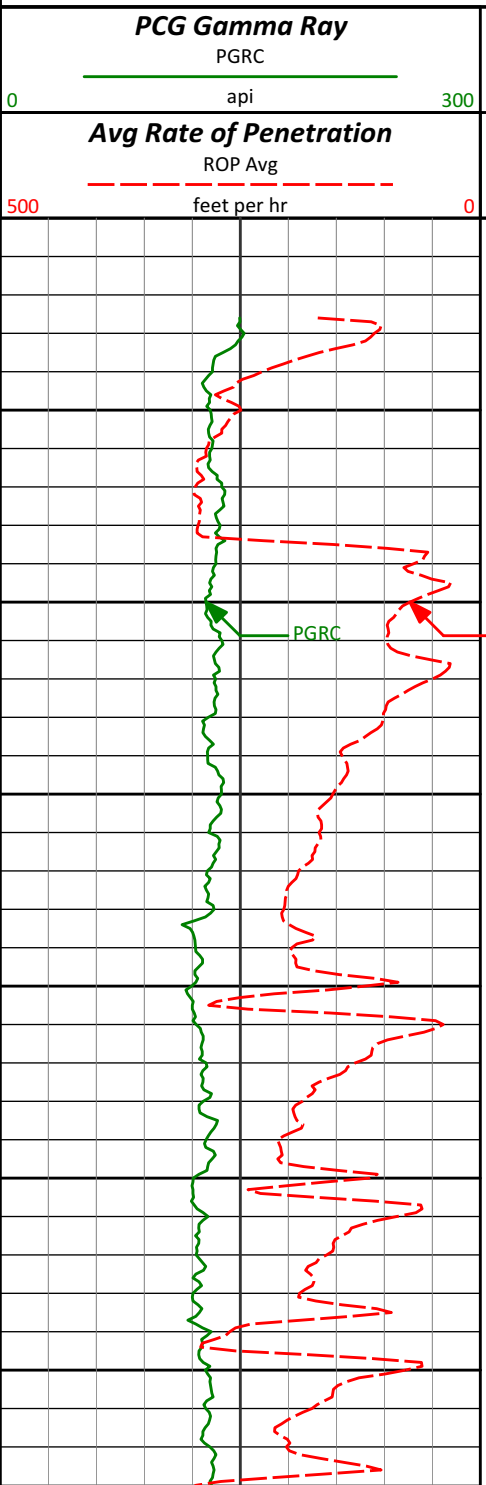
5. INSITE version 8.0.0

WARRANTY

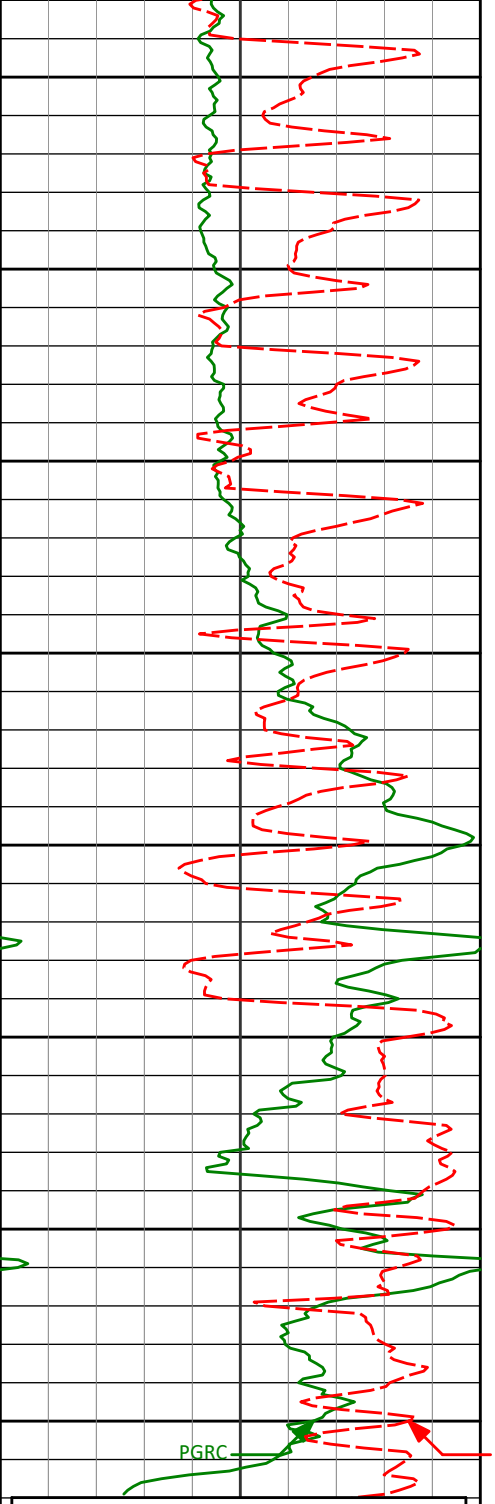
HALLIBURTON
Sperry Drilling Services

TVD Detail Log 1:600

Noble Energy, Inc
Crow Creek State AC36-77HN
H&P 315
T7N R63W



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<Run 200>	5980'	0.22°	21.50°	5932.35'	-170.53'
5950					
<KOP>					
6000					
6050	6106'	9.06°	350.33°	6057.82'	-160.39'
6100	6154'	14.80°	350.74°	6104.76'	-150.50'
6150	6201'	20.21°	355.08°	6149.57'	-136.38'
6200	6249'	24.75°	358.14°	6193.91'	-118.05'



Depth	Inc.	Azi.	TVD	V.S.
6296'	27.65°	0.52°	6236.08'	-97.38'
6344'	30.71°	0.60°	6277.98'	-74.10'
6391'	34.06°	0.20°	6317.67'	-49.06'
6439'	36.26°	359.69°	6356.91'	-21.54'
6486'	40.96°	359.45°	6393.62'	7.68'
6534'	46.22°	0.34°	6428.38'	40.62'
6581'	49.71°	3.10°	6459.85'	75.25'
6629'	50.71°	4.23°	6490.57'	111.67'
6676'	54.47°	5.05°	6519.12'	148.43'
6724'	58.54°	4.31°	6545.60'	187.84'
6771'	64.88°	1.75°	6567.87'	228.76'
6819'	73.10°	359.32°	6585.07'	273.29'
6866'	77.07°	358.89°	6597.17'	318.56'
6906'	78.22°	359.54°	6605.72'	357.51'
6952'	81.40°	0.42°	6613.86'	402.58'

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

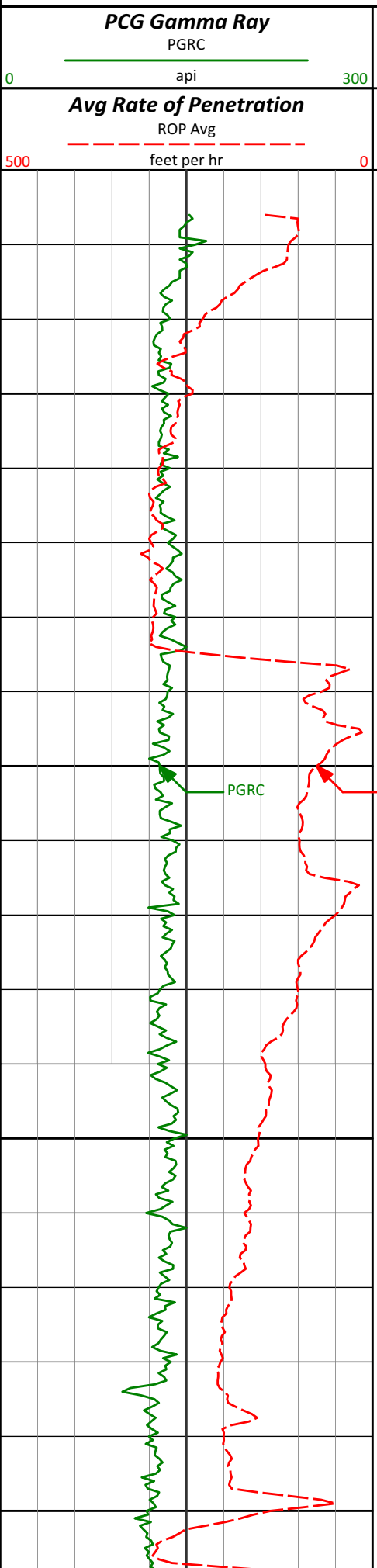
PCG Gamma Ray
PGRC
0 api 300

Depth
ft

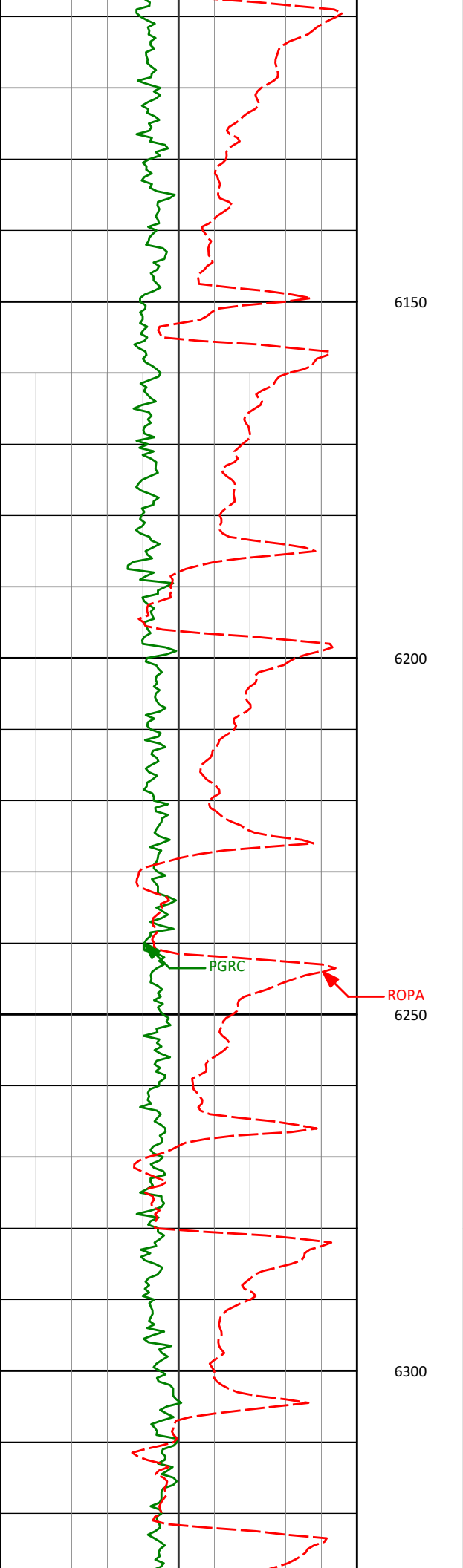
HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

Noble Energy, Inc
Crow Creek State AC36-77HN

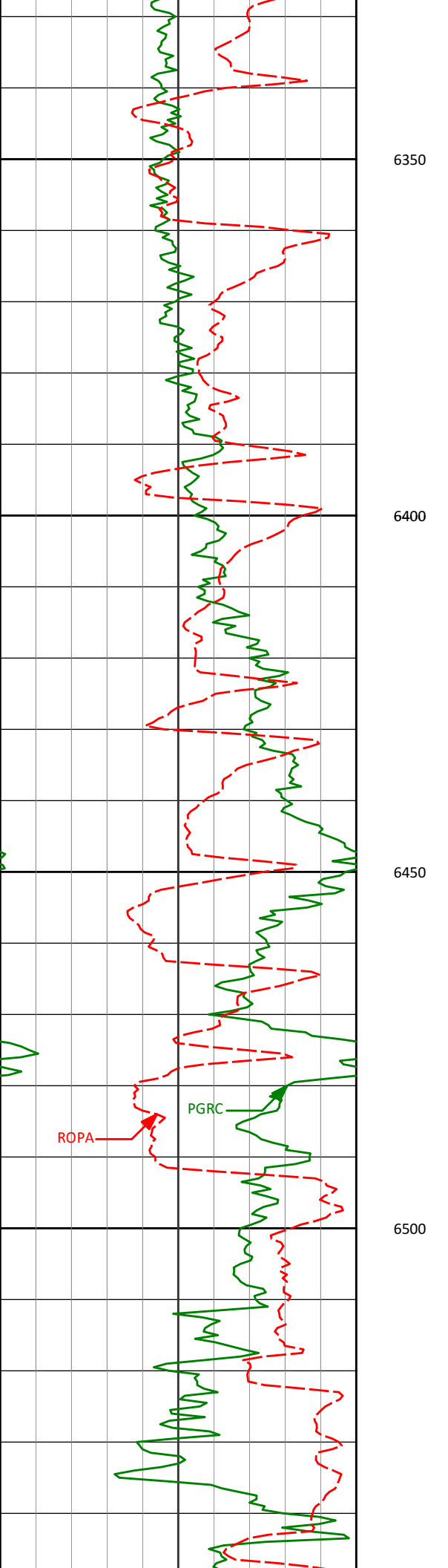
H&P 315
T7N R63W



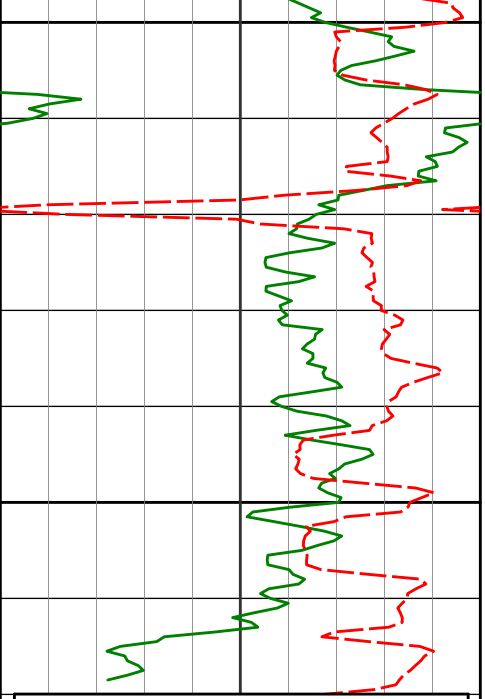
Depth	Inc.	Azi.	TVD	V.S.
5980'	0.22°	21.50°	5932.35'	-170.53'
6106'	9.06°	350.33°	6057.82'	-160.39'
6154'	14.80°	350.74°	6104.76'	-150.50'



6201'	20.21°	355.08°	6149.57'	-136.38'
6249'	24.75°	358.14°	6193.91'	-118.05'
6296'	27.65°	0.52°	6236.08'	-97.38'
6344'	30.71°	0.60°	6277.98'	-74.10'
6391'	34.06°	0.20°	6317.67'	-49.06'



6439'	36.26°	359.69°	6356.91'	-21.54'
6486'	40.96°	359.45°	6393.62'	7.68'
6534'	46.22°	0.34°	6428.38'	40.62'
6581'	49.71°	3.10°	6459.85'	75.25'
6629'	50.71°	4.23°	6490.57'	111.67'
6676'	54.47°	5.05°	6519.12'	148.43'
6724'	58.54°	4.31°	6545.60'	187.84'



6550

6600

Depth	Inc.	Azi.	TVD	V.S.
6771'	64.88°	1.75°	6567.87'	228.76'
6819'	73.10°	359.32°	6585.07'	273.29'
6866'	77.07°	358.89°	6597.17'	318.56'
6906'	78.22°	359.54°	6605.72'	357.51'
6952'	81.40°	0.42°	6613.86'	402.58'

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

Depth
ft

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Crow Creek State AC36-77HN
Wattenburg
Weld Colorado
USA
CA-XX-0900758848

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
327.00	0.60	246.17	326.99	0.69 S	1.57 W	-0.54	0.18
600.00	0.70	273.27	599.98	1.17 S	4.54 W	-0.75	0.12
716.00	0.65	264.12	715.97	1.20 S	5.91 W	-0.65	0.10
808.00	0.22	275.44	807.97	1.24 S	6.60 W	-0.62	0.48
900.00	0.54	240.39	899.96	1.44 S	7.15 W	-0.76	0.42
993.00	0.17	254.08	992.96	1.69 S	7.66 W	-0.97	0.41
1085.00	0.35	264.03	1084.96	1.76 S	8.07 W	-1.00	0.21
1179.00	0.48	266.25	1178.96	1.81 S	8.75 W	-0.99	0.14
1273.00	0.92	260.53	1272.95	1.96 S	9.89 W	-1.03	0.47
1365.00	0.52	246.03	1364.94	2.25 S	11.00 W	-1.22	0.47
1458.00	0.66	243.40	1457.94	2.67 S	11.87 W	-1.55	0.15
1553.00	0.57	250.84	1552.93	3.07 S	12.80 W	-1.86	0.13
1648.00	0.38	236.83	1647.93	3.39 S	13.51 W	-2.12	0.23
1743.00	0.09	178.89	1742.93	3.64 S	13.77 W	-2.34	0.36
1838.00	2.75	257.79	1837.89	4.20 S	16.00 W	-2.69	2.88
1933.00	3.73	244.05	1932.74	6.03 S	21.00 W	-4.05	1.31

2028.00	4.67	246.07	2027.49	8.95 S	27.31 W	-6.37	1.00
2123.00	6.14	229.26	2122.07	13.84 S	34.69 W	-10.54	2.26
2218.00	8.31	230.84	2216.31	21.48 S	43.86 W	-17.30	2.29
2312.00	9.52	234.39	2309.17	30.30 S	55.45 W	-25.00	1.42
2407.00	11.32	243.04	2402.61	39.10 S	70.15 W	-32.39	2.50
2502.00	11.80	246.22	2495.68	47.25 S	87.35 W	-38.90	0.84
2597.00	13.66	250.64	2588.34	54.88 S	106.83 W	-44.68	2.21
2692.00	13.69	249.81	2680.65	62.48 S	127.97 W	-50.28	0.21
2787.00	13.41	246.96	2773.01	70.67 S	148.65 W	-56.50	0.76
2882.00	13.63	247.75	2865.37	79.22 S	169.15 W	-63.11	0.30
2976.00	13.78	249.08	2956.70	87.41 S	189.86 W	-69.33	0.37
3071.00	14.30	248.79	3048.86	95.70 S	211.37 W	-75.57	0.55
3166.00	13.13	248.31	3141.15	103.93 S	232.34 W	-81.82	1.24
3261.00	11.87	247.72	3233.89	111.62 S	251.41 W	-87.70	1.34
3356.00	11.48	249.06	3326.93	118.71 S	269.27 W	-93.08	0.50
3451.00	11.45	248.09	3420.03	125.61 S	286.85 W	-98.31	0.20
3546.00	11.46	245.49	3513.14	133.04 S	304.20 W	-104.10	0.54
3641.00	12.67	245.51	3606.04	141.28 S	322.27 W	-110.61	1.28
3736.00	13.03	242.23	3698.66	150.59 S	341.23 W	-118.12	0.86
3831.00	14.00	240.34	3791.03	161.26 S	360.69 W	-126.93	1.12
3926.00	12.79	242.88	3883.44	171.74 S	380.04 W	-135.56	1.42
4021.00	9.98	240.64	3976.56	180.57 S	396.57 W	-142.81	2.99
4116.00	8.35	244.39	4070.35	187.59 S	409.97 W	-148.55	1.83
4211.00	7.09	237.53	4164.49	193.72 S	421.14 W	-153.61	1.65
4306.00	5.13	244.66	4258.94	198.69 S	429.93 W	-157.74	2.20
4400.00	2.35	241.44	4352.73	201.41 S	435.43 W	-159.93	2.97
4495.00	0.78	257.90	4447.70	202.48 S	437.76 W	-160.78	1.70
4780.00	1.36	216.78	4732.65	205.59 S	441.68 W	-163.51	0.33
5065.00	2.89	170.16	5017.46	215.37 S	442.47 W	-173.18	0.77
5160.00	1.33	117.68	5112.40	218.25 S	441.09 W	-176.17	2.46
5254.00	1.09	355.65	5206.39	217.86 S	440.19 W	-175.87	2.26
5539.00	0.44	222.20	5491.38	215.95 S	441.12 W	-173.88	0.50
5824.00	1.00	4.18	5776.36	214.27 S	441.67 W	-172.15	0.48
5980.00	0.22	21.50	5932.35	212.62 S	441.45 W	-170.53	0.51
6106.00	9.06	350.33	6057.82	202.59 S	443.03 W	-160.39	7.04
6154.00	14.80	350.74	6104.76	192.80 S	444.66 W	-150.50	11.96
6201.00	20.21	355.08	6149.57	178.78 S	446.32 W	-136.38	11.82
6249.00	24.75	358.14	6193.91	160.46 S	447.36 W	-118.05	9.77
6296.00	27.65	0.52	6236.08	139.72 S	447.58 W	-97.38	6.57
6344.00	30.71	0.60	6277.98	116.32 S	447.35 W	-74.10	6.37
6391.00	34.06	0.20	6317.67	91.15 S	447.18 W	-49.06	7.15
6439.00	36.26	359.69	6356.91	63.51 S	447.21 W	-21.54	4.61
6486.00	40.96	359.45	6393.62	34.19 S	447.43 W	7.68	10.02
6534.00	46.22	0.34	6428.38	1.11 S	447.48 W	40.62	11.02
6581.00	49.71	3.10	6459.85	33.77 N	446.41 W	75.25	8.60
6629.00	50.71	4.23	6490.57	70.58 N	444.05 W	111.67	2.77
6676.00	54.47	5.05	6519.12	107.78 N	441.03 W	148.43	8.12
6724.00	58.54	4.31	6545.60	147.67 N	437.77 W	187.84	8.59
6771.00	64.88	1.75	6567.87	188.97 N	435.61 W	228.76	14.30
6819.00	73.10	359.32	6585.07	233.73 N	435.22 W	273.29	17.76
6866.00	77.07	358.89	6597.17	279.13 N	435.93 W	318.56	8.51
6906.00	78.22	359.54	6605.72	318.20 N	436.47 W	357.51	3.27
6952.00	81.40	0.42	6613.86	363.47 N	436.48 W	402.58	7.16
7006.00	87.10	0.70	6619.27	417.17 N	435.96 W	456.01	10.58

CALCULATION BASED ON MINIMUM CURVATURE METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 354.65 DEGREES (GRID)
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7006.00 FEET
IS 603.40 FEET ALONG 313.74 DEGREES (GRID)

Surface surveys at 327 ft and 600 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6952 ft MD to TD at 7006 ft MD

Last survey is a projection from 8852 ft MD to TD at 9000 ft MD.

Date Printed:02 October 2013