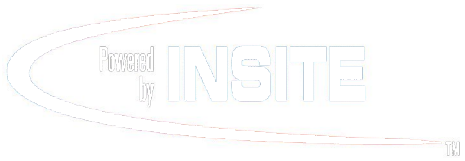
HALLIBURTON | Sperry Drilling

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional



Country : **USA**
Field : **Wattenberg**
Location : **Lat: 40° 46' 27.80" North**
Long: 103° 48' 59.11" West
Well : **Atwater State LD01-76-1AHN**
Company : **Noble Energy**
Rig : **H&P 273**

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Well : **Atwater State LD01-76-1AHN**
Field : **Wattenberg**
Country : **USA**
API Number : **05-123-39761**

LOCATION
Latitude : **40° 46' 27.80" North**
Longitude : **103° 48' 59.11" West**
UTM Easting = **3,466,276.840 ft**
UTM Northing = **1,529,382.560 ft**

Other Services
Directional Drilling

Permanent Datum : **Ground Level** Elevation : **4648.00 ft**
Log Measured From : **Drill Floor** **24.00 ft** Above Permanent Datum
Drilling Measured From : **Drill Floor**

TVD LOG

Elev. KB **N/A**
DF **4672.00 ft**
GL **4648.00 ft**
WD **N/A**

Depth Logged : **1,234.95 ft** To **5,463.21 ft**
Date Logged : **01-Nov-14** To **02-Nov-14**
Total Depth MD : **5,883.00 ft** TVD : **5,463.21 ft**
Spud Date : **30-Oct-14**

Unit No. : **11703717** Job No. : **CA-XX-0901782069**
Plot Type : **Final**
Plot Date : **04-Nov-14**

Run No.	Borehole Record (TVD) Size	From	To
2	8.750 in	1,234.95 ft	5,463.21 ft

Run No.	Borehole Record (TVD) Size	From	To

Casing Record (TVD) Size	Weight	From	To
7.000 in	26.00 lbpf	SURFACE	5,462.13 ft

WELL INFORMATION

MWD Run Number	100
Date run completed	03-Nov-14
Rig Bit Number	2
Bit Size (in)	8.750
Tool Nominal OD (in)	6.750
Log Start Depth (TVD, ft)	1,234.95
Log End Depth (TVD, ft)	5,463.21
Drill or Wipe	Drill
Drill/Wipe Start Date and Time	30-Oct-14 19:14
Drill/Wipe End Date and Time	30-Oct-14 19:14
Min Inc (deg) @ Depth (TVD, ft)	1.73 @ 1,289.93
Max Inc (deg) @ Depth (TVD, ft)	84.40 @ 5,463.21
Bit TFA(in2) / Bit Type	0.91 /
Flow Rate (gpm)	577.92
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A
Fluid Type	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.70 / 27.00
Filtrate CL (ppm)	150.00
pH / Fluid Loss (mptm)	8.60 / 20
PV (cP) / YP (lhf2)	10 / 7.00
% Solids / % Sand	2.70 / 0.10
% Oil / Oil:Water Ratio	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A

Max Tool Temp (degF) / Source	162.80 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	JP Centeno				
Customer Representative	Justin Fields				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11342275				
Insert Serial Number	12001076				
Date and Time Initialized	31-Oct-14 16:07				
Date and Time Read	04-Nov-14 07:32				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	51.86				
Software Version	6.21				
Sub Serial Number	11342275				
Sonde Serial Number	11478053				
Sensor ID Number	N/A				
Toolface Offset (deg)	335.96				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	46.76				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11342275				
Insert/Sonde Serial Number	11579778				

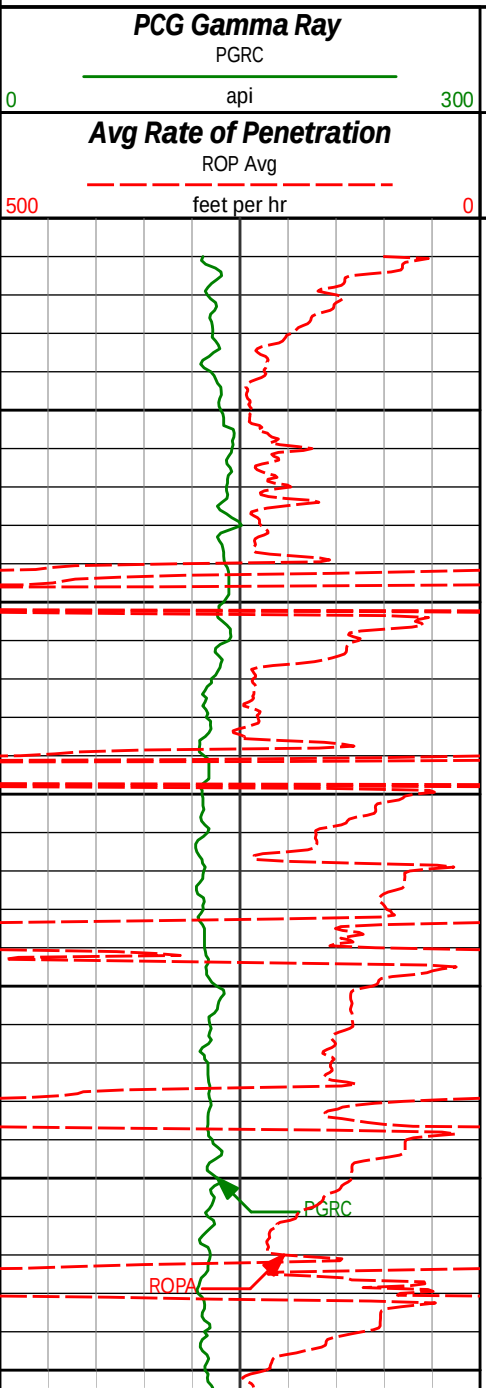
REMARKS

**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:
- 2" (1:600) log - 1 ft. interval, 3 ft. coercion distance, 5 ft. gap fill.
- 5" (1:240) log for ROP - 0.5 ft. interval, 1.2 ft. coercion distance, 3 ft. gap
fill.
- 5" (1:240) log for Gamma Ray - 0.5 ft. interval, 0.6 ft. coercion distance, 3
ft. gap fill.
5. INSITE version 8.0.20**

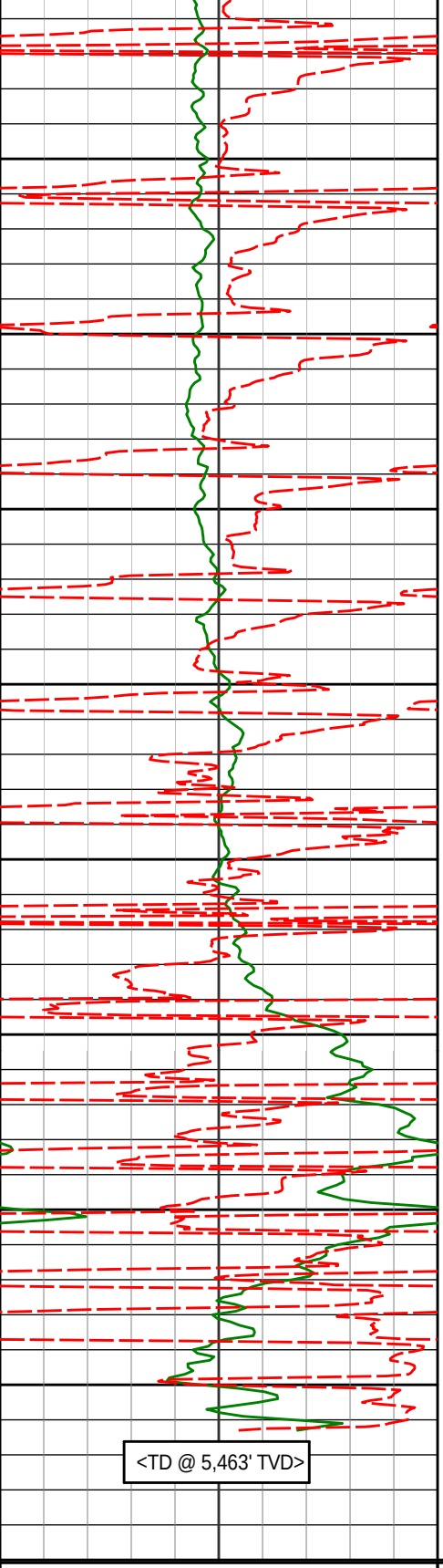
WARRANTY

HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:600

Noble Energy, Inc
Atwater State LD01-76-1AHN
H&P 273
T9N R58W



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<KOP>					
4800	4856'	11.94°	70.75°	4802.01'	60.51'
4850	4904'	15.18°	56.66°	4848.67'	66.00'
4900	4951'	18.19°	46.72°	4893.70'	74.83'
4950	4999'	20.75°	38.79°	4938.96'	87.02'
5000	5046'	23.52°	33.41°	4982.50'	101.74'
5050	5094'	25.35°	25.53°	5026.21'	119.39'



Depth	Inc.	Azi.	TVD	V.S.
5141'	28.22°	21.90°	5068.16'	139.11'
5189'	31.71°	19.09°	5109.74'	161.89'
5236'	35.51°	15.85°	5148.88'	186.99'
5284'	39.21°	13.86°	5187.03'	215.42'
5330'	42.92°	11.73°	5221.70'	245.13'
5378'	46.55°	11.76°	5255.80'	278.45'
5425'	50.40°	11.70°	5286.95'	313.16'
5473'	54.11°	10.62°	5316.33'	350.65'
5520'	57.93°	7.85°	5342.60'	389.33'
5568'	62.04°	5.91°	5366.60'	430.75'
5614'	65.55°	4.03°	5386.92'	471.97'
5662'	68.76°	0.87°	5405.55'	516.19'
5709'	71.11°	358.27°	5421.68'	560.28'
5757'	72.46°	356.35°	5436.68'	605.70'
5804'	75.96°	356.34°	5449.47'	650.68'
5829'	78.22°	357.18°	5455.05'	674.93'

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

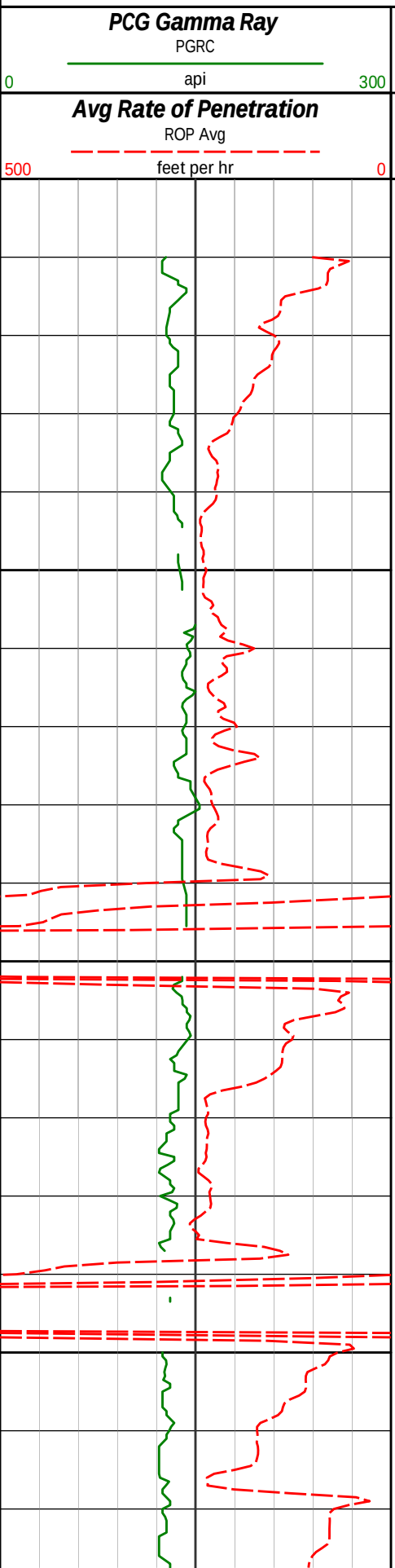
Depth
ft

5100
5150
5200
5250
5300
5350
5400
5450
5500

HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

TVD Detail Log 1:240

Noble Energy, Inc
Atwater State LD01-76-1AHN
H&P 273
T9N R58W



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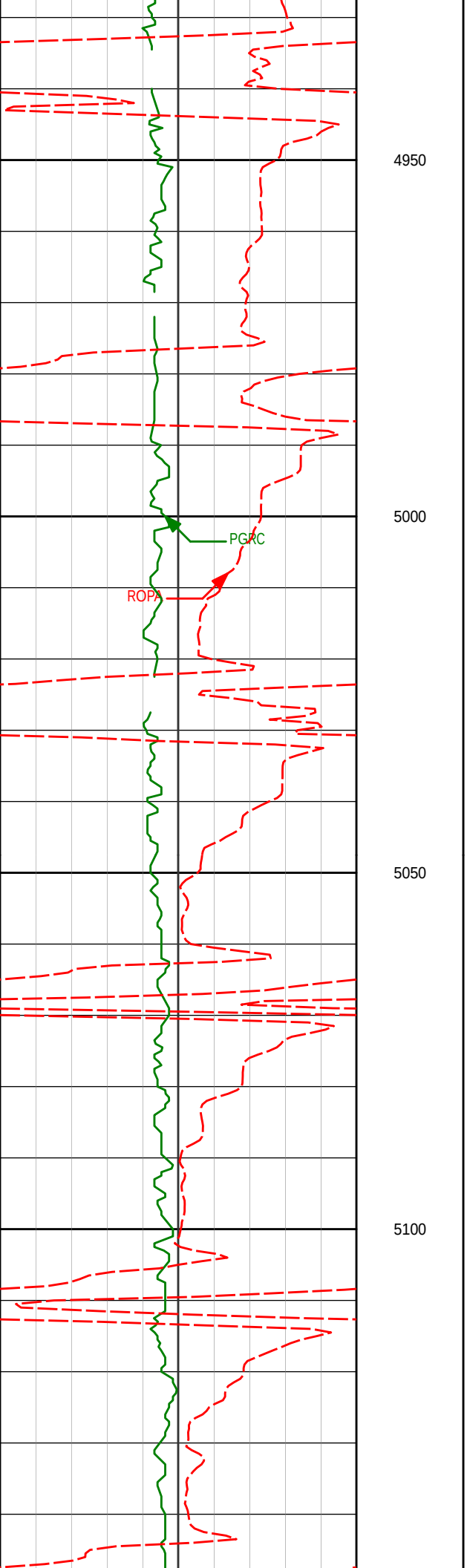
	4951'	18.19°	46.72°	4893.70'	74.83'
4900					



4999'	20.75°	38.79°	4938.96'	87.02'
5046'	23.52°	33.41°	4982.50'	101.74'
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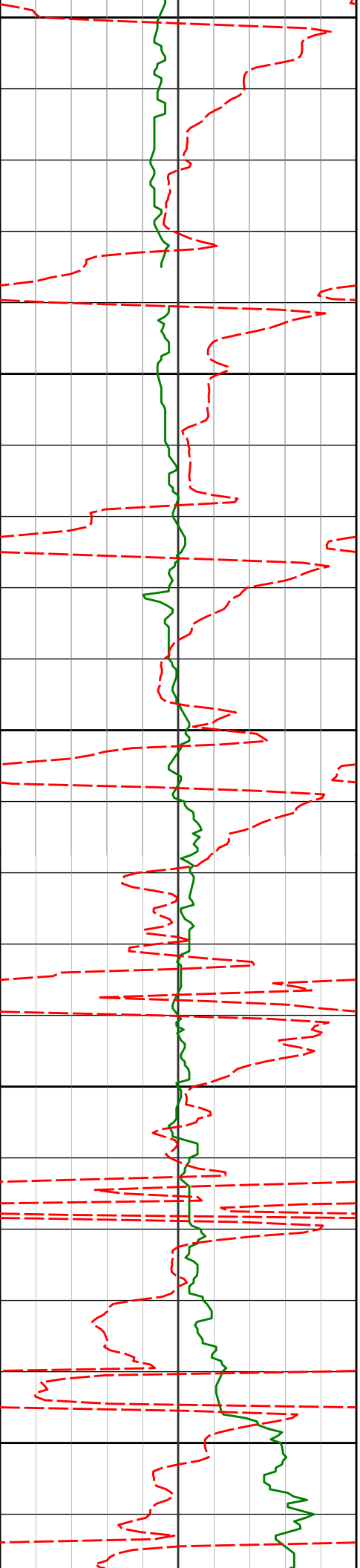

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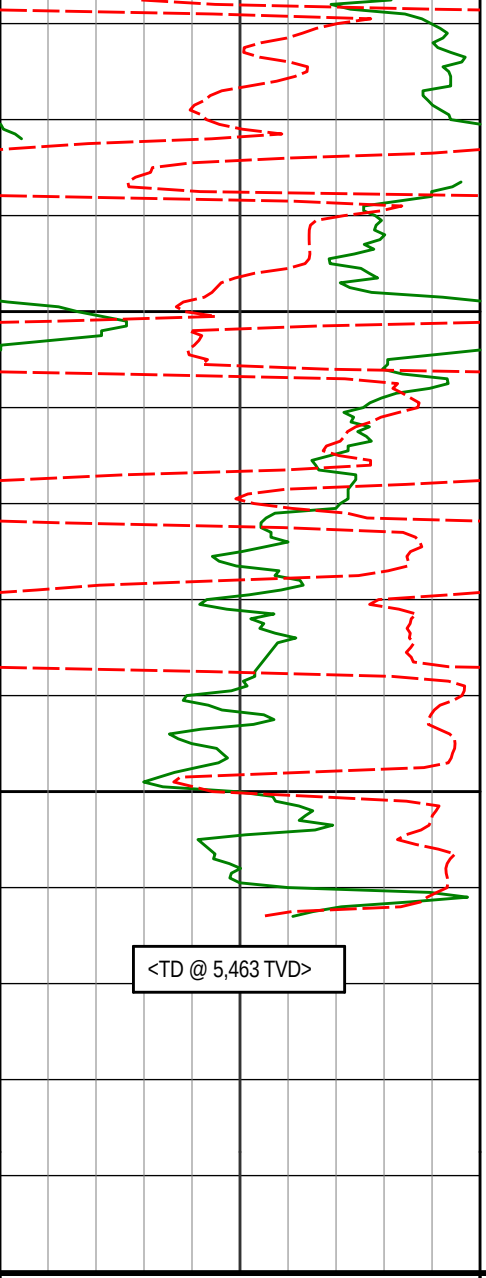

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Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

Depth ft

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Atwater State LD01-76-1AHN
Wattenberg
Weld Colorado
USA
CA-XX-0901782069

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
380.00	0.40	179.62	380.00	1.33 S	0.01 E	-1.32	0.11
830.00	0.40	159.12	829.99	4.36 S	0.58 E	-4.34	0.03
1290.00	1.73	8.90	1289.93	0.99 N	2.22 E	1.07	0.45

1382.00	2.86	78.33	1381.87	2.82 N	4.69 E	3.01	3.01
1474.00	5.48	103.54	1473.62	2.26 N	11.21 E	2.70	3.41
1567.00	9.21	106.69	1565.84	0.92 S	22.66 E	-0.01	4.03
1659.00	10.90	98.93	1656.43	4.39 S	38.30 E	-2.85	2.35
1752.00	10.97	87.60	1747.75	5.38 S	55.83 E	-3.14	2.31
1938.00	10.91	84.66	1930.38	3.00 S	91.03 E	0.65	0.30
2124.00	10.17	81.40	2113.24	1.09 N	124.79 E	6.10	0.51
2217.00	10.41	89.14	2204.75	2.44 N	141.30 E	8.11	1.51
2495.00	10.34	85.04	2478.21	4.98 N	191.28 E	12.65	0.27
2588.00	10.50	83.87	2569.67	6.61 N	208.02 E	14.95	0.28
2681.00	10.51	80.17	2661.11	8.96 N	224.80 E	17.97	0.73
2773.00	10.11	86.23	2751.63	10.92 N	241.13 E	20.59	1.25
2963.00	9.68	83.42	2938.81	13.85 N	273.64 E	24.82	0.34
3057.00	9.40	81.02	3031.51	15.95 N	289.06 E	27.54	0.52
3152.00	10.63	89.23	3125.06	17.28 N	305.49 E	29.53	1.98
3342.00	11.51	89.37	3311.53	17.73 N	341.97 E	31.43	0.46
3437.00	12.06	88.90	3404.52	18.02 N	361.37 E	32.51	0.59
3531.00	12.02	89.04	3496.45	18.37 N	380.98 E	33.65	0.05
3626.00	10.99	80.92	3589.55	19.97 N	399.81 E	36.00	2.02
3721.00	10.17	78.25	3682.93	23.10 N	416.97 E	39.82	1.00
3816.00	9.83	76.97	3776.49	26.64 N	433.08 E	44.00	0.43
3910.00	9.23	73.69	3869.19	30.57 N	448.14 E	48.53	0.86
4004.00	9.36	80.33	3961.96	33.97 N	462.91 E	52.52	1.15
4099.00	9.75	88.18	4055.65	35.52 N	478.56 E	54.70	1.43
4193.00	9.46	87.50	4148.33	36.11 N	494.24 E	55.92	0.34
4288.00	9.71	87.42	4242.00	36.81 N	510.04 E	57.25	0.27
4383.00	9.93	88.53	4335.61	37.38 N	526.23 E	58.47	0.30
4478.00	8.42	84.49	4429.40	38.26 N	541.34 E	59.95	1.72
4572.00	9.05	98.29	4522.31	37.85 N	555.51 E	60.12	2.32
4667.00	10.75	97.03	4615.90	35.69 N	571.70 E	58.61	1.79
4762.00	8.82	96.02	4709.51	33.84 N	587.74 E	57.40	2.03
4856.00	11.94	70.75	4802.01	36.30 N	604.10 E	60.51	5.80
4904.00	15.18	56.66	4848.67	41.39 N	614.04 E	66.00	9.59
4951.00	18.19	46.72	4893.70	49.80 N	624.53 E	74.83	8.81
4999.00	20.75	38.79	4938.96	61.57 N	635.31 E	87.02	7.65
5046.00	23.52	33.41	4982.50	75.89 N	645.70 E	101.74	7.31
5094.00	25.35	25.53	5026.21	93.16 N	655.40 E	119.39	7.77
5141.00	28.22	21.90	5068.16	112.56 N	663.89 E	139.11	7.04
5189.00	31.71	19.09	5109.74	135.02 N	672.25 E	161.89	7.82
5236.00	35.51	15.85	5148.88	159.83 N	680.02 E	186.99	8.95
5284.00	39.21	13.86	5187.03	187.99 N	687.46 E	215.42	8.10
5330.00	42.92	11.73	5221.70	217.45 N	694.13 E	245.13	8.62
5378.00	46.55	11.76	5255.80	250.52 N	701.01 E	278.45	7.55
5425.00	50.40	11.70	5286.95	284.97 N	708.15 E	313.16	8.19
5473.00	54.11	10.62	5316.33	322.20 N	715.49 E	350.65	7.93
5520.00	57.93	7.85	5342.60	360.66 N	721.72 E	389.33	9.49
5568.00	62.04	5.91	5366.60	401.91 N	726.68 E	430.75	9.26
5614.00	65.55	4.03	5386.92	443.02 N	730.24 E	471.97	8.45
5662.00	68.76	0.87	5405.55	487.20 N	732.12 E	516.19	9.04
5709.00	71.11	358.27	5421.68	531.34 N	731.78 E	560.28	7.22
5757.00	72.46	356.35	5436.68	576.88 N	729.63 E	605.70	4.73
5804.00	75.96	356.34	5449.47	622.01 N	726.75 E	650.68	7.45
5829.00	78.22	357.18	5455.05	646.34 N	725.38 E	674.93	9.59
5883.00	84.40	357.50	5463.21	699.63 N	722.91 E	728.08	11.46

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 2.30 DEGREES (GRID)
A TOTAL CORRECTION OF 6.92 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 5883.00 FEET
IS 1006.02 FEET ALONG 45.94 DEGREES (GRID)

Surface surveys at 380 ft and 830 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 5829 ft MD to TD at 5883 ft MD.

Date Printed:04 November 2014