



Multiple Propagation Resistivity
Gamma Ray

Scale:

1:1200 TVD

Depth Reference:

Driller's Depth

Company: Noble Energy

Well: Hullabaloo Y21-746

Field: Weld County

County: Weld Country: United States

State: Colorado

Status: Surface Location:

Final Print

Latitude: 40° 41' 45" N

Longitude: 105° 41' 00" W

Other Services:

Wellbore Surveys

API No: 0512345235

SEC: 16 TWN: 2N RGE: 64W

Permanent Datum (P.D.): Ground Level

Elevation: 4944.00 ft

Elev. KB: N/A

Log Measured From: Rig Floor

Above P.D. 30.00 ft

Elev. DF: 4974.00 ft

Elev. GL: 4944.00 ft

Dates: Interval Logged

Date From: 2017-09-26

Top: (ft) 0.00

Azi Reference North:

Grid Dip Angle: (deg) 8.06

Date To: 2017-09-29

Bottom: (ft) 0.00

Total Magnetic Field Strength: (nT) 52271

Spud Date: 2017-09-25

Mag to Reference North Correction: (deg) 7.45 E

Magnetic Field Reference

Borehole Record

Casing Record

Hole Size (in)

From (ft)

To (ft)

Size (in)

Weight (lb/ft)

From (ft)

To (ft)

8.500

2033.00

17204.00

9.625

36.00

30.00

2023.00

Mud Record

Deviation Record

Type

From (ft)

To (ft)

Hole Size (in)

Interval (ft)

Inc | Azi (Start)

Inc | Azi (End)

Oil Based Mud

30.00

17204.00

8.500

15171.00

0.52 | 198.53

0.38 | 2.19

Acquisition System

Software Version

Other

Baker Hughes Cadence

RT4.1

Plot Studio

4.1.7763.3

Rig: H&P 524

Contractor: Helmerich & Payne Drilling Co

District: RMD

Unit: D&E

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Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours (h)
						Top (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
1	1	8.500	PDC	2.00	AutoTrak Curve	2033.00	6484.00	2033.00	17204.00	2017-09-26 15:31	2017-09-29 06:07	56.30

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
Steven Cano	2017-09-25	2017-09-29	TY Jackson	2017-09-25	2017-09-29			

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2017-09-26 05:04	1	2500.00	Oil Based Mud	9.2	8	N/A	17.0	82/18	Active Pit	28500	0.00
2017-09-27 10:01	1	6404.00	Oil Based Mud	9.3	9	N/A	16.0	83/17	Active Pit	29000	0.00
2017-09-28 16:30	1	14135.00	Oil Based Mud	9.2	8	N/A	16.0	85/15	Active Pit	30000	0.00

Mud Resistivity Record

Date / Time	Run No.	Measured Depth (ft)	Surface Temp (degF)	Surface			BHCT (degF)	Downhole		
				Rm (ohm.m)	Rmf (ohm.m)	Rmc (ohm.m)		Rm @ BHCT (ohm.m)	Rmf @ BHCT (ohm.m)	Rmc @ BHCT (ohm.m)
2017-09-28 08:00	1	10500.00	98.0	100.000	N/A	N/A	195.0	100.000	N/A	N/A

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
1	OnTrak	11931013	Pressure	2.51	10719.54	6.750	0.000
1	OnTrak	11931013	Gamma (double)	3.40	10720.43	6.750	0.000
1	OnTrak	11931013	Resistivity (4tx)	7.44	10724.47	6.750	0.000
1	OnTrak	11931013	Directional (mag)	13.23	10730.26	6.750	0.000

Service and Tool Mnemonics


Mnemonic	Name	Description
OTK	OnTrak	Sensor Sub (Inc, Azi, Temp, Azimuthal GR, Res, AP, VSS), OnTrak Platform

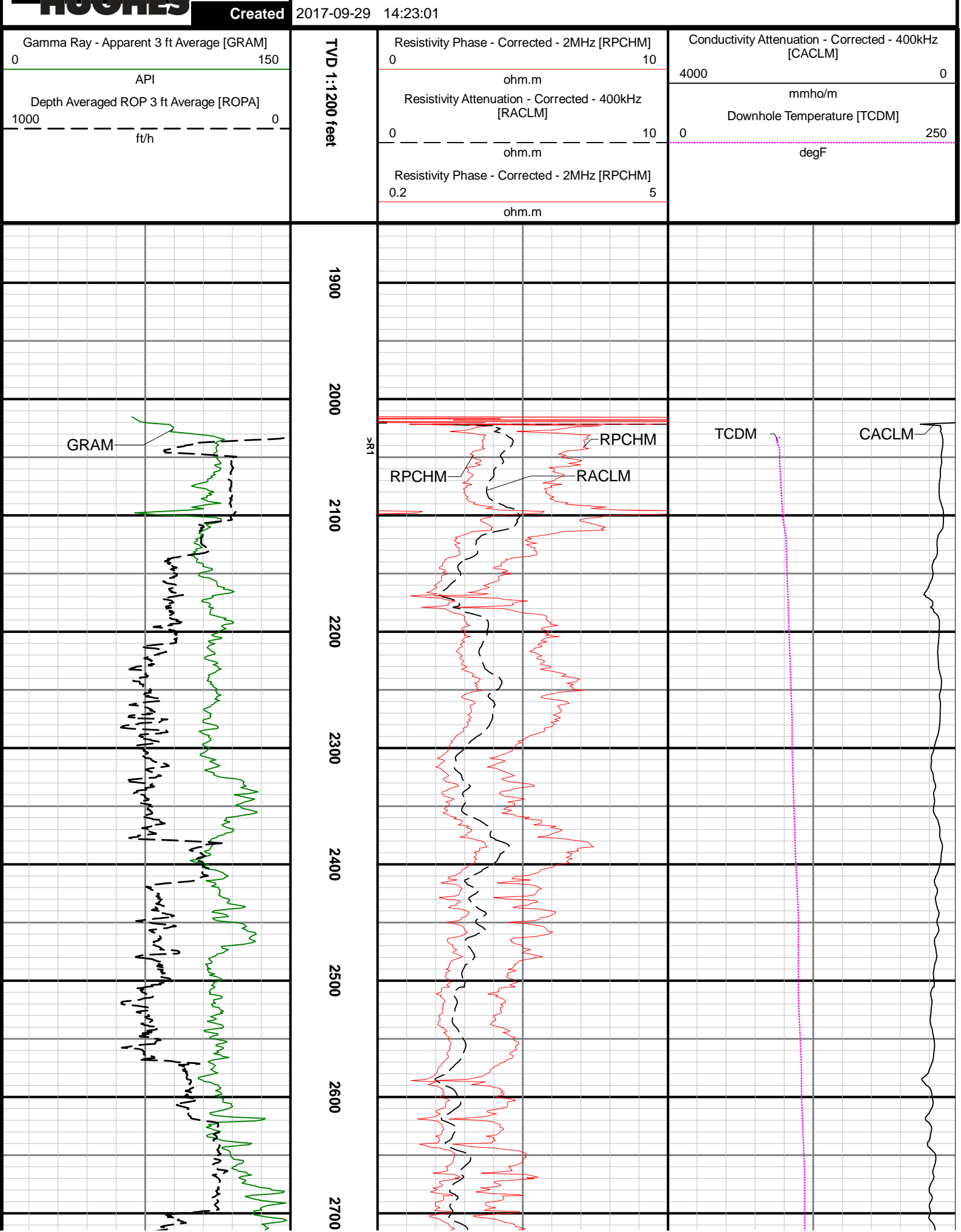
Comments

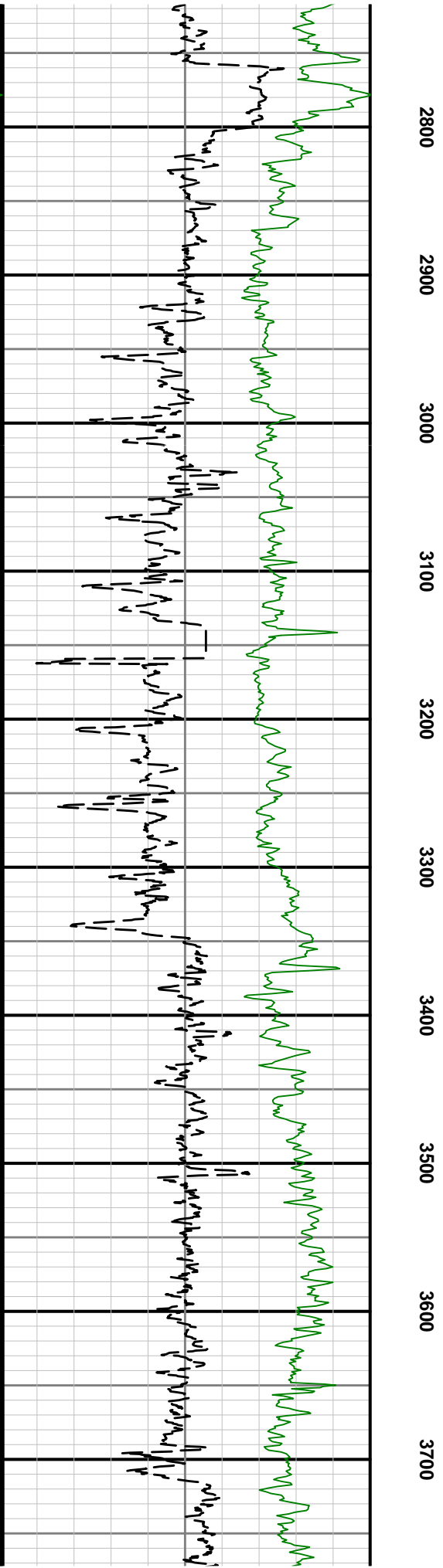
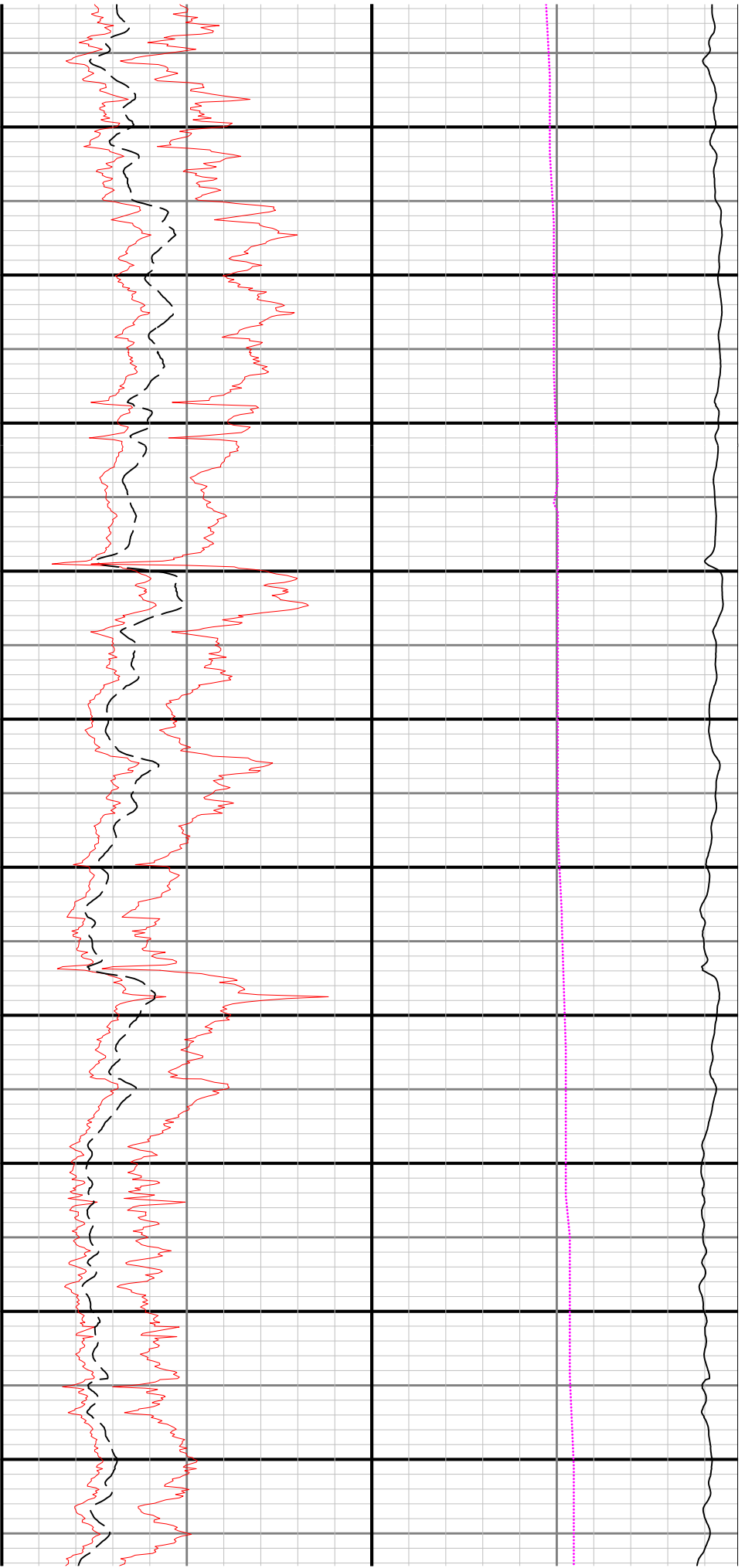
<div>1</div> <div>Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes, depth calibrations and measurements could not be independently verified.</div>
<div>2</div> <div>Baker Hughes LWD run 1 utilized a 6.75 inch Ontrak services (Multiple Propagation Resistivity, Gamma Ray, and Directional) behind a 8.5 inch bit and rotary steerable assembly to perform a MAD (Measurement After Drilling) Pass from 2033 to 6484 feet MD (2033 to 6483 feet TVD). The data during this run was logged up to 33 hours after being drilled.</div>

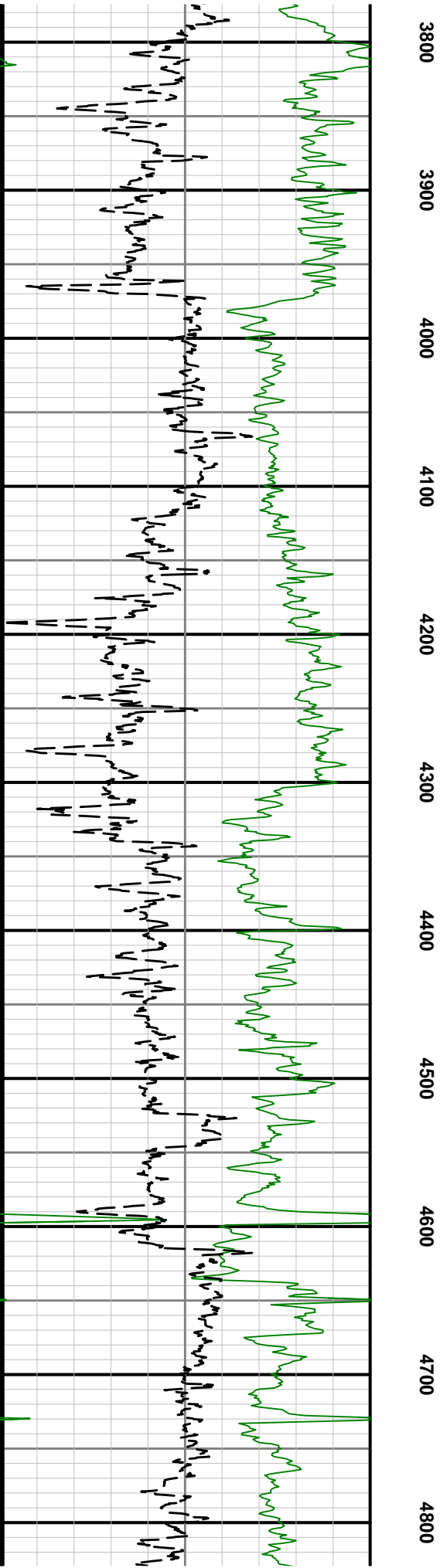
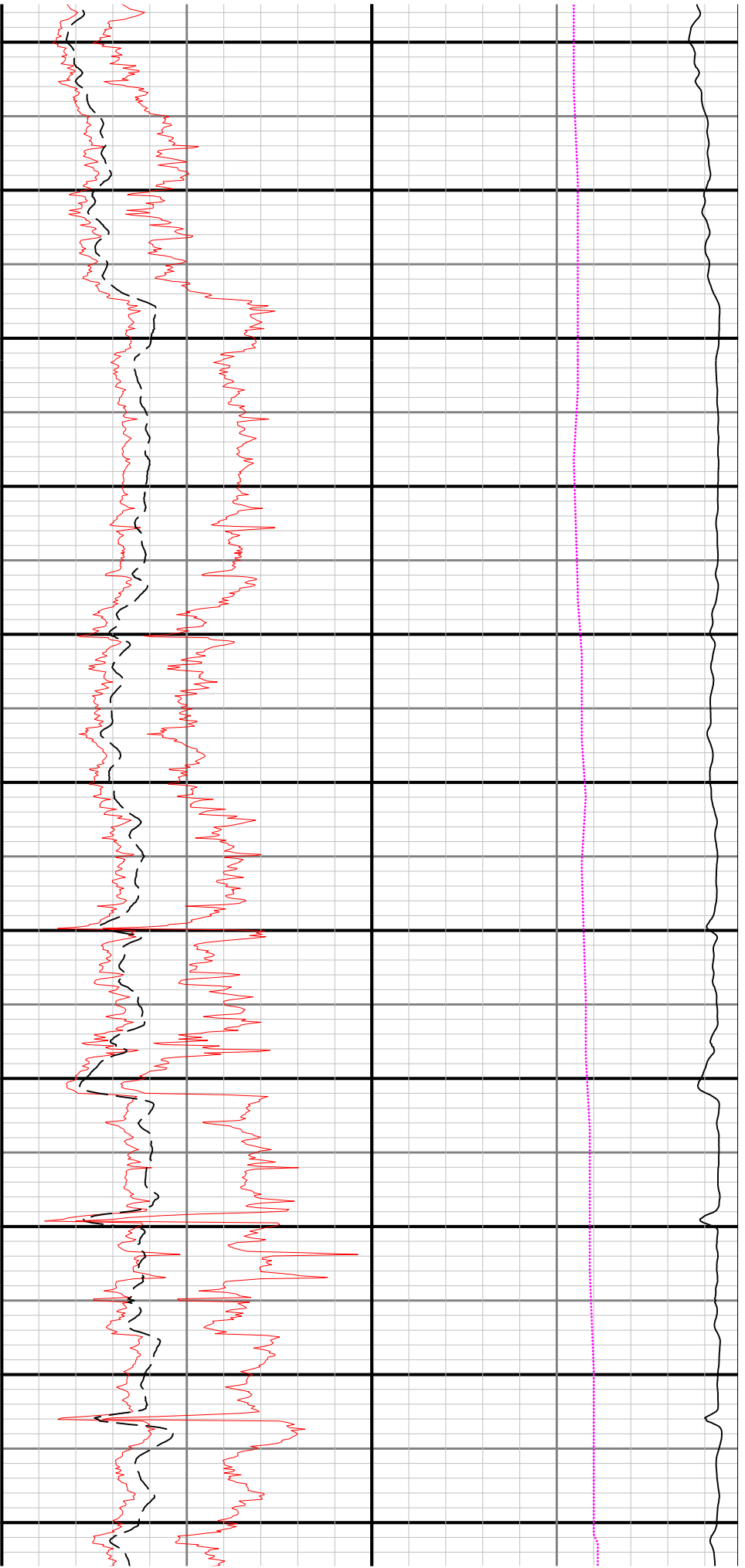
Curve Mnemonics

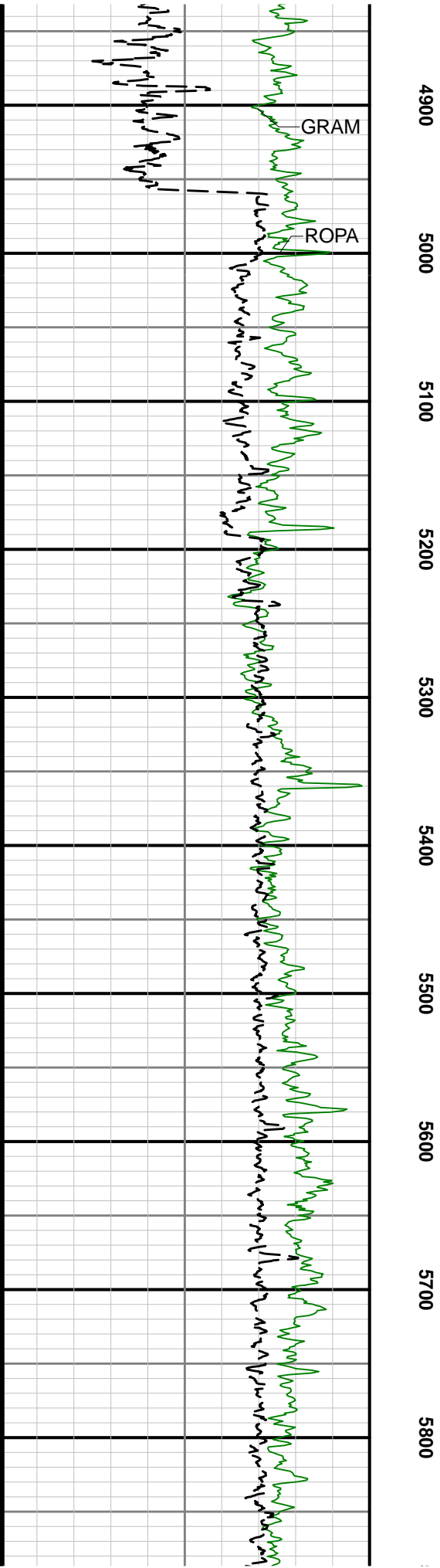
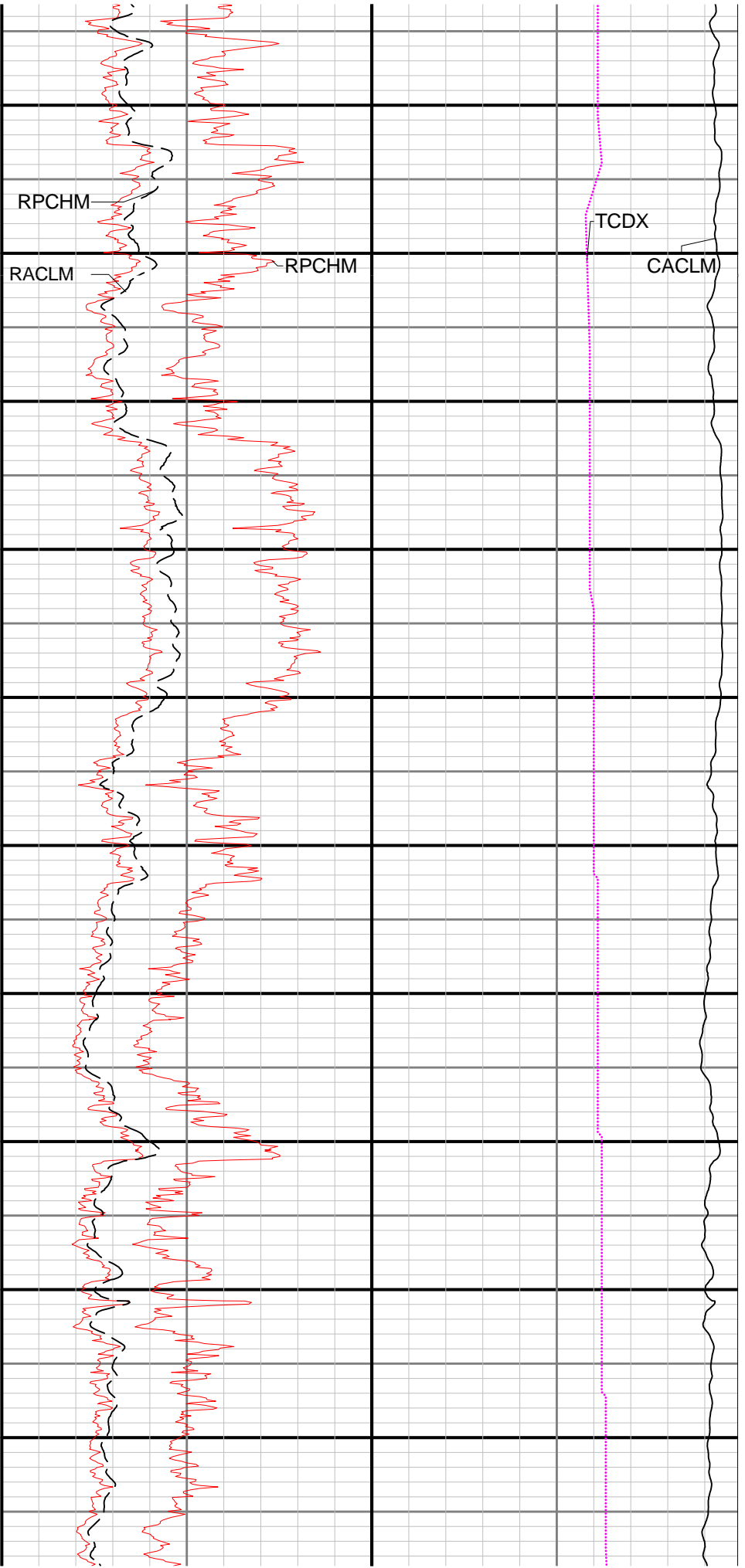
Presented Curves	Description	Units
CACLM	Conductivity Attenuation - Corrected - 400kHz	mmho/m
RACLM	Resistivity Attenuation - Corrected - 400kHz	ohm.m
RPCHM	Resistivity Phase - Corrected - 2MHz	ohm.m
TCDX	Downhole Temperature	degF
ROPA	Depth Averaged ROP 3 ft Average	ft/h
GRAM	OnTrak - Gamma Ray - Apparent - Memory 3 ft Average	API
TCDM	Downhole Temperature	degF

 BAKER HUGHES	Company	Noble Energy			
	Well	Hullabaloo Y21-746			
	Interval	Date From:	2017-09-26 09:31:40	Top:	2015.00
		Date To:	2017-09-29 00:05:40	Bottom:	17204.00










Tie-In / Projection	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	Temperature (degF)	North (ft)	East (ft)	True Vertical Depth (ft)	TVD Subsea (ft)	Vertical Section (ft)	Course Length (ft)	Dog Leg Severity (deg/100ft)	Build Rate (deg/100ft)	Turn Rate (deg/100ft)
Tie-In	0.00	0.00	0.00	N/A	0.00	0.00	0.00	-4974.00	0.00	0.00	0.00	0.00	0.00
	81.00	0.52	198.53	N/A	-0.35	-0.12	81.00	-4893.00	0.36	81.00	0.64	0.64	-199.35
	178.00	0.50	208.07	N/A	-1.14	-0.46	178.00	-4796.00	1.19	97.00	0.09	-0.02	9.84
	269.00	0.27	246.07	N/A	-1.58	-0.84	268.99	-4705.01	1.67	91.00	0.36	-0.25	41.76
	364.00	0.61	107.75	N/A	-1.82	-0.56	363.99	-4610.01	1.88	95.00	0.88	0.36	-145.60
	458.00	0.45	56.34	N/A	-1.77	0.22	457.99	-4516.01	1.73	94.00	0.51	-0.17	-54.69
	553.00	0.35	318.36	N/A	-1.35	0.34	552.99	-4421.01	1.29	95.00	0.64	-0.11	-103.14
	647.00	0.54	125.29	N/A	-1.39	0.51	646.99	-4327.01	1.31	94.00	0.94	0.20	177.59
	742.00	0.46	127.02	N/A	-1.88	1.18	741.98	-4232.02	1.72	95.00	0.09	-0.08	1.82
	836.00	0.32	108.60	N/A	-2.19	1.73	835.98	-4138.02	1.96	94.00	0.20	-0.15	-19.60
	931.00	0.26	102.72	N/A	-2.32	2.19	930.98	-4043.02	2.03	95.00	0.07	-0.06	-6.19
	1025.00	0.13	128.56	N/A	-2.43	2.48	1024.98	-3949.02	2.11	94.00	0.16	-0.14	27.49
	1120.00	0.25	143.31	N/A	-2.67	2.69	1119.98	-3854.02	2.32	95.00	0.14	0.13	15.53
	1215.00	0.74	142.91	N/A	-3.32	3.19	1214.97	-3759.03	2.91	95.00	0.52	0.52	-0.42
	1309.00	0.57	124.19	N/A	-4.07	3.94	1308.97	-3665.03	3.56	94.00	0.29	-0.18	-19.91
	1403.00	0.22	85.90	N/A	-4.32	4.51	1402.97	-3571.03	3.74	94.00	0.45	-0.37	-40.73
	1498.00	0.05	270.95	N/A	-4.30	4.65	1497.96	-3476.04	3.71	95.00	0.28	-0.18	-184.16
	1593.00	0.13	327.49	N/A	-4.21	4.55	1592.96	-3381.04	3.63	95.00	0.12	0.08	59.52
	1687.00	0.08	279.93	N/A	-4.11	4.42	1686.96	-3287.04	3.54	94.00	0.10	-0.05	-50.60
	1782.00	0.31	344.48	N/A	-3.85	4.29	1781.96	-3192.04	3.30	95.00	0.30	0.24	67.95
	1876.00	0.57	19.06	N/A	-3.17	4.37	1875.96	-3098.04	2.61	94.00	0.38	0.28	36.79
	1971.00	0.44	11.78	N/A	-2.36	4.60	1970.96	-3003.04	1.78	95.00	0.15	-0.14	-7.66
	2016.00	0.38	2.19	N/A	-2.04	4.64	2015.96	-2958.04	1.46	45.00	0.20	-0.13	-21.31
Projection	17204.00	89.94	179.76	N/A	-10054.53	-1226.99	6979.88	2005.88	10129.12	15188.00	0.00	0.00	0.00



LWD Memory Log

Multiple Propagation Resistivity
Gamma Ray

Scale:
1:1200 TVD

Depth Reference:
Driller's Depth

Status:
Final Print

API:
0512345235

Job ID:
8776777

Company:
Noble Energy

Well:
Hullabaloo Y21-746

Field:
Weld County

County:
Weld

State:
Colorado

Country:
United States

Surface Location:
Latitude:
Longitude:

SEC:
16

TWN:
2N

RGE:
64W

Other Services:
Wellbore Surveys

Elevations:
Elev. KB:
Elev. DF:
Elev. GL:

Permanent Datum (P.D.): Ground Level
Log Measured From: Rig Floor

Elevation:
Above P.D.

Interval:
Created:

0.00 ft - 0.00 ft
2017-09-29 14:23:02

N/A
4974.00 ft
4944.00 ft