



Multiple Propagation Resistivity  
Gamma Ray

Scale:

Company: Noble Energy

1:1200 MD

Well: Hullabaloo Y21-746

Depth Reference:

Field: Weld County

Driller's Depth

County: Weld Country: United States

State: Colorado

Status:

Final Print

Surface Location:

Latitude:

Longitude:

Other Services:

API No: 0512345235

Latitude: 40° 45' 45" N  
Longitude: 105° 45' 45" W

Wellbore Surveys

Job ID: 8776777

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.

Elev. DF:

4974.00 ft

Elev. GL:

4944.00 ft

Dates

Interval Logged

Magnetic Field Reference

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

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 | Az (Start)

Inc | Az (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

Rig: H&P 524

Contractor: Helmerich & Payne Drilling Co

Unit: D&E

Plot Studio

4.1.7763.3

District: RMD

"These interpretations and analyses ("Interpretations") are opinions provided by Baker Hughes Oilfield Operations, Inc ("Baker Hughes"), based upon industry practice, empirical relationships, assumptions and measurements, (many of which may be provided by the customer). The Interpretations are not infallible and may be subject to different opinions. Vjwu."Dcmgt"Jwi jgu"fqgu"pqv"ycttcpv"vjgkt"ceewtce{"."eqttgevpguu."qt"eqorngvgpguu."qt"vjcv"vjg"ewuvqogtøu"cpflqt"cp{"vjktf"rctv{øu"tgnkcpv"qp"uwej"Kpvgtrtgvcvkqpu"yknn"ceeornkuj"cp{"rctvkewnct"tguwnvu0"Vjg"ewuvqogt"cuuwogu"hwnn"responsibility for the use of the Interpretations and for decisions based thereon and the customer agrees to release, defend and indemnify Baker Hughes, its parent, subsidiaries and affiliated or related entities, and subcontractors, together with its and their officers, directors, employees, agents and invitees against, any and all claims, losses, damages, or expenses sustained by the customer or any third party arising out of reliance upon or use of the Interpretations, without regard to the cause(s) thereof, including without limitation any form of negligence on the part of Baker Hughes. Unless other contract terms have been agreed to by the parties, each party's liabilities and qdnkicvkqpu"ujcnn"dg"iqxgtpgf"d{"Dcmgt"Jwi jgu"Kpeqtrqtcvvgføu"Yqtnfykfg"Vgtou"cpf"Eqpfkvkqpu0\$""

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
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Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart 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)	Rm (ohm.m)	Rmf (ohm.m)	Rmc (ohm.m)	BHCT (degF)	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

1	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.
2	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.

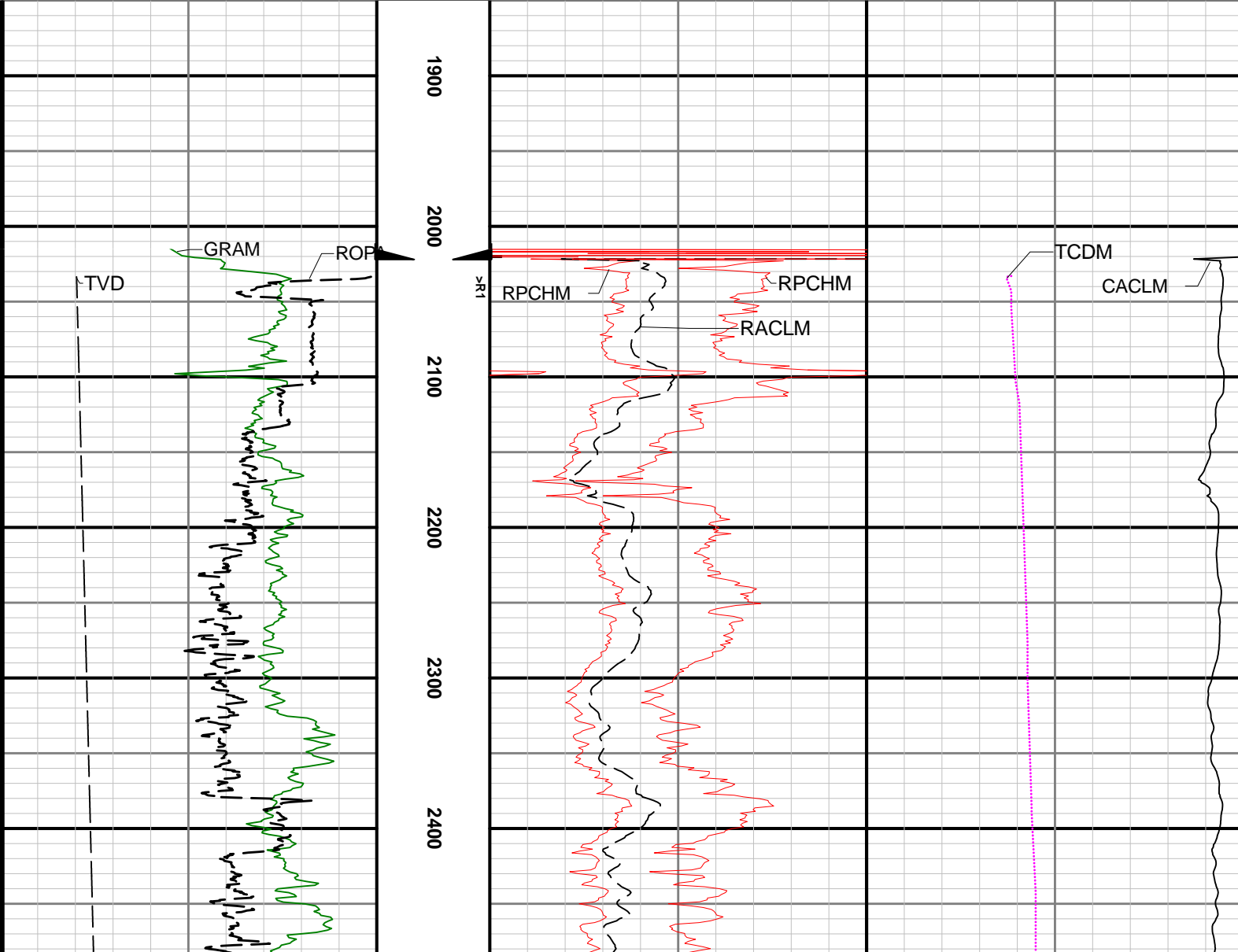
Curve Mnemonics

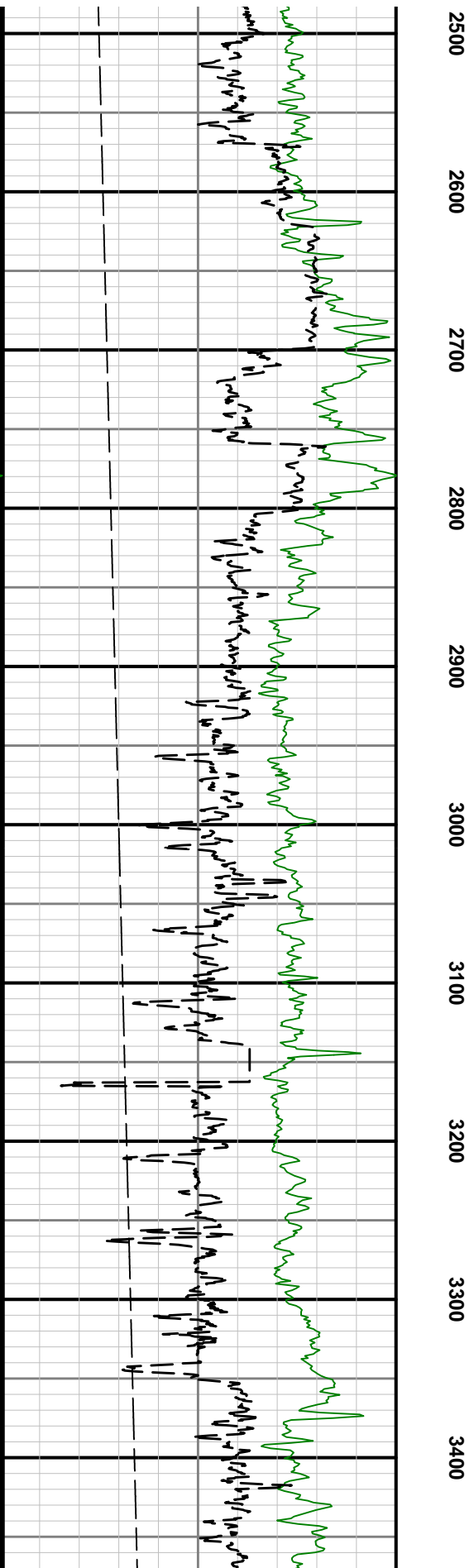
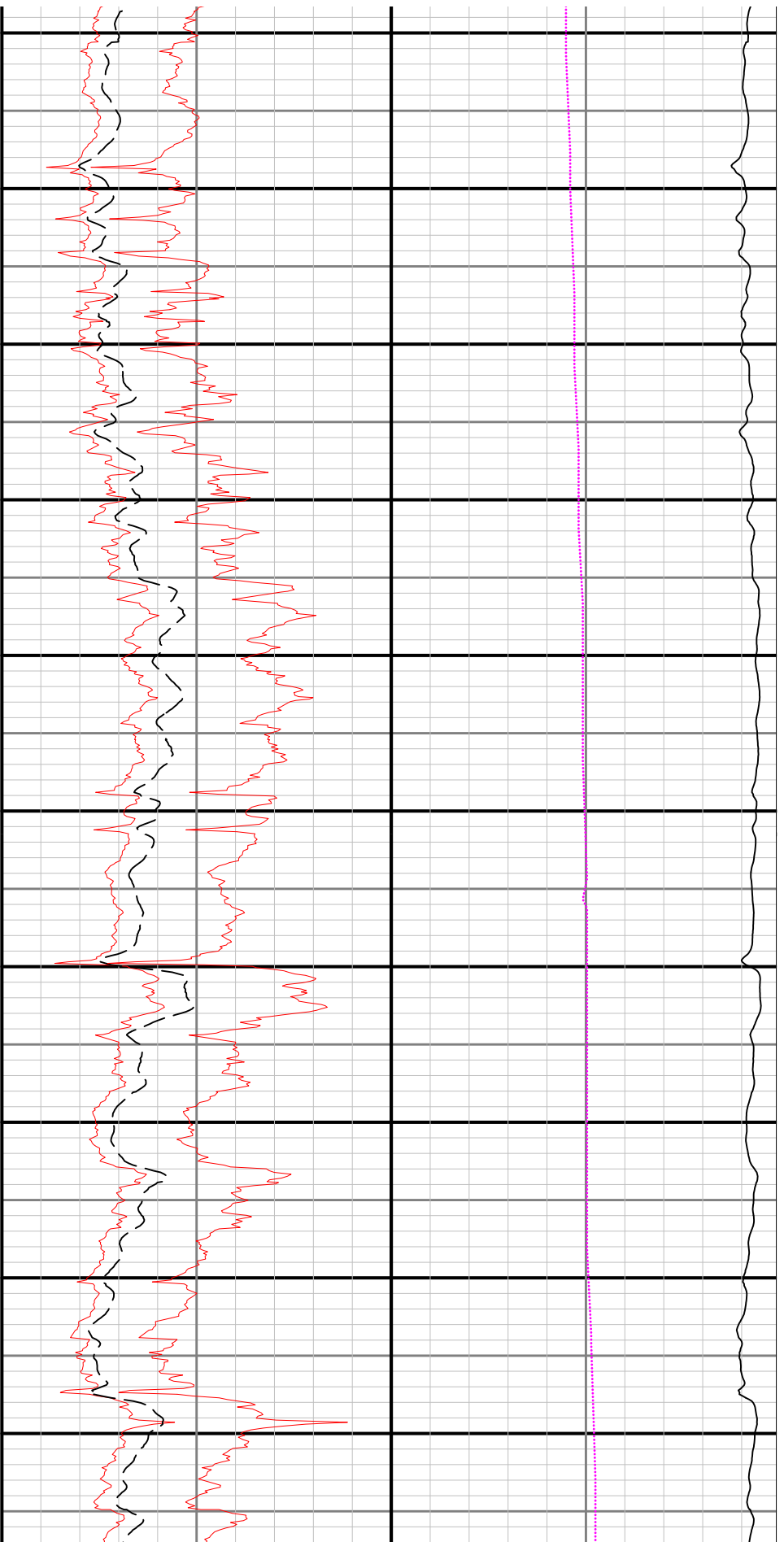
Presented Curves	Description	Units
CACLM	Conductivity Attenuation - Corrected - 400kHz	mmho/m
RACLM	Resistivity Attenuation - Corrected - 400kHz	ohm.m
RPCHM	Resistivity Phase - Corrected - 2MHz	ohm.m
TCDX	Downhole Temperature	degF
ROPA	Depth Averaged ROP 3 ft Average	ft/h

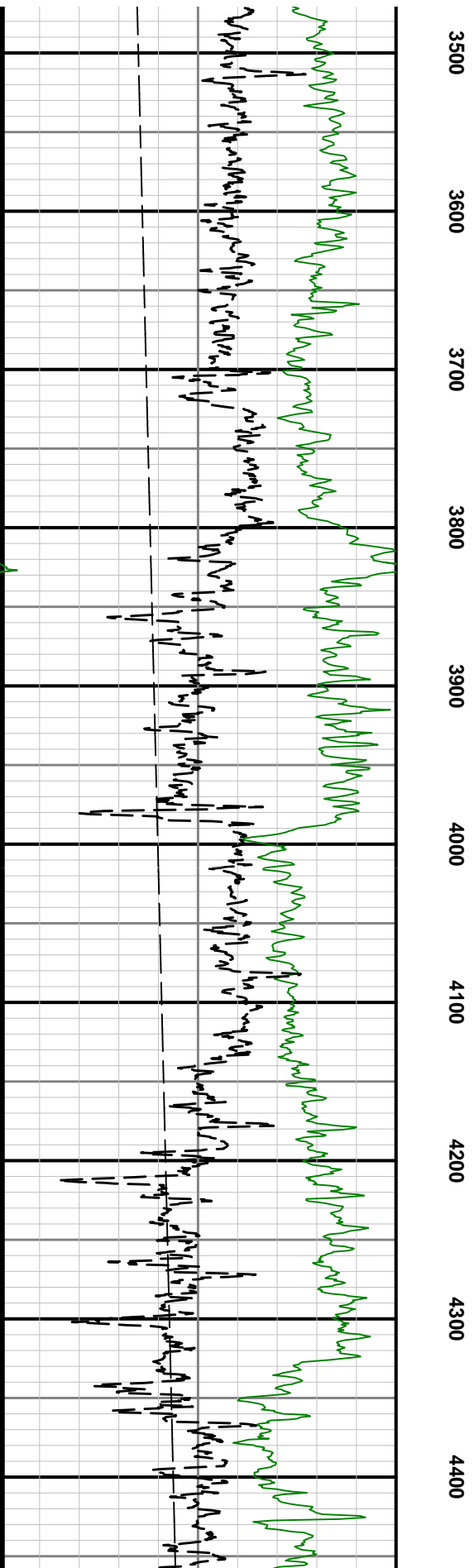
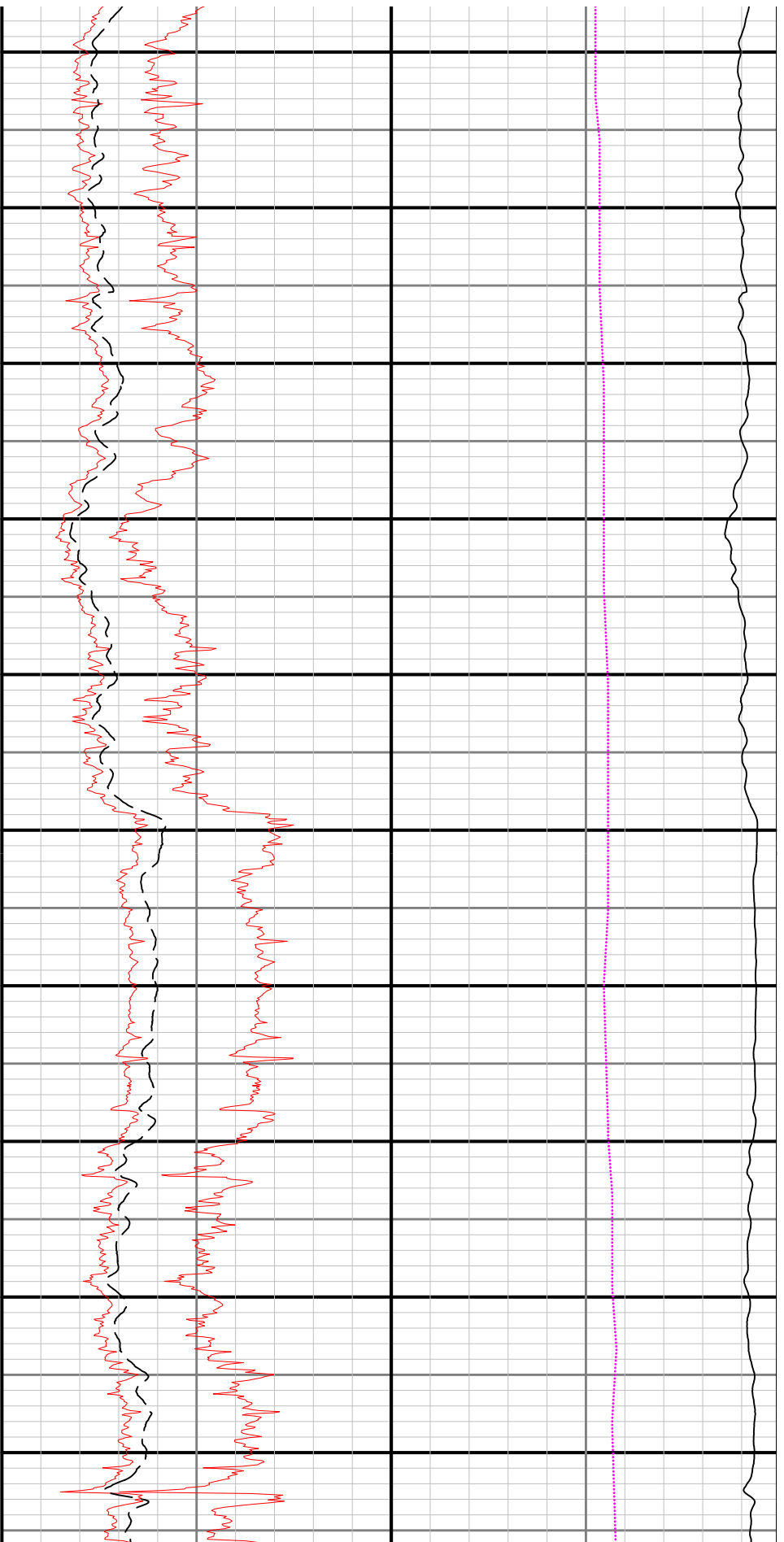
TVD	True Vertical Depth	ft
GRAM	OnTrak - Gamma Ray - Apparent - Memory 3 ft Average	API
TCDM	Downhole Temperature	degF

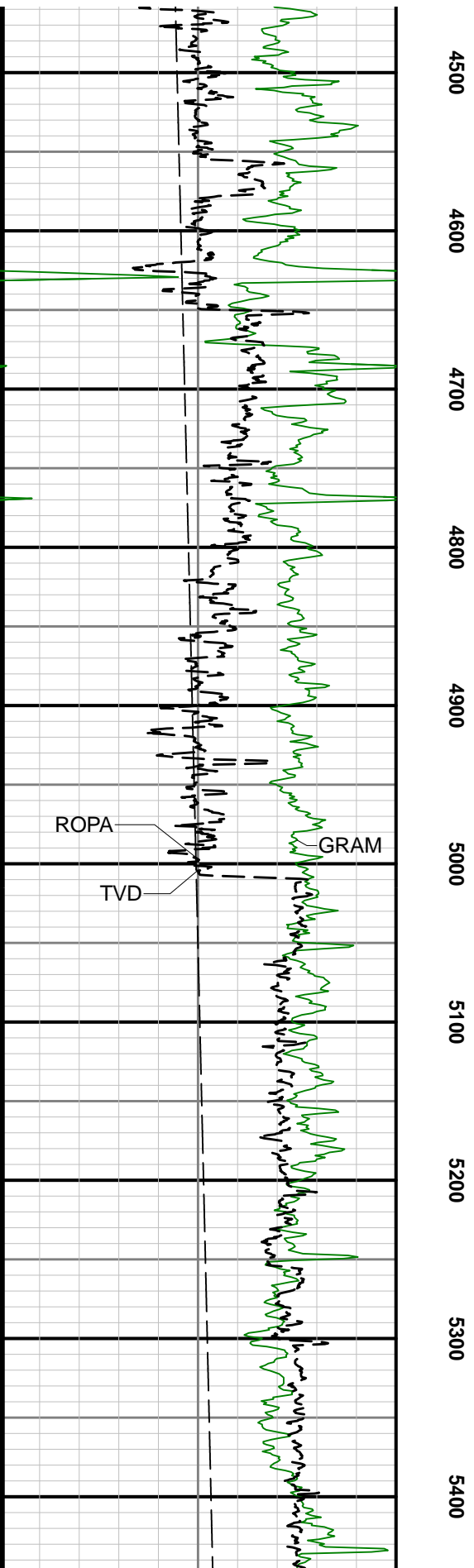
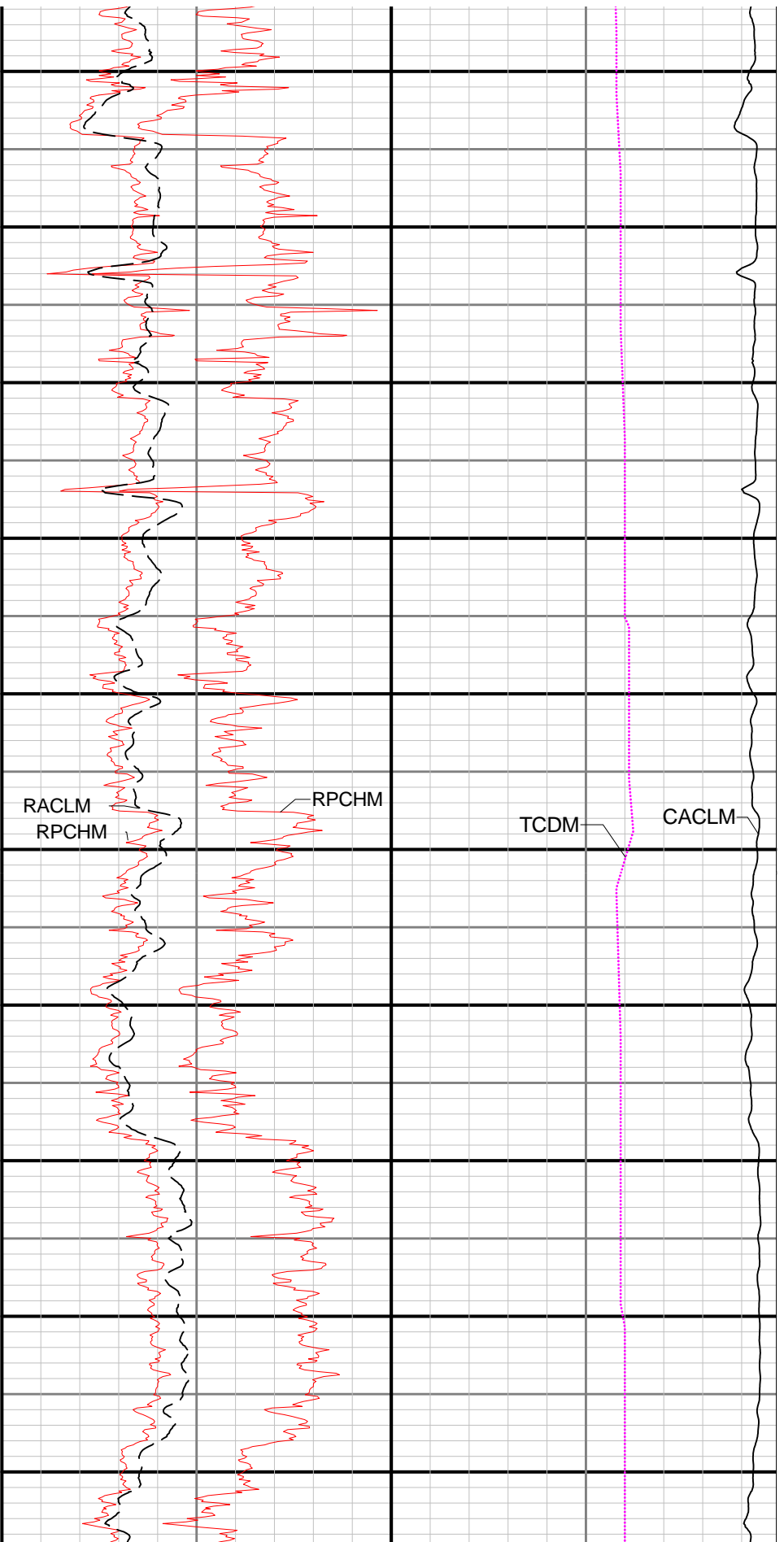
<div> <div>  </div> <div> <div>Company</div> <div>Well</div> <div>Interval</div> <div>Created</div> </div> </div>	Noble Energy		
	Hullabaloo Y21-746		
	Date From:	2017-09-26 09:31:40	Top: 2015.00
	Date To:	2017-09-29 00:05:40	Bottom: 17204.00
Created		2017-09-29 14:24:43	

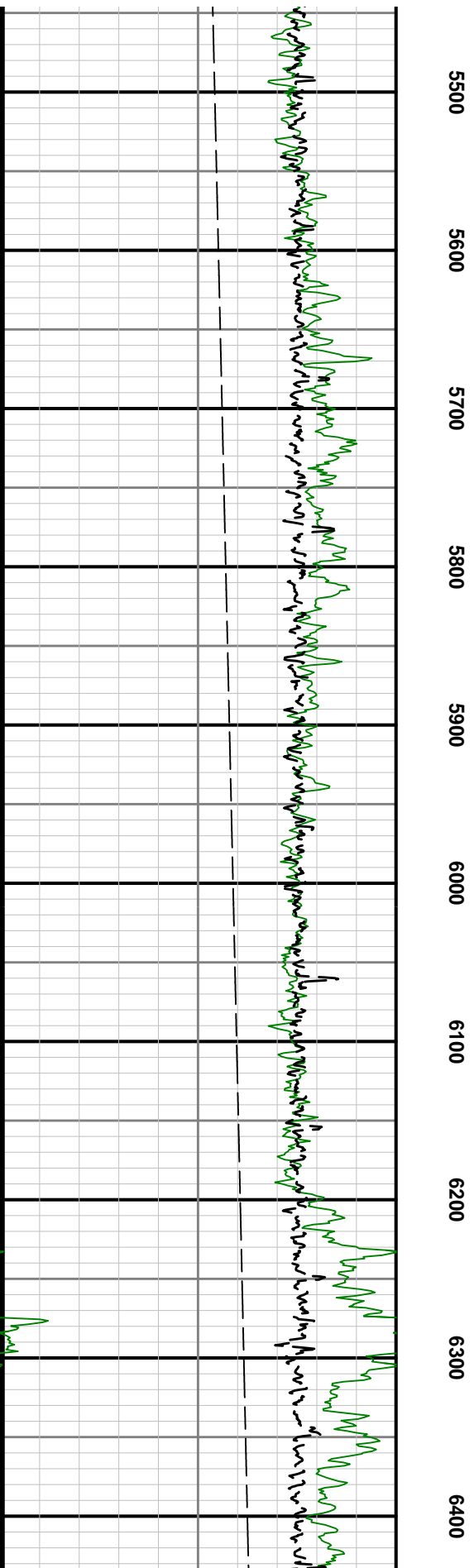
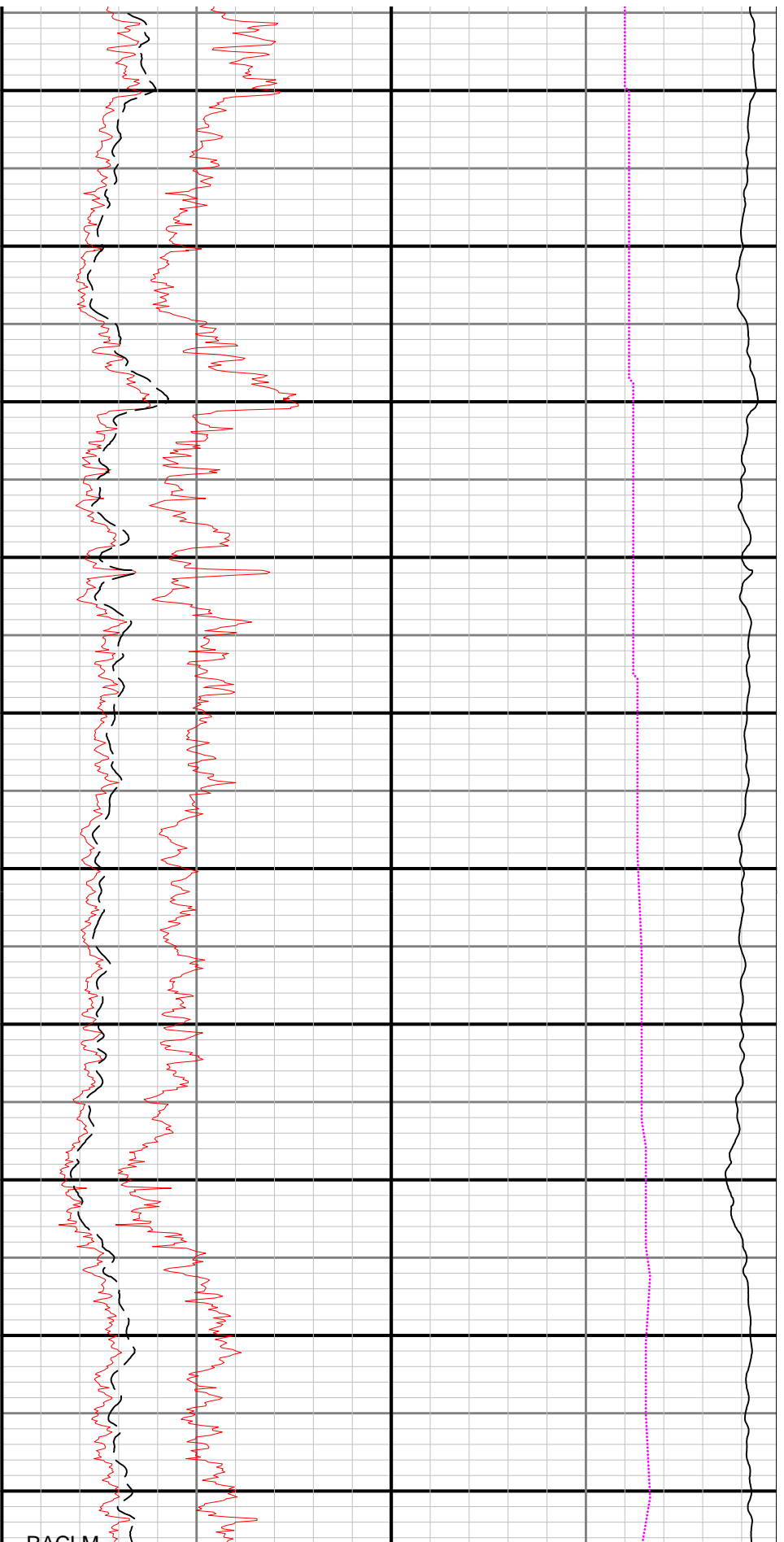
Gamma Ray - Apparent 3 ft Average [GRAM]	MD 1:1200 feet	Resistivity Phase - Corrected - 2MHz [RPCHM]	Conductivity Attenuation - Corrected - 400kHz [CACLM]
0 150		0 10	4000 0
API		ohm.m	mmho/m
Depth Averaged ROP 3 ft Average [ROPA]		Resistivity Attenuation - Corrected - 400kHz [RACLM]	Downhole Temperature [TCDM]
1200 0		0 10	0 250
ft/h		ohm.m	degF
True Vertical Depth [TVD]		Resistivity Phase - Corrected - 2MHz [RPCHM]	
0 10000		0 5	
ft		ohm.m	

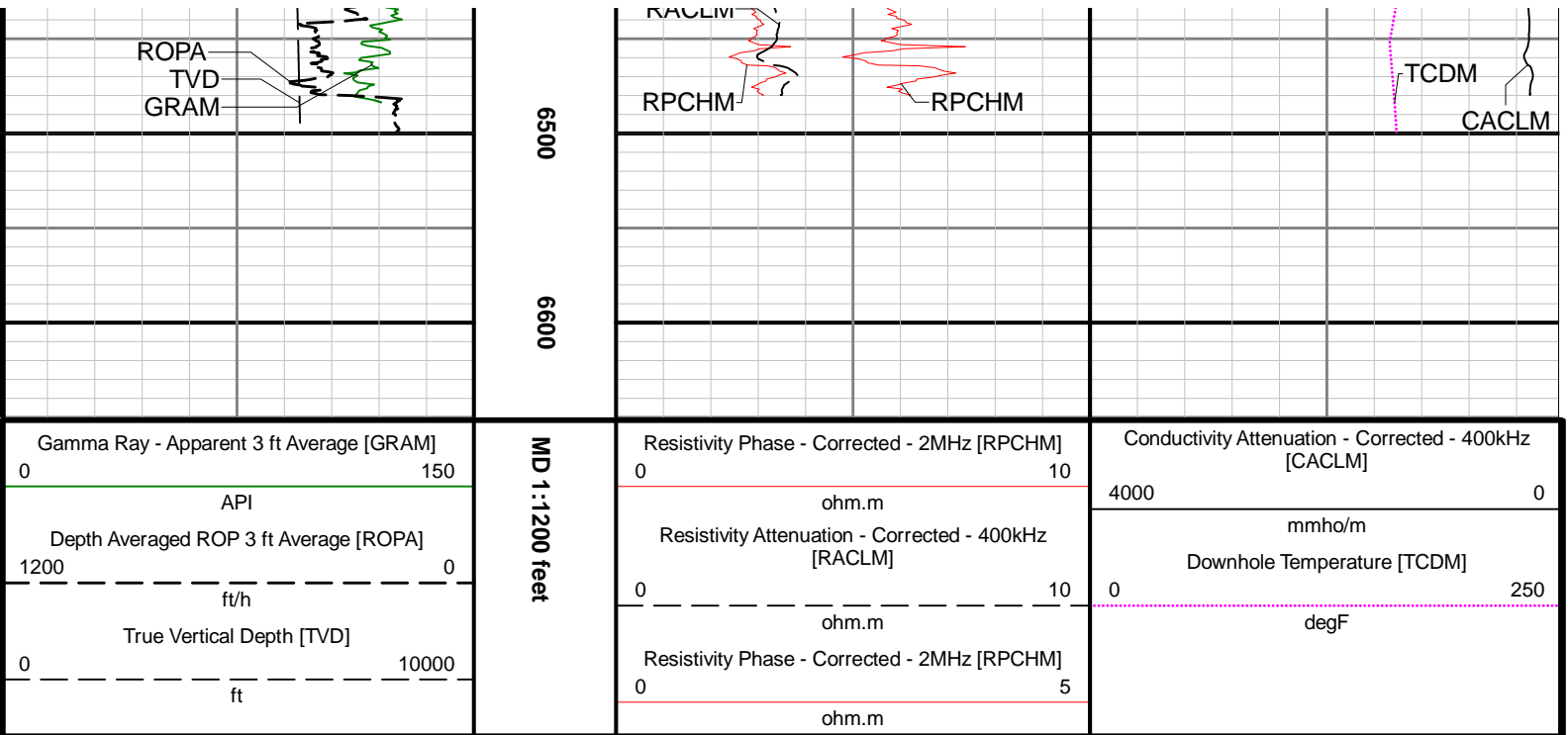












<div></div>	<div>LWD Memory Log</div> <div>Multiple Propagation Resistivity Gamma Ray</div>			
<div>Scale:</div> <div>1:1200 MD</div>	<div>Company: Noble Energy</div>			
<div>Depth Reference:</div> <div>Driller's Depth</div>	<div>Well: Hullabaloo Y21-746</div>			
	<div>Field: Weld County</div>			
	<div>County: Weld</div>		<div>Country: United States</div>	
<div>Status:</div> <div>Final Print</div>	<div>State: Colorado</div>			
	<div>Surface Location:</div> <div>Latitude: 40° 43' 00" N</div> <div>Longitude: 105° 43' 00" W</div>		<div>Other Services:</div> <div>Wellbore Surveys</div>	
	<div>API: 0512345235</div> <div>Job ID: 8776777</div>			
<div>SEC: 16</div>		<div>TWN: 2N</div>	<div>RGE: 64W</div>	<div>Elevations:</div> <div>Elev. KB: N/A</div> <div>Elev. DF: 4974.00 ft</div> <div>Elev. GL: 4944.00 ft</div>
<div>Permanent Datum (P.D.): Ground Level</div> <div>Log Measured From: Rig Floor</div>		<div>Elevation: 4944.00 ft</div> <div>Above P.D. 30.00 ft</div>	<div>Interval: 0.00 ft - 0.00 ft</div> <div>Created: 2017-09-29 14:24:43</div>	