

LWD MEMORY LOG



Natural Formation Evaluation  
Azimuthal Gamma Ray

Scale: Company: Cub Creek Energy

1:1200 MD Well: Markham 7

Depth Reference: Field: Weld County

Driller's Depth County: Weld County State: Colorado

Status: Surface Location: Other Services:

Final Print Latitude: 040° 16' 8.004" N

API No: 05-123-43245-00 Longitude: 105° 01' 23.268" W Wellbore Survey

Job ID: 8071491 SEC: 32 TWN: 4N RGE: 68W

Permanent Datum (P.D.): Ground Level Elevation: 5041.00 ft KB: N/A

Log Measured From: Rig Floor Above P.D. 17.00 ft DF: 5058.00 ft

Dates Interval Logged Magnetic Field Reference

Date From: 2016-09-20 Top: (ft) 1500.00 Azi Reference North: True Dip Angle: (deg) 66.75

Date To: 2016-09-19 Bottom: (ft) 12029.00 Total Magnetic Field Strength: (nT) 52424

Spud Date: 2016-07-31 Mag to Reference North Correction: (deg) 8.58 E

Borehole Record Casing Record

Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
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8.750	1539.00	4958.00	9.625	36.00	0.00	1529.00
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8.500	4958.00	12030.00				
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Mud Record Deviation Record

Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc   Az (Start)	Inc   Az (End)
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Water Based Mud	1539.55	12030.00	13.500	1442.00	0.46   35.74	2.85   115.79
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			8.750	3419.00	2.85   115.79	21.49   115.16
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			8.500	7072.00	21.49   115.16	91.08   276.72
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Acquisition System Software Version Other

Baker Hughes Cadence G3.3 Rig: Xtreme 18

PlotStudio 3.3.7410.1 Contractor: Xtreme Coil Drilling

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
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
2	2	8.750	PDC	2.00	AutoTrak Curve	1527.33	1845.03	1539.55	1851.63	2016-09-15 22:10	2016-09-16 01:11	5.16
3	2	8.750	PDC	2.00	AutoTrak Curve	1839.42	1931.56	1851.63	1938.16	2016-09-16 07:12	2016-09-16 10:03	3.36
4	3	8.750	PDC	3.00	AutoTrak Curve	1925.85	4952.13	1938.16	4958.83	2016-09-16 14:03	2016-09-17 08:52	16.43
5	4	8.500	PDC	2.00	AutoTrak Curve	4946.49	12022.14	4958.83	12028.86	2016-09-17 17:16	2016-09-19 12:53	45.46
Crew												
Name			Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite	Name		Arrive Wellsite	Depart Wellsite
Austin Small			2016-09-15	2016-09-20	Brandan Sackett		2016-09-15	2016-09-19	Matthew Delmore		2016-09-19	2016-09-20
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+ (%)
2016-09-14 19:40		2	1539.55	Water Based Mud	8.5	29	9	19.0	0.0/96.0	Suction	700	0.00
2016-09-16 05:25		3	1845.00	Water Based Mud	8.5	27	9.8	45.0	0.0/98.5	Suction	1300	0.00
2016-09-16 11:56		4	1938.16	Water Based Mud	8.5	27	9.3	57.0	0.0/98.5	Suction	1300	0.00
2016-09-17 16:00		5	4958.83	Water Based Mud	9.4	9	8.5	78.0	0/1	Suction	1300	0.00
2016-09-18 07:02		5	7244.04	Water Based Mud	10.0	42	10.5	5.9	1.5/89.7	Suction	2100	0.00
2016-09-19 06:03		5	10668.82	Water Based Mud	10.0	40	10	5.8	1.8/90	Suction	2200	0.00
Equipment and Service Data												
Run No.	Tool		Serial Number		Measurement		Sensor Offset (ft)		Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)	
2	ATC_SU		12606359		Near Bit Inclination		5.93		6.60	7.000	4.330	
2	ATC_SU		12606359		Near Bit VSS		5.93		6.60	7.000	4.330	
2	ATC_MWD		12651936		Gamma (single)		2.20		12.22	7.000	3.250	
2	ATC_MWD		12651936		Directional (mag)		12.27		22.29	7.000	3.250	
3	ATC_SU		11813726		Near Bit VSS		5.93		6.60	7.000	4.330	
3	ATC_SU		11813726		Near Bit Inclination		5.93		6.60	7.000	4.330	
3	ATC_MWD		12188066		Gamma (single)		2.20		12.21	7.000	3.250	
3	ATC_MWD		12188066		Directional (mag)		12.27		22.28	7.000	3.250	
4	ATC_SU		11813726		Near Bit Inclination		5.93		6.70	7.000	4.330	
4	ATC_SU		11813726		Near Bit VSS		5.93		6.70	7.000	4.330	
4	ATC_MWD		12188066		Gamma (single)		2.20		12.31	7.000	3.250	
4	ATC_MWD		12188066		Directional (mag)		12.27		22.38	7.000	3.250	
5	ATC_SU		12142976		Near Bit Inclination		5.93		6.72	7.000	4.330	

	ATC_SU	12142976	Near Bit Inclination	5.93	6.72	7.000	4.330
5	ATC_SU	12142976	Near Bit VSS	5.93	6.72	7.000	4.330
5	ATC_MWD	12473747	Gamma (single)	2.19	12.34	7.000	3.250
5	ATC_MWD	12473747	Directional (mag)	12.26	22.41	7.000	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

Comments


1	Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
2	Baker Hughes LWD Run 1 utilized 8 1/4 inch NaviTrak service (Directional only) behind a 13 1/2” inch bit and steerable assembly from surface to 1539 feet MD (surface to 1539 feet TVD).
3	Baker Hughes LWD Runs 2 through 4 utilized 6 ¾ inch AziGamma services (Gamma Ray and Directional) behind an 8 3/4 inch bit and rotary steerable assembly from 1539 to 4958 feet MD (1539 to 4739 feet TVD).
4	Baker Hughes LWD Run 5 utilized 6 ¾ inch AziGamma services (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 4958 to 12030 feet MD (4739 to 7065 feet TVD).
5	Gamma Ray Apparent (GRAM) is presented 0 to 200 API per customer request.

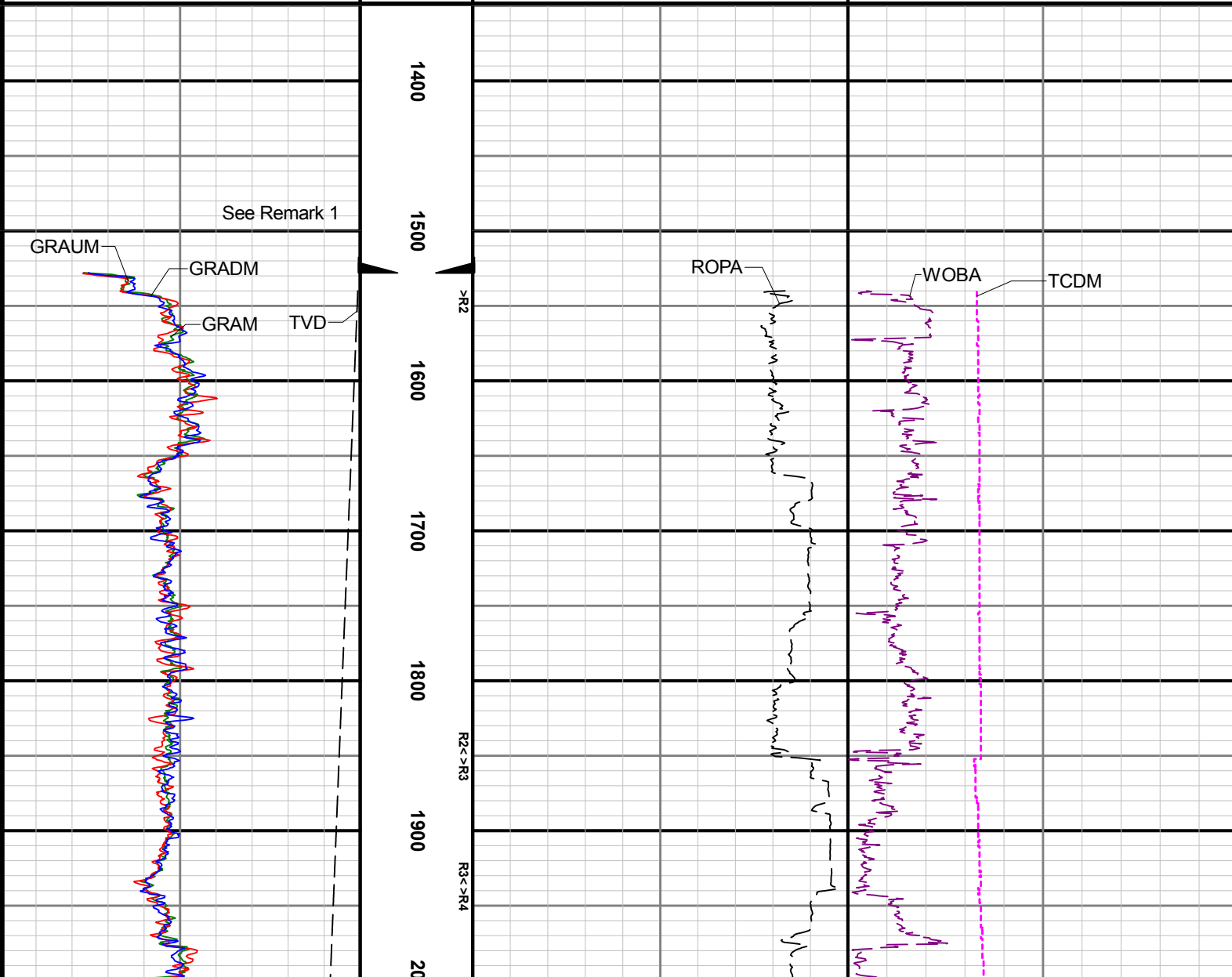
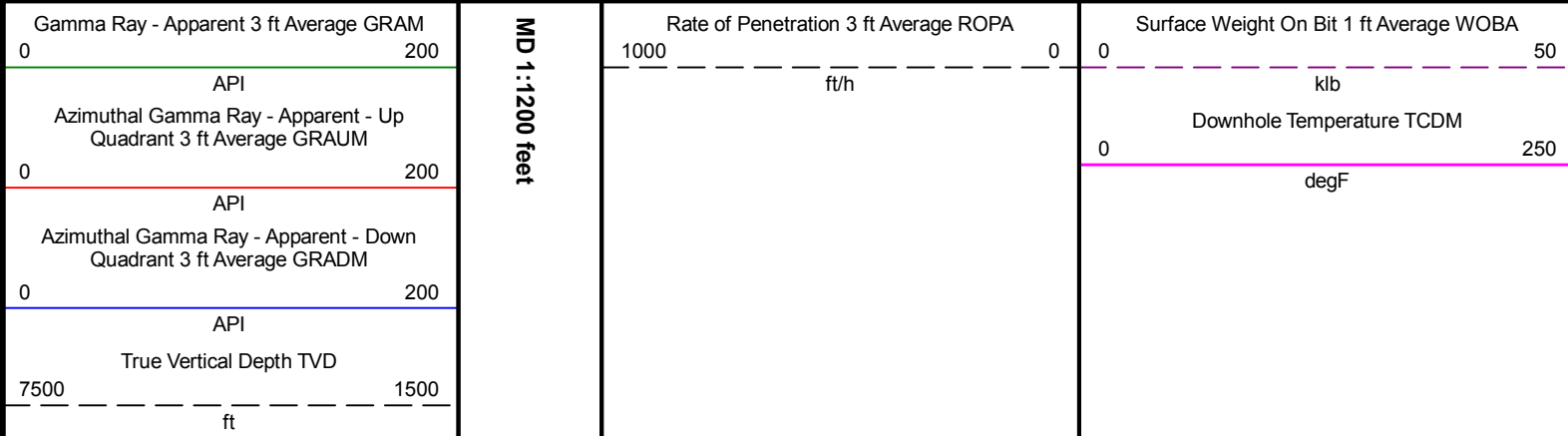
Remarks

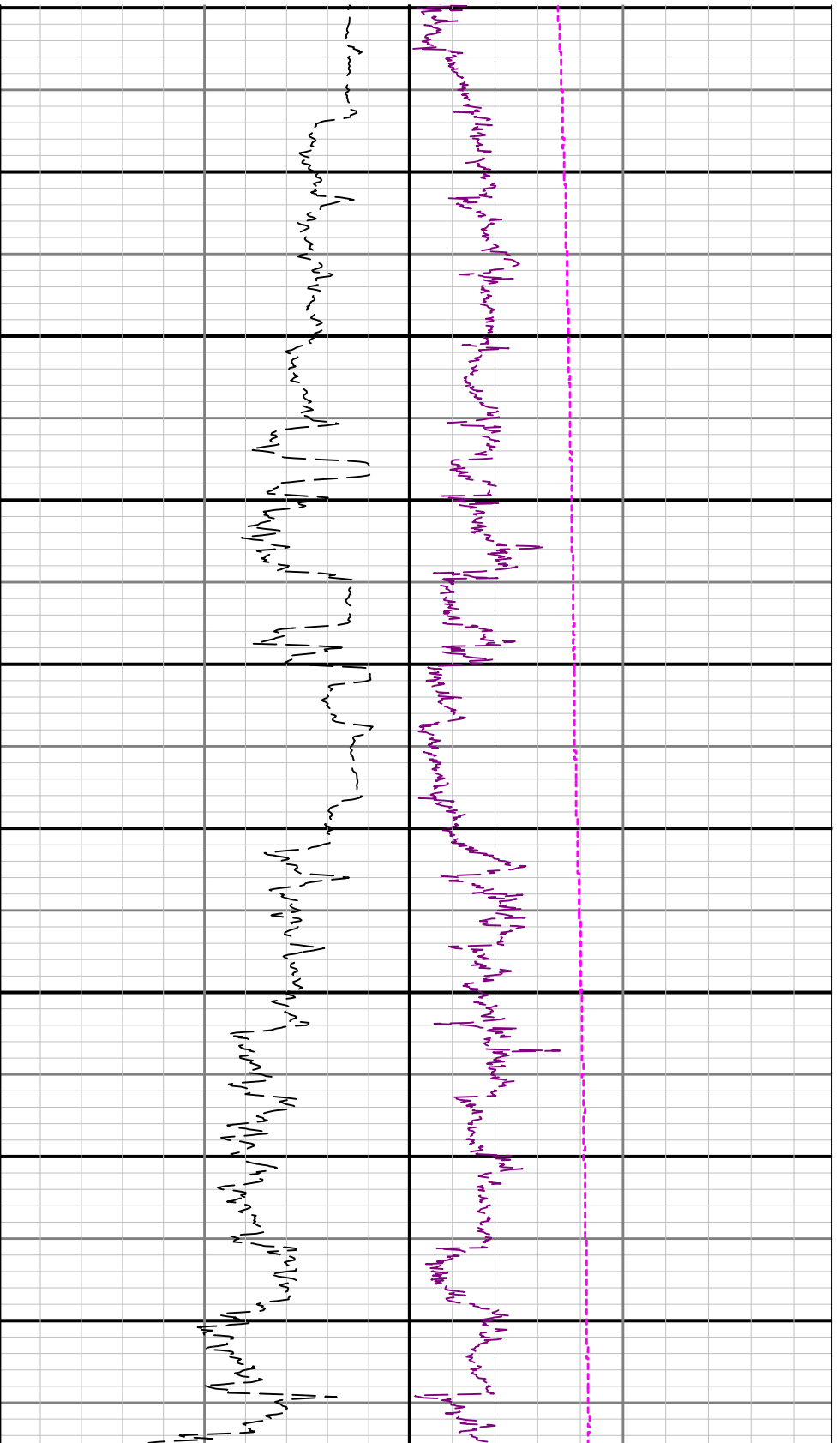
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	1539.00	8.750	2	Gamma Ray logging operations began at 1539 feet (1539 feet TVD).
2	12016.00	8.500	5	The interval from 12016 to 12030 feet MD (7065 feet TVD) was not logged due to sensor offset at well TD.

Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 3 ft Average	ft/h
GRADM	Azimuthal Gamma Ray - Apparent - Down Quadrant 3 ft Average	API
GRAM	Gamma Ray - Apparent 3 ft Average	API
GRAUM	Azimuthal Gamma Ray - Apparent - Up Quadrant 3 ft Average	API
TCDM	Downhole Temperature	degF
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb

	Company	Cub Creek Energy					
	Well	Markham 7					
	Interval	Date From:	2016-09-20 08:53:39		Top:	1500.00	
	Created	Date To:	2016-09-19 12:52:38		Bottom:	12029.00	
			2016-09-20 11:32				





100

2100

2200

2300

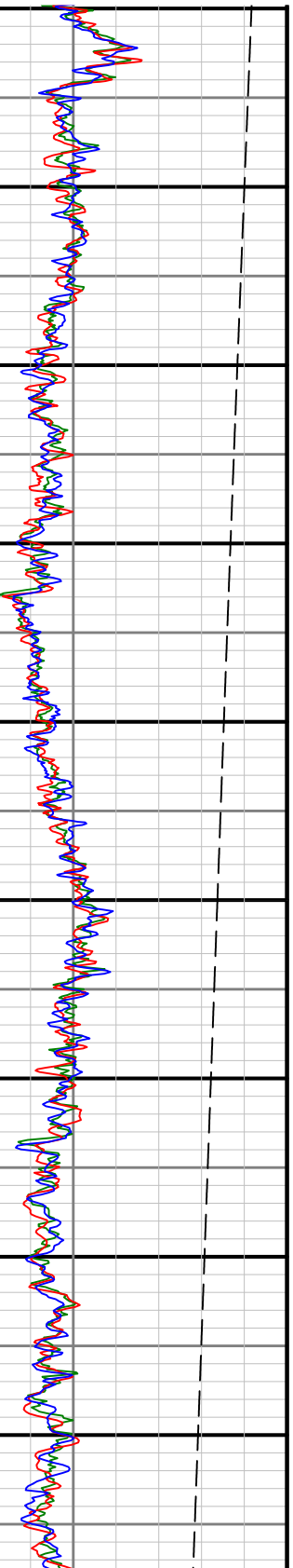
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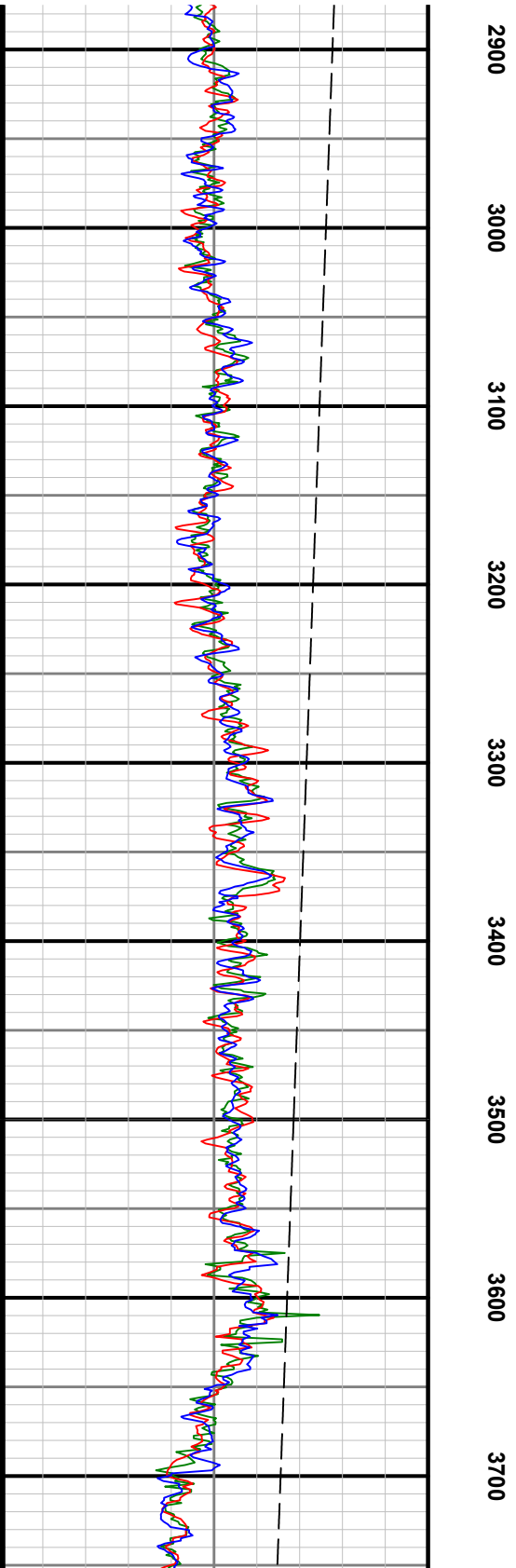
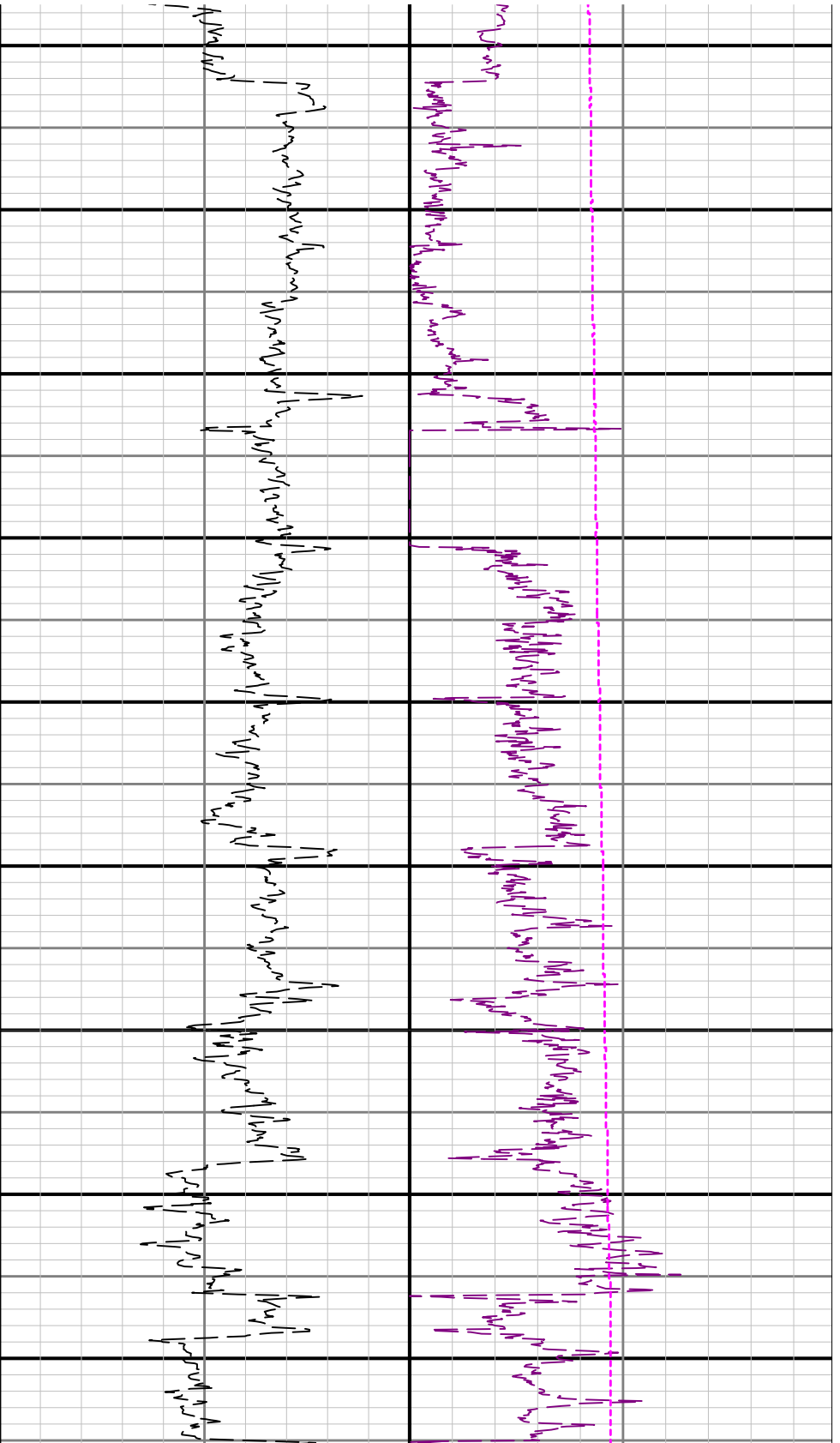
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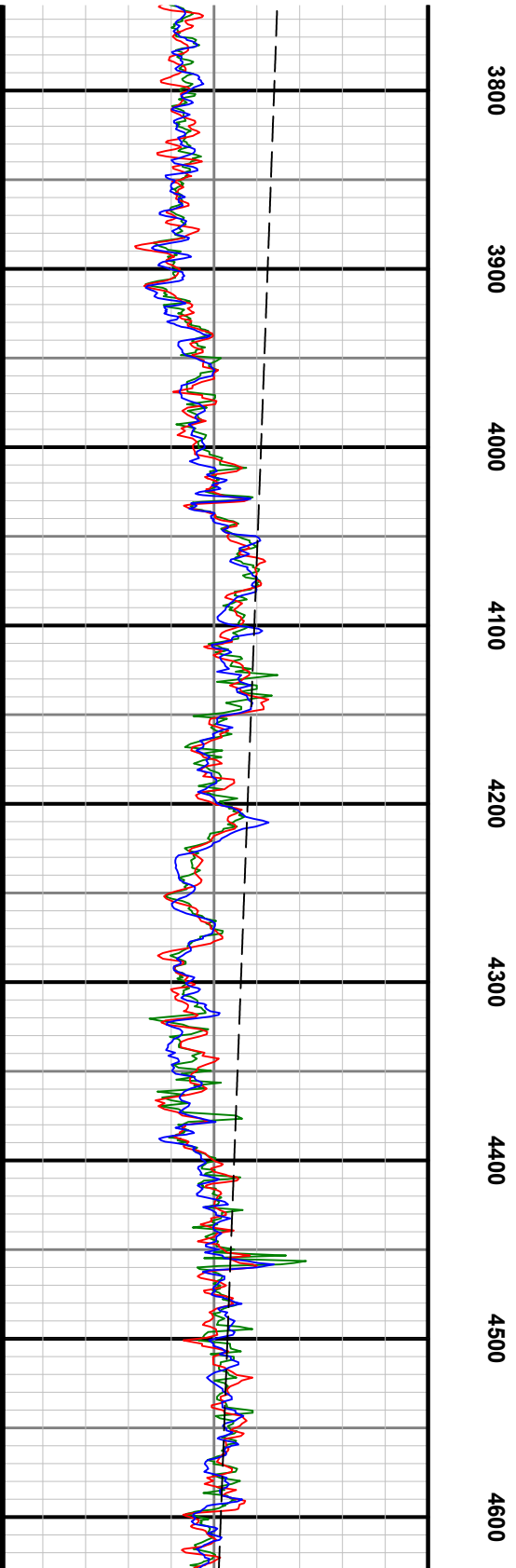
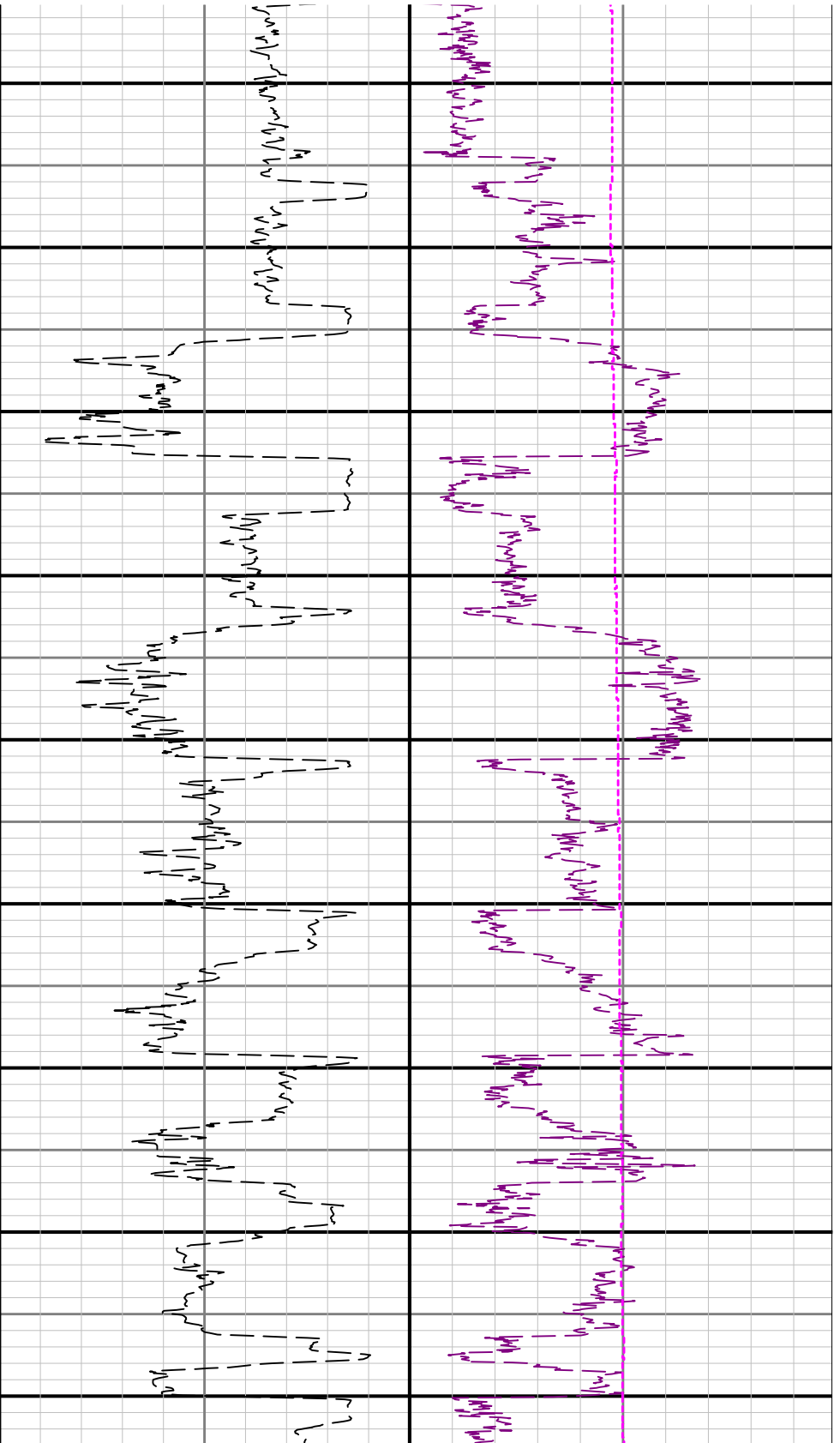
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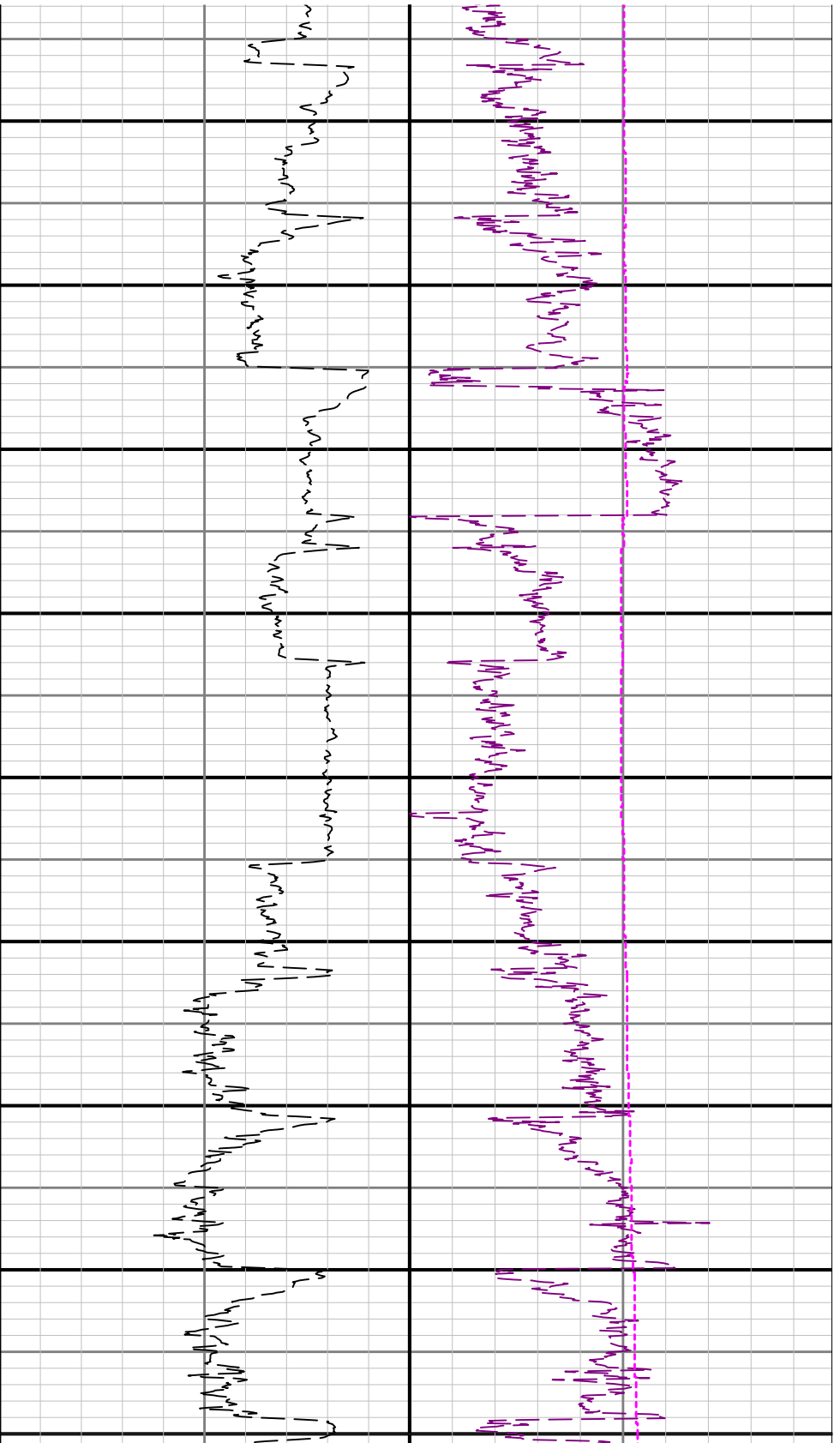
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R4 > R5

4700

4800

4900

5000

5100

5200

5300

5400

5500

