



LWD MEMORY LOG

Gamma Ray

Scale:	Company: Noble Energy										
1:1200 MD	Well: Minutemen Federal LC21-620										
Depth Reference:	Field:	DJ Basin									
Driller's Depth	County:	Weld	Country: United States								
Status:	State:	Colorado									
Final Print	Surface Location:	Latitude:	Longitude:	Other Services:							
API No: 0512342787	SEC:	22	TWN:	9N	RGE:	59W	Wellbore Surveys				
Job ID: 8597136	Permanent Datum (P.D.):	Ground Level	Elevation:	4877.00 ft	Elev. KB:	N/A					
Log Measured From:	Rig Floor	Above P.D.	30.00 ft	Elev. DF:	4907.00 ft	Elev. GL:	4877.00 ft				
Dates	Interval Logged	Magnetic Field Reference									
Date From: 2017-08-01	Top: (ft)	1940.00	Azi Reference North:	Grid	Dip Angle: (deg)	67.06					
Date To: 2017-08-02	Bottom: (ft)	11082.00	Total Magnetic Field Strength: (nT)	Mag to Reference North Correction: (deg)	52589	6.74 E					
Spud Date: 2017-07-31											
Borehole Record	Casing Record										
Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)					
8.500	1940.00	11082.00	9.625	36.00	30.00	1940.00					

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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	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	8.500	PDC	3.00	AutoTrak Curve	1928.00	11069.00	1940.00	11082.00	2017-08-01 03:54	2017-08-02 13:53	30.41

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Steven Cano	2017-07-31	2017-08-02	Vu Ngo	2017-07-31	2017-08-02			

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+ (%)
2017-07-31 21:33	1	1940.00	Oil Based Mud	9.2	10	N/A	N/A	78.9/21.1	Active Pit	25500	0.00
2017-08-02 14:33	1	4220.00	Oil Based Mud	9.0	9	N/A	N/A	80.2/19.8	Active Pit	27000	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)
1	ATC_SU	14236901	Near Bit VSS	5.93	6.75	7.000	4.330
1	ATC_SU	14236901	Near Bit Inclination	5.93	6.75	7.000	4.330
1	ATC_MWD	14179564	Gamma (single)	2.21	12.38	7.000	3.250
1	ATC_MWD	14179564	Directional (mag)	12.28	22.45	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 a 6 3/4" inch Navigamma service (Gamma Ray and Directional) behind a 8 1/2 inch bit and rotary steerable from 1940 to 11082 feet MD (1939 to 6054 feet TVD).

Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	11070.00	8.500	1	The interval from 11070 to 11082 feet MD (6054 feet TVD) was not logged due to sensor offset at well TD.

Curve Mnemonics

Presented Curves	Description	Units
ROPA	Depth Averaged ROP 10 ft Average	ft/h
TVD	True Vertical Depth	ft
WOBA	Weight On Bit, Average 1 ft Average	klb
GRAM	Gamma Ray - Apparent 3 ft Average	API
GRTX	Gamma Time Since Drilled	min
TCDM	Downhole Temperature	degF













