



## Azimuthal Gamma Ray

**Company: Cub Creek Energy**

**Well: Markham 1**

**Field:** Weld County

County: Weld County State: Colorado

Surface Location:

Latitude: 040° 16' 7.032" N

Longitude: 105° 01' 23.232" W

SEC: 32      TWN: 4N      RGE: 68W

el	Elevation:	5044.00 ft	KB:	N/A
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Above P.D.	17.00 ft	CI :	EM4 m #

Interval Logged

## Magnetic Field Reference

1524.00	Azi Reference North:	True	Dip Angle: (deg)	66.74
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n: (tt)	12202.00	Total Magnetic Field Strength: (nT)	52414
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Mag to Reference North Correction: (deg)	8.57
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# Casing Record

To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)
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1537.00	9.625	36.00	97.00	1527.00
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12202.00			
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[illegible]

## Deviation Record

To (ft)	Hole Size (in)	Interval (ft)	Inc   Az (Start)	Inc   Az (End)
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12202.00	13.500	1440.00	1.53	17.44	22.64	139.11
0						

8.500	10665.00	22.64	139.11	91.08	265.46
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Software Version

Other

### 63.3

Rig: Xtreme 18

### 3.3.7410.1

**Contractor:** Xtreme Drilling

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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)			
2	2	8.500	PDC	3.00	AutoTrak Curve	1524.00	12189.00	1538.00	12202.00	2016-10-15 20:23	2016-10-18 05:22	56.76

Crew								
Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Tien Bui	2016-10-07	2016-10-16	Scott Sims	2016-10-15	2016-10-19	Matthew Delmore	2016-10-17	2016-10-19

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+ (%)
2016-10-15 15:30		2	1537.00	Water Based Mud	8.6	2	10.5	24.0	0.2/97.4	Suction	1200	0.00
2016-10-16 03:30		2	3400.00	Water Based Mud	8.6	3	9.5	47.0	0.2/97.5	Suction	1100	0.00
2016-10-16 15:30		2	6100.00	Water Based Mud	10.0	11	9.5	7.1	1.6/90.0	Suction	1400	0.00
2016-10-17 03:30		2	7700.00	Water Based Mud	10.0	12	9.5	6.0	1.6/90.0	Suction	1500	0.00
2016-10-17 15:30		2	9852.00	Water Based Mud	10.0	12	9.8	5.8	1.8/89.9	Suction	1600	0.00
2016-10-18 03:30		2	11843.00	Water Based Mud	10.0	10	9.9	5.9	2.0/89.5	Suction	1800	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	12022378	Near Bit VSS	5.93	6.71	7.000	4.330
2	ATC_SU	12022378	Near Bit Inclination	5.93	6.71	7.000	4.330
2	ATC_MWD	12651936	Gamma (single)	2.75	12.88	7.000	3.250
2	ATC_MWD	12651936	Directional (mag)	12.25	22.38	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 97 to 1537 feet MD (97 to

1497 feet TVD). No logging data was acquired during this run

3 Baker Hughes LWD Run 2 utilized 6 3/4 inch AziGamma services (Gamma Ray and Directional) behind an 8 1/2 inch bit and rotary steerable assembly from 1537 to 12202 feet MD (1497 to 7078 feet TVD).


4 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	1537.00	8.500	2	Gamma Ray logging operations began at 1525 feet MD (1486 feet TVD)
2	12196.00	8.500	2	The interval from 12189 to 12202 feet MD (7078 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 Well

Interval

Created

Cub Creek Energy

Markham 1

Date From: 2016-10-15 20:23:50

Date To: 2016-10-18 05:21:37

2016-10-19 11:32

Top: 1524.00

Bottom: 12202.00

