

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

Well Name State Seventy Holes F21-J24-4HNB

Location NENW SEC. 4 T4N R62W

State CO

County WELD

Country USA

Rig Number FRONTIER 4

API Number 05-123-39212-00

Field WATTENBERG

Region DJ BASIN

Spud Date 1/5/2015

Surface Coordinates 330' FNL x 1384' FWL (LAT: 40.34803, -104.33591)

Bottom Hole Coordinates 470' FSL x 1656' FWL (LAT: 40.33528, -104.33409) PROJECTED

Ground Elevation 4551'

K.B. Elevation 4573'

Logged Interval 5900'

Formation NIOBRARA, B-CHALK

Type of Drilling Fluid LSND, H2O

## Operator

Company Bonanza Creek Energy Inc.

Address 410 17th Street, Suite 1500 Denver, CO 80202

## Geologist

Name Paul McKay

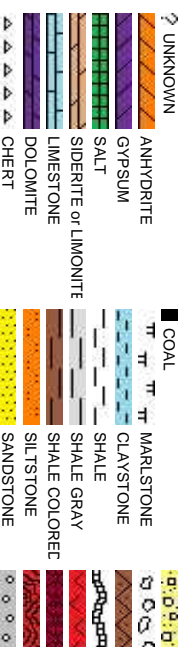
Company Bonanza Creek

Address 410 17TH STREET, SUITE 1500 DENVER, CO 80202

## Zone Color Code



## Rock Types



## Accessories

### Fossils

F FOSSIL	— ARGILLACEOUS	↘ GLAUCONITE
GA GASTROFOD	/ ARGILLITE GRAIN	≡ GYPSIFEROUS
Q OOLITE	B BENTONITE	↑ HEAVY MINERAL
OSTRACOD	BITUMENOUS SUBSTANCE	K KAOLIN
BELEMNITE	BRECCIA FRAGMENTS	TT MARLSTONE
BIOLCLASTIC	↑ CALCAREOUS	⌘ MINERAL CRYSTALS
BRACHIOPOD	■ CARBONACEOUS FLAKES	⊞ NODULES
↑ PISOLITE	▲ CHITK	⊞ PHOSPHATE PELLET
PLANT REMAINS	CHITL	P PYRITE
CERHALOPOD	SCAPHOPOD	田 SALT CAST
CORAL	COAL - THIN BEDS	: SANDY
CRINOID	III STROMATOPOROID	⋈ DOLOMITIC
ECHINOID	+ FELDSPAR	↗ SILICEOUS
FISH	● FERRUGINOUS PELLET	.. SILTY
FORAMINIFERA	// ANHYDRITIC	↘ FERRUGINOUS
		↘ TUFFACEOUS

### Stringer

ANHYDRITE STRINGER
BENTONITE STRINGER
COAL STRINGER
DOLOMITE STRINGER
GYPSUM STRINGER
LIMESTONE STRINGER
MARLSTONE (CALC) STRG
MARLSTONE (DOL) STRG
SANDSTONE STRINGER
SHALE STRINGER
SILTSTONE STRINGER

## Other Symbols

### Oil Show

Q ORGANIC	↔ FORMATION TOP	⬇ CONNECTION GAS	⊞ CRYPTOXLN
P PINPOINT	⚡ GAS SHOW	⬆ CONNECTION DOWN	E EARTHY
↓ DEAD	MINDEPTH MN DEPTH	CASING	FX FINELYXLN
● EVEN	⚡ NORMAL FAULT	FORMATION TOP	GS GRAINSTONE
QUESTIONABLE	● OIL SHOW	⬆ FORMATION TOP	L LITHOGRAPHIC
SPOTTED STAINING	⚡ OVERTURNED STRATA		MX MICROXLN

### Engineering

BIT	REVERSE FAULT	A ANGULAR
CASING	SIDEWALL CORE (LEFT)	R ROUNDED
CONNECTION (LEFT)	SIDEWALL CORE (RIGHT)	B SUBANG
CONNECTION (RIGHT)	CONNECTION GAS	P SUBRND
F FRACTURE	↓ CORE - LOST	
INTERCRYSTALLINE	■ CORE - RECOVERED	
INTEROOLITIC	⚡ DST INTERVAL	
MOULDIC	⚡ FAULT	

### Porosity

E EARTHY	CONNECTION (LEFT)	REVERSE FAULT	A ANGULAR
FENESTRAL	CONNECTION (RIGHT)	SIDEWALL CORE (LEFT)	R ROUNDED
FRACTURE	CONNECTION GAS	SIDEWALL CORE (RIGHT)	B SUBANG
INTERCRYSTALLINE	↓ CORE - LOST	CONNECTION GAS	P SUBRND
INTEROOLITIC	■ CORE - RECOVERED		
MOULDIC	⚡ DST INTERVAL		
	⚡ FAULT		

### Textures

WIREFINE TESTED - LEFT	B3 BOUNDSTONE	M MODERATE
WIREFINE TESTED - RT	C CHALKY	P POOR
		W WELL

### Sorting

MS MUDSTONE
PS PACKSTONE
WS WACKSTONE

## ding



CONGLOMERATE	CHALK
BRECCIA	SILTY SHALE
TILL	NO SAMPLE
BENTONITE	SHALY SANDSTONE
TUFF	SHALY SILTSTONE
IGNEOUS	
METAMORPHIC	
CEMENT	

Slide/Rotate

ROP  
ROP  
GAMMA

Bit Data  
Bit #: 3  
Type: HE04JMRSV  
Size: 8.75  
Depth In: 5686"  
Jets: 3/20  
S/N: 1395284

Total Gas & Chromatograph  
GAS  
C1  
C2  
C3  
C4

Depth Labels

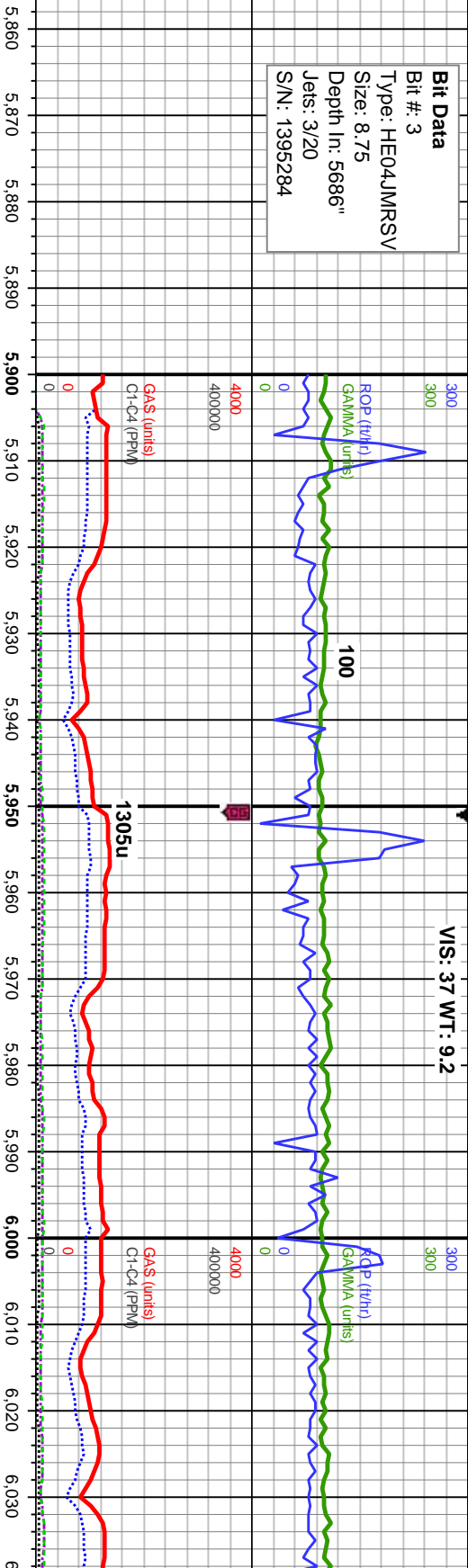
% Lith

Well Bore  
TVD

Oil Show

Images

VIS: 37 WT: 9.2



COLUMBINE LOGGING INC.  
RIGGED UP ON 1/8/2015  
MANNED 2-PERSON LOGGING  
WITH BLOODHOUND GAS  
CHROMATOGRAPH UNIT #316  
BEGAN LOGGING ON  
1/10/2015 @ 04:00 MST

100% SLTY SH: lt-med gy, some dk gy, mod  
sft - sl firm, sb blk-y-sb pily, occ pily, rthy, mtx;  
arg-sily, sl calc, tr shly ss

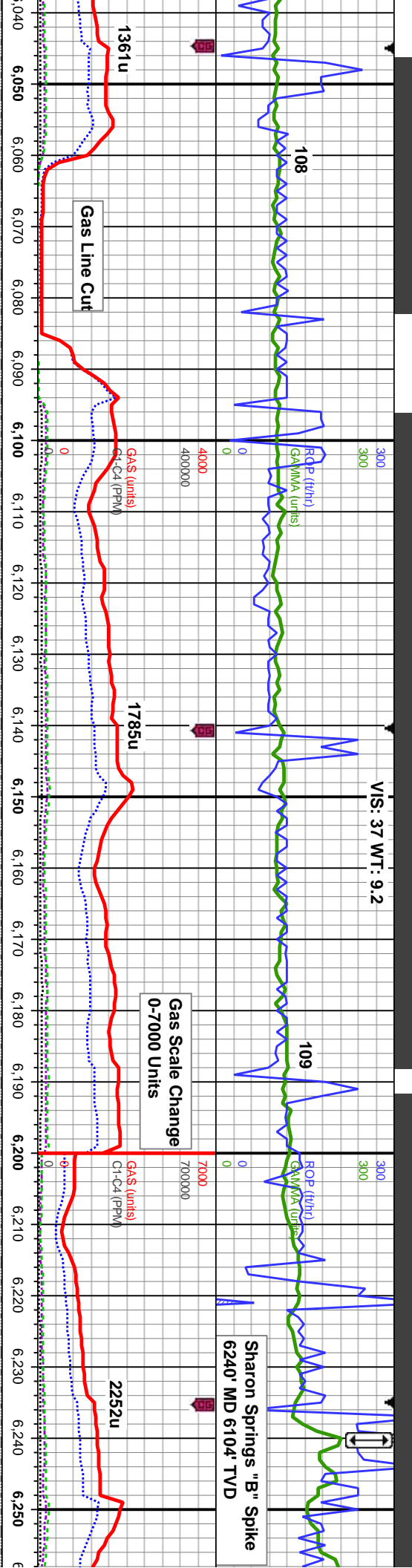
100% SLTY SH: lt-med gy, some dk gy, mod  
sft - sl firm, sb blk-y-sb pily, occ pily, rthy, mtx;  
arg-sily, sl calc, tr shly ss

100% SLTY SH: lt-med gy, some c  
firm, sb blk-y-sb pily, occ pily, rthy,  
calc, tr shly ss

E  
G  
M  
F  
T  
ST







MD: 6,052'  
Inclination: 38.57°  
Azimuth: 176.93°  
VS: -165.07'  
TVD: 5,977.28'

MD: 6,099'  
Inclination: 41.73°  
Azimuth: 175.7°  
VS: -134.8'  
TVD: 6,013.2'

MD: 6,146'  
Inclination: 46.97°  
Azimuth: 173.19°  
VS: -101.97'  
TVD: 6,046.8'

MD: 6,194'  
Inclination: 52.47°  
Azimuth: 175.8°  
VS: -65.37'  
TVD: 6,077.82'

MD: 6,242'  
Inclination: 58.2°  
Azimuth: 178.57°  
VS: -25.99'  
TVD: 6,105.12'

108		109		2252u	
1361u		1785u		2252u	
Gas Line Cut		Gas Scale Change 0-7000 Units		Sharon Springs "B" Spike 6240' MD 6104' TVD	
MD: 6,052'		MD: 6,099'		MD: 6,146'	
Inclination: 38.57°		Inclination: 41.73°		Inclination: 46.97°	
Azimuth: 176.93°		Azimuth: 175.7°		Azimuth: 173.19°	
VS: -165.07'		VS: -134.8'		VS: -101.97'	
TVD: 5,977.28'		TVD: 6,013.2'		TVD: 6,046.8'	
MD: 6,194'		MD: 6,194'		MD: 6,194'	
Inclination: 52.47°		Inclination: 52.47°		Inclination: 52.47°	
Azimuth: 175.8°		Azimuth: 175.8°		Azimuth: 175.8°	
VS: -65.37'		VS: -65.37'		VS: -65.37'	
TVD: 6,077.82'		TVD: 6,077.82'		TVD: 6,077.82'	
MD: 6,242'		MD: 6,242'		MD: 6,242'	
Inclination: 58.2°		Inclination: 58.2°		Inclination: 58.2°	
Azimuth: 178.57°		Azimuth: 178.57°		Azimuth: 178.57°	
VS: -25.99'		VS: -25.99'		VS: -25.99'	
TVD: 6,105.12'		TVD: 6,105.12'		TVD: 6,105.12'	
100% SLTY SH: lt-med gy, some dk gy, mod sft - sl		100% SLTY SH: lt-med gy, some dk gy, mod sft - sl		100% SLTY SH: lt-med gy, some dk gy, mod sft - sl	
firm, sb blk-ly-sb pty, occ pty, rthy, mx; arg-sily, sl calc		firm, sb blk-ly-sb pty, occ pty, rthy, mx; arg-sily, sl calc		firm, sb blk-ly-sb pty, occ pty, rthy, mx; arg-sily, sl calc	
15-0% SLTY SH		15-0% SLTY SH		15-0% SLTY SH	
mx; arg-sily, sl		mx; arg-sily, sl		mx; arg-sily, sl	
50-60%: MRLS		50-60%: MRLS		50-60%: MRLS	
frm-mod nd, arg		frm-mod nd, arg		frm-mod nd, arg	
occ wht-crm, mn		occ wht-crm, mn		occ wht-crm, mn	
yel ring, fr stn		yel ring, fr stn		yel ring, fr stn	

