

# Bighorn Directional, Inc.

Nighthawk Production LLC  
Blackcomb 5-14  
Lincoln County, CO



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### Minimum of Curvature

Slot Location: 1624817.88', 3588683.76'

Plane of Vertical Section:  $303.29^\circ$ 

Measured Depth Feet	B O R E Inc Degrees	H O L E Direction Degrees	True Vertical Depth Feet	RECTANGULAR COORDINATES		LAMBERT COORDINATES		Vertical Section Feet	CLOSURES		Dogleg Severity Deg/100'	
				North(-South)	East(-West)	Y	X		Distance	Direction		
				Feet	Feet	Feet	Feet		Feet	Deg		
KOP - Start Build	1500.00	0.00	0.00	1500.00	0.00	0.00	1624817.9	3588683.8	0.00	0.00	0.00	0.00
	1600.00	1.50	303.29	1599.99	0.72	-1.09	1624818.6	3588682.7	1.31	1.31	303.29	1.50
	1700.00	3.00	303.29	1699.91	2.87	-4.38	1624820.8	3588679.4	5.23	5.23	303.29	1.50
	1800.00	4.50	303.29	1799.69	6.46	-9.84	1624824.3	3588673.9	11.77	11.77	303.29	1.50
	1833.20	5.00	303.29	1832.78	7.97	-12.14	1624825.8	3588671.6	14.52	14.52	303.29	1.50
End Build												
Niobrara Ft. Hayes	2333.20	5.00	303.29	2330.88	31.88	-48.55	1624849.8	3588635.2	58.08	58.08	303.29	0.00
	2833.20	5.00	303.29	2828.98	55.79	-84.97	1624873.7	3588598.8	101.64	101.64	303.29	0.00
	3333.20	5.00	303.29	3327.07	79.69	-121.38	1624897.6	3588562.4	145.21	145.21	303.29	0.00
	3698.52	5.00	303.29	3691.00	97.16	-147.99	1624915.0	3588535.8	177.03	177.03	303.29	0.00
	4057.88	5.00	303.29	4049.00	114.34	-174.16	1624932.2	3588509.6	208.34	208.34	303.29	0.00
Start Drop D Sand Vertical	4371.08	5.00	303.29	4361.01	129.32	-196.97	1624947.2	3588486.8	235.63	235.63	303.29	0.00
	4471.08	3.50	303.29	4460.73	133.38	-203.16	1624951.3	3588480.6	243.03	243.03	303.29	1.50
	4554.46	2.25	303.29	4544.00	135.68	-206.65	1624953.6	3588477.1	247.21	247.21	303.29	1.50
	4654.46	0.75	303.29	4643.96	137.11	-208.84	1624955.0	3588474.9	249.82	249.82	303.29	1.50
	4704.28	0.00	303.29	4693.79	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	1.50
Pennsylvanian LKC Marmaton	6169.49	0.00	303.29	6159.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00
	6873.49	0.00	303.29	6863.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00
	7205.49	0.00	303.29	7195.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00

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Slot Location: 1624817.88', 3588683.76'

Plane of Vertical Section:  $303.29^\circ$ 

Measured Depth Feet	BORE Inc Degrees	HOLE Direction Degrees	True Vertical Depth Feet	RECTANGULAR COORDINATES		LAMBERT COORDINATES		Vertical Section Feet	CLOSURES		Dogleg Severity Deg/100'
				North(-South)	East(-West)	Y Feet	X Feet		Distance Feet	Direction Deg	
				Feet	Feet						
7386.49	0.00	303.29	7376.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00
Cherokee											
7999.49	0.00	303.29	7989.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00
Mississippian											
8070.49	0.00	303.29	8060.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00
Spergen											
9010.49	0.00	303.29	9000.00	137.29	-209.11	1624955.2	3588474.7	250.15	250.15	303.29	0.00

TD

Final Station Closure Distance: 250.15' Direction: 303.29°

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**Horizontal Plan**  
1" = 100'

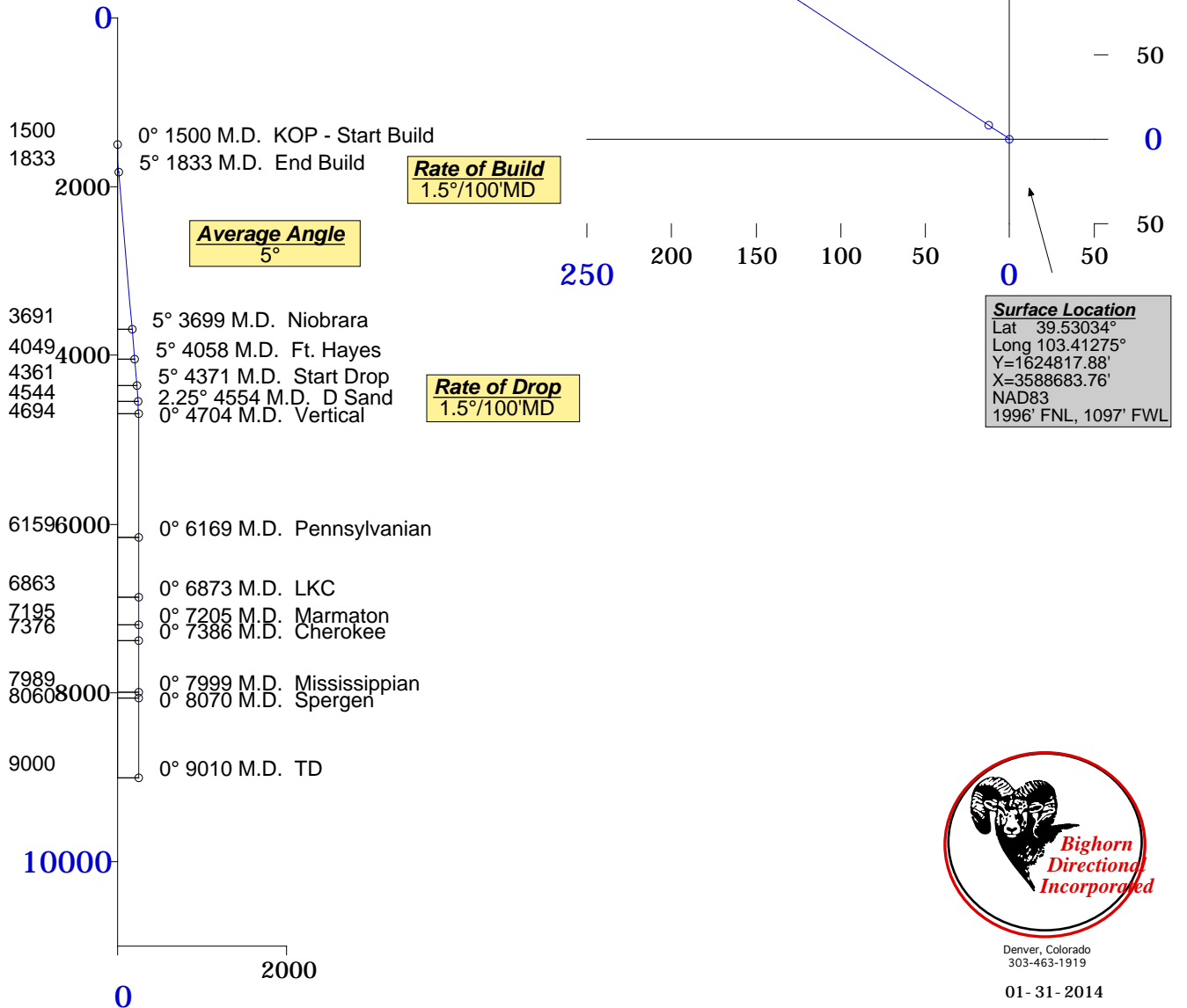


## Vertical Target

250.15' Displacement from S/L  
@ 303.29° Azimuth from S/L  
North-137.29' West-209.11' of S/L  
TVD-4694' MD-4704'  
Y=1624955.2', X=3588474.7'  
**TD**  
TVD-9000' MD-9010'  
1853' FNL, 893' FWL

**Plane of Proposal**  
303.29° Azimuth

**Vertical Section**  
1" = 2000'



Denver, Colorado  
303-463-1919

01-31-2014