

# **MALLARD EXPLORATION**

**WELD COUNTY, COLORADO (NAD 83)**

**NE SW SEC. 31 T9N R59W 6th P.M.**

**SHULL FED 31-32-12HN**

**ORIGINAL WELLBORE**

**21 December, 2017**

**Plan: PROPOSAL #1**





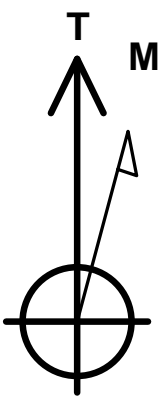
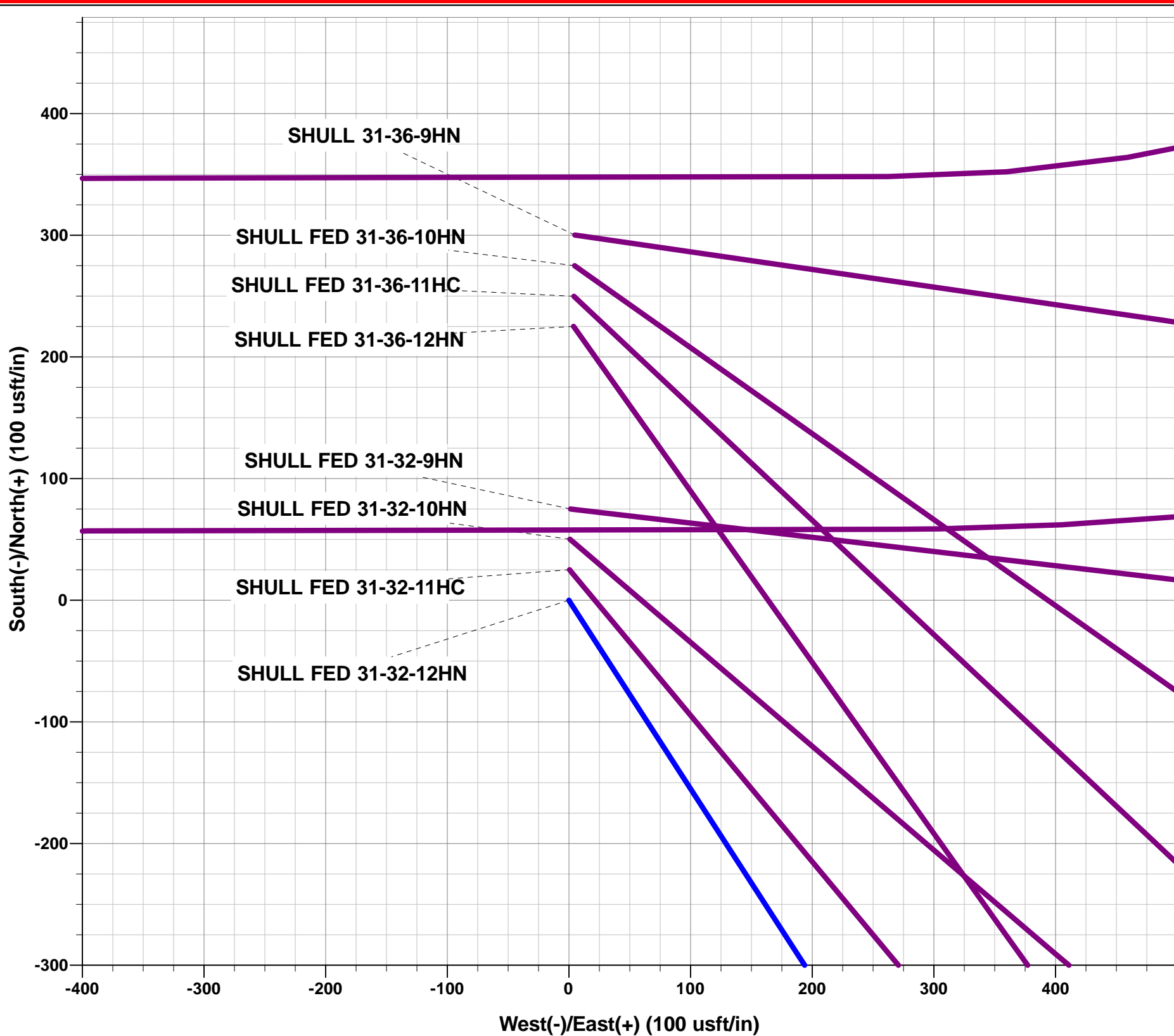
Project: WELD COUNTY, COLORADO (NAD 83)  
Site: NE SW SEC. 31 T9N R59W 6th P.M.  
Well: SHULL FED 31-32-12HN  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHL: 1703ft FSL & 1777ft FWL of Sec 31
300.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1280.86	1301.11	20.02	147.14	-145.45	93.94	114.23	173.15	EOB TO 20.02° INC
4442.18	4665.79	20.02	147.14	-1113.18	718.95	874.28	1325.16	END OF TANGENT
5423.04	5666.91	0.00	0.00	-1258.63	812.89	988.51	1498.31	EOD TO VERTICAL
5523.04	5766.91	0.00	0.00	-1258.63	812.89	988.51	1498.31	KOP (10°/100ft BUR)
6096.00	6666.90	90.00	89.79	-1256.53	1385.84	1554.98	2071.27	HZ LP: 465ft FSL & 2140ft FEL of Sec 32
6096.00	13593.65	90.00	89.79	-1231.12	8312.54	8403.21	8998.02	BHL: 465ft FSL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP: SHULL FED 31-32-12HN	5523.04	-1258.63	812.89	40.700482	-104.020979
HZ LP: SHULL FED 31-32-12HN	6096.00	-1256.53	1385.84	40.700488	-104.018913
BHL: SHULL FED 31-32-12HN	6096.00	-1231.12	8312.54	40.700554	-103.993932



Azimuths to True North  
Magnetic North: 7.78°

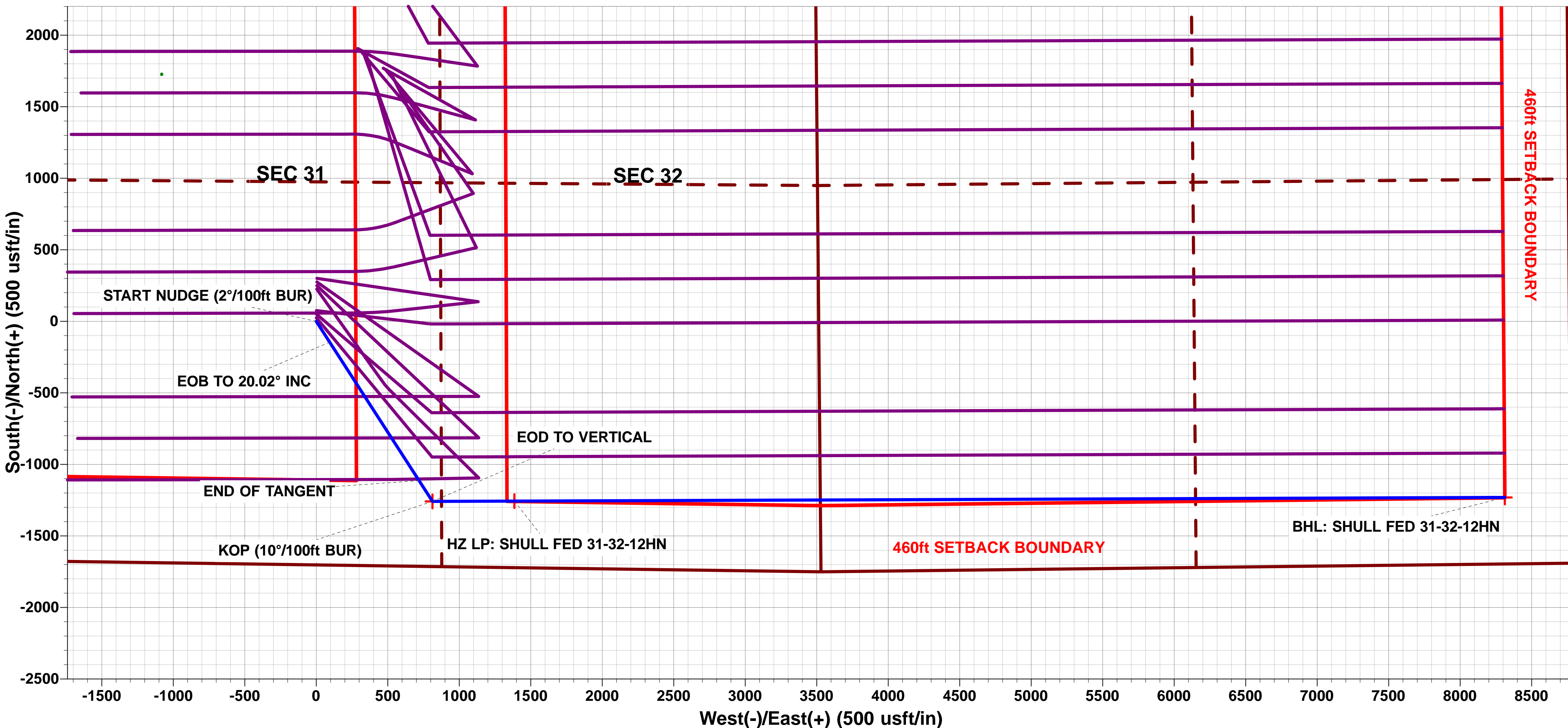
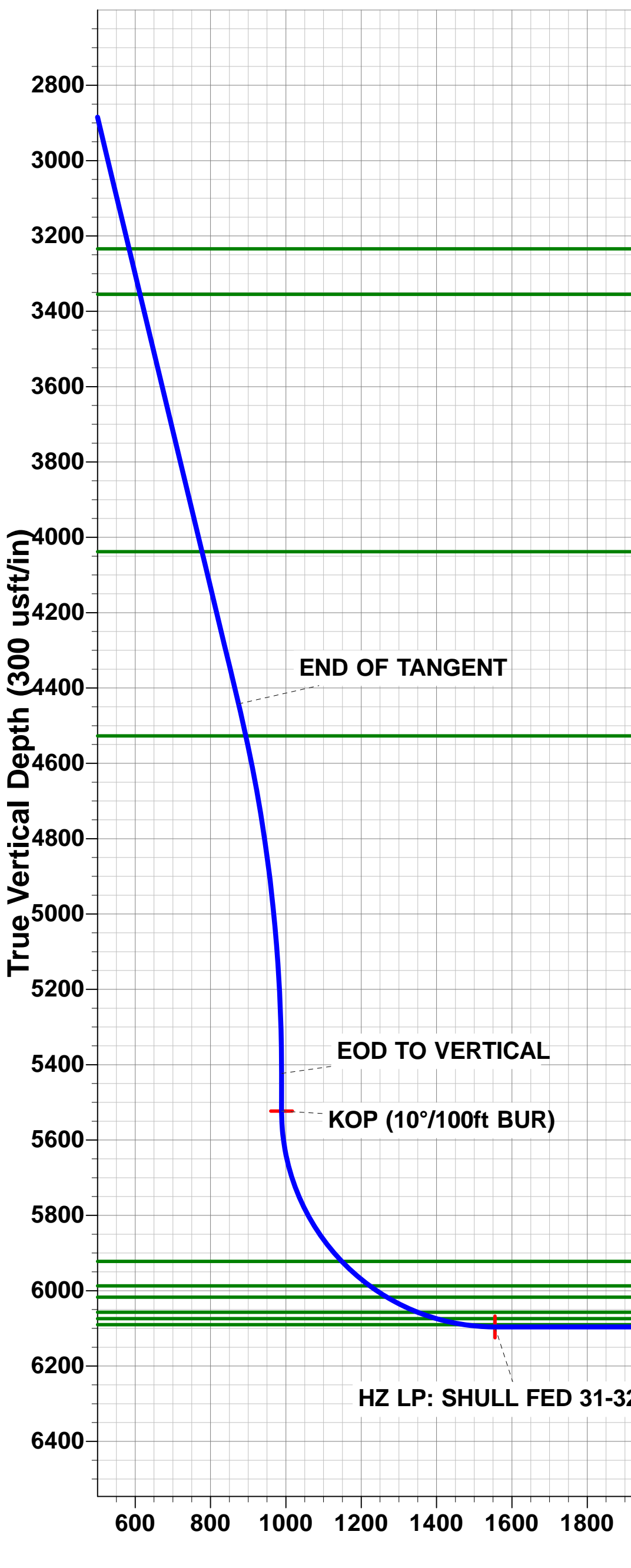
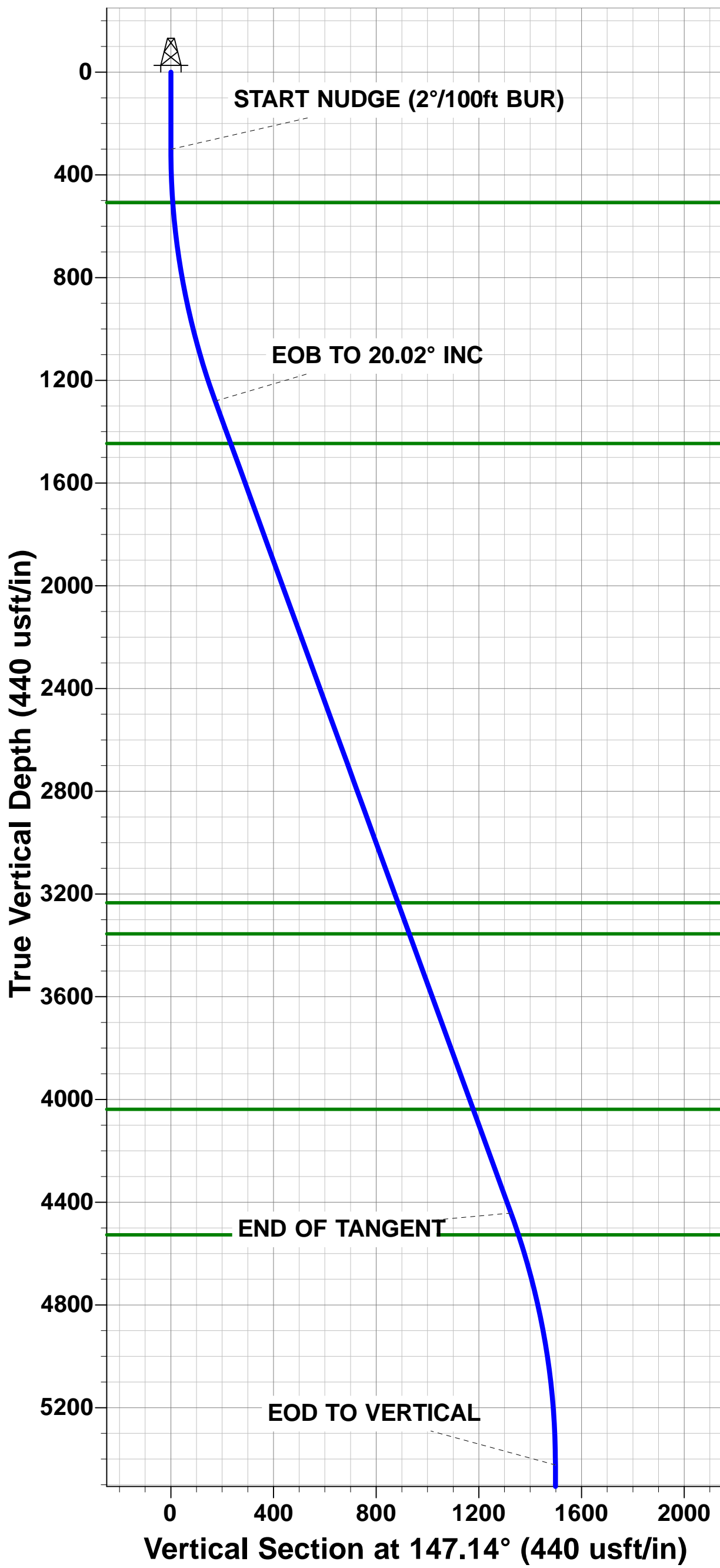
Magnetic Field  
Strength: 52566.2snT  
Dip Angle: 67.20°  
Date: 19/12/2017  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
508.00	508.18	FOX HILLS BASE
1446.00	1476.87	PIERRE SHALE TOP
3234.00	3379.89	RICHARD SNADSTONE
3355.00	3508.68	PARKMAN SANDSTONE
4038.00	4235.61	SUSSEX SANDSTONE
4527.00	4755.57	SHANNON SANDSTONE
5922.00	6208.23	SHARON SPRINGS
5987.00	6307.63	NIOBRARA A CHALK
6017.00	6362.46	NIOBRARA A CHALK BASE
6057.00	6454.29	NIOBRARA B1 CHALK TOP
6074.00	6507.62	NIOBRARA B1 CHALK BASE
6090.00	6583.92	NIOBRARA B2 CHALK TOP

PROPOSED LOCAL COORDINATES:

SHL: 1703ft FSL & 1777ft FWL of Sec 31  
HZ LP: 465ft FSL & 2140ft FEL of Sec 32  
BHL: 465ft FSL & 460ft FEL of Sec 32



Vertical Section at 98.42° (300 usft/in)

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-12HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Site:</b>	NE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-12HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

<b>Project</b>	WELD COUNTY, COLORADO (NAD 83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

<b>Site</b>	NE SW SEC. 31 T9N R59W 6th P.M.		
<b>Site Position:</b>		<b>Northing:</b>	1,502,994.38 usft
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,409,243.99 usft
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	1.10000 ft
		<b>Latitude:</b>	40.704761
		<b>Longitude:</b>	-104.023893
		<b>Grid Convergence:</b>	0.95 °

<b>Well</b>	SHULL FED 31-32-12HN		
<b>Well Position</b>	<b>+N/-S</b>	-300.22 usft	<b>Northing:</b> 1,502,694.12 usft
	<b>+E/-W</b>	-4.99 usft	<b>Easting:</b> 3,409,243.99 usft
<b>Position Uncertainty</b>	0.00 usft	<b>Wellhead Elevation:</b>	usft
		<b>Latitude:</b>	40.703937
		<b>Longitude:</b>	-104.023911
		<b>Ground Level:</b>	4,880.00 usft

<b>Wellbore</b>	ORIGINAL WELLBORE				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	19/12/2017	7.78	67.20	52,566

<b>Design</b>	PROPOSAL #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	98.42

<b>Plan Sections</b>											
MD (usft)	Inc (°)	Azi (°)	Vertical Depth	SS (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100usf)	Turn Rate (°/100usf)	TFO (°)	Target
0.00	0.00	0.00	0.00	-4,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	-4,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,301.11	20.02	147.14	1,280.86	-3,619.14	-145.45	93.94	2.00	2.00	0.00	147.14	
4,665.79	20.02	147.14	4,442.18	-457.82	-1,113.18	718.95	0.00	0.00	0.00	0.00	
5,666.91	0.00	0.00	5,423.04	523.04	-1,258.63	812.89	2.00	-2.00	0.00	180.00	
5,766.91	0.00	0.00	5,523.04	623.04	-1,258.63	812.89	0.00	0.00	0.00	0.00	KOP: SHULL FED 31-
6,666.90	90.00	89.79	6,096.00	1,196.00	-1,256.53	1,385.84	10.00	10.00	9.98	89.79	HZ LP: SHULL FED 3
13,593.65	90.00	89.79	6,096.00	1,196.00	-1,231.12	8,312.54	0.00	0.00	0.00	0.00	BHL: SHULL FED 31-

# Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Site:</b>	NE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-12HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
<b>SHL: 1703ft FSL &amp; 1777ft FWL of Sec 31</b>										
0.00	0.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>START NUDGE (2°/100ft BUR)</b>										
300.00	0.00	0.00	300.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	2.00	147.14	399.98	4,500.02	-1.47	0.95	1.15	2.00	2.00	0.00
500.00	4.00	147.14	499.84	4,400.16	-5.86	3.79	4.60	2.00	2.00	0.00
<b>FOX HILLS BASE</b>										
508.18	4.16	147.14	508.00	4,392.00	-6.35	4.10	4.99	2.00	2.00	0.00
600.00	6.00	147.14	599.45	4,300.55	-13.18	8.51	10.35	2.00	2.00	0.00
700.00	8.00	147.14	698.70	4,201.30	-23.42	15.13	18.39	2.00	2.00	0.00
800.00	10.00	147.14	797.47	4,102.53	-36.56	23.61	28.71	2.00	2.00	0.00
900.00	12.00	147.14	895.62	4,004.38	-52.59	33.96	41.30	2.00	2.00	0.00
1,000.00	14.00	147.14	993.06	3,906.94	-71.48	46.17	56.14	2.00	2.00	0.00
1,100.00	16.00	147.14	1,089.64	3,810.36	-93.22	60.21	73.22	2.00	2.00	0.00
1,200.00	18.00	147.14	1,185.27	3,714.73	-117.78	76.07	92.51	2.00	2.00	0.00
1,300.00	20.00	147.14	1,279.82	3,620.18	-145.13	93.73	113.98	2.00	2.00	0.00
<b>EOB TO 20.02° INC</b>										
1,301.11	20.02	147.14	1,280.86	3,619.14	-145.45	93.94	114.23	2.00	2.00	0.00
1,400.00	20.02	147.14	1,373.77	3,526.23	-173.89	112.31	136.57	0.00	0.00	0.00
<b>PIERRE SHALE TOP</b>										
1,476.87	20.02	147.14	1,446.00	3,454.00	-196.00	126.59	153.94	0.00	0.00	0.00
1,500.00	20.02	147.14	1,467.73	3,432.27	-202.65	130.88	159.16	0.00	0.00	0.00
1,600.00	20.02	147.14	1,561.68	3,338.32	-231.41	149.46	181.75	0.00	0.00	0.00
1,700.00	20.02	147.14	1,655.64	3,244.36	-260.18	168.04	204.34	0.00	0.00	0.00
1,800.00	20.02	147.14	1,749.60	3,150.40	-288.94	186.61	226.93	0.00	0.00	0.00
1,900.00	20.02	147.14	1,843.55	3,056.45	-317.70	205.19	249.52	0.00	0.00	0.00
2,000.00	20.02	147.14	1,937.51	2,962.49	-346.46	223.76	272.11	0.00	0.00	0.00
2,100.00	20.02	147.14	2,031.46	2,868.54	-375.22	242.34	294.70	0.00	0.00	0.00
2,200.00	20.02	147.14	2,125.42	2,774.58	-403.98	260.91	317.28	0.00	0.00	0.00
2,300.00	20.02	147.14	2,219.38	2,680.62	-432.74	279.49	339.87	0.00	0.00	0.00
2,400.00	20.02	147.14	2,313.33	2,586.67	-461.51	298.06	362.46	0.00	0.00	0.00
2,500.00	20.02	147.14	2,407.29	2,492.71	-490.27	316.64	385.05	0.00	0.00	0.00
2,600.00	20.02	147.14	2,501.24	2,398.76	-519.03	335.22	407.64	0.00	0.00	0.00
2,700.00	20.02	147.14	2,595.20	2,304.80	-547.79	353.79	430.23	0.00	0.00	0.00
2,800.00	20.02	147.14	2,689.16	2,210.84	-576.55	372.37	452.82	0.00	0.00	0.00
2,900.00	20.02	147.14	2,783.11	2,116.89	-605.31	390.94	475.41	0.00	0.00	0.00
3,000.00	20.02	147.14	2,877.07	2,022.93	-634.07	409.52	498.00	0.00	0.00	0.00
3,100.00	20.02	147.14	2,971.02	1,928.98	-662.84	428.09	520.58	0.00	0.00	0.00
3,200.00	20.02	147.14	3,064.98	1,835.02	-691.60	446.67	543.17	0.00	0.00	0.00
3,300.00	20.02	147.14	3,158.94	1,741.06	-720.36	465.25	565.76	0.00	0.00	0.00
<b>RICHARD SNADSTONE</b>										
3,379.89	20.02	147.14	3,234.00	1,666.00	-743.34	480.09	583.81	0.00	0.00	0.00
3,400.00	20.02	147.14	3,252.89	1,647.11	-749.12	483.82	588.35	0.00	0.00	0.00
3,500.00	20.02	147.14	3,346.85	1,553.15	-777.88	502.40	610.94	0.00	0.00	0.00
<b>PARKMAN SANDSTONE</b>										
3,508.68	20.02	147.14	3,355.00	1,545.00	-780.38	504.01	612.90	0.00	0.00	0.00
3,600.00	20.02	147.14	3,440.80	1,459.20	-806.64	520.97	633.53	0.00	0.00	0.00
3,700.00	20.02	147.14	3,534.76	1,365.24	-835.40	539.55	656.12	0.00	0.00	0.00
3,800.00	20.02	147.14	3,628.72	1,271.28	-864.17	558.12	678.71	0.00	0.00	0.00
3,900.00	20.02	147.14	3,722.67	1,177.33	-892.93	576.70	701.30	0.00	0.00	0.00
4,000.00	20.02	147.14	3,816.63	1,083.37	-921.69	595.28	723.88	0.00	0.00	0.00

## Planning Report



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<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Site:</b>	NE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-12HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,100.00	20.02	147.14	3,910.58	989.42	-950.45	613.85	746.47	0.00	0.00	0.00
4,200.00	20.02	147.14	4,004.54	895.46	-979.21	632.43	769.06	0.00	0.00	0.00
<b>SUSSEX SANDSTONE</b>										
<b>4,235.61</b>	<b>20.02</b>	<b>147.14</b>	<b>4,038.00</b>	<b>862.00</b>	<b>-989.45</b>	<b>639.04</b>	<b>777.11</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,300.00	20.02	147.14	4,098.50	801.50	-1,007.97	651.00	791.65	0.00	0.00	0.00
4,400.00	20.02	147.14	4,192.45	707.55	-1,036.73	669.58	814.24	0.00	0.00	0.00
4,500.00	20.02	147.14	4,286.41	613.59	-1,065.50	688.15	836.83	0.00	0.00	0.00
4,600.00	20.02	147.14	4,380.36	519.64	-1,094.26	706.73	859.42	0.00	0.00	0.00
<b>END OF TANGENT</b>										
<b>4,665.79</b>	<b>20.02</b>	<b>147.14</b>	<b>4,442.18</b>	<b>457.82</b>	<b>-1,113.18</b>	<b>718.95</b>	<b>874.28</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,700.00	19.34	147.14	4,474.39	425.61	-1,122.86	725.20	881.88	2.00	-2.00	0.00
<b>SHANNON SANDSTONE</b>										
<b>4,755.57</b>	<b>18.23</b>	<b>147.14</b>	<b>4,527.00</b>	<b>373.00</b>	<b>-1,137.89</b>	<b>734.91</b>	<b>893.68</b>	<b>2.00</b>	<b>-2.00</b>	<b>0.00</b>
4,800.00	17.34	147.14	4,569.31	330.69	-1,149.28	742.27	902.64	2.00	-2.00	0.00
4,900.00	15.34	147.14	4,665.26	234.74	-1,172.91	757.53	921.19	2.00	-2.00	0.00
5,000.00	13.34	147.14	4,762.14	137.86	-1,193.72	770.97	937.53	2.00	-2.00	0.00
5,100.00	11.34	147.14	4,859.83	40.17	-1,211.66	782.56	951.63	2.00	-2.00	0.00
5,200.00	9.34	147.14	4,958.20	-58.20	-1,226.74	792.29	963.47	2.00	-2.00	0.00
5,300.00	7.34	147.14	5,057.14	-157.14	-1,238.92	800.16	973.03	2.00	-2.00	0.00
5,400.00	5.34	147.14	5,156.52	-256.52	-1,248.19	806.15	980.32	2.00	-2.00	0.00
5,500.00	3.34	147.14	5,256.23	-356.23	-1,254.55	810.25	985.31	2.00	-2.00	0.00
5,600.00	1.34	147.14	5,356.14	-456.14	-1,257.97	812.47	988.00	2.00	-2.00	0.00
<b>EOD TO VERTICAL</b>										
<b>5,666.91</b>	<b>0.00</b>	<b>0.00</b>	<b>5,423.04</b>	<b>-523.04</b>	<b>-1,258.63</b>	<b>812.89</b>	<b>988.51</b>	<b>2.00</b>	<b>-2.00</b>	<b>0.00</b>
5,700.00	0.00	0.00	5,456.13	-556.13	-1,258.63	812.89	988.51	0.00	0.00	0.00
<b>KOP (10°/100ft BUR)</b>										
<b>5,766.91</b>	<b>0.00</b>	<b>0.00</b>	<b>5,523.04</b>	<b>-623.04</b>	<b>-1,258.63</b>	<b>812.89</b>	<b>988.51</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
5,800.00	3.31	89.79	5,556.12	-656.12	-1,258.63	813.85	989.46	10.00	10.00	0.00
5,900.00	13.31	89.79	5,654.94	-754.94	-1,258.57	828.28	1,003.73	10.00	10.00	0.00
6,000.00	23.31	89.79	5,749.76	-849.76	-1,258.46	859.65	1,034.75	10.00	10.00	0.00
6,100.00	33.31	89.79	5,837.69	-937.69	-1,258.28	907.02	1,081.58	10.00	10.00	0.00
6,200.00	43.31	89.79	5,916.05	-1,016.05	-1,258.06	968.93	1,142.79	10.00	10.00	0.00
<b>SHARON SPRINGS</b>										
<b>6,208.23</b>	<b>44.13</b>	<b>89.79</b>	<b>5,922.00</b>	<b>-1,022.00</b>	<b>-1,258.04</b>	<b>974.61</b>	<b>1,148.41</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,300.00	53.31	89.79	5,982.48	-1,082.48	-1,257.78	1,043.51	1,216.52	10.00	10.00	0.00
<b>NIORARA A CHALK</b>										
<b>6,307.63</b>	<b>54.07</b>	<b>89.79</b>	<b>5,987.00</b>	<b>-1,087.00</b>	<b>-1,257.76</b>	<b>1,049.66</b>	<b>1,222.60</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
<b>NIORARA A CHALK BASE</b>										
<b>6,362.46</b>	<b>59.56</b>	<b>89.79</b>	<b>6,017.00</b>	<b>-1,117.00</b>	<b>-1,257.59</b>	<b>1,095.53</b>	<b>1,267.95</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,400.00	63.31	89.79	6,034.95	-1,134.95	-1,257.47	1,128.49	1,300.54	10.00	10.00	0.00
<b>NIORARA B1 CHALK TOP</b>										
<b>6,454.29</b>	<b>68.74</b>	<b>89.79</b>	<b>6,057.00</b>	<b>-1,157.00</b>	<b>-1,257.29</b>	<b>1,178.07</b>	<b>1,349.56</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,500.00	73.31	89.79	6,071.86	-1,171.86	-1,257.13	1,221.29	1,392.29	10.00	10.00	0.00
<b>NIORARA B1 CHALK BASE</b>										
<b>6,507.62</b>	<b>74.07</b>	<b>89.79</b>	<b>6,074.00</b>	<b>-1,174.00</b>	<b>-1,257.11</b>	<b>1,228.60</b>	<b>1,399.52</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
<b>NIORARA B2 CHALK TOP</b>										
<b>6,583.92</b>	<b>81.70</b>	<b>89.79</b>	<b>6,090.00</b>	<b>-1,190.00</b>	<b>-1,256.83</b>	<b>1,303.15</b>	<b>1,473.22</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,600.00	83.31	89.79	6,092.10	-1,192.10	-1,256.77	1,319.09	1,488.98	10.00	10.00	0.00
<b>HZ LP: 465ft FSL &amp; 2140ft FEL of Sec 32</b>										
<b>6,666.90</b>	<b>90.00</b>	<b>89.79</b>	<b>6,096.00</b>	<b>-1,196.00</b>	<b>-1,256.53</b>	<b>1,385.84</b>	<b>1,554.98</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,700.00	90.00	89.79	6,096.00	-1,196.00	-1,256.41	1,418.94	1,587.70	0.00	0.00	0.00
6,800.00	90.00	89.79	6,096.00	-1,196.00	-1,256.04	1,518.94	1,686.56	0.00	0.00	0.00



# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-12HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Site:</b>	NE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-12HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,900.00	90.00	89.79	6,096.00	-1,196.00	-1,255.67	1,618.94	1,785.43	0.00	0.00	0.00
7,000.00	90.00	89.79	6,096.00	-1,196.00	-1,255.31	1,718.94	1,884.30	0.00	0.00	0.00
7,100.00	90.00	89.79	6,096.00	-1,196.00	-1,254.94	1,818.93	1,983.16	0.00	0.00	0.00
7,200.00	90.00	89.79	6,096.00	-1,196.00	-1,254.57	1,918.93	2,082.03	0.00	0.00	0.00
7,300.00	90.00	89.79	6,096.01	-1,196.01	-1,254.21	2,018.93	2,180.90	0.00	0.00	0.00
7,400.00	90.00	89.79	6,096.01	-1,196.01	-1,253.84	2,118.93	2,279.76	0.00	0.00	0.00
7,500.00	90.00	89.79	6,096.01	-1,196.01	-1,253.47	2,218.93	2,378.63	0.00	0.00	0.00
7,600.00	90.00	89.79	6,096.01	-1,196.01	-1,253.11	2,318.93	2,477.50	0.00	0.00	0.00
7,700.00	90.00	89.79	6,096.01	-1,196.01	-1,252.74	2,418.93	2,576.36	0.00	0.00	0.00
7,800.00	90.00	89.79	6,096.01	-1,196.01	-1,252.37	2,518.93	2,675.23	0.00	0.00	0.00
7,900.00	90.00	89.79	6,096.01	-1,196.01	-1,252.01	2,618.93	2,774.10	0.00	0.00	0.00
8,000.00	90.00	89.79	6,096.01	-1,196.01	-1,251.64	2,718.93	2,872.96	0.00	0.00	0.00
8,100.00	90.00	89.79	6,096.01	-1,196.01	-1,251.27	2,818.93	2,971.83	0.00	0.00	0.00
8,200.00	90.00	89.79	6,096.01	-1,196.01	-1,250.91	2,918.93	3,070.70	0.00	0.00	0.00
8,300.00	90.00	89.79	6,096.01	-1,196.01	-1,250.54	3,018.93	3,169.56	0.00	0.00	0.00
8,400.00	90.00	89.79	6,096.02	-1,196.02	-1,250.17	3,118.93	3,268.43	0.00	0.00	0.00
8,500.00	90.00	89.79	6,096.02	-1,196.02	-1,249.81	3,218.93	3,367.30	0.00	0.00	0.00
8,600.00	90.00	89.79	6,096.02	-1,196.02	-1,249.44	3,318.92	3,466.16	0.00	0.00	0.00
8,700.00	90.00	89.79	6,096.02	-1,196.02	-1,249.07	3,418.92	3,565.03	0.00	0.00	0.00
8,800.00	90.00	89.79	6,096.02	-1,196.02	-1,248.70	3,518.92	3,663.90	0.00	0.00	0.00
8,900.00	90.00	89.79	6,096.02	-1,196.02	-1,248.34	3,618.92	3,762.76	0.00	0.00	0.00
9,000.00	90.00	89.79	6,096.02	-1,196.02	-1,247.97	3,718.92	3,861.63	0.00	0.00	0.00
9,100.00	90.00	89.79	6,096.02	-1,196.02	-1,247.60	3,818.92	3,960.50	0.00	0.00	0.00
9,200.00	90.00	89.79	6,096.02	-1,196.02	-1,247.24	3,918.92	4,059.36	0.00	0.00	0.00
9,300.00	90.00	89.79	6,096.02	-1,196.02	-1,246.87	4,018.92	4,158.23	0.00	0.00	0.00
9,400.00	90.00	89.79	6,096.02	-1,196.02	-1,246.50	4,118.92	4,257.10	0.00	0.00	0.00
9,500.00	90.00	89.79	6,096.02	-1,196.02	-1,246.14	4,218.92	4,355.96	0.00	0.00	0.00
9,600.00	90.00	89.79	6,096.03	-1,196.03	-1,245.77	4,318.92	4,454.83	0.00	0.00	0.00
9,700.00	90.00	89.79	6,096.03	-1,196.03	-1,245.40	4,418.92	4,553.69	0.00	0.00	0.00
9,800.00	90.00	89.79	6,096.03	-1,196.03	-1,245.04	4,518.92	4,652.56	0.00	0.00	0.00
9,900.00	90.00	89.79	6,096.03	-1,196.03	-1,244.67	4,618.92	4,751.43	0.00	0.00	0.00
10,000.00	90.00	89.79	6,096.03	-1,196.03	-1,244.30	4,718.92	4,850.29	0.00	0.00	0.00
10,100.00	90.00	89.79	6,096.03	-1,196.03	-1,243.94	4,818.91	4,949.16	0.00	0.00	0.00
10,200.00	90.00	89.79	6,096.03	-1,196.03	-1,243.57	4,918.91	5,048.03	0.00	0.00	0.00
10,300.00	90.00	89.79	6,096.03	-1,196.03	-1,243.20	5,018.91	5,146.89	0.00	0.00	0.00
10,400.00	90.00	89.79	6,096.03	-1,196.03	-1,242.84	5,118.91	5,245.76	0.00	0.00	0.00
10,500.00	90.00	89.79	6,096.03	-1,196.03	-1,242.47	5,218.91	5,344.63	0.00	0.00	0.00
10,600.00	90.00	89.79	6,096.03	-1,196.03	-1,242.10	5,318.91	5,443.49	0.00	0.00	0.00
10,700.00	90.00	89.79	6,096.04	-1,196.04	-1,241.74	5,418.91	5,542.36	0.00	0.00	0.00
10,800.00	90.00	89.79	6,096.04	-1,196.04	-1,241.37	5,518.91	5,641.23	0.00	0.00	0.00
10,900.00	90.00	89.79	6,096.04	-1,196.04	-1,241.00	5,618.91	5,740.09	0.00	0.00	0.00
11,000.00	90.00	89.79	6,096.04	-1,196.04	-1,240.64	5,718.91	5,838.96	0.00	0.00	0.00
11,100.00	90.00	89.79	6,096.04	-1,196.04	-1,240.27	5,818.91	5,937.83	0.00	0.00	0.00
11,200.00	90.00	89.79	6,096.04	-1,196.04	-1,239.90	5,918.91	6,036.69	0.00	0.00	0.00
11,300.00	90.00	89.79	6,096.04	-1,196.04	-1,239.54	6,018.91	6,135.56	0.00	0.00	0.00
11,400.00	90.00	89.79	6,096.04	-1,196.04	-1,239.17	6,118.91	6,234.43	0.00	0.00	0.00
11,500.00	90.00	89.79	6,096.04	-1,196.04	-1,238.80	6,218.91	6,333.29	0.00	0.00	0.00
11,600.00	90.00	89.79	6,096.04	-1,196.04	-1,238.44	6,318.90	6,432.16	0.00	0.00	0.00
11,700.00	90.00	89.79	6,096.04	-1,196.04	-1,238.07	6,418.90	6,531.03	0.00	0.00	0.00
11,800.00	90.00	89.79	6,096.04	-1,196.04	-1,237.70	6,518.90	6,629.89	0.00	0.00	0.00
11,900.00	90.00	89.79	6,096.05	-1,196.05	-1,237.33	6,618.90	6,728.76	0.00	0.00	0.00
12,000.00	90.00	89.79	6,096.05	-1,196.05	-1,236.97	6,718.90	6,827.63	0.00	0.00	0.00
12,100.00	90.00	89.79	6,096.05	-1,196.05	-1,236.60	6,818.90	6,926.49	0.00	0.00	0.00
12,200.00	90.00	89.79	6,096.05	-1,196.05	-1,236.23	6,918.90	7,025.36	0.00	0.00	0.00

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-12HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	WELL @ 4900.00usft (Original Well Elev)
<b>Site:</b>	NE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-12HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,300.00	90.00	89.79	6,096.05	-1,196.05	-1,235.87	7,018.90	7,124.23	0.00	0.00	0.00
12,400.00	90.00	89.79	6,096.05	-1,196.05	-1,235.50	7,118.90	7,223.09	0.00	0.00	0.00
12,500.00	90.00	89.79	6,096.05	-1,196.05	-1,235.13	7,218.90	7,321.96	0.00	0.00	0.00
12,600.00	90.00	89.79	6,096.05	-1,196.05	-1,234.77	7,318.90	7,420.83	0.00	0.00	0.00
12,700.00	90.00	89.79	6,096.05	-1,196.05	-1,234.40	7,418.90	7,519.69	0.00	0.00	0.00
12,800.00	90.00	89.79	6,096.05	-1,196.05	-1,234.03	7,518.90	7,618.56	0.00	0.00	0.00
12,900.00	90.00	89.79	6,096.05	-1,196.05	-1,233.67	7,618.90	7,717.43	0.00	0.00	0.00
13,000.00	90.00	89.79	6,096.06	-1,196.06	-1,233.30	7,718.90	7,816.29	0.00	0.00	0.00
13,100.00	90.00	89.79	6,096.06	-1,196.06	-1,232.93	7,818.89	7,915.16	0.00	0.00	0.00
13,200.00	90.00	89.79	6,096.06	-1,196.06	-1,232.57	7,918.89	8,014.03	0.00	0.00	0.00
13,300.00	90.00	89.79	6,096.06	-1,196.06	-1,232.20	8,018.89	8,112.89	0.00	0.00	0.00
13,400.00	90.00	89.79	6,096.06	-1,196.06	-1,231.83	8,118.89	8,211.76	0.00	0.00	0.00
13,500.00	90.00	89.79	6,096.06	-1,196.06	-1,231.47	8,218.89	8,310.63	0.00	0.00	0.00
<b>BHL: 465ft FSL &amp; 460ft FEL of Sec 32</b>										
<b>13,593.65</b>	<b>90.00</b>	<b>89.79</b>	<b>6,096.00</b>	<b>-1,196.00</b>	<b>-1,231.12</b>	<b>8,312.54</b>	<b>8,403.21</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
508.18	508.00	FOX HILLS BASE				
1,476.87	1,446.00	PIERRE SHALE TOP				
3,379.89	3,234.00	RICHARD SNADSTONE				
3,508.68	3,355.00	PARKMAN SANDSTONE				
4,235.61	4,038.00	SUSSEX SANDSTONE				
4,755.57	4,527.00	SHANNON SANDSTONE				
6,208.23	5,922.00	SHARON SPRINGS				
6,307.63	5,987.00	NIOBRARA A CHALK				
6,362.46	6,017.00	NIOBRARA A CHALK BASE				
6,454.29	6,057.00	NIOBRARA B1 CHALK TOP				
6,507.62	6,074.00	NIOBRARA B1 CHALK BASE				
6,583.92	6,090.00	NIOBRARA B2 CHALK TOP				

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	SHL: 1703ft FSL & 1777ft FWL of Sec 31
300.00	300.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1,301.11	1,280.86	-145.45	93.94	EOB TO 20.02° INC
4,665.79	4,442.18	-1,113.18	718.95	END OF TANGENT
5,666.91	5,423.04	-1,258.63	812.89	EOD TO VERTICAL
5,766.91	5,523.04	-1,258.63	812.89	KOP (10°/100ft BUR)
6,666.90	6,096.00	-1,256.53	1,385.84	HZ LP: 465ft FSL & 2140ft FEL of Sec 32
13,593.65	6,096.00	-1,231.12	8,312.54	BHL: 465ft FSL & 460ft FEL of Sec 32