

# **MALLARD EXPLORATION**

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

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

**SHULL FED 31-32-1HN**

**ORIGINAL WELLBORE**

**17 December, 2017**

**Plan: PROPOSAL #1**





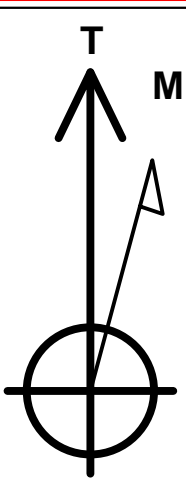
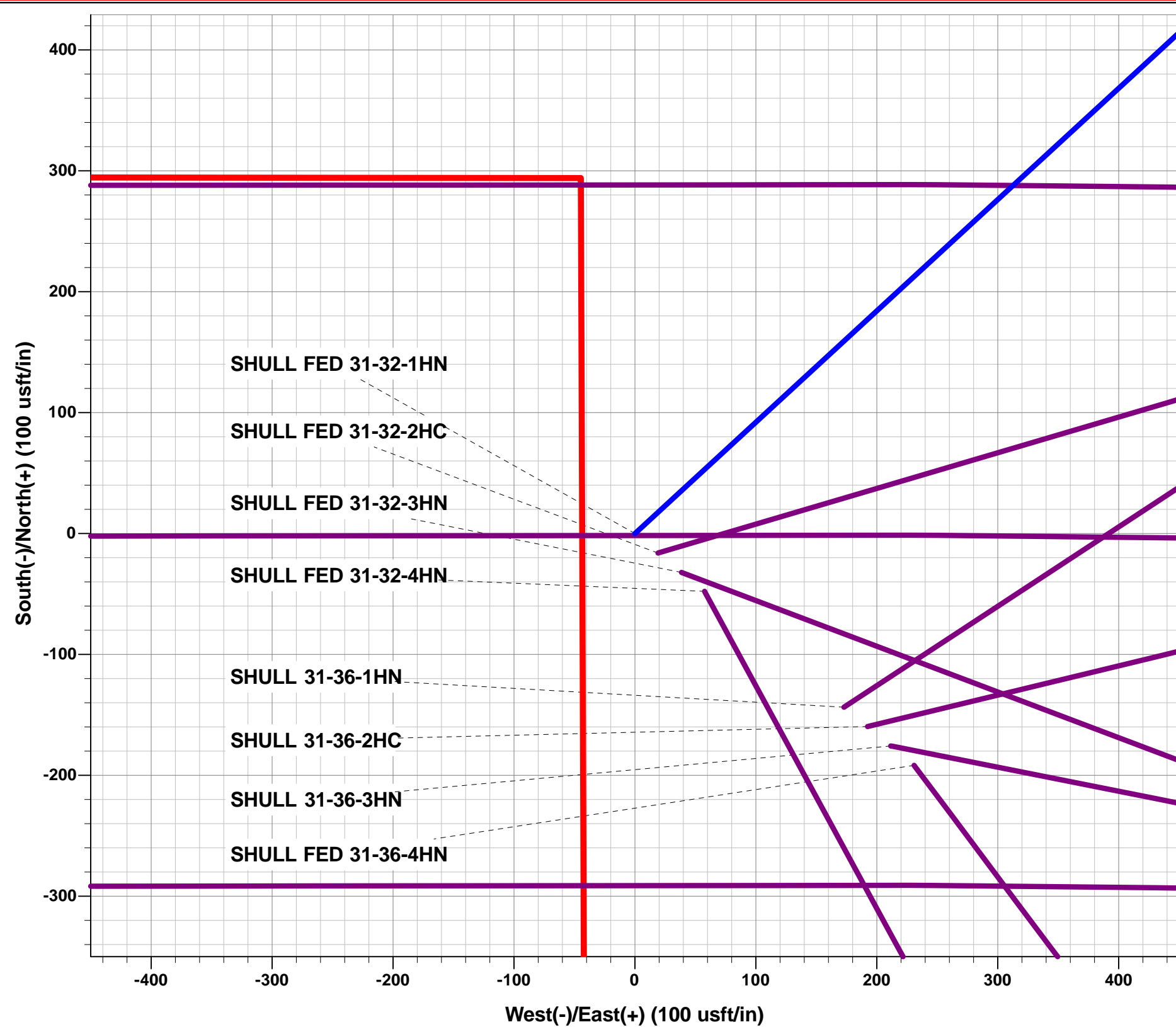
Project: WELD COUNTY, COLORADO (NAD 83)  
Site: NE NW SEC. 31 T9N R59W 6th P.M.  
Well: SHULL FED 31-32-1HN  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

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: 894ft FNL & 2090ft FWL of Sec 31
1950.00	1950.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
2567.00	2571.87	12.44	47.37	45.54	49.46	51.97	67.23	EOB TO 12° INC
4806.04	4864.72	12.44	47.37	380.01	412.76	433.70	561.05	END OF TANGENT
5423.04	5486.59	0.00	0.00	425.55	462.22	485.68	628.28	EOD TO VERTICAL
5523.04	5586.59	0.00	0.00	425.55	462.22	485.68	628.28	KOP (10°/100ft BUR)
6096.00	6486.59	90.00	89.78	427.75	1035.17	1057.83	1201.24	HZ LP: 465ft FNL & 2140ft FEL of Sec 31
6096.00	13423.45	90.00	89.78	454.16	7971.98	7984.91	8138.10	BHL: 465ft FNL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - SHULL FED 31-32-1HN	5523.04	425.55	462.22	40.712677	-104.021126
HZ LP - SHULL FED 31-32-1HN	6096.00	427.75	1035.17	40.712683	-104.019059
BHL - SHULL FED 31-32-1HN	6096.00	454.16	7971.98	40.712752	-103.994037



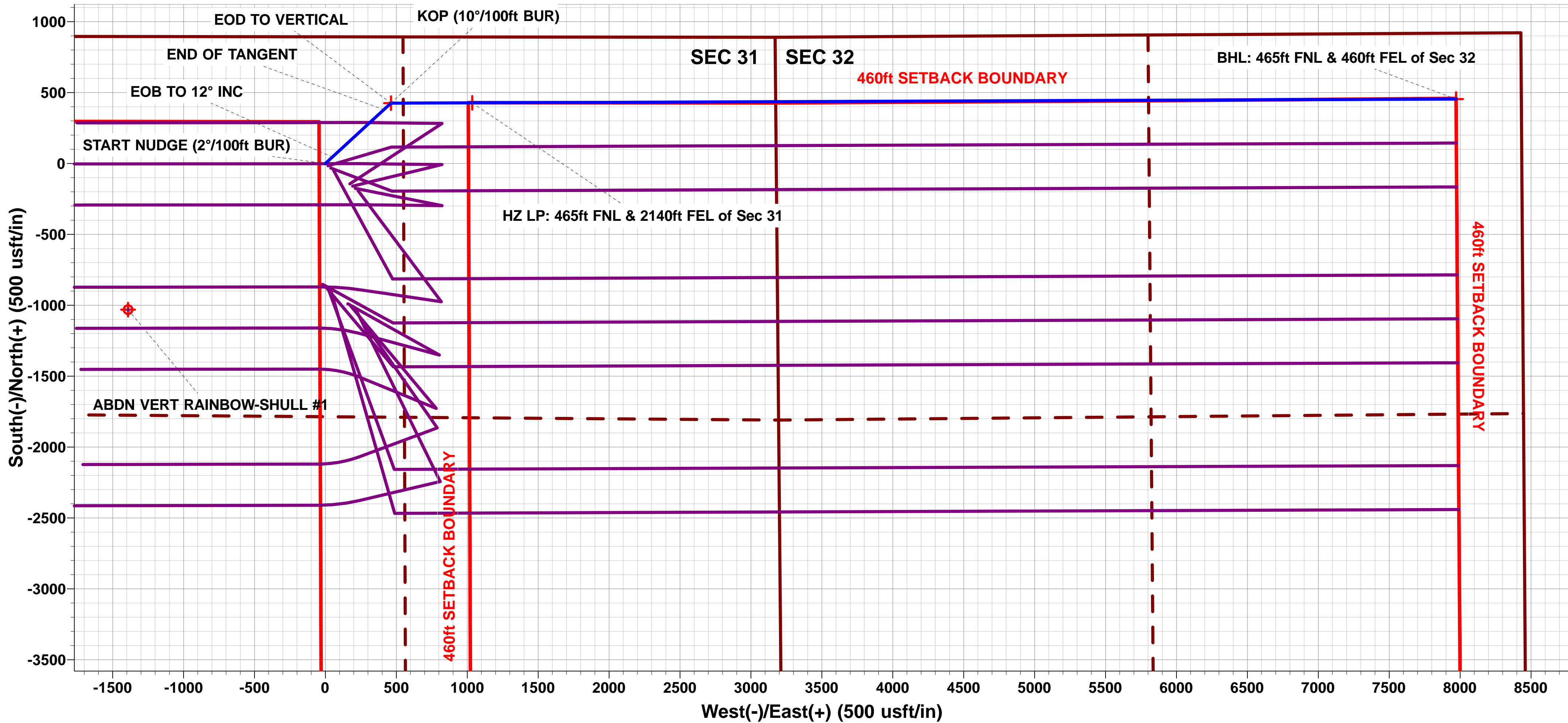
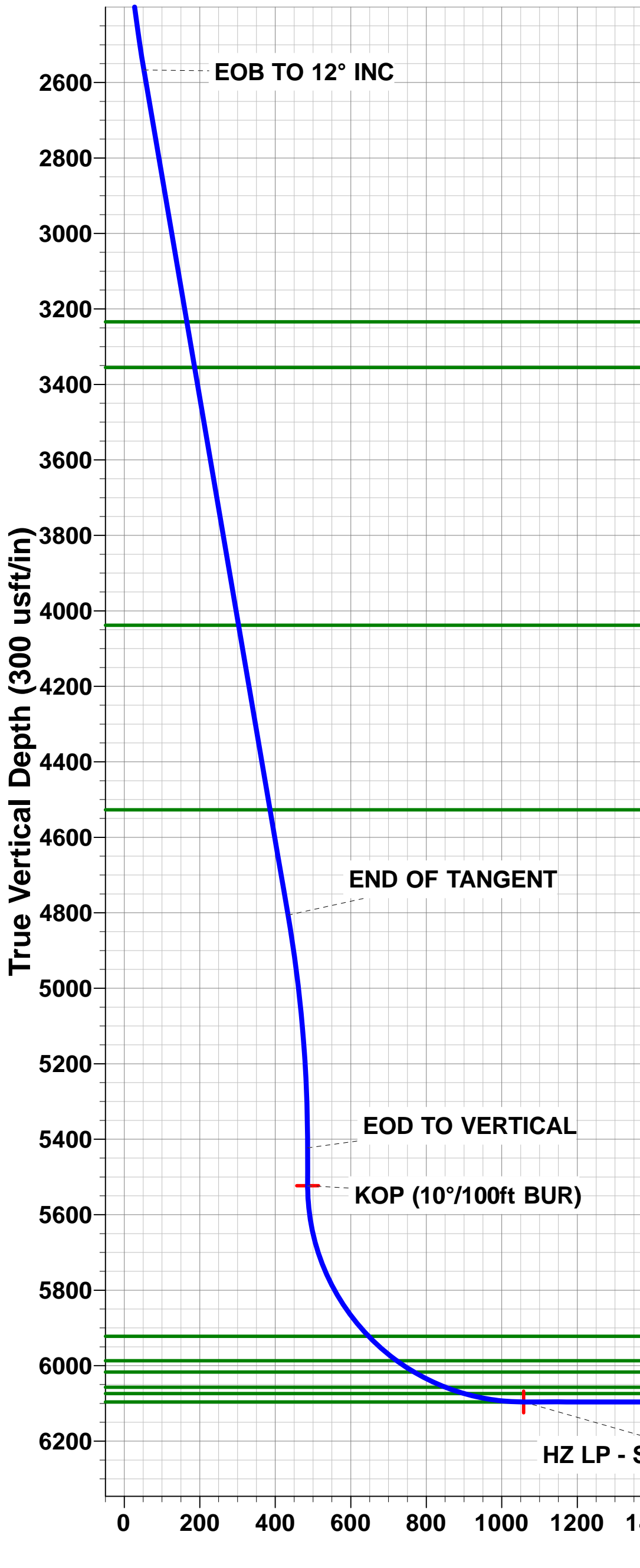
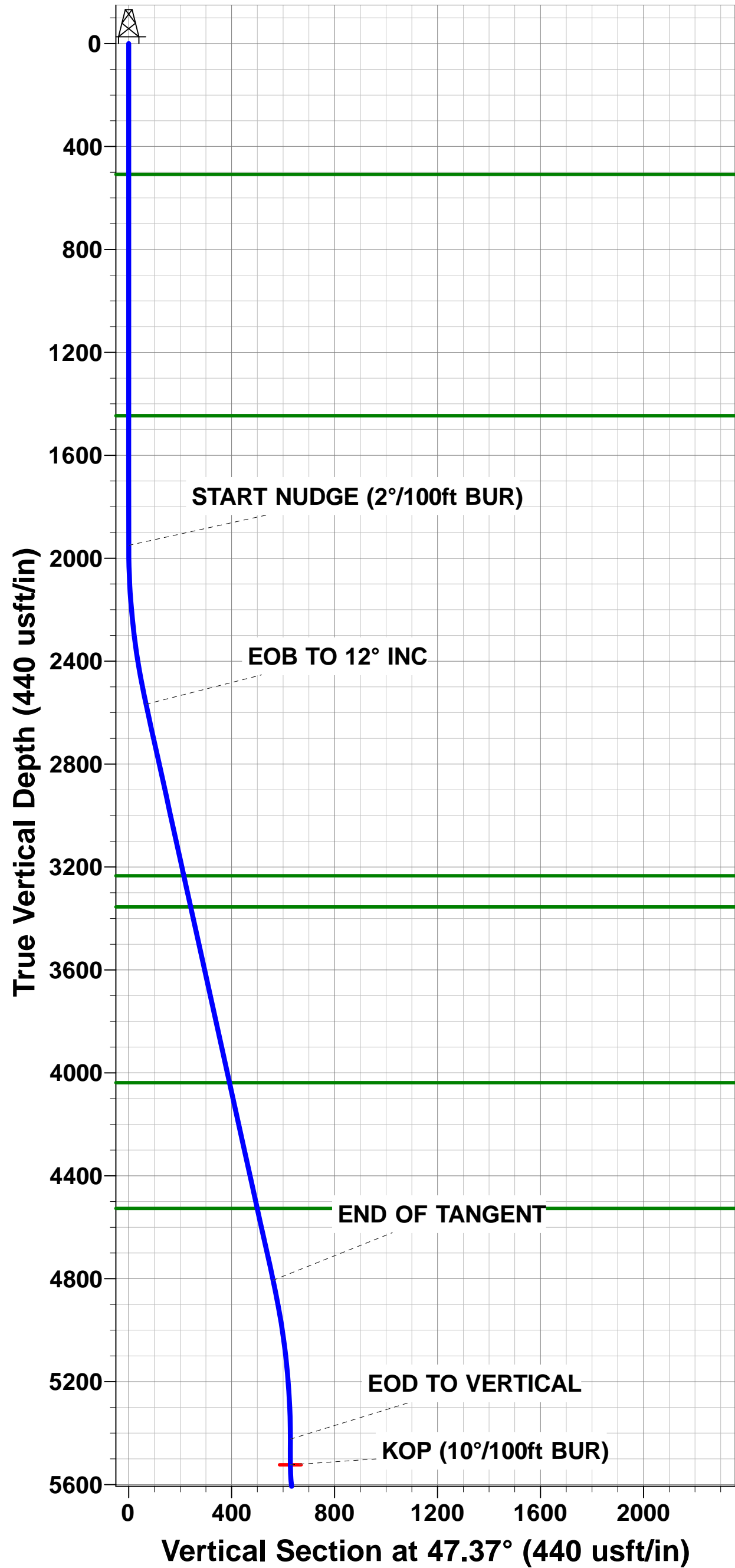
Azimuths to True North  
Magnetic North: 7.78°  
Magnetic Field  
Strength: 52570.6snT  
Dip Angle: 67.20°  
Date: 17/12/2017  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
508.00	508.00	Fox Hills Base
1446.00	1446.00	Pierre Shale Top
3234.00	3254.90	Richard Sandstone
3355.00	3378.81	Parkman Sandstone
4038.00	4078.22	Sussex Sandstone
4527.00	4578.98	Shannon Sandstone
5922.00	6027.92	Sharon Springs
5987.00	6127.32	Niobrara A Chalk
6017.00	6182.15	Niobrara A Chalk Base
6057.00	6273.98	Niobrara B1 Chalk Top
6074.00	6327.31	Niobrara B1 Chalk Base
6096.00	6486.59	Niobrara B2 Chalk Top (Target)

PROPOSED LOCAL COORDINATES:

SHL:894ft FNL & 2090ft FWL of Sec 31  
HZ LP: 465ft FNL & 2140ft FEL of Sec 31  
BHL: 465ft FNL & 460ft FEL of Sec 32



BHL - SHULL FED 31-32-1HN

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-1HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Site:</b>	NE NW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-1HN	<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 NW SEC. 31 T9N R59W 6th P.M.		
<b>Site Position:</b>		<b>Northing:</b>	1,505,316.95 usft
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,409,683.34 usft
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	1.10000ft
		<b>Latitude:</b>	40.711115
		<b>Longitude:</b>	-104.022169
		<b>Grid Convergence:</b>	0.95 °

<b>Well</b>	SHULL FED 31-32-1HN		
<b>Well Position</b>	<b>+N-S</b>	143.54 usft	<b>Northing:</b>
	<b>+E-W</b>	-172.99 usft	<b>Easting:</b>
<b>Position Uncertainty</b>	0.00 usft		<b>Wellhead Elevation:</b>
			<b>Latitude:</b>
			<b>Longitude:</b>
			<b>Ground Level:</b>

<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	17/12/2017	7.78	67.20	52,571

<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>
	6,096.00	0.00	0.00	86.74

<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	-4,925.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,950.00	0.00	0.00	1,950.00	-2,975.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,571.87	12.44	47.37	2,567.00	-2,358.00	45.54	49.46	2.00	2.00	0.00	47.37	
4,864.72	12.44	47.37	4,806.04	-118.96	380.01	412.76	0.00	0.00	0.00	0.00	
5,486.59	0.00	0.00	5,423.04	498.04	425.55	462.22	2.00	-2.00	0.00	180.00	
5,586.59	0.00	0.00	5,523.04	598.04	425.55	462.22	0.00	0.00	0.00	0.00	KOP - SHULL FED
6,486.59	90.00	89.78	6,096.00	1,171.00	427.75	1,035.17	10.00	10.00	9.98	89.78	HZ LP - SHULL FEI
13,423.45	90.00	89.78	6,096.00	1,171.00	454.16	7,971.98	0.00	0.00	0.00	81.10	BHL - SHULL FED

# Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Site:</b>	NE NW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-1HN	<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: 894ft FNL &amp; 2090ft FWL of Sec 31</b>										
0.00	0.00	0.00	0.00	4,925.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,825.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,725.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	4,625.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	4,525.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	4,425.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fox Hills Base</b>										
508.00	0.00	0.00	508.00	4,417.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	4,325.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	4,225.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	4,125.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	4,025.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	3,925.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	3,825.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	3,725.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	3,625.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	3,525.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Pierre Shale Top</b>										
1,446.00	0.00	0.00	1,446.00	3,479.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	3,425.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	3,325.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	3,225.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	3,125.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	3,025.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>START NUDGE (2°/100ft BUR)</b>										
1,950.00	0.00	0.00	1,950.00	2,975.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	1.00	47.37	2,000.00	2,925.00	0.30	0.32	0.34	2.00	2.00	0.00
2,100.00	3.00	47.37	2,099.93	2,825.07	2.66	2.89	3.03	2.00	2.00	0.00
2,200.00	5.00	47.37	2,199.68	2,725.32	7.38	8.02	8.43	2.00	2.00	0.00
2,300.00	7.00	47.37	2,299.13	2,625.87	14.46	15.71	16.51	2.00	2.00	0.00
2,400.00	9.00	47.37	2,398.15	2,526.85	23.89	25.95	27.26	2.00	2.00	0.00
2,500.00	11.00	47.37	2,496.63	2,428.37	35.65	38.72	40.69	2.00	2.00	0.00
<b>EOB TO 12° INC</b>										
2,571.87	12.44	47.37	2,567.00	2,358.00	45.54	49.46	51.97	2.00	2.00	0.00
2,600.00	12.44	47.37	2,594.47	2,330.53	49.64	53.92	56.65	0.00	0.00	0.00
2,700.00	12.44	47.37	2,692.12	2,232.88	64.23	69.76	73.30	0.00	0.00	0.00
2,800.00	12.44	47.37	2,789.77	2,135.23	78.82	85.61	89.95	0.00	0.00	0.00
2,900.00	12.44	47.37	2,887.43	2,037.57	93.40	101.45	106.60	0.00	0.00	0.00
3,000.00	12.44	47.37	2,985.08	1,939.92	107.99	117.30	123.25	0.00	0.00	0.00
3,100.00	12.44	47.37	3,082.73	1,842.27	122.58	133.14	139.90	0.00	0.00	0.00
3,200.00	12.44	47.37	3,180.39	1,744.61	137.17	148.99	156.55	0.00	0.00	0.00
<b>Richard Sandstone</b>										
3,254.90	12.44	47.37	3,234.00	1,691.00	145.18	157.69	165.69	0.00	0.00	0.00
3,300.00	12.44	47.37	3,278.04	1,646.96	151.75	164.83	173.20	0.00	0.00	0.00
<b>Parkman Sandstone</b>										
3,378.81	12.44	47.37	3,355.00	1,570.00	163.25	177.32	186.32	0.00	0.00	0.00
3,400.00	12.44	47.37	3,375.69	1,549.31	166.34	180.68	189.85	0.00	0.00	0.00
3,500.00	12.44	47.37	3,473.35	1,451.65	180.93	196.52	206.49	0.00	0.00	0.00
3,600.00	12.44	47.37	3,571.00	1,354.00	195.52	212.37	223.14	0.00	0.00	0.00
3,700.00	12.44	47.37	3,668.65	1,256.35	210.11	228.21	239.79	0.00	0.00	0.00
3,800.00	12.44	47.37	3,766.31	1,158.69	224.69	244.06	256.44	0.00	0.00	0.00
3,900.00	12.44	47.37	3,863.96	1,061.04	239.28	259.90	273.09	0.00	0.00	0.00

# Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Site:</b>	NE NW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-1HN	<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)
4,000.00	12.44	47.37	3,961.61	963.39	253.87	275.75	289.74	0.00	0.00	0.00
<b>Sussex Sandstone</b>										
<b>4,078.22</b>	<b>12.44</b>	<b>47.37</b>	<b>4,038.00</b>	<b>887.00</b>	<b>265.28</b>	<b>288.14</b>	<b>302.76</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,100.00	12.44	47.37	4,059.26	865.74	268.46	291.59	306.39	0.00	0.00	0.00
4,200.00	12.44	47.37	4,156.92	768.08	283.04	307.43	323.04	0.00	0.00	0.00
4,300.00	12.44	47.37	4,254.57	670.43	297.63	323.28	339.68	0.00	0.00	0.00
4,400.00	12.44	47.37	4,352.22	572.78	312.22	339.12	356.33	0.00	0.00	0.00
4,500.00	12.44	47.37	4,449.88	475.12	326.81	354.97	372.98	0.00	0.00	0.00
<b>Shannon Sandstone</b>										
<b>4,578.98</b>	<b>12.44</b>	<b>47.37</b>	<b>4,527.00</b>	<b>398.00</b>	<b>338.33</b>	<b>367.48</b>	<b>386.13</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,600.00	12.44	47.37	4,547.53	377.47	341.40	370.81	389.63	0.00	0.00	0.00
4,700.00	12.44	47.37	4,645.18	279.82	355.98	386.66	406.28	0.00	0.00	0.00
4,800.00	12.44	47.37	4,742.84	182.16	370.57	402.50	422.93	0.00	0.00	0.00
<b>END OF TANGENT</b>										
<b>4,864.72</b>	<b>12.44</b>	<b>47.37</b>	<b>4,806.04</b>	<b>118.96</b>	<b>380.01</b>	<b>412.76</b>	<b>433.70</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,900.00	11.73	47.37	4,840.54	84.46	385.02	418.19	439.41	2.00	-2.00	0.00
5,000.00	9.73	47.37	4,938.78	-13.78	397.63	431.89	453.81	2.00	-2.00	0.00
5,100.00	7.73	47.37	5,037.62	-112.62	407.91	443.06	465.54	2.00	-2.00	0.00
5,200.00	5.73	47.37	5,136.92	-211.92	415.85	451.68	474.60	2.00	-2.00	0.00
5,300.00	3.73	47.37	5,236.58	-311.58	421.44	457.75	480.98	2.00	-2.00	0.00
5,400.00	1.73	47.37	5,336.46	-411.46	424.66	461.26	484.66	2.00	-2.00	0.00
<b>EOD TO VERTICAL</b>										
<b>5,486.59</b>	<b>0.00</b>	<b>0.00</b>	<b>5,423.04</b>	<b>-498.04</b>	<b>425.55</b>	<b>462.22</b>	<b>485.68</b>	<b>2.00</b>	<b>-2.00</b>	<b>0.00</b>
5,500.00	0.00	0.00	5,436.45	-511.45	425.55	462.22	485.68	0.00	0.00	0.00
<b>KOP (10°/100ft BUR)</b>										
<b>5,586.59</b>	<b>0.00</b>	<b>0.00</b>	<b>5,523.04</b>	<b>-598.04</b>	<b>425.55</b>	<b>462.22</b>	<b>485.68</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
5,600.00	1.34	89.78	5,536.44	-611.44	425.55	462.38	485.83	10.00	10.00	0.00
5,700.00	11.34	89.78	5,635.71	-710.71	425.59	473.41	496.85	10.00	10.00	0.00
5,800.00	21.34	89.78	5,731.55	-806.55	425.70	501.51	524.91	10.00	10.00	0.00
5,900.00	31.34	89.78	5,821.05	-896.05	425.87	545.82	569.16	10.00	10.00	0.00
6,000.00	41.34	89.78	5,901.50	-976.50	426.10	605.00	628.26	10.00	10.00	0.00
<b>Sharon Springs</b>										
<b>6,027.92</b>	<b>44.13</b>	<b>89.78</b>	<b>5,922.00</b>	<b>-997.00</b>	<b>426.17</b>	<b>623.94</b>	<b>647.17</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,100.00	51.34	89.78	5,970.45	-1,045.45	426.38	677.25	700.41	10.00	10.00	0.00
<b>Niobrara A Chalk</b>										
<b>6,127.32</b>	<b>54.07</b>	<b>89.78</b>	<b>5,987.00</b>	<b>-1,062.00</b>	<b>426.46</b>	<b>698.99</b>	<b>722.11</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
<b>Niobrara A Chalk Base</b>										
<b>6,182.15</b>	<b>59.56</b>	<b>89.78</b>	<b>6,017.00</b>	<b>-1,092.00</b>	<b>426.64</b>	<b>744.86</b>	<b>767.92</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,200.00	61.34	89.78	6,025.80	-1,100.80	426.70	760.38	783.42	10.00	10.00	0.00
<b>Niobrara B1 Chalk Top</b>										
<b>6,273.98</b>	<b>68.74</b>	<b>89.78</b>	<b>6,057.00</b>	<b>-1,132.00</b>	<b>426.96</b>	<b>827.40</b>	<b>850.35</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,300.00	71.34	89.78	6,065.88	-1,140.88	427.05	851.86	874.77	10.00	10.00	0.00
<b>Niobrara B1 Chalk Base</b>										
<b>6,327.31</b>	<b>74.07</b>	<b>89.78</b>	<b>6,074.00</b>	<b>-1,149.00</b>	<b>427.15</b>	<b>877.93</b>	<b>900.81</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,400.00	81.34	89.78	6,089.47	-1,164.47	427.42	948.91	971.68	10.00	10.00	0.00
<b>HZ LP: 465ft FNL &amp; 2140ft FEL of Sec 31 - Niobrara B2 Chalk Top (Target)</b>										
<b>6,486.59</b>	<b>90.00</b>	<b>89.78</b>	<b>6,096.00</b>	<b>-1,171.00</b>	<b>427.75</b>	<b>1,035.17</b>	<b>1,057.83</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,500.00	90.00	89.78	6,096.00	-1,171.00	427.81	1,048.58	1,071.21	0.00	0.00	0.00
6,600.00	90.00	89.78	6,096.00	-1,171.00	428.19	1,148.58	1,171.07	0.00	0.00	0.00
6,700.00	90.00	89.78	6,096.00	-1,171.00	428.58	1,248.58	1,270.93	0.00	0.00	0.00
6,800.00	90.00	89.78	6,096.00	-1,171.00	428.96	1,348.58	1,370.79	0.00	0.00	0.00
6,900.00	90.00	89.78	6,096.00	-1,171.00	429.34	1,448.57	1,470.65	0.00	0.00	0.00
7,000.00	90.00	89.78	6,096.00	-1,171.00	429.73	1,548.57	1,570.51	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 31-32-1HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Site:</b>	NE NW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-1HN	<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)
7,100.00	90.00	89.78	6,096.00	-1,171.00	430.11	1,648.57	1,670.37	0.00	0.00	0.00
7,200.00	90.00	89.78	6,096.00	-1,171.00	430.50	1,748.57	1,770.23	0.00	0.00	0.00
7,300.00	90.00	89.78	6,096.00	-1,171.00	430.88	1,848.57	1,870.09	0.00	0.00	0.00
7,400.00	90.00	89.78	6,096.01	-1,171.01	431.26	1,948.57	1,969.95	0.00	0.00	0.00
7,500.00	90.00	89.78	6,096.01	-1,171.01	431.65	2,048.57	2,069.81	0.00	0.00	0.00
7,600.00	90.00	89.78	6,096.01	-1,171.01	432.03	2,148.57	2,169.66	0.00	0.00	0.00
7,700.00	90.00	89.78	6,096.01	-1,171.01	432.41	2,248.57	2,269.52	0.00	0.00	0.00
7,800.00	90.00	89.78	6,096.01	-1,171.01	432.80	2,348.57	2,369.38	0.00	0.00	0.00
7,900.00	90.00	89.78	6,096.01	-1,171.01	433.18	2,448.57	2,469.24	0.00	0.00	0.00
8,000.00	90.00	89.78	6,096.01	-1,171.01	433.56	2,548.57	2,569.10	0.00	0.00	0.00
8,100.00	90.00	89.78	6,096.01	-1,171.01	433.95	2,648.57	2,668.96	0.00	0.00	0.00
8,200.00	90.00	89.78	6,096.01	-1,171.01	434.33	2,748.57	2,768.82	0.00	0.00	0.00
8,300.00	90.00	89.78	6,096.01	-1,171.01	434.71	2,848.56	2,868.68	0.00	0.00	0.00
8,400.00	90.00	89.78	6,096.01	-1,171.01	435.10	2,948.56	2,968.54	0.00	0.00	0.00
8,500.00	90.00	89.78	6,096.01	-1,171.01	435.48	3,048.56	3,068.40	0.00	0.00	0.00
8,600.00	90.00	89.78	6,096.01	-1,171.01	435.86	3,148.56	3,168.26	0.00	0.00	0.00
8,700.00	90.00	89.78	6,096.01	-1,171.01	436.24	3,248.56	3,268.12	0.00	0.00	0.00
8,800.00	90.00	89.78	6,096.01	-1,171.01	436.62	3,348.56	3,367.97	0.00	0.00	0.00
8,900.00	90.00	89.78	6,096.01	-1,171.01	437.01	3,448.56	3,467.83	0.00	0.00	0.00
9,000.00	90.00	89.78	6,096.01	-1,171.01	437.39	3,548.56	3,567.69	0.00	0.00	0.00
9,100.00	90.00	89.78	6,096.01	-1,171.01	437.77	3,648.56	3,667.55	0.00	0.00	0.00
9,200.00	90.00	89.78	6,096.01	-1,171.01	438.15	3,748.56	3,767.41	0.00	0.00	0.00
9,300.00	90.00	89.78	6,096.01	-1,171.01	438.53	3,848.56	3,867.27	0.00	0.00	0.00
9,400.00	90.00	89.78	6,096.01	-1,171.01	438.91	3,948.56	3,967.13	0.00	0.00	0.00
9,500.00	90.00	89.78	6,096.01	-1,171.01	439.30	4,048.56	4,066.99	0.00	0.00	0.00
9,600.00	90.00	89.78	6,096.01	-1,171.01	439.68	4,148.56	4,166.85	0.00	0.00	0.00
9,700.00	90.00	89.78	6,096.01	-1,171.01	440.06	4,248.55	4,266.71	0.00	0.00	0.00
9,800.00	90.00	89.78	6,096.01	-1,171.01	440.44	4,348.55	4,366.57	0.00	0.00	0.00
9,900.00	90.00	89.78	6,096.01	-1,171.01	440.82	4,448.55	4,466.42	0.00	0.00	0.00
10,000.00	90.00	89.78	6,096.01	-1,171.01	441.20	4,548.55	4,566.28	0.00	0.00	0.00
10,100.00	90.00	89.78	6,096.01	-1,171.01	441.58	4,648.55	4,666.14	0.00	0.00	0.00
10,200.00	90.00	89.78	6,096.01	-1,171.01	441.96	4,748.55	4,766.00	0.00	0.00	0.00
10,300.00	90.00	89.78	6,096.01	-1,171.01	442.34	4,848.55	4,865.86	0.00	0.00	0.00
10,400.00	90.00	89.78	6,096.01	-1,171.01	442.72	4,948.55	4,965.72	0.00	0.00	0.00
10,500.00	90.00	89.78	6,096.01	-1,171.01	443.10	5,048.55	5,065.58	0.00	0.00	0.00
10,600.00	90.00	89.78	6,096.01	-1,171.01	443.48	5,148.55	5,165.44	0.00	0.00	0.00
10,700.00	90.00	89.78	6,096.01	-1,171.01	443.86	5,248.55	5,265.30	0.00	0.00	0.00
10,800.00	90.00	89.78	6,096.01	-1,171.01	444.24	5,348.55	5,365.16	0.00	0.00	0.00
10,900.00	90.00	89.78	6,096.01	-1,171.01	444.62	5,448.55	5,465.01	0.00	0.00	0.00
11,000.00	90.00	89.78	6,096.01	-1,171.01	445.00	5,548.55	5,564.87	0.00	0.00	0.00
11,100.00	90.00	89.78	6,096.01	-1,171.01	445.38	5,648.54	5,664.73	0.00	0.00	0.00
11,200.00	90.00	89.78	6,096.01	-1,171.01	445.76	5,748.54	5,764.59	0.00	0.00	0.00
11,300.00	90.00	89.78	6,096.01	-1,171.01	446.14	5,848.54	5,864.45	0.00	0.00	0.00
11,400.00	90.00	89.78	6,096.01	-1,171.01	446.52	5,948.54	5,964.31	0.00	0.00	0.00
11,500.00	90.00	89.78	6,096.01	-1,171.01	446.90	6,048.54	6,064.17	0.00	0.00	0.00
11,600.00	90.00	89.78	6,096.01	-1,171.01	447.28	6,148.54	6,164.03	0.00	0.00	0.00
11,700.00	90.00	89.78	6,096.01	-1,171.01	447.66	6,248.54	6,263.89	0.00	0.00	0.00
11,800.00	90.00	89.78	6,096.01	-1,171.01	448.03	6,348.54	6,363.75	0.00	0.00	0.00
11,900.00	90.00	89.78	6,096.01	-1,171.01	448.41	6,448.54	6,463.60	0.00	0.00	0.00
12,000.00	90.00	89.78	6,096.01	-1,171.01	448.79	6,548.54	6,563.46	0.00	0.00	0.00
12,100.00	90.00	89.78	6,096.01	-1,171.01	449.17	6,648.54	6,663.32	0.00	0.00	0.00
12,200.00	90.00	89.78	6,096.01	-1,171.01	449.55	6,748.54	6,763.18	0.00	0.00	0.00
12,300.00	90.00	89.78	6,096.01	-1,171.01	449.93	6,848.54	6,863.04	0.00	0.00	0.00
12,400.00	90.00	89.78	6,096.01	-1,171.01	450.30	6,948.54	6,962.90	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 31-32-1HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 4925.00usft (Original Well Elev)
<b>Site:</b>	NE NW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-1HN	<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)
12,500.00	90.00	89.78	6,096.01	-1,171.01	450.68	7,048.53	7,062.76	0.00	0.00	0.00
12,600.00	90.00	89.78	6,096.00	-1,171.00	451.06	7,148.53	7,162.62	0.00	0.00	0.00
12,700.00	90.00	89.78	6,096.00	-1,171.00	451.44	7,248.53	7,262.48	0.00	0.00	0.00
12,800.00	90.00	89.78	6,096.00	-1,171.00	451.81	7,348.53	7,362.33	0.00	0.00	0.00
12,900.00	90.00	89.78	6,096.00	-1,171.00	452.19	7,448.53	7,462.19	0.00	0.00	0.00
13,000.00	90.00	89.78	6,096.00	-1,171.00	452.57	7,548.53	7,562.05	0.00	0.00	0.00
13,100.00	90.00	89.78	6,096.00	-1,171.00	452.95	7,648.53	7,661.91	0.00	0.00	0.00
13,200.00	90.00	89.78	6,096.00	-1,171.00	453.32	7,748.53	7,761.77	0.00	0.00	0.00
13,300.00	90.00	89.78	6,096.00	-1,171.00	453.70	7,848.53	7,861.63	0.00	0.00	0.00
13,400.00	90.00	89.78	6,096.00	-1,171.00	454.08	7,948.53	7,961.49	0.00	0.00	0.00
<b>BHL: 465ft FNL &amp; 460ft FEL of Sec 32</b>										
<b>13,423.45</b>	<b>90.00</b>	<b>89.78</b>	<b>6,096.00</b>	<b>-1,171.00</b>	<b>454.16</b>	<b>7,971.98</b>	<b>7,984.91</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
508.00	508.00	Fox Hills Base				
1,446.00	1,446.00	Pierre Shale Top				
3,254.90	3,234.00	Richard Sandstone				
3,378.81	3,355.00	Parkman Sandstone				
4,078.22	4,038.00	Sussex Sandstone				
4,578.98	4,527.00	Shannon Sandstone				
6,027.92	5,922.00	Sharon Springs				
6,127.32	5,987.00	Niobrara A Chalk				
6,182.15	6,017.00	Niobrara A Chalk Base				
6,273.98	6,057.00	Niobrara B1 Chalk Top				
6,327.31	6,074.00	Niobrara B1 Chalk Base				
6,486.59	6,096.00	Niobrara B2 Chalk Top (Target)				

Plan Annotations					
MD (usft)	TVD (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
0.00	0.00	0.00	0.00	SHL: 894ft FNL & 2090ft FWL of Sec 31	
1,950.00	1,950.00	0.00	0.00	START NUDGE (2°/100ft BUR)	
2,571.87	2,567.00	45.54	49.46	EOB TO 12° INC	
4,864.72	4,806.04	380.01	412.76	END OF TANGENT	
5,486.59	5,423.04	425.55	462.22	EOD TO VERTICAL	
5,586.59	5,523.04	425.55	462.22	KOP (10°/100ft BUR)	
6,486.59	6,096.00	427.75	1,035.17	HZ LP: 465ft FNL & 2140ft FEL of Sec 31	
13,423.45	6,096.00	454.16	7,971.98	BHL: 465ft FNL & 460ft FEL of Sec 32	