

# **MALLARD EXPLORATION**

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

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

**SHULL FED 31-32-9HN**

**ORIGINAL WELLBORE**

**23 July, 2019**

**Plan: PROPOSAL #2**





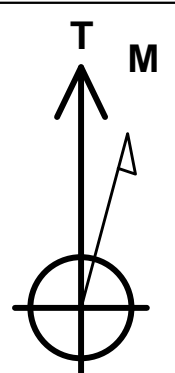
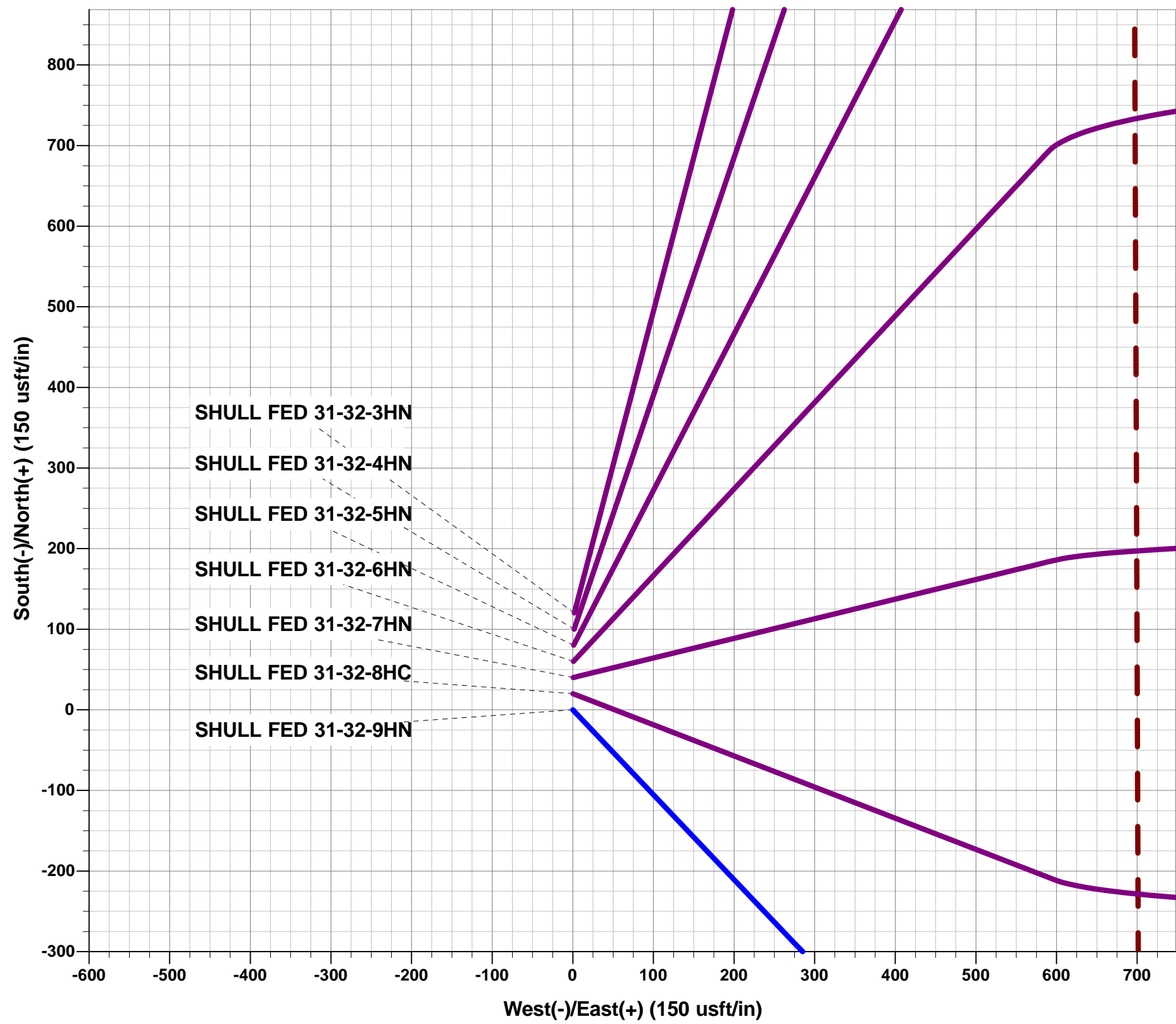
Project: WELD COUNTY, COLORADO (NAD 83)  
Site: SE SW SEC. 31 T9N R59W 6th P.M.  
Well: SHULL FED 31-32-9HN  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #2

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: 1149ft FSL & 1950ft FWL of Sec 31
1297.00	1297.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1892.52	1896.89	12.00	136.48	-45.38	43.10	46.70	62.58	EOB TO 12° INC
5665.53	5754.16	12.00	136.48	-626.78	595.27	645.05	864.41	KOP (10°/100ft DGLG)
6151.00	6572.17	90.00	89.80	-699.84	1162.64	1216.51	1441.96	LP: 465ft FSL & 2190ft FEL of Sec 31
6151.00	13549.10	90.00	89.80	-675.20	8139.52	8167.48	8418.89	BHL: 465ft FSL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP - SHULL FED 31-32-9HN (P2)	6151.00	-699.84	1162.63	40.700490	-104.019094
BHL - SHULL FED 31-32-9HN (P2)	6151.00	-675.20	8139.52	40.700554	-103.993932



Azimuths to True North  
Magnetic North: 7.61°

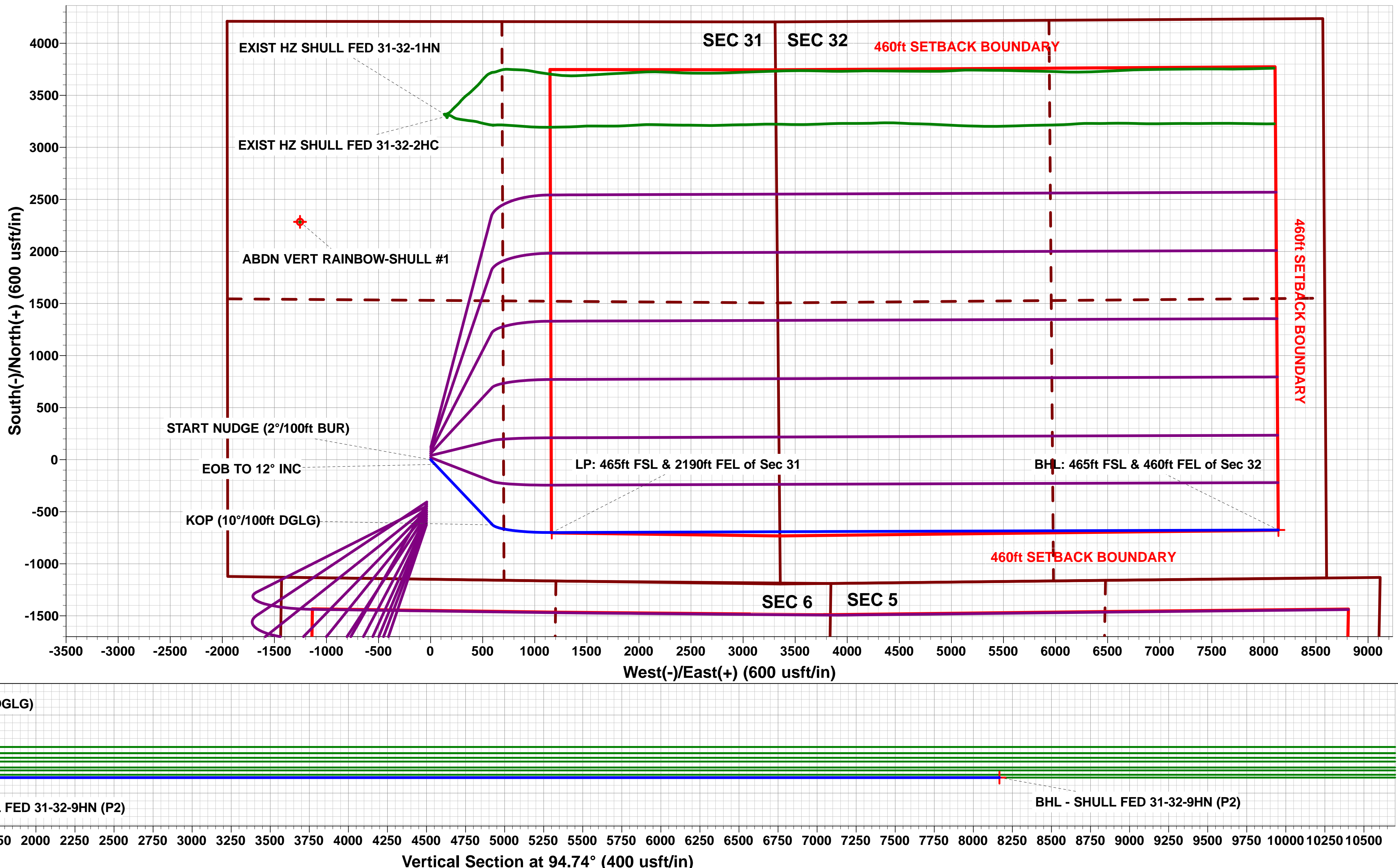
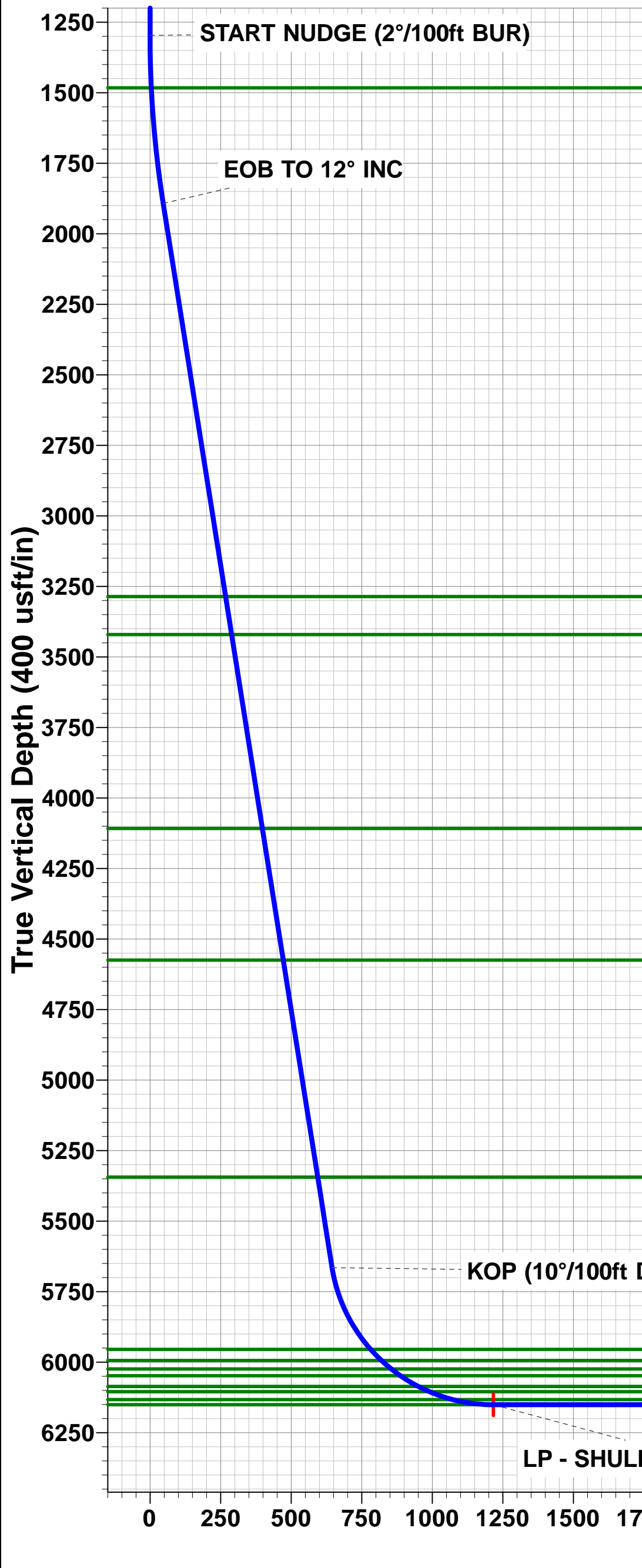
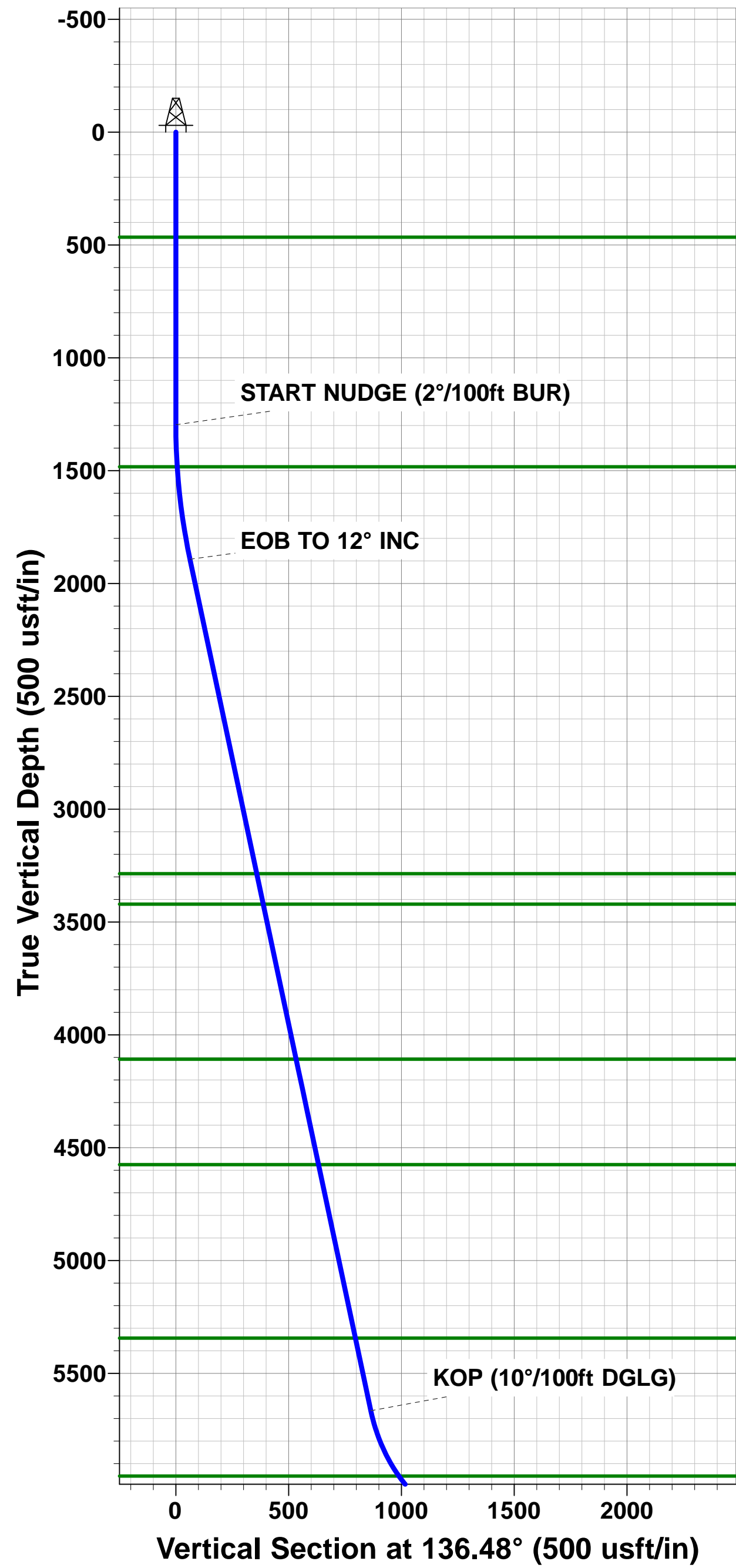
Magnetic Field  
Strength: 52383.2snT  
Dip Angle: 67.15°  
Date: 22/07/2019  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
466.00	466.00	Fox Hills Base
1483.00	1483.13	Pierre Shale Top
3286.00	3321.49	Richard Sandstone
3421.00	3459.51	Parkman Sandstone
4108.00	4161.85	Sussex Sandstone
4575.00	4639.28	Shannon Sandstone
5344.00	5425.45	TeePee Buttes
5955.00	6080.49	Sharon Springs
5994.00	6134.97	Niobrara Top
6024.00	6180.86	Niobrara A Chalk
6048.00	6221.11	Niobrara A Chalk Base
6086.00	6294.93	Niobrara B1 Chalk Top
6105.00	6339.62	Niobrara B1 Chalk Base
6133.00	6427.31	Niobrara B2 Chalk Target Top
6151.00	6572.1	Niobrara B2 Chalk Target Center

PROPOSED LOCAL COORDINATES:

SHL: 1149ft FSL & 1950ft FWL of Sec 31  
HZ LP: 465ft FSL & 2190ft FEL of Sec 31  
BHL: 465ft FSL & 460ft FEL of Sec 32



# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-9HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 25' @ 4902.00usft
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB 25' @ 4902.00usft
<b>Site:</b>	SE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-9HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

<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>	SE SW SEC. 31 T9N R59W 6th P.M.		
<b>Site Position:</b>		<b>Northing:</b>	1,501,513.53 usft
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,409,242.57 usft
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	1.10 ft
		<b>Latitude:</b>	40.700697
		<b>Longitude:</b>	-104.023987
		<b>Grid Convergence:</b>	0.95 °

<b>Well</b>	SHULL FED 31-32-9HN		
<b>Well Position</b>	<b>+N-S</b>	624.46 usft	<b>Northing:</b>
	<b>+E-W</b>	194.09 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	22/07/2019	7.61	67.15	52,383

<b>Design</b>	PROPOSAL #2			
<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>
	5.00	0.00	0.00	94.74

<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	-4,902.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,297.00	0.00	0.00	1,297.00	-3,605.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,896.89	12.00	136.48	1,892.52	-3,009.48	-45.38	43.10	2.00	2.00	0.00	136.48	
5,754.16	12.00	136.48	5,665.52	763.52	-626.79	595.27	0.00	0.00	0.00	0.00	
6,572.17	90.00	89.80	6,151.00	1,249.00	-699.84	1,162.63	10.00	9.54	-5.71	-47.31	LP - SHULL FED 3'
13,549.10	90.00	89.80	6,151.00	1,249.00	-675.21	8,139.52	0.00	0.00	0.00	0.00	BHL - SHULL FED

# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-9HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 25' @ 4902.00usft
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB 25' @ 4902.00usft
<b>Site:</b>	SE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-9HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

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: 1149ft FSL &amp; 1950ft FWL of Sec 31</b>										
0.00	0.00	0.00	0.00	4,902.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,802.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,702.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	4,602.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	4,502.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fox Hills Base</b>										
466.00	0.00	0.00	466.00	4,436.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	4,402.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	4,302.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	4,202.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	4,102.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	4,002.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	3,902.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	3,802.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	3,702.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>START NUDGE (2°/100ft BUR)</b>										
1,297.00	0.00	0.00	1,297.00	3,605.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.06	136.48	1,300.00	3,602.00	0.00	0.00	0.00	2.00	2.00	0.00
1,400.00	2.06	136.48	1,399.98	3,502.02	-1.34	1.27	1.38	2.00	2.00	0.00
<b>Pierre Shale Top</b>										
1,483.13	3.72	136.48	1,483.00	3,419.00	-4.38	4.16	4.51	2.00	2.00	0.00
1,500.00	4.06	136.48	1,499.83	3,402.17	-5.21	4.95	5.36	2.00	2.00	0.00
1,600.00	6.06	136.48	1,599.44	3,302.56	-11.61	11.02	11.95	2.00	2.00	0.00
1,700.00	8.06	136.48	1,698.67	3,203.33	-20.52	19.49	21.12	2.00	2.00	0.00
1,800.00	10.06	136.48	1,797.42	3,104.58	-31.94	30.33	32.87	2.00	2.00	0.00
<b>EOB TO 12° INC</b>										
1,896.89	12.00	136.48	1,892.52	3,009.48	-45.38	43.09	46.70	2.00	2.00	0.00
1,900.00	12.00	136.48	1,895.56	3,006.44	-45.85	43.54	47.18	0.00	0.00	0.00
2,000.00	12.00	136.48	1,993.37	2,908.63	-60.92	57.86	62.69	0.00	0.00	0.00
2,100.00	12.00	136.48	2,091.19	2,810.81	-75.99	72.17	78.21	0.00	0.00	0.00
2,200.00	12.00	136.48	2,189.00	2,713.00	-91.06	86.49	93.72	0.00	0.00	0.00
2,300.00	12.00	136.48	2,286.82	2,615.18	-106.14	100.80	109.23	0.00	0.00	0.00
2,400.00	12.00	136.48	2,384.64	2,517.36	-121.21	115.12	124.74	0.00	0.00	0.00
2,500.00	12.00	136.48	2,482.45	2,419.55	-136.28	129.43	140.25	0.00	0.00	0.00
2,600.00	12.00	136.48	2,580.27	2,321.73	-151.36	143.75	155.77	0.00	0.00	0.00
2,700.00	12.00	136.48	2,678.08	2,223.92	-166.43	158.06	171.28	0.00	0.00	0.00
2,800.00	12.00	136.48	2,775.90	2,126.10	-181.50	172.38	186.79	0.00	0.00	0.00
2,900.00	12.00	136.48	2,873.71	2,028.29	-196.58	186.69	202.30	0.00	0.00	0.00
3,000.00	12.00	136.48	2,971.53	1,930.47	-211.65	201.01	217.82	0.00	0.00	0.00
3,100.00	12.00	136.48	3,069.34	1,832.66	-226.72	215.32	233.33	0.00	0.00	0.00
3,200.00	12.00	136.48	3,167.16	1,734.84	-241.80	229.64	248.84	0.00	0.00	0.00
3,300.00	12.00	136.48	3,264.98	1,637.02	-256.87	243.95	264.35	0.00	0.00	0.00
<b>Richard Sandstone</b>										
3,321.49	12.00	136.48	3,286.00	1,616.00	-260.11	247.03	267.69	0.00	0.00	0.00
3,400.00	12.00	136.48	3,362.79	1,539.21	-271.94	258.27	279.86	0.00	0.00	0.00
<b>Parkman Sandstone</b>										
3,459.51	12.00	136.48	3,421.00	1,481.00	-280.91	266.79	289.10	0.00	0.00	0.00
3,500.00	12.00	136.48	3,460.61	1,441.39	-287.01	272.58	295.38	0.00	0.00	0.00
3,600.00	12.00	136.48	3,558.42	1,343.58	-302.09	286.90	310.89	0.00	0.00	0.00
3,700.00	12.00	136.48	3,656.24	1,245.76	-317.16	301.21	326.40	0.00	0.00	0.00
3,800.00	12.00	136.48	3,754.05	1,147.95	-332.23	315.53	341.91	0.00	0.00	0.00
3,900.00	12.00	136.48	3,851.87	1,050.13	-347.31	329.84	357.43	0.00	0.00	0.00

# Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 25' @ 4902.00usft
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB 25' @ 4902.00usft
<b>Site:</b>	SE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-9HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

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	12.00	136.48	3,949.68	952.32	-362.38	344.16	372.94	0.00	0.00	0.00
4,100.00	12.00	136.48	4,047.50	854.50	-377.45	358.47	388.45	0.00	0.00	0.00
<b>Sussex Sandstone</b>										
<b>4,161.85</b>	<b>12.00</b>	<b>136.48</b>	<b>4,108.00</b>	<b>794.00</b>	<b>-386.78</b>	<b>367.33</b>	<b>398.05</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,200.00	12.00	136.48	4,145.31	756.69	-392.53	372.79	403.96	0.00	0.00	0.00
4,300.00	12.00	136.48	4,243.13	658.87	-407.60	387.10	419.48	0.00	0.00	0.00
4,400.00	12.00	136.48	4,340.95	561.05	-422.67	401.42	434.99	0.00	0.00	0.00
4,500.00	12.00	136.48	4,438.76	463.24	-437.75	415.73	450.50	0.00	0.00	0.00
4,600.00	12.00	136.48	4,536.58	365.42	-452.82	430.05	466.01	0.00	0.00	0.00
<b>Shannon Sandstone</b>										
<b>4,639.28</b>	<b>12.00</b>	<b>136.48</b>	<b>4,575.00</b>	<b>327.00</b>	<b>-458.74</b>	<b>435.67</b>	<b>472.11</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,700.00	12.00	136.48	4,634.39	267.61	-467.89	444.36	481.52	0.00	0.00	0.00
4,800.00	12.00	136.48	4,732.21	169.79	-482.96	458.68	497.04	0.00	0.00	0.00
4,900.00	12.00	136.48	4,830.02	71.98	-498.04	472.99	512.55	0.00	0.00	0.00
5,000.00	12.00	136.48	4,927.84	-25.84	-513.11	487.31	528.06	0.00	0.00	0.00
5,100.00	12.00	136.48	5,025.65	-123.65	-528.18	501.63	543.57	0.00	0.00	0.00
5,200.00	12.00	136.48	5,123.47	-221.47	-543.26	515.94	559.09	0.00	0.00	0.00
5,300.00	12.00	136.48	5,221.29	-319.29	-558.33	530.26	574.60	0.00	0.00	0.00
5,400.00	12.00	136.48	5,319.10	-417.10	-573.40	544.57	590.11	0.00	0.00	0.00
<b>TeePee Buttes</b>										
<b>5,425.45</b>	<b>12.00</b>	<b>136.48</b>	<b>5,344.00</b>	<b>-442.00</b>	<b>-577.24</b>	<b>548.21</b>	<b>594.06</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
5,500.00	12.00	136.48	5,416.92	-514.92	-588.48	558.89	605.62	0.00	0.00	0.00
5,600.00	12.00	136.48	5,514.73	-612.73	-603.55	573.20	621.13	0.00	0.00	0.00
5,700.00	12.00	136.48	5,612.55	-710.55	-618.62	587.52	636.65	0.00	0.00	0.00
<b>KOP (10°/100ft DGLG)</b>										
<b>5,754.16</b>	<b>12.00</b>	<b>136.48</b>	<b>5,665.52</b>	<b>-763.52</b>	<b>-626.79</b>	<b>595.27</b>	<b>645.05</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
5,800.00	15.47	123.76	5,710.06	-808.06	-633.64	603.64	653.96	10.00	7.58	-27.75
5,900.00	24.34	109.79	5,804.04	-902.04	-648.06	634.19	685.60	10.00	8.86	-13.97
6,000.00	33.81	103.14	5,891.36	-989.36	-661.40	680.79	733.14	10.00	9.48	-6.64
<b>Sharon Springs</b>										
<b>6,080.49</b>	<b>41.61</b>	<b>99.82</b>	<b>5,955.00</b>	<b>-1,053.00</b>	<b>-671.07</b>	<b>729.01</b>	<b>782.00</b>	<b>10.00</b>	<b>9.68</b>	<b>-4.12</b>
6,100.00	43.51	99.17	5,969.37	-1,067.37	-673.25	742.03	795.14	10.00	9.74	-3.34
<b>Niobrara Top</b>										
<b>6,134.97</b>	<b>46.92</b>	<b>98.11</b>	<b>5,994.00</b>	<b>-1,092.00</b>	<b>-676.97</b>	<b>766.56</b>	<b>819.90</b>	<b>10.00</b>	<b>9.77</b>	<b>-3.04</b>
<b>Niobrara A Chalk</b>										
<b>6,180.86</b>	<b>51.41</b>	<b>96.88</b>	<b>6,024.00</b>	<b>-1,122.00</b>	<b>-681.48</b>	<b>800.98</b>	<b>854.57</b>	<b>10.00</b>	<b>9.79</b>	<b>-2.67</b>
6,200.00	53.29	96.42	6,035.69	-1,133.69	-683.24	816.03	869.72	10.00	9.81	-2.44
<b>Niobrara A Chalk Base</b>										
<b>6,221.11</b>	<b>55.37</b>	<b>95.93</b>	<b>6,048.00</b>	<b>-1,146.00</b>	<b>-685.08</b>	<b>833.08</b>	<b>886.86</b>	<b>10.00</b>	<b>9.82</b>	<b>-2.32</b>
<b>Niobrara B1 Chalk Top</b>										
<b>6,294.93</b>	<b>62.63</b>	<b>94.39</b>	<b>6,086.00</b>	<b>-1,184.00</b>	<b>-690.73</b>	<b>896.06</b>	<b>950.09</b>	<b>10.00</b>	<b>9.84</b>	<b>-2.09</b>
6,300.00	63.13	94.29	6,088.31	-1,186.31	-691.08	900.55	954.60	10.00	9.85	-1.93
<b>Niobrara B1 Chalk Base</b>										
<b>6,339.62</b>	<b>67.03</b>	<b>93.55</b>	<b>6,105.00</b>	<b>-1,203.00</b>	<b>-693.53</b>	<b>936.40</b>	<b>990.52</b>	<b>10.00</b>	<b>9.86</b>	<b>-1.86</b>
6,400.00	72.99	92.51	6,125.63	-1,223.63	-696.52	993.03	1,047.21	10.00	9.87	-1.73
<b>Niobrara B2 Chalk Target Top</b>										
<b>6,427.31</b>	<b>75.69</b>	<b>92.06</b>	<b>6,133.00</b>	<b>-1,231.00</b>	<b>-697.57</b>	<b>1,019.31</b>	<b>1,073.48</b>	<b>10.00</b>	<b>9.87</b>	<b>-1.65</b>
6,500.00	82.87	90.91	6,146.51	-1,244.51	-699.40	1,090.65	1,144.74	10.00	9.88	-1.59
<b>LP: 465ft FSL &amp; 2190ft FEL of Sec 31 - Niobrara B2 Chalk Target Center</b>										
<b>6,572.17</b>	<b>90.00</b>	<b>89.80</b>	<b>6,151.00</b>	<b>-1,249.00</b>	<b>-699.84</b>	<b>1,162.63</b>	<b>1,216.51</b>	<b>10.00</b>	<b>9.88</b>	<b>-1.54</b>
6,600.00	90.00	89.80	6,151.00	-1,249.00	-699.74	1,190.47	1,244.24	0.00	0.00	0.00
6,700.00	90.00	89.80	6,151.00	-1,249.00	-699.39	1,290.46	1,343.87	0.00	0.00	0.00



# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-9HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 25' @ 4902.00usft
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB 25' @ 4902.00usft
<b>Site:</b>	SE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-9HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

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)
6,800.00	90.00	89.80	6,151.00	-1,249.00	-699.04	1,390.46	1,443.49	0.00	0.00	0.00
6,900.00	90.00	89.80	6,151.00	-1,249.00	-698.69	1,490.46	1,543.12	0.00	0.00	0.00
7,000.00	90.00	89.80	6,151.00	-1,249.00	-698.33	1,590.46	1,642.75	0.00	0.00	0.00
7,100.00	90.00	89.80	6,151.00	-1,249.00	-697.98	1,690.46	1,742.38	0.00	0.00	0.00
7,200.00	90.00	89.80	6,151.00	-1,249.00	-697.63	1,790.46	1,842.01	0.00	0.00	0.00
7,300.00	90.00	89.80	6,151.00	-1,249.00	-697.27	1,890.46	1,941.63	0.00	0.00	0.00
7,400.00	90.00	89.80	6,151.00	-1,249.00	-696.92	1,990.46	2,041.26	0.00	0.00	0.00
7,500.00	90.00	89.80	6,151.00	-1,249.00	-696.57	2,090.46	2,140.89	0.00	0.00	0.00
7,600.00	90.00	89.80	6,151.00	-1,249.00	-696.21	2,190.46	2,240.52	0.00	0.00	0.00
7,700.00	90.00	89.80	6,151.00	-1,249.00	-695.86	2,290.46	2,340.14	0.00	0.00	0.00
7,800.00	90.00	89.80	6,151.00	-1,249.00	-695.51	2,390.46	2,439.77	0.00	0.00	0.00
7,900.00	90.00	89.80	6,151.00	-1,249.00	-695.15	2,490.46	2,539.40	0.00	0.00	0.00
8,000.00	90.00	89.80	6,151.00	-1,249.00	-694.80	2,590.46	2,639.03	0.00	0.00	0.00
8,100.00	90.00	89.80	6,151.00	-1,249.00	-694.45	2,690.46	2,738.66	0.00	0.00	0.00
8,200.00	90.00	89.80	6,151.00	-1,249.00	-694.10	2,790.46	2,838.28	0.00	0.00	0.00
8,300.00	90.00	89.80	6,151.00	-1,249.00	-693.74	2,890.45	2,937.91	0.00	0.00	0.00
8,400.00	90.00	89.80	6,151.00	-1,249.00	-693.39	2,990.45	3,037.54	0.00	0.00	0.00
8,500.00	90.00	89.80	6,151.00	-1,249.00	-693.04	3,090.45	3,137.17	0.00	0.00	0.00
8,600.00	90.00	89.80	6,151.00	-1,249.00	-692.68	3,190.45	3,236.80	0.00	0.00	0.00
8,700.00	90.00	89.80	6,151.00	-1,249.00	-692.33	3,290.45	3,336.42	0.00	0.00	0.00
8,800.00	90.00	89.80	6,151.00	-1,249.00	-691.98	3,390.45	3,436.05	0.00	0.00	0.00
8,900.00	90.00	89.80	6,151.00	-1,249.00	-691.62	3,490.45	3,535.68	0.00	0.00	0.00
9,000.00	90.00	89.80	6,151.00	-1,249.00	-691.27	3,590.45	3,635.31	0.00	0.00	0.00
9,100.00	90.00	89.80	6,151.00	-1,249.00	-690.92	3,690.45	3,734.94	0.00	0.00	0.00
9,200.00	90.00	89.80	6,151.00	-1,249.00	-690.56	3,790.45	3,834.56	0.00	0.00	0.00
9,300.00	90.00	89.80	6,151.00	-1,249.00	-690.21	3,890.45	3,934.19	0.00	0.00	0.00
9,400.00	90.00	89.80	6,151.00	-1,249.00	-689.86	3,990.45	4,033.82	0.00	0.00	0.00
9,500.00	90.00	89.80	6,151.00	-1,249.00	-689.50	4,090.45	4,133.45	0.00	0.00	0.00
9,600.00	90.00	89.80	6,151.00	-1,249.00	-689.15	4,190.45	4,233.07	0.00	0.00	0.00
9,700.00	90.00	89.80	6,151.00	-1,249.00	-688.80	4,290.45	4,332.70	0.00	0.00	0.00
9,800.00	90.00	89.80	6,151.00	-1,249.00	-688.45	4,390.45	4,432.33	0.00	0.00	0.00
9,900.00	90.00	89.80	6,151.00	-1,249.00	-688.09	4,490.44	4,531.96	0.00	0.00	0.00
10,000.00	90.00	89.80	6,151.00	-1,249.00	-687.74	4,590.44	4,631.59	0.00	0.00	0.00
10,100.00	90.00	89.80	6,151.00	-1,249.00	-687.39	4,690.44	4,731.21	0.00	0.00	0.00
10,200.00	90.00	89.80	6,151.00	-1,249.00	-687.03	4,790.44	4,830.84	0.00	0.00	0.00
10,300.00	90.00	89.80	6,151.00	-1,249.00	-686.68	4,890.44	4,930.47	0.00	0.00	0.00
10,400.00	90.00	89.80	6,151.00	-1,249.00	-686.33	4,990.44	5,030.10	0.00	0.00	0.00
10,500.00	90.00	89.80	6,151.00	-1,249.00	-685.97	5,090.44	5,129.73	0.00	0.00	0.00
10,600.00	90.00	89.80	6,151.00	-1,249.00	-685.62	5,190.44	5,229.35	0.00	0.00	0.00
10,700.00	90.00	89.80	6,151.00	-1,249.00	-685.27	5,290.44	5,328.98	0.00	0.00	0.00
10,800.00	90.00	89.80	6,151.00	-1,249.00	-684.91	5,390.44	5,428.61	0.00	0.00	0.00
10,900.00	90.00	89.80	6,151.00	-1,249.00	-684.56	5,490.44	5,528.24	0.00	0.00	0.00
11,000.00	90.00	89.80	6,151.00	-1,249.00	-684.21	5,590.44	5,627.87	0.00	0.00	0.00
11,100.00	90.00	89.80	6,151.00	-1,249.00	-683.85	5,690.44	5,727.49	0.00	0.00	0.00
11,200.00	90.00	89.80	6,151.00	-1,249.00	-683.50	5,790.44	5,827.12	0.00	0.00	0.00
11,300.00	90.00	89.80	6,151.00	-1,249.00	-683.15	5,890.44	5,926.75	0.00	0.00	0.00
11,400.00	90.00	89.80	6,151.00	-1,249.00	-682.80	5,990.44	6,026.38	0.00	0.00	0.00
11,500.00	90.00	89.80	6,151.00	-1,249.00	-682.44	6,090.43	6,126.00	0.00	0.00	0.00
11,600.00	90.00	89.80	6,151.00	-1,249.00	-682.09	6,190.43	6,225.63	0.00	0.00	0.00
11,700.00	90.00	89.80	6,151.00	-1,249.00	-681.74	6,290.43	6,325.26	0.00	0.00	0.00
11,800.00	90.00	89.80	6,151.00	-1,249.00	-681.38	6,390.43	6,424.89	0.00	0.00	0.00
11,900.00	90.00	89.80	6,151.00	-1,249.00	-681.03	6,490.43	6,524.52	0.00	0.00	0.00
12,000.00	90.00	89.80	6,151.00	-1,249.00	-680.68	6,590.43	6,624.14	0.00	0.00	0.00
12,100.00	90.00	89.80	6,151.00	-1,249.00	-680.32	6,690.43	6,723.77	0.00	0.00	0.00

# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-9HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 25' @ 4902.00usft
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB 25' @ 4902.00usft
<b>Site:</b>	SE SW SEC. 31 T9N R59W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	SHULL FED 31-32-9HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

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)
12,200.00	90.00	89.80	6,151.00	-1,249.00	-679.97	6,790.43	6,823.40	0.00	0.00	0.00
12,300.00	90.00	89.80	6,151.00	-1,249.00	-679.62	6,890.43	6,923.03	0.00	0.00	0.00
12,400.00	90.00	89.80	6,151.00	-1,249.00	-679.26	6,990.43	7,022.66	0.00	0.00	0.00
12,500.00	90.00	89.80	6,151.00	-1,249.00	-678.91	7,090.43	7,122.28	0.00	0.00	0.00
12,600.00	90.00	89.80	6,151.00	-1,249.00	-678.56	7,190.43	7,221.91	0.00	0.00	0.00
12,700.00	90.00	89.80	6,151.00	-1,249.00	-678.20	7,290.43	7,321.54	0.00	0.00	0.00
12,800.00	90.00	89.80	6,151.00	-1,249.00	-677.85	7,390.43	7,421.17	0.00	0.00	0.00
12,900.00	90.00	89.80	6,151.00	-1,249.00	-677.50	7,490.43	7,520.79	0.00	0.00	0.00
13,000.00	90.00	89.80	6,151.00	-1,249.00	-677.15	7,590.43	7,620.42	0.00	0.00	0.00
13,100.00	90.00	89.80	6,151.00	-1,249.00	-676.79	7,690.42	7,720.05	0.00	0.00	0.00
13,200.00	90.00	89.80	6,151.00	-1,249.00	-676.44	7,790.42	7,819.68	0.00	0.00	0.00
13,300.00	90.00	89.80	6,151.00	-1,249.00	-676.09	7,890.42	7,919.31	0.00	0.00	0.00
13,400.00	90.00	89.80	6,151.00	-1,249.00	-675.73	7,990.42	8,018.93	0.00	0.00	0.00
13,500.00	90.00	89.80	6,151.00	-1,249.00	-675.38	8,090.42	8,118.56	0.00	0.00	0.00
<b>BHL: 465ft FSL &amp; 460ft FEL of Sec 32</b>										
<b>13,549.10</b>	<b>90.00</b>	<b>89.80</b>	<b>6,151.00</b>	<b>-1,249.00</b>	<b>-675.21</b>	<b>8,139.52</b>	<b>8,167.48</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
466.00	466.00	Fox Hills Base			
1,483.13	1,483.00	Pierre Shale Top			
3,321.49	3,286.00	Richard Sandstone			
3,459.51	3,421.00	Parkman Sandstone			
4,161.85	4,108.00	Sussex Sandstone			
4,639.28	4,575.00	Shannon Sandstone			
5,425.45	5,344.00	TeePee Buttes			
6,080.49	5,955.00	Sharon Springs			
6,134.97	5,994.00	Niobrara Top			
6,180.86	6,024.00	Niobrara A Chalk			
6,221.11	6,048.00	Niobrara A Chalk Base			
6,294.93	6,086.00	Niobrara B1 Chalk Top			
6,339.62	6,105.00	Niobrara B1 Chalk Base			
6,427.31	6,133.00	Niobrara B2 Chalk Target Top			
6,572.17	6,151.00	Niobrara B2 Chalk Target Center			

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	SHL: 1149ft FSL & 1950ft FWL of Sec 31
1,297.00	1,297.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1,896.89	1,892.52	-45.38	43.09	EOB TO 12° INC
5,754.16	5,665.52	-626.79	595.27	KOP (10°/100ft DGLG)
6,572.17	6,151.00	-699.84	1,162.64	LP: 465ft FSL & 2190ft FEL of Sec 31
13,549.10	6,151.00	-675.21	8,139.52	BHL: 465ft FSL & 460ft FEL of Sec 32