

# **MALLARD EXPLORATION**

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

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

**SHULL FED 31-32-4HN**

**ORIGINAL WELLBORE**

**23 July, 2019**

**Plan: PROPOSAL #2**





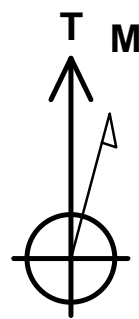
Project: WELD COUNTY, COLORADO (NAD 83)  
Site: SE SW SEC. 31 T9N R59W 6th P.M.  
Well: SHULL FED 31-32-4HN  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #2

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: 1249ft FSL & 1951ft FWL of Sec 31
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1167.46	1186.86	19.74	18.73	159.39	54.04	89.09	168.30	EOB TO 19.74° INC
5749.93	6055.35	19.74	18.73	1716.45	581.98	959.38	1812.43	KOP (10°/100ft DGLG)
6233.00	6892.39	90.00	89.78	1882.54	1150.86	1551.17	2426.55	LP: 2225ft FNL & 2176ft FEL of Sec 31
6233.00	13861.09	90.00	89.78	1908.99	8119.50	8340.90	9395.24	BHL: 2255ft FNL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP - SHULL FED 31-32-4HN (P2)	6233.00	1882.54	1150.86	40.707853	-104.019130
BHL - SHULL FED 31-32-4HN (P2)	6233.00	1908.99	8119.50	40.707922	-103.993995



Azimuths to True North  
Magnetic North: 7.61°

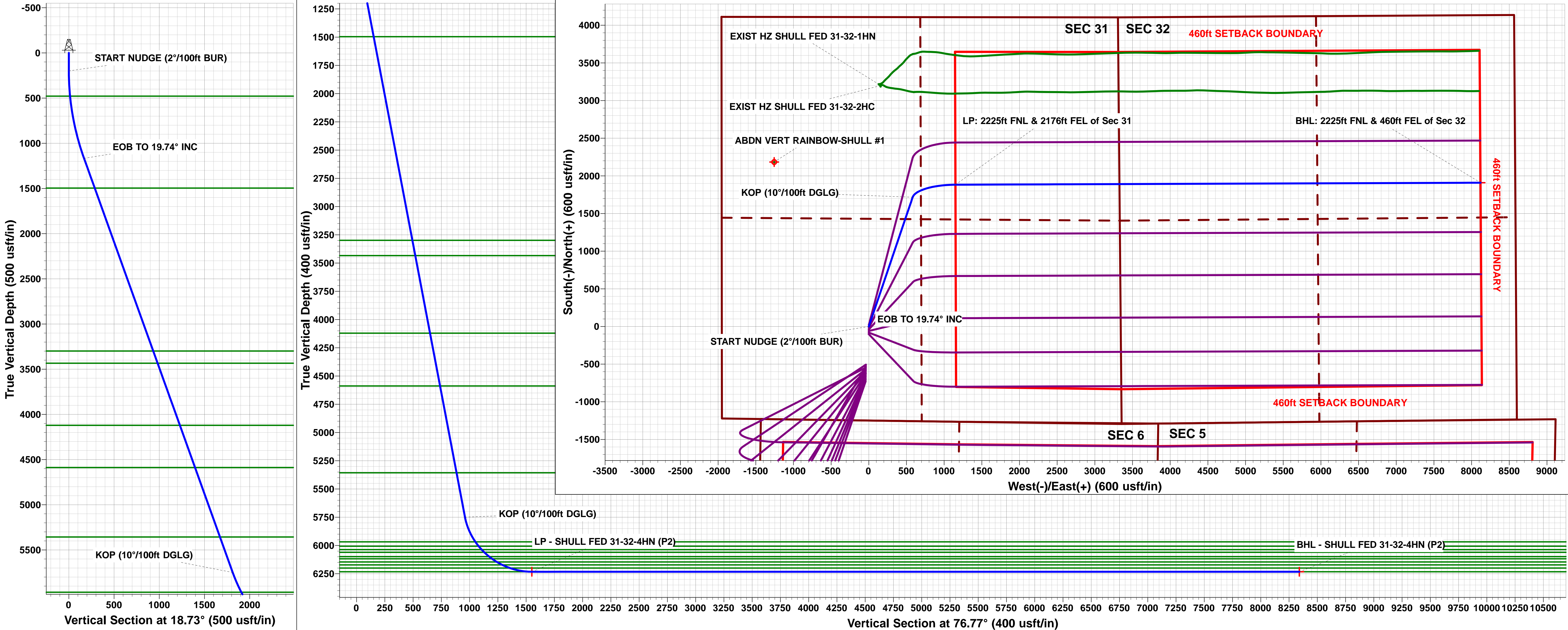
Magnetic Field  
Strength: 52383.3snT  
Dip Angle: 67.15°  
Date: 22/07/2019  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
479.00	479.44	Fox Hills Base
1496.00	1535.91	Pierre Shale Top
3299.00	3451.44	Richard Sandstone
3434.00	3594.87	Parkman Sandstone
4121.00	4324.75	Sussex Sandstone
4588.00	4820.90	Shannon Sandstone
5357.00	5637.89	TeePee Buttes
5968.00	6300.08	Sharon Springs
6007.00	6349.34	Niobrara Top
6037.00	6389.38	Niobrara A Chalk
6061.00	6423.17	Niobrara A Chalk Base
6099.00	6480.92	Niobrara B1 Chalk Top
6118.00	6512.42	Niobrara B1 Chalk Base
6146.00	6563.43	Niobrara B2 Chalk Top
6172.00	6618.09	Niobrara B2 Chalk Base
6200.00	6691.53	Niobrara C Chalk Target Top
6233.00	6892.39	Niobrara C Chalk Target Center

PROPOSED LOCAL COORDINATES:

SHL: 1249ft FSL & 1951ft FWL of Sec 31  
HZ LP: 2225ft FNL & 2176ft FEL of Sec 31  
BHL: 2255ft FNL & 460ft FEL of Sec 32



# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-4HN
<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 31-32-4HN	<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 31-32-4HN		
<b>Well Position</b>	<b>+N-S</b>	724.65 usft	<b>Northing:</b>
	<b>+E-W</b>	195.75 usft	<b>Easting:</b>
<b>Position Uncertainty</b>	0.00 usft	<b>Wellhead Elevation:</b>	usft
		<b>Latitude:</b>	40.702686
		<b>Longitude:</b>	-104.023281
		<b>Ground Level:</b>	4,877.00 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	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	76.77

<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	
200.00	0.00	0.00	200.00	-4,702.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,186.86	19.74	18.73	1,167.46	-3,734.54	159.39	54.04	2.00	2.00	0.00	18.73	
6,055.35	19.74	18.73	5,749.93	847.93	1,716.44	581.98	0.00	0.00	0.00	0.00	
6,892.39	90.00	89.78	6,233.00	1,331.00	1,882.53	1,150.86	10.00	8.39	8.49	72.09	LP - SHULL FED 3'
13,861.09	90.00	89.78	6,233.00	1,331.00	1,908.98	8,119.50	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 31-32-4HN
<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 31-32-4HN	<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: 1249ft FSL &amp; 1951ft 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
<b>START NUDGE (2°/100ft BUR)</b>										
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	2.00	18.73	299.98	4,602.02	1.65	0.56	0.92	2.00	2.00	0.00
400.00	4.00	18.73	399.84	4,502.16	6.61	2.24	3.69	2.00	2.00	0.00
<b>Fox Hills Base</b>										
479.44	5.59	18.73	479.00	4,423.00	12.90	4.37	7.21	2.00	2.00	0.00
500.00	6.00	18.73	499.45	4,402.55	14.86	5.04	8.31	2.00	2.00	0.00
600.00	8.00	18.73	598.70	4,303.30	26.40	8.95	14.76	2.00	2.00	0.00
700.00	10.00	18.73	697.47	4,204.53	41.22	13.98	23.04	2.00	2.00	0.00
800.00	12.00	18.73	795.62	4,106.38	59.29	20.10	33.14	2.00	2.00	0.00
900.00	14.00	18.73	893.06	4,008.94	80.59	27.33	45.04	2.00	2.00	0.00
1,000.00	16.00	18.73	989.64	3,912.36	105.10	35.64	58.74	2.00	2.00	0.00
1,100.00	18.00	18.73	1,085.27	3,816.73	132.79	45.02	74.22	2.00	2.00	0.00
<b>EOB TO 19.74° INC</b>										
1,186.86	19.74	18.73	1,167.46	3,734.54	159.39	54.04	89.09	2.00	2.00	0.00
1,200.00	19.74	18.73	1,179.83	3,722.17	163.59	55.47	91.44	0.00	0.00	0.00
1,300.00	19.74	18.73	1,273.95	3,628.05	195.57	66.31	109.31	0.00	0.00	0.00
1,400.00	19.74	18.73	1,368.08	3,533.92	227.56	77.16	127.19	0.00	0.00	0.00
1,500.00	19.74	18.73	1,462.20	3,439.80	259.54	88.00	145.07	0.00	0.00	0.00
<b>Pierre Shale Top</b>										
1,535.91	19.74	18.73	1,496.00	3,406.00	271.02	91.89	151.48	0.00	0.00	0.00
1,600.00	19.74	18.73	1,556.33	3,345.67	291.52	98.84	162.94	0.00	0.00	0.00
1,700.00	19.74	18.73	1,650.45	3,251.55	323.50	109.69	180.82	0.00	0.00	0.00
1,800.00	19.74	18.73	1,744.58	3,157.42	355.49	120.53	198.69	0.00	0.00	0.00
1,900.00	19.74	18.73	1,838.70	3,063.30	387.47	131.38	216.57	0.00	0.00	0.00
2,000.00	19.74	18.73	1,932.83	2,969.17	419.45	142.22	234.45	0.00	0.00	0.00
2,100.00	19.74	18.73	2,026.95	2,875.05	451.43	153.06	252.32	0.00	0.00	0.00
2,200.00	19.74	18.73	2,121.08	2,780.92	483.41	163.91	270.20	0.00	0.00	0.00
2,300.00	19.74	18.73	2,215.20	2,686.80	515.40	174.75	288.07	0.00	0.00	0.00
2,400.00	19.74	18.73	2,309.33	2,592.67	547.38	185.60	305.95	0.00	0.00	0.00
2,500.00	19.74	18.73	2,403.45	2,498.55	579.36	196.44	323.83	0.00	0.00	0.00
2,600.00	19.74	18.73	2,497.58	2,404.42	611.34	207.28	341.70	0.00	0.00	0.00
2,700.00	19.74	18.73	2,591.70	2,310.30	643.33	218.13	359.58	0.00	0.00	0.00
2,800.00	19.74	18.73	2,685.83	2,216.17	675.31	228.97	377.45	0.00	0.00	0.00
2,900.00	19.74	18.73	2,779.95	2,122.05	707.29	239.82	395.33	0.00	0.00	0.00
3,000.00	19.74	18.73	2,874.08	2,027.92	739.27	250.66	413.21	0.00	0.00	0.00
3,100.00	19.74	18.73	2,968.20	1,933.80	771.26	261.50	431.08	0.00	0.00	0.00
3,200.00	19.74	18.73	3,062.33	1,839.67	803.24	272.35	448.96	0.00	0.00	0.00
3,300.00	19.74	18.73	3,156.45	1,745.55	835.22	283.19	466.83	0.00	0.00	0.00
3,400.00	19.74	18.73	3,250.58	1,651.42	867.20	294.04	484.71	0.00	0.00	0.00
<b>Richard Sandstone</b>										
3,451.44	19.74	18.73	3,299.00	1,603.00	883.66	299.62	493.91	0.00	0.00	0.00
3,500.00	19.74	18.73	3,344.70	1,557.30	899.18	304.88	502.59	0.00	0.00	0.00
<b>Parkman Sandstone</b>										
3,594.87	19.74	18.73	3,434.00	1,468.00	929.53	315.17	519.54	0.00	0.00	0.00
3,600.00	19.74	18.73	3,438.83	1,463.17	931.17	315.73	520.46	0.00	0.00	0.00
3,700.00	19.74	18.73	3,532.95	1,369.05	963.15	326.57	538.34	0.00	0.00	0.00
3,800.00	19.74	18.73	3,627.08	1,274.92	995.13	337.41	556.21	0.00	0.00	0.00
3,900.00	19.74	18.73	3,721.20	1,180.80	1,027.11	348.26	574.09	0.00	0.00	0.00
4,000.00	19.74	18.73	3,815.33	1,086.67	1,059.10	359.10	591.97	0.00	0.00	0.00

# Planning Report



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<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 31-32-4HN	<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)
4,100.00	19.74	18.73	3,909.45	992.55	1,091.08	369.95	609.84	0.00	0.00	0.00
4,200.00	19.74	18.73	4,003.58	898.42	1,123.06	380.79	627.72	0.00	0.00	0.00
4,300.00	19.74	18.73	4,097.70	804.30	1,155.04	391.63	645.59	0.00	0.00	0.00
<b>Sussex Sandstone</b>										
<b>4,324.75</b>	<b>19.74</b>	<b>18.73</b>	<b>4,121.00</b>	<b>781.00</b>	<b>1,162.96</b>	<b>394.32</b>	<b>650.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,400.00	19.74	18.73	4,191.83	710.17	1,187.03	402.48	663.47	0.00	0.00	0.00
4,500.00	19.74	18.73	4,285.95	616.05	1,219.01	413.32	681.35	0.00	0.00	0.00
4,600.00	19.74	18.73	4,380.08	521.92	1,250.99	424.17	699.22	0.00	0.00	0.00
4,700.00	19.74	18.73	4,474.21	427.79	1,282.97	435.01	717.10	0.00	0.00	0.00
4,800.00	19.74	18.73	4,568.33	333.67	1,314.95	445.85	734.97	0.00	0.00	0.00
<b>Shannon Sandstone</b>										
<b>4,820.90</b>	<b>19.74</b>	<b>18.73</b>	<b>4,588.00</b>	<b>314.00</b>	<b>1,321.64</b>	<b>448.12</b>	<b>738.71</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,900.00	19.74	18.73	4,662.46	239.54	1,346.94	456.70	752.85	0.00	0.00	0.00
5,000.00	19.74	18.73	4,756.58	145.42	1,378.92	467.54	770.73	0.00	0.00	0.00
5,100.00	19.74	18.73	4,850.71	51.29	1,410.90	478.39	788.60	0.00	0.00	0.00
5,200.00	19.74	18.73	4,944.83	-42.83	1,442.88	489.23	806.48	0.00	0.00	0.00
5,300.00	19.74	18.73	5,038.96	-136.96	1,474.87	500.07	824.35	0.00	0.00	0.00
5,400.00	19.74	18.73	5,133.08	-231.08	1,506.85	510.92	842.23	0.00	0.00	0.00
5,500.00	19.74	18.73	5,227.21	-325.21	1,538.83	521.76	860.11	0.00	0.00	0.00
5,600.00	19.74	18.73	5,321.33	-419.33	1,570.81	532.61	877.98	0.00	0.00	0.00
<b>TeePee Buttes</b>										
<b>5,637.89</b>	<b>19.74</b>	<b>18.73</b>	<b>5,357.00</b>	<b>-455.00</b>	<b>1,582.93</b>	<b>536.72</b>	<b>884.76</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
5,700.00	19.74	18.73	5,415.46	-513.46	1,602.80	543.45	895.86	0.00	0.00	0.00
5,800.00	19.74	18.73	5,509.58	-607.58	1,634.78	554.29	913.73	0.00	0.00	0.00
5,900.00	19.74	18.73	5,603.71	-701.71	1,666.76	565.14	931.61	0.00	0.00	0.00
6,000.00	19.74	18.73	5,697.83	-795.83	1,698.74	575.98	949.49	0.00	0.00	0.00
<b>KOP (10°/100ft DGLG)</b>										
<b>6,055.35</b>	<b>19.74</b>	<b>18.73</b>	<b>5,749.93</b>	<b>-847.93</b>	<b>1,716.44</b>	<b>581.98</b>	<b>959.38</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
6,100.00	21.52	30.38	5,791.73	-889.73	1,730.66	588.55	969.02	10.00	3.99	26.10
6,200.00	27.69	49.49	5,882.75	-980.75	1,761.65	615.56	1,002.41	10.00	6.17	19.11
6,300.00	35.54	61.42	5,967.93	-1,065.93	1,790.71	658.86	1,051.21	10.00	7.85	11.92
<b>Sharon Springs</b>										
<b>6,300.08</b>	<b>35.54</b>	<b>61.42</b>	<b>5,968.00</b>	<b>-1,066.00</b>	<b>1,790.74</b>	<b>658.90</b>	<b>1,051.26</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Niobrara Top</b>										
<b>6,349.34</b>	<b>39.73</b>	<b>65.68</b>	<b>6,007.00</b>	<b>-1,105.00</b>	<b>1,804.07</b>	<b>685.83</b>	<b>1,080.53</b>	<b>10.02</b>	<b>8.51</b>	<b>8.66</b>
<b>Niobrara A Chalk</b>										
<b>6,389.38</b>	<b>43.23</b>	<b>68.62</b>	<b>6,037.00</b>	<b>-1,135.00</b>	<b>1,814.35</b>	<b>710.28</b>	<b>1,106.67</b>	<b>10.00</b>	<b>8.74</b>	<b>7.34</b>
6,400.00	44.17	69.34	6,044.68	-1,142.68	1,816.98	717.12	1,113.94	10.00	8.85	6.73
<b>Niobrara A Chalk Base</b>										
<b>6,423.17</b>	<b>46.24</b>	<b>70.82</b>	<b>6,061.00</b>	<b>-1,159.00</b>	<b>1,822.58</b>	<b>732.58</b>	<b>1,130.27</b>	<b>10.00</b>	<b>8.92</b>	<b>6.38</b>
<b>Niobrara B1 Chalk Top</b>										
<b>6,480.92</b>	<b>51.46</b>	<b>74.10</b>	<b>6,099.00</b>	<b>-1,197.00</b>	<b>1,835.63</b>	<b>774.04</b>	<b>1,173.61</b>	<b>10.00</b>	<b>9.04</b>	<b>5.68</b>
6,500.00	53.20	75.08	6,110.66	-1,208.66	1,839.64	788.59	1,188.70	10.00	9.14	5.13
<b>Niobrara B1 Chalk Base</b>										
<b>6,512.42</b>	<b>54.34</b>	<b>75.69</b>	<b>6,118.00</b>	<b>-1,216.00</b>	<b>1,842.17</b>	<b>798.29</b>	<b>1,198.72</b>	<b>10.00</b>	<b>9.17</b>	<b>4.94</b>
<b>Niobrara B2 Chalk Top</b>										
<b>6,563.43</b>	<b>59.05</b>	<b>78.04</b>	<b>6,146.00</b>	<b>-1,244.00</b>	<b>1,851.83</b>	<b>839.79</b>	<b>1,241.33</b>	<b>10.00</b>	<b>9.23</b>	<b>4.61</b>
6,600.00	62.45	79.59	6,163.87	-1,261.87	1,858.01	871.09	1,273.21	10.00	9.30	4.22
<b>Niobrara B2 Chalk Base</b>										
<b>6,618.09</b>	<b>64.14</b>	<b>80.31</b>	<b>6,172.00</b>	<b>-1,270.00</b>	<b>1,860.83</b>	<b>887.00</b>	<b>1,289.34</b>	<b>10.00</b>	<b>9.33</b>	<b>4.03</b>
<b>Niobrara C Chalk Target Top</b>										
<b>6,691.53</b>	<b>71.02</b>	<b>83.08</b>	<b>6,200.00</b>	<b>-1,298.00</b>	<b>1,870.59</b>	<b>954.13</b>	<b>1,356.93</b>	<b>10.00</b>	<b>9.38</b>	<b>3.77</b>



# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-4HN
<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 31-32-4HN	<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)
6,700.00	71.82	83.38	6,202.70	-1,300.70	1,871.53	962.10	1,364.91	10.00	9.41	3.58
6,800.00	81.25	86.79	6,225.96	-1,323.96	1,879.79	1,058.88	1,461.00	10.00	9.44	3.41
LP: 2225ft FNL & 2176ft FEL of Sec 31 - Niobrara C Chalk Target Center										
<b>6,892.39</b>	<b>90.00</b>	<b>89.78</b>	<b>6,233.00</b>	<b>-1,331.00</b>	<b>1,882.53</b>	<b>1,150.86</b>	<b>1,551.17</b>	<b>10.00</b>	<b>9.47</b>	<b>3.24</b>
6,900.00	90.00	89.78	6,233.00	-1,331.00	1,882.56	1,158.47	1,558.58	0.00	0.00	0.00
7,000.00	90.00	89.78	6,233.00	-1,331.00	1,882.94	1,258.47	1,656.01	0.00	0.00	0.00
7,100.00	90.00	89.78	6,233.00	-1,331.00	1,883.32	1,358.47	1,753.45	0.00	0.00	0.00
7,200.00	90.00	89.78	6,233.00	-1,331.00	1,883.70	1,458.47	1,850.88	0.00	0.00	0.00
7,300.00	90.00	89.78	6,233.00	-1,331.00	1,884.08	1,558.47	1,948.31	0.00	0.00	0.00
7,400.00	90.00	89.78	6,233.00	-1,331.00	1,884.46	1,658.46	2,045.74	0.00	0.00	0.00
7,500.00	90.00	89.78	6,233.00	-1,331.00	1,884.84	1,758.46	2,143.17	0.00	0.00	0.00
7,600.00	90.00	89.78	6,233.00	-1,331.00	1,885.22	1,858.46	2,240.60	0.00	0.00	0.00
7,700.00	90.00	89.78	6,233.00	-1,331.00	1,885.60	1,958.46	2,338.04	0.00	0.00	0.00
7,800.00	90.00	89.78	6,233.00	-1,331.00	1,885.98	2,058.46	2,435.47	0.00	0.00	0.00
7,900.00	90.00	89.78	6,233.00	-1,331.00	1,886.36	2,158.46	2,532.90	0.00	0.00	0.00
8,000.00	90.00	89.78	6,233.00	-1,331.00	1,886.74	2,258.46	2,630.33	0.00	0.00	0.00
8,100.00	90.00	89.78	6,233.00	-1,331.00	1,887.12	2,358.46	2,727.76	0.00	0.00	0.00
8,200.00	90.00	89.78	6,233.00	-1,331.00	1,887.50	2,458.46	2,825.20	0.00	0.00	0.00
8,300.00	90.00	89.78	6,233.00	-1,331.00	1,887.88	2,558.46	2,922.63	0.00	0.00	0.00
8,400.00	90.00	89.78	6,233.00	-1,331.00	1,888.26	2,658.46	3,020.06	0.00	0.00	0.00
8,500.00	90.00	89.78	6,233.00	-1,331.00	1,888.63	2,758.46	3,117.49	0.00	0.00	0.00
8,600.00	90.00	89.78	6,233.00	-1,331.00	1,889.01	2,858.46	3,214.92	0.00	0.00	0.00
8,700.00	90.00	89.78	6,233.00	-1,331.00	1,889.39	2,958.46	3,312.36	0.00	0.00	0.00
8,800.00	90.00	89.78	6,233.00	-1,331.00	1,889.77	3,058.45	3,409.79	0.00	0.00	0.00
8,900.00	90.00	89.78	6,233.00	-1,331.00	1,890.15	3,158.45	3,507.22	0.00	0.00	0.00
9,000.00	90.00	89.78	6,233.00	-1,331.00	1,890.53	3,258.45	3,604.65	0.00	0.00	0.00
9,100.00	90.00	89.78	6,233.00	-1,331.00	1,890.91	3,358.45	3,702.08	0.00	0.00	0.00
9,200.00	90.00	89.78	6,233.00	-1,331.00	1,891.29	3,458.45	3,799.51	0.00	0.00	0.00
9,300.00	90.00	89.78	6,233.00	-1,331.00	1,891.67	3,558.45	3,896.95	0.00	0.00	0.00
9,400.00	90.00	89.78	6,233.00	-1,331.00	1,892.05	3,658.45	3,994.38	0.00	0.00	0.00
9,500.00	90.00	89.78	6,233.00	-1,331.00	1,892.43	3,758.45	4,091.81	0.00	0.00	0.00
9,600.00	90.00	89.78	6,233.00	-1,331.00	1,892.81	3,858.45	4,189.24	0.00	0.00	0.00
9,700.00	90.00	89.78	6,233.00	-1,331.00	1,893.19	3,958.45	4,286.67	0.00	0.00	0.00
9,800.00	90.00	89.78	6,233.00	-1,331.00	1,893.57	4,058.45	4,384.11	0.00	0.00	0.00
9,900.00	90.00	89.78	6,233.00	-1,331.00	1,893.95	4,158.45	4,481.54	0.00	0.00	0.00
10,000.00	90.00	89.78	6,233.00	-1,331.00	1,894.33	4,258.45	4,578.97	0.00	0.00	0.00
10,100.00	90.00	89.78	6,233.00	-1,331.00	1,894.71	4,358.45	4,676.40	0.00	0.00	0.00
10,200.00	90.00	89.78	6,233.00	-1,331.00	1,895.09	4,458.44	4,773.83	0.00	0.00	0.00
10,300.00	90.00	89.78	6,233.00	-1,331.00	1,895.47	4,558.44	4,871.27	0.00	0.00	0.00
10,400.00	90.00	89.78	6,233.00	-1,331.00	1,895.85	4,658.44	4,968.70	0.00	0.00	0.00
10,500.00	90.00	89.78	6,233.00	-1,331.00	1,896.23	4,758.44	5,066.13	0.00	0.00	0.00
10,600.00	90.00	89.78	6,233.00	-1,331.00	1,896.61	4,858.44	5,163.56	0.00	0.00	0.00
10,700.00	90.00	89.78	6,233.00	-1,331.00	1,896.99	4,958.44	5,260.99	0.00	0.00	0.00
10,800.00	90.00	89.78	6,233.00	-1,331.00	1,897.37	5,058.44	5,358.42	0.00	0.00	0.00
10,900.00	90.00	89.78	6,233.00	-1,331.00	1,897.74	5,158.44	5,455.86	0.00	0.00	0.00
11,000.00	90.00	89.78	6,233.00	-1,331.00	1,898.12	5,258.44	5,553.29	0.00	0.00	0.00
11,100.00	90.00	89.78	6,233.00	-1,331.00	1,898.50	5,358.44	5,650.72	0.00	0.00	0.00
11,200.00	90.00	89.78	6,233.00	-1,331.00	1,898.88	5,458.44	5,748.15	0.00	0.00	0.00
11,300.00	90.00	89.78	6,233.00	-1,331.00	1,899.26	5,558.44	5,845.58	0.00	0.00	0.00
11,400.00	90.00	89.78	6,233.00	-1,331.00	1,899.64	5,658.44	5,943.02	0.00	0.00	0.00
11,500.00	90.00	89.78	6,233.00	-1,331.00	1,900.02	5,758.44	6,040.45	0.00	0.00	0.00
11,600.00	90.00	89.78	6,233.00	-1,331.00	1,900.40	5,858.43	6,137.88	0.00	0.00	0.00
11,700.00	90.00	89.78	6,233.00	-1,331.00	1,900.78	5,958.43	6,235.31	0.00	0.00	0.00
11,800.00	90.00	89.78	6,233.00	-1,331.00	1,901.16	6,058.43	6,332.74	0.00	0.00	0.00

# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-4HN
<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 31-32-4HN	<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)
11,900.00	90.00	89.78	6,233.00	-1,331.00	1,901.54	6,158.43	6,430.18	0.00	0.00	0.00
12,000.00	90.00	89.78	6,233.00	-1,331.00	1,901.92	6,258.43	6,527.61	0.00	0.00	0.00
12,100.00	90.00	89.78	6,233.00	-1,331.00	1,902.30	6,358.43	6,625.04	0.00	0.00	0.00
12,200.00	90.00	89.78	6,233.00	-1,331.00	1,902.68	6,458.43	6,722.47	0.00	0.00	0.00
12,300.00	90.00	89.78	6,233.00	-1,331.00	1,903.06	6,558.43	6,819.90	0.00	0.00	0.00
12,400.00	90.00	89.78	6,233.00	-1,331.00	1,903.44	6,658.43	6,917.33	0.00	0.00	0.00
12,500.00	90.00	89.78	6,233.00	-1,331.00	1,903.82	6,758.43	7,014.77	0.00	0.00	0.00
12,600.00	90.00	89.78	6,233.00	-1,331.00	1,904.20	6,858.43	7,112.20	0.00	0.00	0.00
12,700.00	90.00	89.78	6,233.00	-1,331.00	1,904.58	6,958.43	7,209.63	0.00	0.00	0.00
12,800.00	90.00	89.78	6,233.00	-1,331.00	1,904.96	7,058.43	7,307.06	0.00	0.00	0.00
12,900.00	90.00	89.78	6,233.00	-1,331.00	1,905.34	7,158.43	7,404.49	0.00	0.00	0.00
13,000.00	90.00	89.78	6,233.00	-1,331.00	1,905.72	7,258.42	7,501.93	0.00	0.00	0.00
13,100.00	90.00	89.78	6,233.00	-1,331.00	1,906.10	7,358.42	7,599.36	0.00	0.00	0.00
13,200.00	90.00	89.78	6,233.00	-1,331.00	1,906.48	7,458.42	7,696.79	0.00	0.00	0.00
13,300.00	90.00	89.78	6,233.00	-1,331.00	1,906.86	7,558.42	7,794.22	0.00	0.00	0.00
13,400.00	90.00	89.78	6,233.00	-1,331.00	1,907.23	7,658.42	7,891.65	0.00	0.00	0.00
13,500.00	90.00	89.78	6,233.00	-1,331.00	1,907.61	7,758.42	7,989.08	0.00	0.00	0.00
13,600.00	90.00	89.78	6,233.00	-1,331.00	1,907.99	7,858.42	8,086.52	0.00	0.00	0.00
13,700.00	90.00	89.78	6,233.00	-1,331.00	1,908.37	7,958.42	8,183.95	0.00	0.00	0.00
13,800.00	90.00	89.78	6,233.00	-1,331.00	1,908.75	8,058.42	8,281.38	0.00	0.00	0.00
<b>BHL: 2225ft FNL &amp; 460ft FEL of Sec 32</b>										
<b>13,861.09</b>	<b>90.00</b>	<b>89.78</b>	<b>6,233.00</b>	<b>-1,331.00</b>	<b>1,908.98</b>	<b>8,119.50</b>	<b>8,340.90</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
479.44	479.00	Fox Hills Base				
1,535.91	1,496.00	Pierre Shale Top				
3,451.44	3,299.00	Richard Sandstone				
3,594.87	3,434.00	Parkman Sandstone				
4,324.75	4,121.00	Sussex Sandstone				
4,820.90	4,588.00	Shannon Sandstone				
5,637.89	5,357.00	TeePee Buttes				
6,300.08	5,968.00	Sharon Springs				
6,349.34	6,007.00	Niobrara Top				
6,389.38	6,037.00	Niobrara A Chalk				
6,423.17	6,061.00	Niobrara A Chalk Base				
6,480.92	6,099.00	Niobrara B1 Chalk Top				
6,512.42	6,118.00	Niobrara B1 Chalk Base				
6,563.43	6,146.00	Niobrara B2 Chalk Top				
6,618.09	6,172.00	Niobrara B2 Chalk Base				
6,691.53	6,200.00	Niobrara C Chalk Target Top				
6,892.39	6,233.00	Niobrara C Chalk Target Center				

# Planning Report



<b>Database:</b>	Database 1	<b>Local Co-ordinate Reference:</b>	Well SHULL FED 31-32-4HN
<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 31-32-4HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #2		

Plan Annotations				
Local Coordinates				
MD (usft)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Comment
0.00	0.00	0.00	0.00	SHL: 1249ft FSL & 1951ft FWL of Sec 31
200.00	200.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1,186.86	1,167.46	159.39	54.04	EOB TO 19.74° INC
6,055.35	5,749.93	1,716.44	581.98	KOP (10°/100ft DGLG)
6,892.39	6,233.00	1,882.53	1,150.86	LP: 2225ft FNL & 2176ft FEL of Sec 31
13,861.09	6,233.00	1,908.98	8,119.50	BHL: 2225ft FNL & 460ft FEL of Sec 32