

# **MALLARD EXPLORATION**

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

**NE SE SEC. 33 T8N R61W 6th P.M.**

**HARLEQUIN 33-32-14HN**

**ORIGINAL WELLBORE**

**27 December, 2017**

**Plan: PROPOSAL #1**





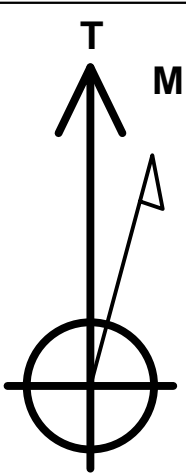
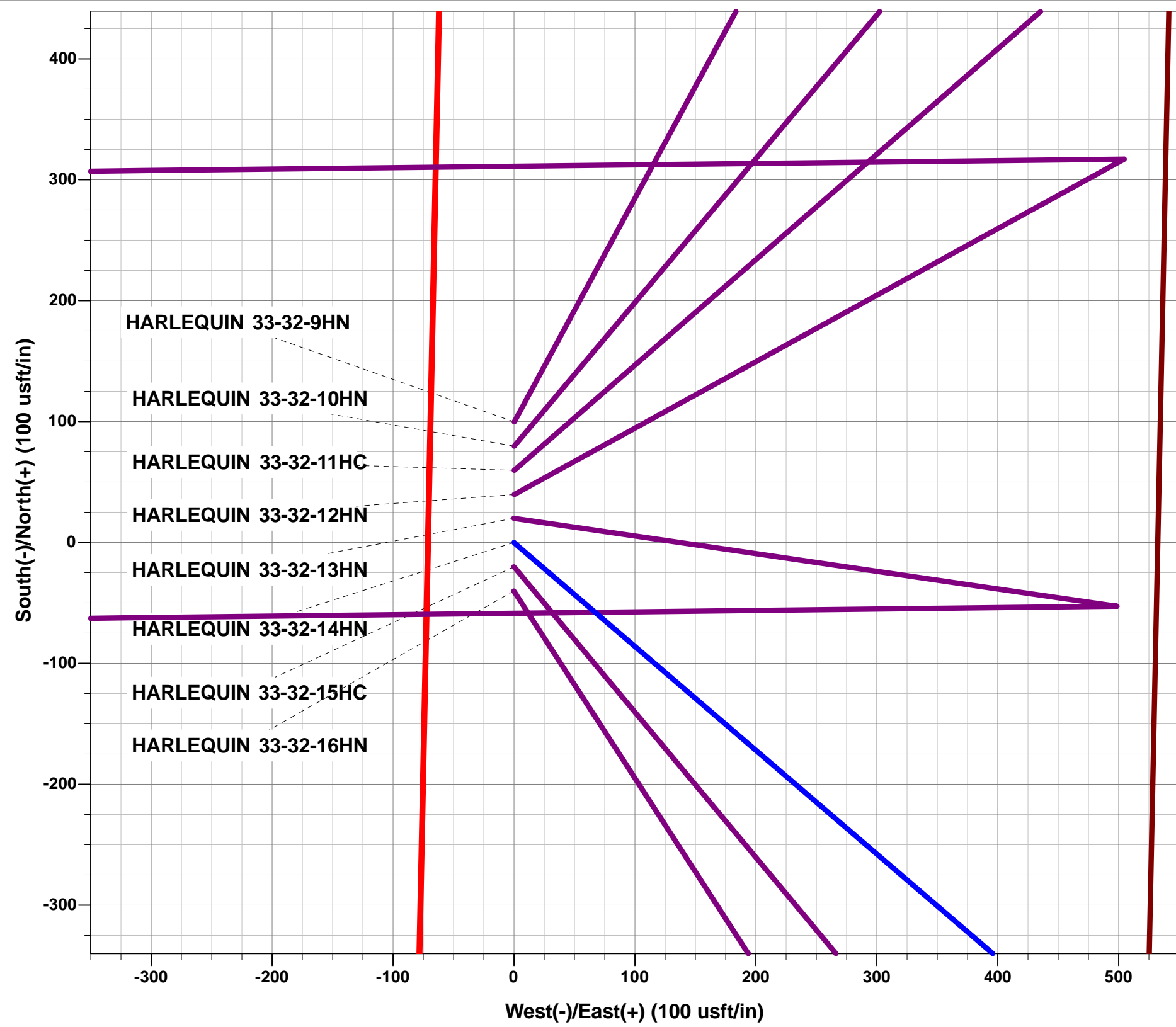
Project: WELD COUNTY, COLORADO (NAD 83)  
Site: NE SE SEC. 33 T8N R61W 6th P.M.  
Well: HARLEQUIN 33-32-14HN  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Dep	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHL: 1404ft FSL & 527ft FEL of Sec 33
300.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
895.62	900.00	12.00	130.65	-40.78	47.49	-45.10	62.60	EOB TO 12° INC
3360.04	3419.47	12.00	130.65	-382.05	444.91	-422.46	586.43	END OF TANGENT
3955.66	4019.47	0.00	0.00	-422.83	492.40	-467.56	649.03	EOD TO VERTICAL
6004.04	6067.85	0.00	0.00	-422.83	492.40	-467.56	649.03	KOP (10°/100ft BUR)
6577.00	6967.85	90.00	269.33	-429.53	-80.52	104.81	1221.99	HZ LP: 975ft FSL & 600ft FEL of Sec 33
6577.00	16361.64	90.00	269.33	-539.56	-9473.66	9489.01	10615.77	BHL: 975ft FSL & 600ft FWL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HARLEQUIN 33-32-14HN	6004.04	-422.83	492.40	40.613544	-104.202082
HZ LP - HARLEQUIN 33-32-14HN	6577.00	-429.53	-80.52	40.613526	-104.204146
BHL - HARLEQUIN 33-32-14HN	6577.00	-539.56	-9473.66	40.613219	-104.237978



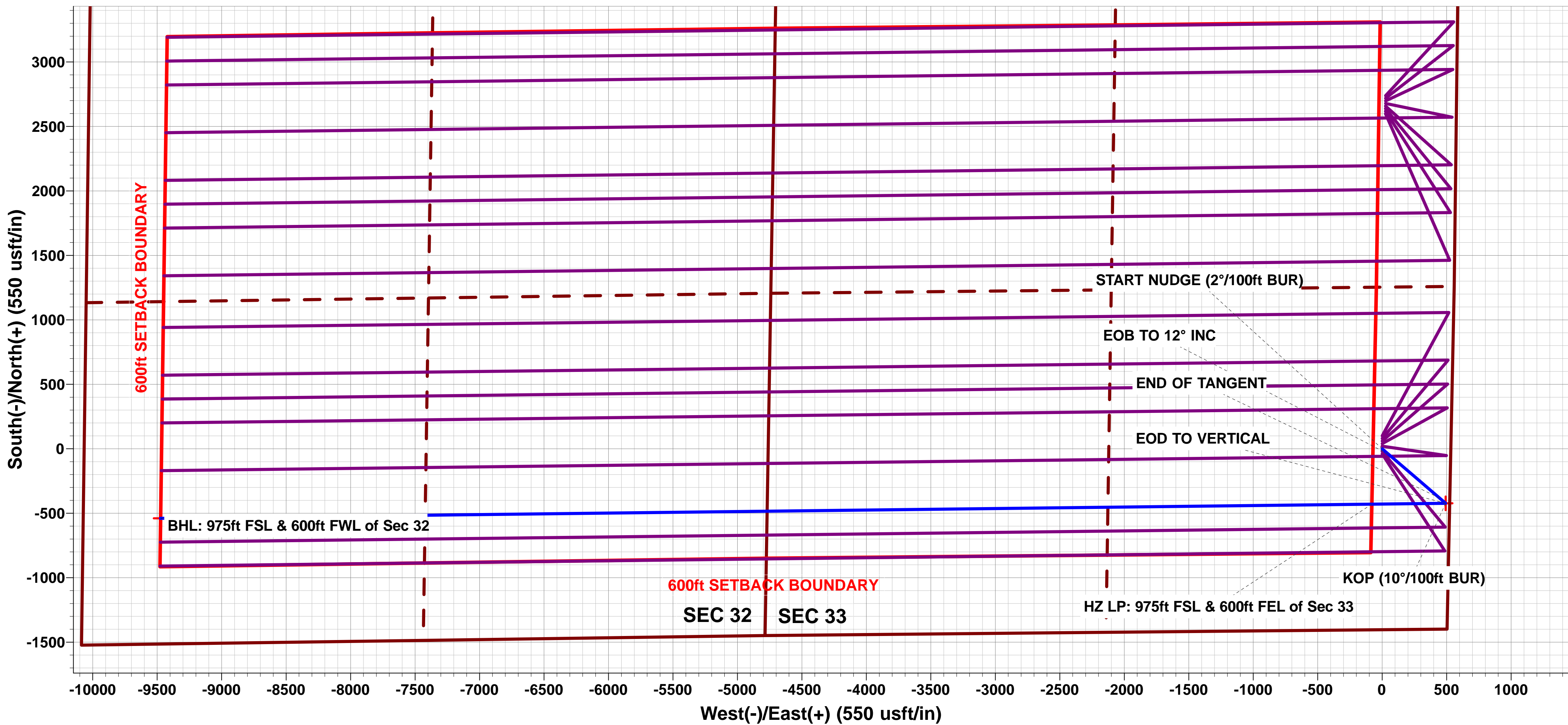
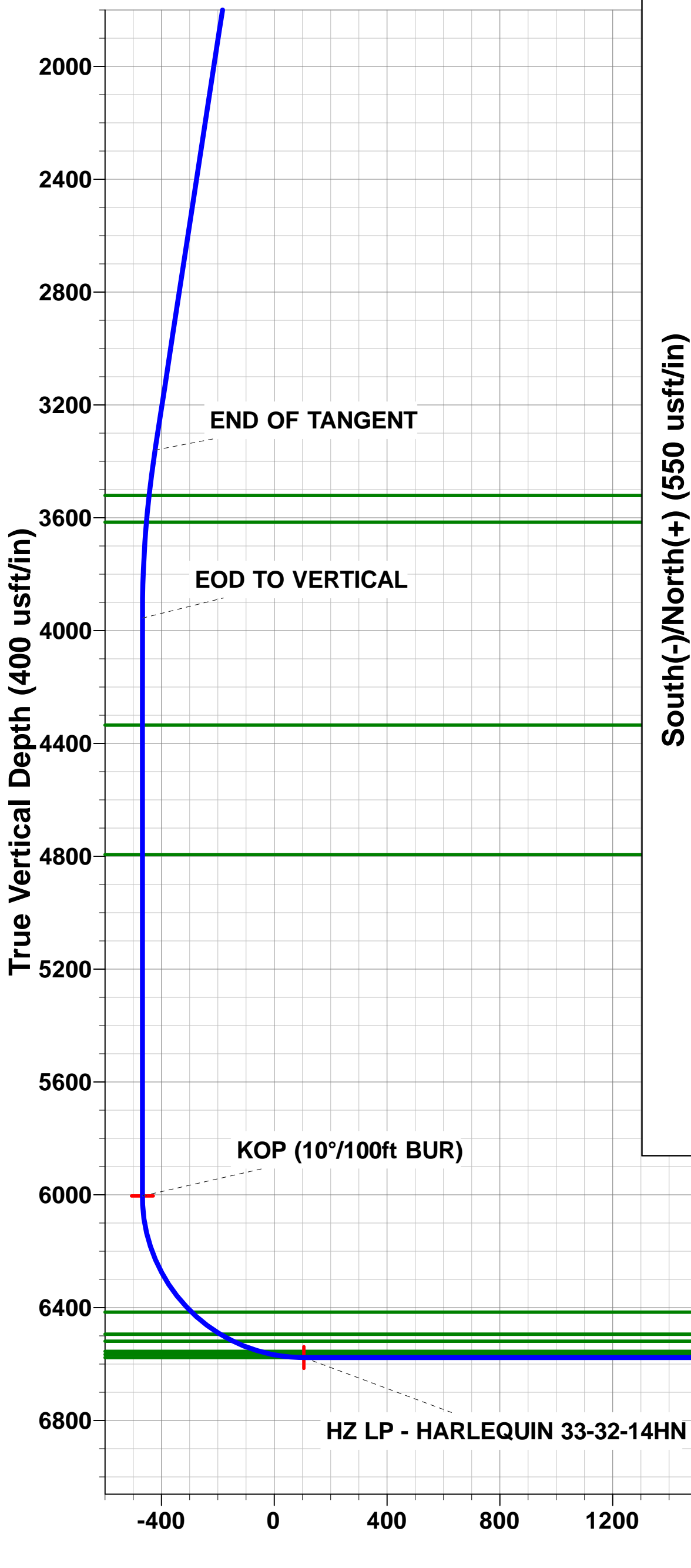
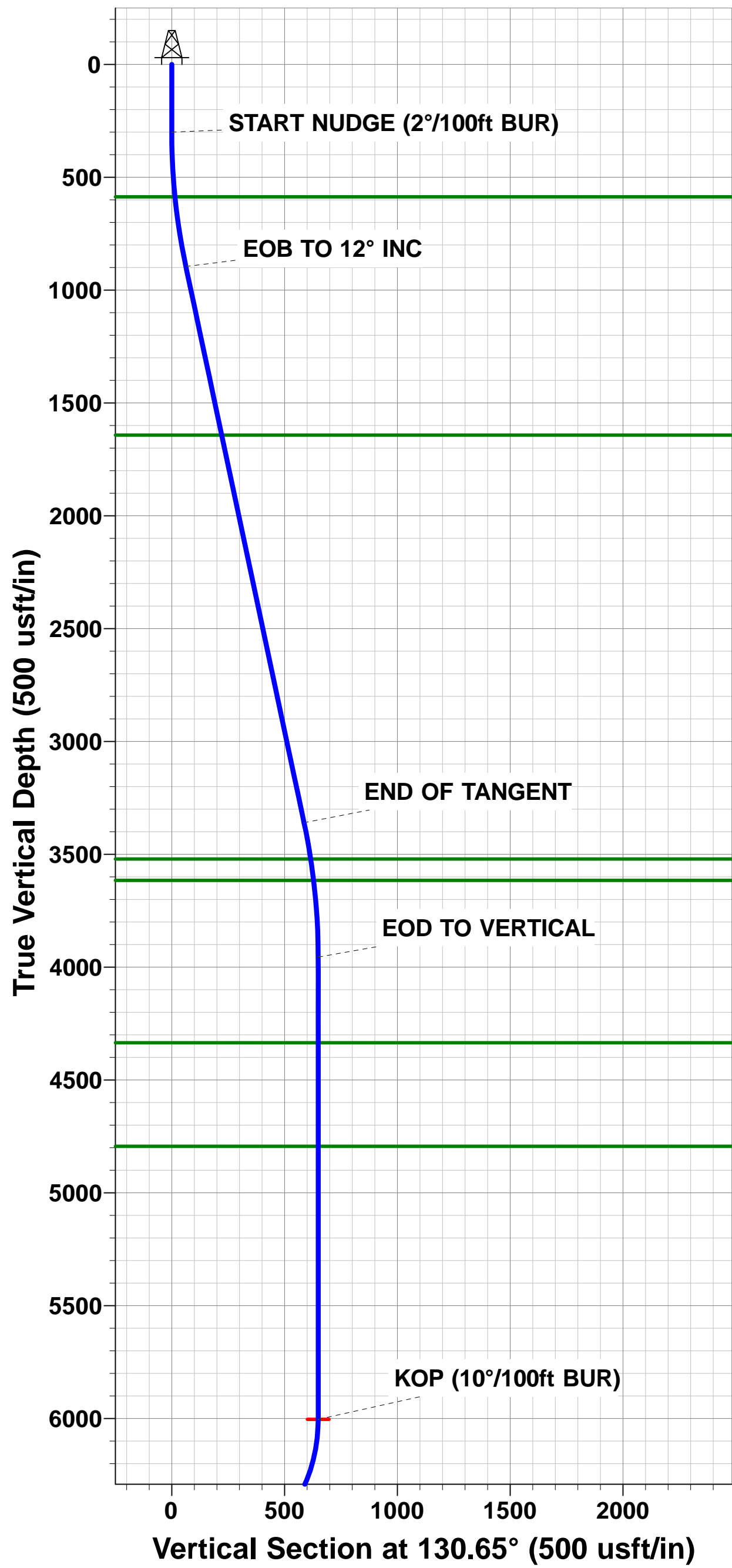
Azimuths to True North  
Magnetic North: 7.87°  
  
Magnetic Field  
Strength: 52498.9snT  
Dip Angle: 67.10°  
Date: 27/12/2017  
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
587.00	587.48	Fox Hills Base
1643.00	1664.07	Pierre Shale Top
3521.00	3583.13	Richard Sandstone
3616.00	3679.01	Parkman Sandstone
4335.00	4398.81	Sussex Sandstone
4794.00	4857.81	Shannon Sandstone
6416.00	6527.57	Sharon Springs
6494.00	6655.60	Niobrara A Chalk
6519.00	6707.82	Niobrara A Chalk Base
6555.00	6808.56	Niobrara B1 Chalk Top
6566.00	6855.40	Niobrara B1 Chalk Base
6577.00	6967.85	Niobrara B2 Chalk Top (Target)

PROPOSED LOCAL COORDINATES:

SHL: 1404ft FSL & 527ft FEL of Sec 33  
HZ LP: 975ft FSL & 600ft FEL of Sec 33  
BHL: 975ft FSL & 600ft FWL of Sec 32



Vertical Section at 266.74° (400 usft/in)

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-14HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<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

Site	NE SE SEC. 33 T8N R61W 6th P.M.				
Site Position:		Northing:	1,469,508.45 usft	Latitude:	40.614979
From:	Lat/Long	Easting:	3,359,832.23 usft	Longitude:	-104.203855
Position Uncertainty:	0.00 usft	Slot Radius:	1.10000 ft	Grid Convergence:	0.84 °

Well	HARLEQUIN 33-32-14HN					
Well Position	+N/-S	-99.83 usft	Northing:	1,469,408.62 usft	Latitude:	40.614705
	+E/-W	-0.28 usft	Easting:	3,359,833.41 usft	Longitude:	-104.203856
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	5,012.00 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	27/12/2017	7.87	67.10	52,499

<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>
	6,577.00	0.00	0.00	266.74

<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	-5,032.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	-4,732.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	12.00	130.65	895.62	-4,136.38	-40.78	47.49	2.00	2.00	0.00	130.65	
3,419.47	12.00	130.65	3,360.04	-1,671.96	-382.05	444.91	0.00	0.00	0.00	0.00	
4,019.47	0.00	0.00	3,955.66	-1,076.34	-422.83	492.40	2.00	-2.00	0.00	180.00	
6,067.85	0.00	0.00	6,004.04	972.04	-422.83	492.40	0.00	0.00	0.00	0.00	KOP - HARLEQUIN
6,967.85	90.00	269.33	6,577.00	1,545.00	-429.53	-80.52	10.00	10.00	-10.07	269.33	HZ LP - HARLEQUIN
16,361.64	90.00	269.33	6,577.00	1,545.00	-539.56	-9,473.66	0.00	0.00	0.00	-61.50	BHL - HARLEQUIN

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-14HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<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: 1404ft FSL &amp; 527ft FEL of Sec 33</b>										
0.00	0.00	0.00	0.00	5,032.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,932.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,832.00	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	4,732.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	2.00	130.65	399.98	4,632.02	-1.14	1.32	-1.26	2.00	2.00	0.00
500.00	4.00	130.65	499.84	4,532.16	-4.55	5.29	-5.03	2.00	2.00	0.00
<b>Fox Hills Base</b>										
587.48	5.75	130.65	587.00	4,445.00	-9.39	10.93	-10.38	2.00	2.00	0.00
600.00	6.00	130.65	599.45	4,432.55	-10.22	11.91	-11.31	2.00	2.00	0.00
700.00	8.00	130.65	698.70	4,333.30	-18.16	21.15	-20.08	2.00	2.00	0.00
800.00	10.00	130.65	797.47	4,234.53	-28.35	33.02	-31.35	2.00	2.00	0.00
<b>EOB TO 12° INC</b>										
900.00	12.00	130.65	895.62	4,136.38	-40.78	47.49	-45.10	2.00	2.00	0.00
1,000.00	12.00	130.65	993.44	4,038.56	-54.33	63.27	-60.08	0.00	0.00	0.00
1,100.00	12.00	130.65	1,091.25	3,940.75	-67.87	79.04	-75.05	0.00	0.00	0.00
1,200.00	12.00	130.65	1,189.07	3,842.93	-81.42	94.82	-90.03	0.00	0.00	0.00
1,300.00	12.00	130.65	1,286.88	3,745.12	-94.96	110.59	-105.01	0.00	0.00	0.00
1,400.00	12.00	130.65	1,384.70	3,647.30	-108.51	126.36	-119.99	0.00	0.00	0.00
1,500.00	12.00	130.65	1,482.51	3,549.49	-122.05	142.14	-134.97	0.00	0.00	0.00
1,600.00	12.00	130.65	1,580.33	3,451.67	-135.60	157.91	-149.94	0.00	0.00	0.00
<b>Pierre Shale Top</b>										
1,664.07	12.00	130.65	1,643.00	3,389.00	-144.28	168.02	-159.54	0.00	0.00	0.00
1,700.00	12.00	130.65	1,678.14	3,353.86	-149.14	173.68	-164.92	0.00	0.00	0.00
1,800.00	12.00	130.65	1,775.96	3,256.04	-162.69	189.46	-179.90	0.00	0.00	0.00
1,900.00	12.00	130.65	1,873.77	3,158.23	-176.23	205.23	-194.88	0.00	0.00	0.00
2,000.00	12.00	130.65	1,971.59	3,060.41	-189.78	221.00	-209.86	0.00	0.00	0.00
2,100.00	12.00	130.65	2,069.40	2,962.60	-203.32	236.78	-224.83	0.00	0.00	0.00
2,200.00	12.00	130.65	2,167.22	2,864.78	-216.87	252.55	-239.81	0.00	0.00	0.00
2,300.00	12.00	130.65	2,265.03	2,766.97	-230.41	268.32	-254.79	0.00	0.00	0.00
2,400.00	12.00	130.65	2,362.84	2,669.16	-243.96	284.10	-269.77	0.00	0.00	0.00
2,500.00	12.00	130.65	2,460.66	2,571.34	-257.50	299.87	-284.74	0.00	0.00	0.00
2,600.00	12.00	130.65	2,558.47	2,473.53	-271.05	315.65	-299.72	0.00	0.00	0.00
2,700.00	12.00	130.65	2,656.29	2,375.71	-284.59	331.42	-314.70	0.00	0.00	0.00
2,800.00	12.00	130.65	2,754.10	2,277.90	-298.14	347.19	-329.68	0.00	0.00	0.00
2,900.00	12.00	130.65	2,851.92	2,180.08	-311.68	362.97	-344.66	0.00	0.00	0.00
3,000.00	12.00	130.65	2,949.73	2,082.27	-325.23	378.74	-359.63	0.00	0.00	0.00
3,100.00	12.00	130.65	3,047.55	1,984.45	-338.77	394.51	-374.61	0.00	0.00	0.00
3,200.00	12.00	130.65	3,145.36	1,886.64	-352.32	410.29	-389.59	0.00	0.00	0.00
3,300.00	12.00	130.65	3,243.18	1,788.82	-365.86	426.06	-404.57	0.00	0.00	0.00
3,400.00	12.00	130.65	3,340.99	1,691.01	-379.41	441.83	-419.55	0.00	0.00	0.00
<b>END OF TANGENT</b>										
3,419.47	12.00	130.65	3,360.04	1,671.96	-382.05	444.91	-422.46	0.00	0.00	0.00
3,500.00	10.39	130.65	3,439.03	1,592.97	-392.23	456.77	-433.72	2.00	-2.00	0.00
<b>Richard Sandstone</b>										
3,583.13	8.73	130.65	3,521.00	1,511.00	-401.22	467.24	-443.67	2.00	-2.00	0.00
3,600.00	8.39	130.65	3,537.69	1,494.31	-402.86	469.14	-445.48	2.00	-2.00	0.00
<b>Parkman Sandstone</b>										
3,679.01	6.81	130.65	3,616.00	1,416.00	-409.67	477.07	-453.00	2.00	-2.00	0.00
3,700.00	6.39	130.65	3,636.85	1,395.15	-411.24	478.90	-454.74	2.00	-2.00	0.00
3,800.00	4.39	130.65	3,736.40	1,295.60	-417.36	486.03	-461.51	2.00	-2.00	0.00
3,900.00	2.39	130.65	3,836.22	1,195.78	-421.21	490.51	-465.77	2.00	-2.00	0.00

# Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<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	0.39	130.65	3,936.19	1,095.81	-422.79	492.35	-467.51	2.00	-2.00	0.00
<b>EOD TO VERTICAL</b>										
<b>4,019.47</b>	<b>0.00</b>	<b>0.00</b>	<b>3,955.66</b>	<b>1,076.34</b>	<b>-422.83</b>	<b>492.40</b>	<b>-467.56</b>	<b>2.00</b>	<b>-2.00</b>	<b>0.00</b>
4,100.00	0.00	0.00	4,036.19	995.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,200.00	0.00	0.00	4,136.19	895.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,300.00	0.00	0.00	4,236.19	795.81	-422.83	492.40	-467.56	0.00	0.00	0.00
<b>Sussex Sandstone</b>										
<b>4,398.81</b>	<b>0.00</b>	<b>0.00</b>	<b>4,335.00</b>	<b>697.00</b>	<b>-422.83</b>	<b>492.40</b>	<b>-467.56</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,400.00	0.00	0.00	4,336.19	695.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,500.00	0.00	0.00	4,436.19	595.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,600.00	0.00	0.00	4,536.19	495.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,700.00	0.00	0.00	4,636.19	395.81	-422.83	492.40	-467.56	0.00	0.00	0.00
4,800.00	0.00	0.00	4,736.19	295.81	-422.83	492.40	-467.56	0.00	0.00	0.00
<b>Shannon Sandstone</b>										
<b>4,857.81</b>	<b>0.00</b>	<b>0.00</b>	<b>4,794.00</b>	<b>238.00</b>	<b>-422.83</b>	<b>492.40</b>	<b>-467.56</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
4,900.00	0.00	0.00	4,836.19	195.81	-422.83	492.40	-467.56	0.00	0.00	0.00
5,000.00	0.00	0.00	4,936.19	95.81	-422.83	492.40	-467.56	0.00	0.00	0.00
5,100.00	0.00	0.00	5,036.19	-4.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,200.00	0.00	0.00	5,136.19	-104.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,300.00	0.00	0.00	5,236.19	-204.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,400.00	0.00	0.00	5,336.19	-304.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,500.00	0.00	0.00	5,436.19	-404.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,600.00	0.00	0.00	5,536.19	-504.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,700.00	0.00	0.00	5,636.19	-604.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,800.00	0.00	0.00	5,736.19	-704.19	-422.83	492.40	-467.56	0.00	0.00	0.00
5,900.00	0.00	0.00	5,836.19	-804.19	-422.83	492.40	-467.56	0.00	0.00	0.00
6,000.00	0.00	0.00	5,936.19	-904.19	-422.83	492.40	-467.56	0.00	0.00	0.00
<b>KOP (10°/100ft BUR)</b>										
<b>6,067.85</b>	<b>0.00</b>	<b>0.00</b>	<b>6,004.04</b>	<b>-972.04</b>	<b>-422.83</b>	<b>492.40</b>	<b>-467.56</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
6,100.00	3.21	269.33	6,036.17	-1,004.17	-422.84	491.50	-466.66	10.00	10.00	0.00
6,200.00	13.21	269.33	6,135.02	-1,103.02	-423.01	477.23	-452.40	10.00	10.00	0.00
6,300.00	23.21	269.33	6,229.89	-1,197.89	-423.37	446.01	-421.22	10.00	10.00	0.00
6,400.00	33.21	269.33	6,317.90	-1,285.90	-423.92	398.80	-374.05	10.00	10.00	0.00
6,500.00	43.21	269.33	6,396.37	-1,364.37	-424.65	337.02	-312.33	10.00	10.00	0.00
<b>Sharon Springs</b>										
<b>6,527.57</b>	<b>45.97</b>	<b>269.33</b>	<b>6,416.00</b>	<b>-1,384.00</b>	<b>-424.87</b>	<b>317.66</b>	<b>-292.99</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,600.00	53.21	269.33	6,462.92	-1,430.92	-425.52	262.55	-237.93	10.00	10.00	0.00
<b>Niobrara A Chalk</b>										
<b>6,655.60</b>	<b>58.78</b>	<b>269.33</b>	<b>6,494.00</b>	<b>-1,462.00</b>	<b>-426.06</b>	<b>216.48</b>	<b>-191.91</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,700.00	63.21	269.33	6,515.52	-1,483.52	-426.51	177.66	-153.13	10.00	10.00	0.00
<b>Niobrara A Chalk Base</b>										
<b>6,707.82</b>	<b>64.00</b>	<b>269.33</b>	<b>6,519.00</b>	<b>-1,487.00</b>	<b>-426.59</b>	<b>170.66</b>	<b>-146.13</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,800.00	73.21	269.33	6,552.59	-1,520.59	-427.60	84.93	-60.48	10.00	10.00	0.00
<b>Niobrara B1 Chalk Top</b>										
<b>6,808.56</b>	<b>74.07</b>	<b>269.33</b>	<b>6,555.00</b>	<b>-1,523.00</b>	<b>-427.69</b>	<b>76.71</b>	<b>-52.27</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
<b>Niobrara B1 Chalk Base</b>										
<b>6,855.40</b>	<b>78.75</b>	<b>269.33</b>	<b>6,566.00</b>	<b>-1,534.00</b>	<b>-428.22</b>	<b>31.20</b>	<b>-6.80</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,900.00	83.21	269.33	6,572.99	-1,540.99	-428.74	-12.83	37.19	10.00	10.00	0.00
<b>HZ LP: 975ft FSL &amp; 600ft FEL of Sec 33 - Niobrara B2 Chalk Top (Target)</b>										
<b>6,967.85</b>	<b>90.00</b>	<b>269.33</b>	<b>6,577.00</b>	<b>-1,545.00</b>	<b>-429.53</b>	<b>-80.52</b>	<b>104.81</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
7,000.00	90.00	269.33	6,577.00	-1,545.00	-429.91	-112.66	136.93	0.00	0.00	0.00
7,100.00	90.00	269.33	6,577.00	-1,545.00	-431.08	-212.66	236.83	0.00	0.00	0.00
7,200.00	90.00	269.33	6,577.00	-1,545.00	-432.25	-312.65	336.72	0.00	0.00	0.00



# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-14HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<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)
7,300.00	90.00	269.33	6,577.00	-1,545.00	-433.42	-412.64	436.62	0.00	0.00	0.00
7,400.00	90.00	269.33	6,577.00	-1,545.00	-434.59	-512.64	536.52	0.00	0.00	0.00
7,500.00	90.00	269.33	6,577.00	-1,545.00	-435.76	-612.63	636.42	0.00	0.00	0.00
7,600.00	90.00	269.33	6,577.01	-1,545.01	-436.92	-712.62	736.31	0.00	0.00	0.00
7,700.00	90.00	269.33	6,577.01	-1,545.01	-438.09	-812.62	836.21	0.00	0.00	0.00
7,800.00	90.00	269.33	6,577.01	-1,545.01	-439.26	-912.61	936.11	0.00	0.00	0.00
7,900.00	90.00	269.33	6,577.01	-1,545.01	-440.43	-1,012.60	1,036.01	0.00	0.00	0.00
8,000.00	90.00	269.33	6,577.01	-1,545.01	-441.60	-1,112.60	1,135.91	0.00	0.00	0.00
8,100.00	90.00	269.33	6,577.01	-1,545.01	-442.77	-1,212.59	1,235.80	0.00	0.00	0.00
8,200.00	90.00	269.33	6,577.01	-1,545.01	-443.94	-1,312.58	1,335.70	0.00	0.00	0.00
8,300.00	90.00	269.33	6,577.01	-1,545.01	-445.11	-1,412.58	1,435.60	0.00	0.00	0.00
8,400.00	90.00	269.33	6,577.01	-1,545.01	-446.28	-1,512.57	1,535.50	0.00	0.00	0.00
8,500.00	90.00	269.33	6,577.01	-1,545.01	-447.45	-1,612.56	1,635.40	0.00	0.00	0.00
8,600.00	90.00	269.33	6,577.01	-1,545.01	-448.62	-1,712.56	1,735.29	0.00	0.00	0.00
8,700.00	90.00	269.33	6,577.01	-1,545.01	-449.79	-1,812.55	1,835.19	0.00	0.00	0.00
8,800.00	90.00	269.33	6,577.01	-1,545.01	-450.96	-1,912.54	1,935.09	0.00	0.00	0.00
8,900.00	90.00	269.33	6,577.01	-1,545.01	-452.13	-2,012.53	2,034.99	0.00	0.00	0.00
9,000.00	90.00	269.33	6,577.01	-1,545.01	-453.31	-2,112.53	2,134.89	0.00	0.00	0.00
9,100.00	90.00	269.33	6,577.02	-1,545.02	-454.48	-2,212.52	2,234.78	0.00	0.00	0.00
9,200.00	90.00	269.33	6,577.02	-1,545.02	-455.65	-2,312.51	2,334.68	0.00	0.00	0.00
9,300.00	90.00	269.33	6,577.02	-1,545.02	-456.82	-2,412.51	2,434.58	0.00	0.00	0.00
9,400.00	90.00	269.33	6,577.02	-1,545.02	-457.99	-2,512.50	2,534.48	0.00	0.00	0.00
9,500.00	90.00	269.33	6,577.02	-1,545.02	-459.16	-2,612.49	2,634.38	0.00	0.00	0.00
9,600.00	90.00	269.33	6,577.02	-1,545.02	-460.33	-2,712.49	2,734.27	0.00	0.00	0.00
9,700.00	90.00	269.33	6,577.02	-1,545.02	-461.50	-2,812.48	2,834.17	0.00	0.00	0.00
9,800.00	90.00	269.33	6,577.02	-1,545.02	-462.67	-2,912.47	2,934.07	0.00	0.00	0.00
9,900.00	90.00	269.33	6,577.02	-1,545.02	-463.84	-3,012.47	3,033.97	0.00	0.00	0.00
10,000.00	90.00	269.33	6,577.02	-1,545.02	-465.01	-3,112.46	3,133.86	0.00	0.00	0.00
10,100.00	90.00	269.33	6,577.02	-1,545.02	-466.18	-3,212.45	3,233.76	0.00	0.00	0.00
10,200.00	90.00	269.33	6,577.02	-1,545.02	-467.35	-3,312.45	3,333.66	0.00	0.00	0.00
10,300.00	90.00	269.33	6,577.02	-1,545.02	-468.52	-3,412.44	3,433.56	0.00	0.00	0.00
10,400.00	90.00	269.33	6,577.02	-1,545.02	-469.69	-3,512.43	3,533.46	0.00	0.00	0.00
10,500.00	90.00	269.33	6,577.02	-1,545.02	-470.86	-3,612.43	3,633.35	0.00	0.00	0.00
10,600.00	90.00	269.33	6,577.02	-1,545.02	-472.03	-3,712.42	3,733.25	0.00	0.00	0.00
10,700.00	90.00	269.33	6,577.02	-1,545.02	-473.21	-3,812.41	3,833.15	0.00	0.00	0.00
10,800.00	90.00	269.33	6,577.02	-1,545.02	-474.38	-3,912.40	3,933.05	0.00	0.00	0.00
10,900.00	90.00	269.33	6,577.02	-1,545.02	-475.55	-4,012.40	4,032.95	0.00	0.00	0.00
11,000.00	90.00	269.33	6,577.02	-1,545.02	-476.72	-4,112.39	4,132.84	0.00	0.00	0.00
11,100.00	90.00	269.33	6,577.02	-1,545.02	-477.89	-4,212.38	4,232.74	0.00	0.00	0.00
11,200.00	90.00	269.33	6,577.02	-1,545.02	-479.06	-4,312.38	4,332.64	0.00	0.00	0.00
11,300.00	90.00	269.33	6,577.02	-1,545.02	-480.23	-4,412.37	4,432.54	0.00	0.00	0.00
11,400.00	90.00	269.33	6,577.02	-1,545.02	-481.40	-4,512.36	4,532.44	0.00	0.00	0.00
11,500.00	90.00	269.33	6,577.02	-1,545.02	-482.57	-4,612.36	4,632.33	0.00	0.00	0.00
11,600.00	90.00	269.33	6,577.02	-1,545.02	-483.74	-4,712.35	4,732.23	0.00	0.00	0.00
11,700.00	90.00	269.33	6,577.02	-1,545.02	-484.92	-4,812.34	4,832.13	0.00	0.00	0.00
11,800.00	90.00	269.33	6,577.02	-1,545.02	-486.09	-4,912.34	4,932.03	0.00	0.00	0.00
11,900.00	90.00	269.33	6,577.02	-1,545.02	-487.26	-5,012.33	5,031.93	0.00	0.00	0.00
12,000.00	90.00	269.33	6,577.02	-1,545.02	-488.43	-5,112.32	5,131.82	0.00	0.00	0.00
12,100.00	90.00	269.33	6,577.02	-1,545.02	-489.60	-5,212.32	5,231.72	0.00	0.00	0.00
12,200.00	90.00	269.33	6,577.02	-1,545.02	-490.77	-5,312.31	5,331.62	0.00	0.00	0.00
12,300.00	90.00	269.33	6,577.02	-1,545.02	-491.94	-5,412.30	5,431.52	0.00	0.00	0.00
12,400.00	90.00	269.33	6,577.02	-1,545.02	-493.12	-5,512.29	5,531.42	0.00	0.00	0.00
12,500.00	90.00	269.33	6,577.02	-1,545.02	-494.29	-5,612.29	5,631.31	0.00	0.00	0.00
12,600.00	90.00	269.33	6,577.02	-1,545.02	-495.46	-5,712.28	5,731.21	0.00	0.00	0.00

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-14HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<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)
12,700.00	90.00	269.33	6,577.02	-1,545.02	-496.63	-5,812.27	5,831.11	0.00	0.00	0.00
12,800.00	90.00	269.33	6,577.02	-1,545.02	-497.80	-5,912.27	5,931.01	0.00	0.00	0.00
12,900.00	90.00	269.33	6,577.02	-1,545.02	-498.97	-6,012.26	6,030.91	0.00	0.00	0.00
13,000.00	90.00	269.33	6,577.02	-1,545.02	-500.15	-6,112.25	6,130.80	0.00	0.00	0.00
13,100.00	90.00	269.33	6,577.02	-1,545.02	-501.32	-6,212.25	6,230.70	0.00	0.00	0.00
13,200.00	90.00	269.33	6,577.02	-1,545.02	-502.49	-6,312.24	6,330.60	0.00	0.00	0.00
13,300.00	90.00	269.33	6,577.02	-1,545.02	-503.66	-6,412.23	6,430.50	0.00	0.00	0.00
13,400.00	90.00	269.33	6,577.02	-1,545.02	-504.83	-6,512.23	6,530.40	0.00	0.00	0.00
13,500.00	90.00	269.33	6,577.02	-1,545.02	-506.00	-6,612.22	6,630.29	0.00	0.00	0.00
13,600.00	90.00	269.33	6,577.02	-1,545.02	-507.18	-6,712.21	6,730.19	0.00	0.00	0.00
13,700.00	90.00	269.33	6,577.02	-1,545.02	-508.35	-6,812.21	6,830.09	0.00	0.00	0.00
13,800.00	90.00	269.33	6,577.02	-1,545.02	-509.52	-6,912.20	6,929.99	0.00	0.00	0.00
13,900.00	90.00	269.33	6,577.02	-1,545.02	-510.69	-7,012.19	7,029.89	0.00	0.00	0.00
14,000.00	90.00	269.33	6,577.02	-1,545.02	-511.86	-7,112.19	7,129.78	0.00	0.00	0.00
14,100.00	90.00	269.33	6,577.02	-1,545.02	-513.04	-7,212.18	7,229.68	0.00	0.00	0.00
14,200.00	90.00	269.33	6,577.02	-1,545.02	-514.21	-7,312.17	7,329.58	0.00	0.00	0.00
14,300.00	90.00	269.33	6,577.02	-1,545.02	-515.38	-7,412.16	7,429.48	0.00	0.00	0.00
14,400.00	90.00	269.33	6,577.01	-1,545.01	-516.55	-7,512.16	7,529.38	0.00	0.00	0.00
14,500.00	90.00	269.33	6,577.01	-1,545.01	-517.73	-7,612.15	7,629.27	0.00	0.00	0.00
14,600.00	90.00	269.33	6,577.01	-1,545.01	-518.90	-7,712.14	7,729.17	0.00	0.00	0.00
14,700.00	90.00	269.33	6,577.01	-1,545.01	-520.07	-7,812.14	7,829.07	0.00	0.00	0.00
14,800.00	90.00	269.33	6,577.01	-1,545.01	-521.24	-7,912.13	7,928.97	0.00	0.00	0.00
14,900.00	90.00	269.33	6,577.01	-1,545.01	-522.42	-8,012.12	8,028.87	0.00	0.00	0.00
15,000.00	90.00	269.33	6,577.01	-1,545.01	-523.59	-8,112.12	8,128.76	0.00	0.00	0.00
15,100.00	90.00	269.33	6,577.01	-1,545.01	-524.76	-8,212.11	8,228.66	0.00	0.00	0.00
15,200.00	90.00	269.33	6,577.01	-1,545.01	-525.93	-8,312.10	8,328.56	0.00	0.00	0.00
15,300.00	90.00	269.33	6,577.01	-1,545.01	-527.11	-8,412.10	8,428.46	0.00	0.00	0.00
15,400.00	90.00	269.33	6,577.01	-1,545.01	-528.28	-8,512.09	8,528.36	0.00	0.00	0.00
15,500.00	90.00	269.33	6,577.01	-1,545.01	-529.45	-8,612.08	8,628.25	0.00	0.00	0.00
15,600.00	90.00	269.33	6,577.01	-1,545.01	-530.62	-8,712.08	8,728.15	0.00	0.00	0.00
15,700.00	90.00	269.33	6,577.01	-1,545.01	-531.80	-8,812.07	8,828.05	0.00	0.00	0.00
15,800.00	90.00	269.33	6,577.00	-1,545.00	-532.97	-8,912.06	8,927.95	0.00	0.00	0.00
15,900.00	90.00	269.33	6,577.00	-1,545.00	-534.14	-9,012.05	9,027.85	0.00	0.00	0.00
16,000.00	90.00	269.33	6,577.00	-1,545.00	-535.31	-9,112.05	9,127.74	0.00	0.00	0.00
16,100.00	90.00	269.33	6,577.00	-1,545.00	-536.49	-9,212.04	9,227.64	0.00	0.00	0.00
16,200.00	90.00	269.33	6,577.00	-1,545.00	-537.66	-9,312.03	9,327.54	0.00	0.00	0.00
16,300.00	90.00	269.33	6,577.00	-1,545.00	-538.83	-9,412.03	9,427.44	0.00	0.00	0.00
<b>BHL: 975ft FSL &amp; 600ft FWL of Sec 32</b>										
<b>16,361.64</b>	<b>90.00</b>	<b>269.33</b>	<b>6,577.00</b>	<b>-1,545.00</b>	<b>-539.56</b>	<b>-9,473.66</b>	<b>9,489.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

# Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-14HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5032.00usft (Original Well Elev)
<b>Site:</b>	NE SE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-14HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	ORIGINAL WELLBORE		
<b>Design:</b>	PROPOSAL #1		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
587.48	587.00	Fox Hills Base			
1,664.07	1,643.00	Pierre Shale Top			
3,583.13	3,521.00	Richard Sandstone			
3,679.01	3,616.00	Parkman Sandstone			
4,398.81	4,335.00	Sussex Sandstone			
4,857.81	4,794.00	Shannon Sandstone			
6,527.57	6,416.00	Sharon Springs			
6,655.60	6,494.00	Niobrara A Chalk			
6,707.82	6,519.00	Niobrara A Chalk Base			
6,808.56	6,555.00	Niobrara B1 Chalk Top			
6,855.40	6,566.00	Niobrara B1 Chalk Base			
6,967.85	6,577.00	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: 1404ft FSL & 527ft FEL of Sec 33
300.00	300.00	0.00	0.00	START NUDGE (2°/100ft BUR)
900.00	895.62	-40.78	47.49	EOB TO 12° INC
3,419.47	3,360.04	-382.05	444.91	END OF TANGENT
4,019.47	3,955.66	-422.83	492.40	EOD TO VERTICAL
6,067.85	6,004.04	-422.83	492.40	KOP (10°/100ft BUR)
6,967.85	6,577.00	-429.53	-80.52	HZ LP: 975ft FSL & 600ft FEL of Sec 33
16,361.64	6,577.00	-539.56	-9,473.66	BHL: 975ft FSL & 600ft FWL of Sec 32