

# **MALLARD EXPLORATION**

**WELD COUNTY**

**SEC 33-T8N-R61W**

**HARLEQUIN 34-35-2HN**

**OWB**

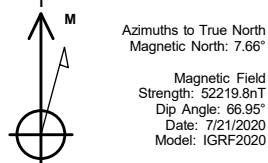
**Plan: PROPOSAL 1**

## **Standard Planning Report**

**26 September, 2022**



Project: WELD COUNTY  
Site: SEC 33-T8N-R61W  
Well: HARLEQUIN 34-35-2HN  
Wellbore: OWB  
Design: PROPOSAL 1



WELL DETAILS: HARLEQUIN 34-35-2HN

+N/-S	+E/-W	Northing	Easting	5029.00	Latitude	Longitude	Slot
0.00	0.00	1472026.71	3359821.24		40.621891°N	104.203762°W	

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	Start Build 2.00
1229.04	4.58	43.37	1228.80	6.65	6.28	6.55	9.15	Start 4949.72 hold at 1229.04 MD
6178.76	4.58	43.37	6162.71	294.04	277.72	289.33	404.46	Start DLS 10.00 TFO 46.13
7046.98	90.00	89.40	6703.00	331.19	849.44	862.08	978.95	Start 9966.16 hold at 7046.98 MD
17013.14	90.00	89.40	6703.00	435.56	10815.06	10823.82	10945.12	TD at 17013.14

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00	
3	1229.04	4.58	43.37	1228.80	6.65	6.28	2.00	43.37	6.55	
4	6178.76	4.58	43.37	6162.71	294.04	277.72	0.00	0.00	289.33	
5	7046.98	90.00	89.40	6703.00	331.19	849.44	10.00	46.13	862.08	HA
6	17013.14	90.00	89.40	6703.00	435.56	10815.06	0.00	0.00	10823.82	HA

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
HARLEQUIN 34-35-2HN - LP	6703.00	331.19	849.44	1472370.28	3360665.75	40.622800°N	104.200702°W	Point
HARLEQUIN 34-35-2HN - PBHL	6703.00	435.56	10815.06	1472620.31	3370628.77	40.623080°N	104.164802°W	Point
- plan hits target center								

PROJECT DETAILS: WELD COUNTY

Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Northern Zone  
System Datum: Mean Sea Level

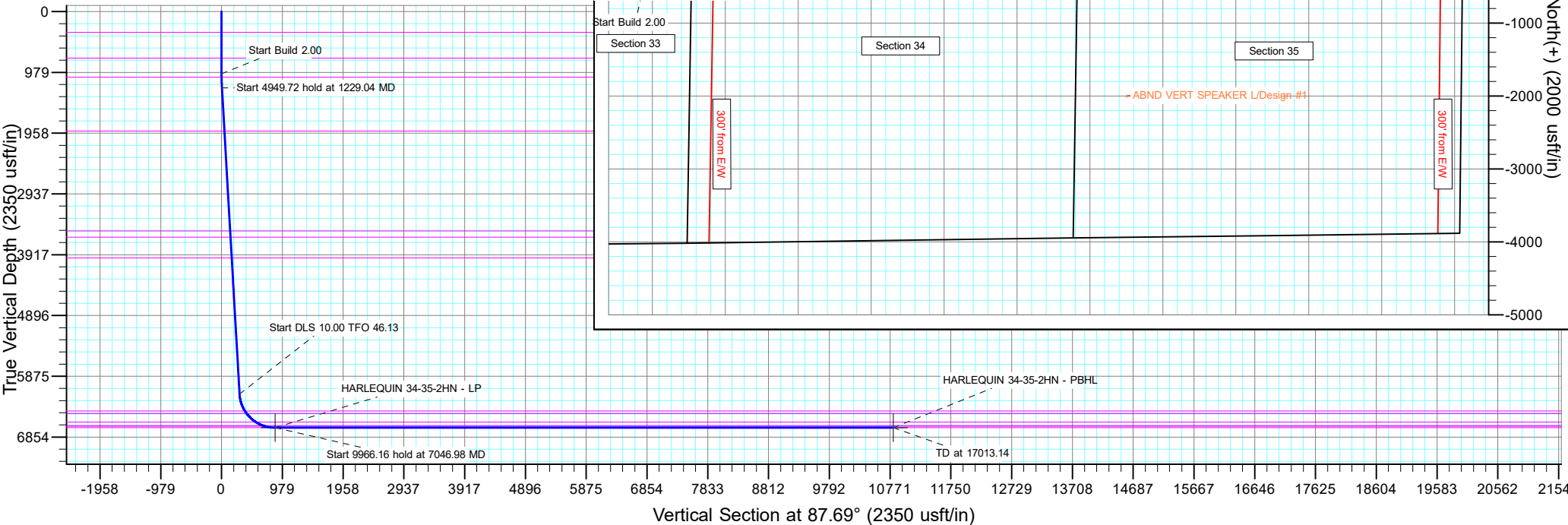
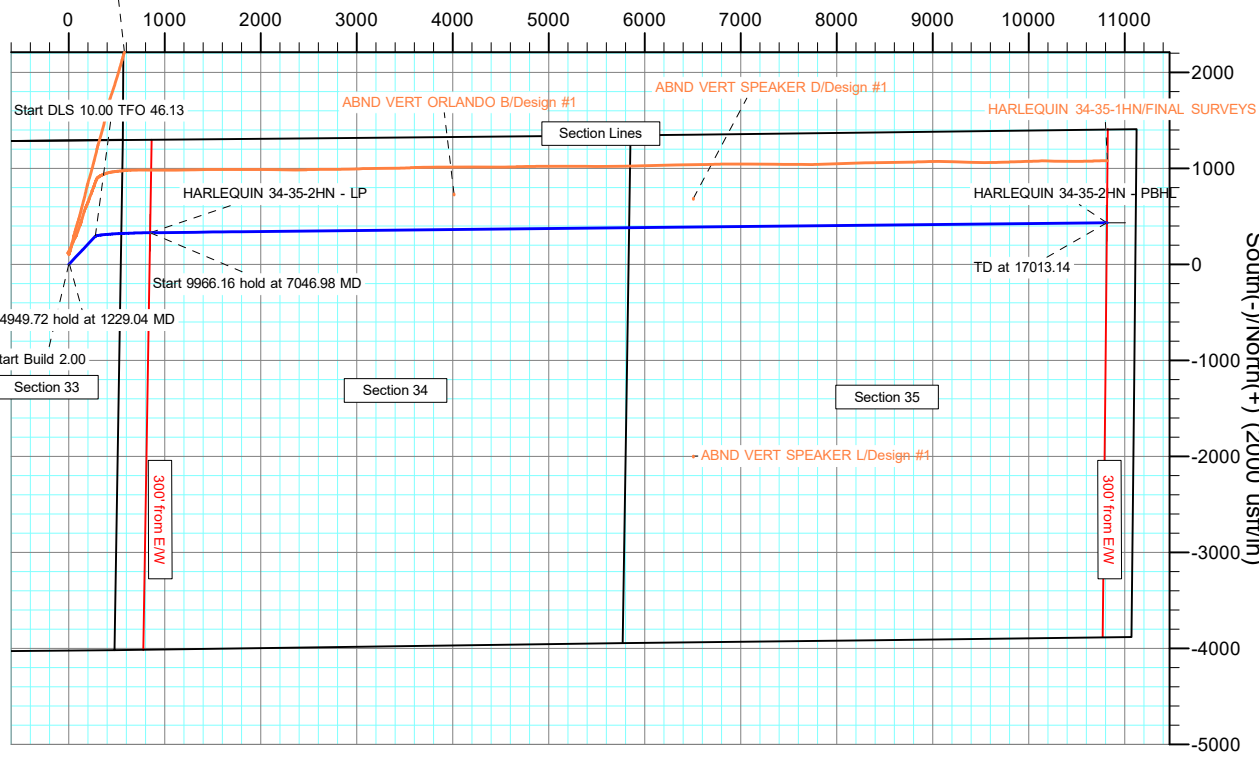
FORMATION TOP DETAILS

TVDPath	MDPath	Formation
334.00	334.00	Laramie Shale Base
749.00	749.00	Fox Hills Base
1057.00	1057.00	Pierre Shale Base
1924.00	1926.47	Upper Pierre Shale Base (SFC min depth)
3534.00	3541.63	Richard Sandstone Top
3632.00	3639.95	Parkman Sandstone Top
3969.00	3978.03	Parkman Sandstone Base
6434.00	6466.85	Sharon Springs Top
6477.00	6519.20	Niobrara Top
6612.00	6719.34	Niobrara B2 Chalk Top
6671.00	6854.42	Niobrara C Chalk Top
6679.00	6880.42	Niobrara C Chalk Target Top
6703.00	7046.98	Niobrara C Chalk Target Center (Landing Point)

SHL:  
1292' FNL, 544' FEL  
Sec 33-T8N-R61W  
  
LP:  
970' FNL, 300' FWL  
Sec 34-T8N-R61W  
  
BHL:  
970' FNL, 300' FEL  
Sec 35-T8N-R61W

HARLEQUIN 28-29-4HN/FINAL SURVEY

West(-)/East(+) (2000 usft/in)



## Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

<b>Project</b>	WELD COUNTY		
<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		

Site		SEC 33-T8N-R61W				
Site Position:		Northing:	1,468,017.54	usft	Latitude:	40.610866°N
From:	Lat/Long	Easting:	3,360,357.16	usft	Longitude:	104.202043°W
Position Uncertainty:		0.00	usft	Slot Radius:	13.200	in

Well		HARLEQUIN 34-35-2HN				
Well Position	+N/-S	0.00 usft	Northing:	1,472,026.71 usft	Latitude:	40.621891°N
	+E/-W	0.00 usft	Easting:	3,359,821.23 usft	Longitude:	104.203762°W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	5,029.00 usft
Grid Convergence:		0.84 °				

<b>Wellbore</b>	OWB				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2020	7/21/2020	7.66	66.95	52,219.82816240

<b>Design</b>	PROPOSAL 1				
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.00	
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	87.69	

<b>Plan Survey Tool Program</b>	<b>Date</b>	9/26/2022			
<b>Depth From (usft)</b>	<b>Depth To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Remarks</b>	
1	0.00	17,013.14 PROPOSAL 1 (OWB)	MWD		
			OWSG MWD - Standard		

<b>Plan Sections</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	<b>TFO (°)</b>	<b>Target</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,229.04	4.58	43.37	1,228.80	6.65	6.28	2.00	2.00	0.00	43.37	
6,178.76	4.58	43.37	6,162.71	294.04	277.72	0.00	0.00	0.00	0.00	
7,046.98	90.00	89.40	6,703.00	331.19	849.44	10.00	9.84	5.30	46.13	HARLEQUIN 34-35-2
17,013.14	90.00	89.40	6,703.00	435.56	10,815.06	0.00	0.00	0.00	0.00	HARLEQUIN 34-35-2

# Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
334.00	0.00	0.00	334.00	0.00	0.00	0.00	0.00	0.00	0.00
Laramie Shale Base									
749.00	0.00	0.00	749.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base									
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,057.00	1.14	43.37	1,057.00	0.41	0.39	0.41	2.00	2.00	0.00
Pierre Shale Base									
1,100.00	2.00	43.37	1,099.98	1.27	1.20	1.25	2.00	2.00	0.00
1,200.00	4.00	43.37	1,199.84	5.07	4.79	4.99	2.00	2.00	0.00
1,229.04	4.58	43.37	1,228.80	6.65	6.28	6.55	2.00	2.00	0.00
Start 4949.72 hold at 1229.04 MD									
1,300.00	4.58	43.37	1,299.53	10.77	10.17	10.60	0.00	0.00	0.00
1,400.00	4.58	43.37	1,399.21	16.58	15.66	16.31	0.00	0.00	0.00
1,500.00	4.58	43.37	1,498.89	22.39	21.14	22.03	0.00	0.00	0.00
1,600.00	4.58	43.37	1,598.57	28.19	26.63	27.74	0.00	0.00	0.00
1,700.00	4.58	43.37	1,698.25	34.00	32.11	33.45	0.00	0.00	0.00
1,800.00	4.58	43.37	1,797.93	39.80	37.59	39.17	0.00	0.00	0.00
1,900.00	4.58	43.37	1,897.61	45.61	43.08	44.88	0.00	0.00	0.00
1,926.47	4.58	43.37	1,924.00	47.15	44.53	46.39	0.00	0.00	0.00
Upper Pierre Shale Base (SFC min depth)									
2,000.00	4.58	43.37	1,997.29	51.42	48.56	50.59	0.00	0.00	0.00
2,100.00	4.58	43.37	2,096.97	57.22	54.05	56.31	0.00	0.00	0.00
2,200.00	4.58	43.37	2,196.65	63.03	59.53	62.02	0.00	0.00	0.00
2,300.00	4.58	43.37	2,296.34	68.83	65.01	67.73	0.00	0.00	0.00
2,400.00	4.58	43.37	2,396.02	74.64	70.50	73.44	0.00	0.00	0.00
2,500.00	4.58	43.37	2,495.70	80.45	75.98	79.16	0.00	0.00	0.00
2,600.00	4.58	43.37	2,595.38	86.25	81.47	84.87	0.00	0.00	0.00
2,700.00	4.58	43.37	2,695.06	92.06	86.95	90.58	0.00	0.00	0.00
2,800.00	4.58	43.37	2,794.74	97.86	92.43	96.30	0.00	0.00	0.00
2,900.00	4.58	43.37	2,894.42	103.67	97.92	102.01	0.00	0.00	0.00
3,000.00	4.58	43.37	2,994.10	109.48	103.40	107.72	0.00	0.00	0.00
3,100.00	4.58	43.37	3,093.78	115.28	108.89	113.44	0.00	0.00	0.00
3,200.00	4.58	43.37	3,193.46	121.09	114.37	119.15	0.00	0.00	0.00
3,300.00	4.58	43.37	3,293.14	126.90	119.85	124.86	0.00	0.00	0.00
3,400.00	4.58	43.37	3,392.82	132.70	125.34	130.58	0.00	0.00	0.00
3,500.00	4.58	43.37	3,492.50	138.51	130.82	136.29	0.00	0.00	0.00
3,541.63	4.58	43.37	3,534.00	140.92	133.10	138.67	0.00	0.00	0.00
Richard Sandstone Top									
3,600.00	4.58	43.37	3,592.18	144.31	136.31	142.00	0.00	0.00	0.00
3,639.95	4.58	43.37	3,632.00	146.63	138.50	144.28	0.00	0.00	0.00
Parkman Sandstone Top									
3,700.00	4.58	43.37	3,691.86	150.12	141.79	147.72	0.00	0.00	0.00
3,800.00	4.58	43.37	3,791.54	155.93	147.27	153.43	0.00	0.00	0.00
3,900.00	4.58	43.37	3,891.22	161.73	152.76	159.14	0.00	0.00	0.00
3,978.03	4.58	43.37	3,969.00	166.26	157.04	163.60	0.00	0.00	0.00
Parkman Sandstone Base									
4,000.00	4.58	43.37	3,990.90	167.54	158.24	164.85	0.00	0.00	0.00
4,100.00	4.58	43.37	4,090.59	173.34	163.73	170.57	0.00	0.00	0.00
4,200.00	4.58	43.37	4,190.27	179.15	169.21	176.28	0.00	0.00	0.00
4,300.00	4.58	43.37	4,289.95	184.96	174.69	181.99	0.00	0.00	0.00
4,400.00	4.58	43.37	4,389.63	190.76	180.18	187.71	0.00	0.00	0.00

# Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,500.00	4.58	43.37	4,489.31	196.57	185.66	193.42	0.00	0.00	0.00
4,600.00	4.58	43.37	4,588.99	202.38	191.14	199.13	0.00	0.00	0.00
4,700.00	4.58	43.37	4,688.67	208.18	196.63	204.85	0.00	0.00	0.00
4,800.00	4.58	43.37	4,788.35	213.99	202.11	210.56	0.00	0.00	0.00
4,900.00	4.58	43.37	4,888.03	219.79	207.60	216.27	0.00	0.00	0.00
5,000.00	4.58	43.37	4,987.71	225.60	213.08	221.99	0.00	0.00	0.00
5,100.00	4.58	43.37	5,087.39	231.41	218.56	227.70	0.00	0.00	0.00
5,200.00	4.58	43.37	5,187.07	237.21	224.05	233.41	0.00	0.00	0.00
5,300.00	4.58	43.37	5,286.75	243.02	229.53	239.12	0.00	0.00	0.00
5,400.00	4.58	43.37	5,386.43	248.82	235.02	244.84	0.00	0.00	0.00
5,500.00	4.58	43.37	5,486.11	254.63	240.50	250.55	0.00	0.00	0.00
5,600.00	4.58	43.37	5,585.79	260.44	245.98	256.26	0.00	0.00	0.00
5,700.00	4.58	43.37	5,685.47	266.24	251.47	261.98	0.00	0.00	0.00
5,800.00	4.58	43.37	5,785.16	272.05	256.95	267.69	0.00	0.00	0.00
5,900.00	4.58	43.37	5,884.84	277.85	262.44	273.40	0.00	0.00	0.00
6,000.00	4.58	43.37	5,984.52	283.66	267.92	279.12	0.00	0.00	0.00
6,100.00	4.58	43.37	6,084.20	289.47	273.40	284.83	0.00	0.00	0.00
6,178.76	4.58	43.37	6,162.71	294.04	277.72	289.33	0.00	0.00	0.00
Start DLS 10.00 TFO 46.13									
6,200.00	6.24	57.59	6,183.85	295.28	279.28	290.94	10.00	7.83	66.96
6,300.00	15.65	77.52	6,281.95	301.12	297.08	308.96	10.00	9.40	19.93
6,400.00	25.50	82.46	6,375.46	306.88	331.68	343.76	10.00	9.86	4.94
6,466.85	32.14	84.13	6,434.00	310.59	363.67	375.87	10.00	9.93	2.51
Sharon Springs Top									
6,500.00	35.44	84.75	6,461.55	312.37	382.01	394.27	10.00	9.95	1.87
6,519.20	37.35	85.07	6,477.00	313.38	393.36	405.65	10.00	9.95	1.64
Niobrara Top									
6,600.00	45.40	86.14	6,537.59	317.43	446.56	458.97	10.00	9.96	1.33
6,700.00	55.37	87.12	6,601.28	321.91	523.37	535.89	10.00	9.97	0.98
6,719.34	57.30	87.28	6,612.00	322.69	539.44	551.99	10.00	9.98	0.83
Niobrara B2 Chalk Top									
6,800.00	65.35	87.88	6,650.68	325.66	610.09	622.70	10.00	9.98	0.75
6,854.42	70.78	88.25	6,671.00	327.36	660.52	673.16	10.00	9.98	0.67
Niobrara C Chalk Top									
6,880.42	73.37	88.41	6,679.00	328.08	685.24	697.89	10.00	9.98	0.64
Niobrara C Chalk Target Top									
6,900.00	75.33	88.53	6,684.28	328.59	704.09	716.74	10.00	9.98	0.62
7,000.00	85.31	89.13	6,701.08	330.58	802.52	815.17	10.00	9.98	0.59
7,046.98	90.00	89.40	6,703.00	331.19	849.44	862.08	10.00	9.98	0.58
Start 9966.16 hold at 7046.98 MD - Niobrara C Chalk Target Center (Landing Point)									
7,100.00	90.00	89.40	6,703.00	331.74	902.46	915.08	0.00	0.00	0.00
7,200.00	90.00	89.40	6,703.00	332.79	1,002.45	1,015.03	0.00	0.00	0.00
7,300.00	90.00	89.40	6,703.00	333.84	1,102.45	1,114.99	0.00	0.00	0.00
7,400.00	90.00	89.40	6,703.00	334.88	1,202.44	1,214.94	0.00	0.00	0.00
7,500.00	90.00	89.40	6,703.00	335.93	1,302.44	1,314.90	0.00	0.00	0.00
7,600.00	90.00	89.40	6,703.00	336.98	1,402.43	1,414.86	0.00	0.00	0.00
7,700.00	90.00	89.40	6,703.00	338.03	1,502.43	1,514.81	0.00	0.00	0.00
7,800.00	90.00	89.40	6,703.00	339.07	1,602.42	1,614.77	0.00	0.00	0.00
7,900.00	90.00	89.40	6,703.00	340.12	1,702.42	1,714.72	0.00	0.00	0.00
8,000.00	90.00	89.40	6,703.00	341.17	1,802.41	1,814.68	0.00	0.00	0.00
8,100.00	90.00	89.40	6,703.00	342.21	1,902.41	1,914.63	0.00	0.00	0.00
8,200.00	90.00	89.40	6,703.00	343.26	2,002.40	2,014.59	0.00	0.00	0.00
8,300.00	90.00	89.40	6,703.00	344.31	2,102.39	2,114.55	0.00	0.00	0.00

## Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
8,400.00	90.00	89.40	6,703.00	345.36	2,202.39	2,214.50	0.00	0.00	0.00	
8,500.00	90.00	89.40	6,703.00	346.40	2,302.38	2,314.46	0.00	0.00	0.00	
8,600.00	90.00	89.40	6,703.00	347.45	2,402.38	2,414.41	0.00	0.00	0.00	
8,700.00	90.00	89.40	6,703.00	348.50	2,502.37	2,514.37	0.00	0.00	0.00	
8,800.00	90.00	89.40	6,703.00	349.55	2,602.37	2,614.32	0.00	0.00	0.00	
8,900.00	90.00	89.40	6,703.00	350.59	2,702.36	2,714.28	0.00	0.00	0.00	
9,000.00	90.00	89.40	6,703.00	351.64	2,802.36	2,814.24	0.00	0.00	0.00	
9,100.00	90.00	89.40	6,703.00	352.69	2,902.35	2,914.19	0.00	0.00	0.00	
9,200.00	90.00	89.40	6,703.00	353.73	3,002.34	3,014.15	0.00	0.00	0.00	
9,300.00	90.00	89.40	6,703.00	354.78	3,102.34	3,114.10	0.00	0.00	0.00	
9,400.00	90.00	89.40	6,703.00	355.83	3,202.33	3,214.06	0.00	0.00	0.00	
9,500.00	90.00	89.40	6,703.00	356.88	3,302.33	3,314.01	0.00	0.00	0.00	
9,600.00	90.00	89.40	6,703.00	357.92	3,402.32	3,413.97	0.00	0.00	0.00	
9,700.00	90.00	89.40	6,703.00	358.97	3,502.32	3,513.93	0.00	0.00	0.00	
9,800.00	90.00	89.40	6,703.00	360.02	3,602.31	3,613.88	0.00	0.00	0.00	
9,900.00	90.00	89.40	6,703.00	361.07	3,702.31	3,713.84	0.00	0.00	0.00	
10,000.00	90.00	89.40	6,703.00	362.11	3,802.30	3,813.79	0.00	0.00	0.00	
10,100.00	90.00	89.40	6,703.00	363.16	3,902.30	3,913.75	0.00	0.00	0.00	
10,200.00	90.00	89.40	6,703.00	364.21	4,002.29	4,013.70	0.00	0.00	0.00	
10,300.00	90.00	89.40	6,703.00	365.25	4,102.28	4,113.66	0.00	0.00	0.00	
10,400.00	90.00	89.40	6,703.00	366.30	4,202.28	4,213.61	0.00	0.00	0.00	
10,500.00	90.00	89.40	6,703.00	367.35	4,302.27	4,313.57	0.00	0.00	0.00	
10,600.00	90.00	89.40	6,703.00	368.40	4,402.27	4,413.53	0.00	0.00	0.00	
10,700.00	90.00	89.40	6,703.00	369.44	4,502.26	4,513.48	0.00	0.00	0.00	
10,800.00	90.00	89.40	6,703.00	370.49	4,602.26	4,613.44	0.00	0.00	0.00	
10,900.00	90.00	89.40	6,703.00	371.54	4,702.25	4,713.39	0.00	0.00	0.00	
11,000.00	90.00	89.40	6,703.00	372.58	4,802.25	4,813.35	0.00	0.00	0.00	
11,100.00	90.00	89.40	6,703.00	373.63	4,902.24	4,913.30	0.00	0.00	0.00	
11,200.00	90.00	89.40	6,703.00	374.68	5,002.24	5,013.26	0.00	0.00	0.00	
11,300.00	90.00	89.40	6,703.00	375.73	5,102.23	5,113.22	0.00	0.00	0.00	
11,400.00	90.00	89.40	6,703.00	376.77	5,202.22	5,213.17	0.00	0.00	0.00	
11,500.00	90.00	89.40	6,703.00	377.82	5,302.22	5,313.13	0.00	0.00	0.00	
11,600.00	90.00	89.40	6,703.00	378.87	5,402.21	5,413.08	0.00	0.00	0.00	
11,700.00	90.00	89.40	6,703.00	379.92	5,502.21	5,513.04	0.00	0.00	0.00	
11,800.00	90.00	89.40	6,703.00	380.96	5,602.20	5,612.99	0.00	0.00	0.00	
11,900.00	90.00	89.40	6,703.00	382.01	5,702.20	5,712.95	0.00	0.00	0.00	
12,000.00	90.00	89.40	6,703.00	383.06	5,802.19	5,812.91	0.00	0.00	0.00	
12,100.00	90.00	89.40	6,703.00	384.10	5,902.19	5,912.86	0.00	0.00	0.00	
12,200.00	90.00	89.40	6,703.00	385.15	6,002.18	6,012.82	0.00	0.00	0.00	
12,300.00	90.00	89.40	6,703.00	386.20	6,102.17	6,112.77	0.00	0.00	0.00	
12,400.00	90.00	89.40	6,703.00	387.25	6,202.17	6,212.73	0.00	0.00	0.00	
12,500.00	90.00	89.40	6,703.00	388.29	6,302.16	6,312.68	0.00	0.00	0.00	
12,600.00	90.00	89.40	6,703.00	389.34	6,402.16	6,412.64	0.00	0.00	0.00	
12,700.00	90.00	89.40	6,703.00	390.39	6,502.15	6,512.60	0.00	0.00	0.00	
12,800.00	90.00	89.40	6,703.00	391.44	6,602.15	6,612.55	0.00	0.00	0.00	
12,900.00	90.00	89.40	6,703.00	392.48	6,702.14	6,712.51	0.00	0.00	0.00	
13,000.00	90.00	89.40	6,703.00	393.53	6,802.14	6,812.46	0.00	0.00	0.00	
13,100.00	90.00	89.40	6,703.00	394.58	6,902.13	6,912.42	0.00	0.00	0.00	
13,200.00	90.00	89.40	6,703.00	395.62	7,002.13	7,012.37	0.00	0.00	0.00	
13,300.00	90.00	89.40	6,703.00	396.67	7,102.12	7,112.33	0.00	0.00	0.00	
13,400.00	90.00	89.40	6,703.00	397.72	7,202.11	7,212.29	0.00	0.00	0.00	
13,500.00	90.00	89.40	6,703.00	398.77	7,302.11	7,312.24	0.00	0.00	0.00	
13,600.00	90.00	89.40	6,703.00	399.81	7,402.10	7,412.20	0.00	0.00	0.00	
13,700.00	90.00	89.40	6,703.00	400.86	7,502.10	7,512.15	0.00	0.00	0.00	

## Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
13,800.00	90.00	89.40	6,703.00	401.91	7,602.09	7,612.11	0.00	0.00	0.00	
13,900.00	90.00	89.40	6,703.00	402.96	7,702.09	7,712.06	0.00	0.00	0.00	
14,000.00	90.00	89.40	6,703.00	404.00	7,802.08	7,812.02	0.00	0.00	0.00	
14,100.00	90.00	89.40	6,703.00	405.05	7,902.08	7,911.97	0.00	0.00	0.00	
14,200.00	90.00	89.40	6,703.00	406.10	8,002.07	8,011.93	0.00	0.00	0.00	
14,300.00	90.00	89.40	6,703.00	407.14	8,102.07	8,111.89	0.00	0.00	0.00	
14,400.00	90.00	89.40	6,703.00	408.19	8,202.06	8,211.84	0.00	0.00	0.00	
14,500.00	90.00	89.40	6,703.00	409.24	8,302.05	8,311.80	0.00	0.00	0.00	
14,600.00	90.00	89.40	6,703.00	410.29	8,402.05	8,411.75	0.00	0.00	0.00	
14,700.00	90.00	89.40	6,703.00	411.33	8,502.04	8,511.71	0.00	0.00	0.00	
14,800.00	90.00	89.40	6,703.00	412.38	8,602.04	8,611.66	0.00	0.00	0.00	
14,900.00	90.00	89.40	6,703.00	413.43	8,702.03	8,711.62	0.00	0.00	0.00	
15,000.00	90.00	89.40	6,703.00	414.47	8,802.03	8,811.58	0.00	0.00	0.00	
15,100.00	90.00	89.40	6,703.00	415.52	8,902.02	8,911.53	0.00	0.00	0.00	
15,200.00	90.00	89.40	6,703.00	416.57	9,002.02	9,011.49	0.00	0.00	0.00	
15,300.00	90.00	89.40	6,703.00	417.62	9,102.01	9,111.44	0.00	0.00	0.00	
15,400.00	90.00	89.40	6,703.00	418.66	9,202.00	9,211.40	0.00	0.00	0.00	
15,500.00	90.00	89.40	6,703.00	419.71	9,302.00	9,311.35	0.00	0.00	0.00	
15,600.00	90.00	89.40	6,703.00	420.76	9,401.99	9,411.31	0.00	0.00	0.00	
15,700.00	90.00	89.40	6,703.00	421.81	9,501.99	9,511.27	0.00	0.00	0.00	
15,800.00	90.00	89.40	6,703.00	422.85	9,601.98	9,611.22	0.00	0.00	0.00	
15,900.00	90.00	89.40	6,703.00	423.90	9,701.98	9,711.18	0.00	0.00	0.00	
16,000.00	90.00	89.40	6,703.00	424.95	9,801.97	9,811.13	0.00	0.00	0.00	
16,100.00	90.00	89.40	6,703.00	425.99	9,901.97	9,911.09	0.00	0.00	0.00	
16,200.00	90.00	89.40	6,703.00	427.04	10,001.96	10,011.04	0.00	0.00	0.00	
16,300.00	90.00	89.40	6,703.00	428.09	10,101.96	10,111.00	0.00	0.00	0.00	
16,400.00	90.00	89.40	6,703.00	429.14	10,201.95	10,210.96	0.00	0.00	0.00	
16,500.00	90.00	89.40	6,703.00	430.18	10,301.94	10,310.91	0.00	0.00	0.00	
16,600.00	90.00	89.40	6,703.00	431.23	10,401.94	10,410.87	0.00	0.00	0.00	
16,700.00	90.00	89.40	6,703.00	432.28	10,501.93	10,510.82	0.00	0.00	0.00	
16,800.00	90.00	89.40	6,703.00	433.33	10,601.93	10,610.78	0.00	0.00	0.00	
16,900.00	90.00	89.40	6,703.00	434.37	10,701.92	10,710.73	0.00	0.00	0.00	
17,000.00	90.00	89.40	6,703.00	435.42	10,801.92	10,810.69	0.00	0.00	0.00	
17,013.14	90.00	89.40	6,703.00	435.56	10,815.06	10,823.82	0.00	0.00	0.00	
TD at 17013.14										

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
HARLEQUIN 34-35-2HN - plan hits target center - Point	0.00	0.00	6,703.00	331.19	849.44	1,472,370.28	3,360,665.74	40.622800°N	104.200702°W
HARLEQUIN 34-35-2HN - plan hits target center - Point	0.00	0.00	6,703.00	435.56	10,815.06	1,472,620.31	3,370,628.77	40.623080°N	104.164802°W

## Planning Report

<b>Database:</b>	EDM 5000.16 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 34-35-2HN
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB 27' @ 5056.00usft
<b>Project:</b>	WELD COUNTY	<b>MD Reference:</b>	KB 27' @ 5056.00usft
<b>Site:</b>	SEC 33-T8N-R61W	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 34-35-2HN	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OWB		
<b>Design:</b>	PROPOSAL 1		

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
334.00	334.00	Laramie Shale Base				
749.00	749.00	Fox Hills Base				
1,057.00	1,057.00	Pierre Shale Base				
1,926.47	1,924.00	Upper Pierre Shale Base (SFC min dept				
3,541.63	3,534.00	Richard Sandstone Top				
3,639.95	3,632.00	Parkman Sandstone Top				
3,978.03	3,969.00	Parkman Sandstone Base				
6,466.85	6,434.00	Sharon Springs Top				
6,519.20	6,477.00	Niobrara Top				
6,719.34	6,612.00	Niobrara B2 Chalk Top				
6,854.42	6,671.00	Niobrara C Chalk Top				
6,880.42	6,679.00	Niobrara C Chalk Target Top				
7,046.98	6,703.00	Niobrara C Chalk Target Center (Landin				

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,000.00	1,000.00	0.00	0.00	Start Build 2.00	
1,229.04	1,228.80	6.65	6.28	Start 4949.72 hold at 1229.04 MD	
6,178.76	6,162.71	294.04	277.72	Start DLS 10.00 TFO 46.13	
7,046.98	6,703.00	331.19	849.44	Start 9966.16 hold at 7046.98 MD	
17,013.14	6,703.00	435.56	10,815.06	TD at 17013.14	