

MALLARD EXPLORATION

WELD COUNTY

SEC 33-T8N-R61W

HARLEQUIN 34-35-2HN

ORIGINAL WELLBORE

Plan: PROPOSAL 1

Standard Planning Report

22 July, 2020



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



Azimuths to True North
Magnetic North: 7.66°
Magnetic Field
Strength: 52219.8nT
Dip Angle: 66.95°
Date: 7/21/2020
Model: IGRF2020

WELL DETAILS: HARLEQUIN 34-35-2HN

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

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	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	1234.52	4.69	43.44	1234.26	6.97	6.60	2.00	43.44	6.87	
4	6057.96	4.69	43.44	6041.55	293.38	277.77	0.00	0.00	289.36	
5	6925.38	90.00	89.40	6581.00	331.19	849.44	10.00	46.06	862.08	HARLEQUIN 34-35-;
6	16891.54	90.00	89.40	6581.00	435.56	10815.06	0.00	0.00	10823.82	HARLEQUIN 34-35-;

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	Start Build 2.00
1234.52	4.69	43.44	1234.26	6.97	6.60	6.87	9.59	Start 4823.44 hold at 1234.52 MD
6057.96	4.69	43.44	6041.55	293.38	277.77	289.36	404.02	Start DLS 10.00 TFO 46.06
6925.38	90.00	89.40	6581.00	331.19	849.44	862.08	978.57	Start 9966.16 hold at 6925.38 MD
16891.54	90.00	89.40	6581.00	435.56	10815.06	10823.82	10944.73	TD at 16891.54

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
HARLEQUIN 34-35-2HN - LP	6581.00	331.19	849.44	1472370.28	3360665.75	40.622800°N	104.200702°W	Point
- plan hits target center								
HARLEQUIN 34-35-2HN - PBHL	6581.00	435.56	10815.06	1472620.31	3370628.77	40.623080°N	104.164802°W	Point
- plan hits target center								

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
662.00	662.00	Fox Hills Base
1683.00	1684.77	Pierre Shale Top
3562.00	3570.08	Richard Sandstone
3662.00	3670.42	Parkman Sandstone
4407.00	4417.92	Sussex Sandstone
4837.00	4849.37	Shannon Sandstone
5695.00	5710.25	TeePee Buttes
6390.00	6443.02	Sharon Springs
6426.00	6493.41	Niobrara Top
6561.00	6773.41	Niobrara B2 Chalk Top
6571.00	6818.00	Niobrara B2 Chalk Target Top
6581.00	6825.38	Target Center (Landing Point)

PROJECT DETAILS: WELD COUNTY

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

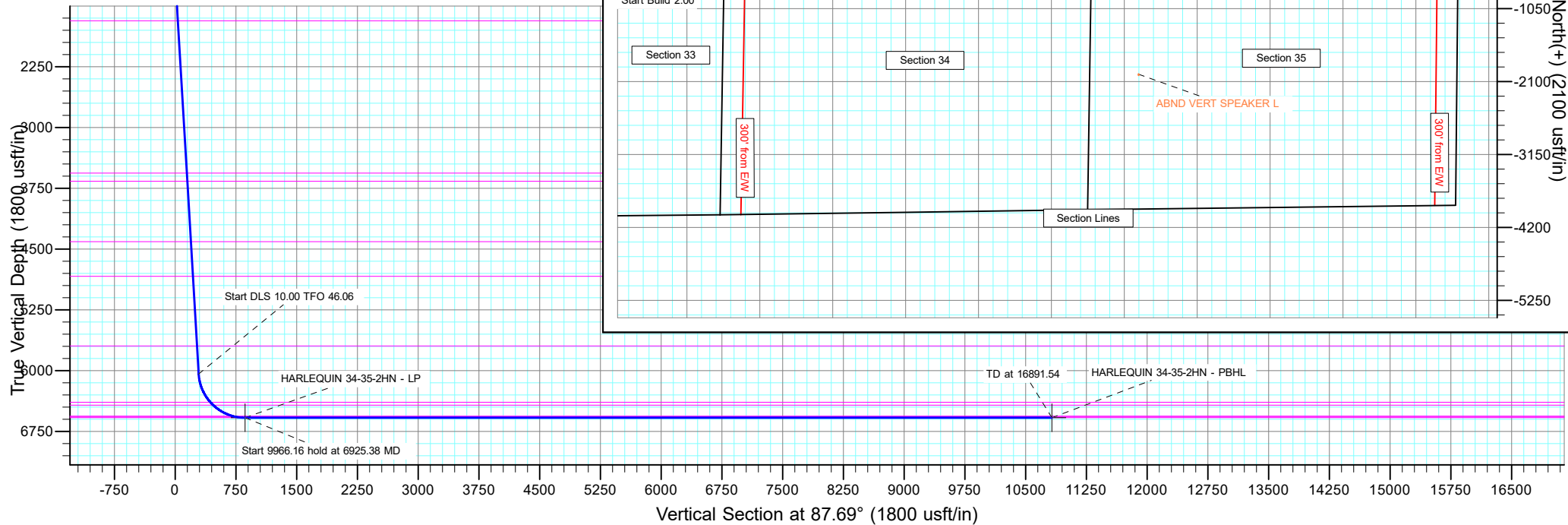
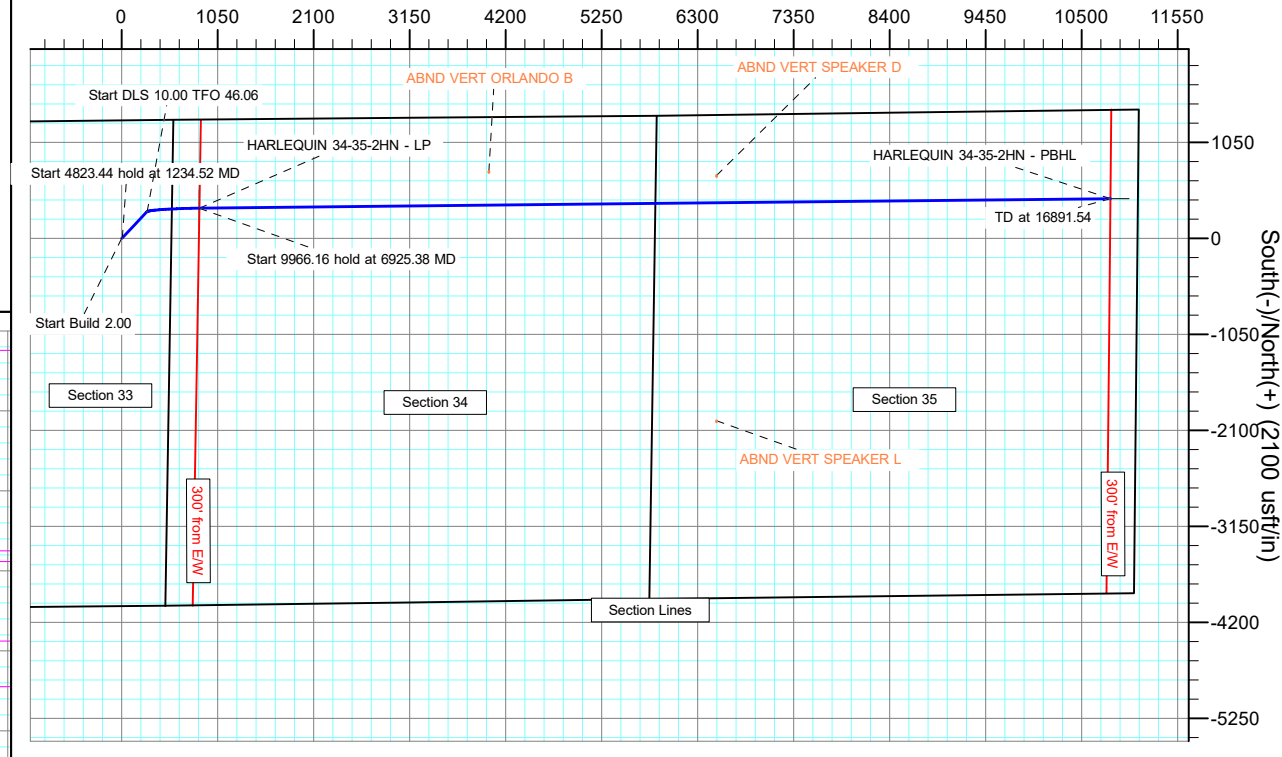
System Datum: Mean Sea Level

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

West(-)/East(+) (2100 usft/in)



Planning Report

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

Project	WELD COUNTY		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	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 °				

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

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

Plan Survey Tool Program	Date	7/22/2020			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks	
1	0.00	16,891.54	PROPOSAL 1 (ORIGINAL WELL	MWD	
			OWSG MWD - Standard		

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
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	
1,234.52	4.69	43.44	1,234.26	6.97	6.60	2.00	2.00	0.00	43.44	
6,057.96	4.69	43.44	6,041.55	293.38	277.77	0.00	0.00	0.00	0.00	
6,925.38	90.00	89.40	6,581.00	331.19	849.44	10.00	9.83	5.30	46.06	HARLEQUIN 34-35-2
16,891.54	90.00	89.40	6,581.00	435.56	10,815.06	0.00	0.00	0.00	0.00	HARLEQUIN 34-35-2

Planning Report

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Company:	MALLARD EXPLORATION	TVD Reference:	KB 27' @ 5056.00usft
Project:	WELD COUNTY	MD Reference:	KB 27' @ 5056.00usft
Site:	SEC 33-T8N-R61W	North Reference:	True
Well:	HARLEQUIN 34-35-2HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
662.00	0.00	0.00	662.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base									
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	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
Start Build 2.00									
1,100.00	2.00	43.44	1,099.98	1.27	1.20	1.25	2.00	2.00	0.00
1,200.00	4.00	43.44	1,199.84	5.07	4.80	5.00	2.00	2.00	0.00
1,234.52	4.69	43.44	1,234.26	6.97	6.60	6.87	2.00	2.00	0.00
Start 4823.44 hold at 1234.52 MD									
1,300.00	4.69	43.44	1,299.52	10.85	10.28	10.71	0.00	0.00	0.00
1,400.00	4.69	43.44	1,399.18	16.79	15.90	16.56	0.00	0.00	0.00
1,500.00	4.69	43.44	1,498.85	22.73	21.52	22.42	0.00	0.00	0.00
1,600.00	4.69	43.44	1,598.51	28.67	27.14	28.28	0.00	0.00	0.00
1,684.77	4.69	43.44	1,683.00	33.70	31.91	33.24	0.00	0.00	0.00
Pierre Shale Top									
1,700.00	4.69	43.44	1,698.18	34.61	32.77	34.13	0.00	0.00	0.00
1,800.00	4.69	43.44	1,797.84	40.54	38.39	39.99	0.00	0.00	0.00
1,900.00	4.69	43.44	1,897.51	46.48	44.01	45.84	0.00	0.00	0.00
2,000.00	4.69	43.44	1,997.17	52.42	49.63	51.70	0.00	0.00	0.00
2,100.00	4.69	43.44	2,096.84	58.36	55.25	57.56	0.00	0.00	0.00
2,200.00	4.69	43.44	2,196.50	64.30	60.88	63.41	0.00	0.00	0.00
2,300.00	4.69	43.44	2,296.17	70.23	66.50	69.27	0.00	0.00	0.00
2,400.00	4.69	43.44	2,395.84	76.17	72.12	75.13	0.00	0.00	0.00
2,500.00	4.69	43.44	2,495.50	82.11	77.74	80.98	0.00	0.00	0.00
2,600.00	4.69	43.44	2,595.17	88.05	83.36	86.84	0.00	0.00	0.00
2,700.00	4.69	43.44	2,694.83	93.99	88.99	92.70	0.00	0.00	0.00
2,800.00	4.69	43.44	2,794.50	99.92	94.61	98.55	0.00	0.00	0.00
2,900.00	4.69	43.44	2,894.16	105.86	100.23	104.41	0.00	0.00	0.00
3,000.00	4.69	43.44	2,993.83	111.80	105.85	110.27	0.00	0.00	0.00
3,100.00	4.69	43.44	3,093.49	117.74	111.48	116.12	0.00	0.00	0.00
3,200.00	4.69	43.44	3,193.16	123.68	117.10	121.98	0.00	0.00	0.00
3,300.00	4.69	43.44	3,292.82	129.61	122.72	127.84	0.00	0.00	0.00
3,400.00	4.69	43.44	3,392.49	135.55	128.34	133.69	0.00	0.00	0.00
3,500.00	4.69	43.44	3,492.15	141.49	133.96	139.55	0.00	0.00	0.00
3,570.08	4.69	43.44	3,562.00	145.65	137.90	143.65	0.00	0.00	0.00
Richard Sandstone									
3,600.00	4.69	43.44	3,591.82	147.43	139.59	145.41	0.00	0.00	0.00
3,670.42	4.69	43.44	3,662.00	151.61	143.54	149.53	0.00	0.00	0.00
Parkman Sandstone									
3,700.00	4.69	43.44	3,691.48	153.36	145.21	151.26	0.00	0.00	0.00
3,800.00	4.69	43.44	3,791.15	159.30	150.83	157.12	0.00	0.00	0.00
3,900.00	4.69	43.44	3,890.81	165.24	156.45	162.97	0.00	0.00	0.00
4,000.00	4.69	43.44	3,990.48	171.18	162.07	168.83	0.00	0.00	0.00
4,100.00	4.69	43.44	4,090.14	177.12	167.70	174.69	0.00	0.00	0.00

Planning Report

Database:	EDM 5000.16 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 34-35-2HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 27' @ 5056.00usft
Project:	WELD COUNTY	MD Reference:	KB 27' @ 5056.00usft
Site:	SEC 33-T8N-R61W	North Reference:	True
Well:	HARLEQUIN 34-35-2HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
4,200.00	4.69	43.44	4,189.81	183.05	173.32	180.54	0.00	0.00	0.00
4,300.00	4.69	43.44	4,289.47	188.99	178.94	186.40	0.00	0.00	0.00
4,400.00	4.69	43.44	4,389.14	194.93	184.56	192.26	0.00	0.00	0.00
4,417.92	4.69	43.44	4,407.00	195.99	185.57	193.31	0.00	0.00	0.00
Sussex Sandstone									
4,500.00	4.69	43.44	4,488.80	200.87	190.18	198.11	0.00	0.00	0.00
4,600.00	4.69	43.44	4,588.47	206.81	195.81	203.97	0.00	0.00	0.00
4,700.00	4.69	43.44	4,688.13	212.74	201.43	209.83	0.00	0.00	0.00
4,800.00	4.69	43.44	4,787.80	218.68	207.05	215.68	0.00	0.00	0.00
4,849.37	4.69	43.44	4,837.00	221.61	209.83	218.57	0.00	0.00	0.00
Shannon Sandstone									
4,900.00	4.69	43.44	4,887.46	224.62	212.67	221.54	0.00	0.00	0.00
5,000.00	4.69	43.44	4,987.13	230.56	218.30	227.40	0.00	0.00	0.00
5,100.00	4.69	43.44	5,086.79	236.50	223.92	233.25	0.00	0.00	0.00
5,200.00	4.69	43.44	5,186.46	242.43	229.54	239.11	0.00	0.00	0.00
5,300.00	4.69	43.44	5,286.12	248.37	235.16	244.97	0.00	0.00	0.00
5,400.00	4.69	43.44	5,385.79	254.31	240.78	250.82	0.00	0.00	0.00
5,500.00	4.69	43.44	5,485.45	260.25	246.41	256.68	0.00	0.00	0.00
5,600.00	4.69	43.44	5,585.12	266.19	252.03	262.54	0.00	0.00	0.00
5,700.00	4.69	43.44	5,684.78	272.12	257.65	268.39	0.00	0.00	0.00
5,710.25	4.69	43.44	5,695.00	272.73	258.23	268.99	0.00	0.00	0.00
TeePee Buttes									
5,800.00	4.69	43.44	5,784.45	278.06	263.27	274.25	0.00	0.00	0.00
5,900.00	4.69	43.44	5,884.11	284.00	268.89	280.10	0.00	0.00	0.00
6,000.00	4.69	43.44	5,983.78	289.94	274.52	285.96	0.00	0.00	0.00
6,057.96	4.69	43.44	6,041.55	293.38	277.77	289.36	0.00	0.00	0.00
Start DLS 10.00 TFO 46.06									
6,100.00	8.19	65.19	6,083.32	295.88	281.68	293.35	10.00	8.32	51.76
6,150.00	12.90	74.48	6,132.46	298.87	290.29	302.08	10.00	9.44	18.57
6,200.00	17.78	78.80	6,180.67	301.85	303.17	315.07	10.00	9.74	8.63
6,250.00	22.70	81.29	6,227.57	304.80	320.20	332.21	10.00	9.85	4.99
6,300.00	27.65	82.94	6,272.81	307.69	341.27	353.37	10.00	9.90	3.28
6,350.00	32.62	84.11	6,316.03	310.50	366.20	378.40	10.00	9.93	2.35
6,400.00	37.59	85.01	6,356.93	313.21	394.82	407.10	10.00	9.95	1.79
6,443.02	41.88	85.63	6,390.00	315.45	422.22	434.57	10.00	9.96	1.44
Sharon Springs									
6,450.00	42.57	85.72	6,395.17	315.80	426.90	439.26	10.00	9.96	1.30
6,493.41	46.90	86.24	6,426.00	317.94	457.36	469.79	10.00	9.96	1.19
Niobrara Top									
6,500.00	47.55	86.31	6,430.48	318.25	462.19	474.62	10.00	9.97	1.09
6,550.00	52.54	86.81	6,462.58	320.55	500.44	512.93	10.00	9.97	1.00
6,600.00	57.53	87.25	6,491.22	322.66	541.35	553.89	10.00	9.97	0.88
6,650.00	62.51	87.64	6,516.20	324.59	584.60	597.19	10.00	9.98	0.79
6,700.00	67.50	88.00	6,537.32	326.31	629.87	642.49	10.00	9.98	0.72
6,750.00	72.49	88.33	6,554.41	327.81	676.82	689.46	10.00	9.98	0.67
6,773.41	74.83	88.48	6,561.00	328.43	699.27	711.92	10.00	9.98	0.64
Niobrara B2 Chalk Top									
6,800.00	77.48	88.65	6,567.36	329.08	725.08	737.73	10.00	9.98	0.62
6,818.08	79.29	88.76	6,571.00	329.48	742.78	755.44	10.00	9.98	0.61
Niobrara B2 Chalk Target Top									
6,850.00	82.48	88.95	6,576.06	330.11	774.29	786.94	10.00	9.98	0.60
6,900.00	87.47	89.25	6,580.44	330.89	824.07	836.72	10.00	9.98	0.59
6,925.38	90.00	89.40	6,581.00	331.19	849.44	862.08	10.00	9.98	0.59

Planning Report

Database:	EDM 5000.16 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 34-35-2HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 27' @ 5056.00usft
Project:	WELD COUNTY	MD Reference:	KB 27' @ 5056.00usft
Site:	SEC 33-T8N-R61W	North Reference:	True
Well:	HARLEQUIN 34-35-2HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)	
Start 9966.16 hold at 6925.38 MD - Niobrara B2 Chalk Target Center (Landing Point)										
7,000.00	90.00	89.40	6,581.00	331.97	924.06	936.67	0.00	0.00	0.00	
7,100.00	90.00	89.40	6,581.00	333.02	1,024.05	1,036.63	0.00	0.00	0.00	
7,200.00	90.00	89.40	6,581.00	334.06	1,124.05	1,136.58	0.00	0.00	0.00	
7,300.00	90.00	89.40	6,581.00	335.11	1,224.04	1,236.54	0.00	0.00	0.00	
7,400.00	90.00	89.40	6,581.00	336.16	1,324.04	1,336.49	0.00	0.00	0.00	
7,500.00	90.00	89.40	6,581.00	337.20	1,424.03	1,436.45	0.00	0.00	0.00	
7,600.00	90.00	89.40	6,581.00	338.25	1,524.03	1,536.40	0.00	0.00	0.00	
7,700.00	90.00	89.40	6,581.00	339.30	1,624.02	1,636.36	0.00	0.00	0.00	
7,800.00	90.00	89.40	6,581.00	340.35	1,724.02	1,736.32	0.00	0.00	0.00	
7,900.00	90.00	89.40	6,581.00	341.39	1,824.01	1,836.27	0.00	0.00	0.00	
8,000.00	90.00	89.40	6,581.00	342.44	1,924.00	1,936.23	0.00	0.00	0.00	
8,100.00	90.00	89.40	6,581.00	343.49	2,024.00	2,036.18	0.00	0.00	0.00	
8,200.00	90.00	89.40	6,581.00	344.54	2,123.99	2,136.14	0.00	0.00	0.00	
8,300.00	90.00	89.40	6,581.00	345.58	2,223.99	2,236.09	0.00	0.00	0.00	
8,400.00	90.00	89.40	6,581.00	346.63	2,323.98	2,336.05	0.00	0.00	0.00	
8,500.00	90.00	89.40	6,581.00	347.68	2,423.98	2,436.00	0.00	0.00	0.00	
8,600.00	90.00	89.40	6,581.00	348.72	2,523.97	2,535.96	0.00	0.00	0.00	
8,700.00	90.00	89.40	6,581.00	349.77	2,623.97	2,635.92	0.00	0.00	0.00	
8,800.00	90.00	89.40	6,581.00	350.82	2,723.96	2,735.87	0.00	0.00	0.00	
8,900.00	90.00	89.40	6,581.00	351.87	2,823.96	2,835.83	0.00	0.00	0.00	
9,000.00	90.00	89.40	6,581.00	352.91	2,923.95	2,935.78	0.00	0.00	0.00	
9,100.00	90.00	89.40	6,581.00	353.96	3,023.94	3,035.74	0.00	0.00	0.00	
9,200.00	90.00	89.40	6,581.00	355.01	3,123.94	3,135.69	0.00	0.00	0.00	
9,300.00	90.00	89.40	6,581.00	356.06	3,223.93	3,235.65	0.00	0.00	0.00	
9,400.00	90.00	89.40	6,581.00	357.10	3,323.93	3,335.61	0.00	0.00	0.00	
9,500.00	90.00	89.40	6,581.00	358.15	3,423.92	3,435.56	0.00	0.00	0.00	
9,600.00	90.00	89.40	6,581.00	359.20	3,523.92	3,535.52	0.00	0.00	0.00	
9,700.00	90.00	89.40	6,581.00	360.24	3,623.91	3,635.47	0.00	0.00	0.00	
9,800.00	90.00	89.40	6,581.00	361.29	3,723.91	3,735.43	0.00	0.00	0.00	
9,900.00	90.00	89.40	6,581.00	362.34	3,823.90	3,835.38	0.00	0.00	0.00	
10,000.00	90.00	89.40	6,581.00	363.39	3,923.90	3,935.34	0.00	0.00	0.00	
10,100.00	90.00	89.40	6,581.00	364.43	4,023.89	4,035.30	0.00	0.00	0.00	
10,200.00	90.00	89.40	6,581.00	365.48	4,123.88	4,135.25	0.00	0.00	0.00	
10,300.00	90.00	89.40	6,581.00	366.53	4,223.88	4,235.21	0.00	0.00	0.00	
10,400.00	90.00	89.40	6,581.00	367.57	4,323.87	4,335.16	0.00	0.00	0.00	
10,500.00	90.00	89.40	6,581.00	368.62	4,423.87	4,435.12	0.00	0.00	0.00	
10,600.00	90.00	89.40	6,581.00	369.67	4,523.86	4,535.07	0.00	0.00	0.00	
10,700.00	90.00	89.40	6,581.00	370.72	4,623.86	4,635.03	0.00	0.00	0.00	
10,800.00	90.00	89.40	6,581.00	371.76	4,723.85	4,734.99	0.00	0.00	0.00	
10,900.00	90.00	89.40	6,581.00	372.81	4,823.85	4,834.94	0.00	0.00	0.00	
11,000.00	90.00	89.40	6,581.00	373.86	4,923.84	4,934.90	0.00	0.00	0.00	
11,100.00	90.00	89.40	6,581.00	374.91	5,023.84	5,034.85	0.00	0.00	0.00	
11,200.00	90.00	89.40	6,581.00	375.95	5,123.83	5,134.81	0.00	0.00	0.00	
11,300.00	90.00	89.40	6,581.00	377.00	5,223.82	5,234.76	0.00	0.00	0.00	
11,400.00	90.00	89.40	6,581.00	378.05	5,323.82	5,334.72	0.00	0.00	0.00	
11,500.00	90.00	89.40	6,581.00	379.09	5,423.81	5,434.67	0.00	0.00	0.00	
11,600.00	90.00	89.40	6,581.00	380.14	5,523.81	5,534.63	0.00	0.00	0.00	
11,700.00	90.00	89.40	6,581.00	381.19	5,623.80	5,634.59	0.00	0.00	0.00	
11,800.00	90.00	89.40	6,581.00	382.24	5,723.80	5,734.54	0.00	0.00	0.00	
11,900.00	90.00	89.40	6,581.00	383.28	5,823.79	5,834.50	0.00	0.00	0.00	
12,000.00	90.00	89.40	6,581.00	384.33	5,923.79	5,934.45	0.00	0.00	0.00	
12,100.00	90.00	89.40	6,581.00	385.38	6,023.78	6,034.41	0.00	0.00	0.00	
12,200.00	90.00	89.40	6,581.00	386.43	6,123.77	6,134.36	0.00	0.00	0.00	

Planning Report

Database:	EDM 5000.16 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 34-35-2HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 27' @ 5056.00usft
Project:	WELD COUNTY	MD Reference:	KB 27' @ 5056.00usft
Site:	SEC 33-T8N-R61W	North Reference:	True
Well:	HARLEQUIN 34-35-2HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
12,300.00	90.00	89.40	6,581.00	387.47	6,223.77	6,234.32	0.00	0.00	0.00
12,400.00	90.00	89.40	6,581.00	388.52	6,323.76	6,334.28	0.00	0.00	0.00
12,500.00	90.00	89.40	6,581.00	389.57	6,423.76	6,434.23	0.00	0.00	0.00
12,600.00	90.00	89.40	6,581.00	390.61	6,523.75	6,534.19	0.00	0.00	0.00
12,700.00	90.00	89.40	6,581.00	391.66	6,623.75	6,634.14	0.00	0.00	0.00
12,800.00	90.00	89.40	6,581.00	392.71	6,723.74	6,734.10	0.00	0.00	0.00
12,900.00	90.00	89.40	6,581.00	393.76	6,823.74	6,834.05	0.00	0.00	0.00
13,000.00	90.00	89.40	6,581.00	394.80	6,923.73	6,934.01	0.00	0.00	0.00
13,100.00	90.00	89.40	6,581.00	395.85	7,023.73	7,033.97	0.00	0.00	0.00
13,200.00	90.00	89.40	6,581.00	396.90	7,123.72	7,133.92	0.00	0.00	0.00
13,300.00	90.00	89.40	6,581.00	397.95	7,223.71	7,233.88	0.00	0.00	0.00
13,400.00	90.00	89.40	6,581.00	398.99	7,323.71	7,333.83	0.00	0.00	0.00
13,500.00	90.00	89.40	6,581.00	400.04	7,423.70	7,433.79	0.00	0.00	0.00
13,600.00	90.00	89.40	6,581.00	401.09	7,523.70	7,533.74	0.00	0.00	0.00
13,700.00	90.00	89.40	6,581.00	402.13	7,623.69	7,633.70	0.00	0.00	0.00
13,800.00	90.00	89.40	6,581.00	403.18	7,723.69	7,733.66	0.00	0.00	0.00
13,900.00	90.00	89.40	6,581.00	404.23	7,823.68	7,833.61	0.00	0.00	0.00
14,000.00	90.00	89.40	6,581.00	405.28	7,923.68	7,933.57	0.00	0.00	0.00
14,100.00	90.00	89.40	6,581.00	406.32	8,023.67	8,033.52	0.00	0.00	0.00
14,200.00	90.00	89.40	6,581.00	407.37	8,123.67	8,133.48	0.00	0.00	0.00
14,300.00	90.00	89.40	6,581.00	408.42	8,223.66	8,233.43	0.00	0.00	0.00
14,400.00	90.00	89.40	6,581.00	409.46	8,323.65	8,333.39	0.00	0.00	0.00
14,500.00	90.00	89.40	6,581.00	410.51	8,423.65	8,433.34	0.00	0.00	0.00
14,600.00	90.00	89.40	6,581.00	411.56	8,523.64	8,533.30	0.00	0.00	0.00
14,700.00	90.00	89.40	6,581.00	412.61	8,623.64	8,633.26	0.00	0.00	0.00
14,800.00	90.00	89.40	6,581.00	413.65	8,723.63	8,733.21	0.00	0.00	0.00
14,900.00	90.00	89.40	6,581.00	414.70	8,823.63	8,833.17	0.00	0.00	0.00
15,000.00	90.00	89.40	6,581.00	415.75	8,923.62	8,933.12	0.00	0.00	0.00
15,100.00	90.00	89.40	6,581.00	416.80	9,023.62	9,033.08	0.00	0.00	0.00
15,200.00	90.00	89.40	6,581.00	417.84	9,123.61	9,133.03	0.00	0.00	0.00
15,300.00	90.00	89.40	6,581.00	418.89	9,223.60	9,232.99	0.00	0.00	0.00
15,400.00	90.00	89.40	6,581.00	419.94	9,323.60	9,332.95	0.00	0.00	0.00
15,500.00	90.00	89.40	6,581.00	420.98	9,423.59	9,432.90	0.00	0.00	0.00
15,600.00	90.00	89.40	6,581.00	422.03	9,523.59	9,532.86	0.00	0.00	0.00
15,700.00	90.00	89.40	6,581.00	423.08	9,623.58	9,632.81	0.00	0.00	0.00
15,800.00	90.00	89.40	6,581.00	424.13	9,723.58	9,732.77	0.00	0.00	0.00
15,900.00	90.00	89.40	6,581.00	425.17	9,823.57	9,832.72	0.00	0.00	0.00
16,000.00	90.00	89.40	6,581.00	426.22	9,923.57	9,932.68	0.00	0.00	0.00
16,100.00	90.00	89.40	6,581.00	427.27	10,023.56	10,032.64	0.00	0.00	0.00
16,200.00	90.00	89.40	6,581.00	428.32	10,123.56	10,132.59	0.00	0.00	0.00
16,300.00	90.00	89.40	6,581.00	429.36	10,223.55	10,232.55	0.00	0.00	0.00
16,400.00	90.00	89.40	6,581.00	430.41	10,323.54	10,332.50	0.00	0.00	0.00
16,500.00	90.00	89.40	6,581.00	431.46	10,423.54	10,432.46	0.00	0.00	0.00
16,600.00	90.00	89.40	6,581.00	432.50	10,523.53	10,532.41	0.00	0.00	0.00
16,700.00	90.00	89.40	6,581.00	433.55	10,623.53	10,632.37	0.00	0.00	0.00
16,800.00	90.00	89.40	6,581.00	434.60	10,723.52	10,732.33	0.00	0.00	0.00
16,891.54	90.00	89.40	6,581.00	435.56	10,815.06	10,823.82	0.00	0.00	0.00
TD at 16891.54									

Planning Report

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

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
HARLEQUIN 34-35-2HN - plan hits target center - Point	0.00	0.00	6,581.00	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	6,581.00	435.56	10,815.06	1,472,620.31	3,370,628.77	40.623080°N	104.164802°W

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
662.00	662.00	Fox Hills Base				
1,684.77	1,683.00	Pierre Shale Top				
3,570.08	3,562.00	Richard Sandstone				
3,670.42	3,662.00	Parkman Sandstone				
4,417.92	4,407.00	Sussex Sandstone				
4,849.37	4,837.00	Shannon Sandstone				
5,710.25	5,695.00	TeePee Buttes				
6,443.02	6,390.00	Sharon Springs				
6,493.41	6,426.00	Niobrara Top				
6,773.41	6,561.00	Niobrara B2 Chalk Top				
6,818.08	6,571.00	Niobrara B2 Chalk Target Top				
6,925.38	6,581.00	Niobrara B2 Chalk Target Center (Landi				

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,000.00	1,000.00	0.00	0.00	Start Build 2.00
1,234.52	1,234.26	6.97	6.60	Start 4823.44 hold at 1234.52 MD
6,057.96	6,041.55	293.38	277.77	Start DLS 10.00 TFO 46.06
6,925.38	6,581.00	331.19	849.44	Start 9966.16 hold at 6925.38 MD
16,891.54	6,581.00	435.56	10,815.06	TD at 16891.54