

# **MALLARD EXPLORATION**

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

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

**HARLEQUIN 33-32-2HC**

**ORIGINAL WELLBORE**

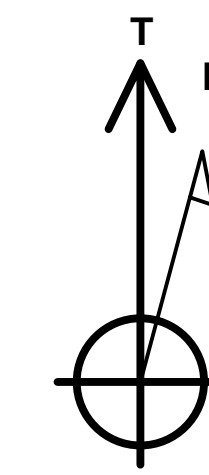
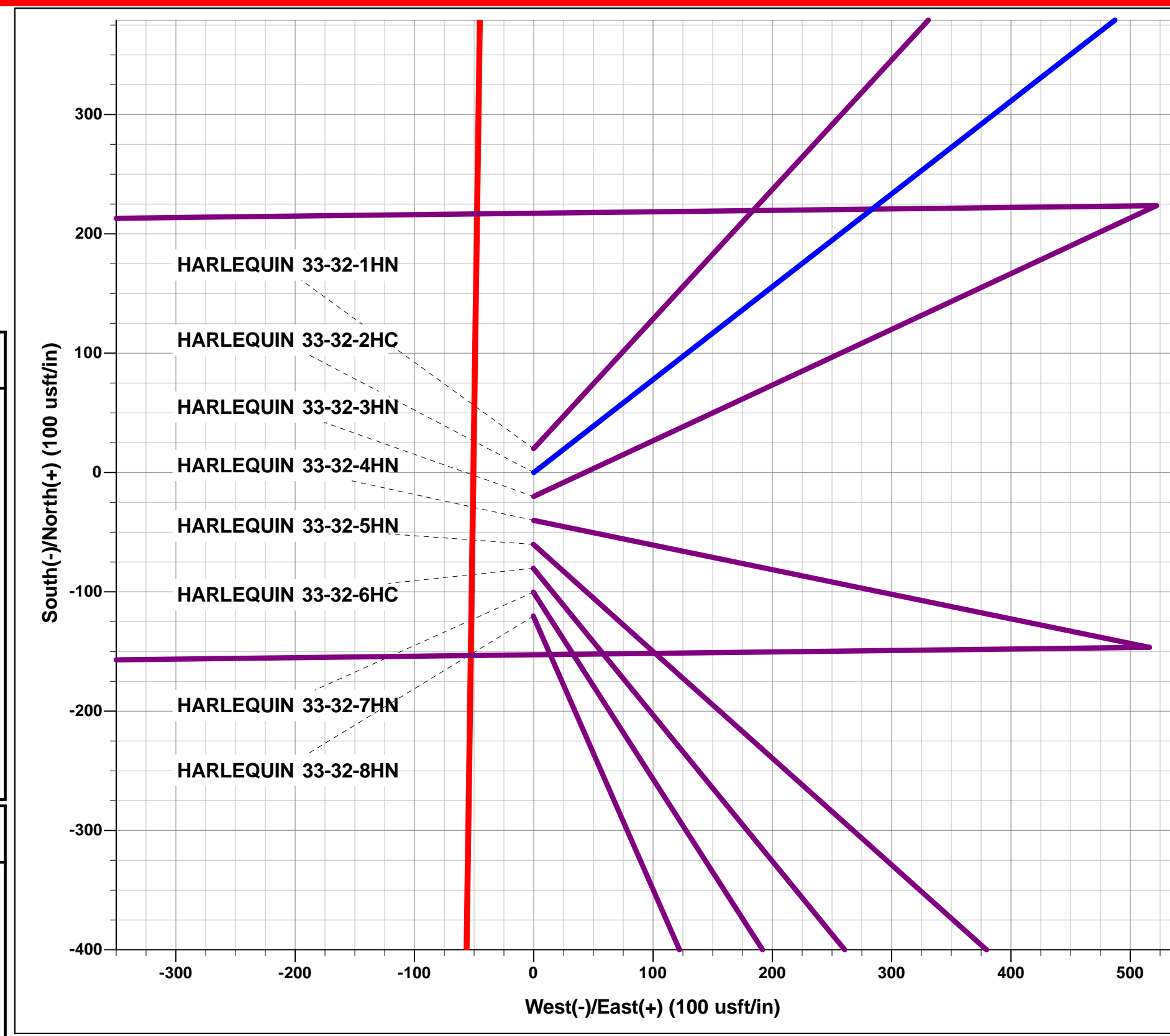
**26 December, 2017**

**Plan: PROPOSAL #1**





Project: WELD COUNTY, COLORADO (NAD 83)  
 Site: NE NE SEC. 33 T8N R61W 6th P.M.  
 Well: HARLEQUIN 33-32-2HC  
 Wellbore: ORIGINAL WELLBORE  
 Design: PROPOSAL #1



Azimuths to True North  
 Magnetic North: 7.87°  
 Magnetic Field  
 Strength: 52502.9snT  
 Dip Angle: 67.10°  
 Date: 26/12/2017  
 Model: IGRF2015

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: 1192ft FNL & 546ft FEL of Sec 33
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDDGE (2°/100ft BUR)
795.62	800.00	12.00	52.11	38.45	49.40	-48.21	62.60	EOB TO 12° INC
3337.50	3398.67	12.00	52.11	370.31	475.77	-464.25	602.90	END OF TANGENT
3933.13	3998.67	0.00	0.00	408.76	525.17	-512.45	665.50	EOD TO VERTICAL
6196.04	6261.58	0.00	0.00	408.76	525.17	-512.45	665.50	KOP (10°/100ft BUR)
6769.00	7161.58	90.00	269.31	401.86	-47.75	59.99	1238.46	HZ LP: 790ft FNL & 600ft FEL of Sec 33
6769.00	16566.82	90.00	269.31	288.55	-9452.30	9456.70	10643.69	BHL: 790ft FNL & 600ft FWL of Sec 32

FORMATION TOP DETAILS

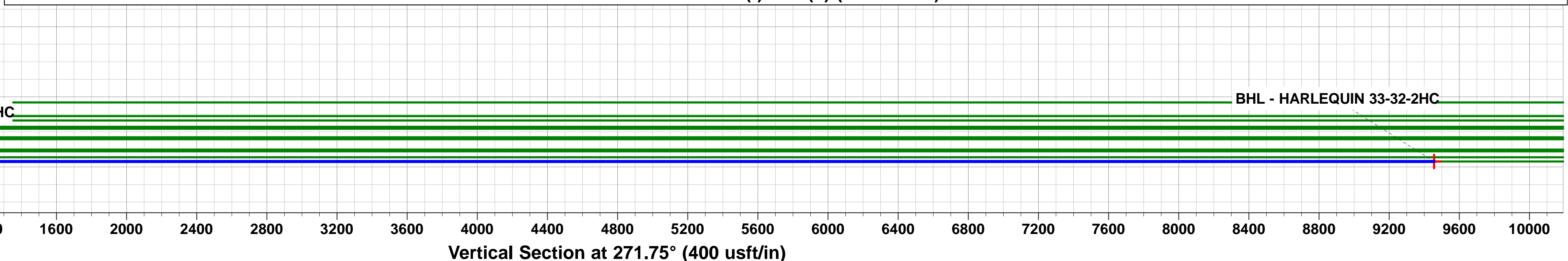
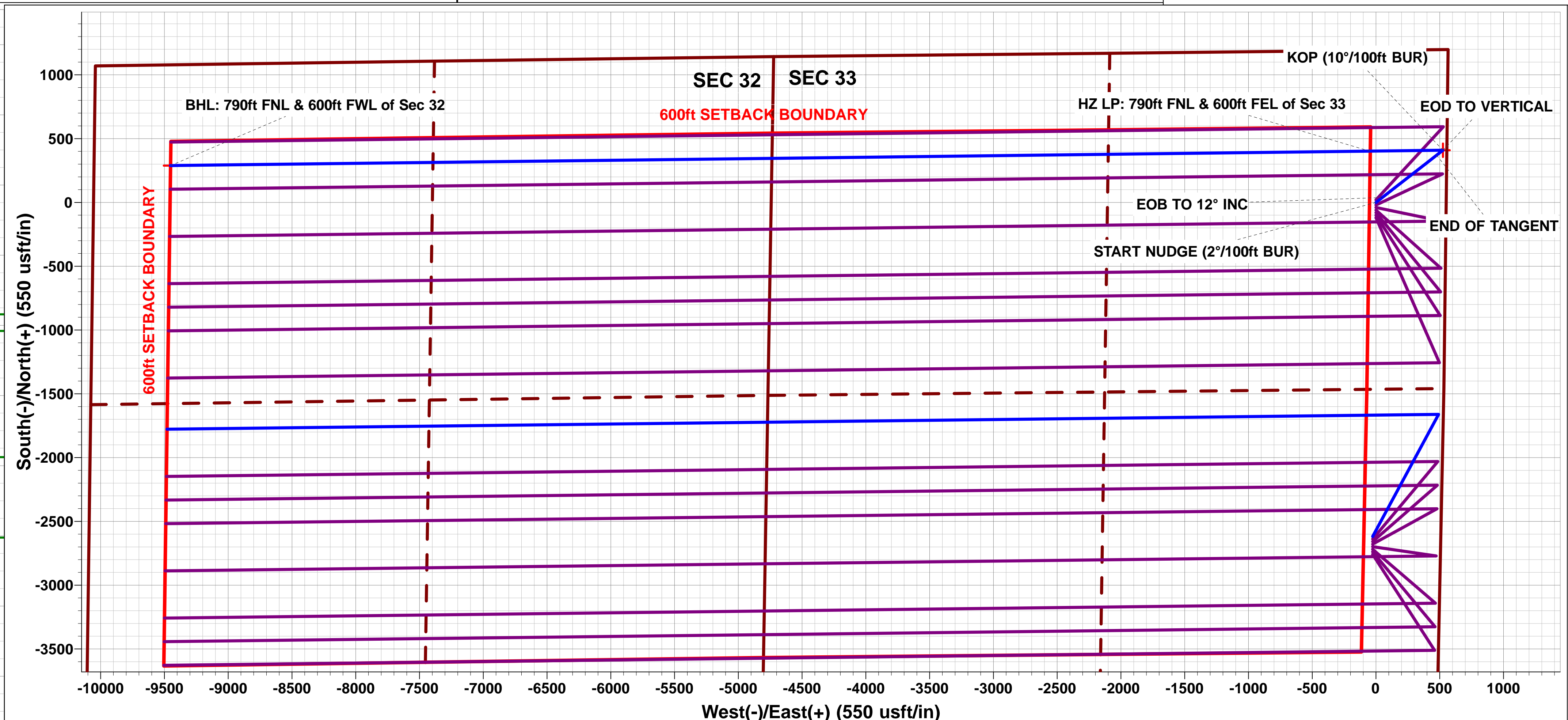
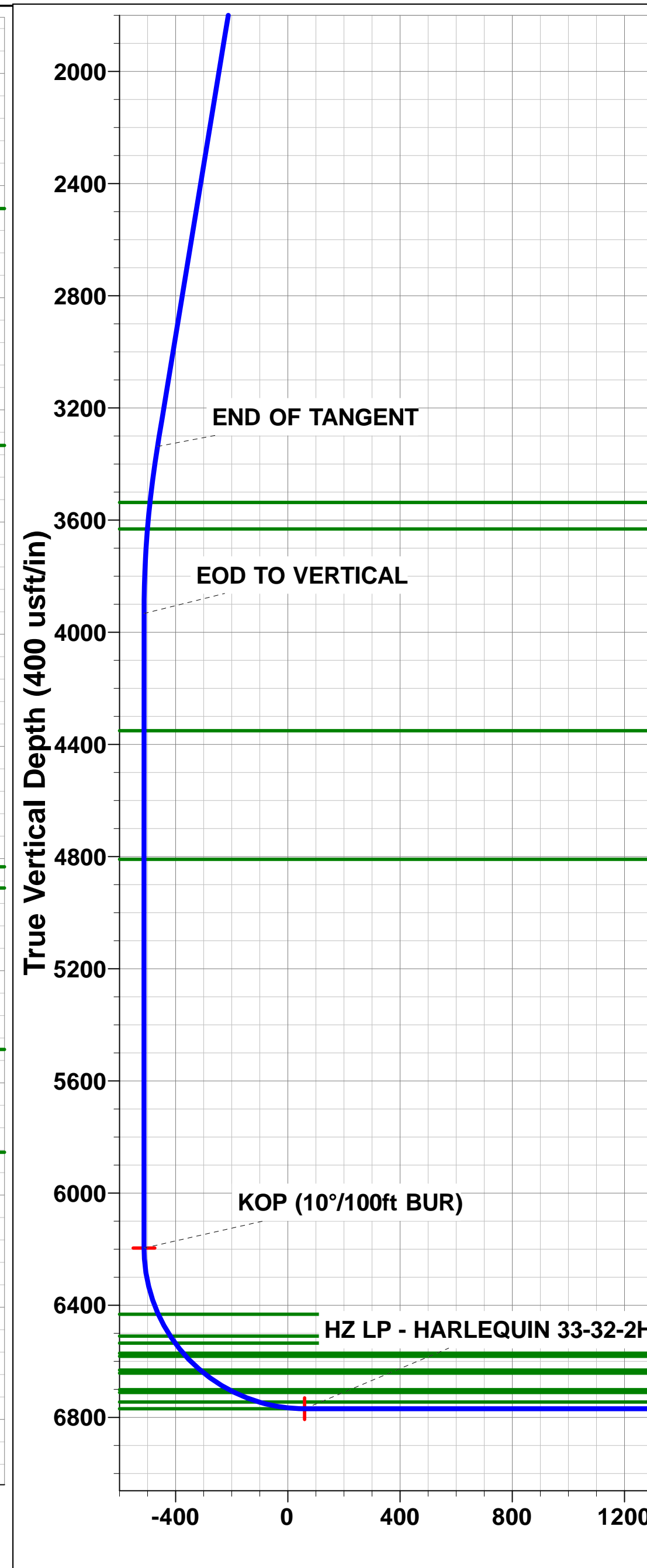
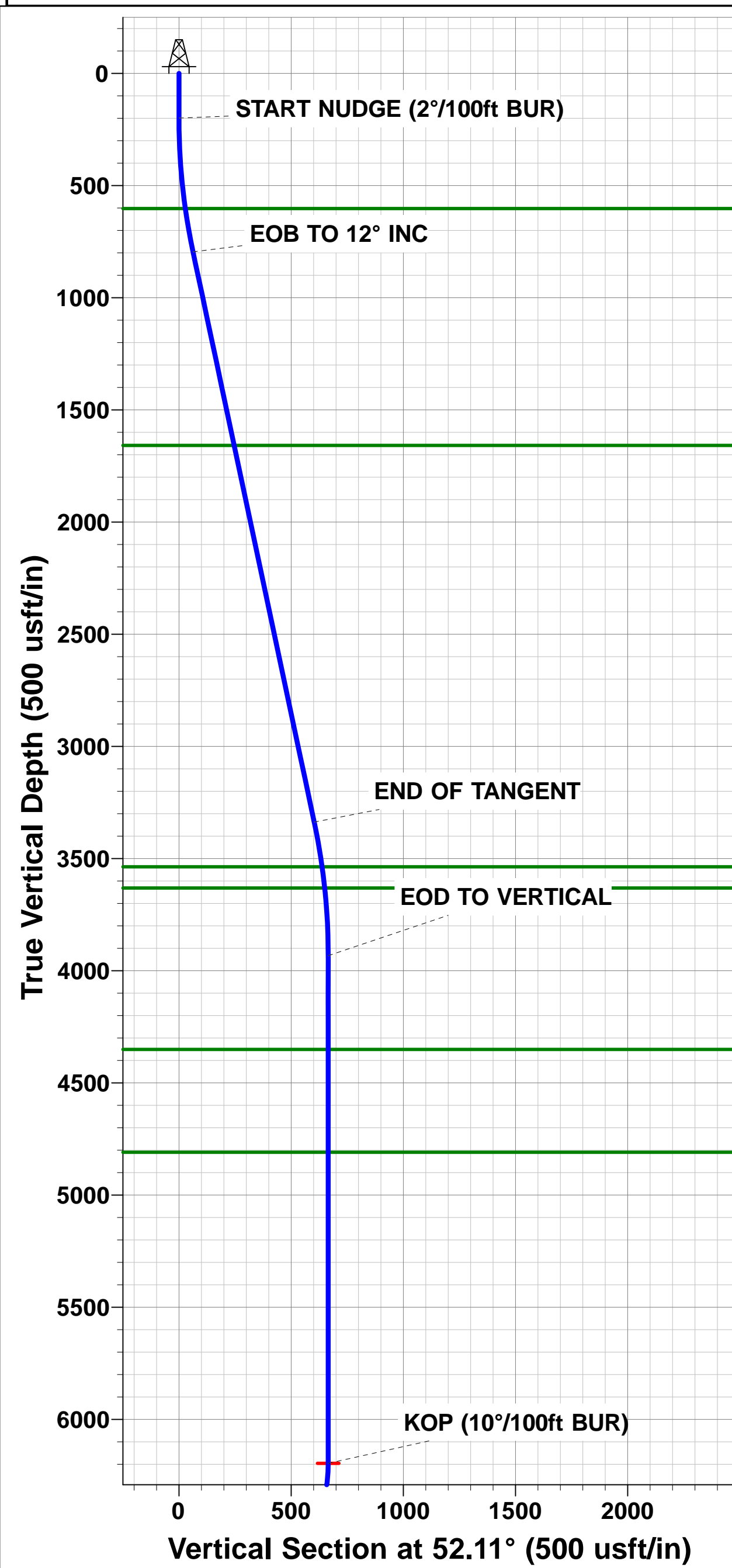
TVDPath	MDPath	Formation
603.00	604.34	Fox Hills Base
1659.00	1682.67	Pierre Shale Top
3537.00	3601.27	Richard Sandstone
3632.00	3696.98	Parkman Sandstone
4351.00	4416.54	Sussex Sandstone
4810.00	4875.54	Shannon Sandstone
6432.00	6504.78	Sharon Springs
6510.00	6593.85	Niobrara A Chalk
6535.00	6624.28	Niobrara A Chalk Base
6571.00	6670.34	Niobrara B1 Chalk Base
6582.00	6685.06	Niobrara B1 Chalk Top
6631.00	6755.47	Niobrara B2 Chalk Base
6642.00	6772.67	Niobrara C Chalk Top
6701.00	6879.60	Niobrara C Chalk Base
6711.00	6901.55	Niobrara D Chalk Top
6745.00	6995.16	Ft. Hays
6769.00	7161.58	Codell (Target)

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HARLEQUIN 33-32-2HC	6196.04	408.76	525.17	40.623288	-104.201869
HZ LP - HARLEQUIN 33-32-2HC	6769.00	401.86	-47.75	40.623269	-104.203933
BHL - HARLEQUIN 33-32-2HC	6769.00	288.55	-9452.30	40.622953	-104.237811

PROPOSED LOCAL COORDINATES:

SHL: 1192ft FNL & 546ft FEL of Sec 33  
 HZ LP: 790ft FNL & 600ft FEL of Sec 33  
 BHL: 790ft FNL & 600ft FWL of Sec 32



Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-2HC
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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

<b>Site</b>	NE NE SEC. 33 T8N R61W 6th P.M.				
<b>Site Position:</b>		<b>Northing:</b>	1,472,146.93 usft	<b>Latitude:</b>	40.622221
<b>From:</b>	Lat/Long	<b>Easting:</b>	3,359,819.76 usft	<b>Longitude:</b>	-104.203761
<b>Position Uncertainty:</b>	0.00 usft	<b>Slot Radius:</b>	1.10000ft	<b>Grid Convergence:</b>	0.84 °

<b>Well</b>	HARLEQUIN 33-32-2HC					
<b>Well Position</b>	<b>+N-S</b>	-20.05 usft	<b>Northing:</b>	1,472,126.89 usft	<b>Latitude:</b>	40.622166
	<b>+E-W</b>	0.00 usft	<b>Easting:</b>	3,359,820.05 usft	<b>Longitude:</b>	-104.203761
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	usft	<b>Ground Level:</b>	5,028.00 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	26/12/2017	7.87	67.10	52,503

<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>
	6,769.00	0.00	0.00	271.75

<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	-5,048.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	-4,848.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	12.00	52.11	795.62	-4,252.38	38.45	49.40	2.00	2.00	0.00	52.11	
3,398.67	12.00	52.11	3,337.50	-1,710.50	370.31	475.77	0.00	0.00	0.00	0.00	
3,998.67	0.00	0.00	3,933.13	-1,114.87	408.76	525.17	2.00	-2.00	0.00	180.00	
6,261.58	0.00	0.00	6,196.04	1,148.04	408.76	525.17	0.00	0.00	0.00	0.00	KOP - HARLEQUIN
7,161.58	90.00	269.31	6,769.00	1,721.00	401.86	-47.75	10.00	10.00	-10.08	269.31	HZ LP - HARLEQU
16,566.82	90.00	269.31	6,769.00	1,721.00	288.55	-9,452.30	0.00	0.00	0.00	0.00	BHL - HARLEQUIN

Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-2HC
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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: 1192ft FNL &amp; 546ft FEL of Sec 33</b>										
0.00	0.00	0.00	0.00	5,048.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,948.00	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	4,848.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	2.00	52.11	299.98	4,748.02	1.07	1.38	-1.34	2.00	2.00	0.00
400.00	4.00	52.11	399.84	4,648.16	4.29	5.51	-5.37	2.00	2.00	0.00
500.00	6.00	52.11	499.45	4,548.55	9.64	12.38	-12.08	2.00	2.00	0.00
600.00	8.00	52.11	598.70	4,449.30	17.12	22.00	-21.47	2.00	2.00	0.00
<b>Fox Hills Base</b>										
604.34	8.09	52.11	603.00	4,445.00	17.50	22.48	-21.94	2.00	2.00	0.00
700.00	10.00	52.11	697.47	4,350.53	26.73	34.35	-33.51	2.00	2.00	0.00
<b>EOB TO 12° INC</b>										
800.00	12.00	52.11	795.62	4,252.38	38.45	49.40	-48.21	2.00	2.00	0.00
900.00	12.00	52.11	893.44	4,154.56	51.22	65.81	-64.22	0.00	0.00	0.00
1,000.00	12.00	52.11	991.25	4,056.75	63.99	82.22	-80.23	0.00	0.00	0.00
1,100.00	12.00	52.11	1,089.07	3,958.93	76.76	98.62	-96.24	0.00	0.00	0.00
1,200.00	12.00	52.11	1,186.88	3,861.12	89.53	115.03	-112.24	0.00	0.00	0.00
1,300.00	12.00	52.11	1,284.70	3,763.30	102.30	131.44	-128.25	0.00	0.00	0.00
1,400.00	12.00	52.11	1,382.51	3,665.49	115.07	147.84	-144.26	0.00	0.00	0.00
1,500.00	12.00	52.11	1,480.33	3,567.67	127.84	164.25	-160.27	0.00	0.00	0.00
1,600.00	12.00	52.11	1,578.14	3,469.86	140.61	180.66	-176.28	0.00	0.00	0.00
<b>Pierre Shale Top</b>										
1,682.67	12.00	52.11	1,659.00	3,389.00	151.17	194.22	-189.52	0.00	0.00	0.00
1,700.00	12.00	52.11	1,675.96	3,372.04	153.38	197.07	-192.29	0.00	0.00	0.00
1,800.00	12.00	52.11	1,773.77	3,274.23	166.15	213.47	-208.30	0.00	0.00	0.00
1,900.00	12.00	52.11	1,871.59	3,176.41	178.92	229.88	-224.31	0.00	0.00	0.00
2,000.00	12.00	52.11	1,969.40	3,078.60	191.69	246.29	-240.32	0.00	0.00	0.00
2,100.00	12.00	52.11	2,067.22	2,980.78	204.47	262.69	-256.33	0.00	0.00	0.00
2,200.00	12.00	52.11	2,165.03	2,882.97	217.24	279.10	-272.34	0.00	0.00	0.00
2,300.00	12.00	52.11	2,262.84	2,785.16	230.01	295.51	-288.35	0.00	0.00	0.00
2,400.00	12.00	52.11	2,360.66	2,687.34	242.78	311.92	-304.36	0.00	0.00	0.00
2,500.00	12.00	52.11	2,458.47	2,589.53	255.55	328.32	-320.37	0.00	0.00	0.00
2,600.00	12.00	52.11	2,556.29	2,491.71	268.32	344.73	-336.38	0.00	0.00	0.00
2,700.00	12.00	52.11	2,654.10	2,393.90	281.09	361.14	-352.39	0.00	0.00	0.00
2,800.00	12.00	52.11	2,751.92	2,296.08	293.86	377.54	-368.40	0.00	0.00	0.00
2,900.00	12.00	52.11	2,849.73	2,198.27	306.63	393.95	-384.41	0.00	0.00	0.00
3,000.00	12.00	52.11	2,947.55	2,100.45	319.40	410.36	-400.42	0.00	0.00	0.00
3,100.00	12.00	52.11	3,045.36	2,002.64	332.17	426.77	-416.43	0.00	0.00	0.00
3,200.00	12.00	52.11	3,143.18	1,904.82	344.94	443.17	-432.44	0.00	0.00	0.00
3,300.00	12.00	52.11	3,240.99	1,807.01	357.71	459.58	-448.45	0.00	0.00	0.00
<b>END OF TANGENT</b>										
3,398.67	12.00	52.11	3,337.50	1,710.50	370.31	475.77	-464.25	0.00	0.00	0.00
3,400.00	11.97	52.11	3,338.81	1,709.19	370.48	475.99	-464.46	2.00	-2.00	0.00
3,500.00	9.97	52.11	3,436.97	1,611.03	382.17	491.01	-479.12	2.00	-2.00	0.00
3,600.00	7.97	52.11	3,535.74	1,512.26	391.75	503.31	-491.13	2.00	-2.00	0.00
<b>Richard Sandstone</b>										
3,601.27	7.95	52.11	3,537.00	1,511.00	391.86	503.45	-491.26	2.00	-2.00	0.00
<b>Parkman Sandstone</b>										
3,696.98	6.03	52.11	3,632.00	1,416.00	399.01	512.65	-500.23	2.00	-2.00	0.00
3,700.00	5.97	52.11	3,635.00	1,413.00	399.21	512.90	-500.48	2.00	-2.00	0.00
3,800.00	3.97	52.11	3,734.62	1,313.38	404.53	519.74	-507.15	2.00	-2.00	0.00
3,900.00	1.97	52.11	3,834.48	1,213.52	407.72	523.83	-511.14	2.00	-2.00	0.00

Planning Report



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<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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>EOD TO VERTICAL</b>										
3,998.67	0.00	0.00	3,933.13	1,114.87	408.76	525.17	-512.45	2.00	-2.00	0.00
4,000.00	0.00	0.00	3,934.46	1,113.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,100.00	0.00	0.00	4,034.46	1,013.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,200.00	0.00	0.00	4,134.46	913.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,300.00	0.00	0.00	4,234.46	813.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,400.00	0.00	0.00	4,334.46	713.54	408.76	525.17	-512.45	0.00	0.00	0.00
<b>Sussex Sandstone</b>										
4,416.54	0.00	0.00	4,351.00	697.00	408.76	525.17	-512.45	0.00	0.00	0.00
4,500.00	0.00	0.00	4,434.46	613.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,600.00	0.00	0.00	4,534.46	513.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,700.00	0.00	0.00	4,634.46	413.54	408.76	525.17	-512.45	0.00	0.00	0.00
4,800.00	0.00	0.00	4,734.46	313.54	408.76	525.17	-512.45	0.00	0.00	0.00
<b>Shannon Sandstone</b>										
4,875.54	0.00	0.00	4,810.00	238.00	408.76	525.17	-512.45	0.00	0.00	0.00
4,900.00	0.00	0.00	4,834.46	213.54	408.76	525.17	-512.45	0.00	0.00	0.00
5,000.00	0.00	0.00	4,934.46	113.54	408.76	525.17	-512.45	0.00	0.00	0.00
5,100.00	0.00	0.00	5,034.46	13.54	408.76	525.17	-512.45	0.00	0.00	0.00
5,200.00	0.00	0.00	5,134.46	-86.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,300.00	0.00	0.00	5,234.46	-186.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,400.00	0.00	0.00	5,334.46	-286.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,500.00	0.00	0.00	5,434.46	-386.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,600.00	0.00	0.00	5,534.46	-486.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,700.00	0.00	0.00	5,634.46	-586.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,800.00	0.00	0.00	5,734.46	-686.46	408.76	525.17	-512.45	0.00	0.00	0.00
5,900.00	0.00	0.00	5,834.46	-786.46	408.76	525.17	-512.45	0.00	0.00	0.00
6,000.00	0.00	0.00	5,934.46	-886.46	408.76	525.17	-512.45	0.00	0.00	0.00
6,100.00	0.00	0.00	6,034.46	-986.46	408.76	525.17	-512.45	0.00	0.00	0.00
6,200.00	0.00	0.00	6,134.46	-1,086.46	408.76	525.17	-512.45	0.00	0.00	0.00
<b>KOP (10°/100ft BUR)</b>										
6,261.58	0.00	0.00	6,196.04	-1,148.04	408.76	525.17	-512.45	0.00	0.00	0.00
6,300.00	3.84	269.31	6,234.43	-1,186.43	408.74	523.88	-511.17	10.00	10.00	0.00
6,400.00	13.84	269.31	6,333.12	-1,285.12	408.56	508.53	-495.83	10.00	10.00	0.00
6,500.00	23.84	269.31	6,427.64	-1,379.64	408.17	476.28	-463.60	10.00	10.00	0.00
<b>Sharon Springs</b>										
6,504.78	24.32	269.31	6,432.00	-1,384.00	408.15	474.33	-461.66	10.00	10.00	0.00
<b>Niobrara A Chalk</b>										
6,593.85	33.23	269.31	6,510.00	-1,462.00	407.63	431.50	-418.86	10.00	10.00	0.00
6,600.00	33.84	269.31	6,515.12	-1,467.12	407.59	428.11	-415.47	10.00	10.00	0.00
<b>Niobrara A Chalk Base</b>										
6,624.28	36.27	269.31	6,535.00	-1,487.00	407.42	414.16	-401.53	10.00	10.00	0.00
<b>Niobrara B1 Chalk Top</b>										
6,670.34	40.88	269.31	6,571.00	-1,523.00	407.08	385.45	-372.85	10.00	10.00	0.00
<b>Niobrara B1 Chalk Base</b>										
6,685.06	42.35	269.31	6,582.00	-1,534.00	406.96	375.68	-363.09	10.00	10.00	0.00
6,700.00	43.84	269.31	6,592.91	-1,544.91	406.84	365.47	-352.89	10.00	10.00	0.00
<b>Niobrara B2 Chalk Base</b>										
6,755.47	49.39	269.31	6,631.00	-1,583.00	406.35	325.18	-312.63	10.00	10.00	0.00
<b>Niobrara C Chalk Top</b>										
6,772.67	51.11	269.31	6,642.00	-1,594.00	406.19	311.95	-299.41	10.00	10.00	0.00
6,800.00	53.84	269.31	6,658.64	-1,610.64	405.93	290.28	-277.76	10.00	10.00	0.00
<b>Niobrara C Chalk Base</b>										

Planning Report



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-2HC
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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>6,879.60</b>	<b>61.80</b>	<b>269.31</b>	<b>6,701.00</b>	<b>-1,653.00</b>	<b>405.12</b>	<b>222.97</b>	<b>-210.50</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
6,900.00	63.84	269.31	6,710.32	-1,662.32	404.90	204.82	-192.37	10.00	10.00	0.00
<b>Niobrara D Chalk Top</b>										
<b>6,901.55</b>	<b>64.00</b>	<b>269.31</b>	<b>6,711.00</b>	<b>-1,663.00</b>	<b>404.88</b>	<b>203.43</b>	<b>-190.98</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
<b>Ft. Hays</b>										
<b>6,995.16</b>	<b>73.36</b>	<b>269.31</b>	<b>6,745.00</b>	<b>-1,697.00</b>	<b>403.84</b>	<b>116.33</b>	<b>-103.96</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
7,000.00	73.84	269.31	6,746.37	-1,698.37	403.78	111.69	-99.32	10.00	10.00	0.00
7,100.00	83.84	269.31	6,765.69	-1,717.69	402.60	13.71	-1.42	10.00	10.00	0.00
<b>HZ LP: 790ft FNL &amp; 600ft FEL of Sec 33 - Codell (Target)</b>										
<b>7,161.58</b>	<b>90.00</b>	<b>269.31</b>	<b>6,769.00</b>	<b>-1,721.00</b>	<b>401.86</b>	<b>-47.75</b>	<b>59.99</b>	<b>10.00</b>	<b>10.00</b>	<b>0.00</b>
7,200.00	90.00	269.31	6,769.00	-1,721.00	401.40	-86.16	98.37	0.00	0.00	0.00
7,300.00	90.00	269.31	6,769.00	-1,721.00	400.19	-186.15	198.28	0.00	0.00	0.00
7,400.00	90.00	269.31	6,769.00	-1,721.00	398.99	-286.15	298.19	0.00	0.00	0.00
7,500.00	90.00	269.31	6,769.00	-1,721.00	397.78	-386.14	398.10	0.00	0.00	0.00
7,600.00	90.00	269.31	6,769.00	-1,721.00	396.58	-486.13	498.01	0.00	0.00	0.00
7,700.00	90.00	269.31	6,769.00	-1,721.00	395.37	-586.13	597.92	0.00	0.00	0.00
7,800.00	90.00	269.31	6,769.00	-1,721.00	394.17	-686.12	697.83	0.00	0.00	0.00
7,900.00	90.00	269.31	6,769.00	-1,721.00	392.97	-786.11	797.73	0.00	0.00	0.00
8,000.00	90.00	269.31	6,769.00	-1,721.00	391.76	-886.10	897.64	0.00	0.00	0.00
8,100.00	90.00	269.31	6,769.00	-1,721.00	390.56	-986.10	997.55	0.00	0.00	0.00
8,200.00	90.00	269.31	6,769.00	-1,721.00	389.35	-1,086.09	1,097.46	0.00	0.00	0.00
8,300.00	90.00	269.31	6,769.00	-1,721.00	388.15	-1,186.08	1,197.37	0.00	0.00	0.00
8,400.00	90.00	269.31	6,769.00	-1,721.00	386.94	-1,286.07	1,297.28	0.00	0.00	0.00
8,500.00	90.00	269.31	6,769.00	-1,721.00	385.74	-1,386.07	1,397.19	0.00	0.00	0.00
8,600.00	90.00	269.31	6,769.00	-1,721.00	384.53	-1,486.06	1,497.10	0.00	0.00	0.00
8,700.00	90.00	269.31	6,769.00	-1,721.00	383.33	-1,586.05	1,597.01	0.00	0.00	0.00
8,800.00	90.00	269.31	6,769.00	-1,721.00	382.13	-1,686.05	1,696.92	0.00	0.00	0.00
8,900.00	90.00	269.31	6,769.00	-1,721.00	380.92	-1,786.04	1,796.83	0.00	0.00	0.00
9,000.00	90.00	269.31	6,769.00	-1,721.00	379.72	-1,886.03	1,896.74	0.00	0.00	0.00
9,100.00	90.00	269.31	6,769.00	-1,721.00	378.51	-1,986.02	1,996.65	0.00	0.00	0.00
9,200.00	90.00	269.31	6,769.00	-1,721.00	377.31	-2,086.02	2,096.56	0.00	0.00	0.00
9,300.00	90.00	269.31	6,769.01	-1,721.01	376.10	-2,186.01	2,196.47	0.00	0.00	0.00
9,400.00	90.00	269.31	6,769.01	-1,721.01	374.90	-2,286.00	2,296.38	0.00	0.00	0.00
9,500.00	90.00	269.31	6,769.01	-1,721.01	373.69	-2,385.99	2,396.29	0.00	0.00	0.00
9,600.00	90.00	269.31	6,769.01	-1,721.01	372.49	-2,485.99	2,496.20	0.00	0.00	0.00
9,700.00	90.00	269.31	6,769.01	-1,721.01	371.29	-2,585.98	2,596.10	0.00	0.00	0.00
9,800.00	90.00	269.31	6,769.01	-1,721.01	370.08	-2,685.97	2,696.01	0.00	0.00	0.00
9,900.00	90.00	269.31	6,769.01	-1,721.01	368.88	-2,785.97	2,795.92	0.00	0.00	0.00
10,000.00	90.00	269.31	6,769.01	-1,721.01	367.67	-2,885.96	2,895.83	0.00	0.00	0.00
10,100.00	90.00	269.31	6,769.01	-1,721.01	366.47	-2,985.95	2,995.74	0.00	0.00	0.00
10,200.00	90.00	269.31	6,769.01	-1,721.01	365.26	-3,085.94	3,095.65	0.00	0.00	0.00
10,300.00	90.00	269.31	6,769.01	-1,721.01	364.06	-3,185.94	3,195.56	0.00	0.00	0.00
10,400.00	90.00	269.31	6,769.01	-1,721.01	362.85	-3,285.93	3,295.47	0.00	0.00	0.00
10,500.00	90.00	269.31	6,769.01	-1,721.01	361.65	-3,385.92	3,395.38	0.00	0.00	0.00
10,600.00	90.00	269.31	6,769.01	-1,721.01	360.45	-3,485.91	3,495.29	0.00	0.00	0.00
10,700.00	90.00	269.31	6,769.01	-1,721.01	359.24	-3,585.91	3,595.20	0.00	0.00	0.00
10,800.00	90.00	269.31	6,769.01	-1,721.01	358.04	-3,685.90	3,695.11	0.00	0.00	0.00
10,900.00	90.00	269.31	6,769.01	-1,721.01	356.83	-3,785.89	3,795.02	0.00	0.00	0.00
11,000.00	90.00	269.31	6,769.01	-1,721.01	355.63	-3,885.89	3,894.93	0.00	0.00	0.00
11,100.00	90.00	269.31	6,769.01	-1,721.01	354.42	-3,985.88	3,994.84	0.00	0.00	0.00
11,200.00	90.00	269.31	6,769.01	-1,721.01	353.22	-4,085.87	4,094.75	0.00	0.00	0.00
11,300.00	90.00	269.31	6,769.01	-1,721.01	352.01	-4,185.86	4,194.66	0.00	0.00	0.00
11,400.00	90.00	269.31	6,769.01	-1,721.01	350.81	-4,285.86	4,294.57	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 33-32-2HC
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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)
11,500.00	90.00	269.31	6,769.01	-1,721.01	349.61	-4,385.85	4,394.47	0.00	0.00	0.00
11,600.00	90.00	269.31	6,769.01	-1,721.01	348.40	-4,485.84	4,494.38	0.00	0.00	0.00
11,700.00	90.00	269.31	6,769.01	-1,721.01	347.20	-4,585.83	4,594.29	0.00	0.00	0.00
11,800.00	90.00	269.31	6,769.01	-1,721.01	345.99	-4,685.83	4,694.20	0.00	0.00	0.00
11,900.00	90.00	269.31	6,769.01	-1,721.01	344.79	-4,785.82	4,794.11	0.00	0.00	0.00
12,000.00	90.00	269.31	6,769.01	-1,721.01	343.58	-4,885.81	4,894.02	0.00	0.00	0.00
12,100.00	90.00	269.31	6,769.01	-1,721.01	342.38	-4,985.81	4,993.93	0.00	0.00	0.00
12,200.00	90.00	269.31	6,769.01	-1,721.01	341.17	-5,085.80	5,093.84	0.00	0.00	0.00
12,300.00	90.00	269.31	6,769.01	-1,721.01	339.97	-5,185.79	5,193.75	0.00	0.00	0.00
12,400.00	90.00	269.31	6,769.01	-1,721.01	338.77	-5,285.78	5,293.66	0.00	0.00	0.00
12,500.00	90.00	269.31	6,769.01	-1,721.01	337.56	-5,385.78	5,393.57	0.00	0.00	0.00
12,600.00	90.00	269.31	6,769.01	-1,721.01	336.36	-5,485.77	5,493.48	0.00	0.00	0.00
12,700.00	90.00	269.31	6,769.01	-1,721.01	335.15	-5,585.76	5,593.39	0.00	0.00	0.00
12,800.00	90.00	269.31	6,769.01	-1,721.01	333.95	-5,685.76	5,693.30	0.00	0.00	0.00
12,900.00	90.00	269.31	6,769.01	-1,721.01	332.74	-5,785.75	5,793.21	0.00	0.00	0.00
13,000.00	90.00	269.31	6,769.01	-1,721.01	331.54	-5,885.74	5,893.12	0.00	0.00	0.00
13,100.00	90.00	269.31	6,769.01	-1,721.01	330.33	-5,985.73	5,993.03	0.00	0.00	0.00
13,200.00	90.00	269.31	6,769.01	-1,721.01	329.13	-6,085.73	6,092.94	0.00	0.00	0.00
13,300.00	90.00	269.31	6,769.01	-1,721.01	327.93	-6,185.72	6,192.84	0.00	0.00	0.00
13,400.00	90.00	269.31	6,769.01	-1,721.01	326.72	-6,285.71	6,292.75	0.00	0.00	0.00
13,500.00	90.00	269.31	6,769.02	-1,721.02	325.52	-6,385.70	6,392.66	0.00	0.00	0.00
13,600.00	90.00	269.31	6,769.02	-1,721.02	324.31	-6,485.70	6,492.57	0.00	0.00	0.00
13,700.00	90.00	269.31	6,769.02	-1,721.02	323.11	-6,585.69	6,592.48	0.00	0.00	0.00
13,800.00	90.00	269.31	6,769.02	-1,721.02	321.90	-6,685.68	6,692.39	0.00	0.00	0.00
13,900.00	90.00	269.31	6,769.02	-1,721.02	320.70	-6,785.68	6,792.30	0.00	0.00	0.00
14,000.00	90.00	269.31	6,769.02	-1,721.02	319.49	-6,885.67	6,892.21	0.00	0.00	0.00
14,100.00	90.00	269.31	6,769.02	-1,721.02	318.29	-6,985.66	6,992.12	0.00	0.00	0.00
14,200.00	90.00	269.31	6,769.02	-1,721.02	317.09	-7,085.65	7,092.03	0.00	0.00	0.00
14,300.00	90.00	269.31	6,769.02	-1,721.02	315.88	-7,185.65	7,191.94	0.00	0.00	0.00
14,400.00	90.00	269.31	6,769.02	-1,721.02	314.68	-7,285.64	7,291.85	0.00	0.00	0.00
14,500.00	90.00	269.31	6,769.02	-1,721.02	313.47	-7,385.63	7,391.76	0.00	0.00	0.00
14,600.00	90.00	269.31	6,769.02	-1,721.02	312.27	-7,485.62	7,491.67	0.00	0.00	0.00
14,700.00	90.00	269.31	6,769.02	-1,721.02	311.06	-7,585.62	7,591.58	0.00	0.00	0.00
14,800.00	90.00	269.31	6,769.02	-1,721.02	309.86	-7,685.61	7,691.49	0.00	0.00	0.00
14,900.00	90.00	269.31	6,769.02	-1,721.02	308.65	-7,785.60	7,791.40	0.00	0.00	0.00
15,000.00	90.00	269.31	6,769.02	-1,721.02	307.45	-7,885.60	7,891.30	0.00	0.00	0.00
15,100.00	90.00	269.31	6,769.02	-1,721.02	306.25	-7,985.59	7,991.21	0.00	0.00	0.00
15,200.00	90.00	269.31	6,769.02	-1,721.02	305.04	-8,085.58	8,091.12	0.00	0.00	0.00
15,300.00	90.00	269.31	6,769.02	-1,721.02	303.84	-8,185.57	8,191.03	0.00	0.00	0.00
15,400.00	90.00	269.31	6,769.02	-1,721.02	302.63	-8,285.57	8,290.94	0.00	0.00	0.00
15,500.00	90.00	269.31	6,769.02	-1,721.02	301.43	-8,385.56	8,390.85	0.00	0.00	0.00
15,600.00	90.00	269.31	6,769.02	-1,721.02	300.22	-8,485.55	8,490.76	0.00	0.00	0.00
15,700.00	90.00	269.31	6,769.02	-1,721.02	299.02	-8,585.54	8,590.67	0.00	0.00	0.00
15,800.00	90.00	269.31	6,769.02	-1,721.02	297.81	-8,685.54	8,690.58	0.00	0.00	0.00
15,900.00	90.00	269.31	6,769.02	-1,721.02	296.61	-8,785.53	8,790.49	0.00	0.00	0.00
16,000.00	90.00	269.31	6,769.02	-1,721.02	295.41	-8,885.52	8,890.40	0.00	0.00	0.00
16,100.00	90.00	269.31	6,769.02	-1,721.02	294.20	-8,985.52	8,990.31	0.00	0.00	0.00
16,200.00	90.00	269.31	6,769.02	-1,721.02	293.00	-9,085.51	9,090.22	0.00	0.00	0.00
16,300.00	90.00	269.31	6,769.02	-1,721.02	291.79	-9,185.50	9,190.13	0.00	0.00	0.00
16,400.00	90.00	269.31	6,769.02	-1,721.02	290.59	-9,285.49	9,290.04	0.00	0.00	0.00
16,500.00	90.00	269.31	6,769.02	-1,721.02	289.38	-9,385.49	9,389.95	0.00	0.00	0.00
<b>BHL: 790ft FNL &amp; 600ft FWL of Sec 32</b>										
<b>16,566.82</b>	<b>90.00</b>	<b>269.31</b>	<b>6,769.00</b>	<b>-1,721.00</b>	<b>288.55</b>	<b>-9,452.30</b>	<b>9,456.70</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>



<b>Database:</b>	EDM 5000.1 Single User Db	<b>Local Co-ordinate Reference:</b>	Well HARLEQUIN 33-32-2HC
<b>Company:</b>	MALLARD EXPLORATION	<b>TVD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Project:</b>	WELD COUNTY, COLORADO (NAD 83)	<b>MD Reference:</b>	KB-EST @ 5048.00usft (Original Well Elev)
<b>Site:</b>	NE NE SEC. 33 T8N R61W 6th P.M.	<b>North Reference:</b>	True
<b>Well:</b>	HARLEQUIN 33-32-2HC	<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 (°)	
604.34	603.00	Fox Hills Base				
1,682.67	1,659.00	Pierre Shale Top				
3,601.27	3,537.00	Richard Sandstone				
3,696.98	3,632.00	Parkman Sandstone				
4,416.54	4,351.00	Sussex Sandstone				
4,875.54	4,810.00	Shannon Sandstone				
6,504.78	6,432.00	Sharon Springs				
6,593.85	6,510.00	Niobrara A Chalk				
6,624.28	6,535.00	Niobrara A Chalk Base				
6,670.34	6,571.00	Niobrara B1 Chalk Top				
6,685.06	6,582.00	Niobrara B1 Chalk Base				
6,755.47	6,631.00	Niobrara B2 Chalk Base				
6,772.67	6,642.00	Niobrara C Chalk Top				
6,879.60	6,701.00	Niobrara C Chalk Base				
6,901.55	6,711.00	Niobrara D Chalk Top				
6,995.16	6,745.00	Ft. Hays				
7,161.58	6,769.00	Codell (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: 1192ft FNL & 546ft FEL of Sec 33	
200.00	200.00	0.00	0.00	START NUDGE (2°/100ft BUR)	
800.00	795.62	38.45	49.40	EOB TO 12° INC	
3,398.67	3,337.50	370.31	475.77	END OF TANGENT	
3,998.67	3,933.13	408.76	525.17	EOD TO VERTICAL	
6,261.58	6,196.04	408.76	525.17	KOP (10°/100ft BUR)	
7,161.58	6,769.00	401.86	-47.75	HZ LP: 790ft FNL & 600ft FEL of Sec 33	
16,566.82	6,769.00	288.55	-9,452.30	BHL: 790ft FNL & 600ft FWL of Sec 32	