

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

HARLEQUIN 33-32-1HN

ORIGINAL WELLBORE

26 December, 2017

Plan: PROPOSAL #1





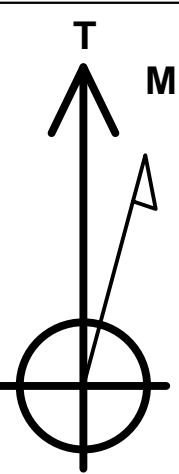
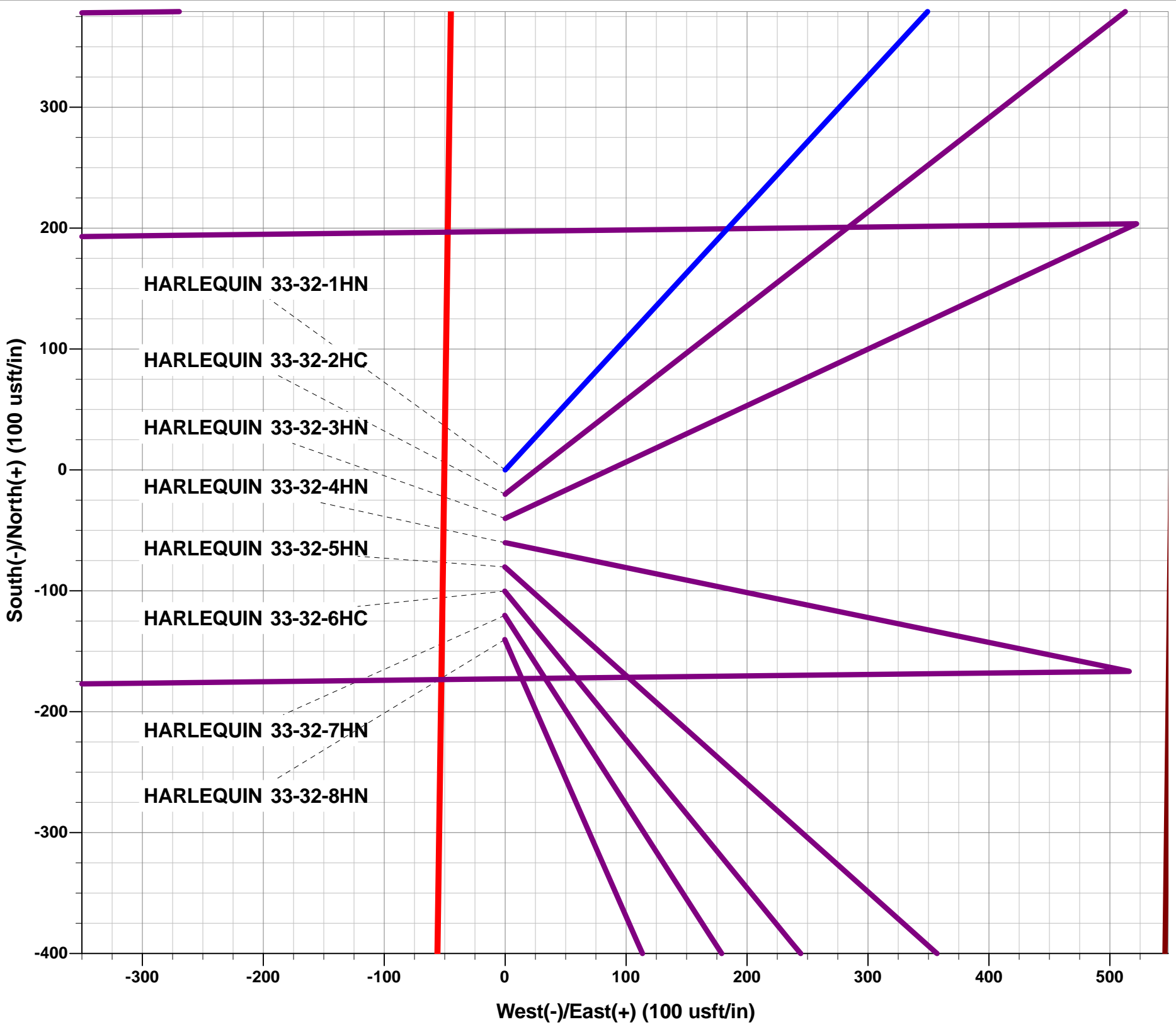
Project: WELD COUNTY, COLORADO (NAD 83)
Site: NE NE SEC. 33 T8N R61W 6th P.M.
Well: HARLEQUIN 33-32-1HN
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

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: 1172ft FNL & 546ft FEL of Sec 33
100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
695.62	700.00	12.00	42.65	46.04	42.41	-40.16	62.60	EOB TO 12° INC
3774.53	3847.69	12.00	42.65	527.39	485.82	-459.99	717.04	END OF TANGENT
4370.15	4447.69	0.00	0.00	573.43	528.23	-500.15	779.65	EOD TO VERTICAL
6020.04	6097.58	0.00	0.00	573.43	528.23	-500.15	779.65	KOP (10°/100ft BUR)
6593.00	6997.59	90.00	269.31	566.53	-44.69	71.78	1352.61	HZ LP: 605ft FNL & 600ft FEL of Sec 33
6593.00	16403.30	90.00	269.31	453.21	-9449.73	9460.59	10758.33	BHL: 605ft FNL & 600ft FWL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - HARLEQUIN 33-32-1HN	6020.04	573.43	528.23	40.623795	-104.201858
HZ LP - HARLEQUIN 33-32-1HN	6593.00	566.53	-44.69	40.623776	-104.203922
BHL - HARLEQUIN 33-32-1HN	6593.00	453.21	-9449.73	40.623460	-104.237802



Azimuths to True North
Magnetic North: 7.87°

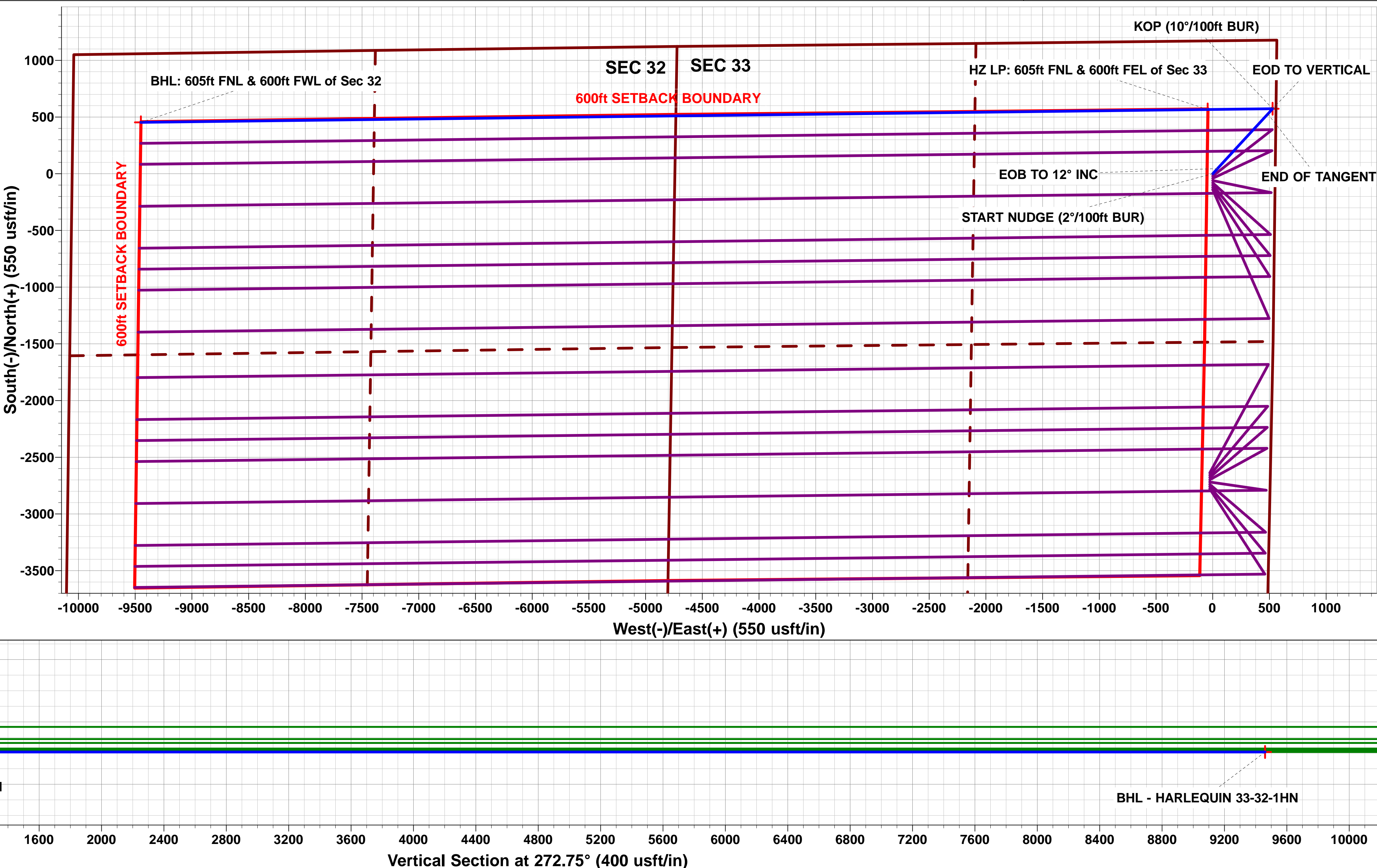
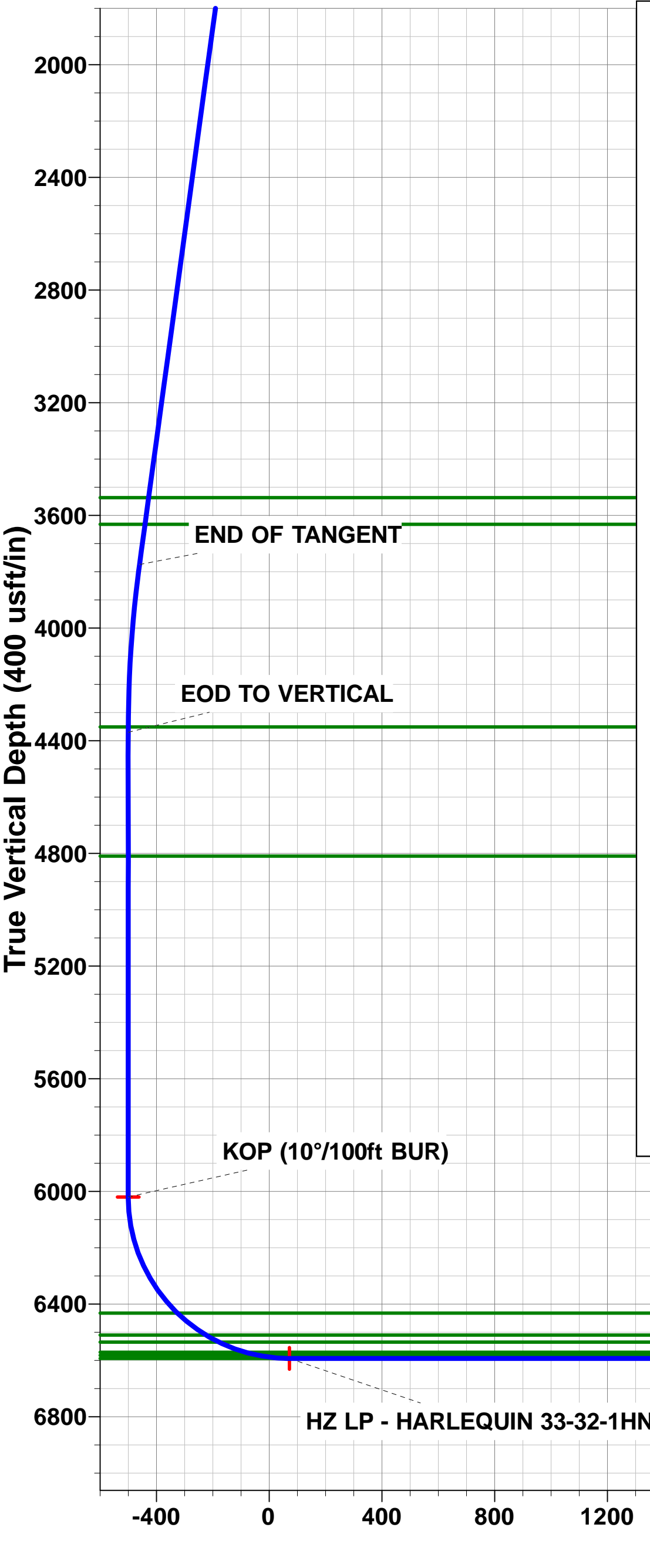
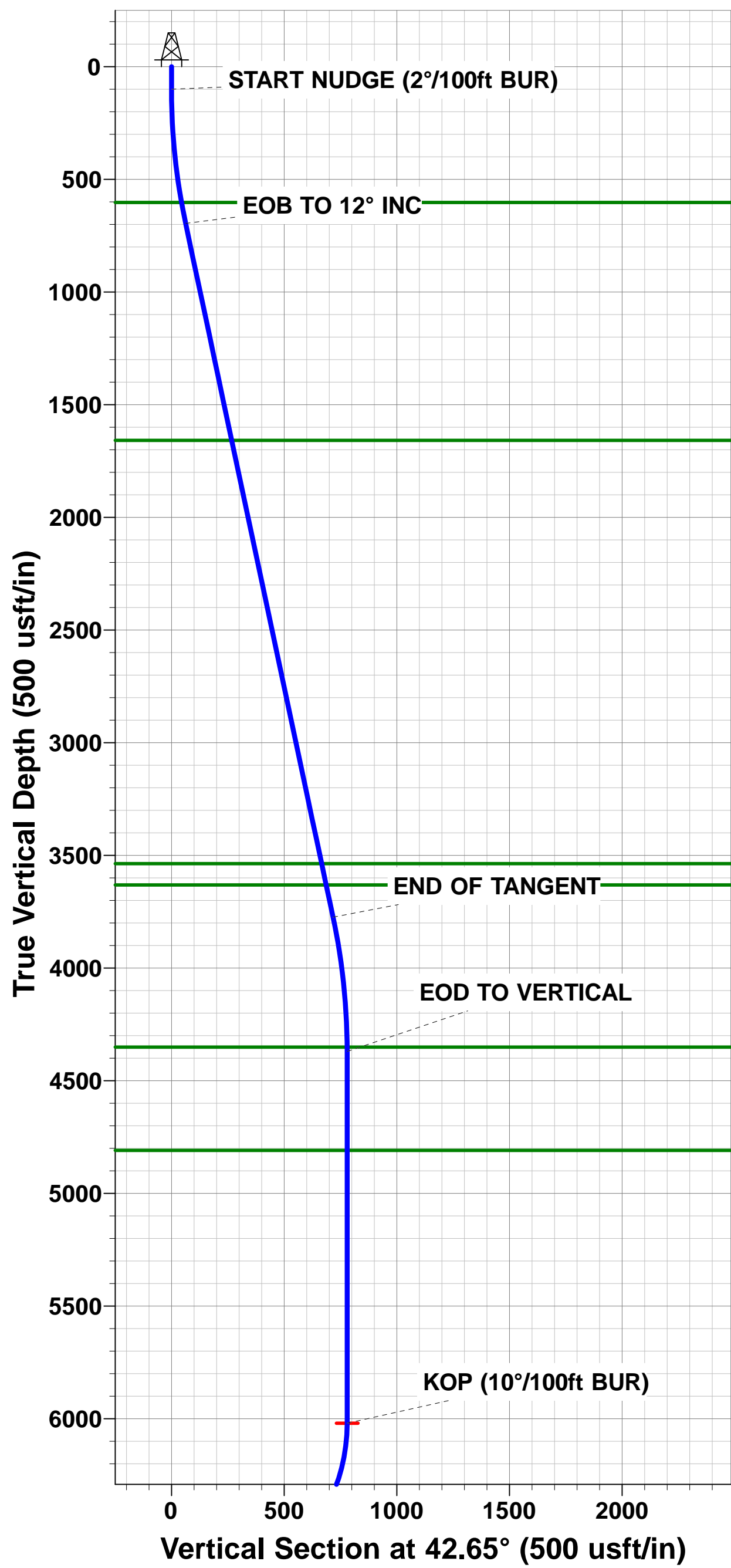
Magnetic Field
Strength: 52502.9snT
Dip Angle: 67.10°
Date: 26/12/2017
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
603.00	605.62	Fox Hills Base
1659.00	1684.90	Pierre Shale Top
3537.00	3604.85	Richard Sandstone
3632.00	3701.98	Parkman Sandstone
4351.00	4428.54	Sussex Sandstone
4810.00	4887.54	Shannon Sandstone
6432.00	6557.30	Sharon Springs
6510.00	6685.33	Niobrara A Chalk
6535.00	6737.55	Niobrara A Chalk Base
6571.00	6838.29	Niobrara B1 Chalk Top
6582.00	6885.13	Niobrara B1 Chalk Base
6593.00	6997.59	Niobrara B2 Chalk Top (Target)

PROPOSED LOCAL COORDINATES:

SHL: 1172ft FNL & 546ft FEL of Sec 33
HZ LP: 605ft FNL & 600ft FEL of Sec 33
BHL: 605ft FNL & 600ft FWL of Sec 32



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 33-32-1HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Site:	NE NE SEC. 33 T8N R61W 6th P.M.	North Reference:	True
Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Project	WELD COUNTY, COLORADO (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

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

Well	HARLEQUIN 33-32-1HN		
Well Position	+N-S	0.00 usft	Northing: 1,472,146.93 usft
	+E-W	0.00 usft	Easting: 3,359,819.76 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	40.622221
		Longitude:	-104.203761
		Ground Level:	5,028.00 usft

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	26/12/2017	7.87	67.10	52,503

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 (°)	
	6,593.00	0.00	0.00	272.75	

Plan Sections											
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	
100.00	0.00	0.00	100.00	-4,948.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	12.00	42.65	695.62	-4,352.38	46.04	42.41	2.00	2.00	0.00	42.65	
3,847.69	12.00	42.65	3,774.53	-1,273.47	527.39	485.82	0.00	0.00	0.00	0.00	
4,447.69	0.00	0.00	4,370.15	-677.85	573.43	528.23	2.00	-2.00	0.00	180.00	
6,097.58	0.00	0.00	6,020.04	972.04	573.43	528.23	0.00	0.00	0.00	0.00	KOP - HARLEQUIN
6,997.59	90.00	269.31	6,593.00	1,545.00	566.53	-44.69	10.00	10.00	-10.08	269.31	HZ LP - HARLEQU
16,403.30	90.00	269.31	6,593.00	1,545.00	453.21	-9,449.73	0.00	0.00	0.00	0.00	BHL - HARLEQUIN

Planning Report



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Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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)
SHL: 1172ft FNL & 546ft FEL of Sec 33										
0.00	0.00	0.00	0.00	5,048.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
100.00	0.00	0.00	100.00	4,948.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	2.00	42.65	199.98	4,848.02	1.28	1.18	-1.12	2.00	2.00	0.00
300.00	4.00	42.65	299.84	4,748.16	5.13	4.73	-4.48	2.00	2.00	0.00
400.00	6.00	42.65	399.45	4,648.55	11.54	10.63	-10.07	2.00	2.00	0.00
500.00	8.00	42.65	498.70	4,549.30	20.51	18.89	-17.89	2.00	2.00	0.00
600.00	10.00	42.65	597.47	4,450.53	32.01	29.49	-27.92	2.00	2.00	0.00
Fox Hills Base										
605.62	10.11	42.65	603.00	4,445.00	32.73	30.15	-28.55	2.00	2.00	0.00
EOB TO 12° INC										
700.00	12.00	42.65	695.62	4,352.38	46.04	42.41	-40.16	2.00	2.00	0.00
800.00	12.00	42.65	793.44	4,254.56	61.34	56.50	-53.50	0.00	0.00	0.00
900.00	12.00	42.65	891.25	4,156.75	76.63	70.59	-66.84	0.00	0.00	0.00
1,000.00	12.00	42.65	989.07	4,058.93	91.92	84.67	-80.17	0.00	0.00	0.00
1,100.00	12.00	42.65	1,086.88	3,961.12	107.21	98.76	-93.51	0.00	0.00	0.00
1,200.00	12.00	42.65	1,184.70	3,863.30	122.50	112.85	-106.85	0.00	0.00	0.00
1,300.00	12.00	42.65	1,282.51	3,765.49	137.80	126.93	-120.19	0.00	0.00	0.00
1,400.00	12.00	42.65	1,380.33	3,667.67	153.09	141.02	-133.52	0.00	0.00	0.00
1,500.00	12.00	42.65	1,478.14	3,569.86	168.38	155.11	-146.86	0.00	0.00	0.00
1,600.00	12.00	42.65	1,575.96	3,472.04	183.67	169.19	-160.20	0.00	0.00	0.00
Pierre Shale Top										
1,684.90	12.00	42.65	1,659.00	3,389.00	196.65	181.15	-171.52	0.00	0.00	0.00
1,700.00	12.00	42.65	1,673.77	3,374.23	198.96	183.28	-173.54	0.00	0.00	0.00
1,800.00	12.00	42.65	1,771.59	3,276.41	214.26	197.37	-186.88	0.00	0.00	0.00
1,900.00	12.00	42.65	1,869.40	3,178.60	229.55	211.45	-200.21	0.00	0.00	0.00
2,000.00	12.00	42.65	1,967.22	3,080.78	244.84	225.54	-213.55	0.00	0.00	0.00
2,100.00	12.00	42.65	2,065.03	2,982.97	260.13	239.63	-226.89	0.00	0.00	0.00
2,200.00	12.00	42.65	2,162.84	2,885.16	275.42	253.71	-240.23	0.00	0.00	0.00
2,300.00	12.00	42.65	2,260.66	2,787.34	290.71	267.80	-253.57	0.00	0.00	0.00
2,400.00	12.00	42.65	2,358.47	2,689.53	306.01	281.89	-266.90	0.00	0.00	0.00
2,500.00	12.00	42.65	2,456.29	2,591.71	321.30	295.97	-280.24	0.00	0.00	0.00
2,600.00	12.00	42.65	2,554.10	2,493.90	336.59	310.06	-293.58	0.00	0.00	0.00
2,700.00	12.00	42.65	2,651.92	2,396.08	351.88	324.15	-306.92	0.00	0.00	0.00
2,800.00	12.00	42.65	2,749.73	2,298.27	367.17	338.23	-320.25	0.00	0.00	0.00
2,900.00	12.00	42.65	2,847.55	2,200.45	382.47	352.32	-333.59	0.00	0.00	0.00
3,000.00	12.00	42.65	2,945.36	2,102.64	397.76	366.41	-346.93	0.00	0.00	0.00
3,100.00	12.00	42.65	3,043.18	2,004.82	413.05	380.49	-360.27	0.00	0.00	0.00
3,200.00	12.00	42.65	3,140.99	1,907.01	428.34	394.58	-373.61	0.00	0.00	0.00
3,300.00	12.00	42.65	3,238.81	1,809.19	443.63	408.66	-386.94	0.00	0.00	0.00
3,400.00	12.00	42.65	3,336.62	1,711.38	458.93	422.75	-400.28	0.00	0.00	0.00
3,500.00	12.00	42.65	3,434.44	1,613.56	474.22	436.84	-413.62	0.00	0.00	0.00
3,600.00	12.00	42.65	3,532.25	1,515.75	489.51	450.92	-426.96	0.00	0.00	0.00
Richard Sandstone										
3,604.85	12.00	42.65	3,537.00	1,511.00	490.25	451.61	-427.60	0.00	0.00	0.00
3,700.00	12.00	42.65	3,630.07	1,417.93	504.80	465.01	-440.29	0.00	0.00	0.00
Parkman Sandstone										
3,701.98	12.00	42.65	3,632.00	1,416.00	505.10	465.29	-440.56	0.00	0.00	0.00
3,800.00	12.00	42.65	3,727.88	1,320.12	520.09	479.10	-453.63	0.00	0.00	0.00
END OF TANGENT										
3,847.69	12.00	42.65	3,774.53	1,273.47	527.39	485.82	-459.99	0.00	0.00	0.00
3,900.00	10.95	42.65	3,825.79	1,222.21	535.04	492.87	-466.67	2.00	-2.00	0.00

Planning Report



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Site:	NE NE SEC. 33 T8N R61W 6th P.M.	North Reference:	True
Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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	8.95	42.65	3,924.28	1,123.72	547.75	504.58	-477.76	2.00	-2.00	0.00
4,100.00	6.95	42.65	4,023.31	1,024.69	557.93	513.95	-486.63	2.00	-2.00	0.00
4,200.00	4.95	42.65	4,122.77	925.23	565.56	520.98	-493.29	2.00	-2.00	0.00
4,300.00	2.95	42.65	4,222.53	825.47	570.63	525.65	-497.71	2.00	-2.00	0.00
4,400.00	0.95	42.65	4,322.46	725.54	573.14	527.96	-499.90	2.00	-2.00	0.00
Sussex Sandstone										
4,428.54	0.38	42.65	4,351.00	697.00	573.38	528.19	-500.11	2.00	-2.00	0.00
EOD TO VERTICAL										
4,447.69	0.00	0.00	4,370.15	677.85	573.43	528.23	-500.15	2.00	-2.00	0.00
4,500.00	0.00	0.00	4,422.46	625.54	573.43	528.23	-500.15	0.00	0.00	0.00
4,600.00	0.00	0.00	4,522.46	525.54	573.43	528.23	-500.15	0.00	0.00	0.00
4,700.00	0.00	0.00	4,622.46	425.54	573.43	528.23	-500.15	0.00	0.00	0.00
4,800.00	0.00	0.00	4,722.46	325.54	573.43	528.23	-500.15	0.00	0.00	0.00
Shannon Sandstone										
4,887.54	0.00	0.00	4,810.00	238.00	573.43	528.23	-500.15	0.00	0.00	0.00
4,900.00	0.00	0.00	4,822.46	225.54	573.43	528.23	-500.15	0.00	0.00	0.00
5,000.00	0.00	0.00	4,922.46	125.54	573.43	528.23	-500.15	0.00	0.00	0.00
5,100.00	0.00	0.00	5,022.46	25.54	573.43	528.23	-500.15	0.00	0.00	0.00
5,200.00	0.00	0.00	5,122.46	-74.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,300.00	0.00	0.00	5,222.46	-174.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,400.00	0.00	0.00	5,322.46	-274.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,500.00	0.00	0.00	5,422.46	-374.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,600.00	0.00	0.00	5,522.46	-474.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,700.00	0.00	0.00	5,622.46	-574.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,800.00	0.00	0.00	5,722.46	-674.46	573.43	528.23	-500.15	0.00	0.00	0.00
5,900.00	0.00	0.00	5,822.46	-774.46	573.43	528.23	-500.15	0.00	0.00	0.00
6,000.00	0.00	0.00	5,922.46	-874.46	573.43	528.23	-500.15	0.00	0.00	0.00
KOP (10°/100ft BUR)										
6,097.58	0.00	0.00	6,020.04	-972.04	573.43	528.23	-500.15	0.00	0.00	0.00
6,100.00	0.24	269.31	6,022.46	-974.46	573.43	528.22	-500.15	10.00	10.00	0.00
6,200.00	10.24	269.31	6,121.92	-1,073.92	573.32	519.10	-491.04	10.00	10.00	0.00
6,300.00	20.24	269.31	6,218.28	-1,170.28	573.00	492.85	-464.83	10.00	10.00	0.00
6,400.00	30.24	269.31	6,308.61	-1,260.61	572.49	450.26	-422.32	10.00	10.00	0.00
6,500.00	40.24	269.31	6,390.18	-1,342.18	571.80	392.63	-364.79	10.00	10.00	0.00
Sharon Springs										
6,557.30	45.97	269.31	6,432.00	-1,384.00	571.32	353.49	-325.72	10.00	10.00	0.00
6,600.00	50.24	269.31	6,460.50	-1,412.50	570.94	321.72	-294.00	10.00	10.00	0.00
Niobrara A Chalk										
6,685.33	58.78	269.31	6,510.00	-1,462.00	570.11	252.31	-224.71	10.00	10.00	0.00
6,700.00	60.24	269.31	6,517.44	-1,469.44	569.95	239.67	-212.09	10.00	10.00	0.00
Niobrara A Chalk Base										
6,737.55	64.00	269.31	6,535.00	-1,487.00	569.55	206.49	-178.97	10.00	10.00	0.00
6,800.00	70.24	269.31	6,559.27	-1,511.27	568.86	148.99	-121.56	10.00	10.00	0.00
Niobrara B1 Chalk Top										
6,838.29	74.07	269.31	6,571.00	-1,523.00	568.42	112.55	-85.19	10.00	10.00	0.00
Niobrara B1 Chalk Base										
6,885.13	78.75	269.31	6,582.00	-1,534.00	567.87	67.04	-39.75	10.00	10.00	0.00
6,900.00	80.24	269.31	6,584.71	-1,536.71	567.70	52.42	-25.16	10.00	10.00	0.00
HZ LP: 605ft FNL & 600ft FEL of Sec 33 - Niobrara B2 Chalk Top (Target)										
6,997.59	90.00	269.31	6,593.00	-1,545.00	566.53	-44.69	71.78	10.00	10.00	0.00
7,000.00	90.00	269.31	6,593.00	-1,545.00	566.50	-47.11	74.19	0.00	0.00	0.00
7,100.00	90.00	269.31	6,593.00	-1,545.00	565.29	-147.10	174.01	0.00	0.00	0.00
7,200.00	90.00	269.31	6,593.00	-1,545.00	564.09	-247.09	273.83	0.00	0.00	0.00

Planning Report



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Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Site:	NE NE SEC. 33 T8N R61W 6th P.M.	North Reference:	True
Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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	269.31	6,593.00	-1,545.00	562.88	-347.08	373.65	0.00	0.00	0.00
7,400.00	90.00	269.31	6,593.00	-1,545.00	561.68	-447.08	473.47	0.00	0.00	0.00
7,500.00	90.00	269.31	6,593.00	-1,545.00	560.47	-547.07	573.29	0.00	0.00	0.00
7,600.00	90.00	269.31	6,593.00	-1,545.00	559.27	-647.06	673.11	0.00	0.00	0.00
7,700.00	90.00	269.31	6,592.99	-1,544.99	558.06	-747.06	772.93	0.00	0.00	0.00
7,800.00	90.00	269.31	6,592.99	-1,544.99	556.86	-847.05	872.75	0.00	0.00	0.00
7,900.00	90.00	269.31	6,592.99	-1,544.99	555.65	-947.04	972.57	0.00	0.00	0.00
8,000.00	90.00	269.31	6,592.99	-1,544.99	554.45	-1,047.03	1,072.39	0.00	0.00	0.00
8,100.00	90.00	269.31	6,592.99	-1,544.99	553.24	-1,147.03	1,172.21	0.00	0.00	0.00
8,200.00	90.00	269.31	6,592.99	-1,544.99	552.04	-1,247.02	1,272.03	0.00	0.00	0.00
8,300.00	90.00	269.31	6,592.99	-1,544.99	550.83	-1,347.01	1,371.85	0.00	0.00	0.00
8,400.00	90.00	269.31	6,592.99	-1,544.99	549.63	-1,447.00	1,471.67	0.00	0.00	0.00
8,500.00	90.00	269.31	6,592.99	-1,544.99	548.42	-1,547.00	1,571.49	0.00	0.00	0.00
8,600.00	90.00	269.31	6,592.99	-1,544.99	547.22	-1,646.99	1,671.31	0.00	0.00	0.00
8,700.00	90.00	269.31	6,592.99	-1,544.99	546.01	-1,746.98	1,771.13	0.00	0.00	0.00
8,800.00	90.00	269.31	6,592.99	-1,544.99	544.81	-1,846.98	1,870.95	0.00	0.00	0.00
8,900.00	90.00	269.31	6,592.98	-1,544.98	543.60	-1,946.97	1,970.77	0.00	0.00	0.00
9,000.00	90.00	269.31	6,592.98	-1,544.98	542.40	-2,046.96	2,070.59	0.00	0.00	0.00
9,100.00	90.00	269.31	6,592.98	-1,544.98	541.19	-2,146.95	2,170.42	0.00	0.00	0.00
9,200.00	90.00	269.31	6,592.98	-1,544.98	539.99	-2,246.95	2,270.24	0.00	0.00	0.00
9,300.00	90.00	269.31	6,592.98	-1,544.98	538.78	-2,346.94	2,370.06	0.00	0.00	0.00
9,400.00	90.00	269.31	6,592.98	-1,544.98	537.58	-2,446.93	2,469.88	0.00	0.00	0.00
9,500.00	90.00	269.31	6,592.98	-1,544.98	536.37	-2,546.92	2,569.70	0.00	0.00	0.00
9,600.00	90.00	269.31	6,592.98	-1,544.98	535.17	-2,646.92	2,669.52	0.00	0.00	0.00
9,700.00	90.00	269.31	6,592.98	-1,544.98	533.96	-2,746.91	2,769.34	0.00	0.00	0.00
9,800.00	90.00	269.31	6,592.98	-1,544.98	532.76	-2,846.90	2,869.16	0.00	0.00	0.00
9,900.00	90.00	269.31	6,592.98	-1,544.98	531.55	-2,946.90	2,968.98	0.00	0.00	0.00
10,000.00	90.00	269.31	6,592.98	-1,544.98	530.35	-3,046.89	3,068.80	0.00	0.00	0.00
10,100.00	90.00	269.31	6,592.97	-1,544.97	529.14	-3,146.88	3,168.62	0.00	0.00	0.00
10,200.00	90.00	269.31	6,592.97	-1,544.97	527.94	-3,246.87	3,268.44	0.00	0.00	0.00
10,300.00	90.00	269.31	6,592.97	-1,544.97	526.73	-3,346.87	3,368.26	0.00	0.00	0.00
10,400.00	90.00	269.31	6,592.97	-1,544.97	525.53	-3,446.86	3,468.08	0.00	0.00	0.00
10,500.00	90.00	269.31	6,592.97	-1,544.97	524.32	-3,546.85	3,567.90	0.00	0.00	0.00
10,600.00	90.00	269.31	6,592.97	-1,544.97	523.12	-3,646.85	3,667.72	0.00	0.00	0.00
10,700.00	90.00	269.31	6,592.97	-1,544.97	521.91	-3,746.84	3,767.54	0.00	0.00	0.00
10,800.00	90.00	269.31	6,592.97	-1,544.97	520.71	-3,846.83	3,867.36	0.00	0.00	0.00
10,900.00	90.00	269.31	6,592.97	-1,544.97	519.51	-3,946.82	3,967.18	0.00	0.00	0.00
11,000.00	90.00	269.31	6,592.97	-1,544.97	518.30	-4,046.82	4,067.00	0.00	0.00	0.00
11,100.00	90.00	269.31	6,592.97	-1,544.97	517.10	-4,146.81	4,166.82	0.00	0.00	0.00
11,200.00	90.00	269.31	6,592.97	-1,544.97	515.89	-4,246.80	4,266.64	0.00	0.00	0.00
11,300.00	90.00	269.31	6,592.96	-1,544.96	514.69	-4,346.79	4,366.46	0.00	0.00	0.00
11,400.00	90.00	269.31	6,592.96	-1,544.96	513.48	-4,446.79	4,466.28	0.00	0.00	0.00
11,500.00	90.00	269.31	6,592.96	-1,544.96	512.28	-4,546.78	4,566.10	0.00	0.00	0.00
11,600.00	90.00	269.31	6,592.96	-1,544.96	511.07	-4,646.77	4,665.92	0.00	0.00	0.00
11,700.00	90.00	269.31	6,592.96	-1,544.96	509.87	-4,746.77	4,765.74	0.00	0.00	0.00
11,800.00	90.00	269.31	6,592.96	-1,544.96	508.66	-4,846.76	4,865.56	0.00	0.00	0.00
11,900.00	90.00	269.31	6,592.96	-1,544.96	507.46	-4,946.75	4,965.38	0.00	0.00	0.00
12,000.00	90.00	269.31	6,592.96	-1,544.96	506.25	-5,046.74	5,065.20	0.00	0.00	0.00
12,100.00	90.00	269.31	6,592.96	-1,544.96	505.05	-5,146.74	5,165.02	0.00	0.00	0.00
12,200.00	90.00	269.31	6,592.96	-1,544.96	503.84	-5,246.73	5,264.84	0.00	0.00	0.00
12,300.00	90.00	269.31	6,592.96	-1,544.96	502.64	-5,346.72	5,364.66	0.00	0.00	0.00
12,400.00	90.00	269.31	6,592.96	-1,544.96	501.43	-5,446.71	5,464.48	0.00	0.00	0.00
12,500.00	90.00	269.31	6,592.95	-1,544.95	500.23	-5,546.71	5,564.30	0.00	0.00	0.00
12,600.00	90.00	269.31	6,592.95	-1,544.95	499.02	-5,646.70	5,664.12	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 33-32-1HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Site:	NE NE SEC. 33 T8N R61W 6th P.M.	North Reference:	True
Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	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	269.31	6,592.95	-1,544.95	497.82	-5,746.69	5,763.94	0.00	0.00	0.00
12,800.00	90.00	269.31	6,592.95	-1,544.95	496.61	-5,846.69	5,863.76	0.00	0.00	0.00
12,900.00	90.00	269.31	6,592.95	-1,544.95	495.41	-5,946.68	5,963.58	0.00	0.00	0.00
13,000.00	90.00	269.31	6,592.95	-1,544.95	494.20	-6,046.67	6,063.40	0.00	0.00	0.00
13,100.00	90.00	269.31	6,592.95	-1,544.95	493.00	-6,146.66	6,163.22	0.00	0.00	0.00
13,200.00	90.00	269.31	6,592.95	-1,544.95	491.79	-6,246.66	6,263.04	0.00	0.00	0.00
13,300.00	90.00	269.31	6,592.95	-1,544.95	490.59	-6,346.65	6,362.86	0.00	0.00	0.00
13,400.00	90.00	269.31	6,592.95	-1,544.95	489.38	-6,446.64	6,462.68	0.00	0.00	0.00
13,500.00	90.00	269.31	6,592.95	-1,544.95	488.18	-6,546.63	6,562.50	0.00	0.00	0.00
13,600.00	90.00	269.31	6,592.95	-1,544.95	486.97	-6,646.63	6,662.32	0.00	0.00	0.00
13,700.00	90.00	269.31	6,592.94	-1,544.94	485.77	-6,746.62	6,762.14	0.00	0.00	0.00
13,800.00	90.00	269.31	6,592.94	-1,544.94	484.56	-6,846.61	6,861.97	0.00	0.00	0.00
13,900.00	90.00	269.31	6,592.94	-1,544.94	483.36	-6,946.61	6,961.79	0.00	0.00	0.00
14,000.00	90.00	269.31	6,592.94	-1,544.94	482.15	-7,046.60	7,061.61	0.00	0.00	0.00
14,100.00	90.00	269.31	6,592.94	-1,544.94	480.95	-7,146.59	7,161.43	0.00	0.00	0.00
14,200.00	90.00	269.31	6,592.94	-1,544.94	479.74	-7,246.58	7,261.25	0.00	0.00	0.00
14,300.00	90.00	269.31	6,592.94	-1,544.94	478.54	-7,346.58	7,361.07	0.00	0.00	0.00
14,400.00	90.00	269.31	6,592.94	-1,544.94	477.33	-7,446.57	7,460.89	0.00	0.00	0.00
14,500.00	90.00	269.31	6,592.94	-1,544.94	476.13	-7,546.56	7,560.71	0.00	0.00	0.00
14,600.00	90.00	269.31	6,592.94	-1,544.94	474.92	-7,646.55	7,660.53	0.00	0.00	0.00
14,700.00	90.00	269.31	6,592.94	-1,544.94	473.72	-7,746.55	7,760.35	0.00	0.00	0.00
14,800.00	90.00	269.31	6,592.94	-1,544.94	472.51	-7,846.54	7,860.17	0.00	0.00	0.00
14,900.00	90.00	269.31	6,592.93	-1,544.93	471.31	-7,946.53	7,959.99	0.00	0.00	0.00
15,000.00	90.00	269.31	6,592.93	-1,544.93	470.10	-8,046.53	8,059.81	0.00	0.00	0.00
15,100.00	90.00	269.31	6,592.93	-1,544.93	468.90	-8,146.52	8,159.63	0.00	0.00	0.00
15,200.00	90.00	269.31	6,592.93	-1,544.93	467.69	-8,246.51	8,259.45	0.00	0.00	0.00
15,300.00	90.00	269.31	6,592.93	-1,544.93	466.49	-8,346.50	8,359.27	0.00	0.00	0.00
15,400.00	90.00	269.31	6,592.93	-1,544.93	465.28	-8,446.50	8,459.09	0.00	0.00	0.00
15,500.00	90.00	269.31	6,592.93	-1,544.93	464.08	-8,546.49	8,558.91	0.00	0.00	0.00
15,600.00	90.00	269.31	6,592.93	-1,544.93	462.87	-8,646.48	8,658.73	0.00	0.00	0.00
15,700.00	90.00	269.31	6,592.93	-1,544.93	461.67	-8,746.47	8,758.55	0.00	0.00	0.00
15,800.00	90.00	269.31	6,592.93	-1,544.93	460.46	-8,846.47	8,858.37	0.00	0.00	0.00
15,900.00	90.00	269.31	6,592.93	-1,544.93	459.26	-8,946.46	8,958.19	0.00	0.00	0.00
16,000.00	90.00	269.31	6,592.93	-1,544.93	458.05	-9,046.45	9,058.01	0.00	0.00	0.00
16,100.00	90.00	269.31	6,592.92	-1,544.92	456.85	-9,146.45	9,157.83	0.00	0.00	0.00
16,200.00	90.00	269.31	6,592.92	-1,544.92	455.64	-9,246.44	9,257.65	0.00	0.00	0.00
16,300.00	90.00	269.31	6,592.92	-1,544.92	454.44	-9,346.43	9,357.47	0.00	0.00	0.00
16,400.00	90.00	269.31	6,592.92	-1,544.92	453.23	-9,446.42	9,457.29	0.00	0.00	0.00
BHL: 605ft FNL & 600ft FWL of Sec 32										
16,403.30	90.00	269.31	6,593.00	-1,545.00	453.21	-9,449.73	9,460.59	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well HARLEQUIN 33-32-1HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 5048.00usft (Original Well Elev)
Site:	NE NE SEC. 33 T8N R61W 6th P.M.	North Reference:	True
Well:	HARLEQUIN 33-32-1HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
605.62	603.00	Fox Hills Base			
1,684.90	1,659.00	Pierre Shale Top			
3,604.85	3,537.00	Richard Sandstone			
3,701.98	3,632.00	Parkman Sandstone			
4,428.54	4,351.00	Sussex Sandstone			
4,887.54	4,810.00	Shannon Sandstone			
6,557.30	6,432.00	Sharon Springs			
6,685.33	6,510.00	Niobrara A Chalk			
6,737.55	6,535.00	Niobrara A Chalk Base			
6,838.29	6,571.00	Niobrara B1 Chalk Top			
6,885.13	6,582.00	Niobrara B1 Chalk Base			
6,997.59	6,593.00	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: 1172ft FNL & 546ft FEL of Sec 33
100.00	100.00	0.00	0.00	START NUDGE (2°/100ft BUR)
700.00	695.62	46.04	42.41	EOB TO 12° INC
3,847.69	3,774.53	527.39	485.82	END OF TANGENT
4,447.69	4,370.15	573.43	528.23	EOD TO VERTICAL
6,097.58	6,020.04	573.43	528.23	KOP (10°/100ft BUR)
6,997.59	6,593.00	566.53	-44.69	HZ LP: 605ft FNL & 600ft FEL of Sec 33
16,403.30	6,593.00	453.21	-9,449.73	BHL: 605ft FNL & 600ft FWL of Sec 32