

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

SW SW SEC. 31 T8N R59W 6th P.M.

MOTTLED 31-7HN

ORIGINAL WELLBORE

26 September, 2017

Plan: PROPOSAL #1





Project: WELD COUNTY, COLORADO (NAD 83)
Site: SW SW SEC. 31 T8N R59W 6th P.M.
Well: MOTTLED 31-7HN
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Dep	Annotation	
0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	SHL: 550ft FSL & 1319ft FWL of Sec 31	
100.0	100.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2°/100ft BUR)	
695.6	700.0	12.00	124.93	-35.8	51.3	-30.5	62.6	EOB TO 12° INC	
4442.9	4531.0	12.00	124.93	-491.9	704.4	-419.0	859.1	END OF TANGENT	
5038.5	5131.0	0.00	0.00	-527.7	755.7	-449.5	921.7	EOD TO VERTICAL	
5639.0	5731.5	0.00	0.00	-527.7	755.7	-449.5	921.7	KOP (10°/100ft BUR)	
6212.0	6631.6	90.00	1.11	45.2	766.8	121.7	1494.7	HZ LP: 600ft FSL & 2085ft FWL of Sec 31	
6212.0	16037.3	90.00	1.11	9449.2	949.7	9496.8	10900.5	BHL: 600ft FNL & 2085ft FWL of Sec 30	

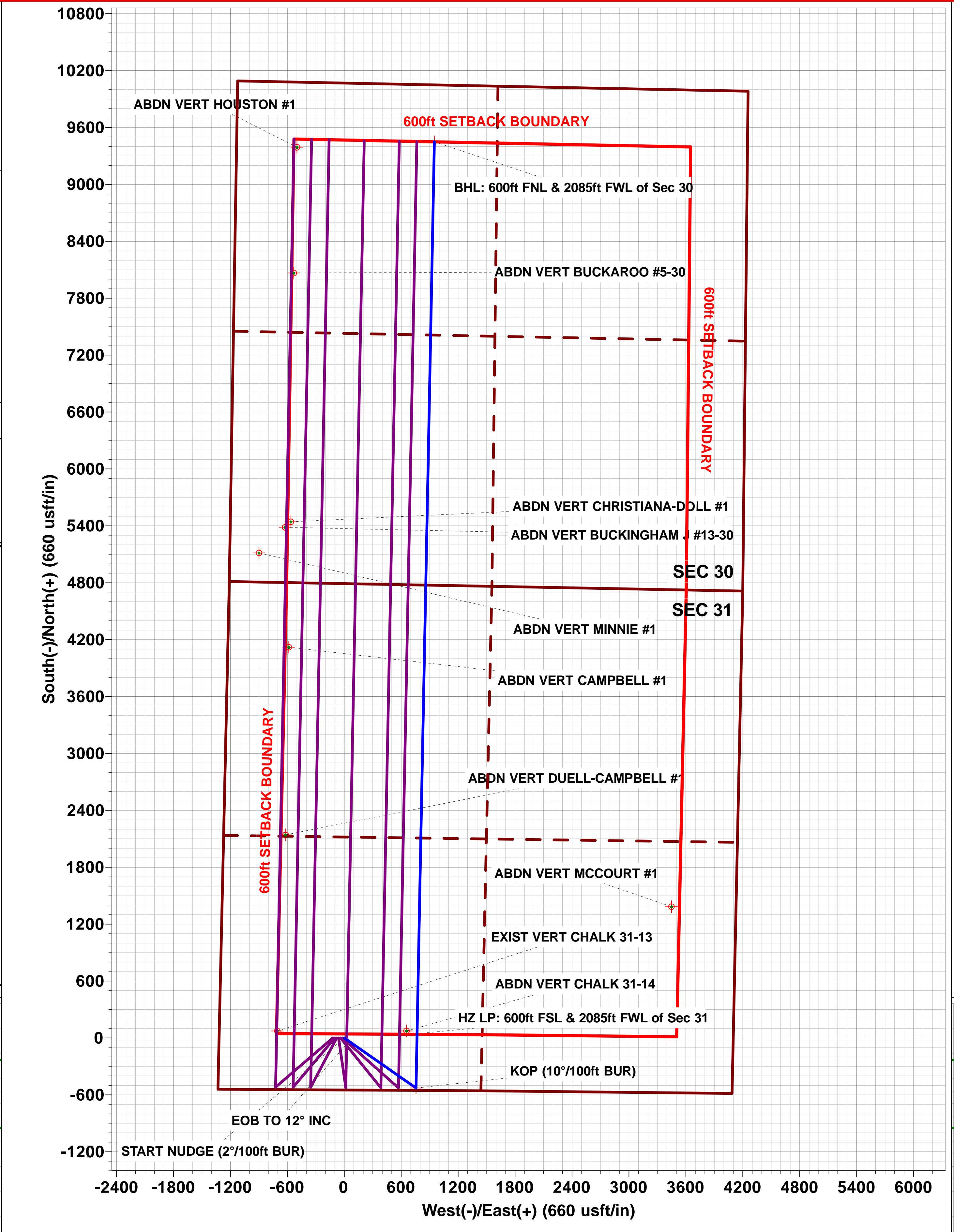
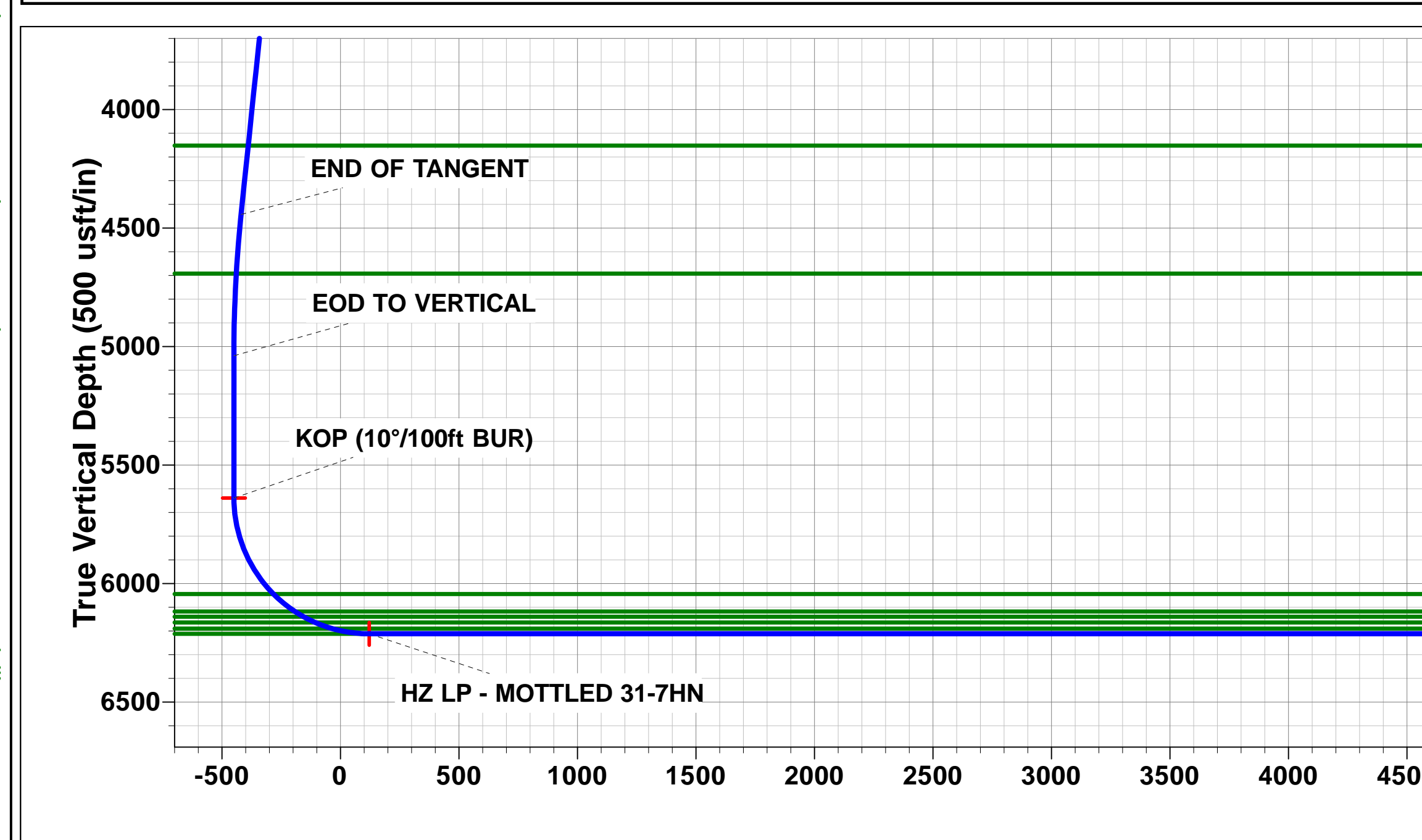
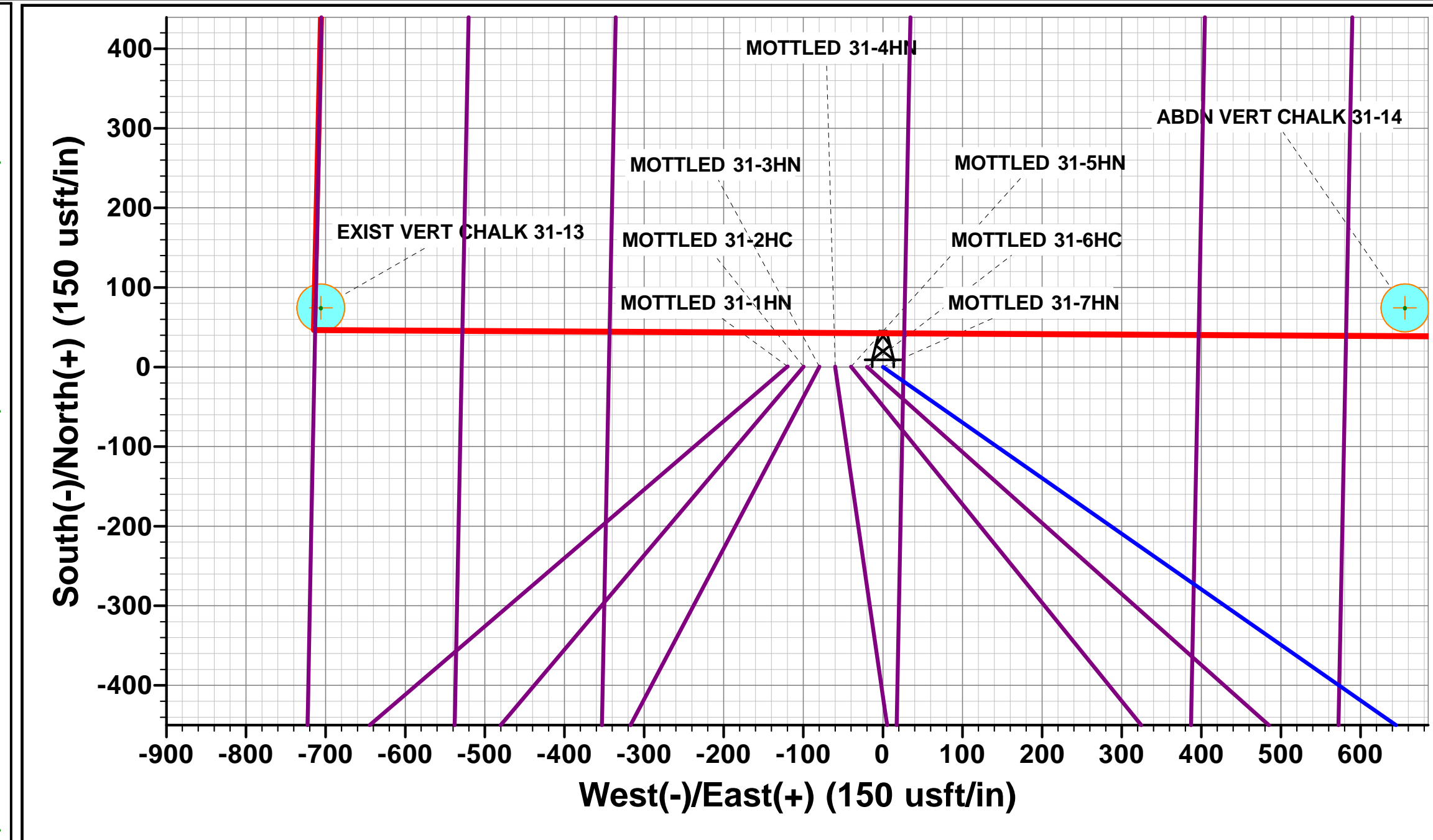
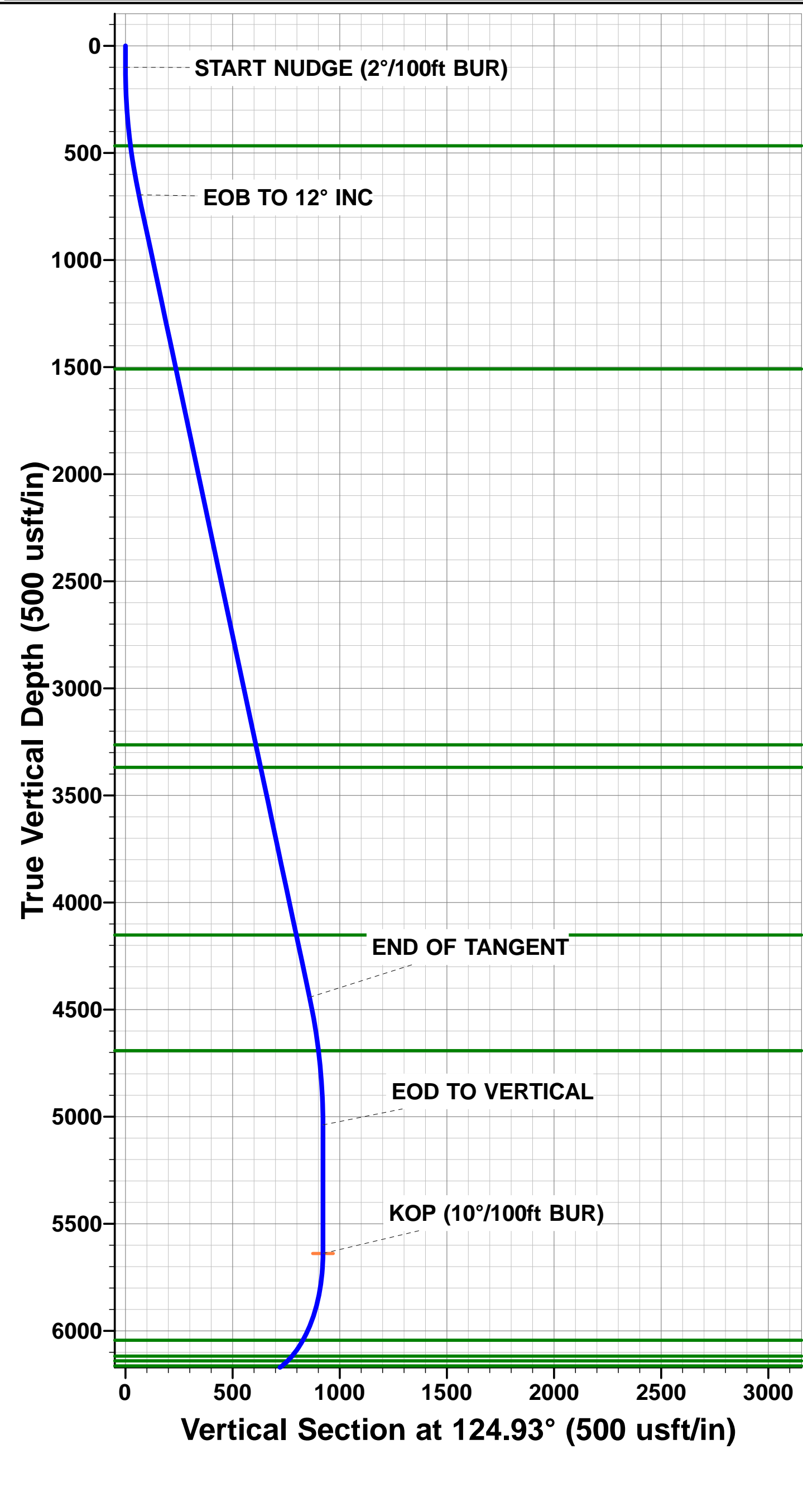
PROPOSED LOCAL COORDINATES:

SHL: 550ft FSL & 1319ft FWL Sec 31

HZ LP: 600ft FSL & 2085ft FWL Sec 31

BHL: 600ft FNL & 2085ft FWL of Sec 30

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - MOTTLED 31-7HN	5639.0	-527.7	755.7	40.611637	-104.023200
HZ LP - MOTTLED 31-7HN	6212.0	45.2	766.8	40.613210	-104.023160
BHL - MOTTLED 31-7HN	6212.0	9449.2	949.7	40.639022	-104.022500



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well MOTTLED 31-7HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Site:	SW SW SEC. 31 T8N R59W 6th P.M.	North Reference:	True
Well:	MOTTLED 31-7HN	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	SW SW SEC. 31 T8N R59W 6th P.M.		
Site Position:		Northing:	1,469,589.22 usft
From:	Lat/Long	Easting:	3,409,117.03 usft
Position Uncertainty:	0.0 usft	Slot Radius:	1.10000ft
		Latitude:	40.613088
		Longitude:	-104.026353
		Grid Convergence:	0.95 °

Well	MOTTLED 31-7HN		
Well Position	+N-S	-0.7 usft	Northing:
	+E-W	119.7 usft	Easting:
Position Uncertainty		0.0 usft	Wellhead Elevation:
			Latitude:
			Longitude:
			Ground Level:

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	26/09/2017	7.80	67.13	52,545

Design	PROPOSAL #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)
	6,212.0	0.0	0.0	5.74

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
0.0	0.00	0.00	0.0	-4,983.0	0.0	0.0	0.00	0.00	0.00	0.00	
100.0	0.00	0.00	100.0	-4,883.0	0.0	0.0	0.00	0.00	0.00	0.00	
700.0	12.00	124.93	695.6	-4,287.4	-35.8	51.3	2.00	2.00	0.00	124.93	
4,531.0	12.00	124.93	4,442.9	-540.1	-491.9	704.4	0.00	0.00	0.00	0.00	
5,131.0	0.00	0.00	5,038.5	55.5	-527.7	755.7	2.00	-2.00	0.00	180.00	
5,731.5	0.00	0.00	5,639.0	656.0	-527.7	755.7	0.00	0.00	0.00	0.00	KOP - MOTTLED 3
6,631.6	90.00	1.11	6,212.0	1,229.0	45.2	766.8	10.00	10.00	0.12	1.11	HZ LP - MOTTLED
16,037.3	90.00	1.11	6,212.0	1,229.0	9,449.2	949.7	0.00	0.00	0.00	-170.92	BHL - MOTTLED 3

Planning Report



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Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Site:	SW SW SEC. 31 T8N R59W 6th P.M.	North Reference:	True
Well:	MOTTLED 31-7HN	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: 550ft FSL & 1319ft FWL of Sec 31										
0.0	0.00	0.00	0.0	4,983.00	0.0	0.0	0.0	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
100.0	0.00	0.00	100.0	4,883.00	0.0	0.0	0.0	0.00	0.00	0.00
200.0	2.00	124.93	200.0	4,783.02	-1.0	1.4	-0.9	2.00	2.00	0.00
300.0	4.00	124.93	299.8	4,683.16	-4.0	5.7	-3.4	2.00	2.00	0.00
400.0	6.00	124.93	399.5	4,583.55	-9.0	12.9	-7.7	2.00	2.00	0.00
Fox Hills Base										
468.0	7.36	124.93	467.0	4,516.00	-13.5	19.4	-11.5	2.00	2.00	0.00
500.0	8.00	124.93	498.7	4,484.30	-16.0	22.9	-13.6	2.00	2.00	0.00
600.0	10.00	124.93	597.5	4,385.53	-24.9	35.7	-21.2	2.00	2.00	0.00
EOB TO 12° INC										
700.0	12.00	124.93	695.6	4,287.38	-35.8	51.3	-30.5	2.00	2.00	0.00
800.0	12.00	124.93	793.4	4,189.56	-47.7	68.4	-40.7	0.00	0.00	0.00
900.0	12.00	124.93	891.3	4,091.75	-59.6	85.4	-50.8	0.00	0.00	0.00
1,000.0	12.00	124.93	989.1	3,993.93	-71.6	102.5	-60.9	0.00	0.00	0.00
1,100.0	12.00	124.93	1,086.9	3,896.12	-83.5	119.5	-71.1	0.00	0.00	0.00
1,200.0	12.00	124.93	1,184.7	3,798.30	-95.4	136.6	-81.2	0.00	0.00	0.00
1,300.0	12.00	124.93	1,282.5	3,700.49	-107.3	153.6	-91.4	0.00	0.00	0.00
1,400.0	12.00	124.93	1,380.3	3,602.67	-119.2	170.7	-101.5	0.00	0.00	0.00
1,500.0	12.00	124.93	1,478.1	3,504.86	-131.1	187.7	-111.6	0.00	0.00	0.00
Pierre Shale Top										
1,531.5	12.00	124.93	1,509.0	3,474.00	-134.8	193.1	-114.8	0.00	0.00	0.00
1,600.0	12.00	124.93	1,576.0	3,407.04	-143.0	204.7	-121.8	0.00	0.00	0.00
1,700.0	12.00	124.93	1,673.8	3,309.23	-154.9	221.8	-131.9	0.00	0.00	0.00
1,800.0	12.00	124.93	1,771.6	3,211.41	-166.8	238.8	-142.1	0.00	0.00	0.00
1,900.0	12.00	124.93	1,869.4	3,113.60	-178.7	255.9	-152.2	0.00	0.00	0.00
2,000.0	12.00	124.93	1,967.2	3,015.78	-190.6	272.9	-162.3	0.00	0.00	0.00
2,100.0	12.00	124.93	2,065.0	2,917.97	-202.5	290.0	-172.5	0.00	0.00	0.00
2,200.0	12.00	124.93	2,162.8	2,820.16	-214.4	307.0	-182.6	0.00	0.00	0.00
2,300.0	12.00	124.93	2,260.7	2,722.34	-226.3	324.1	-192.8	0.00	0.00	0.00
2,400.0	12.00	124.93	2,358.5	2,624.53	-238.2	341.1	-202.9	0.00	0.00	0.00
2,500.0	12.00	124.93	2,456.3	2,526.71	-250.1	358.2	-213.0	0.00	0.00	0.00
2,600.0	12.00	124.93	2,554.1	2,428.90	-262.0	375.2	-223.2	0.00	0.00	0.00
2,700.0	12.00	124.93	2,651.9	2,331.08	-273.9	392.3	-233.3	0.00	0.00	0.00
2,800.0	12.00	124.93	2,749.7	2,233.27	-285.8	409.3	-243.4	0.00	0.00	0.00
2,900.0	12.00	124.93	2,847.5	2,135.45	-297.7	426.3	-253.6	0.00	0.00	0.00
3,000.0	12.00	124.93	2,945.4	2,037.64	-309.6	443.4	-263.7	0.00	0.00	0.00
3,100.0	12.00	124.93	3,043.2	1,939.82	-321.5	460.4	-273.9	0.00	0.00	0.00
3,200.0	12.00	124.93	3,141.0	1,842.01	-333.4	477.5	-284.0	0.00	0.00	0.00
3,300.0	12.00	124.93	3,238.8	1,744.19	-345.3	494.5	-294.1	0.00	0.00	0.00
Richard Sandstone										
3,325.8	12.00	124.93	3,264.0	1,719.00	-348.4	498.9	-296.8	0.00	0.00	0.00
3,400.0	12.00	124.93	3,336.6	1,646.38	-357.2	511.6	-304.3	0.00	0.00	0.00
Parkman Sandstone										
3,433.1	12.00	124.93	3,369.0	1,614.00	-361.2	517.2	-307.6	0.00	0.00	0.00
3,500.0	12.00	124.93	3,434.4	1,548.56	-369.1	528.6	-314.4	0.00	0.00	0.00
3,600.0	12.00	124.93	3,532.3	1,450.75	-381.0	545.7	-324.6	0.00	0.00	0.00
3,700.0	12.00	124.93	3,630.1	1,352.93	-392.9	562.7	-334.7	0.00	0.00	0.00
3,800.0	12.00	124.93	3,727.9	1,255.12	-404.8	579.8	-344.8	0.00	0.00	0.00
3,900.0	12.00	124.93	3,825.7	1,157.30	-416.8	596.8	-355.0	0.00	0.00	0.00
4,000.0	12.00	124.93	3,923.5	1,059.49	-428.7	613.9	-365.1	0.00	0.00	0.00
4,100.0	12.00	124.93	4,021.3	961.68	-440.6	630.9	-375.3	0.00	0.00	0.00

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Well:	MOTTLED 31-7HN	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)
4,200.0	12.00	124.93	4,119.1	863.86	-452.5	648.0	-385.4	0.00	0.00	0.00
Sussex Sandstone										
4,233.6	12.00	124.93	4,152.0	831.00	-456.5	653.7	-388.8	0.00	0.00	0.00
4,300.0	12.00	124.93	4,217.0	766.05	-464.4	665.0	-395.5	0.00	0.00	0.00
4,400.0	12.00	124.93	4,314.8	668.23	-476.3	682.0	-405.7	0.00	0.00	0.00
4,500.0	12.00	124.93	4,412.6	570.42	-488.2	699.1	-415.8	0.00	0.00	0.00
END OF TANGENT										
4,531.0	12.00	124.93	4,442.9	540.11	-491.9	704.4	-419.0	0.00	0.00	0.00
4,600.0	10.62	124.93	4,510.6	472.43	-499.6	715.5	-425.6	2.00	-2.00	0.00
4,700.0	8.62	124.93	4,609.2	373.85	-509.2	729.2	-433.7	2.00	-2.00	0.00
Shannon Sandstone										
4,783.6	6.95	124.93	4,692.0	291.00	-515.7	738.5	-439.2	2.00	-2.00	0.00
4,800.0	6.62	124.93	4,708.3	274.73	-516.8	740.0	-440.2	2.00	-2.00	0.00
4,900.0	4.62	124.93	4,807.8	175.22	-522.4	748.1	-444.9	2.00	-2.00	0.00
5,000.0	2.62	124.93	4,907.6	75.42	-526.0	753.2	-448.0	2.00	-2.00	0.00
5,100.0	0.62	124.93	5,007.5	-24.53	-527.6	755.6	-449.4	2.00	-2.00	0.00
EOD TO VERTICAL										
5,131.0	0.00	0.00	5,038.5	-55.51	-527.7	755.7	-449.5	2.00	-2.00	0.00
5,200.0	0.00	0.00	5,107.5	-124.53	-527.7	755.7	-449.5	0.00	0.00	0.00
5,300.0	0.00	0.00	5,207.5	-224.53	-527.7	755.7	-449.5	0.00	0.00	0.00
5,400.0	0.00	0.00	5,307.5	-324.53	-527.7	755.7	-449.5	0.00	0.00	0.00
5,500.0	0.00	0.00	5,407.5	-424.53	-527.7	755.7	-449.5	0.00	0.00	0.00
5,600.0	0.00	0.00	5,507.5	-524.53	-527.7	755.7	-449.5	0.00	0.00	0.00
5,700.0	0.00	0.00	5,607.5	-624.53	-527.7	755.7	-449.5	0.00	0.00	0.00
KOP (10°/100ft BUR)										
5,731.5	0.00	0.00	5,639.0	-656.00	-527.7	755.7	-449.5	0.00	0.00	0.00
5,800.0	6.85	1.11	5,707.4	-724.37	-523.6	755.8	-445.4	10.00	10.00	0.00
5,900.0	16.85	1.11	5,805.1	-822.11	-503.1	756.2	-425.0	10.00	10.00	0.00
6,000.0	26.85	1.11	5,897.8	-914.81	-465.9	756.9	-387.9	10.00	10.00	0.00
6,100.0	36.85	1.11	5,982.6	-999.64	-413.2	757.9	-335.4	10.00	10.00	0.00
Sharon Springs										
6,181.3	44.98	1.11	6,044.0	-1,061.00	-360.1	759.0	-282.4	10.00	10.00	0.00
6,200.0	46.85	1.11	6,057.0	-1,074.04	-346.6	759.2	-269.0	10.00	10.00	0.00
Niobrara A Chalk										
6,298.7	56.72	1.11	6,118.0	-1,135.00	-269.2	760.7	-191.8	10.00	10.00	0.00
6,300.0	56.85	1.11	6,118.7	-1,135.73	-268.1	760.7	-190.7	10.00	10.00	0.00
Niobrara A Chalk Base										
6,341.2	60.97	1.11	6,140.0	-1,157.00	-232.8	761.4	-155.5	10.00	10.00	0.00
Niobrara B1 Chalk Top										
6,395.3	66.38	1.11	6,164.0	-1,181.00	-184.3	762.4	-107.2	10.00	10.00	0.00
6,400.0	66.85	1.11	6,165.9	-1,182.85	-180.1	762.5	-102.9	10.00	10.00	0.00
Niobrara B1 Chalk Base										
6,472.2	74.07	1.11	6,190.0	-1,207.00	-112.0	763.8	-35.1	10.00	10.00	0.00
6,500.0	76.85	1.11	6,197.0	-1,213.97	-85.2	764.3	-8.3	10.00	10.00	0.00
6,600.0	86.85	1.11	6,211.1	-1,228.13	13.7	766.2	90.2	10.00	10.00	0.00
HZ LP: 600ft FSL & 2085ft FWL of Sec 31 - Niobrara B2 Chalk Top (Target)										
6,631.5	90.00	1.11	6,212.0	-1,229.00	45.2	766.8	121.6	10.00	10.00	0.00
6,700.0	90.00	1.11	6,212.0	-1,229.00	113.6	768.2	189.9	0.00	0.00	0.00
6,800.0	90.00	1.11	6,212.0	-1,229.00	213.6	770.1	289.6	0.00	0.00	0.00
6,900.0	90.00	1.11	6,212.0	-1,228.99	313.6	772.1	389.2	0.00	0.00	0.00
7,000.0	90.00	1.11	6,212.0	-1,228.99	413.6	774.0	488.9	0.00	0.00	0.00
7,100.0	90.00	1.11	6,212.0	-1,228.99	513.6	776.0	588.6	0.00	0.00	0.00
7,200.0	90.00	1.11	6,212.0	-1,228.98	613.5	777.9	688.3	0.00	0.00	0.00

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Site:	SW SW SEC. 31 T8N R59W 6th P.M.	North Reference:	True
Well:	MOTTLED 31-7HN	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)
7,300.0	90.00	1.11	6,212.0	-1,228.98	713.5	779.8	787.9	0.00	0.00	0.00
7,400.0	90.00	1.11	6,212.0	-1,228.98	813.5	781.8	887.6	0.00	0.00	0.00
7,500.0	90.00	1.11	6,212.0	-1,228.98	913.5	783.7	987.3	0.00	0.00	0.00
7,600.0	90.00	1.11	6,212.0	-1,228.97	1,013.5	785.7	1,087.0	0.00	0.00	0.00
7,700.0	90.00	1.11	6,212.0	-1,228.97	1,113.5	787.6	1,186.6	0.00	0.00	0.00
7,800.0	90.00	1.11	6,212.0	-1,228.97	1,213.4	789.6	1,286.3	0.00	0.00	0.00
7,900.0	90.00	1.11	6,212.0	-1,228.97	1,313.4	791.5	1,386.0	0.00	0.00	0.00
8,000.0	90.00	1.11	6,212.0	-1,228.97	1,413.4	793.5	1,485.7	0.00	0.00	0.00
8,100.0	90.00	1.11	6,212.0	-1,228.96	1,513.4	795.4	1,585.3	0.00	0.00	0.00
8,200.0	90.00	1.11	6,212.0	-1,228.96	1,613.4	797.3	1,685.0	0.00	0.00	0.00
8,300.0	90.00	1.11	6,212.0	-1,228.96	1,713.3	799.3	1,784.7	0.00	0.00	0.00
8,400.0	90.00	1.11	6,212.0	-1,228.96	1,813.3	801.2	1,884.4	0.00	0.00	0.00
8,500.0	90.00	1.11	6,212.0	-1,228.96	1,913.3	803.2	1,984.0	0.00	0.00	0.00
8,600.0	90.00	1.11	6,212.0	-1,228.95	2,013.3	805.1	2,083.7	0.00	0.00	0.00
8,700.0	90.00	1.11	6,212.0	-1,228.95	2,113.3	807.1	2,183.4	0.00	0.00	0.00
8,800.0	90.00	1.11	6,212.0	-1,228.95	2,213.2	809.0	2,283.1	0.00	0.00	0.00
8,900.0	90.00	1.11	6,211.9	-1,228.95	2,313.2	811.0	2,382.7	0.00	0.00	0.00
9,000.0	90.00	1.11	6,211.9	-1,228.95	2,413.2	812.9	2,482.4	0.00	0.00	0.00
9,100.0	90.00	1.11	6,211.9	-1,228.95	2,513.2	814.8	2,582.1	0.00	0.00	0.00
9,200.0	90.00	1.11	6,211.9	-1,228.95	2,613.2	816.8	2,681.8	0.00	0.00	0.00
9,300.0	90.00	1.11	6,211.9	-1,228.94	2,713.2	818.7	2,781.4	0.00	0.00	0.00
9,400.0	90.00	1.11	6,211.9	-1,228.94	2,813.1	820.7	2,881.1	0.00	0.00	0.00
9,500.0	90.00	1.11	6,211.9	-1,228.94	2,913.1	822.6	2,980.8	0.00	0.00	0.00
9,600.0	90.00	1.11	6,211.9	-1,228.94	3,013.1	824.6	3,080.5	0.00	0.00	0.00
9,700.0	90.00	1.11	6,211.9	-1,228.94	3,113.1	826.5	3,180.1	0.00	0.00	0.00
9,800.0	90.00	1.11	6,211.9	-1,228.94	3,213.1	828.5	3,279.8	0.00	0.00	0.00
9,900.0	90.00	1.11	6,211.9	-1,228.94	3,313.0	830.4	3,379.5	0.00	0.00	0.00
10,000.0	90.00	1.11	6,211.9	-1,228.94	3,413.0	832.3	3,479.1	0.00	0.00	0.00
10,100.0	90.00	1.11	6,211.9	-1,228.94	3,513.0	834.3	3,578.8	0.00	0.00	0.00
10,200.0	90.00	1.11	6,211.9	-1,228.94	3,613.0	836.2	3,678.5	0.00	0.00	0.00
10,300.0	90.00	1.11	6,211.9	-1,228.93	3,713.0	838.2	3,778.2	0.00	0.00	0.00
10,400.0	90.00	1.11	6,211.9	-1,228.93	3,812.9	840.1	3,877.8	0.00	0.00	0.00
10,500.0	90.00	1.11	6,211.9	-1,228.93	3,912.9	842.1	3,977.5	0.00	0.00	0.00
10,600.0	90.00	1.11	6,211.9	-1,228.93	4,012.9	844.0	4,077.2	0.00	0.00	0.00
10,700.0	90.00	1.11	6,211.9	-1,228.93	4,112.9	846.0	4,176.9	0.00	0.00	0.00
10,800.0	90.00	1.11	6,211.9	-1,228.93	4,212.9	847.9	4,276.5	0.00	0.00	0.00
10,900.0	90.00	1.11	6,211.9	-1,228.93	4,312.8	849.8	4,376.2	0.00	0.00	0.00
11,000.0	90.00	1.11	6,211.9	-1,228.93	4,412.8	851.8	4,475.9	0.00	0.00	0.00
11,100.0	90.00	1.11	6,211.9	-1,228.93	4,512.8	853.7	4,575.6	0.00	0.00	0.00
11,200.0	90.00	1.11	6,211.9	-1,228.93	4,612.8	855.7	4,675.2	0.00	0.00	0.00
11,300.0	90.00	1.11	6,211.9	-1,228.93	4,712.8	857.6	4,774.9	0.00	0.00	0.00
11,400.0	90.00	1.11	6,211.9	-1,228.93	4,812.8	859.6	4,874.6	0.00	0.00	0.00
11,500.0	90.00	1.11	6,211.9	-1,228.93	4,912.7	861.5	4,974.3	0.00	0.00	0.00
11,600.0	90.00	1.11	6,211.9	-1,228.93	5,012.7	863.5	5,073.9	0.00	0.00	0.00
11,700.0	90.00	1.11	6,211.9	-1,228.93	5,112.7	865.4	5,173.6	0.00	0.00	0.00
11,800.0	90.00	1.11	6,211.9	-1,228.93	5,212.7	867.3	5,273.3	0.00	0.00	0.00
11,900.0	90.00	1.11	6,211.9	-1,228.93	5,312.7	869.3	5,373.0	0.00	0.00	0.00
12,000.0	90.00	1.11	6,211.9	-1,228.93	5,412.6	871.2	5,472.6	0.00	0.00	0.00
12,100.0	90.00	1.11	6,211.9	-1,228.93	5,512.6	873.2	5,572.3	0.00	0.00	0.00
12,200.0	90.00	1.11	6,211.9	-1,228.93	5,612.6	875.1	5,672.0	0.00	0.00	0.00
12,300.0	90.00	1.11	6,211.9	-1,228.93	5,712.6	877.1	5,771.7	0.00	0.00	0.00
12,400.0	90.00	1.11	6,211.9	-1,228.94	5,812.6	879.0	5,871.3	0.00	0.00	0.00
12,500.0	90.00	1.11	6,211.9	-1,228.94	5,912.5	881.0	5,971.0	0.00	0.00	0.00
12,600.0	90.00	1.11	6,211.9	-1,228.94	6,012.5	882.9	6,070.7	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well MOTTLED 31-7HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Site:	SW SW SEC. 31 T8N R59W 6th P.M.	North Reference:	True
Well:	MOTTLED 31-7HN	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)
12,700.0	90.00	1.11	6,211.9	-1,228.94	6,112.5	884.8	6,170.4	0.00	0.00	0.00
12,800.0	90.00	1.11	6,211.9	-1,228.94	6,212.5	886.8	6,270.0	0.00	0.00	0.00
12,900.0	90.00	1.11	6,211.9	-1,228.94	6,312.5	888.7	6,369.7	0.00	0.00	0.00
13,000.0	90.00	1.11	6,211.9	-1,228.94	6,412.5	890.7	6,469.4	0.00	0.00	0.00
13,100.0	90.00	1.11	6,211.9	-1,228.94	6,512.4	892.6	6,569.1	0.00	0.00	0.00
13,200.0	90.00	1.11	6,211.9	-1,228.94	6,612.4	894.6	6,668.7	0.00	0.00	0.00
13,300.0	90.00	1.11	6,211.9	-1,228.94	6,712.4	896.5	6,768.4	0.00	0.00	0.00
13,400.0	90.00	1.11	6,211.9	-1,228.94	6,812.4	898.5	6,868.1	0.00	0.00	0.00
13,500.0	90.00	1.11	6,211.9	-1,228.95	6,912.4	900.4	6,967.7	0.00	0.00	0.00
13,600.0	90.00	1.11	6,211.9	-1,228.95	7,012.3	902.3	7,067.4	0.00	0.00	0.00
13,700.0	90.00	1.11	6,211.9	-1,228.95	7,112.3	904.3	7,167.1	0.00	0.00	0.00
13,800.0	90.00	1.11	6,212.0	-1,228.95	7,212.3	906.2	7,266.8	0.00	0.00	0.00
13,900.0	90.00	1.11	6,212.0	-1,228.95	7,312.3	908.2	7,366.4	0.00	0.00	0.00
14,000.0	90.00	1.11	6,212.0	-1,228.95	7,412.3	910.1	7,466.1	0.00	0.00	0.00
14,100.0	90.00	1.11	6,212.0	-1,228.96	7,512.2	912.1	7,565.8	0.00	0.00	0.00
14,200.0	90.00	1.11	6,212.0	-1,228.96	7,612.2	914.0	7,665.5	0.00	0.00	0.00
14,300.0	90.00	1.11	6,212.0	-1,228.96	7,712.2	916.0	7,765.1	0.00	0.00	0.00
14,400.0	90.00	1.11	6,212.0	-1,228.96	7,812.2	917.9	7,864.8	0.00	0.00	0.00
14,500.0	90.00	1.11	6,212.0	-1,228.96	7,912.2	919.8	7,964.5	0.00	0.00	0.00
14,600.0	90.00	1.11	6,212.0	-1,228.96	8,012.1	921.8	8,064.2	0.00	0.00	0.00
14,700.0	90.00	1.11	6,212.0	-1,228.97	8,112.1	923.7	8,163.8	0.00	0.00	0.00
14,800.0	90.00	1.11	6,212.0	-1,228.97	8,212.1	925.7	8,263.5	0.00	0.00	0.00
14,900.0	90.00	1.11	6,212.0	-1,228.97	8,312.1	927.6	8,363.2	0.00	0.00	0.00
15,000.0	90.00	1.11	6,212.0	-1,228.97	8,412.1	929.6	8,462.9	0.00	0.00	0.00
15,100.0	90.00	1.11	6,212.0	-1,228.98	8,512.1	931.5	8,562.5	0.00	0.00	0.00
15,200.0	90.00	1.11	6,212.0	-1,228.98	8,612.0	933.4	8,662.2	0.00	0.00	0.00
15,300.0	90.00	1.11	6,212.0	-1,228.98	8,712.0	935.4	8,761.9	0.00	0.00	0.00
15,400.0	90.00	1.11	6,212.0	-1,228.98	8,812.0	937.3	8,861.6	0.00	0.00	0.00
15,500.0	90.00	1.11	6,212.0	-1,228.99	8,912.0	939.3	8,961.2	0.00	0.00	0.00
15,600.0	90.00	1.11	6,212.0	-1,228.99	9,012.0	941.2	9,060.9	0.00	0.00	0.00
15,700.0	90.00	1.11	6,212.0	-1,228.99	9,111.9	943.2	9,160.6	0.00	0.00	0.00
15,800.0	90.00	1.11	6,212.0	-1,228.99	9,211.9	945.1	9,260.3	0.00	0.00	0.00
15,900.0	90.00	1.11	6,212.0	-1,229.00	9,311.9	947.1	9,359.9	0.00	0.00	0.00
16,000.0	90.00	1.11	6,212.0	-1,229.00	9,411.9	949.0	9,459.6	0.00	0.00	0.00
BHL: 600ft FNL & 2085ft FWL of Sec 30										
16,037.3	90.00	1.11	6,212.0	-1,229.00	9,449.2	949.7	9,496.8	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well MOTTLED 31-7HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4983.0usft (Original Well Elev)
Site:	SW SW SEC. 31 T8N R59W 6th P.M.	North Reference:	True
Well:	MOTTLED 31-7HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
468.0	467.0	Fox Hills Base				
1,531.5	1,509.0	Pierre Shale Top				
3,325.8	3,264.0	Richard Sandstone				
3,433.1	3,369.0	Parkman Sandstone				
4,233.6	4,152.0	Sussex Sandstone				
4,783.6	4,692.0	Shannon Sandstone				
6,181.3	6,044.0	Sharon Springs				
6,298.7	6,118.0	Niobrara A Chalk				
6,341.2	6,140.0	Niobrara A Chalk Base				
6,395.3	6,164.0	Niobrara B1 Chalk Top				
6,472.2	6,190.0	Niobrara B1 Chalk Base				
6,631.5	6,212.0	Niobrara B2 Chalk Top (Target)				

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.0	0.0	0.0	0.0	SHL: 550ft FSL & 1319ft FWL of Sec 31
100.0	100.0	0.0	0.0	START NUDGE (2°/100ft BUR)
700.0	695.6	-35.8	51.3	EOB TO 12° INC
4,531.0	4,442.9	-491.9	704.4	END OF TANGENT
5,131.0	5,038.5	-527.7	755.7	EOD TO VERTICAL
5,731.5	5,639.0	-527.7	755.7	KOP (10°/100ft BUR)
6,631.6	6,212.0	45.2	766.8	HZ LP: 600ft FSL & 2085ft FWL of Sec 31
16,037.3	6,212.0	9,449.2	949.7	BHL: 600ft FNL & 2085ft FWL of Sec 30