

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

NE NW SEC. 4 T7N R60W 6th P.M.

WIGEON FED 33-28-2HC

ORIGINAL WELLBORE

18 September, 2017

Plan: PROPOSAL #2





Project: WELD COUNTY, COLORADO (NAD 83)
Site: NE NW SEC. 4 T7N R60W 6th P.M.
Well: WIGEON FED 33-28-2HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

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 FNL & 2304ft FEL of Sec 4			
200.0	200.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2"/100ft BUR)			
1249.2	1274.2	21.48	285.94	54.7	-191.4	89.3	199.0	EOB TO 21.48° INC			
1555.0	1602.8	21.48	285.94	87.7	-307.1	143.3	319.4	SURFACE CASING			
6068.4	6453.3	21.48	285.94	575.7	-2015.3	940.1	2095.9	KOP (10"/100ft DGLG)			
6554.0	7299.8	90.00	1.20	1149.9	-2188.1	1536.5	2721.9	HZ LP: 600ft FSL & 790ft FWL of Sec 33			
6554.0	16682.2	90.00	1.20	10530.2	-1991.3	10716.8	12104.3	BHL: 600ft FNL & 790ft FWL of Sec 28			

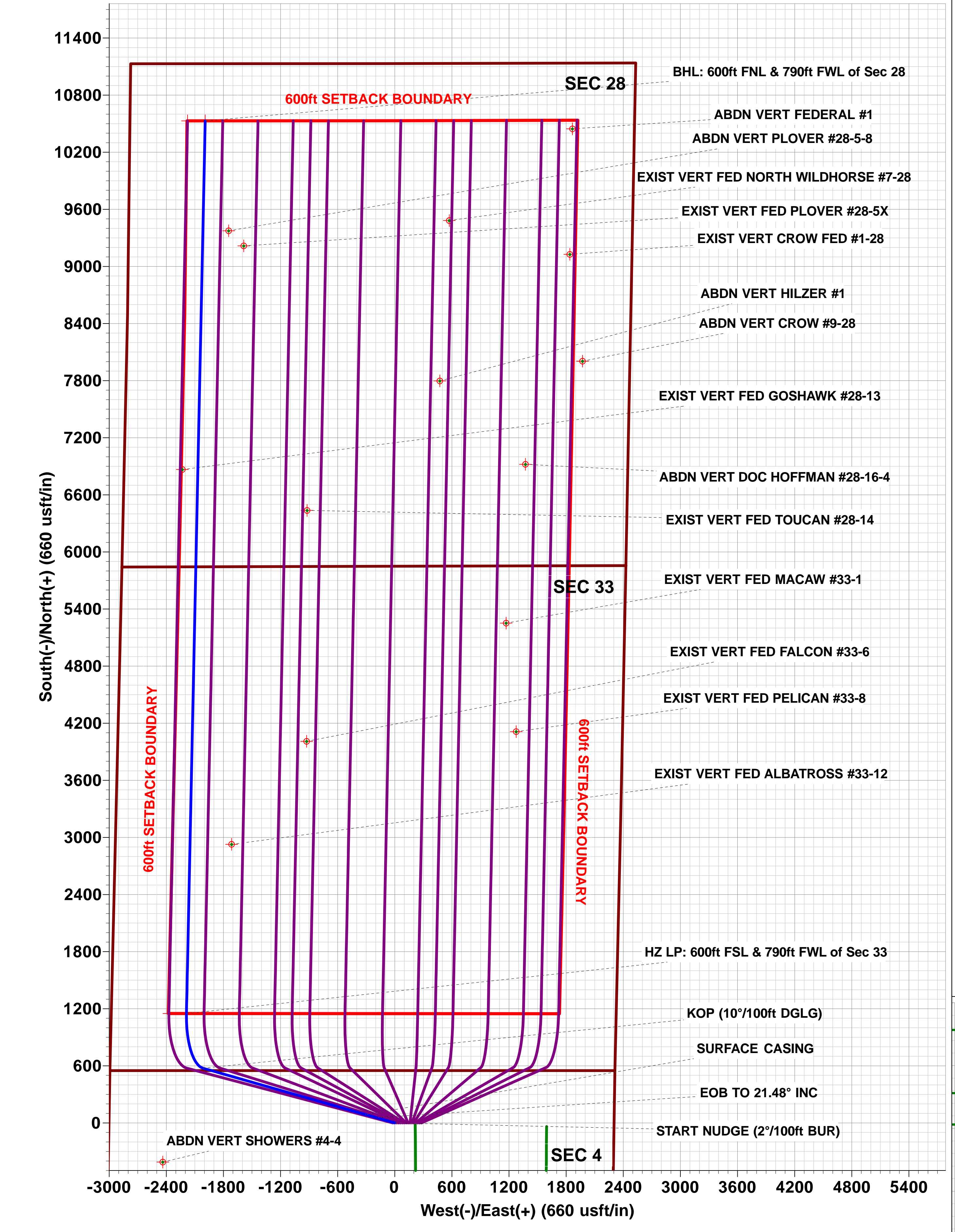
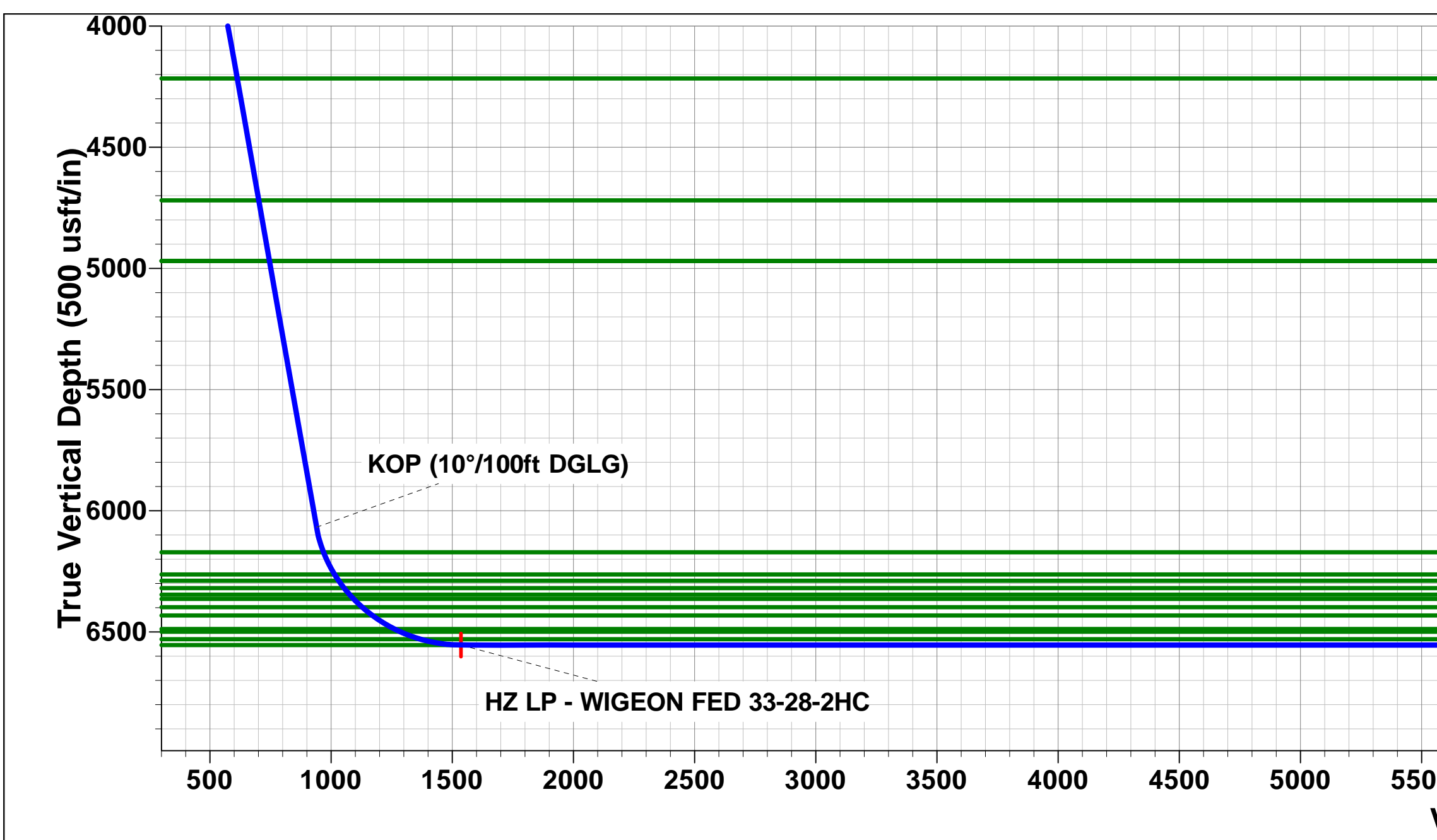
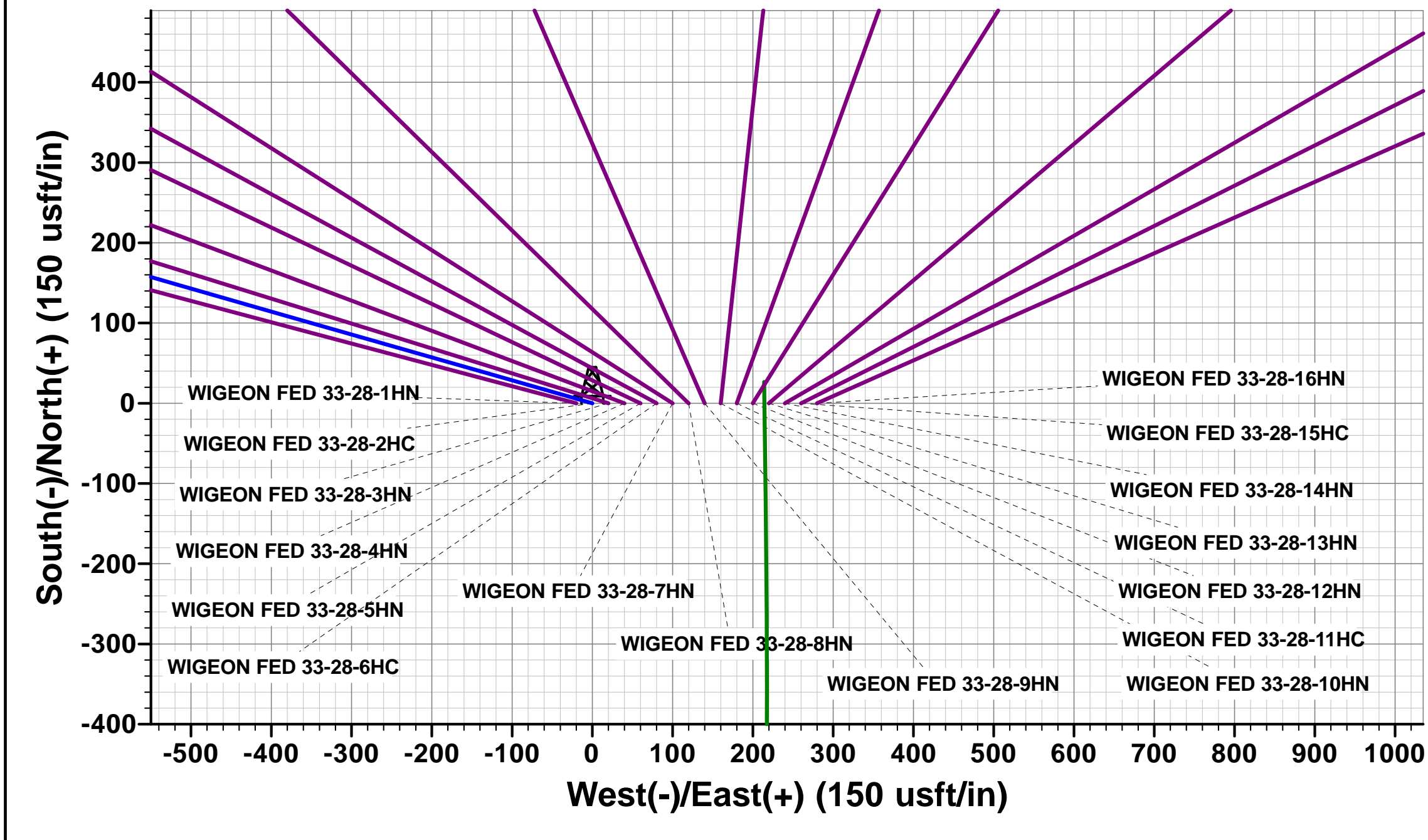
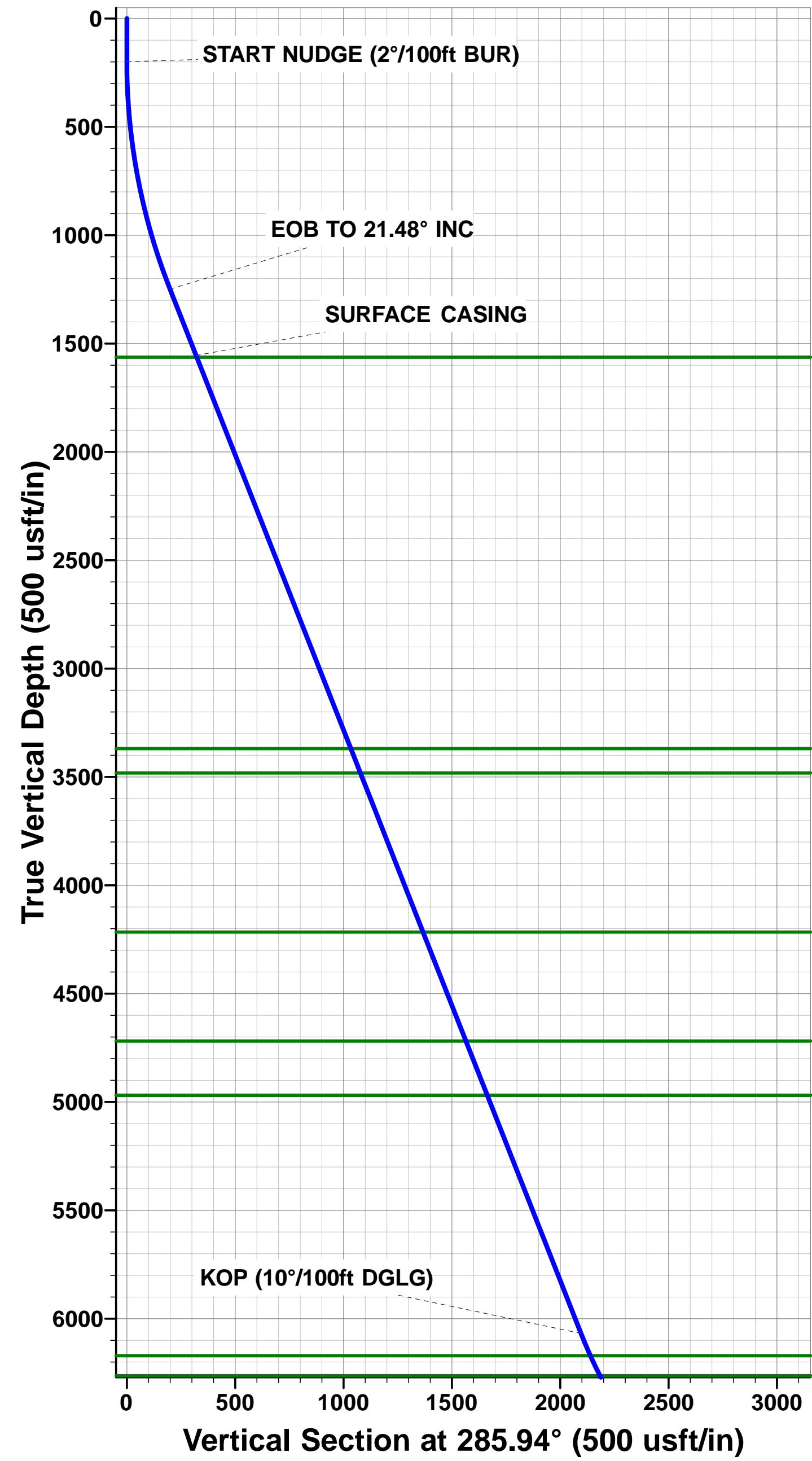
PROPOSED LOCAL COORDINATES:

SHL: 550ft FNL & 2304ft FEL Sec 4

HZ LP: 600ft FSL & 790ft FWL Sec 33

BHL: 600ft FNL & 790ft FWL of Sec 28

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HZ LP - WIGEON FED 33-28-2HC	6554.0	1149.9	-2188.1	40.613140	-104.104217
BHL - WIGEON FED 33-28-2HC	6554.0	10530.2	-1991.3	40.638887	-104.103511



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4969.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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 NW SEC. 4 T7N R60W 6th P.M.		
Site Position:		Northing:	1,467,825.37 usft
From:	Lat/Long	Easting:	3,388,564.57 usft
Position Uncertainty:	0.0 usft	Slot Radius:	1.10000ft
		Latitude:	40.609161
		Longitude:	-104.100471
		Grid Convergence:	0.90 °

Well	WIGEON FED 33-28-2HC		
Well Position	+N/-S	299.9 usft	Northing:
	+E/-W	1,148.1 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	31/08/2017	7.84	67.12	52,545

Design	PROPOSAL #2			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	26.0	0.0	0.0	349.29

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	-4,969.0	0.0	0.0	0.00	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	-4,769.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,274.2	21.48	285.94	1,249.2	-3,719.8	54.7	-191.4	2.00	2.00	0.00	285.94	
6,453.3	21.48	285.94	6,068.4	1,099.4	575.7	-2,015.2	0.00	0.00	0.00	0.00	
7,299.8	90.00	1.20	6,554.0	1,585.0	1,149.9	-2,188.1	10.00	8.09	8.89	76.24	HZ LP - WIGEON F
16,682.2	90.00	1.20	6,554.0	1,585.0	10,530.2	-1,991.3	0.00	0.00	0.00	90.00	BHL - WIGEON FE

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4969.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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 FNL & 2304ft FEL of Sec 4										
0.0	0.00	0.00	0.0	4,969.00	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	4,869.00	0.0	0.0	0.0	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
200.0	0.00	0.00	200.0	4,769.00	0.0	0.0	0.0	0.00	0.00	0.00
300.0	2.00	285.94	300.0	4,669.02	0.5	-1.7	0.8	2.00	2.00	0.00
400.0	4.00	285.94	399.8	4,569.16	1.9	-6.7	3.1	2.00	2.00	0.00
500.0	6.00	285.94	499.5	4,469.55	4.3	-15.1	7.0	2.00	2.00	0.00
600.0	8.00	285.94	598.7	4,370.30	7.7	-26.8	12.5	2.00	2.00	0.00
700.0	10.00	285.94	697.5	4,271.53	12.0	-41.8	19.5	2.00	2.00	0.00
800.0	12.00	285.94	795.6	4,173.38	17.2	-60.2	28.1	2.00	2.00	0.00
900.0	14.00	285.94	893.1	4,075.94	23.4	-81.8	38.2	2.00	2.00	0.00
1,000.0	16.00	285.94	989.6	3,979.36	30.5	-106.7	49.8	2.00	2.00	0.00
1,100.0	18.00	285.94	1,085.3	3,883.73	38.5	-134.8	62.9	2.00	2.00	0.00
1,200.0	20.00	285.94	1,179.8	3,789.18	47.5	-166.1	77.5	2.00	2.00	0.00
EOB TO 21.48° INC										
1,274.2	21.48	285.94	1,249.2	3,719.80	54.7	-191.4	89.3	2.00	2.00	0.00
1,300.0	21.48	285.94	1,273.2	3,695.79	57.3	-200.5	93.5	0.00	0.00	0.00
1,400.0	21.48	285.94	1,366.3	3,602.74	67.3	-235.7	110.0	0.00	0.00	0.00
1,500.0	21.48	285.94	1,459.3	3,509.68	77.4	-270.9	126.4	0.00	0.00	0.00
1,600.0	21.48	285.94	1,552.4	3,416.63	87.5	-306.1	142.8	0.00	0.00	0.00
SURFACE CASING										
1,602.8	21.48	285.94	1,555.0	3,414.00	87.7	-307.1	143.3	0.00	0.00	0.00
Formation 2										
1,611.4	21.48	285.94	1,563.0	3,406.00	88.6	-310.1	144.7	0.00	0.00	0.00
1,700.0	21.48	285.94	1,645.4	3,323.58	97.5	-341.3	159.2	0.00	0.00	0.00
1,800.0	21.48	285.94	1,738.5	3,230.53	107.6	-376.6	175.7	0.00	0.00	0.00
1,900.0	21.48	285.94	1,831.5	3,137.48	117.6	-411.8	192.1	0.00	0.00	0.00
2,000.0	21.48	285.94	1,924.6	3,044.43	127.7	-447.0	208.5	0.00	0.00	0.00
2,100.0	21.48	285.94	2,017.6	2,951.37	137.8	-482.2	225.0	0.00	0.00	0.00
2,200.0	21.48	285.94	2,110.7	2,858.32	147.8	-517.4	241.4	0.00	0.00	0.00
2,300.0	21.48	285.94	2,203.7	2,765.27	157.9	-552.6	257.8	0.00	0.00	0.00
2,400.0	21.48	285.94	2,296.8	2,672.22	167.9	-587.8	274.2	0.00	0.00	0.00
2,500.0	21.48	285.94	2,389.8	2,579.17	178.0	-623.1	290.7	0.00	0.00	0.00
2,600.0	21.48	285.94	2,482.9	2,486.12	188.1	-658.3	307.1	0.00	0.00	0.00
2,700.0	21.48	285.94	2,575.9	2,393.06	198.1	-693.5	323.5	0.00	0.00	0.00
2,800.0	21.48	285.94	2,669.0	2,300.01	208.2	-728.7	340.0	0.00	0.00	0.00
2,900.0	21.48	285.94	2,762.0	2,206.96	218.2	-763.9	356.4	0.00	0.00	0.00
3,000.0	21.48	285.94	2,855.1	2,113.91	228.3	-799.1	372.8	0.00	0.00	0.00
3,100.0	21.48	285.94	2,948.1	2,020.86	238.4	-834.4	389.2	0.00	0.00	0.00
3,200.0	21.48	285.94	3,041.2	1,927.80	248.4	-869.6	405.7	0.00	0.00	0.00
3,300.0	21.48	285.94	3,134.2	1,834.75	258.5	-904.8	422.1	0.00	0.00	0.00
3,400.0	21.48	285.94	3,227.3	1,741.70	268.5	-940.0	438.5	0.00	0.00	0.00
3,500.0	21.48	285.94	3,320.4	1,648.65	278.6	-975.2	455.0	0.00	0.00	0.00
Formation 3										
3,553.4	21.48	285.94	3,370.0	1,599.00	284.0	-994.0	463.7	0.00	0.00	0.00
3,600.0	21.48	285.94	3,413.4	1,555.60	288.7	-1,010.4	471.4	0.00	0.00	0.00
Formation 4										
3,673.7	21.48	285.94	3,482.0	1,487.00	296.1	-1,036.4	483.5	0.00	0.00	0.00
3,700.0	21.48	285.94	3,506.5	1,462.55	298.7	-1,045.7	487.8	0.00	0.00	0.00
3,800.0	21.48	285.94	3,599.5	1,369.49	308.8	-1,080.9	504.2	0.00	0.00	0.00
3,900.0	21.48	285.94	3,692.6	1,276.44	318.8	-1,116.1	520.7	0.00	0.00	0.00
4,000.0	21.48	285.94	3,785.6	1,183.39	328.9	-1,151.3	537.1	0.00	0.00	0.00

Planning Report



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Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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)
4,100.0	21.48	285.94	3,878.7	1,090.34	339.0	-1,186.5	553.5	0.00	0.00	0.00
4,200.0	21.48	285.94	3,971.7	997.29	349.0	-1,221.7	570.0	0.00	0.00	0.00
4,300.0	21.48	285.94	4,064.8	904.23	359.1	-1,256.9	586.4	0.00	0.00	0.00
4,400.0	21.48	285.94	4,157.8	811.18	369.1	-1,292.2	602.8	0.00	0.00	0.00
Fox Hills Base										
4,462.5	21.48	285.94	4,216.0	753.00	375.4	-1,314.2	613.1	0.00	0.00	0.00
4,500.0	21.48	285.94	4,250.9	718.13	379.2	-1,327.4	619.2	0.00	0.00	0.00
4,600.0	21.48	285.94	4,343.9	625.08	389.3	-1,362.6	635.7	0.00	0.00	0.00
4,700.0	21.48	285.94	4,437.0	532.03	399.3	-1,397.8	652.1	0.00	0.00	0.00
4,800.0	21.48	285.94	4,530.0	438.98	409.4	-1,433.0	668.5	0.00	0.00	0.00
4,900.0	21.48	285.94	4,623.1	345.92	419.4	-1,468.2	685.0	0.00	0.00	0.00
5,000.0	21.48	285.94	4,716.1	252.87	429.5	-1,503.5	701.4	0.00	0.00	0.00
Richard Sandstone										
5,003.1	21.48	285.94	4,719.0	250.00	429.8	-1,504.5	701.9	0.00	0.00	0.00
5,100.0	21.48	285.94	4,809.2	159.82	439.6	-1,538.7	717.8	0.00	0.00	0.00
5,200.0	21.48	285.94	4,902.2	66.77	449.6	-1,573.9	734.2	0.00	0.00	0.00
Niobrara D Chalk Top - Ft. Hays - Codell (Target)										
5,271.8	21.48	285.94	4,969.0	0.00	456.8	-1,599.2	746.0	0.00	0.00	0.00
5,300.0	21.48	285.94	4,995.3	-26.28	459.7	-1,609.1	750.7	0.00	0.00	0.00
5,400.0	21.48	285.94	5,088.3	-119.33	469.7	-1,644.3	767.1	0.00	0.00	0.00
5,500.0	21.48	285.94	5,181.4	-212.39	479.8	-1,679.5	783.5	0.00	0.00	0.00
5,600.0	21.48	285.94	5,274.4	-305.44	489.9	-1,714.8	800.0	0.00	0.00	0.00
5,700.0	21.48	285.94	5,367.5	-398.49	499.9	-1,750.0	816.4	0.00	0.00	0.00
5,800.0	21.48	285.94	5,460.5	-491.54	510.0	-1,785.2	832.8	0.00	0.00	0.00
5,900.0	21.48	285.94	5,553.6	-584.59	520.0	-1,820.4	849.2	0.00	0.00	0.00
6,000.0	21.48	285.94	5,646.6	-677.65	530.1	-1,855.6	865.7	0.00	0.00	0.00
6,100.0	21.48	285.94	5,739.7	-770.70	540.2	-1,890.8	882.1	0.00	0.00	0.00
6,200.0	21.48	285.94	5,832.7	-863.75	550.2	-1,926.1	898.5	0.00	0.00	0.00
6,300.0	21.48	285.94	5,925.8	-956.80	560.3	-1,961.3	915.0	0.00	0.00	0.00
6,400.0	21.48	285.94	6,018.9	-1,049.85	570.3	-1,996.5	931.4	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
6,453.3	21.48	285.94	6,068.4	-1,099.45	575.7	-2,015.3	940.1	0.00	0.00	0.00
6,500.0	23.03	297.61	6,111.7	-1,142.69	582.3	-2,031.6	949.6	10.00	3.30	24.99
Parkman Sandstone										
6,565.2	26.38	311.06	6,171.0	-1,202.00	597.7	-2,053.8	969.0	10.00	5.14	20.62
6,600.0	28.58	316.89	6,201.8	-1,232.84	608.9	-2,065.3	982.1	10.00	6.35	16.75
Sussex Sandstone										
6,671.5	33.75	326.47	6,263.0	-1,294.00	638.0	-2,088.0	1,014.8	10.00	7.23	13.41
6,700.0	35.98	329.58	6,286.4	-1,317.42	651.8	-2,096.6	1,030.0	10.00	7.82	10.90
Shannon Sandstone										
6,703.2	36.24	329.91	6,289.0	-1,320.00	653.4	-2,097.6	1,031.8	10.00	7.97	10.24
Sharon Springs										
6,741.1	39.32	333.51	6,319.0	-1,350.00	673.9	-2,108.6	1,054.0	10.00	8.14	9.50
Niobrara A Chalk										
6,776.8	42.32	336.49	6,346.0	-1,377.00	695.0	-2,118.4	1,076.6	10.00	8.39	8.34
6,800.0	44.30	338.24	6,362.9	-1,393.86	709.7	-2,124.5	1,092.1	10.00	8.55	7.57
Niobrara A Chalk Base										
6,801.6	44.43	338.35	6,364.0	-1,395.00	710.7	-2,124.9	1,093.2	10.00	8.61	7.28
Niobrara B1 Chalk Top										
6,851.1	48.75	341.70	6,398.0	-1,429.00	744.5	-2,137.2	1,128.7	10.00	8.72	6.75
6,900.0	53.09	344.59	6,428.8	-1,459.84	780.9	-2,148.2	1,166.4	10.00	8.89	5.91
Niobrara B1 Chalk Base										

Planning Report



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Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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)
6,905.3	53.57	344.88	6,432.0	-1,463.00	785.0	-2,149.3	1,170.6	10.00	8.96	5.53
7,000.0	62.16	349.60	6,482.4	-1,513.35	863.1	-2,166.8	1,250.7	10.00	9.07	4.98
Niobrara B2 Chalk Top (Target)										
7,012.3	63.29	350.16	6,488.0	-1,519.00	873.9	-2,168.7	1,261.6	10.00	9.16	4.50
Niobrara B2 Chalk Base										
7,037.8	65.63	351.27	6,499.0	-1,530.00	896.6	-2,172.5	1,284.7	10.00	9.19	4.37
7,100.0	71.38	353.83	6,521.8	-1,552.77	953.9	-2,179.9	1,342.4	10.00	9.24	4.11
Niobrara C Chalk Top										
7,127.6	73.94	354.91	6,530.0	-1,561.00	980.2	-2,182.5	1,368.6	10.00	9.28	3.91
7,200.0	80.68	357.62	6,545.9	-1,576.90	1,050.6	-2,187.1	1,438.7	10.00	9.31	3.74
HZ LP: 600ft FSL & 790ft FWL of Sec 33 - Niobrara C Chalk Base										
7,299.8	90.00	1.20	6,554.0	-1,585.00	1,149.9	-2,188.1	1,536.5	10.00	9.34	3.59
7,300.0	90.00	1.20	6,554.0	-1,585.00	1,150.1	-2,188.1	1,536.7	0.00	0.00	0.00
7,400.0	90.00	1.20	6,554.0	-1,585.00	1,250.1	-2,186.0	1,634.5	0.00	0.00	0.00
7,500.0	90.00	1.20	6,554.0	-1,585.00	1,350.1	-2,183.9	1,732.4	0.00	0.00	0.00
7,600.0	90.00	1.20	6,554.0	-1,585.00	1,450.0	-2,181.8	1,830.2	0.00	0.00	0.00
7,700.0	90.00	1.20	6,554.0	-1,585.00	1,550.0	-2,179.7	1,928.1	0.00	0.00	0.00
7,800.0	90.00	1.20	6,554.0	-1,585.00	1,650.0	-2,177.6	2,025.9	0.00	0.00	0.00
7,900.0	90.00	1.20	6,554.0	-1,585.00	1,750.0	-2,175.5	2,123.7	0.00	0.00	0.00
8,000.0	90.00	1.20	6,554.0	-1,585.00	1,850.0	-2,173.4	2,221.6	0.00	0.00	0.00
8,100.0	90.00	1.20	6,554.0	-1,585.00	1,949.9	-2,171.3	2,319.4	0.00	0.00	0.00
8,200.0	90.00	1.20	6,554.0	-1,585.00	2,049.9	-2,169.2	2,417.3	0.00	0.00	0.00
8,300.0	90.00	1.20	6,554.0	-1,585.00	2,149.9	-2,167.2	2,515.1	0.00	0.00	0.00
8,400.0	90.00	1.20	6,554.0	-1,585.00	2,249.9	-2,165.1	2,613.0	0.00	0.00	0.00
8,500.0	90.00	1.20	6,554.0	-1,585.00	2,349.9	-2,163.0	2,710.8	0.00	0.00	0.00
8,600.0	90.00	1.20	6,554.0	-1,585.00	2,449.8	-2,160.9	2,808.7	0.00	0.00	0.00
8,700.0	90.00	1.20	6,554.0	-1,585.00	2,549.8	-2,158.8	2,906.5	0.00	0.00	0.00
8,800.0	90.00	1.20	6,554.0	-1,585.00	2,649.8	-2,156.7	3,004.4	0.00	0.00	0.00
8,900.0	90.00	1.20	6,554.0	-1,585.00	2,749.8	-2,154.6	3,102.2	0.00	0.00	0.00
9,000.0	90.00	1.20	6,554.0	-1,585.00	2,849.7	-2,152.5	3,200.1	0.00	0.00	0.00
9,100.0	90.00	1.20	6,554.0	-1,585.00	2,949.7	-2,150.4	3,297.9	0.00	0.00	0.00
9,200.0	90.00	1.20	6,554.0	-1,585.00	3,049.7	-2,148.3	3,395.8	0.00	0.00	0.00
9,300.0	90.00	1.20	6,554.0	-1,585.00	3,149.7	-2,146.2	3,493.6	0.00	0.00	0.00
9,400.0	90.00	1.20	6,554.0	-1,585.00	3,249.7	-2,144.1	3,591.5	0.00	0.00	0.00
9,500.0	90.00	1.20	6,554.0	-1,585.00	3,349.6	-2,142.0	3,689.3	0.00	0.00	0.00
9,600.0	90.00	1.20	6,554.0	-1,585.00	3,449.6	-2,139.9	3,787.2	0.00	0.00	0.00
9,700.0	90.00	1.20	6,554.0	-1,585.00	3,549.6	-2,137.8	3,885.0	0.00	0.00	0.00
9,800.0	90.00	1.20	6,554.0	-1,585.00	3,649.6	-2,135.7	3,982.9	0.00	0.00	0.00
9,900.0	90.00	1.20	6,554.0	-1,585.00	3,749.5	-2,133.6	4,080.7	0.00	0.00	0.00
10,000.0	90.00	1.20	6,554.0	-1,585.00	3,849.5	-2,131.5	4,178.6	0.00	0.00	0.00
10,100.0	90.00	1.20	6,554.0	-1,585.00	3,949.5	-2,129.5	4,276.4	0.00	0.00	0.00
10,200.0	90.00	1.20	6,554.0	-1,585.00	4,049.5	-2,127.4	4,374.2	0.00	0.00	0.00
10,300.0	90.00	1.20	6,554.0	-1,585.00	4,149.5	-2,125.3	4,472.1	0.00	0.00	0.00
10,400.0	90.00	1.20	6,554.0	-1,585.00	4,249.4	-2,123.2	4,569.9	0.00	0.00	0.00
10,500.0	90.00	1.20	6,554.0	-1,585.00	4,349.4	-2,121.1	4,667.8	0.00	0.00	0.00
10,600.0	90.00	1.20	6,554.0	-1,585.00	4,449.4	-2,119.0	4,765.6	0.00	0.00	0.00
10,700.0	90.00	1.20	6,554.0	-1,585.00	4,549.4	-2,116.9	4,863.5	0.00	0.00	0.00
10,800.0	90.00	1.20	6,554.0	-1,585.00	4,649.3	-2,114.8	4,961.3	0.00	0.00	0.00
10,900.0	90.00	1.20	6,554.0	-1,585.00	4,749.3	-2,112.7	5,059.2	0.00	0.00	0.00
11,000.0	90.00	1.20	6,554.0	-1,585.00	4,849.3	-2,110.6	5,157.0	0.00	0.00	0.00
11,100.0	90.00	1.20	6,554.0	-1,585.00	4,949.3	-2,108.5	5,254.9	0.00	0.00	0.00
11,200.0	90.00	1.20	6,554.0	-1,585.00	5,049.3	-2,106.4	5,352.7	0.00	0.00	0.00
11,300.0	90.00	1.20	6,554.0	-1,585.00	5,149.2	-2,104.3	5,450.6	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4969.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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)
11,400.0	90.00	1.20	6,554.0	-1,585.00	5,249.2	-2,102.2	5,548.4	0.00	0.00	0.00
11,500.0	90.00	1.20	6,554.0	-1,585.00	5,349.2	-2,100.1	5,646.3	0.00	0.00	0.00
11,600.0	90.00	1.20	6,554.0	-1,585.00	5,449.2	-2,098.0	5,744.1	0.00	0.00	0.00
11,700.0	90.00	1.20	6,554.0	-1,585.00	5,549.1	-2,095.9	5,842.0	0.00	0.00	0.00
11,800.0	90.00	1.20	6,554.0	-1,585.00	5,649.1	-2,093.8	5,939.8	0.00	0.00	0.00
11,900.0	90.00	1.20	6,554.0	-1,585.00	5,749.1	-2,091.7	6,037.7	0.00	0.00	0.00
12,000.0	90.00	1.20	6,554.0	-1,585.00	5,849.1	-2,089.6	6,135.5	0.00	0.00	0.00
12,100.0	90.00	1.20	6,554.0	-1,585.00	5,949.1	-2,087.5	6,233.3	0.00	0.00	0.00
12,200.0	90.00	1.20	6,554.0	-1,585.00	6,049.0	-2,085.4	6,331.2	0.00	0.00	0.00
12,300.0	90.00	1.20	6,554.0	-1,585.00	6,149.0	-2,083.3	6,429.0	0.00	0.00	0.00
12,400.0	90.00	1.20	6,554.0	-1,585.00	6,249.0	-2,081.2	6,526.9	0.00	0.00	0.00
12,500.0	90.00	1.20	6,554.0	-1,585.00	6,349.0	-2,079.1	6,624.7	0.00	0.00	0.00
12,600.0	90.00	1.20	6,554.0	-1,585.00	6,449.0	-2,077.0	6,722.6	0.00	0.00	0.00
12,700.0	90.00	1.20	6,554.0	-1,585.00	6,548.9	-2,074.9	6,820.4	0.00	0.00	0.00
12,800.0	90.00	1.20	6,554.0	-1,585.00	6,648.9	-2,072.8	6,918.3	0.00	0.00	0.00
12,900.0	90.00	1.20	6,554.0	-1,585.00	6,748.9	-2,070.7	7,016.1	0.00	0.00	0.00
13,000.0	90.00	1.20	6,554.0	-1,585.00	6,848.9	-2,068.6	7,114.0	0.00	0.00	0.00
13,100.0	90.00	1.20	6,554.0	-1,585.00	6,948.8	-2,066.5	7,211.8	0.00	0.00	0.00
13,200.0	90.00	1.20	6,554.0	-1,585.00	7,048.8	-2,064.4	7,309.7	0.00	0.00	0.00
13,300.0	90.00	1.20	6,554.0	-1,585.00	7,148.8	-2,062.3	7,407.5	0.00	0.00	0.00
13,400.0	90.00	1.20	6,554.0	-1,585.00	7,248.8	-2,060.3	7,505.4	0.00	0.00	0.00
13,500.0	90.00	1.20	6,554.0	-1,585.00	7,348.8	-2,058.2	7,603.2	0.00	0.00	0.00
13,600.0	90.00	1.20	6,554.0	-1,585.00	7,448.7	-2,056.1	7,701.1	0.00	0.00	0.00
13,700.0	90.00	1.20	6,554.0	-1,585.00	7,548.7	-2,054.0	7,798.9	0.00	0.00	0.00
13,800.0	90.00	1.20	6,554.0	-1,585.00	7,648.7	-2,051.9	7,896.7	0.00	0.00	0.00
13,900.0	90.00	1.20	6,554.0	-1,585.00	7,748.7	-2,049.8	7,994.6	0.00	0.00	0.00
14,000.0	90.00	1.20	6,554.0	-1,585.00	7,848.6	-2,047.7	8,092.4	0.00	0.00	0.00
14,100.0	90.00	1.20	6,554.0	-1,585.00	7,948.6	-2,045.6	8,190.3	0.00	0.00	0.00
14,200.0	90.00	1.20	6,554.0	-1,585.00	8,048.6	-2,043.5	8,288.1	0.00	0.00	0.00
14,300.0	90.00	1.20	6,554.0	-1,585.00	8,148.6	-2,041.4	8,386.0	0.00	0.00	0.00
14,400.0	90.00	1.20	6,554.0	-1,585.00	8,248.6	-2,039.3	8,483.8	0.00	0.00	0.00
14,500.0	90.00	1.20	6,554.0	-1,585.00	8,348.5	-2,037.2	8,581.7	0.00	0.00	0.00
14,600.0	90.00	1.20	6,554.0	-1,585.00	8,448.5	-2,035.1	8,679.5	0.00	0.00	0.00
14,700.0	90.00	1.20	6,554.0	-1,585.00	8,548.5	-2,033.0	8,777.4	0.00	0.00	0.00
14,800.0	90.00	1.20	6,554.0	-1,585.00	8,648.5	-2,030.9	8,875.2	0.00	0.00	0.00
14,900.0	90.00	1.20	6,554.0	-1,585.00	8,748.4	-2,028.8	8,973.1	0.00	0.00	0.00
15,000.0	90.00	1.20	6,554.0	-1,585.00	8,848.4	-2,026.7	9,070.9	0.00	0.00	0.00
15,100.0	90.00	1.20	6,554.0	-1,585.00	8,948.4	-2,024.6	9,168.8	0.00	0.00	0.00
15,200.0	90.00	1.20	6,554.0	-1,585.00	9,048.4	-2,022.5	9,266.6	0.00	0.00	0.00
15,300.0	90.00	1.20	6,554.0	-1,585.00	9,148.4	-2,020.4	9,364.4	0.00	0.00	0.00
15,400.0	90.00	1.20	6,554.0	-1,585.00	9,248.3	-2,018.3	9,462.3	0.00	0.00	0.00
15,500.0	90.00	1.20	6,554.0	-1,585.00	9,348.3	-2,016.2	9,560.1	0.00	0.00	0.00
15,600.0	90.00	1.20	6,554.0	-1,585.00	9,448.3	-2,014.1	9,658.0	0.00	0.00	0.00
15,700.0	90.00	1.20	6,554.0	-1,585.00	9,548.3	-2,012.0	9,755.8	0.00	0.00	0.00
15,800.0	90.00	1.20	6,554.0	-1,585.00	9,648.2	-2,009.9	9,853.7	0.00	0.00	0.00
15,900.0	90.00	1.20	6,554.0	-1,585.00	9,748.2	-2,007.8	9,951.5	0.00	0.00	0.00
16,000.0	90.00	1.20	6,554.0	-1,585.00	9,848.2	-2,005.7	10,049.4	0.00	0.00	0.00
16,100.0	90.00	1.20	6,554.0	-1,585.00	9,948.2	-2,003.6	10,147.2	0.00	0.00	0.00
16,200.0	90.00	1.20	6,554.0	-1,585.00	10,048.2	-2,001.4	10,245.1	0.00	0.00	0.00
16,300.0	90.00	1.20	6,554.0	-1,585.00	10,148.1	-1,999.3	10,342.9	0.00	0.00	0.00
16,400.0	90.00	1.20	6,554.0	-1,585.00	10,248.1	-1,997.2	10,440.8	0.00	0.00	0.00
16,500.0	90.00	1.20	6,554.0	-1,585.00	10,348.1	-1,995.1	10,538.6	0.00	0.00	0.00
16,600.0	90.00	1.20	6,554.0	-1,585.00	10,448.1	-1,993.0	10,636.5	0.00	0.00	0.00
BHL: 600ft FNL & 790ft FWL of Sec 28										

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4969.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4969.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

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)
16,682.2	90.00	1.20	6,554.0	-1,585.00	10,530.2	-1,991.3	10,716.8	0.00	0.00	0.00

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,611.4	1,563.0	Formation 2				
3,553.4	3,370.0	Formation 3				
3,673.7	3,482.0	Formation 4				
4,462.5	4,216.0	Fox Hills Base				
5,003.1	4,719.0	Richard Sandstone				
5,271.8	4,969.0	Ft. Hays				
5,271.8	4,969.0	Codell (Target)				
5,271.8	4,969.0	Niobrara D Chalk Top				
6,565.2	6,171.0	Parkman Sandstone				
6,671.5	6,263.0	Sussex Sandstone				
6,703.2	6,289.0	Shannon Sandstone				
6,741.1	6,319.0	Sharon Springs				
6,776.8	6,346.0	Niobrara A Chalk				
6,801.6	6,364.0	Niobrara A Chalk Base				
6,851.1	6,398.0	Niobrara B1 Chalk Top				
6,905.3	6,432.0	Niobrara B1 Chalk Base				
7,012.3	6,488.0	Niobrara B2 Chalk Top (Target)				
7,037.8	6,499.0	Niobrara B2 Chalk Base				
7,127.6	6,530.0	Niobrara C Chalk Top				
7,299.8	6,554.0	Niobrara C Chalk Base				

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 FNL & 2304ft FEL of Sec 4
200.0	200.0	0.0	0.0	START NUDGE (2°/100ft BUR)
1,274.2	1,249.2	54.7	-191.4	EOB TO 21.48° INC
1,602.8	1,555.0	87.7	-307.1	SURFACE CASING
6,453.3	6,068.4	575.7	-2,015.3	KOP (10°/100ft DGLG)
7,299.8	6,554.0	1,149.9	-2,188.1	HZ LP: 600ft FSL & 790ft FWL of Sec 33
16,682.2	6,554.0	10,530.2	-1,991.3	BHL: 600ft FNL & 790ft FWL of Sec 28