

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

WIGEON FED 33-28-12HN

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 33-28-12HN
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

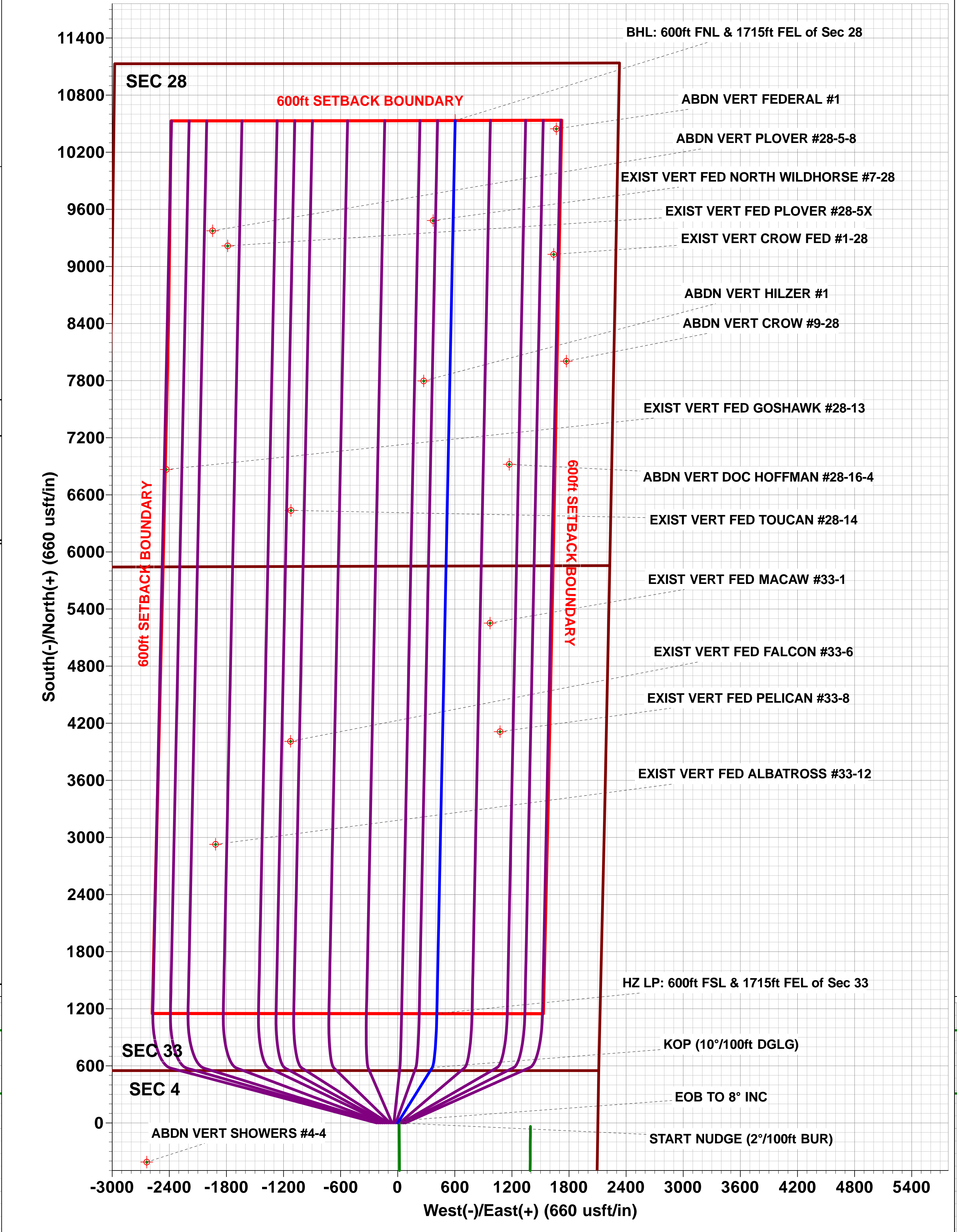
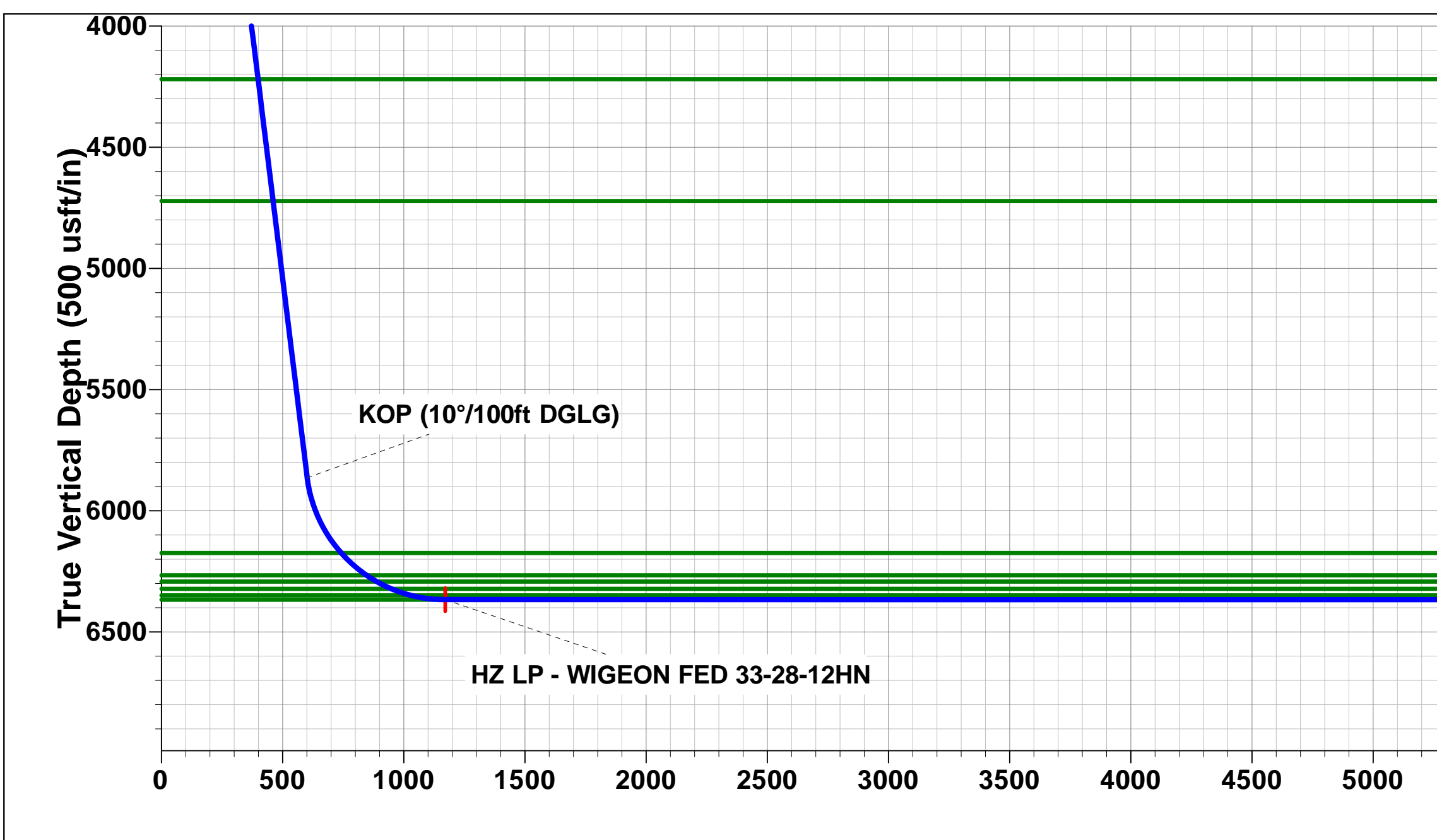
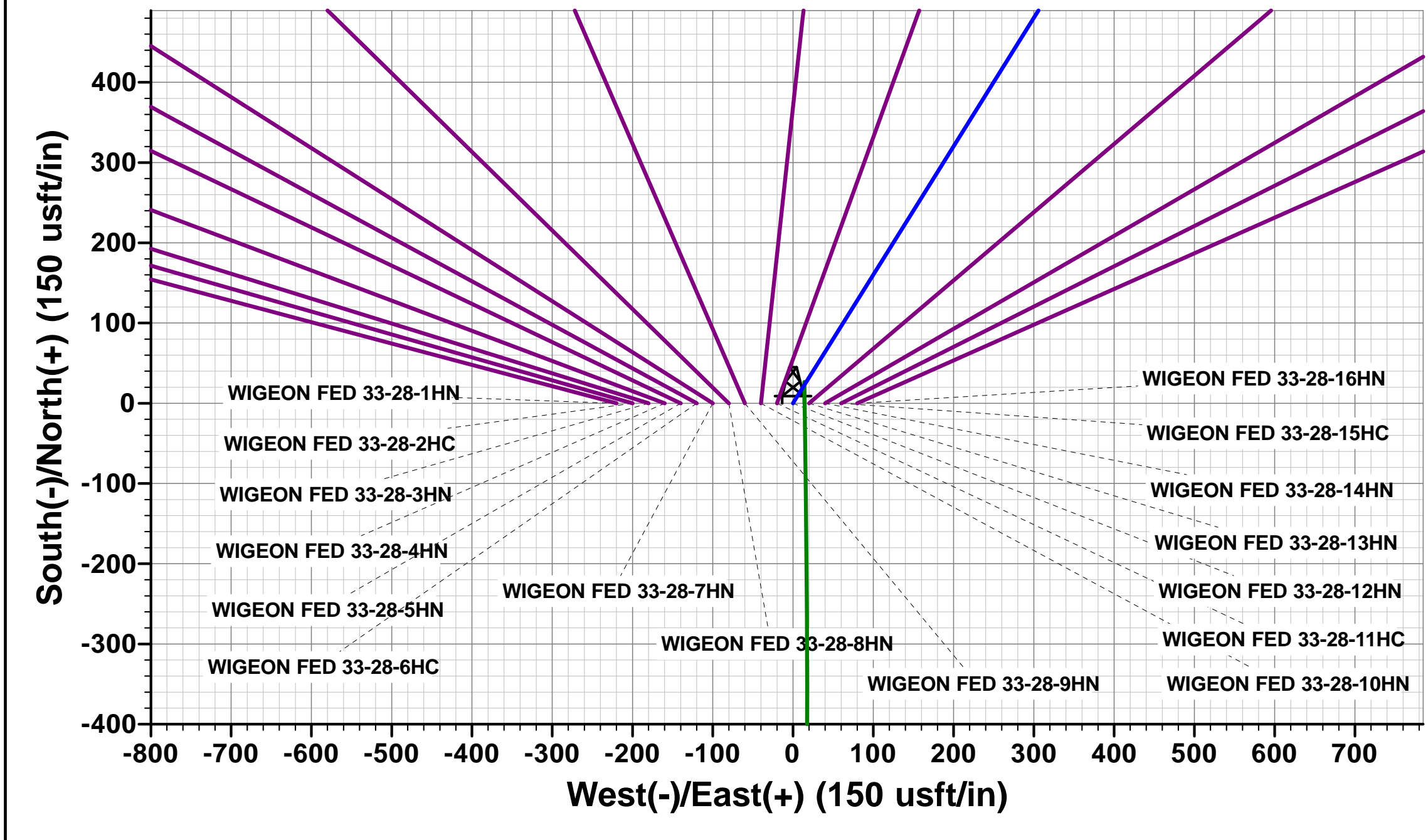
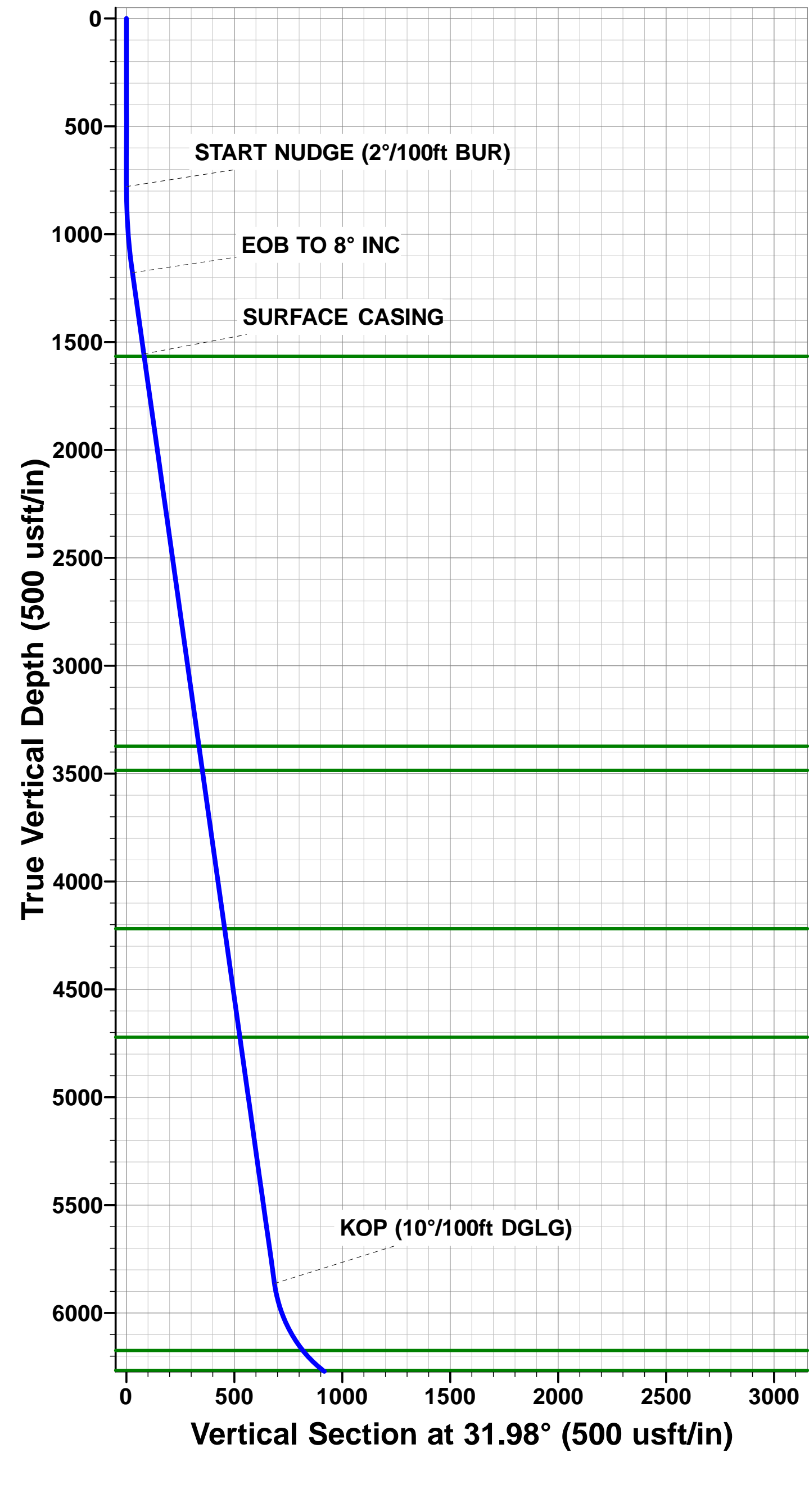
ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Dep	Annotation	
0.0	0.0	0.00	0.00	0.0	0.0	0.0	0.0	SHL: 550ft FNL & 2104ft FEL of Sec 4	
780.0	780.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2°/100ft BUR)	
1178.5	1179.8	8.00	31.98	23.6	14.8	24.4	27.9	EOB TO 8° INC	
1555.0	1560.0	8.00	31.98	68.5	42.8	70.8	80.7	SURFACE CASING	
5863.8	5911.1	8.00	31.98	581.8	363.3	601.7	686.0	KOP (10°/100ft DGLG)	
6367.0	6742.5	90.00	1.17	1149.9	411.2	1171.5	1257.5	HZ LP: 600ft FSL & 1715ft FEL of Sec 33	
6367.0	16128.4	90.00	1.18	10533.8	603.9	10551.1	10643.4	BHL: 600ft FNL & 1715ft FEL of Sec 28	

PROPOSED LOCAL COORDINATES:

SHL: 550ft FNL & 2104ft FEL Sec 4
HZ LP: 600ft FSL & 1715ft FEL Sec 33

BHL: 600ft FNL & 1715ft FEL of Sec 28

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HZ LP - WIGEON FED 33-28-12HN	6367.0	1149.8	411.2	40.613140	-104.094135
BHL - WIGEON FED 33-28-12HN	6367.0	10533.8	603.9	40.638897	-104.093440



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-12HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4972.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	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 33-28-12HN		
Well Position	+N/-S	299.9 usft	Northing:
	+E/-W	1,348.0 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 (°)
	28.0	0.0	0.0	3.28

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	-4,972.0	0.0	0.0	0.00	0.00	0.00	0.00	
780.0	0.00	0.00	780.0	-4,192.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,179.8	8.00	31.98	1,178.5	-3,793.5	23.6	14.8	2.00	2.00	0.00	31.98	
5,911.1	8.00	31.98	5,863.8	891.8	581.8	363.3	0.00	0.00	0.00	0.00	
6,742.5	90.00	1.17	6,367.0	1,395.0	1,149.8	411.2	10.00	9.86	-3.71	-31.06	HZ LP - WIGEON F
16,128.4	90.00	1.18	6,367.0	1,395.0	10,533.8	603.9	0.00	0.00	0.00	90.00	BHL - WIGEON FE

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-12HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4972.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	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 & 2104ft FEL of Sec 4										
0.0	0.00	0.00	0.0	4,972.00	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	4,872.00	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	4,772.00	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	4,672.00	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	4,572.00	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	4,472.00	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	4,372.00	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	4,272.00	0.0	0.0	0.0	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
780.0	0.00	0.00	780.0	4,192.00	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.40	31.98	800.0	4,172.00	0.1	0.0	0.1	2.00	2.00	0.00
900.0	2.40	31.98	900.0	4,072.04	2.1	1.3	2.2	2.00	2.00	0.00
1,000.0	4.40	31.98	999.8	3,972.22	7.2	4.5	7.4	2.00	2.00	0.00
1,100.0	6.40	31.98	1,099.3	3,872.67	15.1	9.5	15.7	2.00	2.00	0.00
EOB TO 8° INC										
1,179.8	8.00	31.98	1,178.5	3,793.50	23.6	14.8	24.4	2.00	2.00	0.00
1,200.0	8.00	31.98	1,198.5	3,773.49	26.0	16.2	26.9	0.00	0.00	0.00
1,300.0	8.00	31.98	1,297.5	3,674.46	37.8	23.6	39.1	0.00	0.00	0.00
1,400.0	8.00	31.98	1,396.6	3,575.44	49.6	31.0	51.3	0.00	0.00	0.00
1,500.0	8.00	31.98	1,495.6	3,476.41	61.4	38.3	63.5	0.00	0.00	0.00
SURFACE CASING										
1,560.0	8.00	31.98	1,555.0	3,417.00	68.5	42.8	70.8	0.00	0.00	0.00
Fox Hills Base										
1,571.1	8.00	31.98	1,566.0	3,406.00	69.8	43.6	72.2	0.00	0.00	0.00
1,600.0	8.00	31.98	1,594.6	3,377.38	73.2	45.7	75.7	0.00	0.00	0.00
1,700.0	8.00	31.98	1,693.6	3,278.35	85.0	53.1	87.9	0.00	0.00	0.00
1,800.0	8.00	31.98	1,792.7	3,179.33	96.8	60.4	100.1	0.00	0.00	0.00
1,900.0	8.00	31.98	1,891.7	3,080.30	108.6	67.8	112.3	0.00	0.00	0.00
2,000.0	8.00	31.98	1,990.7	2,981.27	120.4	75.2	124.5	0.00	0.00	0.00
2,100.0	8.00	31.98	2,089.8	2,882.24	132.2	82.5	136.7	0.00	0.00	0.00
2,200.0	8.00	31.98	2,188.8	2,783.21	144.0	89.9	148.9	0.00	0.00	0.00
2,300.0	8.00	31.98	2,287.8	2,684.19	155.8	97.3	161.1	0.00	0.00	0.00
2,400.0	8.00	31.98	2,386.8	2,585.16	167.6	104.7	173.3	0.00	0.00	0.00
2,500.0	8.00	31.98	2,485.9	2,486.13	179.4	112.0	185.5	0.00	0.00	0.00
2,600.0	8.00	31.98	2,584.9	2,387.10	191.2	119.4	197.7	0.00	0.00	0.00
2,700.0	8.00	31.98	2,683.9	2,288.07	203.0	126.8	209.9	0.00	0.00	0.00
2,800.0	8.00	31.98	2,783.0	2,189.05	214.8	134.1	222.1	0.00	0.00	0.00
2,900.0	8.00	31.98	2,882.0	2,090.02	226.6	141.5	234.3	0.00	0.00	0.00
3,000.0	8.00	31.98	2,981.0	1,990.99	238.4	148.9	246.5	0.00	0.00	0.00
3,100.0	8.00	31.98	3,080.0	1,891.96	250.2	156.2	258.7	0.00	0.00	0.00
3,200.0	8.00	31.98	3,179.1	1,792.94	262.0	163.6	270.9	0.00	0.00	0.00
3,300.0	8.00	31.98	3,278.1	1,693.91	273.8	171.0	283.1	0.00	0.00	0.00
Richard Sandstone										
3,395.8	8.00	31.98	3,373.0	1,599.00	285.1	178.0	294.8	0.00	0.00	0.00
3,400.0	8.00	31.98	3,377.1	1,594.88	285.6	178.3	295.3	0.00	0.00	0.00
3,500.0	8.00	31.98	3,476.1	1,495.85	297.4	185.7	307.5	0.00	0.00	0.00
Parkman Sandstone										
3,508.9	8.00	31.98	3,485.0	1,487.00	298.4	186.4	308.6	0.00	0.00	0.00
3,600.0	8.00	31.98	3,575.2	1,396.82	309.2	193.1	319.7	0.00	0.00	0.00
3,700.0	8.00	31.98	3,674.2	1,297.80	321.0	200.4	331.9	0.00	0.00	0.00
3,800.0	8.00	31.98	3,773.2	1,198.77	332.8	207.8	344.1	0.00	0.00	0.00
3,900.0	8.00	31.98	3,872.3	1,099.74	344.6	215.2	356.3	0.00	0.00	0.00

Planning Report



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Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	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)
4,000.0	8.00	31.98	3,971.3	1,000.71	356.4	222.5	368.5	0.00	0.00	0.00
4,100.0	8.00	31.98	4,070.3	901.68	368.2	229.9	380.7	0.00	0.00	0.00
4,200.0	8.00	31.98	4,169.3	802.66	380.0	237.3	392.9	0.00	0.00	0.00
Sussex Sandstone										
4,250.1	8.00	31.98	4,219.0	753.00	385.9	241.0	399.0	0.00	0.00	0.00
4,300.0	8.00	31.98	4,268.4	703.63	391.7	244.6	405.1	0.00	0.00	0.00
4,400.0	8.00	31.98	4,367.4	604.60	403.5	252.0	417.3	0.00	0.00	0.00
4,500.0	8.00	31.98	4,466.4	505.57	415.3	259.4	429.5	0.00	0.00	0.00
4,600.0	8.00	31.98	4,565.5	406.54	427.1	266.7	441.7	0.00	0.00	0.00
4,700.0	8.00	31.98	4,664.5	307.52	438.9	274.1	453.9	0.00	0.00	0.00
Shannon Sandstone										
4,758.1	8.00	31.98	4,722.0	250.00	445.8	278.4	461.0	0.00	0.00	0.00
4,800.0	8.00	31.98	4,763.5	208.49	450.7	281.5	466.1	0.00	0.00	0.00
4,900.0	8.00	31.98	4,862.5	109.46	462.5	288.8	478.3	0.00	0.00	0.00
5,000.0	8.00	31.98	4,961.6	10.43	474.3	296.2	490.5	0.00	0.00	0.00
5,100.0	8.00	31.98	5,060.6	-88.59	486.1	303.6	502.7	0.00	0.00	0.00
5,200.0	8.00	31.98	5,159.6	-187.62	497.9	310.9	514.9	0.00	0.00	0.00
5,300.0	8.00	31.98	5,258.7	-286.65	509.7	318.3	527.1	0.00	0.00	0.00
5,400.0	8.00	31.98	5,357.7	-385.68	521.5	325.7	539.3	0.00	0.00	0.00
5,500.0	8.00	31.98	5,456.7	-484.71	533.3	333.0	551.5	0.00	0.00	0.00
5,600.0	8.00	31.98	5,555.7	-583.73	545.1	340.4	563.7	0.00	0.00	0.00
5,700.0	8.00	31.98	5,654.8	-682.76	556.9	347.8	575.9	0.00	0.00	0.00
5,800.0	8.00	31.98	5,753.8	-781.79	568.7	355.2	588.1	0.00	0.00	0.00
5,900.0	8.00	31.98	5,852.8	-880.82	580.5	362.5	600.3	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
5,911.1	8.00	31.98	5,863.8	-891.81	581.8	363.3	601.7	0.00	0.00	0.00
6,000.0	16.27	15.45	5,950.7	-978.67	599.1	369.9	619.3	10.00	9.31	-18.60
6,100.0	26.06	9.63	6,043.8	-1,071.82	634.4	377.4	654.9	10.00	9.79	-5.81
6,200.0	35.96	6.87	6,129.4	-1,157.43	685.3	384.6	706.2	10.00	9.90	-2.77
Sharon Springs										
6,257.2	41.64	5.82	6,174.0	-1,202.00	720.9	388.5	742.0	10.00	9.93	-1.84
6,300.0	45.90	5.17	6,204.9	-1,232.89	750.4	391.3	771.5	10.00	9.95	-1.50
Niobrara A Chalk										
6,396.6	55.51	4.01	6,266.0	-1,294.00	824.8	397.3	846.2	10.00	9.96	-1.21
6,400.0	55.85	3.97	6,267.9	-1,295.92	827.6	397.5	849.0	10.00	9.96	-1.05
Niobrara A Chalk Base										
6,445.6	60.40	3.52	6,292.0	-1,320.00	866.2	400.0	887.7	10.00	9.96	-1.00
6,500.0	65.82	3.03	6,316.6	-1,344.59	914.6	402.7	936.2	10.00	9.97	-0.90
Niobrara B1 Chalk Top										
6,513.6	67.17	2.91	6,322.0	-1,350.00	927.1	403.4	948.6	10.00	9.97	-0.85
Niobrara B1 Chalk Base										
6,598.3	75.62	2.23	6,349.0	-1,377.00	1,007.2	407.0	1,028.9	10.00	9.97	-0.80
6,600.0	75.79	2.22	6,349.4	-1,377.42	1,008.9	407.0	1,030.5	10.00	9.97	-0.76
6,700.0	85.76	1.48	6,365.4	-1,393.43	1,107.4	410.2	1,129.1	10.00	9.97	-0.74
HZ LP: 600ft FSL & 1715ft FEL of Sec 33 - Niobrara B2 Chalk Top (Target)										
6,742.5	90.00	1.17	6,367.0	-1,395.00	1,149.8	411.2	1,171.5	10.00	9.97	-0.72
6,800.0	90.00	1.17	6,367.0	-1,395.00	1,207.3	412.4	1,229.0	0.00	0.00	0.00
6,900.0	90.00	1.17	6,367.0	-1,395.00	1,307.3	414.4	1,328.9	0.00	0.00	0.00
7,000.0	90.00	1.17	6,367.0	-1,395.00	1,407.3	416.5	1,428.8	0.00	0.00	0.00
7,100.0	90.00	1.17	6,367.0	-1,395.00	1,507.3	418.5	1,528.8	0.00	0.00	0.00
7,200.0	90.00	1.17	6,367.0	-1,395.00	1,607.3	420.6	1,628.7	0.00	0.00	0.00
7,300.0	90.00	1.17	6,367.0	-1,395.00	1,707.2	422.6	1,728.6	0.00	0.00	0.00
7,400.0	90.00	1.17	6,367.0	-1,395.00	1,807.2	424.7	1,828.6	0.00	0.00	0.00

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4972.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	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)
7,500.0	90.00	1.17	6,367.0	-1,395.00	1,907.2	426.7	1,928.5	0.00	0.00	0.00
7,600.0	90.00	1.17	6,367.0	-1,395.00	2,007.2	428.8	2,028.4	0.00	0.00	0.00
7,700.0	90.00	1.17	6,367.0	-1,395.00	2,107.2	430.8	2,128.4	0.00	0.00	0.00
7,800.0	90.00	1.17	6,367.0	-1,395.00	2,207.1	432.9	2,228.3	0.00	0.00	0.00
7,900.0	90.00	1.17	6,367.0	-1,395.00	2,307.1	434.9	2,328.2	0.00	0.00	0.00
8,000.0	90.00	1.17	6,367.0	-1,395.00	2,407.1	437.0	2,428.2	0.00	0.00	0.00
8,100.0	90.00	1.17	6,367.0	-1,395.00	2,507.1	439.0	2,528.1	0.00	0.00	0.00
8,200.0	90.00	1.17	6,367.0	-1,395.00	2,607.0	441.1	2,628.0	0.00	0.00	0.00
8,300.0	90.00	1.17	6,367.0	-1,395.00	2,707.0	443.1	2,727.9	0.00	0.00	0.00
8,400.0	90.00	1.17	6,367.0	-1,395.00	2,807.0	445.2	2,827.9	0.00	0.00	0.00
8,500.0	90.00	1.18	6,367.0	-1,395.00	2,907.0	447.2	2,927.8	0.00	0.00	0.00
8,600.0	90.00	1.18	6,367.0	-1,395.00	3,007.0	449.3	3,027.7	0.00	0.00	0.00
8,700.0	90.00	1.18	6,367.0	-1,395.00	3,106.9	451.3	3,127.7	0.00	0.00	0.00
8,800.0	90.00	1.18	6,367.0	-1,395.00	3,206.9	453.4	3,227.6	0.00	0.00	0.00
8,900.0	90.00	1.18	6,367.0	-1,395.00	3,306.9	455.4	3,327.5	0.00	0.00	0.00
9,000.0	90.00	1.18	6,367.0	-1,395.00	3,406.9	457.5	3,427.5	0.00	0.00	0.00
9,100.0	90.00	1.18	6,367.0	-1,395.00	3,506.9	459.5	3,527.4	0.00	0.00	0.00
9,200.0	90.00	1.18	6,367.0	-1,395.00	3,606.8	461.6	3,627.3	0.00	0.00	0.00
9,300.0	90.00	1.18	6,367.0	-1,395.00	3,706.8	463.6	3,727.3	0.00	0.00	0.00
9,400.0	90.00	1.18	6,367.0	-1,395.00	3,806.8	465.7	3,827.2	0.00	0.00	0.00
9,500.0	90.00	1.18	6,367.0	-1,395.00	3,906.8	467.7	3,927.1	0.00	0.00	0.00
9,600.0	90.00	1.18	6,367.0	-1,395.00	4,006.8	469.8	4,027.1	0.00	0.00	0.00
9,700.0	90.00	1.18	6,367.0	-1,395.00	4,106.7	471.8	4,127.0	0.00	0.00	0.00
9,800.0	90.00	1.18	6,367.0	-1,395.00	4,206.7	473.9	4,226.9	0.00	0.00	0.00
9,900.0	90.00	1.18	6,367.0	-1,395.00	4,306.7	475.9	4,326.9	0.00	0.00	0.00
10,000.0	90.00	1.18	6,367.0	-1,395.00	4,406.7	478.0	4,426.8	0.00	0.00	0.00
10,100.0	90.00	1.18	6,367.0	-1,395.00	4,506.6	480.0	4,526.7	0.00	0.00	0.00
10,200.0	90.00	1.18	6,367.0	-1,395.00	4,606.6	482.1	4,626.7	0.00	0.00	0.00
10,300.0	90.00	1.18	6,367.0	-1,395.00	4,706.6	484.1	4,726.6	0.00	0.00	0.00
10,400.0	90.00	1.18	6,367.0	-1,395.00	4,806.6	486.2	4,826.5	0.00	0.00	0.00
10,500.0	90.00	1.18	6,367.0	-1,395.00	4,906.6	488.2	4,926.5	0.00	0.00	0.00
10,600.0	90.00	1.18	6,367.0	-1,395.00	5,006.5	490.3	5,026.4	0.00	0.00	0.00
10,700.0	90.00	1.18	6,367.0	-1,395.00	5,106.5	492.4	5,126.3	0.00	0.00	0.00
10,800.0	90.00	1.18	6,367.0	-1,395.00	5,206.5	494.4	5,226.3	0.00	0.00	0.00
10,900.0	90.00	1.18	6,367.0	-1,395.00	5,306.5	496.5	5,326.2	0.00	0.00	0.00
11,000.0	90.00	1.18	6,367.0	-1,395.00	5,406.5	498.5	5,426.1	0.00	0.00	0.00
11,100.0	90.00	1.18	6,367.0	-1,395.00	5,506.4	500.6	5,526.1	0.00	0.00	0.00
11,200.0	90.00	1.18	6,367.0	-1,395.00	5,606.4	502.6	5,626.0	0.00	0.00	0.00
11,300.0	90.00	1.18	6,367.0	-1,395.00	5,706.4	504.7	5,725.9	0.00	0.00	0.00
11,400.0	90.00	1.18	6,367.0	-1,395.00	5,806.4	506.7	5,825.9	0.00	0.00	0.00
11,500.0	90.00	1.18	6,367.0	-1,395.00	5,906.4	508.8	5,925.8	0.00	0.00	0.00
11,600.0	90.00	1.18	6,367.0	-1,395.00	6,006.3	510.8	6,025.7	0.00	0.00	0.00
11,700.0	90.00	1.18	6,367.0	-1,395.00	6,106.3	512.9	6,125.7	0.00	0.00	0.00
11,800.0	90.00	1.18	6,367.0	-1,395.00	6,206.3	514.9	6,225.6	0.00	0.00	0.00
11,900.0	90.00	1.18	6,367.0	-1,395.00	6,306.3	517.0	6,325.5	0.00	0.00	0.00
12,000.0	90.00	1.18	6,367.0	-1,395.00	6,406.2	519.0	6,425.5	0.00	0.00	0.00
12,100.0	90.00	1.18	6,367.0	-1,395.00	6,506.2	521.1	6,525.4	0.00	0.00	0.00
12,200.0	90.00	1.18	6,367.0	-1,395.00	6,606.2	523.2	6,625.3	0.00	0.00	0.00
12,300.0	90.00	1.18	6,367.0	-1,395.00	6,706.2	525.2	6,725.2	0.00	0.00	0.00
12,400.0	90.00	1.18	6,367.0	-1,395.00	6,806.2	527.3	6,825.2	0.00	0.00	0.00
12,500.0	90.00	1.18	6,367.0	-1,395.00	6,906.1	529.3	6,925.1	0.00	0.00	0.00
12,600.0	90.00	1.18	6,367.0	-1,395.00	7,006.1	531.4	7,025.0	0.00	0.00	0.00
12,700.0	90.00	1.18	6,367.0	-1,395.00	7,106.1	533.4	7,125.0	0.00	0.00	0.00
12,800.0	90.00	1.18	6,367.0	-1,395.00	7,206.1	535.5	7,224.9	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-12HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4972.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	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)
12,900.0	90.00	1.18	6,367.0	-1,395.00	7,306.1	537.5	7,324.8	0.00	0.00	0.00
13,000.0	90.00	1.18	6,367.0	-1,395.00	7,406.0	539.6	7,424.8	0.00	0.00	0.00
13,100.0	90.00	1.18	6,367.0	-1,395.00	7,506.0	541.6	7,524.7	0.00	0.00	0.00
13,200.0	90.00	1.18	6,367.0	-1,395.00	7,606.0	543.7	7,624.6	0.00	0.00	0.00
13,300.0	90.00	1.18	6,367.0	-1,395.00	7,706.0	545.8	7,724.6	0.00	0.00	0.00
13,400.0	90.00	1.18	6,367.0	-1,395.00	7,805.9	547.8	7,824.5	0.00	0.00	0.00
13,500.0	90.00	1.18	6,367.0	-1,395.00	7,905.9	549.9	7,924.4	0.00	0.00	0.00
13,600.0	90.00	1.18	6,367.0	-1,395.00	8,005.9	551.9	8,024.4	0.00	0.00	0.00
13,700.0	90.00	1.18	6,367.0	-1,395.00	8,105.9	554.0	8,124.3	0.00	0.00	0.00
13,800.0	90.00	1.18	6,367.0	-1,395.00	8,205.9	556.0	8,224.2	0.00	0.00	0.00
13,900.0	90.00	1.18	6,367.0	-1,395.00	8,305.8	558.1	8,324.2	0.00	0.00	0.00
14,000.0	90.00	1.18	6,367.0	-1,395.00	8,405.8	560.1	8,424.1	0.00	0.00	0.00
14,100.0	90.00	1.18	6,367.0	-1,395.00	8,505.8	562.2	8,524.0	0.00	0.00	0.00
14,200.0	90.00	1.18	6,367.0	-1,395.00	8,605.8	564.3	8,624.0	0.00	0.00	0.00
14,300.0	90.00	1.18	6,367.0	-1,395.00	8,705.8	566.3	8,723.9	0.00	0.00	0.00
14,400.0	90.00	1.18	6,367.0	-1,395.00	8,805.7	568.4	8,823.8	0.00	0.00	0.00
14,500.0	90.00	1.18	6,367.0	-1,395.00	8,905.7	570.4	8,923.8	0.00	0.00	0.00
14,600.0	90.00	1.18	6,367.0	-1,395.00	9,005.7	572.5	9,023.7	0.00	0.00	0.00
14,700.0	90.00	1.18	6,367.0	-1,395.00	9,105.7	574.5	9,123.6	0.00	0.00	0.00
14,800.0	90.00	1.18	6,367.0	-1,395.00	9,205.7	576.6	9,223.6	0.00	0.00	0.00
14,900.0	90.00	1.18	6,367.0	-1,395.00	9,305.6	578.6	9,323.5	0.00	0.00	0.00
15,000.0	90.00	1.18	6,367.0	-1,395.00	9,405.6	580.7	9,423.4	0.00	0.00	0.00
15,100.0	90.00	1.18	6,367.0	-1,395.00	9,505.6	582.8	9,523.4	0.00	0.00	0.00
15,200.0	90.00	1.18	6,367.0	-1,395.00	9,605.6	584.8	9,623.3	0.00	0.00	0.00
15,300.0	90.00	1.18	6,367.0	-1,395.00	9,705.5	586.9	9,723.2	0.00	0.00	0.00
15,400.0	90.00	1.18	6,367.0	-1,395.00	9,805.5	588.9	9,823.2	0.00	0.00	0.00
15,500.0	90.00	1.18	6,367.0	-1,395.00	9,905.5	591.0	9,923.1	0.00	0.00	0.00
15,600.0	90.00	1.18	6,367.0	-1,395.00	10,005.5	593.0	10,023.0	0.00	0.00	0.00
15,700.0	90.00	1.18	6,367.0	-1,395.00	10,105.5	595.1	10,123.0	0.00	0.00	0.00
15,800.0	90.00	1.18	6,367.0	-1,395.00	10,205.4	597.2	10,222.9	0.00	0.00	0.00
15,900.0	90.00	1.18	6,367.0	-1,395.00	10,305.4	599.2	10,322.8	0.00	0.00	0.00
16,000.0	90.00	1.18	6,367.0	-1,395.00	10,405.4	601.3	10,422.8	0.00	0.00	0.00
16,100.0	90.00	1.18	6,367.0	-1,395.00	10,505.4	603.3	10,522.7	0.00	0.00	0.00
BHL: 600ft FNL & 1715ft FEL of Sec 28										
16,128.4	90.00	1.18	6,367.0	-1,395.00	10,533.8	603.9	10,551.1	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-12HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4972.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4972.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-12HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,571.1	1,566.0	Fox Hills Base			
3,395.8	3,373.0	Richard Sandstone			
3,508.9	3,485.0	Parkman Sandstone			
4,250.1	4,219.0	Sussex Sandstone			
4,758.1	4,722.0	Shannon Sandstone			
6,257.2	6,174.0	Sharon Springs			
6,396.6	6,266.0	Niobrara A Chalk			
6,445.6	6,292.0	Niobrara A Chalk Base			
6,513.6	6,322.0	Niobrara B1 Chalk Top			
6,598.3	6,349.0	Niobrara B1 Chalk Base			
6,742.5	6,367.0	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 FNL & 2104ft FEL of Sec 4
780.0	780.0	0.0	0.0	START NUDGE (2°/100ft BUR)
1,179.8	1,178.5	23.6	14.8	EOB TO 8° INC
1,560.0	1,555.0	68.5	42.8	SURFACE CASING
5,911.1	5,863.8	581.8	363.3	KOP (10°/100ft DGLG)
6,742.5	6,367.0	1,149.9	411.2	HZ LP: 600ft FSL & 1715ft FEL of Sec 33
16,128.4	6,367.0	10,533.8	603.9	BHL: 600ft FNL & 1715ft FEL of Sec 28