

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

WIGEON FED 33-28-4HN

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 33-28-4HN
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 & 2264ft FEL of Sec 4	
400.0	400.0	0.00	0.00	0.0	0.0	0.0	0.0	START NUDGE (2°/100ft BUR)	
1289.4	1304.3	18.09	290.61	49.8	-132.5	67.7	141.5	EOB TO 18.09° INC	
1555.0	1583.7	18.09	290.61	80.4	-213.7	109.3	228.3	SURFACE CASING	
5873.9	6127.1	18.09	290.61	576.9	-1533.8	784.3	1638.7	KOP (10°/100ft DGLG)	
6365.0	6967.9	90.00	1.20	1149.9	-1673.1	1371.0	2247.7	HZ LP: 600ft FSL & 1345ft FWL of Sec 33	
6365.0	16350.6	90.00	1.20	10530.5	-1476.5	10633.5	11630.4	BHL: 600ft FNL & 1345ft FWL of Sec 28	

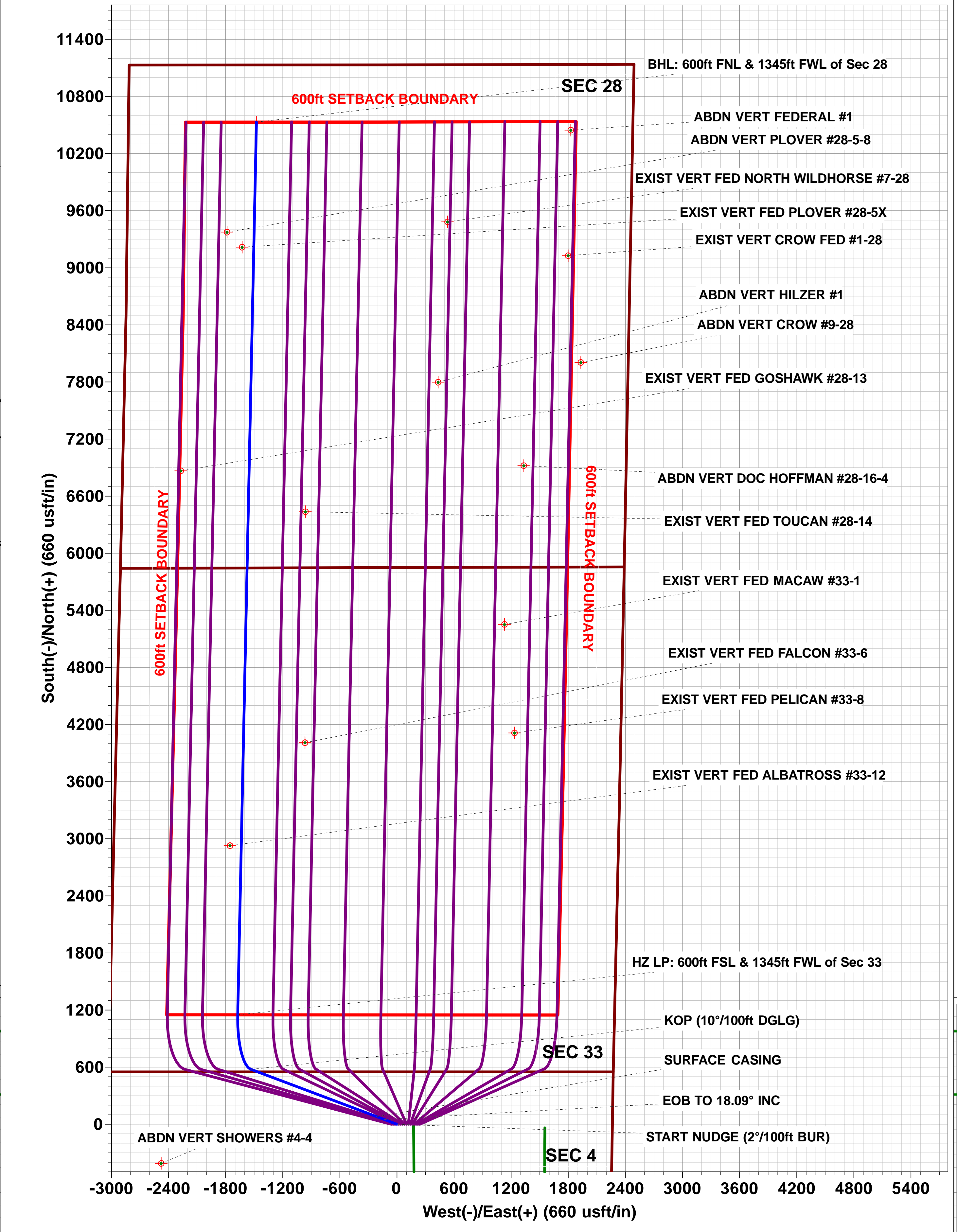
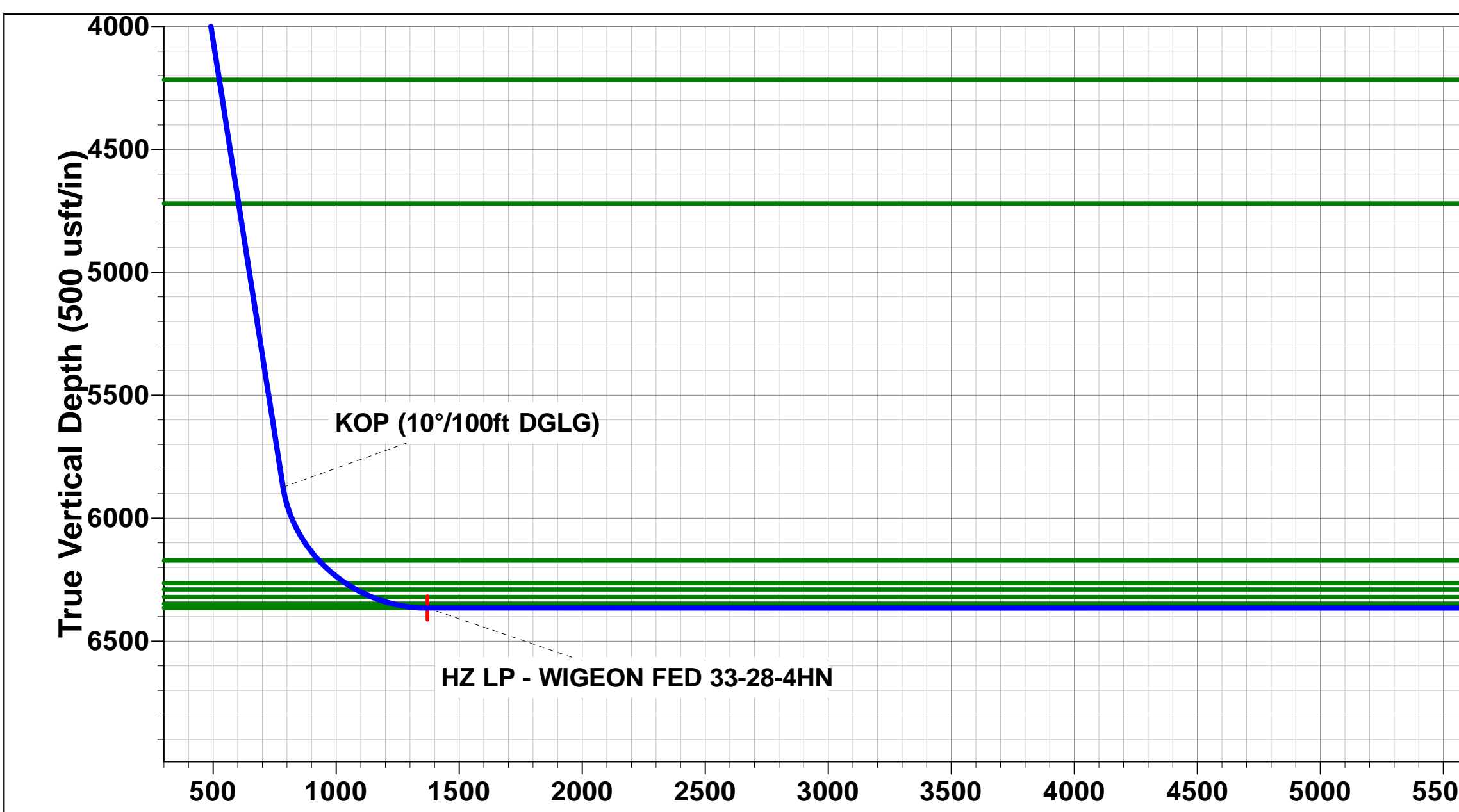
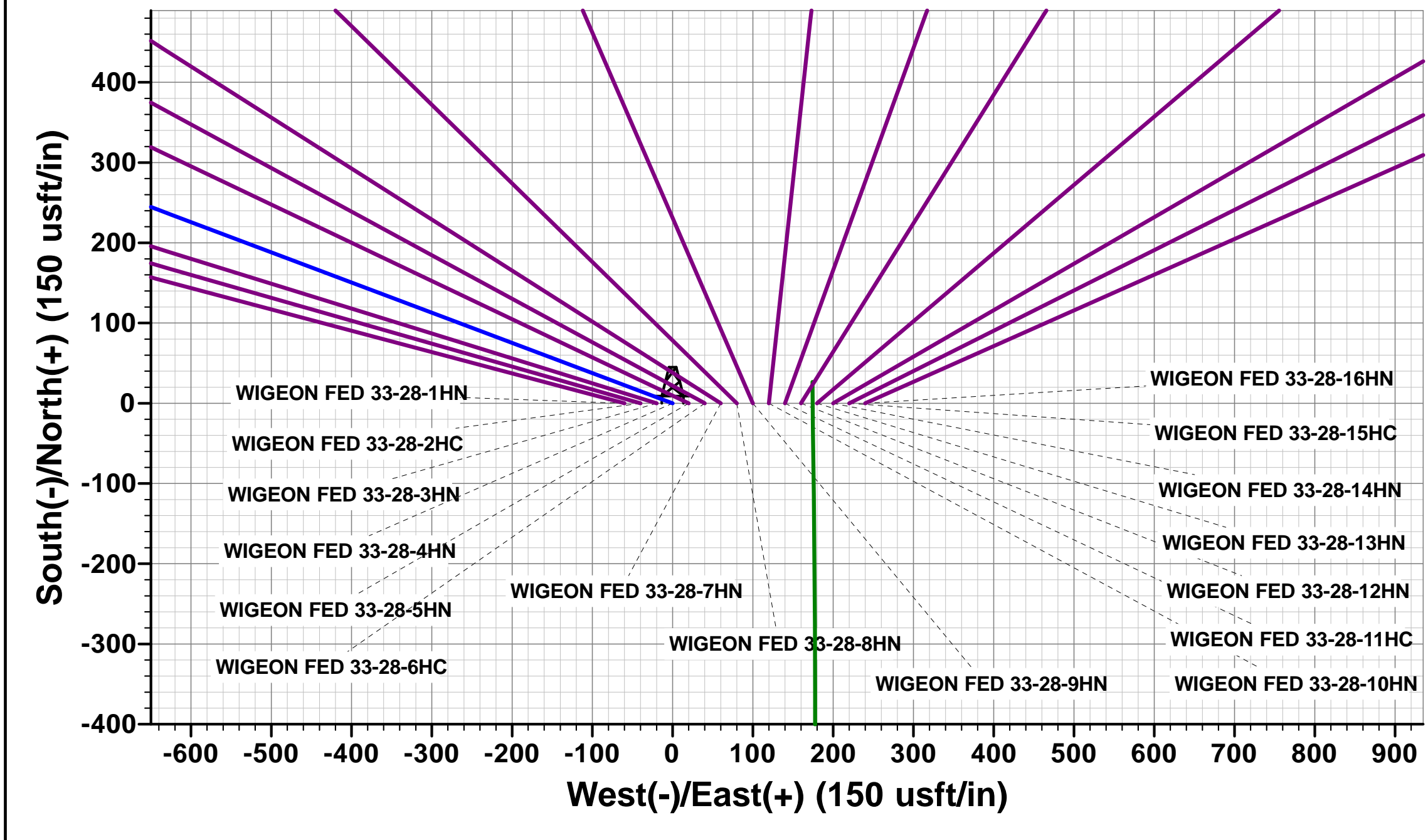
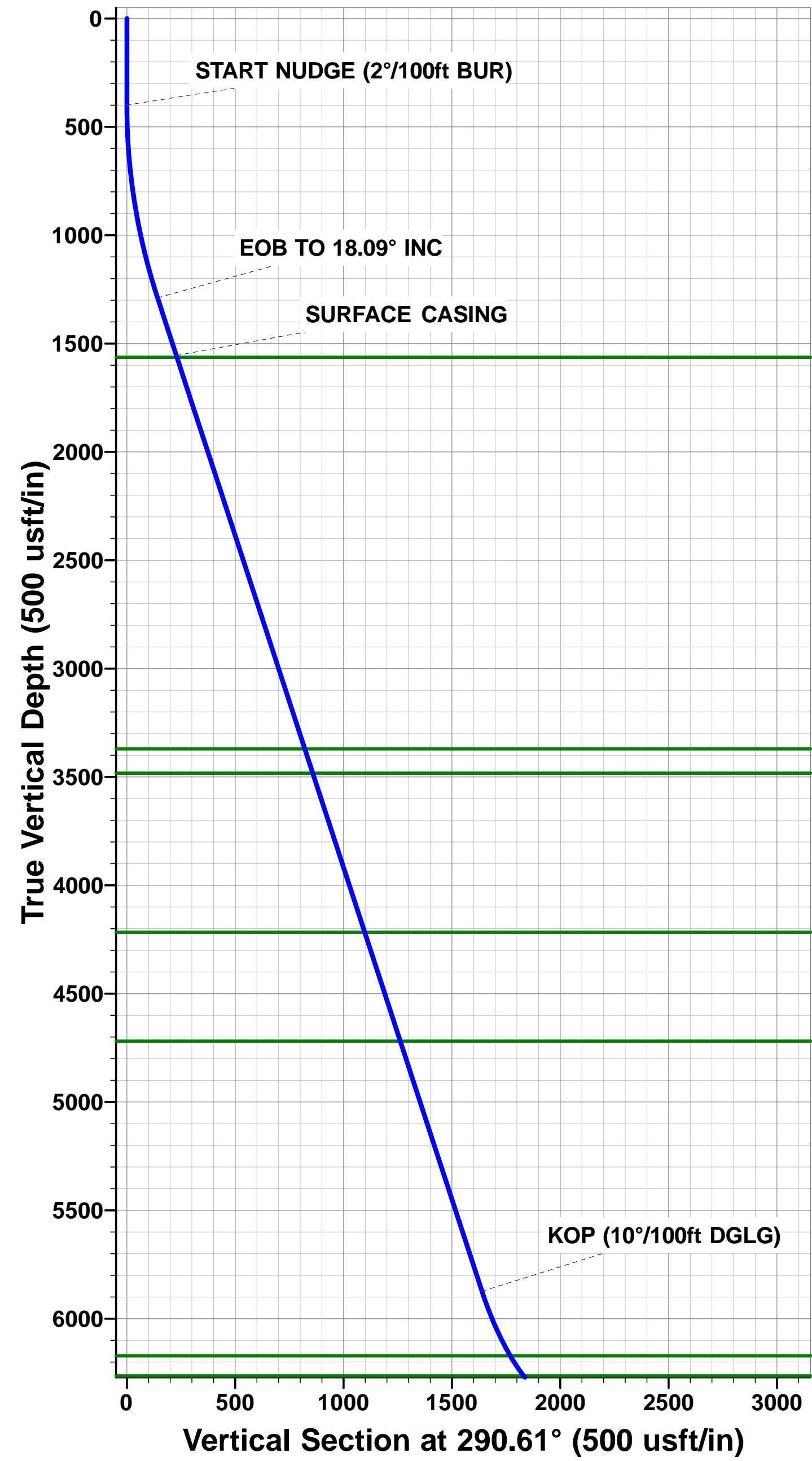
PROPOSED LOCAL COORDINATES:

SHL: 550ft FNL & 2264ft FEL Sec 4

HZ LP: 600ft FSL & 1345ft FWL Sec 33

BHL: 600ft FNL & 1345ft FWL of Sec 28

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HZ LP - WIGEON FED 33-28-4HN	6365.0	1149.9	-1673.1	40.613140	-104.102218
BHL - WIGEON FED 33-28-4HN	6365.0	10530.5	-1476.5	40.638888	-104.101512



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-4HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	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 33-28-4HN		
Well Position	+N/-S	299.9 usft	Northing:
	+E/-W	1,188.1 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 (°)
	27.0	0.0	0.0	352.02

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	-4,970.0	0.0	0.0	0.00	0.00	0.00	0.00	
400.0	0.00	0.00	400.0	-4,570.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,304.3	18.09	290.61	1,289.3	-3,680.7	49.8	-132.5	2.00	2.00	0.00	290.61	
6,127.1	18.09	290.61	5,873.9	903.9	576.9	-1,533.8	0.00	0.00	0.00	0.00	
6,967.9	90.00	1.20	6,365.0	1,395.0	1,149.9	-1,673.1	10.00	8.55	8.40	71.48	HZ LP - WIGEON F
16,350.6	90.00	1.20	6,365.0	1,395.0	10,530.5	-1,476.5	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 33-28-4HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	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 & 2264ft FEL of Sec 4										
0.0	0.00	0.00	0.0	4,970.00	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	4,870.00	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	4,770.00	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	4,670.00	0.0	0.0	0.0	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
400.0	0.00	0.00	400.0	4,570.00	0.0	0.0	0.0	0.00	0.00	0.00
500.0	2.00	290.61	500.0	4,470.02	0.6	-1.6	0.8	2.00	2.00	0.00
600.0	4.00	290.61	599.8	4,370.16	2.5	-6.5	3.3	2.00	2.00	0.00
700.0	6.00	290.61	699.5	4,270.55	5.5	-14.7	7.5	2.00	2.00	0.00
800.0	8.00	290.61	798.7	4,171.30	9.8	-26.1	13.3	2.00	2.00	0.00
900.0	10.00	290.61	897.5	4,072.53	15.3	-40.7	20.8	2.00	2.00	0.00
1,000.0	12.00	290.61	995.6	3,974.38	22.0	-58.6	30.0	2.00	2.00	0.00
1,100.0	14.00	290.61	1,093.1	3,876.94	30.0	-79.6	40.7	2.00	2.00	0.00
1,200.0	16.00	290.61	1,189.6	3,780.36	39.1	-103.9	53.1	2.00	2.00	0.00
1,300.0	18.00	290.61	1,285.3	3,684.73	49.4	-131.2	67.1	2.00	2.00	0.00
EOB TO 18.09° INC										
1,304.3	18.09	290.61	1,289.4	3,680.64	49.8	-132.5	67.7	1.98	1.98	0.00
1,400.0	18.09	290.61	1,380.3	3,589.67	60.3	-160.3	82.0	0.00	0.00	0.00
1,500.0	18.09	290.61	1,475.4	3,494.61	71.2	-189.3	96.8	0.00	0.00	0.00
SURFACE CASING										
1,583.7	18.09	290.61	1,555.0	3,415.00	80.4	-213.7	109.3	0.00	0.00	0.00
Fox Hills Base										
1,593.2	18.09	290.61	1,564.0	3,406.00	81.4	-216.4	110.7	0.00	0.00	0.00
1,600.0	18.09	290.61	1,570.4	3,399.55	82.2	-218.4	111.7	0.00	0.00	0.00
1,700.0	18.09	290.61	1,665.5	3,304.49	93.1	-247.5	126.5	0.00	0.00	0.00
1,800.0	18.09	290.61	1,760.6	3,209.43	104.0	-276.5	141.4	0.00	0.00	0.00
1,900.0	18.09	290.61	1,855.6	3,114.37	114.9	-305.6	156.3	0.00	0.00	0.00
2,000.0	18.09	290.61	1,950.7	3,019.31	125.9	-334.6	171.1	0.00	0.00	0.00
2,100.0	18.09	290.61	2,045.7	2,924.25	136.8	-363.7	186.0	0.00	0.00	0.00
2,200.0	18.09	290.61	2,140.8	2,829.19	147.7	-392.7	200.8	0.00	0.00	0.00
2,300.0	18.09	290.61	2,235.9	2,734.13	158.7	-421.8	215.7	0.00	0.00	0.00
2,400.0	18.09	290.61	2,330.9	2,639.07	169.6	-450.8	230.5	0.00	0.00	0.00
2,500.0	18.09	290.61	2,426.0	2,544.01	180.5	-479.9	245.4	0.00	0.00	0.00
2,600.0	18.09	290.61	2,521.0	2,448.95	191.4	-509.0	260.3	0.00	0.00	0.00
2,700.0	18.09	290.61	2,616.1	2,353.90	202.4	-538.0	275.1	0.00	0.00	0.00
2,800.0	18.09	290.61	2,711.2	2,258.84	213.3	-567.1	290.0	0.00	0.00	0.00
2,900.0	18.09	290.61	2,806.2	2,163.78	224.2	-596.1	304.8	0.00	0.00	0.00
3,000.0	18.09	290.61	2,901.3	2,068.72	235.2	-625.2	319.7	0.00	0.00	0.00
3,100.0	18.09	290.61	2,996.3	1,973.66	246.1	-654.2	334.5	0.00	0.00	0.00
3,200.0	18.09	290.61	3,091.4	1,878.60	257.0	-683.3	349.4	0.00	0.00	0.00
3,300.0	18.09	290.61	3,186.5	1,783.54	268.0	-712.3	364.3	0.00	0.00	0.00
3,400.0	18.09	290.61	3,281.5	1,688.48	278.9	-741.4	379.1	0.00	0.00	0.00
Richard Sandstone										
3,494.1	18.09	290.61	3,371.0	1,599.00	289.2	-768.7	393.1	0.00	0.00	0.00
3,500.0	18.09	290.61	3,376.6	1,593.42	289.8	-770.4	394.0	0.00	0.00	0.00
3,600.0	18.09	290.61	3,471.6	1,498.36	300.7	-799.5	408.8	0.00	0.00	0.00
Parkman Sandstone										
3,611.9	18.09	290.61	3,483.0	1,487.00	302.0	-803.0	410.6	0.00	0.00	0.00
3,700.0	18.09	290.61	3,566.7	1,403.30	311.7	-828.6	423.7	0.00	0.00	0.00
3,800.0	18.09	290.61	3,661.8	1,308.24	322.6	-857.6	438.6	0.00	0.00	0.00
3,900.0	18.09	290.61	3,756.8	1,213.18	333.5	-886.7	453.4	0.00	0.00	0.00
4,000.0	18.09	290.61	3,851.9	1,118.12	344.5	-915.7	468.3	0.00	0.00	0.00

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	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	18.09	290.61	3,946.9	1,023.06	355.4	-944.8	483.1	0.00	0.00	0.00
4,200.0	18.09	290.61	4,042.0	928.00	366.3	-973.8	498.0	0.00	0.00	0.00
4,300.0	18.09	290.61	4,137.1	832.94	377.2	-1,002.9	512.8	0.00	0.00	0.00
Sussex Sandstone										
4,384.1	18.09	290.61	4,217.0	753.00	386.4	-1,027.3	525.3	0.00	0.00	0.00
4,400.0	18.09	290.61	4,232.1	737.88	388.2	-1,031.9	527.7	0.00	0.00	0.00
4,500.0	18.09	290.61	4,327.2	642.82	399.1	-1,061.0	542.6	0.00	0.00	0.00
4,600.0	18.09	290.61	4,422.2	547.76	410.0	-1,090.1	557.4	0.00	0.00	0.00
4,700.0	18.09	290.61	4,517.3	452.70	421.0	-1,119.1	572.3	0.00	0.00	0.00
4,800.0	18.09	290.61	4,612.4	357.64	431.9	-1,148.2	587.1	0.00	0.00	0.00
4,900.0	18.09	290.61	4,707.4	262.58	442.8	-1,177.2	602.0	0.00	0.00	0.00
Shannon Sandstone										
4,913.2	18.09	290.61	4,720.0	250.00	444.3	-1,181.1	604.0	0.00	0.00	0.00
5,000.0	18.09	290.61	4,802.5	167.52	453.7	-1,206.3	616.8	0.00	0.00	0.00
5,100.0	18.09	290.61	4,897.5	72.46	464.7	-1,235.3	631.7	0.00	0.00	0.00
5,200.0	18.09	290.61	4,992.6	-22.60	475.6	-1,264.4	646.6	0.00	0.00	0.00
5,300.0	18.09	290.61	5,087.7	-117.66	486.5	-1,293.4	661.4	0.00	0.00	0.00
5,400.0	18.09	290.61	5,182.7	-212.72	497.5	-1,322.5	676.3	0.00	0.00	0.00
5,500.0	18.09	290.61	5,277.8	-307.78	508.4	-1,351.6	691.1	0.00	0.00	0.00
5,600.0	18.09	290.61	5,372.8	-402.84	519.3	-1,380.6	706.0	0.00	0.00	0.00
5,700.0	18.09	290.61	5,467.9	-497.90	530.3	-1,409.7	720.9	0.00	0.00	0.00
5,800.0	18.09	290.61	5,563.0	-592.95	541.2	-1,438.7	735.7	0.00	0.00	0.00
5,900.0	18.09	290.61	5,658.0	-688.01	552.1	-1,467.8	750.6	0.00	0.00	0.00
6,000.0	18.09	290.61	5,753.1	-783.07	563.0	-1,496.8	765.4	0.00	0.00	0.00
6,100.0	18.09	290.61	5,848.1	-878.13	574.0	-1,525.9	780.3	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
6,127.1	18.09	290.61	5,873.9	-903.90	576.9	-1,533.8	784.3	0.00	0.00	0.00
6,200.0	21.50	309.77	5,942.6	-972.55	589.5	-1,554.6	799.6	9.99	4.69	26.27
6,300.0	28.56	326.73	6,033.2	-1,063.22	621.3	-1,581.9	834.9	10.00	7.05	16.96
6,400.0	36.91	336.99	6,117.3	-1,147.33	669.0	-1,606.8	885.6	10.00	8.35	10.26
Sharon Springs										
6,471.5	43.26	342.09	6,172.0	-1,202.00	712.1	-1,622.8	930.5	10.00	8.89	7.14
6,500.0	45.85	343.80	6,192.3	-1,222.33	731.2	-1,628.6	950.3	10.00	9.08	5.98
6,600.0	55.08	348.78	6,255.9	-1,285.94	806.1	-1,646.7	1,026.9	10.00	9.24	4.98
Niobrara A Chalk										
6,614.3	56.42	349.40	6,264.0	-1,294.00	817.7	-1,648.9	1,038.8	10.00	9.34	4.31
Niobrara A Chalk Base										
6,664.5	61.13	351.42	6,290.0	-1,320.00	860.0	-1,656.0	1,081.6	10.00	9.39	4.03
6,700.0	64.48	352.74	6,306.2	-1,336.22	891.3	-1,660.4	1,113.2	10.00	9.44	3.72
Niobrara B1 Chalk Top										
6,734.0	67.70	353.94	6,320.0	-1,350.00	922.2	-1,664.0	1,144.3	10.00	9.47	3.52
6,800.0	73.97	356.12	6,341.7	-1,371.66	984.2	-1,669.3	1,206.5	10.00	9.50	3.30
Niobrara B1 Chalk Base										
6,820.6	75.93	356.77	6,347.0	-1,377.00	1,004.1	-1,670.6	1,226.3	10.00	9.52	3.16
6,900.0	83.51	359.19	6,361.2	-1,391.16	1,082.1	-1,673.3	1,304.0	10.00	9.54	3.05
HZ LP: 600ft FSL & 1345ft FWL of Sec 33 - Niobrara B2 Chalk Top (Target)										
6,967.9	90.00	1.20	6,365.0	-1,395.00	1,149.9	-1,673.1	1,371.0	10.00	9.56	2.96
7,000.0	90.00	1.20	6,365.0	-1,395.00	1,182.0	-1,672.4	1,402.7	0.00	0.00	0.00
7,100.0	90.00	1.20	6,365.0	-1,395.00	1,281.9	-1,670.3	1,501.4	0.00	0.00	0.00
7,200.0	90.00	1.20	6,365.0	-1,395.00	1,381.9	-1,668.2	1,600.2	0.00	0.00	0.00
7,300.0	90.00	1.20	6,365.0	-1,395.00	1,481.9	-1,666.1	1,698.9	0.00	0.00	0.00
7,400.0	90.00	1.20	6,365.0	-1,395.00	1,581.9	-1,664.0	1,797.6	0.00	0.00	0.00
7,500.0	90.00	1.20	6,365.0	-1,395.00	1,681.9	-1,661.9	1,896.3	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-4HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	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)
7,600.0	90.00	1.20	6,365.0	-1,395.00	1,781.8	-1,659.8	1,995.0	0.00	0.00	0.00
7,700.0	90.00	1.20	6,365.0	-1,395.00	1,881.8	-1,657.8	2,093.8	0.00	0.00	0.00
7,800.0	90.00	1.20	6,365.0	-1,395.00	1,981.8	-1,655.7	2,192.5	0.00	0.00	0.00
7,900.0	90.00	1.20	6,365.0	-1,395.00	2,081.8	-1,653.6	2,291.2	0.00	0.00	0.00
8,000.0	90.00	1.20	6,365.0	-1,395.00	2,181.7	-1,651.5	2,389.9	0.00	0.00	0.00
8,100.0	90.00	1.20	6,365.0	-1,395.00	2,281.7	-1,649.4	2,488.6	0.00	0.00	0.00
8,200.0	90.00	1.20	6,365.0	-1,395.00	2,381.7	-1,647.3	2,587.4	0.00	0.00	0.00
8,300.0	90.00	1.20	6,365.0	-1,395.00	2,481.7	-1,645.2	2,686.1	0.00	0.00	0.00
8,400.0	90.00	1.20	6,365.0	-1,395.00	2,581.7	-1,643.1	2,784.8	0.00	0.00	0.00
8,500.0	90.00	1.20	6,365.0	-1,395.00	2,681.6	-1,641.0	2,883.5	0.00	0.00	0.00
8,600.0	90.00	1.20	6,365.0	-1,395.00	2,781.6	-1,638.9	2,982.2	0.00	0.00	0.00
8,700.0	90.00	1.20	6,365.0	-1,395.00	2,881.6	-1,636.8	3,081.0	0.00	0.00	0.00
8,800.0	90.00	1.20	6,365.0	-1,395.00	2,981.6	-1,634.7	3,179.7	0.00	0.00	0.00
8,900.0	90.00	1.20	6,365.0	-1,395.00	3,081.5	-1,632.7	3,278.4	0.00	0.00	0.00
9,000.0	90.00	1.20	6,365.0	-1,395.00	3,181.5	-1,630.6	3,377.1	0.00	0.00	0.00
9,100.0	90.00	1.20	6,365.0	-1,395.00	3,281.5	-1,628.5	3,475.8	0.00	0.00	0.00
9,200.0	90.00	1.20	6,365.0	-1,395.00	3,381.5	-1,626.4	3,574.5	0.00	0.00	0.00
9,300.0	90.00	1.20	6,365.0	-1,395.00	3,481.5	-1,624.3	3,673.3	0.00	0.00	0.00
9,400.0	90.00	1.20	6,365.0	-1,395.00	3,581.4	-1,622.2	3,772.0	0.00	0.00	0.00
9,500.0	90.00	1.20	6,365.0	-1,395.00	3,681.4	-1,620.1	3,870.7	0.00	0.00	0.00
9,600.0	90.00	1.20	6,365.0	-1,395.00	3,781.4	-1,618.0	3,969.4	0.00	0.00	0.00
9,700.0	90.00	1.20	6,365.0	-1,395.00	3,881.4	-1,615.9	4,068.1	0.00	0.00	0.00
9,800.0	90.00	1.20	6,365.0	-1,395.00	3,981.3	-1,613.8	4,166.9	0.00	0.00	0.00
9,900.0	90.00	1.20	6,365.0	-1,395.00	4,081.3	-1,611.7	4,265.6	0.00	0.00	0.00
10,000.0	90.00	1.20	6,365.0	-1,395.00	4,181.3	-1,609.6	4,364.3	0.00	0.00	0.00
10,100.0	90.00	1.20	6,365.0	-1,395.00	4,281.3	-1,607.5	4,463.0	0.00	0.00	0.00
10,200.0	90.00	1.20	6,365.0	-1,395.00	4,381.3	-1,605.4	4,561.7	0.00	0.00	0.00
10,300.0	90.00	1.20	6,365.0	-1,395.00	4,481.2	-1,603.4	4,660.5	0.00	0.00	0.00
10,400.0	90.00	1.20	6,365.0	-1,395.00	4,581.2	-1,601.3	4,759.2	0.00	0.00	0.00
10,500.0	90.00	1.20	6,365.0	-1,395.00	4,681.2	-1,599.2	4,857.9	0.00	0.00	0.00
10,600.0	90.00	1.20	6,365.0	-1,395.00	4,781.2	-1,597.1	4,956.6	0.00	0.00	0.00
10,700.0	90.00	1.20	6,365.0	-1,395.00	4,881.2	-1,595.0	5,055.3	0.00	0.00	0.00
10,800.0	90.00	1.20	6,365.0	-1,395.00	4,981.1	-1,592.9	5,154.1	0.00	0.00	0.00
10,900.0	90.00	1.20	6,365.0	-1,395.00	5,081.1	-1,590.8	5,252.8	0.00	0.00	0.00
11,000.0	90.00	1.20	6,365.0	-1,395.00	5,181.1	-1,588.7	5,351.5	0.00	0.00	0.00
11,100.0	90.00	1.20	6,365.0	-1,395.00	5,281.1	-1,586.6	5,450.2	0.00	0.00	0.00
11,200.0	90.00	1.20	6,365.0	-1,395.00	5,381.0	-1,584.5	5,548.9	0.00	0.00	0.00
11,300.0	90.00	1.20	6,365.0	-1,395.00	5,481.0	-1,582.4	5,647.6	0.00	0.00	0.00
11,400.0	90.00	1.20	6,365.0	-1,395.00	5,581.0	-1,580.3	5,746.4	0.00	0.00	0.00
11,500.0	90.00	1.20	6,365.0	-1,395.00	5,681.0	-1,578.2	5,845.1	0.00	0.00	0.00
11,600.0	90.00	1.20	6,365.0	-1,395.00	5,781.0	-1,576.1	5,943.8	0.00	0.00	0.00
11,700.0	90.00	1.20	6,365.0	-1,395.00	5,880.9	-1,574.0	6,042.5	0.00	0.00	0.00
11,800.0	90.00	1.20	6,365.0	-1,395.00	5,980.9	-1,571.9	6,141.2	0.00	0.00	0.00
11,900.0	90.00	1.20	6,365.0	-1,395.00	6,080.9	-1,569.8	6,240.0	0.00	0.00	0.00
12,000.0	90.00	1.20	6,365.0	-1,395.00	6,180.9	-1,567.7	6,338.7	0.00	0.00	0.00
12,100.0	90.00	1.20	6,365.0	-1,395.00	6,280.8	-1,565.6	6,437.4	0.00	0.00	0.00
12,200.0	90.00	1.20	6,365.0	-1,395.00	6,380.8	-1,563.6	6,536.1	0.00	0.00	0.00
12,300.0	90.00	1.20	6,365.0	-1,395.00	6,480.8	-1,561.5	6,634.8	0.00	0.00	0.00
12,400.0	90.00	1.20	6,365.0	-1,395.00	6,580.8	-1,559.4	6,733.6	0.00	0.00	0.00
12,500.0	90.00	1.20	6,365.0	-1,395.00	6,680.8	-1,557.3	6,832.3	0.00	0.00	0.00
12,600.0	90.00	1.20	6,365.0	-1,395.00	6,780.7	-1,555.2	6,931.0	0.00	0.00	0.00
12,700.0	90.00	1.20	6,365.0	-1,395.00	6,880.7	-1,553.1	7,029.7	0.00	0.00	0.00
12,800.0	90.00	1.20	6,365.0	-1,395.00	6,980.7	-1,551.0	7,128.4	0.00	0.00	0.00
12,900.0	90.00	1.20	6,365.0	-1,395.00	7,080.7	-1,548.9	7,227.1	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-4HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	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)
13,000.0	90.00	1.20	6,365.0	-1,395.00	7,180.6	-1,546.8	7,325.9	0.00	0.00	0.00
13,100.0	90.00	1.20	6,365.0	-1,395.00	7,280.6	-1,544.7	7,424.6	0.00	0.00	0.00
13,200.0	90.00	1.20	6,365.0	-1,395.00	7,380.6	-1,542.6	7,523.3	0.00	0.00	0.00
13,300.0	90.00	1.20	6,365.0	-1,395.00	7,480.6	-1,540.5	7,622.0	0.00	0.00	0.00
13,400.0	90.00	1.20	6,365.0	-1,395.00	7,580.6	-1,538.4	7,720.7	0.00	0.00	0.00
13,500.0	90.00	1.20	6,365.0	-1,395.00	7,680.5	-1,536.3	7,819.5	0.00	0.00	0.00
13,600.0	90.00	1.20	6,365.0	-1,395.00	7,780.5	-1,534.2	7,918.2	0.00	0.00	0.00
13,700.0	90.00	1.20	6,365.0	-1,395.00	7,880.5	-1,532.1	8,016.9	0.00	0.00	0.00
13,800.0	90.00	1.20	6,365.0	-1,395.00	7,980.5	-1,530.0	8,115.6	0.00	0.00	0.00
13,900.0	90.00	1.20	6,365.0	-1,395.00	8,080.4	-1,527.9	8,214.3	0.00	0.00	0.00
14,000.0	90.00	1.20	6,365.0	-1,395.00	8,180.4	-1,525.8	8,313.0	0.00	0.00	0.00
14,100.0	90.00	1.20	6,365.0	-1,395.00	8,280.4	-1,523.7	8,411.8	0.00	0.00	0.00
14,200.0	90.00	1.20	6,365.0	-1,395.00	8,380.4	-1,521.6	8,510.5	0.00	0.00	0.00
14,300.0	90.00	1.20	6,365.0	-1,395.00	8,480.4	-1,519.5	8,609.2	0.00	0.00	0.00
14,400.0	90.00	1.20	6,365.0	-1,395.00	8,580.3	-1,517.4	8,707.9	0.00	0.00	0.00
14,500.0	90.00	1.20	6,365.0	-1,395.00	8,680.3	-1,515.3	8,806.6	0.00	0.00	0.00
14,600.0	90.00	1.20	6,365.0	-1,395.00	8,780.3	-1,513.2	8,905.4	0.00	0.00	0.00
14,700.0	90.00	1.20	6,365.0	-1,395.00	8,880.3	-1,511.1	9,004.1	0.00	0.00	0.00
14,800.0	90.00	1.20	6,365.0	-1,395.00	8,980.2	-1,509.0	9,102.8	0.00	0.00	0.00
14,900.0	90.00	1.20	6,365.0	-1,395.00	9,080.2	-1,506.9	9,201.5	0.00	0.00	0.00
15,000.0	90.00	1.20	6,365.0	-1,395.00	9,180.2	-1,504.8	9,300.2	0.00	0.00	0.00
15,100.0	90.00	1.20	6,365.0	-1,395.00	9,280.2	-1,502.7	9,398.9	0.00	0.00	0.00
15,200.0	90.00	1.20	6,365.0	-1,395.00	9,380.2	-1,500.6	9,497.7	0.00	0.00	0.00
15,300.0	90.00	1.20	6,365.0	-1,395.00	9,480.1	-1,498.5	9,596.4	0.00	0.00	0.00
15,400.0	90.00	1.20	6,365.0	-1,395.00	9,580.1	-1,496.4	9,695.1	0.00	0.00	0.00
15,500.0	90.00	1.20	6,365.0	-1,395.00	9,680.1	-1,494.3	9,793.8	0.00	0.00	0.00
15,600.0	90.00	1.20	6,365.0	-1,395.00	9,780.1	-1,492.2	9,892.5	0.00	0.00	0.00
15,700.0	90.00	1.20	6,365.0	-1,395.00	9,880.1	-1,490.1	9,991.3	0.00	0.00	0.00
15,800.0	90.00	1.20	6,365.0	-1,395.00	9,980.0	-1,488.0	10,090.0	0.00	0.00	0.00
15,900.0	90.00	1.20	6,365.0	-1,395.00	10,080.0	-1,485.9	10,188.7	0.00	0.00	0.00
16,000.0	90.00	1.20	6,365.0	-1,395.00	10,180.0	-1,483.8	10,287.4	0.00	0.00	0.00
16,100.0	90.00	1.20	6,365.0	-1,395.00	10,280.0	-1,481.8	10,386.1	0.00	0.00	0.00
16,200.0	90.00	1.20	6,365.0	-1,395.00	10,379.9	-1,479.7	10,484.8	0.00	0.00	0.00
16,300.0	90.00	1.20	6,365.0	-1,395.00	10,479.9	-1,477.6	10,583.6	0.00	0.00	0.00
BHL: 600ft FNL & 1345ft FWL of Sec 28										
16,350.6	90.00	1.20	6,365.0	-1,395.00	10,530.5	-1,476.5	10,633.5	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well WIGEON FED 33-28-4HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB @ 4970.0usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB @ 4970.0usft
Site:	NE NW SEC. 4 T7N R60W 6th P.M.	North Reference:	True
Well:	WIGEON FED 33-28-4HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,593.2	1,564.0	Fox Hills Base				
3,494.1	3,371.0	Richard Sandstone				
3,611.9	3,483.0	Parkman Sandstone				
4,384.1	4,217.0	Sussex Sandstone				
4,913.2	4,720.0	Shannon Sandstone				
6,471.5	6,172.0	Sharon Springs				
6,614.3	6,264.0	Niobrara A Chalk				
6,664.5	6,290.0	Niobrara A Chalk Base				
6,734.0	6,320.0	Niobrara B1 Chalk Top				
6,820.6	6,347.0	Niobrara B1 Chalk Base				
6,967.9	6,365.0	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 & 2264ft FEL of Sec 4
400.0	400.0	0.0	0.0	START NUDGE (2°/100ft BUR)
1,304.3	1,289.4	49.8	-132.5	EOB TO 18.09° INC
1,583.7	1,555.0	80.4	-213.7	SURFACE CASING
6,127.1	5,873.9	576.9	-1,533.8	KOP (10°/100ft DGLG)
6,967.9	6,365.0	1,149.9	-1,673.1	HZ LP: 600ft FSL & 1345ft FWL of Sec 33
16,350.6	6,365.0	10,530.5	-1,476.5	BHL: 600ft FNL & 1345ft FWL of Sec 28