

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

SE SW SEC. 31 T9N R59W 6th P.M.

AF 2

ORIGINAL WELLBORE

23 July, 2019

Plan: PROPOSAL #1





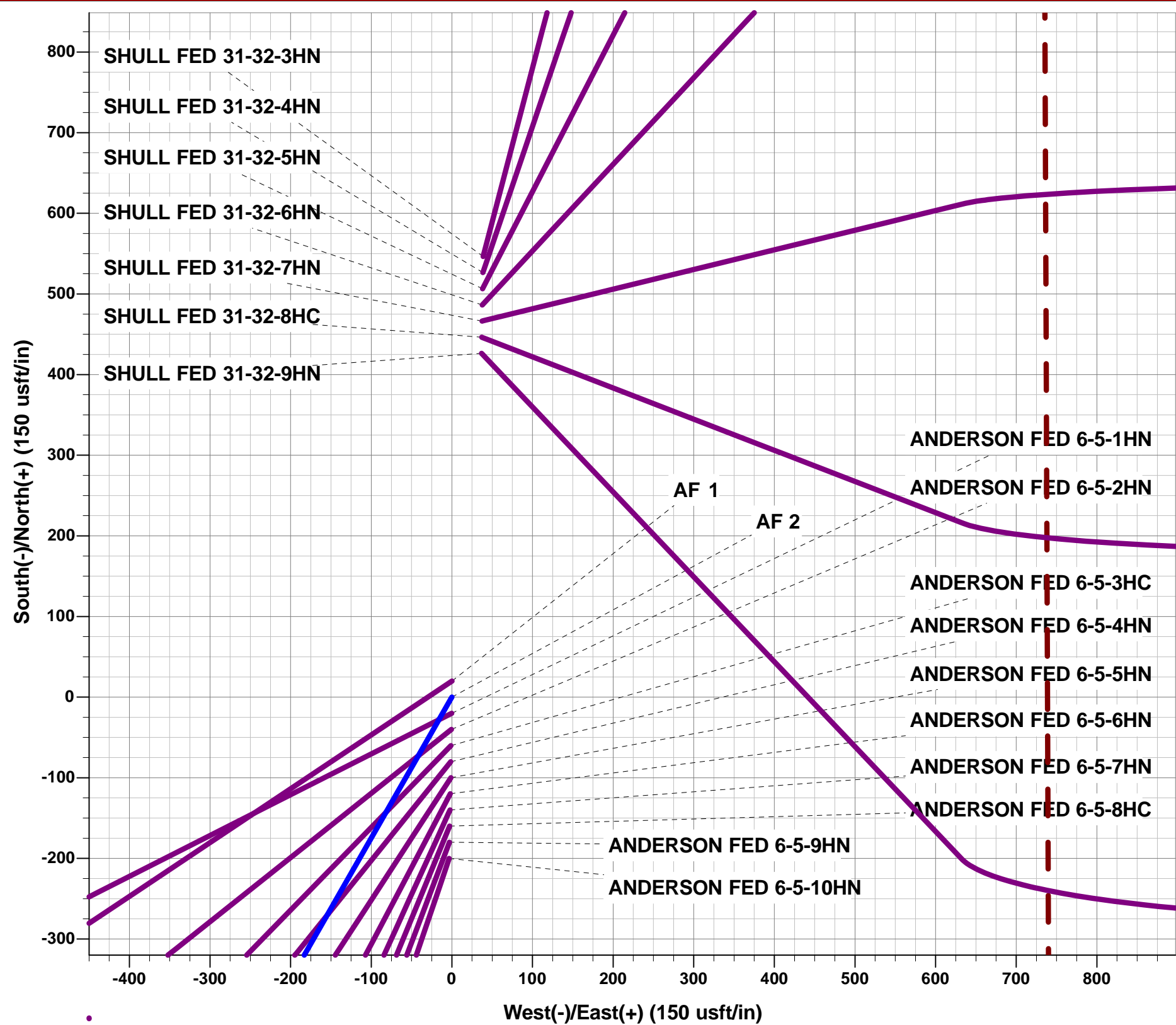
Project: WELD COUNTY, COLORADO (NAD 83)
Site: SE SW SEC. 31 T9N R59W 6th P.M.
Well: AF 2
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

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: 722ft FSL & 1912ft FWL of Sec 31
1100.00	1100.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (3°/100ft BUR)
2406.27	2538.46	43.15	209.78	-448.36	-256.56	-74.13	516.58	EOB TO 43.15° INC
5454.83	6717.32	43.15	209.78	-2929.11	-1676.09	-484.26	3374.75	KOP (10°/100ft BUR)
6048.00	7813.91	90.00	90.32	-3416.29	-1139.21	193.94	4246.75	LP: 2710ft FNL & 300ft FWL of Sec 6
6048.00	17752.48	90.00	90.32	-3471.21	8799.21	9459.15	14185.32	BHL: 2763ft FNL & 300ft FEL of Sec 5

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP - AF 2	6048.00	-3416.29	-1139.21	40.691864	-104.027528
BHL - AF 2	6048.00	-3471.21	8799.21	40.691709	-103.991690



Azimuths to True North
Magnetic North: 7.61°

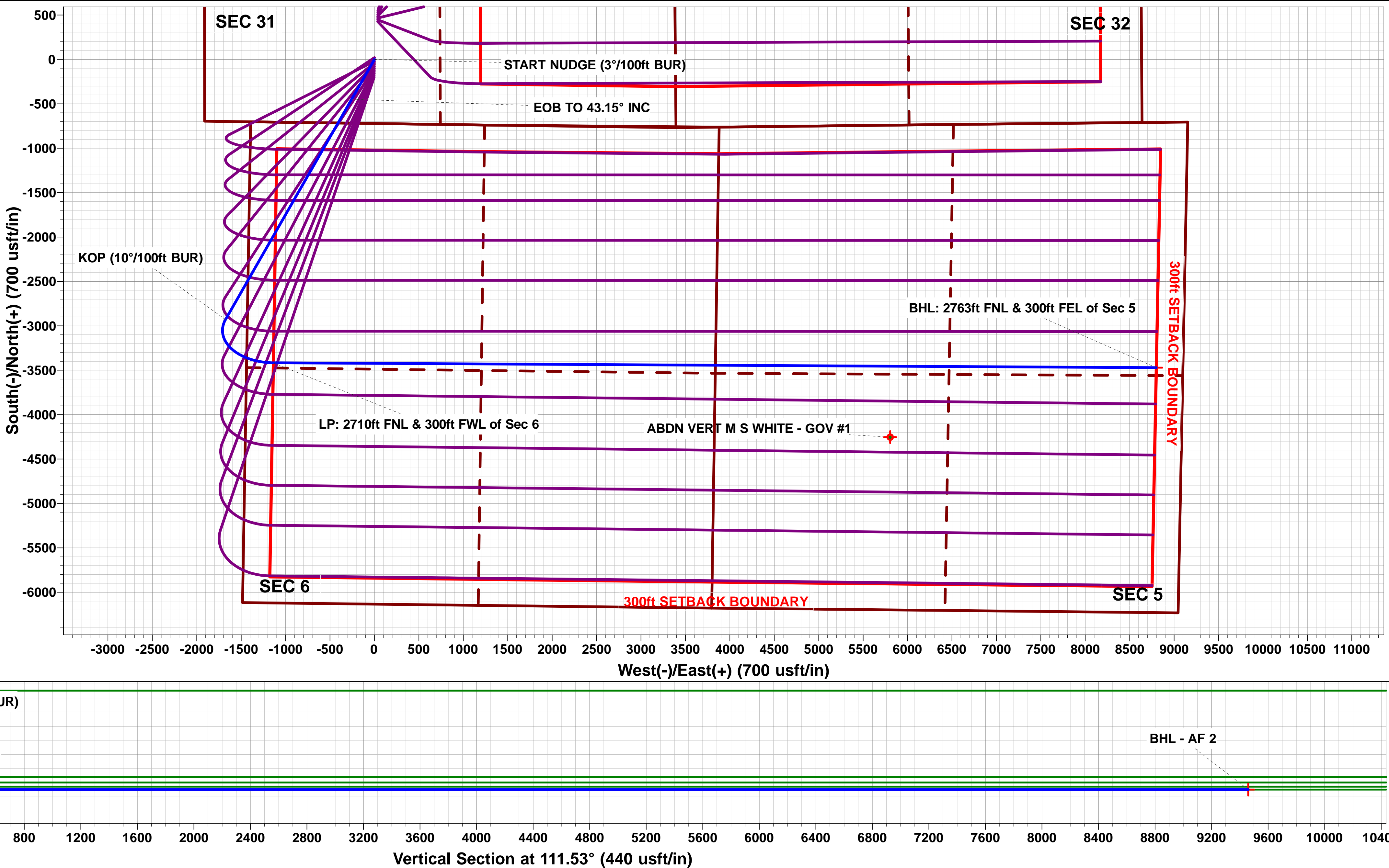
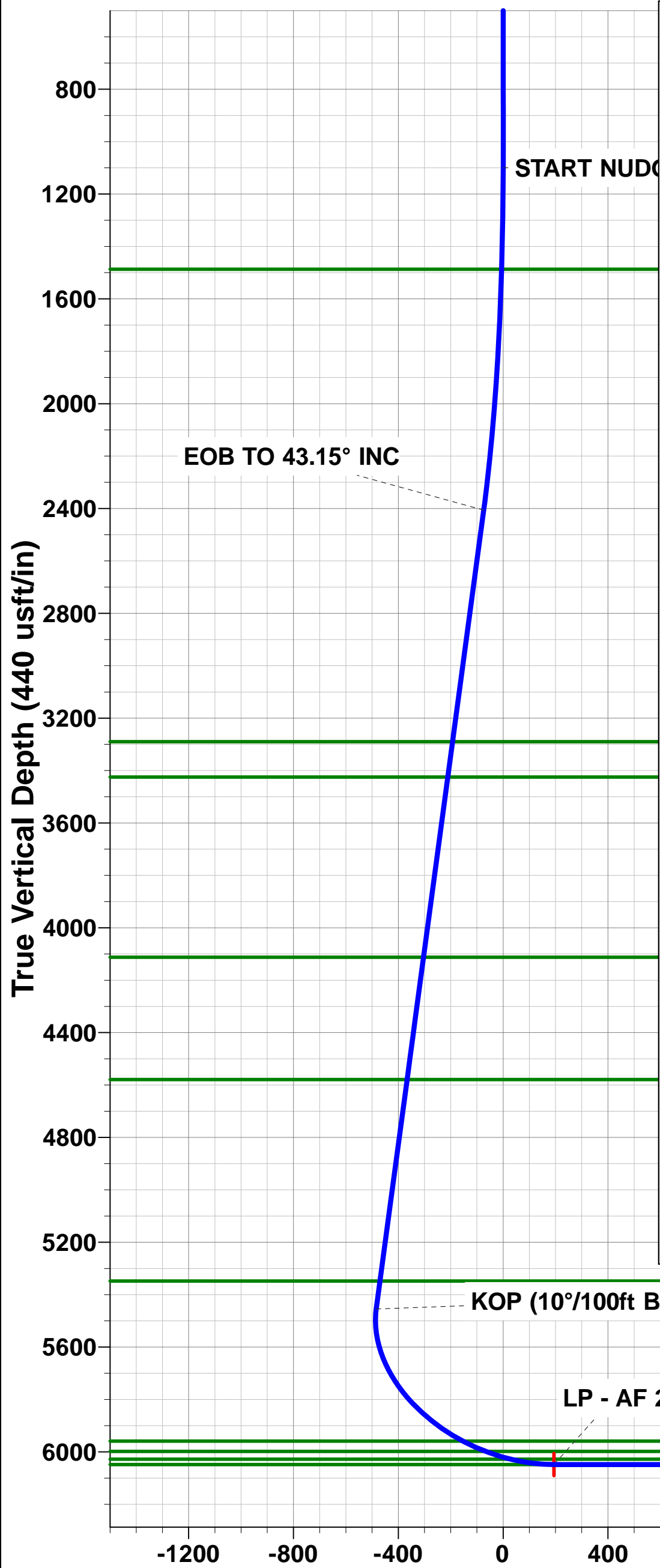
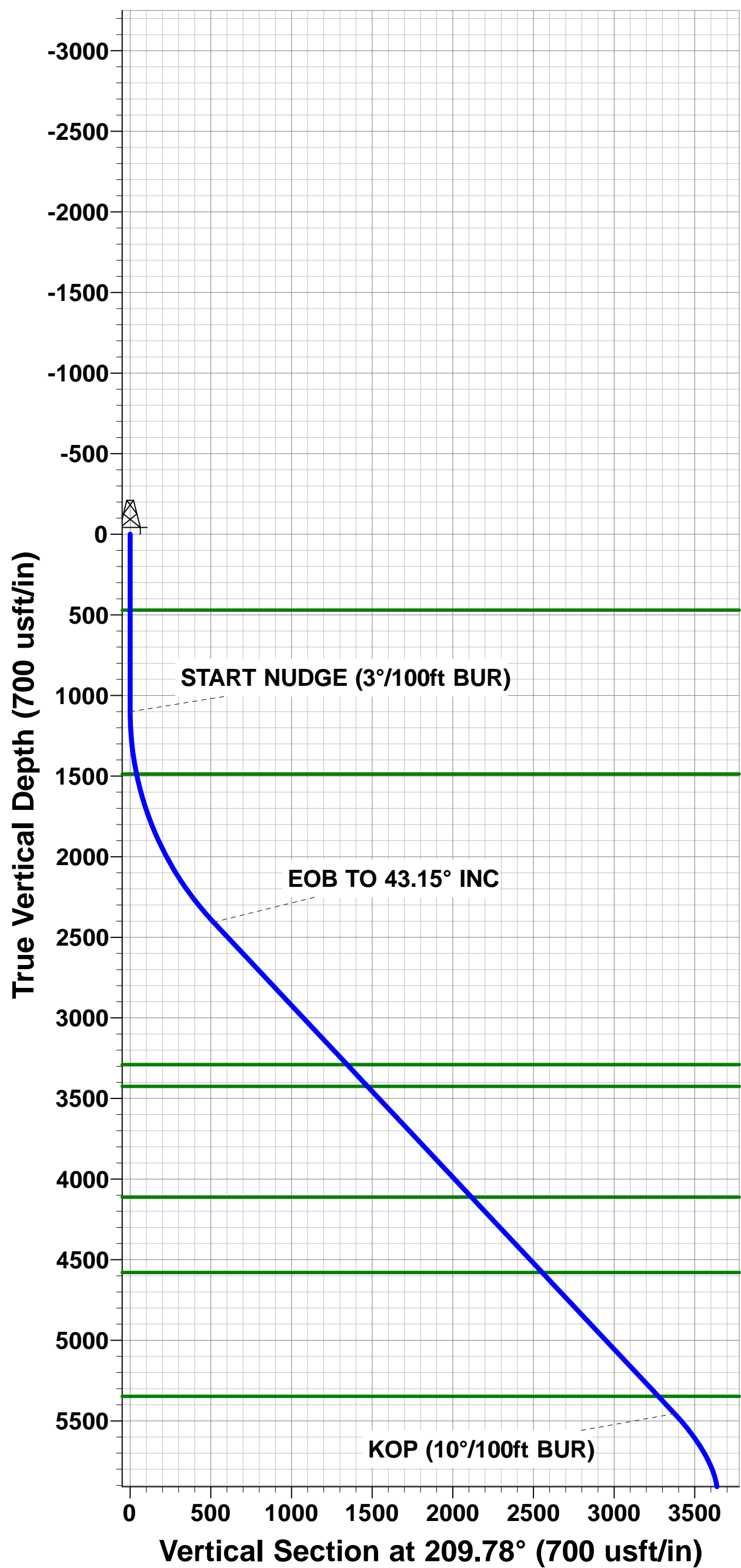
Magnetic Field
Strength: 52382.3snT
Dip Angle: 67.15°
Date: 23/07/2019
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
470.00	470.00	Fox Hills Base
1487.00	1489.70	Pierre Shale Top
3290.00	3749.85	Richard Sandstone
3425.00	3934.90	Parkman Sandstone
4112.00	4876.62	Sussex Sandstone
4579.00	5516.77	Shannon Sandstone
5348.00	6570.88	TeePee Buttes
5959.00	7444.71	Sharon Springs
5998.00	7539.33	Niobrara Top
6028.00	7641.25	Niobrara A Chalk Target Top
6048.00	7813.73	Niobrara A Chalk Tgt Center

PROPOSED LOCAL COORDINATES:

SHL: 722ft FSL & 1912ft FWL of Sec 31
HZ LP: 2710ft FNL & 300ft FWL of Sec 6
BHL: 2763ft FNL & 300ft FEL of Sec 5



Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well AF 2
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	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	SE SW SEC. 31 T9N R59W 6th P.M.		
Site Position:		Northing:	1,501,513.53 usft
From:	Lat/Long	Easting:	3,409,242.57 usft
Position Uncertainty:	0.00 usft	Slot Radius:	1.10 ft
		Latitude:	40.700697
		Longitude:	-104.023987
		Grid Convergence:	0.95 °

Well	AF 2		
Well Position	+N/-S	198.19 usft	Northing: 1,501,714.30 usft
	+E/-W	157.22 usft	Easting: 3,409,396.47 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	40.701241
		Longitude:	-104.023420
		Ground Level:	4,878.00 usft

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	23/07/2019	7.61	67.15	52,382

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 (°)
	6,048.00	0.00	0.00	111.53

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	-4,903.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,100.00	0.00	0.00	1,100.00	-3,803.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,538.46	43.15	209.78	2,406.27	-2,496.73	-448.36	-256.56	3.00	3.00	0.00	209.78	
6,717.32	43.15	209.78	5,454.83	551.83	-2,929.11	-1,676.09	0.00	0.00	0.00	0.00	
7,813.91	90.00	90.32	6,048.00	1,145.00	-3,416.29	-1,139.21	10.00	4.27	-10.89	-112.40	LP - AF 2
17,752.48	90.00	90.32	6,048.00	1,145.00	-3,471.21	8,799.21	0.00	0.00	0.00	0.00	BHL - AF 2

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	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: 722ft FSL & 1912ft FWL of Sec 31										
0.00	0.00	0.00	0.00	4,903.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,803.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,703.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	4,603.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	4,503.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base										
470.00	0.00	0.00	470.00	4,433.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	4,403.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	4,303.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	4,203.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	4,103.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	4,003.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	3,903.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (3°/100ft BUR)										
1,100.00	0.00	0.00	1,100.00	3,803.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	3.00	209.78	1,199.95	3,703.05	-2.27	-1.30	-0.38	3.00	3.00	0.00
1,300.00	6.00	209.78	1,299.63	3,603.37	-9.08	-5.20	-1.50	3.00	3.00	0.00
1,400.00	9.00	209.78	1,398.77	3,504.23	-20.41	-11.68	-3.37	3.00	3.00	0.00
Pierre Shale Top										
1,489.70	11.69	209.78	1,487.00	3,416.00	-34.39	-19.68	-5.69	3.00	3.00	0.00
1,500.00	12.00	209.78	1,497.08	3,405.92	-36.22	-20.73	-5.99	3.00	3.00	0.00
1,600.00	15.00	209.78	1,594.31	3,308.69	-56.48	-32.32	-9.34	3.00	3.00	0.00
1,700.00	18.00	209.78	1,690.18	3,212.82	-81.13	-46.42	-13.41	3.00	3.00	0.00
1,800.00	21.00	209.78	1,784.43	3,118.57	-110.10	-63.00	-18.20	3.00	3.00	0.00
1,900.00	24.00	209.78	1,876.81	3,026.19	-143.31	-82.01	-23.69	3.00	3.00	0.00
2,000.00	27.00	209.78	1,967.06	2,935.94	-180.67	-103.38	-29.87	3.00	3.00	0.00
2,100.00	30.00	209.78	2,054.93	2,848.07	-222.08	-127.08	-36.72	3.00	3.00	0.00
2,200.00	33.00	209.78	2,140.18	2,762.82	-267.43	-153.03	-44.21	3.00	3.00	0.00
2,300.00	36.00	209.78	2,222.59	2,680.41	-316.58	-181.16	-52.34	3.00	3.00	0.00
2,400.00	39.00	209.78	2,301.91	2,601.09	-369.42	-211.39	-61.07	3.00	3.00	0.00
2,500.00	42.00	209.78	2,377.95	2,525.05	-425.78	-243.64	-70.39	3.00	3.00	0.00
EOB TO 43.15° INC										
2,538.46	43.15	209.78	2,406.27	2,496.73	-448.36	-256.56	-74.13	3.00	3.00	0.00
2,600.00	43.15	209.78	2,451.16	2,451.84	-484.90	-277.47	-80.17	0.00	0.00	0.00
2,700.00	43.15	209.78	2,524.11	2,378.89	-544.26	-311.44	-89.98	0.00	0.00	0.00
2,800.00	43.15	209.78	2,597.06	2,305.94	-603.62	-345.40	-99.80	0.00	0.00	0.00
2,900.00	43.15	209.78	2,670.02	2,232.98	-662.99	-379.37	-109.61	0.00	0.00	0.00
3,000.00	43.15	209.78	2,742.97	2,160.03	-722.35	-413.34	-119.42	0.00	0.00	0.00
3,100.00	43.15	209.78	2,815.92	2,087.08	-781.72	-447.31	-129.24	0.00	0.00	0.00
3,200.00	43.15	209.78	2,888.87	2,014.13	-841.08	-481.28	-139.05	0.00	0.00	0.00
3,300.00	43.15	209.78	2,961.82	1,941.18	-900.44	-515.25	-148.87	0.00	0.00	0.00
3,400.00	43.15	209.78	3,034.78	1,868.22	-959.81	-549.22	-158.68	0.00	0.00	0.00
3,500.00	43.15	209.78	3,107.73	1,795.27	-1,019.17	-583.19	-168.50	0.00	0.00	0.00
3,600.00	43.15	209.78	3,180.68	1,722.32	-1,078.54	-617.16	-178.31	0.00	0.00	0.00
3,700.00	43.15	209.78	3,253.63	1,649.37	-1,137.90	-651.13	-188.13	0.00	0.00	0.00
Richard Sandstone										
3,749.85	43.15	209.78	3,290.00	1,613.00	-1,167.49	-668.06	-193.02	0.00	0.00	0.00
3,800.00	43.15	209.78	3,326.58	1,576.42	-1,197.26	-685.10	-197.94	0.00	0.00	0.00
3,900.00	43.15	209.78	3,399.54	1,503.46	-1,256.63	-719.07	-207.76	0.00	0.00	0.00
Parkman Sandstone										
3,934.90	43.15	209.78	3,425.00	1,478.00	-1,277.35	-730.92	-211.18	0.00	0.00	0.00
4,000.00	43.15	209.78	3,472.49	1,430.51	-1,315.99	-753.03	-217.57	0.00	0.00	0.00

Planning Report



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Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	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)
4,100.00	43.15	209.78	3,545.44	1,357.56	-1,375.36	-787.00	-227.38	0.00	0.00	0.00
4,200.00	43.15	209.78	3,618.39	1,284.61	-1,434.72	-820.97	-237.20	0.00	0.00	0.00
4,300.00	43.15	209.78	3,691.34	1,211.66	-1,494.09	-854.94	-247.01	0.00	0.00	0.00
4,400.00	43.15	209.78	3,764.30	1,138.70	-1,553.45	-888.91	-256.83	0.00	0.00	0.00
4,500.00	43.15	209.78	3,837.25	1,065.75	-1,612.81	-922.88	-266.64	0.00	0.00	0.00
4,600.00	43.15	209.78	3,910.20	992.80	-1,672.18	-956.85	-276.46	0.00	0.00	0.00
4,700.00	43.15	209.78	3,983.15	919.85	-1,731.54	-990.82	-286.27	0.00	0.00	0.00
4,800.00	43.15	209.78	4,056.10	846.90	-1,790.91	-1,024.79	-296.09	0.00	0.00	0.00
Sussex Sandstone										
4,876.62	43.15	209.78	4,112.00	791.00	-1,836.39	-1,050.82	-303.61	0.00	0.00	0.00
4,900.00	43.15	209.78	4,129.06	773.94	-1,850.27	-1,058.76	-305.90	0.00	0.00	0.00
5,000.00	43.15	209.78	4,202.01	700.99	-1,909.63	-1,092.73	-315.72	0.00	0.00	0.00
5,100.00	43.15	209.78	4,274.96	628.04	-1,969.00	-1,126.70	-325.53	0.00	0.00	0.00
5,200.00	43.15	209.78	4,347.91	555.09	-2,028.36	-1,160.67	-335.34	0.00	0.00	0.00
5,300.00	43.15	209.78	4,420.86	482.14	-2,087.73	-1,194.63	-345.16	0.00	0.00	0.00
5,400.00	43.15	209.78	4,493.82	409.18	-2,147.09	-1,228.60	-354.97	0.00	0.00	0.00
5,500.00	43.15	209.78	4,566.77	336.23	-2,206.45	-1,262.57	-364.79	0.00	0.00	0.00
Shannon Sandstone										
5,516.77	43.15	209.78	4,579.00	324.00	-2,216.41	-1,268.27	-366.43	0.00	0.00	0.00
5,600.00	43.15	209.78	4,639.72	263.28	-2,265.82	-1,296.54	-374.60	0.00	0.00	0.00
5,700.00	43.15	209.78	4,712.67	190.33	-2,325.18	-1,330.51	-384.42	0.00	0.00	0.00
5,800.00	43.15	209.78	4,785.62	117.38	-2,384.55	-1,364.48	-394.23	0.00	0.00	0.00
5,900.00	43.15	209.78	4,858.58	44.42	-2,443.91	-1,398.45	-404.05	0.00	0.00	0.00
6,000.00	43.15	209.78	4,931.53	-28.53	-2,503.27	-1,432.42	-413.86	0.00	0.00	0.00
6,100.00	43.15	209.78	5,004.48	-101.48	-2,562.64	-1,466.39	-423.68	0.00	0.00	0.00
6,200.00	43.15	209.78	5,077.43	-174.43	-2,622.00	-1,500.36	-433.49	0.00	0.00	0.00
6,300.00	43.15	209.78	5,150.38	-247.38	-2,681.37	-1,534.33	-443.30	0.00	0.00	0.00
6,400.00	43.15	209.78	5,223.34	-320.34	-2,740.73	-1,568.30	-453.12	0.00	0.00	0.00
6,500.00	43.15	209.78	5,296.29	-393.29	-2,800.10	-1,602.27	-462.93	0.00	0.00	0.00
TeePee Buttes										
6,570.88	43.15	209.78	5,348.00	-445.00	-2,842.17	-1,626.34	-469.89	0.00	0.00	0.00
6,600.00	43.15	209.78	5,369.24	-466.24	-2,859.46	-1,636.23	-472.75	0.00	0.00	0.00
6,700.00	43.15	209.78	5,442.19	-539.19	-2,918.82	-1,670.20	-482.56	0.00	0.00	0.00
KOP (10°/100ft BUR)										
6,717.32	43.15	209.78	5,454.83	-551.83	-2,929.11	-1,676.09	-484.26	0.00	0.00	0.00
6,800.00	40.59	197.99	5,516.49	-613.49	-2,979.31	-1,698.48	-486.66	10.00	-3.10	-14.26
6,900.00	39.25	182.51	5,593.38	-690.38	-3,042.02	-1,709.94	-474.32	10.00	-1.34	-15.47
7,000.00	40.01	166.85	5,670.59	-767.59	-3,105.08	-1,704.00	-445.65	10.00	0.76	-15.66
7,100.00	42.76	152.28	5,745.79	-842.79	-3,166.59	-1,680.84	-401.53	10.00	2.75	-14.57
7,200.00	47.15	139.54	5,816.68	-913.68	-3,224.68	-1,641.16	-343.30	10.00	4.39	-12.74
7,300.00	52.75	128.69	5,881.12	-978.12	-3,277.59	-1,586.17	-272.74	10.00	5.60	-10.85
7,400.00	59.19	119.45	5,937.13	-1,034.13	-3,323.70	-1,517.54	-191.97	10.00	6.44	-9.24
Sharon Springs										
7,444.71	62.27	115.73	5,959.00	-1,056.00	-3,341.74	-1,482.97	-153.20	10.00	6.89	-8.32
7,500.00	66.20	111.42	5,983.04	-1,080.04	-3,361.61	-1,437.35	-103.46	10.00	7.12	-7.80
Niobrara Top										
7,539.33	69.07	108.51	5,998.00	-1,095.00	-3,374.01	-1,403.17	-67.12	10.00	7.30	-7.40
7,600.00	73.59	104.23	6,017.43	-1,114.43	-3,390.17	-1,348.04	-9.90	10.00	7.44	-7.05
Niobrara A Chalk Target Top										
7,641.25	76.71	101.44	6,028.00	-1,125.00	-3,399.02	-1,309.17	29.50	10.00	7.56	-6.77
7,700.00	81.20	97.58	6,039.26	-1,136.26	-3,408.53	-1,252.32	85.87	10.00	7.65	-6.57
7,800.00	88.92	91.20	6,047.87	-1,144.87	-3,416.10	-1,153.11	180.94	10.00	7.72	-6.38
Niobrara A Chalk Target Center										

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well AF 2
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	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)
7,813.73	89.99	90.33	6,048.00	-1,145.00	-3,416.29	-1,139.38	193.78	10.00	7.75	-6.32
LP: 2710ft FNL & 300ft FWL of Sec 6										
7,813.91	90.00	90.32	6,048.00	-1,145.00	-3,416.29	-1,139.21	193.94	10.00	7.75	-6.32
7,900.00	90.00	90.32	6,048.00	-1,145.00	-3,416.76	-1,053.12	274.20	0.00	0.00	0.00
8,000.00	90.00	90.32	6,048.00	-1,145.00	-3,417.32	-953.12	367.43	0.00	0.00	0.00
8,100.00	90.00	90.32	6,048.00	-1,145.00	-3,417.87	-853.12	460.65	0.00	0.00	0.00
8,200.00	90.00	90.32	6,048.00	-1,145.00	-3,418.42	-753.12	553.88	0.00	0.00	0.00
8,300.00	90.00	90.32	6,048.00	-1,145.00	-3,418.97	-653.12	647.10	0.00	0.00	0.00
8,400.00	90.00	90.32	6,048.00	-1,145.00	-3,419.53	-553.12	740.33	0.00	0.00	0.00
8,500.00	90.00	90.32	6,048.00	-1,145.00	-3,420.08	-453.12	833.55	0.00	0.00	0.00
8,600.00	90.00	90.32	6,048.00	-1,145.00	-3,420.63	-353.13	926.77	0.00	0.00	0.00
8,700.00	90.00	90.32	6,048.00	-1,145.00	-3,421.18	-253.13	1,020.00	0.00	0.00	0.00
8,800.00	90.00	90.32	6,048.00	-1,145.00	-3,421.74	-153.13	1,113.22	0.00	0.00	0.00
8,900.00	90.00	90.32	6,048.00	-1,145.00	-3,422.29	-53.13	1,206.45	0.00	0.00	0.00
9,000.00	90.00	90.32	6,048.00	-1,145.00	-3,422.84	46.87	1,299.67	0.00	0.00	0.00
9,100.00	90.00	90.32	6,048.00	-1,145.00	-3,423.39	146.87	1,392.90	0.00	0.00	0.00
9,200.00	90.00	90.32	6,048.00	-1,145.00	-3,423.95	246.86	1,486.12	0.00	0.00	0.00
9,300.00	90.00	90.32	6,048.00	-1,145.00	-3,424.50	346.86	1,579.35	0.00	0.00	0.00
9,400.00	90.00	90.32	6,048.00	-1,145.00	-3,425.05	446.86	1,672.57	0.00	0.00	0.00
9,500.00	90.00	90.32	6,048.00	-1,145.00	-3,425.60	546.86	1,765.80	0.00	0.00	0.00
9,600.00	90.00	90.32	6,048.00	-1,145.00	-3,426.16	646.86	1,859.02	0.00	0.00	0.00
9,700.00	90.00	90.32	6,048.00	-1,145.00	-3,426.71	746.86	1,952.25	0.00	0.00	0.00
9,800.00	90.00	90.32	6,048.00	-1,145.00	-3,427.26	846.86	2,045.47	0.00	0.00	0.00
9,900.00	90.00	90.32	6,048.00	-1,145.00	-3,427.82	946.85	2,138.70	0.00	0.00	0.00
10,000.00	90.00	90.32	6,048.00	-1,145.00	-3,428.37	1,046.85	2,231.92	0.00	0.00	0.00
10,100.00	90.00	90.32	6,048.00	-1,145.00	-3,428.92	1,146.85	2,325.15	0.00	0.00	0.00
10,200.00	90.00	90.32	6,048.00	-1,145.00	-3,429.47	1,246.85	2,418.37	0.00	0.00	0.00
10,300.00	90.00	90.32	6,048.00	-1,145.00	-3,430.03	1,346.85	2,511.59	0.00	0.00	0.00
10,400.00	90.00	90.32	6,048.00	-1,145.00	-3,430.58	1,446.85	2,604.82	0.00	0.00	0.00
10,500.00	90.00	90.32	6,048.00	-1,145.00	-3,431.13	1,546.84	2,698.04	0.00	0.00	0.00
10,600.00	90.00	90.32	6,048.00	-1,145.00	-3,431.68	1,646.84	2,791.27	0.00	0.00	0.00
10,700.00	90.00	90.32	6,048.00	-1,145.00	-3,432.24	1,746.84	2,884.49	0.00	0.00	0.00
10,800.00	90.00	90.32	6,048.00	-1,145.00	-3,432.79	1,846.84	2,977.72	0.00	0.00	0.00
10,900.00	90.00	90.32	6,048.00	-1,145.00	-3,433.34	1,946.84	3,070.94	0.00	0.00	0.00
11,000.00	90.00	90.32	6,048.00	-1,145.00	-3,433.89	2,046.84	3,164.17	0.00	0.00	0.00
11,100.00	90.00	90.32	6,048.00	-1,145.00	-3,434.45	2,146.84	3,257.39	0.00	0.00	0.00
11,200.00	90.00	90.32	6,048.00	-1,145.00	-3,435.00	2,246.83	3,350.62	0.00	0.00	0.00
11,300.00	90.00	90.32	6,048.00	-1,145.00	-3,435.55	2,346.83	3,443.84	0.00	0.00	0.00
11,400.00	90.00	90.32	6,048.00	-1,145.00	-3,436.10	2,446.83	3,537.07	0.00	0.00	0.00
11,500.00	90.00	90.32	6,048.00	-1,145.00	-3,436.66	2,546.83	3,630.29	0.00	0.00	0.00
11,600.00	90.00	90.32	6,048.00	-1,145.00	-3,437.21	2,646.83	3,723.52	0.00	0.00	0.00
11,700.00	90.00	90.32	6,048.00	-1,145.00	-3,437.76	2,746.83	3,816.74	0.00	0.00	0.00
11,800.00	90.00	90.32	6,048.00	-1,145.00	-3,438.32	2,846.83	3,909.97	0.00	0.00	0.00
11,900.00	90.00	90.32	6,048.00	-1,145.00	-3,438.87	2,946.82	4,003.19	0.00	0.00	0.00
12,000.00	90.00	90.32	6,048.00	-1,145.00	-3,439.42	3,046.82	4,096.41	0.00	0.00	0.00
12,100.00	90.00	90.32	6,048.00	-1,145.00	-3,439.97	3,146.82	4,189.64	0.00	0.00	0.00
12,200.00	90.00	90.32	6,048.00	-1,145.00	-3,440.53	3,246.82	4,282.86	0.00	0.00	0.00
12,300.00	90.00	90.32	6,048.00	-1,145.00	-3,441.08	3,346.82	4,376.09	0.00	0.00	0.00
12,400.00	90.00	90.32	6,048.00	-1,145.00	-3,441.63	3,446.82	4,469.31	0.00	0.00	0.00
12,500.00	90.00	90.32	6,048.00	-1,145.00	-3,442.18	3,546.81	4,562.54	0.00	0.00	0.00
12,600.00	90.00	90.32	6,048.00	-1,145.00	-3,442.74	3,646.81	4,655.76	0.00	0.00	0.00
12,700.00	90.00	90.32	6,048.00	-1,145.00	-3,443.29	3,746.81	4,748.99	0.00	0.00	0.00
12,800.00	90.00	90.32	6,048.00	-1,145.00	-3,443.84	3,846.81	4,842.21	0.00	0.00	0.00
12,900.00	90.00	90.32	6,048.00	-1,145.00	-3,444.39	3,946.81	4,935.44	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well AF 2
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	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)
13,000.00	90.00	90.32	6,048.00	-1,145.00	-3,444.95	4,046.81	5,028.66	0.00	0.00	0.00
13,100.00	90.00	90.32	6,048.00	-1,145.00	-3,445.50	4,146.81	5,121.89	0.00	0.00	0.00
13,200.00	90.00	90.32	6,048.00	-1,145.00	-3,446.05	4,246.80	5,215.11	0.00	0.00	0.00
13,300.00	90.00	90.32	6,048.00	-1,145.00	-3,446.60	4,346.80	5,308.34	0.00	0.00	0.00
13,400.00	90.00	90.32	6,048.00	-1,145.00	-3,447.16	4,446.80	5,401.56	0.00	0.00	0.00
13,500.00	90.00	90.32	6,048.00	-1,145.00	-3,447.71	4,546.80	5,494.79	0.00	0.00	0.00
13,600.00	90.00	90.32	6,048.00	-1,145.00	-3,448.26	4,646.80	5,588.01	0.00	0.00	0.00
13,700.00	90.00	90.32	6,048.00	-1,145.00	-3,448.82	4,746.80	5,681.23	0.00	0.00	0.00
13,800.00	90.00	90.32	6,048.00	-1,145.00	-3,449.37	4,846.79	5,774.46	0.00	0.00	0.00
13,900.00	90.00	90.32	6,048.00	-1,145.00	-3,449.92	4,946.79	5,867.68	0.00	0.00	0.00
14,000.00	90.00	90.32	6,048.00	-1,145.00	-3,450.47	5,046.79	5,960.91	0.00	0.00	0.00
14,100.00	90.00	90.32	6,048.00	-1,145.00	-3,451.03	5,146.79	6,054.13	0.00	0.00	0.00
14,200.00	90.00	90.32	6,048.00	-1,145.00	-3,451.58	5,246.79	6,147.36	0.00	0.00	0.00
14,300.00	90.00	90.32	6,048.00	-1,145.00	-3,452.13	5,346.79	6,240.58	0.00	0.00	0.00
14,400.00	90.00	90.32	6,048.00	-1,145.00	-3,452.68	5,446.79	6,333.81	0.00	0.00	0.00
14,500.00	90.00	90.32	6,048.00	-1,145.00	-3,453.24	5,546.78	6,427.03	0.00	0.00	0.00
14,600.00	90.00	90.32	6,048.00	-1,145.00	-3,453.79	5,646.78	6,520.26	0.00	0.00	0.00
14,700.00	90.00	90.32	6,048.00	-1,145.00	-3,454.34	5,746.78	6,613.48	0.00	0.00	0.00
14,800.00	90.00	90.32	6,048.00	-1,145.00	-3,454.89	5,846.78	6,706.71	0.00	0.00	0.00
14,900.00	90.00	90.32	6,048.00	-1,145.00	-3,455.45	5,946.78	6,799.93	0.00	0.00	0.00
15,000.00	90.00	90.32	6,048.00	-1,145.00	-3,456.00	6,046.78	6,893.16	0.00	0.00	0.00
15,100.00	90.00	90.32	6,048.00	-1,145.00	-3,456.55	6,146.77	6,986.38	0.00	0.00	0.00
15,200.00	90.00	90.32	6,048.00	-1,145.00	-3,457.10	6,246.77	7,079.61	0.00	0.00	0.00
15,300.00	90.00	90.32	6,048.00	-1,145.00	-3,457.66	6,346.77	7,172.83	0.00	0.00	0.00
15,400.00	90.00	90.32	6,048.00	-1,145.00	-3,458.21	6,446.77	7,266.05	0.00	0.00	0.00
15,500.00	90.00	90.32	6,048.00	-1,145.00	-3,458.76	6,546.77	7,359.28	0.00	0.00	0.00
15,600.00	90.00	90.32	6,048.00	-1,145.00	-3,459.32	6,646.77	7,452.50	0.00	0.00	0.00
15,700.00	90.00	90.32	6,048.00	-1,145.00	-3,459.87	6,746.77	7,545.73	0.00	0.00	0.00
15,800.00	90.00	90.32	6,048.00	-1,145.00	-3,460.42	6,846.76	7,638.95	0.00	0.00	0.00
15,900.00	90.00	90.32	6,048.00	-1,145.00	-3,460.97	6,946.76	7,732.18	0.00	0.00	0.00
16,000.00	90.00	90.32	6,048.00	-1,145.00	-3,461.53	7,046.76	7,825.40	0.00	0.00	0.00
16,100.00	90.00	90.32	6,048.00	-1,145.00	-3,462.08	7,146.76	7,918.63	0.00	0.00	0.00
16,200.00	90.00	90.32	6,048.00	-1,145.00	-3,462.63	7,246.76	8,011.85	0.00	0.00	0.00
16,300.00	90.00	90.32	6,048.00	-1,145.00	-3,463.18	7,346.76	8,105.08	0.00	0.00	0.00
16,400.00	90.00	90.32	6,048.00	-1,145.00	-3,463.74	7,446.75	8,198.30	0.00	0.00	0.00
16,500.00	90.00	90.32	6,048.00	-1,145.00	-3,464.29	7,546.75	8,291.53	0.00	0.00	0.00
16,600.00	90.00	90.32	6,048.00	-1,145.00	-3,464.84	7,646.75	8,384.75	0.00	0.00	0.00
16,700.00	90.00	90.32	6,048.00	-1,145.00	-3,465.39	7,746.75	8,477.98	0.00	0.00	0.00
16,800.00	90.00	90.32	6,048.00	-1,145.00	-3,465.95	7,846.75	8,571.20	0.00	0.00	0.00
16,900.00	90.00	90.32	6,048.00	-1,145.00	-3,466.50	7,946.75	8,664.43	0.00	0.00	0.00
17,000.00	90.00	90.32	6,048.00	-1,145.00	-3,467.05	8,046.75	8,757.65	0.00	0.00	0.00
17,100.00	90.00	90.32	6,048.00	-1,145.00	-3,467.60	8,146.74	8,850.87	0.00	0.00	0.00
17,200.00	90.00	90.32	6,048.00	-1,145.00	-3,468.16	8,246.74	8,944.10	0.00	0.00	0.00
17,300.00	90.00	90.32	6,048.00	-1,145.00	-3,468.71	8,346.74	9,037.32	0.00	0.00	0.00
17,400.00	90.00	90.32	6,048.00	-1,145.00	-3,469.26	8,446.74	9,130.55	0.00	0.00	0.00
17,500.00	90.00	90.32	6,048.00	-1,145.00	-3,469.82	8,546.74	9,223.77	0.00	0.00	0.00
17,600.00	90.00	90.32	6,048.00	-1,145.00	-3,470.37	8,646.74	9,317.00	0.00	0.00	0.00
17,700.00	90.00	90.32	6,048.00	-1,145.00	-3,470.92	8,746.74	9,410.22	0.00	0.00	0.00
BHL: 2763ft FNL & 300ft FEL of Sec 5										
17,752.48	90.00	90.32	6,048.00	-1,145.00	-3,471.21	8,799.21	9,459.15	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well AF 2
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft (Original Well Elev)
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	AF 2	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
470.00	470.00	Fox Hills Base			
1,489.70	1,487.00	Pierre Shale Top			
3,749.85	3,290.00	Richard Sandstone			
3,934.90	3,425.00	Parkman Sandstone			
4,876.62	4,112.00	Sussex Sandstone			
5,516.77	4,579.00	Shannon Sandstone			
6,570.88	5,348.00	TeePee Buttes			
7,444.71	5,959.00	Sharon Springs			
7,539.33	5,998.00	Niobrara Top			
7,641.25	6,028.00	Niobrara A Chalk Target Top			
7,813.73	6,048.00	Niobrara A Chalk Target Center			

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	SHL: 722ft FSL & 1912ft FWL of Sec 31
1,100.00	1,100.00	0.00	0.00	START NUDGE (3°/100ft BUR)
2,538.46	2,406.27	-448.36	-256.56	EOB TO 43.15° INC
6,717.32	5,454.83	-2,929.11	-1,676.09	KOP (10°/100ft BUR)
7,813.91	6,048.00	-3,416.29	-1,139.21	LP: 2710ft FNL & 300ft FWL of Sec 6
17,752.48	6,048.00	-3,471.21	8,799.21	BHL: 2763ft FNL & 300ft FEL of Sec 5