

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

ANDERSON FED 6-5-8HC

ORIGINAL WELLBORE

25 July, 2019

Plan: PROPOSAL #2





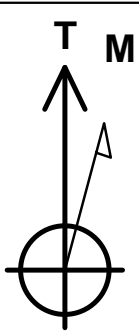
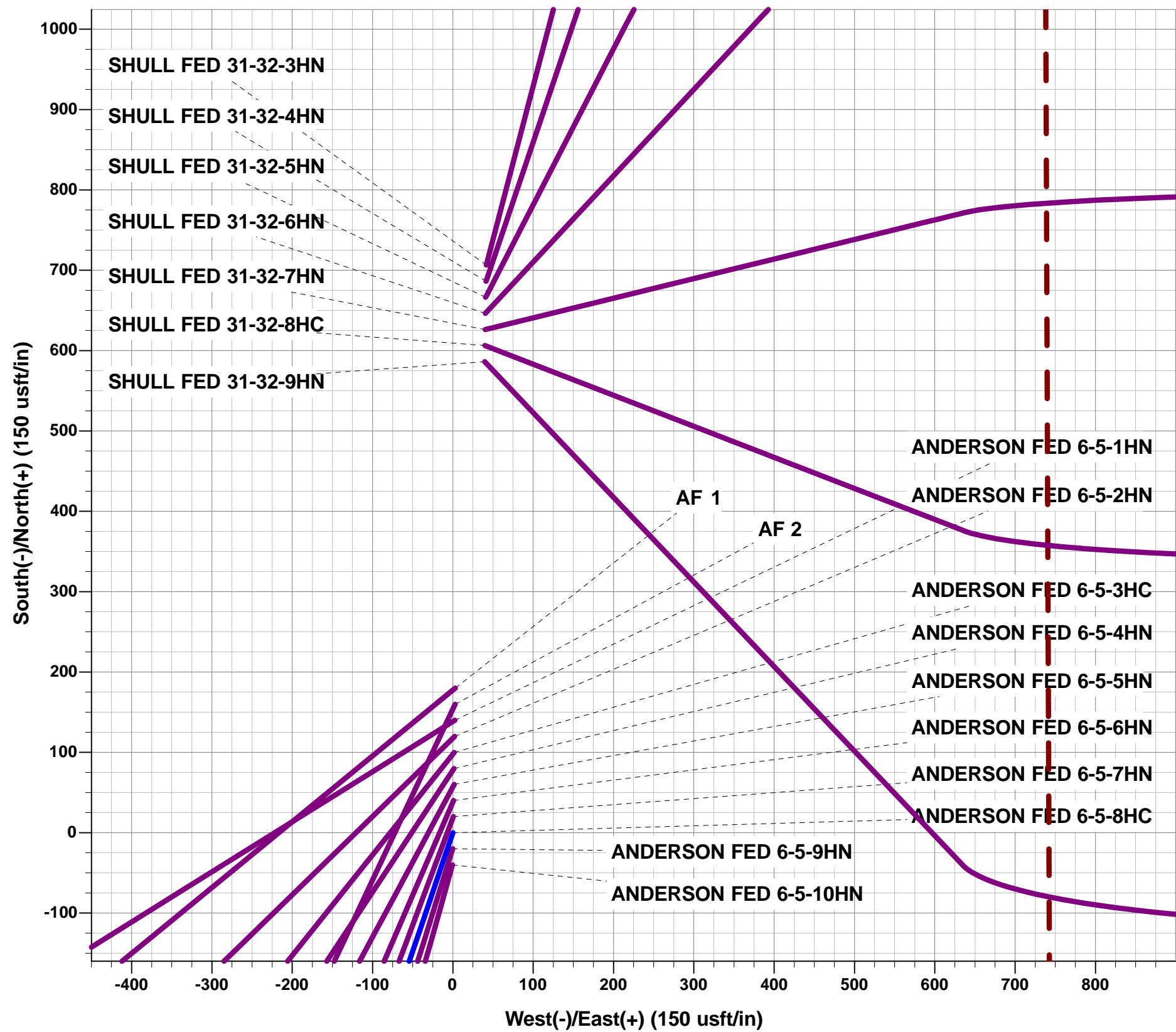
Project: WELD COUNTY, COLORADO (NAD 83)
Site: SE SW SEC. 31 T9N R59W 6th P.M.
Well: ANDERSON FED 6-5-8HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

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: 562ft FSL & 1910ft FWL of Sec 31
300.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (3°/100ft BUR)
1598.29	1727.56	42.83	198.72	-482.21	-163.40	85.65	509.15	EOB TO 42.83° INC
5804.35	7462.48	42.83	198.72	-4174.51	-1414.53	741.48	4407.65	KOP (10°/100ft DGLG)
6325.00	8484.34	90.00	90.63	-4639.34	-859.54	1450.77	5244.50	LP *NEW*: 1325ft FSL & 600ft FWL of Sec 6
6325.00	18118.67	90.00	90.63	-4744.91	8774.21	9975.02	14878.83	BHL: 1325ft FSL & 300ft FEL of Sec 5

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP *NEW* - ANDERSON FED 6-5-8HC (P2)	6325.00	-4639.34	-859.54	40.688068	-104.026529
BHL - ANDERSON FED 6-5-8HC (P2)	6325.00	-4744.91	8774.21	40.687774	-103.991792



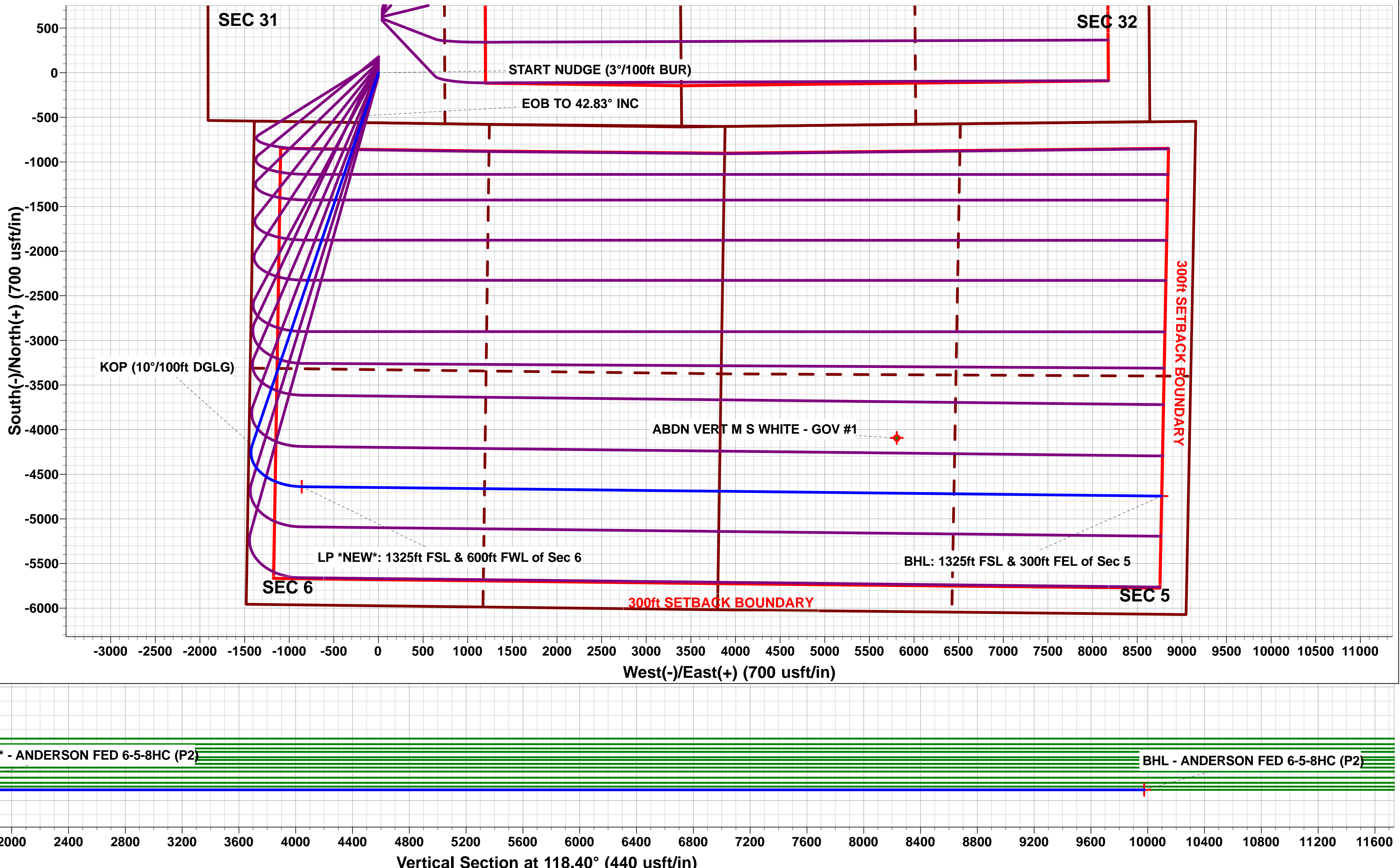
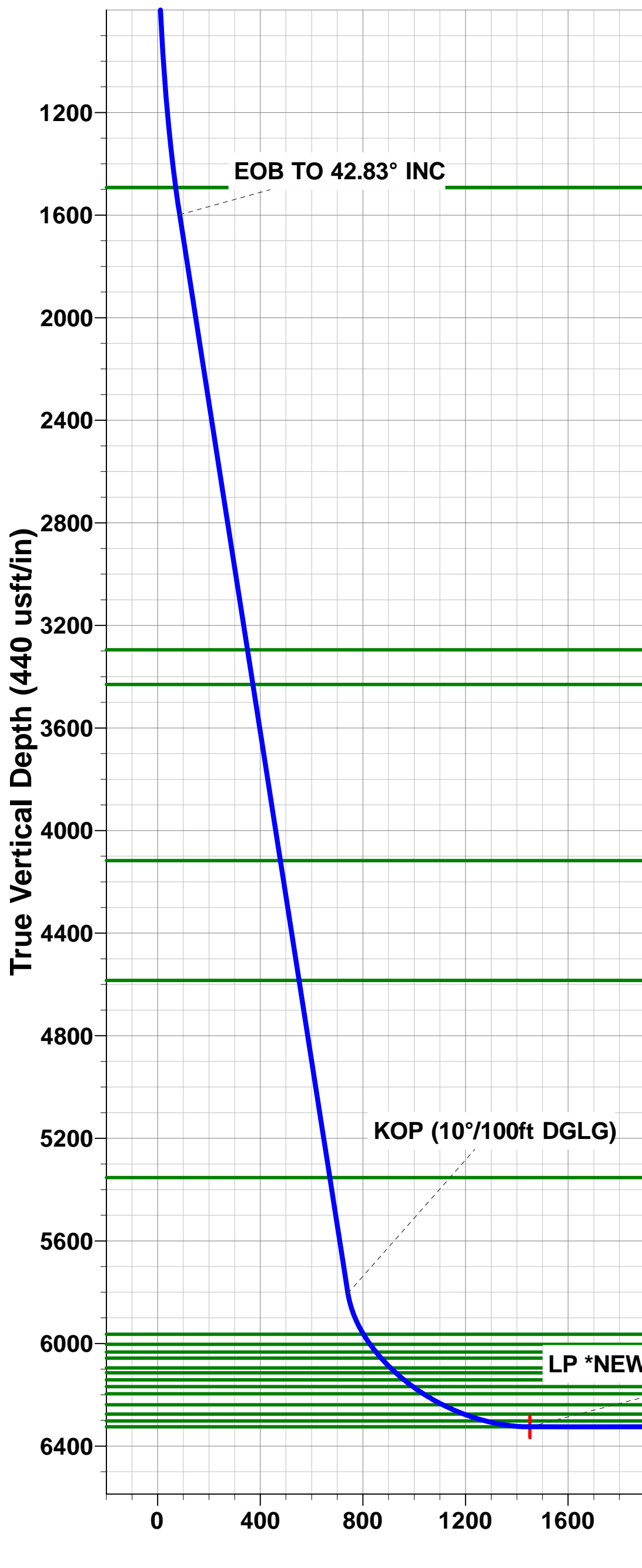
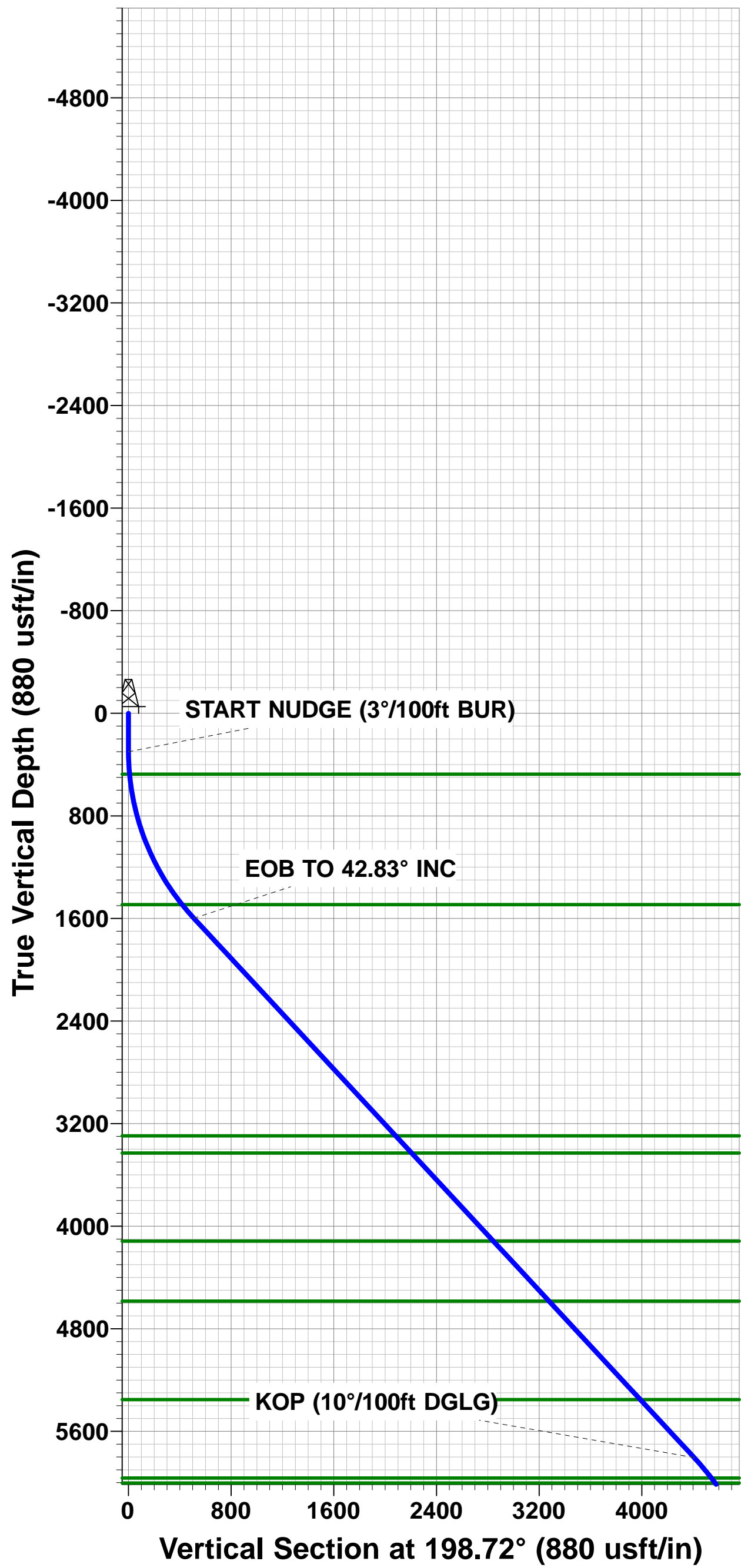
Azimuths to True North
Magnetic North: 7.61°
Magnetic Field
Strength: 52382.4snT
Dip Angle: 67.15°
Date: 22/07/2019
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
475.00	475.25	Fox Hills Base
1492.00	1587.28	Pierre Shale Top
3295.00	4041.00	Richard Sandstone
3430.00	4225.07	Parkman Sandstone
4117.00	5161.79	Sussex Sandstone
4584.00	5798.54	Shannon Sandstone
5353.00	6847.07	TeePee Buttes
5964.00	7676.57	Sharon Springs
6003.00	7729.70	Niobrara Top
6033.00	7771.44	Niobrara A Chalk
6057.00	7805.57	Niobrara A Chalk Base
6095.00	7861.44	Niobrara B1 Chalk Top
6114.00	7890.44	Niobrara B1 Chalk Base
6142.00	7934.86	Niobrara B2 Chalk Top
6168.00	7978.39	Niobrara B2 Chalk Base
6196.00	8028.56	Niobrara C Chalk Top
6239.00	8115.60	Niobrara C Chalk Base
6275.00	8205.25	Niobrara D Chalk Top
6302.00	8296.07	Ft. Hays
6325.00	8484.34	Codell (Target)

PROPOSED LOCAL COORDINATES:

SHL: 562ft FSL & 1910ft FWL of Sec 31
HZ LP *NEW*: 1325ft FSL & 600ft FWL of Sec 6
BHL: 1325ft FSL & 300ft FEL of Sec 5



Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well ANDERSON FED 6-5-8HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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	SE SW SEC. 31 T9N R59W 6th P.M.				
Site Position:		Northing:	1,501,513.53 usft	Latitude:	40.700697
From:	Lat/Long	Easting:	3,409,242.57 usft	Longitude:	-104.023987
Position Uncertainty:	0.00 usft	Slot Radius:	1.10 ft	Grid Convergence:	0.95 °

Well	ANDERSON FED 6-5-8HC					
Well Position	+N/-S	38.24 usft	Northing:	1,501,554.34 usft	Latitude:	40.700802
	+E/-W	154.44 usft	Easting:	3,409,396.36 usft	Longitude:	-104.023430
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,878.00 usft

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	22/07/2019	7.61	67.15	52,382

Design	PROPOSAL #2			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	6,325.00	0.00	0.00	118.40

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	
300.00	0.00	0.00	300.00	-4,603.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,727.56	42.83	198.72	1,598.29	-3,304.71	-482.21	-163.40	3.00	3.00	0.00	198.72	
7,462.48	42.83	198.72	5,804.35	901.35	-4,174.51	-1,414.53	0.00	0.00	0.00	0.00	
8,484.34	90.00	90.63	6,325.00	1,422.00	-4,639.34	-859.54	10.00	4.62	-10.58	-103.47	LP *NEW* - ANDEF
18,118.67	90.00	90.63	6,325.00	1,422.00	-4,744.91	8,774.21	0.00	0.00	0.00	0.00	BHL - ANDERSON

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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: 562ft FSL & 1910ft 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
START NUDGE (3°/100ft BUR)										
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	3.00	198.72	399.95	4,503.05	-2.48	-0.84	0.44	3.00	3.00	0.00
Fox Hills Base										
475.25	5.26	198.72	475.00	4,428.00	-7.61	-2.58	1.35	3.00	3.00	0.00
500.00	6.00	198.72	499.63	4,403.37	-9.91	-3.36	1.76	3.00	3.00	0.00
600.00	9.00	198.72	598.77	4,304.23	-22.27	-7.55	3.96	3.00	3.00	0.00
700.00	12.00	198.72	697.08	4,205.92	-39.53	-13.39	7.02	3.00	3.00	0.00
800.00	15.00	198.72	794.31	4,108.69	-61.63	-20.88	10.95	3.00	3.00	0.00
900.00	18.00	198.72	890.18	4,012.82	-88.53	-30.00	15.72	3.00	3.00	0.00
1,000.00	21.00	198.72	984.43	3,918.57	-120.14	-40.71	21.34	3.00	3.00	0.00
1,100.00	24.00	198.72	1,076.81	3,826.19	-156.38	-52.99	27.78	3.00	3.00	0.00
1,200.00	27.00	198.72	1,167.06	3,735.94	-197.15	-66.80	35.02	3.00	3.00	0.00
1,300.00	30.00	198.72	1,254.93	3,648.07	-242.34	-82.12	43.04	3.00	3.00	0.00
1,400.00	33.00	198.72	1,340.18	3,562.82	-291.82	-98.88	51.83	3.00	3.00	0.00
1,500.00	36.00	198.72	1,422.59	3,480.41	-345.46	-117.06	61.36	3.00	3.00	0.00
Pierre Shale Top										
1,587.28	38.62	198.72	1,492.00	3,411.00	-395.56	-134.03	70.26	3.00	3.00	0.00
1,600.00	39.00	198.72	1,501.91	3,401.09	-403.11	-136.59	71.60	3.00	3.00	0.00
1,700.00	42.00	198.72	1,577.95	3,325.05	-464.61	-157.43	82.52	3.00	3.00	0.00
EOB TO 42.83° INC										
1,727.56	42.83	198.72	1,598.29	3,304.71	-482.21	-163.40	85.65	3.00	3.00	0.00
1,800.00	42.83	198.72	1,651.42	3,251.58	-528.85	-179.20	93.94	0.00	0.00	0.00
1,900.00	42.83	198.72	1,724.76	3,178.24	-593.24	-201.02	105.37	0.00	0.00	0.00
2,000.00	42.83	198.72	1,798.10	3,104.90	-657.62	-222.83	116.81	0.00	0.00	0.00
2,100.00	42.83	198.72	1,871.44	3,031.56	-722.00	-244.65	128.24	0.00	0.00	0.00
2,200.00	42.83	198.72	1,944.79	2,958.21	-786.38	-266.47	139.68	0.00	0.00	0.00
2,300.00	42.83	198.72	2,018.13	2,884.87	-850.77	-288.28	151.11	0.00	0.00	0.00
2,400.00	42.83	198.72	2,091.47	2,811.53	-915.15	-310.10	162.55	0.00	0.00	0.00
2,500.00	42.83	198.72	2,164.81	2,738.19	-979.53	-331.91	173.99	0.00	0.00	0.00
2,600.00	42.83	198.72	2,238.15	2,664.85	-1,043.91	-353.73	185.42	0.00	0.00	0.00
2,700.00	42.83	198.72	2,311.49	2,591.51	-1,108.30	-375.55	196.86	0.00	0.00	0.00
2,800.00	42.83	198.72	2,384.83	2,518.17	-1,172.68	-397.36	208.29	0.00	0.00	0.00
2,900.00	42.83	198.72	2,458.17	2,444.83	-1,237.06	-419.18	219.73	0.00	0.00	0.00
3,000.00	42.83	198.72	2,531.52	2,371.48	-1,301.45	-440.99	231.16	0.00	0.00	0.00
3,100.00	42.83	198.72	2,604.86	2,298.14	-1,365.83	-462.81	242.60	0.00	0.00	0.00
3,200.00	42.83	198.72	2,678.20	2,224.80	-1,430.21	-484.63	254.04	0.00	0.00	0.00
3,300.00	42.83	198.72	2,751.54	2,151.46	-1,494.59	-506.44	265.47	0.00	0.00	0.00
3,400.00	42.83	198.72	2,824.88	2,078.12	-1,558.98	-528.26	276.91	0.00	0.00	0.00
3,500.00	42.83	198.72	2,898.22	2,004.78	-1,623.36	-550.07	288.34	0.00	0.00	0.00
3,600.00	42.83	198.72	2,971.56	1,931.44	-1,687.74	-571.89	299.78	0.00	0.00	0.00
3,700.00	42.83	198.72	3,044.90	1,858.10	-1,752.12	-593.71	311.21	0.00	0.00	0.00
3,800.00	42.83	198.72	3,118.25	1,784.75	-1,816.51	-615.52	322.65	0.00	0.00	0.00
3,900.00	42.83	198.72	3,191.59	1,711.41	-1,880.89	-637.34	334.09	0.00	0.00	0.00
4,000.00	42.83	198.72	3,264.93	1,638.07	-1,945.27	-659.15	345.52	0.00	0.00	0.00
Richard Sandstone										
4,041.00	42.83	198.72	3,295.00	1,608.00	-1,971.67	-668.10	350.21	0.00	0.00	0.00
4,100.00	42.83	198.72	3,338.27	1,564.73	-2,009.65	-680.97	356.96	0.00	0.00	0.00
4,200.00	42.83	198.72	3,411.61	1,491.39	-2,074.04	-702.78	368.39	0.00	0.00	0.00

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
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Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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)
Parkman Sandstone										
4,225.07	42.83	198.72	3,430.00	1,473.00	-2,090.18	-708.26	371.26	0.00	0.00	0.00
4,300.00	42.83	198.72	3,484.95	1,418.05	-2,138.42	-724.60	379.83	0.00	0.00	0.00
4,400.00	42.83	198.72	3,558.29	1,344.71	-2,202.80	-746.42	391.27	0.00	0.00	0.00
4,500.00	42.83	198.72	3,631.63	1,271.37	-2,267.19	-768.23	402.70	0.00	0.00	0.00
4,600.00	42.83	198.72	3,704.97	1,198.03	-2,331.57	-790.05	414.14	0.00	0.00	0.00
4,700.00	42.83	198.72	3,778.32	1,124.68	-2,395.95	-811.86	425.57	0.00	0.00	0.00
4,800.00	42.83	198.72	3,851.66	1,051.34	-2,460.33	-833.68	437.01	0.00	0.00	0.00
4,900.00	42.83	198.72	3,925.00	978.00	-2,524.72	-855.50	448.44	0.00	0.00	0.00
5,000.00	42.83	198.72	3,998.34	904.66	-2,589.10	-877.31	459.88	0.00	0.00	0.00
5,100.00	42.83	198.72	4,071.68	831.32	-2,653.48	-899.13	471.32	0.00	0.00	0.00
Sussex Sandstone										
5,161.79	42.83	198.72	4,117.00	786.00	-2,693.27	-912.61	478.38	0.00	0.00	0.00
5,200.00	42.83	198.72	4,145.02	757.98	-2,717.86	-920.94	482.75	0.00	0.00	0.00
5,300.00	42.83	198.72	4,218.36	684.64	-2,782.25	-942.76	494.19	0.00	0.00	0.00
5,400.00	42.83	198.72	4,291.70	611.30	-2,846.63	-964.58	505.62	0.00	0.00	0.00
5,500.00	42.83	198.72	4,365.05	537.95	-2,911.01	-986.39	517.06	0.00	0.00	0.00
5,600.00	42.83	198.72	4,438.39	464.61	-2,975.39	-1,008.21	528.49	0.00	0.00	0.00
5,700.00	42.83	198.72	4,511.73	391.27	-3,039.78	-1,030.02	539.93	0.00	0.00	0.00
Shannon Sandstone										
5,798.54	42.83	198.72	4,584.00	319.00	-3,103.22	-1,051.52	551.20	0.00	0.00	0.00
5,800.00	42.83	198.72	4,585.07	317.93	-3,104.16	-1,051.84	551.37	0.00	0.00	0.00
5,900.00	42.83	198.72	4,658.41	244.59	-3,168.54	-1,073.66	562.80	0.00	0.00	0.00
6,000.00	42.83	198.72	4,731.75	171.25	-3,232.93	-1,095.47	574.24	0.00	0.00	0.00
6,100.00	42.83	198.72	4,805.09	97.91	-3,297.31	-1,117.29	585.67	0.00	0.00	0.00
6,200.00	42.83	198.72	4,878.43	24.57	-3,361.69	-1,139.10	597.11	0.00	0.00	0.00
6,300.00	42.83	198.72	4,951.78	-48.78	-3,426.07	-1,160.92	608.54	0.00	0.00	0.00
6,400.00	42.83	198.72	5,025.12	-122.12	-3,490.46	-1,182.74	619.98	0.00	0.00	0.00
6,500.00	42.83	198.72	5,098.46	-195.46	-3,554.84	-1,204.55	631.42	0.00	0.00	0.00
6,600.00	42.83	198.72	5,171.80	-268.80	-3,619.22	-1,226.37	642.85	0.00	0.00	0.00
6,700.00	42.83	198.72	5,245.14	-342.14	-3,683.60	-1,248.18	654.29	0.00	0.00	0.00
6,800.00	42.83	198.72	5,318.48	-415.48	-3,747.99	-1,270.00	665.72	0.00	0.00	0.00
TeePee Buttes										
6,847.07	42.83	198.72	5,353.00	-450.00	-3,778.29	-1,280.27	671.11	0.00	0.00	0.00
6,900.00	42.83	198.72	5,391.82	-488.82	-3,812.37	-1,291.82	677.16	0.00	0.00	0.00
7,000.00	42.83	198.72	5,465.16	-562.16	-3,876.75	-1,313.63	688.59	0.00	0.00	0.00
7,100.00	42.83	198.72	5,538.50	-635.50	-3,941.14	-1,335.45	700.03	0.00	0.00	0.00
7,200.00	42.83	198.72	5,611.85	-708.85	-4,005.52	-1,357.26	711.47	0.00	0.00	0.00
7,300.00	42.83	198.72	5,685.19	-782.19	-4,069.90	-1,379.08	722.90	0.00	0.00	0.00
7,400.00	42.83	198.72	5,758.53	-855.53	-4,134.28	-1,400.90	734.34	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
7,462.48	42.83	198.72	5,804.35	-901.35	-4,174.51	-1,414.53	741.48	0.00	0.00	0.00
7,500.00	42.08	193.27	5,832.04	-929.04	-4,198.83	-1,421.51	746.91	10.00	-1.99	-14.52
7,600.00	41.41	178.26	5,906.85	-1,003.85	-4,264.67	-1,428.21	772.33	10.00	-0.67	-15.01
Sharon Springs										
7,676.57	42.22	166.83	5,964.00	-1,061.00	-4,315.10	-1,421.57	802.16	10.00	1.06	-14.93
7,700.00	42.69	163.43	5,981.29	-1,078.29	-4,330.38	-1,417.51	813.00	10.00	2.01	-14.52
Niobrara Top										
7,729.70	43.42	159.21	6,003.00	-1,100.00	-4,349.58	-1,411.02	827.85	10.00	2.48	-14.19
Niobrara A Chalk										
7,771.44	44.71	153.50	6,033.00	-1,130.00	-4,376.14	-1,399.37	850.73	10.00	3.09	-13.68
7,800.00	45.75	149.75	6,053.12	-1,150.12	-4,393.97	-1,389.73	867.69	10.00	3.64	-13.12
Niobrara A Chalk Base										

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well ANDERSON FED 6-5-8HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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)
7,805.57	45.97	149.04	6,057.00	-1,154.00	-4,397.41	-1,387.69	871.12	10.00	3.89	-12.84
Niobrara B1 Chalk Top										
7,861.44	48.37	142.16	6,095.00	-1,192.00	-4,431.15	-1,364.54	907.53	10.00	4.31	-12.31
Niobrara B1 Chalk Base										
7,890.44	49.78	138.80	6,114.00	-1,211.00	-4,448.04	-1,350.59	927.84	10.00	4.84	-11.58
7,900.00	50.26	137.72	6,120.14	-1,217.14	-4,453.51	-1,345.71	934.73	10.00	5.06	-11.26
Niobrara B2 Chalk Top										
7,934.86	52.10	133.93	6,142.00	-1,239.00	-4,472.98	-1,326.79	960.64	10.00	5.29	-10.90
Niobrara B2 Chalk Base										
7,978.39	54.57	129.45	6,168.00	-1,265.00	-4,496.17	-1,300.71	994.61	10.00	5.66	-10.28
8,000.00	55.85	127.33	6,180.33	-1,277.33	-4,507.19	-1,286.80	1,012.08	10.00	5.93	-9.80
Niobrara C Chalk Top										
8,028.56	57.60	124.63	6,196.00	-1,293.00	-4,521.21	-1,267.48	1,035.74	10.00	6.12	-9.46
8,100.00	62.20	118.31	6,231.85	-1,328.85	-4,553.37	-1,214.78	1,097.40	10.00	6.44	-8.85
Niobrara C Chalk Base										
8,115.60	63.24	117.00	6,239.00	-1,336.00	-4,559.81	-1,202.50	1,111.26	10.00	6.68	-8.37
8,200.00	69.07	110.32	6,273.14	-1,370.14	-4,590.66	-1,131.83	1,188.10	10.00	6.90	-7.92
Niobrara D Chalk Top										
8,205.25	69.44	109.93	6,275.00	-1,372.00	-4,592.35	-1,127.22	1,192.96	10.00	7.07	-7.56
Ft. Hays										
8,296.07	75.99	103.33	6,302.00	-1,399.00	-4,617.05	-1,044.20	1,277.73	10.00	7.21	-7.26
8,300.00	76.28	103.05	6,302.94	-1,399.94	-4,617.92	-1,040.49	1,281.41	10.00	7.32	-7.01
8,400.00	83.68	96.23	6,320.35	-1,417.35	-4,634.32	-943.53	1,374.51	10.00	7.41	-6.83
LP *NEW*: 1325ft FSL & 600ft FWL of Sec 6 - Codell (Target)										
8,484.34	90.00	90.63	6,325.00	-1,422.00	-4,639.34	-859.54	1,450.77	10.00	7.49	-6.64
8,500.00	90.00	90.63	6,325.00	-1,422.00	-4,639.51	-843.88	1,464.63	0.00	0.00	0.00
8,600.00	90.00	90.63	6,325.00	-1,422.00	-4,640.61	-743.89	1,553.10	0.00	0.00	0.00
8,700.00	90.00	90.63	6,325.00	-1,422.00	-4,641.70	-643.89	1,641.58	0.00	0.00	0.00
8,800.00	90.00	90.63	6,325.00	-1,422.00	-4,642.80	-543.90	1,730.06	0.00	0.00	0.00
8,900.00	90.00	90.63	6,325.00	-1,422.00	-4,643.89	-443.91	1,818.54	0.00	0.00	0.00
9,000.00	90.00	90.63	6,325.00	-1,422.00	-4,644.99	-343.91	1,907.01	0.00	0.00	0.00
9,100.00	90.00	90.63	6,325.00	-1,422.00	-4,646.09	-243.92	1,995.49	0.00	0.00	0.00
9,200.00	90.00	90.63	6,325.00	-1,422.00	-4,647.18	-143.92	2,083.97	0.00	0.00	0.00
9,300.00	90.00	90.63	6,325.00	-1,422.00	-4,648.28	-43.93	2,172.45	0.00	0.00	0.00
9,400.00	90.00	90.63	6,325.00	-1,422.00	-4,649.37	56.06	2,260.93	0.00	0.00	0.00
9,500.00	90.00	90.63	6,325.00	-1,422.00	-4,650.47	156.06	2,349.40	0.00	0.00	0.00
9,600.00	90.00	90.63	6,325.00	-1,422.00	-4,651.57	256.05	2,437.88	0.00	0.00	0.00
9,700.00	90.00	90.63	6,325.00	-1,422.00	-4,652.66	356.05	2,526.36	0.00	0.00	0.00
9,800.00	90.00	90.63	6,325.00	-1,422.00	-4,653.76	456.04	2,614.84	0.00	0.00	0.00
9,900.00	90.00	90.63	6,325.00	-1,422.00	-4,654.85	556.03	2,703.32	0.00	0.00	0.00
10,000.00	90.00	90.63	6,325.00	-1,422.00	-4,655.95	656.03	2,791.79	0.00	0.00	0.00
10,100.00	90.00	90.63	6,325.00	-1,422.00	-4,657.04	756.02	2,880.27	0.00	0.00	0.00
10,200.00	90.00	90.63	6,325.00	-1,422.00	-4,658.14	856.02	2,968.75	0.00	0.00	0.00
10,300.00	90.00	90.63	6,325.00	-1,422.00	-4,659.24	956.01	3,057.23	0.00	0.00	0.00
10,400.00	90.00	90.63	6,325.00	-1,422.00	-4,660.33	1,056.00	3,145.70	0.00	0.00	0.00
10,500.00	90.00	90.63	6,325.00	-1,422.00	-4,661.43	1,156.00	3,234.18	0.00	0.00	0.00
10,600.00	90.00	90.63	6,325.00	-1,422.00	-4,662.52	1,255.99	3,322.66	0.00	0.00	0.00
10,700.00	90.00	90.63	6,325.00	-1,422.00	-4,663.62	1,355.99	3,411.14	0.00	0.00	0.00
10,800.00	90.00	90.63	6,325.00	-1,422.00	-4,664.71	1,455.98	3,499.62	0.00	0.00	0.00
10,900.00	90.00	90.63	6,325.00	-1,422.00	-4,665.81	1,555.97	3,588.09	0.00	0.00	0.00
11,000.00	90.00	90.63	6,325.00	-1,422.00	-4,666.91	1,655.97	3,676.57	0.00	0.00	0.00
11,100.00	90.00	90.63	6,325.00	-1,422.00	-4,668.00	1,755.96	3,765.05	0.00	0.00	0.00
11,200.00	90.00	90.63	6,325.00	-1,422.00	-4,669.10	1,855.96	3,853.53	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well ANDERSON FED 6-5-8HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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)
11,300.00	90.00	90.63	6,325.00	-1,422.00	-4,670.19	1,955.95	3,942.00	0.00	0.00	0.00
11,400.00	90.00	90.63	6,325.00	-1,422.00	-4,671.29	2,055.94	4,030.48	0.00	0.00	0.00
11,500.00	90.00	90.63	6,325.00	-1,422.00	-4,672.38	2,155.94	4,118.96	0.00	0.00	0.00
11,600.00	90.00	90.63	6,325.00	-1,422.00	-4,673.48	2,255.93	4,207.44	0.00	0.00	0.00
11,700.00	90.00	90.63	6,325.00	-1,422.00	-4,674.58	2,355.93	4,295.92	0.00	0.00	0.00
11,800.00	90.00	90.63	6,325.00	-1,422.00	-4,675.67	2,455.92	4,384.39	0.00	0.00	0.00
11,900.00	90.00	90.63	6,325.00	-1,422.00	-4,676.77	2,555.91	4,472.87	0.00	0.00	0.00
12,000.00	90.00	90.63	6,325.00	-1,422.00	-4,677.86	2,655.91	4,561.35	0.00	0.00	0.00
12,100.00	90.00	90.63	6,325.00	-1,422.00	-4,678.96	2,755.90	4,649.83	0.00	0.00	0.00
12,200.00	90.00	90.63	6,325.00	-1,422.00	-4,680.05	2,855.90	4,738.31	0.00	0.00	0.00
12,300.00	90.00	90.63	6,325.00	-1,422.00	-4,681.15	2,955.89	4,826.78	0.00	0.00	0.00
12,400.00	90.00	90.63	6,325.00	-1,422.00	-4,682.25	3,055.88	4,915.26	0.00	0.00	0.00
12,500.00	90.00	90.63	6,325.00	-1,422.00	-4,683.34	3,155.88	5,003.74	0.00	0.00	0.00
12,600.00	90.00	90.63	6,325.00	-1,422.00	-4,684.44	3,255.87	5,092.22	0.00	0.00	0.00
12,700.00	90.00	90.63	6,325.00	-1,422.00	-4,685.53	3,355.87	5,180.69	0.00	0.00	0.00
12,800.00	90.00	90.63	6,325.00	-1,422.00	-4,686.63	3,455.86	5,269.17	0.00	0.00	0.00
12,900.00	90.00	90.63	6,325.00	-1,422.00	-4,687.73	3,555.85	5,357.65	0.00	0.00	0.00
13,000.00	90.00	90.63	6,325.00	-1,422.00	-4,688.82	3,655.85	5,446.13	0.00	0.00	0.00
13,100.00	90.00	90.63	6,325.00	-1,422.00	-4,689.92	3,755.84	5,534.61	0.00	0.00	0.00
13,200.00	90.00	90.63	6,325.00	-1,422.00	-4,691.01	3,855.84	5,623.08	0.00	0.00	0.00
13,300.00	90.00	90.63	6,325.00	-1,422.00	-4,692.11	3,955.83	5,711.56	0.00	0.00	0.00
13,400.00	90.00	90.63	6,325.00	-1,422.00	-4,693.20	4,055.82	5,800.04	0.00	0.00	0.00
13,500.00	90.00	90.63	6,325.00	-1,422.00	-4,694.30	4,155.82	5,888.52	0.00	0.00	0.00
13,600.00	90.00	90.63	6,325.00	-1,422.00	-4,695.40	4,255.81	5,977.00	0.00	0.00	0.00
13,700.00	90.00	90.63	6,325.00	-1,422.00	-4,696.49	4,355.81	6,065.47	0.00	0.00	0.00
13,800.00	90.00	90.63	6,325.00	-1,422.00	-4,697.59	4,455.80	6,153.95	0.00	0.00	0.00
13,900.00	90.00	90.63	6,325.00	-1,422.00	-4,698.68	4,555.79	6,242.43	0.00	0.00	0.00
14,000.00	90.00	90.63	6,325.00	-1,422.00	-4,699.78	4,655.79	6,330.91	0.00	0.00	0.00
14,100.00	90.00	90.63	6,325.00	-1,422.00	-4,700.87	4,755.78	6,419.38	0.00	0.00	0.00
14,200.00	90.00	90.63	6,325.00	-1,422.00	-4,701.97	4,855.78	6,507.86	0.00	0.00	0.00
14,300.00	90.00	90.63	6,325.00	-1,422.00	-4,703.07	4,955.77	6,596.34	0.00	0.00	0.00
14,400.00	90.00	90.63	6,325.00	-1,422.00	-4,704.16	5,055.76	6,684.82	0.00	0.00	0.00
14,500.00	90.00	90.63	6,325.00	-1,422.00	-4,705.26	5,155.76	6,773.30	0.00	0.00	0.00
14,600.00	90.00	90.63	6,325.00	-1,422.00	-4,706.35	5,255.75	6,861.77	0.00	0.00	0.00
14,700.00	90.00	90.63	6,325.00	-1,422.00	-4,707.45	5,355.75	6,950.25	0.00	0.00	0.00
14,800.00	90.00	90.63	6,325.00	-1,422.00	-4,708.54	5,455.74	7,038.73	0.00	0.00	0.00
14,900.00	90.00	90.63	6,325.00	-1,422.00	-4,709.64	5,555.73	7,127.21	0.00	0.00	0.00
15,000.00	90.00	90.63	6,325.00	-1,422.00	-4,710.74	5,655.73	7,215.68	0.00	0.00	0.00
15,100.00	90.00	90.63	6,325.00	-1,422.00	-4,711.83	5,755.72	7,304.16	0.00	0.00	0.00
15,200.00	90.00	90.63	6,325.00	-1,422.00	-4,712.93	5,855.72	7,392.64	0.00	0.00	0.00
15,300.00	90.00	90.63	6,325.00	-1,422.00	-4,714.02	5,955.71	7,481.12	0.00	0.00	0.00
15,400.00	90.00	90.63	6,325.00	-1,422.00	-4,715.12	6,055.70	7,569.60	0.00	0.00	0.00
15,500.00	90.00	90.63	6,325.00	-1,422.00	-4,716.22	6,155.70	7,658.07	0.00	0.00	0.00
15,600.00	90.00	90.63	6,325.00	-1,422.00	-4,717.31	6,255.69	7,746.55	0.00	0.00	0.00
15,700.00	90.00	90.63	6,325.00	-1,422.00	-4,718.41	6,355.69	7,835.03	0.00	0.00	0.00
15,800.00	90.00	90.63	6,325.00	-1,422.00	-4,719.50	6,455.68	7,923.51	0.00	0.00	0.00
15,900.00	90.00	90.63	6,325.00	-1,422.00	-4,720.60	6,555.67	8,011.99	0.00	0.00	0.00
16,000.00	90.00	90.63	6,325.00	-1,422.00	-4,721.69	6,655.67	8,100.46	0.00	0.00	0.00
16,100.00	90.00	90.63	6,325.00	-1,422.00	-4,722.79	6,755.66	8,188.94	0.00	0.00	0.00
16,200.00	90.00	90.63	6,325.00	-1,422.00	-4,723.89	6,855.66	8,277.42	0.00	0.00	0.00
16,300.00	90.00	90.63	6,325.00	-1,422.00	-4,724.98	6,955.65	8,365.90	0.00	0.00	0.00
16,400.00	90.00	90.63	6,325.00	-1,422.00	-4,726.08	7,055.64	8,454.37	0.00	0.00	0.00
16,500.00	90.00	90.63	6,325.00	-1,422.00	-4,727.17	7,155.64	8,542.85	0.00	0.00	0.00
16,600.00	90.00	90.63	6,325.00	-1,422.00	-4,728.27	7,255.63	8,631.33	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well ANDERSON FED 6-5-8HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	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)
16,700.00	90.00	90.63	6,325.00	-1,422.00	-4,729.36	7,355.63	8,719.81	0.00	0.00	0.00
16,800.00	90.00	90.63	6,325.00	-1,422.00	-4,730.46	7,455.62	8,808.29	0.00	0.00	0.00
16,900.00	90.00	90.63	6,325.00	-1,422.00	-4,731.56	7,555.61	8,896.76	0.00	0.00	0.00
17,000.00	90.00	90.63	6,325.00	-1,422.00	-4,732.65	7,655.61	8,985.24	0.00	0.00	0.00
17,100.00	90.00	90.63	6,325.00	-1,422.00	-4,733.75	7,755.60	9,073.72	0.00	0.00	0.00
17,200.00	90.00	90.63	6,325.00	-1,422.00	-4,734.84	7,855.60	9,162.20	0.00	0.00	0.00
17,300.00	90.00	90.63	6,325.00	-1,422.00	-4,735.94	7,955.59	9,250.67	0.00	0.00	0.00
17,400.00	90.00	90.63	6,325.00	-1,422.00	-4,737.03	8,055.58	9,339.15	0.00	0.00	0.00
17,500.00	90.00	90.63	6,325.00	-1,422.00	-4,738.13	8,155.58	9,427.63	0.00	0.00	0.00
17,600.00	90.00	90.63	6,325.00	-1,422.00	-4,739.23	8,255.57	9,516.11	0.00	0.00	0.00
17,700.00	90.00	90.63	6,325.00	-1,422.00	-4,740.32	8,355.57	9,604.59	0.00	0.00	0.00
17,800.00	90.00	90.63	6,325.00	-1,422.00	-4,741.42	8,455.56	9,693.06	0.00	0.00	0.00
17,900.00	90.00	90.63	6,325.00	-1,422.00	-4,742.51	8,555.55	9,781.54	0.00	0.00	0.00
18,000.00	90.00	90.63	6,325.00	-1,422.00	-4,743.61	8,655.55	9,870.02	0.00	0.00	0.00
18,100.00	90.00	90.63	6,325.00	-1,422.00	-4,744.71	8,755.54	9,958.50	0.00	0.00	0.00
BHL: 1325ft FSL & 300ft FEL of Sec 5										
18,118.67	90.00	90.63	6,325.00	-1,422.00	-4,744.91	8,774.21	9,975.02	0.00	0.00	0.00

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
475.25	475.00	Fox Hills Base				
1,587.28	1,492.00	Pierre Shale Top				
4,041.00	3,295.00	Richard Sandstone				
4,225.07	3,430.00	Parkman Sandstone				
5,161.79	4,117.00	Sussex Sandstone				
5,798.54	4,584.00	Shannon Sandstone				
6,847.07	5,353.00	TeePee Buttes				
7,676.57	5,964.00	Sharon Springs				
7,729.70	6,003.00	Niobrara Top				
7,771.44	6,033.00	Niobrara A Chalk				
7,805.57	6,057.00	Niobrara A Chalk Base				
7,861.44	6,095.00	Niobrara B1 Chalk Top				
7,890.44	6,114.00	Niobrara B1 Chalk Base				
7,934.86	6,142.00	Niobrara B2 Chalk Top				
7,978.39	6,168.00	Niobrara B2 Chalk Base				
8,028.56	6,196.00	Niobrara C Chalk Top				
8,115.60	6,239.00	Niobrara C Chalk Base				
8,205.25	6,275.00	Niobrara D Chalk Top				
8,296.07	6,302.00	Ft. Hays				
8,484.34	6,325.00	Codell (Target)				

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well ANDERSON FED 6-5-8HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4903.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4903.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	ANDERSON FED 6-5-8HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

Plan Annotations				
Local Coordinates				
MD (usft)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Comment
0.00	0.00	0.00	0.00	SHL: 562ft FSL & 1910ft FWL of Sec 31
300.00	300.00	0.00	0.00	START NUDGE (3°/100ft BUR)
1,727.56	1,598.29	-482.21	-163.40	EOB TO 42.83° INC
7,462.48	5,804.35	-4,174.51	-1,414.53	KOP (10°/100ft DGLG)
8,484.34	6,325.00	-4,639.34	-859.54	LP *NEW*: 1325ft FSL & 600ft FWL of Sec 6
18,118.67	6,325.00	-4,744.91	8,774.21	BHL: 1325ft FSL & 300ft FEL of Sec 5