

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

NE NW SEC. 31 T9N R59W 6th P.M.

SHULL FED 31-32-2HC

ORIGINAL WELLBORE

17 December, 2017

Plan: PROPOSAL #1





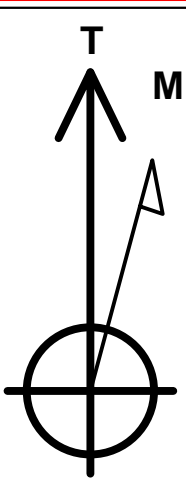
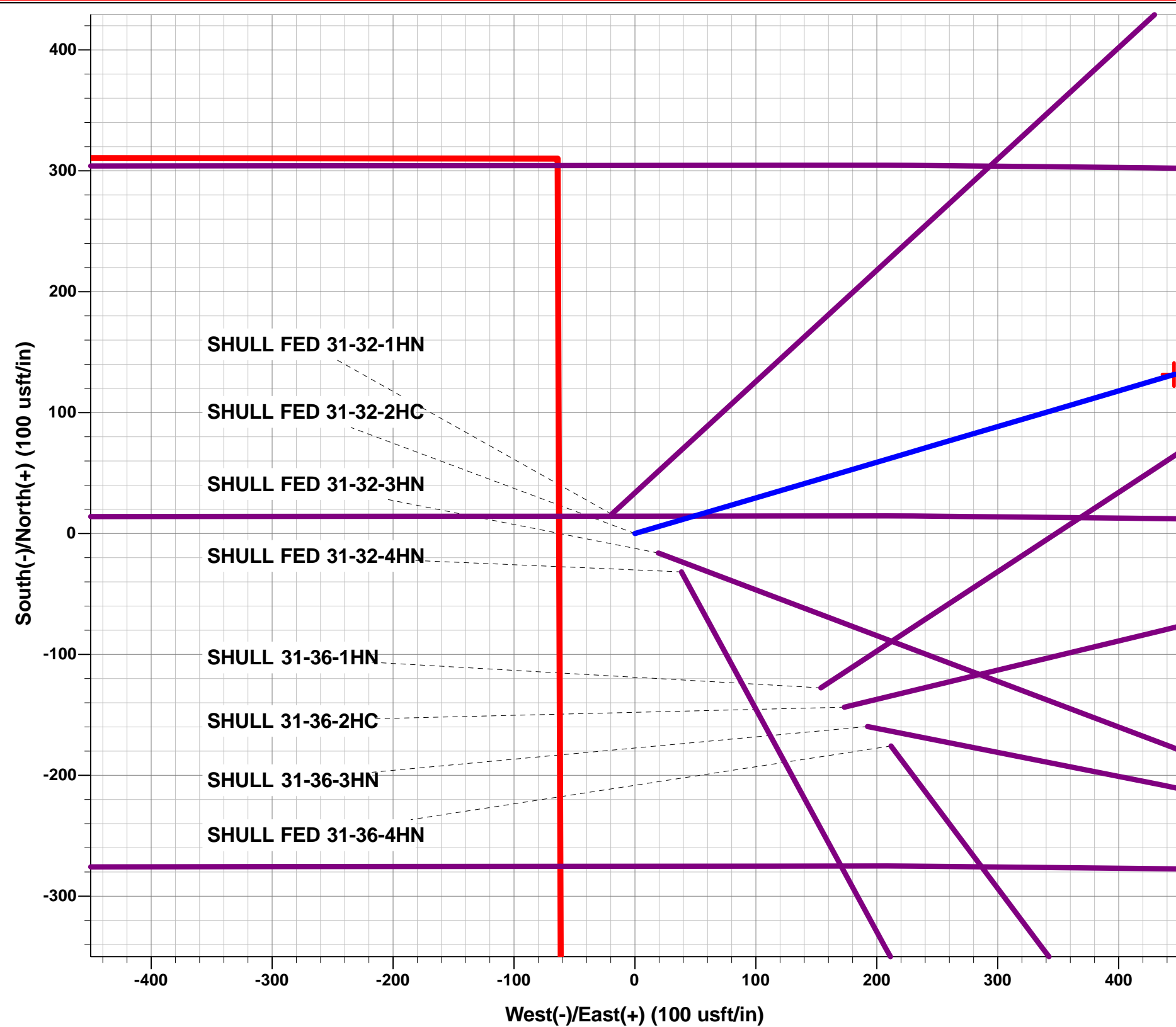
Project: WELD COUNTY, COLORADO (NAD 83)
Site: NE NW SEC. 31 T9N R59W 6th P.M.
Well: SHULL FED 31-32-2HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

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: 910ft FNL & 2110ft FWL of Sec 31
1850.00	1850.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
2445.62	2450.00	12.00	73.56	17.71	60.04	60.39	62.60	EOB TO 12° INC
4043.66	4083.74	12.00	73.56	113.83	385.84	388.05	402.28	END OF TANGENT
4639.28	4683.74	0.00	0.00	131.54	445.88	448.44	464.88	EOD TO VERTICAL
5717.04	5761.49	0.00	0.00	131.54	445.88	448.44	464.88	KOP (10°/100ft BUR)
6290.00	6661.49	90.00	89.78	133.74	1018.83	1021.31	1037.83	HZ LP: 775ft FNL & 2140ft FEL of Sec 31
6290.00	13597.88	90.00	89.78	160.14	7955.17	7956.78	7974.22	BHL: 775ft FNL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - SHULL FED 31-32-2HC	5717.04	131.54	445.88	40.711826	-104.021116
HZ LP - SHULL FED 31-32-2HC	6290.00	133.74	1018.83	40.711832	-104.019049
BHL - SHULL FED 31-32-2HC	6290.00	160.14	7955.17	40.711901	-103.994029



Azimuths to True North
Magnetic North: 7.78°

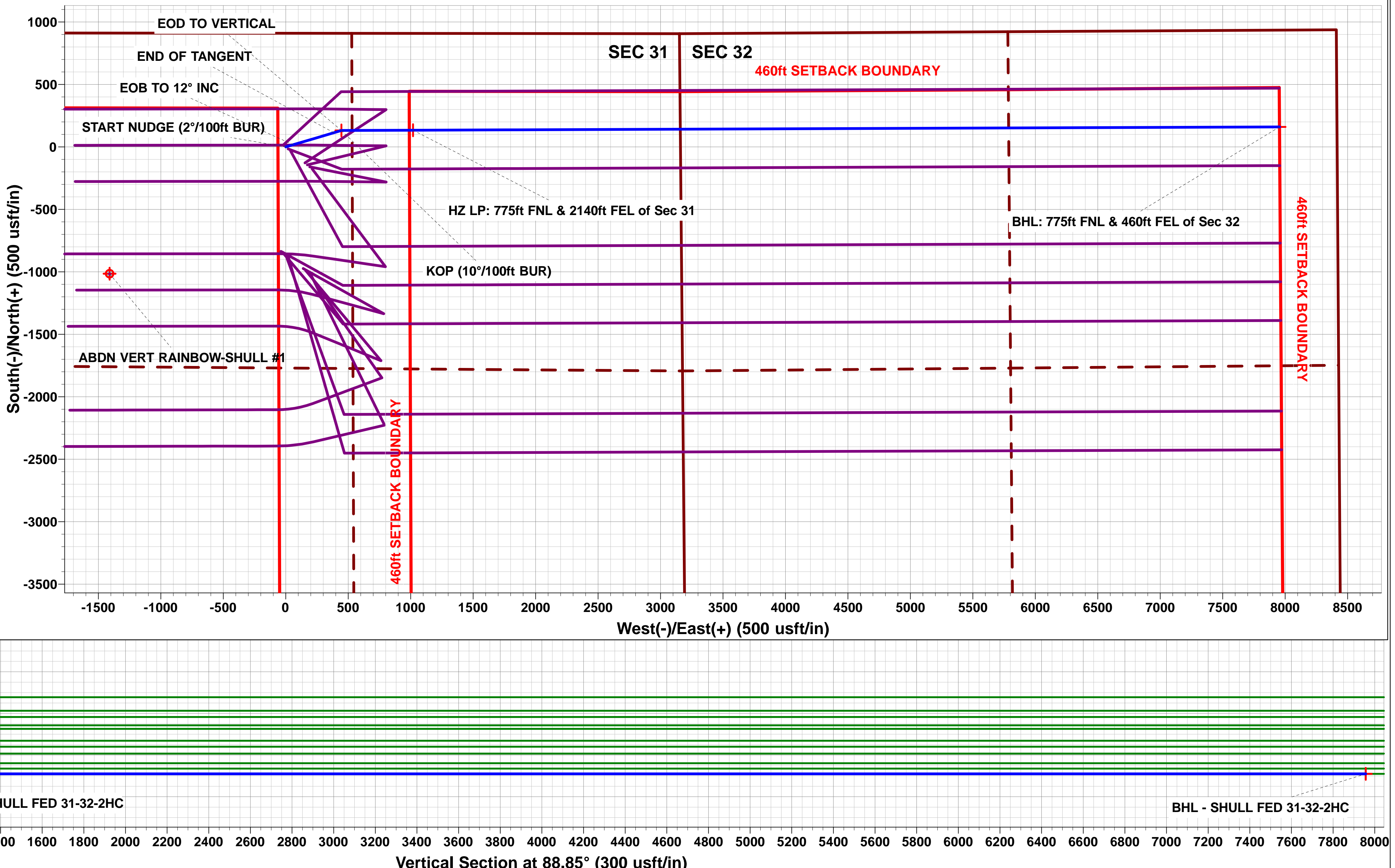
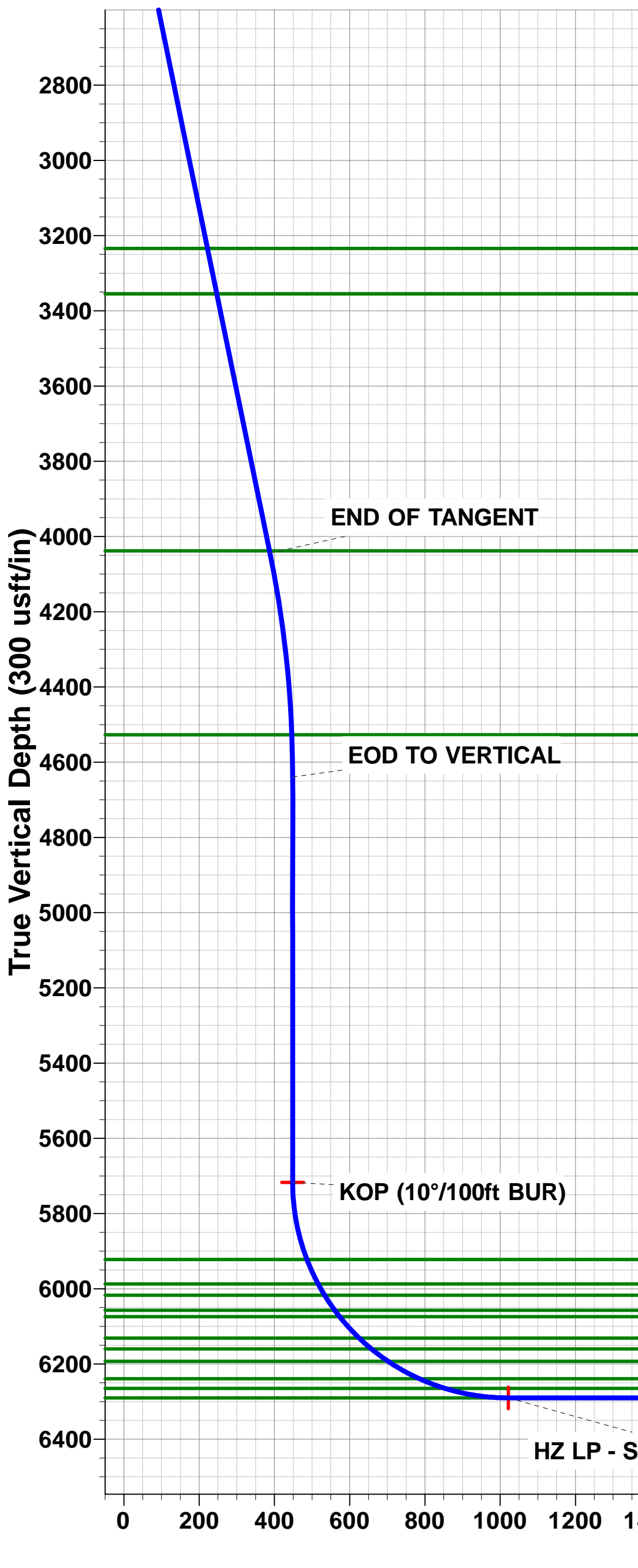
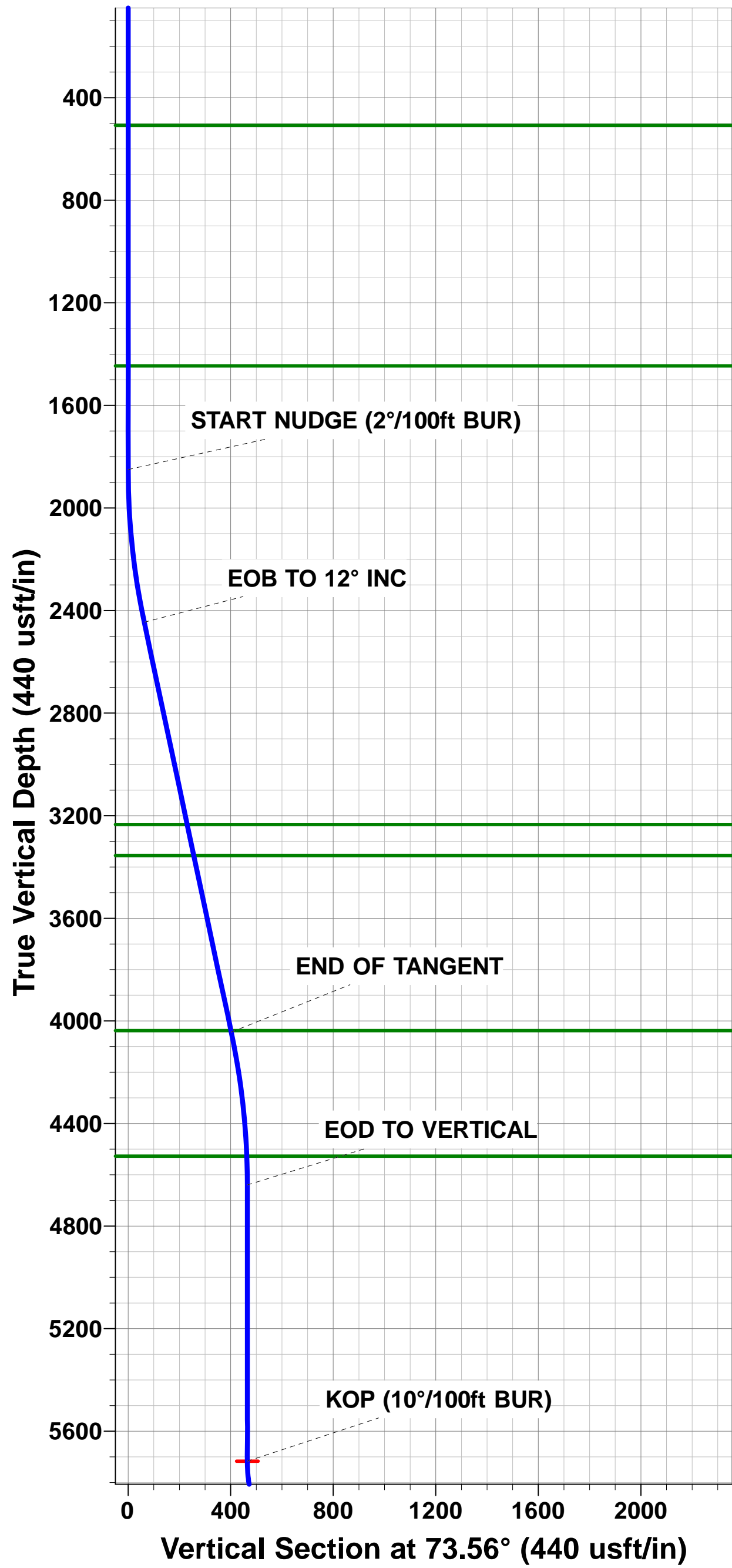
Magnetic Field
Strength: 52570.6snT
Dip Angle: 67.20°
Date: 17/12/2017
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
508.00	508.00	Fox Hills Base
1446.00	1446.00	Pierre Shale Top
3234.00	3255.99	Richard Sandstone
3355.00	3379.69	Parkman Sandstone
4038.00	4077.95	Sussex Sandstone
4527.00	4571.43	Shannon Sandstone
5922.00	5971.10	Sharon Springs
5987.00	6042.60	Niobrara A Chalk
6017.00	6077.19	Niobrara A Chalk Base
6057.00	6125.44	Niobrara B1 Chalk Top
6074.00	6146.86	Niobrara B1 Chalk Base
6131.00	6224.10	Niobrara B2 Chalk Base
6160.00	6267.83	Niobrara C Chalk Top
6193.00	6323.21	Niobrara C Chalk Base
6239.00	6417.92	Niobrara D Chalk Top
6265.00	6491.62	Ft. Hays
6290.00	6661.49	Codell (Target)

PROPOSED LOCAL COORDINATES:

SHL:910ft FNL & 2110ft FWL of Sec 31
HZ LP: 775ft FNL & 2140ft FEL of Sec 31
BHL: 775ft FNL & 460ft FEL of Sec 32



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Site:	NE NW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-2HC	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	NE NW SEC. 31 T9N R59W 6th P.M.		
Site Position:		Northing:	1,505,316.95 usft
From:	Lat/Long	Easting:	3,409,683.34 usft
Position Uncertainty:	0.00 usft	Slot Radius:	1.10000ft
		Latitude:	40.711115
		Longitude:	-104.022169
		Grid Convergence:	0.95 °

Well	SHULL FED 31-32-2HC		
Well Position	+N-S	127.51 usft	Northing:
	+E-W	-153.86 usft	Easting:
Position Uncertainty	0.00 usft		Wellhead Elevation:
			Latitude:
			Longitude:
			Ground Level:

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	17/12/2017	7.78	67.20	52,571

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 (°)
	6,290.00	0.00	0.00	88.85

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	-4,925.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,850.00	0.00	0.00	1,850.00	-3,075.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,450.00	12.00	73.56	2,445.62	-2,479.38	17.71	60.04	2.00	2.00	0.00	73.56	
4,083.74	12.00	73.56	4,043.66	-881.34	113.83	385.84	0.00	0.00	0.00	0.00	
4,683.74	0.00	0.00	4,639.28	-285.72	131.54	445.88	2.00	-2.00	0.00	180.00	
5,761.49	0.00	0.00	5,717.04	792.04	131.54	445.88	0.00	0.00	0.00	0.00	KOP - SHULL FED
6,661.49	90.00	89.78	6,290.00	1,365.00	133.74	1,018.83	10.00	10.00	9.98	89.78	HZ LP - SHULL FEI
13,597.88	90.00	89.78	6,290.00	1,365.00	160.14	7,955.17	0.00	0.00	0.00	67.39	BHL - SHULL FED

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Well:	SHULL FED 31-32-2HC	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: 910ft FNL & 2110ft FWL of Sec 31										
0.00	0.00	0.00	0.00	4,925.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,825.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,725.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	4,625.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	4,525.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	4,425.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base										
508.00	0.00	0.00	508.00	4,417.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	4,325.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	4,225.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	4,125.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	4,025.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	3,925.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	3,825.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	3,725.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	3,625.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	3,525.00	0.00	0.00	0.00	0.00	0.00	0.00
Pierre Shale Top										
1,446.00	0.00	0.00	1,446.00	3,479.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	3,425.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	3,325.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	3,225.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	3,125.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
1,850.00	0.00	0.00	1,850.00	3,075.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	1.00	73.56	1,900.00	3,025.00	0.12	0.42	0.42	2.00	2.00	0.00
2,000.00	3.00	73.56	1,999.93	2,925.07	1.11	3.77	3.79	2.00	2.00	0.00
2,100.00	5.00	73.56	2,099.68	2,825.32	3.08	10.46	10.52	2.00	2.00	0.00
2,200.00	7.00	73.56	2,199.13	2,725.87	6.04	20.48	20.60	2.00	2.00	0.00
2,300.00	9.00	73.56	2,298.15	2,626.85	9.98	33.83	34.02	2.00	2.00	0.00
2,400.00	11.00	73.56	2,396.63	2,528.37	14.89	50.48	50.77	2.00	2.00	0.00
EOB TO 12° INC										
2,450.00	12.00	73.56	2,445.62	2,479.38	17.71	60.04	60.39	2.00	2.00	0.00
2,500.00	12.00	73.56	2,494.53	2,430.47	20.66	70.01	70.42	0.00	0.00	0.00
2,600.00	12.00	73.56	2,592.35	2,332.65	26.54	89.96	90.47	0.00	0.00	0.00
2,700.00	12.00	73.56	2,690.16	2,234.84	32.42	109.90	110.53	0.00	0.00	0.00
2,800.00	12.00	73.56	2,787.97	2,137.03	38.30	129.84	130.58	0.00	0.00	0.00
2,900.00	12.00	73.56	2,885.79	2,039.21	44.19	149.78	150.64	0.00	0.00	0.00
3,000.00	12.00	73.56	2,983.60	1,941.40	50.07	169.72	170.70	0.00	0.00	0.00
3,100.00	12.00	73.56	3,081.42	1,843.58	55.95	189.66	190.75	0.00	0.00	0.00
3,200.00	12.00	73.56	3,179.23	1,745.77	61.84	209.61	210.81	0.00	0.00	0.00
Richard Sandstone										
3,255.99	12.00	73.56	3,234.00	1,691.00	65.13	220.77	222.04	0.00	0.00	0.00
3,300.00	12.00	73.56	3,277.05	1,647.95	67.72	229.55	230.86	0.00	0.00	0.00
Parkman Sandstone										
3,379.69	12.00	73.56	3,355.00	1,570.00	72.41	245.44	246.85	0.00	0.00	0.00
3,400.00	12.00	73.56	3,374.86	1,550.14	73.60	249.49	250.92	0.00	0.00	0.00
3,500.00	12.00	73.56	3,472.68	1,452.32	79.49	269.43	270.98	0.00	0.00	0.00
3,600.00	12.00	73.56	3,570.49	1,354.51	85.37	289.37	291.03	0.00	0.00	0.00
3,700.00	12.00	73.56	3,668.31	1,256.69	91.25	309.31	311.09	0.00	0.00	0.00
3,800.00	12.00	73.56	3,766.12	1,158.88	97.13	329.25	331.14	0.00	0.00	0.00
3,900.00	12.00	73.56	3,863.94	1,061.06	103.02	349.20	351.20	0.00	0.00	0.00

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Well:	SHULL FED 31-32-2HC	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)
4,000.00	12.00	73.56	3,961.75	963.25	108.90	369.14	371.25	0.00	0.00	0.00
Sussex Sandstone										
4,077.95	12.00	73.56	4,038.00	887.00	113.49	384.68	386.89	0.00	0.00	0.00
END OF TANGENT										
4,083.74	12.00	73.56	4,043.66	881.34	113.83	385.84	388.05	0.00	0.00	0.00
4,100.00	11.67	73.56	4,059.58	865.42	114.77	389.04	391.27	2.00	-2.00	0.00
4,200.00	9.67	73.56	4,157.84	767.16	120.01	406.80	409.13	2.00	-2.00	0.00
4,300.00	7.67	73.56	4,256.69	668.31	124.28	421.27	423.68	2.00	-2.00	0.00
4,400.00	5.67	73.56	4,356.01	568.99	127.57	432.41	434.89	2.00	-2.00	0.00
4,500.00	3.67	73.56	4,455.67	469.33	129.87	440.23	442.76	2.00	-2.00	0.00
Shannon Sandstone										
4,571.43	2.25	73.56	4,527.00	398.00	130.92	443.77	446.31	2.00	-2.00	0.00
4,600.00	1.67	73.56	4,555.56	369.44	131.19	444.71	447.26	2.00	-2.00	0.00
EOD TO VERTICAL										
4,683.74	0.00	0.00	4,639.28	285.72	131.54	445.88	448.44	2.00	-2.00	0.00
4,700.00	0.00	0.00	4,655.55	269.45	131.54	445.88	448.44	0.00	0.00	0.00
4,800.00	0.00	0.00	4,755.55	169.45	131.54	445.88	448.44	0.00	0.00	0.00
4,900.00	0.00	0.00	4,855.55	69.45	131.54	445.88	448.44	0.00	0.00	0.00
5,000.00	0.00	0.00	4,955.55	-30.55	131.54	445.88	448.44	0.00	0.00	0.00
5,100.00	0.00	0.00	5,055.55	-130.55	131.54	445.88	448.44	0.00	0.00	0.00
5,200.00	0.00	0.00	5,155.55	-230.55	131.54	445.88	448.44	0.00	0.00	0.00
5,300.00	0.00	0.00	5,255.55	-330.55	131.54	445.88	448.44	0.00	0.00	0.00
5,400.00	0.00	0.00	5,355.55	-430.55	131.54	445.88	448.44	0.00	0.00	0.00
5,500.00	0.00	0.00	5,455.55	-530.55	131.54	445.88	448.44	0.00	0.00	0.00
5,600.00	0.00	0.00	5,555.55	-630.55	131.54	445.88	448.44	0.00	0.00	0.00
5,700.00	0.00	0.00	5,655.55	-730.55	131.54	445.88	448.44	0.00	0.00	0.00
KOP (10°/100ft BUR)										
5,761.49	0.00	0.00	5,717.04	-792.04	131.54	445.88	448.44	0.00	0.00	0.00
5,800.00	3.85	89.78	5,755.52	-830.52	131.54	447.17	449.73	10.00	10.00	0.00
5,900.00	13.85	89.78	5,854.20	-929.20	131.60	462.54	465.09	10.00	10.00	0.00
Sharon Springs										
5,971.10	20.96	89.78	5,922.00	-997.00	131.69	483.79	486.35	10.00	10.00	0.00
6,000.00	23.85	89.78	5,948.72	-1,023.72	131.73	494.81	497.36	10.00	10.00	0.00
Niobrara A Chalk										
6,042.60	28.11	89.78	5,987.00	-1,062.00	131.80	513.46	516.01	10.00	10.00	0.00
Niobrara A Chalk Base										
6,077.19	31.57	89.78	6,017.00	-1,092.00	131.87	530.67	533.22	10.00	10.00	0.00
6,100.00	33.85	89.78	6,036.19	-1,111.19	131.91	543.00	545.54	10.00	10.00	0.00
Niobrara B1 Chalk Top										
6,125.44	36.39	89.78	6,057.00	-1,132.00	131.97	557.63	560.18	10.00	10.00	0.00
Niobrara B1 Chalk Base										
6,146.86	38.54	89.78	6,074.00	-1,149.00	132.02	570.66	573.20	10.00	10.00	0.00
6,200.00	43.85	89.78	6,113.97	-1,188.97	132.15	605.65	608.18	10.00	10.00	0.00
Niobrara B2 Chalk Base										
6,224.10	46.26	89.78	6,131.00	-1,206.00	132.22	622.71	625.24	10.00	10.00	0.00
Niobrara C Chalk Top										
6,267.83	50.63	89.78	6,160.00	-1,235.00	132.34	655.42	657.96	10.00	10.00	0.00
6,300.00	53.85	89.78	6,179.69	-1,254.69	132.44	680.85	683.38	10.00	10.00	0.00
Niobrara C Chalk Base										
6,323.21	56.17	89.78	6,193.00	-1,268.00	132.51	699.86	702.39	10.00	10.00	0.00
6,400.00	63.85	89.78	6,231.35	-1,306.35	132.77	766.32	768.84	10.00	10.00	0.00
Niobrara D Chalk Top										
6,417.92	65.64	89.78	6,239.00	-1,314.00	132.83	782.53	785.05	10.00	10.00	0.00

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Site:	NE NW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-2HC	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)
Ft. Hays										
6,491.62	73.01	89.78	6,265.00	-1,340.00	133.10	851.44	853.94	10.00	10.00	0.00
6,500.00	73.85	89.78	6,267.39	-1,342.39	133.13	859.47	861.97	10.00	10.00	0.00
6,600.00	83.85	89.78	6,286.70	-1,361.70	133.50	957.46	959.95	10.00	10.00	0.00
HZ LP: 775ft FNL & 2140ft FEL of Sec 31 - Codell (Target)										
6,661.49	90.00	89.78	6,290.00	-1,365.00	133.74	1,018.83	1,021.31	10.00	10.00	0.00
6,700.00	90.00	89.78	6,290.00	-1,365.00	133.89	1,057.34	1,059.82	0.00	0.00	0.00
6,800.00	90.00	89.78	6,290.00	-1,365.00	134.27	1,157.34	1,159.80	0.00	0.00	0.00
6,900.00	90.00	89.78	6,290.00	-1,365.00	134.65	1,257.34	1,259.79	0.00	0.00	0.00
7,000.00	90.00	89.78	6,290.00	-1,365.00	135.04	1,357.33	1,359.78	0.00	0.00	0.00
7,100.00	90.00	89.78	6,290.01	-1,365.01	135.42	1,457.33	1,459.76	0.00	0.00	0.00
7,200.00	90.00	89.78	6,290.01	-1,365.01	135.80	1,557.33	1,559.75	0.00	0.00	0.00
7,300.00	90.00	89.78	6,290.01	-1,365.01	136.19	1,657.33	1,659.74	0.00	0.00	0.00
7,400.00	90.00	89.78	6,290.01	-1,365.01	136.57	1,757.33	1,759.72	0.00	0.00	0.00
7,500.00	90.00	89.78	6,290.01	-1,365.01	136.95	1,857.33	1,859.71	0.00	0.00	0.00
7,600.00	90.00	89.78	6,290.01	-1,365.01	137.34	1,957.33	1,959.70	0.00	0.00	0.00
7,700.00	90.00	89.78	6,290.01	-1,365.01	137.72	2,057.33	2,059.68	0.00	0.00	0.00
7,800.00	90.00	89.78	6,290.01	-1,365.01	138.10	2,157.33	2,159.67	0.00	0.00	0.00
7,900.00	90.00	89.78	6,290.01	-1,365.01	138.48	2,257.33	2,259.66	0.00	0.00	0.00
8,000.00	90.00	89.78	6,290.01	-1,365.01	138.87	2,357.33	2,359.65	0.00	0.00	0.00
8,100.00	90.00	89.78	6,290.01	-1,365.01	139.25	2,457.33	2,459.63	0.00	0.00	0.00
8,200.00	90.00	89.78	6,290.02	-1,365.02	139.63	2,557.33	2,559.62	0.00	0.00	0.00
8,300.00	90.00	89.78	6,290.02	-1,365.02	140.01	2,657.33	2,659.61	0.00	0.00	0.00
8,400.00	90.00	89.78	6,290.02	-1,365.02	140.40	2,757.32	2,759.59	0.00	0.00	0.00
8,500.00	90.00	89.78	6,290.02	-1,365.02	140.78	2,857.32	2,859.58	0.00	0.00	0.00
8,600.00	90.00	89.78	6,290.02	-1,365.02	141.16	2,957.32	2,959.57	0.00	0.00	0.00
8,700.00	90.00	89.78	6,290.02	-1,365.02	141.54	3,057.32	3,059.55	0.00	0.00	0.00
8,800.00	90.00	89.78	6,290.02	-1,365.02	141.92	3,157.32	3,159.54	0.00	0.00	0.00
8,900.00	90.00	89.78	6,290.02	-1,365.02	142.31	3,257.32	3,259.53	0.00	0.00	0.00
9,000.00	90.00	89.78	6,290.02	-1,365.02	142.69	3,357.32	3,359.51	0.00	0.00	0.00
9,100.00	90.00	89.78	6,290.02	-1,365.02	143.07	3,457.32	3,459.50	0.00	0.00	0.00
9,200.00	90.00	89.78	6,290.02	-1,365.02	143.45	3,557.32	3,559.49	0.00	0.00	0.00
9,300.00	90.00	89.78	6,290.02	-1,365.02	143.83	3,657.32	3,659.47	0.00	0.00	0.00
9,400.00	90.00	89.78	6,290.02	-1,365.02	144.21	3,757.32	3,759.46	0.00	0.00	0.00
9,500.00	90.00	89.78	6,290.02	-1,365.02	144.60	3,857.32	3,859.45	0.00	0.00	0.00
9,600.00	90.00	89.78	6,290.02	-1,365.02	144.98	3,957.32	3,959.43	0.00	0.00	0.00
9,700.00	90.00	89.78	6,290.02	-1,365.02	145.36	4,057.32	4,059.42	0.00	0.00	0.00
9,800.00	90.00	89.78	6,290.02	-1,365.02	145.74	4,157.31	4,159.41	0.00	0.00	0.00
9,900.00	90.00	89.78	6,290.02	-1,365.02	146.12	4,257.31	4,259.39	0.00	0.00	0.00
10,000.00	90.00	89.78	6,290.02	-1,365.02	146.50	4,357.31	4,359.38	0.00	0.00	0.00
10,100.00	90.00	89.78	6,290.02	-1,365.02	146.88	4,457.31	4,459.37	0.00	0.00	0.00
10,200.00	90.00	89.78	6,290.02	-1,365.02	147.26	4,557.31	4,559.35	0.00	0.00	0.00
10,300.00	90.00	89.78	6,290.02	-1,365.02	147.64	4,657.31	4,659.34	0.00	0.00	0.00
10,400.00	90.00	89.78	6,290.02	-1,365.02	148.02	4,757.31	4,759.33	0.00	0.00	0.00
10,500.00	90.00	89.78	6,290.02	-1,365.02	148.40	4,857.31	4,859.31	0.00	0.00	0.00
10,600.00	90.00	89.78	6,290.02	-1,365.02	148.78	4,957.31	4,959.30	0.00	0.00	0.00
10,700.00	90.00	89.78	6,290.02	-1,365.02	149.16	5,057.31	5,059.29	0.00	0.00	0.00
10,800.00	90.00	89.78	6,290.02	-1,365.02	149.54	5,157.31	5,159.27	0.00	0.00	0.00
10,900.00	90.00	89.78	6,290.02	-1,365.02	149.92	5,257.31	5,259.26	0.00	0.00	0.00
11,000.00	90.00	89.78	6,290.02	-1,365.02	150.30	5,357.31	5,359.25	0.00	0.00	0.00
11,100.00	90.00	89.78	6,290.02	-1,365.02	150.68	5,457.31	5,459.23	0.00	0.00	0.00
11,200.00	90.00	89.78	6,290.02	-1,365.02	151.06	5,557.30	5,559.22	0.00	0.00	0.00
11,300.00	90.00	89.78	6,290.02	-1,365.02	151.44	5,657.30	5,659.21	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Site:	NE NW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-2HC	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)
11,400.00	90.00	89.78	6,290.02	-1,365.02	151.82	5,757.30	5,759.19	0.00	0.00	0.00
11,500.00	90.00	89.78	6,290.02	-1,365.02	152.20	5,857.30	5,859.18	0.00	0.00	0.00
11,600.00	90.00	89.78	6,290.02	-1,365.02	152.58	5,957.30	5,959.17	0.00	0.00	0.00
11,700.00	90.00	89.78	6,290.02	-1,365.02	152.96	6,057.30	6,059.15	0.00	0.00	0.00
11,800.00	90.00	89.78	6,290.02	-1,365.02	153.34	6,157.30	6,159.14	0.00	0.00	0.00
11,900.00	90.00	89.78	6,290.02	-1,365.02	153.72	6,257.30	6,259.13	0.00	0.00	0.00
12,000.00	90.00	89.78	6,290.02	-1,365.02	154.10	6,357.30	6,359.11	0.00	0.00	0.00
12,100.00	90.00	89.78	6,290.01	-1,365.01	154.48	6,457.30	6,459.10	0.00	0.00	0.00
12,200.00	90.00	89.78	6,290.01	-1,365.01	154.86	6,557.30	6,559.09	0.00	0.00	0.00
12,300.00	90.00	89.78	6,290.01	-1,365.01	155.24	6,657.30	6,659.07	0.00	0.00	0.00
12,400.00	90.00	89.78	6,290.01	-1,365.01	155.61	6,757.30	6,759.06	0.00	0.00	0.00
12,500.00	90.00	89.78	6,290.01	-1,365.01	155.99	6,857.30	6,859.05	0.00	0.00	0.00
12,600.00	90.00	89.78	6,290.01	-1,365.01	156.37	6,957.29	6,959.03	0.00	0.00	0.00
12,700.00	90.00	89.78	6,290.01	-1,365.01	156.75	7,057.29	7,059.02	0.00	0.00	0.00
12,800.00	90.00	89.78	6,290.01	-1,365.01	157.13	7,157.29	7,159.01	0.00	0.00	0.00
12,900.00	90.00	89.78	6,290.01	-1,365.01	157.51	7,257.29	7,258.99	0.00	0.00	0.00
13,000.00	90.00	89.78	6,290.01	-1,365.01	157.88	7,357.29	7,358.98	0.00	0.00	0.00
13,100.00	90.00	89.78	6,290.01	-1,365.01	158.26	7,457.29	7,458.97	0.00	0.00	0.00
13,200.00	90.00	89.78	6,290.00	-1,365.00	158.64	7,557.29	7,558.95	0.00	0.00	0.00
13,300.00	90.00	89.78	6,290.00	-1,365.00	159.02	7,657.29	7,658.94	0.00	0.00	0.00
13,400.00	90.00	89.78	6,290.00	-1,365.00	159.40	7,757.29	7,758.93	0.00	0.00	0.00
13,500.00	90.00	89.78	6,290.00	-1,365.00	159.77	7,857.29	7,858.91	0.00	0.00	0.00
BHL: 775ft FNL & 460ft FEL of Sec 32										
13,597.88	90.00	89.78	6,290.00	-1,365.00	160.14	7,955.17	7,956.78	0.00	0.00	0.00

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
508.00	508.00	Fox Hills Base				
1,446.00	1,446.00	Pierre Shale Top				
3,255.99	3,234.00	Richard Sandstone				
3,379.69	3,355.00	Parkman Sandstone				
4,077.95	4,038.00	Sussex Sandstone				
4,571.43	4,527.00	Shannon Sandstone				
5,971.10	5,922.00	Sharon Springs				
6,042.60	5,987.00	Niobrara A Chalk				
6,077.19	6,017.00	Niobrara A Chalk Base				
6,125.44	6,057.00	Niobrara B1 Chalk Top				
6,146.86	6,074.00	Niobrara B1 Chalk Base				
6,224.10	6,131.00	Niobrara B2 Chalk Base				
6,267.83	6,160.00	Niobrara C Chalk Top				
6,323.21	6,193.00	Niobrara C Chalk Base				
6,417.92	6,239.00	Niobrara D Chalk Top				
6,491.62	6,265.00	Ft. Hays				
6,661.49	6,290.00	Codell (Target)				

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4925.00usft (Original Well Elev)
Site:	NE NW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-2HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Plan Annotations				
Local Coordinates				
MD (usft)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Comment
0.00	0.00	0.00	0.00	SHL: 910ft FNL & 2110ft FWL of Sec 31
1,850.00	1,850.00	0.00	0.00	START NUDGE (2°/100ft BUR)
2,450.00	2,445.62	17.71	60.04	EOB TO 12° INC
4,083.74	4,043.66	113.83	385.84	END OF TANGENT
4,683.74	4,639.28	131.54	445.88	EOD TO VERTICAL
5,761.49	5,717.04	131.54	445.88	KOP (10°/100ft BUR)
6,661.49	6,290.00	133.74	1,018.83	HZ LP: 775ft FNL & 2140ft FEL of Sec 31
13,597.88	6,290.00	160.14	7,955.17	BHL: 775ft FNL & 460ft FEL of Sec 32