

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

SHULL FED 31-32-5HN

ORIGINAL WELLBORE

23 July, 2019

Plan: PROPOSAL #2





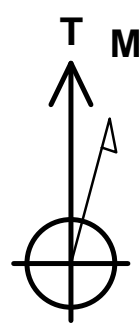
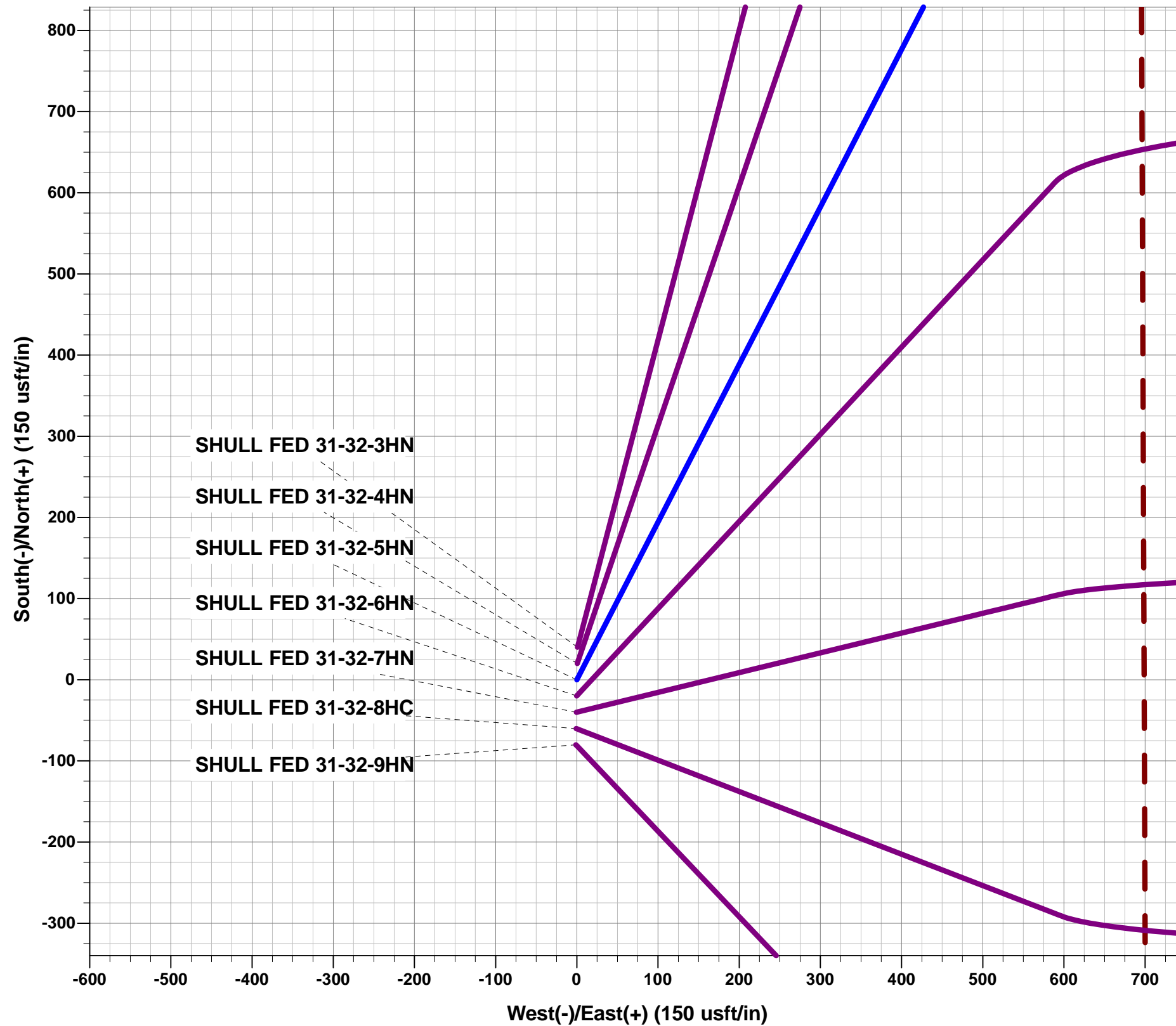
Project: WELD COUNTY, COLORADO (NAD 83)
Site: SE SW SEC. 31 T9N R59W 6th P.M.
Well: SHULL FED 31-32-5HN
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

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: 1229ft FSL & 1951ft FWL of Sec 31
300.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1008.11	1015.53	14.31	27.25	79.03	40.70	52.46	88.89	EOB TO 14.31° INC
5668.86	5825.53	14.31	27.25	1135.99	585.11	754.07	1277.82	KOP (10°/100ft DGLG)
6164.00	6660.10	90.00	89.80	1250.06	1153.94	1333.71	1869.83	LP: 2495ft FSL & 2179ft FEL of Sec 31
6164.00	13630.63	90.00	89.80	1274.33	8124.43	8223.76	8840.36	BHL: 2495ft FSL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP - SHULL FED 31-32-5HN (P2)	6164.00	1250.06	1153.94	40.706062	-104.019121
BHL - SHULL FED 31-32-5HN (P2)	6164.00	1274.33	8124.43	40.706125	-103.993980



Azimuths to True North
Magnetic North: 7.61°

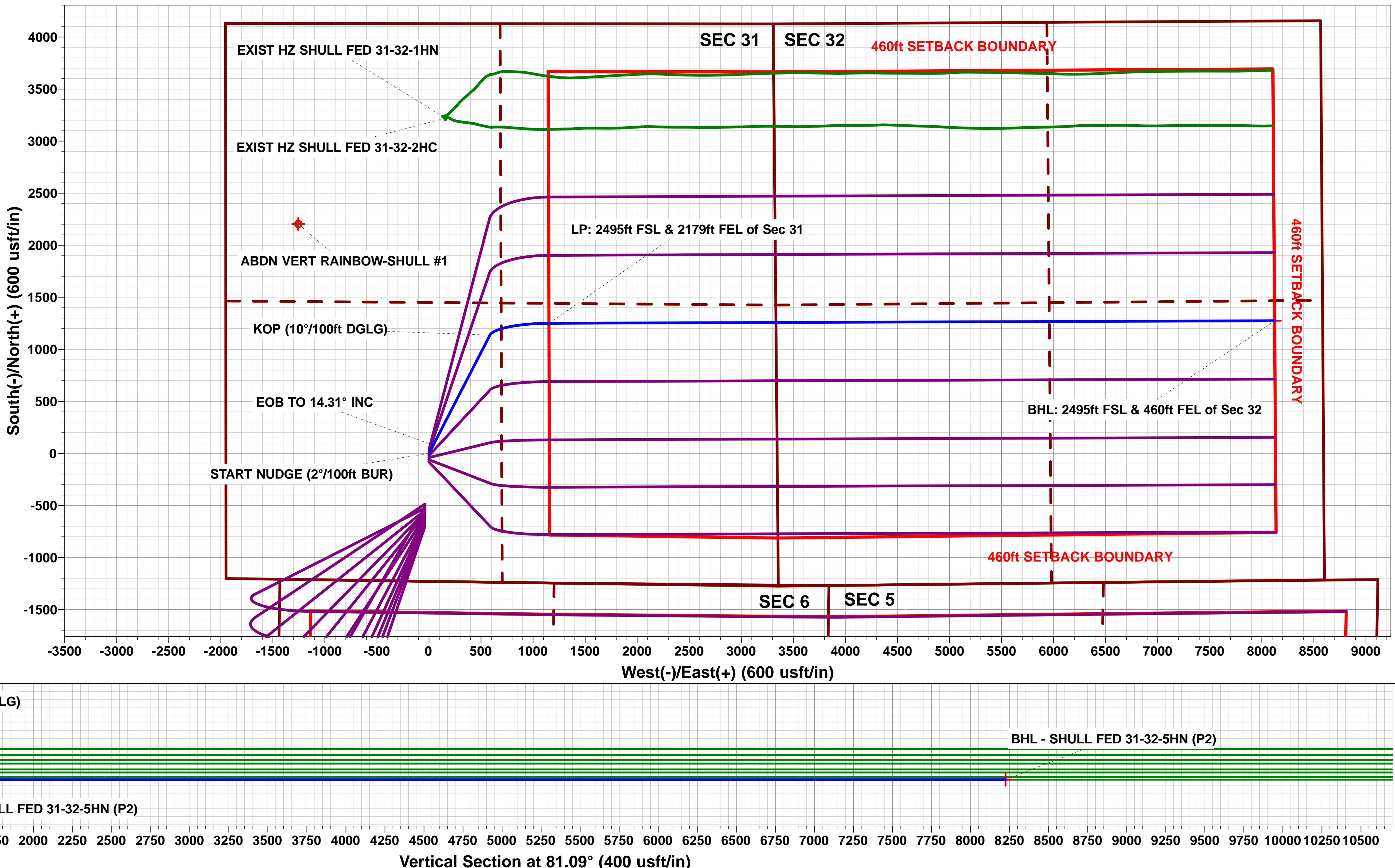
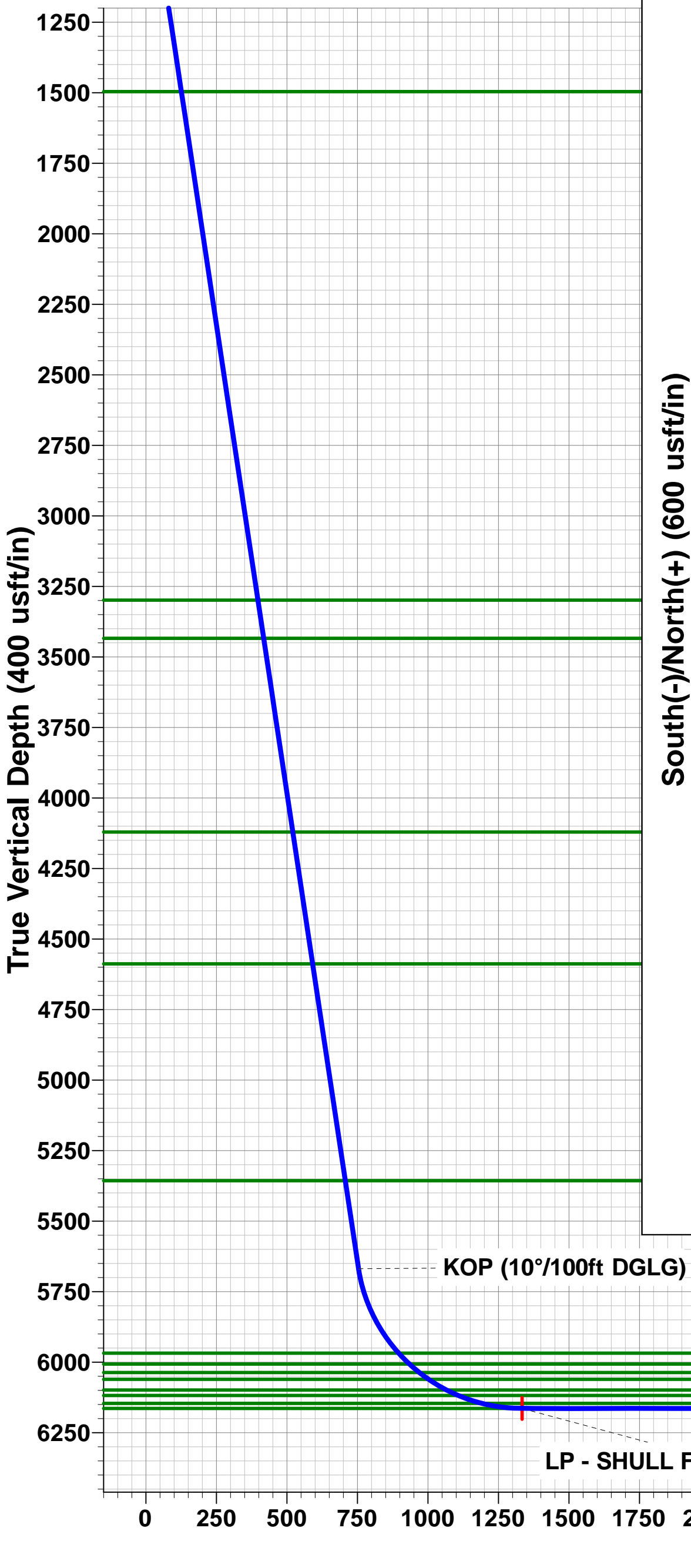
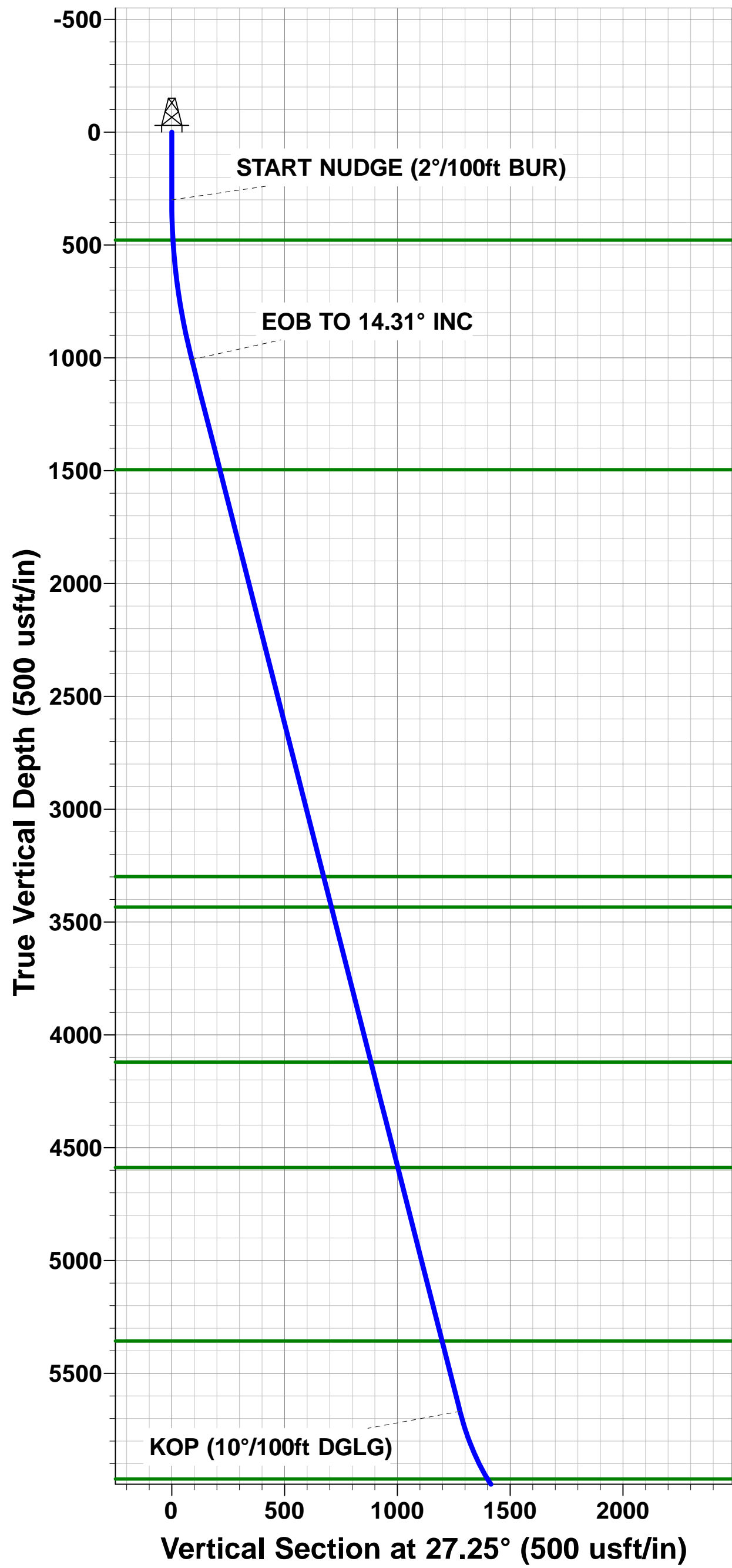
Magnetic Field
Strength: 52383.3snT
Dip Angle: 67.15°
Date: 22/07/2019
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
479.00	479.12	Fox Hills Base
1496.00	1519.04	Pierre Shale Top
3299.00	3379.78	Richard Sandstone
3434.00	3519.10	Parkman Sandstone
4121.00	4228.10	Sussex Sandstone
4588.00	4710.06	Shannon Sandstone
5357.00	5503.68	TeePee Buttes
5968.00	6164.96	Sharon Springs
6007.00	6219.86	Niobrara Top
6037.00	6266.10	Niobrara A Chalk
6061.00	6306.65	Niobrara A Chalk Base
6099.00	6381.00	Niobrara B1 Chalk Top
6118.00	6426.00	Niobrara B1 Chalk Base
6146.00	6514.28	Niobrara B2 Chalk Target Top
6164.00	6660.10	Niobrara B2 Chalk Target Center

PROPOSED LOCAL COORDINATES:

SHL: 1229ft FSL & 1951ft FWL of Sec 31
HZ LP: 2495ft FSL & 2179ft FEL of Sec 31
BHL: 2495ft FSL & 460ft FEL of Sec 32



Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-5HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4902.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4902.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-5HN	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
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	SHULL FED 31-32-5HN		
Well Position	+N-S	704.61 usft	Northing:
	+E-W	195.20 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	22/07/2019	7.61	67.15	52,383

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 (°)
	5.00	0.00	0.00	81.09

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	-4,902.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	-4,602.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,015.53	14.31	27.25	1,008.11	-3,893.89	79.03	40.70	2.00	2.00	0.00	27.25	
5,825.53	14.31	27.25	5,668.86	766.86	1,135.99	585.11	0.00	0.00	0.00	0.00	
6,660.10	90.00	89.80	6,164.00	1,262.00	1,250.05	1,153.94	10.00	9.07	7.49	63.28	LP - SHULL FED 3'
13,630.63	90.00	89.80	6,164.00	1,262.00	1,274.32	8,124.43	0.00	0.00	0.00	0.00	BHL - SHULL FED

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4902.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4902.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-5HN	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: 1229ft FSL & 1951ft FWL of Sec 31										
0.00	0.00	0.00	0.00	4,902.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,802.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,702.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
300.00	0.00	0.00	300.00	4,602.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	2.00	27.25	399.98	4,502.02	1.55	0.80	1.03	2.00	2.00	0.00
Fox Hills Base										
479.12	3.58	27.25	479.00	4,423.00	4.98	2.56	3.30	2.00	2.00	0.00
500.00	4.00	27.25	499.84	4,402.16	6.20	3.20	4.12	2.00	2.00	0.00
600.00	6.00	27.25	599.45	4,302.55	13.95	7.19	9.26	2.00	2.00	0.00
700.00	8.00	27.25	698.70	4,203.30	24.79	12.77	16.45	2.00	2.00	0.00
800.00	10.00	27.25	797.47	4,104.53	38.69	19.93	25.68	2.00	2.00	0.00
900.00	12.00	27.25	895.62	4,006.38	55.65	28.67	36.94	2.00	2.00	0.00
1,000.00	14.00	27.25	993.06	3,908.94	75.65	38.97	50.22	2.00	2.00	0.00
EOB TO 14.31° INC										
1,015.53	14.31	27.25	1,008.11	3,893.89	79.03	40.70	52.46	2.00	2.00	0.00
1,100.00	14.31	27.25	1,089.96	3,812.04	97.59	50.26	64.78	0.00	0.00	0.00
1,200.00	14.31	27.25	1,186.86	3,715.14	119.56	61.58	79.37	0.00	0.00	0.00
1,300.00	14.31	27.25	1,283.76	3,618.24	141.54	72.90	93.95	0.00	0.00	0.00
1,400.00	14.31	27.25	1,380.65	3,521.35	163.51	84.22	108.54	0.00	0.00	0.00
1,500.00	14.31	27.25	1,477.55	3,424.45	185.49	95.54	123.13	0.00	0.00	0.00
Pierre Shale Top										
1,519.04	14.31	27.25	1,496.00	3,406.00	189.67	97.69	125.90	0.00	0.00	0.00
1,600.00	14.31	27.25	1,574.45	3,327.55	207.46	106.86	137.71	0.00	0.00	0.00
1,700.00	14.31	27.25	1,671.34	3,230.66	229.43	118.17	152.30	0.00	0.00	0.00
1,800.00	14.31	27.25	1,768.24	3,133.76	251.41	129.49	166.89	0.00	0.00	0.00
1,900.00	14.31	27.25	1,865.14	3,036.86	273.38	140.81	181.47	0.00	0.00	0.00
2,000.00	14.31	27.25	1,962.04	2,939.96	295.36	152.13	196.06	0.00	0.00	0.00
2,100.00	14.31	27.25	2,058.93	2,843.07	317.33	163.45	210.64	0.00	0.00	0.00
2,200.00	14.31	27.25	2,155.83	2,746.17	339.31	174.76	225.23	0.00	0.00	0.00
2,300.00	14.31	27.25	2,252.73	2,649.27	361.28	186.08	239.82	0.00	0.00	0.00
2,400.00	14.31	27.25	2,349.62	2,552.38	383.25	197.40	254.40	0.00	0.00	0.00
2,500.00	14.31	27.25	2,446.52	2,455.48	405.23	208.72	268.99	0.00	0.00	0.00
2,600.00	14.31	27.25	2,543.42	2,358.58	427.20	220.04	283.58	0.00	0.00	0.00
2,700.00	14.31	27.25	2,640.31	2,261.69	449.18	231.36	298.16	0.00	0.00	0.00
2,800.00	14.31	27.25	2,737.21	2,164.79	471.15	242.67	312.75	0.00	0.00	0.00
2,900.00	14.31	27.25	2,834.11	2,067.89	493.13	253.99	327.34	0.00	0.00	0.00
3,000.00	14.31	27.25	2,931.01	1,970.99	515.10	265.31	341.92	0.00	0.00	0.00
3,100.00	14.31	27.25	3,027.90	1,874.10	537.07	276.63	356.51	0.00	0.00	0.00
3,200.00	14.31	27.25	3,124.80	1,777.20	559.05	287.95	371.10	0.00	0.00	0.00
3,300.00	14.31	27.25	3,221.70	1,680.30	581.02	299.26	385.68	0.00	0.00	0.00
Richard Sandstone										
3,379.78	14.31	27.25	3,299.00	1,603.00	598.55	308.29	397.32	0.00	0.00	0.00
3,400.00	14.31	27.25	3,318.59	1,583.41	603.00	310.58	400.27	0.00	0.00	0.00
3,500.00	14.31	27.25	3,415.49	1,486.51	624.97	321.90	414.86	0.00	0.00	0.00
Parkman Sandstone										
3,519.10	14.31	27.25	3,434.00	1,468.00	629.17	324.06	417.64	0.00	0.00	0.00
3,600.00	14.31	27.25	3,512.39	1,389.61	646.94	333.22	429.44	0.00	0.00	0.00
3,700.00	14.31	27.25	3,609.29	1,292.71	668.92	344.54	444.03	0.00	0.00	0.00
3,800.00	14.31	27.25	3,706.18	1,195.82	690.89	355.86	458.62	0.00	0.00	0.00
3,900.00	14.31	27.25	3,803.08	1,098.92	712.87	367.17	473.20	0.00	0.00	0.00
4,000.00	14.31	27.25	3,899.98	1,002.02	734.84	378.49	487.79	0.00	0.00	0.00

Planning Report



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Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4902.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4902.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-5HN	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)
4,100.00	14.31	27.25	3,996.87	905.13	756.82	389.81	502.37	0.00	0.00	0.00
4,200.00	14.31	27.25	4,093.77	808.23	778.79	401.13	516.96	0.00	0.00	0.00
Sussex Sandstone										
4,228.10	14.31	27.25	4,121.00	781.00	784.97	404.31	521.06	0.00	0.00	0.00
4,300.00	14.31	27.25	4,190.67	711.33	800.76	412.45	531.55	0.00	0.00	0.00
4,400.00	14.31	27.25	4,287.56	614.44	822.74	423.76	546.13	0.00	0.00	0.00
4,500.00	14.31	27.25	4,384.46	517.54	844.71	435.08	560.72	0.00	0.00	0.00
4,600.00	14.31	27.25	4,481.36	420.64	866.69	446.40	575.31	0.00	0.00	0.00
4,700.00	14.31	27.25	4,578.26	323.74	888.66	457.72	589.89	0.00	0.00	0.00
Shannon Sandstone										
4,710.06	14.31	27.25	4,588.00	314.00	890.87	458.86	591.36	0.00	0.00	0.00
4,800.00	14.31	27.25	4,675.15	226.85	910.64	469.04	604.48	0.00	0.00	0.00
4,900.00	14.31	27.25	4,772.05	129.95	932.61	480.36	619.07	0.00	0.00	0.00
5,000.00	14.31	27.25	4,868.95	33.05	954.58	491.67	633.65	0.00	0.00	0.00
5,100.00	14.31	27.25	4,965.84	-63.84	976.56	502.99	648.24	0.00	0.00	0.00
5,200.00	14.31	27.25	5,062.74	-160.74	998.53	514.31	662.83	0.00	0.00	0.00
5,300.00	14.31	27.25	5,159.64	-257.64	1,020.51	525.63	677.41	0.00	0.00	0.00
5,400.00	14.31	27.25	5,256.53	-354.53	1,042.48	536.95	692.00	0.00	0.00	0.00
5,500.00	14.31	27.25	5,353.43	-451.43	1,064.45	548.26	706.59	0.00	0.00	0.00
TeePee Buttes										
5,503.68	14.31	27.25	5,357.00	-455.00	1,065.26	548.68	707.12	0.00	0.00	0.00
5,600.00	14.31	27.25	5,450.33	-548.33	1,086.43	559.58	721.17	0.00	0.00	0.00
5,700.00	14.31	27.25	5,547.23	-645.23	1,108.40	570.90	735.76	0.00	0.00	0.00
5,800.00	14.31	27.25	5,644.12	-742.12	1,130.38	582.22	750.35	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
5,825.53	14.31	27.25	5,668.86	-766.86	1,135.99	585.11	754.07	0.00	0.00	0.00
5,900.00	18.85	48.25	5,740.28	-838.28	1,152.20	598.32	769.63	10.00	6.09	28.20
6,000.00	26.99	63.41	5,832.39	-930.39	1,173.16	630.74	804.91	10.00	8.15	15.16
6,100.00	36.03	71.67	5,917.59	-1,015.59	1,192.62	679.08	855.68	10.00	9.04	8.26
Sharon Springs										
6,164.96	42.12	75.30	5,968.00	-1,066.00	1,204.17	718.33	896.24	10.00	9.36	5.59
6,200.00	45.44	76.92	5,993.30	-1,091.30	1,209.98	741.86	920.39	10.00	9.48	4.62
Niobrara Top										
6,219.86	47.33	77.75	6,007.00	-1,105.00	1,213.13	755.89	934.74	10.00	9.52	4.21
Niobrara A Chalk										
6,266.10	51.75	79.52	6,037.00	-1,135.00	1,220.04	790.37	969.88	10.00	9.57	3.82
6,300.00	55.01	80.68	6,057.22	-1,155.22	1,224.71	817.17	997.08	10.00	9.61	3.43
Niobrara A Chalk Base										
6,306.65	55.65	80.90	6,061.00	-1,159.00	1,225.58	822.57	1,002.54	10.00	9.63	3.26
Niobrara B1 Chalk Top										
6,381.00	62.84	83.13	6,099.00	-1,197.00	1,234.41	885.80	1,066.38	10.00	9.66	3.00
6,400.00	64.68	83.65	6,107.40	-1,205.40	1,236.37	902.73	1,083.41	10.00	9.69	2.74
Niobrara B1 Chalk Base										
6,426.00	67.20	84.34	6,118.00	-1,216.00	1,238.85	926.34	1,107.11	10.00	9.70	2.65
6,500.00	74.40	86.18	6,142.33	-1,240.33	1,244.60	995.94	1,176.76	10.00	9.72	2.48
Niobrara B2 Chalk Target Top										
6,514.28	75.79	86.51	6,146.00	-1,244.00	1,245.48	1,009.71	1,190.51	10.00	9.74	2.36
6,600.00	84.14	88.47	6,160.93	-1,258.93	1,249.15	1,093.96	1,274.31	10.00	9.74	2.28
LP: 2495ft FSL & 2179ft FEL of Sec 31 - Niobrara B2 Chalk Target Center										
6,660.10	90.00	89.80	6,164.00	-1,262.00	1,250.05	1,153.94	1,333.71	10.00	9.75	2.22
6,700.00	90.00	89.80	6,164.00	-1,262.00	1,250.19	1,193.84	1,373.15	0.00	0.00	0.00
6,800.00	90.00	89.80	6,164.00	-1,262.00	1,250.54	1,293.84	1,471.99	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-5HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4902.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4902.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-5HN	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)
6,900.00	90.00	89.80	6,164.00	-1,262.00	1,250.89	1,393.84	1,570.84	0.00	0.00	0.00
7,000.00	90.00	89.80	6,164.00	-1,262.00	1,251.24	1,493.84	1,669.68	0.00	0.00	0.00
7,100.00	90.00	89.80	6,164.00	-1,262.00	1,251.59	1,593.84	1,768.53	0.00	0.00	0.00
7,200.00	90.00	89.80	6,164.00	-1,262.00	1,251.93	1,693.84	1,867.38	0.00	0.00	0.00
7,300.00	90.00	89.80	6,164.00	-1,262.00	1,252.28	1,793.84	1,966.22	0.00	0.00	0.00
7,400.00	90.00	89.80	6,164.00	-1,262.00	1,252.63	1,893.84	2,065.07	0.00	0.00	0.00
7,500.00	90.00	89.80	6,164.00	-1,262.00	1,252.98	1,993.84	2,163.91	0.00	0.00	0.00
7,600.00	90.00	89.80	6,164.00	-1,262.00	1,253.33	2,093.84	2,262.76	0.00	0.00	0.00
7,700.00	90.00	89.80	6,164.00	-1,262.00	1,253.67	2,193.84	2,361.60	0.00	0.00	0.00
7,800.00	90.00	89.80	6,164.00	-1,262.00	1,254.02	2,293.84	2,460.45	0.00	0.00	0.00
7,900.00	90.00	89.80	6,164.00	-1,262.00	1,254.37	2,393.84	2,559.29	0.00	0.00	0.00
8,000.00	90.00	89.80	6,164.00	-1,262.00	1,254.72	2,493.83	2,658.14	0.00	0.00	0.00
8,100.00	90.00	89.80	6,164.00	-1,262.00	1,255.07	2,593.83	2,756.98	0.00	0.00	0.00
8,200.00	90.00	89.80	6,164.00	-1,262.00	1,255.41	2,693.83	2,855.83	0.00	0.00	0.00
8,300.00	90.00	89.80	6,164.00	-1,262.00	1,255.76	2,793.83	2,954.68	0.00	0.00	0.00
8,400.00	90.00	89.80	6,164.00	-1,262.00	1,256.11	2,893.83	3,053.52	0.00	0.00	0.00
8,500.00	90.00	89.80	6,164.00	-1,262.00	1,256.46	2,993.83	3,152.37	0.00	0.00	0.00
8,600.00	90.00	89.80	6,164.00	-1,262.00	1,256.81	3,093.83	3,251.21	0.00	0.00	0.00
8,700.00	90.00	89.80	6,164.00	-1,262.00	1,257.16	3,193.83	3,350.06	0.00	0.00	0.00
8,800.00	90.00	89.80	6,164.00	-1,262.00	1,257.50	3,293.83	3,448.90	0.00	0.00	0.00
8,900.00	90.00	89.80	6,164.00	-1,262.00	1,257.85	3,393.83	3,547.75	0.00	0.00	0.00
9,000.00	90.00	89.80	6,164.00	-1,262.00	1,258.20	3,493.83	3,646.59	0.00	0.00	0.00
9,100.00	90.00	89.80	6,164.00	-1,262.00	1,258.55	3,593.83	3,745.44	0.00	0.00	0.00
9,200.00	90.00	89.80	6,164.00	-1,262.00	1,258.90	3,693.83	3,844.28	0.00	0.00	0.00
9,300.00	90.00	89.80	6,164.00	-1,262.00	1,259.24	3,793.83	3,943.13	0.00	0.00	0.00
9,400.00	90.00	89.80	6,164.00	-1,262.00	1,259.59	3,893.83	4,041.98	0.00	0.00	0.00
9,500.00	90.00	89.80	6,164.00	-1,262.00	1,259.94	3,993.83	4,140.82	0.00	0.00	0.00
9,600.00	90.00	89.80	6,164.00	-1,262.00	1,260.29	4,093.83	4,239.67	0.00	0.00	0.00
9,700.00	90.00	89.80	6,164.00	-1,262.00	1,260.64	4,193.82	4,338.51	0.00	0.00	0.00
9,800.00	90.00	89.80	6,164.00	-1,262.00	1,260.99	4,293.82	4,437.36	0.00	0.00	0.00
9,900.00	90.00	89.80	6,164.00	-1,262.00	1,261.33	4,393.82	4,536.20	0.00	0.00	0.00
10,000.00	90.00	89.80	6,164.00	-1,262.00	1,261.68	4,493.82	4,635.05	0.00	0.00	0.00
10,100.00	90.00	89.80	6,164.00	-1,262.00	1,262.03	4,593.82	4,733.89	0.00	0.00	0.00
10,200.00	90.00	89.80	6,164.00	-1,262.00	1,262.38	4,693.82	4,832.74	0.00	0.00	0.00
10,300.00	90.00	89.80	6,164.00	-1,262.00	1,262.73	4,793.82	4,931.59	0.00	0.00	0.00
10,400.00	90.00	89.80	6,164.00	-1,262.00	1,263.07	4,893.82	5,030.43	0.00	0.00	0.00
10,500.00	90.00	89.80	6,164.00	-1,262.00	1,263.42	4,993.82	5,129.28	0.00	0.00	0.00
10,600.00	90.00	89.80	6,164.00	-1,262.00	1,263.77	5,093.82	5,228.12	0.00	0.00	0.00
10,700.00	90.00	89.80	6,164.00	-1,262.00	1,264.12	5,193.82	5,326.97	0.00	0.00	0.00
10,800.00	90.00	89.80	6,164.00	-1,262.00	1,264.47	5,293.82	5,425.81	0.00	0.00	0.00
10,900.00	90.00	89.80	6,164.00	-1,262.00	1,264.82	5,393.82	5,524.66	0.00	0.00	0.00
11,000.00	90.00	89.80	6,164.00	-1,262.00	1,265.16	5,493.82	5,623.50	0.00	0.00	0.00
11,100.00	90.00	89.80	6,164.00	-1,262.00	1,265.51	5,593.82	5,722.35	0.00	0.00	0.00
11,200.00	90.00	89.80	6,164.00	-1,262.00	1,265.86	5,693.82	5,821.19	0.00	0.00	0.00
11,300.00	90.00	89.80	6,164.00	-1,262.00	1,266.21	5,793.81	5,920.04	0.00	0.00	0.00
11,400.00	90.00	89.80	6,164.00	-1,262.00	1,266.56	5,893.81	6,018.89	0.00	0.00	0.00
11,500.00	90.00	89.80	6,164.00	-1,262.00	1,266.90	5,993.81	6,117.73	0.00	0.00	0.00
11,600.00	90.00	89.80	6,164.00	-1,262.00	1,267.25	6,093.81	6,216.58	0.00	0.00	0.00
11,700.00	90.00	89.80	6,164.00	-1,262.00	1,267.60	6,193.81	6,315.42	0.00	0.00	0.00
11,800.00	90.00	89.80	6,164.00	-1,262.00	1,267.95	6,293.81	6,414.27	0.00	0.00	0.00
11,900.00	90.00	89.80	6,164.00	-1,262.00	1,268.30	6,393.81	6,513.11	0.00	0.00	0.00
12,000.00	90.00	89.80	6,164.00	-1,262.00	1,268.64	6,493.81	6,611.96	0.00	0.00	0.00
12,100.00	90.00	89.80	6,164.00	-1,262.00	1,268.99	6,593.81	6,710.80	0.00	0.00	0.00
12,200.00	90.00	89.80	6,164.00	-1,262.00	1,269.34	6,693.81	6,809.65	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-5HN
Company:	MALLARD EXPLORATION	TVD Reference:	KB 25' @ 4902.00usft
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB 25' @ 4902.00usft
Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-5HN	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,300.00	90.00	89.80	6,164.00	-1,262.00	1,269.69	6,793.81	6,908.49	0.00	0.00	0.00
12,400.00	90.00	89.80	6,164.00	-1,262.00	1,270.04	6,893.81	7,007.34	0.00	0.00	0.00
12,500.00	90.00	89.80	6,164.00	-1,262.00	1,270.39	6,993.81	7,106.19	0.00	0.00	0.00
12,600.00	90.00	89.80	6,164.00	-1,262.00	1,270.73	7,093.81	7,205.03	0.00	0.00	0.00
12,700.00	90.00	89.80	6,164.00	-1,262.00	1,271.08	7,193.81	7,303.88	0.00	0.00	0.00
12,800.00	90.00	89.80	6,164.00	-1,262.00	1,271.43	7,293.81	7,402.72	0.00	0.00	0.00
12,900.00	90.00	89.80	6,164.00	-1,262.00	1,271.78	7,393.81	7,501.57	0.00	0.00	0.00
13,000.00	90.00	89.80	6,164.00	-1,262.00	1,272.13	7,493.80	7,600.41	0.00	0.00	0.00
13,100.00	90.00	89.80	6,164.00	-1,262.00	1,272.47	7,593.80	7,699.26	0.00	0.00	0.00
13,200.00	90.00	89.80	6,164.00	-1,262.00	1,272.82	7,693.80	7,798.10	0.00	0.00	0.00
13,300.00	90.00	89.80	6,164.00	-1,262.00	1,273.17	7,793.80	7,896.95	0.00	0.00	0.00
13,400.00	90.00	89.80	6,164.00	-1,262.00	1,273.52	7,893.80	7,995.80	0.00	0.00	0.00
13,500.00	90.00	89.80	6,164.00	-1,262.00	1,273.87	7,993.80	8,094.64	0.00	0.00	0.00
13,600.00	90.00	89.80	6,164.00	-1,262.00	1,274.22	8,093.80	8,193.49	0.00	0.00	0.00
BHL: 2495ft FSL & 460ft FEL of Sec 32										
13,630.63	90.00	89.80	6,164.00	-1,262.00	1,274.32	8,124.43	8,223.76	0.00	0.00	0.00

Formations					
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
479.12	479.00	Fox Hills Base			
1,519.04	1,496.00	Pierre Shale Top			
3,379.78	3,299.00	Richard Sandstone			
3,519.10	3,434.00	Parkman Sandstone			
4,228.10	4,121.00	Sussex Sandstone			
4,710.06	4,588.00	Shannon Sandstone			
5,503.68	5,357.00	TeePee Buttes			
6,164.96	5,968.00	Sharon Springs			
6,219.86	6,007.00	Niobrara Top			
6,266.10	6,037.00	Niobrara A Chalk			
6,306.65	6,061.00	Niobrara A Chalk Base			
6,381.00	6,099.00	Niobrara B1 Chalk Top			
6,426.00	6,118.00	Niobrara B1 Chalk Base			
6,514.28	6,146.00	Niobrara B2 Chalk Target Top			
6,660.10	6,164.00	Niobrara B2 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: 1229ft FSL & 1951ft FWL of Sec 31
300.00	300.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1,015.53	1,008.11	79.03	40.70	EOB TO 14.31° INC
5,825.53	5,668.86	1,135.99	585.11	KOP (10°/100ft DGLG)
6,660.10	6,164.00	1,250.05	1,153.94	LP: 2495ft FSL & 2179ft FEL of Sec 31
13,630.63	6,164.00	1,274.32	8,124.43	BHL: 2495ft FSL & 460ft FEL of Sec 32