

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

SHULL FED 31-32-8HC

ORIGINAL WELLBORE

23 July, 2019

Plan: PROPOSAL #2





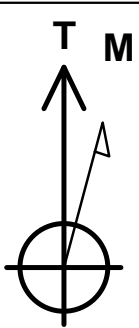
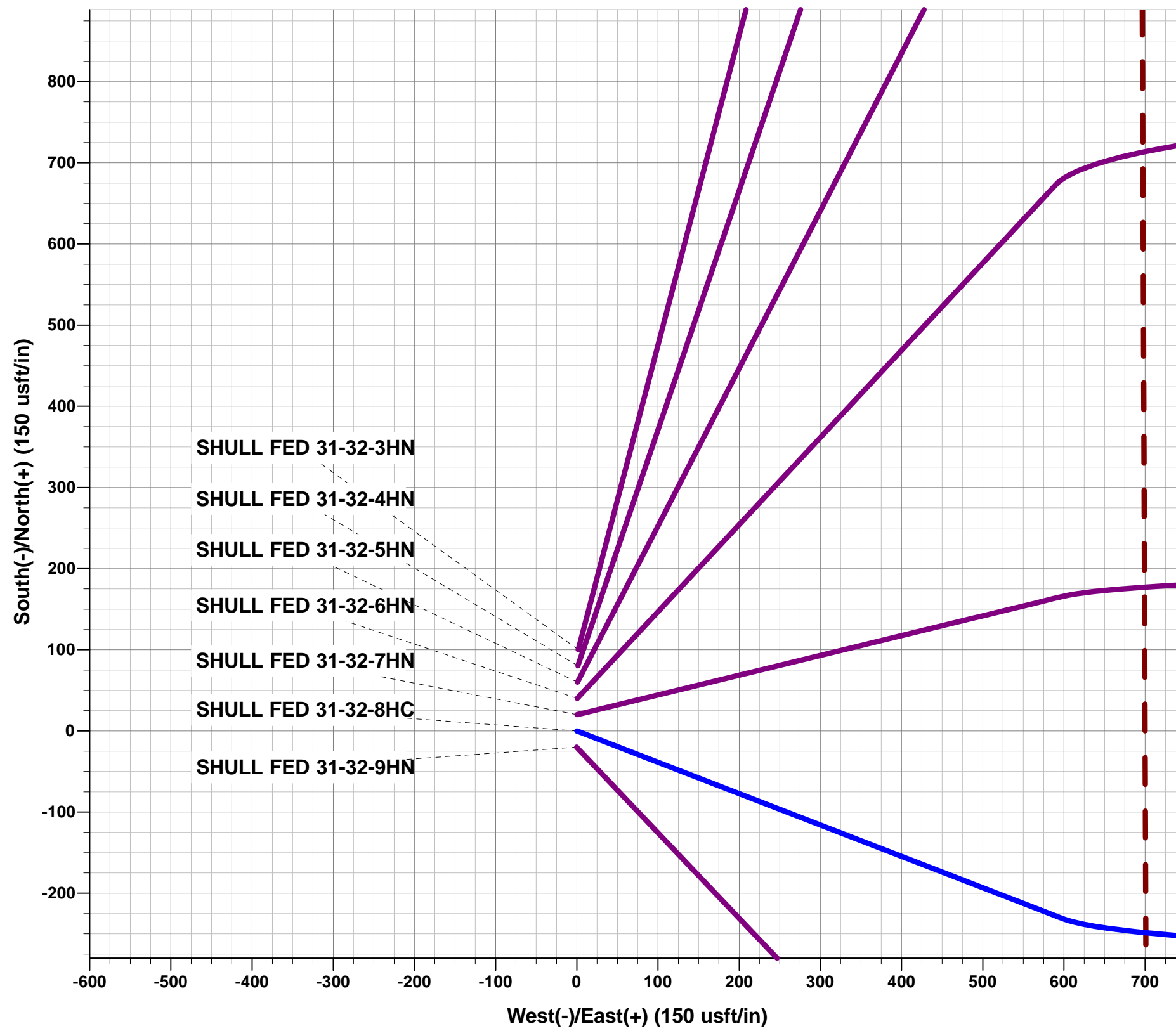
Project: WELD COUNTY, COLORADO (NAD 83)
Site: SE SW SEC. 31 T9N R59W 6th P.M.
Well: SHULL FED 31-32-8HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

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: 1169ft FSL & 1950ft FWL of Sec 31
2536.00	2536.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
3131.61	3135.99	12.00	111.12	-22.56	58.39	59.03	62.60	EOB TO 12° INC
5855.38	5920.61	12.00	111.12	-231.21	598.44	605.00	641.55	KOP (10°/100ft DGLG)
6316.00	6708.94	90.00	89.80	-264.83	1160.67	1167.98	1205.94	LP: 920ft FSL & 2188ft FEL of Sec 31
6316.00	13684.36	90.00	89.80	-240.19	8136.04	8139.59	8181.36	BHL: 920ft FSL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
LP - SHULL FED 31-32-8HC (P2)	6316.00	-264.83	1160.67	40.701739	-104.019100
BHL - SHULL FED 31-32-8HC (P2)	6316.00	-240.19	8136.04	40.701803	-103.993943



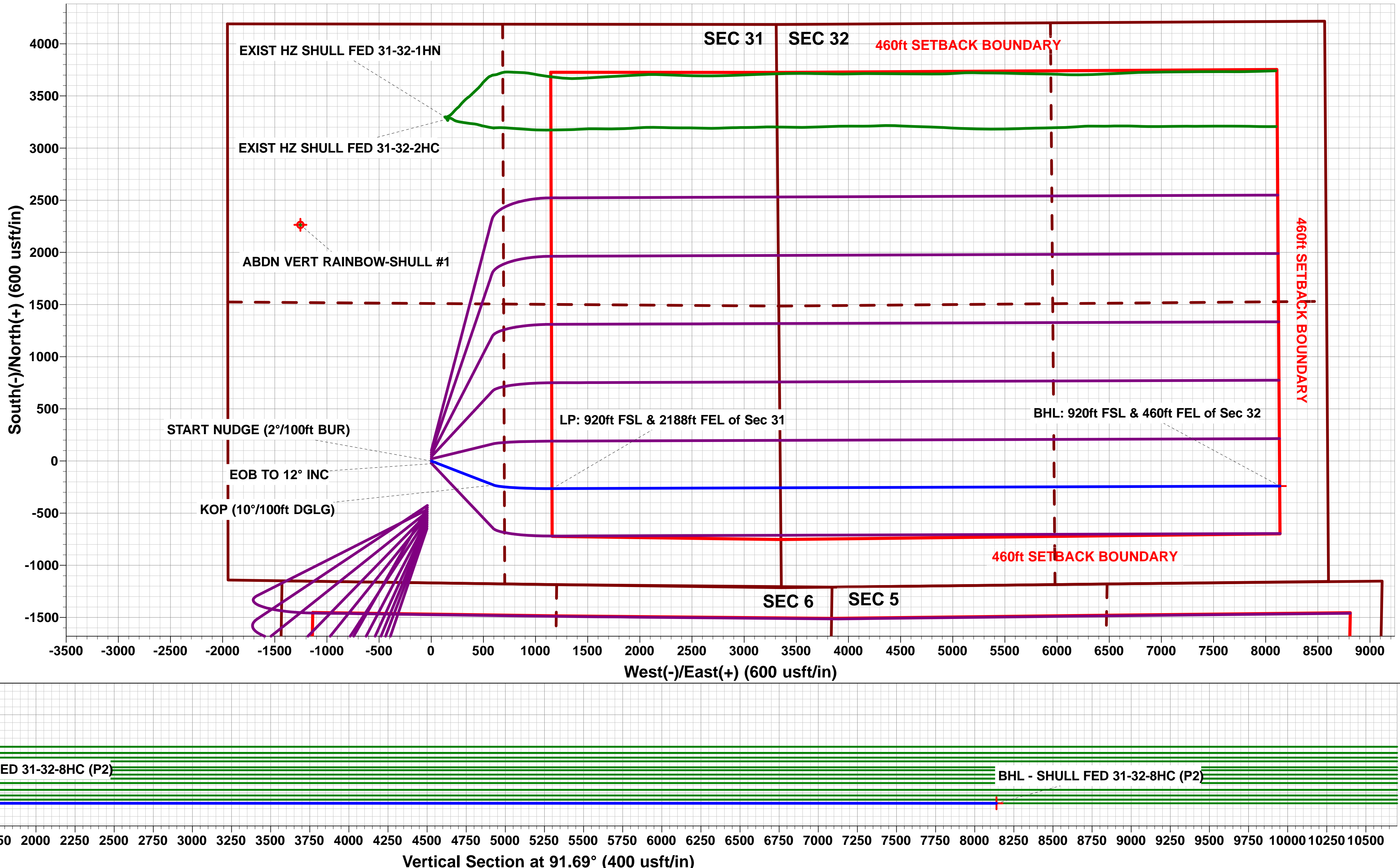
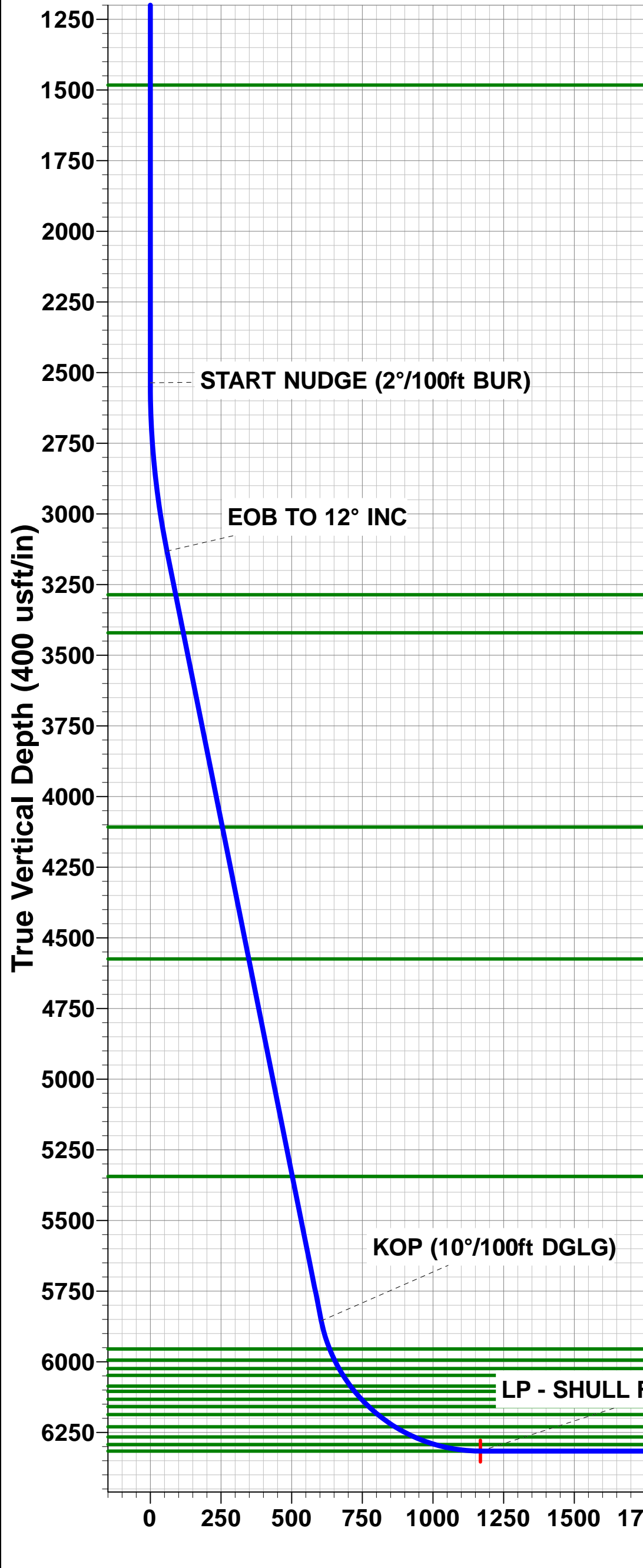
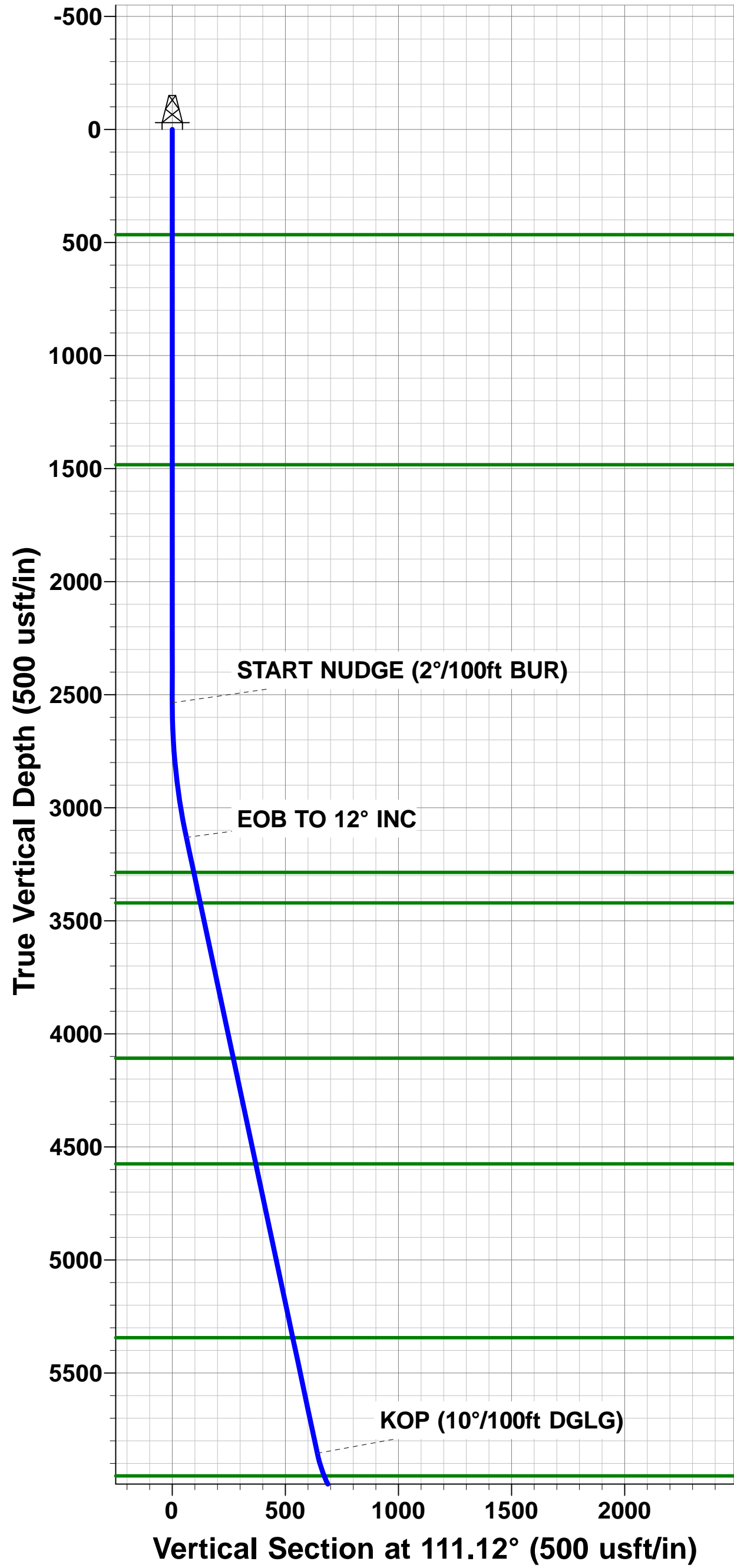
Azimuths to True North
Magnetic North: 7.61°
Magnetic Field
Strength: 52383.2snT
Dip Angle: 67.15°
Date: 22/07/2019
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
466.00	466.00	Fox Hills Base
1483.00	1483.00	Pierre Shale Top
3286.00	3293.83	Richard Sandstone
3421.00	3431.84	Parkman Sandstone
4108.00	4134.19	Sussex Sandstone
4575.00	4611.62	Shannon Sandstone
5344.00	5397.80	TeePee Buttes
5955.00	6024.89	Sharon Springs
5994.00	6067.63	Niobrara Top
6024.00	6101.58	Niobrara A Chalk
6048.00	6129.57	Niobrara A Chalk Base
6086.00	6175.76	Niobrara B1 Chalk Top
6105.00	6199.91	Niobrara B1 Chalk Base
6133.00	6237.10	Niobrara B2 Chalk Top
6159.00	6273.76	Niobrara B2 Chalk Base
6187.00	6316.24	Niobrara C Chalk Top
6230.00	6390.46	Niobrara C Chalk Base
6266.00	6467.43	Niobrara D Chalk Top
6293.00	6545.80	Ft. Hays
6316.00	6708.94	Codell (Target)

PROPOSED LOCAL COORDINATES:

SHL: 1169ft FSL & 1950ft FWL of Sec 31
HZ LP: 920ft FSL & 2188ft FEL of Sec 31
BHL: 920ft FSL & 460ft FEL of Sec 32



Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-8HC
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 31-32-8HC	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
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 31-32-8HC		
Well Position	+N-S	644.49 usft	Northing:
	+E-W	194.37 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	91.69	

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	
2,536.00	0.00	0.00	2,536.00	-2,366.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,135.99	12.00	111.12	3,131.62	-1,770.38	-22.56	58.39	2.00	2.00	0.00	111.12	
5,920.61	12.00	111.12	5,855.38	953.38	-231.21	598.44	0.00	0.00	0.00	0.00	
6,708.94	90.00	89.80	6,316.00	1,414.00	-264.83	1,160.67	10.00	9.89	-2.71	-21.76	LP - SHULL FED 3'
13,684.36	90.00	89.80	6,316.00	1,414.00	-240.20	8,136.04	0.00	0.00	0.00	0.00	BHL - SHULL FED

Planning Report



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Site:	SE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-8HC	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: 1169ft FSL & 1950ft 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
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	0.00	0.00	400.00	4,502.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base										
466.00	0.00	0.00	466.00	4,436.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	4,402.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	4,302.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	4,202.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	4,102.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	4,002.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	3,902.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	3,802.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	3,702.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	3,602.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	3,502.00	0.00	0.00	0.00	0.00	0.00	0.00
Pierre Shale Top										
1,483.00	0.00	0.00	1,483.00	3,419.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	3,402.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	3,302.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	3,202.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	3,102.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	3,002.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	2,902.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	2,802.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	2,702.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	2,602.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	2,502.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	2,402.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
2,536.00	0.00	0.00	2,536.00	2,366.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	1.28	111.12	2,599.99	2,302.01	-0.26	0.67	0.67	2.00	2.00	0.00
2,700.00	3.28	111.12	2,699.91	2,202.09	-1.69	4.38	4.43	2.00	2.00	0.00
2,800.00	5.28	111.12	2,799.63	2,102.37	-4.38	11.34	11.46	2.00	2.00	0.00
2,900.00	7.28	111.12	2,899.02	2,002.98	-8.32	21.54	21.78	2.00	2.00	0.00
3,000.00	9.28	111.12	2,997.97	1,904.03	-13.51	34.97	35.36	2.00	2.00	0.00
3,100.00	11.28	111.12	3,096.36	1,805.64	-19.94	51.62	52.19	2.00	2.00	0.00
EOB TO 12° INC										
3,135.99	12.00	111.12	3,131.61	1,770.39	-22.56	58.39	59.03	2.00	2.00	0.00
3,200.00	12.00	111.12	3,194.22	1,707.78	-27.36	70.81	71.58	0.00	0.00	0.00
Richard Sandstone										
3,293.83	12.00	111.12	3,286.00	1,616.00	-34.39	89.00	89.98	0.00	0.00	0.00
3,300.00	12.00	111.12	3,292.04	1,609.96	-34.85	90.20	91.19	0.00	0.00	0.00
3,400.00	12.00	111.12	3,389.85	1,512.15	-42.34	109.60	110.80	0.00	0.00	0.00
Parkman Sandstone										
3,431.84	12.00	111.12	3,421.00	1,481.00	-44.73	115.77	117.04	0.00	0.00	0.00
3,500.00	12.00	111.12	3,487.67	1,414.33	-49.84	128.99	130.40	0.00	0.00	0.00
3,600.00	12.00	111.12	3,585.48	1,316.52	-57.33	148.38	150.01	0.00	0.00	0.00
3,700.00	12.00	111.12	3,683.30	1,218.70	-64.82	167.78	169.62	0.00	0.00	0.00
3,800.00	12.00	111.12	3,781.11	1,120.89	-72.31	187.17	189.22	0.00	0.00	0.00
3,900.00	12.00	111.12	3,878.93	1,023.07	-79.81	206.56	208.83	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:	SHULL FED 31-32-8HC	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)
4,000.00	12.00	111.12	3,976.74	925.26	-87.30	225.96	228.44	0.00	0.00	0.00
4,100.00	12.00	111.12	4,074.56	827.44	-94.79	245.35	248.04	0.00	0.00	0.00
Sussex Sandstone										
4,134.19	12.00	111.12	4,108.00	794.00	-97.36	251.98	254.75	0.00	0.00	0.00
4,200.00	12.00	111.12	4,172.37	729.63	-102.29	264.75	267.65	0.00	0.00	0.00
4,300.00	12.00	111.12	4,270.19	631.81	-109.78	284.14	287.26	0.00	0.00	0.00
4,400.00	12.00	111.12	4,368.00	534.00	-117.27	303.53	306.86	0.00	0.00	0.00
4,500.00	12.00	111.12	4,465.82	436.18	-124.77	322.93	326.47	0.00	0.00	0.00
4,600.00	12.00	111.12	4,563.63	338.37	-132.26	342.32	346.07	0.00	0.00	0.00
Shannon Sandstone										
4,611.62	12.00	111.12	4,575.00	327.00	-133.13	344.58	348.35	0.00	0.00	0.00
4,700.00	12.00	111.12	4,661.45	240.55	-139.75	361.71	365.68	0.00	0.00	0.00
4,800.00	12.00	111.12	4,759.26	142.74	-147.24	381.11	385.29	0.00	0.00	0.00
4,900.00	12.00	111.12	4,857.08	44.92	-154.74	400.50	404.89	0.00	0.00	0.00
5,000.00	12.00	111.12	4,954.89	-52.89	-162.23	419.90	424.50	0.00	0.00	0.00
5,100.00	12.00	111.12	5,052.71	-150.71	-169.72	439.29	444.11	0.00	0.00	0.00
5,200.00	12.00	111.12	5,150.52	-248.52	-177.22	458.68	463.71	0.00	0.00	0.00
5,300.00	12.00	111.12	5,248.34	-346.34	-184.71	478.08	483.32	0.00	0.00	0.00
TeePee Buttes										
5,397.80	12.00	111.12	5,344.00	-442.00	-192.04	497.05	502.50	0.00	0.00	0.00
5,400.00	12.00	111.12	5,346.15	-444.15	-192.20	497.47	502.93	0.00	0.00	0.00
5,500.00	12.00	111.12	5,443.97	-541.97	-199.70	516.87	522.53	0.00	0.00	0.00
5,600.00	12.00	111.12	5,541.78	-639.78	-207.19	536.26	542.14	0.00	0.00	0.00
5,700.00	12.00	111.12	5,639.59	-737.59	-214.68	555.65	561.75	0.00	0.00	0.00
5,800.00	12.00	111.12	5,737.41	-835.41	-222.17	575.05	581.35	0.00	0.00	0.00
5,900.00	12.00	111.12	5,835.22	-933.22	-229.67	594.44	600.96	0.00	0.00	0.00
KOP (10°/100ft DGLG)										
5,920.61	12.00	111.12	5,855.38	-953.38	-231.21	598.44	605.00	0.00	0.00	0.00
6,000.00	19.59	102.34	5,931.73	-1,029.73	-237.04	619.17	625.90	10.00	9.56	-11.06
Sharon Springs										
6,024.89	22.02	100.82	5,955.00	-1,053.00	-238.81	627.84	634.61	10.00	9.76	-6.13
Niobrara Top										
6,067.63	26.22	98.83	5,994.00	-1,092.00	-241.76	645.04	651.90	10.00	9.82	-4.65
6,100.00	29.41	97.68	6,022.62	-1,120.62	-243.92	659.99	666.90	10.00	9.86	-3.55
Niobrara A Chalk										
6,101.58	29.57	97.63	6,024.00	-1,122.00	-244.03	660.76	667.67	10.00	9.88	-3.18
Niobrara A Chalk Base										
6,129.57	32.33	96.81	6,048.00	-1,146.00	-245.83	675.04	682.00	10.00	9.89	-2.92
Niobrara B1 Chalk Top										
6,175.76	36.91	95.70	6,086.00	-1,184.00	-248.68	701.12	708.15	10.00	9.91	-2.40
Niobrara B1 Chalk Base										
6,199.91	39.31	95.22	6,105.00	-1,203.00	-250.09	715.95	723.02	10.00	9.92	-2.03
6,200.00	39.32	95.21	6,105.07	-1,203.07	-250.10	716.01	723.08	10.00	9.93	-1.92
Niobrara B2 Chalk Top										
6,237.10	43.00	94.55	6,133.00	-1,231.00	-252.17	740.34	747.46	10.00	9.93	-1.78
Niobrara B2 Chalk Base										
6,273.76	46.64	93.98	6,159.00	-1,257.00	-254.09	766.10	773.27	10.00	9.94	-1.55
6,300.00	49.25	93.62	6,176.57	-1,274.57	-255.38	785.54	792.74	10.00	9.95	-1.40
Niobrara C Chalk Top										
6,316.24	50.87	93.40	6,187.00	-1,285.00	-256.14	797.97	805.19	10.00	9.95	-1.31
Niobrara C Chalk Base										
6,390.46	58.26	92.54	6,230.00	-1,328.00	-259.25	858.32	865.60	10.00	9.95	-1.17
6,400.00	59.21	92.44	6,234.95	-1,332.95	-259.61	866.47	873.75	10.00	9.96	-1.05

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 31-32-8HC	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)
Niobrara D Chalk Top										
6,467.43	65.93	91.78	6,266.00	-1,364.00	-261.80	926.24	933.56	10.00	9.96	-0.98
6,500.00	69.17	91.48	6,278.44	-1,376.44	-262.65	956.32	963.66	10.00	9.97	-0.90
Ft. Hays										
6,545.80	73.74	91.09	6,293.00	-1,391.00	-263.62	999.72	1,007.07	10.00	9.97	-0.86
6,600.00	79.14	90.65	6,305.71	-1,403.71	-264.42	1,052.39	1,059.73	10.00	9.97	-0.82
6,700.00	89.11	89.87	6,315.93	-1,413.93	-264.86	1,151.73	1,159.05	10.00	9.97	-0.78
LP: 920ft FSL & 2188ft FEL of Sec 31 - Codell (Target)										
6,708.94	90.00	89.80	6,316.00	-1,414.00	-264.83	1,160.67	1,167.98	10.00	9.97	-0.77
6,800.00	90.00	89.80	6,316.00	-1,414.00	-264.51	1,251.73	1,258.99	0.00	0.00	0.00
6,900.00	90.00	89.80	6,316.00	-1,414.00	-264.16	1,351.73	1,358.94	0.00	0.00	0.00
7,000.00	90.00	89.80	6,316.00	-1,414.00	-263.80	1,451.73	1,458.88	0.00	0.00	0.00
7,100.00	90.00	89.80	6,316.00	-1,414.00	-263.45	1,551.73	1,558.83	0.00	0.00	0.00
7,200.00	90.00	89.80	6,316.00	-1,414.00	-263.10	1,651.73	1,658.77	0.00	0.00	0.00
7,300.00	90.00	89.80	6,316.00	-1,414.00	-262.75	1,751.73	1,758.72	0.00	0.00	0.00
7,400.00	90.00	89.80	6,316.00	-1,414.00	-262.39	1,851.73	1,858.66	0.00	0.00	0.00
7,500.00	90.00	89.80	6,316.00	-1,414.00	-262.04	1,951.73	1,958.61	0.00	0.00	0.00
7,600.00	90.00	89.80	6,316.00	-1,414.00	-261.69	2,051.73	2,058.56	0.00	0.00	0.00
7,700.00	90.00	89.80	6,316.00	-1,414.00	-261.33	2,151.73	2,158.50	0.00	0.00	0.00
7,800.00	90.00	89.80	6,316.00	-1,414.00	-260.98	2,251.73	2,258.45	0.00	0.00	0.00
7,900.00	90.00	89.80	6,316.00	-1,414.00	-260.63	2,351.73	2,358.39	0.00	0.00	0.00
8,000.00	90.00	89.80	6,316.00	-1,414.00	-260.27	2,451.72	2,458.34	0.00	0.00	0.00
8,100.00	90.00	89.80	6,316.00	-1,414.00	-259.92	2,551.72	2,558.28	0.00	0.00	0.00
8,200.00	90.00	89.80	6,316.00	-1,414.00	-259.57	2,651.72	2,658.23	0.00	0.00	0.00
8,300.00	90.00	89.80	6,316.00	-1,414.00	-259.21	2,751.72	2,758.17	0.00	0.00	0.00
8,400.00	90.00	89.80	6,316.00	-1,414.00	-258.86	2,851.72	2,858.12	0.00	0.00	0.00
8,500.00	90.00	89.80	6,316.00	-1,414.00	-258.51	2,951.72	2,958.06	0.00	0.00	0.00
8,600.00	90.00	89.80	6,316.00	-1,414.00	-258.15	3,051.72	3,058.01	0.00	0.00	0.00
8,700.00	90.00	89.80	6,316.00	-1,414.00	-257.80	3,151.72	3,157.96	0.00	0.00	0.00
8,800.00	90.00	89.80	6,316.00	-1,414.00	-257.45	3,251.72	3,257.90	0.00	0.00	0.00
8,900.00	90.00	89.80	6,316.00	-1,414.00	-257.09	3,351.72	3,357.85	0.00	0.00	0.00
9,000.00	90.00	89.80	6,316.00	-1,414.00	-256.74	3,451.72	3,457.79	0.00	0.00	0.00
9,100.00	90.00	89.80	6,316.00	-1,414.00	-256.39	3,551.72	3,557.74	0.00	0.00	0.00
9,200.00	90.00	89.80	6,316.00	-1,414.00	-256.03	3,651.72	3,657.68	0.00	0.00	0.00
9,300.00	90.00	89.80	6,316.00	-1,414.00	-255.68	3,751.72	3,757.63	0.00	0.00	0.00
9,400.00	90.00	89.80	6,316.00	-1,414.00	-255.33	3,851.72	3,857.57	0.00	0.00	0.00
9,500.00	90.00	89.80	6,316.00	-1,414.00	-254.98	3,951.72	3,957.52	0.00	0.00	0.00
9,600.00	90.00	89.80	6,316.00	-1,414.00	-254.62	4,051.71	4,057.46	0.00	0.00	0.00
9,700.00	90.00	89.80	6,316.00	-1,414.00	-254.27	4,151.71	4,157.41	0.00	0.00	0.00
9,800.00	90.00	89.80	6,316.00	-1,414.00	-253.92	4,251.71	4,257.35	0.00	0.00	0.00
9,900.00	90.00	89.80	6,316.00	-1,414.00	-253.56	4,351.71	4,357.30	0.00	0.00	0.00
10,000.00	90.00	89.80	6,316.00	-1,414.00	-253.21	4,451.71	4,457.25	0.00	0.00	0.00
10,100.00	90.00	89.80	6,316.00	-1,414.00	-252.86	4,551.71	4,557.19	0.00	0.00	0.00
10,200.00	90.00	89.80	6,316.00	-1,414.00	-252.50	4,651.71	4,657.14	0.00	0.00	0.00
10,300.00	90.00	89.80	6,316.00	-1,414.00	-252.15	4,751.71	4,757.08	0.00	0.00	0.00
10,400.00	90.00	89.80	6,316.00	-1,414.00	-251.80	4,851.71	4,857.03	0.00	0.00	0.00
10,500.00	90.00	89.80	6,316.00	-1,414.00	-251.44	4,951.71	4,956.97	0.00	0.00	0.00
10,600.00	90.00	89.80	6,316.00	-1,414.00	-251.09	5,051.71	5,056.92	0.00	0.00	0.00
10,700.00	90.00	89.80	6,316.00	-1,414.00	-250.74	5,151.71	5,156.86	0.00	0.00	0.00
10,800.00	90.00	89.80	6,316.00	-1,414.00	-250.38	5,251.71	5,256.81	0.00	0.00	0.00
10,900.00	90.00	89.80	6,316.00	-1,414.00	-250.03	5,351.71	5,356.75	0.00	0.00	0.00
11,000.00	90.00	89.80	6,316.00	-1,414.00	-249.68	5,451.71	5,456.70	0.00	0.00	0.00
11,100.00	90.00	89.80	6,316.00	-1,414.00	-249.32	5,551.71	5,556.64	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-8HC
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 31-32-8HC	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)
11,200.00	90.00	89.80	6,316.00	-1,414.00	-248.97	5,651.70	5,656.59	0.00	0.00	0.00
11,300.00	90.00	89.80	6,316.00	-1,414.00	-248.62	5,751.70	5,756.54	0.00	0.00	0.00
11,400.00	90.00	89.80	6,316.00	-1,414.00	-248.26	5,851.70	5,856.48	0.00	0.00	0.00
11,500.00	90.00	89.80	6,316.00	-1,414.00	-247.91	5,951.70	5,956.43	0.00	0.00	0.00
11,600.00	90.00	89.80	6,316.00	-1,414.00	-247.56	6,051.70	6,056.37	0.00	0.00	0.00
11,700.00	90.00	89.80	6,316.00	-1,414.00	-247.21	6,151.70	6,156.32	0.00	0.00	0.00
11,800.00	90.00	89.80	6,316.00	-1,414.00	-246.85	6,251.70	6,256.26	0.00	0.00	0.00
11,900.00	90.00	89.80	6,316.00	-1,414.00	-246.50	6,351.70	6,356.21	0.00	0.00	0.00
12,000.00	90.00	89.80	6,316.00	-1,414.00	-246.15	6,451.70	6,456.15	0.00	0.00	0.00
12,100.00	90.00	89.80	6,316.00	-1,414.00	-245.79	6,551.70	6,556.10	0.00	0.00	0.00
12,200.00	90.00	89.80	6,316.00	-1,414.00	-245.44	6,651.70	6,656.04	0.00	0.00	0.00
12,300.00	90.00	89.80	6,316.00	-1,414.00	-245.09	6,751.70	6,755.99	0.00	0.00	0.00
12,400.00	90.00	89.80	6,316.00	-1,414.00	-244.73	6,851.70	6,855.94	0.00	0.00	0.00
12,500.00	90.00	89.80	6,316.00	-1,414.00	-244.38	6,951.70	6,955.88	0.00	0.00	0.00
12,600.00	90.00	89.80	6,316.00	-1,414.00	-244.03	7,051.70	7,055.83	0.00	0.00	0.00
12,700.00	90.00	89.80	6,316.00	-1,414.00	-243.67	7,151.70	7,155.77	0.00	0.00	0.00
12,800.00	90.00	89.80	6,316.00	-1,414.00	-243.32	7,251.69	7,255.72	0.00	0.00	0.00
12,900.00	90.00	89.80	6,316.00	-1,414.00	-242.97	7,351.69	7,355.66	0.00	0.00	0.00
13,000.00	90.00	89.80	6,316.00	-1,414.00	-242.61	7,451.69	7,455.61	0.00	0.00	0.00
13,100.00	90.00	89.80	6,316.00	-1,414.00	-242.26	7,551.69	7,555.55	0.00	0.00	0.00
13,200.00	90.00	89.80	6,316.00	-1,414.00	-241.91	7,651.69	7,655.50	0.00	0.00	0.00
13,300.00	90.00	89.80	6,316.00	-1,414.00	-241.55	7,751.69	7,755.44	0.00	0.00	0.00
13,400.00	90.00	89.80	6,316.00	-1,414.00	-241.20	7,851.69	7,855.39	0.00	0.00	0.00
13,500.00	90.00	89.80	6,316.00	-1,414.00	-240.85	7,951.69	7,955.33	0.00	0.00	0.00
13,600.00	90.00	89.80	6,316.00	-1,414.00	-240.49	8,051.69	8,055.28	0.00	0.00	0.00
BHL: 920ft FSL & 460ft FEL of Sec 32										
13,684.36	90.00	89.80	6,316.00	-1,414.00	-240.20	8,136.04	8,139.59	0.00	0.00	0.00

Planning Report



Database:	Database 1	Local Co-ordinate Reference:	Well SHULL FED 31-32-8HC
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 31-32-8HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #2		

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
466.00	466.00	Fox Hills Base				
1,483.00	1,483.00	Pierre Shale Top				
3,293.83	3,286.00	Richard Sandstone				
3,431.84	3,421.00	Parkman Sandstone				
4,134.19	4,108.00	Sussex Sandstone				
4,611.62	4,575.00	Shannon Sandstone				
5,397.80	5,344.00	TeePee Buttes				
6,024.89	5,955.00	Sharon Springs				
6,067.63	5,994.00	Niobrara Top				
6,101.58	6,024.00	Niobrara A Chalk				
6,129.57	6,048.00	Niobrara A Chalk Base				
6,175.76	6,086.00	Niobrara B1 Chalk Top				
6,199.91	6,105.00	Niobrara B1 Chalk Base				
6,237.10	6,133.00	Niobrara B2 Chalk Top				
6,273.76	6,159.00	Niobrara B2 Chalk Base				
6,316.24	6,187.00	Niobrara C Chalk Top				
6,390.46	6,230.00	Niobrara C Chalk Base				
6,467.43	6,266.00	Niobrara D Chalk Top				
6,545.80	6,293.00	Ft. Hays				
6,708.94	6,316.00	Codell (Target)				

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	SHL: 1169ft FSL & 1950ft FWL of Sec 31
2,536.00	2,536.00	0.00	0.00	START NUDGE (2°/100ft BUR)
3,135.99	3,131.61	-22.56	58.39	EOB TO 12° INC
5,920.61	5,855.38	-231.21	598.44	KOP (10°/100ft DGLG)
6,708.94	6,316.00	-264.83	1,160.67	LP: 920ft FSL & 2188ft FEL of Sec 31
13,684.36	6,316.00	-240.20	8,136.04	BHL: 920ft FSL & 460ft FEL of Sec 32