

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

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

SHULL FED 31-32-11HC

ORIGINAL WELLBORE

21 December, 2017

Plan: PROPOSAL #1





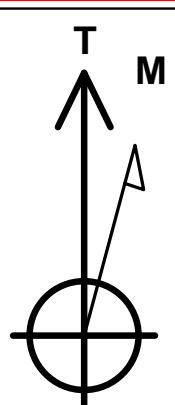
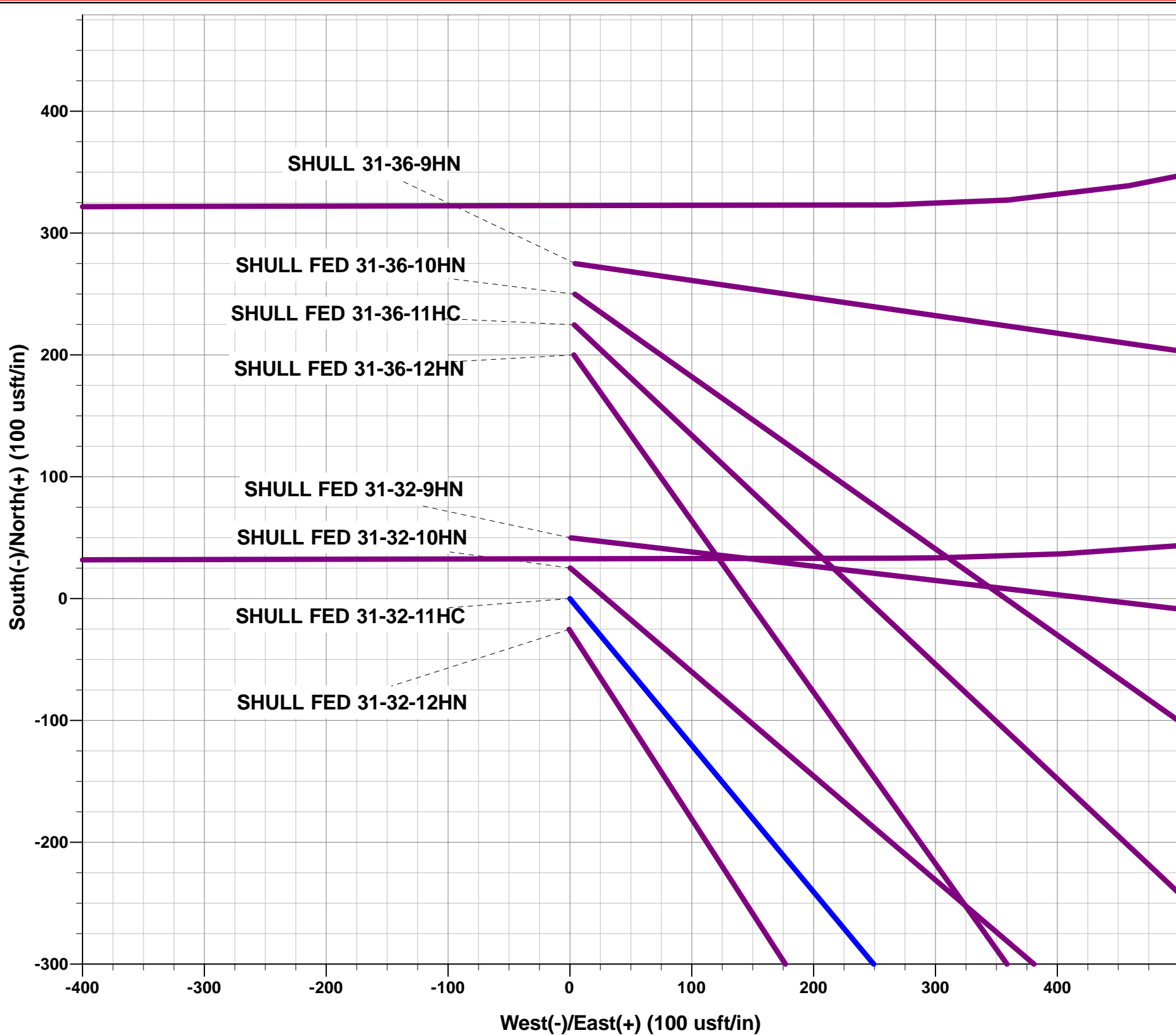
Project: WELD COUNTY, COLORADO (NAD 83)
Site: NE SW SEC. 31 T9N R59W 6th P.M.
Well: SHULL FED 31-32-11HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

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: 1728ft FSL & 1778ft FWL of Sec 31
400.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1190.50	1200.90	16.02	140.26	-85.53	71.11	80.33	111.22	EOB TO 16.02° INC
4826.54	4983.80	16.02	140.26	-888.19	738.44	834.19	1155.07	END OF TANGENT
5617.04	5784.69	0.00	0.00	-973.72	809.55	914.51	1266.29	EOD TO VERTICAL
5717.04	5884.69	0.00	0.00	-973.72	809.55	914.51	1266.29	KOP (10°/100ft BUR)
6290.00	6784.69	90.00	89.79	-971.62	1382.50	1483.54	1839.24	HZ LP: 775ft FSL & 2140ft FEL of Sec 32
6290.00	13712.18	90.00	89.79	-946.21	8309.94	8363.64	8766.74	BHL: 775ft FSL & 460ft FEL of Sec 32

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP: SHULL FED 31-32-11HC	5717.04	-973.72	809.55	40.701333	-104.020989
HZ LP: SHULL FED 31-32-11HC	6290.00	-971.62	1382.50	40.701339	-104.018923
BHL: SHULL FED 31-32-11HC	6290.00	-946.21	8309.94	40.701405	-103.993939



Azimuths to True North
Magnetic North: 7.78°

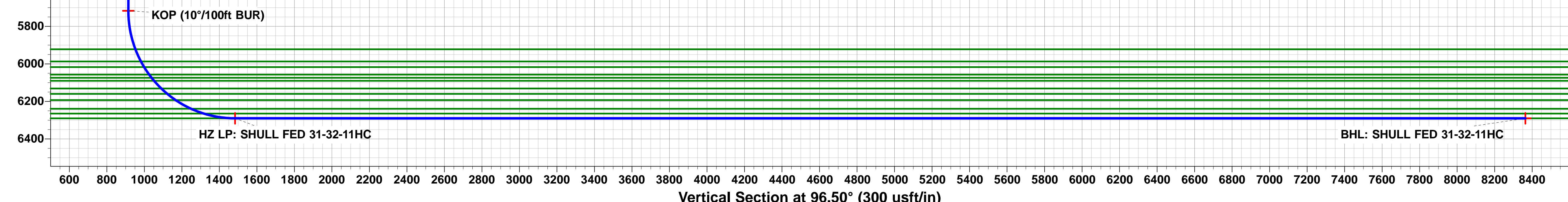
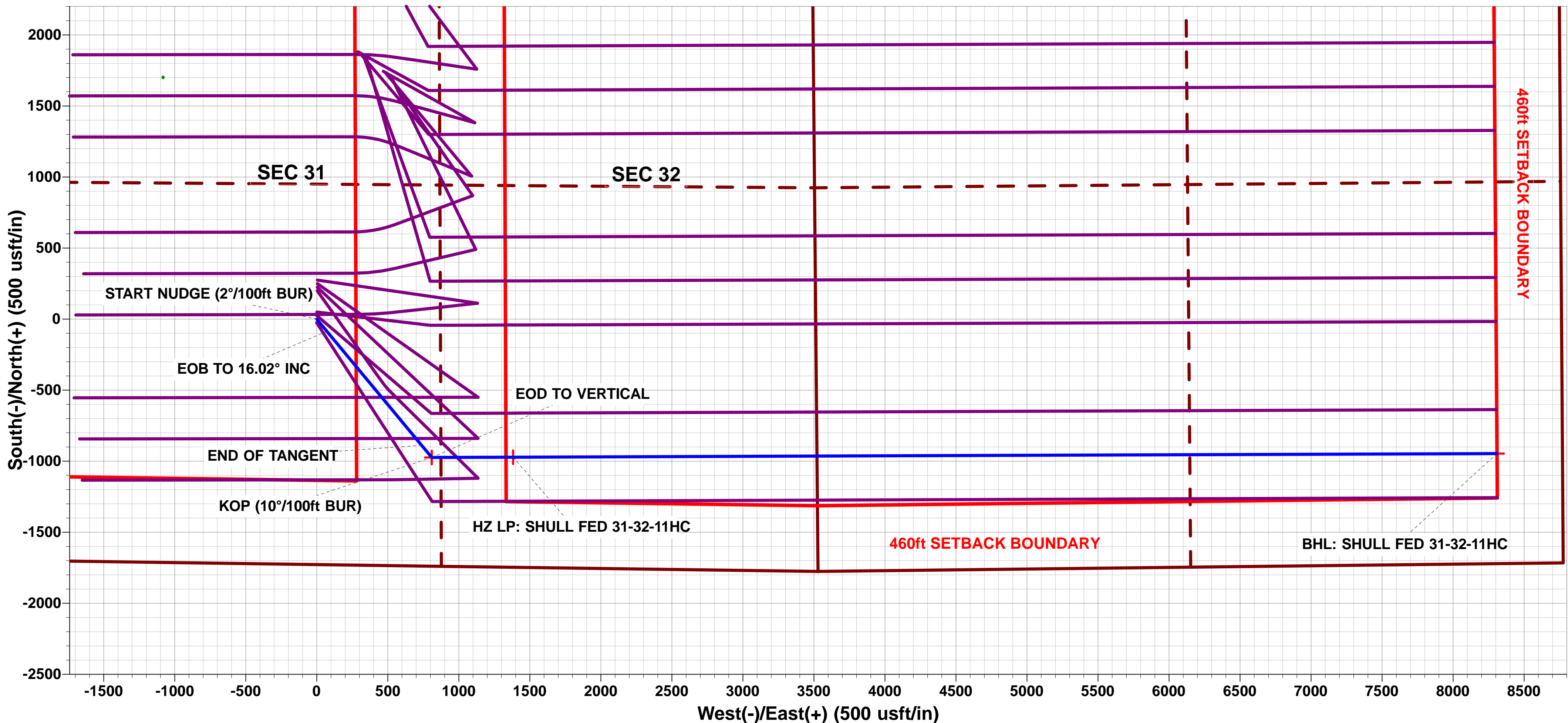
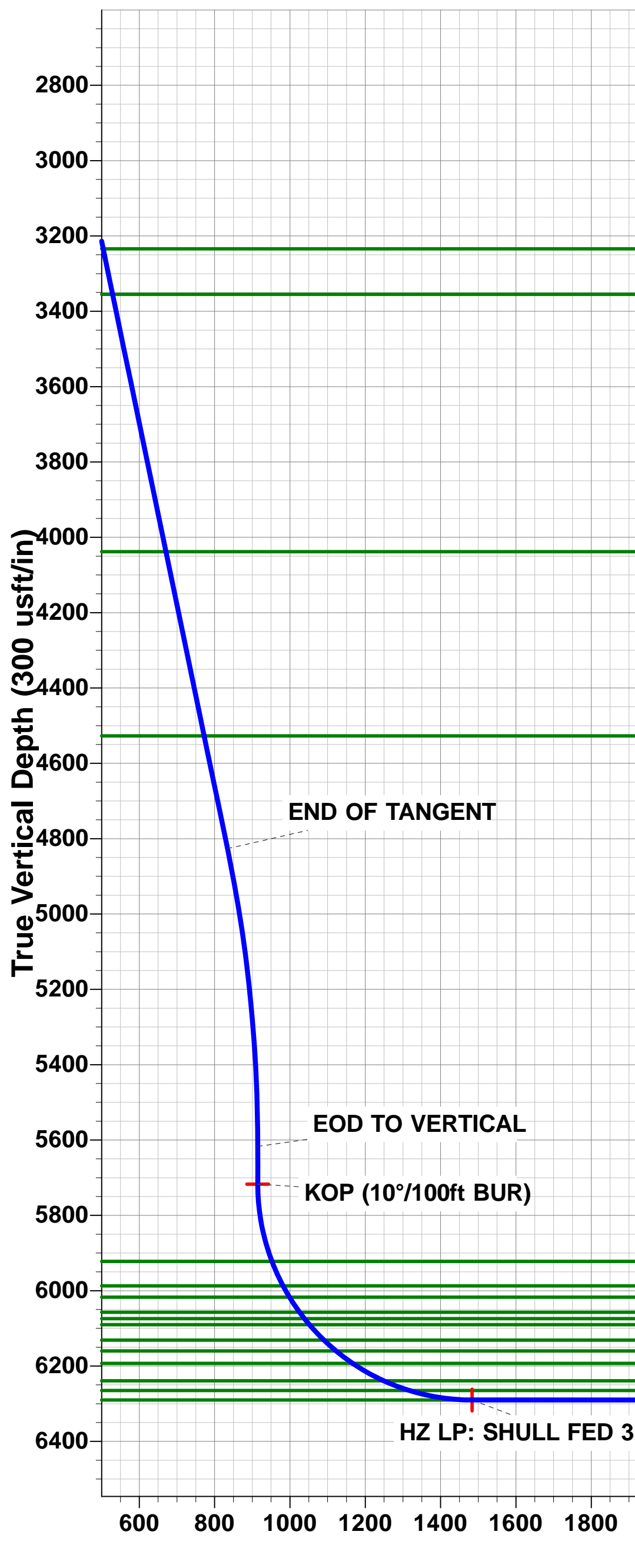
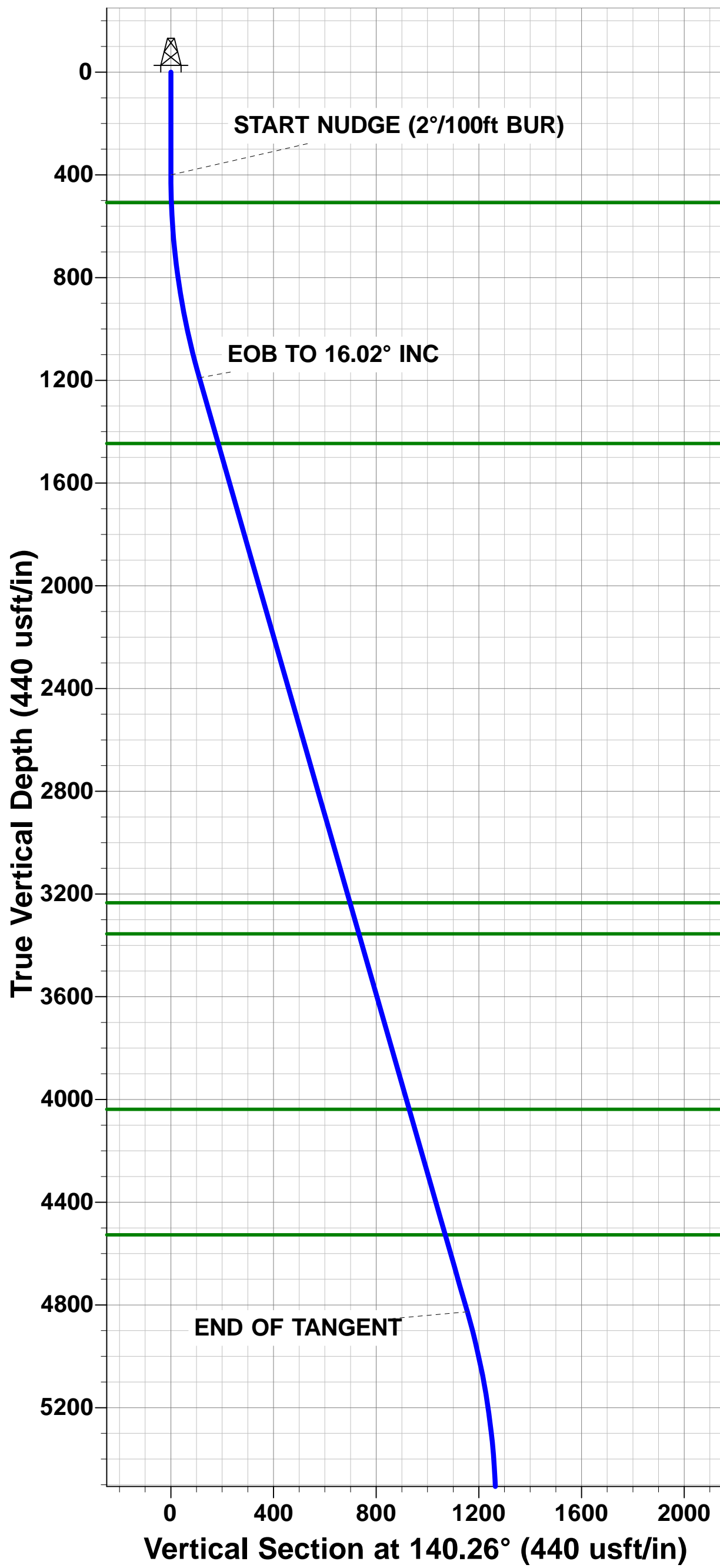
Magnetic Field
Strength: 52566.3snT
Dip Angle: 67.20°
Date: 19/12/2017
Model: IGRF2015

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
508.00	508.03	FOX HILLS BASE
1446.00	1466.71	PIERRE SHALE TOP
3234.00	3326.93	RICHARD SNADSTONE
3355.00	3452.82	PARKMAN SANDSTONE
4038.00	4163.41	SUSSEX SANDSTONE
4527.00	4672.16	SHANNON SANDSTONE
5922.00	6094.30	SHARON SPRINGS
5987.00	6165.80	NIOBRARA A CHALK
6017.00	6200.39	NIOBRARA A CHALK BASE
6057.00	6248.64	NIOBRARA B1 CHALK TOP
6074.00	6270.06	NIOBRARA B1 CHALK BASE
6090.00	6290.82	NIOBRARA B2 CHALK TOP
6131.00	6347.30	NIOBRARA B2 CHALK BASE
6160.00	6391.03	NIOBRARA C CHALK TOP
6193.00	6446.41	NIOBRARA C CHALK BASE
6239.00	6541.12	NIOBRARA D CHALK TOP
6265.00	6614.82	FT. HAYS
6290.00	6784.69	CODELL

PROPOSED LOCAL COORDINATES:

SHL: 1728ft FSL & 1778ft FWL of Sec 31
HZ LP: 775ft FSL & 2140ft FEL of Sec 32
BHL: 775ft FSL & 460ft FEL of Sec 32



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	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 SW SEC. 31 T9N R59W 6th P.M.				
Site Position:		Northing:	1,502,994.38 usft	Latitude:	40.704761
From:	Lat/Long	Easting:	3,409,243.99 usft	Longitude:	-104.023893
Position Uncertainty:	0.00 usft	Slot Radius:	1.10000 ft	Grid Convergence:	0.95 °

Well	SHULL FED 31-32-11HC					
Well Position	+N/-S	-275.08 usft	Northing:	1,502,719.27 usft	Latitude:	40.704006
	+E/-W	-4.44 usft	Easting:	3,409,244.13 usft	Longitude:	-104.023909
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,880.00 usft

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	19/12/2017	7.78	67.20	52,566

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 (°)
	0.00	0.00	0.00	96.50

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	-4,900.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	-4,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,200.90	16.02	140.26	1,190.50	-3,709.50	-85.53	71.11	2.00	2.00	0.00	140.26	
4,983.80	16.02	140.26	4,826.54	-73.46	-888.19	738.44	0.00	0.00	0.00	0.00	
5,784.69	0.00	0.00	5,617.04	717.04	-973.72	809.55	2.00	-2.00	0.00	180.00	
5,884.69	0.00	0.00	5,717.04	817.04	-973.72	809.55	0.00	0.00	0.00	0.00	KOP: SHULL FED 31-
6,784.69	90.00	89.79	6,290.00	1,390.00	-971.62	1,382.50	10.00	10.00	9.98	89.79	HZ LP: SHULL FED 3
13,712.18	90.00	89.79	6,290.00	1,390.00	-946.21	8,309.94	0.00	0.00	0.00	-23.01	BHL: SHULL FED 31-

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	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: 1728ft FSL & 1778ft FWL of Sec 31										
0.00	0.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
400.00	0.00	0.00	400.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	2.00	140.26	499.98	4,400.02	-1.34	1.12	1.26	2.00	2.00	0.00
FOX HILLS BASE										
508.03	2.16	140.26	508.00	4,392.00	-1.57	1.30	1.47	2.00	2.00	0.00
600.00	4.00	140.26	599.84	4,300.16	-5.37	4.46	5.04	2.00	2.00	0.00
700.00	6.00	140.26	699.45	4,200.55	-12.07	10.03	11.33	2.00	2.00	0.00
800.00	8.00	140.26	798.70	4,101.30	-21.44	17.82	20.13	2.00	2.00	0.00
900.00	10.00	140.26	897.47	4,002.53	-33.47	27.82	31.43	2.00	2.00	0.00
1,000.00	12.00	140.26	995.62	3,904.38	-48.14	40.02	45.21	2.00	2.00	0.00
1,100.00	14.00	140.26	1,093.06	3,806.94	-65.44	54.40	61.46	2.00	2.00	0.00
1,200.00	16.00	140.26	1,189.64	3,710.36	-85.34	70.95	80.15	2.00	2.00	0.00
EOB TO 16.02° INC										
1,200.90	16.02	140.26	1,190.50	3,709.50	-85.53	71.11	80.33	2.00	2.00	0.00
1,300.00	16.02	140.26	1,285.76	3,614.24	-106.55	88.59	100.08	0.00	0.00	0.00
1,400.00	16.02	140.26	1,381.88	3,518.12	-127.77	106.23	120.00	0.00	0.00	0.00
PIERRE SHALE TOP										
1,466.71	16.02	140.26	1,446.00	3,454.00	-141.93	118.00	133.30	0.00	0.00	0.00
1,500.00	16.02	140.26	1,478.00	3,422.00	-148.99	123.87	139.93	0.00	0.00	0.00
1,600.00	16.02	140.26	1,574.11	3,325.89	-170.21	141.51	159.86	0.00	0.00	0.00
1,700.00	16.02	140.26	1,670.23	3,229.77	-191.43	159.15	179.79	0.00	0.00	0.00
1,800.00	16.02	140.26	1,766.35	3,133.65	-212.65	176.79	199.72	0.00	0.00	0.00
1,900.00	16.02	140.26	1,862.47	3,037.53	-233.86	194.43	219.64	0.00	0.00	0.00
2,000.00	16.02	140.26	1,958.58	2,941.42	-255.08	212.08	239.57	0.00	0.00	0.00
2,100.00	16.02	140.26	2,054.70	2,845.30	-276.30	229.72	259.50	0.00	0.00	0.00
2,200.00	16.02	140.26	2,150.82	2,749.18	-297.52	247.36	279.43	0.00	0.00	0.00
2,300.00	16.02	140.26	2,246.94	2,653.06	-318.74	265.00	299.36	0.00	0.00	0.00
2,400.00	16.02	140.26	2,343.05	2,556.95	-339.96	282.64	319.28	0.00	0.00	0.00
2,500.00	16.02	140.26	2,439.17	2,460.83	-361.17	300.28	339.21	0.00	0.00	0.00
2,600.00	16.02	140.26	2,535.29	2,364.71	-382.39	317.92	359.14	0.00	0.00	0.00
2,700.00	16.02	140.26	2,631.41	2,268.59	-403.61	335.56	379.07	0.00	0.00	0.00
2,800.00	16.02	140.26	2,727.52	2,172.48	-424.83	353.20	399.00	0.00	0.00	0.00
2,900.00	16.02	140.26	2,823.64	2,076.36	-446.05	370.84	418.93	0.00	0.00	0.00
3,000.00	16.02	140.26	2,919.76	1,980.24	-467.27	388.48	438.85	0.00	0.00	0.00
3,100.00	16.02	140.26	3,015.88	1,884.12	-488.48	406.13	458.78	0.00	0.00	0.00
3,200.00	16.02	140.26	3,111.99	1,788.01	-509.70	423.77	478.71	0.00	0.00	0.00
3,300.00	16.02	140.26	3,208.11	1,691.89	-530.92	441.41	498.64	0.00	0.00	0.00
RICHARD SNADSTONE										
3,326.93	16.02	140.26	3,234.00	1,666.00	-536.64	446.16	504.01	0.00	0.00	0.00
3,400.00	16.02	140.26	3,304.23	1,595.77	-552.14	459.05	518.57	0.00	0.00	0.00
PARKMAN SANDSTONE										
3,452.82	16.02	140.26	3,355.00	1,545.00	-563.35	468.37	529.09	0.00	0.00	0.00
3,500.00	16.02	140.26	3,400.35	1,499.65	-573.36	476.69	538.49	0.00	0.00	0.00
3,600.00	16.02	140.26	3,496.46	1,403.54	-594.58	494.33	558.42	0.00	0.00	0.00
3,700.00	16.02	140.26	3,592.58	1,307.42	-615.79	511.97	578.35	0.00	0.00	0.00
3,800.00	16.02	140.26	3,688.70	1,211.30	-637.01	529.61	598.28	0.00	0.00	0.00
3,900.00	16.02	140.26	3,784.82	1,115.18	-658.23	547.25	618.21	0.00	0.00	0.00
4,000.00	16.02	140.26	3,880.93	1,019.07	-679.45	564.89	638.14	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Planned Survey										
MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,100.00	16.02	140.26	3,977.05	922.95	-700.67	582.53	658.06	0.00	0.00	0.00
SUSSEX SANDSTONE										
4,163.41	16.02	140.26	4,038.00	862.00	-714.12	593.72	670.70	0.00	0.00	0.00
4,200.00	16.02	140.26	4,073.17	826.83	-721.89	600.17	677.99	0.00	0.00	0.00
4,300.00	16.02	140.26	4,169.29	730.71	-743.10	617.82	697.92	0.00	0.00	0.00
4,400.00	16.02	140.26	4,265.40	634.60	-764.32	635.46	717.85	0.00	0.00	0.00
4,500.00	16.02	140.26	4,361.52	538.48	-785.54	653.10	737.78	0.00	0.00	0.00
4,600.00	16.02	140.26	4,457.64	442.36	-806.76	670.74	757.70	0.00	0.00	0.00
SHANNON SANDSTONE										
4,672.16	16.02	140.26	4,527.00	373.00	-822.07	683.47	772.08	0.00	0.00	0.00
4,700.00	16.02	140.26	4,553.76	346.24	-827.98	688.38	777.63	0.00	0.00	0.00
4,800.00	16.02	140.26	4,649.87	250.13	-849.20	706.02	797.56	0.00	0.00	0.00
4,900.00	16.02	140.26	4,745.99	154.01	-870.41	723.66	817.49	0.00	0.00	0.00
END OF TANGENT										
4,983.80	16.02	140.26	4,826.54	73.46	-888.19	738.44	834.19	0.00	0.00	0.00
5,000.00	15.69	140.26	4,842.12	57.88	-891.60	741.27	837.38	2.00	-2.00	0.00
5,100.00	13.69	140.26	4,938.85	-38.85	-911.10	757.49	855.70	2.00	-2.00	0.00
5,200.00	11.69	140.26	5,036.40	-136.40	-928.00	771.54	871.57	2.00	-2.00	0.00
5,300.00	9.69	140.26	5,134.66	-234.66	-942.27	783.40	884.97	2.00	-2.00	0.00
5,400.00	7.69	140.26	5,233.50	-333.50	-953.89	793.06	895.89	2.00	-2.00	0.00
5,500.00	5.69	140.26	5,332.82	-432.82	-962.85	800.51	904.31	2.00	-2.00	0.00
5,600.00	3.69	140.26	5,432.47	-532.47	-969.14	805.75	910.22	2.00	-2.00	0.00
5,700.00	1.69	140.26	5,532.36	-632.36	-972.76	808.75	913.61	2.00	-2.00	0.00
EOD TO VERTICAL										
5,784.69	0.00	0.00	5,617.04	-717.04	-973.72	809.55	914.51	2.00	-2.00	0.00
5,800.00	0.00	0.00	5,632.35	-732.35	-973.72	809.55	914.51	0.00	0.00	0.00
KOP (10°/100ft BUR)										
5,884.69	0.00	0.00	5,717.04	-817.04	-973.72	809.55	914.51	0.00	0.00	0.00
5,900.00	1.53	89.79	5,732.34	-832.34	-973.72	809.75	914.72	10.00	10.00	0.00
6,000.00	11.53	89.79	5,831.57	-931.57	-973.68	821.11	926.00	10.00	10.00	0.00
SHARON SPRINGS										
6,094.30	20.96	89.79	5,922.00	-1,022.00	-973.58	847.46	952.17	10.00	10.00	0.00
6,100.00	21.53	89.79	5,927.32	-1,027.32	-973.57	849.53	954.22	10.00	10.00	0.00
NIOBRARA A CHALK										
6,165.80	28.11	89.79	5,987.00	-1,087.00	-973.47	877.13	981.64	10.00	10.00	0.00
6,200.00	31.53	89.79	6,016.67	-1,116.67	-973.41	894.14	998.53	10.00	10.00	0.00
NIOBRARA A CHALK BASE										
6,200.39	31.57	89.79	6,017.00	-1,117.00	-973.41	894.34	998.73	10.00	10.00	0.00
NIOBRARA B1 CHALK TOP										
6,248.64	36.39	89.79	6,057.00	-1,157.00	-973.31	921.30	1,025.50	10.00	10.00	0.00
NIOBRARA B1 CHALK BASE										
6,270.06	38.54	89.79	6,074.00	-1,174.00	-973.26	934.33	1,038.44	10.00	10.00	0.00
NIOBRARA B2 CHALK TOP										
6,290.82	40.61	89.79	6,090.00	-1,190.00	-973.21	947.56	1,051.58	10.00	10.00	0.00
6,300.00	41.53	89.79	6,096.92	-1,196.92	-973.19	953.59	1,057.57	10.00	10.00	0.00
NIOBRARA B2 CHALK BASE										
6,347.30	46.26	89.79	6,131.00	-1,231.00	-973.07	986.38	1,090.13	10.00	10.00	0.00
NIOBRARA C CHALK TOP										
6,391.03	50.63	89.79	6,160.00	-1,260.00	-972.95	1,019.09	1,122.63	10.00	10.00	0.00
6,400.00	51.53	89.79	6,165.63	-1,265.63	-972.93	1,026.07	1,129.55	10.00	10.00	0.00
NIOBRARA C CHALK BASE										
6,446.41	56.17	89.79	6,193.00	-1,293.00	-972.79	1,063.53	1,166.76	10.00	10.00	0.00
6,500.00	61.53	89.79	6,220.71	-1,320.71	-972.62	1,109.38	1,212.30	10.00	10.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	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)
NIORARA D CHALK TOP										
6,541.12	65.64	89.79	6,239.00	-1,339.00	-972.49	1,146.20	1,248.86	10.00	10.00	0.00
6,600.00	71.53	89.79	6,260.49	-1,360.49	-972.29	1,200.99	1,303.28	10.00	10.00	0.00
FT. HAYS										
6,614.82	73.01	89.79	6,265.00	-1,365.00	-972.24	1,215.11	1,317.30	10.00	10.00	0.00
6,700.00	81.53	89.79	6,283.75	-1,383.75	-971.93	1,298.12	1,399.74	10.00	10.00	0.00
HZ LP: 775ft FSL & 2140ft FEL of Sec 32 - CODELL										
6,784.69	90.00	89.79	6,290.00	-1,390.00	-971.62	1,382.50	1,483.54	10.00	10.00	0.00
6,800.00	90.00	89.79	6,290.00	-1,390.00	-971.57	1,397.81	1,498.75	0.00	0.00	0.00
6,900.00	90.00	89.79	6,290.00	-1,390.00	-971.20	1,497.81	1,598.07	0.00	0.00	0.00
7,000.00	90.00	89.79	6,290.00	-1,390.00	-970.83	1,597.81	1,697.38	0.00	0.00	0.00
7,100.00	90.00	89.79	6,290.01	-1,390.01	-970.47	1,697.81	1,796.70	0.00	0.00	0.00
7,200.00	90.00	89.79	6,290.01	-1,390.01	-970.10	1,797.81	1,896.02	0.00	0.00	0.00
7,300.00	90.00	89.79	6,290.01	-1,390.01	-969.74	1,897.81	1,995.33	0.00	0.00	0.00
7,400.00	90.00	89.79	6,290.01	-1,390.01	-969.37	1,997.81	2,094.65	0.00	0.00	0.00
7,500.00	90.00	89.79	6,290.01	-1,390.01	-969.00	2,097.80	2,193.96	0.00	0.00	0.00
7,600.00	90.00	89.79	6,290.01	-1,390.01	-968.64	2,197.80	2,293.28	0.00	0.00	0.00
7,700.00	90.00	89.79	6,290.01	-1,390.01	-968.27	2,297.80	2,392.60	0.00	0.00	0.00
7,800.00	90.00	89.79	6,290.01	-1,390.01	-967.90	2,397.80	2,491.91	0.00	0.00	0.00
7,900.00	90.00	89.79	6,290.02	-1,390.02	-967.54	2,497.80	2,591.23	0.00	0.00	0.00
8,000.00	90.00	89.79	6,290.02	-1,390.02	-967.17	2,597.80	2,690.54	0.00	0.00	0.00
8,100.00	90.00	89.79	6,290.02	-1,390.02	-966.81	2,697.80	2,789.86	0.00	0.00	0.00
8,200.00	90.00	89.79	6,290.02	-1,390.02	-966.44	2,797.80	2,889.17	0.00	0.00	0.00
8,300.00	90.00	89.79	6,290.02	-1,390.02	-966.07	2,897.80	2,988.49	0.00	0.00	0.00
8,400.00	90.00	89.79	6,290.02	-1,390.02	-965.71	2,997.80	3,087.81	0.00	0.00	0.00
8,500.00	90.00	89.79	6,290.02	-1,390.02	-965.34	3,097.80	3,187.12	0.00	0.00	0.00
8,600.00	90.00	89.79	6,290.02	-1,390.02	-964.97	3,197.80	3,286.44	0.00	0.00	0.00
8,700.00	90.00	89.79	6,290.02	-1,390.02	-964.61	3,297.80	3,385.75	0.00	0.00	0.00
8,800.00	90.00	89.79	6,290.02	-1,390.02	-964.24	3,397.80	3,485.07	0.00	0.00	0.00
8,900.00	90.00	89.79	6,290.03	-1,390.03	-963.87	3,497.80	3,584.39	0.00	0.00	0.00
9,000.00	90.00	89.79	6,290.03	-1,390.03	-963.51	3,597.79	3,683.70	0.00	0.00	0.00
9,100.00	90.00	89.79	6,290.03	-1,390.03	-963.14	3,697.79	3,783.02	0.00	0.00	0.00
9,200.00	90.00	89.79	6,290.03	-1,390.03	-962.77	3,797.79	3,882.33	0.00	0.00	0.00
9,300.00	90.00	89.79	6,290.03	-1,390.03	-962.41	3,897.79	3,981.65	0.00	0.00	0.00
9,400.00	90.00	89.79	6,290.03	-1,390.03	-962.04	3,997.79	4,080.96	0.00	0.00	0.00
9,500.00	90.00	89.79	6,290.03	-1,390.03	-961.67	4,097.79	4,180.28	0.00	0.00	0.00
9,600.00	90.00	89.79	6,290.03	-1,390.03	-961.31	4,197.79	4,279.60	0.00	0.00	0.00
9,700.00	90.00	89.79	6,290.03	-1,390.03	-960.94	4,297.79	4,378.91	0.00	0.00	0.00
9,800.00	90.00	89.79	6,290.03	-1,390.03	-960.57	4,397.79	4,478.23	0.00	0.00	0.00
9,900.00	90.00	89.79	6,290.03	-1,390.03	-960.21	4,497.79	4,577.54	0.00	0.00	0.00
10,000.00	90.00	89.79	6,290.03	-1,390.03	-959.84	4,597.79	4,676.86	0.00	0.00	0.00
10,100.00	90.00	89.79	6,290.03	-1,390.03	-959.47	4,697.79	4,776.18	0.00	0.00	0.00
10,200.00	90.00	89.79	6,290.03	-1,390.03	-959.11	4,797.79	4,875.49	0.00	0.00	0.00
10,300.00	90.00	89.79	6,290.03	-1,390.03	-958.74	4,897.79	4,974.81	0.00	0.00	0.00
10,400.00	90.00	89.79	6,290.03	-1,390.03	-958.37	4,997.79	5,074.12	0.00	0.00	0.00
10,500.00	90.00	89.79	6,290.03	-1,390.03	-958.01	5,097.78	5,173.44	0.00	0.00	0.00
10,600.00	90.00	89.79	6,290.03	-1,390.03	-957.64	5,197.78	5,272.75	0.00	0.00	0.00
10,700.00	90.00	89.79	6,290.03	-1,390.03	-957.27	5,297.78	5,372.07	0.00	0.00	0.00
10,800.00	90.00	89.79	6,290.03	-1,390.03	-956.91	5,397.78	5,471.39	0.00	0.00	0.00
10,900.00	90.00	89.79	6,290.03	-1,390.03	-956.54	5,497.78	5,570.70	0.00	0.00	0.00
11,000.00	90.00	89.79	6,290.03	-1,390.03	-956.17	5,597.78	5,670.02	0.00	0.00	0.00
11,100.00	90.00	89.79	6,290.03	-1,390.03	-955.81	5,697.78	5,769.33	0.00	0.00	0.00
11,200.00	90.00	89.79	6,290.03	-1,390.03	-955.44	5,797.78	5,868.65	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	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)
11,300.00	90.00	89.79	6,290.03	-1,390.03	-955.07	5,897.78	5,967.96	0.00	0.00	0.00
11,400.00	90.00	89.79	6,290.03	-1,390.03	-954.70	5,997.78	6,067.28	0.00	0.00	0.00
11,500.00	90.00	89.79	6,290.03	-1,390.03	-954.34	6,097.78	6,166.60	0.00	0.00	0.00
11,600.00	90.00	89.79	6,290.03	-1,390.03	-953.97	6,197.78	6,265.91	0.00	0.00	0.00
11,700.00	90.00	89.79	6,290.02	-1,390.02	-953.60	6,297.78	6,365.23	0.00	0.00	0.00
11,800.00	90.00	89.79	6,290.02	-1,390.02	-953.24	6,397.78	6,464.54	0.00	0.00	0.00
11,900.00	90.00	89.79	6,290.02	-1,390.02	-952.87	6,497.78	6,563.86	0.00	0.00	0.00
12,000.00	90.00	89.79	6,290.02	-1,390.02	-952.50	6,597.77	6,663.18	0.00	0.00	0.00
12,100.00	90.00	89.79	6,290.02	-1,390.02	-952.13	6,697.77	6,762.49	0.00	0.00	0.00
12,200.00	90.00	89.79	6,290.02	-1,390.02	-951.77	6,797.77	6,861.81	0.00	0.00	0.00
12,300.00	90.00	89.79	6,290.02	-1,390.02	-951.40	6,897.77	6,961.12	0.00	0.00	0.00
12,400.00	90.00	89.79	6,290.02	-1,390.02	-951.03	6,997.77	7,060.44	0.00	0.00	0.00
12,500.00	90.00	89.79	6,290.02	-1,390.02	-950.67	7,097.77	7,159.75	0.00	0.00	0.00
12,600.00	90.00	89.79	6,290.02	-1,390.02	-950.30	7,197.77	7,259.07	0.00	0.00	0.00
12,700.00	90.00	89.79	6,290.01	-1,390.01	-949.93	7,297.77	7,358.39	0.00	0.00	0.00
12,800.00	90.00	89.79	6,290.01	-1,390.01	-949.56	7,397.77	7,457.70	0.00	0.00	0.00
12,900.00	90.00	89.79	6,290.01	-1,390.01	-949.20	7,497.77	7,557.02	0.00	0.00	0.00
13,000.00	90.00	89.79	6,290.01	-1,390.01	-948.83	7,597.77	7,656.33	0.00	0.00	0.00
13,100.00	90.00	89.79	6,290.01	-1,390.01	-948.46	7,697.77	7,755.65	0.00	0.00	0.00
13,200.00	90.00	89.79	6,290.01	-1,390.01	-948.09	7,797.77	7,854.96	0.00	0.00	0.00
13,300.00	90.00	89.79	6,290.01	-1,390.01	-947.73	7,897.77	7,954.28	0.00	0.00	0.00
13,400.00	90.00	89.79	6,290.01	-1,390.01	-947.36	7,997.76	8,053.60	0.00	0.00	0.00
13,500.00	90.00	89.79	6,290.00	-1,390.00	-946.99	8,097.76	8,152.91	0.00	0.00	0.00
13,600.00	90.00	89.79	6,290.00	-1,390.00	-946.62	8,197.76	8,252.23	0.00	0.00	0.00
13,700.00	90.00	89.79	6,290.00	-1,390.00	-946.26	8,297.76	8,351.54	0.00	0.00	0.00
BHL: 775ft FSL & 460ft FEL of Sec 32										
13,712.18	90.00	89.79	6,290.00	-1,390.00	-946.21	8,309.94	8,363.64	0.00	0.00	0.00

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well SHULL FED 31-32-11HC
Company:	MALLARD EXPLORATION	TVD Reference:	WELL @ 4900.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	WELL @ 4900.00usft (Original Well Elev)
Site:	NE SW SEC. 31 T9N R59W 6th P.M.	North Reference:	True
Well:	SHULL FED 31-32-11HC	Survey Calculation Method:	Minimum Curvature
Wellbore:	ORIGINAL WELLBORE		
Design:	PROPOSAL #1		

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
508.03	508.00	FOX HILLS BASE				
1,466.71	1,446.00	PIERRE SHALE TOP				
3,326.93	3,234.00	RICHARD SNADSTONE				
3,452.82	3,355.00	PARKMAN SANDSTONE				
4,163.41	4,038.00	SUSSEX SANDSTONE				
4,672.16	4,527.00	SHANNON SANDSTONE				
6,094.30	5,922.00	SHARON SPRINGS				
6,165.80	5,987.00	NIOBRARA A CHALK				
6,200.39	6,017.00	NIOBRARA A CHALK BASE				
6,248.64	6,057.00	NIOBRARA B1 CHALK TOP				
6,270.06	6,074.00	NIOBRARA B1 CHALK BASE				
6,290.82	6,090.00	NIOBRARA B2 CHALK TOP				
6,347.30	6,131.00	NIOBRARA B2 CHALK BASE				
6,391.03	6,160.00	NIOBRARA C CHALK TOP				
6,446.41	6,193.00	NIOBRARA C CHALK BASE				
6,541.12	6,239.00	NIOBRARA D CHALK TOP				
6,614.82	6,265.00	FT. HAYS				
6,784.69	6,290.00	CODELL				

Plan Annotations				
MD (usft)	TVD (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	SHL: 1728ft FSL & 1778ft FWL of Sec 31
400.00	400.00	0.00	0.00	START NUDGE (2°/100ft BUR)
1,200.90	1,190.50	-85.53	71.11	EOB TO 16.02° INC
4,983.80	4,826.54	-888.19	738.44	END OF TANGENT
5,784.69	5,617.04	-973.72	809.55	EOD TO VERTICAL
5,884.69	5,717.04	-973.72	809.55	KOP (10°/100ft BUR)
6,784.69	6,290.00	-971.62	1,382.50	HZ LP: 775ft FSL & 2140ft FEL of Sec 32
13,712.18	6,290.00	-946.21	8,309.94	BHL: 775ft FSL & 460ft FEL of Sec 32