

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

NE NW SEC. 13 T8N R61W 6th P.M.

RUDDY 13-2HC

ORIGINAL WELLBORE

30 March, 2018

Plan: PROPOSAL #2





Project: WELD COUNTY, COLORADO (NAD 83)
Site: NE NW SEC. 13 T8N R61W 6th P.M.
Well: RUDDY 13-2HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

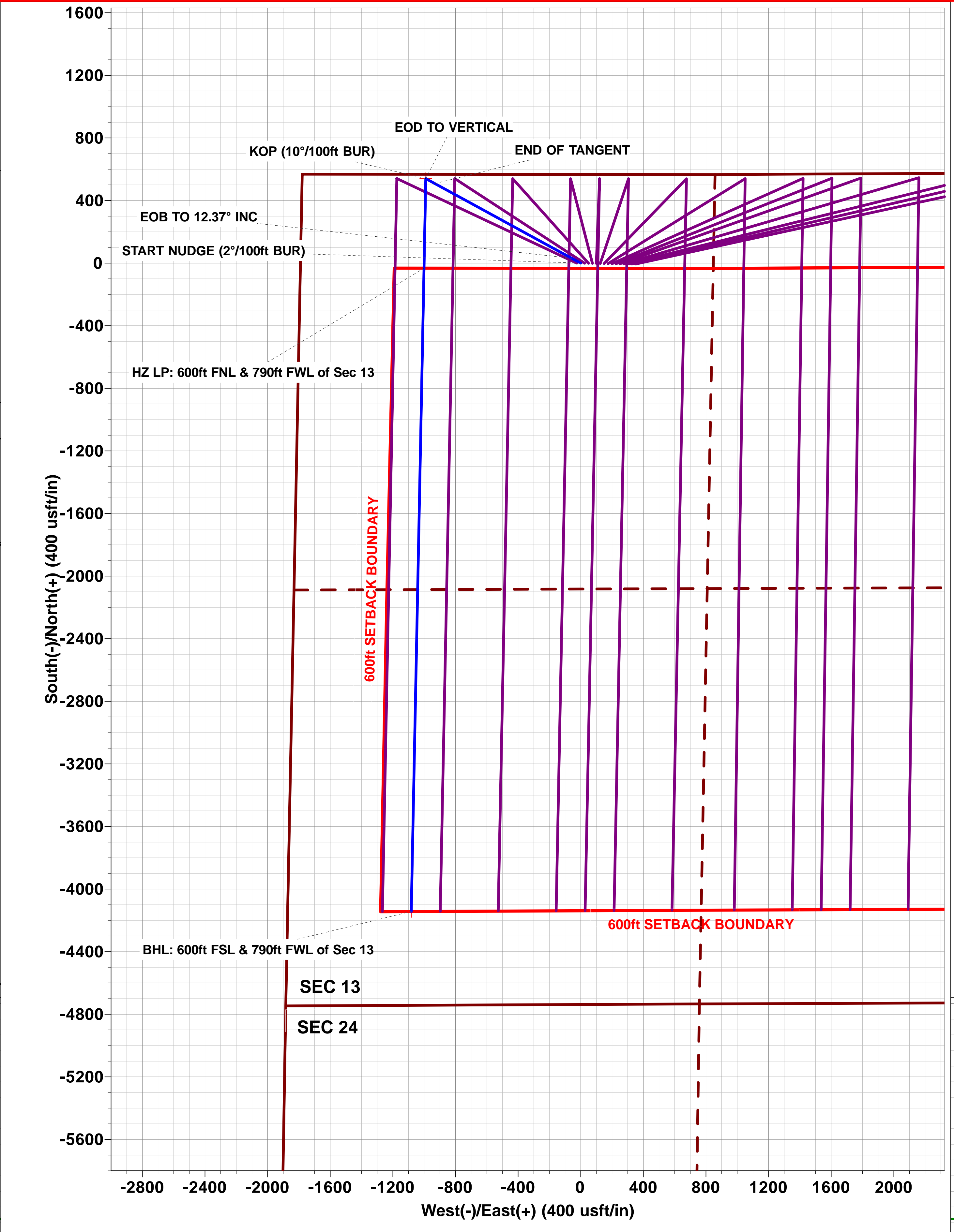
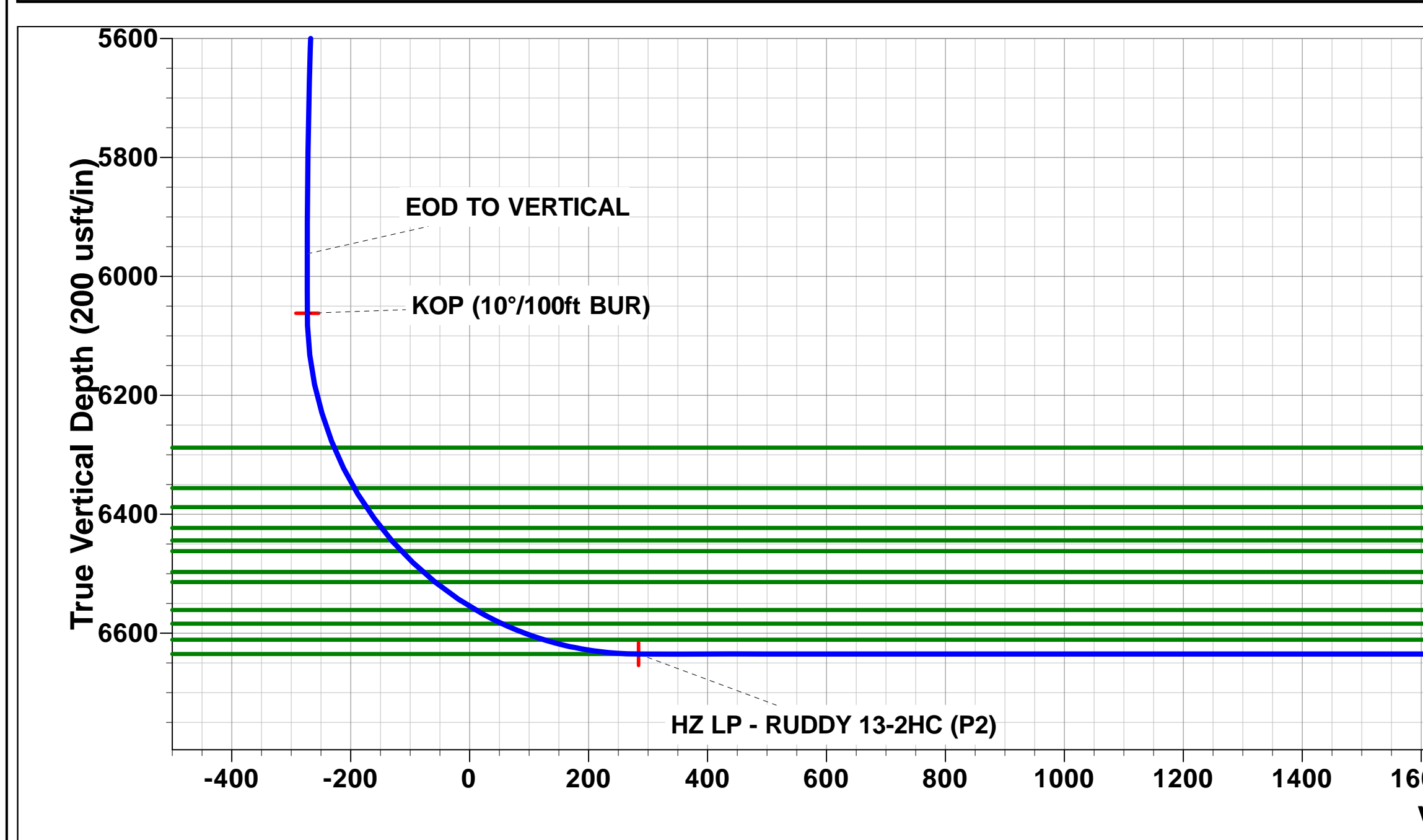
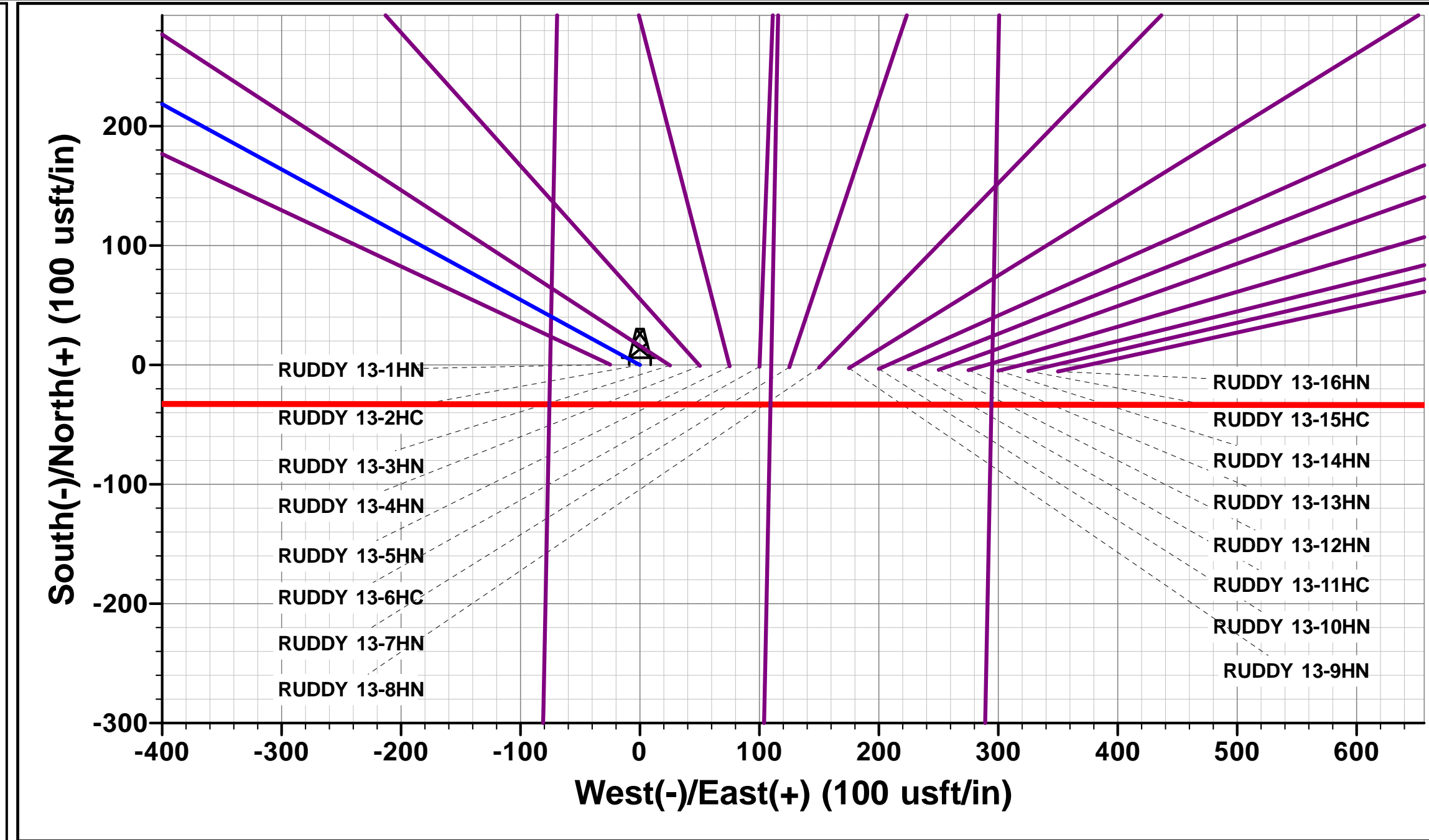
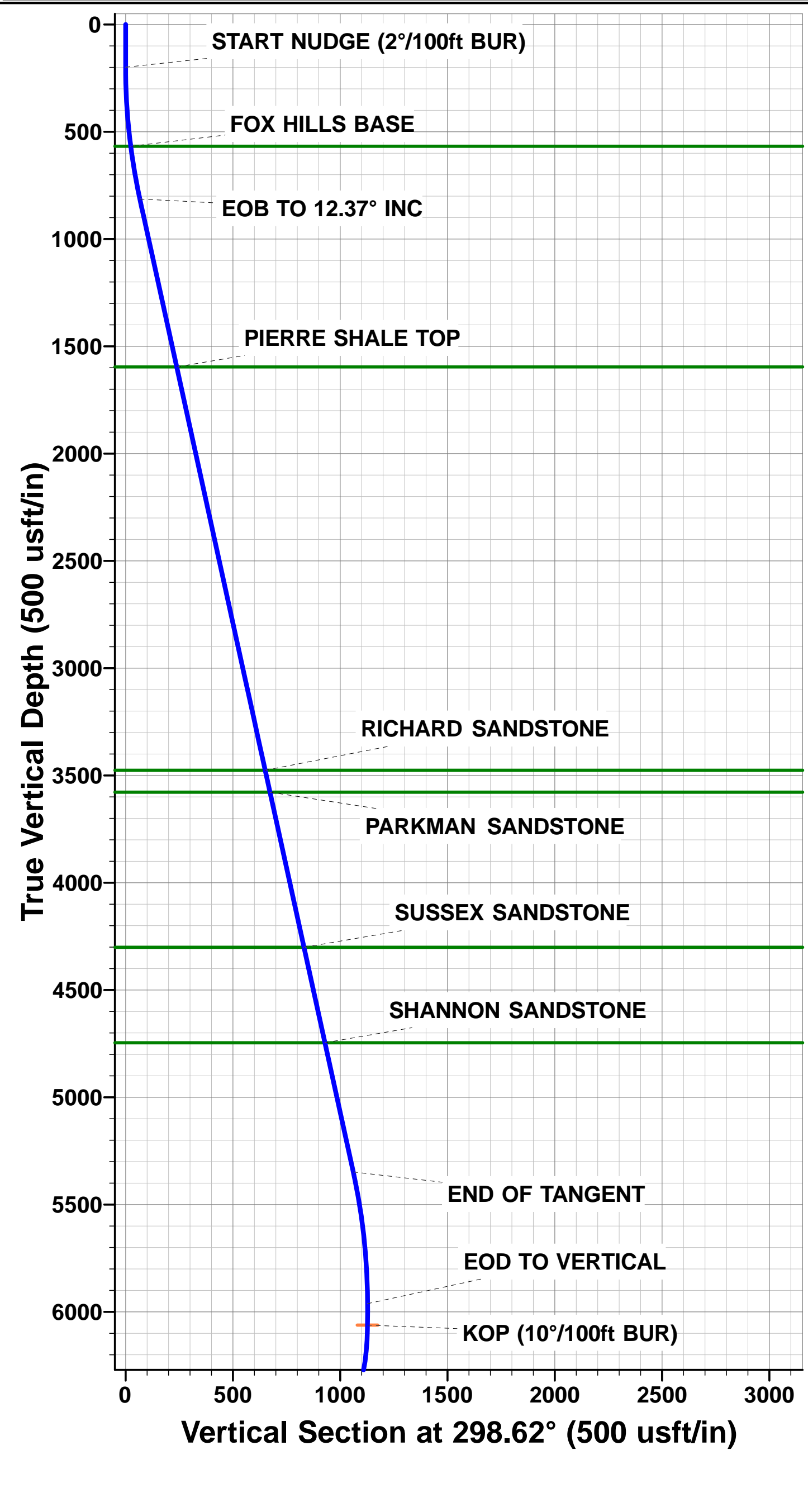
ANNOTATIONS									
TVD	MD	Inc	Azi	+N/-S	+E/-W	VSect	Dep	Annotation	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHL: 567ft FNL & 1790ft FWL of Sec 13	
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)	
813.59	818.38	12.37	298.65	31.87	-58.34	-16.09	66.48	EOB TO 12.37° INC	
5348.45	5460.98	12.37	298.65	508.58	-931.00	-256.83	1060.85	END OF TANGENT	
5962.04	6079.36	0.00	0.00	540.45	-989.34	-272.92	1127.33	EOD TO VERTICAL	
6062.04	6179.36	0.00	0.00	540.45	-989.34	-272.92	1127.33	KOP (10°/100ft BUR)	
6635.00	7079.36	90.00	181.13	-32.39	-1000.64	284.19	1700.29	HZ LP: 600ft FNL & 790ft FWL of Sec 13	
6635.00	11190.14	90.00	181.13	-4142.37	-1081.82	4281.31	5811.07	BHL: 600ft FSL & 790ft FWL of Sec 13	

PROPOSED LOCAL COORDINATES:

SHL: 567ft FNL & 1790ft FWL Sec 13
HZ LP: 600ft FNL & 790ft FWL Sec 13

BHL: 600ft FSL & 790ft FWL of Sec 13

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP - RUDDY 13-2HC (P2)	6062.04	540.45	-989.34	40.669337	-104.159876
HZ LP - RUDDY 13-2HC (P2)	6635.00	-32.40	-1000.64	40.667765	-104.159917
BHL - RUDDY 13-2HC (P2)	6635.00	-4142.37	-1081.82	40.656484	-104.160209



Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well RUDDY 13-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4987.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4987.00usft (Original Well Elev)
Site:	NE NW SEC. 13 T8N R61W 6th P.M.	North Reference:	True
Well:	RUDDY 13-2HC	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		NE NW SEC. 13 T8N R61W 6th P.M.			
Site Position:		Northing:	1,488,966.08 usft	Latitude:	40.667855
From:	Lat/Long	Easting:	3,372,713.69 usft	Longitude:	-104.156400
Position Uncertainty:	0.00 usft	Slot Radius:	1.10000 ft	Grid Convergence:	0.87 °

Well	RUDDY 13-2HC					
Well Position	+N/-S	-0.37 usft	Northing:	1,488,966.09 usft	Latitude:	40.667854
	+E/-W	24.97 usft	Easting:	3,372,738.66 usft	Longitude:	-104.156310
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,967.00 usft

Wellbore	ORIGINAL WELLBORE				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	27/03/2018	7.82	67.14	52,503

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 (°)
	0.00	0.00	0.00	194.64

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	-4,987.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	-4,787.00	0.00	0.00	0.00	0.00	0.00	0.00	
818.38	12.37	298.65	813.59	-4,173.41	31.87	-58.34	2.00	2.00	0.00	298.65	
5,460.98	12.37	298.65	5,348.45	361.45	508.58	-931.00	0.00	0.00	0.00	0.00	
6,079.36	0.00	0.00	5,962.04	975.04	540.45	-989.34	2.00	-2.00	0.00	180.00	
6,179.36	0.00	0.00	6,062.04	1,075.04	540.45	-989.34	0.00	0.00	0.00	0.00	KOP - RUDDY 13-2
7,079.36	90.00	181.13	6,635.00	1,648.00	-32.40	-1,000.64	10.00	10.00	-19.87	181.13	HZ LP - RUDDY 13
11,190.14	90.00	181.13	6,635.00	1,648.00	-4,142.37	-1,081.82	0.00	0.00	0.00	84.97	BHL - RUDDY 13-2

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Site:	NE NW SEC. 13 T8N R61W 6th P.M.	North Reference:	True
Well:	RUDDY 13-2HC	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: 567ft FNL & 1790ft FWL of Sec 13										
0.00	0.00	0.00	0.00	4,987.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	4,887.00	0.00	0.00	0.00	0.00	0.00	0.00
START NUDGE (2°/100ft BUR)										
200.00	0.00	0.00	200.00	4,787.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	2.00	298.65	299.98	4,687.02	0.84	-1.53	-0.42	2.00	2.00	0.00
400.00	4.00	298.65	399.84	4,587.16	3.35	-6.12	-1.69	2.00	2.00	0.00
500.00	6.00	298.65	499.45	4,487.55	7.52	-13.77	-3.80	2.00	2.00	0.00
FOX HILLS BASE										
569.02	7.38	298.65	568.00	4,419.00	11.38	-20.83	-5.75	2.00	2.00	0.00
600.00	8.00	298.65	598.70	4,388.30	13.37	-24.47	-6.75	2.00	2.00	0.00
700.00	10.00	298.65	697.47	4,289.53	20.86	-38.20	-10.54	2.00	2.00	0.00
800.00	12.00	298.65	795.62	4,191.38	30.01	-54.94	-15.16	2.00	2.00	0.00
EOB TO 12.37° INC										
818.38	12.37	298.65	813.59	4,173.41	31.87	-58.34	-16.09	2.00	2.00	0.00
900.00	12.37	298.65	893.31	4,093.69	40.25	-73.69	-20.33	0.00	0.00	0.00
1,000.00	12.37	298.65	990.99	3,996.01	50.52	-92.48	-25.51	0.00	0.00	0.00
1,100.00	12.37	298.65	1,088.67	3,898.33	60.79	-111.28	-30.70	0.00	0.00	0.00
1,200.00	12.37	298.65	1,186.35	3,800.65	71.06	-130.08	-35.88	0.00	0.00	0.00
1,300.00	12.37	298.65	1,284.03	3,702.97	81.32	-148.87	-41.07	0.00	0.00	0.00
1,400.00	12.37	298.65	1,381.71	3,605.29	91.59	-167.67	-46.25	0.00	0.00	0.00
1,500.00	12.37	298.65	1,479.39	3,507.61	101.86	-186.47	-51.44	0.00	0.00	0.00
1,600.00	12.37	298.65	1,577.07	3,409.93	112.13	-205.26	-56.62	0.00	0.00	0.00
PIERRE SHALE TOP										
1,619.38	12.37	298.65	1,596.00	3,391.00	114.12	-208.90	-57.63	0.00	0.00	0.00
1,700.00	12.37	298.65	1,674.75	3,312.25	122.40	-224.06	-61.81	0.00	0.00	0.00
1,800.00	12.37	298.65	1,772.43	3,214.57	132.67	-242.86	-66.99	0.00	0.00	0.00
1,900.00	12.37	298.65	1,870.11	3,116.89	142.93	-261.65	-72.18	0.00	0.00	0.00
2,000.00	12.37	298.65	1,967.79	3,019.21	153.20	-280.45	-77.36	0.00	0.00	0.00
2,100.00	12.37	298.65	2,065.47	2,921.53	163.47	-299.25	-82.55	0.00	0.00	0.00
2,200.00	12.37	298.65	2,163.15	2,823.85	173.74	-318.04	-87.74	0.00	0.00	0.00
2,300.00	12.37	298.65	2,260.83	2,726.17	184.01	-336.84	-92.92	0.00	0.00	0.00
2,400.00	12.37	298.65	2,358.51	2,628.49	194.27	-355.64	-98.11	0.00	0.00	0.00
2,500.00	12.37	298.65	2,456.18	2,530.82	204.54	-374.43	-103.29	0.00	0.00	0.00
2,600.00	12.37	298.65	2,553.86	2,433.14	214.81	-393.23	-108.48	0.00	0.00	0.00
2,700.00	12.37	298.65	2,651.54	2,335.46	225.08	-412.02	-113.66	0.00	0.00	0.00
2,800.00	12.37	298.65	2,749.22	2,237.78	235.35	-430.82	-118.85	0.00	0.00	0.00
2,900.00	12.37	298.65	2,846.90	2,140.10	245.61	-449.62	-124.03	0.00	0.00	0.00
3,000.00	12.37	298.65	2,944.58	2,042.42	255.88	-468.41	-129.22	0.00	0.00	0.00
3,100.00	12.37	298.65	3,042.26	1,944.74	266.15	-487.21	-134.40	0.00	0.00	0.00
3,200.00	12.37	298.65	3,139.94	1,847.06	276.42	-506.01	-139.59	0.00	0.00	0.00
3,300.00	12.37	298.65	3,237.62	1,749.38	286.69	-524.80	-144.77	0.00	0.00	0.00
3,400.00	12.37	298.65	3,335.30	1,651.70	296.95	-543.60	-149.96	0.00	0.00	0.00
3,500.00	12.37	298.65	3,432.98	1,554.02	307.22	-562.40	-155.14	0.00	0.00	0.00
RICHARD SANDSTONE										
3,544.04	12.37	298.65	3,476.00	1,511.00	311.75	-570.68	-157.43	0.00	0.00	0.00
3,600.00	12.37	298.65	3,530.66	1,456.34	317.49	-581.19	-160.33	0.00	0.00	0.00
PARKMAN SANDSTONE										
3,648.47	12.37	298.65	3,578.00	1,409.00	322.47	-590.30	-162.84	0.00	0.00	0.00
3,700.00	12.37	298.65	3,628.34	1,358.66	327.76	-599.99	-165.51	0.00	0.00	0.00
3,800.00	12.37	298.65	3,726.02	1,260.98	338.03	-618.79	-170.70	0.00	0.00	0.00
3,900.00	12.37	298.65	3,823.70	1,163.30	348.30	-637.58	-175.88	0.00	0.00	0.00
4,000.00	12.37	298.65	3,921.37	1,065.63	358.56	-656.38	-181.07	0.00	0.00	0.00

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Well:	RUDDY 13-2HC	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	12.37	298.65	4,019.05	967.95	368.83	-675.18	-186.26	0.00	0.00	0.00
4,200.00	12.37	298.65	4,116.73	870.27	379.10	-693.97	-191.44	0.00	0.00	0.00
4,300.00	12.37	298.65	4,214.41	772.59	389.37	-712.77	-196.63	0.00	0.00	0.00
SUSSEX SANDSTONE										
4,388.64	12.37	298.65	4,301.00	686.00	398.47	-729.43	-201.22	0.00	0.00	0.00
4,400.00	12.37	298.65	4,312.09	674.91	399.64	-731.57	-201.81	0.00	0.00	0.00
4,500.00	12.37	298.65	4,409.77	577.23	409.90	-750.36	-207.00	0.00	0.00	0.00
4,600.00	12.37	298.65	4,507.45	479.55	420.17	-769.16	-212.18	0.00	0.00	0.00
4,700.00	12.37	298.65	4,605.13	381.87	430.44	-787.96	-217.37	0.00	0.00	0.00
4,800.00	12.37	298.65	4,702.81	284.19	440.71	-806.75	-222.55	0.00	0.00	0.00
SHANNON SANDSTONE										
4,844.22	12.37	298.65	4,746.00	241.00	445.25	-815.07	-224.84	0.00	0.00	0.00
4,900.00	12.37	298.65	4,800.49	186.51	450.98	-825.55	-227.74	0.00	0.00	0.00
5,000.00	12.37	298.65	4,898.17	88.83	461.24	-844.35	-232.92	0.00	0.00	0.00
5,100.00	12.37	298.65	4,995.85	-8.85	471.51	-863.14	-238.11	0.00	0.00	0.00
5,200.00	12.37	298.65	5,093.53	-106.53	481.78	-881.94	-243.29	0.00	0.00	0.00
5,300.00	12.37	298.65	5,191.21	-204.21	492.05	-900.74	-248.48	0.00	0.00	0.00
5,400.00	12.37	298.65	5,288.89	-301.89	502.32	-919.53	-253.66	0.00	0.00	0.00
END OF TANGENT										
5,460.98	12.37	298.65	5,348.45	-361.45	508.58	-931.00	-256.83	0.00	0.00	0.00
5,500.00	11.59	298.65	5,386.62	-399.62	512.46	-938.10	-258.79	2.00	-2.00	0.00
5,600.00	9.59	298.65	5,484.91	-497.91	521.27	-954.23	-263.23	2.00	-2.00	0.00
5,700.00	7.59	298.65	5,583.79	-596.79	528.43	-967.33	-266.85	2.00	-2.00	0.00
5,800.00	5.59	298.65	5,683.12	-696.12	533.93	-977.40	-269.63	2.00	-2.00	0.00
5,900.00	3.59	298.65	5,782.80	-795.80	537.76	-984.41	-271.56	2.00	-2.00	0.00
6,000.00	1.59	298.65	5,882.69	-895.69	539.92	-988.38	-272.65	2.00	-2.00	0.00
EOD TO VERTICAL										
6,079.36	0.00	0.00	5,962.04	-975.04	540.45	-989.34	-272.92	2.00	-2.00	77.31
6,100.00	0.00	0.00	5,982.68	-995.68	540.45	-989.34	-272.92	0.00	0.00	0.00
KOP (10°/100ft BUR)										
6,179.36	0.00	0.00	6,062.04	-1,075.04	540.45	-989.34	-272.92	0.00	0.00	0.00
6,200.00	2.06	181.13	6,082.67	-1,095.67	540.08	-989.35	-272.56	10.00	10.00	0.00
6,300.00	12.06	181.13	6,181.79	-1,194.79	527.80	-989.59	-260.62	10.00	10.00	0.00
6,400.00	22.06	181.13	6,277.27	-1,290.27	498.50	-990.17	-232.12	10.00	10.00	0.00
SHARON SPRINGS										
6,411.63	23.23	181.13	6,288.00	-1,301.00	494.02	-990.26	-227.77	10.00	10.00	0.00
NIOBRARA A CHALK										
6,488.04	30.87	181.13	6,356.00	-1,369.00	459.31	-990.94	-194.01	10.00	10.00	0.00
6,500.00	32.06	181.13	6,366.20	-1,379.20	453.07	-991.06	-187.94	10.00	10.00	0.00
NIOBRARA A CHALK BASE										
6,526.10	34.67	181.13	6,388.00	-1,401.00	438.71	-991.35	-173.98	10.00	10.00	0.00
NIOBRARA B1 CHALK TOP										
6,569.86	39.05	181.13	6,423.00	-1,436.00	412.48	-991.86	-148.46	10.00	10.00	0.00
NIOBRARA B1 CHALK BASE										
6,597.45	41.81	181.13	6,444.00	-1,457.00	394.59	-992.22	-131.07	10.00	10.00	0.00
6,600.00	42.06	181.13	6,445.90	-1,458.90	392.88	-992.25	-129.41	10.00	10.00	0.00
NIOBRARA B2 CHALK TOP										
6,622.08	44.27	181.13	6,462.00	-1,475.00	377.78	-992.55	-114.72	10.00	10.00	0.00
NIOBRARA B2 CHALK BASE										
6,673.25	49.39	181.13	6,497.00	-1,510.00	340.48	-993.28	-78.44	10.00	10.00	0.00
6,700.00	52.06	181.13	6,513.93	-1,526.93	319.78	-993.69	-58.31	10.00	10.00	0.00
NIOBRARA C CHALK TOP										

Planning Report



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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)
6,700.11	52.06	181.13	6,514.00	-1,527.00	319.69	-993.69	-58.23	0.00	0.00	0.00
NIORARA C CHALK BASE										
6,784.93	60.56	181.13	6,561.00	-1,574.00	249.19	-995.08	10.34	10.01	10.01	0.00
6,800.00	62.06	181.13	6,568.23	-1,581.23	235.98	-995.34	23.19	10.00	10.00	0.00
NIORARA D CHALK TOP										
6,835.79	65.64	181.13	6,584.00	-1,597.00	203.86	-995.98	54.42	10.00	10.00	0.00
6,900.00	72.06	181.13	6,607.15	-1,620.15	144.02	-997.16	112.62	10.00	10.00	0.00
FT HAYS										
6,912.94	73.36	181.13	6,611.00	-1,624.00	131.66	-997.40	124.64	10.00	10.00	0.00
7,000.00	82.06	181.13	6,629.51	-1,642.51	46.70	-999.08	207.27	10.00	10.00	0.00
HZ LP: 600ft FNL & 790ft FWL of Sec 13 - CODELL (TARGET)										
7,079.36	90.00	181.13	6,635.00	-1,648.00	-32.40	-1,000.64	284.19	10.00	10.00	0.00
7,100.00	90.00	181.13	6,635.00	-1,648.00	-53.03	-1,001.04	304.26	0.00	0.00	0.00
7,200.00	90.00	181.13	6,635.00	-1,648.00	-153.01	-1,003.01	401.49	0.00	0.00	0.00
7,300.00	90.00	181.13	6,635.00	-1,648.00	-252.99	-1,004.99	498.73	0.00	0.00	0.00
7,400.00	90.00	181.13	6,635.00	-1,648.00	-352.97	-1,006.96	595.96	0.00	0.00	0.00
7,500.00	90.00	181.13	6,635.00	-1,648.00	-452.95	-1,008.93	693.19	0.00	0.00	0.00
7,600.00	90.00	181.13	6,635.00	-1,648.00	-552.93	-1,010.90	790.43	0.00	0.00	0.00
7,700.00	90.00	181.13	6,635.00	-1,648.00	-652.91	-1,012.87	887.66	0.00	0.00	0.00
7,800.00	90.00	181.13	6,635.00	-1,648.00	-752.89	-1,014.85	984.90	0.00	0.00	0.00
7,900.00	90.00	181.13	6,635.00	-1,648.00	-852.87	-1,016.82	1,082.13	0.00	0.00	0.00
8,000.00	90.00	181.13	6,635.00	-1,648.00	-952.86	-1,018.79	1,179.37	0.00	0.00	0.00
8,100.00	90.00	181.13	6,635.00	-1,648.00	-1,052.84	-1,020.77	1,276.60	0.00	0.00	0.00
8,200.00	90.00	181.13	6,635.00	-1,648.00	-1,152.82	-1,022.74	1,373.84	0.00	0.00	0.00
8,300.00	90.00	181.13	6,635.00	-1,648.00	-1,252.80	-1,024.71	1,471.07	0.00	0.00	0.00
8,400.00	90.00	181.13	6,635.00	-1,648.00	-1,352.78	-1,026.69	1,568.31	0.00	0.00	0.00
8,500.00	90.00	181.13	6,635.00	-1,648.00	-1,452.76	-1,028.66	1,665.54	0.00	0.00	0.00
8,600.00	90.00	181.13	6,635.00	-1,648.00	-1,552.74	-1,030.63	1,762.78	0.00	0.00	0.00
8,700.00	90.00	181.13	6,635.00	-1,648.00	-1,652.72	-1,032.61	1,860.01	0.00	0.00	0.00
8,800.00	90.00	181.13	6,635.00	-1,648.00	-1,752.70	-1,034.58	1,957.25	0.00	0.00	0.00
8,900.00	90.00	181.13	6,635.00	-1,648.00	-1,852.68	-1,036.56	2,054.48	0.00	0.00	0.00
9,000.00	90.00	181.13	6,635.00	-1,648.00	-1,952.66	-1,038.53	2,151.72	0.00	0.00	0.00
9,100.00	90.00	181.13	6,635.00	-1,648.00	-2,052.64	-1,040.51	2,248.95	0.00	0.00	0.00
9,200.00	90.00	181.13	6,635.00	-1,648.00	-2,152.62	-1,042.48	2,346.19	0.00	0.00	0.00
9,300.00	90.00	181.13	6,635.00	-1,648.00	-2,252.60	-1,044.46	2,443.42	0.00	0.00	0.00
9,400.00	90.00	181.13	6,635.00	-1,648.00	-2,352.58	-1,046.43	2,540.66	0.00	0.00	0.00
9,500.00	90.00	181.13	6,635.00	-1,648.00	-2,452.56	-1,048.41	2,637.89	0.00	0.00	0.00
9,600.00	90.00	181.13	6,635.00	-1,648.00	-2,552.54	-1,050.38	2,735.13	0.00	0.00	0.00
9,700.00	90.00	181.13	6,635.00	-1,648.00	-2,652.52	-1,052.36	2,832.36	0.00	0.00	0.00
9,800.00	90.00	181.13	6,635.00	-1,648.00	-2,752.50	-1,054.33	2,929.60	0.00	0.00	0.00
9,900.00	90.00	181.13	6,635.00	-1,648.00	-2,852.48	-1,056.31	3,026.83	0.00	0.00	0.00
10,000.00	90.00	181.13	6,635.00	-1,648.00	-2,952.47	-1,058.29	3,124.07	0.00	0.00	0.00
10,100.00	90.00	181.13	6,635.00	-1,648.00	-3,052.45	-1,060.26	3,221.30	0.00	0.00	0.00
10,200.00	90.00	181.13	6,635.00	-1,648.00	-3,152.43	-1,062.24	3,318.54	0.00	0.00	0.00
10,300.00	90.00	181.13	6,635.00	-1,648.00	-3,252.41	-1,064.22	3,415.77	0.00	0.00	0.00
10,400.00	90.00	181.13	6,635.00	-1,648.00	-3,352.39	-1,066.19	3,513.01	0.00	0.00	0.00
10,500.00	90.00	181.13	6,635.00	-1,648.00	-3,452.37	-1,068.17	3,610.24	0.00	0.00	0.00
10,600.00	90.00	181.13	6,635.00	-1,648.00	-3,552.35	-1,070.15	3,707.48	0.00	0.00	0.00
10,700.00	90.00	181.13	6,635.00	-1,648.00	-3,652.33	-1,072.13	3,804.72	0.00	0.00	0.00
10,800.00	90.00	181.13	6,635.00	-1,648.00	-3,752.31	-1,074.10	3,901.95	0.00	0.00	0.00
10,900.00	90.00	181.13	6,635.00	-1,648.00	-3,852.29	-1,076.08	3,999.19	0.00	0.00	0.00
11,000.00	90.00	181.13	6,635.00	-1,648.00	-3,952.27	-1,078.06	4,096.42	0.00	0.00	0.00
11,100.00	90.00	181.13	6,635.00	-1,648.00	-4,052.25	-1,080.04	4,193.66	0.00	0.00	0.00
BHL: 600ft FSL & 790ft FWL of Sec 13										

Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well RUDDY 13-2HC
Company:	MALLARD EXPLORATION	TVD Reference:	KB-EST @ 4987.00usft (Original Well Elev)
Project:	WELD COUNTY, COLORADO (NAD 83)	MD Reference:	KB-EST @ 4987.00usft (Original Well Elev)
Site:	NE NW SEC. 13 T8N R61W 6th P.M.	North Reference:	True
Well:	RUDDY 13-2HC	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)
11,190.14	90.00	181.13	6,635.00	-1,648.00	-4,142.37	-1,081.82	4,281.31	0.00	0.00	0.00

Formations						
MD (usft)	TVD (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
569.02	568.00	FOX HILLS BASE				
1,619.38	1,596.00	PIERRE SHALE TOP				
3,544.04	3,476.00	RICHARD SANDSTONE				
3,648.47	3,578.00	PARKMAN SANDSTONE				
4,388.64	4,301.00	SUSSEX SANDSTONE				
4,844.22	4,746.00	SHANNON SANDSTONE				
6,411.63	6,288.00	SHARON SPRINGS				
6,488.04	6,356.00	NIOBRARA A CHALK				
6,526.10	6,388.00	NIOBRARA A CHALK BASE				
6,569.86	6,423.00	NIOBRARA B1 CHALK TOP				
6,597.45	6,444.00	NIOBRARA B1 CHALK BASE				
6,622.08	6,462.00	NIOBRARA B2 CHALK TOP				
6,673.25	6,497.00	NIOBRARA B2 CHALK BASE				
6,700.11	6,514.00	NIOBRARA C CHALK TOP				
6,784.93	6,561.00	NIOBRARA C CHALK BASE				
6,835.79	6,584.00	NIOBRARA D CHALK TOP				
6,912.94	6,611.00	FT HAYS				
7,079.36	6,635.00	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: 567ft FNL & 1790ft FWL of Sec 13
200.00	200.00	0.00	0.00	START NUDGE (2°/100ft BUR)
818.38	813.59	31.87	-58.34	EOB TO 12.37° INC
5,460.98	5,348.45	508.58	-931.00	END OF TANGENT
6,079.36	5,962.04	540.45	-989.34	EOD TO VERTICAL
6,179.36	6,062.04	540.45	-989.34	KOP (10°/100ft BUR)
7,079.36	6,635.00	-32.39	-1,000.64	HZ LP: 600ft FNL & 790ft FWL of Sec 13
11,190.14	6,635.00	-4,142.37	-1,081.82	BHL: 600ft FSL & 790ft FWL of Sec 13