

# US ROCKIES WATTENBERG PLANNING

WELD-NAD83-UTMFT13N

2N-66W-32 Land Fed 13S-32HZ Pad

LAND 14N-32HZ

Plan A

Plan: Permit Rev-1

## Sperry Drilling Services Proposal Report

27 May, 2015

Well Coordinates: 14,562,852.40 N, 1,694,877.18 E (40° 05' 56.49" N, 104° 48' 18.91" W)

Ground Level: 4,897.00 usft

Local Coordinate Origin:

Centered on Well LAND 14N-32HZ

Viewing Datum:

RKB = 17' @ 4914.00usft (D Rig)

TVDs to System:

N

North Reference:

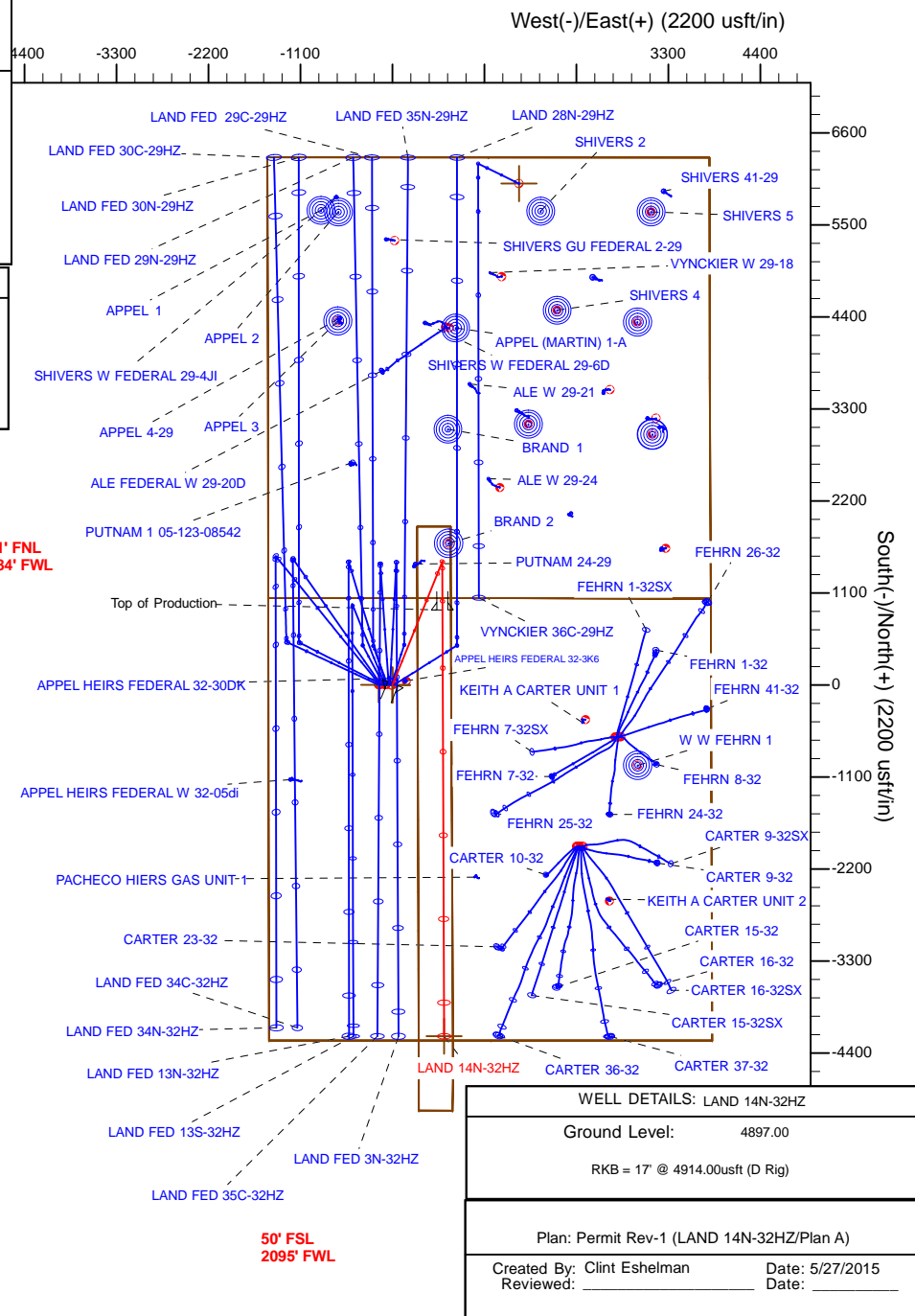
True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Version: 5000.1 Build: 70

**HALLIBURTON**



## Plan Report for LAND 14N-32HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LAND 14N-32HZ_Hardlines - LAND 14N-32HZ_SHL - 2N-R66W-Sec. 32_Section Lines										
10.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2N-R66W-Sec. 29_Section Lines										
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,250.00	0.00	0.00	1,250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 1250.00ft										
1,300.00	0.75	22.00	1,300.00	0.30	0.12	-0.30	1.50	1.50	0.00	22.00
1,308.00	0.87	22.00	1,308.00	0.41	0.16	-0.41	1.50	1.50	0.00	0.00
Fox Hills										
1,400.00	2.25	22.00	1,399.96	2.73	1.10	-2.73	1.50	1.50	0.00	0.00
1,500.00	3.75	22.00	1,499.82	7.58	3.06	-7.57	1.50	1.50	0.00	0.00
1,600.00	5.25	22.00	1,599.51	14.86	6.00	-14.83	1.50	1.50	0.00	0.00
1,600.49	5.26	22.00	1,600.00	14.90	6.02	-14.88	1.50	1.50	0.00	0.00
9 5/8"										
1,700.00	6.75	22.00	1,698.96	24.55	9.92	-24.51	1.50	1.50	0.00	0.00
1,800.00	8.25	22.00	1,798.10	36.65	14.81	-36.59	1.50	1.50	0.00	0.00
1,900.00	9.75	22.00	1,896.87	51.15	20.67	-51.07	1.50	1.50	0.00	0.00
2,000.00	11.25	22.00	1,995.19	68.05	27.49	-67.94	1.50	1.50	0.00	0.00
2,100.00	12.75	22.00	2,093.00	87.33	35.28	-87.19	1.50	1.50	0.00	0.00
2,200.00	14.25	22.00	2,190.24	108.97	44.03	-108.80	1.50	1.50	0.00	0.00
2,300.00	15.75	22.00	2,286.83	132.97	53.72	-132.76	1.50	1.50	0.00	0.00
2,400.00	17.25	22.00	2,382.71	159.30	64.36	-159.05	1.50	1.50	0.00	0.00
2,500.00	18.75	22.00	2,477.81	187.95	75.94	-187.66	1.50	1.50	0.00	0.00
2,600.00	20.25	22.00	2,572.07	218.90	88.44	-218.56	1.50	1.50	0.00	0.00
2,700.00	21.75	22.00	2,665.43	252.13	101.87	-251.73	1.50	1.50	0.00	0.00
2,783.33	23.00	22.00	2,742.48	281.54	113.75	-281.10	1.50	1.50	0.00	0.00
End Nudge @ 2783.33ft										
2,800.00	23.00	22.00	2,757.82	287.58	116.19	-287.13	0.00	0.00	0.00	0.00
2,900.00	23.00	22.00	2,849.88	323.80	130.83	-323.30	0.00	0.00	0.00	0.00
3,000.00	23.00	22.00	2,941.93	360.03	145.46	-359.47	0.00	0.00	0.00	0.00
3,100.00	23.00	22.00	3,033.98	396.26	160.10	-395.64	0.00	0.00	0.00	0.00
3,200.00	23.00	22.00	3,126.03	432.49	174.74	-431.81	0.00	0.00	0.00	0.00
3,300.00	23.00	22.00	3,218.08	468.72	189.37	-467.99	0.00	0.00	0.00	0.00
3,400.00	23.00	22.00	3,310.13	504.94	204.01	-504.16	0.00	0.00	0.00	0.00
3,500.00	23.00	22.00	3,402.18	541.17	218.65	-540.33	0.00	0.00	0.00	0.00
3,600.00	23.00	22.00	3,494.23	577.40	233.28	-576.50	0.00	0.00	0.00	0.00
3,700.00	23.00	22.00	3,586.28	613.63	247.92	-612.67	0.00	0.00	0.00	0.00
3,800.00	23.00	22.00	3,678.33	649.86	262.56	-648.84	0.00	0.00	0.00	0.00
3,900.00	23.00	22.00	3,770.38	686.08	277.20	-685.01	0.00	0.00	0.00	0.00
4,000.00	23.00	22.00	3,862.43	722.31	291.83	-721.19	0.00	0.00	0.00	0.00
4,100.00	23.00	22.00	3,954.48	758.54	306.47	-757.36	0.00	0.00	0.00	0.00
4,200.00	23.00	22.00	4,046.53	794.77	321.11	-793.53	0.00	0.00	0.00	0.00
4,300.00	23.00	22.00	4,138.58	831.00	335.74	-829.70	0.00	0.00	0.00	0.00
4,400.00	23.00	22.00	4,230.63	867.22	350.38	-865.87	0.00	0.00	0.00	0.00
4,500.00	23.00	22.00	4,322.68	903.45	365.02	-902.04	0.00	0.00	0.00	0.00
4,600.00	23.00	22.00	4,414.73	939.68	379.66	-938.22	0.00	0.00	0.00	0.00

## Plan Report for LAND 14N-32HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
4,700.00	23.00	22.00	4,506.78	975.91	394.29	-974.39	0.00	0.00	0.00	0.00
4,800.00	23.00	22.00	4,598.83	1,012.14	408.93	-1,010.56	0.00	0.00	0.00	0.00
4,900.00	23.00	22.00	4,690.88	1,048.36	423.57	-1,046.73	0.00	0.00	0.00	0.00
5,000.00	23.00	22.00	4,782.94	1,084.59	438.20	-1,082.90	0.00	0.00	0.00	0.00
5,100.00	23.00	22.00	4,874.99	1,120.82	452.84	-1,119.07	0.00	0.00	0.00	0.00
5,140.21	23.00	22.00	4,912.00	1,135.39	458.73	-1,133.62	0.00	0.00	0.00	0.00
<b>Sussex</b>										
5,200.00	23.00	22.00	4,967.04	1,157.05	467.48	-1,155.24	0.00	0.00	0.00	0.00
5,300.00	23.00	22.00	5,059.09	1,193.28	482.11	-1,191.42	0.00	0.00	0.00	0.00
5,400.00	23.00	22.00	5,151.14	1,229.50	496.75	-1,227.59	0.00	0.00	0.00	0.00
5,493.33	23.00	22.00	5,237.05	1,263.32	510.41	-1,261.35	0.00	0.00	0.00	0.00
<b>Begin Drop @ 5493.33ft</b>										
5,500.00	22.87	22.00	5,243.19	1,265.72	511.39	-1,263.75	2.00	-2.00	0.00	180.00
5,600.00	20.87	22.00	5,335.99	1,300.26	525.34	-1,298.23	2.00	-2.00	0.00	180.00
5,700.00	18.87	22.00	5,430.04	1,331.76	538.07	-1,329.69	2.00	-2.00	0.00	180.00
5,800.00	16.87	22.00	5,525.21	1,360.21	549.56	-1,358.09	2.00	-2.00	0.00	180.00
5,900.00	14.87	22.00	5,621.39	1,385.56	559.80	-1,383.40	2.00	-2.00	0.00	180.00
6,000.00	12.87	22.00	5,718.47	1,407.78	568.78	-1,405.58	2.00	-2.00	0.00	180.00
6,100.00	10.87	22.00	5,816.33	1,426.84	576.48	-1,424.62	2.00	-2.00	0.00	180.00
6,200.00	8.87	22.00	5,914.85	1,442.73	582.90	-1,440.48	2.00	-2.00	0.00	-180.00
6,300.00	6.87	22.00	6,013.90	1,455.42	588.03	-1,453.15	2.00	-2.00	0.00	180.00
6,400.00	4.87	22.00	6,113.37	1,464.89	591.86	-1,462.61	2.00	-2.00	0.00	180.00
6,500.00	2.87	22.00	6,213.14	1,471.15	594.38	-1,468.85	2.00	-2.00	0.00	180.00
6,600.00	0.87	22.00	6,313.08	1,474.17	595.60	-1,471.87	2.00	-2.00	0.00	180.00
6,643.33	0.00	22.00	6,356.41	1,474.47	595.72	-1,472.17	2.00	-2.00	0.00	-180.00
<b>End Drop @ 6643.33ft</b>										
6,700.00	0.00	0.00	6,413.08	1,474.47	595.72	-1,472.17	0.00	0.00	0.00	-180.00
6,800.00	0.00	0.00	6,513.08	1,474.47	595.72	-1,472.17	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,613.08	1,474.47	595.72	-1,472.17	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,713.08	1,474.47	595.72	-1,472.17	0.00	0.00	0.00	0.00
7,000.99	0.00	0.00	6,714.07	1,474.47	595.72	-1,472.17	0.00	0.00	0.00	0.00
<b>KOP @ 7000.99ft</b>										
7,100.00	9.90	179.78	6,812.59	1,465.94	595.76	-1,463.64	10.00	10.00	0.00	179.78
7,200.00	19.90	179.78	6,909.10	1,440.26	595.86	-1,437.96	10.00	10.00	0.00	0.00
7,300.00	29.90	179.78	6,999.69	1,398.20	596.02	-1,395.91	10.00	10.00	0.00	0.00
7,400.00	39.90	179.78	7,081.60	1,341.06	596.24	-1,338.76	10.00	10.00	0.00	0.00
7,458.66	45.77	179.78	7,124.60	1,301.20	596.40	-1,298.90	10.00	10.00	0.00	0.00
<b>Sharon Springs</b>										
7,500.00	49.90	179.78	7,152.35	1,270.56	596.52	-1,268.26	10.00	10.00	0.00	0.00
<b>DLS = 10°/100'</b>										
7,540.99	54.00	179.78	7,177.60	1,238.29	596.65	-1,235.99	10.00	10.00	0.00	0.00
<b>Niobrara Top</b>										
7,600.00	59.90	179.78	7,209.77	1,188.85	596.84	-1,186.55	10.00	10.00	0.00	0.00
7,700.00	69.90	179.78	7,252.14	1,098.41	597.19	-1,096.11	10.00	10.00	0.00	0.00
7,719.55	71.86	179.78	7,258.54	1,079.94	597.26	-1,077.64	10.00	10.00	0.00	0.00
<b>Niobrara B Bench</b>										
7,800.00	79.90	179.78	7,278.15	1,001.99	597.57	-999.69	10.00	10.00	0.00	0.00
7,900.00	89.90	179.78	7,287.03	902.51	597.95	-900.21	10.00	10.00	0.00	0.00
7,906.50	90.55	179.78	7,287.00	896.01	597.98	-893.71	10.00	10.00	0.00	0.00
<b>End Build @ 7906.50ft - Heel: - Top of Production</b>										
8,000.00	90.55	179.78	7,286.11	802.52	598.34	-800.21	0.00	0.00	0.00	0.00
8,100.00	90.55	179.78	7,285.14	702.52	598.73	-700.22	0.00	0.00	0.00	0.00
8,200.00	90.55	179.78	7,284.18	602.53	599.12	-600.22	0.00	0.00	0.00	0.00
8,300.00	90.55	179.78	7,283.22	502.53	599.51	-500.23	0.00	0.00	0.00	0.00
8,400.00	90.55	179.78	7,282.26	402.54	599.90	-400.23	0.00	0.00	0.00	0.00
8,500.00	90.55	179.78	7,281.30	302.54	600.29	-300.23	0.00	0.00	0.00	0.00
8,600.00	90.55	179.78	7,280.34	202.55	600.68	-200.24	0.00	0.00	0.00	0.00
8,700.00	90.55	179.78	7,279.37	102.55	601.07	-100.24	0.00	0.00	0.00	0.00

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
8,800.00	90.55	179.78	7,278.41	2.56	601.46	-0.25	0.00	0.00	0.00	0.00
8,900.00	90.55	179.78	7,277.45	-97.44	601.85	99.75	0.00	0.00	0.00	0.00
9,000.00	90.55	179.78	7,276.49	-197.43	602.24	199.74	0.00	0.00	0.00	0.00
9,100.00	90.55	179.78	7,275.53	-297.43	602.63	299.74	0.00	0.00	0.00	0.00
9,200.00	90.55	179.78	7,274.57	-397.42	603.02	399.73	0.00	0.00	0.00	0.00
9,300.00	90.55	179.78	7,273.60	-497.41	603.41	499.73	0.00	0.00	0.00	0.00
9,400.00	90.55	179.78	7,272.64	-597.41	603.80	599.72	0.00	0.00	0.00	0.00
9,500.00	90.55	179.78	7,271.68	-697.40	604.19	699.72	0.00	0.00	0.00	0.00
9,600.00	90.55	179.78	7,270.72	-797.40	604.58	799.71	0.00	0.00	0.00	0.00
9,700.00	90.55	179.78	7,269.76	-897.39	604.97	899.71	0.00	0.00	0.00	0.00
9,800.00	90.55	179.78	7,268.79	-997.39	605.36	999.70	0.00	0.00	0.00	0.00
9,900.00	90.55	179.78	7,267.83	-1,097.38	605.75	1,099.70	0.00	0.00	0.00	0.00
10,000.00	90.55	179.78	7,266.87	-1,197.38	606.14	1,199.70	0.00	0.00	0.00	0.00
10,100.00	90.55	179.78	7,265.91	-1,297.37	606.53	1,299.69	0.00	0.00	0.00	0.00
10,200.00	90.55	179.78	7,264.95	-1,397.37	606.92	1,399.69	0.00	0.00	0.00	0.00
10,300.00	90.55	179.78	7,263.99	-1,497.36	607.31	1,499.68	0.00	0.00	0.00	0.00
10,400.00	90.55	179.78	7,263.02	-1,597.36	607.70	1,599.68	0.00	0.00	0.00	0.00
10,500.00	90.55	179.78	7,262.06	-1,697.35	608.09	1,699.67	0.00	0.00	0.00	0.00
10,600.00	90.55	179.78	7,261.10	-1,797.34	608.48	1,799.67	0.00	0.00	0.00	0.00
10,700.00	90.55	179.78	7,260.14	-1,897.34	608.87	1,899.66	0.00	0.00	0.00	0.00
10,800.00	90.55	179.78	7,259.18	-1,997.33	609.26	1,999.66	0.00	0.00	0.00	0.00
10,900.00	90.55	179.78	7,258.22	-2,097.33	609.65	2,099.65	0.00	0.00	0.00	0.00
11,000.00	90.55	179.78	7,257.25	-2,197.32	610.04	2,199.65	0.00	0.00	0.00	0.00
11,100.00	90.55	179.78	7,256.29	-2,297.32	610.43	2,299.64	0.00	0.00	0.00	0.00
11,200.00	90.55	179.78	7,255.33	-2,397.31	610.82	2,399.64	0.00	0.00	0.00	0.00
11,300.00	90.55	179.78	7,254.37	-2,497.31	611.21	2,499.64	0.00	0.00	0.00	0.00
11,400.00	90.55	179.78	7,253.41	-2,597.30	611.60	2,599.63	0.00	0.00	0.00	0.00
11,500.00	90.55	179.78	7,252.45	-2,697.30	611.99	2,699.63	0.00	0.00	0.00	0.00
11,600.00	90.55	179.78	7,251.48	-2,797.29	612.38	2,799.62	0.00	0.00	0.00	0.00
11,700.00	90.55	179.78	7,250.52	-2,897.29	612.77	2,899.62	0.00	0.00	0.00	0.00
11,800.00	90.55	179.78	7,249.56	-2,997.28	613.16	2,999.61	0.00	0.00	0.00	0.00
11,900.00	90.55	179.78	7,248.60	-3,097.27	613.55	3,099.61	0.00	0.00	0.00	0.00
12,000.00	90.55	179.78	7,247.64	-3,197.27	613.94	3,199.60	0.00	0.00	0.00	0.00
12,100.00	90.55	179.78	7,246.68	-3,297.26	614.33	3,299.60	0.00	0.00	0.00	0.00
12,200.00	90.55	179.78	7,245.71	-3,397.26	614.72	3,399.59	0.00	0.00	0.00	0.00
12,300.00	90.55	179.78	7,244.75	-3,497.25	615.11	3,499.59	0.00	0.00	0.00	0.00
12,400.00	90.55	179.78	7,243.79	-3,597.25	615.50	3,599.58	0.00	0.00	0.00	0.00
12,500.00	90.55	179.78	7,242.83	-3,697.24	615.89	3,699.58	0.00	0.00	0.00	0.00
12,600.00	90.55	179.78	7,241.87	-3,797.24	616.28	3,799.58	0.00	0.00	0.00	0.00
12,700.00	90.55	179.78	7,240.91	-3,897.23	616.67	3,899.57	0.00	0.00	0.00	0.00
12,800.00	90.55	179.78	7,239.94	-3,997.23	617.05	3,999.57	0.00	0.00	0.00	0.00
12,900.00	90.55	179.78	7,238.98	-4,097.22	617.44	4,099.56	0.00	0.00	0.00	0.00
13,000.00	90.55	179.78	7,238.02	-4,197.22	617.83	4,199.56	0.00	0.00	0.00	0.00
13,002.12	90.55	179.78	7,238.00	-4,199.34	617.84	4,201.68	0.00	0.00	0.00	0.00
Toe:										
13,002.13	90.55	179.78	7,238.00	-4,199.34	617.84	4,201.68	0.01	0.00	0.00	0.00
TD Well @ 13002.13ft - LAND 14N-32HZ_BHL										

## Plan Report for LAND 14N-32HZ - Permit Rev-1

**Plan Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,250.00	1,250.00	0.00	0.00	Begin Nudge @ 1250.00ft
2,783.33	2,742.48	281.54	113.75	End Nudge @ 2783.33ft
5,493.33	5,237.05	1,263.32	510.41	Begin Drop @ 5493.33ft
6,643.33	6,356.41	1,474.47	595.72	End Drop @ 6643.33ft
7,000.99	6,714.07	1,474.47	595.72	KOP @ 7000.99ft
7,500.00	7,152.35	1,270.56	596.52	DLS = 10°/100'
7,906.50	7,287.00	896.01	597.98	End Build @ 7906.50ft
13,002.13	7,238.00	-4,199.34	617.84	TD Well @ 13002.13ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
User	No Target (Freehand)	179.78	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	7,906.50	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1
7,906.50	13,002.13	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1

**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,600.49	1,600.00	9 5/8"	9-5/8	13-1/2
7,906.50	7,287.00	Top of Production	5-1/2	7-7/8

**Formation Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,308.00	1,308.00	Fox Hills		0.00	
5,140.21	4,912.00	Sussex		0.00	
7,458.66	7,124.60	Sharon Springs		0.00	
7,540.99	7,177.60	Niobrara Top		0.00	
7,719.55	7,258.54	Niobrara B Bench		0.00	
7,906.50	7,287.00	Heel:		0.00	
13,002.12	7,238.00	Toe:		0.00	

**Targets associated with this wellbore**

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
LAND 14N-32HZ_Hardlines	0.00	0.00	0.00	Polygon
LAND 14N-32HZ_BHL	7,238.00	-4,199.34	617.84	Point
LAND 14N-32HZ_SHL	0.00	0.00	0.00	Point
2N-R66W-Sec. 29_Section Lines	10.00	5,994.29	1,513.36	Polygon
2N-R66W-Sec. 32_Section Lines	0.00	1.46	-164.99	Polygon

## North Reference Sheet for 2N-66W-32 Land Fed 13S-32HZ Pad - LAND 14N-32HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB = 17' @ 4914.00usft (D Rig). Northing and Easting are relative to LAND 14N-32HZ

Coordinate System is Universal Transverse Mercator (US Survey Feet), Zone 13N (108 W to 102 W) using datum North American Datum 1983, ellipsoid

Projection method is Transverse Mercator (Gauss-Kruger)

Central Meridian is -105.00°, Longitude Origin:0.000000°, Latitude Origin:0.000000°

False Easting: 1,640,416.67usft, False Northing: 0.00usft, Scale Reduction: 0.99960339

Grid Coordinates of Well: 14,562,852.40 usft N, 1,694,877.18 usft E

Geographical Coordinates of Well: 40° 05' 56.49" N, 104° 48' 18.91" W

Grid Convergence at Surface is: 0.13°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,002.13usft the Bottom Hole Displacement is 4,244.55usft in the Direction of 171.63° (True).

Magnetic Convergence at surface is: -8.21° (19 May 2015, , IGRF2010)

