

# US ROCKIES WATTENBERG PLANNING

WELD-NAD83-UTMFT13N

1N-66W-09 Highlands 2-9HZ Pad

HIGHLANDS 2C-33HZ

Plan A

Plan: Permit Rev-1

## Sperry Drilling Services Proposal Report

18 May, 2015

Well Coordinates: 14,553,105.31 N, 1,702,521.91 E (40° 04' 19.95" N, 104° 46' 40.81" W)

Ground Level: 4,994.00 usft

Local Coordinate Origin:

Centered on Well HIGHLANDS 2C-33HZ

Viewing Datum:

RKB = 17' @ 5011.00usft (D Rig)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Version: 5000.1 Build: 70

**HALLIBURTON**

Project: WELD-NAD83-UTMFT13N  
Site: 1N-66W-09 Highlands 2-9HZ Pad  
Well: HIGHLANDS 2C-33HZ  
Wellbore: Plan A  
Design: Permit Rev-1

# US ROCKIES WATTENBERG PLANNING

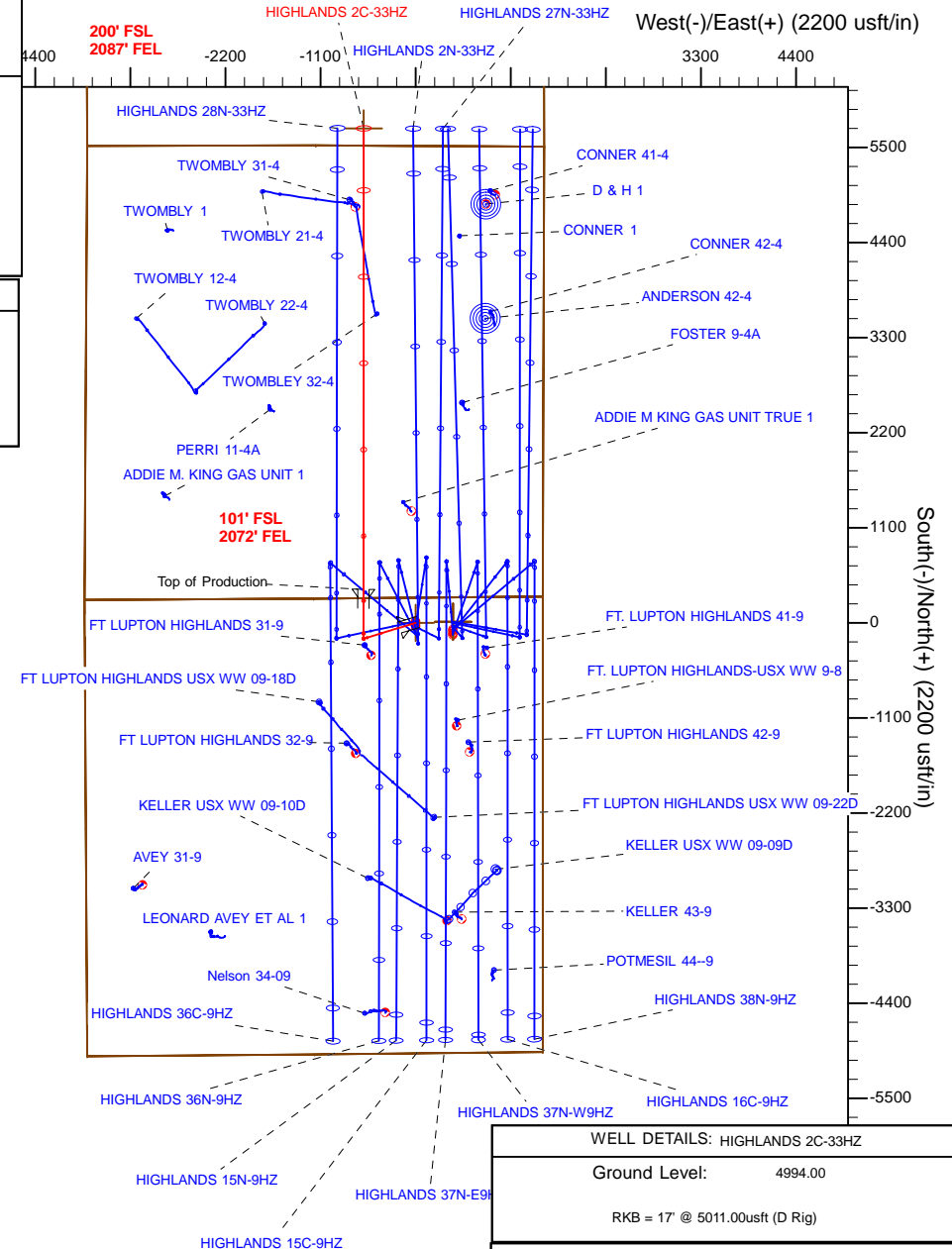
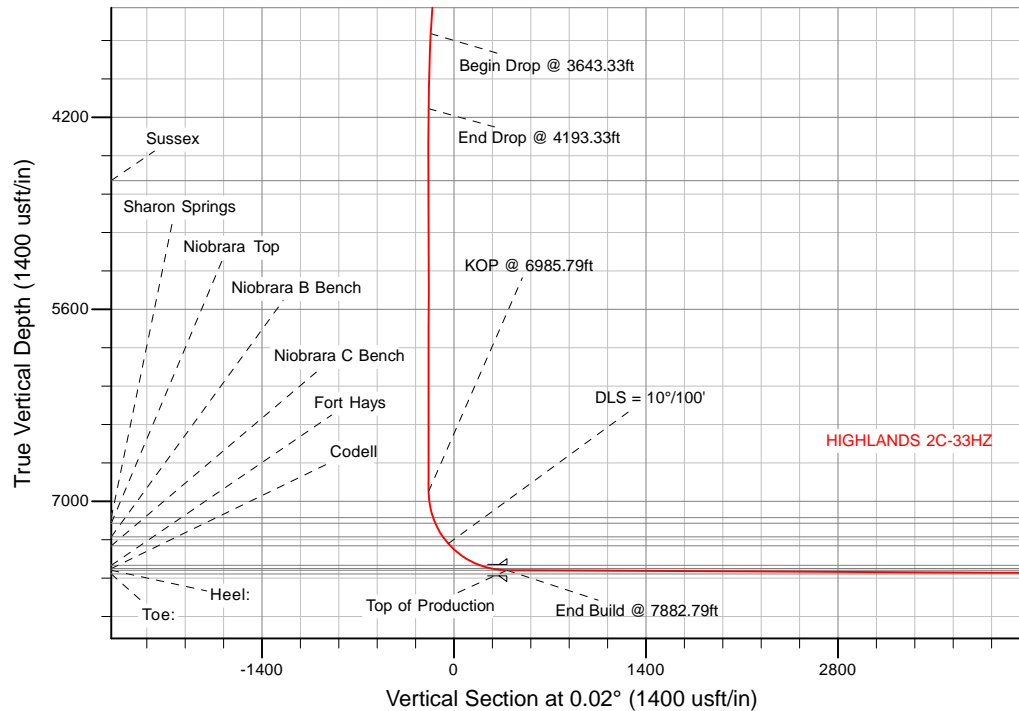
**HALLIBURTON**  
Sperry Drilling

## SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	983.33	11.00	253.00	978.84	-20.52	-67.11	1.50	253.00	-20.54	
4	3643.33	11.00	253.00	3589.96	-168.91	-552.49	0.00	0.00	-169.11	
5	4193.33	0.00	0.00	4136.59	-184.30	-602.82	2.00	180.00	-184.51	
6	6985.79	0.00	0.00	6929.05	-184.30	-602.82	0.00	0.00	-184.51	
7	7882.79	89.70	0.02	7502.00	385.65	-602.65	10.00	0.02	385.44	
8	13216.87	89.70	0.02	7530.00	5719.66	-601.06	0.00	0.00	5719.45	HIGHLANDS 2C-33HZ_BHL

## WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
HIGHLANDS 2C-33HZ_SHL	0.00	0.00	0.00	40.072209	-104.778002	Point
HIGHLANDS 2C-33HZ_BHL	7530.00	5719.66	-601.06	40.087916	-104.780151	Point



## WELL DETAILS: HIGHLANDS 2C-33HZ

Ground Level: 4994.00

RKB = 17' @ 5011.00usft (D Rig)

Plan: Permit Rev-1 (HIGHLANDS 2C-33HZ/Plan A)

Created By: Clint Eshelman

Date: 5/19/2015

Reviewed:

Date:

## Plan Report for HIGHLANDS 2C-33HZ - 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
1N-R66W-Sec. 9_Section Lines - 2N-R66W-Sec. 33_Section Lines - HIGHLANDS 2C-33HZ_SHL - 1N-R66W-Sec. 4_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
250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 250.00ft										
300.00	0.75	253.00	300.00	-0.10	-0.31	-0.10	1.50	1.50	0.00	253.00
400.00	2.25	253.00	399.96	-0.86	-2.82	-0.86	1.50	1.50	0.00	0.00
500.00	3.75	253.00	499.82	-2.39	-7.82	-2.39	1.50	1.50	0.00	0.00
600.00	5.25	253.00	599.51	-4.68	-15.32	-4.69	1.50	1.50	0.00	0.00
700.00	6.75	253.00	698.96	-7.74	-25.32	-7.75	1.50	1.50	0.00	0.00
800.00	8.25	253.00	798.10	-11.56	-37.80	-11.57	1.50	1.50	0.00	0.00
900.00	9.75	253.00	896.87	-16.13	-52.76	-16.15	1.50	1.50	0.00	0.00
983.33	11.00	253.00	978.83	-20.52	-67.11	-20.54	1.50	1.50	0.00	0.00
End Nudge @ 983.33ft										
1,000.00	11.00	253.00	995.20	-21.45	-70.15	-21.47	0.00	0.00	0.00	0.00
1,100.00	11.00	253.00	1,093.36	-27.03	-88.40	-27.06	0.00	0.00	0.00	0.00
1,200.00	11.00	253.00	1,191.52	-32.61	-106.65	-32.64	0.00	0.00	0.00	0.00
1,300.00	11.00	253.00	1,289.69	-38.18	-124.90	-38.23	0.00	0.00	0.00	0.00
1,400.00	11.00	253.00	1,387.85	-43.76	-143.14	-43.81	0.00	0.00	0.00	0.00
1,478.60	11.00	253.00	1,465.00	-48.15	-157.48	-48.20	0.00	0.00	0.00	0.00
Fox Hills										
1,500.00	11.00	253.00	1,486.01	-49.34	-161.39	-49.40	0.00	0.00	0.00	0.00
1,600.00	11.00	253.00	1,584.17	-54.92	-179.64	-54.98	0.00	0.00	0.00	0.00
1,616.12	11.00	253.00	1,600.00	-55.82	-182.58	-55.88	0.00	0.00	0.00	0.00
9 5/8"										
1,700.00	11.00	253.00	1,682.34	-60.50	-197.88	-60.57	0.00	0.00	0.00	0.00
1,800.00	11.00	253.00	1,780.50	-66.08	-216.13	-66.15	0.00	0.00	0.00	0.00
1,900.00	11.00	253.00	1,878.66	-71.66	-234.38	-71.74	0.00	0.00	0.00	0.00
2,000.00	11.00	253.00	1,976.82	-77.24	-252.63	-77.32	0.00	0.00	0.00	0.00
2,100.00	11.00	253.00	2,074.99	-82.81	-270.87	-82.91	0.00	0.00	0.00	0.00
2,200.00	11.00	253.00	2,173.15	-88.39	-289.12	-88.49	0.00	0.00	0.00	0.00
2,300.00	11.00	253.00	2,271.31	-93.97	-307.37	-94.08	0.00	0.00	0.00	0.00
2,400.00	11.00	253.00	2,369.48	-99.55	-325.61	-99.66	0.00	0.00	0.00	0.00
2,500.00	11.00	253.00	2,467.64	-105.13	-343.86	-105.25	0.00	0.00	0.00	0.00
2,600.00	11.00	253.00	2,565.80	-110.71	-362.11	-110.83	0.00	0.00	0.00	0.00
2,700.00	11.00	253.00	2,663.96	-116.29	-380.36	-116.42	0.00	0.00	0.00	0.00
2,800.00	11.00	253.00	2,762.13	-121.87	-398.60	-122.00	0.00	0.00	0.00	0.00
2,900.00	11.00	253.00	2,860.29	-127.44	-416.85	-127.59	0.00	0.00	0.00	0.00
3,000.00	11.00	253.00	2,958.45	-133.02	-435.10	-133.17	0.00	0.00	0.00	0.00
3,100.00	11.00	253.00	3,056.61	-138.60	-453.34	-138.76	0.00	0.00	0.00	0.00
3,200.00	11.00	253.00	3,154.78	-144.18	-471.59	-144.34	0.00	0.00	0.00	0.00
3,300.00	11.00	253.00	3,252.94	-149.76	-489.84	-149.93	0.00	0.00	0.00	0.00
3,400.00	11.00	253.00	3,351.10	-155.34	-508.09	-155.51	0.00	0.00	0.00	0.00
3,500.00	11.00	253.00	3,449.27	-160.92	-526.33	-161.10	0.00	0.00	0.00	0.00
3,600.00	11.00	253.00	3,547.43	-166.49	-544.58	-166.68	0.00	0.00	0.00	0.00
3,643.33	11.00	253.00	3,589.96	-168.91	-552.49	-169.10	0.00	0.00	0.00	0.00
Begin Drop @ 3643.33ft										
3,700.00	9.87	253.00	3,645.69	-171.91	-562.30	-172.11	2.00	-2.00	0.00	180.00
3,800.00	7.87	253.00	3,744.49	-176.42	-577.04	-176.62	2.00	-2.00	0.00	180.00
3,900.00	5.87	253.00	3,843.77	-179.91	-588.47	-180.12	2.00	-2.00	0.00	180.00
4,000.00	3.87	253.00	3,943.41	-182.39	-596.58	-182.60	2.00	-2.00	0.00	180.00
4,100.00	1.87	253.00	4,043.28	-183.86	-601.37	-184.07	2.00	-2.00	0.00	180.00
4,193.33	0.00	253.00	4,136.59	-184.30	-602.82	-184.51	2.00	-2.00	0.00	180.00
End Drop @ 4193.33ft										
4,200.00	0.00	0.00	4,143.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	180.00
4,300.00	0.00	0.00	4,243.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00

## Plan Report for HIGHLANDS 2C-33HZ - 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 (°)
4,400.00	0.00	0.00	4,343.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,443.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,543.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,643.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
4,718.74	0.00	0.00	4,662.00	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,800.00	0.00	0.00	4,743.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,843.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	4,943.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,043.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,143.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,243.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,343.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,443.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,543.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,643.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,743.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,843.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	5,943.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,043.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,143.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,243.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,343.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,443.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,543.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,643.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,743.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,843.26	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
6,985.79	0.00	0.00	6,929.05	-184.30	-602.82	-184.51	0.00	0.00	0.00	0.00
<b>KOP @ 6985.79ft</b>										
7,000.00	1.42	0.02	6,943.26	-184.12	-602.82	-184.34	10.00	10.00	0.00	0.02
7,100.00	11.42	0.02	7,042.50	-172.96	-602.82	-173.17	10.00	10.00	0.00	0.00
7,178.82	19.30	0.02	7,118.45	-152.09	-602.81	-152.30	10.00	10.00	0.00	0.00
<b>Sharon Springs</b>										
7,200.00	21.42	0.02	7,138.30	-144.72	-602.81	-144.93	10.00	10.00	0.00	0.00
7,222.90	23.71	0.02	7,159.45	-135.94	-602.81	-136.15	10.00	10.00	0.00	0.00
<b>Niobrara Top</b>										
7,300.00	31.42	0.02	7,227.75	-100.28	-602.80	-100.49	10.00	10.00	0.00	0.00
7,338.02	35.22	0.02	7,259.51	-79.40	-602.79	-79.61	10.00	10.00	0.00	0.00
<b>Niobrara B Bench</b>										
7,400.00	41.42	0.02	7,308.11	-40.99	-602.78	-41.20	10.00	10.00	0.00	0.00
<b>DLS = 10°/100'</b>										
7,422.49	43.67	0.02	7,324.68	-25.78	-602.77	-25.99	10.00	10.00	0.00	0.00
<b>Niobrara C Bench</b>										
7,500.00	51.42	0.02	7,376.96	31.36	-602.76	31.15	10.00	10.00	0.00	0.00
7,600.00	61.42	0.02	7,432.20	114.57	-602.73	114.36	10.00	10.00	0.00	0.00
7,683.53	69.77	0.02	7,466.68	190.57	-602.71	190.36	10.00	10.00	0.00	0.00
<b>Fort Hays</b>										
7,700.00	71.42	0.02	7,472.15	206.10	-602.70	205.89	10.00	10.00	0.00	0.00
7,772.24	78.64	0.02	7,490.79	275.84	-602.68	275.63	10.00	10.00	0.00	0.00
<b>Codell</b>										
7,800.00	81.42	0.02	7,495.60	303.18	-602.68	302.97	10.00	10.00	0.00	0.00
7,882.79	89.70	0.02	7,502.00	385.65	-602.65	385.44	10.00	10.00	0.00	0.00
<b>End Build @ 7882.79ft - Heel: - Top of Production</b>										
7,900.00	89.70	0.02	7,502.09	402.86	-602.65	402.65	0.00	0.00	0.00	0.00
8,000.00	89.70	0.02	7,502.62	502.86	-602.62	502.65	0.00	0.00	0.00	0.00
8,100.00	89.70	0.02	7,503.14	602.86	-602.59	602.65	0.00	0.00	0.00	0.00
8,200.00	89.70	0.02	7,503.67	702.86	-602.56	702.65	0.00	0.00	0.00	0.00
8,300.00	89.70	0.02	7,504.19	802.86	-602.53	802.65	0.00	0.00	0.00	0.00

## Plan Report for HIGHLANDS 2C-33HZ - 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 (°)
8,400.00	89.70	0.02	7,504.72	902.86	-602.50	902.65	0.00	0.00	0.00	0.00
8,500.00	89.70	0.02	7,505.24	1,002.85	-602.47	1,002.64	0.00	0.00	0.00	0.00
8,600.00	89.70	0.02	7,505.77	1,102.85	-602.44	1,102.64	0.00	0.00	0.00	0.00
8,700.00	89.70	0.02	7,506.29	1,202.85	-602.41	1,202.64	0.00	0.00	0.00	0.00
8,800.00	89.70	0.02	7,506.82	1,302.85	-602.38	1,302.64	0.00	0.00	0.00	0.00
8,900.00	89.70	0.02	7,507.34	1,402.85	-602.35	1,402.64	0.00	0.00	0.00	0.00
9,000.00	89.70	0.02	7,507.87	1,502.85	-602.32	1,502.64	0.00	0.00	0.00	0.00
9,100.00	89.70	0.02	7,508.39	1,602.85	-602.29	1,602.64	0.00	0.00	0.00	0.00
9,200.00	89.70	0.02	7,508.92	1,702.85	-602.26	1,702.63	0.00	0.00	0.00	0.00
9,300.00	89.70	0.02	7,509.44	1,802.84	-602.23	1,802.63	0.00	0.00	0.00	0.00
9,400.00	89.70	0.02	7,509.97	1,902.84	-602.20	1,902.63	0.00	0.00	0.00	0.00
9,500.00	89.70	0.02	7,510.49	2,002.84	-602.17	2,002.63	0.00	0.00	0.00	0.00
9,600.00	89.70	0.02	7,511.02	2,102.84	-602.14	2,102.63	0.00	0.00	0.00	0.00
9,700.00	89.70	0.02	7,511.54	2,202.84	-602.11	2,202.63	0.00	0.00	0.00	0.00
9,800.00	89.70	0.02	7,512.07	2,302.84	-602.08	2,302.63	0.00	0.00	0.00	0.00
9,900.00	89.70	0.02	7,512.59	2,402.84	-602.05	2,402.63	0.00	0.00	0.00	0.00
10,000.00	89.70	0.02	7,513.12	2,502.83	-602.02	2,502.62	0.00	0.00	0.00	0.00
10,100.00	89.70	0.02	7,513.64	2,602.83	-601.99	2,602.62	0.00	0.00	0.00	0.00
10,200.00	89.70	0.02	7,514.17	2,702.83	-601.96	2,702.62	0.00	0.00	0.00	0.00
10,300.00	89.70	0.02	7,514.69	2,802.83	-601.93	2,802.62	0.00	0.00	0.00	0.00
10,400.00	89.70	0.02	7,515.21	2,902.83	-601.90	2,902.62	0.00	0.00	0.00	0.00
10,500.00	89.70	0.02	7,515.74	3,002.83	-601.87	3,002.62	0.00	0.00	0.00	0.00
10,600.00	89.70	0.02	7,516.26	3,102.83	-601.84	3,102.62	0.00	0.00	0.00	0.00
10,700.00	89.70	0.02	7,516.79	3,202.82	-601.81	3,202.61	0.00	0.00	0.00	0.00
10,800.00	89.70	0.02	7,517.31	3,302.82	-601.78	3,302.61	0.00	0.00	0.00	0.00
10,900.00	89.70	0.02	7,517.84	3,402.82	-601.75	3,402.61	0.00	0.00	0.00	0.00
11,000.00	89.70	0.02	7,518.36	3,502.82	-601.72	3,502.61	0.00	0.00	0.00	0.00
11,100.00	89.70	0.02	7,518.89	3,602.82	-601.69	3,602.61	0.00	0.00	0.00	0.00
11,200.00	89.70	0.02	7,519.41	3,702.82	-601.66	3,702.61	0.00	0.00	0.00	0.00
11,300.00	89.70	0.02	7,519.94	3,802.82	-601.63	3,802.61	0.00	0.00	0.00	0.00
11,400.00	89.70	0.02	7,520.46	3,902.81	-601.60	3,902.60	0.00	0.00	0.00	0.00
11,500.00	89.70	0.02	7,520.99	4,002.81	-601.57	4,002.60	0.00	0.00	0.00	0.00
11,600.00	89.70	0.02	7,521.51	4,102.81	-601.54	4,102.60	0.00	0.00	0.00	0.00
11,700.00	89.70	0.02	7,522.04	4,202.81	-601.51	4,202.60	0.00	0.00	0.00	0.00
11,800.00	89.70	0.02	7,522.56	4,302.81	-601.48	4,302.60	0.00	0.00	0.00	0.00
11,900.00	89.70	0.02	7,523.09	4,402.81	-601.45	4,402.60	0.00	0.00	0.00	0.00
12,000.00	89.70	0.02	7,523.61	4,502.81	-601.42	4,502.60	0.00	0.00	0.00	0.00
12,100.00	89.70	0.02	7,524.14	4,602.81	-601.39	4,602.60	0.00	0.00	0.00	0.00
12,200.00	89.70	0.02	7,524.66	4,702.80	-601.36	4,702.59	0.00	0.00	0.00	0.00
12,300.00	89.70	0.02	7,525.19	4,802.80	-601.33	4,802.59	0.00	0.00	0.00	0.00
12,400.00	89.70	0.02	7,525.71	4,902.80	-601.30	4,902.59	0.00	0.00	0.00	0.00
12,500.00	89.70	0.02	7,526.24	5,002.80	-601.27	5,002.59	0.00	0.00	0.00	0.00
12,600.00	89.70	0.02	7,526.76	5,102.80	-601.24	5,102.59	0.00	0.00	0.00	0.00
12,700.00	89.70	0.02	7,527.29	5,202.80	-601.22	5,202.59	0.00	0.00	0.00	0.00
12,800.00	89.70	0.02	7,527.81	5,302.80	-601.19	5,302.59	0.00	0.00	0.00	0.00
12,900.00	89.70	0.02	7,528.34	5,402.79	-601.16	5,402.58	0.00	0.00	0.00	0.00
13,000.00	89.70	0.02	7,528.86	5,502.79	-601.13	5,502.58	0.00	0.00	0.00	0.00
13,100.00	89.70	0.02	7,529.39	5,602.79	-601.10	5,602.58	0.00	0.00	0.00	0.00
13,200.00	89.70	0.02	7,529.91	5,702.79	-601.07	5,702.58	0.00	0.00	0.00	0.00
13,216.87	89.70	0.02	7,530.00	5,719.66	-601.06	5,719.45	0.00	0.00	0.00	0.00

TD Well @ 13216.87ft - Toe: - HIGHLANDS 2C-33HZ\_BHL

**Plan Report for HIGHLANDS 2C-33HZ - Permit Rev-1****Plan Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft
983.33	978.83	-20.52	-67.11	End Nudge @ 983.33ft
3,643.33	3,589.96	-168.91	-552.49	Begin Drop @ 3643.33ft
4,193.33	4,136.59	-184.30	-602.82	End Drop @ 4193.33ft
6,985.79	6,929.05	-184.30	-602.82	KOP @ 6985.79ft
7,400.00	7,308.11	-40.99	-602.78	DLS = 10°/100'
7,882.79	7,502.00	385.65	-602.65	End Build @ 7882.79ft
13,216.87	7,530.00	5,719.66	-601.06	TD Well @ 13216.87ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	0.02	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	7,882.79	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1
7,882.79	13,216.87	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1

**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,616.12	1,600.00	9 5/8"	9-5/8	13-1/2
7,882.79	7,502.00	Top of Production	5-1/2	7-7/8

**Formation Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,478.60	1,465.00	Fox Hills		0.00	
4,718.74	4,662.00	Sussex		0.00	
7,178.82	7,118.45	Sharon Springs		0.00	
7,222.90	7,159.45	Niobrara Top		0.00	
7,338.02	7,259.51	Niobrara B Bench		0.00	
7,422.49	7,324.68	Niobrara C Bench		0.00	
7,683.53	7,466.68	Fort Hays		0.00	
7,772.24	7,490.79	Codell		0.00	
7,882.79	7,502.00	Heel:		0.00	
13,216.87	7,530.00	Toe:		0.00	

**Plan Report for HIGHLANDS 2C-33HZ - Permit Rev-1**

*Targets associated with this wellbore*

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
1N-R66W-Sec. 9_Section Lines	-4.00	11.66	432.22	Polygon
2N-R66W-Sec. 33_Section Lines	-4.00	11.66	432.22	Polygon
HIGHLANDS 2C-33HZ_SHL	0.00	0.00	0.00	Point
HIGHLANDS 2C-33HZ_BHL	7,530.00	5,719.66	-601.06	Point
1N-R66W-Sec. 4_Section Lines	-4.00	11.66	432.22	Polygon

## North Reference Sheet for 1N-66W-09 Highlands 2-9HZ Pad - HIGHLANDS 2C-33HZ - 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' @ 5011.00usft (D Rig). Northing and Easting are relative to HIGHLANDS 2C-33HZ

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: 0.99960441

Grid Coordinates of Well: 14,553,105.31 usft N, 1,702,521.91 usft E

Geographical Coordinates of Well: 40° 04' 19.95" N, 104° 46' 40.81" W

Grid Convergence at Surface is: 0.14°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,216.87usft  
the Bottom Hole Displacement is 5,751.15usft in the Direction of 354.00° (True).

Magnetic Convergence at surface is: -8.17° (14 May 2015, , IGRF2010)

