

# US ROCKIES WATTENBERG PLANNING

WELD-NAD83-UTMFT13N  
2N-65W-22 Powers 2-22  
POWERS 1C-27HZ

Plan: Permit Rev-1

## Sperry Drilling Services Standard Report

11 March, 2015

Well Coordinates: 14,574,463.30 N, 1,739,622.94 E (40° 07' 49.91" N, 104° 38' 42.29" W)  
Ground Level: 4,894.00 usft

Local Coordinate Origin:	Centered on Well POWERS 1C-27Z
Viewing Datum:	RKB = 17' @ 4911.00usft (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: 2N-65W-22 Powers 2-22

Well: POWERS 1C-27HZ

Wellbore: Plan A

Design: Permit Rev-1

# US ROCKIES WATTENBERG PLANNING

HALLIBURTON

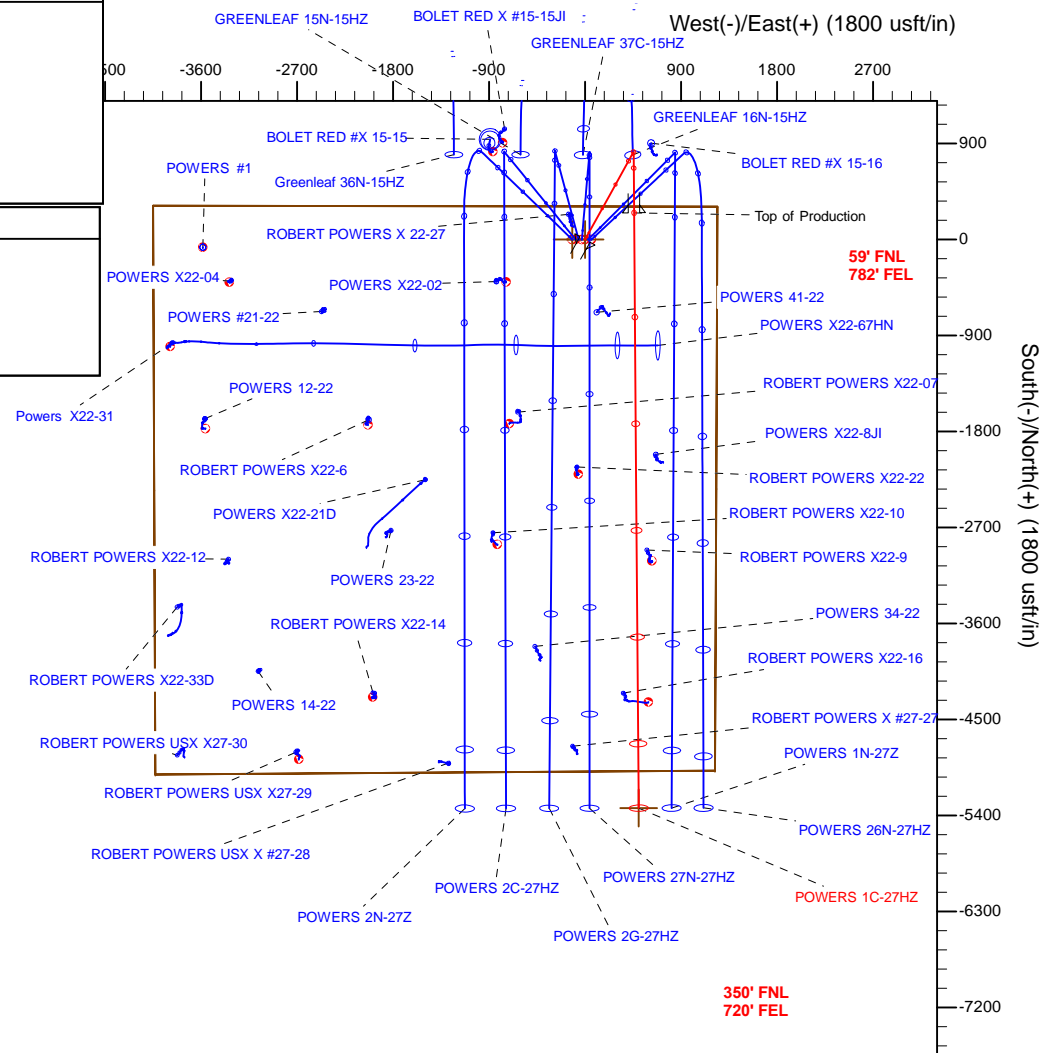
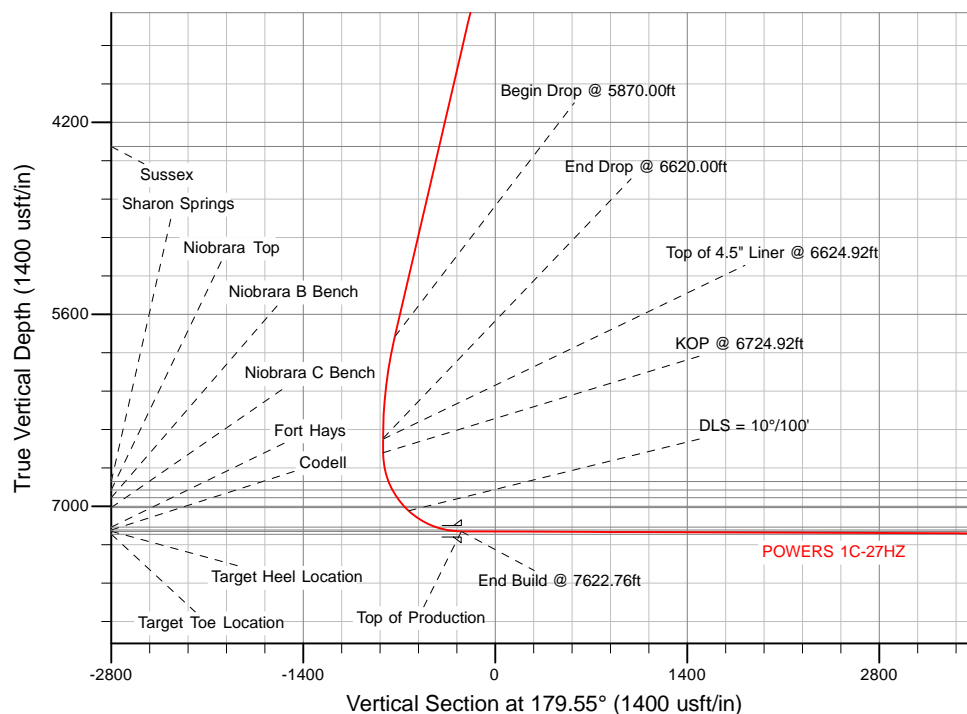
Sperry Drilling

## 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	2250.00	0.00	0.00	2250.00	0.00	0.00	0.00	0.00	0.00	
3	3000.00	15.00	29.00	2991.46	85.38	47.32	2.00	29.00	-85.00	
4	5870.00	15.00	29.00	5763.67	735.05	407.45	0.00	0.00	-731.83	
5	6620.00	0.00	0.00	6505.13	820.43	454.77	2.00	180.00	-816.83	
6	6724.92	0.00	0.00	6610.05	820.43	454.77	0.00	0.00	-816.83	
7	7622.76	89.78	179.55	7183.00	249.64	459.23	10.00	179.55	-246.03	
8	13203.24	89.78	179.55	7204.00	-5330.62	502.84	0.00	0.00	5334.40	POWERS 1C-27HZ_BHL

## WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
2N-R65W-Sec. 22_Section Lines	0.00	0.00	-119.91	40.130530	-104.645509
POWERS 1C-27HZ_SHL	0.00	0.00	0.00	40.130530	-104.645080
POWERS 1C-27HZ_BHL	7204.00	-5330.62	502.84	40.115892	-104.643281



WELL DETAILS: POWERS 1C-27Z	
Ground Level:	4894.00
RKB = 17' @ 4911.00usft (D Rig)	
Plan: Permit Rev-1 (POWERS 1C-27HZ/Plan A)	
Created By: Clint Eshelman	Date: 3/11/2015
Reviewed:	Date:

## Plan Report for POWERS 1C-27HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>2N-R65W-Sec. 22_Section Lines - POWERS 1C-27HZ_SHL</b>							
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	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
1,100.00	0.00	0.00	1,100.00	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
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00
1,362.00	0.00	0.00	1,362.00	0.00	0.00	0.00	0.00
<b>9 5/8"</b>							
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00
2,250.00	0.00	0.00	2,250.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 2250.00ft</b>							
2,300.00	1.00	29.00	2,300.00	0.38	0.21	-0.38	2.00
2,400.00	3.00	29.00	2,399.93	3.43	1.90	-3.42	2.00
2,500.00	5.00	29.00	2,499.68	9.53	5.29	-9.49	2.00
2,600.00	7.00	29.00	2,599.13	18.68	10.35	-18.59	2.00
2,700.00	9.00	29.00	2,698.15	30.85	17.10	-30.71	2.00
2,800.00	11.00	29.00	2,796.63	46.03	25.52	-45.83	2.00
2,900.00	13.00	29.00	2,894.44	64.22	35.60	-63.94	2.00
3,000.00	15.00	29.00	2,991.46	85.38	47.32	-85.00	2.00
<b>End Nudge @ 3000.00ft</b>							
3,100.00	15.00	29.00	3,088.05	108.01	59.87	-107.54	0.00
3,200.00	15.00	29.00	3,184.65	130.65	72.42	-130.08	0.00
3,300.00	15.00	29.00	3,281.24	153.29	84.97	-152.61	0.00
3,400.00	15.00	29.00	3,377.83	175.92	97.52	-175.15	0.00
3,500.00	15.00	29.00	3,474.42	198.56	110.06	-197.69	0.00
3,600.00	15.00	29.00	3,571.02	221.20	122.61	-220.23	0.00
3,700.00	15.00	29.00	3,667.61	243.83	135.16	-242.76	0.00
3,800.00	15.00	29.00	3,764.20	266.47	147.71	-265.30	0.00
3,900.00	15.00	29.00	3,860.80	289.11	160.26	-287.84	0.00
4,000.00	15.00	29.00	3,957.39	311.74	172.80	-310.38	0.00
4,100.00	15.00	29.00	4,053.98	334.38	185.35	-332.92	0.00
4,200.00	15.00	29.00	4,150.57	357.02	197.90	-355.45	0.00
4,300.00	15.00	29.00	4,247.17	379.65	210.45	-377.99	0.00

## Plan Report for POWERS 1C-27HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,400.00	15.00	29.00	4,343.76	402.29	222.99	-400.53	0.00
4,433.38	15.00	29.00	4,376.00	409.85	227.18	-408.05	0.00
<b>Sussex</b>							
4,500.00	15.00	29.00	4,440.35	424.93	235.54	-423.07	0.00
4,600.00	15.00	29.00	4,536.94	447.57	248.09	-445.60	0.00
4,700.00	15.00	29.00	4,633.54	470.20	260.64	-468.14	0.00
4,800.00	15.00	29.00	4,730.13	492.84	273.19	-490.68	0.00
4,900.00	15.00	29.00	4,826.72	515.48	285.73	-513.22	0.00
5,000.00	15.00	29.00	4,923.31	538.11	298.28	-535.75	0.00
5,100.00	15.00	29.00	5,019.91	560.75	310.83	-558.29	0.00
5,200.00	15.00	29.00	5,116.50	583.39	323.38	-580.83	0.00
5,300.00	15.00	29.00	5,213.09	606.02	335.92	-603.37	0.00
5,400.00	15.00	29.00	5,309.68	628.66	348.47	-625.90	0.00
5,500.00	15.00	29.00	5,406.28	651.30	361.02	-648.44	0.00
5,600.00	15.00	29.00	5,502.87	673.93	373.57	-670.98	0.00
5,700.00	15.00	29.00	5,599.46	696.57	386.12	-693.52	0.00
5,800.00	15.00	29.00	5,696.05	719.21	398.66	-716.05	0.00
5,870.00	15.00	29.00	5,763.67	735.05	407.45	-731.83	0.00
<b>Begin Drop @ 5870.00ft</b>							
5,900.00	14.40	29.00	5,792.69	741.71	411.14	-738.46	2.00
6,000.00	12.40	29.00	5,889.96	761.98	422.37	-758.64	2.00
6,100.00	10.40	29.00	5,987.98	779.27	431.95	-775.85	2.00
6,200.00	8.40	29.00	6,086.63	793.55	439.87	-790.07	2.00
6,300.00	6.40	29.00	6,185.80	804.81	446.12	-801.29	2.00
6,400.00	4.40	29.00	6,285.35	813.04	450.68	-809.48	2.00
6,500.00	2.40	29.00	6,385.17	818.23	453.55	-814.64	2.00
6,600.00	0.40	29.00	6,485.13	820.37	454.74	-816.77	2.00
6,620.00	0.00	0.00	6,505.13	820.43	454.77	-816.83	2.00
<b>End Drop @ 6620.00ft</b>							
6,624.92	0.00	0.00	6,510.05	820.43	454.77	-816.83	0.00
<b>Top of 4.5" Liner @ 6624.92ft</b>							
6,700.00	0.00	0.00	6,585.13	820.43	454.77	-816.83	0.00
6,724.92	0.00	0.00	6,610.05	820.43	454.77	-816.83	0.00
<b>KOP @ 6724.92ft</b>							
6,800.00	7.51	179.55	6,684.92	815.52	454.81	-811.92	10.00
6,900.00	17.51	179.55	6,782.42	793.89	454.98	-790.29	10.00
6,939.27	21.44	179.55	6,819.44	780.80	455.08	-777.20	10.00
<b>Sharon Springs</b>							
7,000.00	27.51	179.55	6,874.68	755.66	455.28	-752.06	10.00
7,006.51	28.16	179.55	6,880.44	752.62	455.30	-749.02	10.00
<b>Niobrara Top</b>							
7,072.90	34.80	179.55	6,937.03	717.97	455.57	-714.37	10.00
<b>Niobrara B Bench</b>							
7,100.00	37.51	179.55	6,958.91	701.98	455.70	-698.38	10.00
7,167.49	44.26	179.55	7,009.91	657.84	456.04	-654.24	10.00
<b>Niobrara C Bench</b>							
7,200.00	47.51	179.55	7,032.53	634.50	456.22	-630.90	10.00
<b>DLS = 10°/100'</b>							
7,300.00	57.51	179.55	7,093.32	555.26	456.84	-551.66	10.00
7,400.00	67.51	179.55	7,139.43	466.67	457.54	-463.06	10.00
7,432.19	70.73	179.55	7,150.90	436.60	457.77	-432.99	10.00

## Plan Report for POWERS 1C-27HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
<b>Fort Hays</b>							
7,500.00	77.51	179.55	7,169.44	371.42	458.28	-367.81	10.00
7,517.13	79.22	179.55	7,172.90	354.65	458.41	-351.03	10.00
<b>Codell</b>							
7,600.00	87.51	179.55	7,182.47	272.40	459.05	-268.79	10.00
7,622.76	89.78	179.55	7,183.00	249.65	459.23	-246.03	10.00
<b>End Build @ 7622.76ft - Target Heel Location - Top of Production</b>							
7,700.00	89.78	179.55	7,183.30	172.41	459.84	-168.80	0.00
7,800.00	89.78	179.55	7,183.67	72.42	460.62	-68.80	0.00
7,900.00	89.78	179.55	7,184.05	-27.58	461.40	31.20	0.00
8,000.00	89.78	179.55	7,184.42	-127.58	462.18	131.20	0.00
8,100.00	89.78	179.55	7,184.80	-227.57	462.96	231.20	0.00
8,200.00	89.78	179.55	7,185.18	-327.57	463.74	331.20	0.00
8,300.00	89.78	179.55	7,185.55	-427.57	464.52	431.20	0.00
8,400.00	89.78	179.55	7,185.93	-527.56	465.31	531.20	0.00
8,500.00	89.78	179.55	7,186.31	-627.56	466.09	631.20	0.00
8,600.00	89.78	179.55	7,186.68	-727.55	466.87	731.20	0.00
8,700.00	89.78	179.55	7,187.06	-827.55	467.65	831.20	0.00
8,800.00	89.78	179.55	7,187.43	-927.55	468.43	931.20	0.00
8,900.00	89.78	179.55	7,187.81	-1,027.54	469.21	1,031.20	0.00
9,000.00	89.78	179.55	7,188.19	-1,127.54	469.99	1,131.20	0.00
9,100.00	89.78	179.55	7,188.56	-1,227.54	470.78	1,231.19	0.00
9,200.00	89.78	179.55	7,188.94	-1,327.53	471.56	1,331.19	0.00
9,300.00	89.78	179.55	7,189.31	-1,427.53	472.34	1,431.19	0.00
9,400.00	89.78	179.55	7,189.69	-1,527.52	473.12	1,531.19	0.00
9,500.00	89.78	179.55	7,190.07	-1,627.52	473.90	1,631.19	0.00
9,600.00	89.78	179.55	7,190.44	-1,727.52	474.68	1,731.19	0.00
9,700.00	89.78	179.55	7,190.82	-1,827.51	475.46	1,831.19	0.00
9,800.00	89.78	179.55	7,191.20	-1,927.51	476.25	1,931.19	0.00
9,900.00	89.78	179.55	7,191.57	-2,027.51	477.03	2,031.19	0.00
10,000.00	89.78	179.55	7,191.95	-2,127.50	477.81	2,131.19	0.00
10,100.00	89.78	179.55	7,192.32	-2,227.50	478.59	2,231.19	0.00
10,200.00	89.78	179.55	7,192.70	-2,327.49	479.37	2,331.19	0.00
10,300.00	89.78	179.55	7,193.08	-2,427.49	480.15	2,431.19	0.00
10,400.00	89.78	179.55	7,193.45	-2,527.49	480.93	2,531.19	0.00
10,500.00	89.78	179.55	7,193.83	-2,627.48	481.72	2,631.19	0.00
10,600.00	89.78	179.55	7,194.21	-2,727.48	482.50	2,731.18	0.00
10,700.00	89.78	179.55	7,194.58	-2,827.48	483.28	2,831.18	0.00
10,800.00	89.78	179.55	7,194.96	-2,927.47	484.06	2,931.18	0.00
10,900.00	89.78	179.55	7,195.33	-3,027.47	484.84	3,031.18	0.00
11,000.00	89.78	179.55	7,195.71	-3,127.46	485.62	3,131.18	0.00
11,100.00	89.78	179.55	7,196.09	-3,227.46	486.40	3,231.18	0.00
11,200.00	89.78	179.55	7,196.46	-3,327.46	487.19	3,331.18	0.00
11,300.00	89.78	179.55	7,196.84	-3,427.45	487.97	3,431.18	0.00
11,400.00	89.78	179.55	7,197.22	-3,527.45	488.75	3,531.18	0.00
11,500.00	89.78	179.55	7,197.59	-3,627.45	489.53	3,631.18	0.00
11,600.00	89.78	179.55	7,197.97	-3,727.44	490.31	3,731.18	0.00
11,700.00	89.78	179.55	7,198.34	-3,827.44	491.09	3,831.18	0.00
11,800.00	89.78	179.55	7,198.72	-3,927.43	491.87	3,931.18	0.00
11,900.00	89.78	179.55	7,199.10	-4,027.43	492.66	4,031.18	0.00
12,000.00	89.78	179.55	7,199.47	-4,127.43	493.44	4,131.17	0.00

## Plan Report for POWERS 1C-27HZ - Permit Rev-1

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,100.00	89.78	179.55	7,199.85	-4,227.42	494.22	4,231.17	0.00
12,200.00	89.78	179.55	7,200.23	-4,327.42	495.00	4,331.17	0.00
12,300.00	89.78	179.55	7,200.60	-4,427.42	495.78	4,431.17	0.00
12,400.00	89.78	179.55	7,200.98	-4,527.41	496.56	4,531.17	0.00
12,500.00	89.78	179.55	7,201.35	-4,627.41	497.34	4,631.17	0.00
12,600.00	89.78	179.55	7,201.73	-4,727.40	498.13	4,731.17	0.00
12,700.00	89.78	179.55	7,202.11	-4,827.40	498.91	4,831.17	0.00
12,800.00	89.78	179.55	7,202.48	-4,927.40	499.69	4,931.17	0.00
12,900.00	89.78	179.55	7,202.86	-5,027.39	500.47	5,031.17	0.00
13,000.00	89.78	179.55	7,203.24	-5,127.39	501.25	5,131.17	0.00
13,100.00	89.78	179.55	7,203.61	-5,227.38	502.03	5,231.17	0.00
13,200.00	89.78	179.55	7,203.99	-5,327.38	502.81	5,331.17	0.00
13,203.23	89.78	179.55	7,204.00	-5,330.61	502.84	5,334.40	0.00
Target Toe Location							
13,203.24	89.78	179.55	7,204.00	-5,330.62	502.84	5,334.40	0.00
TD Well @ 13203.24ft - POWERS 1C-27HZ_BHL							

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,250.00	2,250.00	0.00	0.00	Begin Nudge @ 2250.00ft
3,000.00	2,991.46	85.38	47.32	End Nudge @ 3000.00ft
5,870.00	5,763.67	735.05	407.45	Begin Drop @ 5870.00ft
6,620.00	6,505.13	820.43	454.77	End Drop @ 6620.00ft
6,624.92	6,510.05	820.43	454.77	Top of 4.5" Liner @ 6624.92ft
6,724.92	6,610.05	820.43	454.77	KOP @ 6724.92ft
7,200.00	7,032.53	634.50	456.22	DLS = 10°/100'
7,622.76	7,183.00	249.65	459.23	End Build @ 7622.76ft
13,203.24	7,204.00	-5,330.62	502.84	TD Well @ 13203.24ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
User	No Target (Freehand)	179.55	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	7,622.76	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1
7,622.76	13,203.24	Permit Rev-1	APC_ISCWSA REV 2 MWD+IFR1

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,362.00	1,362.00	9 5/8"	9-5/8	13-1/2
7,622.76	7,183.00	Top of Production	5-1/2	7-7/8

## Plan Report for POWERS 1C-27HZ - Permit Rev-1

**Formation Details**

Measured Depth (usft)	Vertical Depth (usft)	TVDSS (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,433.38	4,376.00	-535.00	Sussex		0.00	
6,939.27	6,819.44	1,908.44	Sharon Springs		0.00	
7,006.51	6,880.44	1,969.44	Niobrara Top		0.00	
7,072.90	6,937.03	2,026.03	Niobrara B Bench		0.00	
7,167.49	7,009.91	2,098.91	Niobrara C Bench		0.00	
7,432.19	7,150.90	2,239.90	Fort Hays		0.00	
7,517.13	7,172.90	2,261.90	Codell		0.00	
7,622.76	7,183.00	2,272.00	Target Heel Location		0.00	
13,203.23	7,204.00	2,293.00	Target Toe Location		0.00	

**Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
2N-R65W-Sec. 22_Ser - plan misses target center by 119.91usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Polygon	0.00	0.00	0.00	0.00	-119.91	14,574,462.83	1,739,503.03	40.130530	-104.645509
POWERS 1C-27HZ_B - plan hits target center - Point	0.00	0.00	7,204.00	-5,330.62	502.84	14,569,134.73	1,740,147.06	40.115892	-104.643281
POWERS 1C-27HZ_S - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	14,574,463.30	1,739,622.94	40.130530	-104.645080

**North Reference Sheet for 2N-65W-22 Powers 2-22 - POWERS 1C-27HZ - 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' @ 4911.00usft (D Rig). Northing and Easting are relative to POWERS 1C-27Z

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 -105.000000°, Longitude Origin:0.000000°, Latitude Origin:0.000000°

False Easting: 1,640,416.67usft, False Northing: 0.00usft, Scale Reduction: 0.99961126

Grid Coordinates of Well: 14,574,463.30 usft N, 1,739,622.94 usft E

Geographical Coordinates of Well: 40° 07' 49.91" N, 104° 38' 42.29" W

Grid Convergence at Surface is: 0.23°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,203.24usft  
the Bottom Hole Displacement is 5,354.28usft in the Direction of 174.61° (True).

Magnetic Convergence at surface is: -8.07° (12 January 2015, , IGRF2010)

