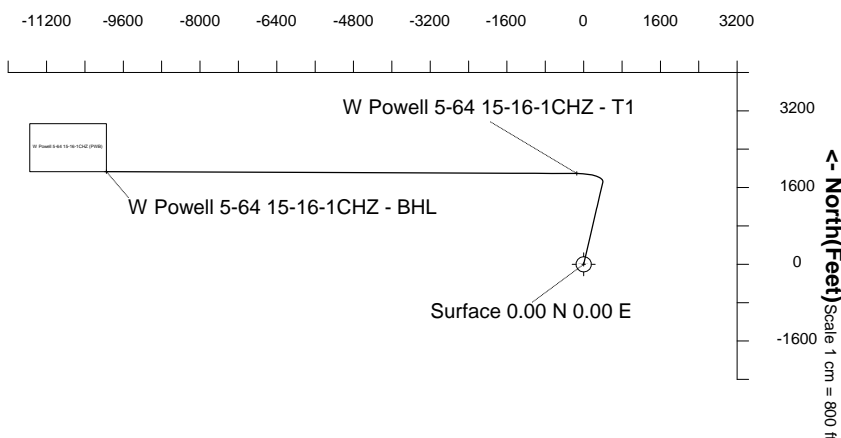


Highlands Natural Resources

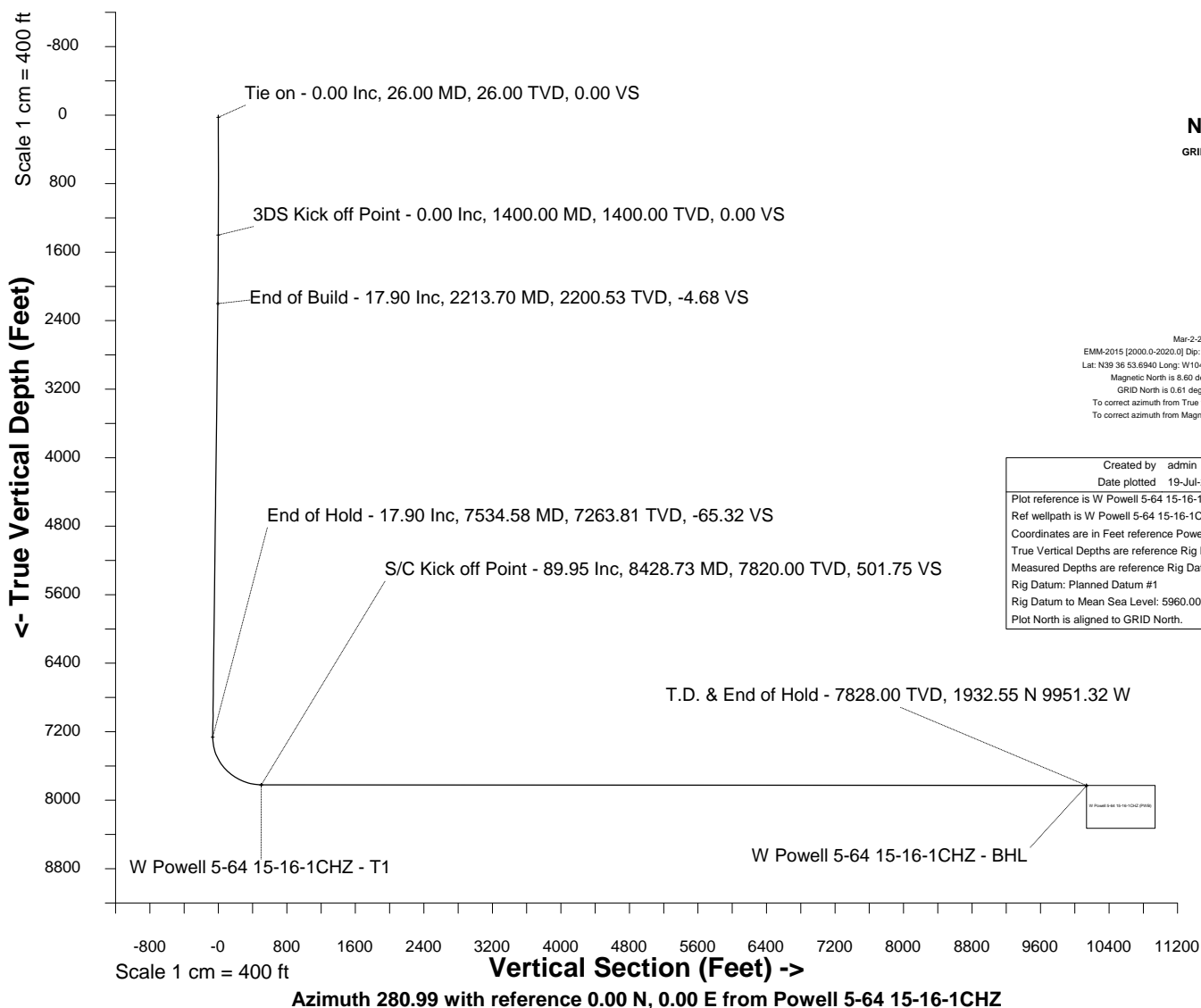
Location	DJ Basin Southern Extension	Slot	Powell 5-64 15-16-1CHZ
Field	DJ Basin Southern Extension	Well	W Powell 5-64 15-16-1CHZ
Installation	HNR Arapahoe County Pad Updated 7-14-2017_AJS	Wellbore	W Powell 5-64 15-16-1CHZ (PWB)

Scale 1 cm = 800 ft **East (Feet) ->**



WELL PROFILE DATA

Point	MD	Inc	Azi	TVD	North	East	deg/100ft	V. Sect
Tie on	26.00	0.00	0.00	26.00	S 0.00	W 0.00		0.00
KOP	1400.00	0.00	13.12	1400.00	S 0.00	W 0.00	0.00	0.00
End of Build	2213.70	17.90	13.12	2200.53	N 122.80	E 28.61	2.20	-4.68
End of Hold	7534.58	17.90	13.12	7263.81	N 1715.67	E 399.73	0.00	-65.32
Target W Powe...Z - T1	8428.73	89.95	270.23	7820.00	N 1892.86	W 143.53	10.50	501.75
T.D. & Target W P...BHL	18236.61	89.95	270.23	7828.00	N 1932.55	W 9951.32	0.00	10137.24





SYSDRILL
Well Design Combined Report
Wellbore: W Powell 5-64 15-16-1CHZ (PWB)



Wellhead Details							
Name	Latitude	Longitude	Northing	Easting	North	East	Slot Elevation Above Ground
Powell 5-64 15-16-1CHZ	N39 36 53.6937	W104 31 51.5661	1650317.0768	3272987.7275	0.03S	0.12E	0.00

Declination		
Date	Source	Time
Mar-2-2017	EMM-2015 [2000.0-2020.0]	14:57

Installation Details						
Name	Installation Position (Latitude)	Installation Position (Longitude)	Northing	Easting	Coord System Name	North Alignment
HNR Arapahoe County Pad Updated 7-14-2017_AJS	N39 36 53.6940	W104 31 51.5676	1650317.1047	3272987.6089	CO83-CF on NORTH AMERICAN DATUM 1983 datum	Grid

Summary Wellpath									
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	Northing	Easting
26.00	0.00	0.000	26.00	0.00N	0.00E		0.00	1650317.08	3272987.73
1400.00	0.00	13.120	1400.00	0.00N	0.00E	==>	0.00	1650317.08	3272987.73
2213.70	17.90	13.120	2200.53	122.80N	28.61E	2.20	-4.68	1650439.87	3273016.34
7534.58	17.90	13.120	7263.81	1715.67N	399.73E	==>	-65.32	1652032.70	3273387.44
8428.73	89.95	270.230	7820.00	1892.86N	143.53W	10.50	501.75	1652209.89	3272844.20
18236.61	89.95	270.230	7828.00	1932.55N	9951.32W	==>	10137.24	1652249.58	3263036.66

Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
0.00	0.00	0.000	0.00	0.00N	0.00E		0.00	Rig Datum
26.00	0.00	0.000	26.00	0.00N	0.00E	==>	0.00	Slot Datum
100.00	0.00	0.000	100.00	0.00N	0.00E	==>	0.00	
200.00	0.00	0.000	200.00	0.00N	0.00E	==>	0.00	
300.00	0.00	0.000	300.00	0.00N	0.00E	==>	0.00	
400.00	0.00	0.000	400.00	0.00N	0.00E	==>	0.00	
500.00	0.00	0.000	500.00	0.00N	0.00E	==>	0.00	
600.00	0.00	0.000	600.00	0.00N	0.00E	==>	0.00	
700.00	0.00	0.000	700.00	0.00N	0.00E	==>	0.00	
800.00	0.00	0.000	800.00	0.00N	0.00E	==>	0.00	
900.00	0.00	0.000	900.00	0.00N	0.00E	==>	0.00	
1000.00	0.00	0.000	1000.00	0.00N	0.00E	==>	0.00	
1100.00	0.00	0.000	1100.00	0.00N	0.00E	==>	0.00	
1200.00	0.00	0.000	1200.00	0.00N	0.00E	==>	0.00	
1300.00	0.00	0.000	1300.00	0.00N	0.00E	==>	0.00	
1400.00	0.00	13.120	1400.00	0.00N	0.00E	==>	0.00	
1500.00	2.20	13.120	1499.98	1.87N	0.44E	2.20	-0.07	
1600.00	4.40	13.120	1599.80	7.48N	1.74E	2.20	-0.28	
1700.00	6.60	13.120	1699.34	16.81N	3.92E	2.20	-0.64	
1800.00	8.80	13.120	1798.43	29.86N	6.96E	2.20	-1.14	
1900.00	11.00	13.120	1896.93	46.60N	10.86E	2.20	-1.77	
2000.00	13.20	13.120	1994.71	67.02N	15.61E	2.20	-2.55	
2100.00	15.40	13.120	2091.60	91.07N	21.22E	2.20	-3.47	
2200.00	17.60	13.120	2187.48	118.73N	27.66E	2.20	-4.52	
2300.00	17.90	13.120	2282.65	148.63N	34.63E	==>	-5.66	
2400.00	17.90	13.120	2377.81	178.57N	41.60E	==>	-6.80	
2500.00	17.90	13.120	2472.97	208.50N	48.58E	==>	-7.94	
2600.00	17.90	13.120	2568.12	238.44N	55.55E	==>	-9.08	
2700.00	17.90	13.120	2663.28	268.38N	62.53E	==>	-10.22	
2800.00	17.90	13.120	2758.44	298.31N	69.50E	==>	-11.36	
2900.00	17.90	13.120	2853.60	328.25N	76.48E	==>	-12.50	
3000.00	17.90	13.120	2948.76	358.19N	83.45E	==>	-13.64	

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Coordinates are from Slot MD's are from Rig and TVD's are from Rig (Planned Datum #1 5960.0ft above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 280.990 degrees
Bottom hole distance is 10137.24 Feet on azimuth 280.99 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Integrated Petroleum Technologies, Inc.
Date Printed: 19-Jul-2017



SYSDRILL
Well Design Combined Report
Wellbore: W Powell 5-64 15-16-1CHZ (PWB)



Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
3100.00	17.90	13.120	3043.92	388.12N	90.43E	==>	-14.78	
3200.00	17.90	13.120	3139.08	418.06N	97.40E	==>	-15.92	
3300.00	17.90	13.120	3234.23	447.99N	104.38E	==>	-17.06	
3400.00	17.90	13.120	3329.39	477.93N	111.35E	==>	-18.20	
3500.00	17.90	13.120	3424.55	507.87N	118.33E	==>	-19.34	
3600.00	17.90	13.120	3519.71	537.80N	125.30E	==>	-20.48	
3700.00	17.90	13.120	3614.87	567.74N	132.27E	==>	-21.62	
3800.00	17.90	13.120	3710.03	597.68N	139.25E	==>	-22.76	
3900.00	17.90	13.120	3805.19	627.61N	146.22E	==>	-23.90	
4000.00	17.90	13.120	3900.34	657.55N	153.20E	==>	-25.03	
4100.00	17.90	13.120	3995.50	687.48N	160.17E	==>	-26.17	
4200.00	17.90	13.120	4090.66	717.42N	167.15E	==>	-27.31	
4300.00	17.90	13.120	4185.82	747.36N	174.12E	==>	-28.45	
4400.00	17.90	13.120	4280.98	777.29N	181.10E	==>	-29.59	
4500.00	17.90	13.120	4376.14	807.23N	188.07E	==>	-30.73	
4600.00	17.90	13.120	4471.30	837.17N	195.05E	==>	-31.87	
4700.00	17.90	13.120	4566.46	867.10N	202.02E	==>	-33.01	
4800.00	17.90	13.120	4661.61	897.04N	209.00E	==>	-34.15	
4900.00	17.90	13.120	4756.77	926.98N	215.97E	==>	-35.29	
5000.00	17.90	13.120	4851.93	956.91N	222.95E	==>	-36.43	
5100.00	17.90	13.120	4947.09	986.85N	229.92E	==>	-37.57	
5200.00	17.90	13.120	5042.25	1016.78N	236.90E	==>	-38.71	
5300.00	17.90	13.120	5137.41	1046.72N	243.87E	==>	-39.85	
5400.00	17.90	13.120	5232.57	1076.66N	250.85E	==>	-40.99	
5500.00	17.90	13.120	5327.72	1106.59N	257.82E	==>	-42.13	
5600.00	17.90	13.120	5422.88	1136.53N	264.79E	==>	-43.27	
5700.00	17.90	13.120	5518.04	1166.47N	271.77E	==>	-44.41	
5800.00	17.90	13.120	5613.20	1196.40N	278.74E	==>	-45.55	
5900.00	17.90	13.120	5708.36	1226.34N	285.72E	==>	-46.69	
6000.00	17.90	13.120	5803.52	1256.27N	292.69E	==>	-47.83	
6100.00	17.90	13.120	5898.68	1286.21N	299.67E	==>	-48.97	
6200.00	17.90	13.120	5993.84	1316.15N	306.64E	==>	-50.11	
6300.00	17.90	13.120	6088.99	1346.08N	313.62E	==>	-51.25	
6400.00	17.90	13.120	6184.15	1376.02N	320.59E	==>	-52.39	
6500.00	17.90	13.120	6279.31	1405.96N	327.57E	==>	-53.53	
6600.00	17.90	13.120	6374.47	1435.89N	334.54E	==>	-54.67	
6700.00	17.90	13.120	6469.63	1465.83N	341.52E	==>	-55.81	
6800.00	17.90	13.120	6564.79	1495.77N	348.49E	==>	-56.95	
6900.00	17.90	13.120	6659.95	1525.70N	355.47E	==>	-58.09	
7000.00	17.90	13.120	6755.10	1555.64N	362.44E	==>	-59.23	
7100.00	17.90	13.120	6850.26	1585.57N	369.42E	==>	-60.37	
7200.00	17.90	13.120	6945.42	1615.51N	376.39E	==>	-61.51	
7300.00	17.90	13.120	7040.58	1645.45N	383.36E	==>	-62.65	
7400.00	17.90	13.120	7135.74	1675.38N	390.34E	==>	-63.79	
7500.00	17.90	13.120	7230.90	1705.32N	397.31E	==>	-64.93	
7600.00	17.71	350.530	7326.16	1735.30N	400.37E	10.50	-62.21	
7700.00	21.92	321.720	7420.44	1765.04N	386.27E	10.50	-42.70	
7800.00	29.33	304.300	7510.67	1793.58N	354.38E	10.50	-5.96	
7900.00	38.12	293.870	7593.83	1819.94N	305.79E	10.50	46.77	
8000.00	47.53	286.970	7667.13	1843.27N	242.11E	10.50	113.73	
8100.00	57.24	281.910	7728.12	1862.76N	165.48E	10.50	192.67	
8200.00	67.11	277.860	7774.76	1877.77N	78.46E	10.50	280.95	
8300.00	77.07	274.360	7805.48	1887.81N	16.02W	10.50	375.62	
8400.00	87.08	271.140	7819.26	1892.52N	114.82W	10.50	473.50	
8500.00	89.95	270.230	7820.06	1893.15N	214.80W	==>	571.77	
8600.00	89.95	270.230	7820.14	1893.55N	314.80W	==>	670.01	
8700.00	89.95	270.230	7820.22	1893.96N	414.80W	==>	768.25	
8800.00	89.95	270.230	7820.30	1894.36N	514.80W	==>	866.50	
8900.00	89.95	270.230	7820.38	1894.77N	614.80W	==>	964.74	

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Coordinates are from Slot MD's are from Rig and TVD's are from Rig (Planned Datum #1 5960.0ft above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 280.990 degrees
Bottom hole distance is 10137.24 Feet on azimuth 280.99 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Integrated Petroleum Technologies, Inc.
Date Printed: 19-Jul-2017



SYSDRILL
Well Design Combined Report
Wellbore: W Powell 5-64 15-16-1CHZ (PWB)



Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
9000.00	89.95	270.230	7820.47	1895.17N	714.80W	==>	1062.98	
9100.00	89.95	270.230	7820.55	1895.58N	814.79W	==>	1161.22	
9200.00	89.95	270.230	7820.63	1895.98N	914.79W	==>	1259.46	
9300.00	89.95	270.230	7820.71	1896.39N	1014.79W	==>	1357.71	
9400.00	89.95	270.230	7820.79	1896.79N	1114.79W	==>	1455.95	
9500.00	89.95	270.230	7820.87	1897.20N	1214.79W	==>	1554.19	
9600.00	89.95	270.230	7820.96	1897.60N	1314.79W	==>	1652.43	
9700.00	89.95	270.230	7821.04	1898.01N	1414.79W	==>	1750.68	
9800.00	89.95	270.230	7821.12	1898.41N	1514.79W	==>	1848.92	
9900.00	89.95	270.230	7821.20	1898.81N	1614.79W	==>	1947.16	
10000.00	89.95	270.230	7821.28	1899.22N	1714.79W	==>	2045.40	
10100.00	89.95	270.230	7821.36	1899.62N	1814.79W	==>	2143.65	
10200.00	89.95	270.230	7821.44	1900.03N	1914.78W	==>	2241.89	
10300.00	89.95	270.230	7821.53	1900.43N	2014.78W	==>	2340.13	
10400.00	89.95	270.230	7821.61	1900.84N	2114.78W	==>	2438.37	
10500.00	89.95	270.230	7821.69	1901.24N	2214.78W	==>	2536.61	
10600.00	89.95	270.230	7821.77	1901.65N	2314.78W	==>	2634.86	
10700.00	89.95	270.230	7821.85	1902.05N	2414.78W	==>	2733.10	
10800.00	89.95	270.230	7821.93	1902.46N	2514.78W	==>	2831.34	
10900.00	89.95	270.230	7822.02	1902.86N	2614.78W	==>	2929.58	
11000.00	89.95	270.230	7822.10	1903.27N	2714.78W	==>	3027.83	
11100.00	89.95	270.230	7822.18	1903.67N	2814.78W	==>	3126.07	
11200.00	89.95	270.230	7822.26	1904.08N	2914.78W	==>	3224.31	
11300.00	89.95	270.230	7822.34	1904.48N	3014.78W	==>	3322.55	
11400.00	89.95	270.230	7822.42	1904.89N	3114.77W	==>	3420.80	
11500.00	89.95	270.230	7822.51	1905.29N	3214.77W	==>	3519.04	
11600.00	89.95	270.230	7822.59	1905.69N	3314.77W	==>	3617.28	
11700.00	89.95	270.230	7822.67	1906.10N	3414.77W	==>	3715.52	
11800.00	89.95	270.230	7822.75	1906.50N	3514.77W	==>	3813.77	
11900.00	89.95	270.230	7822.83	1906.91N	3614.77W	==>	3912.01	
12000.00	89.95	270.230	7822.91	1907.31N	3714.77W	==>	4010.25	
12100.00	89.95	270.230	7822.99	1907.72N	3814.77W	==>	4108.49	
12200.00	89.95	270.230	7823.08	1908.12N	3914.77W	==>	4206.73	
12300.00	89.95	270.230	7823.16	1908.53N	4014.77W	==>	4304.98	
12400.00	89.95	270.230	7823.24	1908.93N	4114.77W	==>	4403.22	
12500.00	89.95	270.230	7823.32	1909.34N	4214.77W	==>	4501.46	
12600.00	89.95	270.230	7823.40	1909.74N	4314.76W	==>	4599.70	
12700.00	89.95	270.230	7823.48	1910.15N	4414.76W	==>	4697.95	
12800.00	89.95	270.230	7823.57	1910.55N	4514.76W	==>	4796.19	
12900.00	89.95	270.230	7823.65	1910.96N	4614.76W	==>	4894.43	
13000.00	89.95	270.230	7823.73	1911.36N	4714.76W	==>	4992.67	
13100.00	89.95	270.230	7823.81	1911.77N	4814.76W	==>	5090.92	
13200.00	89.95	270.230	7823.89	1912.17N	4914.76W	==>	5189.16	
13300.00	89.95	270.230	7823.97	1912.57N	5014.76W	==>	5287.40	
13400.00	89.95	270.230	7824.05	1912.98N	5114.76W	==>	5385.64	
13500.00	89.95	270.230	7824.14	1913.38N	5214.76W	==>	5483.88	
13600.00	89.95	270.230	7824.22	1913.79N	5314.76W	==>	5582.13	
13700.00	89.95	270.230	7824.30	1914.19N	5414.76W	==>	5680.37	
13800.00	89.95	270.230	7824.38	1914.60N	5514.75W	==>	5778.61	
13900.00	89.95	270.230	7824.46	1915.00N	5614.75W	==>	5876.85	
14000.00	89.95	270.230	7824.54	1915.41N	5714.75W	==>	5975.10	
14100.00	89.95	270.230	7824.63	1915.81N	5814.75W	==>	6073.34	
14200.00	89.95	270.230	7824.71	1916.22N	5914.75W	==>	6171.58	
14300.00	89.95	270.230	7824.79	1916.62N	6014.75W	==>	6269.82	
14400.00	89.95	270.230	7824.87	1917.03N	6114.75W	==>	6368.07	
14500.00	89.95	270.230	7824.95	1917.43N	6214.75W	==>	6466.31	
14600.00	89.95	270.230	7825.03	1917.84N	6314.75W	==>	6564.55	
14700.00	89.95	270.230	7825.12	1918.24N	6414.75W	==>	6662.79	
14800.00	89.95	270.230	7825.20	1918.64N	6514.75W	==>	6761.04	

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Vertical Section is from 0.00N 0.00E on azimuth 280.990 degrees
Bottom hole distance is 10137.24 Feet on azimuth 280.99 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Integrated Petroleum Technologies, Inc.
Date Printed: 19-Jul-2017



SYS DRILL
Well Design Combined Report
Wellbore: W Powell 5-64 15-16-1CHZ (PWB)



Interpolated Wellpath								
MD[ft]	Inc[deg]	Azi[deg]	TVD[ft]	North[ft]	East[ft]	Dogleg [deg/100ft]	Vertical Section[ft]	All Station Comments
14900.00	89.95	270.230	7825.28	1919.05N	6614.74W	==>	6859.28	
15000.00	89.95	270.230	7825.36	1919.45N	6714.74W	==>	6957.52	
15100.00	89.95	270.230	7825.44	1919.86N	6814.74W	==>	7055.76	
15200.00	89.95	270.230	7825.52	1920.26N	6914.74W	==>	7154.00	
15300.00	89.95	270.230	7825.60	1920.67N	7014.74W	==>	7252.25	
15400.00	89.95	270.230	7825.69	1921.07N	7114.74W	==>	7350.49	
15500.00	89.95	270.230	7825.77	1921.48N	7214.74W	==>	7448.73	
15600.00	89.95	270.230	7825.85	1921.88N	7314.74W	==>	7546.97	
15700.00	89.95	270.230	7825.93	1922.29N	7414.74W	==>	7645.22	
15800.00	89.95	270.230	7826.01	1922.69N	7514.74W	==>	7743.46	
15900.00	89.95	270.230	7826.09	1923.10N	7614.74W	==>	7841.70	
16000.00	89.95	270.230	7826.18	1923.50N	7714.74W	==>	7939.94	
16100.00	89.95	270.230	7826.26	1923.91N	7814.73W	==>	8038.19	
16200.00	89.95	270.230	7826.34	1924.31N	7914.73W	==>	8136.43	
16300.00	89.95	270.230	7826.42	1924.72N	8014.73W	==>	8234.67	
16400.00	89.95	270.230	7826.50	1925.12N	8114.73W	==>	8332.91	
16500.00	89.95	270.230	7826.58	1925.52N	8214.73W	==>	8431.15	
16600.00	89.95	270.230	7826.67	1925.93N	8314.73W	==>	8529.40	
16700.00	89.95	270.230	7826.75	1926.33N	8414.73W	==>	8627.64	
16800.00	89.95	270.230	7826.83	1926.74N	8514.73W	==>	8725.88	
16900.00	89.95	270.230	7826.91	1927.14N	8614.73W	==>	8824.12	
17000.00	89.95	270.230	7826.99	1927.55N	8714.73W	==>	8922.37	
17100.00	89.95	270.230	7827.07	1927.95N	8814.73W	==>	9020.61	
17200.00	89.95	270.230	7827.15	1928.36N	8914.73W	==>	9118.85	
17300.00	89.95	270.230	7827.24	1928.76N	9014.72W	==>	9217.09	
17400.00	89.95	270.230	7827.32	1929.17N	9114.72W	==>	9315.34	
17500.00	89.95	270.230	7827.40	1929.57N	9214.72W	==>	9413.58	
17600.00	89.95	270.230	7827.48	1929.98N	9314.72W	==>	9511.82	
17700.00	89.95	270.230	7827.56	1930.38N	9414.72W	==>	9610.06	
17800.00	89.95	270.230	7827.64	1930.79N	9514.72W	==>	9708.31	
17900.00	89.95	270.230	7827.73	1931.19N	9614.72W	==>	9806.55	
18000.00	89.95	270.230	7827.81	1931.60N	9714.72W	==>	9904.79	
18100.00	89.95	270.230	7827.89	1932.00N	9814.72W	==>	10003.03	
18200.00	89.95	270.230	7827.97	1932.40N	9914.72W	==>	10101.27	
18236.61	89.95	270.230	7828.00	1932.55N	9951.32W	==>	10137.24	

All data is in Feet unless otherwise stated
Coordinates are from Slot MD's are from Rig and TVD's are from Rig (Planned Datum #1 5960.0ft above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 280.990 degrees
Bottom hole distance is 10137.24 Feet on azimuth 280.99 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Integrated Petroleum Technologies, Inc.
Date Printed: 19-Jul-2017



SYSDRILL
Well Design Combined Report
Wellbore: W Powell 5-64 15-16-1CHZ (PWB)



Targets							
Name	North[ft]	East[ft]	TVD[ft]	Latitude	Longitude	Northing	Easting
W Powell 5-64 15-16-1CHZ - BHL	1932.55N	9951.32W	7828.00	N39 37 13.8220	W104 33 58.4650	1652249.58	3263036.66
W Powell 5-64 15-16-1CHZ - T1	1892.86N	143.53W	7820.00	N39 37 12.4149	W104 31 53.1421	1652209.89	3272844.20

Survey Tool Program					
Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
564272	Planned	1500.00	1499.98	WdW Rate Gyro	Standard
564271	Planned	18236.61	7828.00	ISCWSA MWD	Rev 4 + SAG + FLT

Notes