

Highlands Natural Resources

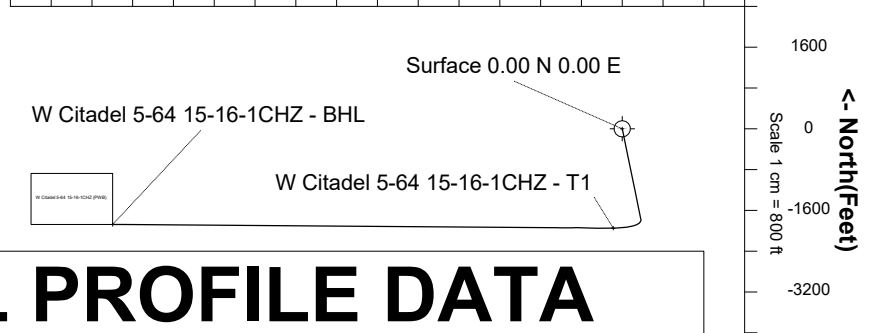
Location	DJ Basin Southern Extension	Slot	Citadel 5-64 15-16-1CHZ
Field	DJ Basin Southern Extension	Well	W Citadel 5-64 15-16-1CHZ
Installation	HNR Arapahoe County Pad Updated 04.13.18 JFalls	Wellbore	W Citadel 5-64 15-16-1CHZ (PWB)

N

GRID

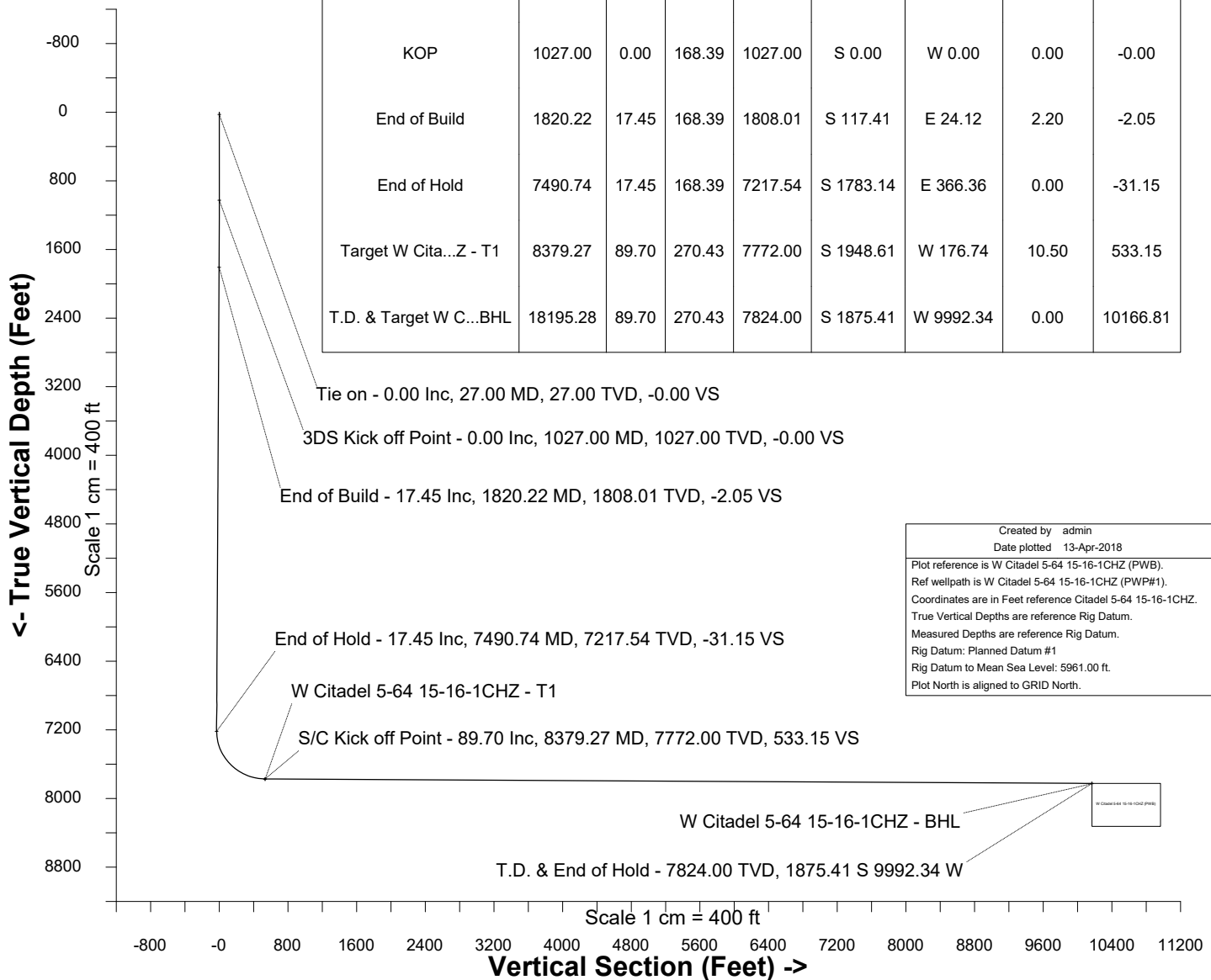
East (Feet) ->

-11200 -9600 -8000 -6400 -4800 -3200 -1600 0 1600
Scale 1 cm = 800 ft



WELL PROFILE DATA

Point	MD	Inc	Azi	TVD	North	East	deg/100ft	V. Sect
Tie on	27.00	0.00	0.00	27.00	S 0.00	W 0.00		-0.00
KOP	1027.00	0.00	168.39	1027.00	S 0.00	W 0.00	0.00	-0.00
End of Build	1820.22	17.45	168.39	1808.01	S 117.41	E 24.12	2.20	-2.05
End of Hold	7490.74	17.45	168.39	7217.54	S 1783.14	E 366.36	0.00	-31.15
Target W Cita...Z - T1	8379.27	89.70	270.43	7772.00	S 1948.61	W 176.74	10.50	533.15
T.D. & Target W C...BHL	18195.28	89.70	270.43	7824.00	S 1875.41	W 9992.34	0.00	10166.81



Created by admin
Date plotted 13-Apr-2018
Plot reference is W Citadel 5-64 15-16-1CHZ (PWB).
Ref wellpath is W Citadel 5-64 15-16-1CHZ (PWP#1).
Coordinates are in Feet reference Citadel 5-64 15-16-1CHZ.
True Vertical Depths are reference Rig Datum.
Measured Depths are reference Rig Datum.
Rig Datum: Planned Datum #1
Rig Datum to Mean Sea Level: 5961.00 ft.
Plot North is aligned to GRID North.

Azimuth 259.37 with reference 0.00 N, 0.00 E from Citadel 5-64 15-16-1CHZ



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



Wellhead Details

Name	Latitude	Longitude	Northing	Easting	North	East	Slot Elevation Above Ground
Citadel 5-64 15-16-1CHZ	39.61453100	-104.53100000	1650177.2124	3272986.5655	139.90S	1.04W	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 04.13.18 JFalls	39.61491500	-104.53099100	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
27.00	0.00	0.000	27.00	0.00N	0.00E		0.00	1650177.21	3272986.57
1027.00	0.00	168.390	1027.00	0.00N	0.00E	==>	0.00	1650177.21	3272986.57
1820.22	17.45	168.390	1808.01	117.41S	24.12E	2.20	-2.05	1650059.80	3273010.69
7490.74	17.45	168.390	7217.54	1783.14S	366.36E	==>	-31.15	1648394.12	3273352.91
8379.27	89.70	270.430	7772.00	1948.61S	176.74W	10.50	533.15	1648228.65	3272809.83
18195.28	89.70	270.430	7824.00	1875.41S	9992.34W	==>	10166.81	1648301.85	3262994.48

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
27.00	0.00	0.000	27.00	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	1.61	168.390	1099.99	1.00S	0.21E	2.20	-0.02	
1200.00	3.81	168.390	1199.87	5.63S	1.16E	2.20	-0.10	
1300.00	6.01	168.390	1299.50	14.00S	2.88E	2.20	-0.24	
1400.00	8.21	168.390	1398.73	26.12S	5.37E	2.20	-0.46	
1500.00	10.41	168.390	1497.40	41.96S	8.62E	2.20	-0.73	
1501.00	10.43	168.390	1498.39	42.14S	8.66E	2.20	-0.74	
1601.00	12.63	168.390	1596.36	61.71S	12.68E	2.20	-1.08	
1701.00	14.83	168.390	1693.50	84.95S	17.45E	2.20	-1.48	
1801.00	17.03	168.390	1789.66	111.83S	22.98E	2.20	-1.95	
1901.00	17.45	168.390	1885.07	141.14S	29.00E	==>	-2.47	
2001.00	17.45	168.390	1980.47	170.52S	35.03E	==>	-2.98	
2101.00	17.45	168.390	2075.87	199.89S	41.07E	==>	-3.49	
2201.00	17.45	168.390	2171.27	229.27S	47.10E	==>	-4.00	
2301.00	17.45	168.390	2266.66	258.64S	53.14E	==>	-4.52	
2401.00	17.45	168.390	2362.06	288.02S	59.18E	==>	-5.03	
2501.00	17.45	168.390	2457.46	317.39S	65.21E	==>	-5.54	
2601.00	17.45	168.390	2552.86	346.77S	71.25E	==>	-6.06	
2701.00	17.45	168.390	2648.25	376.14S	77.28E	==>	-6.57	
2801.00	17.45	168.390	2743.65	405.52S	83.32E	==>	-7.08	
2901.00	17.45	168.390	2839.05	434.89S	89.35E	==>	-7.60	

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Coordinates are from Slot MD's are from Rig and TVD's are from Rig (Planned Datum #1 5961.0ft above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 259.370 degrees
Bottom hole distance is 10166.81 Feet on azimuth 259.37 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Microsoft
Date Printed: 15-Apr-2018



SYS DRILL
Well Design Combined Report
Wellbore: W Citadel 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
3001.00	17.45	168.390	2934.45	464.27S	95.39E	==>	-8.11	
3101.00	17.45	168.390	3029.84	493.64S	101.42E	==>	-8.62	
3201.00	17.45	168.390	3125.24	523.02S	107.46E	==>	-9.14	
3301.00	17.45	168.390	3220.64	552.39S	113.49E	==>	-9.65	
3401.00	17.45	168.390	3316.04	581.77S	119.53E	==>	-10.16	
3501.00	17.45	168.390	3411.43	611.15S	125.56E	==>	-10.67	
3601.00	17.45	168.390	3506.83	640.52S	131.60E	==>	-11.19	
3701.00	17.45	168.390	3602.23	669.90S	137.63E	==>	-11.70	
3801.00	17.45	168.390	3697.63	699.27S	143.67E	==>	-12.21	
3901.00	17.45	168.390	3793.02	728.65S	149.70E	==>	-12.73	
4001.00	17.45	168.390	3888.42	758.02S	155.74E	==>	-13.24	
4101.00	17.45	168.390	3983.82	787.40S	161.78E	==>	-13.75	
4201.00	17.45	168.390	4079.22	816.77S	167.81E	==>	-14.27	
4301.00	17.45	168.390	4174.61	846.15S	173.85E	==>	-14.78	
4401.00	17.45	168.390	4270.01	875.52S	179.88E	==>	-15.29	
4501.00	17.45	168.390	4365.41	904.90S	185.92E	==>	-15.81	
4601.00	17.45	168.390	4460.81	934.27S	191.95E	==>	-16.32	
4701.00	17.45	168.390	4556.20	963.65S	197.99E	==>	-16.83	
4801.00	17.45	168.390	4651.60	993.02S	204.02E	==>	-17.34	
4901.00	17.45	168.390	4747.00	1022.40S	210.06E	==>	-17.86	
5001.00	17.45	168.390	4842.40	1051.77S	216.09E	==>	-18.37	
5101.00	17.45	168.390	4937.79	1081.15S	222.13E	==>	-18.88	
5201.00	17.45	168.390	5033.19	1110.52S	228.16E	==>	-19.40	
5301.00	17.45	168.390	5128.59	1139.90S	234.20E	==>	-19.91	
5401.00	17.45	168.390	5223.99	1169.27S	240.23E	==>	-20.42	
5501.00	17.45	168.390	5319.38	1198.65S	246.27E	==>	-20.94	
5601.00	17.45	168.390	5414.78	1228.02S	252.30E	==>	-21.45	
5701.00	17.45	168.390	5510.18	1257.40S	258.34E	==>	-21.96	
5801.00	17.45	168.390	5605.58	1286.77S	264.38E	==>	-22.48	
5901.00	17.45	168.390	5700.97	1316.15S	270.41E	==>	-22.99	
6001.00	17.45	168.390	5796.37	1345.52S	276.45E	==>	-23.50	
6101.00	17.45	168.390	5891.77	1374.90S	282.48E	==>	-24.01	
6201.00	17.45	168.390	5987.17	1404.27S	288.52E	==>	-24.53	
6301.00	17.45	168.390	6082.56	1433.65S	294.55E	==>	-25.04	
6401.00	17.45	168.390	6177.96	1463.02S	300.59E	==>	-25.55	
6501.00	17.45	168.390	6273.36	1492.40S	306.62E	==>	-26.07	
6601.00	17.45	168.390	6368.76	1521.77S	312.66E	==>	-26.58	
6701.00	17.45	168.390	6464.15	1551.15S	318.69E	==>	-27.09	
6801.00	17.45	168.390	6559.55	1580.52S	324.73E	==>	-27.61	
6901.00	17.45	168.390	6654.95	1609.90S	330.76E	==>	-28.12	
7001.00	17.45	168.390	6750.35	1639.27S	336.80E	==>	-28.63	
7101.00	17.45	168.390	6845.74	1668.65S	342.83E	==>	-29.15	
7201.00	17.45	168.390	6941.14	1698.02S	348.87E	==>	-29.66	
7301.00	17.45	168.390	7036.54	1727.40S	354.90E	==>	-30.17	
7401.00	17.45	168.390	7131.94	1756.78S	360.94E	==>	-30.68	
7501.00	17.27	171.950	7227.34	1786.15S	366.88E	10.50	-31.10	
7601.00	18.80	205.990	7322.69	1815.41S	361.88E	10.50	-20.80	
7701.00	24.95	229.180	7415.61	1843.76S	338.80E	10.50	7.12	
7801.00	33.25	242.560	7503.00	1870.25S	298.39E	10.50	51.72	
7901.00	42.44	250.880	7581.94	1894.00S	242.02E	10.50	111.50	
8001.00	52.06	256.660	7649.77	1914.21S	171.58E	10.50	184.47	
8101.00	61.89	261.070	7704.23	1930.20S	89.41E	10.50	268.17	
8201.00	71.83	264.730	7743.49	1941.44S	1.71W	10.50	359.81	
8301.00	81.84	268.000	7766.23	1947.55S	98.76W	10.50	456.31	
8401.00	89.70	270.430	7772.12	1948.45S	198.47W	==>	554.48	
8501.00	89.70	270.430	7772.64	1947.70S	298.46W	==>	652.62	
8601.00	89.70	270.430	7773.17	1946.96S	398.46W	==>	750.77	
8701.00	89.70	270.430	7773.70	1946.21S	498.46W	==>	848.91	
8801.00	89.70	270.430	7774.23	1945.47S	598.45W	==>	947.05	

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Bottom hole distance is 10166.81 Feet on azimuth 259.37 degrees from Wellhead
Calculation method uses Minimum Curvature method
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Well Design Combined Report
Wellbore: W Citadel 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
8901.00	89.70	270.430	7774.76	1944.72S	698.45W	==>	1045.19	
9001.00	89.70	270.430	7775.29	1943.98S	798.44W	==>	1143.34	
9101.00	89.70	270.430	7775.82	1943.23S	898.44W	==>	1241.48	
9201.00	89.70	270.430	7776.35	1942.48S	998.44W	==>	1339.62	
9301.00	89.70	270.430	7776.88	1941.74S	1098.43W	==>	1437.76	
9401.00	89.70	270.430	7777.41	1940.99S	1198.43W	==>	1535.90	
9501.00	89.70	270.430	7777.94	1940.25S	1298.42W	==>	1634.05	
9601.00	89.70	270.430	7778.47	1939.50S	1398.42W	==>	1732.19	
9701.00	89.70	270.430	7779.00	1938.76S	1498.41W	==>	1830.33	
9801.00	89.70	270.430	7779.53	1938.01S	1598.41W	==>	1928.47	
9901.00	89.70	270.430	7780.06	1937.26S	1698.41W	==>	2026.62	
10001.00	89.70	270.430	7780.59	1936.52S	1798.40W	==>	2124.76	
10101.00	89.70	270.430	7781.12	1935.77S	1898.40W	==>	2222.90	
10201.00	89.70	270.430	7781.65	1935.03S	1998.39W	==>	2321.04	
10301.00	89.70	270.430	7782.18	1934.28S	2098.39W	==>	2419.18	
10401.00	89.70	270.430	7782.71	1933.54S	2198.39W	==>	2517.33	
10501.00	89.70	270.430	7783.24	1932.79S	2298.38W	==>	2615.47	
10601.00	89.70	270.430	7783.77	1932.04S	2398.38W	==>	2713.61	
10701.00	89.70	270.430	7784.30	1931.30S	2498.37W	==>	2811.75	
10801.00	89.70	270.430	7784.83	1930.55S	2598.37W	==>	2909.90	
10901.00	89.70	270.430	7785.36	1929.81S	2698.36W	==>	3008.04	
11001.00	89.70	270.430	7785.89	1929.06S	2798.36W	==>	3106.18	
11101.00	89.70	270.430	7786.42	1928.31S	2898.36W	==>	3204.32	
11201.00	89.70	270.430	7786.95	1927.57S	2998.35W	==>	3302.46	
11301.00	89.70	270.430	7787.48	1926.82S	3098.35W	==>	3400.61	
11401.00	89.70	270.430	7788.01	1926.08S	3198.34W	==>	3498.75	
11501.00	89.70	270.430	7788.54	1925.33S	3298.34W	==>	3596.89	
11601.00	89.70	270.430	7789.07	1924.59S	3398.34W	==>	3695.03	
11701.00	89.70	270.430	7789.60	1923.84S	3498.33W	==>	3793.18	
11801.00	89.70	270.430	7790.13	1923.09S	3598.33W	==>	3891.32	
11901.00	89.70	270.430	7790.66	1922.35S	3698.32W	==>	3989.46	
12001.00	89.70	270.430	7791.19	1921.60S	3798.32W	==>	4087.60	
12101.00	89.70	270.430	7791.72	1920.86S	3898.31W	==>	4185.75	
12201.00	89.70	270.430	7792.25	1920.11S	3998.31W	==>	4283.89	
12301.00	89.70	270.430	7792.78	1919.37S	4098.31W	==>	4382.03	
12401.00	89.70	270.430	7793.30	1918.62S	4198.30W	==>	4480.17	
12501.00	89.70	270.430	7793.83	1917.87S	4298.30W	==>	4578.31	
12601.00	89.70	270.430	7794.36	1917.13S	4398.29W	==>	4676.46	
12701.00	89.70	270.430	7794.89	1916.38S	4498.29W	==>	4774.60	
12801.00	89.70	270.430	7795.42	1915.64S	4598.29W	==>	4872.74	
12901.00	89.70	270.430	7795.95	1914.89S	4698.28W	==>	4970.88	
13001.00	89.70	270.430	7796.48	1914.15S	4798.28W	==>	5069.03	
13101.00	89.70	270.430	7797.01	1913.40S	4898.27W	==>	5167.17	
13201.00	89.70	270.430	7797.54	1912.65S	4998.27W	==>	5265.31	
13301.00	89.70	270.430	7798.07	1911.91S	5098.26W	==>	5363.45	
13401.00	89.70	270.430	7798.60	1911.16S	5198.26W	==>	5461.59	
13501.00	89.70	270.430	7799.13	1910.42S	5298.26W	==>	5559.74	
13601.00	89.70	270.430	7799.66	1909.67S	5398.25W	==>	5657.88	
13701.00	89.70	270.430	7800.19	1908.92S	5498.25W	==>	5756.02	
13801.00	89.70	270.430	7800.72	1908.18S	5598.24W	==>	5854.16	
13901.00	89.70	270.430	7801.25	1907.43S	5698.24W	==>	5952.31	
14001.00	89.70	270.430	7801.78	1906.69S	5798.23W	==>	6050.45	
14101.00	89.70	270.430	7802.31	1905.94S	5898.23W	==>	6148.59	
14201.00	89.70	270.430	7802.84	1905.20S	5998.23W	==>	6246.73	
14301.00	89.70	270.430	7803.37	1904.45S	6098.22W	==>	6344.87	
14401.00	89.70	270.430	7803.90	1903.70S	6198.22W	==>	6443.02	
14501.00	89.70	270.430	7804.43	1902.96S	6298.21W	==>	6541.16	
14601.00	89.70	270.430	7804.96	1902.21S	6398.21W	==>	6639.30	
14701.00	89.70	270.430	7805.49	1901.47S	6498.21W	==>	6737.44	

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Well Design Combined Report
Wellbore: W Citadel 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
14801.00	89.70	270.430	7806.02	1900.72S	6598.20W	==>	6835.59	
14901.00	89.70	270.430	7806.55	1899.98S	6698.20W	==>	6933.73	
15001.00	89.70	270.430	7807.08	1899.23S	6798.19W	==>	7031.87	
15101.00	89.70	270.430	7807.61	1898.48S	6898.19W	==>	7130.01	
15201.00	89.70	270.430	7808.14	1897.74S	6998.18W	==>	7228.15	
15301.00	89.70	270.430	7808.67	1896.99S	7098.18W	==>	7326.30	
15401.00	89.70	270.430	7809.20	1896.25S	7198.18W	==>	7424.44	
15501.00	89.70	270.430	7809.73	1895.50S	7298.17W	==>	7522.58	
15601.00	89.70	270.430	7810.26	1894.76S	7398.17W	==>	7620.72	
15701.00	89.70	270.430	7810.79	1894.01S	7498.16W	==>	7718.87	
15801.00	89.70	270.430	7811.32	1893.26S	7598.16W	==>	7817.01	
15901.00	89.70	270.430	7811.85	1892.52S	7698.16W	==>	7915.15	
16001.00	89.70	270.430	7812.38	1891.77S	7798.15W	==>	8013.29	
16101.00	89.70	270.430	7812.91	1891.03S	7898.15W	==>	8111.44	
16201.00	89.70	270.430	7813.44	1890.28S	7998.14W	==>	8209.58	
16301.00	89.70	270.430	7813.97	1889.53S	8098.14W	==>	8307.72	
16401.00	89.70	270.430	7814.49	1888.79S	8198.13W	==>	8405.86	
16501.00	89.70	270.430	7815.02	1888.04S	8298.13W	==>	8504.00	
16601.00	89.70	270.430	7815.55	1887.30S	8398.13W	==>	8602.15	
16701.00	89.70	270.430	7816.08	1886.55S	8498.12W	==>	8700.29	
16801.00	89.70	270.430	7816.61	1885.81S	8598.12W	==>	8798.43	
16901.00	89.70	270.430	7817.14	1885.06S	8698.11W	==>	8896.57	
17001.00	89.70	270.430	7817.67	1884.31S	8798.11W	==>	8994.72	
17101.00	89.70	270.430	7818.20	1883.57S	8898.11W	==>	9092.86	
17201.00	89.70	270.430	7818.73	1882.82S	8998.10W	==>	9191.00	
17301.00	89.70	270.430	7819.26	1882.08S	9098.10W	==>	9289.14	
17401.00	89.70	270.430	7819.79	1881.33S	9198.09W	==>	9387.28	
17501.00	89.70	270.430	7820.32	1880.59S	9298.09W	==>	9485.43	
17601.00	89.70	270.430	7820.85	1879.84S	9398.08W	==>	9583.57	
17701.00	89.70	270.430	7821.38	1879.09S	9498.08W	==>	9681.71	
17801.00	89.70	270.430	7821.91	1878.35S	9598.08W	==>	9779.85	
17901.00	89.70	270.430	7822.44	1877.60S	9698.07W	==>	9878.00	
18001.00	89.70	270.430	7822.97	1876.86S	9798.07W	==>	9976.14	
18101.00	89.70	270.430	7823.50	1876.11S	9898.06W	==>	10074.28	
18195.28	89.70	270.430	7824.00	1875.41S	9992.34W	==>	10166.81	

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 5961.0ft above Mean Sea Level)
Vertical Section is from 0.00N 0.00E on azimuth 259.370 degrees
Bottom hole distance is 10166.81 Feet on azimuth 259.37 degrees from Wellhead
Calculation method uses Minimum Curvature method
Prepared by Microsoft
Date Printed: 15-Apr-2018



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



Targets							
Name	North[ft]	East[ft]	TVD[ft]	Latitude	Longitude	Northing	Easting
W Citadel 5-64 15-16-1CHZ - BHL	1875.41S	9992.34W	7824.00	39.60967000	-104.56653400	1648301.85	3262994.48
W Citadel 5-64 15-16-1CHZ - T1	1948.61S	176.74W	7772.00	39.60918700	-104.53170100	1648228.65	3272809.83

Survey Tool Program					
Reference	Survey Name	MD[ft]	TVD[ft]	Survey Tool	Error Model
564202	Planned	1501.00	1498.39	WdW Rate Gyro	Standard
564201	Planned	18195.28	7824.00	ISCWSA MWD	Rev 4 + SAG + FLT

Notes