

HIGHLANDS NATURAL RESOURCES

Location: COLORADO Slot: SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL, SEC. 15)
Field: ARAPAHOE COUNTY (NAD83/GRID) Well: CITADEL 5-64 15-16-1CHZ
Facility: SEC.15-T05S-R64W Wellbore: CITADEL 5-64 15-16-1CHZ PWB

Plot reference wellpath is CITADEL 5-64 15-16-1CHZ (REV-D.0) PWP	Grid System: NAD83 / Lambert Colorado SP, Central Zone (502), US feet
True vertical depths are referenced to Production Rig (27KB) (RKB)	" = Wellpath was transformed from a different geodetic datum
Measured depths are referenced to Production Rig (27KB) (RKB)	North Reference: Grid north
Production Rig (27KB) (RKB) to Mean Sea Level: 5961 feet	Scale: True distance
Mean Sea Level to Ground level (At Slot: SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL, SEC. 15)): 0 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: guenaler on 2018-08-20
	Database: WA_DEN_Denver_Deln

Location Information

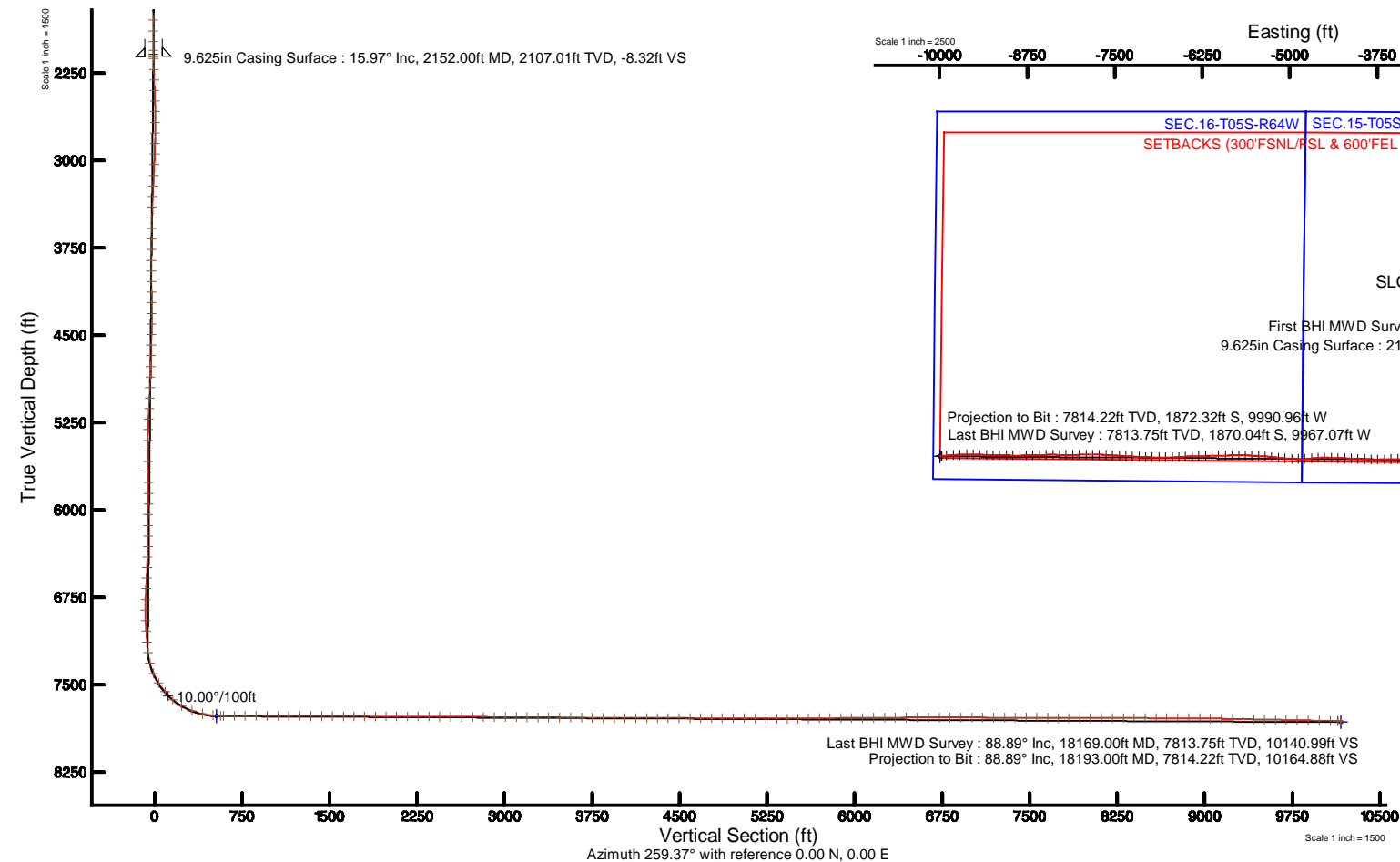
Facility Name			Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
SEC.15-T05S-R64W			3272987.577	1650317.104	39°36'53.694"N	104°31'51.568"W
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL, SEC. 15)	-139.86	-1.01	3272986.565	1650177.253	39°36'52.312"N	104°31'51.600"W
Production Rig (27KB) (RKB) to Ground level (At Slot: SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL, SEC. 15))						5961ft
Mean Sea Level to Ground level (At Slot: SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL, SEC. 15))						0ft
Production Rig (27KB) (RKB) to Mean Sea Level						5961ft

Survey Program

Start MD (ft)	End MD (ft)	Tool	Model	Log Name/Comment	Wellbore
27.00	2097.00	BHI NaviTrak	BHI NaviTrak (Standard)		CITADEL 5-64 15-16-1CHZ AWB
2097.00	18187.83	BHI AutoTrak Curve	BHI AutoTrak Curve (Short)		CITADEL 5-64 15-16-1CHZ PWB



HIGHLANDS
NATURAL RESOURCES





Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

REPORT SETUP INFORMATION			
Projection System	NAD83 / Lambert Colorado SP, Central Zone (502), US feet	Software System	WellArchitect® 5.0
North Reference	Grid	User	Guenaler
Scale	0.999976	Report Generated	8/20/2018 at 3:25:55 PM
Convergence at slot	0.62° East	Database/Source file	WA_DEN_Denver_Defn/CITADEL_5-64_15-16-1CHZ_AWP.xml

WELLPATH LOCATION						
	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	-139.86	-1.01	3272986.57	1650177.25	39°36'52.312"N	104°31'51.600"W
Facility Reference Pt			3272987.58	1650317.10	39°36'53.694"N	104°31'51.568"W
Field Reference Pt			3272987.61	1650317.11	39°36'53.694"N	104°31'51.568"W

WELLPATH DATUM			
Calculation method	Minimum curvature	Production Rig (27'KB) (RKB) to Facility Vertical Datum	5961.00ft
Horizontal Reference Pt	Slot	Production Rig (27'KB) (RKB) to Mean Sea Level	5961.00ft
Vertical Reference Pt	Production Rig (27'KB) (RKB)	Production Rig (27'KB) (RKB) to Ground Level at Slot (SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15))	5961.00ft
MD Reference Pt	Production Rig (27'KB) (RKB)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	259.37°



Actual Wellpath Report

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Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations) † = interpolated/extrapolated station										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
0.00†	0.000	167.880	0.00	0.00	0.00	0.00	39°36'52.312"N	104°31'51.600"W	0.00	
27.00	0.000	167.880	27.00	0.00	0.00	0.00	39°36'52.312"N	104°31'51.600"W	0.00	
328.00	0.360	167.880	328.00	-0.02	-0.92	0.20	39°36'52.303"N	104°31'51.598"W	0.12	First BHI MWD Survey
421.00	2.140	170.460	420.97	0.00	-2.92	0.55	39°36'52.283"N	104°31'51.593"W	1.91	
514.00	2.310	178.300	513.90	0.32	-6.51	0.89	39°36'52.248"N	104°31'51.590"W	0.37	
607.00	2.880	181.130	606.81	1.09	-10.72	0.90	39°36'52.206"N	104°31'51.590"W	0.63	
701.00	4.760	178.230	700.59	2.17	-16.98	0.97	39°36'52.144"N	104°31'51.590"W	2.01	
794.00	6.570	174.360	793.14	3.23	-26.13	1.62	39°36'52.054"N	104°31'51.583"W	1.99	
887.00	9.130	169.110	885.26	3.66	-38.67	3.53	39°36'51.929"N	104°31'51.560"W	2.86	
980.00	11.880	166.640	976.69	3.17	-55.23	7.14	39°36'51.765"N	104°31'51.516"W	3.00	
1074.00	14.240	166.710	1068.25	2.17	-75.90	12.03	39°36'51.561"N	104°31'51.457"W	2.51	
1167.00	16.340	169.190	1157.96	1.60	-99.89	17.12	39°36'51.323"N	104°31'51.395"W	2.36	
1260.00	16.480	168.430	1247.17	1.34	-125.66	22.22	39°36'51.068"N	104°31'51.333"W	0.28	
1354.00	16.400	166.380	1337.33	0.43	-151.62	28.02	39°36'50.811"N	104°31'51.263"W	0.62	
1449.00	16.300	167.130	1428.48	-0.79	-177.65	34.14	39°36'50.553"N	104°31'51.188"W	0.25	
1543.00	14.830	164.190	1519.04	-2.39	-202.09	40.36	39°36'50.311"N	104°31'51.112"W	1.77	
1638.00	14.020	163.890	1611.04	-4.59	-224.84	46.87	39°36'50.085"N	104°31'51.032"W	0.86	
1733.00	15.230	166.480	1702.96	-6.31	-248.03	52.98	39°36'49.855"N	104°31'50.957"W	1.45	
1828.00	13.950	164.000	1794.90	-8.01	-271.17	59.05	39°36'49.626"N	104°31'50.882"W	1.50	
1923.00	15.270	168.770	1886.83	-9.22	-294.45	64.64	39°36'49.395"N	104°31'50.814"W	1.88	
2017.00	15.850	168.250	1977.38	-9.60	-319.16	69.67	39°36'49.151"N	104°31'50.753"W	0.63	
2097.00	16.550	172.200	2054.21	-9.25	-341.15	73.44	39°36'48.933"N	104°31'50.708"W	1.63	
2172.00	15.760	173.950	2126.25	-7.91	-361.86	75.96	39°36'48.728"N	104°31'50.679"W	1.24	
2267.00	16.460	176.030	2217.51	-5.32	-388.11	78.25	39°36'48.468"N	104°31'50.653"W	0.95	
2362.00	16.250	176.510	2308.67	-2.10	-414.81	80.00	39°36'48.204"N	104°31'50.634"W	0.26	
2457.00	16.150	177.140	2399.90	1.34	-441.27	81.46	39°36'47.943"N	104°31'50.619"W	0.21	
2551.00	16.140	174.610	2490.19	4.30	-467.34	83.34	39°36'47.685"N	104°31'50.599"W	0.75	
2646.00	16.220	171.500	2581.43	5.99	-493.60	86.54	39°36'47.425"N	104°31'50.561"W	0.92	
2741.00	16.190	169.450	2672.66	6.51	-519.75	90.93	39°36'47.166"N	104°31'50.509"W	0.60	
2836.00	16.100	168.070	2763.91	6.23	-545.66	96.08	39°36'46.909"N	104°31'50.447"W	0.41	



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP



REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
2931.00	16.040	164.420	2855.20	4.80	-571.19	102.33	39°36'46.657"N	104°31'50.370"W	1.07	
3025.00	16.110	163.110	2945.53	2.25	-596.17	109.60	39°36'46.409"N	104°31'50.281"W	0.39	
3120.00	16.370	159.690	3036.74	-1.44	-621.34	118.08	39°36'46.159"N	104°31'50.176"W	1.04	
3215.00	15.870	157.500	3128.00	-6.36	-645.90	127.70	39°36'45.915"N	104°31'50.056"W	0.83	
3310.00	15.950	160.030	3219.37	-11.15	-670.17	137.13	39°36'45.675"N	104°31'49.939"W	0.73	
3405.00	15.940	161.390	3310.71	-15.08	-694.80	145.75	39°36'45.430"N	104°31'49.832"W	0.39	
3500.00	16.010	163.670	3402.04	-18.19	-719.73	153.59	39°36'45.183"N	104°31'49.736"W	0.66	
3594.00	16.080	163.720	3492.38	-20.76	-744.67	160.89	39°36'44.936"N	104°31'49.646"W	0.08	
3689.00	15.460	163.340	3583.80	-23.38	-769.43	168.21	39°36'44.690"N	104°31'49.556"W	0.66	
3784.00	16.170	165.430	3675.21	-25.62	-794.36	175.16	39°36'44.443"N	104°31'49.470"W	0.96	
3879.00	16.080	167.100	3766.47	-27.05	-819.99	181.43	39°36'44.189"N	104°31'49.394"W	0.50	
3974.00	15.250	169.070	3857.94	-27.64	-845.08	186.74	39°36'43.941"N	104°31'49.329"W	1.04	
4069.00	16.240	170.560	3949.38	-27.43	-870.45	191.28	39°36'43.690"N	104°31'49.275"W	1.13	
4163.00	16.330	173.030	4039.61	-26.31	-896.54	195.04	39°36'43.431"N	104°31'49.230"W	0.74	
4258.00	16.730	171.320	4130.68	-25.00	-923.31	198.73	39°36'43.166"N	104°31'49.187"W	0.66	
4353.00	16.180	171.090	4221.79	-24.13	-949.91	202.84	39°36'42.903"N	104°31'49.138"W	0.58	
4448.00	14.990	170.610	4313.30	-23.47	-975.10	206.90	39°36'42.654"N	104°31'49.089"W	1.26	
4543.00	16.130	167.870	4404.81	-23.55	-1000.13	211.67	39°36'42.406"N	104°31'49.032"W	1.43	
4638.00	16.370	164.410	4496.02	-25.05	-1025.93	218.04	39°36'42.150"N	104°31'48.954"W	1.05	
4732.00	16.040	164.470	4586.29	-27.31	-1051.20	225.08	39°36'41.900"N	104°31'48.867"W	0.35	
4827.00	16.410	164.040	4677.50	-29.67	-1076.74	232.29	39°36'41.647"N	104°31'48.779"W	0.41	
4922.00	16.410	163.030	4768.63	-32.40	-1102.48	239.89	39°36'41.392"N	104°31'48.685"W	0.30	
5016.00	16.370	164.470	4858.81	-35.00	-1127.94	247.31	39°36'41.139"N	104°31'48.594"W	0.43	
5111.00	16.040	161.780	4950.04	-37.88	-1153.31	255.00	39°36'40.888"N	104°31'48.499"W	0.86	
5206.00	16.140	162.440	5041.32	-41.20	-1178.37	263.09	39°36'40.639"N	104°31'48.399"W	0.22	
5301.00	17.200	158.340	5132.33	-45.48	-1204.01	272.26	39°36'40.385"N	104°31'48.286"W	1.67	
5395.00	17.030	159.830	5222.17	-50.42	-1229.85	282.13	39°36'40.128"N	104°31'48.163"W	0.50	
5490.00	17.120	163.190	5312.98	-54.24	-1256.29	290.98	39°36'39.866"N	104°31'48.054"W	1.04	
5585.00	16.720	167.550	5403.87	-56.17	-1283.02	297.97	39°36'39.601"N	104°31'47.968"W	1.40	
5680.00	16.080	170.890	5495.01	-56.26	-1309.36	302.99	39°36'39.340"N	104°31'47.907"W	1.20	



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP



REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
5774.00	16.080	170.890	5585.33	-55.57	-1335.07	307.12	39°36'39.086"N	104°31'47.858"W	0.00	
5869.00	15.980	173.880	5676.64	-54.19	-1361.06	310.59	39°36'38.829"N	104°31'47.817"W	0.88	
5964.00	15.980	173.880	5767.97	-52.14	-1387.06	313.38	39°36'38.571"N	104°31'47.785"W	0.00	
6059.00	14.800	170.090	5859.56	-50.95	-1412.02	316.87	39°36'38.324"N	104°31'47.744"W	1.63	
6153.00	14.890	165.060	5950.43	-51.71	-1435.52	322.05	39°36'38.092"N	104°31'47.681"W	1.37	
6248.00	15.520	165.170	6042.10	-53.56	-1459.60	328.45	39°36'37.853"N	104°31'47.603"W	0.66	
6343.00	16.700	165.570	6133.37	-55.39	-1485.10	335.10	39°36'37.600"N	104°31'47.521"W	1.25	
6438.00	16.510	169.540	6224.41	-56.26	-1511.60	340.95	39°36'37.338"N	104°31'47.450"W	1.21	
6532.00	16.180	167.940	6314.61	-56.55	-1537.54	346.11	39°36'37.081"N	104°31'47.387"W	0.59	
6627.00	15.310	161.780	6406.05	-58.53	-1562.40	352.80	39°36'36.834"N	104°31'47.305"W	1.98	
6722.00	16.390	158.800	6497.44	-62.65	-1586.81	361.57	39°36'36.592"N	104°31'47.197"W	1.42	
6817.00	16.750	159.900	6588.50	-67.36	-1612.16	371.12	39°36'36.341"N	104°31'47.078"W	0.50	
6911.00	16.780	158.750	6678.50	-72.09	-1637.53	380.69	39°36'36.089"N	104°31'46.959"W	0.35	
7006.00	16.570	161.780	6769.51	-76.41	-1663.18	389.90	39°36'35.835"N	104°31'46.845"W	0.94	
7101.00	16.020	168.830	6860.70	-78.32	-1688.91	396.68	39°36'35.580"N	104°31'46.762"W	2.16	
7196.00	16.000	179.690	6952.04	-76.10	-1714.87	399.29	39°36'35.323"N	104°31'46.732"W	3.15	
7291.00	16.130	185.970	7043.33	-69.98	-1741.09	397.98	39°36'35.064"N	104°31'46.752"W	1.83	
7386.00	16.100	182.070	7134.60	-63.31	-1767.38	396.14	39°36'34.804"N	104°31'46.780"W	1.14	
7480.00	15.950	187.460	7224.96	-56.44	-1793.21	393.99	39°36'34.549"N	104°31'46.811"W	1.59	
7575.00	18.620	224.020	7315.92	-39.96	-1817.13	381.72	39°36'34.314"N	104°31'46.971"W	11.57	
7670.00	25.430	239.230	7404.01	-8.38	-1838.51	353.60	39°36'34.106"N	104°31'47.333"W	9.30	
7765.00	33.040	246.710	7486.87	36.12	-1859.23	312.21	39°36'33.905"N	104°31'47.864"W	8.87	
7860.00	40.800	249.670	7562.77	92.07	-1880.28	259.23	39°36'33.703"N	104°31'48.544"W	8.38	
7955.00	50.000	248.410	7629.40	158.53	-1904.51	196.16	39°36'33.470"N	104°31'49.353"W	9.73	
8049.00	60.100	251.710	7683.19	234.47	-1930.61	123.79	39°36'33.220"N	104°31'50.282"W	11.12	
8144.00	68.540	261.300	7724.40	319.78	-1950.30	40.69	39°36'33.034"N	104°31'51.346"W	12.70	
8239.00	78.000	271.490	7751.78	409.81	-1955.80	-49.88	39°36'32.989"N	104°31'52.504"W	14.30	
8334.00	85.870	275.860	7765.11	500.85	-1949.74	-143.65	39°36'33.059"N	104°31'53.701"W	9.45	
8401.00	89.750	275.080	7767.67	565.16	-1943.36	-210.28	39°36'33.129"N	104°31'54.551"W	5.91	
8429.00	89.750	274.140	7767.79	592.18	-1941.11	-238.19	39°36'33.154"N	104°31'54.908"W	3.36	



Actual Wellpath Report

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Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
8524.00	89.780	269.990	7768.18	684.83	-1937.69	-333.11	39°36'33.198"N	104°31'56.120"W	4.37	
8619.00	89.780	266.860	7768.54	778.64	-1940.30	-428.06	39°36'33.182"N	104°31'57.333"W	3.29	
8714.00	89.720	268.170	7768.96	872.67	-1944.42	-522.97	39°36'33.151"N	104°31'58.547"W	1.38	
8809.00	89.720	270.410	7769.42	966.25	-1945.60	-617.95	39°36'33.150"N	104°31'59.760"W	2.36	
8904.00	89.750	270.800	7769.86	1059.43	-1944.59	-712.95	39°36'33.170"N	104°32'00.974"W	0.41	
8999.00	89.690	268.010	7770.33	1152.96	-1945.58	-807.93	39°36'33.170"N	104°32'02.188"W	2.94	
9094.00	89.660	266.890	7770.87	1247.02	-1949.81	-902.83	39°36'33.138"N	104°32'03.401"W	1.18	
9189.00	89.750	265.910	7771.36	1341.30	-1955.77	-997.64	39°36'33.089"N	104°32'04.613"W	1.04	
9284.00	89.750	269.210	7771.77	1435.32	-1959.82	-1092.54	39°36'33.059"N	104°32'05.826"W	3.47	
9379.00	89.750	277.540	7772.18	1527.41	-1954.23	-1187.29	39°36'33.124"N	104°32'07.036"W	8.77	
9474.00	89.660	278.040	7772.67	1617.54	-1941.35	-1281.41	39°36'33.261"N	104°32'08.236"W	0.53	
9568.00	89.660	272.810	7773.23	1707.84	-1932.47	-1374.96	39°36'33.359"N	104°32'09.430"W	5.56	
9663.00	89.660	271.940	7773.80	1800.40	-1928.53	-1469.88	39°36'33.408"N	104°32'10.643"W	0.92	
9758.00	89.720	272.640	7774.31	1893.00	-1924.74	-1564.80	39°36'33.455"N	104°32'11.855"W	0.74	
9853.00	89.940	275.280	7774.59	1984.92	-1918.18	-1659.56	39°36'33.530"N	104°32'13.065"W	2.79	
9948.00	89.690	275.580	7774.90	2076.22	-1909.19	-1754.13	39°36'33.629"N	104°32'14.272"W	0.41	
10042.00	89.910	274.260	7775.23	2166.77	-1901.12	-1847.79	39°36'33.718"N	104°32'15.467"W	1.42	
10137.00	89.780	273.650	7775.48	2258.71	-1894.57	-1942.56	39°36'33.793"N	104°32'16.677"W	0.66	
10232.00	89.660	271.390	7775.95	2351.21	-1890.40	-2037.46	39°36'33.844"N	104°32'17.889"W	2.38	
10327.00	89.820	269.350	7776.38	2444.46	-1889.78	-2132.45	39°36'33.860"N	104°32'19.103"W	2.15	
10422.00	89.780	267.350	7776.71	2538.29	-1892.52	-2227.41	39°36'33.843"N	104°32'20.316"W	2.11	
10516.00	89.380	265.910	7777.40	2631.53	-1898.04	-2321.24	39°36'33.798"N	104°32'21.516"W	1.59	
10611.00	89.600	266.760	7778.25	2725.83	-1904.11	-2416.04	39°36'33.748"N	104°32'22.728"W	0.92	
10706.00	89.630	269.310	7778.88	2819.73	-1907.37	-2510.97	39°36'33.726"N	104°32'23.941"W	2.68	
10801.00	89.410	269.280	7779.68	2913.31	-1908.54	-2605.96	39°36'33.724"N	104°32'25.155"W	0.23	
10896.00	89.720	269.310	7780.40	3006.88	-1909.71	-2700.95	39°36'33.723"N	104°32'26.369"W	0.33	
10991.00	89.630	271.230	7780.94	3100.16	-1909.26	-2795.95	39°36'33.737"N	104°32'27.582"W	2.02	
11086.00	89.570	271.250	7781.60	3193.13	-1907.21	-2890.92	39°36'33.767"N	104°32'28.796"W	0.07	
11180.00	89.480	269.910	7782.38	3285.33	-1906.25	-2984.91	39°36'33.786"N	104°32'29.996"W	1.43	
11275.00	89.480	269.040	7783.24	3378.85	-1907.13	-3079.90	39°36'33.788"N	104°32'31.210"W	0.92	



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP



REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
11370.00	89.540	268.470	7784.06	3472.58	-1909.19	-3174.88	39°36'33.777"N	104°32'32.424"W	0.60	
11465.00	89.690	268.340	7784.70	3566.39	-1911.83	-3269.84	39°36'33.761"N	104°32'33.637"W	0.21	
11559.00	89.660	268.510	7785.23	3659.22	-1914.42	-3363.80	39°36'33.745"N	104°32'34.838"W	0.18	
11654.00	89.480	269.130	7785.94	3752.93	-1916.37	-3458.78	39°36'33.736"N	104°32'36.052"W	0.68	
11749.00	89.720	269.050	7786.61	3846.56	-1917.88	-3553.76	39°36'33.731"N	104°32'37.266"W	0.27	
11844.00	89.600	268.620	7787.17	3940.27	-1919.81	-3648.74	39°36'33.722"N	104°32'38.479"W	0.47	
11938.00	89.970	268.360	7787.52	4033.08	-1922.29	-3742.71	39°36'33.707"N	104°32'39.680"W	0.48	
12033.00	89.850	271.740	7787.67	4126.42	-1922.21	-3837.69	39°36'33.718"N	104°32'40.894"W	3.56	
12128.00	90.060	273.580	7787.75	4218.87	-1917.80	-3932.59	39°36'33.771"N	104°32'42.106"W	1.95	
12223.00	89.750	272.950	7787.90	4311.09	-1912.39	-4027.43	39°36'33.834"N	104°32'43.317"W	0.74	
12317.00	89.750	272.480	7788.31	4402.55	-1907.94	-4121.33	39°36'33.888"N	104°32'44.516"W	0.50	
12412.00	89.690	271.700	7788.78	4495.22	-1904.47	-4216.26	39°36'33.932"N	104°32'45.728"W	0.82	
12507.00	89.910	271.890	7789.11	4587.99	-1901.50	-4311.21	39°36'33.971"N	104°32'46.941"W	0.31	
12602.00	89.750	272.640	7789.39	4680.59	-1897.74	-4406.14	39°36'34.018"N	104°32'48.153"W	0.81	
12696.00	89.850	269.920	7789.72	4772.56	-1895.64	-4500.11	39°36'34.049"N	104°32'49.354"W	2.90	
12791.00	89.690	267.480	7790.10	4866.30	-1897.80	-4595.07	39°36'34.037"N	104°32'50.567"W	2.57	
12886.00	89.600	262.220	7790.69	4960.83	-1906.32	-4689.65	39°36'33.963"N	104°32'51.777"W	5.54	
12981.00	89.850	268.700	7791.15	5055.24	-1913.84	-4784.30	39°36'33.899"N	104°32'52.987"W	6.83	
13075.00	89.660	271.790	7791.55	5147.54	-1913.43	-4878.29	39°36'33.912"N	104°32'54.188"W	3.29	
13170.00	89.720	272.110	7792.06	5240.26	-1910.20	-4973.23	39°36'33.954"N	104°32'55.400"W	0.34	
13265.00	89.820	273.650	7792.44	5332.63	-1905.43	-5068.11	39°36'34.011"N	104°32'56.612"W	1.62	
13360.00	89.720	275.970	7792.82	5424.19	-1897.46	-5162.77	39°36'34.099"N	104°32'57.820"W	2.44	
13455.00	90.490	277.820	7792.65	5514.78	-1886.06	-5257.08	39°36'34.222"N	104°32'59.024"W	2.11	
13549.00	90.620	272.720	7791.74	5605.15	-1877.43	-5350.64	39°36'34.317"N	104°33'00.218"W	5.43	
13644.00	90.520	273.070	7790.79	5697.51	-1872.63	-5445.52	39°36'34.374"N	104°33'01.430"W	0.38	
13739.00	90.520	273.860	7789.93	5789.64	-1866.89	-5540.34	39°36'34.441"N	104°33'02.640"W	0.83	
13834.00	90.590	272.570	7789.01	5881.88	-1861.56	-5635.18	39°36'34.503"N	104°33'03.851"W	1.36	
13929.00	90.370	269.610	7788.22	5974.88	-1859.76	-5730.15	39°36'34.531"N	104°33'05.064"W	3.12	
14024.00	90.590	267.780	7787.42	6068.62	-1861.92	-5825.12	39°36'34.519"N	104°33'06.278"W	1.94	
14119.00	90.490	268.380	7786.52	6162.52	-1865.10	-5920.06	39°36'34.498"N	104°33'07.492"W	0.64	



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP



REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
14213.00	90.520	269.010	7785.70	6255.27	-1867.24	-6014.03	39°36'34.486"N	104°33'08.692"W	0.67	
14308.00	90.430	268.320	7784.91	6349.02	-1869.46	-6109.01	39°36'34.474"N	104°33'09.906"W	0.73	
14403.00	90.710	268.980	7783.96	6442.77	-1871.69	-6203.97	39°36'34.462"N	104°33'11.120"W	0.75	
14498.00	90.490	268.470	7782.97	6536.50	-1873.81	-6298.94	39°36'34.451"N	104°33'12.333"W	0.58	
14593.00	90.550	268.430	7782.11	6630.31	-1876.38	-6393.91	39°36'34.435"N	104°33'13.547"W	0.08	
14688.00	89.660	266.330	7781.93	6724.37	-1880.72	-6488.80	39°36'34.402"N	104°33'14.760"W	2.40	
14783.00	89.630	265.560	7782.52	6818.75	-1887.44	-6583.56	39°36'34.345"N	104°33'15.972"W	0.81	
14878.00	89.750	270.100	7783.04	6912.69	-1891.03	-6678.47	39°36'34.319"N	104°33'17.185"W	4.78	
14972.00	89.690	270.040	7783.49	7005.05	-1890.92	-6772.46	39°36'34.330"N	104°33'18.386"W	0.09	
15067.00	89.660	269.950	7784.03	7098.42	-1890.93	-6867.46	39°36'34.340"N	104°33'19.599"W	0.10	
15162.00	89.720	271.770	7784.55	7191.51	-1889.50	-6962.45	39°36'34.364"N	104°33'20.813"W	1.92	
15257.00	89.660	271.880	7785.06	7284.28	-1886.48	-7057.40	39°36'34.403"N	104°33'22.026"W	0.13	
15351.00	89.780	271.840	7785.52	7376.05	-1883.42	-7151.35	39°36'34.443"N	104°33'23.225"W	0.13	
15446.00	89.940	272.750	7785.75	7468.64	-1879.62	-7246.27	39°36'34.490"N	104°33'24.438"W	0.97	
15541.00	89.660	272.660	7786.08	7561.08	-1875.14	-7341.16	39°36'34.544"N	104°33'25.650"W	0.31	
15636.00	89.720	272.880	7786.60	7653.49	-1870.55	-7436.05	39°36'34.600"N	104°33'26.861"W	0.24	
15731.00	89.820	276.030	7786.98	7745.21	-1863.17	-7530.75	39°36'34.682"N	104°33'28.070"W	3.32	
15825.00	89.970	272.580	7787.15	7836.02	-1856.11	-7624.47	39°36'34.762"N	104°33'29.267"W	3.67	
15920.00	89.850	269.760	7787.30	7929.00	-1854.17	-7719.44	39°36'34.790"N	104°33'30.480"W	2.97	
16015.00	89.850	271.980	7787.55	8022.09	-1852.73	-7814.42	39°36'34.814"N	104°33'31.693"W	2.34	
16110.00	89.970	268.910	7787.70	8115.31	-1851.99	-7909.41	39°36'34.831"N	104°33'32.907"W	3.23	
16205.00	89.780	268.250	7787.91	8209.08	-1854.35	-8004.38	39°36'34.818"N	104°33'34.120"W	0.72	
16300.00	89.750	270.420	7788.30	8302.64	-1855.45	-8099.37	39°36'34.817"N	104°33'35.334"W	2.28	
16395.00	89.850	269.840	7788.63	8395.97	-1855.23	-8194.37	39°36'34.829"N	104°33'36.548"W	0.62	
16489.00	89.780	270.260	7788.93	8488.34	-1855.15	-8288.36	39°36'34.839"N	104°33'37.749"W	0.45	
16584.00	89.720	270.800	7789.35	8581.54	-1854.27	-8383.36	39°36'34.857"N	104°33'38.962"W	0.57	
16679.00	89.750	268.330	7789.79	8675.03	-1854.99	-8478.35	39°36'34.860"N	104°33'40.176"W	2.60	
16774.00	89.880	267.750	7790.09	8768.95	-1858.24	-8573.29	39°36'34.838"N	104°33'41.390"W	0.63	
16869.00	89.690	268.840	7790.45	8862.80	-1861.07	-8668.25	39°36'34.819"N	104°33'42.603"W	1.16	
16964.00	89.820	269.190	7790.86	8956.45	-1862.70	-8763.23	39°36'34.813"N	104°33'43.817"W	0.39	



Actual Wellpath Report
CITADEL 5-64 15-16-1CHZ AWP
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REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH DATA (194 stations)										
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Latitude	Longitude	DLS [°/100ft]	Comments
17059.00	88.860	269.390	7791.95	9050.02	-1863.88	-8858.22	39°36'34.811"N	104°33'45.031"W	1.03	
17154.00	88.890	270.640	7793.81	9143.37	-1863.86	-8953.20	39°36'34.821"N	104°33'46.244"W	1.32	
17248.00	88.830	270.990	7795.68	9235.48	-1862.52	-9047.17	39°36'34.844"N	104°33'47.445"W	0.38	
17343.00	88.890	270.490	7797.57	9328.60	-1861.29	-9142.14	39°36'34.865"N	104°33'48.658"W	0.53	
17438.00	88.890	270.170	7799.42	9421.85	-1860.74	-9237.12	39°36'34.881"N	104°33'49.871"W	0.34	
17533.00	88.950	273.660	7801.21	9514.55	-1857.57	-9332.04	39°36'34.922"N	104°33'51.084"W	3.67	
17628.00	88.860	271.610	7803.02	9606.99	-1853.20	-9426.91	39°36'34.974"N	104°33'52.295"W	2.16	
17722.00	88.800	271.550	7804.94	9698.85	-1850.61	-9520.86	39°36'35.010"N	104°33'53.495"W	0.09	
17817.00	88.830	269.320	7806.91	9792.05	-1849.89	-9615.83	39°36'35.026"N	104°33'54.709"W	2.35	
17912.00	89.010	267.290	7808.70	9885.88	-1852.70	-9710.77	39°36'35.008"N	104°33'55.922"W	2.14	
18007.00	88.860	267.470	7810.46	9979.94	-1857.04	-9805.65	39°36'34.975"N	104°33'57.135"W	0.25	
18102.00	88.800	264.520	7812.40	10074.27	-1863.68	-9900.39	39°36'34.919"N	104°33'58.346"W	3.11	
18169.00	88.890	264.570	7813.75	10140.99	-1870.04	-9967.07	39°36'34.863"N	104°33'59.199"W	0.15	Last BHI MWD Survey
18193.00	88.890	264.570	7814.22	10164.88	-1872.32	-9990.96	39°36'34.843"N	104°33'59.504"W	0.00	Projection to Bit

HOLE & CASING SECTIONS - Ref Wellbore: CITADEL 5-64 15-16-1CHZ AWB Ref Wellpath: CITADEL 5-64 15-16-1CHZ AWP									
String/Diameter	Start MD [ft]	End MD [ft]	Interval [ft]	Start TVD [ft]	End TVD [ft]	Start N/S [ft]	Start E/W [ft]	End N/S [ft]	End E/W [ft]
13.5in Open Hole	27.00	2152.00	2125.00	27.00	2107.01	0.00	0.00	-356.42	75.36
9.625in Casing Surface	27.00	2152.00	2125.00	27.00	2107.01	0.00	0.00	-356.42	75.36
8.5in Open Hole	27.00	27.00	0.00	27.00	27.00	0.00	0.00	0.00	0.00



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP



REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

TARGETS

Name	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
SEC.15-T05S-R64W	-3.00	139.86	1.04	3272987.61	1650317.10	39°36'53.694"N	104°31'51.568"W	polygon
SEC.16-T05S-R64W	-3.00	139.86	1.04	3272987.61	1650317.10	39°36'53.694"N	104°31'51.568"W	polygon
CITADEL 5-64 15-16-1CHZ Landing Point(330'FSL&600'FEL)	7772.00	-1948.67	-176.77	3272809.80	1648228.63	39°36'33.073"N	104°31'54.124"W	point
CITADEL 5-64 15-16-1CHZ REV-2 Landing Point(330'FSL&600'FEL)	7772.00	-1948.67	-176.77	3272809.80	1648228.63	39°36'33.073"N	104°31'54.124"W	point
CITADEL 5-64 15-16-1CHZ REV-1 BHL (330'FSL&100'FWL,SEC.16)	7824.00	-1875.45	-9992.31	3262994.51	1648301.85	39°36'34.812"N	104°33'59.522"W	point
CITADEL 5-64 15-16-1CHZ REV-2 BHL (330'FSL&100'FWL,SEC.16)	7824.00	-1875.45	-9992.31	3262994.51	1648301.85	39°36'34.812"N	104°33'59.522"W	point
SEC.15/16-T05S-R64W SETBACKS (300'FSNL/FSL & 600'FEL & 100'FWL)	7825.00	139.86	1.04	3272987.61	1650317.10	39°36'53.694"N	104°31'51.568"W	polygon

WELLPATH COMPOSITION - Ref Wellbore: CITADEL 5-64 15-16-1CHZ AWB Ref Wellpath: CITADEL 5-64 15-16-1CHZ AWP				
Start MD [ft]	End MD [ft]	Positional Uncertainty Model	Log Name/Comment	Wellbore
27.00	2097.00	BHI NaviTrak (Standard)	BH/Navitrak MWD Surface <328'-2097'>	CITADEL 5-64 15-16-1CHZ AWB
2097.00	18169.00	BHI AutoTrak Curve (Short)	BH/ATC 8.5 MWD Short <2172'-18169'>	CITADEL 5-64 15-16-1CHZ AWB
18169.00	18193.00	Blind Drilling (std)	Projection to bit	CITADEL 5-64 15-16-1CHZ AWB



Actual Wellpath Report

CITADEL 5-64 15-16-1CHZ AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	HIGHLANDS NATURAL RESOURCES	Slot	SLOT#08 CITADEL 5-64 15-16-1CHZ (2280'FSL&440'FEL,SEC.15)
Area	COLORADO	Well	CITADEL 5-64 15-16-1CHZ
Field	ARAPAHOE COUNTY (NAD83/GRID)	Wellbore	CITADEL 5-64 15-16-1CHZ AWB
Facility	SEC.15-T05S-R64W		

WELLPATH COMMENTS				
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Comment
328.00	0.360	167.880	328.00	First BHI MWD Survey
18169.00	88.890	264.570	7813.75	Last BHI MWD Survey
18193.00	88.890	264.570	7814.22	Projection to Bit