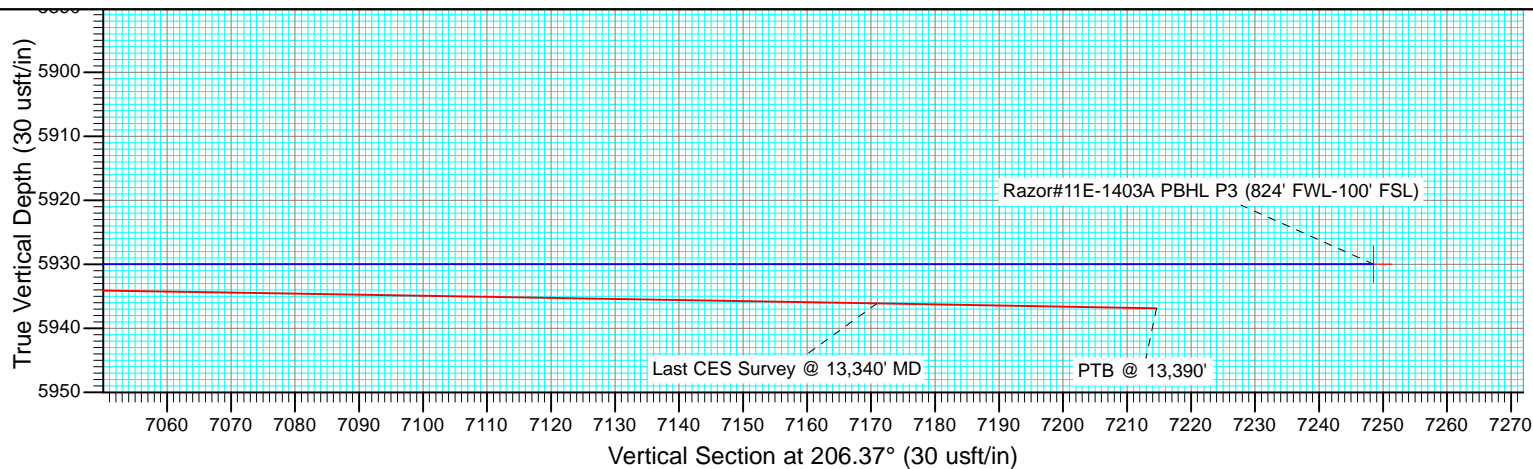
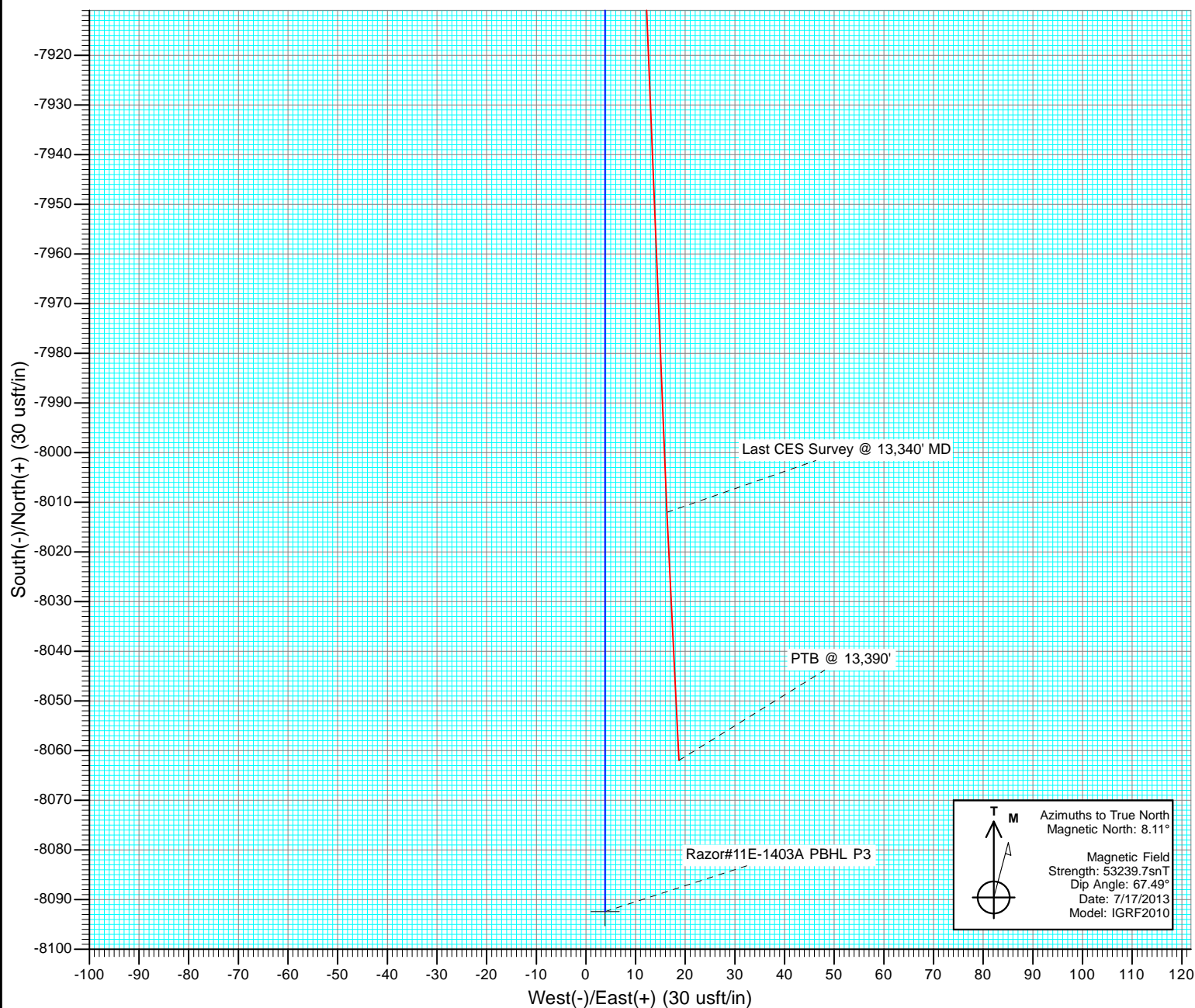




Project: Weld County, CO  
Site: S11-T10N-R58W  
Well: Razor #11E-1403A  
Wellbore: HZ  
Design: FINAL



# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

Site		S11-T10N-R58W			
Site Position:		Northing:	1,558,620.57 usft	Latitude:	40.854775
From:	Lat/Long	Easting:	3,463,389.92 usft	Longitude:	-103.824847
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.08 °

Well	Razor #11E-1403A					
Well Position	+N/-S	0.0 usft	Northing:	1,558,257.11 usft	Latitude:	40.853983
	+E/-W	0.0 usft	Easting:	3,459,406.24 usft	Longitude:	-103.839269
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	5,001.8 usft

<b>Wellbore</b>	HZ				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	7/17/2013	8.11	67.49	53,240

<b>Design</b>	FINAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	206.37	

<b>Survey Program</b>	<b>Date</b>	2/21/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
163.0	13,390.0	Survey #1 (HZ)	ISCWSA MWD	MWD - ISCWSA	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usf)</b>	<b>Build Rate (°/100u)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
163.0	0.48	240.23	163.0	-0.3	-0.6	0.6	0.29	0.29		
532.0	0.92	269.87	532.0	-1.1	-4.9	3.2	0.15	0.12		
623.0	1.05	257.51	623.0	-1.3	-6.4	4.0	0.27	0.14		
715.0	2.37	229.53	714.9	-2.7	-8.7	6.3	1.66	1.43		
806.0	3.08	205.93	805.8	-6.1	-11.2	10.5	1.44	0.78		
898.0	3.47	217.41	897.7	-10.6	-14.0	15.7	0.83	0.42		
989.0	3.30	200.57	988.5	-15.2	-16.6	21.0	1.10	-0.19		
1,080.0	2.90	184.97	1,079.4	-20.0	-17.7	25.7	1.02	-0.44		
1,171.0	3.87	179.94	1,170.2	-25.3	-17.9	30.6	1.11	1.07		
1,355.0	3.74	194.98	1,353.8	-37.3	-19.4	42.1	0.55	-0.07		
1,446.0	4.26	193.61	1,444.6	-43.5	-21.0	48.3	0.58	0.57		
1,537.0	4.22	186.64	1,535.3	-50.1	-22.2	54.7	0.57	-0.04		

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,629.0	4.79	176.92	1,627.1	-57.3	-22.4	61.3	1.03	0.62	
1,812.0	5.27	184.95	1,809.4	-73.3	-22.7	75.7	0.47	0.26	
1,941.0	5.27	192.03	1,937.8	-85.0	-24.4	87.0	0.50	0.00	
2,032.0	4.57	192.06	2,028.5	-92.6	-26.1	94.6	0.77	-0.77	
2,123.0	4.79	159.71	2,119.2	-99.7	-25.5	100.7	2.87	0.24	
2,215.0	4.04	158.10	2,210.9	-106.3	-23.0	105.5	0.83	-0.82	
2,307.0	4.09	162.20	2,302.7	-112.5	-20.7	110.0	0.32	0.05	
2,398.0	4.09	160.65	2,393.5	-118.6	-18.7	114.6	0.12	0.00	
2,490.0	4.00	159.71	2,485.2	-124.7	-16.5	119.1	0.12	-0.10	
2,581.0	3.34	156.13	2,576.0	-130.1	-14.3	122.9	0.77	-0.73	
2,673.0	3.30	155.64	2,667.9	-135.0	-12.1	126.3	0.05	-0.04	
2,765.0	3.52	158.42	2,759.7	-140.0	-10.0	129.9	0.30	0.24	
2,856.0	3.34	154.94	2,850.6	-145.0	-7.8	133.4	0.30	-0.20	
2,948.0	3.21	156.97	2,942.4	-149.8	-5.7	136.8	0.19	-0.14	
3,039.0	3.03	155.65	3,033.3	-154.4	-3.7	139.9	0.21	-0.20	
3,130.0	4.35	162.71	3,124.1	-159.8	-1.7	144.0	1.53	1.45	
3,222.0	4.18	157.00	3,215.8	-166.3	0.6	148.7	0.50	-0.18	
3,313.0	4.04	174.14	3,306.6	-172.5	2.3	153.5	1.35	-0.15	
3,405.0	3.78	170.05	3,398.4	-178.7	3.1	158.7	0.41	-0.28	
3,496.0	4.79	183.48	3,489.1	-185.5	3.4	164.6	1.56	1.11	
3,587.0	4.62	179.79	3,579.8	-192.9	3.2	171.4	0.38	-0.19	
3,679.0	4.18	182.33	3,671.6	-200.0	3.1	177.8	0.52	-0.48	
3,770.0	4.09	177.86	3,762.3	-206.5	3.1	183.7	0.37	-0.10	
3,862.0	4.18	176.55	3,854.1	-213.2	3.4	189.5	0.14	0.10	
3,953.0	4.53	172.96	3,944.8	-220.0	4.0	195.3	0.49	0.38	
4,044.0	4.18	157.07	4,035.6	-226.7	5.8	200.5	1.38	-0.38	
4,136.0	3.74	170.60	4,127.3	-232.7	7.6	205.1	1.12	-0.48	
4,227.0	5.05	164.09	4,218.1	-239.5	9.1	210.5	1.54	1.44	
4,319.0	4.79	179.57	4,309.7	-247.2	10.3	216.9	1.47	-0.28	
4,410.0	4.62	167.64	4,400.4	-254.6	11.1	223.2	1.09	-0.19	
4,503.0	3.47	175.96	4,493.2	-261.1	12.1	228.5	1.39	-1.24	
4,593.0	3.96	197.50	4,583.0	-266.7	11.3	233.9	1.63	0.54	
4,684.0	3.69	176.07	4,673.8	-272.7	10.6	239.6	1.59	-0.30	
4,775.0	2.90	214.70	4,764.7	-277.5	9.5	244.4	2.53	-0.87	
4,866.0	2.64	211.14	4,855.6	-281.2	7.1	248.8	0.34	-0.29	
4,958.0	2.29	215.25	4,947.5	-284.5	4.9	252.7	0.43	-0.38	
5,050.0	3.56	193.37	5,039.4	-288.8	3.2	257.3	1.81	1.38	
5,141.0	3.34	184.79	5,130.2	-294.2	2.3	262.5	0.62	-0.24	
5,232.0	2.99	174.72	5,221.1	-299.2	2.3	267.0	0.72	-0.38	
5,324.0	7.25	174.19	5,312.7	-307.3	3.2	273.9	4.63	4.63	
5,415.0	15.60	186.05	5,401.8	-325.2	2.4	290.3	9.48	9.18	
5,507.0	23.34	186.10	5,488.5	-355.7	-0.8	319.0	8.41	8.41	
5,599.0	31.03	184.73	5,570.3	-397.5	-4.7	358.2	8.39	8.36	
5,689.0	39.16	179.85	5,643.8	-449.2	-6.5	405.3	9.55	9.03	
5,781.0	45.80	186.67	5,711.7	-511.1	-10.3	462.4	8.78	7.22	
5,812.0	48.79	187.15	5,732.7	-533.7	-13.0	483.9	9.71	9.65	
5,872.0	51.91	188.59	5,771.0	-579.4	-19.4	527.7	5.52	5.20	
5,903.0	53.76	185.26	5,789.7	-603.9	-22.4	551.0	10.43	5.97	
5,933.0	55.65	182.10	5,807.1	-628.4	-23.9	573.6	10.66	6.30	
5,964.0	58.55	182.66	5,823.9	-654.4	-25.0	597.4	9.48	9.35	
5,995.0	62.73	182.09	5,839.1	-681.4	-26.1	622.1	13.58	13.48	
6,027.0	67.52	182.79	5,852.6	-710.4	-27.4	648.6	15.10	14.97	
6,058.0	71.74	181.81	5,863.3	-739.4	-28.5	675.1	13.93	13.61	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
6,090.0	75.78	178.93	5,872.3	-770.1	-28.7	702.7	15.30	12.62	
6,122.0	78.86	175.36	5,879.3	-801.3	-27.1	729.9	14.53	9.62	
6,153.0	79.43	173.53	5,885.2	-831.6	-24.2	755.8	6.08	1.84	
6,185.0	80.44	173.74	5,890.7	-862.9	-20.7	782.3	3.22	3.16	
6,217.0	83.21	173.86	5,895.3	-894.4	-17.3	809.0	8.66	8.66	
6,248.0	87.30	173.62	5,897.9	-925.1	-13.9	835.0	13.22	13.19	
6,284.0	89.19	173.71	5,899.0	-960.8	-9.9	865.3	5.26	5.25	
6,397.0	89.80	174.32	5,900.0	-1,073.2	1.8	960.7	0.76	0.54	
6,491.0	89.71	176.29	5,900.4	-1,166.9	9.5	1,041.2	2.10	-0.10	
6,586.0	88.75	178.72	5,901.6	-1,261.8	13.7	1,124.4	2.75	-1.01	
6,681.0	88.09	178.66	5,904.3	-1,356.7	15.8	1,208.5	0.70	-0.69	
6,775.0	89.67	180.72	5,906.1	-1,450.7	16.3	1,292.5	2.76	1.68	
6,870.0	89.85	180.79	5,906.5	-1,545.7	15.1	1,378.1	0.20	0.19	
6,964.0	89.36	180.40	5,907.1	-1,639.7	14.1	1,462.8	0.67	-0.52	
7,059.0	89.10	180.33	5,908.4	-1,734.7	13.5	1,548.1	0.28	-0.27	
7,153.0	90.29	180.53	5,908.9	-1,828.7	12.8	1,632.7	1.28	1.27	
7,247.0	91.12	181.20	5,907.8	-1,922.7	11.4	1,717.5	1.13	0.88	
7,342.0	91.82	181.73	5,905.3	-2,017.6	9.0	1,803.6	0.92	0.74	
7,437.0	90.24	181.29	5,903.6	-2,112.5	6.5	1,889.8	1.73	-1.66	
7,532.0	90.55	181.28	5,903.0	-2,207.5	4.3	1,975.8	0.33	0.33	
7,626.0	90.46	181.11	5,902.1	-2,301.5	2.4	2,060.9	0.20	-0.10	
7,721.0	90.77	181.14	5,901.1	-2,396.5	0.5	2,146.8	0.33	0.33	
7,816.0	89.80	180.89	5,900.6	-2,491.4	-1.2	2,232.7	1.05	-1.02	
7,911.0	89.23	178.90	5,901.4	-2,586.4	-1.0	2,317.7	2.18	-0.60	
8,006.0	89.32	178.26	5,902.6	-2,681.4	1.3	2,401.7	0.68	0.09	
8,101.0	89.85	178.42	5,903.3	-2,776.4	4.1	2,485.6	0.58	0.56	
8,195.0	90.02	178.29	5,903.4	-2,870.3	6.8	2,568.6	0.23	0.18	
8,287.0	89.01	178.55	5,904.2	-2,962.3	9.3	2,649.8	1.13	-1.10	
8,379.0	89.27	179.34	5,905.6	-3,054.3	11.0	2,731.5	0.90	0.28	
8,471.0	88.92	178.44	5,907.1	-3,146.2	12.8	2,813.1	1.05	-0.38	
8,561.0	90.77	178.94	5,907.3	-3,236.2	14.9	2,892.8	2.13	2.06	
8,653.0	90.68	179.84	5,906.1	-3,328.2	15.8	2,974.8	0.98	-0.10	
8,745.0	90.86	181.08	5,904.9	-3,420.2	15.1	3,057.5	1.36	0.20	
8,837.0	91.08	181.00	5,903.3	-3,512.1	13.4	3,140.6	0.25	0.24	
8,927.0	91.21	180.61	5,901.5	-3,602.1	12.2	3,221.8	0.46	0.14	
9,019.0	89.67	179.99	5,900.8	-3,694.1	11.7	3,304.4	1.80	-1.67	
9,110.0	89.49	179.22	5,901.5	-3,785.1	12.3	3,385.7	0.87	-0.20	
9,201.0	90.02	180.34	5,901.9	-3,876.1	12.7	3,467.1	1.36	0.58	
9,293.0	90.55	180.19	5,901.4	-3,968.1	12.2	3,549.7	0.60	0.58	
9,385.0	90.29	182.14	5,900.8	-4,060.1	10.4	3,632.9	2.14	-0.28	
9,476.0	89.98	180.76	5,900.5	-4,151.0	8.1	3,715.4	1.55	-0.34	
9,568.0	90.02	180.12	5,900.5	-4,243.0	7.4	3,798.2	0.70	0.04	
9,659.0	90.24	179.50	5,900.3	-4,334.0	7.7	3,879.6	0.72	0.24	
9,751.0	90.68	179.21	5,899.6	-4,426.0	8.7	3,961.5	0.57	0.48	
9,843.0	89.32	179.57	5,899.6	-4,518.0	9.7	4,043.5	1.53	-1.48	
9,934.0	89.67	179.26	5,900.4	-4,609.0	10.6	4,124.6	0.51	0.38	
10,026.0	89.67	178.51	5,900.9	-4,701.0	12.4	4,206.2	0.82	0.00	
10,117.0	89.98	181.35	5,901.2	-4,792.0	12.5	4,287.7	3.14	0.34	
10,208.0	89.89	180.66	5,901.3	-4,883.0	10.9	4,369.9	0.76	-0.10	
10,300.0	91.21	182.75	5,900.4	-4,974.9	8.2	4,453.5	2.69	1.43	
10,391.0	90.59	181.49	5,899.0	-5,065.8	4.8	4,536.5	1.54	-0.68	
10,483.0	90.46	180.75	5,898.2	-5,157.8	3.0	4,619.7	0.82	-0.14	
10,574.0	91.08	182.16	5,896.9	-5,248.8	0.7	4,702.2	1.69	0.68	

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
10,665.0	90.64	178.70	5,895.6	-5,339.7	0.0	4,784.0	3.83	-0.48	
10,757.0	90.81	177.34	5,894.4	-5,431.7	3.2	4,864.9	1.49	0.18	
10,848.0	90.55	176.77	5,893.3	-5,522.6	7.9	4,944.3	0.69	-0.29	
10,940.0	90.64	178.00	5,892.4	-5,614.5	12.1	5,024.8	1.34	0.10	
11,031.0	90.11	178.87	5,891.8	-5,705.4	14.6	5,105.1	1.12	-0.58	
11,122.0	88.92	179.53	5,892.5	-5,796.4	15.8	5,186.1	1.50	-1.31	
11,214.0	88.92	180.97	5,894.3	-5,888.4	15.4	5,268.7	1.56	0.00	
11,305.0	89.67	181.80	5,895.4	-5,979.3	13.2	5,351.2	1.23	0.82	
11,397.0	90.02	181.95	5,895.6	-6,071.3	10.2	5,434.9	0.41	0.38	
11,488.0	89.19	183.48	5,896.3	-6,162.2	5.9	5,518.2	1.91	-0.91	
11,581.0	88.62	183.80	5,898.0	-6,255.0	0.0	5,604.0	0.70	-0.61	
11,671.0	88.44	181.94	5,900.4	-6,344.8	-4.5	5,686.5	2.08	-0.20	
11,762.0	90.20	184.26	5,901.4	-6,435.7	-9.4	5,770.1	3.20	1.93	
11,853.0	87.96	183.54	5,902.9	-6,526.5	-15.6	5,854.1	2.59	-2.46	
11,944.0	87.25	181.94	5,906.7	-6,617.3	-20.0	5,937.4	1.92	-0.78	
12,036.0	86.77	179.54	5,911.5	-6,709.1	-21.1	6,020.3	2.66	-0.52	
12,128.0	86.11	178.87	5,917.2	-6,800.9	-19.9	6,102.0	1.02	-0.72	
12,219.0	88.00	178.65	5,921.9	-6,891.8	-17.9	6,182.5	2.09	2.08	
12,310.0	88.22	177.93	5,924.9	-6,982.7	-15.2	6,262.7	0.83	0.24	
12,402.0	88.53	177.34	5,927.5	-7,074.6	-11.4	6,343.4	0.72	0.34	
12,493.0	88.75	176.79	5,929.7	-7,165.4	-6.7	6,422.7	0.65	0.24	
12,585.0	89.93	179.43	5,930.7	-7,257.4	-3.7	6,503.7	3.14	1.28	
12,677.0	90.55	178.77	5,930.3	-7,349.4	-2.3	6,585.5	0.98	0.67	
12,767.0	90.73	178.25	5,929.3	-7,439.3	0.1	6,665.0	0.61	0.20	
12,859.0	89.45	179.13	5,929.2	-7,531.3	2.2	6,746.5	1.69	-1.39	
12,950.0	89.19	178.40	5,930.3	-7,622.3	4.1	6,827.1	0.85	-0.29	
13,042.0	89.05	177.74	5,931.7	-7,714.2	7.2	6,908.1	0.73	-0.15	
13,136.0	89.14	179.20	5,933.2	-7,808.2	9.8	6,991.2	1.56	0.10	
13,231.0	89.23	178.18	5,934.5	-7,903.1	11.9	7,075.3	1.08	0.09	
13,340.0	89.10	177.22	5,936.1	-8,012.0	16.3	7,170.9	0.89	-0.12	Last CES Survey @ 13,340' MD
13,390.0	89.10	177.22	5,936.9	-8,062.0	18.7	7,214.6	0.00	0.00	PTB @ 13,390' - TD - 128' FSL, 840' FWL

# Cathedral Energy Services

## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
Razor #11E-1403A 5900	0.00	0.00	5,895.0	-5,900.0	3.8	1,552,358.22	3,459,520.53	40.837790	-103.839256
- actual wellpath misses target center by 11.4usft at 11225.9usft MD (5894.5 TVD, -5900.3 N, 15.2 E)									
- Point									
Razor#11E-1403A PBHL	0.00	0.00	5,930.0	-8,092.4	3.8	1,550,166.16	3,459,561.63	40.831772	-103.839256
- actual wellpath misses target center by 34.6usft at 13390.0usft MD (5936.9 TVD, -8062.0 N, 18.7 E)									
- Point									
Razor #11E-1403A 4600	0.00	0.00	5,905.0	-4,600.0	3.8	1,553,657.98	3,459,496.15	40.841358	-103.839256
- actual wellpath misses target center by 8.2usft at 9925.0usft MD (5900.3 TVD, -4600.0 N, 10.5 E)									
- Point									
Razor #11E-1403A 2000	0.00	0.00	5,905.0	-2,000.0	3.7	1,556,257.52	3,459,447.41	40.848494	-103.839256
- actual wellpath misses target center by 5.8usft at 7324.6usft MD (5905.9 TVD, -2000.2 N, 9.5 E)									
- Point									
Razor #11E-1403A PBH	0.00	0.00	5,912.0	-8,092.4	3.8	1,550,166.16	3,459,561.63	40.831772	-103.839256
- actual wellpath misses target center by 42.1usft at 13390.0usft MD (5936.9 TVD, -8062.0 N, 18.7 E)									
- Point									
Razor#11E-1403A PBHL	0.00	0.00	5,900.0	-8,092.4	3.8	1,550,166.16	3,459,561.63	40.831772	-103.839256
- actual wellpath misses target center by 50.1usft at 13390.0usft MD (5936.9 TVD, -8062.0 N, 18.7 E)									
- Point									
Razor #11E-1403A 7100	0.00	0.00	5,930.0	-7,100.0	3.8	1,551,158.43	3,459,543.02	40.834496	-103.839256
- actual wellpath misses target center by 14.1usft at 12428.2usft MD (5928.2 TVD, -7100.8 N, -10.1 E)									
- Point									

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,321.0	5,899.4	7" - 1,904' FSL, 847' FWL	0	0

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		
		+N/-S (usft)	+E/-W (usft)	Comment
13,340.0	5,936.1	-8,012.0	16.3	Last CES Survey @ 13,340' MD
13,390.0	5,936.9	-8,062.0	18.7	PTB @ 13,390'
13,390.0	5,936.9	-8,062.0	18.7	TD - 128' FSL, 840' FWL

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

# **Whiting Petroleum Corporation**

**Weld County, CO**

**S11-T10N-R58W**

**Razor #11E-1403A**

**HZ**

**Design: FINAL**

## **Survey Report - Geographic**

**21 February, 2014**



# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

Site	S11-T10N-R58W				
Site Position:		Northing:	1,558,620.57 usft	Latitude:	40.854775
From:	Lat/Long	Easting:	3,463,389.92 usft	Longitude:	-103.824847
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.08 °

Well	Razor #11E-1403A					
Well Position	+N-S	0.0 usft	Northing:	1,558,257.11 usft	Latitude:	40.853983
	+E-W	0.0 usft	Easting:	3,459,406.24 usft	Longitude:	-103.839270
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	5,001.8 usft

<b>Wellbore</b>	HZ				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	7/17/2013	8.11	67.49	53,240

<b>Design</b>	FINAL				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	206.37	

<b>Survey Program</b>	<b>Date</b>	2/21/2014			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
163.0	13,390.0	Survey #1 (HZ)	ISCWSA MWD	MWD - ISCWSA	

<b>Survey</b>									
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Map Northing (usft)</b>	<b>Map Easting (usft)</b>	<b>Latitude</b>	<b>Longitude</b>
0.0	0.00	0.00	0.0	0.0	0.0	1,558,257.11	3,459,406.24	40.853983	-103.839270
163.0	0.48	240.23	163.0	-0.3	-0.6	1,558,256.76	3,459,405.65	40.853982	-103.839272
532.0	0.92	269.87	532.0	-1.1	-4.9	1,558,255.91	3,459,401.36	40.853980	-103.839287
623.0	1.05	257.51	623.0	-1.3	-6.4	1,558,255.70	3,459,399.82	40.853980	-103.839293
715.0	2.37	229.53	714.9	-2.7	-8.7	1,558,254.24	3,459,397.58	40.853976	-103.839301
806.0	3.08	205.93	805.8	-6.1	-11.2	1,558,250.77	3,459,395.14	40.853967	-103.839310
898.0	3.47	217.41	897.7	-10.6	-14.0	1,558,246.29	3,459,392.45	40.853954	-103.839320
989.0	3.30	200.57	988.5	-15.2	-16.6	1,558,241.60	3,459,389.95	40.853942	-103.839330
1,080.0	2.90	184.97	1,079.4	-20.0	-17.7	1,558,236.83	3,459,388.91	40.853929	-103.839334
1,171.0	3.87	179.94	1,170.2	-25.3	-17.9	1,558,231.47	3,459,388.82	40.853914	-103.839334
1,355.0	3.74	194.98	1,353.8	-37.3	-19.4	1,558,219.43	3,459,387.50	40.853881	-103.839340
1,446.0	4.26	193.61	1,444.6	-43.5	-21.0	1,558,213.25	3,459,386.05	40.853864	-103.839346

# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,537.0	4.22	186.64	1,535.3	-50.1	-22.2	1,558,206.62	3,459,384.99	40.853846	-103.839350
1,629.0	4.79	176.92	1,627.1	-57.3	-22.4	1,558,199.42	3,459,384.94	40.853826	-103.839351
1,812.0	5.27	184.95	1,809.4	-73.3	-22.7	1,558,183.42	3,459,384.93	40.853782	-103.839352
1,941.0	5.27	192.03	1,937.8	-85.0	-24.4	1,558,171.69	3,459,383.40	40.853750	-103.839358
2,032.0	4.57	192.06	2,028.5	-92.6	-26.1	1,558,164.03	3,459,381.92	40.853729	-103.839364
2,123.0	4.79	159.71	2,119.2	-99.7	-25.5	1,558,156.93	3,459,382.61	40.853710	-103.839362
2,215.0	4.04	158.10	2,210.9	-106.3	-23.0	1,558,150.37	3,459,385.27	40.853691	-103.839353
2,307.0	4.09	162.20	2,302.7	-112.5	-20.7	1,558,144.28	3,459,387.60	40.853675	-103.839345
2,398.0	4.09	160.65	2,393.5	-118.6	-18.7	1,558,138.17	3,459,389.78	40.853658	-103.839337
2,490.0	4.00	159.71	2,485.2	-124.7	-16.5	1,558,132.10	3,459,392.10	40.853641	-103.839329
2,581.0	3.34	156.13	2,576.0	-130.1	-14.3	1,558,126.74	3,459,394.37	40.853626	-103.839321
2,673.0	3.30	155.64	2,667.9	-135.0	-12.1	1,558,121.92	3,459,396.64	40.853613	-103.839314
2,765.0	3.52	158.42	2,759.7	-140.0	-10.0	1,558,116.93	3,459,398.86	40.853599	-103.839306
2,856.0	3.34	154.94	2,850.6	-145.0	-7.8	1,558,111.97	3,459,401.11	40.853585	-103.839298
2,948.0	3.21	156.97	2,942.4	-149.8	-5.7	1,558,107.21	3,459,403.34	40.853572	-103.839290
3,039.0	3.03	155.65	3,033.3	-154.4	-3.7	1,558,102.71	3,459,405.41	40.853560	-103.839283
3,130.0	4.35	162.71	3,124.1	-159.8	-1.7	1,558,097.26	3,459,407.53	40.853545	-103.839276
3,222.0	4.18	157.00	3,215.8	-166.3	0.6	1,558,090.89	3,459,410.00	40.853527	-103.839267
3,313.0	4.04	174.14	3,306.6	-172.5	2.3	1,558,084.68	3,459,411.74	40.853510	-103.839261
3,405.0	3.78	170.05	3,398.4	-178.7	3.1	1,558,078.49	3,459,412.71	40.853493	-103.839258
3,496.0	4.79	183.48	3,489.1	-185.5	3.4	1,558,071.75	3,459,413.12	40.853474	-103.839257
3,587.0	4.62	179.79	3,579.8	-192.9	3.2	1,558,064.29	3,459,413.05	40.853454	-103.839258
3,679.0	4.18	182.33	3,671.6	-200.0	3.1	1,558,057.23	3,459,413.06	40.853434	-103.839259
3,770.0	4.09	177.86	3,762.3	-206.5	3.1	1,558,050.67	3,459,413.16	40.853416	-103.839259
3,862.0	4.18	176.55	3,854.1	-213.2	3.4	1,558,044.06	3,459,413.61	40.853398	-103.839257
3,953.0	4.53	172.96	3,944.8	-220.0	4.0	1,558,037.19	3,459,414.38	40.853379	-103.839255
4,044.0	4.18	157.07	4,035.6	-226.7	5.8	1,558,030.60	3,459,416.24	40.853361	-103.839249
4,136.0	3.74	170.60	4,127.3	-232.7	7.6	1,558,024.59	3,459,418.15	40.853345	-103.839242
4,227.0	5.05	164.09	4,218.1	-239.5	9.1	1,558,017.84	3,459,419.86	40.853326	-103.839237
4,319.0	4.79	179.57	4,309.7	-247.2	10.3	1,558,010.13	3,459,421.14	40.853305	-103.839233
4,410.0	4.62	167.64	4,400.4	-254.6	11.1	1,558,002.77	3,459,422.09	40.853285	-103.839230
4,503.0	3.47	175.96	4,493.2	-261.1	12.1	1,557,996.32	3,459,423.21	40.853267	-103.839226
4,593.0	3.96	197.50	4,583.0	-266.7	11.3	1,557,990.63	3,459,422.58	40.853251	-103.839229
4,684.0	3.69	176.07	4,673.8	-272.7	10.6	1,557,984.69	3,459,421.94	40.853235	-103.839231
4,775.0	2.90	214.70	4,764.7	-277.5	9.5	1,557,979.86	3,459,420.92	40.853222	-103.839235
4,866.0	2.64	211.14	4,855.6	-281.2	7.1	1,557,976.13	3,459,418.60	40.853212	-103.839244
4,958.0	2.29	215.25	4,947.5	-284.5	4.9	1,557,972.77	3,459,416.50	40.853203	-103.839252
5,050.0	3.56	193.37	5,039.4	-288.8	3.2	1,557,968.46	3,459,414.86	40.853191	-103.839258
5,141.0	3.34	184.79	5,130.2	-294.2	2.3	1,557,963.06	3,459,414.09	40.853176	-103.839261
5,232.0	2.99	174.72	5,221.1	-299.2	2.3	1,557,958.05	3,459,414.18	40.853162	-103.839261
5,324.0	7.25	174.19	5,312.7	-307.3	3.2	1,557,949.90	3,459,415.14	40.853140	-103.839258
5,415.0	15.60	186.05	5,401.8	-325.2	2.4	1,557,931.98	3,459,414.77	40.853091	-103.839261
5,507.0	23.34	186.10	5,488.5	-355.7	-0.8	1,557,901.45	3,459,412.09	40.853007	-103.839273
5,599.0	31.03	184.73	5,570.3	-397.5	-4.7	1,557,859.57	3,459,408.98	40.852892	-103.839287
5,689.0	39.16	179.85	5,643.8	-449.2	-6.5	1,557,807.91	3,459,408.11	40.852751	-103.839293
5,781.0	45.80	186.67	5,711.7	-511.1	-10.3	1,557,745.95	3,459,405.50	40.852581	-103.839307
5,812.0	48.79	187.15	5,732.7	-533.7	-13.0	1,557,723.29	3,459,403.19	40.852519	-103.839317
5,872.0	51.91	188.59	5,771.0	-579.4	-19.4	1,557,677.43	3,459,397.71	40.852393	-103.839340
5,903.0	53.76	185.26	5,789.7	-603.9	-22.4	1,557,652.86	3,459,395.20	40.852326	-103.839351
5,933.0	55.65	182.10	5,807.1	-628.4	-23.9	1,557,628.40	3,459,394.09	40.852259	-103.839356
5,964.0	58.55	182.66	5,823.9	-654.4	-25.0	1,557,602.38	3,459,393.50	40.852187	-103.839360
5,995.0	62.73	182.09	5,839.1	-681.4	-26.1	1,557,575.38	3,459,392.88	40.852113	-103.839364
6,027.0	67.52	182.79	5,852.6	-710.4	-27.4	1,557,546.36	3,459,392.19	40.852034	-103.839369
6,058.0	71.74	181.81	5,863.3	-739.4	-28.5	1,557,517.32	3,459,391.57	40.851954	-103.839373
6,090.0	75.78	178.93	5,872.3	-770.1	-28.7	1,557,486.61	3,459,391.96	40.851870	-103.839373

# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,122.0	78.86	175.36	5,879.3	-801.3	-27.1	1,557,455.47	3,459,394.10	40.851784	-103.839368
6,153.0	79.43	173.53	5,885.2	-831.6	-24.2	1,557,425.23	3,459,397.61	40.851701	-103.839357
6,185.0	80.44	173.74	5,890.7	-862.9	-20.7	1,557,393.99	3,459,401.69	40.851615	-103.839345
6,217.0	83.21	173.86	5,895.3	-894.4	-17.3	1,557,362.57	3,459,405.70	40.851529	-103.839332
6,248.0	87.30	173.62	5,897.9	-925.1	-13.9	1,557,331.94	3,459,409.64	40.851444	-103.839320
6,284.0	89.19	173.71	5,899.0	-960.8	-9.9	1,557,296.25	3,459,414.28	40.851346	-103.839306
6,397.0	89.80	174.32	5,900.0	-1,073.2	1.8	1,557,184.12	3,459,428.17	40.851038	-103.839263
6,491.0	89.71	176.29	5,900.4	-1,166.9	9.5	1,557,090.60	3,459,437.61	40.850781	-103.839235
6,586.0	88.75	178.72	5,901.6	-1,261.8	13.7	1,556,995.80	3,459,443.53	40.850520	-103.839220
6,681.0	88.09	178.66	5,904.3	-1,356.7	15.8	1,556,900.92	3,459,447.47	40.850260	-103.839212
6,775.0	89.67	180.72	5,906.1	-1,450.7	16.3	1,556,806.97	3,459,449.74	40.850002	-103.839211
6,870.0	89.85	180.79	5,906.5	-1,545.7	15.1	1,556,711.97	3,459,450.27	40.849741	-103.839215
6,964.0	89.36	180.40	5,907.1	-1,639.7	14.1	1,556,617.98	3,459,451.05	40.849483	-103.839219
7,059.0	89.10	180.33	5,908.4	-1,734.7	13.5	1,556,523.00	3,459,452.23	40.849222	-103.839221
7,153.0	90.29	180.53	5,908.9	-1,828.7	12.8	1,556,429.00	3,459,453.28	40.848964	-103.839223
7,247.0	91.12	181.20	5,907.8	-1,922.7	11.4	1,556,335.01	3,459,453.62	40.848706	-103.839229
7,342.0	91.82	181.73	5,905.3	-2,017.6	9.0	1,556,240.05	3,459,452.97	40.848446	-103.839237
7,437.0	90.24	181.29	5,903.6	-2,112.5	6.5	1,556,145.07	3,459,452.25	40.848185	-103.839246
7,532.0	90.55	181.28	5,903.0	-2,207.5	4.3	1,556,050.07	3,459,451.90	40.847924	-103.839254
7,626.0	90.46	181.11	5,902.1	-2,301.5	2.4	1,555,956.08	3,459,451.70	40.847667	-103.839261
7,721.0	90.77	181.14	5,901.1	-2,396.5	0.5	1,555,861.08	3,459,451.61	40.847406	-103.839268
7,816.0	89.80	180.89	5,900.6	-2,491.4	-1.2	1,555,766.08	3,459,451.71	40.847145	-103.839274
7,911.0	89.23	178.90	5,901.4	-2,586.4	-1.0	1,555,671.11	3,459,453.66	40.846884	-103.839273
8,006.0	89.32	178.26	5,902.6	-2,681.4	1.3	1,555,576.21	3,459,457.79	40.846624	-103.839265
8,101.0	89.85	178.42	5,903.3	-2,776.4	4.1	1,555,481.32	3,459,462.32	40.846363	-103.839255
8,195.0	90.02	178.29	5,903.4	-2,870.3	6.8	1,555,387.43	3,459,466.78	40.846105	-103.839245
8,287.0	89.01	178.55	5,904.2	-2,962.3	9.3	1,555,295.53	3,459,471.04	40.845853	-103.839236
8,379.0	89.27	179.34	5,905.6	-3,054.3	11.0	1,555,203.61	3,459,474.45	40.845600	-103.839230
8,471.0	88.92	178.44	5,907.1	-3,146.2	12.8	1,555,111.68	3,459,477.96	40.845348	-103.839223
8,561.0	90.77	178.94	5,907.3	-3,236.2	14.9	1,555,021.77	3,459,481.70	40.845101	-103.839216
8,653.0	90.68	179.84	5,906.1	-3,328.2	15.8	1,554,929.81	3,459,484.40	40.844849	-103.839212
8,745.0	90.86	181.08	5,904.9	-3,420.2	15.1	1,554,837.83	3,459,485.39	40.844596	-103.839215
8,837.0	91.08	181.00	5,903.3	-3,512.1	13.4	1,554,745.84	3,459,485.44	40.844344	-103.839221
8,927.0	91.21	180.61	5,901.5	-3,602.1	12.2	1,554,655.86	3,459,485.86	40.844097	-103.839226
9,019.0	89.67	179.99	5,900.8	-3,694.1	11.7	1,554,563.88	3,459,487.10	40.843844	-103.839227
9,110.0	89.49	179.22	5,901.5	-3,785.1	12.3	1,554,472.91	3,459,489.43	40.843595	-103.839225
9,201.0	90.02	180.34	5,901.9	-3,876.1	12.7	1,554,381.94	3,459,491.49	40.843345	-103.839224
9,293.0	90.55	180.19	5,901.4	-3,968.1	12.2	1,554,289.95	3,459,492.78	40.843092	-103.839225
9,385.0	90.29	182.14	5,900.8	-4,060.1	10.4	1,554,197.95	3,459,492.64	40.842840	-103.839232
9,476.0	89.98	180.76	5,900.5	-4,151.0	8.1	1,554,106.96	3,459,492.04	40.842590	-103.839241
9,568.0	90.02	180.12	5,900.5	-4,243.0	7.4	1,554,014.96	3,459,493.05	40.842338	-103.839243
9,659.0	90.24	179.50	5,900.3	-4,334.0	7.7	1,553,923.99	3,459,495.06	40.842088	-103.839242
9,751.0	90.68	179.21	5,899.6	-4,426.0	8.7	1,553,832.03	3,459,497.82	40.841835	-103.839238
9,843.0	89.32	179.57	5,899.6	-4,518.0	9.7	1,553,740.07	3,459,500.52	40.841583	-103.839235
9,934.0	89.67	179.26	5,900.4	-4,609.0	10.6	1,553,649.12	3,459,503.15	40.841333	-103.839231
10,026.0	89.67	178.51	5,900.9	-4,701.0	12.4	1,553,557.18	3,459,506.67	40.841081	-103.839225
10,117.0	89.98	181.35	5,901.2	-4,792.0	12.5	1,553,466.21	3,459,508.48	40.840831	-103.839225
10,208.0	89.89	180.66	5,901.3	-4,883.0	10.9	1,553,375.21	3,459,508.59	40.840581	-103.839230
10,300.0	91.21	182.75	5,900.4	-4,974.9	8.2	1,553,283.23	3,459,507.57	40.840329	-103.839240
10,391.0	90.59	181.49	5,899.0	-5,065.8	4.8	1,553,192.26	3,459,505.91	40.840079	-103.839252
10,483.0	90.46	180.75	5,898.2	-5,157.8	3.0	1,553,100.26	3,459,505.84	40.839827	-103.839259
10,574.0	91.08	182.16	5,896.9	-5,248.8	0.7	1,553,009.28	3,459,505.23	40.839577	-103.839267
10,665.0	90.64	178.70	5,895.6	-5,339.7	0.0	1,552,918.31	3,459,506.25	40.839328	-103.839270
10,757.0	90.81	177.34	5,894.4	-5,431.7	3.2	1,552,826.45	3,459,511.15	40.839075	-103.839258
10,848.0	90.55	176.77	5,893.3	-5,522.6	7.9	1,552,735.68	3,459,517.53	40.838826	-103.839241

# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,940.0	90.64	178.00	5,892.4	-5,614.5	12.1	1,552,643.87	3,459,523.44	40.838574	-103.839226
11,031.0	90.11	178.87	5,891.8	-5,705.4	14.6	1,552,552.97	3,459,527.63	40.838324	-103.839217
11,122.0	88.92	179.53	5,892.5	-5,796.4	15.8	1,552,462.03	3,459,530.61	40.838074	-103.839213
11,214.0	88.92	180.97	5,894.3	-5,888.4	15.4	1,552,370.06	3,459,531.93	40.837822	-103.839214
11,305.0	89.67	181.80	5,895.4	-5,979.3	13.2	1,552,279.07	3,459,531.43	40.837572	-103.839222
11,397.0	90.02	181.95	5,895.6	-6,071.3	10.2	1,552,187.08	3,459,530.14	40.837320	-103.839233
11,488.0	89.19	183.48	5,896.3	-6,162.2	5.9	1,552,096.12	3,459,527.54	40.837070	-103.839248
11,581.0	88.62	183.80	5,898.0	-6,255.0	0.0	1,552,003.23	3,459,523.37	40.836816	-103.839270
11,671.0	88.44	181.94	5,900.4	-6,344.8	-4.5	1,551,913.31	3,459,520.55	40.836569	-103.839286
11,762.0	90.20	184.26	5,901.4	-6,435.7	-9.4	1,551,822.38	3,459,517.33	40.836320	-103.839304
11,853.0	87.96	183.54	5,902.9	-6,526.5	-15.6	1,551,731.51	3,459,512.85	40.836070	-103.839326
11,944.0	87.25	181.94	5,906.7	-6,617.3	-20.0	1,551,640.63	3,459,510.20	40.835821	-103.839342
12,036.0	86.77	179.54	5,911.5	-6,709.1	-21.1	1,551,548.76	3,459,510.73	40.835569	-103.839346
12,128.0	86.11	178.87	5,917.2	-6,800.9	-19.9	1,551,456.99	3,459,513.73	40.835317	-103.839342
12,219.0	88.00	178.65	5,921.9	-6,891.8	-17.9	1,551,366.19	3,459,517.40	40.835068	-103.839334
12,310.0	88.22	177.93	5,924.9	-6,982.7	-15.2	1,551,275.35	3,459,521.81	40.834818	-103.839325
12,402.0	88.53	177.34	5,927.5	-7,074.6	-11.4	1,551,183.55	3,459,527.33	40.834566	-103.839311
12,493.0	88.75	176.79	5,929.7	-7,165.4	-6.7	1,551,092.80	3,459,533.69	40.834317	-103.839294
12,585.0	89.93	179.43	5,930.7	-7,257.4	-3.7	1,551,000.94	3,459,538.44	40.834064	-103.839283
12,677.0	90.55	178.77	5,930.3	-7,349.4	-2.3	1,550,908.99	3,459,541.61	40.833812	-103.839278
12,767.0	90.73	178.25	5,929.3	-7,439.3	0.1	1,550,819.09	3,459,545.63	40.833565	-103.839269
12,859.0	89.45	179.13	5,929.2	-7,531.3	2.2	1,550,727.17	3,459,549.46	40.833312	-103.839262
12,950.0	89.19	178.40	5,930.3	-7,622.3	4.1	1,550,636.25	3,459,553.12	40.833063	-103.839255
13,042.0	89.05	177.74	5,931.7	-7,714.2	7.2	1,550,544.39	3,459,557.94	40.832810	-103.839244
13,136.0	89.14	179.20	5,933.2	-7,808.2	9.8	1,550,450.50	3,459,562.21	40.832553	-103.839234
13,231.0	89.23	178.18	5,934.5	-7,903.1	11.9	1,550,355.60	3,459,566.16	40.832292	-103.839227
13,340.0	89.10	177.22	5,936.1	-8,012.0	16.3	1,550,246.80	3,459,572.57	40.831993	-103.839211
Last CES Survey @ 13,340' MD									
13,390.0	89.10	177.22	5,936.9	-8,062.0	18.7	1,550,196.92	3,459,575.93	40.831856	-103.839202
PTB @ 13,390' - TD - 128' FSL, 840' FWL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Razor#11E-1403A PBHL	0.00	0.00	5,930.0	-8,092.4	3.8	1,550,166.17	3,459,561.63	40.831772	-103.839256
- actual wellpath misses target center by 34.6usft at 13390.0usft MD (5936.9 TVD, -8062.0 N, 18.7 E)									
- Point									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
6,321.0	5,899.4	7" - 1,904' FSL, 847' FWL	0	0	

# Cathedral Energy Services

## Survey Report - Geographic

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well Razor #11E-1403A
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Site:</b>	S11-T10N-R58W	<b>MD Reference:</b>	WELL @ 5018.6usft (Original Well Elev)
<b>Well:</b>	Razor #11E-1403A	<b>North Reference:</b>	True
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL	<b>Database:</b>	USA EDM 5000 Multi Users DB

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13,340.0	5,936.1	-8,012.0	16.3	Last CES Survey @ 13,340' MD
13,390.0	5,936.9	-8,062.0	18.7	PTB @ 13,390'
13,390.0	5,936.9	-8,062.0	18.7	TD - 128' FSL, 840' FWL

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_