



Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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

Site		S21-T10N-R58W			
Site Position:		Northing:	1,549,389.38 usft	Latitude:	40.830125
From:	Lat/Long	Easting:	3,450,038.37 usft	Longitude:	-103.873714
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.05 °

Well	Razor #21B-0909A					
Well Position	+N/-S	0.0 usft	Northing:	1,549,441.31 usft	Latitude:	40.830200
	+E/-W	0.0 usft	Easting:	3,451,378.46 usft	Longitude:	-103.868869
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,837.3 usft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/10/2014	7.95	67.42	53,095

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	357.34	

Survey Program	Date	10/22/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
255.0	13,915.0	Survey #1 (HZ)	ISCWSA MWD	MWD - ISCWSA	

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	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
255.0	0.83	146.39	255.0	-1.5	1.0	-1.6	0.33	0.33		
347.0	0.90	139.49	347.0	-2.6	1.9	-2.7	0.14	0.08		
439.0	1.04	162.49	439.0	-4.0	2.6	-4.1	0.45	0.15		
529.0	2.31	238.43	528.9	-5.7	1.3	-5.8	2.55	1.41		
621.0	5.34	244.60	620.7	-8.5	-4.2	-8.3	3.32	3.29		
713.0	5.58	247.11	712.3	-12.1	-12.2	-11.5	0.37	0.26		
805.0	5.17	250.44	803.9	-15.2	-20.2	-14.3	0.56	-0.45		
896.0	4.72	248.05	894.6	-18.0	-27.5	-16.7	0.54	-0.49		
988.0	4.17	248.75	986.3	-20.6	-34.1	-19.0	0.60	-0.60		
1,079.0	4.16	248.71	1,077.0	-23.0	-40.3	-21.1	0.01	-0.01		
1,171.0	3.64	247.54	1,168.8	-25.4	-46.1	-23.2	0.57	-0.57		
1,262.0	4.73	262.22	1,259.6	-27.0	-52.5	-24.5	1.67	1.20		

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Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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
1,353.0	5.39	267.83	1,350.2	-27.6	-60.5	-24.8	0.91	0.73	
1,444.0	5.42	272.23	1,440.8	-27.6	-69.1	-24.4	0.46	0.03	
1,535.0	5.89	273.38	1,531.4	-27.2	-78.0	-23.5	0.53	0.52	
1,627.0	5.25	274.55	1,622.9	-26.6	-86.9	-22.5	0.71	-0.70	
1,697.0	4.77	273.93	1,692.7	-26.1	-93.0	-21.8	0.69	-0.69	
1,788.0	4.24	267.85	1,783.4	-26.0	-100.2	-21.3	0.78	-0.58	
1,880.0	6.38	260.97	1,875.0	-26.9	-108.6	-21.9	2.42	2.33	
1,971.0	6.58	255.01	1,965.4	-29.1	-118.6	-23.5	0.77	0.22	
2,062.0	6.19	255.70	2,055.9	-31.6	-128.4	-25.6	0.44	-0.43	
2,154.0	5.76	252.50	2,147.4	-34.2	-137.6	-27.8	0.59	-0.47	
2,246.0	5.69	248.00	2,238.9	-37.3	-146.3	-30.5	0.49	-0.08	
2,337.0	5.46	244.77	2,329.5	-40.9	-154.4	-33.7	0.43	-0.25	
2,428.0	4.71	243.59	2,420.1	-44.4	-161.6	-36.8	0.83	-0.82	
2,519.0	5.31	240.93	2,510.8	-48.1	-168.6	-40.2	0.71	0.66	
2,610.0	5.25	257.00	2,601.4	-51.1	-176.4	-42.8	1.62	-0.07	
2,701.0	6.13	254.94	2,691.9	-53.3	-185.1	-44.6	0.99	0.97	
2,793.0	5.21	254.50	2,783.5	-55.7	-193.9	-46.6	1.00	-1.00	
2,884.0	3.88	240.31	2,874.2	-58.3	-200.6	-48.9	1.90	-1.46	
2,975.0	5.47	252.29	2,964.9	-61.1	-207.4	-51.4	2.04	1.75	
3,066.0	4.44	247.44	3,055.5	-63.8	-214.8	-53.8	1.22	-1.13	
3,158.0	3.57	233.63	3,147.3	-66.9	-220.3	-56.6	1.41	-0.95	
3,249.0	5.55	252.92	3,238.0	-69.8	-226.8	-59.2	2.72	2.18	
3,340.0	5.10	245.99	3,328.6	-72.8	-234.7	-61.8	0.86	-0.49	
3,431.0	7.49	271.20	3,419.1	-74.3	-244.4	-62.9	3.96	2.63	
3,522.0	7.81	272.14	3,509.3	-73.9	-256.5	-62.0	0.38	0.35	
3,613.0	7.97	272.32	3,599.4	-73.5	-269.0	-60.9	0.18	0.18	
3,704.0	7.91	270.58	3,689.6	-73.1	-281.5	-60.0	0.27	-0.07	
3,795.0	7.05	268.74	3,779.8	-73.2	-293.4	-59.5	0.98	-0.95	
3,886.0	5.92	269.91	3,870.2	-73.3	-303.6	-59.2	1.25	-1.24	
3,977.0	4.37	279.70	3,960.8	-72.7	-311.8	-58.2	1.95	-1.70	
4,069.0	3.45	286.13	4,052.6	-71.4	-317.9	-56.6	1.11	-1.00	
4,160.0	6.09	267.73	4,143.3	-70.8	-325.3	-55.7	3.32	2.90	
4,252.0	5.71	265.87	4,234.8	-71.3	-334.8	-55.7	0.46	-0.41	
4,343.0	5.76	259.47	4,325.4	-72.5	-343.8	-56.5	0.70	0.05	
4,434.0	5.59	254.93	4,415.9	-74.5	-352.5	-58.1	0.53	-0.19	
4,526.0	4.63	251.85	4,507.5	-76.8	-360.4	-60.0	1.08	-1.04	
4,617.0	4.19	248.46	4,598.3	-79.2	-367.0	-62.1	0.56	-0.48	
4,710.0	3.85	246.10	4,691.0	-81.7	-373.0	-64.3	0.41	-0.37	
4,801.0	3.61	244.86	4,781.9	-84.1	-378.4	-66.5	0.28	-0.26	
4,892.0	3.00	242.76	4,872.7	-86.5	-383.1	-68.6	0.68	-0.67	
4,983.0	0.36	79.85	4,963.7	-87.5	-384.9	-69.5	3.68	-2.90	
5,074.0	0.07	330.40	5,054.7	-87.4	-384.7	-69.5	0.43	-0.32	
5,166.0	5.88	350.12	5,146.5	-82.7	-385.5	-64.7	6.32	6.32	
5,258.0	14.43	2.85	5,237.0	-66.6	-385.7	-48.6	9.55	9.29	
5,348.0	24.91	359.15	5,321.6	-36.3	-385.5	-18.4	11.72	11.64	
5,440.0	30.87	356.72	5,402.9	6.6	-387.1	24.6	6.59	6.48	
5,532.0	34.56	357.87	5,480.3	56.3	-389.4	74.3	4.07	4.01	
5,623.0	38.78	0.56	5,553.3	110.6	-390.1	128.6	4.96	4.64	
5,714.0	47.91	7.06	5,619.4	172.8	-385.7	190.5	11.16	10.03	
5,746.0	54.38	6.95	5,639.5	197.5	-382.6	215.0	20.22	20.22	
5,777.0	57.67	7.46	5,656.8	223.0	-379.4	240.4	10.70	10.61	
5,809.0	61.96	5.16	5,672.9	250.5	-376.4	267.7	14.77	13.41	
5,841.0	62.95	2.52	5,687.7	278.8	-374.5	295.9	7.94	3.09	

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Survey									
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5,872.0	64.78	0.50	5,701.3	306.6	-373.8	323.6	8.31	5.90	
5,904.0	66.04	359.09	5,714.7	335.7	-373.9	352.7	5.62	3.94	
5,935.0	68.11	357.31	5,726.7	364.2	-374.8	381.2	8.52	6.68	
5,967.0	71.72	356.08	5,737.7	394.2	-376.5	411.3	11.84	11.28	
5,999.0	73.48	357.12	5,747.3	424.7	-378.3	441.8	6.31	5.50	
6,030.0	76.16	357.55	5,755.4	454.6	-379.7	471.7	8.75	8.65	
6,062.0	77.58	356.14	5,762.7	485.7	-381.4	502.9	6.17	4.44	
6,094.0	81.83	355.38	5,768.4	517.1	-383.7	534.3	13.49	13.28	
6,197.0	87.22	355.64	5,778.2	619.3	-391.8	636.8	5.24	5.23	
6,292.0	88.42	356.60	5,781.8	714.0	-398.2	731.7	1.62	1.26	
6,387.0	90.05	358.35	5,783.1	808.9	-402.4	826.7	2.52	1.72	
6,482.0	91.34	0.91	5,781.9	903.9	-403.0	921.6	3.02	1.36	
6,576.0	89.50	0.02	5,781.3	997.9	-402.2	1,015.4	2.17	-1.96	
6,671.0	90.51	0.64	5,781.2	1,092.9	-401.7	1,110.3	1.25	1.06	
6,766.0	86.57	357.94	5,783.7	1,187.8	-402.8	1,205.2	5.03	-4.15	
6,861.0	89.35	0.15	5,787.0	1,282.7	-404.4	1,300.1	3.74	2.93	
6,956.0	87.47	356.75	5,789.7	1,377.6	-407.0	1,395.0	4.09	-1.98	
7,051.0	88.32	357.15	5,793.2	1,472.4	-412.0	1,489.9	0.99	0.89	
7,146.0	89.13	358.73	5,795.3	1,567.3	-415.5	1,584.9	1.87	0.85	
7,241.0	90.01	359.50	5,796.0	1,662.3	-416.9	1,679.9	1.23	0.93	
7,335.0	90.42	0.91	5,795.6	1,756.3	-416.6	1,773.7	1.56	0.44	
7,430.0	90.16	0.43	5,795.2	1,851.3	-415.5	1,868.6	0.57	-0.27	
7,525.0	91.90	3.40	5,793.5	1,946.2	-412.3	1,963.3	3.62	1.83	
7,620.0	91.84	1.90	5,790.4	2,041.1	-407.9	2,057.8	1.58	-0.06	
7,715.0	92.53	0.97	5,786.7	2,136.0	-405.5	2,152.5	1.22	0.73	
7,810.0	91.24	2.50	5,783.6	2,230.9	-402.7	2,247.1	2.11	-1.36	
7,905.0	90.88	3.38	5,781.9	2,325.7	-397.8	2,341.7	1.00	-0.38	
7,999.0	87.92	2.92	5,782.8	2,419.6	-392.6	2,435.2	3.19	-3.15	
8,094.0	87.48	2.00	5,786.7	2,514.4	-388.6	2,529.7	1.07	-0.46	
8,189.0	87.08	1.57	5,791.2	2,609.3	-385.6	2,624.3	0.62	-0.42	
8,284.0	88.55	1.38	5,794.8	2,704.2	-383.2	2,719.0	1.56	1.55	
8,379.0	90.51	359.69	5,795.6	2,799.1	-382.3	2,813.8	2.72	2.06	
8,474.0	90.55	358.96	5,794.7	2,894.1	-383.4	2,908.8	0.77	0.04	
8,569.0	90.30	358.59	5,794.0	2,989.1	-385.4	3,003.8	0.47	-0.26	
8,663.0	89.45	0.74	5,794.2	3,083.1	-386.0	3,097.7	2.46	-0.90	
8,758.0	87.71	359.46	5,796.5	3,178.1	-385.8	3,192.5	2.27	-1.83	
8,853.0	87.40	1.09	5,800.6	3,273.0	-385.3	3,287.3	1.75	-0.33	
8,948.0	89.45	2.48	5,803.2	3,367.9	-382.4	3,382.0	2.61	2.16	
9,043.0	90.74	2.27	5,803.0	3,462.8	-378.5	3,476.6	1.38	1.36	
9,137.0	89.54	0.79	5,802.8	3,556.8	-375.9	3,570.4	2.03	-1.28	
9,232.0	91.53	1.75	5,801.9	3,651.7	-373.8	3,665.1	2.33	2.09	
9,327.0	91.58	1.42	5,799.3	3,746.6	-371.2	3,759.8	0.35	0.05	
9,422.0	91.30	0.68	5,797.0	3,841.6	-369.5	3,854.6	0.83	-0.29	
9,517.0	91.27	0.04	5,794.8	3,936.6	-368.9	3,949.4	0.67	-0.03	
9,610.0	91.66	359.62	5,792.5	4,029.5	-369.1	4,042.3	0.62	0.42	
9,704.0	89.96	358.43	5,791.1	4,123.5	-370.7	4,136.3	2.21	-1.81	
9,796.0	88.38	357.64	5,792.5	4,215.4	-373.9	4,228.3	1.92	-1.72	
9,887.0	89.48	358.44	5,794.2	4,306.4	-377.0	4,319.2	1.49	1.21	
9,978.0	90.93	359.27	5,793.8	4,397.4	-378.8	4,410.2	1.84	1.59	
10,069.0	91.57	0.34	5,791.8	4,488.3	-379.1	4,501.1	1.37	0.70	
10,162.0	90.40	1.08	5,790.2	4,581.3	-378.0	4,593.9	1.49	-1.26	
10,254.0	90.65	0.47	5,789.4	4,673.3	-376.7	4,685.7	0.72	0.27	
10,345.0	89.39	0.84	5,789.4	4,764.3	-375.7	4,776.6	1.44	-1.38	

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10,436.0	88.58	0.23	5,791.0	4,855.3	-374.9	4,867.4	1.11	-0.89	
10,528.0	87.83	0.10	5,793.9	4,947.2	-374.6	4,959.3	0.83	-0.82	
10,620.0	88.39	359.88	5,796.9	5,039.2	-374.6	5,051.1	0.65	0.61	
10,711.0	89.78	359.66	5,798.4	5,130.2	-375.0	5,142.0	1.55	1.53	
10,802.0	90.27	0.61	5,798.3	5,221.2	-374.8	5,232.9	1.17	0.54	
10,893.0	90.66	0.67	5,797.6	5,312.1	-373.7	5,323.8	0.43	0.43	
10,984.0	90.37	0.16	5,796.8	5,403.1	-373.1	5,414.6	0.64	-0.32	
11,075.0	89.73	358.46	5,796.7	5,494.1	-374.2	5,505.6	2.00	-0.70	
11,167.0	90.74	1.22	5,796.3	5,586.1	-374.4	5,597.5	3.19	1.10	
11,258.0	90.80	0.23	5,795.1	5,677.1	-373.3	5,688.3	1.09	0.07	
11,349.0	90.69	359.84	5,793.9	5,768.1	-373.2	5,779.2	0.45	-0.12	
11,440.0	90.31	359.59	5,793.1	5,859.1	-373.7	5,870.1	0.50	-0.42	
11,532.0	89.88	359.91	5,792.9	5,951.1	-374.1	5,962.0	0.58	-0.47	
11,623.0	91.09	0.62	5,792.2	6,042.1	-373.7	6,052.9	1.54	1.33	
11,714.0	91.01	0.21	5,790.5	6,133.1	-373.0	6,143.8	0.46	-0.09	
11,805.0	90.43	359.38	5,789.4	6,224.1	-373.3	6,234.7	1.11	-0.64	
11,896.0	89.46	358.75	5,789.5	6,315.0	-374.8	6,325.6	1.27	-1.07	
11,987.0	91.34	359.28	5,788.8	6,406.0	-376.4	6,416.6	2.15	2.07	
12,078.0	91.25	358.66	5,786.8	6,497.0	-378.0	6,507.5	0.69	-0.10	
12,169.0	91.89	358.22	5,784.3	6,587.9	-380.5	6,598.5	0.85	0.70	
12,260.0	90.04	358.76	5,782.7	6,678.9	-382.9	6,689.4	2.12	-2.03	
12,351.0	90.68	0.52	5,782.2	6,769.9	-383.5	6,780.4	2.06	0.70	
12,443.0	90.16	358.60	5,781.5	6,861.8	-384.2	6,872.3	2.16	-0.57	
12,534.0	91.68	1.27	5,780.0	6,952.8	-384.3	6,963.2	3.38	1.67	
12,626.0	89.17	2.15	5,779.3	7,044.8	-381.5	7,054.9	2.89	-2.73	
12,717.0	88.11	0.56	5,781.5	7,135.7	-379.4	7,145.6	2.10	-1.16	
12,808.0	88.87	1.54	5,783.9	7,226.7	-377.7	7,236.4	1.36	0.84	
12,900.0	88.43	1.05	5,786.1	7,318.6	-375.6	7,328.2	0.72	-0.48	
12,992.0	89.24	0.72	5,787.9	7,410.6	-374.2	7,420.0	0.95	0.88	
13,084.0	91.24	1.29	5,787.6	7,502.6	-372.6	7,511.8	2.26	2.17	
13,175.0	92.18	0.82	5,784.8	7,593.5	-370.9	7,602.5	1.15	1.03	
13,266.0	91.34	1.22	5,782.0	7,684.5	-369.3	7,693.3	1.02	-0.92	
13,357.0	88.79	359.59	5,781.9	7,775.4	-368.7	7,784.2	3.33	-2.80	
13,448.0	88.10	359.35	5,784.4	7,866.4	-369.5	7,875.1	0.80	-0.76	
13,540.0	88.09	359.95	5,787.5	7,958.3	-370.1	7,966.9	0.65	-0.01	
13,632.0	88.63	0.62	5,790.1	8,050.3	-369.6	8,058.8	0.94	0.59	
13,722.0	90.32	0.95	5,790.9	8,140.3	-368.4	8,148.6	1.91	1.88	
13,860.0	89.07	356.99	5,791.7	8,278.2	-370.8	8,286.5	3.01	-0.91	Last CES Survey @ 13,860' MD
13,915.0	89.07	356.99	5,792.6	8,333.2	-373.7	8,341.5	0.00	0.00	TD - 2612' FSL, 2456' FEL - PTB @ 13,915'

Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
21B-0909A BHL - actual wellpath misses target center by 13.5usft at 13860.0usft MD (5791.7 TVD, 8278.2 N, -370.8 E) - Point	0.00	1.05	5,793.5	8,278.6	-384.3	1,557,711.46	3,450,841.99	40.852922	-103.870258
21B-0909A TGT - actual wellpath misses target center by 17.0usft at 13360.7usft MD (5782.0 TVD, 7779.2 N, -368.7 E) - Point	0.00	1.05	5,793.5	7,778.7	-381.2	1,557,211.72	3,450,854.21	40.851550	-103.870247
21B-0909A BHL P4 - actual wellpath misses target center by 23.0usft at 13860.0usft MD (5791.7 TVD, 8278.2 N, -370.8 E) - Point	0.00	1.05	5,773.0	8,278.6	-384.3	1,557,711.46	3,450,841.99	40.852922	-103.870258
21B-0909A VP P3 - actual wellpath misses target center by 13.6usft at 5115.7usft MD (5096.4 TVD, -86.4 N, -384.9 E) - Point	0.00	1.05	5,097.1	-100.0	-384.3	1,549,334.26	3,450,996.10	40.829925	-103.870258
21B-0909A VP P4 - actual wellpath misses target center by 12.5usft at 4971.6usft MD (4952.2 TVD, -87.5 N, -385.0 E) - Point	0.00	1.05	4,952.1	-100.0	-384.3	1,549,334.26	3,450,996.10	40.829925	-103.870258
21B-0909A TGT P2 - actual wellpath misses target center by 136.5usft at 13364.1usft MD (5782.1 TVD, 7782.5 N, -368.7 E) - Point	0.00	1.05	5,918.0	7,778.7	-381.2	1,557,211.72	3,450,854.21	40.851550	-103.870247
21B-0909A BHL P2 - actual wellpath misses target center by 127.0usft at 13860.0usft MD (5791.7 TVD, 8278.2 N, -370.8 E) - Point	0.00	1.05	5,918.0	8,278.6	-384.3	1,557,711.46	3,450,841.99	40.852922	-103.870258

Casing Points				
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,152.0	5,775.1	7" - 255' FSL, 2545' FEL	0	0

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
13,860.0	5,791.7	8,278.2	-370.8	Last CES Survey @ 13,860' MD
13,915.0	5,792.6	8,333.2	-373.7	TD - 2612' FSL, 2456' FEL
13,915.0	5,792.6	8,333.2	-373.7	PTB @ 13,915'

Checked By: _____ Approved By: _____ Date: _____

Whiting Petroleum Corporation

Weld County, CO

S21-T10N-R58W

Razor #21B-0909A

HZ

Design: FINAL

Survey Report - Geographic

22 October, 2014

Cathedral Energy Services

Survey Report - Geographic

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

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

Site	S21-T10N-R58W				
Site Position:		Northing:	1,549,389.39 usft	Latitude:	40.830125
From:	Lat/Long	Easting:	3,450,038.36 usft	Longitude:	-103.873714
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.05 °

Well	Razor #21B-0909A					
Well Position	+N/-S	0.0 usft	Northing:	1,549,441.31 usft	Latitude:	40.830200
	+E/-W	0.0 usft	Easting:	3,451,378.46 usft	Longitude:	-103.868869
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,837.3 usft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/10/2014	7.95	67.42	53,095

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	357.34	

Survey Program	Date	10/22/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
255.0	13,915.0	Survey #1 (HZ)	ISCWSA MWD	MWD - ISCWSA	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	1,549,441.31	3,451,378.46	40.830200	-103.868869
255.0	0.83	146.39	255.0	-1.5	1.0	1,549,439.79	3,451,379.51	40.830196	-103.868866
347.0	0.90	139.49	347.0	-2.6	1.9	1,549,438.71	3,451,380.37	40.830193	-103.868863
439.0	1.04	162.49	439.0	-4.0	2.6	1,549,437.37	3,451,381.11	40.830189	-103.868860
529.0	2.31	238.43	528.9	-5.7	1.3	1,549,435.62	3,451,379.84	40.830184	-103.868865
621.0	5.34	244.60	620.7	-8.5	-4.2	1,549,432.71	3,451,374.45	40.830177	-103.868884
713.0	5.58	247.11	712.3	-12.1	-12.2	1,549,428.99	3,451,366.53	40.830167	-103.868913
805.0	5.17	250.44	803.9	-15.2	-20.2	1,549,425.72	3,451,358.56	40.830158	-103.868942
896.0	4.72	248.05	894.6	-18.0	-27.5	1,549,422.81	3,451,351.27	40.830151	-103.868969
988.0	4.17	248.75	986.3	-20.6	-34.1	1,549,420.06	3,451,344.70	40.830143	-103.868993
1,079.0	4.16	248.71	1,077.0	-23.0	-40.3	1,549,417.55	3,451,338.58	40.830137	-103.869015
1,171.0	3.64	247.54	1,168.8	-25.4	-46.1	1,549,415.12	3,451,332.82	40.830130	-103.869036

Cathedral Energy Services

Survey Report - Geographic

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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
1,262.0	4.73	262.22	1,259.6	-27.0	-52.5	1,549,413.39	3,451,326.46	40.830126	-103.869059
1,353.0	5.39	267.83	1,350.2	-27.6	-60.5	1,549,412.57	3,451,318.49	40.830124	-103.869088
1,444.0	5.42	272.23	1,440.8	-27.6	-69.1	1,549,412.42	3,451,309.92	40.830124	-103.869119
1,535.0	5.89	273.38	1,531.4	-27.2	-78.0	1,549,412.70	3,451,300.96	40.830125	-103.869151
1,627.0	5.25	274.55	1,622.9	-26.6	-86.9	1,549,413.15	3,451,292.04	40.830127	-103.869183
1,697.0	4.77	273.93	1,692.7	-26.1	-93.0	1,549,413.49	3,451,285.94	40.830128	-103.869205
1,788.0	4.24	267.85	1,783.4	-26.0	-100.2	1,549,413.49	3,451,278.80	40.830129	-103.869231
1,880.0	6.38	260.97	1,875.0	-26.9	-108.6	1,549,412.40	3,451,270.37	40.830126	-103.869262
1,971.0	6.58	255.01	1,965.4	-29.1	-118.6	1,549,410.08	3,451,260.38	40.830120	-103.869298
2,062.0	6.19	255.70	2,055.9	-31.6	-128.4	1,549,407.34	3,451,250.64	40.830113	-103.869333
2,154.0	5.76	252.50	2,147.4	-34.2	-137.6	1,549,404.56	3,451,241.48	40.830106	-103.869367
2,246.0	5.69	248.00	2,238.9	-37.3	-146.3	1,549,401.30	3,451,232.91	40.830098	-103.869398
2,337.0	5.46	244.77	2,329.5	-40.9	-154.4	1,549,397.62	3,451,224.88	40.830088	-103.869427
2,428.0	4.71	243.59	2,420.1	-44.4	-161.6	1,549,393.98	3,451,217.68	40.830078	-103.869453
2,519.0	5.31	240.93	2,510.8	-48.1	-168.6	1,549,390.14	3,451,210.72	40.830068	-103.869479
2,610.0	5.25	257.00	2,601.4	-51.1	-176.4	1,549,387.02	3,451,203.04	40.830060	-103.869507
2,701.0	6.13	254.94	2,691.9	-53.3	-185.1	1,549,384.66	3,451,194.33	40.830054	-103.869538
2,793.0	5.21	254.50	2,783.5	-55.7	-193.9	1,549,382.10	3,451,185.61	40.830047	-103.869570
2,884.0	3.88	240.31	2,874.2	-58.3	-200.6	1,549,379.35	3,451,179.00	40.830040	-103.869594
2,975.0	5.47	252.29	2,964.9	-61.1	-207.4	1,549,376.38	3,451,172.25	40.830032	-103.869619
3,066.0	4.44	247.44	3,055.5	-63.8	-214.8	1,549,373.58	3,451,164.92	40.830025	-103.869645
3,158.0	3.57	233.63	3,147.3	-66.9	-220.3	1,549,370.41	3,451,159.38	40.830017	-103.869665
3,249.0	5.55	252.92	3,238.0	-69.8	-226.8	1,549,367.32	3,451,152.94	40.830008	-103.869689
3,340.0	5.10	245.99	3,328.6	-72.8	-234.7	1,549,364.23	3,451,145.10	40.830000	-103.869717
3,431.0	7.49	271.20	3,419.1	-74.3	-244.4	1,549,362.53	3,451,135.50	40.829996	-103.869752
3,522.0	7.81	272.14	3,509.3	-73.9	-256.5	1,549,362.67	3,451,123.39	40.829997	-103.869796
3,613.0	7.97	272.32	3,599.4	-73.5	-269.0	1,549,362.92	3,451,110.90	40.829998	-103.869841
3,704.0	7.91	270.58	3,689.6	-73.1	-281.5	1,549,363.01	3,451,098.33	40.829999	-103.869887
3,795.0	7.05	268.74	3,779.8	-73.2	-293.4	1,549,362.73	3,451,086.49	40.829999	-103.869929
3,886.0	5.92	269.91	3,870.2	-73.3	-303.6	1,549,362.41	3,451,076.22	40.829999	-103.869966
3,977.0	4.37	279.70	3,960.8	-72.7	-311.8	1,549,362.84	3,451,068.10	40.830000	-103.869996
4,069.0	3.45	286.13	4,052.6	-71.4	-317.9	1,549,364.09	3,451,061.96	40.830004	-103.870018
4,160.0	6.09	267.73	4,143.3	-70.8	-325.3	1,549,364.52	3,451,054.49	40.830006	-103.870045
4,252.0	5.71	265.87	4,234.8	-71.3	-334.8	1,549,363.82	3,451,045.06	40.830004	-103.870079
4,343.0	5.76	259.47	4,325.4	-72.5	-343.8	1,549,362.50	3,451,036.08	40.830001	-103.870111
4,434.0	5.59	254.93	4,415.9	-74.5	-352.5	1,549,360.35	3,451,027.35	40.829996	-103.870143
4,526.0	4.63	251.85	4,507.5	-76.8	-360.4	1,549,357.89	3,451,019.54	40.829989	-103.870172
4,617.0	4.19	248.46	4,598.3	-79.2	-367.0	1,549,355.40	3,451,013.00	40.829983	-103.870195
4,710.0	3.85	246.10	4,691.0	-81.7	-373.0	1,549,352.78	3,451,007.03	40.829976	-103.870217
4,801.0	3.61	244.86	4,781.9	-84.1	-378.4	1,549,350.22	3,451,001.69	40.829969	-103.870237
4,892.0	3.00	242.76	4,872.7	-86.5	-383.1	1,549,347.83	3,450,997.03	40.829963	-103.870254
4,983.0	0.36	79.85	4,963.7	-87.5	-384.9	1,549,346.76	3,450,995.21	40.829960	-103.870260
5,074.0	0.07	330.40	5,054.7	-87.4	-384.7	1,549,346.86	3,450,995.46	40.829960	-103.870259
5,166.0	5.88	350.12	5,146.5	-82.7	-385.5	1,549,351.54	3,450,994.54	40.829973	-103.870262
5,258.0	14.43	2.85	5,237.0	-66.6	-385.7	1,549,367.66	3,450,994.00	40.830017	-103.870263
5,348.0	24.91	359.15	5,321.6	-36.3	-385.5	1,549,397.89	3,450,993.72	40.830100	-103.870262
5,440.0	30.87	356.72	5,402.9	6.6	-387.1	1,549,440.83	3,450,991.29	40.830218	-103.870268
5,532.0	34.56	357.87	5,480.3	56.3	-389.4	1,549,490.44	3,450,988.06	40.830355	-103.870276
5,623.0	38.78	0.56	5,553.3	110.6	-390.1	1,549,544.73	3,450,986.38	40.830504	-103.870279
5,714.0	47.91	7.06	5,619.4	172.8	-385.7	1,549,606.97	3,450,989.68	40.830674	-103.870263
5,746.0	54.38	6.95	5,639.5	197.5	-382.6	1,549,631.75	3,450,992.26	40.830742	-103.870252
5,777.0	57.67	7.46	5,656.8	223.0	-379.4	1,549,657.30	3,450,995.01	40.830812	-103.870240
5,809.0	61.96	5.16	5,672.9	250.5	-376.4	1,549,684.84	3,450,997.53	40.830888	-103.870229
5,841.0	62.95	2.52	5,687.7	278.8	-374.5	1,549,713.17	3,450,998.91	40.830965	-103.870222
5,872.0	64.78	0.50	5,701.3	306.6	-373.8	1,549,741.00	3,450,999.13	40.831042	-103.870220

Cathedral Energy Services

Survey Report - Geographic

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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
5,904.0	66.04	359.09	5,714.7	335.7	-373.9	1,549,770.09	3,450,998.49	40.831121	-103.870220
5,935.0	68.11	357.31	5,726.7	364.2	-374.8	1,549,798.60	3,450,997.06	40.831200	-103.870223
5,967.0	71.72	356.08	5,737.7	394.2	-376.5	1,549,828.56	3,450,994.77	40.831282	-103.870230
5,999.0	73.48	357.12	5,747.3	424.7	-378.3	1,549,859.00	3,450,992.40	40.831366	-103.870236
6,030.0	76.16	357.55	5,755.4	454.6	-379.7	1,549,888.86	3,450,990.46	40.831448	-103.870241
6,062.0	77.58	356.14	5,762.7	485.7	-381.4	1,549,919.93	3,450,988.18	40.831533	-103.870248
6,094.0	81.83	355.38	5,768.4	517.1	-383.7	1,549,951.28	3,450,985.27	40.831619	-103.870256
6,197.0	87.22	355.64	5,778.2	619.3	-391.8	1,550,053.30	3,450,975.37	40.831900	-103.870285
6,292.0	88.42	356.60	5,781.8	714.0	-398.2	1,550,147.88	3,450,967.20	40.832160	-103.870308
6,387.0	90.05	358.35	5,783.1	808.9	-402.4	1,550,242.68	3,450,961.28	40.832420	-103.870323
6,482.0	91.34	0.91	5,781.9	903.9	-403.0	1,550,337.63	3,450,958.92	40.832681	-103.870325
6,576.0	89.50	0.02	5,781.3	997.9	-402.2	1,550,431.62	3,450,957.95	40.832939	-103.870323
6,671.0	90.51	0.64	5,781.2	1,092.9	-401.7	1,550,526.61	3,450,956.75	40.833200	-103.870321
6,766.0	86.57	357.94	5,783.7	1,187.8	-402.8	1,550,621.51	3,450,953.83	40.833460	-103.870325
6,861.0	89.35	0.15	5,787.0	1,282.7	-404.4	1,550,716.37	3,450,950.50	40.833721	-103.870331
6,956.0	87.47	356.75	5,789.7	1,377.6	-407.0	1,550,811.22	3,450,946.19	40.833981	-103.870340
7,051.0	88.32	357.15	5,793.2	1,472.4	-412.0	1,550,905.91	3,450,939.40	40.834241	-103.870358
7,146.0	89.13	358.73	5,795.3	1,567.3	-415.5	1,551,000.74	3,450,934.24	40.834502	-103.870371
7,241.0	90.01	359.50	5,796.0	1,662.3	-416.9	1,551,095.69	3,450,931.02	40.834763	-103.870376
7,335.0	90.42	0.91	5,795.6	1,756.3	-416.6	1,551,189.67	3,450,929.63	40.835021	-103.870375
7,430.0	90.16	0.43	5,795.2	1,851.3	-415.5	1,551,284.67	3,450,928.99	40.835281	-103.870371
7,525.0	91.90	3.40	5,793.5	1,946.2	-412.3	1,551,379.63	3,450,930.42	40.835542	-103.870359
7,620.0	91.84	1.90	5,790.4	2,041.1	-407.9	1,551,474.54	3,450,933.06	40.835802	-103.870343
7,715.0	92.53	0.97	5,786.7	2,136.0	-405.5	1,551,569.47	3,450,933.70	40.836063	-103.870335
7,810.0	91.24	2.50	5,783.6	2,230.9	-402.7	1,551,664.40	3,450,934.83	40.836323	-103.870324
7,905.0	90.88	3.38	5,781.9	2,325.7	-397.8	1,551,759.33	3,450,937.95	40.836583	-103.870307
7,999.0	87.92	2.92	5,782.8	2,419.6	-392.6	1,551,853.26	3,450,941.39	40.836841	-103.870288
8,094.0	87.48	2.00	5,786.7	2,514.4	-388.6	1,551,948.15	3,450,943.72	40.837101	-103.870273
8,189.0	87.08	1.57	5,791.2	2,609.3	-385.6	1,552,043.03	3,450,944.93	40.837362	-103.870263
8,284.0	88.55	1.38	5,794.8	2,704.2	-383.2	1,552,137.96	3,450,945.63	40.837622	-103.870254
8,379.0	90.51	359.69	5,795.6	2,799.1	-382.3	1,552,232.94	3,450,944.77	40.837883	-103.870251
8,474.0	90.55	358.96	5,794.7	2,894.1	-383.4	1,552,327.90	3,450,941.90	40.838143	-103.870255
8,569.0	90.30	358.59	5,794.0	2,989.1	-385.4	1,552,422.82	3,450,938.12	40.838404	-103.870262
8,663.0	89.45	0.74	5,794.2	3,083.1	-386.0	1,552,516.78	3,450,935.84	40.838662	-103.870264
8,758.0	87.71	359.46	5,796.5	3,178.1	-385.8	1,552,611.74	3,450,934.26	40.838923	-103.870264
8,853.0	87.40	1.09	5,800.6	3,273.0	-385.3	1,552,706.64	3,450,932.97	40.839183	-103.870262
8,948.0	89.45	2.48	5,803.2	3,367.9	-382.4	1,552,801.59	3,450,934.19	40.839444	-103.870251
9,043.0	90.74	2.27	5,803.0	3,462.8	-378.5	1,552,896.56	3,450,936.38	40.839704	-103.870237
9,137.0	89.54	0.79	5,802.8	3,556.8	-375.9	1,552,990.55	3,450,937.16	40.839962	-103.870228
9,232.0	91.53	1.75	5,801.9	3,651.7	-373.8	1,553,085.54	3,450,937.51	40.840223	-103.870220
9,327.0	91.58	1.42	5,799.3	3,746.6	-371.2	1,553,180.50	3,450,938.40	40.840483	-103.870211
9,422.0	91.30	0.68	5,797.0	3,841.6	-369.5	1,553,275.47	3,450,938.39	40.840744	-103.870205
9,517.0	91.27	0.04	5,794.8	3,936.6	-368.9	1,553,370.44	3,450,937.24	40.841005	-103.870202
9,610.0	91.66	359.62	5,792.5	4,029.5	-369.1	1,553,463.39	3,450,935.25	40.841260	-103.870203
9,704.0	89.96	358.43	5,791.1	4,123.5	-370.7	1,553,557.31	3,450,931.92	40.841518	-103.870209
9,796.0	88.38	357.64	5,792.5	4,215.4	-373.9	1,553,649.17	3,450,927.08	40.841770	-103.870221
9,887.0	89.48	358.44	5,794.2	4,306.4	-377.0	1,553,740.03	3,450,922.30	40.842020	-103.870232
9,978.0	90.93	359.27	5,793.8	4,397.4	-378.8	1,553,830.96	3,450,918.81	40.842269	-103.870238
10,069.0	91.57	0.34	5,791.8	4,488.3	-379.1	1,553,921.91	3,450,916.82	40.842519	-103.870240
10,162.0	90.40	1.08	5,790.2	4,581.3	-378.0	1,554,014.90	3,450,916.26	40.842774	-103.870235
10,254.0	90.65	0.47	5,789.4	4,673.3	-376.7	1,554,106.89	3,450,915.82	40.843027	-103.870231
10,345.0	89.39	0.84	5,789.4	4,764.3	-375.7	1,554,197.89	3,450,915.18	40.843276	-103.870227
10,436.0	88.58	0.23	5,791.0	4,855.3	-374.9	1,554,288.87	3,450,914.36	40.843526	-103.870224
10,528.0	87.83	0.10	5,793.9	4,947.2	-374.6	1,554,380.81	3,450,912.93	40.843779	-103.870223
10,620.0	88.39	359.88	5,796.9	5,039.2	-374.6	1,554,472.74	3,450,911.22	40.844031	-103.870223

Cathedral Energy Services

Survey Report - Geographic

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	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
10,711.0	89.78	359.66	5,798.4	5,130.2	-375.0	1,554,563.71	3,450,909.19	40.844281	-103.870224
10,802.0	90.27	0.61	5,798.3	5,221.2	-374.8	1,554,654.69	3,450,907.73	40.844530	-103.870224
10,893.0	90.66	0.67	5,797.6	5,312.1	-373.7	1,554,745.69	3,450,907.07	40.844780	-103.870220
10,984.0	90.37	0.16	5,796.8	5,403.1	-373.1	1,554,836.68	3,450,906.05	40.845030	-103.870218
11,075.0	89.73	358.46	5,796.7	5,494.1	-374.2	1,554,927.63	3,450,903.29	40.845280	-103.870222
11,167.0	90.74	1.22	5,796.3	5,586.1	-374.4	1,555,019.60	3,450,901.34	40.845532	-103.870223
11,258.0	90.80	0.23	5,795.1	5,677.1	-373.3	1,555,110.59	3,450,900.81	40.845782	-103.870218
11,349.0	90.69	359.84	5,793.9	5,768.1	-373.2	1,555,201.57	3,450,899.20	40.846032	-103.870218
11,440.0	90.31	359.59	5,793.1	5,859.1	-373.7	1,555,292.54	3,450,897.07	40.846281	-103.870220
11,532.0	89.88	359.91	5,792.9	5,951.1	-374.1	1,555,384.51	3,450,894.98	40.846534	-103.870221
11,623.0	91.09	0.62	5,792.2	6,042.1	-373.7	1,555,475.50	3,450,893.72	40.846784	-103.870220
11,714.0	91.01	0.21	5,790.5	6,133.1	-373.0	1,555,566.48	3,450,892.71	40.847033	-103.870217
11,805.0	90.43	359.38	5,789.4	6,224.1	-373.3	1,555,657.45	3,450,890.71	40.847283	-103.870219
11,896.0	89.46	358.75	5,789.5	6,315.0	-374.8	1,555,748.39	3,450,887.55	40.847533	-103.870224
11,987.0	91.34	359.28	5,788.8	6,406.0	-376.4	1,555,839.33	3,450,884.31	40.847782	-103.870230
12,078.0	91.25	358.66	5,786.8	6,497.0	-378.0	1,555,930.24	3,450,881.01	40.848032	-103.870236
12,169.0	91.89	358.22	5,784.3	6,587.9	-380.5	1,556,021.12	3,450,876.86	40.848282	-103.870245
12,260.0	90.04	358.76	5,782.7	6,678.9	-382.9	1,556,112.01	3,450,872.79	40.848531	-103.870253
12,351.0	90.68	0.52	5,782.2	6,769.9	-383.5	1,556,202.97	3,450,870.54	40.848781	-103.870255
12,443.0	90.16	358.60	5,781.5	6,861.8	-384.2	1,556,294.94	3,450,868.14	40.849034	-103.870258
12,534.0	91.68	1.27	5,780.0	6,952.8	-384.3	1,556,385.90	3,450,866.37	40.849283	-103.870258
12,626.0	89.17	2.15	5,779.3	7,044.8	-381.5	1,556,477.88	3,450,867.42	40.849536	-103.870248
12,717.0	88.11	0.56	5,781.5	7,135.7	-379.4	1,556,568.85	3,450,867.90	40.849785	-103.870241
12,808.0	88.87	1.54	5,783.9	7,226.7	-377.7	1,556,659.81	3,450,867.89	40.850035	-103.870234
12,900.0	88.43	1.05	5,786.1	7,318.6	-375.6	1,556,751.79	3,450,868.28	40.850287	-103.870227
12,992.0	89.24	0.72	5,787.9	7,410.6	-374.2	1,556,843.77	3,450,868.01	40.850540	-103.870222
13,084.0	91.24	1.29	5,787.6	7,502.6	-372.6	1,556,935.76	3,450,867.93	40.850792	-103.870216
13,175.0	92.18	0.82	5,784.8	7,593.5	-370.9	1,557,026.72	3,450,867.93	40.851042	-103.870210
13,266.0	91.34	1.22	5,782.0	7,684.5	-369.3	1,557,117.67	3,450,867.88	40.851291	-103.870204
13,357.0	88.79	359.59	5,781.9	7,775.4	-368.7	1,557,208.66	3,450,866.85	40.851541	-103.870202
13,448.0	88.10	359.35	5,784.4	7,866.4	-369.5	1,557,299.59	3,450,864.33	40.851791	-103.870205
13,540.0	88.09	359.95	5,787.5	7,958.3	-370.1	1,557,391.51	3,450,862.08	40.852043	-103.870207
13,632.0	88.63	0.62	5,790.1	8,050.3	-369.6	1,557,483.46	3,450,860.85	40.852295	-103.870205
13,722.0	90.32	0.95	5,790.9	8,140.3	-368.4	1,557,573.46	3,450,860.42	40.852542	-103.870201
13,860.0	89.07	356.99	5,791.7	8,278.2	-370.8	1,557,711.33	3,450,855.41	40.852921	-103.870210
Last CES Survey @ 13,860' MD									
13,915.0	89.07	356.99	5,792.6	8,333.2	-373.7	1,557,766.19	3,450,851.51	40.853072	-103.870220
TD - 2612' FSL, 2456' FEL - PTB @ 13,915'									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
21B-0909A VP P4	0.00	1.05	4,952.1	-100.0	-384.3	1,549,334.26	3,450,996.09	40.829926	-103.870258
- hit/miss target									
- Shape									
- actual wellpath misses target center by 12.5usft at 4971.6usft MD (4952.2 TVD, -87.5 N, -385.0 E)									
- Point									
21B-0909A BHL P4	0.00	1.05	5,773.0	8,278.6	-384.3	1,557,711.47	3,450,841.98	40.852922	-103.870258
- hit/miss target									
- Shape									
- actual wellpath misses target center by 23.0usft at 13860.0usft MD (5791.7 TVD, 8278.2 N, -370.8 E)									
- Point									

Cathedral Energy Services

Survey Report - Geographic

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #21B-0909A
Project:	Weld County, CO	TVD Reference:	KB=17 @ 4854.3usft
Site:	S21-T10N-R58W	MD Reference:	KB=17 @ 4854.3usft
Well:	Razor #21B-0909A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
6,152.0	5,775.1	7" - 255' FSL, 2545' FEL	0	0	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
13,860.0	5,791.7	8,278.2	-370.8	Last CES Survey @ 13,860' MD	
13,915.0	5,792.6	8,333.2	-373.7	TD - 2612' FSL, 2456' FEL	
13,915.0	5,792.6	8,333.2	-373.7	PTB @ 13,915'	

Checked By: _____ Approved By: _____ Date: _____