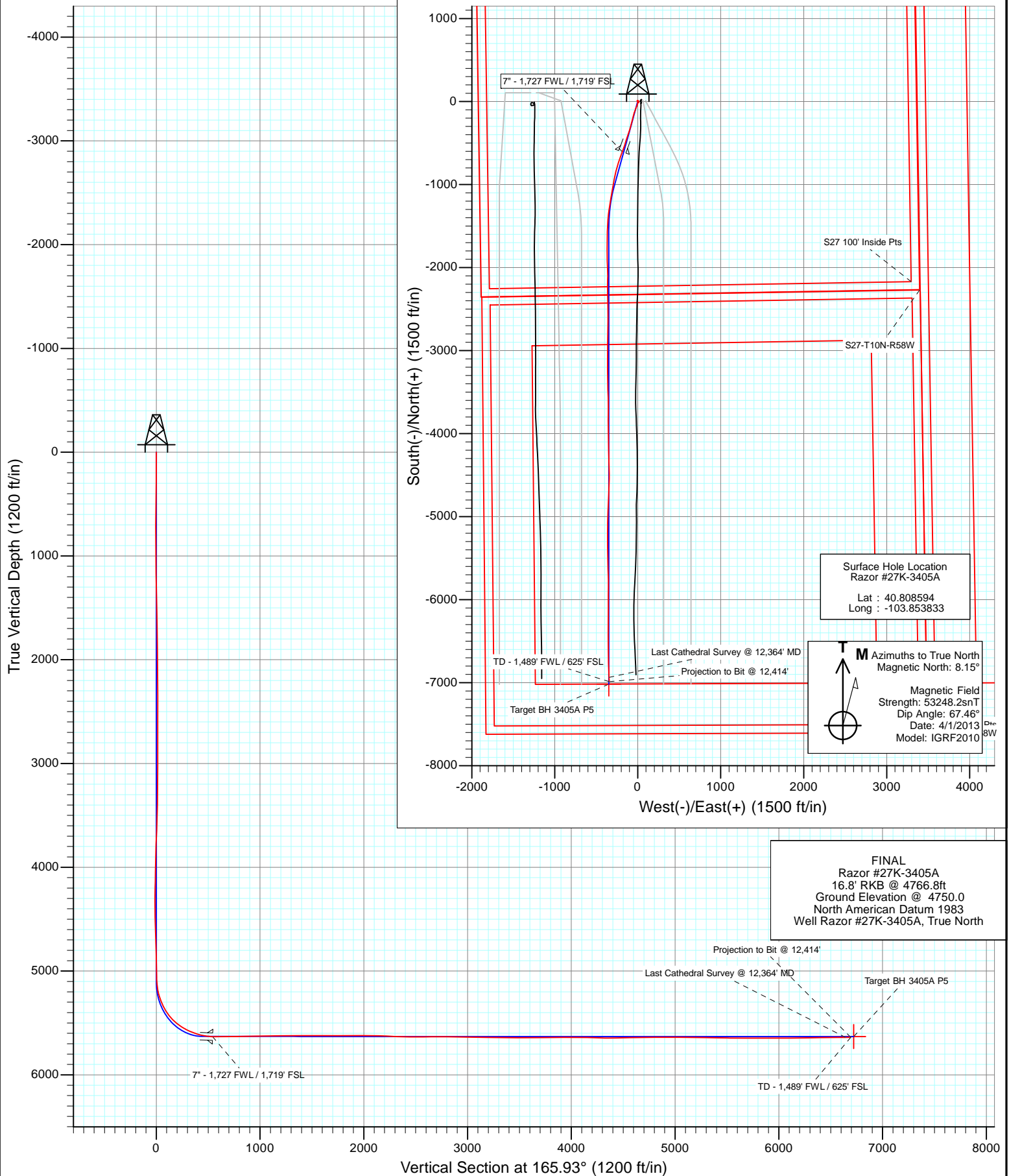


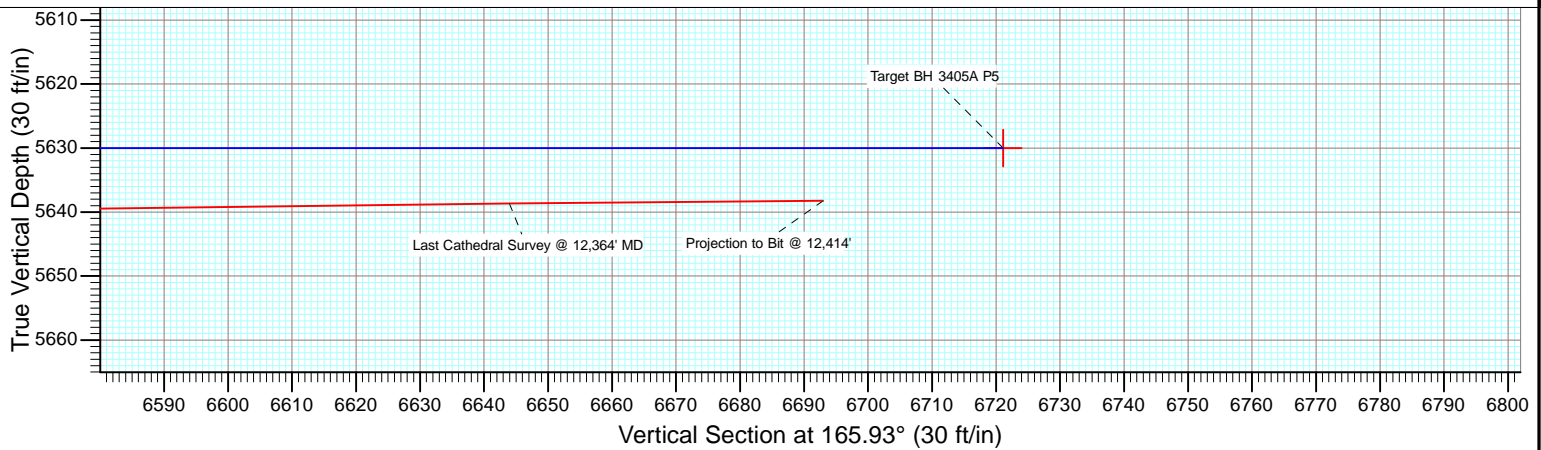
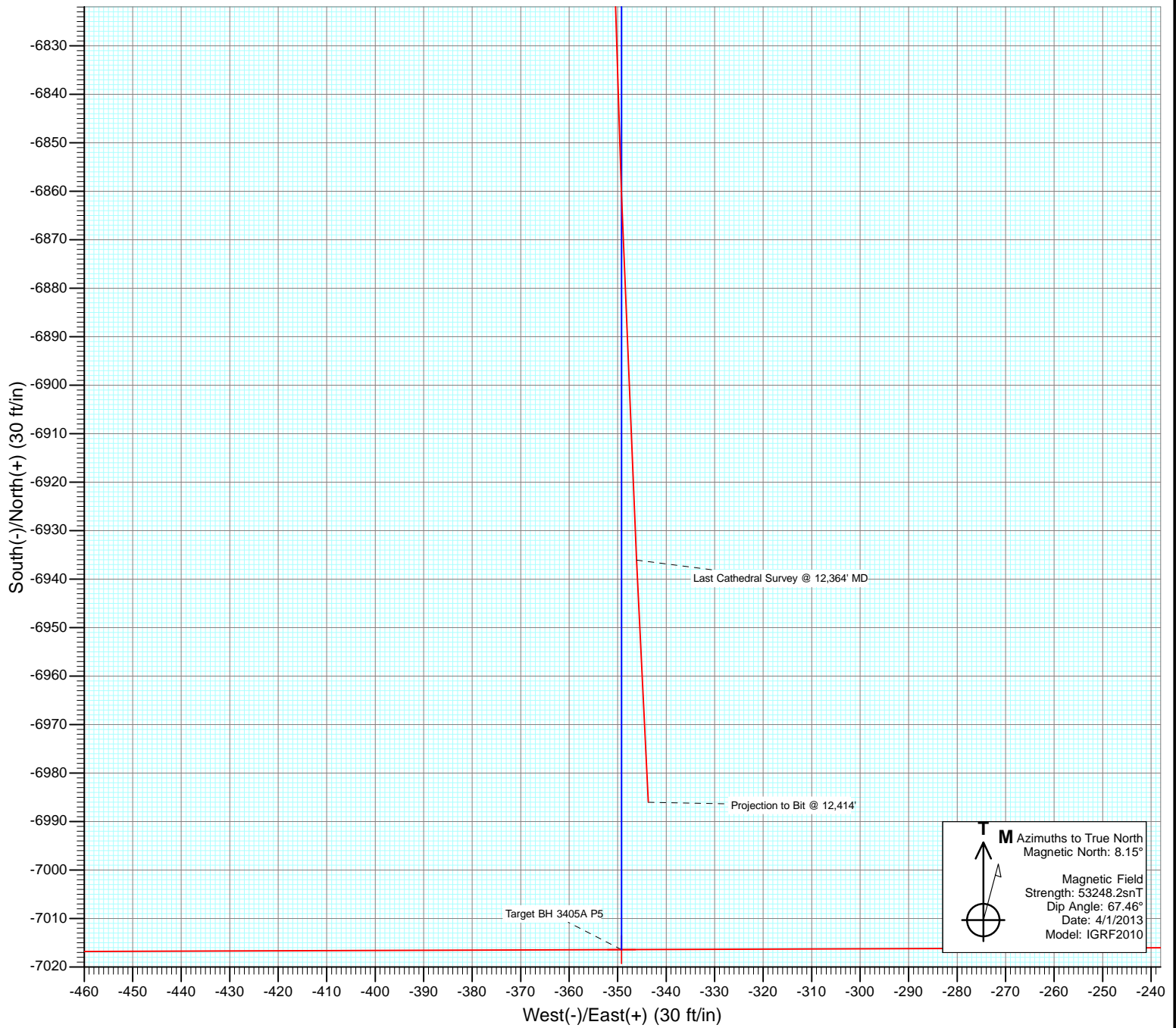


Project: Weld County, CO
Site: S27-T10N-R58W
Well: Razor #27K-3405A
Wellbore: HZ
Design: FINAL





Project: Weld County, CO
Site: S27-T10N-R58W
Well: Razor #27K-3405A
Wellbore: HZ
Design: FINAL



Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #27K-3405A
Project:	Weld County, CO	TVD Reference:	16.8' RKB @ 4766.8ft
Site:	S27-T10N-R58W	MD Reference:	16.8' RKB @ 4766.8ft
Well:	Razor #27K-3405A	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		S27-T10N-R58W			
Site Position:		Northing:	1,541,650.73 ft	Latitude:	40.808594
From:	Lat/Long	Easting:	3,455,691.89 ft	Longitude:	-103.853833
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	1.06 °

Well	Razor #27K-3405A					
Well Position	+N/-S	0.0 ft	Northing:	1,541,650.71 ft	Latitude:	40.808594
	+E/-W	0.0 ft	Easting:	3,455,691.89 ft	Longitude:	-103.853833
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,750.0 ft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/1/2013	8.15	67.46	53,248

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	165.93	

Survey Program	Date	8/27/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
284.0	12,414.0	Survey #1 (HZ)	ISCWSA MWD	MWD - ISCWSA	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
284.0	0.70	330.30	284.0	1.5	-0.9	-1.7	0.25	0.25		
711.0	0.50	14.60	711.0	5.6	-1.7	-5.8	0.11	-0.05		
1,169.0	1.20	162.70	1,168.9	2.9	0.2	-2.8	0.36	0.15		
1,550.0	1.20	183.10	1,549.9	-4.9	1.2	5.0	0.11	0.00		
1,671.0	0.80	165.10	1,670.8	-6.9	1.4	7.1	0.42	-0.33		
1,762.0	0.50	202.60	1,761.8	-7.9	1.4	8.0	0.56	-0.33		
1,853.0	0.60	213.90	1,852.8	-8.7	1.0	8.7	0.16	0.11		
1,944.0	1.50	192.00	1,943.8	-10.2	0.4	10.0	1.07	0.99		
2,035.0	0.70	120.60	2,034.8	-11.7	0.7	11.5	1.58	-0.88		
2,126.0	0.90	109.10	2,125.8	-12.2	1.8	12.3	0.28	0.22		
2,218.0	0.50	91.70	2,217.8	-12.5	2.9	12.8	0.49	-0.43		
2,308.0	0.40	91.30	2,307.8	-12.5	3.6	13.0	0.11	-0.11		

Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #27K-3405A
Project:	Weld County, CO	TVD Reference:	16.8' RKB @ 4766.8ft
Site:	S27-T10N-R58W	MD Reference:	16.8' RKB @ 4766.8ft
Well:	Razor #27K-3405A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
2,400.0	0.60	92.40	2,399.8	-12.5	4.4	13.2	0.22	0.22	
2,491.0	1.20	64.20	2,490.8	-12.1	5.8	13.1	0.80	0.66	
2,582.0	1.50	66.40	2,581.7	-11.2	7.7	12.8	0.33	0.33	
2,674.0	0.10	45.40	2,673.7	-10.7	8.9	12.5	1.53	-1.52	
2,765.0	0.10	83.80	2,764.7	-10.6	9.0	12.5	0.07	0.00	
2,857.0	0.20	32.60	2,856.7	-10.5	9.2	12.4	0.17	0.11	
2,948.0	0.20	58.60	2,947.7	-10.3	9.4	12.2	0.10	0.00	
3,040.0	0.50	123.00	3,039.7	-10.4	9.9	12.5	0.49	0.33	
3,132.0	0.60	164.50	3,131.7	-11.1	10.3	13.3	0.44	0.11	
3,224.0	1.20	4.50	3,223.7	-10.6	10.5	12.8	1.93	0.65	
3,315.0	1.10	22.10	3,314.7	-8.8	10.9	11.2	0.40	-0.11	
3,407.0	1.30	27.20	3,406.7	-7.1	11.7	9.7	0.25	0.22	
3,499.0	1.30	23.70	3,498.7	-5.2	12.6	8.1	0.09	0.00	
3,591.0	2.70	337.50	3,590.6	-2.2	12.2	5.1	2.21	1.52	
3,682.0	2.60	345.30	3,681.5	1.7	10.9	1.0	0.41	-0.11	
3,774.0	2.20	358.30	3,773.4	5.5	10.3	-2.9	0.73	-0.43	
3,866.0	1.80	297.80	3,865.4	8.0	9.0	-5.5	2.22	-0.43	
3,957.0	1.50	292.30	3,956.3	9.1	6.6	-7.2	0.37	-0.33	
4,049.0	1.60	287.90	4,048.3	9.9	4.3	-8.6	0.17	0.11	
4,140.0	1.70	290.00	4,139.3	10.8	1.8	-10.0	0.13	0.11	
4,232.0	1.70	291.00	4,231.2	11.7	-0.8	-11.6	0.03	0.00	
4,323.0	1.80	291.70	4,322.2	12.8	-3.3	-13.2	0.11	0.11	
4,415.0	1.10	217.70	4,414.2	12.6	-5.2	-13.5	1.99	-0.76	
4,506.0	1.40	200.00	4,505.1	10.9	-6.1	-12.0	0.53	0.33	
4,597.0	1.50	199.90	4,596.1	8.7	-6.9	-10.1	0.11	0.11	
4,689.0	3.00	138.80	4,688.1	5.7	-5.8	-7.0	2.85	1.63	
4,781.0	3.30	138.30	4,779.9	2.0	-2.4	-2.5	0.33	0.33	
4,872.0	1.50	105.60	4,870.8	-0.3	0.5	0.4	2.41	-1.98	
4,964.0	1.10	116.20	4,962.8	-1.0	2.4	1.6	0.51	-0.43	
5,056.0	1.10	127.50	5,054.8	-2.0	3.9	2.9	0.24	0.00	
5,118.0	5.20	188.90	5,116.7	-5.1	4.0	5.9	7.70	6.61	
5,148.0	7.50	194.30	5,146.5	-8.3	3.3	8.9	7.91	7.67	
5,179.0	11.20	197.20	5,177.1	-13.2	1.9	13.2	12.03	11.94	
5,209.0	14.50	196.00	5,206.3	-19.6	0.0	19.0	11.04	11.00	
5,239.0	18.20	196.10	5,235.1	-27.7	-2.4	26.3	12.33	12.33	
5,270.0	22.90	197.70	5,264.1	-38.1	-5.5	35.6	15.27	15.16	
5,300.0	26.90	199.90	5,291.3	-50.0	-9.6	46.2	13.68	13.33	
5,331.0	29.60	202.00	5,318.7	-63.7	-14.9	58.2	9.28	8.71	
5,361.0	31.20	202.20	5,344.5	-77.8	-20.6	70.5	5.34	5.33	
5,392.0	34.20	201.40	5,370.6	-93.3	-26.8	84.0	9.78	9.68	
5,422.0	37.50	200.70	5,394.9	-109.7	-33.1	98.4	11.08	11.00	
5,452.0	41.40	198.90	5,418.1	-127.7	-39.5	114.2	13.55	13.00	
5,483.0	44.80	197.30	5,440.7	-147.8	-46.1	132.2	11.52	10.97	
5,514.0	48.10	195.20	5,462.1	-169.4	-52.4	151.6	11.72	10.65	
5,544.0	51.70	193.90	5,481.4	-191.6	-58.1	171.7	12.45	12.00	
5,575.0	55.20	194.50	5,499.9	-215.7	-64.3	193.6	11.40	11.29	
5,605.0	56.70	194.20	5,516.7	-239.8	-70.4	215.5	5.07	5.00	
5,635.0	58.60	193.80	5,532.7	-264.4	-76.6	237.9	6.43	6.33	
5,666.0	61.20	194.80	5,548.2	-290.4	-83.2	261.5	8.84	8.39	
5,696.0	65.50	196.40	5,561.7	-316.2	-90.4	284.7	15.10	14.33	
5,727.0	69.20	197.90	5,573.6	-343.5	-98.8	309.2	12.74	11.94	
5,757.0	71.10	197.80	5,583.8	-370.4	-107.5	333.1	6.34	6.33	
5,787.0	72.10	197.70	5,593.3	-397.5	-116.2	357.3	3.35	3.33	

Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #27K-3405A
Project:	Weld County, CO	TVD Reference:	16.8' RKB @ 4766.8ft
Site:	S27-T10N-R58W	MD Reference:	16.8' RKB @ 4766.8ft
Well:	Razor #27K-3405A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
5,818.0	73.10	198.30	5,602.6	-425.6	-125.3	382.4	3.72	3.23	
5,848.0	75.40	197.90	5,610.7	-453.1	-134.3	406.8	7.77	7.67	
5,879.0	78.90	197.90	5,617.6	-481.8	-143.6	432.5	11.29	11.29	
5,910.0	82.50	198.50	5,622.6	-510.9	-153.1	458.3	11.77	11.61	
5,930.0	82.90	198.50	5,625.2	-529.7	-159.4	475.1	2.00	2.00	
5,974.0	85.10	198.60	5,629.8	-571.2	-173.3	511.9	5.01	5.00	
6,020.0	89.20	200.90	5,632.0	-614.4	-188.8	550.1	10.22	8.91	
6,115.0	90.80	200.00	5,632.0	-703.4	-222.0	628.3	1.93	1.68	
6,210.0	90.20	195.00	5,631.2	-794.0	-250.6	709.3	5.30	-0.63	
6,305.0	91.80	191.80	5,629.6	-886.4	-272.6	793.5	3.77	1.68	
6,399.0	91.00	191.10	5,627.3	-978.5	-291.3	878.3	1.13	-0.85	
6,494.0	89.50	189.10	5,626.8	-1,072.0	-307.9	965.0	2.63	-1.58	
6,589.0	90.80	189.80	5,626.6	-1,165.7	-323.5	1,052.1	1.55	1.37	
6,684.0	91.50	189.00	5,624.7	-1,259.4	-339.0	1,139.2	1.12	0.74	
6,779.0	91.10	187.20	5,622.5	-1,353.4	-352.4	1,227.2	1.94	-0.42	
6,874.0	89.40	181.90	5,622.1	-1,448.1	-359.9	1,317.2	5.86	-1.79	
6,969.0	90.50	184.30	5,622.2	-1,542.9	-365.1	1,407.9	2.78	1.16	
7,063.0	89.80	179.70	5,622.0	-1,636.9	-368.4	1,498.2	4.95	-0.74	
7,158.0	89.80	179.70	5,622.3	-1,731.9	-367.9	1,590.5	0.00	0.00	
7,253.0	90.00	179.40	5,622.4	-1,826.9	-367.1	1,682.8	0.38	0.21	
7,348.0	90.20	179.90	5,622.3	-1,921.8	-366.5	1,775.1	0.57	0.21	
7,439.0	89.80	177.30	5,622.3	-2,012.8	-364.3	1,863.9	2.89	-0.44	
7,531.0	89.80	179.80	5,622.6	-2,104.8	-362.0	1,953.7	2.72	0.00	
7,622.0	90.50	182.30	5,622.4	-2,195.8	-363.7	2,041.5	2.85	0.77	
7,714.0	88.40	178.40	5,623.2	-2,287.7	-364.2	2,130.6	4.81	-2.28	
7,805.0	87.70	178.20	5,626.3	-2,378.6	-361.5	2,219.4	0.80	-0.77	
7,897.0	87.30	179.20	5,630.4	-2,470.5	-359.4	2,309.1	1.17	-0.43	
7,988.0	88.70	179.60	5,633.5	-2,561.5	-358.5	2,397.5	1.60	1.54	
8,079.0	89.90	180.30	5,634.6	-2,652.4	-358.4	2,485.8	1.53	1.32	
8,170.0	90.20	180.80	5,634.6	-2,743.4	-359.3	2,573.8	0.64	0.33	
8,261.0	90.80	181.20	5,633.8	-2,834.4	-360.9	2,661.7	0.79	0.66	
8,352.0	90.30	180.90	5,632.9	-2,925.4	-362.5	2,749.6	0.64	-0.55	
8,444.0	90.10	181.10	5,632.6	-3,017.4	-364.1	2,838.4	0.31	-0.22	
8,534.0	88.70	179.40	5,633.5	-3,107.4	-364.5	2,925.6	2.45	-1.56	
8,626.0	87.90	179.60	5,636.2	-3,199.3	-363.7	3,015.0	0.90	-0.87	
8,717.0	89.50	179.50	5,638.3	-3,290.3	-363.0	3,103.4	1.76	1.76	
8,808.0	89.70	179.00	5,638.9	-3,381.3	-361.8	3,191.9	0.59	0.22	
8,900.0	89.20	178.40	5,639.8	-3,473.3	-359.7	3,281.7	0.85	-0.54	
8,991.0	89.30	178.60	5,641.0	-3,564.2	-357.3	3,370.5	0.25	0.11	
9,083.0	89.80	179.60	5,641.7	-3,656.2	-355.9	3,460.0	1.22	0.54	
9,175.0	90.20	180.50	5,641.7	-3,748.2	-356.0	3,549.3	1.07	0.43	
9,266.0	89.20	179.60	5,642.2	-3,839.2	-356.1	3,637.5	1.48	-1.10	
9,358.0	91.20	179.60	5,641.9	-3,931.2	-355.4	3,726.9	2.17	2.17	
9,450.0	90.90	179.00	5,640.2	-4,023.2	-354.3	3,816.4	0.73	-0.33	
9,542.0	91.20	179.10	5,638.5	-4,115.1	-352.8	3,906.0	0.34	0.33	
9,634.0	89.90	178.10	5,637.6	-4,207.1	-350.5	3,995.7	1.78	-1.41	
9,725.0	89.00	178.80	5,638.5	-4,298.1	-348.1	4,084.6	1.25	-0.99	
9,817.0	88.40	178.20	5,640.6	-4,390.0	-345.7	4,174.3	0.92	-0.65	
9,909.0	88.40	179.00	5,643.2	-4,482.0	-343.4	4,264.1	0.87	0.00	
10,000.0	89.50	181.50	5,644.8	-4,572.9	-343.8	4,352.2	3.00	1.21	
10,092.0	91.30	182.70	5,644.2	-4,664.9	-347.2	4,440.6	2.35	1.96	
10,183.0	91.20	182.70	5,642.2	-4,755.7	-351.5	4,527.7	0.11	-0.11	
10,275.0	90.80	181.90	5,640.6	-4,847.6	-355.2	4,615.9	0.97	-0.43	

Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #27K-3405A
Project:	Weld County, CO	TVD Reference:	16.8' RKB @ 4766.8ft
Site:	S27-T10N-R58W	MD Reference:	16.8' RKB @ 4766.8ft
Well:	Razor #27K-3405A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
10,367.0	91.20	182.30	5,639.0	-4,939.6	-358.5	4,704.3	0.61	0.43	
10,459.0	90.80	181.80	5,637.4	-5,031.5	-361.8	4,792.7	0.70	-0.43	
10,549.0	89.70	180.20	5,637.0	-5,121.5	-363.4	4,879.6	2.16	-1.22	
10,641.0	89.70	180.30	5,637.5	-5,213.5	-363.8	4,968.7	0.11	0.00	
10,732.0	89.20	179.50	5,638.4	-5,304.5	-363.6	5,057.0	1.04	-0.55	
10,824.0	89.60	179.80	5,639.3	-5,396.5	-363.1	5,146.4	0.54	0.43	
10,915.0	89.50	178.80	5,640.0	-5,487.5	-362.0	5,234.9	1.10	-0.11	
11,007.0	89.40	178.50	5,640.9	-5,579.4	-359.8	5,324.6	0.34	-0.11	
11,099.0	88.90	177.90	5,642.3	-5,671.4	-356.9	5,414.5	0.85	-0.54	
11,191.0	88.70	178.30	5,644.2	-5,763.3	-353.8	5,504.4	0.49	-0.22	
11,282.0	89.90	181.20	5,645.3	-5,854.3	-353.5	5,592.8	3.45	1.32	
11,374.0	89.80	180.20	5,645.6	-5,946.3	-354.6	5,681.8	1.09	-0.11	
11,466.0	90.10	180.10	5,645.6	-6,038.3	-354.8	5,770.9	0.34	0.33	
11,557.0	89.80	180.10	5,645.7	-6,129.3	-355.0	5,859.2	0.33	-0.33	
11,648.0	90.20	180.40	5,645.7	-6,220.3	-355.4	5,947.3	0.55	0.44	
11,740.0	90.40	180.20	5,645.2	-6,312.3	-355.9	6,036.5	0.31	0.22	
11,831.0	90.60	180.50	5,644.5	-6,403.3	-356.4	6,124.6	0.40	0.22	
11,922.0	90.40	179.50	5,643.7	-6,494.3	-356.4	6,212.9	1.12	-0.22	
12,014.0	90.60	179.40	5,642.9	-6,586.2	-355.5	6,302.3	0.24	0.22	
12,105.0	90.80	179.00	5,641.7	-6,677.2	-354.3	6,390.9	0.49	0.22	
12,196.0	90.50	178.30	5,640.7	-6,768.2	-352.1	6,479.6	0.84	-0.33	
12,288.0	90.90	178.10	5,639.6	-6,860.1	-349.2	6,569.5	0.49	0.43	
12,364.0	90.50	177.20	5,638.7	-6,936.1	-346.1	6,643.9	1.30	-0.53	Last Cathedral Survey @ 12,364' MD Projection to Bit @ 12,414'
12,414.0	90.50	177.20	5,638.2	-6,986.0	-343.7	6,693.0	0.00	0.00	

Cathedral Energy Services

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #27K-3405A
Project:	Weld County, CO	TVD Reference:	16.8' RKB @ 4766.8ft
Site:	S27-T10N-R58W	MD Reference:	16.8' RKB @ 4766.8ft
Well:	Razor #27K-3405A	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
PBHL 3405A	0.00	1.06	5,667.3	-7,516.3	-343.9	1,534,129.34	3,455,487.55	40.787964	-103.855075
- actual wellpath misses target center by 531.1ft at 12414.0ft MD (5638.2 TVD, -6986.0 N, -343.7 E)									
- Point									
Target BH 3405A P5	0.00	1.06	5,630.0	-7,016.4	-349.2	1,534,629.03	3,455,473.01	40.789336	-103.855094
- actual wellpath misses target center by 32.0ft at 12414.0ft MD (5638.2 TVD, -6986.0 N, -343.7 E)									
- Point									
Target BH 3405A	0.00	1.06	5,667.3	-7,016.4	-349.2	1,534,629.03	3,455,473.01	40.789336	-103.855094
- actual wellpath misses target center by 42.4ft at 12414.0ft MD (5638.2 TVD, -6986.0 N, -343.7 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name		
(ft)	(ft)		Casing Diameter	Hole Diameter
			(in)	(in)
6,010.0	5,631.8	7" -		

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S	+E/-W	
		(ft)	(ft)	
12,364.0	5,638.7	-6,936.1	-346.1	Last Cathedral Survey @ 12,364' MD
12,414.0	5,638.2	-6,986.0	-343.7	Projection to Bit @ 12,414'

Checked By: _____ Approved By: _____ Date: _____