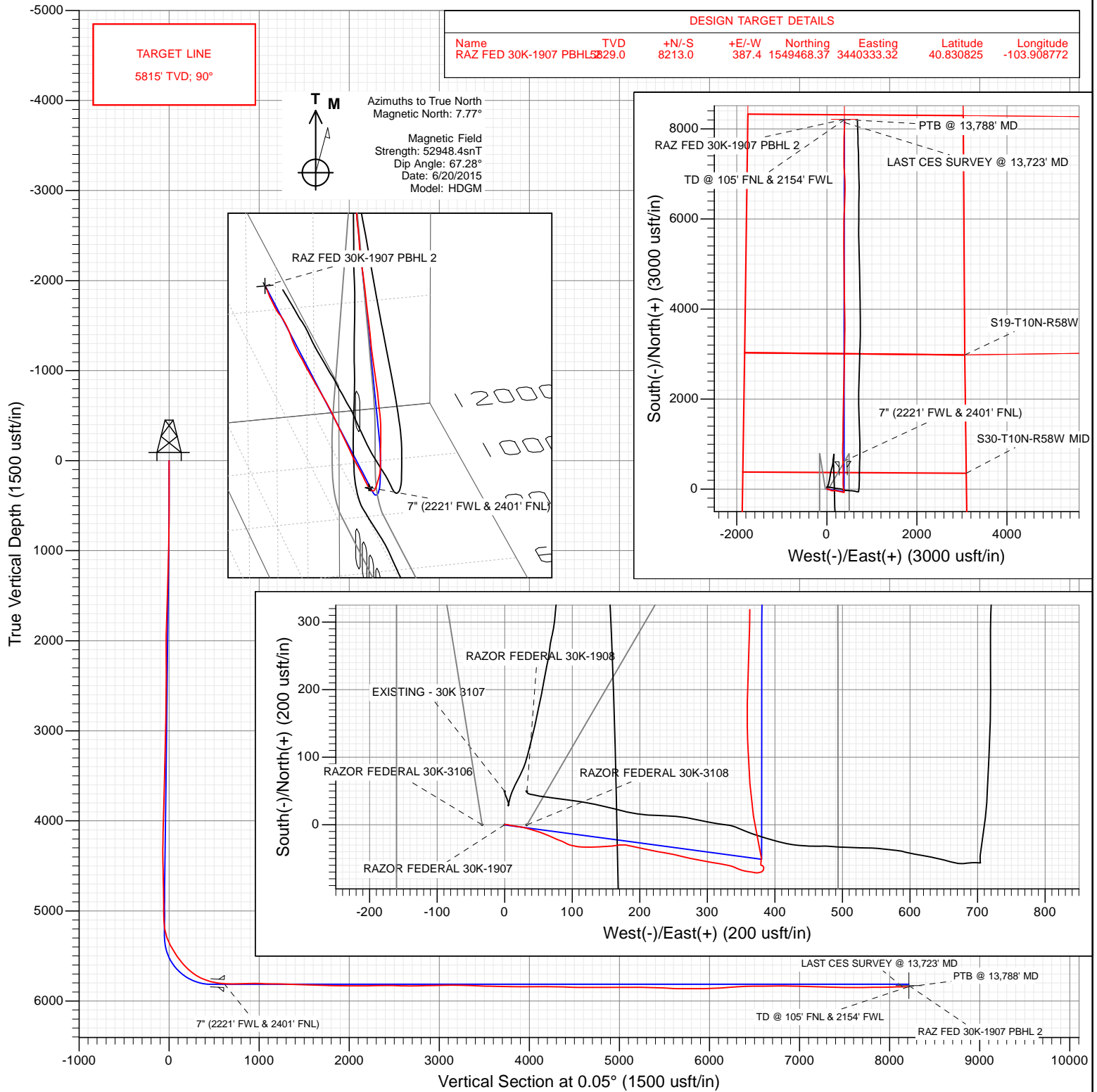




Project: Weld County, CO
 Site: S30-T10N-R58W
 Well: RAZOR FEDERAL 30K-1907
 Wellbore: OH
 Design: FINAL



WELL DETAILS: RAZOR FEDERAL 30K-1907

Ground Level: 4828.2
 +N/-S 0.0 +E/-W 0.0 Northing 1541249.78 Easting 3440093.19 Latitude 40.808283 Longitude -103.910172



Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-1907
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-1907	North Reference:	True
Wellbore:	OH	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		S30-T10N-R58W			
Site Position:		Northing:	1,541,302.42 usft	Latitude:	40.808492
From:	Lat/Long	Easting:	3,438,779.30 usft	Longitude:	-103.914914
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.02 °

Well		RAZOR FEDERAL 30K-1907				
Well Position	+N/-S	0.0 usft	Northing:	1,541,249.78 usft	Latitude:	40.808283
	+E/-W	0.0 usft	Easting:	3,440,093.19 usft	Longitude:	-103.910172
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,828.2 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/20/2015	7.77	67.28	52,948

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	0.05	

Survey Program	Date	6/30/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
165.0	13,788.0	Survey #1 (OH)	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		
165.0	0.42	76.45	165.0	0.1	0.6	0.1	0.25	0.25		
258.0	0.13	76.85	258.0	0.2	1.0	0.2	0.31	-0.31		
351.0	0.64	80.65	351.0	0.4	1.6	0.4	0.55	0.55		
445.0	0.40	88.90	445.0	0.4	2.5	0.4	0.27	-0.26		
538.0	0.58	97.14	538.0	0.4	3.3	0.4	0.21	0.19		
630.0	2.72	101.99	629.9	-0.1	5.9	-0.1	2.33	2.33		
723.0	5.05	98.97	722.7	-1.2	12.1	-1.2	2.51	2.51		
817.0	5.51	99.79	816.3	-2.6	20.6	-2.6	0.50	0.49		
910.0	4.53	102.33	909.0	-4.2	28.6	-4.1	1.08	-1.05		
1,004.0	3.97	106.04	1,002.7	-5.9	35.4	-5.8	0.66	-0.60		
1,097.0	3.28	106.70	1,095.5	-7.5	41.0	-7.5	0.74	-0.74		
1,191.0	4.94	106.64	1,189.3	-9.4	47.4	-9.4	1.77	1.77		

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-1907
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-1907	North Reference:	True
Wellbore:	OH	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
1,284.0	5.99	109.72	1,281.9	-12.2	55.9	-12.2	1.17	1.13	
1,378.0	5.26	113.77	1,375.4	-15.6	64.4	-15.6	0.88	-0.78	
1,471.0	4.31	114.78	1,468.1	-18.8	71.5	-18.7	1.03	-1.02	
1,540.0	3.85	115.24	1,536.9	-20.9	75.9	-20.8	0.67	-0.67	
1,565.0	3.71	114.23	1,561.8	-21.6	77.4	-21.5	0.62	-0.56	
1,672.0	3.37	106.30	1,668.6	-23.9	83.6	-23.8	0.56	-0.32	
1,764.0	6.05	120.01	1,760.3	-27.1	90.4	-27.0	3.14	2.91	
1,858.0	8.62	102.38	1,853.6	-31.0	101.6	-31.0	3.60	2.73	
1,951.0	7.70	93.12	1,945.6	-32.9	114.6	-32.8	1.72	-0.99	
2,045.0	7.24	88.58	2,038.8	-33.1	126.8	-33.0	0.80	-0.49	
2,138.0	7.00	87.42	2,131.1	-32.7	138.3	-32.6	0.30	-0.26	
2,232.0	6.80	86.75	2,224.4	-32.1	149.6	-32.0	0.23	-0.21	
2,325.0	5.92	83.66	2,316.9	-31.3	159.9	-31.1	1.01	-0.95	
2,419.0	5.59	78.63	2,410.4	-29.8	169.2	-29.7	0.64	-0.35	
2,512.0	6.00	100.17	2,502.9	-29.8	178.4	-29.6	2.36	0.44	
2,606.0	5.94	102.29	2,596.4	-31.7	188.0	-31.5	0.24	-0.06	
2,700.0	6.19	101.90	2,689.9	-33.8	197.7	-33.6	0.27	0.27	
2,793.0	6.40	101.50	2,782.3	-35.8	207.7	-35.7	0.23	0.23	
2,887.0	5.99	101.14	2,875.8	-37.8	217.6	-37.6	0.44	-0.44	
2,980.0	5.11	101.76	2,968.3	-39.6	226.5	-39.4	0.95	-0.95	
3,074.0	5.16	99.14	3,062.0	-41.1	234.7	-40.9	0.26	0.05	
3,167.0	4.13	97.17	3,154.6	-42.2	242.2	-42.0	1.12	-1.11	
3,261.0	6.75	104.66	3,248.2	-44.0	250.9	-43.8	2.88	2.79	
3,354.0	7.17	103.44	3,340.5	-46.8	261.8	-46.5	0.48	0.45	
3,448.0	7.12	101.03	3,433.8	-49.3	273.2	-49.0	0.32	-0.05	
3,541.0	6.96	101.22	3,526.1	-51.5	284.4	-51.2	0.17	-0.17	
3,635.0	7.38	100.82	3,619.4	-53.7	295.9	-53.4	0.45	0.45	
3,728.0	7.37	100.02	3,711.6	-55.9	307.7	-55.6	0.11	-0.01	
3,822.0	7.06	98.90	3,804.9	-57.8	319.3	-57.5	0.36	-0.33	
3,915.0	6.65	102.24	3,897.2	-59.8	330.2	-59.5	0.61	-0.44	
4,009.0	5.32	109.74	3,990.7	-62.4	339.7	-62.2	1.64	-1.41	
4,103.0	4.75	117.86	4,084.3	-65.7	347.2	-65.4	0.97	-0.61	
4,196.0	6.55	99.19	4,176.9	-68.4	355.8	-68.1	2.74	1.94	
4,290.0	6.60	99.92	4,270.2	-70.2	366.5	-69.9	0.10	0.05	
4,383.0	4.16	91.01	4,362.8	-71.2	375.1	-70.8	2.77	-2.62	
4,477.0	3.07	51.35	4,456.7	-69.6	380.5	-69.3	2.83	-1.16	
4,570.0	1.32	26.20	4,549.6	-67.1	382.9	-66.8	2.10	-1.88	
4,664.0	1.32	7.55	4,643.6	-65.1	383.5	-64.7	0.46	0.00	
4,758.0	1.15	349.95	4,737.5	-63.1	383.5	-62.7	0.44	-0.18	
4,851.0	1.26	319.94	4,830.5	-61.4	382.7	-61.0	0.68	0.12	
4,945.0	1.15	297.19	4,924.5	-60.2	381.2	-59.8	0.52	-0.12	
5,038.0	1.12	256.03	5,017.5	-59.9	379.4	-59.6	0.86	-0.03	
5,132.0	2.61	18.87	5,111.5	-58.1	379.2	-57.8	3.57	1.59	
5,226.0	9.56	359.04	5,204.9	-48.3	379.8	-48.0	7.62	7.39	
5,319.0	19.27	345.23	5,294.9	-25.7	375.8	-25.3	11.00	10.44	
5,413.0	30.50	351.69	5,380.0	13.1	368.3	13.4	12.28	11.95	
5,507.0	31.39	355.84	5,460.6	61.1	363.1	61.4	2.46	0.95	
5,600.0	37.33	357.74	5,537.4	113.5	360.2	113.8	6.49	6.39	
5,647.0	40.12	358.45	5,574.0	142.8	359.3	143.2	6.01	5.94	
5,694.0	43.27	0.87	5,609.1	174.1	359.1	174.4	7.53	6.70	
5,741.0	46.70	1.82	5,642.4	207.3	359.9	207.6	7.44	7.30	
5,787.0	50.48	1.73	5,672.8	241.8	361.0	242.1	8.22	8.22	
5,819.0	53.77	2.39	5,692.4	267.0	361.9	267.3	10.41	10.28	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-1907
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-1907	North Reference:	True
Wellbore:	OH	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
5,850.0	56.20	0.97	5,710.2	292.4	362.6	292.7	8.69	7.84	
5,881.0	59.41	0.47	5,726.7	318.6	362.9	318.9	10.44	10.35	
5,912.0	64.39	359.50	5,741.3	346.0	362.9	346.3	16.30	16.06	
5,943.0	68.29	359.14	5,753.8	374.4	362.6	374.7	12.63	12.58	
5,974.0	70.15	358.06	5,764.8	403.3	361.9	403.6	6.83	6.00	
6,006.0	72.41	357.40	5,775.0	433.6	360.7	433.9	7.33	7.06	
6,037.0	74.37	358.45	5,783.9	463.3	359.6	463.6	7.11	6.32	
6,068.0	76.67	359.67	5,791.7	493.3	359.1	493.6	8.34	7.42	
6,099.0	79.91	359.50	5,797.9	523.6	358.9	524.0	10.47	10.45	
6,130.0	83.19	358.28	5,802.5	554.3	358.3	554.6	11.27	10.58	
6,150.0	85.30	358.75	5,804.5	574.2	357.8	574.5	10.81	10.55	
6,258.0	90.16	357.77	5,808.8	682.0	354.5	682.3	4.59	4.50	
6,353.0	90.54	359.69	5,808.2	777.0	352.4	777.3	2.06	0.40	
6,448.0	90.70	0.68	5,807.2	872.0	352.7	872.3	1.06	0.17	
6,542.0	89.41	1.64	5,807.1	966.0	354.6	966.3	1.71	-1.37	
6,637.0	89.14	0.22	5,808.3	1,060.9	356.1	1,061.3	1.52	-0.28	
6,732.0	89.75	0.04	5,809.2	1,155.9	356.4	1,156.2	0.67	0.64	
6,826.0	88.22	0.93	5,810.9	1,249.9	357.2	1,250.2	1.88	-1.63	
6,921.0	88.15	0.12	5,813.9	1,344.9	358.0	1,345.2	0.86	-0.07	
7,016.0	88.43	359.19	5,816.7	1,439.8	357.5	1,440.1	1.02	0.29	
7,111.0	87.65	1.47	5,820.0	1,534.8	358.0	1,535.1	2.54	-0.82	
7,205.0	87.45	0.77	5,824.0	1,628.7	359.8	1,629.0	0.77	-0.21	
7,300.0	88.47	2.99	5,827.4	1,723.5	362.9	1,723.8	2.57	1.07	
7,395.0	89.73	2.19	5,828.9	1,818.4	367.2	1,818.7	1.57	1.33	
7,489.0	89.55	1.74	5,829.5	1,912.4	370.5	1,912.7	0.52	-0.19	
7,584.0	89.36	1.34	5,830.4	2,007.3	373.0	2,007.6	0.47	-0.20	
7,679.0	89.70	0.84	5,831.1	2,102.3	374.8	2,102.6	0.64	0.36	
7,773.0	90.51	1.26	5,831.0	2,196.3	376.5	2,196.6	0.97	0.86	
7,868.0	90.94	0.89	5,829.8	2,291.3	378.3	2,291.6	0.60	0.45	
7,963.0	91.14	0.92	5,828.0	2,386.2	379.8	2,386.6	0.21	0.21	
8,058.0	88.71	0.87	5,828.2	2,481.2	381.3	2,481.5	2.56	-2.56	
8,152.0	88.49	1.07	5,830.5	2,575.2	382.9	2,575.5	0.32	-0.23	
8,247.0	90.16	0.60	5,831.6	2,670.2	384.3	2,670.5	1.83	1.76	
8,342.0	90.72	0.79	5,830.8	2,765.1	385.4	2,765.5	0.62	0.59	
8,436.0	91.09	0.76	5,829.4	2,859.1	386.7	2,859.5	0.39	0.39	
8,531.0	91.26	0.41	5,827.4	2,954.1	387.7	2,954.4	0.41	0.18	
8,626.0	92.01	0.62	5,824.7	3,049.1	388.5	3,049.4	0.82	0.79	
8,719.0	89.10	1.19	5,823.8	3,142.0	390.0	3,142.4	3.19	-3.13	
8,812.0	88.87	1.51	5,825.5	3,235.0	392.2	3,235.3	0.42	-0.25	
8,905.0	88.32	1.56	5,827.7	3,327.9	394.7	3,328.3	0.59	-0.59	
8,999.0	87.54	1.35	5,831.1	3,421.8	397.1	3,422.2	0.86	-0.83	
9,092.0	88.23	0.06	5,834.6	3,514.8	398.2	3,515.1	1.57	0.74	
9,184.0	89.35	0.21	5,836.5	3,606.7	398.4	3,607.1	1.23	1.22	
9,277.0	89.12	359.56	5,837.7	3,699.7	398.2	3,700.1	0.74	-0.25	
9,371.0	88.42	359.49	5,839.8	3,793.7	397.5	3,794.0	0.75	-0.74	
9,464.0	89.97	358.78	5,841.1	3,886.7	396.1	3,887.0	1.83	1.67	
9,558.0	90.26	358.96	5,840.9	3,980.7	394.2	3,981.0	0.36	0.31	
9,651.0	90.75	359.08	5,840.1	4,073.6	392.6	4,074.0	0.54	0.53	
9,745.0	89.71	359.09	5,839.7	4,167.6	391.1	4,168.0	1.11	-1.11	
9,838.0	88.53	358.37	5,841.1	4,260.6	389.1	4,260.9	1.49	-1.27	
9,932.0	87.91	358.77	5,844.0	4,354.5	386.7	4,354.9	0.78	-0.66	
10,025.0	88.28	0.10	5,847.1	4,447.5	385.8	4,447.8	1.48	0.40	
10,119.0	90.38	359.75	5,848.2	4,541.4	385.7	4,541.8	2.26	2.23	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-1907
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-1907	North Reference:	True
Wellbore:	OH	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
10,212.0	89.46	359.82	5,848.3	4,634.4	385.3	4,634.8	0.99	-0.99	
10,306.0	89.49	359.16	5,849.2	4,728.4	384.5	4,728.8	0.70	0.03	
10,399.0	90.22	358.42	5,849.4	4,821.4	382.5	4,821.7	1.12	0.78	
10,493.0	91.02	358.75	5,848.4	4,915.4	380.2	4,915.7	0.92	0.85	
10,586.0	90.79	358.49	5,847.0	5,008.3	378.0	5,008.7	0.37	-0.25	
10,680.0	89.54	0.27	5,846.7	5,102.3	376.9	5,102.7	2.31	-1.33	
10,773.0	89.75	0.42	5,847.3	5,195.3	377.5	5,195.7	0.28	0.23	
10,867.0	88.48	0.85	5,848.7	5,289.3	378.5	5,289.6	1.43	-1.35	
10,960.0	87.95	0.04	5,851.6	5,382.3	379.3	5,382.6	1.04	-0.57	
11,054.0	87.67	359.55	5,855.2	5,476.2	378.9	5,476.5	0.60	-0.30	
11,147.0	87.11	359.24	5,859.4	5,569.1	377.9	5,569.4	0.69	-0.60	
11,241.0	89.77	359.89	5,862.0	5,663.0	377.2	5,663.4	2.91	2.83	
11,335.0	89.57	359.13	5,862.5	5,757.0	376.4	5,757.4	0.84	-0.21	
11,428.0	90.35	1.16	5,862.6	5,850.0	376.7	5,850.4	2.34	0.84	
11,522.0	90.37	0.78	5,862.0	5,944.0	378.3	5,944.3	0.40	0.02	
11,615.0	92.85	2.37	5,859.4	6,036.9	380.8	6,037.3	3.17	2.67	
11,709.0	93.38	2.51	5,854.3	6,130.7	384.8	6,131.0	0.58	0.56	
11,802.0	94.84	1.44	5,847.6	6,223.4	388.0	6,223.7	1.94	1.57	
11,896.0	93.60	3.01	5,840.7	6,317.1	391.6	6,317.4	2.12	-1.32	
11,989.0	91.02	3.35	5,837.0	6,409.9	396.8	6,410.2	2.80	-2.77	
12,083.0	90.48	0.82	5,835.7	6,503.8	400.2	6,504.1	2.75	-0.57	
12,177.0	90.29	0.48	5,835.1	6,597.8	401.3	6,598.1	0.41	-0.20	
12,270.0	91.08	359.80	5,834.0	6,690.8	401.5	6,691.1	1.12	0.85	
12,364.0	90.34	359.29	5,832.8	6,784.7	400.8	6,785.1	0.96	-0.79	
12,458.0	89.07	358.06	5,833.3	6,878.7	398.6	6,879.1	1.88	-1.35	
12,541.0	89.17	356.89	5,834.6	6,961.6	394.9	6,962.0	1.41	0.12	
12,635.0	88.64	355.55	5,836.4	7,055.4	388.7	7,055.7	1.53	-0.56	
12,729.0	86.96	356.74	5,840.0	7,149.1	382.4	7,149.4	2.19	-1.79	
12,822.0	87.72	358.61	5,844.3	7,241.9	378.7	7,242.3	2.17	0.82	
12,916.0	88.71	0.53	5,847.2	7,335.9	378.0	7,336.2	2.30	1.05	
13,010.0	89.95	0.82	5,848.3	7,429.9	379.1	7,430.2	1.35	1.32	
13,103.0	89.39	0.48	5,848.9	7,522.9	380.1	7,523.2	0.70	-0.60	
13,197.0	90.56	0.38	5,848.9	7,616.9	380.8	7,617.2	1.25	1.24	
13,290.0	90.43	359.03	5,848.1	7,709.8	380.3	7,710.2	1.46	-0.14	
13,384.0	90.69	2.43	5,847.2	7,803.8	381.5	7,804.1	3.63	0.28	
13,477.0	90.00	1.83	5,846.6	7,896.8	385.0	7,897.1	0.98	-0.74	
13,571.0	91.42	2.76	5,845.5	7,990.7	388.8	7,991.0	1.81	1.51	
13,664.0	91.14	2.81	5,843.4	8,083.5	393.3	8,083.9	0.31	-0.30	
13,723.0	90.19	1.30	5,842.7	8,142.5	395.4	8,142.8	3.02	-1.61	LAST CES SURVEY @ 13,723' MD
13,788.0	90.19	1.30	5,842.5	8,207.5	396.9	8,207.8	0.00	0.00	PTB @ 13,788' MD - TD @ 105' FNL & 2154' FWL

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-1907
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-1907	North Reference:	True
Wellbore:	OH	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	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
RAZ FED 30K-1907 PBI	0.00	0.00	5,815.0	8,213.0	387.4	1,549,468.37	3,440,333.32	40.830825	-103.908772
- survey misses target center by 29.6usft at 13788.0usft MD (5842.5 TVD, 8207.5 N, 396.9 E)									
- Point									
RAZ FED 30K-1907 PBI	0.00	0.00	5,829.0	8,213.0	387.4	1,549,468.37	3,440,333.32	40.830825	-103.908772
- survey misses target center by 17.3usft at 13788.0usft MD (5842.5 TVD, 8207.5 N, 396.9 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name		
(usft)	(usft)			
6,186.0	5,807.0	7" (2221' FWL & 2401' FNL)	0	0

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
13,723.0	5,842.7	8,142.5	395.4	LAST CES SURVEY @ 13,723' MD
13,788.0	5,842.5	8,207.5	396.9	PTB @ 13,788' MD
13,788.0	5,842.5	8,207.5	396.9	TD @ 105' FNL & 2154' FWL

Checked By: _____ Approved By: _____ Date: _____