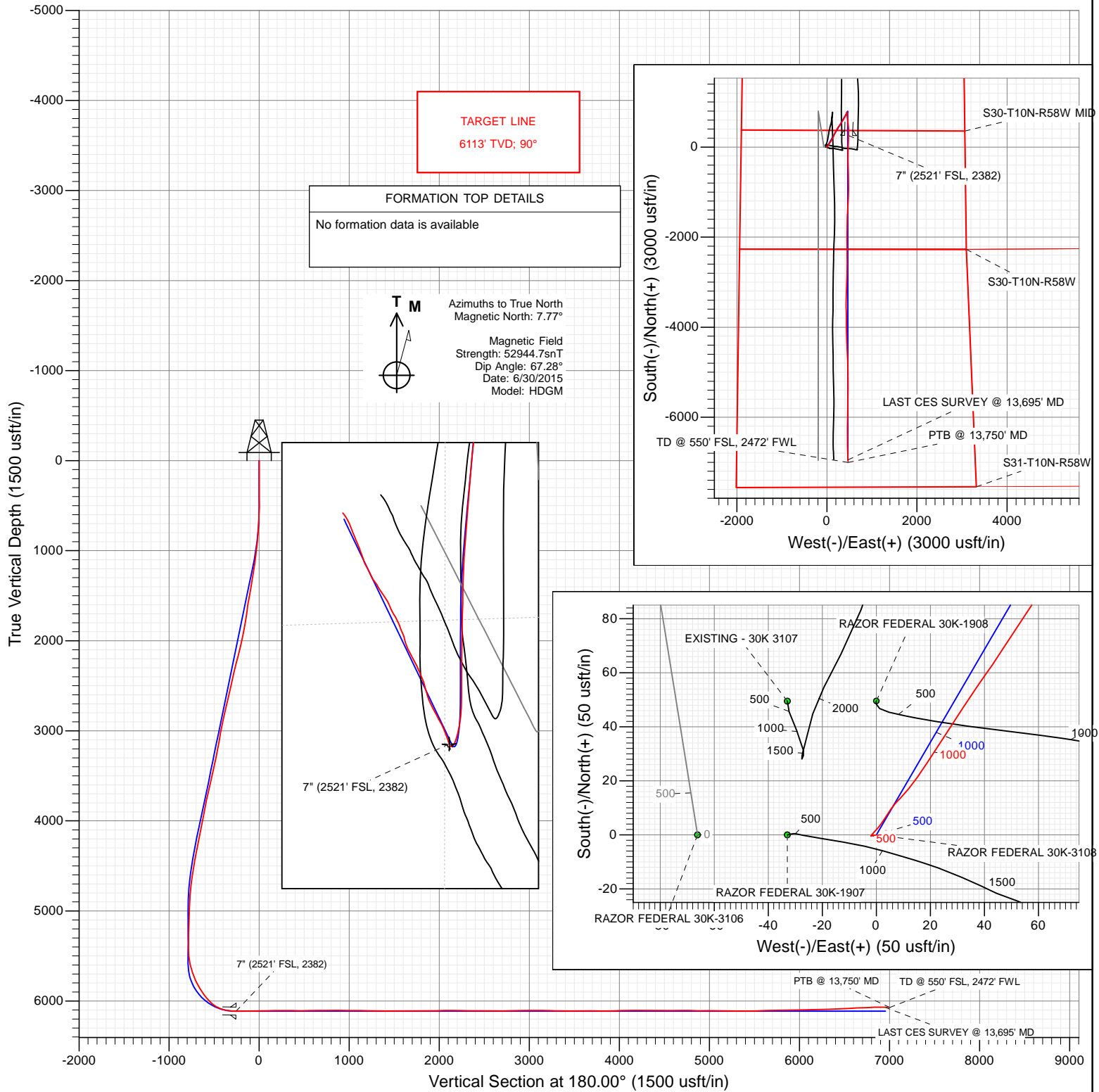




Project: Weld County, CO
Site: S30-T10N-R58W
Well: RAZOR FEDERAL 30K-3108
Wellbore: OH
Design: FINAL



WELL DETAILS: RAZOR FEDERAL 30K-3108

+N/-S	+E/-W	Northing	Ground Level:	4828.2	Latitude	Longitude
0.0	0.0	1541250.36	Easting	3440126.13	40.808283	-103.910053



Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3108
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3108	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-3108				
Well Position	+N/-S	0.0 usft	Northing:	1,541,250.36 usft	Latitude:	40.808283
	+E/-W	0.0 usft	Easting:	3,440,126.13 usft	Longitude:	-103.910053
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	6/30/2015	7.77	67.28	52,945

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	180.00	

Survey Program	Date	7/9/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
167.0	13,750.0	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		
167.0	0.62	262.65	167.0	-0.1	-0.9	0.1	0.37	0.37		
260.0	0.17	264.88	260.0	-0.2	-1.5	0.2	0.48	-0.48		
354.0	0.17	220.44	354.0	-0.3	-1.8	0.3	0.14	0.00		
447.0	0.17	267.96	447.0	-0.4	-2.0	0.4	0.15	0.00		
540.0	1.12	40.07	540.0	0.3	-1.5	-0.3	1.33	1.02		
633.0	2.48	43.99	632.9	2.4	0.4	-2.4	1.47	1.46		
725.0	4.23	30.49	724.8	6.8	3.5	-6.8	2.07	1.90		
819.0	5.98	43.04	818.4	13.3	8.6	-13.3	2.20	1.86		
912.0	6.69	35.55	910.8	21.3	15.1	-21.3	1.17	0.76		
1,006.0	7.85	32.43	1,004.1	31.2	21.7	-31.2	1.30	1.23		
1,099.0	9.13	33.02	1,096.1	42.7	29.2	-42.7	1.38	1.38		
1,193.0	10.28	34.94	1,188.7	55.8	38.0	-55.8	1.27	1.22		

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3108
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3108	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
1,286.0	11.48	33.12	1,280.0	70.4	47.8	-70.4	1.34	1.29	
1,380.0	12.54	33.64	1,372.0	86.7	58.6	-86.7	1.13	1.13	
1,473.0	11.79	34.32	1,462.9	103.0	69.5	-103.0	0.82	-0.81	
1,567.0	10.98	35.53	1,555.0	118.2	80.2	-118.2	0.90	-0.86	
1,575.0	10.88	35.22	1,562.9	119.4	81.0	-119.4	1.45	-1.25	
1,672.0	9.39	34.88	1,658.4	133.4	90.8	-133.4	1.54	-1.54	
1,765.0	10.34	30.62	1,750.0	146.8	99.4	-146.8	1.29	1.02	
1,858.0	11.37	26.11	1,841.3	162.2	107.7	-162.2	1.43	1.11	
1,952.0	12.44	26.74	1,933.3	179.6	116.4	-179.6	1.15	1.14	
2,045.0	14.89	26.55	2,023.7	199.2	126.2	-199.2	2.63	2.63	
2,139.0	14.37	26.09	2,114.6	220.5	136.7	-220.5	0.57	-0.55	
2,232.0	16.46	24.71	2,204.3	242.8	147.3	-242.8	2.28	2.25	
2,326.0	14.79	21.69	2,294.8	266.1	157.3	-266.1	1.98	-1.78	
2,419.0	13.78	20.74	2,384.9	287.5	165.6	-287.5	1.11	-1.09	
2,513.0	13.98	28.38	2,476.2	307.9	175.0	-307.9	1.96	0.21	
2,606.0	14.01	26.11	2,566.4	327.9	185.3	-327.9	0.59	0.03	
2,700.0	15.62	29.41	2,657.3	349.2	196.5	-349.2	1.93	1.71	
2,793.0	14.74	28.00	2,747.1	370.5	208.2	-370.5	1.03	-0.95	
2,887.0	13.95	26.10	2,838.1	391.3	218.8	-391.3	0.98	-0.84	
2,980.0	13.78	31.74	2,928.4	410.7	229.6	-410.7	1.46	-0.18	
3,074.0	11.47	33.06	3,020.1	428.1	240.6	-428.1	2.48	-2.46	
3,167.0	12.42	34.03	3,111.1	444.1	251.2	-444.1	1.04	1.02	
3,261.0	13.39	38.66	3,202.8	461.0	263.7	-461.0	1.51	1.03	
3,354.0	15.14	38.87	3,292.9	478.9	278.0	-478.9	1.88	1.88	
3,448.0	15.00	37.47	3,383.7	498.1	293.1	-498.1	0.41	-0.15	
3,541.0	14.80	34.71	3,473.5	517.4	307.2	-517.4	0.79	-0.22	
3,635.0	15.35	33.03	3,564.3	537.7	320.8	-537.7	0.75	0.59	
3,728.0	15.43	31.53	3,654.0	558.6	334.0	-558.6	0.44	0.09	
3,822.0	14.68	30.49	3,744.7	579.5	346.6	-579.5	0.85	-0.80	
3,916.0	11.50	27.87	3,836.3	598.1	357.0	-598.1	3.44	-3.38	
4,009.0	12.16	30.01	3,927.3	614.7	366.2	-614.7	0.85	0.71	
4,103.0	13.77	28.87	4,018.9	633.1	376.6	-633.1	1.73	1.71	
4,196.0	11.63	25.01	4,109.6	651.3	385.9	-651.3	2.47	-2.30	
4,290.0	12.24	28.53	4,201.6	668.6	394.7	-668.6	1.01	0.65	
4,383.0	13.08	33.59	4,292.3	686.1	405.2	-686.1	1.50	0.90	
4,477.0	13.19	26.97	4,383.9	704.5	415.9	-704.5	1.60	0.12	
4,571.0	9.42	21.58	4,476.0	721.2	423.6	-721.2	4.16	-4.01	
4,664.0	10.05	23.56	4,567.7	735.7	429.7	-735.7	0.77	0.68	
4,758.0	8.03	15.85	4,660.5	749.5	434.8	-749.5	2.50	-2.15	
4,851.0	5.69	12.86	4,752.9	760.3	437.6	-760.3	2.54	-2.52	
4,945.0	4.47	31.06	4,846.5	768.0	440.5	-768.0	2.13	-1.30	
5,039.0	2.93	36.08	4,940.3	773.1	443.8	-773.1	1.67	-1.64	
5,132.0	2.65	25.97	5,033.2	776.9	446.1	-776.9	0.61	-0.30	
5,226.0	1.83	19.02	5,127.1	780.3	447.6	-780.3	0.92	-0.87	
5,320.0	1.46	35.88	5,221.1	782.7	448.8	-782.7	0.64	-0.39	
5,413.0	1.48	50.32	5,314.1	784.4	450.4	-784.4	0.40	0.02	
5,507.0	0.26	10.43	5,408.0	785.4	451.4	-785.4	1.37	-1.30	
5,600.0	4.95	188.73	5,500.9	781.6	450.8	-781.6	5.60	5.04	
5,694.0	13.75	188.59	5,593.6	766.5	448.5	-766.5	9.36	9.36	
5,788.0	18.42	179.63	5,683.9	740.6	446.9	-740.6	5.61	4.97	
5,881.0	25.08	177.23	5,770.2	706.2	448.0	-706.2	7.22	7.16	
5,975.0	30.07	173.71	5,853.5	662.9	451.5	-662.9	5.58	5.31	
6,068.0	37.03	171.93	5,931.0	611.9	458.0	-611.9	7.56	7.48	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3108
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3108	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
6,114.0	40.91	172.60	5,966.7	583.3	461.9	-583.3	8.48	8.43	
6,162.0	43.66	173.40	6,002.3	551.2	465.8	-551.2	5.84	5.73	
6,208.0	50.55	173.75	6,033.5	517.7	469.6	-517.7	14.99	14.98	
6,255.0	59.76	173.55	6,060.4	479.4	473.8	-479.4	19.60	19.60	
6,301.0	67.83	174.16	6,080.7	438.4	478.3	-438.4	17.58	17.54	
6,349.0	74.65	178.11	6,096.1	393.1	481.3	-393.1	16.20	14.21	
6,395.0	80.04	180.21	6,106.2	348.3	481.9	-348.3	12.53	11.72	
6,443.0	87.08	181.33	6,111.6	300.6	481.3	-300.6	14.85	14.67	
6,543.0	91.08	182.60	6,113.2	200.7	477.9	-200.7	4.20	4.00	
6,638.0	91.05	181.61	6,111.4	105.8	474.4	-105.8	1.04	-0.03	
6,732.0	90.97	181.35	6,109.7	11.8	471.9	-11.8	0.29	-0.09	
6,827.0	90.82	180.81	6,108.3	-83.1	470.2	83.1	0.59	-0.16	
6,922.0	90.62	180.43	6,107.1	-178.1	469.1	178.1	0.45	-0.21	
7,016.0	89.96	179.57	6,106.6	-272.1	469.1	272.1	1.15	-0.70	
7,111.0	89.16	178.58	6,107.3	-367.1	470.7	367.1	1.34	-0.84	
7,206.0	90.60	179.12	6,107.5	-462.1	472.6	462.1	1.62	1.52	
7,300.0	90.64	179.08	6,106.5	-556.1	474.0	556.1	0.06	0.04	
7,395.0	90.44	179.01	6,105.6	-651.1	475.6	651.1	0.22	-0.21	
7,490.0	90.88	178.58	6,104.5	-746.0	477.6	746.0	0.65	0.46	
7,585.0	90.06	179.54	6,103.7	-841.0	479.2	841.0	1.33	-0.86	
7,679.0	88.64	180.49	6,104.8	-935.0	479.2	935.0	1.82	-1.51	
7,774.0	89.62	180.82	6,106.2	-1,030.0	478.1	1,030.0	1.09	1.03	
7,869.0	89.59	183.20	6,106.9	-1,124.9	474.7	1,124.9	2.51	-0.03	
7,963.0	89.17	182.49	6,107.9	-1,218.8	470.1	1,218.8	0.88	-0.45	
8,058.0	88.80	182.85	6,109.6	-1,313.7	465.7	1,313.7	0.54	-0.39	
8,153.0	90.03	183.27	6,110.6	-1,408.5	460.6	1,408.5	1.37	1.29	
8,248.0	90.84	183.41	6,109.8	-1,503.4	455.0	1,503.4	0.87	0.85	
8,342.0	89.64	181.58	6,109.4	-1,597.3	451.0	1,597.3	2.33	-1.28	
8,435.0	90.20	180.89	6,109.6	-1,690.2	449.0	1,690.2	0.96	0.60	
8,529.0	90.28	180.39	6,109.2	-1,784.2	447.9	1,784.2	0.54	0.09	
8,622.0	90.66	181.18	6,108.4	-1,877.2	446.6	1,877.2	0.94	0.41	
8,715.0	90.26	179.84	6,107.7	-1,970.2	445.8	1,970.2	1.50	-0.43	
8,808.0	91.99	181.19	6,105.8	-2,063.2	445.0	2,063.2	2.36	1.86	
8,901.0	89.17	178.67	6,104.9	-2,156.2	445.1	2,156.2	4.07	-3.03	
8,994.0	88.46	179.43	6,106.8	-2,249.1	446.6	2,249.1	1.12	-0.76	
9,087.0	89.97	179.42	6,108.1	-2,342.1	447.6	2,342.1	1.62	1.62	
9,181.0	89.62	178.90	6,108.4	-2,436.1	448.9	2,436.1	0.67	-0.37	
9,274.0	89.85	179.54	6,108.9	-2,529.1	450.2	2,529.1	0.73	0.25	
9,367.0	89.78	179.03	6,109.2	-2,622.1	451.4	2,622.1	0.55	-0.08	
9,461.0	90.20	181.81	6,109.2	-2,716.1	450.7	2,716.1	2.99	0.45	
9,555.0	91.28	182.83	6,108.0	-2,810.0	446.9	2,810.0	1.58	1.15	
9,648.0	90.86	182.92	6,106.2	-2,902.9	442.2	2,902.9	0.46	-0.45	
9,742.0	90.45	182.67	6,105.2	-2,996.7	437.6	2,996.7	0.51	-0.44	
9,835.0	90.11	180.69	6,104.7	-3,089.7	434.9	3,089.7	2.16	-0.37	
9,930.0	87.72	179.83	6,106.5	-3,184.7	434.5	3,184.7	2.67	-2.52	
10,023.0	89.76	182.31	6,108.6	-3,277.6	432.7	3,277.6	3.45	2.19	
10,117.0	89.55	182.32	6,109.1	-3,371.5	428.9	3,371.5	0.22	-0.22	
10,210.0	90.18	179.81	6,109.3	-3,464.5	427.2	3,464.5	2.78	0.68	
10,304.0	90.03	179.61	6,109.2	-3,558.5	427.7	3,558.5	0.27	-0.16	
10,397.0	89.61	178.70	6,109.5	-3,651.5	429.0	3,651.5	1.08	-0.45	
10,491.0	89.29	178.14	6,110.4	-3,745.5	431.6	3,745.5	0.69	-0.34	
10,584.0	89.89	179.80	6,111.0	-3,838.4	433.3	3,838.4	1.90	0.65	
10,678.0	91.88	179.89	6,109.6	-3,932.4	433.6	3,932.4	2.12	2.12	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3108
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3108	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
10,771.0	92.04	179.58	6,106.4	-4,025.4	434.0	4,025.4	0.37	0.17	
10,865.0	91.68	179.38	6,103.3	-4,119.3	434.8	4,119.3	0.44	-0.38	
10,958.0	87.91	177.27	6,103.7	-4,212.3	437.6	4,212.3	4.65	-4.05	
11,052.0	89.89	177.77	6,105.5	-4,306.1	441.6	4,306.1	2.17	2.11	
11,145.0	90.18	177.42	6,105.4	-4,399.1	445.5	4,399.1	0.49	0.31	
11,239.0	89.57	177.09	6,105.6	-4,493.0	450.0	4,493.0	0.74	-0.65	
11,333.0	89.57	179.16	6,106.3	-4,586.9	453.1	4,586.9	2.20	0.00	
11,426.0	91.20	177.99	6,105.7	-4,679.9	455.4	4,679.9	2.16	1.75	
11,520.0	88.60	176.50	6,105.9	-4,773.7	459.9	4,773.7	3.19	-2.77	
11,613.0	88.85	177.22	6,107.9	-4,866.6	465.0	4,866.6	0.82	0.27	
11,707.0	90.04	179.88	6,108.9	-4,960.5	467.4	4,960.5	3.10	1.27	
11,800.0	91.23	180.51	6,107.8	-5,053.5	467.1	5,053.5	1.45	1.28	
11,894.0	88.98	179.07	6,107.6	-5,147.5	467.4	5,147.5	2.84	-2.39	
11,988.0	88.97	180.51	6,109.3	-5,241.5	467.8	5,241.5	1.53	-0.01	
12,081.0	89.37	178.86	6,110.7	-5,334.5	468.3	5,334.5	1.83	0.43	
12,175.0	88.99	180.22	6,112.0	-5,428.5	469.0	5,428.5	1.50	-0.40	
12,269.0	92.69	181.32	6,110.6	-5,522.4	467.8	5,522.4	4.11	3.94	
12,362.0	91.98	181.43	6,106.9	-5,615.3	465.6	5,615.3	0.77	-0.76	
12,456.0	90.91	181.05	6,104.5	-5,709.3	463.5	5,709.3	1.21	-1.14	
12,550.0	91.20	181.55	6,102.8	-5,803.2	461.4	5,803.2	0.61	0.31	
12,643.0	91.34	180.71	6,100.7	-5,896.2	459.6	5,896.2	0.92	0.15	
12,737.0	90.93	180.67	6,098.8	-5,990.2	458.4	5,990.2	0.44	-0.44	
12,830.0	90.66	180.19	6,097.5	-6,083.1	457.7	6,083.1	0.59	-0.29	
12,924.0	91.04	180.23	6,096.1	-6,177.1	457.4	6,177.1	0.41	0.40	
13,017.0	92.28	180.09	6,093.5	-6,270.1	457.1	6,270.1	1.34	1.33	
13,111.0	92.33	180.25	6,089.7	-6,364.0	456.8	6,364.0	0.18	0.05	
13,204.0	91.88	180.08	6,086.3	-6,457.0	456.6	6,457.0	0.52	-0.48	
13,298.0	93.23	180.67	6,082.1	-6,550.9	456.0	6,550.9	1.57	1.44	
13,391.0	93.04	179.23	6,077.0	-6,643.7	456.0	6,643.7	1.56	-0.20	
13,485.0	91.62	178.31	6,073.2	-6,737.6	458.1	6,737.6	1.80	-1.51	
13,580.0	92.38	178.14	6,069.8	-6,832.5	461.0	6,832.5	0.82	0.80	
13,674.0	88.71	176.00	6,068.9	-6,926.4	465.8	6,926.4	4.52	-3.90	
13,695.0	88.70	176.23	6,069.4	-6,947.3	467.2	6,947.3	1.10	-0.05	LAST CES SURVEY @ 13,695' MD
13,750.0	88.70	176.23	6,070.7	-7,002.2	470.8	7,002.2	0.00	0.00	PTB @ 13,750' MD - TD @ 550' FSL, 2472' FWL

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3108
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3108	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-3108 PBI	0.00	0.00	6,110.0	-6,953.7	466.9	1,534,306.13	3,440,717.60	40.789197	-103.908367
- actual wellpath misses target center by 41.1usft at 13695.0usft MD (6069.4 TVD, -6947.3 N, 467.2 E)									
- Point									
RAZ FED 30K-3108 PBI	0.00	0.00	6,113.0	-6,953.7	466.9	1,534,306.13	3,440,717.60	40.789197	-103.908367
- actual wellpath misses target center by 44.0usft at 13695.0usft MD (6069.4 TVD, -6947.3 N, 467.2 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(")	(")
6,487.4	6,113.1	7" (2521' FSL, 2382)	0	0

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
13,695.0	6,069.4	-6,947.3	467.2	LAST CES SURVEY @ 13,695' MD
13,750.0	6,070.7	-7,002.2	470.8	PTB @ 13,750' MD
13,750.0	6,070.7	-7,002.2	470.8	TD @ 550' FSL, 2472' FWL

Checked By: _____ Approved By: _____ Date: _____