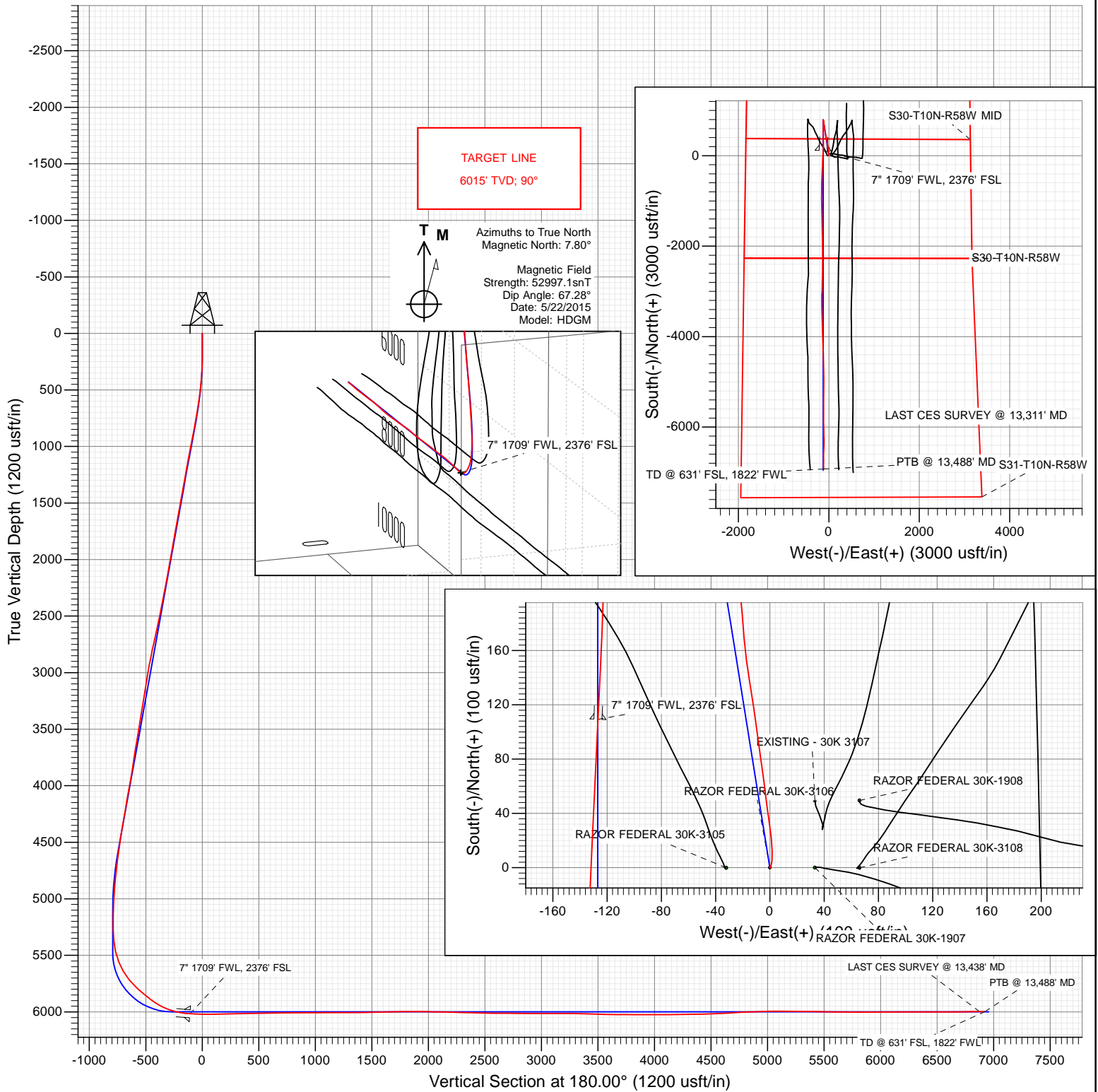




Project: Weld County, CO
Site: S30-T10N-R58W
Well: RAZOR FEDERAL 30K-3106
Wellbore: OH
Design: FINAL



WELL DETAILS: RAZOR FEDERAL 30K-3106

+N/-S	+E/-W	Northing	Ground Level:	4828.2	Latitude	Longitude
0.0	0.0	1541249.18	Easting	3440059.98	40.808283	-103.910292



Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3106
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3106	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-3106				
Well Position	+N/-S	0.0 usft	Northing:	1,541,249.18 usft	Latitude:	40.808283
	+E/-W	0.0 usft	Easting:	3,440,059.98 usft	Longitude:	-103.910292
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	5/22/2015	7.80	67.28	52,997

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	8/5/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
165.0	13,488.0	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	0.21	132.27	165.0	-0.2	0.2	0.2	0.13	0.13		
258.0	1.77	16.07	258.0	1.1	0.7	-1.1	2.01	1.68		
351.0	3.40	7.99	350.9	5.2	1.5	-5.2	1.79	1.75		
445.0	4.71	357.31	444.7	11.8	1.7	-11.8	1.60	1.39		
538.0	7.69	355.04	537.1	21.8	1.0	-21.8	3.21	3.20		
630.0	9.20	351.16	628.1	35.2	-0.6	-35.2	1.75	1.64		
723.0	10.69	353.18	719.7	51.1	-2.8	-51.1	1.65	1.60		
817.0	8.99	351.95	812.3	67.0	-4.9	-67.0	1.82	-1.81		
910.0	10.53	351.84	904.0	82.7	-7.1	-82.7	1.66	1.66		
1,004.0	11.93	352.84	996.2	100.8	-9.5	-100.8	1.50	1.49		
1,097.0	10.71	350.98	1,087.4	118.9	-12.1	-118.9	1.37	-1.31		
1,191.0	10.29	351.52	1,179.8	135.8	-14.7	-135.8	0.46	-0.45		

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3106
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3106	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	10.45	351.81	1,271.3	152.4	-17.1	-152.4	0.18	0.17	
1,378.0	10.82	355.39	1,363.6	169.6	-19.0	-169.6	0.81	0.39	
1,471.0	10.68	355.91	1,455.0	186.9	-20.4	-186.9	0.18	-0.15	
1,565.0	9.83	354.81	1,547.5	203.6	-21.7	-203.6	0.93	-0.90	
1,575.0	9.80	355.07	1,557.4	205.3	-21.9	-205.3	0.54	-0.30	
1,672.0	9.90	354.11	1,652.9	221.8	-23.4	-221.8	0.20	0.10	
1,765.0	9.20	351.65	1,744.6	237.1	-25.3	-237.1	0.87	-0.75	
1,858.0	9.90	345.90	1,836.4	252.2	-28.3	-252.2	1.27	0.75	
1,952.0	11.28	351.29	1,928.8	269.1	-31.7	-269.1	1.81	1.47	
2,045.0	10.83	348.95	2,020.0	286.7	-34.8	-286.7	0.68	-0.48	
2,139.0	10.96	347.27	2,112.3	304.1	-38.4	-304.1	0.37	0.14	
2,232.0	10.76	346.88	2,203.7	321.2	-42.3	-321.2	0.23	-0.22	
2,326.0	10.07	344.12	2,296.1	337.6	-46.6	-337.6	0.91	-0.73	
2,419.0	12.11	349.90	2,387.4	355.0	-50.5	-355.0	2.50	2.19	
2,513.0	11.58	347.44	2,479.4	374.0	-54.3	-374.0	0.78	-0.56	
2,606.0	11.41	345.99	2,570.5	392.0	-58.6	-392.0	0.36	-0.18	
2,700.0	13.26	352.83	2,662.3	411.7	-62.2	-411.7	2.50	1.97	
2,794.0	12.72	351.62	2,753.9	432.6	-65.0	-432.6	0.64	-0.57	
2,887.0	11.58	351.19	2,844.9	452.0	-67.9	-452.0	1.23	-1.23	
2,981.0	10.86	348.50	2,937.1	470.0	-71.1	-470.0	0.95	-0.77	
3,074.0	9.17	347.53	3,028.6	485.8	-74.5	-485.8	1.83	-1.82	
3,168.0	8.54	354.56	3,121.5	500.1	-76.8	-500.1	1.33	-0.67	
3,261.0	9.86	353.42	3,213.3	514.9	-78.3	-514.9	1.43	1.42	
3,356.0	9.56	352.56	3,307.0	530.8	-80.3	-530.8	0.35	-0.32	
3,451.0	9.40	350.70	3,400.7	546.3	-82.6	-546.3	0.36	-0.17	
3,545.0	9.25	350.25	3,493.4	561.3	-85.1	-561.3	0.18	-0.16	
3,640.0	9.70	350.58	3,587.1	576.7	-87.7	-576.7	0.48	0.47	
3,735.0	9.52	349.40	3,680.8	592.3	-90.4	-592.3	0.28	-0.19	
3,829.0	8.76	348.34	3,773.6	607.0	-93.3	-607.0	0.83	-0.81	
3,924.0	8.91	349.12	3,867.5	621.3	-96.2	-621.3	0.20	0.16	
4,019.0	9.58	348.88	3,961.2	636.3	-99.1	-636.3	0.71	0.71	
4,113.0	11.52	354.54	4,053.6	653.3	-101.5	-653.3	2.34	2.06	
4,208.0	9.88	350.20	4,147.0	670.7	-103.8	-670.7	1.92	-1.73	
4,303.0	8.90	348.27	4,240.7	686.0	-106.7	-686.0	1.08	-1.03	
4,398.0	10.81	355.53	4,334.3	702.1	-108.8	-702.1	2.39	2.01	
4,492.0	8.04	353.91	4,427.0	717.4	-110.2	-717.4	2.96	-2.95	
4,587.0	9.22	354.09	4,521.0	731.6	-111.7	-731.6	1.24	1.24	
4,682.0	6.46	351.21	4,615.1	744.4	-113.3	-744.4	2.93	-2.91	
4,776.0	8.12	350.53	4,708.3	756.2	-115.2	-756.2	1.77	1.77	
4,871.0	6.25	342.41	4,802.6	767.7	-117.9	-767.7	2.24	-1.97	
4,966.0	4.08	340.11	4,897.2	775.8	-120.6	-775.8	2.29	-2.28	
5,060.0	3.14	338.07	4,991.0	781.4	-122.7	-781.4	1.01	-1.00	
5,155.0	2.13	334.63	5,085.9	785.4	-124.4	-785.4	1.08	-1.06	
5,250.0	1.56	335.74	5,180.8	788.2	-125.7	-788.2	0.60	-0.60	
5,345.0	1.50	160.98	5,275.8	788.2	-125.8	-788.2	3.22	-0.06	
5,439.0	5.05	168.80	5,369.6	782.9	-124.6	-782.9	3.80	3.78	
5,534.0	13.48	178.28	5,463.3	767.7	-123.5	-767.7	8.99	8.87	
5,629.0	20.25	180.18	5,554.2	740.2	-123.2	-740.2	7.15	7.13	
5,723.0	30.64	180.04	5,639.0	699.9	-123.3	-699.9	11.05	11.05	
5,818.0	38.66	178.40	5,717.0	645.9	-122.5	-645.9	8.50	8.44	
5,913.0	47.14	182.07	5,786.6	581.3	-122.9	-581.3	9.30	8.93	
5,960.0	50.35	181.97	5,817.6	546.0	-124.1	-546.0	6.83	6.83	
6,007.0	49.69	180.73	5,847.8	510.0	-125.0	-510.0	2.46	-1.40	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3106
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3106	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
6,054.0	52.14	178.42	5,877.4	473.5	-124.7	-473.5	6.46	5.21	
6,102.0	55.96	177.69	5,905.6	434.7	-123.4	-434.7	8.05	7.96	
6,149.0	57.98	177.19	5,931.2	395.4	-121.6	-395.4	4.39	4.30	
6,197.0	62.54	180.62	5,955.0	353.7	-120.8	-353.7	11.34	9.50	
6,244.0	69.59	180.31	5,974.1	310.8	-121.2	-310.8	15.01	15.00	
6,292.0	75.96	180.80	5,988.3	265.0	-121.6	-265.0	13.31	13.27	
6,339.0	75.82	180.81	5,999.7	219.4	-122.3	-219.4	0.30	-0.30	
6,386.0	80.58	182.68	6,009.3	173.4	-123.7	-173.4	10.85	10.13	
6,410.0	83.90	182.61	6,012.6	149.7	-124.8	-149.7	13.84	13.83	
6,539.0	89.39	182.82	6,020.1	21.1	-130.9	-21.1	4.26	4.26	
6,634.0	89.45	182.21	6,021.1	-73.8	-135.0	73.8	0.65	0.06	
6,729.0	91.82	182.75	6,020.0	-168.7	-139.2	168.7	2.56	2.49	
6,823.0	92.42	182.75	6,016.6	-262.6	-143.7	262.6	0.64	0.64	
6,918.0	90.82	182.50	6,013.9	-357.4	-148.0	357.4	1.70	-1.68	
7,013.0	90.99	182.12	6,012.4	-452.3	-151.8	452.3	0.44	0.18	
7,107.0	90.94	182.00	6,010.8	-546.3	-155.2	546.3	0.14	-0.05	
7,202.0	90.28	180.92	6,009.8	-641.2	-157.6	641.2	1.33	-0.69	
7,297.0	90.36	180.67	6,009.2	-736.2	-159.0	736.2	0.28	0.08	
7,391.0	90.69	180.49	6,008.4	-830.2	-159.9	830.2	0.40	0.35	
7,486.0	90.47	179.89	6,007.4	-925.2	-160.2	925.2	0.67	-0.23	
7,581.0	90.32	180.00	6,006.8	-1,020.2	-160.1	1,020.2	0.20	-0.16	
7,675.0	90.65	180.61	6,006.0	-1,114.2	-160.6	1,114.2	0.74	0.35	
7,770.0	89.51	177.15	6,005.8	-1,209.1	-158.8	1,209.1	3.83	-1.20	
7,865.0	90.31	177.62	6,006.0	-1,304.0	-154.4	1,304.0	0.98	0.84	
7,960.0	90.77	178.21	6,005.1	-1,399.0	-151.0	1,399.0	0.79	0.48	
8,054.0	90.57	178.04	6,004.0	-1,492.9	-147.9	1,492.9	0.28	-0.21	
8,149.0	91.32	179.42	6,002.4	-1,587.9	-145.8	1,587.9	1.65	0.79	
8,242.0	91.40	179.08	6,000.2	-1,680.8	-144.6	1,680.8	0.38	0.09	
8,336.0	91.66	178.76	5,997.7	-1,774.8	-142.8	1,774.8	0.44	0.28	
8,429.0	89.63	178.51	5,996.7	-1,867.8	-140.6	1,867.8	2.20	-2.18	
8,522.0	88.88	179.88	5,997.9	-1,960.7	-139.3	1,960.7	1.68	-0.81	
8,615.0	89.40	179.81	5,999.3	-2,053.7	-139.0	2,053.7	0.56	0.56	
8,708.0	88.40	178.69	6,001.0	-2,146.7	-137.8	2,146.7	1.61	-1.08	
8,800.0	88.69	179.50	6,003.4	-2,238.7	-136.4	2,238.7	0.93	0.32	
8,894.0	88.22	180.95	6,005.9	-2,332.6	-136.7	2,332.6	1.62	-0.50	
8,987.0	88.19	180.62	6,008.8	-2,425.6	-138.0	2,425.6	0.36	-0.03	
9,081.0	90.04	181.97	6,010.3	-2,519.5	-140.1	2,519.5	2.44	1.97	
9,174.0	89.04	180.77	6,011.0	-2,612.5	-142.4	2,612.5	1.68	-1.08	
9,268.0	89.32	181.21	6,012.4	-2,706.5	-144.0	2,706.5	0.55	0.30	
9,361.0	89.54	181.22	6,013.3	-2,799.4	-146.0	2,799.4	0.24	0.24	
9,455.0	89.61	181.11	6,014.0	-2,893.4	-147.9	2,893.4	0.14	0.07	
9,548.0	90.14	182.46	6,014.2	-2,986.4	-150.8	2,986.4	1.56	0.57	
9,642.0	89.71	182.57	6,014.3	-3,080.3	-154.9	3,080.3	0.47	-0.46	
9,735.0	90.86	181.89	6,013.9	-3,173.2	-158.5	3,173.2	1.44	1.24	
9,829.0	89.06	178.96	6,013.9	-3,267.2	-159.2	3,267.2	3.66	-1.91	
9,923.0	88.53	177.68	6,015.9	-3,361.1	-156.5	3,361.1	1.47	-0.56	
10,016.0	87.88	176.18	6,018.8	-3,453.9	-151.5	3,453.9	1.76	-0.70	
10,110.0	89.12	179.30	6,021.3	-3,547.8	-147.8	3,547.8	3.57	1.32	
10,203.0	89.80	179.52	6,022.2	-3,640.8	-146.8	3,640.8	0.77	0.73	
10,297.0	89.24	179.08	6,022.9	-3,734.8	-145.7	3,734.8	0.76	-0.60	
10,390.0	89.73	178.44	6,023.8	-3,827.8	-143.7	3,827.8	0.87	0.53	
10,484.0	89.95	178.10	6,024.0	-3,921.7	-140.8	3,921.7	0.43	0.23	
10,577.0	89.63	177.73	6,024.4	-4,014.7	-137.4	4,014.7	0.53	-0.34	

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3106
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3106	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
10,671.0	91.13	177.06	6,023.8	-4,108.6	-133.2	4,108.6	1.75	1.60	
10,764.0	90.62	178.74	6,022.3	-4,201.5	-129.8	4,201.5	1.89	-0.55	
10,858.0	90.55	177.87	6,021.4	-4,295.5	-127.0	4,295.5	0.93	-0.07	
10,951.0	90.48	177.74	6,020.5	-4,388.4	-123.4	4,388.4	0.16	-0.08	
11,045.0	91.92	179.16	6,018.6	-4,482.3	-120.9	4,482.3	2.15	1.53	
11,138.0	92.87	178.41	6,014.7	-4,575.2	-118.9	4,575.2	1.30	1.02	
11,232.0	93.37	177.52	6,009.6	-4,669.0	-115.6	4,669.0	1.08	0.53	
11,325.0	93.53	179.38	6,004.0	-4,761.8	-113.1	4,761.8	2.00	0.17	
11,419.0	92.19	180.69	5,999.3	-4,855.7	-113.1	4,855.7	1.99	-1.43	
11,513.0	92.13	180.28	5,995.7	-4,949.6	-113.9	4,949.6	0.44	-0.06	
11,606.0	90.31	180.45	5,993.8	-5,042.6	-114.5	5,042.6	1.97	-1.96	
11,700.0	90.18	179.60	5,993.4	-5,136.6	-114.5	5,136.6	0.91	-0.14	
11,794.0	88.96	180.94	5,994.1	-5,230.6	-115.0	5,230.6	1.93	-1.30	
11,887.0	88.66	179.66	5,996.0	-5,323.6	-115.5	5,323.6	1.41	-0.32	
11,981.0	89.71	181.70	5,997.3	-5,417.5	-116.6	5,417.5	2.44	1.12	
12,074.0	89.25	180.03	5,998.2	-5,510.5	-118.0	5,510.5	1.86	-0.49	
12,168.0	88.57	179.97	6,000.0	-5,604.5	-118.0	5,604.5	0.73	-0.72	
12,262.0	89.57	180.58	6,001.5	-5,698.5	-118.4	5,698.5	1.25	1.06	
12,355.0	89.84	179.81	6,002.0	-5,791.5	-118.8	5,791.5	0.88	0.29	
12,449.0	89.71	177.80	6,002.3	-5,885.5	-116.8	5,885.5	2.14	-0.14	
12,542.0	90.88	179.18	6,001.9	-5,978.4	-114.4	5,978.4	1.95	1.26	
12,636.0	90.32	177.46	6,000.9	-6,072.4	-111.6	6,072.4	1.92	-0.60	
12,733.0	90.64	179.96	6,000.1	-6,169.3	-109.4	6,169.3	2.60	0.33	
12,827.0	89.76	179.24	5,999.7	-6,263.3	-108.8	6,263.3	1.21	-0.94	
12,920.0	89.24	180.00	6,000.5	-6,356.3	-108.1	6,356.3	0.99	-0.56	
13,014.0	91.03	182.81	6,000.3	-6,450.3	-110.4	6,450.3	3.54	1.90	
13,107.0	90.38	181.57	5,999.2	-6,543.2	-114.0	6,543.2	1.51	-0.70	
13,200.0	89.53	180.42	5,999.3	-6,636.2	-115.6	6,636.2	1.54	-0.91	
13,294.0	90.96	181.26	5,998.9	-6,730.2	-117.0	6,730.2	1.76	1.52	
13,389.0	90.25	179.97	5,997.8	-6,825.2	-118.0	6,825.2	1.55	-0.75	
13,438.0	90.19	179.33	5,997.7	-6,874.2	-117.7	6,874.2	1.31	-0.12	LAST CES SURVEY @ 13,438' MD
13,488.0	90.19	179.33	5,997.5	-6,924.2	-117.1	6,924.2	0.00	0.00	PTB @ 13,488' MD - TD @ 631' FSL, 1822' FWL

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well RAZOR FEDERAL 30K-3106
Project:	Weld County, CO	TVD Reference:	21' KB @ 4849.2usft
Site:	S30-T10N-R58W	MD Reference:	21' KB @ 4849.2usft
Well:	RAZOR FEDERAL 30K-3106	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-3106 PBI	0.00	0.00	6,015.0	-6,956.7	-126.8	1,534,291.38	3,440,057.88	40.789189	-103.910750
- actual wellpath misses target center by 38.2usft at 13488.0usft MD (5997.5 TVD, -6924.2 N, -117.1 E)									
- Point									
RAZ FED 30K-3106 PBI	0.00	0.00	5,999.0	-6,956.7	-126.8	1,534,291.38	3,440,057.88	40.789189	-103.910750
- actual wellpath misses target center by 33.9usft at 13488.0usft MD (5997.5 TVD, -6924.2 N, -117.1 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(")	(")
6,450.5	6,016.3	7" 1709' FWL, 2376' FSL	0	0

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
13,438.0	5,997.7	-6,874.2	-117.7	LAST CES SURVEY @ 13,438' MD
13,488.0	5,997.5	-6,924.2	-117.1	PTB @ 13,488' MD
13,488.0	5,997.5	-6,924.2	-117.1	TD @ 631' FSL, 1822' FWL

Checked By: _____ Approved By: _____ Date: _____