



Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #11G-1409A
Project:	Weld County, CO	TVD Reference:	WELL @ 4989.7usft (Original Well Elev)
Site:	S11-T10N-R58W	MD Reference:	WELL @ 4989.7usft (Original Well Elev)
Well:	Razor #11G-1409A	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		S11-T10N-R58W			
Site Position:		Northing:	1,558,620.57 usft	Latitude:	40.854775
From:	Lat/Long	Easting:	3,463,389.92 usft	Longitude:	-103.824847
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.08 °

Well	Razor #11G-1409A					
Well Position	+N/-S	0.0 usft	Northing:	1,558,327.28 usft	Latitude:	40.854039
	+E/-W	0.0 usft	Easting:	3,462,062.72 usft	Longitude:	-103.829664
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,972.9 usft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/6/2015	7.89	67.43	53,075

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	227.67	

Survey Program	Date	3/19/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
165.0	13,760.0	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		
165.0	0.29	314.20	165.0	0.3	-0.3	0.0	0.18	0.18		
257.0	0.59	288.82	257.0	0.6	-0.9	0.3	0.38	0.33		
350.0	0.46	249.67	350.0	0.6	-1.7	0.8	0.40	-0.14		
442.0	0.29	212.61	442.0	0.3	-2.2	1.4	0.31	-0.18		
534.0	0.38	213.32	534.0	-0.1	-2.5	1.9	0.10	0.10		
626.0	0.21	214.02	626.0	-0.5	-2.7	2.4	0.18	-0.18		
717.0	0.20	262.81	717.0	-0.7	-3.0	2.7	0.19	-0.01		
808.0	2.15	271.95	808.0	-0.7	-4.9	4.0	2.15	2.14		
900.0	4.42	280.38	899.8	0.0	-10.1	7.4	2.52	2.47		
992.0	6.30	279.26	991.4	1.5	-18.5	12.7	2.05	2.04		
1,085.0	8.36	275.09	1,083.6	2.9	-30.3	20.5	2.29	2.22		
1,177.0	8.79	272.73	1,174.6	3.8	-44.0	29.9	0.60	0.47		

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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
1,269.0	7.81	274.61	1,265.6	4.7	-57.2	39.2	1.11	-1.07	
1,361.0	7.19	279.12	1,356.9	6.1	-69.2	47.0	0.93	-0.67	
1,454.0	7.18	277.33	1,449.1	7.8	-80.7	54.4	0.24	-0.01	
1,546.0	8.14	267.80	1,540.3	8.2	-92.9	63.1	1.73	1.04	
1,638.0	7.79	270.90	1,631.4	8.1	-105.6	72.6	0.60	-0.38	
1,730.0	6.89	272.34	1,722.7	8.4	-117.4	81.1	1.00	-0.98	
1,821.0	6.14	274.52	1,813.1	9.0	-127.7	88.3	0.87	-0.82	
1,877.0	5.49	273.97	1,868.8	9.4	-133.3	92.2	1.16	-1.16	
1,969.0	6.84	275.66	1,960.3	10.3	-143.2	98.9	1.48	1.47	
2,062.0	8.57	277.74	2,052.4	11.8	-155.6	107.1	1.88	1.86	
2,154.0	10.53	273.26	2,143.1	13.2	-170.7	117.4	2.28	2.13	
2,246.0	10.76	273.05	2,233.5	14.1	-187.7	129.3	0.25	0.25	
2,338.0	12.06	271.62	2,323.7	14.8	-205.9	142.2	1.45	1.41	
2,431.0	12.12	271.13	2,414.7	15.3	-225.4	156.3	0.13	0.06	
2,523.0	10.90	258.90	2,504.8	13.8	-243.6	170.8	2.96	-1.33	
2,615.0	10.98	258.32	2,595.2	10.4	-260.7	185.7	0.15	0.09	
2,707.0	10.71	256.35	2,685.5	6.6	-277.6	200.8	0.50	-0.29	
2,798.0	10.69	255.49	2,774.9	2.5	-294.0	215.7	0.18	-0.02	
2,889.0	10.79	255.66	2,864.3	-1.8	-310.4	230.7	0.12	0.11	
2,979.0	10.66	254.18	2,952.8	-6.1	-326.6	245.5	0.34	-0.14	
3,071.0	10.59	253.11	3,043.2	-10.9	-342.8	260.8	0.23	-0.08	
3,164.0	10.61	254.59	3,134.6	-15.7	-359.3	276.1	0.29	0.02	
3,255.0	10.11	251.82	3,224.1	-20.4	-374.9	290.9	0.78	-0.55	
3,348.0	9.72	250.43	3,315.7	-25.5	-390.1	305.6	0.49	-0.42	
3,440.0	8.91	265.66	3,406.5	-28.7	-404.5	318.4	2.81	-0.88	
3,532.0	8.79	261.32	3,497.4	-30.3	-418.6	329.8	0.74	-0.13	
3,624.0	8.94	261.40	3,588.3	-32.4	-432.6	341.6	0.16	0.16	
3,716.0	8.25	272.50	3,679.3	-33.2	-446.2	352.3	1.95	-0.75	
3,807.0	8.60	274.32	3,769.3	-32.4	-459.5	361.6	0.48	0.38	
3,899.0	8.51	273.84	3,860.3	-31.4	-473.2	371.0	0.12	-0.10	
3,990.0	8.77	270.75	3,950.3	-30.9	-486.8	380.7	0.58	0.29	
4,082.0	8.97	270.67	4,041.2	-30.7	-501.0	391.1	0.22	0.22	
4,174.0	8.76	266.74	4,132.1	-31.0	-515.2	401.8	0.70	-0.23	
4,266.0	9.11	265.92	4,222.9	-31.9	-529.5	412.9	0.40	0.38	
4,357.0	8.85	266.39	4,312.8	-32.9	-543.6	424.1	0.30	-0.29	
4,449.0	9.20	265.98	4,403.7	-33.9	-558.0	435.3	0.39	0.38	
4,541.0	8.99	263.07	4,494.5	-35.2	-572.5	447.0	0.55	-0.23	
4,633.0	8.82	262.18	4,585.4	-37.1	-586.6	458.6	0.24	-0.18	
4,726.0	6.77	269.51	4,677.6	-38.1	-599.2	468.6	2.45	-2.20	
4,818.0	3.17	261.33	4,769.2	-38.5	-607.1	474.8	3.98	-3.91	
4,909.0	1.24	9.70	4,860.2	-37.9	-609.4	476.1	4.12	-2.12	
5,000.0	0.61	29.78	4,951.1	-36.5	-609.0	474.8	0.77	-0.69	
5,092.0	0.63	33.76	5,043.1	-35.7	-608.5	473.9	0.05	0.02	
5,183.0	0.56	80.71	5,134.1	-35.2	-607.8	473.0	0.53	-0.08	
5,276.0	0.69	99.45	5,227.1	-35.2	-606.8	472.3	0.26	0.14	
5,368.0	6.86	185.73	5,318.9	-40.8	-606.8	476.1	7.45	6.71	
5,459.0	16.47	189.31	5,407.9	-59.0	-609.4	490.2	10.59	10.56	
5,551.0	23.06	185.20	5,494.5	-89.8	-613.2	513.8	7.32	7.16	
5,644.0	31.12	185.58	5,577.2	-131.9	-617.2	545.1	8.67	8.67	
5,735.0	39.02	184.78	5,651.6	-184.0	-621.8	583.6	8.70	8.68	
5,766.0	42.01	184.11	5,675.2	-204.0	-623.4	598.3	9.75	9.65	
5,797.0	45.23	181.65	5,697.6	-225.4	-624.5	613.4	11.74	10.39	
5,827.0	49.65	179.87	5,717.9	-247.5	-624.7	628.5	15.37	14.73	

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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
5,858.0	52.95	179.38	5,737.3	-271.7	-624.6	644.7	10.72	10.65	
5,888.0	53.13	179.34	5,755.3	-295.6	-624.3	660.6	0.61	0.60	
5,919.0	54.61	179.25	5,773.6	-320.7	-624.0	677.3	4.78	4.77	
5,950.0	57.30	178.06	5,790.9	-346.4	-623.4	694.1	9.24	8.68	
5,981.0	60.73	177.91	5,806.9	-372.9	-622.5	711.3	11.07	11.06	
6,011.0	64.77	178.84	5,820.6	-399.6	-621.7	728.7	13.75	13.47	
6,042.0	65.46	178.82	5,833.7	-427.7	-621.1	747.2	2.23	2.23	
6,073.0	66.76	179.58	5,846.2	-456.0	-620.7	766.0	4.76	4.19	
6,104.0	70.13	181.11	5,857.6	-484.9	-620.9	785.5	11.80	10.87	
6,148.0	75.78	182.42	5,870.5	-526.9	-622.2	814.8	13.15	12.84	
6,191.0	80.17	183.87	5,879.5	-568.9	-624.5	844.8	10.73	10.21	
6,236.0	84.34	183.61	5,885.5	-613.3	-627.4	876.9	9.28	9.27	
6,270.8	85.53	183.17	5,888.6	-648.0	-629.5	901.7	3.66	3.43	7" (2882' FWL, 2260' FSL)
6,336.0	87.77	182.34	5,892.4	-713.0	-632.6	947.8	3.66	3.43	
6,424.0	89.50	181.68	5,894.5	-800.9	-635.7	1,009.3	2.10	1.97	
6,513.0	90.38	180.90	5,894.6	-889.9	-637.7	1,070.7	1.32	0.99	
6,603.0	90.17	179.86	5,894.2	-979.9	-638.3	1,131.7	1.18	-0.23	
6,692.0	91.94	178.91	5,892.5	-1,068.8	-637.3	1,190.9	2.26	1.99	
6,780.0	91.96	179.03	5,889.5	-1,156.8	-635.8	1,249.0	0.14	0.02	
6,869.0	89.70	176.29	5,888.3	-1,245.7	-632.1	1,306.2	3.99	-2.54	
6,959.0	92.87	181.02	5,886.2	-1,335.6	-630.0	1,365.1	6.33	3.52	
7,049.0	92.18	179.84	5,882.3	-1,425.5	-630.7	1,426.2	1.52	-0.77	
7,136.0	91.94	179.01	5,879.1	-1,512.4	-629.8	1,484.1	0.99	-0.28	
7,225.0	89.85	179.54	5,877.8	-1,601.4	-628.7	1,543.2	2.42	-2.35	
7,313.0	89.43	180.04	5,878.3	-1,689.4	-628.4	1,602.2	0.74	-0.48	
7,402.0	88.64	179.97	5,879.8	-1,778.4	-628.4	1,662.1	0.89	-0.89	
7,490.0	89.13	180.69	5,881.5	-1,866.4	-628.9	1,721.7	0.99	0.56	
7,577.0	90.66	181.01	5,881.7	-1,953.4	-630.2	1,781.3	1.80	1.76	
7,666.0	89.59	179.14	5,881.5	-2,042.4	-630.3	1,841.3	2.42	-1.20	
7,756.0	91.11	180.45	5,880.9	-2,132.4	-630.0	1,901.6	2.23	1.69	
7,847.0	89.63	178.87	5,880.3	-2,223.3	-629.4	1,962.5	2.38	-1.63	
7,939.0	90.99	179.51	5,879.8	-2,315.3	-628.1	2,023.5	1.63	1.48	
8,032.0	92.23	178.00	5,877.2	-2,408.3	-626.1	2,084.6	2.10	1.33	
8,124.0	90.67	175.65	5,874.9	-2,500.1	-621.0	2,142.6	3.07	-1.70	
8,215.0	91.87	177.33	5,872.9	-2,590.9	-615.5	2,199.7	2.27	1.32	
8,308.0	91.11	180.55	5,870.5	-2,683.8	-613.7	2,261.0	3.56	-0.82	
8,399.0	90.74	181.60	5,869.0	-2,774.8	-615.4	2,323.5	1.22	-0.41	
8,490.0	91.61	187.41	5,867.1	-2,865.5	-622.6	2,389.8	6.45	0.96	
8,582.0	91.26	187.60	5,864.8	-2,956.6	-634.6	2,460.1	0.43	-0.38	
8,631.0	91.24	194.68	5,863.8	-3,004.7	-644.1	2,499.5	14.45	-0.04	
8,674.0	91.31	189.09	5,862.8	-3,046.7	-652.9	2,534.3	13.00	0.16	
8,720.0	91.12	185.13	5,861.8	-3,092.3	-658.6	2,569.2	8.62	-0.41	
8,767.0	90.61	183.26	5,861.1	-3,139.2	-662.0	2,603.3	4.12	-1.09	
8,813.0	91.14	181.20	5,860.4	-3,185.2	-663.8	2,635.6	4.62	1.15	
8,859.0	91.81	179.54	5,859.2	-3,231.1	-664.1	2,666.8	3.89	1.46	
8,951.0	92.46	178.95	5,855.8	-3,323.1	-662.9	2,727.8	0.95	0.71	
9,042.0	91.16	179.88	5,852.9	-3,414.0	-662.0	2,788.3	1.76	-1.43	
9,135.0	91.58	179.90	5,850.7	-3,507.0	-661.8	2,850.8	0.45	0.45	
9,228.0	90.04	179.33	5,849.4	-3,600.0	-661.2	2,913.0	1.77	-1.66	
9,320.0	90.52	178.86	5,848.9	-3,692.0	-659.7	2,973.8	0.73	0.52	
9,412.0	89.78	179.62	5,848.7	-3,784.0	-658.5	3,034.9	1.15	-0.80	
9,503.0	90.32	178.81	5,848.6	-3,874.9	-657.3	3,095.2	1.07	0.59	
9,594.0	88.80	177.61	5,849.3	-3,965.9	-654.4	3,154.4	2.13	-1.67	

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Site:	S11-T10N-R58W	MD Reference:	WELL @ 4989.7usft (Original Well Elev)
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Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
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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
9,684.0	88.46	177.93	5,851.5	-4,055.8	-650.9	3,212.3	0.52	-0.38	
9,776.0	88.60	176.70	5,853.8	-4,147.7	-646.6	3,271.0	1.35	0.15	
9,869.0	89.42	178.35	5,855.4	-4,240.6	-642.6	3,330.6	1.98	0.88	
9,960.0	89.89	177.28	5,856.0	-4,331.5	-639.1	3,389.3	1.28	0.52	
10,053.0	90.67	179.24	5,855.5	-4,424.5	-636.3	3,449.8	2.27	0.84	
10,145.0	89.52	180.73	5,855.4	-4,516.5	-636.3	3,511.7	2.05	-1.25	
10,237.0	90.14	181.66	5,855.7	-4,608.4	-638.2	3,575.1	1.21	0.67	
10,329.0	89.82	181.06	5,855.7	-4,700.4	-640.4	3,638.6	0.74	-0.35	
10,421.0	88.32	180.59	5,857.2	-4,792.4	-641.7	3,701.5	1.71	-1.63	
10,512.0	88.43	179.79	5,859.8	-4,883.3	-642.0	3,763.0	0.89	0.12	
10,604.0	88.72	178.41	5,862.0	-4,975.3	-640.6	3,823.9	1.53	0.32	
10,695.0	88.44	178.21	5,864.3	-5,066.2	-637.9	3,883.1	0.38	-0.31	
10,787.0	88.97	179.17	5,866.4	-5,158.2	-635.8	3,943.5	1.19	0.58	
10,879.0	88.94	178.01	5,868.1	-5,250.1	-633.5	4,003.7	1.26	-0.03	
10,971.0	86.19	177.37	5,872.0	-5,342.0	-629.8	4,062.8	3.07	-2.99	
11,062.0	86.44	176.95	5,877.8	-5,432.7	-625.3	4,120.6	0.54	0.27	
11,154.0	86.09	176.34	5,883.8	-5,524.3	-619.9	4,178.3	0.76	-0.38	
11,246.0	86.64	178.02	5,889.6	-5,616.0	-615.4	4,236.7	1.92	0.60	
11,338.0	88.81	179.01	5,893.3	-5,707.9	-613.0	4,296.8	2.59	2.36	
11,431.0	90.35	179.09	5,894.0	-5,800.9	-611.5	4,358.3	1.66	1.66	
11,523.0	90.25	177.96	5,893.5	-5,892.9	-609.1	4,418.5	1.23	-0.11	
11,614.0	90.95	181.69	5,892.5	-5,983.8	-608.8	4,479.5	4.17	0.77	
11,705.0	91.61	181.86	5,890.5	-6,074.8	-611.7	4,542.9	0.75	0.73	
11,797.0	91.92	181.59	5,887.7	-6,166.7	-614.4	4,606.8	0.45	0.34	
11,888.0	90.60	182.60	5,885.7	-6,257.6	-617.8	4,670.5	1.83	-1.45	
11,980.0	90.80	181.95	5,884.5	-6,349.5	-621.4	4,735.1	0.74	0.22	
12,072.0	91.59	181.37	5,882.6	-6,441.5	-624.1	4,799.0	1.07	0.86	
12,164.0	90.61	180.86	5,880.9	-6,533.4	-625.9	4,862.2	1.20	-1.07	
12,256.0	89.64	182.37	5,880.7	-6,625.4	-628.5	4,926.1	1.95	-1.05	
12,348.0	90.12	181.70	5,880.9	-6,717.3	-631.7	4,990.4	0.90	0.52	
12,440.0	89.31	181.50	5,881.3	-6,809.3	-634.3	5,054.2	0.91	-0.88	
12,532.0	89.34	180.47	5,882.4	-6,901.3	-635.9	5,117.3	1.12	0.03	
12,624.0	89.48	180.01	5,883.3	-6,993.3	-636.3	5,179.5	0.52	0.15	
12,716.0	89.55	180.23	5,884.1	-7,085.2	-636.4	5,241.6	0.25	0.08	
12,808.0	89.75	178.90	5,885.2	-7,177.2	-635.0	5,303.7	0.73	0.11	
12,900.0	87.93	178.36	5,887.0	-7,269.2	-633.0	5,365.8	2.18	-2.09	
13,072.0	87.82	178.29	5,890.2	-7,361.2	-630.5	5,427.9	0.15	-0.13	
13,162.0	89.03	179.80	5,892.6	-7,453.2	-629.0	5,490.0	2.15	1.34	
13,251.0	89.72	179.90	5,893.6	-7,545.2	-628.8	5,552.1	0.78	0.78	
13,341.0	89.83	180.16	5,894.0	-7,637.2	-628.8	5,614.2	0.31	0.12	
13,430.0	90.34	180.62	5,893.8	-7,729.2	-629.4	5,676.3	0.77	0.57	
13,520.0	90.55	179.64	5,893.1	-7,821.2	-629.6	5,738.4	1.11	0.23	
13,610.0	91.16	180.84	5,891.8	-7,913.2	-630.0	5,800.5	1.50	0.68	
13,707.0	91.42	180.39	5,889.6	-8,005.2	-631.0	5,862.6	0.54	0.27	
13,740.0	91.42	180.39	5,888.8	-8,097.2	-631.3	5,924.7	0.00	0.00	Last CES Survey @ 13,707' MD
13,760.0	91.42	180.39	5,888.3	-8,189.2	-631.4	5,940.7	0.00	0.00	TD - 75' FSL, 2847' FWL

Survey Report

Company:	Whiting Petroleum Corporation	Local Co-ordinate Reference:	Well Razor #11G-1409A
Project:	Weld County, CO	TVD Reference:	WELL @ 4989.7usft (Original Well Elev)
Site:	S11-T10N-R58W	MD Reference:	WELL @ 4989.7usft (Original Well Elev)
Well:	Razor #11G-1409A	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	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
Razor #11G-1409A PBH	0.00	0.00	5,868.0	-8,111.7	-625.0	1,550,205.26	3,461,590.65	40.831775	-103.831922
- actual wellpath misses target center by 21.9usft at 13740.0usft MD (5888.8 TVD, -8109.0 N, -631.3 E)									
- Point									
Razor #11G-1409A PBH	0.00	0.00	5,899.0	-8,111.7	-625.0	1,550,205.26	3,461,590.65	40.831775	-103.831922
- actual wellpath misses target center by 12.3usft at 13740.0usft MD (5888.8 TVD, -8109.0 N, -631.3 E)									
- Point									
Razor #11G-1409A VP (0.00	0.00	5,078.1	-28.5	-625.0	1,558,287.01	3,461,438.40	40.853961	-103.831923
- actual wellpath misses target center by 18.1usft at 5126.9usft MD (5078.0 TVD, -35.4 N, -608.3 E)									
- Point									

Casing Points					
Measured Depth	Vertical Depth	Name		Casing Diameter	Hole Diameter
(usft)	(usft)			(")	(")
6,270.8	5,888.6	7" (2882' FWL, 2260' FSL)		0	0
13,740.0	5,888.8	TD - 75' FSL, 2847' FWL		0	0

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates		Comment	
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)		
13,707.0	5,889.6	-8,076.0	-631.0	Last CES Survey @ 13,707' MD	
13,760.0	5,888.3	-8,128.9	-631.4	PTB @ 13,760' MD	

Checked By: _____	Approved By: _____	Date: _____
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