

# Whiting Oil and Gas Corporation

Weld County, CO

Sec. 26-T10N-R58W

Razor #26K-2306B

Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

## Standard Report

20 January, 2014

Well Coordinates: 1,541,853.17 N, 3,460,994.18 E (40° 48' 31.99" N, 103° 50' 04.72" W)

Ground Level: 4,737.50 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Razor #26K-2306B

KB 22 ft @ 4759.50usft (Frontier 26)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for Razor #26K-2306B - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
173.00	0.45	28.47	173.00	0.60	0.32	0.60	0.26
265.00	0.50	12.38	265.00	1.31	0.58	1.31	0.15
356.00	0.64	16.39	355.99	2.18	0.81	2.18	0.16
448.00	1.28	347.88	447.98	3.68	0.74	3.68	0.85
538.00	1.25	345.50	537.96	5.61	0.28	5.61	0.07
630.00	1.98	343.59	629.92	8.11	-0.42	8.11	0.80
722.00	3.24	344.09	721.82	12.13	-1.58	12.13	1.37
813.00	3.34	344.35	812.67	17.16	-3.00	17.16	0.11
905.00	3.78	336.17	904.49	22.51	-4.95	22.51	0.73
996.00	3.79	340.40	995.30	28.09	-7.17	28.09	0.31
1,088.00	4.56	349.40	1,087.05	34.55	-8.86	34.55	1.10
1,180.00	5.29	349.61	1,178.71	42.32	-10.30	42.32	0.79
1,271.00	5.91	349.26	1,269.28	51.05	-11.93	51.05	0.68
1,362.00	6.44	349.90	1,359.75	60.67	-13.70	60.67	0.59
1,490.00	6.65	352.64	1,486.91	75.09	-15.90	75.09	0.29
1,576.00	5.92	354.15	1,572.40	84.44	-16.99	84.44	0.87
1,668.00	5.80	349.11	1,663.92	93.73	-18.36	93.73	0.57
1,729.00	5.05	353.10	1,724.64	99.42	-19.26	99.42	1.38
1,820.00	5.05	357.15	1,815.29	107.40	-19.94	107.40	0.39
1,911.00	3.36	359.69	1,906.04	114.06	-20.15	114.06	1.87
2,002.00	4.18	351.24	1,996.85	120.01	-20.67	120.01	1.09
2,093.00	3.72	1.19	2,087.63	126.24	-21.12	126.24	0.91
2,185.00	3.59	352.97	2,179.44	132.08	-21.41	132.08	0.59
2,277.00	3.46	350.62	2,271.27	137.68	-22.21	137.68	0.21
2,368.00	3.51	343.06	2,362.10	143.05	-23.47	143.05	0.51
2,460.00	3.03	9.76	2,453.96	148.14	-23.88	148.14	1.72
2,551.00	3.01	17.18	2,544.83	152.79	-22.77	152.79	0.43
2,643.00	4.42	357.61	2,636.64	158.64	-22.20	158.64	2.04
2,734.00	4.42	354.00	2,727.37	165.64	-22.71	165.64	0.31
2,826.00	3.87	350.17	2,819.13	172.22	-23.62	172.22	0.67
2,916.00	3.99	346.76	2,908.92	178.26	-24.85	178.26	0.29
3,008.00	3.05	342.45	3,000.74	183.71	-26.32	183.71	1.06
3,100.00	3.88	335.27	3,092.57	188.87	-28.36	188.87	1.02
3,191.00	3.60	340.90	3,183.38	194.37	-30.59	194.37	0.51
3,283.00	3.43	328.33	3,275.21	199.44	-32.98	199.44	0.86
3,375.00	4.18	344.29	3,367.01	205.01	-35.33	205.01	1.40
3,466.00	4.97	341.78	3,457.72	211.95	-37.46	211.95	0.90
3,558.00	4.86	345.55	3,549.38	219.51	-39.68	219.51	0.37
3,650.00	4.68	346.63	3,641.06	226.93	-41.52	226.93	0.22
3,741.00	4.41	349.83	3,731.77	233.99	-42.99	233.99	0.41
3,833.00	3.15	335.59	3,823.57	239.77	-44.66	239.77	1.70
3,925.00	4.27	329.64	3,915.38	245.03	-47.44	245.03	1.29
4,016.00	4.05	337.86	4,006.14	250.93	-50.36	250.93	0.70
4,108.00	3.77	340.20	4,097.93	256.78	-52.61	256.78	0.35
4,200.00	3.85	322.56	4,189.73	262.08	-55.51	262.08	1.27
4,291.00	5.78	328.76	4,280.40	268.43	-59.75	268.43	2.19
4,382.00	3.04	347.45	4,371.13	274.70	-62.65	274.70	3.36
4,477.00	4.17	350.13	4,465.94	280.56	-63.79	280.56	1.20
4,572.00	3.53	346.81	4,560.72	286.81	-65.05	286.81	0.71

**Design Report for Razor #26K-2306B - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,667.00	4.39	349.69	4,655.50	293.24	-66.37	293.24	0.93
4,762.00	4.90	348.30	4,750.18	300.79	-67.84	300.79	0.55
4,857.00	4.80	5.92	4,844.85	308.71	-68.25	308.71	1.57
4,952.00	4.30	9.85	4,939.55	316.18	-67.23	316.18	0.62
5,047.00	3.77	6.51	5,034.31	322.79	-66.27	322.79	0.61
5,111.00	4.30	5.25	5,098.15	327.27	-65.81	327.27	0.84
5,142.00	9.89	0.00	5,128.91	331.09	-65.71	331.09	18.13
5,174.00	14.64	349.34	5,160.17	337.82	-66.45	337.82	16.38
5,206.00	18.04	353.11	5,190.87	346.71	-67.80	346.71	11.12
5,237.00	18.44	353.20	5,220.32	356.35	-68.95	356.35	1.29
5,269.00	22.74	352.69	5,250.27	367.51	-70.34	367.51	13.45
5,301.00	29.61	353.21	5,278.97	381.51	-72.06	381.51	21.48
5,332.00	35.70	353.14	5,305.05	398.12	-74.05	398.12	19.65
5,364.00	38.76	352.70	5,330.53	417.33	-76.44	417.33	9.60
5,396.00	39.43	352.95	5,355.36	437.35	-78.96	437.35	2.15
5,427.00	39.26	352.54	5,379.34	456.84	-81.44	456.84	1.00
5,459.00	39.15	352.85	5,404.14	476.91	-84.01	476.91	0.70
5,490.00	39.50	352.42	5,428.12	496.39	-86.53	496.39	1.43
5,522.00	39.26	352.42	5,452.85	516.51	-89.21	516.51	0.75
5,554.00	41.77	350.59	5,477.18	537.07	-92.29	537.07	8.68
5,585.00	44.66	348.31	5,499.77	557.93	-96.19	557.93	10.59
5,617.00	47.92	348.31	5,521.88	580.58	-100.87	580.58	10.19
5,649.00	51.63	353.14	5,542.55	604.68	-104.78	604.68	16.34
5,680.00	54.55	351.83	5,561.16	629.25	-108.03	629.25	10.01
5,712.00	58.72	350.24	5,578.76	655.64	-112.20	655.64	13.68
5,744.00	62.36	349.32	5,594.49	683.05	-117.15	683.05	11.65
5,775.00	63.96	348.98	5,608.49	710.22	-122.35	710.22	5.25
5,807.00	66.15	348.28	5,621.99	738.66	-128.07	738.66	7.13
5,839.00	69.62	347.71	5,634.03	767.65	-134.24	767.65	10.97
5,870.00	72.56	348.70	5,644.08	796.36	-140.23	796.36	9.95
5,902.00	74.73	347.68	5,653.09	826.41	-146.52	826.41	7.44
5,934.00	76.46	347.38	5,661.05	856.67	-153.21	856.67	5.48
5,965.00	79.21	348.09	5,667.58	886.28	-159.65	886.28	9.15
5,997.00	80.44	347.11	5,673.23	917.04	-166.41	917.04	4.88
6,029.00	84.13	347.15	5,677.53	947.95	-173.47	947.95	11.53
6,049.00	87.94	347.56	5,678.91	967.42	-177.84	967.42	19.16
6,119.00	90.99	349.23	5,679.56	1,035.97	-191.92	1,035.97	4.97
6,214.00	89.85	349.56	5,678.87	1,129.35	-209.40	1,129.35	1.25
6,309.00	89.14	352.80	5,679.70	1,223.21	-223.96	1,223.21	3.49
6,404.00	88.92	354.59	5,681.31	1,317.61	-234.40	1,317.61	1.90
6,498.00	90.32	357.05	5,681.94	1,411.35	-241.25	1,411.35	3.01
6,593.00	89.74	0.43	5,681.89	1,506.31	-243.33	1,506.31	3.61
6,688.00	89.77	2.93	5,682.29	1,601.27	-240.55	1,601.27	2.63
6,783.00	88.80	2.96	5,683.48	1,696.13	-235.67	1,696.13	1.02
6,878.00	88.06	2.52	5,686.08	1,790.99	-231.13	1,790.99	0.91
6,973.00	89.18	1.56	5,688.37	1,885.90	-227.75	1,885.90	1.55
7,068.00	89.14	1.87	5,689.76	1,980.84	-224.91	1,980.84	0.33
7,163.00	88.01	1.11	5,692.12	2,075.78	-222.44	2,075.78	1.43
7,258.00	89.18	359.89	5,694.45	2,170.74	-221.61	2,170.74	1.78
7,352.00	90.59	359.22	5,694.64	2,264.74	-222.34	2,264.74	1.66

**Design Report for Razor #26K-2306B - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,447.00	88.81	357.02	5,695.14	2,359.68	-225.45	2,359.68	2.98
7,542.00	90.77	0.72	5,695.49	2,454.64	-227.33	2,454.64	4.41
7,637.00	90.52	359.37	5,694.42	2,549.63	-227.25	2,549.63	1.45
7,728.00	90.20	358.99	5,693.85	2,640.62	-228.55	2,640.62	0.55
7,819.00	90.65	358.88	5,693.17	2,731.60	-230.25	2,731.60	0.51
7,911.00	88.89	358.91	5,693.54	2,823.58	-232.02	2,823.58	1.91
8,002.00	86.36	358.99	5,697.31	2,914.47	-233.69	2,914.47	2.78
8,093.00	87.38	0.31	5,702.28	3,005.33	-234.24	3,005.33	1.83
8,185.00	87.63	1.19	5,706.29	3,097.24	-233.04	3,097.24	0.99
8,216.00	86.93	0.35	5,707.76	3,128.20	-232.62	3,128.20	3.52
8,246.00	87.35	0.69	5,709.25	3,158.16	-232.35	3,158.16	1.80
8,277.00	87.60	1.02	5,710.62	3,189.13	-231.89	3,189.13	1.33
8,307.00	89.20	1.72	5,711.46	3,219.11	-231.17	3,219.11	5.82
8,338.00	89.06	0.62	5,711.93	3,250.10	-230.54	3,250.10	3.58
8,368.00	90.49	359.62	5,712.05	3,280.09	-230.47	3,280.09	5.82
8,399.00	92.02	359.07	5,711.37	3,311.08	-230.83	3,311.08	5.24
8,429.00	92.19	358.57	5,710.26	3,341.06	-231.45	3,341.06	1.76
8,460.00	92.41	359.07	5,709.02	3,372.03	-232.08	3,372.03	1.76
8,490.00	92.56	358.78	5,707.72	3,401.99	-232.65	3,401.99	1.09
8,521.00	92.85	358.61	5,706.26	3,432.95	-233.35	3,432.95	1.08
8,551.00	92.20	359.83	5,704.94	3,462.92	-233.76	3,462.92	4.60
8,582.00	91.15	1.82	5,704.03	3,493.90	-233.31	3,493.90	7.26
8,613.00	90.89	2.82	5,703.48	3,524.87	-232.06	3,524.87	3.33
8,643.00	90.68	2.58	5,703.07	3,554.83	-230.65	3,554.83	1.06
8,673.00	91.22	2.98	5,702.57	3,584.79	-229.19	3,584.79	2.24
8,704.00	91.87	3.13	5,701.73	3,615.74	-227.54	3,615.74	2.15
8,765.00	90.77	4.78	5,700.33	3,676.57	-223.33	3,676.57	3.25
8,826.00	88.92	2.12	5,700.49	3,737.45	-219.66	3,737.45	5.31
8,886.00	89.51	0.40	5,701.31	3,797.43	-218.34	3,797.43	3.03
8,947.00	91.22	0.09	5,700.93	3,858.43	-218.08	3,858.43	2.85
9,008.00	91.60	0.84	5,699.43	3,919.40	-217.59	3,919.40	1.38
9,100.00	90.55	359.55	5,697.70	4,011.38	-217.27	4,011.38	1.81
9,191.00	89.64	357.93	5,697.55	4,102.36	-219.28	4,102.36	2.04
9,283.00	88.70	357.89	5,698.88	4,194.29	-222.63	4,194.29	1.02
9,374.00	89.18	358.98	5,700.56	4,285.24	-225.12	4,285.24	1.31
9,466.00	89.88	359.14	5,701.32	4,377.22	-226.62	4,377.22	0.78
9,556.00	91.05	359.13	5,700.59	4,467.20	-227.98	4,467.20	1.30
9,648.00	89.91	358.76	5,699.82	4,559.18	-229.68	4,559.18	1.30
9,739.00	90.51	358.75	5,699.48	4,650.16	-231.65	4,650.16	0.66
9,831.00	89.48	358.07	5,699.49	4,742.12	-234.21	4,742.12	1.34
9,923.00	90.63	358.57	5,699.40	4,834.08	-236.90	4,834.08	1.36
10,014.00	90.34	357.50	5,698.63	4,925.03	-240.02	4,925.03	1.22
10,105.00	89.32	357.78	5,698.90	5,015.95	-243.77	5,015.95	1.16
10,197.00	90.65	0.55	5,698.93	5,107.93	-245.11	5,107.93	3.34
10,288.00	92.08	1.51	5,696.76	5,198.88	-243.48	5,198.88	1.89
10,380.00	89.37	359.94	5,695.60	5,290.86	-242.31	5,290.86	3.40
10,471.00	88.66	0.29	5,697.16	5,381.84	-242.13	5,381.84	0.87
10,562.00	88.95	358.47	5,699.06	5,472.81	-243.12	5,472.81	2.02
10,654.00	88.21	358.69	5,701.34	5,564.75	-245.39	5,564.75	0.84
10,745.00	90.10	358.20	5,702.68	5,655.71	-247.86	5,655.71	2.15
10,837.00	90.12	359.77	5,702.50	5,747.69	-249.49	5,747.69	1.71

**Design Report for Razor #26K-2306B - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,929.00	89.91	358.20	5,702.48	5,839.67	-251.12	5,839.67	1.72
11,020.00	90.25	358.24	5,702.35	5,930.63	-253.95	5,930.63	0.38
11,112.00	89.88	359.21	5,702.25	6,022.60	-256.00	6,022.60	1.13
11,204.00	89.69	359.56	5,702.59	6,114.60	-256.98	6,114.60	0.43
11,295.00	88.21	359.24	5,704.26	6,205.57	-257.94	6,205.57	1.66
11,387.00	90.06	357.88	5,705.65	6,297.53	-260.25	6,297.53	2.50
11,436.00	90.06	357.88	5,705.60	6,346.50	-262.06	6,346.50	0.00

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	0.00	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
173.00	1,490.00	Surface_Sperry MWD Surveys	MWD+IFR1+MS+sag
1,490.00	6,049.00	Vertical and Build_Sperry MWD Surveys	MWD+IFR1+MS+sag
6,049.00	11,436.00	Lateral_Sperry MWD Surveys	MWD+IFR1+MS+sag

**Wellbore Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Razor 26K-2306B B - actual wellpath misses target center by 1791.74usft at 11436.00usft MD (5705.60 TVD, 6346.50 N, -262.06 E) - Point	0.00	0.00	5,678.00	8,137.89	-283.66	1,549,984.34	3,460,557.75	40° 49' 52.399 N	103° 50' 8.408 W
Razor 26K-2306B W - actual wellpath misses target center by 13.68usft at 6579.29usft MD (5681.83 TVD, 1492.60 N, -243.38 E) - Point	0.00	0.00	5,679.00	1,492.89	-230.00	1,543,341.49	3,460,736.18	40° 48' 46.741 N	103° 50' 7.710 W
Razor 26K-2306B W - actual wellpath misses target center by 14.11usft at 9083.09usft MD (5697.89 TVD, 3994.48 N, -217.18 E) - Point	0.00	0.00	5,692.00	3,994.41	-230.00	1,545,842.58	3,460,689.21	40° 49' 11.458 N	103° 50' 7.710 W
Razor 26K-2306B W - actual wellpath misses target center by 17.30usft at 8081.18usft MD (5701.73 TVD, 2993.53 N, -234.29 E) - Point	0.00	0.00	5,692.00	2,994.15	-220.00	1,544,842.68	3,460,717.99	40° 49' 1.574 N	103° 50' 7.580 W
Razor 26K-2306B W - actual wellpath misses target center by 3.81usft at 10083.59usft MD (5698.69 TVD, 4994.55 N, -242.93 E) - Point	0.00	0.00	5,695.00	4,994.60	-242.00	1,546,842.37	3,460,658.43	40° 49' 21.341 N	103° 50' 7.866 W
Razor 26K-2306B W - actual wellpath misses target center by 1791.56usft at 11436.00usft MD (5705.60 TVD, 6346.50 N, -262.06 E) - Point	0.00	0.00	5,695.00	8,137.89	-283.66	1,549,984.34	3,460,557.74	40° 49' 52.399 N	103° 50' 8.408 W
Razor 26K-2306B W - actual wellpath misses target center by 4.14usft at 11284.33usft MD (5703.94 TVD, 6194.91 N, -257.80 E) - Point	0.00	0.00	5,707.00	6,194.88	-255.00	1,548,042.20	3,460,622.89	40° 49' 33.201 N	103° 50' 8.035 W

Design Report for Razor #26K-2306B - Actual Field Surveys

Directional Difficulty Index

Average Dogleg over Survey:	2.07 °/100usft	Maximum Dogleg over Survey:	21.48 °/100usft at 5,301.00 usft
Net Tortousity applicable to Plans:	0.76 °/100usft	Directional Difficulty Index:	6.481

Audit Info

North Reference Sheet for Sec. 26-T10N-R58W - Razor #26K-2306B - Plan B

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.  
Vertical Depths are relative to KB 22 ft @ 4759.50usft (Frontier 26). Northing and Easting are relative to Razor #26K-2306B  
Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980  
Projection method is Lambert Conformal Conic (2 parallel)  
Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°  
False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 1.00000425

Grid Coordinates of Well: 1,541,853.17 usft N, 3,460,994.18 usft E  
Geographical Coordinates of Well: 40° 48' 31.99" N, 103° 50' 04.72" W  
Grid Convergence at Surface is: 1.08°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,436.00usft  
the Bottom Hole Displacement is 6,351.90usft in the Direction of 357.64° (True).  
Magnetic Convergence at surface is: -7.00° (18 December 2013, , BGGM2013)

