

# Whiting Oil and Gas Corporation

Weld County, CO  
Sec. 26-T10N-R58W  
Razor #26K-2307A

Plan C

Design: Actual Field Surveys

## Sperry Drilling Services Standard Report

10 June, 2014

Well Coordinates: 1,541,930.08 N, 3,461,091.86 E (40° 48' 32.73" N, 103° 50' 03.43" 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-2307A

KB 22 ft @ 4759.50usft (Frontier 26)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for Razor #26K-2307A - 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
170.00	0.64	53.09	170.00	0.57	0.76	0.57	0.38
<b>Sperry First Survey @ 170'</b>							
261.00	0.93	47.85	260.99	1.37	1.71	1.36	0.33
352.00	1.28	61.00	351.97	2.36	3.15	2.34	0.47
444.00	1.77	63.29	443.94	3.50	5.32	3.46	0.54
535.00	2.39	29.42	534.88	5.78	7.51	5.73	1.48
626.00	3.27	31.73	625.77	9.64	9.80	9.58	0.97
718.00	4.28	12.31	717.57	15.23	11.91	15.15	1.76
809.00	5.47	15.73	808.24	22.72	13.81	22.63	1.35
900.00	5.51	0.19	898.83	31.26	15.00	31.16	1.63
992.00	5.98	346.75	990.37	40.35	13.92	40.25	1.54
1,084.00	5.32	333.94	1,081.93	48.84	10.95	48.77	1.54
1,175.00	6.01	333.30	1,172.48	56.89	6.95	56.84	0.76
1,267.00	7.52	333.28	1,263.84	66.57	2.08	66.55	1.64
1,358.00	8.18	336.14	1,353.99	77.81	-3.21	77.83	0.84
1,450.00	8.59	347.09	1,445.01	90.49	-7.40	90.54	1.79
1,538.00	7.62	345.89	1,532.13	102.56	-10.29	102.62	1.12
1,638.00	3.77	339.77	1,631.62	112.08	-13.04	112.16	3.89
1,729.00	1.55	30.46	1,722.52	115.94	-13.45	116.03	3.33
1,820.00	2.00	355.37	1,813.48	118.59	-12.96	118.67	1.27
1,912.00	2.52	3.13	1,905.41	122.21	-12.97	122.29	0.65
2,004.00	3.00	356.02	1,997.30	126.63	-13.03	126.71	0.64
2,095.00	3.72	350.52	2,088.15	131.92	-13.68	132.00	0.87
2,186.00	0.79	340.92	2,179.07	135.42	-14.37	135.51	3.24
2,277.00	0.47	332.77	2,270.06	136.35	-14.75	136.44	0.36
2,368.00	0.46	313.35	2,361.06	136.93	-15.19	137.03	0.17
2,460.00	1.55	349.50	2,453.04	138.41	-15.68	138.51	1.31
2,552.00	1.70	350.82	2,545.01	140.98	-16.13	141.08	0.17
2,643.00	1.82	349.95	2,635.96	143.73	-16.59	143.84	0.14
2,735.00	4.00	351.87	2,727.84	148.35	-17.30	148.46	2.37
2,826.00	3.99	349.08	2,818.62	154.60	-18.35	154.72	0.21
2,918.00	4.05	358.35	2,910.39	160.99	-19.05	161.11	0.71
3,009.00	3.30	7.55	3,001.21	166.80	-18.80	166.92	1.05
3,100.00	3.50	15.54	3,092.05	172.07	-17.71	172.18	0.56
3,191.00	2.31	7.96	3,182.93	176.56	-16.71	176.67	1.37
3,283.00	4.35	356.17	3,274.77	181.88	-16.69	181.99	2.33
3,375.00	4.59	354.53	3,366.49	189.03	-17.27	189.14	0.30
3,466.00	5.23	349.39	3,457.15	196.73	-18.38	196.84	0.85
3,558.00	3.43	0.94	3,548.89	203.60	-19.11	203.72	2.16
3,650.00	3.43	8.39	3,640.73	209.08	-18.66	209.19	0.48
3,741.00	2.67	337.00	3,731.60	213.72	-19.10	213.84	1.98
3,833.00	3.82	339.78	3,823.45	218.57	-20.99	218.70	1.26
3,925.00	3.82	339.88	3,915.25	224.32	-23.11	224.47	0.01
4,016.00	4.18	342.23	4,006.03	230.33	-25.16	230.49	0.43
4,108.00	3.53	341.40	4,097.82	236.20	-27.09	236.38	0.71
4,200.00	3.95	8.17	4,189.63	242.03	-27.54	242.20	1.93
4,291.00	3.11	7.96	4,280.46	247.57	-26.75	247.74	0.92
4,383.00	2.83	3.59	4,372.33	252.31	-26.27	252.48	0.39
4,474.00	3.90	359.98	4,463.17	257.65	-26.13	257.82	1.20

**Design Report for Razor #26K-2307A - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,565.00	2.97	350.94	4,554.01	263.07	-26.50	263.24	1.18
4,659.00	3.94	0.75	4,647.84	268.71	-26.84	268.88	1.20
4,752.00	2.84	358.07	4,740.67	274.20	-26.87	274.37	1.19
4,847.00	4.11	358.73	4,835.50	279.96	-27.03	280.13	1.34
4,942.00	5.07	23.13	4,930.20	287.22	-25.46	287.39	2.27
5,037.00	3.73	20.39	5,024.92	293.98	-22.73	294.12	1.43
5,132.00	4.64	6.82	5,119.67	300.69	-21.20	300.83	1.41
5,196.00	7.86	2.45	5,183.28	307.64	-20.70	307.77	5.08
5,227.00	13.84	2.83	5,213.71	313.46	-20.43	313.59	19.29
5,259.00	18.70	356.22	5,244.42	322.41	-20.58	322.54	16.23
5,291.00	22.10	350.71	5,274.41	333.47	-21.89	333.61	12.19
5,322.00	24.56	352.86	5,302.88	345.62	-23.63	345.77	8.40
5,354.00	27.60	356.02	5,331.62	359.62	-24.97	359.78	10.44
5,386.00	32.58	358.28	5,359.30	375.64	-25.75	375.80	15.96
5,417.00	36.26	0.56	5,384.87	393.16	-25.91	393.32	12.58
5,449.00	39.67	358.71	5,410.09	412.84	-26.04	413.00	11.23
5,481.00	42.87	357.82	5,434.14	433.93	-26.69	434.10	10.17
5,512.00	45.53	358.02	5,456.36	455.53	-27.47	455.70	8.59
5,544.00	47.61	358.40	5,478.36	478.75	-28.20	478.93	6.56
5,576.00	50.16	357.69	5,499.40	502.84	-29.02	503.03	8.14
5,607.00	52.46	358.80	5,518.78	527.03	-29.76	527.21	7.93
5,639.00	54.39	2.20	5,537.85	552.72	-29.53	552.90	10.45
5,670.00	57.97	2.41	5,555.10	578.45	-28.49	578.62	11.56
5,702.00	62.41	3.29	5,571.01	606.17	-27.10	606.34	14.08
5,734.00	65.15	3.86	5,585.14	634.82	-25.31	634.97	8.71
5,765.00	68.48	3.05	5,597.35	663.26	-23.60	663.40	11.01
5,797.00	72.11	1.13	5,608.13	693.36	-22.50	693.49	12.67
5,829.00	74.95	358.80	5,617.21	724.04	-22.53	724.17	11.29
5,860.00	76.29	355.05	5,624.91	754.02	-24.14	754.16	12.49
5,892.00	77.78	351.84	5,632.09	784.99	-27.70	785.16	10.83
5,924.00	78.51	351.48	5,638.66	815.98	-32.25	816.17	2.53
5,955.00	81.68	350.71	5,643.99	846.15	-36.97	846.37	10.51
5,987.00	84.73	349.72	5,647.78	877.45	-42.37	877.71	10.01
6,015.00	86.55	350.01	5,649.91	904.94	-47.29	905.23	6.58
6,107.00	88.89	349.06	5,653.57	995.33	-63.98	995.73	2.74
6,202.00	89.73	351.17	5,654.71	1,088.90	-80.29	1,089.41	2.39
6,298.00	90.22	354.19	5,654.76	1,184.11	-92.52	1,184.69	3.19
6,393.00	90.22	357.30	5,654.39	1,278.84	-99.57	1,279.46	3.27
6,487.00	91.45	0.46	5,653.02	1,372.79	-101.40	1,373.43	3.61
6,582.00	91.45	4.48	5,650.62	1,467.66	-97.31	1,468.27	4.23
6,677.00	89.20	4.30	5,650.08	1,562.37	-90.04	1,562.93	2.38
6,771.00	89.73	4.49	5,650.95	1,656.09	-82.84	1,656.60	0.60
6,866.00	89.45	3.59	5,651.63	1,750.85	-76.15	1,751.31	0.99
6,961.00	89.58	3.25	5,652.44	1,845.68	-70.48	1,846.10	0.38
7,056.00	90.16	3.30	5,652.65	1,940.52	-65.05	1,940.91	0.61
7,151.00	90.57	3.30	5,652.05	2,035.36	-59.58	2,035.71	0.43
7,246.00	90.01	1.30	5,651.57	2,130.28	-55.77	2,130.60	2.19
7,341.00	89.20	359.18	5,652.22	2,225.27	-55.37	2,225.59	2.39
7,436.00	90.22	358.60	5,652.70	2,320.25	-57.21	2,320.57	1.24
7,531.00	89.94	358.23	5,652.57	2,415.21	-59.84	2,415.55	0.49
7,625.00	91.08	357.14	5,651.73	2,509.13	-63.64	2,509.49	1.68

**Design Report for Razor #26K-2307A - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,717.00	91.23	357.61	5,649.88	2,601.01	-67.85	2,601.40	0.54
7,778.00	90.74	357.21	5,648.83	2,661.94	-70.61	2,662.35	1.04
7,839.00	90.32	359.07	5,648.27	2,722.90	-72.59	2,723.32	3.13
7,899.00	92.53	0.61	5,646.77	2,782.88	-72.75	2,783.30	4.49
7,991.00	90.89	2.49	5,644.03	2,874.80	-70.27	2,875.20	2.71
8,082.00	90.71	1.48	5,642.76	2,965.73	-67.11	2,966.11	1.13
8,173.00	91.36	2.55	5,641.11	3,056.66	-63.91	3,057.01	1.38
8,265.00	91.36	2.01	5,638.93	3,148.56	-60.26	3,148.89	0.59
8,356.00	91.14	0.51	5,636.95	3,239.51	-58.26	3,239.83	1.67
8,447.00	90.43	0.38	5,635.70	3,330.50	-57.55	3,330.81	0.79
8,539.00	91.02	2.18	5,634.53	3,422.47	-55.49	3,422.76	2.06
8,631.00	91.88	2.35	5,632.21	3,514.37	-51.86	3,514.63	0.95
8,722.00	90.44	3.16	5,630.36	3,605.24	-47.49	3,605.47	1.82
8,814.00	89.36	359.20	5,630.53	3,697.20	-45.59	3,697.42	4.46
8,905.00	89.69	359.84	5,631.28	3,788.19	-46.35	3,788.42	0.79
8,997.00	89.35	359.13	5,632.05	3,880.18	-47.18	3,880.41	0.86
9,088.00	88.43	358.49	5,633.81	3,971.15	-49.07	3,971.38	1.23
9,179.00	90.25	1.06	5,634.86	4,062.13	-49.43	4,062.37	3.46
9,271.00	89.45	0.11	5,635.10	4,154.12	-48.49	4,154.35	1.35
9,362.00	90.51	359.73	5,635.13	4,245.12	-48.62	4,245.35	1.24
9,454.00	90.22	359.59	5,634.55	4,337.12	-49.16	4,337.35	0.35
9,545.00	92.04	359.34	5,632.75	4,428.09	-50.01	4,428.32	2.02
9,636.00	91.70	357.94	5,629.78	4,519.01	-52.17	4,519.26	1.58
9,728.00	91.23	355.65	5,627.43	4,610.83	-57.31	4,611.11	2.54
9,818.00	91.70	356.42	5,625.13	4,700.59	-63.53	4,700.90	1.00
9,910.00	90.44	358.40	5,623.41	4,792.47	-67.69	4,792.81	2.55
10,002.00	91.17	0.65	5,622.12	4,884.45	-68.45	4,884.80	2.57
10,063.00	91.94	1.87	5,620.46	4,945.41	-67.11	4,945.75	2.36
10,124.00	92.38	1.75	5,618.17	5,006.34	-65.18	5,006.66	0.75
10,185.00	92.12	3.41	5,615.77	5,067.23	-62.44	5,067.53	2.75
10,276.00	90.25	2.64	5,613.89	5,158.08	-57.64	5,158.35	2.22
10,368.00	90.75	2.68	5,613.09	5,249.98	-53.37	5,250.21	0.55
10,459.00	91.79	3.58	5,611.07	5,340.82	-48.40	5,341.02	1.51
10,551.00	93.15	2.64	5,607.10	5,432.59	-43.42	5,432.76	1.80
10,612.00	92.38	1.69	5,604.16	5,493.48	-41.12	5,493.63	2.00
10,672.00	89.20	359.93	5,603.33	5,553.45	-40.27	5,553.60	6.06
10,733.00	89.17	359.48	5,604.20	5,614.45	-40.58	5,614.59	0.74
10,825.00	89.75	359.54	5,605.07	5,706.44	-41.37	5,706.59	0.63
10,916.00	89.82	359.20	5,605.41	5,797.43	-42.37	5,797.59	0.38
11,008.00	90.83	359.99	5,604.89	5,889.43	-43.02	5,889.58	1.39
11,100.00	88.18	357.93	5,605.68	5,981.40	-44.69	5,981.56	3.65
11,192.00	88.43	357.90	5,608.40	6,073.29	-48.03	6,073.48	0.27
11,283.00	89.64	0.04	5,609.94	6,164.26	-49.67	6,164.45	2.70
11,375.00	90.99	0.23	5,609.43	6,256.26	-49.45	6,256.45	1.48
11,466.00	88.53	358.70	5,609.81	6,347.24	-50.30	6,347.43	3.18
11,558.00	87.87	0.35	5,612.70	6,439.19	-51.06	6,439.39	1.93
11,650.00	89.26	0.08	5,615.01	6,531.16	-50.72	6,531.35	1.54
11,742.00	89.45	359.74	5,616.04	6,623.15	-50.86	6,623.34	0.42
11,833.00	90.28	0.75	5,616.26	6,714.15	-50.48	6,714.33	1.44
11,924.00	90.50	359.26	5,615.64	6,805.14	-50.47	6,805.33	1.66

**Design Report for Razor #26K-2307A - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,016.00	92.16	359.49	5,613.50	6,897.11	-51.47	6,897.30	1.82
12,107.00	92.53	359.78	5,609.78	6,988.03	-52.05	6,988.22	0.52
12,198.00	92.77	359.80	5,605.57	7,078.93	-52.38	7,079.12	0.26
12,293.00	92.07	359.37	5,601.56	7,173.85	-53.07	7,174.04	0.86
12,388.00	89.75	358.36	5,600.05	7,268.81	-54.95	7,269.01	2.66
12,483.00	89.42	359.14	5,600.74	7,363.78	-57.02	7,364.00	0.89
12,577.00	88.15	359.47	5,602.73	7,457.75	-58.16	7,457.97	1.40
12,672.00	88.46	1.88	5,605.54	7,552.70	-57.05	7,552.91	2.56
12,767.00	88.62	1.65	5,607.96	7,647.62	-54.12	7,647.81	0.29
12,862.00	88.30	1.28	5,610.52	7,742.55	-51.69	7,742.73	0.51
12,957.00	88.02	0.48	5,613.57	7,837.49	-50.23	7,837.65	0.89
12,979.00	88.15	0.37	5,614.30	7,859.48	-50.07	7,859.64	0.77
<b>Straight Line Projection</b>							
13,027.00	88.15	0.37	5,615.85	7,907.45	-49.76	7,907.61	0.00

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
170.00	170.00	0.57	0.76	Sperry First Survey @ 170'
12,979.00	5,614.30	7,859.48	-50.07	Straight Line Projection

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Razor 26K-2307A TD	359.62	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
170.00	1,538.00	Surface_Sperry MWD Surveys	MWD+IFR1+MS+sag
1,538.00	6,015.00	Vertical and Build_Sperry MWD Surveys	MWD+IFR1+MS+sag
6,107.00	12,979.00	Lateral_Sperry MWD Surveys	MWD+IFR1+MS+sag

**Wellbore Targets**

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Razor 26K-2307A TI	0.00	0.00	5,605.00	8,062.83	-53.13	1,549,990.52	3,460,887.29	40° 49' 52.399 N	103° 50' 4.121 W
- actual wellpath misses target center by 155.79usft at 13027.00usft MD (5615.85 TVD, 7907.45 N, -49.76 E)									
- Point									



Design Report for Razor #26K-2307A - Actual Field Surveys

Directional Difficulty Index

Average Dogleg over Survey:	2.08 °/100usft	Maximum Dogleg over Survey:	19.29 °/100usft at 5,227.00 usft
Net Tortosity applicable to Plans:	0.75 °/100usft	Directional Difficulty Index:	6.694

Audit Info

**North Reference Sheet for Sec. 26-T10N-R58W - Razor #26K-2307A - Plan C**

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-2307A

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: 1.00000428

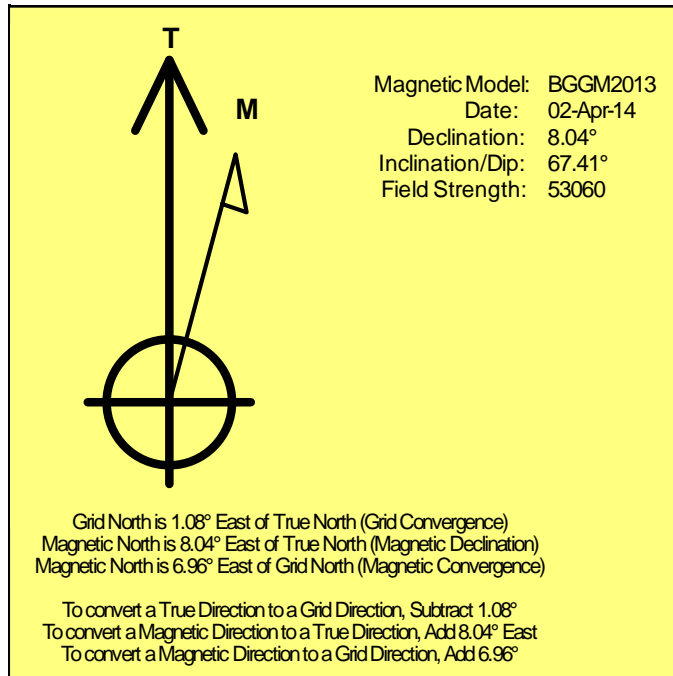
Grid Coordinates of Well: 1,541,930.08 usft N, 3,461,091.86 usft E

Geographical Coordinates of Well: 40° 48' 32.73" N, 103° 50' 03.43" W

Grid Convergence at Surface is: 1.08°

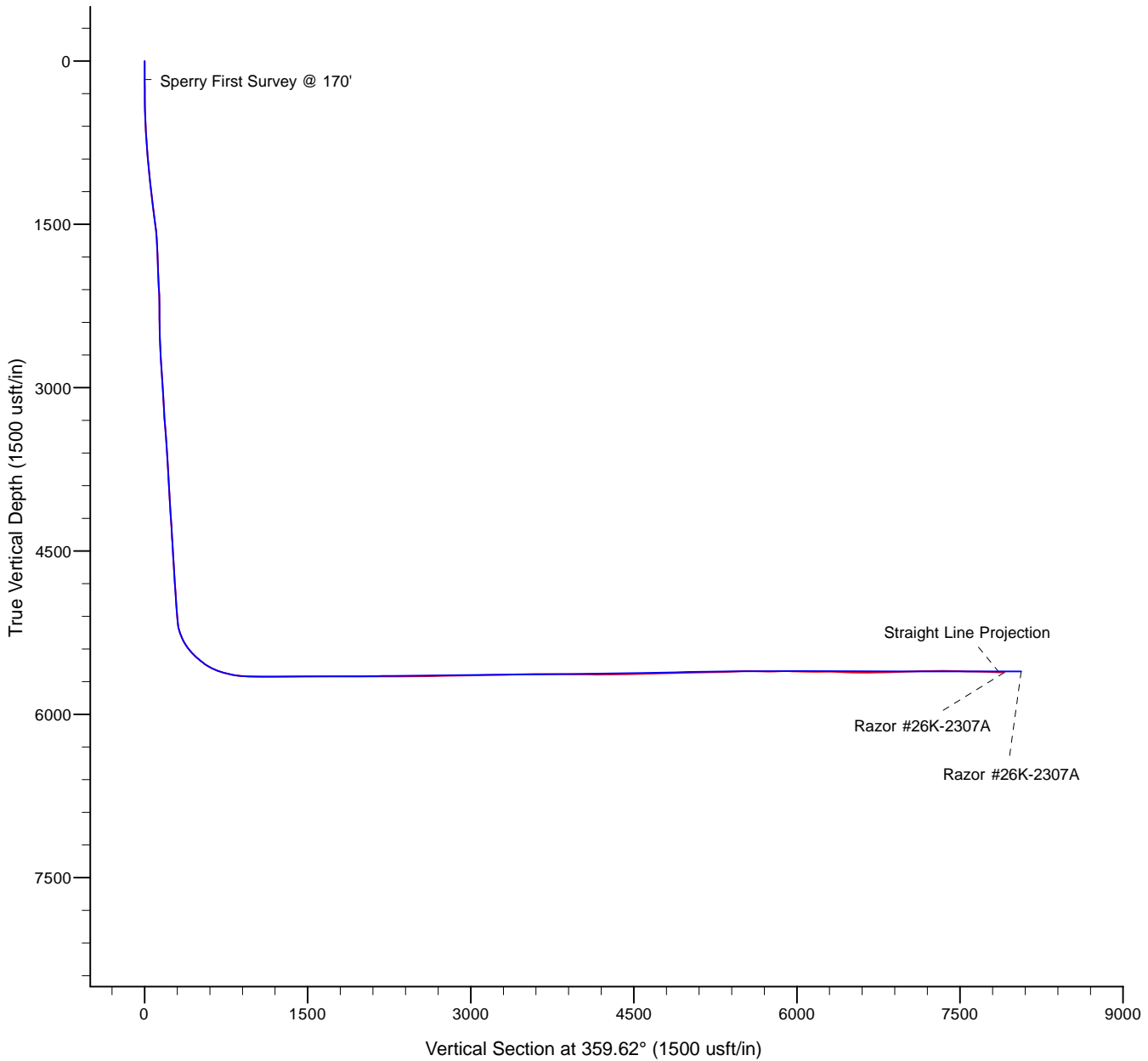
Based upon Minimum Curvature type calculations, at a Measured Depth of 13,027.00usft the Bottom Hole Displacement is 7,907.61usft in the Direction of 359.64° (True).

Magnetic Convergence at surface is: -6.96° ( 2 April 2014, , BGGM2013)



### LEGEND

- ..... Razor #26K-2307A, Plan C, Actual Field Surveys V0
- ..... Rev C0



### LEGEND

- - - Razor #26K-2307A, Plan C, Actual Field Surveys V0
- - - Rev C0

