

# Whiting Oil and Gas Corporation

Weld County, CO

Sec. 27-T10N-R58W (#27 J Pad)

Razor #27J-3410B

Plan C

Design: Actual Field Surveys

## Sperry Drilling Services

### Standard Report

16 September, 2014

Well Coordinates: 1,541,618.75 N, 3,457,072.13 E (40° 48' 30.40" N, 103° 50' 55.77" W)

Ground Level: 4,764.00 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 #27J-3410B

KB 22 ft @ 4786.00usft (Frontier 26)

N

True

API - US Survey Feet - Custom

## HALLIBURTON

**Design Report for Razor #27J-3410B - 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
177.00	0.74	287.78	177.00	0.35	-1.09	-0.34	0.42
<b>Final Sperry MWD Survey @ 177.00 ft</b>							
268.00	0.91	272.83	267.99	0.56	-2.37	-0.55	0.30
359.00	0.61	281.35	358.98	0.70	-3.57	-0.67	0.35
451.00	0.73	281.55	450.97	0.91	-4.62	-0.87	0.13
544.00	1.04	294.25	543.96	1.37	-5.97	-1.33	0.39
635.00	1.02	274.72	634.95	1.78	-7.53	-1.72	0.38
727.00	0.76	249.50	726.93	1.63	-8.92	-1.57	0.50
819.00	0.70	258.88	818.93	1.31	-10.04	-1.24	0.15
911.00	0.52	237.82	910.92	0.98	-10.95	-0.90	0.31
1,003.00	0.46	244.55	1,002.92	0.60	-11.63	-0.51	0.09
1,094.00	0.40	234.70	1,093.92	0.26	-12.22	-0.17	0.10
1,186.00	1.14	315.08	1,185.91	0.72	-13.13	-0.62	1.24
1,278.00	3.15	312.21	1,277.84	3.07	-15.65	-2.95	2.19
1,369.00	5.60	314.86	1,368.57	7.88	-20.65	-7.73	2.70
1,461.00	8.25	323.75	1,459.89	16.37	-27.74	-16.16	3.10
1,552.00	10.28	324.43	1,549.70	28.24	-36.32	-27.97	2.23
1,635.00	12.19	335.31	1,631.11	42.23	-44.29	-41.90	3.43
1,726.00	13.75	346.06	1,719.80	61.46	-50.91	-61.08	3.15
1,817.00	13.32	356.13	1,808.29	82.42	-54.22	-82.01	2.63
1,909.00	13.29	3.65	1,897.83	103.55	-54.27	-103.14	1.88
2,000.00	12.38	1.30	1,986.55	123.74	-53.38	-123.33	1.15
2,092.00	12.27	358.76	2,076.43	143.37	-53.37	-142.97	0.60
2,183.00	13.88	356.62	2,165.07	163.94	-54.22	-163.52	1.85
2,275.00	14.83	358.99	2,254.20	186.73	-55.08	-186.31	1.21
2,366.00	13.36	2.06	2,342.46	208.88	-54.90	-208.46	1.81
2,458.00	13.39	1.87	2,431.96	230.15	-54.17	-229.73	0.06
2,549.00	13.16	4.22	2,520.53	251.01	-53.07	-250.60	0.64
2,641.00	14.33	9.47	2,609.90	272.69	-50.42	-272.30	1.86
2,732.00	13.71	7.40	2,698.19	294.49	-47.18	-294.12	0.88
2,823.00	12.90	4.29	2,786.74	315.31	-45.03	-314.96	1.19
2,915.00	13.83	8.30	2,876.25	336.43	-42.68	-336.10	1.43
3,007.00	12.57	7.20	2,965.82	357.25	-39.84	-356.94	1.40
3,098.00	11.57	5.20	3,054.81	376.16	-37.77	-375.87	1.19
3,189.00	13.02	2.43	3,143.72	395.49	-36.51	-395.21	1.72
3,281.00	15.38	6.51	3,232.91	417.97	-34.68	-417.70	2.78
3,373.00	15.39	5.32	3,321.61	442.25	-32.17	-441.99	0.34
3,465.00	18.19	8.42	3,409.68	468.61	-28.93	-468.38	3.19
3,556.00	18.41	5.75	3,496.08	496.96	-25.41	-496.76	0.95
3,648.00	18.76	7.14	3,583.28	526.10	-22.12	-525.91	0.61
3,739.00	18.30	5.09	3,669.56	554.85	-19.03	-554.69	0.88
3,830.00	15.36	359.42	3,756.66	581.14	-17.89	-580.99	3.70
3,922.00	12.78	355.36	3,845.90	603.47	-18.83	-603.31	3.00
4,013.00	11.85	353.30	3,934.80	622.78	-20.74	-622.61	1.13
4,105.00	11.35	355.88	4,024.92	641.19	-22.49	-641.00	0.78
4,196.00	10.87	356.11	4,114.22	658.68	-23.72	-658.49	0.53
4,287.00	11.17	344.86	4,203.55	675.75	-26.60	-675.53	2.38
4,378.00	10.07	345.80	4,292.99	691.97	-30.85	-691.72	1.22
4,470.00	8.71	343.44	4,383.76	706.45	-34.81	-706.17	1.54

**Design Report for Razor #27J-3410B - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,562.00	8.41	343.37	4,474.73	719.57	-38.72	-719.26	0.33
4,653.00	7.65	342.28	4,564.84	731.72	-42.47	-731.38	0.85
4,745.00	6.76	341.88	4,656.11	742.70	-46.02	-742.33	0.97
4,836.00	4.63	356.22	4,746.66	751.46	-47.93	-751.07	2.80
4,929.00	2.26	341.27	4,839.49	756.94	-48.76	-756.55	2.70
5,020.00	0.98	121.48	4,930.47	758.23	-48.68	-757.84	3.38
5,112.00	2.41	163.92	5,022.43	755.96	-47.47	-755.58	1.97
5,174.00	3.54	174.09	5,084.34	752.81	-46.91	-752.43	2.00
5,204.00	7.38	187.27	5,114.20	749.97	-47.06	-749.60	13.38
5,235.00	12.04	186.01	5,144.75	744.78	-47.65	-744.40	15.05
5,266.00	13.91	189.85	5,174.96	737.89	-48.63	-737.50	6.64
5,296.00	16.25	187.55	5,203.92	730.18	-49.80	-729.78	8.05
5,327.00	20.04	187.65	5,233.38	720.61	-51.07	-720.20	12.23
5,358.00	23.20	188.99	5,262.19	709.31	-52.73	-708.89	10.32
5,388.00	26.67	191.06	5,289.39	696.86	-54.95	-696.43	11.93
5,419.00	30.82	188.14	5,316.57	682.17	-57.41	-681.71	14.13
5,449.00	33.00	183.09	5,342.04	666.40	-58.94	-665.93	11.48
5,479.00	35.74	178.20	5,366.80	649.47	-59.10	-649.01	12.96
5,510.00	39.84	174.73	5,391.30	630.53	-57.91	-630.07	14.89
5,541.00	43.63	175.03	5,414.43	609.98	-56.07	-609.54	12.24
5,571.00	47.03	177.84	5,435.52	588.69	-54.76	-588.26	13.14
5,602.00	51.88	179.41	5,455.66	565.15	-54.20	-564.72	16.11
5,633.00	54.25	179.28	5,474.29	540.37	-53.92	-539.95	7.65
5,663.00	54.77	178.74	5,491.71	515.95	-53.50	-515.53	2.27
5,695.00	55.07	178.65	5,510.10	489.77	-52.90	-489.36	0.97
5,726.00	54.75	179.12	5,527.92	464.41	-52.41	-464.00	1.61
5,758.00	56.23	179.39	5,546.05	438.04	-52.07	-437.64	4.68
5,789.00	58.62	180.03	5,562.74	411.92	-51.94	-411.52	7.90
5,821.00	60.93	180.14	5,578.84	384.27	-51.98	-383.87	7.22
5,853.00	63.40	180.34	5,593.79	355.98	-52.10	-355.58	7.74
5,884.00	64.71	179.89	5,607.35	328.10	-52.15	-327.70	4.42
5,916.00	65.08	180.05	5,620.92	299.13	-52.14	-298.73	1.24
5,948.00	65.24	179.74	5,634.37	270.09	-52.08	-269.69	1.01
5,979.00	66.95	179.87	5,646.93	241.75	-51.99	-241.35	5.53
6,011.00	67.51	179.48	5,659.31	212.24	-51.82	-211.85	2.08
6,043.00	69.72	179.72	5,670.98	182.45	-51.61	-182.05	6.94
6,074.00	71.07	180.17	5,681.38	153.25	-51.58	-152.85	4.56
6,106.00	71.56	180.62	5,691.63	122.93	-51.79	-122.54	2.03
6,137.00	74.08	181.53	5,700.79	93.32	-52.35	-92.93	8.60
6,169.00	79.01	183.16	5,708.23	62.24	-53.63	-61.83	16.18
6,197.00	81.30	183.10	5,713.02	34.69	-55.13	-34.28	8.18
<b>Final Sperry MWD Survey @ 6197.00 ft</b>							
6,250.00	81.30	183.10	5,721.04	-17.62	-57.97	18.05	0.00
<b>Straight Line Projection to TD @ 6250.00 ft</b>							

**Design Report for Razor #27J-3410B - Actual Field Surveys****Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
177.00	177.00	0.35	-1.09	Final Sperry MWD Survey @ 177.00 ft
6,197.00	5,713.02	34.69	-55.13	Final Sperry MWD Survey @ 6197.00 ft
6,250.00	5,721.04	-17.62	-57.97	Straight Line Projection to TD @ 6250.00 ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target		180.43	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
177.00	1,552.00	Surface_Sperry MWD+IFR1+MS+sag	MWD+IFR1+MS+sag
1,635.00	6,197.00	Vertical & Build_Sperry MWD+IFR1+MS+sag	MWD+IFR1+MS+sag
6,250.00	6,250.00	Projection to Bit_TD Build	BLIND

**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,615.00	1,611.55	9 5/8"	9-5/8	13-1/2

**Design Report for Razor #27J-3410B - Actual Field Surveys****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 #27J_Sec 27_N	0.00	0.00	0.00	75.08	-0.83	1,541,693.80	3,457,069.90	40° 48' 31.140 N	103° 50' 55.781 W
- actual wellpath misses target center by 75.09usft at 0.15usft MD (0.15 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	278.58	-3,304.21	1,541,910.81	3,453,761.07	
Point 2				0.00	361.51	1,974.88	1,542,092.02	3,459,037.72	
Razor #27J_Sec 27_1	0.00	0.00	0.00	75.08	-0.83	1,541,693.80	3,457,069.90	40° 48' 31.140 N	103° 50' 55.781 W
- actual wellpath misses target center by 75.09usft at 0.15usft MD (0.15 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	178.58	-3,304.21	1,541,810.83	3,453,762.93	
Point 2				0.00	261.51	1,974.88	1,541,992.04	3,459,039.58	
Razor #27J_Southern	0.00	0.00	0.00	75.07	-32.94	1,541,693.19	3,457,037.80	40° 48' 31.140 N	103° 50' 56.198 W
- actual wellpath misses target center by 81.98usft at 0.35usft MD (0.35 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-2,286.12	1,949.29	1,539,443.76	3,459,029.32	
Point 2				0.00	-7,023.63	2,035.30	1,534,708.65	3,459,203.53	
Point 3				0.00	-7,041.73	-3,081.49	1,534,595.28	3,454,087.94	
Point 4				0.00	-2,373.07	-3,133.14	1,539,262.19	3,453,949.37	
Point 5				0.00	2,330.24	-3,211.05	1,543,963.25	3,453,783.90	
Point 6				0.00	2,369.37	-662.93	1,544,049.82	3,456,330.86	
Point 7				0.00	2,408.06	1,863.59	1,544,135.55	3,458,856.24	
Point 8				0.00	-2,286.12	1,949.29	1,539,443.76	3,459,029.32	
Razor #27J_Southern	0.00	0.00	0.00	75.07	-32.94	1,541,693.19	3,457,037.80	40° 48' 31.140 N	103° 50' 56.198 W
- actual wellpath misses target center by 81.98usft at 0.35usft MD (0.35 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	-2,373.07	-3,233.14	1,539,260.33	3,453,849.39	
Point 2				0.00	-2,286.12	2,049.29	1,539,445.62	3,459,129.31	
Point 3				0.00	-7,623.63	2,135.30	1,534,110.61	3,459,314.69	
Point 4				0.00	-7,641.73	-3,181.49	1,533,993.52	3,453,999.13	
Point 5				0.00	-2,373.07	-3,233.14	1,539,260.33	3,453,849.39	
Point 6				0.00	2,930.24	-3,311.05	1,544,561.29	3,453,672.75	
Point 7				0.00	2,969.37	-662.93	1,544,649.72	3,456,319.69	
Point 8				0.00	3,008.06	1,963.59	1,544,737.31	3,458,945.05	
Point 9				0.00	-2,286.12	2,049.29	1,539,445.62	3,459,129.31	

**Directional Difficulty Index**

Average Dogleg over Survey:	2.52 °/100usft	Maximum Dogleg over Survey:	16.18 °/100usft at 6,169.00 usft
Net Tortousity applicable to Plans:	0.65 °/100usft	Directional Difficulty Index:	5.432

**Audit Info**

# North Reference Sheet for Sec. 27-T10N-R58W (#27 J Pad) - Razor #27J-3410B - 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 @ 4786.00usft (Frontier 26). Northing and Easting are relative to Razor #27J-3410B

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: 1.00000417

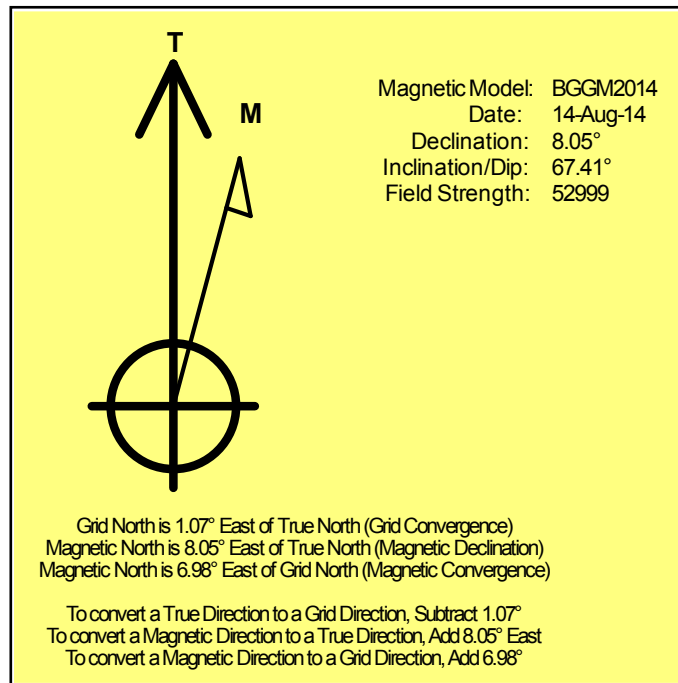
Grid Coordinates of Well: 1,541,618.75 usft N, 3,457,072.13 usft E

Geographical Coordinates of Well: 40° 48' 30.40" N, 103° 50' 55.77" W

Grid Convergence at Surface is: 1.07°

Based upon Minimum Curvature type calculations, at a Measured Depth of 6,250.00usft the Bottom Hole Displacement is 60.59usft in the Direction of 253.09° ( True).

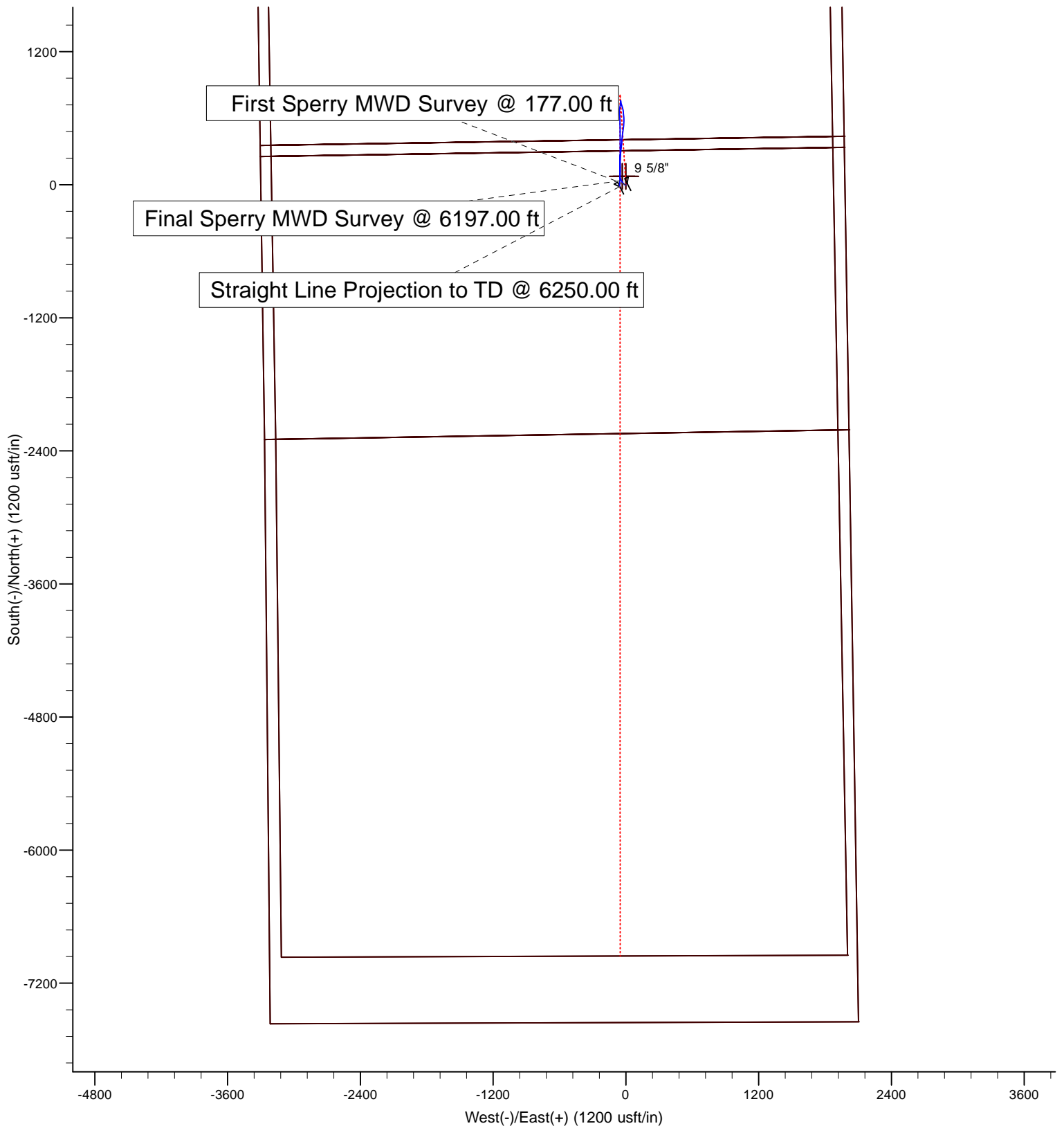
Magnetic Convergence at surface is: -6.98° (14 August 2014, , BGGM2014)



## LEGEND

----- Razor #27J-3410B, Plan C

— Actual Field Surveys



Project: Weld County, CO

Site: Sec. 27-T10N-R58W (#27 J Pad)

Well: Razor #27J-3410B

# Whiting Oil and Gas Corporation

**HALLIBURTON**

Sperry Drilling

