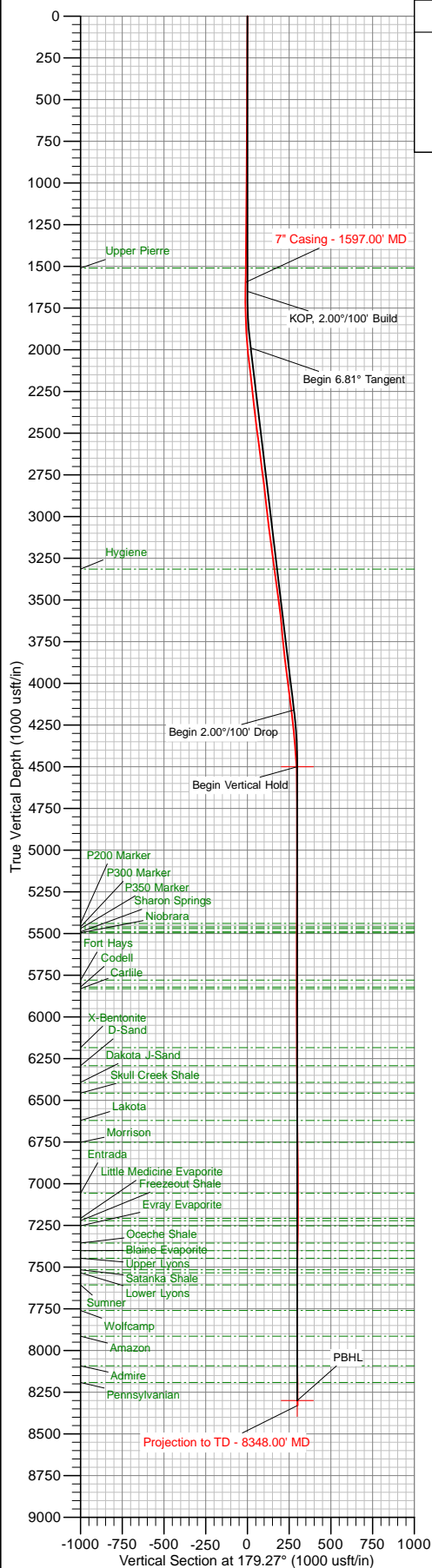
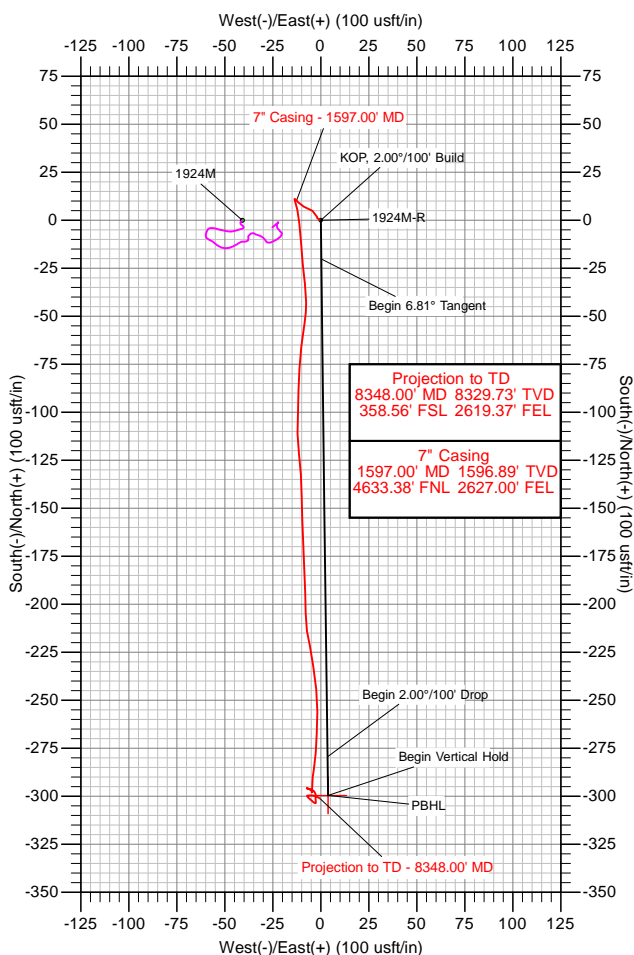




Company: Whiting Oil & Gas  
Site: Horsetail 19N  
Well: 1924M-R  
Project: Weld County, Colorado (NAD 83)  
Rig: Pioneer 54



ANNOTATIONS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation	
1650.00	0.00	0.00	1650.00	0.00	0.00	0.00	0.00	KOP, 2.00°/100' Build	
1990.38	6.81	179.27	1989.58	-20.20	0.26	20.20	20.20	Begin 6.81° Tangent	
4176.64	6.81	179.27	4160.42	-279.32	3.56	279.34	279.34	Begin 2.00°/100' Drop	
4517.01	0.00	0.00	4500.00	-299.52	3.81	299.54	299.54	Begin Vertical Hold	
8317.01	0.00	0.00	8300.00	-299.52	3.81	299.54	299.54	PBHL	



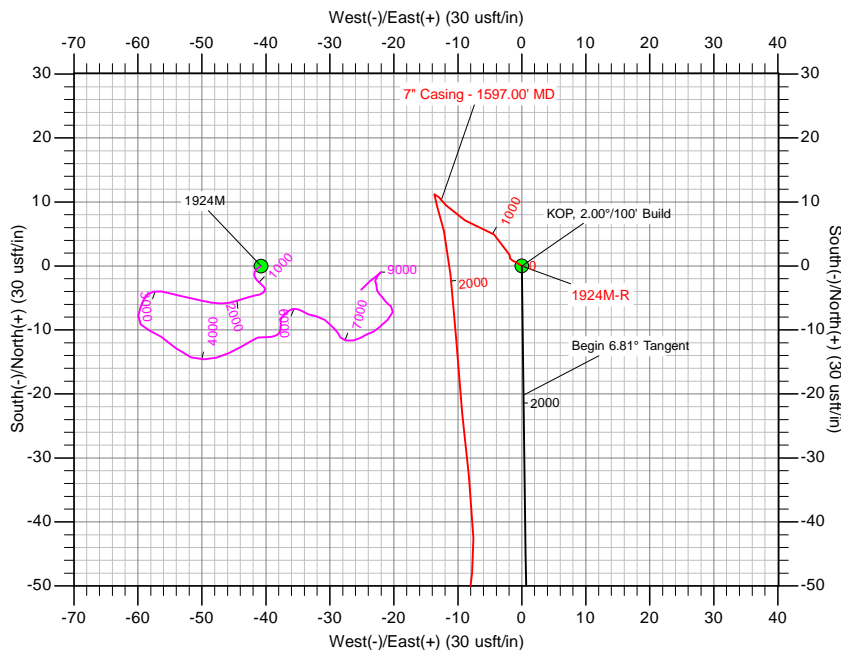
**T**  
**M**

Azimuths to True North  
Magnetic North: 7.89°

Magnetic Field  
Strength: 53084.7snT  
Dip Angle: 67.41°  
Date: 12/03/2014  
Model: WMM\_2010

US State Plane 1983  
Colorado Northern Zone

Created By: TNM  
Date: 12:19, December 15 2014  
Plan: Design #2





# **Whiting Oil & Gas**

**Weld County, Colorado (NAD 83)**

**Horsetail 19N**

**1924M-R**

**Wellbore #1**

**Survey: MS MWD**

## **Standard Survey Report**

**15 December, 2014**



<b>Company:</b>	Whiting Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well 1924M-R
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>TVD Reference:</b>	WELL @ 4767.00usft (Pioneer 54)
<b>Site:</b>	Horsetail 19N	<b>MD Reference:</b>	WELL @ 4767.00usft (Pioneer 54)
<b>Well:</b>	1924M-R	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys	<b>Database:</b>	Conroe Server Database

<b>Project</b>	Weld County, Colorado (NAD 83)		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

<b>Well</b>	1924M-R			
<b>Well Position</b>	<b>+N/-S</b>	0.00 usft	<b>Northing:</b>	1,545,700.17 usft
	<b>+E/-W</b>	0.00 usft	<b>Easting:</b>	3,472,145.28 usft
<b>Position Uncertainty</b>	0.00 usft		<b>Wellhead Elevation:</b>	usft
			<b>Latitude:</b>	40° 49' 7.900 N
			<b>Longitude:</b>	103° 47' 38.770 W
			<b>Ground Level:</b>	4,748.50 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	WMM_2010	12/03/14	7.90	67.41	53,085

<b>Design</b>	Surveys				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	179.27	

<b>Survey Program</b>	<b>Date</b>	12/15/14			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
237.00	8,348.00	MS MWD (Wellbore #1)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
237.00	0.46	301.54	237.00	0.50	-0.81	-0.51	0.19	0.19	0.00	
328.00	0.41	291.72	327.99	0.81	-1.42	-0.83	0.10	-0.05	-10.79	
421.00	0.31	336.72	420.99	1.16	-1.83	-1.19	0.31	-0.11	48.39	
513.00	0.48	359.44	512.99	1.78	-1.94	-1.80	0.25	0.18	24.70	
976.00	0.66	296.39	975.97	4.90	-4.34	-4.96	0.13	0.04	-13.62	
1,346.00	0.90	295.55	1,345.94	7.10	-8.87	-7.21	0.06	0.06	-0.23	
1,554.00	1.29	317.13	1,553.90	9.52	-11.94	-9.67	0.27	0.19	10.38	
1,597.00	1.32	321.11	1,596.89	10.26	-12.58	-10.42	0.22	0.07	9.25	
<b>7" Casing - 1597.00' MD</b>										
1,623.00	1.34	323.42	1,622.88	10.74	-12.95	-10.90	0.22	0.08	8.90	
1,716.00	0.55	191.78	1,715.87	11.18	-13.69	-11.35	1.89	-0.85	-141.55	
1,808.00	1.73	159.56	1,807.86	9.44	-13.29	-9.61	1.41	1.28	-35.02	
1,899.00	3.52	167.01	1,898.76	5.43	-12.19	-5.59	2.00	1.97	8.19	
1,990.00	5.18	174.24	1,989.49	-1.38	-11.15	1.23	1.92	1.82	7.95	
2,083.00	7.49	175.66	2,081.92	-11.60	-10.27	11.47	2.49	2.48	1.53	



<b>Company:</b>	Whiting Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well 1924M-R
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>TVD Reference:</b>	WELL @ 4767.00usft (Pioneer 54)
<b>Site:</b>	Horsetail 19N	<b>MD Reference:</b>	WELL @ 4767.00usft (Pioneer 54)
<b>Well:</b>	1924M-R	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys	<b>Database:</b>	Conroe Server Database

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,176.00	6.69	174.89	2,174.21	-23.04	-9.32	22.92	0.87	-0.86	-0.83
2,267.00	5.75	172.75	2,264.67	-32.84	-8.28	32.73	1.06	-1.03	-2.35
2,360.00	6.32	178.92	2,357.15	-42.58	-7.59	42.48	0.93	0.61	6.63
2,452.00	7.61	188.90	2,448.48	-53.66	-8.44	53.55	1.92	1.40	10.85
2,545.00	7.26	186.89	2,540.69	-65.58	-10.10	65.45	0.47	-0.38	-2.16
2,637.00	7.51	182.42	2,631.93	-77.36	-11.05	77.21	0.68	0.27	-4.86
2,729.00	6.84	182.12	2,723.21	-88.84	-11.51	88.69	0.73	-0.73	-0.33
2,822.00	7.18	181.25	2,815.52	-100.18	-11.84	100.03	0.38	0.37	-0.94
2,914.00	6.48	180.70	2,906.86	-111.12	-12.03	110.96	0.76	-0.76	-0.60
3,007.00	6.40	171.46	2,999.28	-121.50	-11.32	121.34	1.12	-0.09	-9.94
3,099.00	7.17	177.92	3,090.63	-132.31	-10.35	132.16	1.18	0.84	7.02
3,191.00	7.78	178.66	3,181.85	-144.27	-10.00	144.13	0.67	0.66	0.80
3,282.00	7.63	177.46	3,272.03	-156.46	-9.58	156.33	0.24	-0.16	-1.32
3,375.00	7.64	177.62	3,364.21	-168.81	-9.05	168.68	0.03	0.01	0.17
3,468.00	8.00	177.76	3,456.34	-181.45	-8.54	181.33	0.39	0.39	0.15
3,560.00	7.37	177.94	3,547.51	-193.74	-8.08	193.63	0.69	-0.68	0.20
3,653.00	6.19	179.67	3,639.86	-204.72	-7.84	204.60	1.29	-1.27	1.86
3,746.00	5.23	170.38	3,732.40	-213.91	-7.10	213.81	1.43	-1.03	-9.99
3,837.00	5.12	168.35	3,823.03	-221.98	-5.59	221.89	0.23	-0.12	-2.23
3,930.00	7.63	172.49	3,915.45	-232.17	-3.94	232.10	2.74	2.70	4.45
4,023.00	7.44	172.76	4,007.65	-244.26	-2.38	244.21	0.21	-0.20	0.29
4,115.00	7.42	180.89	4,098.88	-256.11	-1.72	256.07	1.14	-0.02	8.84
4,207.00	6.61	182.26	4,190.19	-267.34	-2.02	267.29	0.90	-0.88	1.49
4,299.00	5.83	184.08	4,281.64	-277.29	-2.56	277.24	0.87	-0.85	1.98
4,391.00	5.15	189.40	4,373.22	-286.03	-3.57	285.96	0.92	-0.74	5.78
4,485.00	3.24	182.38	4,466.97	-292.84	-4.37	292.76	2.10	-2.03	-7.47
4,577.00	1.51	185.19	4,558.88	-296.65	-4.59	296.57	1.88	-1.88	3.05
4,669.00	0.10	158.39	4,650.87	-297.93	-4.67	297.85	1.55	-1.53	-29.13
4,763.00	0.04	352.31	4,744.87	-297.97	-4.64	297.89	0.15	-0.06	-176.68
4,856.00	0.04	69.67	4,837.87	-297.93	-4.61	297.85	0.05	0.00	83.18
4,949.00	0.10	45.39	4,930.87	-297.86	-4.53	297.78	0.07	0.06	-26.11
5,042.00	0.18	17.96	5,023.87	-297.67	-4.42	297.59	0.11	0.09	-29.49
5,135.00	0.13	356.43	5,116.87	-297.42	-4.38	297.34	0.08	-0.05	-23.15
5,228.00	0.42	308.13	5,209.87	-297.11	-4.66	297.02	0.37	0.31	-51.94
5,322.00	0.71	301.18	5,303.87	-296.59	-5.43	296.50	0.32	0.31	-7.39
5,415.00	0.54	285.04	5,396.86	-296.18	-6.34	296.08	0.26	-0.18	-17.35
5,508.00	0.34	291.23	5,489.86	-295.97	-7.02	295.85	0.22	-0.22	6.66
5,601.00	0.05	13.27	5,582.86	-295.83	-7.27	295.71	0.36	-0.31	88.22
5,694.00	0.16	27.65	5,675.86	-295.67	-7.20	295.56	0.12	0.12	15.46
5,787.00	0.14	122.76	5,768.86	-295.62	-7.05	295.51	0.24	-0.02	102.27
5,880.00	0.26	131.68	5,861.86	-295.82	-6.79	295.71	0.13	0.13	9.59
5,973.00	0.28	114.07	5,954.86	-296.05	-6.43	295.95	0.09	0.02	-18.94
6,067.00	0.39	114.00	6,048.85	-296.28	-5.93	296.18	0.12	0.12	-0.07



<b>Company:</b>	Whiting Oil & Gas	<b>Local Co-ordinate Reference:</b>	Well 1924M-R
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<b>Site:</b>	Horsetail 19N	<b>MD Reference:</b>	WELL @ 4767.00usft (Pioneer 54)
<b>Well:</b>	1924M-R	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Surveys	<b>Database:</b>	Conroe Server Database

#### Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,160.00	0.50	93.51	6,141.85	-296.43	-5.23	296.34	0.21	0.12	-22.03
6,253.00	0.49	120.73	6,234.85	-296.66	-4.49	296.58	0.25	-0.01	29.27
6,347.00	0.74	132.27	6,328.84	-297.27	-3.69	297.20	0.30	0.27	12.28
6,440.00	0.59	150.12	6,421.84	-298.09	-3.01	298.03	0.27	-0.16	19.19
6,533.00	0.56	169.66	6,514.83	-298.95	-2.69	298.90	0.21	-0.03	21.01
6,626.00	0.57	184.50	6,607.83	-299.86	-2.64	299.80	0.16	0.01	15.96
6,719.00	0.48	177.65	6,700.82	-300.71	-2.66	300.65	0.12	-0.10	-7.37
6,812.00	0.49	178.87	6,793.82	-301.50	-2.64	301.44	0.02	0.01	1.31
6,906.00	0.50	175.30	6,887.82	-302.31	-2.60	302.25	0.03	0.01	-3.80
6,999.00	0.44	181.59	6,980.81	-303.07	-2.57	303.01	0.08	-0.06	6.76
7,092.00	0.15	182.08	7,073.81	-303.55	-2.59	303.49	0.31	-0.31	0.53
7,185.00	0.40	287.36	7,166.81	-303.58	-2.90	303.51	0.50	0.27	113.20
7,279.00	0.78	304.99	7,260.81	-303.11	-3.74	303.04	0.44	0.40	18.76
7,372.00	1.21	312.02	7,353.79	-302.09	-4.99	302.00	0.48	0.46	7.56
7,465.00	1.41	313.63	7,446.77	-300.64	-6.55	300.54	0.22	0.22	1.73
7,559.00	0.31	67.09	7,540.76	-299.75	-7.15	299.63	1.66	-1.17	120.70
7,652.00	0.42	93.88	7,633.76	-299.67	-6.58	299.56	0.22	0.12	28.81
7,746.00	0.54	80.85	7,727.75	-299.62	-5.80	299.53	0.17	0.13	-13.86
7,839.00	0.61	87.74	7,820.75	-299.54	-4.87	299.45	0.11	0.08	7.41
7,932.00	0.37	102.19	7,913.75	-299.58	-4.08	299.50	0.29	-0.26	15.54
8,025.00	0.40	110.17	8,006.74	-299.75	-3.48	299.69	0.07	0.03	8.58
8,119.00	0.54	102.28	8,100.74	-299.96	-2.74	299.90	0.16	0.15	-8.39
8,212.00	0.62	119.86	8,193.74	-300.31	-1.88	300.26	0.21	0.09	18.90
8,292.00	0.74	120.71	8,273.73	-300.78	-1.06	300.75	0.15	0.15	1.06
8,348.00	0.74	120.71	8,329.73	-301.15	-0.44	301.12	0.00	0.00	0.00
Projection to TD - 8348.00' MD									

#### Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,597.00	1,596.89	10.26	-12.58	7" Casing - 1597.00' MD
8,348.00	8,329.73	-301.15	-0.44	Projection to TD - 8348.00' MD