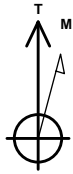




Company: Whiting Oil & Gas
Site: Wolf #12L
Well: 0103
Project: Weld County, Colorado (NAD 83)
Rig Name: Pioneer 54



Azimuths to True North
Magnetic North: 8.01°

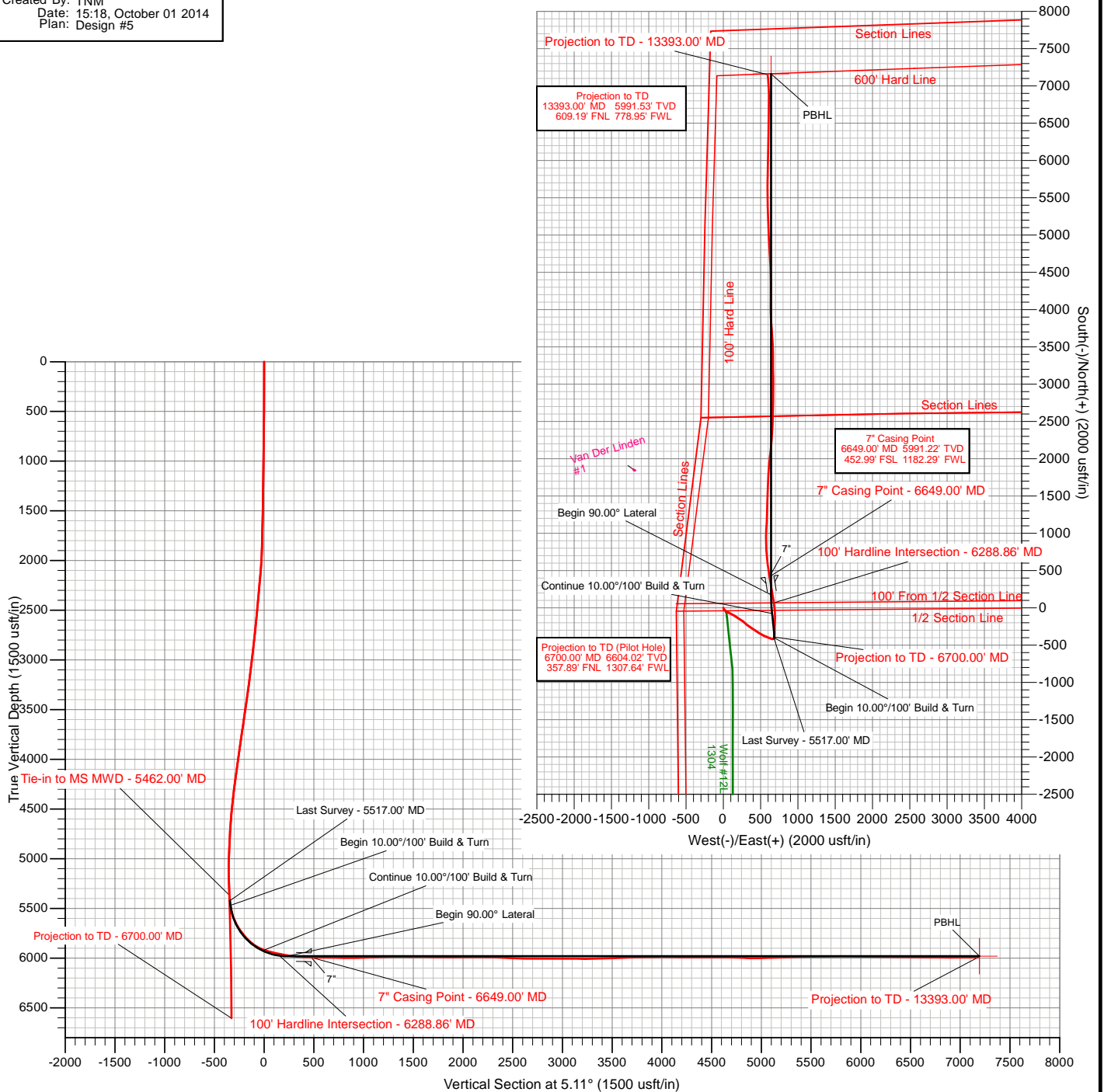
Magnetic Field
Strength: 53117.0snT
Dip Angle: 67.43°
Date: 08/24/2014
Model: WMM_2010

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation
5517.00	6.70	12.90	5421.01	-406.45	681.42	-344.14	0.00	Last Survey - 5517.00' MD
5564.21	6.70	12.90	5467.89	-401.08	682.65	-338.68	5.51	Begin 10.00°/100' Build & Turn
6151.47	65.00	352.95	5924.29	-74.47	655.19	-15.82	333.67	Continue 10.00°/100' Build & Turn
6410.61	90.00	0.00	5980.00	175.93	640.53	232.28	584.65	Begin 90.00° Lateral
13398.51	90.00	0.00	5980.00	7163.82	640.81	7192.43	7572.55	PBHL

US State Plane 1983
Colorado Northern Zone

Created By: TNM
Date: 15:18, October 01 2014
Plan: Design #5



The customer should only rely on this document after independently verifying all paths, targets, coordinates, lease and hard lines represented. Any decisions made or wells drilled utilizing this or any other information supplied by MS Energy are at the sole risk and responsibility of the customer. MS Energy is not responsible for the accuracy of this schematic or the information contained herein.



Company:	Whiting Oil & Gas	Local Co-ordinate Reference:	Well 0103
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4970.00usft (Pioneer 54)
Site:	Wolf #12L	MD Reference:	WELL @ 4970.00usft (Pioneer 54)
Well:	0103	North Reference:	True
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Conroe Server Database

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

Well	0103					
Well Position	+N-S	0.00 usft	Northing:	1,557,393.51 usft	Latitude:	40° 51' 10.551 N
	+E-W	0.00 usft	Easting:	3,433,013.10 usft	Longitude:	103° 56' 4.970 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,953.00 usft

Wellbore	Pilot Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	08/24/14	8.01	67.43	53,117

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.00	0.00	0.00	5.11	

Survey Program	Date	09/11/14			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
500.00	6,700.00	MS MWD (Pilot Hole)	MWD	MWD - Standard	

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)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.60	129.60	499.99	-1.67	2.02	-1.48	0.12	0.12	0.00	
972.00	0.80	146.60	971.96	-5.99	5.74	-5.46	0.06	0.04	3.60	
1,530.00	1.10	176.70	1,529.88	-14.59	8.19	-13.81	0.10	0.05	5.39	
1,760.00	1.40	176.80	1,759.83	-19.60	8.47	-18.77	0.13	0.13	0.04	
1,811.00	1.30	168.40	1,810.81	-20.79	8.62	-19.94	0.43	-0.20	-16.47	
1,905.00	3.40	131.90	1,904.73	-23.70	10.91	-22.63	2.64	2.23	-38.83	
1,999.00	5.30	125.30	1,998.46	-28.07	16.53	-26.49	2.09	2.02	-7.02	
2,093.00	8.40	132.30	2,091.78	-35.20	25.15	-32.82	3.41	3.30	7.45	
2,187.00	10.90	123.80	2,184.44	-44.77	37.62	-41.24	3.05	2.66	-9.04	
2,280.00	14.10	118.00	2,275.23	-54.98	54.93	-49.87	3.69	3.44	-6.24	
2,374.00	13.30	118.70	2,366.56	-65.55	74.53	-58.65	0.87	-0.85	0.74	
2,469.00	12.10	114.80	2,459.23	-74.97	93.15	-66.38	1.55	-1.26	-4.11	
2,563.00	14.50	119.30	2,550.71	-84.87	112.36	-74.52	2.78	2.55	4.79	
2,658.00	13.90	118.60	2,642.80	-96.15	132.75	-83.94	0.66	-0.63	-0.74	



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Site:	Wolf #12L	MD Reference:	WELL @ 4970.00usft (Pioneer 54)
Well:	0103	North Reference:	True
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	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)
2,753.00	13.50	117.30	2,735.10	-106.70	152.63	-92.68	0.53	-0.42	-1.37
2,847.00	14.30	123.80	2,826.35	-118.19	172.02	-102.40	1.87	0.85	6.91
2,942.00	14.00	125.30	2,918.47	-131.36	191.15	-113.81	0.50	-0.32	1.58
3,035.00	14.10	124.40	3,008.69	-144.26	209.68	-125.01	0.26	0.11	-0.97
3,130.00	14.10	122.60	3,100.83	-157.03	228.98	-136.01	0.46	0.00	-1.89
3,223.00	13.70	120.60	3,191.10	-168.74	248.00	-145.98	0.67	-0.43	-2.15
3,317.00	14.70	131.10	3,282.25	-182.25	266.57	-157.78	2.93	1.06	11.17
3,410.00	14.30	130.60	3,372.28	-197.48	284.18	-171.38	0.45	-0.43	-0.54
3,503.00	14.10	131.10	3,462.44	-212.40	301.44	-184.71	0.25	-0.22	0.54
3,596.00	14.10	128.70	3,552.64	-226.93	318.82	-197.63	0.63	0.00	-2.58
3,690.00	14.90	126.60	3,643.65	-241.29	337.46	-210.28	1.02	0.85	-2.23
3,783.00	15.60	125.20	3,733.37	-255.63	357.27	-222.79	0.85	0.75	-1.51
3,875.00	16.60	125.00	3,821.76	-270.30	378.15	-235.54	1.09	1.09	-0.22
3,968.00	17.40	123.80	3,910.70	-285.66	400.59	-248.84	0.94	0.86	-1.29
4,062.00	17.50	123.00	4,000.37	-301.17	424.12	-262.20	0.28	0.11	-0.85
4,155.00	16.30	122.30	4,089.36	-315.76	446.88	-274.70	1.31	-1.29	-0.75
4,250.00	16.10	121.70	4,180.58	-329.81	469.35	-286.69	0.27	-0.21	-0.63
4,343.00	16.10	120.90	4,269.94	-343.21	491.39	-298.07	0.24	0.00	-0.86
4,437.00	16.00	120.20	4,360.27	-356.42	513.77	-309.24	0.23	-0.11	-0.74
4,531.00	16.10	117.30	4,450.61	-368.91	536.55	-319.65	0.86	0.11	-3.09
4,623.00	15.90	113.20	4,539.05	-379.73	559.47	-328.39	1.25	-0.22	-4.46
4,716.00	13.40	110.40	4,629.02	-388.50	581.28	-335.18	2.79	-2.69	-3.01
4,809.00	12.20	112.80	4,719.71	-396.07	600.44	-341.01	1.41	-1.29	2.58
4,902.00	10.70	111.70	4,810.85	-403.07	617.52	-346.46	1.63	-1.61	-1.18
4,996.00	10.40	112.00	4,903.26	-409.47	633.50	-351.42	0.32	-0.32	0.32
5,089.00	7.80	111.70	4,995.09	-414.95	647.15	-355.66	2.80	-2.80	-0.32
5,182.00	7.40	91.40	5,087.28	-417.43	659.00	-357.08	2.90	-0.43	-21.83
5,276.00	5.50	75.10	5,180.69	-416.42	669.41	-355.14	2.79	-2.02	-17.34
5,369.00	4.10	59.50	5,273.37	-413.59	676.58	-351.68	2.05	-1.51	-16.77
5,462.00	1.20	45.10	5,366.26	-411.21	680.13	-349.00	3.18	-3.12	-15.48
5,555.00	1.20	20.40	5,459.24	-409.61	681.16	-347.31	0.55	0.00	-26.56
5,649.00	1.20	26.20	5,553.22	-407.81	681.94	-345.45	0.13	0.00	6.17
5,742.00	1.80	39.30	5,646.19	-405.80	683.30	-343.33	0.74	0.65	14.09
5,835.00	1.60	7.00	5,739.15	-403.38	684.38	-340.82	1.04	-0.22	-34.73
5,928.00	1.60	352.00	5,832.11	-400.81	684.36	-338.26	0.45	0.00	-16.13
5,984.00	1.50	351.10	5,888.09	-399.31	684.13	-336.79	0.18	-0.18	-1.61
6,206.00	0.90	348.40	6,110.04	-394.73	683.33	-332.30	0.27	-0.27	-1.22
6,485.00	0.50	353.30	6,389.02	-391.38	682.75	-329.01	0.14	-0.14	1.76
6,642.00	0.20	301.20	6,546.02	-390.55	682.44	-328.22	0.26	-0.19	-33.18
6,700.00	0.20	301.20	6,604.02	-390.45	682.26	-328.13	0.00	0.00	0.00
Projection to TD - 6700.00' MD									



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Well:	0103	North Reference:	True
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Conroe Server Database

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,700.00	6,604.02	-390.45	682.26	Projection to TD - 6700.00' MD