

WHITING PETROLEUM CORPORATION

Project: Weld County, CO
Site: Horsetail #07F PAD
Well: 0639
Wellbore: OH
Design: OH



Azimuths to True North
Magnetic North: 7.58°

Magnetic Field
Strength: 52903.8snT
Dip Angle: 67.35°
Date: 2/26/2016
Model: HDGM



DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Beffie #1 (1550' Radius)	0.00	3234.73	-1644.45	1561549.56	3469684.53	40° 51' 44.942 N	103° 48' 6.822 W
SHL (HT07F-0639)	0.00	0.00	0.00	1558347.03	3471390.84	40° 51' 12.981 N	103° 47' 45.420 W
BHL - OH (HT07F-0639)	6017.01	-192.88	-365.72	1558147.16	3471028.89	40° 51' 11.076 N	103° 47' 50.179 W
PBHL (HT07F-0639)	6020.00	7321.17	-335.75	1565660.40	3470914.47	40° 52' 25.320 N	103° 47' 49.790 W

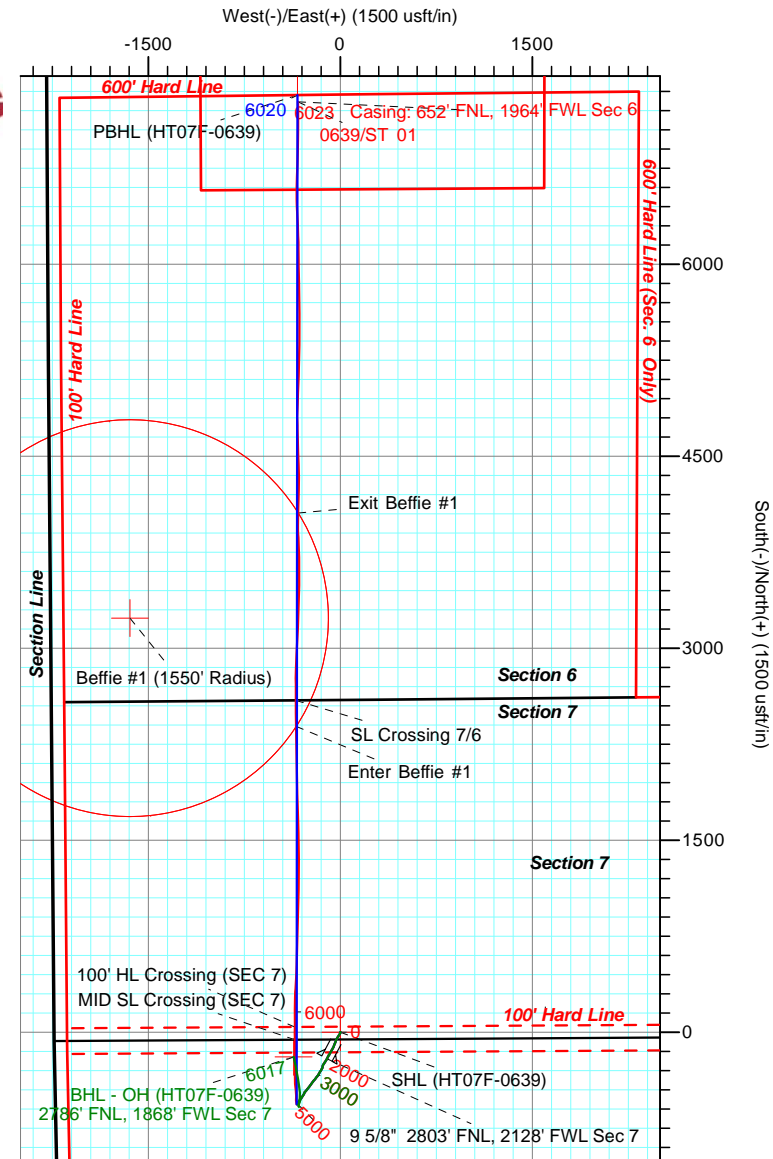
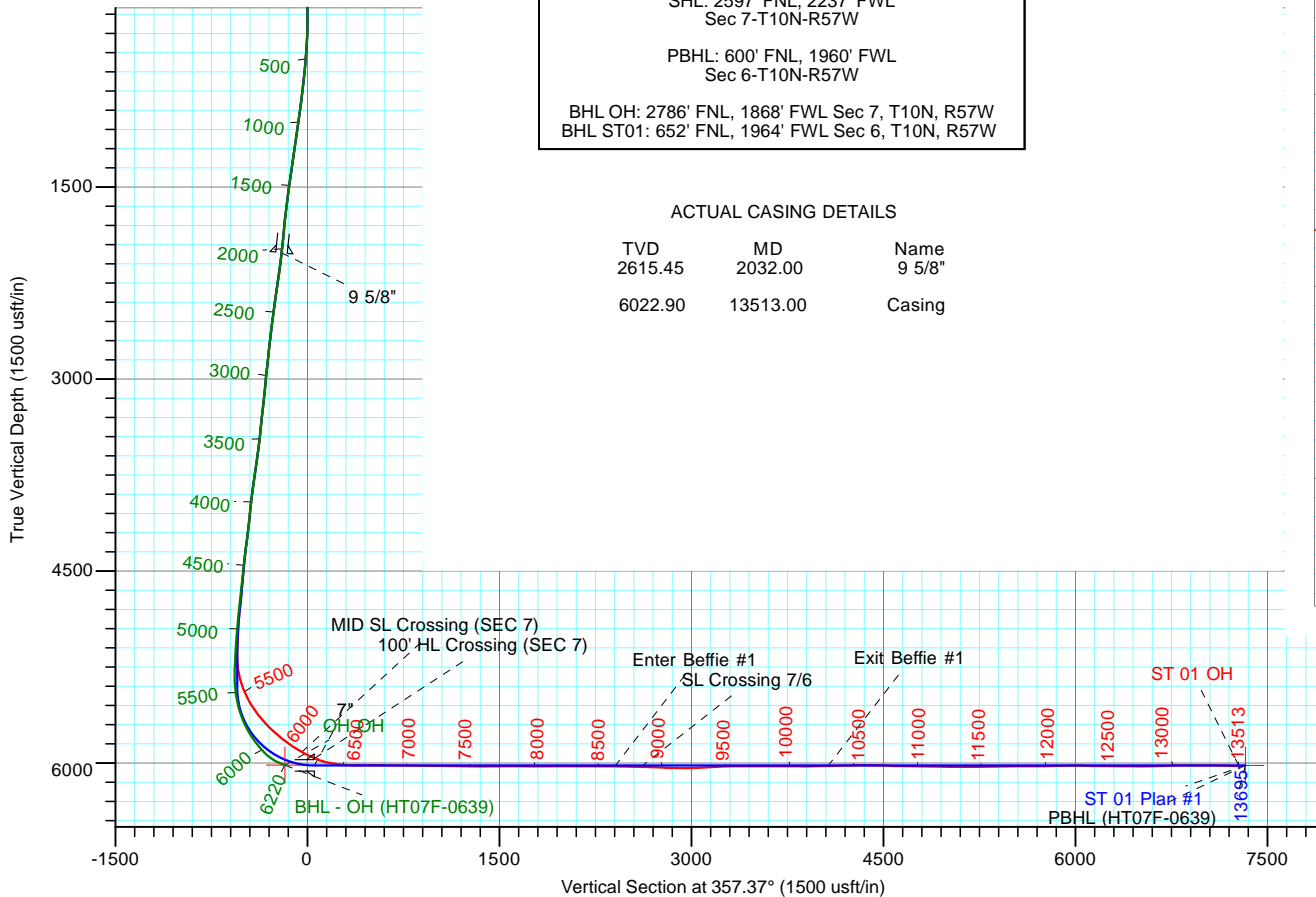
LINE CALLS
SHL: 2597' FNL, 2237' FWL
Sec 7-T10N-R57W

PBHL: 600' FNL, 1960' FWL
Sec 6-T10N-R57W

BHL OH: 2786' FNL, 1868' FWL Sec 7, T10N, R57W
BHL ST01: 652' FNL, 1964' FWL Sec 6, T10N, R57W

ACTUAL CASING DETAILS

TVD	MD	Name
2615.45	2032.00	9 5/8"
6022.90	13513.00	Casing



PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
Datum: GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)



LEAM DRILLING SYSTEMS LLC
2010 East Davis, Conroe, Texas 77301
Phone: 936/756-7577, Fax: 936/756-7595

Design: OH (0639/OH)
Horsetail #07F PAD
Created By: Nora Tucker
Date: 16:48, May 02 2016
Approved: _____
Date: _____

WHITING PETROLEUM CORPORATION

Project: Weld County, CO
Site: Horsetail #07F PAD
Well: 0639
Wellbore: OH
Design: OH



Azimuths to True North
Magnetic North: 7.58°

Magnetic Field
Strength: 52903.8snT
Dip Angle: 67.35°
Date: 2/26/2016
Model: HDGM

PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
Datum: GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)

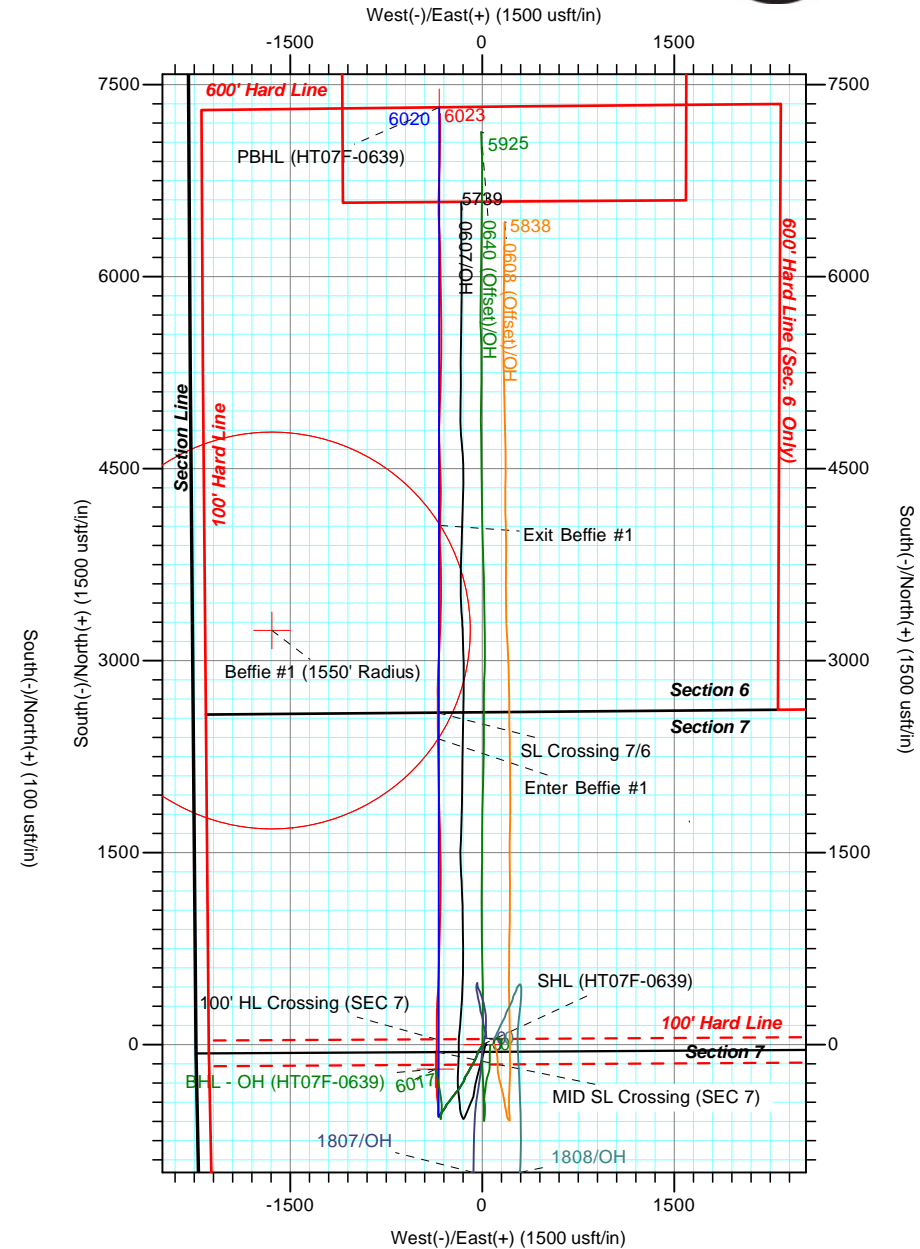
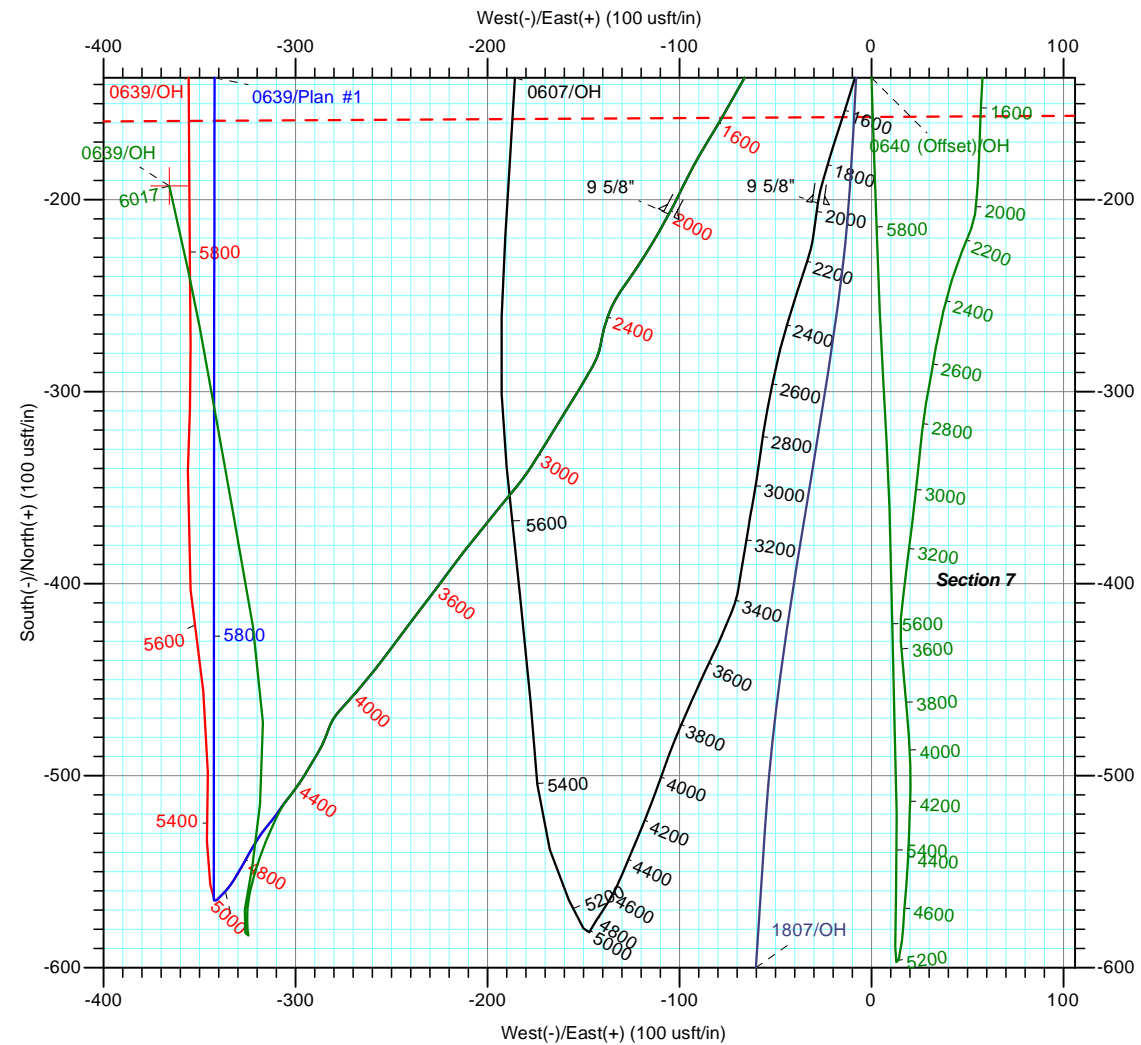


LINE CALLS
SHL: 2597' FNL, 2237' FWL
Sec 7-T10N-R57W

PBHL: 600' FNL, 1960' FWL
Sec 6-T10N-R57W

BHL OH: 2786' FNL, 1868' FWL Sec 7, T10N, R57W
BHL ST01: 652' FNL, 1964' FWL Sec 6, T10N, R57W

ACTUAL CASING DETAILS		
TVD	MD	Name
2015.45	2032.00	9 5/8"
6022.90	13513.00	Casing



LEAM DRILLING SYSTEMS LLC
2010 East Davis, Conroe, Texas 77301
Phone: 936/756-7577, Fax: 936/756-7595

Design: OH (0639/OH)
Horsetail #07F PAD
Created By: Nora Tucker
Date: 16:39, May 02 2016
Approved: _____
Date: _____

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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

Site		Horsetail #07F PAD			
Site Position:		Northing:	1,558,346.52 usft	Latitude:	40° 51' 12.971 N
From:	Map	Easting:	3,471,420.73 usft	Longitude:	103° 47' 45.031 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	0639					
Well Position	+N/-S	0.00 usft	Northing:	1,558,347.04 usft	Latitude:	40° 51' 12.981 N
	+E/-W	0.00 usft	Easting:	3,471,390.84 usft	Longitude:	103° 47' 45.420 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,898.80 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/26/2016	7.58	67.35	52,904

Design	OH				
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	357.37	

Survey Program	Date	5/2/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
232.00	6,170.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
6,220.00	6,220.00	Survey #2 (OH)	Project	Projection	

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	
232.00	0.35	86.55	232.00	0.04	0.71	0.01	0.15	0.15	0.00	
323.00	2.07	197.21	322.98	-1.51	0.50	-1.53	2.44	1.89	121.60	
414.00	4.13	207.46	413.84	-5.99	-1.50	-5.91	2.34	2.26	11.26	
506.00	6.11	207.14	505.47	-13.29	-5.26	-13.03	2.15	2.15	-0.35	
598.00	7.41	212.85	596.83	-22.63	-10.71	-22.11	1.59	1.41	6.21	
690.00	7.47	215.57	688.06	-32.48	-17.41	-31.64	0.39	0.07	2.96	
781.00	8.48	208.63	778.18	-43.18	-24.07	-42.03	1.53	1.11	-7.63	
873.00	8.16	206.84	869.21	-54.96	-30.26	-53.51	0.45	-0.35	-1.95	
964.00	8.70	200.55	959.23	-67.16	-35.60	-65.46	1.17	0.59	-6.91	

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)
1,056.00	9.19	201.60	1,050.11	-80.51	-40.74	-78.56	0.56	0.53	1.14
1,148.00	9.38	201.91	1,140.90	-94.30	-46.24	-92.08	0.21	0.21	0.34
1,239.00	9.01	201.25	1,230.73	-107.82	-51.59	-105.34	0.42	-0.41	-0.73
1,331.00	9.41	209.07	1,321.55	-121.11	-57.86	-118.33	1.43	0.43	8.50
1,423.00	9.17	208.06	1,412.34	-134.15	-64.96	-131.03	0.32	-0.26	-1.10
1,515.00	8.92	209.51	1,503.20	-146.83	-71.92	-143.38	0.37	-0.27	1.58
1,606.00	8.75	210.21	1,593.12	-158.95	-78.88	-155.17	0.22	-0.19	0.77
1,697.00	8.70	211.46	1,683.07	-170.80	-85.96	-166.68	0.22	-0.05	1.37
1,790.00	7.47	208.72	1,775.14	-182.10	-92.53	-177.67	1.39	-1.32	-2.95
1,881.00	6.26	205.52	1,865.49	-191.77	-97.51	-187.10	1.39	-1.33	-3.52
1,975.00	6.73	206.94	1,958.88	-201.30	-102.22	-196.41	0.53	0.50	1.51
1,991.00	7.18	207.36	1,974.77	-203.02	-103.10	-198.09	2.83	2.81	2.63
2,032.00	7.15	208.25	2,015.45	-207.55	-105.49	-202.50	0.28	-0.07	2.18
9 5/8"									
2,123.00	7.09	210.26	2,105.74	-217.39	-111.00	-212.07	0.28	-0.07	2.21
2,218.00	9.98	212.06	2,199.68	-229.43	-118.32	-223.77	3.05	3.04	1.89
2,312.00	11.87	215.75	2,291.98	-244.18	-128.30	-238.05	2.14	2.01	3.93
2,407.00	8.90	200.87	2,385.43	-258.98	-136.62	-252.45	4.19	-3.13	-15.66
2,501.00	7.38	190.41	2,478.48	-271.72	-140.31	-265.00	2.25	-1.62	-11.13
2,524.00	7.16	189.84	2,501.30	-274.58	-140.82	-267.84	1.01	-0.96	-2.48
2,618.00	8.39	208.03	2,594.44	-286.41	-145.04	-279.46	2.91	1.31	19.35
2,713.00	8.13	211.71	2,688.46	-298.24	-151.83	-290.97	0.62	-0.27	3.87
2,807.00	7.65	212.15	2,781.57	-309.19	-158.65	-301.60	0.51	-0.51	0.47
2,901.00	7.31	212.29	2,874.77	-319.55	-165.18	-311.64	0.36	-0.36	0.15
2,996.00	6.63	210.55	2,969.07	-329.38	-171.19	-321.19	0.75	-0.72	-1.83
3,091.00	6.57	212.82	3,063.44	-338.67	-176.93	-330.21	0.28	-0.06	2.39
3,185.00	8.97	218.65	3,156.57	-348.91	-184.42	-340.10	2.68	2.55	6.20
3,280.00	8.48	219.79	3,250.47	-360.08	-193.53	-350.84	0.55	-0.52	1.20
3,374.00	7.83	218.62	3,343.52	-370.41	-201.96	-360.77	0.71	-0.69	-1.24
3,468.00	7.16	219.00	3,436.71	-379.96	-209.64	-369.96	0.71	-0.71	0.40
3,562.00	9.54	216.01	3,529.71	-390.82	-217.91	-380.42	2.57	2.53	-3.18
3,657.00	10.83	217.44	3,623.21	-404.27	-227.97	-393.41	1.38	1.36	1.51
3,751.00	10.70	217.32	3,715.56	-418.22	-238.63	-406.85	0.14	-0.14	-0.13
3,847.00	10.18	216.53	3,809.97	-432.13	-249.08	-420.26	0.56	-0.54	-0.82
3,942.00	9.03	217.65	3,903.64	-444.78	-258.63	-432.46	1.23	-1.21	1.18
4,036.00	8.31	221.88	3,996.56	-455.68	-267.67	-442.94	1.02	-0.77	4.50
4,130.00	8.11	222.00	4,089.60	-465.66	-276.64	-452.50	0.21	-0.21	0.13
4,224.00	7.34	198.36	4,182.77	-476.29	-282.97	-462.83	3.45	-0.82	-25.15
4,319.00	8.95	209.53	4,276.81	-488.48	-288.53	-474.75	2.37	1.69	11.76
4,414.00	8.35	212.61	4,370.73	-500.72	-295.89	-486.64	0.80	-0.63	3.24
4,508.00	7.74	218.80	4,463.81	-511.41	-303.53	-496.96	1.13	-0.65	6.59
4,601.00	7.98	204.05	4,555.94	-522.18	-310.09	-507.43	2.18	0.26	-15.86
4,696.00	7.04	203.63	4,650.13	-533.54	-315.11	-518.54	0.99	-0.99	-0.44

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)	
4,790.00	6.59	197.12	4,743.47	-543.97	-319.00	-528.78	0.95	-0.48	-6.93	
4,883.00	5.57	196.99	4,835.94	-553.39	-321.89	-538.06	1.10	-1.10	-0.14	
4,977.00	5.06	190.49	4,929.54	-561.83	-323.98	-546.39	0.84	-0.54	-6.91	
5,072.00	4.24	184.94	5,024.22	-569.44	-325.05	-553.96	0.98	-0.86	-5.84	
5,166.00	3.36	176.65	5,118.02	-575.66	-325.19	-560.15	1.10	-0.94	-8.82	
5,260.00	2.09	176.12	5,211.91	-580.12	-324.91	-564.62	1.35	-1.35	-0.56	
5,355.00	1.67	169.86	5,306.86	-583.21	-324.55	-567.73	0.49	-0.44	-6.59	
5,450.00	3.95	325.09	5,401.80	-581.89	-326.18	-566.33	5.80	2.40	163.40	
5,544.00	11.77	10.19	5,494.91	-569.77	-326.33	-554.22	10.00	8.32	47.98	
5,638.00	16.64	9.25	5,586.01	-547.03	-322.47	-531.69	5.19	5.18	-1.00	
5,732.00	23.85	5.74	5,674.14	-514.80	-318.40	-499.67	7.77	7.67	-3.73	
5,826.00	29.93	358.79	5,757.96	-472.39	-317.00	-457.38	7.27	6.47	-7.39	
5,919.00	35.56	350.13	5,836.19	-422.49	-322.13	-407.29	7.86	6.05	-9.31	
6,013.00	43.88	350.05	5,908.43	-363.37	-332.46	-347.76	8.85	8.85	-0.09	
6,060.00	49.41	349.70	5,940.69	-329.74	-338.47	-313.89	11.78	11.77	-0.74	
6,107.00	56.88	349.87	5,968.86	-292.75	-345.13	-276.64	15.90	15.89	0.36	
6,138.00	62.37	349.70	5,984.53	-266.44	-349.88	-250.14	17.72	17.71	-0.55	
6,170.00	67.69	347.41	5,998.03	-238.03	-355.64	-221.48	17.84	16.63	-7.16	
6,220.00	67.69	347.41	6,017.01	-192.88	-365.72	-175.92	0.00	0.00	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
2,032.00	2,015.45	9 5/8"	9-5/8	12-1/4	

WHITING PETROLEUM CORPORATION

**Weld County, CO
Horsetail #07F PAD
0639**

OH

Design: OH

Survey Report - Geographic

02 May, 2016

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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

Site		Horsetail #07F PAD			
Site Position:		Northing:	1,558,346.52 usft	Latitude:	40° 51' 12.971 N
From:	Map	Easting:	3,471,420.73 usft	Longitude:	103° 47' 45.031 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	0639					
Well Position	+N/-S	0.00 usft	Northing:	1,558,347.04 usft	Latitude:	40° 51' 12.981 N
	+E/-W	0.00 usft	Easting:	3,471,390.84 usft	Longitude:	103° 47' 45.420 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,898.80 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/26/2016	7.58	67.35	52,904

Design	OH				
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	357.37	

Survey Program	Date	5/2/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
232.00	6,170.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
6,220.00	6,220.00	Survey #2 (OH)	Project	Projection	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	1,558,347.04	3,471,390.84	40° 51' 12.981 N	103° 47' 45.420 W	
232.00	0.35	86.55	232.00	0.04	0.71	1,558,347.09	3,471,391.54	40° 51' 12.982 N	103° 47' 45.411 W	
323.00	2.07	197.21	322.98	-1.51	0.50	1,558,345.54	3,471,391.36	40° 51' 12.967 N	103° 47' 45.414 W	
414.00	4.13	207.46	413.84	-5.99	-1.50	1,558,341.02	3,471,389.45	40° 51' 12.922 N	103° 47' 45.440 W	
506.00	6.11	207.14	505.47	-13.29	-5.26	1,558,333.65	3,471,385.83	40° 51' 12.850 N	103° 47' 45.488 W	
598.00	7.41	212.85	596.83	-22.63	-10.71	1,558,324.21	3,471,380.56	40° 51' 12.758 N	103° 47' 45.559 W	
690.00	7.47	215.57	688.06	-32.48	-17.41	1,558,314.23	3,471,374.05	40° 51' 12.661 N	103° 47' 45.647 W	
781.00	8.48	208.63	778.18	-43.18	-24.07	1,558,303.40	3,471,367.60	40° 51' 12.555 N	103° 47' 45.733 W	
873.00	8.16	206.84	869.21	-54.96	-30.26	1,558,291.51	3,471,361.63	40° 51' 12.438 N	103° 47' 45.814 W	
964.00	8.70	200.55	959.23	-67.16	-35.60	1,558,279.20	3,471,356.54	40° 51' 12.318 N	103° 47' 45.883 W	
1,056.00	9.19	201.60	1,050.11	-80.51	-40.74	1,558,265.76	3,471,351.65	40° 51' 12.186 N	103° 47' 45.950 W	

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,148.00	9.38	201.91	1,140.90	-94.30	-46.24	1,558,251.87	3,471,346.41	40° 51' 12.050 N	103° 47' 46.022 W
1,239.00	9.01	201.25	1,230.73	-107.82	-51.59	1,558,238.25	3,471,341.32	40° 51' 11.916 N	103° 47' 46.091 W
1,331.00	9.41	209.07	1,321.55	-121.11	-57.86	1,558,224.84	3,471,335.31	40° 51' 11.785 N	103° 47' 46.173 W
1,423.00	9.17	208.06	1,412.34	-134.15	-64.96	1,558,211.66	3,471,328.46	40° 51' 11.656 N	103° 47' 46.265 W
1,515.00	8.92	209.51	1,503.20	-146.83	-71.92	1,558,198.86	3,471,321.75	40° 51' 11.531 N	103° 47' 46.356 W
1,606.00	8.75	210.21	1,593.12	-158.95	-78.88	1,558,186.60	3,471,315.02	40° 51' 11.411 N	103° 47' 46.446 W
1,697.00	8.70	211.46	1,683.07	-170.80	-85.96	1,558,174.62	3,471,308.18	40° 51' 11.294 N	103° 47' 46.539 W
1,790.00	7.47	208.72	1,775.14	-182.10	-92.53	1,558,163.19	3,471,301.82	40° 51' 11.182 N	103° 47' 46.624 W
1,881.00	6.26	205.52	1,865.49	-191.77	-97.51	1,558,153.43	3,471,297.03	40° 51' 11.087 N	103° 47' 46.689 W
1,975.00	6.73	206.94	1,958.88	-201.30	-102.22	1,558,143.81	3,471,292.51	40° 51' 10.992 N	103° 47' 46.750 W
1,991.00	7.18	207.36	1,974.77	-203.02	-103.10	1,558,142.07	3,471,291.66	40° 51' 10.975 N	103° 47' 46.762 W
2,032.00	7.15	208.25	2,015.45	-207.55	-105.49	1,558,137.50	3,471,289.36	40° 51' 10.931 N	103° 47' 46.793 W
9 5/8"									
2,123.00	7.09	210.26	2,105.74	-217.39	-111.00	1,558,127.56	3,471,284.04	40° 51' 10.834 N	103° 47' 46.864 W
2,218.00	9.98	212.06	2,199.68	-229.43	-118.32	1,558,115.37	3,471,276.94	40° 51' 10.715 N	103° 47' 46.960 W
2,312.00	11.87	215.75	2,291.98	-244.18	-128.30	1,558,100.43	3,471,267.26	40° 51' 10.569 N	103° 47' 47.089 W
2,407.00	8.90	200.87	2,385.43	-258.98	-136.62	1,558,085.48	3,471,259.21	40° 51' 10.423 N	103° 47' 47.198 W
2,501.00	7.38	190.41	2,478.48	-271.72	-140.31	1,558,072.67	3,471,255.78	40° 51' 10.297 N	103° 47' 47.246 W
2,524.00	7.16	189.84	2,501.30	-274.58	-140.82	1,558,069.80	3,471,255.32	40° 51' 10.268 N	103° 47' 47.252 W
2,618.00	8.39	208.03	2,594.44	-286.41	-145.04	1,558,057.89	3,471,251.32	40° 51' 10.152 N	103° 47' 47.307 W
2,713.00	8.13	211.71	2,688.46	-298.24	-151.83	1,558,045.93	3,471,244.76	40° 51' 10.035 N	103° 47' 47.396 W
2,807.00	7.65	212.15	2,781.57	-309.19	-158.65	1,558,034.85	3,471,238.15	40° 51' 9.926 N	103° 47' 47.485 W
2,901.00	7.31	212.29	2,874.77	-319.55	-165.18	1,558,024.37	3,471,231.83	40° 51' 9.824 N	103° 47' 47.569 W
2,996.00	6.63	210.55	2,969.07	-329.38	-171.19	1,558,014.43	3,471,226.00	40° 51' 9.727 N	103° 47' 47.648 W
3,091.00	6.57	212.82	3,063.44	-338.67	-176.93	1,558,005.03	3,471,220.45	40° 51' 9.635 N	103° 47' 47.722 W
3,185.00	8.97	218.65	3,156.57	-348.91	-184.42	1,557,994.64	3,471,213.15	40° 51' 9.534 N	103° 47' 47.820 W
3,280.00	8.48	219.79	3,250.47	-360.08	-193.53	1,557,983.30	3,471,204.26	40° 51' 9.424 N	103° 47' 47.938 W
3,374.00	7.83	218.62	3,343.52	-370.41	-201.96	1,557,972.82	3,471,196.03	40° 51' 9.322 N	103° 47' 48.048 W
3,468.00	7.16	219.00	3,436.71	-379.96	-209.64	1,557,963.11	3,471,188.53	40° 51' 9.227 N	103° 47' 48.148 W
3,562.00	9.54	216.01	3,529.71	-390.82	-217.91	1,557,952.10	3,471,180.47	40° 51' 9.120 N	103° 47' 48.256 W
3,657.00	10.83	217.44	3,623.21	-404.27	-227.97	1,557,938.46	3,471,170.68	40° 51' 8.987 N	103° 47' 48.386 W
3,751.00	10.70	217.32	3,715.56	-418.22	-238.63	1,557,924.30	3,471,160.29	40° 51' 8.849 N	103° 47' 48.525 W
3,847.00	10.18	216.53	3,809.97	-432.13	-249.08	1,557,910.20	3,471,150.11	40° 51' 8.712 N	103° 47' 48.661 W
3,942.00	9.03	217.65	3,903.64	-444.78	-258.63	1,557,897.37	3,471,140.80	40° 51' 8.587 N	103° 47' 48.785 W
4,036.00	8.31	221.88	3,996.56	-455.68	-267.67	1,557,886.30	3,471,131.97	40° 51' 8.479 N	103° 47' 48.903 W
4,130.00	8.11	222.00	4,089.60	-465.66	-276.64	1,557,876.14	3,471,123.19	40° 51' 8.380 N	103° 47' 49.020 W
4,224.00	7.34	198.36	4,182.77	-476.29	-282.97	1,557,865.40	3,471,117.07	40° 51' 8.275 N	103° 47' 49.102 W
4,319.00	8.95	209.53	4,276.81	-488.48	-288.53	1,557,853.10	3,471,111.75	40° 51' 8.155 N	103° 47' 49.175 W
4,414.00	8.35	212.61	4,370.73	-500.72	-295.89	1,557,840.72	3,471,104.63	40° 51' 8.034 N	103° 47' 49.270 W
4,508.00	7.74	218.80	4,463.81	-511.41	-303.53	1,557,829.89	3,471,097.19	40° 51' 7.928 N	103° 47' 49.370 W
4,601.00	7.98	204.05	4,555.94	-522.18	-310.09	1,557,818.99	3,471,090.84	40° 51' 7.822 N	103° 47' 49.455 W
4,696.00	7.04	203.63	4,650.13	-533.54	-315.11	1,557,807.54	3,471,086.04	40° 51' 7.710 N	103° 47' 49.520 W
4,790.00	6.59	197.12	4,743.47	-543.97	-319.00	1,557,797.04	3,471,082.34	40° 51' 7.607 N	103° 47' 49.571 W
4,883.00	5.57	196.99	4,835.94	-553.39	-321.89	1,557,787.57	3,471,079.63	40° 51' 7.514 N	103° 47' 49.609 W
4,977.00	5.06	190.49	4,929.54	-561.83	-323.98	1,557,779.09	3,471,077.71	40° 51' 7.430 N	103° 47' 49.636 W
5,072.00	4.24	184.94	5,024.22	-569.44	-325.05	1,557,771.45	3,471,076.79	40° 51' 7.355 N	103° 47' 49.650 W
5,166.00	3.36	176.65	5,118.02	-575.66	-325.19	1,557,765.24	3,471,076.77	40° 51' 7.294 N	103° 47' 49.652 W
5,260.00	2.09	176.12	5,211.91	-580.12	-324.91	1,557,760.78	3,471,077.13	40° 51' 7.249 N	103° 47' 49.648 W
5,355.00	1.67	169.86	5,306.86	-583.21	-324.55	1,557,757.70	3,471,077.55	40° 51' 7.219 N	103° 47' 49.643 W
5,450.00	3.95	325.09	5,401.80	-581.89	-326.18	1,557,758.99	3,471,075.90	40° 51' 7.232 N	103° 47' 49.664 W
5,544.00	11.77	10.19	5,494.91	-569.77	-326.33	1,557,771.10	3,471,075.51	40° 51' 7.352 N	103° 47' 49.666 W
5,638.00	16.64	9.25	5,586.01	-547.03	-322.47	1,557,793.91	3,471,078.93	40° 51' 7.576 N	103° 47' 49.616 W
5,732.00	23.85	5.74	5,674.14	-514.80	-318.40	1,557,826.21	3,471,082.38	40° 51' 7.895 N	103° 47' 49.563 W
5,826.00	29.93	358.79	5,757.96	-472.39	-317.00	1,557,868.64	3,471,082.98	40° 51' 8.314 N	103° 47' 49.545 W
5,919.00	35.56	350.13	5,836.19	-422.49	-322.13	1,557,918.44	3,471,076.88	40° 51' 8.807 N	103° 47' 49.612 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,013.00	43.88	350.05	5,908.43	-363.37	-332.46	1,557,977.35	3,471,065.42	40° 51' 9.391 N	103° 47' 49.746 W
6,060.00	49.41	349.70	5,940.69	-329.74	-338.47	1,558,010.85	3,471,058.76	40° 51' 9.723 N	103° 47' 49.824 W
6,107.00	56.88	349.87	5,968.86	-292.75	-345.13	1,558,047.70	3,471,051.39	40° 51' 10.089 N	103° 47' 49.911 W
6,138.00	62.37	349.70	5,984.53	-266.44	-349.88	1,558,073.92	3,471,046.14	40° 51' 10.349 N	103° 47' 49.973 W
6,170.00	67.69	347.41	5,998.03	-238.03	-355.64	1,558,102.22	3,471,039.83	40° 51' 10.630 N	103° 47' 50.048 W
6,220.00	67.69	347.41	6,017.01	-192.88	-365.72	1,558,147.16	3,471,028.89	40° 51' 11.076 N	103° 47' 50.179 W

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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

Site	Horsetail #07F PAD				
Site Position:		Northing:	1,558,346.52 usft	Latitude:	40° 51' 12.971 N
From:	Map	Easting:	3,471,420.73 usft	Longitude:	103° 47' 45.031 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	0639					
Well Position	+N/-S	0.00 usft	Northing:	1,558,347.04 usft	Latitude:	40° 51' 12.981 N
	+E/-W	0.00 usft	Easting:	3,471,390.84 usft	Longitude:	103° 47' 45.420 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,898.80 usft

Wellbore	ST 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/29/2016	7.58	67.35	52,903

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	4,508.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	357.37	

Survey Program	Date	5/2/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
232.00	4,508.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
4,578.00	13,466.00	Survey #1 (ST 01)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
13,513.00	13,513.00	Survey #2 (ST 01)	Project	Projection	

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	
232.00	0.35	86.55	232.00	0.04	0.71	0.01	0.15	0.15	0.00	
323.00	2.07	197.21	322.98	-1.51	0.50	-1.53	2.44	1.89	121.60	
414.00	4.13	207.46	413.84	-5.99	-1.50	-5.91	2.34	2.26	11.26	
506.00	6.11	207.14	505.47	-13.29	-5.26	-13.03	2.15	2.15	-0.35	
598.00	7.41	212.85	596.83	-22.63	-10.71	-22.11	1.59	1.41	6.21	
690.00	7.47	215.57	688.06	-32.48	-17.41	-31.64	0.39	0.07	2.96	
781.00	8.48	208.63	778.18	-43.18	-24.07	-42.03	1.53	1.11	-7.63	
873.00	8.16	206.84	869.21	-54.96	-30.26	-53.51	0.45	-0.35	-1.95	

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)
964.00	8.70	200.55	959.23	-67.16	-35.60	-65.46	1.17	0.59	-6.91
1,056.00	9.19	201.60	1,050.11	-80.51	-40.74	-78.56	0.56	0.53	1.14
1,148.00	9.38	201.91	1,140.90	-94.30	-46.24	-92.08	0.21	0.21	0.34
1,239.00	9.01	201.25	1,230.73	-107.82	-51.59	-105.34	0.42	-0.41	-0.73
1,331.00	9.41	209.07	1,321.55	-121.11	-57.86	-118.32	1.43	0.43	8.50
1,423.00	9.17	208.06	1,412.34	-134.15	-64.96	-131.03	0.32	-0.26	-1.10
1,515.00	8.92	209.51	1,503.20	-146.83	-71.92	-143.37	0.37	-0.27	1.58
1,606.00	8.75	210.21	1,593.12	-158.95	-78.88	-155.16	0.22	-0.19	0.77
1,697.00	8.70	211.46	1,683.07	-170.80	-85.96	-166.67	0.22	-0.05	1.37
1,790.00	7.47	208.72	1,775.14	-182.10	-92.53	-177.66	1.39	-1.32	-2.95
1,881.00	6.26	205.52	1,865.49	-191.77	-97.51	-187.09	1.39	-1.33	-3.52
1,975.00	6.73	206.94	1,958.88	-201.30	-102.22	-196.40	0.53	0.50	1.51
1,991.00	7.18	207.36	1,974.77	-203.02	-103.10	-198.08	2.83	2.81	2.63
2,032.00	7.15	208.25	2,015.45	-207.55	-105.49	-202.49	0.28	-0.07	2.18
9 5/8"									
2,123.00	7.09	210.26	2,105.74	-217.39	-111.00	-212.07	0.28	-0.07	2.21
2,218.00	9.98	212.06	2,199.68	-229.43	-118.32	-223.76	3.05	3.04	1.89
2,312.00	11.87	215.75	2,291.98	-244.18	-128.30	-238.04	2.14	2.01	3.93
2,407.00	8.90	200.87	2,385.43	-258.98	-136.62	-252.44	4.19	-3.13	-15.66
2,501.00	7.38	190.41	2,478.48	-271.72	-140.31	-264.99	2.25	-1.62	-11.13
2,524.00	7.16	189.84	2,501.30	-274.58	-140.82	-267.83	1.01	-0.96	-2.48
2,618.00	8.39	208.03	2,594.44	-286.41	-145.04	-279.45	2.91	1.31	19.35
2,713.00	8.13	211.71	2,688.46	-298.24	-151.83	-290.96	0.62	-0.27	3.87
2,807.00	7.65	212.15	2,781.57	-309.19	-158.65	-301.59	0.51	-0.51	0.47
2,901.00	7.31	212.29	2,874.77	-319.55	-165.18	-311.63	0.36	-0.36	0.15
2,996.00	6.63	210.55	2,969.07	-329.38	-171.19	-321.18	0.75	-0.72	-1.83
3,091.00	6.57	212.82	3,063.44	-338.67	-176.93	-330.19	0.28	-0.06	2.39
3,185.00	8.97	218.65	3,156.57	-348.91	-184.42	-340.08	2.68	2.55	6.20
3,280.00	8.48	219.79	3,250.47	-360.08	-193.53	-350.82	0.55	-0.52	1.20
3,374.00	7.83	218.62	3,343.52	-370.41	-201.96	-360.75	0.71	-0.69	-1.24
3,468.00	7.16	219.00	3,436.71	-379.96	-209.64	-369.94	0.71	-0.71	0.40
3,562.00	9.54	216.01	3,529.71	-390.82	-217.91	-380.41	2.57	2.53	-3.18
3,657.00	10.83	217.44	3,623.21	-404.27	-227.97	-393.39	1.38	1.36	1.51
3,751.00	10.70	217.32	3,715.56	-418.22	-238.63	-406.83	0.14	-0.14	-0.13
3,847.00	10.18	216.53	3,809.97	-432.13	-249.08	-420.24	0.56	-0.54	-0.82
3,942.00	9.03	217.65	3,903.64	-444.78	-258.63	-432.44	1.23	-1.21	1.18
4,036.00	8.31	221.88	3,996.56	-455.68	-267.67	-442.91	1.02	-0.77	4.50
4,130.00	8.11	222.00	4,089.60	-465.66	-276.64	-452.48	0.21	-0.21	0.13
4,224.00	7.34	198.36	4,182.77	-476.29	-282.97	-462.80	3.45	-0.82	-25.15
4,319.00	8.95	209.53	4,276.81	-488.48	-288.53	-474.73	2.37	1.69	11.76
4,414.00	8.35	212.61	4,370.73	-500.72	-295.89	-486.62	0.80	-0.63	3.24
4,508.00	7.74	218.80	4,463.81	-511.41	-303.53	-496.94	1.13	-0.65	6.59
4,578.00	5.08	213.22	4,533.37	-517.67	-308.18	-502.99	3.90	-3.80	-7.97

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)
4,672.00	6.64	220.14	4,626.87	-525.31	-313.97	-510.35	1.82	1.66	7.36
4,766.00	7.81	211.56	4,720.13	-534.91	-320.81	-519.62	1.69	1.24	-9.13
4,860.00	6.69	208.66	4,813.37	-545.15	-326.78	-529.58	1.25	-1.19	-3.09
4,953.00	6.04	212.35	4,905.80	-554.04	-332.00	-538.22	0.83	-0.70	3.97
5,048.00	3.27	223.61	5,000.48	-560.23	-336.54	-544.19	3.06	-2.92	11.85
5,142.00	2.68	224.18	5,094.35	-563.74	-339.92	-547.55	0.63	-0.63	0.61
5,237.00	1.00	299.99	5,189.31	-564.92	-342.19	-548.63	2.76	-1.77	79.80
5,332.00	9.60	349.40	5,283.83	-556.70	-344.37	-540.32	9.45	9.05	52.01
5,426.00	18.85	358.56	5,374.86	-533.77	-346.20	-517.32	10.10	9.84	9.74
5,521.00	24.60	2.76	5,463.08	-498.64	-345.63	-482.26	6.27	6.05	4.42
5,615.00	29.90	351.86	5,546.67	-455.85	-348.01	-439.40	7.72	5.64	-11.60
5,709.00	38.87	353.63	5,624.17	-403.24	-354.61	-386.54	9.60	9.54	1.88
5,803.00	44.03	3.16	5,694.67	-341.20	-356.09	-324.50	8.66	5.49	10.14
5,850.00	44.22	0.92	5,728.41	-308.50	-354.92	-291.89	3.34	0.40	-4.77
5,895.00	49.43	0.13	5,759.19	-275.70	-354.63	-259.14	11.65	11.58	-1.76
5,942.00	49.93	358.99	5,789.60	-239.87	-354.91	-223.33	2.13	1.06	-2.43
5,989.00	52.70	359.83	5,818.98	-203.19	-355.28	-186.67	6.06	5.89	1.79
6,036.00	53.31	359.51	5,847.26	-165.65	-355.50	-149.16	1.41	1.30	-0.68
6,084.00	57.64	0.16	5,874.46	-126.11	-355.61	-109.66	9.09	9.02	1.35
6,131.00	58.48	359.75	5,899.32	-86.23	-355.64	-69.82	1.93	1.79	-0.87
6,162.00	61.45	359.24	5,914.84	-59.39	-355.88	-43.00	9.68	9.57	-1.64
MID SL Crossing (SEC 7)									
6,178.00	62.98	358.99	5,922.30	-45.24	-356.09	-28.85	9.68	9.58	-1.57
6,225.00	63.70	359.57	5,943.39	-3.24	-356.62	13.12	1.89	1.53	1.23
6,273.00	67.91	1.64	5,963.06	40.53	-356.15	56.82	9.61	8.77	4.31
100' HL Crossing (SEC 7)									
6,320.00	68.95	0.15	5,980.34	84.23	-355.47	100.45	3.69	2.21	-3.17
6,367.00	77.26	359.27	5,993.98	129.16	-355.70	145.34	17.77	17.68	-1.87
6,414.00	80.84	359.64	6,002.91	175.29	-356.14	191.45	7.66	7.62	0.79
6,461.00	82.95	1.43	6,009.54	221.82	-355.70	237.90	5.86	4.49	3.81
6,508.00	83.73	2.17	6,014.99	268.47	-354.24	284.45	2.28	1.66	1.57
6,555.00	89.59	3.24	6,017.72	315.32	-352.02	331.14	12.67	12.47	2.28
6,578.00	90.02	3.50	6,017.80	338.28	-350.67	354.02	2.18	1.87	1.13
6,670.00	89.97	2.73	6,017.81	430.14	-345.67	445.55	0.84	-0.05	-0.84
6,765.00	89.36	1.63	6,018.37	525.07	-342.06	540.22	1.32	-0.64	-1.16
6,859.00	88.88	1.61	6,019.81	619.02	-339.40	633.95	0.51	-0.51	-0.02
6,954.00	90.29	1.17	6,020.50	713.99	-337.09	728.71	1.55	1.48	-0.46
7,048.00	89.44	1.50	6,020.72	807.96	-334.91	822.48	0.97	-0.90	0.35
7,141.00	89.18	1.85	6,021.84	900.92	-332.19	915.21	0.47	-0.28	0.38
7,234.00	89.17	1.38	6,023.18	993.87	-329.57	1,007.95	0.51	-0.01	-0.51
7,329.00	88.79	0.82	6,024.87	1,088.84	-327.74	1,102.73	0.71	-0.40	-0.59
7,423.00	89.08	1.07	6,026.62	1,182.81	-326.19	1,196.53	0.41	0.31	0.27
7,515.00	90.16	0.02	6,027.23	1,274.80	-325.32	1,288.38	1.64	1.17	-1.14
7,610.00	90.78	359.21	6,026.45	1,369.79	-325.96	1,383.31	1.07	0.65	-0.85

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)
7,704.00	90.35	358.84	6,025.52	1,463.77	-327.56	1,477.26	0.60	-0.46	-0.39
7,798.00	90.13	359.07	6,025.13	1,557.76	-329.27	1,571.23	0.34	-0.23	0.24
7,892.00	89.54	359.17	6,025.40	1,651.75	-330.71	1,665.18	0.64	-0.63	0.11
7,986.00	89.09	358.28	6,026.52	1,745.71	-332.80	1,759.15	1.06	-0.48	-0.95
8,082.00	88.51	357.70	6,028.53	1,841.63	-336.17	1,855.12	0.85	-0.60	-0.60
8,176.00	91.26	358.98	6,028.72	1,935.58	-338.89	1,949.09	3.23	2.93	1.36
8,271.00	91.56	358.93	6,026.38	2,030.54	-340.63	2,044.03	0.32	0.32	-0.05
8,363.00	91.30	358.88	6,024.09	2,122.49	-342.38	2,135.97	0.29	-0.28	-0.05
8,455.00	89.13	359.43	6,023.74	2,214.48	-343.74	2,227.92	2.43	-2.36	0.60
8,547.00	88.94	359.29	6,025.29	2,306.46	-344.77	2,319.85	0.26	-0.21	-0.15
8,638.00	88.86	358.57	6,027.04	2,397.42	-346.47	2,410.80	0.80	-0.09	-0.79
8,730.00	88.63	358.97	6,029.05	2,489.38	-348.44	2,502.75	0.50	-0.25	0.43
8,821.00	88.85	0.36	6,031.05	2,580.35	-348.97	2,593.65	1.55	0.24	1.53
8,833.50	88.77	0.32	6,031.31	2,592.85	-348.90	2,606.13	0.69	-0.62	-0.30
SL Crossing 7/6									
8,913.00	88.28	0.08	6,033.36	2,672.32	-348.62	2,685.51	0.69	-0.62	-0.30
9,005.00	87.64	359.30	6,036.63	2,764.26	-349.12	2,777.37	1.10	-0.70	-0.85
9,096.00	89.20	3.06	6,039.14	2,855.19	-347.24	2,868.12	4.47	1.71	4.13
9,188.00	89.55	2.02	6,040.15	2,947.09	-343.17	2,959.74	1.19	0.38	-1.13
9,280.00	92.68	3.02	6,038.36	3,038.97	-339.12	3,051.33	3.57	3.40	1.09
9,371.00	93.23	3.07	6,033.66	3,129.72	-334.30	3,141.77	0.61	0.60	0.05
9,463.00	93.06	2.53	6,028.62	3,221.48	-329.81	3,233.22	0.61	-0.18	-0.59
9,555.00	89.98	1.87	6,026.18	3,313.36	-326.28	3,324.85	3.42	-3.35	-0.72
9,646.00	90.32	1.26	6,025.94	3,404.33	-323.79	3,415.60	0.77	0.37	-0.67
9,738.00	90.24	0.72	6,025.49	3,496.31	-322.20	3,507.42	0.59	-0.09	-0.59
9,830.00	90.09	359.91	6,025.22	3,588.31	-321.70	3,599.29	0.90	-0.16	-0.88
9,921.00	89.68	358.60	6,025.41	3,679.30	-322.88	3,690.24	1.51	-0.45	-1.44
10,013.00	89.90	358.35	6,025.74	3,771.27	-325.33	3,782.22	0.36	0.24	-0.27
10,105.00	88.83	357.23	6,026.76	3,863.19	-328.88	3,874.21	1.68	-1.16	-1.22
10,199.00	90.39	359.38	6,027.40	3,957.14	-331.66	3,968.19	2.83	1.66	2.29
10,294.00	92.20	1.51	6,025.26	4,052.10	-330.92	4,063.02	2.94	1.91	2.24
10,388.00	93.35	1.12	6,020.71	4,145.97	-328.76	4,156.69	1.29	1.22	-0.41
10,483.00	90.70	2.37	6,017.35	4,240.85	-325.87	4,251.34	3.08	-2.79	1.32
10,577.00	88.83	358.99	6,017.73	4,334.83	-324.76	4,345.16	4.11	-1.99	-3.60
10,673.00	88.70	358.21	6,019.80	4,430.78	-327.10	4,441.12	0.82	-0.14	-0.81
10,767.00	88.16	357.52	6,022.38	4,524.67	-330.60	4,535.08	0.93	-0.57	-0.73
10,863.00	89.50	358.96	6,024.34	4,620.60	-333.55	4,631.04	2.05	1.40	1.50
10,958.00	89.15	357.80	6,025.46	4,715.56	-336.24	4,726.02	1.28	-0.37	-1.22
11,052.00	89.06	1.18	6,026.93	4,809.53	-337.07	4,819.93	3.60	-0.10	3.60
11,146.00	88.12	1.27	6,029.24	4,903.48	-335.06	4,913.69	1.00	-1.00	0.10
11,240.00	89.70	2.31	6,031.03	4,997.41	-332.13	5,007.39	2.01	1.68	1.11
11,335.00	90.69	1.82	6,030.71	5,092.35	-328.70	5,102.07	1.16	1.04	-0.52
11,428.00	90.48	2.18	6,029.76	5,185.29	-325.46	5,194.76	0.45	-0.23	0.39

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)	
11,523.00	90.64	1.40	6,028.83	5,280.23	-322.49	5,289.47	0.84	0.17	-0.82	
11,617.00	90.44	0.62	6,027.94	5,374.21	-320.83	5,383.28	0.86	-0.21	-0.83	
11,710.00	89.98	0.40	6,027.60	5,467.21	-320.01	5,476.14	0.55	-0.49	-0.24	
11,802.00	89.67	359.89	6,027.88	5,559.21	-319.77	5,568.03	0.65	-0.34	-0.55	
11,896.00	91.29	358.93	6,027.09	5,653.20	-320.74	5,661.96	2.00	1.72	-1.02	
11,990.00	91.08	358.73	6,025.15	5,747.16	-322.66	5,755.91	0.31	-0.22	-0.21	
12,084.00	91.16	359.38	6,023.31	5,841.13	-324.21	5,849.85	0.70	0.09	0.69	
12,179.00	91.34	358.53	6,021.24	5,936.09	-325.94	5,944.79	0.91	0.19	-0.89	
12,274.00	88.58	359.77	6,021.31	6,031.06	-327.35	6,039.73	3.18	-2.91	1.31	
12,369.00	88.65	359.36	6,023.60	6,126.03	-328.07	6,134.64	0.44	0.07	-0.43	
12,463.00	89.83	358.12	6,024.85	6,220.00	-330.14	6,228.60	1.82	1.26	-1.32	
12,557.00	89.48	357.50	6,025.42	6,313.93	-333.73	6,322.59	0.76	-0.37	-0.66	
12,651.00	89.40	356.93	6,026.33	6,407.81	-338.30	6,416.59	0.61	-0.09	-0.61	
12,746.00	89.45	358.72	6,027.29	6,502.74	-341.90	6,511.57	1.88	0.05	1.88	
12,841.00	91.96	1.49	6,026.12	6,597.71	-341.73	6,606.44	3.93	2.64	2.92	
12,935.00	92.55	1.47	6,022.42	6,691.61	-339.30	6,700.13	0.63	0.63	-0.02	
13,030.00	90.39	2.16	6,019.98	6,786.52	-336.30	6,794.80	2.39	-2.27	0.73	
13,124.00	90.21	1.40	6,019.49	6,880.47	-333.38	6,888.52	0.83	-0.19	-0.81	
13,218.00	89.64	1.05	6,019.61	6,974.45	-331.37	6,982.31	0.71	-0.61	-0.37	
13,312.00	89.67	0.44	6,020.18	7,068.44	-330.15	7,076.15	0.65	0.03	-0.65	
13,406.00	89.13	359.68	6,021.16	7,162.44	-330.05	7,170.04	0.99	-0.57	-0.81	
13,466.00	89.05	359.32	6,022.12	7,222.43	-330.57	7,229.99	0.61	-0.13	-0.60	
13,513.00	89.05	359.32	6,022.90	7,269.42	-331.13	7,276.95	0.00	0.00	0.00	
Casing										

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
2,032.00	2,015.45	9 5/8"	9-5/8	12-1/4	
13,513.00	6,022.90	Casing	5-1/2	6	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
6,162.00	5,914.84	-59.39	-355.88	MID SL Crossing (SEC 7)	
6,273.00	5,963.06	40.53	-356.15	100' HL Crossing (SEC 7)	
8,833.50	6,031.31	2,592.85	-348.90	SL Crossing 7/6	

WHITING PETROLEUM CORPORATION

**Weld County, CO
Horsetail #07F PAD
0639**

ST 01

Design: OH

Survey Report - Geographic

02 May, 2016

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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

Site		Horsetail #07F PAD			
Site Position:		Northing:	1,558,346.52 usft	Latitude:	40° 51' 12.971 N
From:	Map	Easting:	3,471,420.73 usft	Longitude:	103° 47' 45.031 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	0639					
Well Position	+N/-S	0.00 usft	Northing:	1,558,347.04 usft	Latitude:	40° 51' 12.981 N
	+E/-W	0.00 usft	Easting:	3,471,390.84 usft	Longitude:	103° 47' 45.420 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,898.80 usft

Wellbore	ST 01				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/29/2016	7.58	67.35	52,903

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	4,508.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	357.37	

Survey Program	Date	5/2/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
232.00	4,508.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
4,578.00	13,466.00	Survey #1 (ST 01)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
13,513.00	13,513.00	Survey #2 (ST 01)	Project	Projection	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	1,558,347.04	3,471,390.84	40° 51' 12.981 N	103° 47' 45.420 W	
232.00	0.35	86.55	232.00	0.04	0.71	1,558,347.09	3,471,391.54	40° 51' 12.982 N	103° 47' 45.411 W	
323.00	2.07	197.21	322.98	-1.51	0.50	1,558,345.54	3,471,391.36	40° 51' 12.967 N	103° 47' 45.414 W	
414.00	4.13	207.46	413.84	-5.99	-1.50	1,558,341.02	3,471,389.45	40° 51' 12.922 N	103° 47' 45.440 W	
506.00	6.11	207.14	505.47	-13.29	-5.26	1,558,333.65	3,471,385.83	40° 51' 12.850 N	103° 47' 45.488 W	
598.00	7.41	212.85	596.83	-22.63	-10.71	1,558,324.21	3,471,380.56	40° 51' 12.758 N	103° 47' 45.559 W	
690.00	7.47	215.57	688.06	-32.48	-17.41	1,558,314.23	3,471,374.05	40° 51' 12.661 N	103° 47' 45.647 W	
781.00	8.48	208.63	778.18	-43.18	-24.07	1,558,303.40	3,471,367.60	40° 51' 12.555 N	103° 47' 45.733 W	
873.00	8.16	206.84	869.21	-54.96	-30.26	1,558,291.51	3,471,361.63	40° 51' 12.438 N	103° 47' 45.814 W	
964.00	8.70	200.55	959.23	-67.16	-35.60	1,558,279.20	3,471,356.54	40° 51' 12.318 N	103° 47' 45.883 W	

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,056.00	9.19	201.60	1,050.11	-80.51	-40.74	1,558,265.76	3,471,351.65	40° 51' 12.186 N	103° 47' 45.950 W
1,148.00	9.38	201.91	1,140.90	-94.30	-46.24	1,558,251.87	3,471,346.41	40° 51' 12.050 N	103° 47' 46.022 W
1,239.00	9.01	201.25	1,230.73	-107.82	-51.59	1,558,238.25	3,471,341.32	40° 51' 11.916 N	103° 47' 46.091 W
1,331.00	9.41	209.07	1,321.55	-121.11	-57.86	1,558,224.84	3,471,335.31	40° 51' 11.785 N	103° 47' 46.173 W
1,423.00	9.17	208.06	1,412.34	-134.15	-64.96	1,558,211.66	3,471,328.46	40° 51' 11.656 N	103° 47' 46.265 W
1,515.00	8.92	209.51	1,503.20	-146.83	-71.92	1,558,198.86	3,471,321.75	40° 51' 11.531 N	103° 47' 46.356 W
1,606.00	8.75	210.21	1,593.12	-158.95	-78.88	1,558,186.60	3,471,315.02	40° 51' 11.411 N	103° 47' 46.446 W
1,697.00	8.70	211.46	1,683.07	-170.80	-85.96	1,558,174.62	3,471,308.18	40° 51' 11.294 N	103° 47' 46.539 W
1,790.00	7.47	208.72	1,775.14	-182.10	-92.53	1,558,163.19	3,471,301.82	40° 51' 11.182 N	103° 47' 46.624 W
1,881.00	6.26	205.52	1,865.49	-191.77	-97.51	1,558,153.43	3,471,297.03	40° 51' 11.087 N	103° 47' 46.689 W
1,975.00	6.73	206.94	1,958.88	-201.30	-102.22	1,558,143.81	3,471,292.51	40° 51' 10.992 N	103° 47' 46.750 W
1,991.00	7.18	207.36	1,974.77	-203.02	-103.10	1,558,142.07	3,471,291.66	40° 51' 10.975 N	103° 47' 46.762 W
2,032.00	7.15	208.25	2,015.45	-207.55	-105.49	1,558,137.50	3,471,289.36	40° 51' 10.931 N	103° 47' 46.793 W
9 5/8"									
2,123.00	7.09	210.26	2,105.74	-217.39	-111.00	1,558,127.56	3,471,284.04	40° 51' 10.834 N	103° 47' 46.864 W
2,218.00	9.98	212.06	2,199.68	-229.43	-118.32	1,558,115.37	3,471,276.94	40° 51' 10.715 N	103° 47' 46.960 W
2,312.00	11.87	215.75	2,291.98	-244.18	-128.30	1,558,100.43	3,471,267.26	40° 51' 10.569 N	103° 47' 47.089 W
2,407.00	8.90	200.87	2,385.43	-258.98	-136.62	1,558,085.48	3,471,259.21	40° 51' 10.423 N	103° 47' 47.198 W
2,501.00	7.38	190.41	2,478.48	-271.72	-140.31	1,558,072.67	3,471,255.78	40° 51' 10.297 N	103° 47' 47.246 W
2,524.00	7.16	189.84	2,501.30	-274.58	-140.82	1,558,069.80	3,471,255.32	40° 51' 10.268 N	103° 47' 47.252 W
2,618.00	8.39	208.03	2,594.44	-286.41	-145.04	1,558,057.89	3,471,251.32	40° 51' 10.152 N	103° 47' 47.307 W
2,713.00	8.13	211.71	2,688.46	-298.24	-151.83	1,558,045.93	3,471,244.76	40° 51' 10.035 N	103° 47' 47.396 W
2,807.00	7.65	212.15	2,781.57	-309.19	-158.65	1,558,034.85	3,471,238.15	40° 51' 9.926 N	103° 47' 47.485 W
2,901.00	7.31	212.29	2,874.77	-319.55	-165.18	1,558,024.37	3,471,231.83	40° 51' 9.824 N	103° 47' 47.569 W
2,996.00	6.63	210.55	2,969.07	-329.38	-171.19	1,558,014.43	3,471,226.00	40° 51' 9.727 N	103° 47' 47.648 W
3,091.00	6.57	212.82	3,063.44	-338.67	-176.93	1,558,005.03	3,471,220.45	40° 51' 9.635 N	103° 47' 47.722 W
3,185.00	8.97	218.65	3,156.57	-348.91	-184.42	1,557,994.64	3,471,213.15	40° 51' 9.534 N	103° 47' 47.820 W
3,280.00	8.48	219.79	3,250.47	-360.08	-193.53	1,557,983.30	3,471,204.26	40° 51' 9.424 N	103° 47' 47.938 W
3,374.00	7.83	218.62	3,343.52	-370.41	-201.96	1,557,972.82	3,471,196.03	40° 51' 9.322 N	103° 47' 48.048 W
3,468.00	7.16	219.00	3,436.71	-379.96	-209.64	1,557,963.11	3,471,188.53	40° 51' 9.227 N	103° 47' 48.148 W
3,562.00	9.54	216.01	3,529.71	-390.82	-217.91	1,557,952.10	3,471,180.47	40° 51' 9.120 N	103° 47' 48.256 W
3,657.00	10.83	217.44	3,623.21	-404.27	-227.97	1,557,938.46	3,471,170.68	40° 51' 8.987 N	103° 47' 48.386 W
3,751.00	10.70	217.32	3,715.56	-418.22	-238.63	1,557,924.30	3,471,160.29	40° 51' 8.849 N	103° 47' 48.525 W
3,847.00	10.18	216.53	3,809.97	-432.13	-249.08	1,557,910.20	3,471,150.11	40° 51' 8.712 N	103° 47' 48.661 W
3,942.00	9.03	217.65	3,903.64	-444.78	-258.63	1,557,897.37	3,471,140.80	40° 51' 8.587 N	103° 47' 48.785 W
4,036.00	8.31	221.88	3,996.56	-455.68	-267.67	1,557,886.30	3,471,131.97	40° 51' 8.479 N	103° 47' 48.903 W
4,130.00	8.11	222.00	4,089.60	-465.66	-276.64	1,557,876.14	3,471,123.19	40° 51' 8.380 N	103° 47' 49.020 W
4,224.00	7.34	198.36	4,182.77	-476.29	-282.97	1,557,865.40	3,471,117.07	40° 51' 8.275 N	103° 47' 49.102 W
4,319.00	8.95	209.53	4,276.81	-488.48	-288.53	1,557,853.10	3,471,111.75	40° 51' 8.155 N	103° 47' 49.175 W
4,414.00	8.35	212.61	4,370.73	-500.72	-295.89	1,557,840.72	3,471,104.63	40° 51' 8.034 N	103° 47' 49.270 W
4,508.00	7.74	218.80	4,463.81	-511.41	-303.53	1,557,829.89	3,471,097.19	40° 51' 7.928 N	103° 47' 49.370 W
4,578.00	5.08	213.22	4,533.37	-517.67	-308.18	1,557,823.54	3,471,092.66	40° 51' 7.866 N	103° 47' 49.430 W
4,672.00	6.64	220.14	4,626.87	-525.31	-313.97	1,557,815.79	3,471,087.02	40° 51' 7.791 N	103° 47' 49.506 W
4,766.00	7.81	211.56	4,720.13	-534.91	-320.81	1,557,806.06	3,471,080.36	40° 51' 7.696 N	103° 47' 49.595 W
4,860.00	6.69	208.66	4,813.37	-545.15	-326.78	1,557,795.70	3,471,074.59	40° 51' 7.595 N	103° 47' 49.672 W
4,953.00	6.04	212.35	4,905.80	-554.04	-332.00	1,557,786.72	3,471,069.54	40° 51' 7.507 N	103° 47' 49.740 W
5,048.00	3.27	223.61	5,000.48	-560.23	-336.54	1,557,780.45	3,471,065.12	40° 51' 7.446 N	103° 47' 49.799 W
5,142.00	2.68	224.18	5,094.35	-563.74	-339.92	1,557,776.86	3,471,061.81	40° 51' 7.411 N	103° 47' 49.843 W
5,237.00	1.00	299.99	5,189.31	-564.92	-342.19	1,557,775.64	3,471,059.56	40° 51' 7.400 N	103° 47' 49.873 W
5,332.00	9.60	349.40	5,283.83	-556.70	-344.37	1,557,783.82	3,471,057.23	40° 51' 7.481 N	103° 47' 49.901 W
5,426.00	18.85	358.56	5,374.86	-533.77	-346.20	1,557,806.72	3,471,054.96	40° 51' 7.707 N	103° 47' 49.925 W
5,521.00	24.60	2.76	5,463.08	-498.64	-345.63	1,557,841.84	3,471,054.85	40° 51' 8.054 N	103° 47' 49.918 W
5,615.00	29.90	351.86	5,546.67	-455.85	-348.01	1,557,884.58	3,471,051.65	40° 51' 8.477 N	103° 47' 49.949 W
5,709.00	38.87	353.63	5,624.17	-403.24	-354.61	1,557,937.06	3,471,044.04	40° 51' 8.997 N	103° 47' 50.034 W
5,803.00	44.03	3.16	5,694.67	-341.20	-356.09	1,557,999.06	3,471,041.37	40° 51' 9.610 N	103° 47' 50.054 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,850.00	44.22	0.92	5,728.41	-308.50	-354.92	1,558,031.77	3,471,041.91	40° 51' 9.933 N	103° 47' 50.039 W
5,895.00	49.43	0.13	5,759.19	-275.70	-354.63	1,558,064.57	3,471,041.57	40° 51' 10.257 N	103° 47' 50.035 W
5,942.00	49.93	358.99	5,789.60	-239.87	-354.91	1,558,100.39	3,471,040.60	40° 51' 10.611 N	103° 47' 50.038 W
5,989.00	52.70	359.83	5,818.98	-203.19	-355.28	1,558,137.06	3,471,039.52	40° 51' 10.974 N	103° 47' 50.043 W
6,036.00	53.31	359.51	5,847.26	-165.65	-355.50	1,558,174.59	3,471,038.59	40° 51' 11.345 N	103° 47' 50.046 W
6,084.00	57.64	0.16	5,874.46	-126.11	-355.61	1,558,214.11	3,471,037.72	40° 51' 11.735 N	103° 47' 50.047 W
6,131.00	58.48	359.75	5,899.32	-86.23	-355.64	1,558,253.99	3,471,036.92	40° 51' 12.129 N	103° 47' 50.048 W
6,162.00	61.45	359.24	5,914.84	-59.39	-355.88	1,558,280.81	3,471,036.17	40° 51' 12.395 N	103° 47' 50.051 W
MID SL Crossing (SEC 7)									
6,178.00	62.98	358.99	5,922.30	-45.24	-356.09	1,558,294.96	3,471,035.68	40° 51' 12.534 N	103° 47' 50.054 W
6,225.00	63.70	359.57	5,943.39	-3.24	-356.62	1,558,336.94	3,471,034.34	40° 51' 12.949 N	103° 47' 50.061 W
6,273.00	67.91	1.64	5,963.06	40.53	-356.15	1,558,380.71	3,471,033.98	40° 51' 13.382 N	103° 47' 50.055 W
100' HL Crossing (SEC 7)									
6,320.00	68.95	0.15	5,980.34	84.23	-355.47	1,558,424.42	3,471,033.82	40° 51' 13.814 N	103° 47' 50.046 W
6,367.00	77.26	359.27	5,993.98	129.16	-355.70	1,558,469.33	3,471,032.72	40° 51' 14.258 N	103° 47' 50.049 W
6,414.00	80.84	359.64	6,002.91	175.29	-356.14	1,558,515.45	3,471,031.39	40° 51' 14.713 N	103° 47' 50.054 W
6,461.00	82.95	1.43	6,009.54	221.82	-355.70	1,558,561.98	3,471,030.94	40° 51' 15.173 N	103° 47' 50.049 W
6,508.00	83.73	2.17	6,014.99	268.47	-354.24	1,558,608.65	3,471,031.51	40° 51' 15.634 N	103° 47' 50.030 W
6,555.00	89.59	3.24	6,017.72	315.32	-352.02	1,558,655.54	3,471,032.82	40° 51' 16.097 N	103° 47' 50.001 W
6,578.00	90.02	3.50	6,017.80	338.28	-350.67	1,558,678.52	3,471,033.73	40° 51' 16.324 N	103° 47' 49.983 W
6,670.00	89.97	2.73	6,017.81	430.14	-345.67	1,558,770.46	3,471,036.96	40° 51' 17.232 N	103° 47' 49.918 W
6,765.00	89.36	1.63	6,018.37	525.07	-342.06	1,558,865.44	3,471,038.75	40° 51' 18.170 N	103° 47' 49.871 W
6,859.00	88.88	1.61	6,019.81	619.02	-339.40	1,558,959.42	3,471,039.60	40° 51' 19.098 N	103° 47' 49.837 W
6,954.00	90.29	1.17	6,020.50	713.99	-337.09	1,559,054.42	3,471,040.08	40° 51' 20.036 N	103° 47' 49.807 W
7,048.00	89.44	1.50	6,020.72	807.96	-334.91	1,559,148.42	3,471,040.47	40° 51' 20.965 N	103° 47' 49.778 W
7,141.00	89.18	1.85	6,021.84	900.92	-332.19	1,559,241.40	3,471,041.40	40° 51' 21.883 N	103° 47' 49.743 W
7,234.00	89.17	1.38	6,023.18	993.87	-329.57	1,559,334.39	3,471,042.23	40° 51' 22.802 N	103° 47' 49.709 W
7,329.00	88.79	0.82	6,024.87	1,088.84	-327.74	1,559,429.37	3,471,042.23	40° 51' 23.740 N	103° 47' 49.685 W
7,423.00	89.08	1.07	6,026.62	1,182.81	-326.19	1,559,523.36	3,471,041.97	40° 51' 24.668 N	103° 47' 49.665 W
7,515.00	90.16	0.02	6,027.23	1,274.80	-325.32	1,559,615.35	3,471,041.08	40° 51' 25.577 N	103° 47' 49.654 W
7,610.00	90.78	359.21	6,026.45	1,369.79	-325.96	1,559,710.31	3,471,038.62	40° 51' 26.516 N	103° 47' 49.662 W
7,704.00	90.35	358.84	6,025.52	1,463.77	-327.56	1,559,804.25	3,471,035.21	40° 51' 27.445 N	103° 47' 49.683 W
7,798.00	90.13	359.07	6,025.13	1,557.76	-329.27	1,559,898.18	3,471,031.69	40° 51' 28.373 N	103° 47' 49.705 W
7,892.00	89.54	359.17	6,025.40	1,651.75	-330.71	1,559,992.12	3,471,028.44	40° 51' 29.302 N	103° 47' 49.724 W
7,986.00	89.09	358.28	6,026.52	1,745.71	-332.80	1,560,086.03	3,471,024.55	40° 51' 30.230 N	103° 47' 49.751 W
8,082.00	88.51	357.70	6,028.53	1,841.63	-336.17	1,560,181.87	3,471,019.34	40° 51' 31.178 N	103° 47' 49.795 W
8,176.00	91.26	358.98	6,028.72	1,935.58	-338.89	1,560,275.75	3,471,014.81	40° 51' 32.106 N	103° 47' 49.830 W
8,271.00	91.56	358.93	6,026.38	2,030.54	-340.63	1,560,370.65	3,471,011.25	40° 51' 33.045 N	103° 47' 49.853 W
8,363.00	91.30	358.88	6,024.09	2,122.49	-342.38	1,560,462.56	3,471,007.73	40° 51' 33.953 N	103° 47' 49.876 W
8,455.00	89.13	359.43	6,023.74	2,214.48	-343.74	1,560,554.50	3,471,004.61	40° 51' 34.862 N	103° 47' 49.893 W
8,547.00	88.94	359.29	6,025.29	2,306.46	-344.77	1,560,646.44	3,471,001.81	40° 51' 35.771 N	103° 47' 49.907 W
8,638.00	88.86	358.57	6,027.04	2,397.42	-346.47	1,560,737.36	3,470,998.36	40° 51' 36.670 N	103° 47' 49.929 W
8,730.00	88.63	358.97	6,029.05	2,489.38	-348.44	1,560,829.26	3,470,994.62	40° 51' 37.578 N	103° 47' 49.955 W
8,821.00	88.85	0.36	6,031.05	2,580.35	-348.97	1,560,920.21	3,470,992.34	40° 51' 38.477 N	103° 47' 49.962 W
8,833.50	88.77	0.32	6,031.31	2,592.85	-348.90	1,560,932.70	3,470,992.18	40° 51' 38.601 N	103° 47' 49.961 W
SL Crossing 7/6									
8,913.00	88.28	0.08	6,033.36	2,672.32	-348.62	1,561,012.17	3,470,990.93	40° 51' 39.386 N	103° 47' 49.957 W
9,005.00	87.64	359.30	6,036.63	2,764.26	-349.12	1,561,104.08	3,470,988.67	40° 51' 40.294 N	103° 47' 49.964 W
9,096.00	89.20	3.06	6,039.14	2,855.19	-347.24	1,561,195.03	3,470,988.79	40° 51' 41.193 N	103° 47' 49.939 W
9,188.00	89.55	2.02	6,040.15	2,947.09	-343.17	1,561,286.99	3,470,991.10	40° 51' 42.101 N	103° 47' 49.886 W
9,280.00	92.68	3.02	6,038.36	3,038.97	-339.12	1,561,378.93	3,470,993.38	40° 51' 43.009 N	103° 47' 49.834 W
9,371.00	93.23	3.07	6,033.66	3,129.72	-334.30	1,561,469.76	3,470,996.46	40° 51' 43.905 N	103° 47' 49.771 W
9,463.00	93.06	2.53	6,028.62	3,221.48	-329.81	1,561,561.58	3,470,999.19	40° 51' 44.812 N	103° 47' 49.712 W
9,555.00	89.98	1.87	6,026.18	3,313.36	-326.28	1,561,653.52	3,471,000.95	40° 51' 45.720 N	103° 47' 49.666 W
9,646.00	90.32	1.26	6,025.94	3,404.33	-323.79	1,561,744.52	3,471,001.69	40° 51' 46.619 N	103° 47' 49.634 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	ST 01	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,738.00	90.24	0.72	6,025.49	3,496.31	-322.20	1,561,836.51	3,471,001.51	40° 51' 47.528 N	103° 47' 49.613 W
9,830.00	90.09	359.91	6,025.22	3,588.31	-321.70	1,561,928.50	3,471,000.25	40° 51' 48.437 N	103° 47' 49.607 W
9,921.00	89.68	358.60	6,025.41	3,679.30	-322.88	1,562,019.45	3,470,997.31	40° 51' 49.336 N	103° 47' 49.622 W
10,013.00	89.90	358.35	6,025.74	3,771.27	-325.33	1,562,111.36	3,470,993.10	40° 51' 50.244 N	103° 47' 49.654 W
10,105.00	88.83	357.23	6,026.76	3,863.19	-328.88	1,562,203.20	3,470,987.79	40° 51' 51.153 N	103° 47' 49.700 W
10,199.00	90.39	359.38	6,027.40	3,957.14	-331.66	1,562,297.07	3,470,983.20	40° 51' 52.081 N	103° 47' 49.737 W
10,294.00	92.20	1.51	6,025.26	4,052.10	-330.92	1,562,392.03	3,470,982.11	40° 51' 53.019 N	103° 47' 49.727 W
10,388.00	93.35	1.12	6,020.71	4,145.97	-328.76	1,562,485.92	3,470,982.46	40° 51' 53.947 N	103° 47' 49.699 W
10,483.00	90.70	2.37	6,017.35	4,240.85	-325.87	1,562,580.84	3,470,983.53	40° 51' 54.884 N	103° 47' 49.661 W
10,577.00	88.83	358.99	6,017.73	4,334.83	-324.76	1,562,674.82	3,470,982.84	40° 51' 55.813 N	103° 47' 49.647 W
10,673.00	88.70	358.21	6,019.80	4,430.78	-327.10	1,562,770.71	3,470,978.65	40° 51' 56.761 N	103° 47' 49.677 W
10,767.00	88.16	357.52	6,022.38	4,524.67	-330.60	1,562,864.52	3,470,973.35	40° 51' 57.689 N	103° 47' 49.723 W
10,863.00	89.50	358.96	6,024.34	4,620.60	-333.55	1,562,960.38	3,470,968.56	40° 51' 58.636 N	103° 47' 49.761 W
10,958.00	89.15	357.80	6,025.46	4,715.56	-336.24	1,563,055.26	3,470,964.05	40° 51' 59.575 N	103° 47' 49.796 W
11,052.00	89.06	1.18	6,026.93	4,809.53	-337.07	1,563,149.20	3,470,961.41	40° 52' 0.503 N	103° 47' 49.807 W
11,146.00	88.12	1.27	6,029.24	4,903.48	-335.06	1,563,243.17	3,470,961.61	40° 52' 1.431 N	103° 47' 49.781 W
11,240.00	89.70	2.31	6,031.03	4,997.41	-332.13	1,563,337.14	3,470,962.74	40° 52' 2.360 N	103° 47' 49.743 W
11,335.00	90.69	1.82	6,030.71	5,092.35	-328.70	1,563,432.13	3,470,964.34	40° 52' 3.298 N	103° 47' 49.698 W
11,428.00	90.48	2.18	6,029.76	5,185.29	-325.46	1,563,525.11	3,470,965.80	40° 52' 4.216 N	103° 47' 49.656 W
11,523.00	90.64	1.40	6,028.83	5,280.23	-322.49	1,563,620.10	3,470,966.94	40° 52' 5.154 N	103° 47' 49.617 W
11,617.00	90.44	0.62	6,027.94	5,374.21	-320.83	1,563,714.09	3,470,966.79	40° 52' 6.083 N	103° 47' 49.596 W
11,710.00	89.98	0.40	6,027.60	5,467.21	-320.01	1,563,807.09	3,470,965.83	40° 52' 7.001 N	103° 47' 49.585 W
11,802.00	89.67	359.89	6,027.88	5,559.21	-319.77	1,563,899.07	3,470,964.30	40° 52' 7.911 N	103° 47' 49.582 W
11,896.00	91.29	358.93	6,027.09	5,653.20	-320.74	1,563,993.03	3,470,961.52	40° 52' 8.839 N	103° 47' 49.595 W
11,990.00	91.08	358.73	6,025.15	5,747.16	-322.66	1,564,086.93	3,470,957.80	40° 52' 9.768 N	103° 47' 49.620 W
12,084.00	91.16	359.38	6,023.31	5,841.13	-324.21	1,564,180.85	3,470,954.44	40° 52' 10.696 N	103° 47' 49.640 W
12,179.00	91.34	358.53	6,021.24	5,936.09	-325.94	1,564,275.76	3,470,950.89	40° 52' 11.634 N	103° 47' 49.663 W
12,274.00	88.58	359.77	6,021.31	6,031.06	-327.35	1,564,370.70	3,470,947.65	40° 52' 12.573 N	103° 47' 49.681 W
12,369.00	88.65	359.36	6,023.60	6,126.03	-328.07	1,564,465.63	3,470,945.11	40° 52' 13.511 N	103° 47' 49.690 W
12,463.00	89.83	358.12	6,024.85	6,220.00	-330.14	1,564,559.54	3,470,941.23	40° 52' 14.440 N	103° 47' 49.717 W
12,557.00	89.48	357.50	6,025.42	6,313.93	-333.73	1,564,653.39	3,470,935.84	40° 52' 15.368 N	103° 47' 49.764 W
12,651.00	89.40	356.93	6,026.33	6,407.81	-338.30	1,564,747.16	3,470,929.47	40° 52' 16.295 N	103° 47' 49.823 W
12,746.00	89.45	358.72	6,027.29	6,502.74	-341.90	1,564,842.00	3,470,924.04	40° 52' 17.233 N	103° 47' 49.870 W
12,841.00	91.96	1.49	6,026.12	6,597.71	-341.73	1,564,936.96	3,470,922.39	40° 52' 18.172 N	103° 47' 49.868 W
12,935.00	92.55	1.47	6,022.42	6,691.61	-339.30	1,565,030.89	3,470,923.01	40° 52' 19.099 N	103° 47' 49.837 W
13,030.00	90.39	2.16	6,019.98	6,786.52	-336.30	1,565,125.84	3,470,924.19	40° 52' 20.037 N	103° 47' 49.797 W
13,124.00	90.21	1.40	6,019.49	6,880.47	-333.38	1,565,219.83	3,470,925.31	40° 52' 20.966 N	103° 47' 49.759 W
13,218.00	89.64	1.05	6,019.61	6,974.45	-331.37	1,565,313.83	3,470,925.51	40° 52' 21.894 N	103° 47' 49.733 W
13,312.00	89.67	0.44	6,020.18	7,068.44	-330.15	1,565,407.83	3,470,924.93	40° 52' 22.823 N	103° 47' 49.717 W
13,406.00	89.13	359.68	6,021.16	7,162.44	-330.05	1,565,501.81	3,470,923.22	40° 52' 23.752 N	103° 47' 49.716 W
13,466.00	89.05	359.32	6,022.12	7,222.43	-330.57	1,565,561.78	3,470,921.54	40° 52' 24.344 N	103° 47' 49.723 W
13,513.00	89.05	359.32	6,022.90	7,269.42	-331.13	1,565,608.75	3,470,920.08	40° 52' 24.809 N	103° 47' 49.730 W
Casing									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
6,162.00	5,914.84	-59.39	-355.88	MID SL Crossing (SEC 7)	
6,273.00	5,963.06	40.53	-356.15	100' HL Crossing (SEC 7)	
8,833.50	6,031.31	2,592.85	-348.90	SL Crossing 7/6	



March 14, 2016

Whiting Oil & Gas Corporation
Well: Horsetail #07F-0639 (OH)
County/Parish: Weld County, CO

LEAM MWD: (OH) from 0' MD – 6,170' MD
Projection: 6,220' MD

This Borehole Survey taken between 02/27/2016 and 03/01/2016 had been conducted and calculated according to the highest professional standards and complies with all known State and Federal requirements.

Reviewed and Approved:

Date: March 14, 2016

*Physical & Mailing: 2010 East Davis, Conroe, TX 77301
936-756-7577 • www.lead.net • 1 (800) 756-7504*



Survey Certification Form

State of CO
Weld County

I, Randy W. Rakowitz, certify that; I am employed by LEAM Drilling Systems LLC, that I did on the day(s) of February 27, 2016 through March 1, 2016, conduct or supervise the taking of MWD Survey from a depth of 0' MD to 6,220' MD; that the data is true, correct, complete and within the limitations of the tools as set forth by LEAM Drilling Systems LLC, that I am authorized and qualified to make this report; that this survey was conducted at the request of Whiting Oil & Gas Corporation for the Horsetail 07F-0639 (OH) in Weld County, CO; and that I reviewed this report and find that it conforms to the principals and procedures as set forth by LEAM Drilling Systems LLC.

A handwritten signature in black ink, appearing to read 'Randy W. Rakowitz', is written over a solid black horizontal line.

Randy W. Rakowitz
MWD Operations Coordinator

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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

Site		Horsetail #07F PAD			
Site Position:		Northing:	1,558,346.52 usft	Latitude:	40° 51' 12.971 N
From:	Map	Easting:	3,471,420.73 usft	Longitude:	103° 47' 45.031 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	0639					
Well Position	+N/-S	0.00 usft	Northing:	1,558,347.04 usft	Latitude:	40° 51' 12.981 N
	+E/-W	0.00 usft	Easting:	3,471,390.84 usft	Longitude:	103° 47' 45.420 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,898.80 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	2/26/2016	7.58	67.35	52,904

Design	OH				
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	357.37	

Survey Program	Date	5/2/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
232.00	6,170.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
6,220.00	6,220.00	Survey #2 (OH)	Project	Projection	

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	
232.00	0.35	86.55	232.00	0.04	0.71	0.01	0.15	0.15	0.00	
323.00	2.07	197.21	322.98	-1.51	0.50	-1.53	2.44	1.89	121.60	
414.00	4.13	207.46	413.84	-5.99	-1.50	-5.91	2.34	2.26	11.26	
506.00	6.11	207.14	505.47	-13.29	-5.26	-13.03	2.15	2.15	-0.35	
598.00	7.41	212.85	596.83	-22.63	-10.71	-22.11	1.59	1.41	6.21	
690.00	7.47	215.57	688.06	-32.48	-17.41	-31.64	0.39	0.07	2.96	
781.00	8.48	208.63	778.18	-43.18	-24.07	-42.03	1.53	1.11	-7.63	
873.00	8.16	206.84	869.21	-54.96	-30.26	-53.51	0.45	-0.35	-1.95	
964.00	8.70	200.55	959.23	-67.16	-35.60	-65.46	1.17	0.59	-6.91	

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)
1,056.00	9.19	201.60	1,050.11	-80.51	-40.74	-78.56	0.56	0.53	1.14
1,148.00	9.38	201.91	1,140.90	-94.30	-46.24	-92.08	0.21	0.21	0.34
1,239.00	9.01	201.25	1,230.73	-107.82	-51.59	-105.34	0.42	-0.41	-0.73
1,331.00	9.41	209.07	1,321.55	-121.11	-57.86	-118.33	1.43	0.43	8.50
1,423.00	9.17	208.06	1,412.34	-134.15	-64.96	-131.03	0.32	-0.26	-1.10
1,515.00	8.92	209.51	1,503.20	-146.83	-71.92	-143.38	0.37	-0.27	1.58
1,606.00	8.75	210.21	1,593.12	-158.95	-78.88	-155.17	0.22	-0.19	0.77
1,697.00	8.70	211.46	1,683.07	-170.80	-85.96	-166.68	0.22	-0.05	1.37
1,790.00	7.47	208.72	1,775.14	-182.10	-92.53	-177.67	1.39	-1.32	-2.95
1,881.00	6.26	205.52	1,865.49	-191.77	-97.51	-187.10	1.39	-1.33	-3.52
1,975.00	6.73	206.94	1,958.88	-201.30	-102.22	-196.41	0.53	0.50	1.51
1,991.00	7.18	207.36	1,974.77	-203.02	-103.10	-198.09	2.83	2.81	2.63
2,032.00	7.15	208.25	2,015.45	-207.55	-105.49	-202.50	0.28	-0.07	2.18
9 5/8"									
2,123.00	7.09	210.26	2,105.74	-217.39	-111.00	-212.07	0.28	-0.07	2.21
2,218.00	9.98	212.06	2,199.68	-229.43	-118.32	-223.77	3.05	3.04	1.89
2,312.00	11.87	215.75	2,291.98	-244.18	-128.30	-238.05	2.14	2.01	3.93
2,407.00	8.90	200.87	2,385.43	-258.98	-136.62	-252.45	4.19	-3.13	-15.66
2,501.00	7.38	190.41	2,478.48	-271.72	-140.31	-265.00	2.25	-1.62	-11.13
2,524.00	7.16	189.84	2,501.30	-274.58	-140.82	-267.84	1.01	-0.96	-2.48
2,618.00	8.39	208.03	2,594.44	-286.41	-145.04	-279.46	2.91	1.31	19.35
2,713.00	8.13	211.71	2,688.46	-298.24	-151.83	-290.97	0.62	-0.27	3.87
2,807.00	7.65	212.15	2,781.57	-309.19	-158.65	-301.60	0.51	-0.51	0.47
2,901.00	7.31	212.29	2,874.77	-319.55	-165.18	-311.64	0.36	-0.36	0.15
2,996.00	6.63	210.55	2,969.07	-329.38	-171.19	-321.19	0.75	-0.72	-1.83
3,091.00	6.57	212.82	3,063.44	-338.67	-176.93	-330.21	0.28	-0.06	2.39
3,185.00	8.97	218.65	3,156.57	-348.91	-184.42	-340.10	2.68	2.55	6.20
3,280.00	8.48	219.79	3,250.47	-360.08	-193.53	-350.84	0.55	-0.52	1.20
3,374.00	7.83	218.62	3,343.52	-370.41	-201.96	-360.77	0.71	-0.69	-1.24
3,468.00	7.16	219.00	3,436.71	-379.96	-209.64	-369.96	0.71	-0.71	0.40
3,562.00	9.54	216.01	3,529.71	-390.82	-217.91	-380.42	2.57	2.53	-3.18
3,657.00	10.83	217.44	3,623.21	-404.27	-227.97	-393.41	1.38	1.36	1.51
3,751.00	10.70	217.32	3,715.56	-418.22	-238.63	-406.85	0.14	-0.14	-0.13
3,847.00	10.18	216.53	3,809.97	-432.13	-249.08	-420.26	0.56	-0.54	-0.82
3,942.00	9.03	217.65	3,903.64	-444.78	-258.63	-432.46	1.23	-1.21	1.18
4,036.00	8.31	221.88	3,996.56	-455.68	-267.67	-442.94	1.02	-0.77	4.50
4,130.00	8.11	222.00	4,089.60	-465.66	-276.64	-452.50	0.21	-0.21	0.13
4,224.00	7.34	198.36	4,182.77	-476.29	-282.97	-462.83	3.45	-0.82	-25.15
4,319.00	8.95	209.53	4,276.81	-488.48	-288.53	-474.75	2.37	1.69	11.76
4,414.00	8.35	212.61	4,370.73	-500.72	-295.89	-486.64	0.80	-0.63	3.24
4,508.00	7.74	218.80	4,463.81	-511.41	-303.53	-496.96	1.13	-0.65	6.59
4,601.00	7.98	204.05	4,555.94	-522.18	-310.09	-507.43	2.18	0.26	-15.86
4,696.00	7.04	203.63	4,650.13	-533.54	-315.11	-518.54	0.99	-0.99	-0.44

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 0639
Project:	Weld County, CO	TVD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Site:	Horsetail #07F PAD	MD Reference:	GE 4898.8' + KB 21' @ 4919.80usft (Unit #406)
Well:	0639	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi_User Db

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)	
4,790.00	6.59	197.12	4,743.47	-543.97	-319.00	-528.78	0.95	-0.48	-6.93	
4,883.00	5.57	196.99	4,835.94	-553.39	-321.89	-538.06	1.10	-1.10	-0.14	
4,977.00	5.06	190.49	4,929.54	-561.83	-323.98	-546.39	0.84	-0.54	-6.91	
5,072.00	4.24	184.94	5,024.22	-569.44	-325.05	-553.96	0.98	-0.86	-5.84	
5,166.00	3.36	176.65	5,118.02	-575.66	-325.19	-560.15	1.10	-0.94	-8.82	
5,260.00	2.09	176.12	5,211.91	-580.12	-324.91	-564.62	1.35	-1.35	-0.56	
5,355.00	1.67	169.86	5,306.86	-583.21	-324.55	-567.73	0.49	-0.44	-6.59	
5,450.00	3.95	325.09	5,401.80	-581.89	-326.18	-566.33	5.80	2.40	163.40	
5,544.00	11.77	10.19	5,494.91	-569.77	-326.33	-554.22	10.00	8.32	47.98	
5,638.00	16.64	9.25	5,586.01	-547.03	-322.47	-531.69	5.19	5.18	-1.00	
5,732.00	23.85	5.74	5,674.14	-514.80	-318.40	-499.67	7.77	7.67	-3.73	
5,826.00	29.93	358.79	5,757.96	-472.39	-317.00	-457.38	7.27	6.47	-7.39	
5,919.00	35.56	350.13	5,836.19	-422.49	-322.13	-407.29	7.86	6.05	-9.31	
6,013.00	43.88	350.05	5,908.43	-363.37	-332.46	-347.76	8.85	8.85	-0.09	
6,060.00	49.41	349.70	5,940.69	-329.74	-338.47	-313.89	11.78	11.77	-0.74	
6,107.00	56.88	349.87	5,968.86	-292.75	-345.13	-276.64	15.90	15.89	0.36	
6,138.00	62.37	349.70	5,984.53	-266.44	-349.88	-250.14	17.72	17.71	-0.55	
6,170.00	67.69	347.41	5,998.03	-238.03	-355.64	-221.48	17.84	16.63	-7.16	
6,220.00	67.69	347.41	6,017.01	-192.88	-365.72	-175.92	0.00	0.00	0.00	

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
2,032.00	2,015.45	9 5/8"	9-5/8	12-1/4	