

WHITING PETROLEUM CORPORATION

Project: Weld County, CO
 Site: Horsetail #30F
 Well: 3105
 Wellbore: OH
 Design: OH

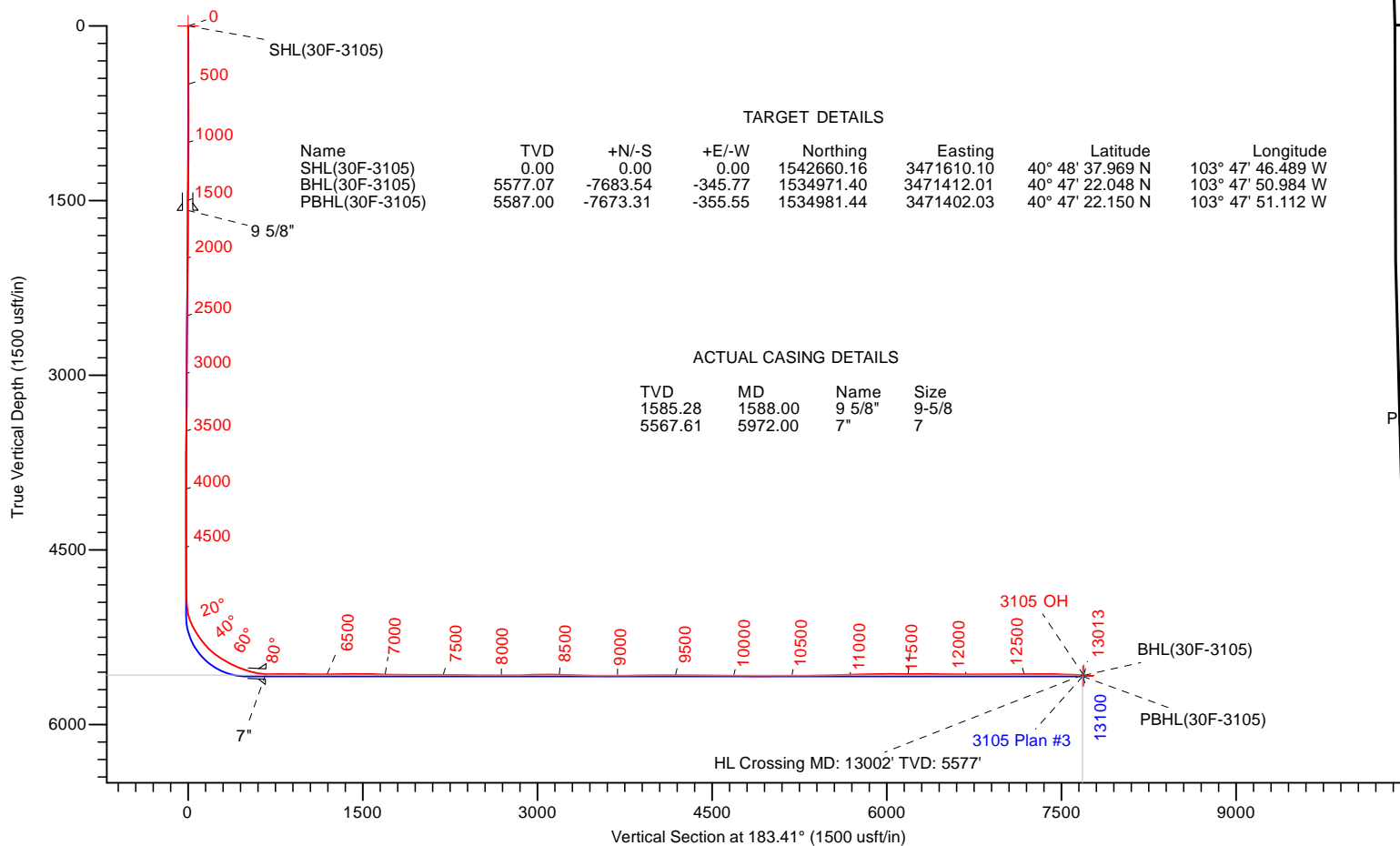
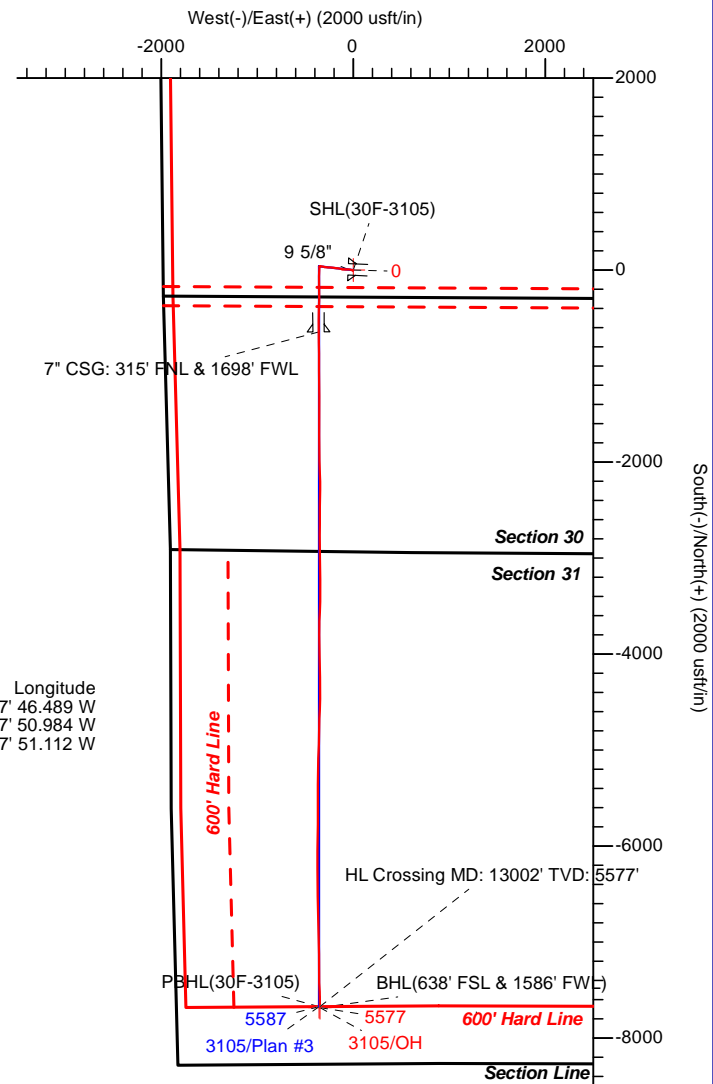


Azimuths to True North
 Magnetic North: 8.01°
 Magnetic Field
 Strength: 53054.6snT
 Dip Angle: 67.42°
 Date: 4/30/2014
 Model: BGGM2013



PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Northern Zone



TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL(30F-3105)	0.00	0.00	0.00	1542660.16	3471610.10	40° 48' 37.969 N	103° 47' 46.489 W
BHL(30F-3105)	5577.07	-7683.54	-345.77	1534971.40	3471412.01	40° 47' 22.048 N	103° 47' 50.984 W
PBHL(30F-3105)	5587.00	-7673.31	-355.55	1534981.44	3471402.03	40° 47' 22.150 N	103° 47' 51.112 W

ACTUAL CASING DETAILS

TVD	MD	Name	Size
1585.28	1588.00	9 5/8"	9-5/8
5567.61	5972.00	7"	7



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

Design: OH (3105/OH)
 Horsetail #30F
 Created By: Cindy Ponce
 Date: 15:57, November 17 2014
 Approved: _____
 Date: _____

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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 #30F				
Site Position:		Northing:	1,542,711.44 usft	Latitude:	40° 48' 38.459 N
From:	Lat/Long	Easting:	3,471,699.09 usft	Longitude:	103° 47' 45.319 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	3105					
Well Position	+N-S	0.00 usft	Northing:	1,542,660.16 usft	Latitude:	40° 48' 37.969 N
	+E-W	0.00 usft	Easting:	3,471,610.09 usft	Longitude:	103° 47' 46.489 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,780.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	04/30/14	8.01	67.42	53,055

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	183.41	

Survey Program	Date	11/12/14			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
141.00	12,963.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
13,013.00	13,013.00	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	
141.00	0.73	211.67	141.00	-0.76	-0.47	0.79	0.52	0.52	0.00	
233.00	0.06	208.70	232.99	-1.31	-0.80	1.35	0.73	-0.73	-3.23	
326.00	0.20	195.63	325.99	-1.50	-0.87	1.55	0.15	0.15	-14.05	
418.00	0.11	205.94	417.99	-1.74	-0.95	1.79	0.10	-0.10	11.21	
510.00	0.56	265.39	509.99	-1.85	-1.44	1.94	0.56	0.49	64.62	
602.00	0.12	321.25	601.99	-1.82	-1.95	1.93	0.55	-0.48	60.72	
693.00	0.32	121.48	692.99	-1.87	-1.79	1.98	0.48	0.22	176.08	
784.00	0.37	133.62	783.99	-2.21	-1.36	2.29	0.10	0.05	13.34	
876.00	0.44	106.41	875.99	-2.51	-0.81	2.56	0.22	0.08	-29.58	

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Well:	3105	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)
967.00	0.63	345.34	966.98	-2.13	-0.60	2.16	1.03	0.21	-133.04
1,059.00	1.45	269.63	1,058.97	-1.65	-1.89	1.76	1.56	0.89	-82.29
1,151.00	2.54	275.31	1,150.91	-1.47	-5.08	1.77	1.20	1.18	6.17
1,243.00	4.58	282.38	1,242.73	-0.49	-10.70	1.13	2.26	2.22	7.68
1,335.00	7.53	287.35	1,334.21	2.10	-20.05	-0.90	3.25	3.21	5.40
1,426.00	6.94	281.55	1,424.48	4.98	-31.12	-3.11	1.03	-0.65	-6.37
1,519.00	7.01	277.30	1,516.80	6.82	-42.26	-4.29	0.56	0.08	-4.57
1,552.00	7.06	274.63	1,549.55	7.24	-46.28	-4.47	1.00	0.15	-8.09
1,588.00	7.06	272.45	1,585.28	7.51	-50.69	-4.48	0.74	0.01	-6.05
9 5/8"									
1,679.00	7.12	266.98	1,675.58	7.46	-61.92	-3.76	0.74	0.06	-6.01
1,771.00	7.31	270.78	1,766.85	7.24	-73.46	-2.85	0.56	0.21	4.13
1,862.00	8.74	278.31	1,856.96	8.31	-86.09	-3.17	1.95	1.57	8.27
1,954.00	8.43	276.44	1,947.93	10.08	-99.71	-4.13	0.45	-0.34	-2.03
2,046.00	8.31	272.27	2,038.95	11.10	-113.05	-4.35	0.67	-0.13	-4.53
2,137.00	8.13	281.13	2,129.02	12.60	-125.94	-5.08	1.40	-0.20	9.74
2,229.00	7.69	280.13	2,220.15	14.94	-138.38	-6.68	0.50	-0.48	-1.09
2,321.00	7.34	280.42	2,311.35	17.09	-150.22	-8.11	0.38	-0.38	0.32
2,413.00	6.77	275.25	2,402.66	18.65	-161.40	-9.00	0.93	-0.62	-5.62
2,505.00	7.47	275.94	2,493.95	19.76	-172.75	-9.44	0.77	0.76	0.75
2,598.00	8.31	280.12	2,586.07	21.57	-185.38	-10.49	1.09	0.90	4.49
2,690.00	8.00	276.85	2,677.14	23.50	-198.28	-11.65	0.61	-0.34	-3.55
2,782.00	8.00	275.84	2,768.24	24.91	-211.01	-12.31	0.15	0.00	-1.10
2,873.00	8.00	276.60	2,858.36	26.29	-223.59	-12.93	0.12	0.00	0.84
2,965.00	7.63	272.48	2,949.50	27.29	-236.06	-13.18	0.73	-0.40	-4.48
3,057.00	7.74	269.83	3,040.68	27.53	-248.35	-12.70	0.40	0.12	-2.88
3,148.00	7.70	272.33	3,130.85	27.76	-260.57	-12.20	0.37	-0.04	2.75
3,241.00	7.34	277.94	3,223.05	28.84	-272.68	-12.55	0.88	-0.39	6.03
3,333.00	7.42	274.92	3,314.29	30.16	-284.42	-13.17	0.43	0.09	-3.28
3,425.00	7.65	281.99	3,405.50	31.94	-296.33	-14.24	1.04	0.25	7.68
3,518.00	7.85	281.63	3,497.65	34.51	-308.61	-16.07	0.22	0.22	-0.39
3,610.00	8.09	281.57	3,588.76	37.07	-321.10	-17.89	0.26	0.26	-0.07
3,702.00	5.54	277.58	3,680.10	38.95	-331.85	-19.13	2.82	-2.77	-4.34
3,794.00	4.40	271.72	3,771.76	39.65	-339.78	-19.35	1.35	-1.24	-6.37
3,886.00	2.45	248.78	3,863.59	39.04	-345.14	-18.42	2.55	-2.12	-24.93
3,978.00	1.77	288.19	3,955.53	38.77	-348.32	-17.97	1.70	-0.74	42.84
4,069.00	0.70	98.50	4,046.52	39.13	-349.11	-18.27	2.71	-1.18	187.15
4,161.00	0.88	104.72	4,138.51	38.87	-347.87	-18.09	0.22	0.20	6.76
4,253.00	0.18	64.39	4,230.51	38.75	-347.05	-18.02	0.82	-0.76	-43.84
4,345.00	0.04	331.77	4,322.51	38.84	-346.94	-18.12	0.20	-0.15	-100.67
4,437.00	0.36	241.84	4,414.51	38.73	-347.21	-17.99	0.39	0.35	-97.75
4,530.00	0.94	261.27	4,507.50	38.48	-348.22	-17.68	0.66	0.62	20.89
4,622.00	0.39	205.61	4,599.50	38.08	-349.10	-17.23	0.86	-0.60	-60.50

LEAM Drilling Systems LLC

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Well:	3105	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)
4,715.00	0.37	227.33	4,692.50	37.59	-349.46	-16.72	0.16	-0.02	23.35
4,806.00	0.44	188.15	4,783.49	37.05	-349.73	-16.16	0.31	0.08	-43.05
4,897.00	0.48	174.81	4,874.49	36.32	-349.74	-15.44	0.13	0.04	-14.66
4,989.00	2.24	189.34	4,966.46	34.16	-350.00	-13.27	1.93	1.91	15.79
5,080.00	14.29	178.87	5,056.35	21.13	-350.06	-0.25	13.29	13.24	-11.51
5,172.00	25.49	185.83	5,142.74	-10.02	-351.86	30.95	12.42	12.17	7.57
5,265.00	32.91	181.33	5,223.87	-55.25	-354.48	76.26	8.32	7.98	-4.84
5,357.00	39.69	180.29	5,297.98	-109.68	-355.21	130.63	7.40	7.37	-1.13
5,387.00	40.53	181.03	5,320.92	-129.00	-355.43	149.94	3.22	2.80	2.47
5,418.00	43.03	178.84	5,344.04	-149.65	-355.40	170.55	9.34	8.06	-7.06
5,448.00	47.43	178.06	5,365.16	-170.94	-354.82	191.76	14.78	14.67	-2.60
5,479.00	52.93	178.62	5,385.00	-194.73	-354.13	215.47	17.80	17.74	1.81
5,510.00	54.59	178.35	5,403.33	-219.72	-353.47	240.38	5.40	5.35	-0.87
5,541.00	55.38	178.52	5,421.12	-245.10	-352.78	265.67	2.59	2.55	0.55
5,571.00	57.19	179.39	5,437.77	-270.05	-352.33	290.55	6.50	6.03	2.90
5,602.00	60.09	180.75	5,453.90	-296.52	-352.36	316.97	10.08	9.35	4.39
5,633.00	62.33	182.12	5,468.83	-323.68	-353.05	344.12	8.20	7.23	4.42
5,663.00	63.38	182.58	5,482.52	-350.35	-354.14	370.81	3.76	3.50	1.53
5,694.00	64.79	182.10	5,496.06	-378.21	-355.28	398.69	4.76	4.55	-1.55
5,724.00	67.34	182.13	5,508.23	-405.61	-356.29	426.10	8.50	8.50	0.10
5,755.00	69.89	181.59	5,519.54	-434.45	-357.23	454.95	8.38	8.23	-1.74
5,785.00	71.38	181.99	5,529.48	-462.74	-358.11	483.24	5.12	4.97	1.33
5,816.00	72.62	181.26	5,539.06	-492.21	-358.95	512.71	4.58	4.00	-2.35
5,846.00	75.12	179.78	5,547.40	-521.03	-359.21	541.49	9.59	8.33	-4.93
5,877.00	77.19	179.24	5,554.82	-551.12	-358.95	571.52	6.89	6.68	-1.74
5,908.00	79.74	179.82	5,561.01	-581.49	-358.70	601.82	8.43	8.23	1.87
5,943.00	84.97	179.87	5,565.67	-616.17	-358.61	636.43	14.94	14.94	0.14
5,972.00	87.37	179.91	5,567.61	-645.10	-358.55	665.31	8.27	8.26	0.15
7"									
6,015.00	90.92	179.98	5,568.25	-688.09	-358.51	708.22	8.27	8.26	0.15
6,105.00	89.54	178.99	5,567.89	-778.08	-357.70	798.00	1.89	-1.53	-1.10
6,194.00	90.20	178.75	5,568.09	-867.07	-355.95	886.72	0.79	0.74	-0.27
6,284.00	90.30	179.84	5,567.70	-957.06	-354.84	976.49	1.22	0.11	1.21
6,373.00	88.05	179.87	5,568.98	-1,046.04	-354.62	1,065.30	2.53	-2.53	0.03
6,463.00	89.91	179.69	5,570.58	-1,136.02	-354.27	1,155.10	2.08	2.07	-0.20
6,552.00	92.11	179.98	5,569.01	-1,225.00	-354.01	1,243.91	2.49	2.47	0.33
6,642.00	90.15	178.40	5,567.24	-1,314.97	-352.74	1,333.64	2.80	-2.18	-1.76
6,732.00	90.51	180.08	5,566.72	-1,404.96	-351.55	1,423.39	1.91	0.40	1.87
6,821.00	89.98	180.27	5,566.34	-1,493.95	-351.82	1,512.25	0.63	-0.60	0.21
6,911.00	87.65	180.06	5,568.20	-1,583.93	-352.08	1,602.08	2.60	-2.59	-0.23
7,001.00	87.99	179.81	5,571.62	-1,673.86	-351.98	1,691.85	0.47	0.38	-0.28
7,090.00	89.47	180.24	5,573.60	-1,762.84	-352.02	1,780.67	1.73	1.66	0.48
7,179.00	91.38	179.93	5,572.94	-1,851.83	-352.15	1,869.51	2.17	2.15	-0.35
7,269.00	88.64	179.15	5,572.92	-1,941.82	-351.43	1,959.30	3.17	-3.04	-0.87

LEAM Drilling Systems LLC

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7,359.00	89.94	179.17	5,574.03	-2,031.80	-350.11	2,049.04	1.44	1.44	0.02
7,446.00	90.19	177.27	5,573.94	-2,118.76	-347.40	2,135.68	2.20	0.29	-2.18
7,530.00	89.23	178.03	5,574.36	-2,202.68	-343.96	2,219.25	1.46	-1.14	0.90
7,618.00	89.80	181.21	5,575.11	-2,290.67	-343.38	2,307.05	3.67	0.65	3.61
7,706.00	89.06	180.71	5,575.98	-2,378.65	-344.85	2,394.96	1.01	-0.84	-0.57
7,795.00	89.37	180.91	5,577.20	-2,467.63	-346.11	2,483.86	0.41	0.35	0.22
7,883.00	89.91	181.16	5,577.75	-2,555.61	-347.70	2,571.78	0.68	0.61	0.28
7,975.00	89.86	178.63	5,577.94	-2,647.61	-347.53	2,663.60	2.75	-0.05	-2.75
8,068.00	90.03	180.17	5,578.03	-2,740.60	-346.56	2,756.37	1.67	0.18	1.66
8,160.00	91.21	179.93	5,577.03	-2,832.59	-346.64	2,848.20	1.31	1.28	-0.26
8,253.00	92.54	180.16	5,573.99	-2,925.54	-346.71	2,940.99	1.45	1.43	0.25
8,344.00	90.75	179.86	5,571.38	-3,016.50	-346.73	3,031.79	1.99	-1.97	-0.33
8,436.00	88.74	178.37	5,571.79	-3,108.48	-345.30	3,123.52	2.72	-2.18	-1.62
8,527.00	89.01	178.08	5,573.57	-3,199.42	-342.49	3,214.13	0.44	0.30	-0.32
8,619.00	87.96	179.25	5,576.01	-3,291.36	-340.34	3,305.78	1.71	-1.14	1.27
8,710.00	87.16	181.43	5,579.88	-3,382.27	-340.88	3,396.56	2.55	-0.88	2.40
8,802.00	88.79	181.99	5,583.13	-3,474.17	-343.63	3,488.46	1.87	1.77	0.61
8,894.00	90.55	182.38	5,583.66	-3,566.09	-347.13	3,580.43	1.96	1.91	0.42
8,985.00	90.02	182.12	5,583.21	-3,657.02	-350.71	3,671.41	0.65	-0.58	-0.29
9,077.00	91.69	180.20	5,581.84	-3,748.98	-352.57	3,763.32	2.77	1.82	-2.09
9,169.00	91.47	179.60	5,579.30	-3,840.95	-352.41	3,855.12	0.69	-0.24	-0.65
9,261.00	91.38	179.45	5,577.01	-3,932.92	-351.65	3,946.88	0.19	-0.10	-0.16
9,353.00	89.89	177.67	5,575.99	-4,024.88	-349.33	4,038.53	2.52	-1.62	-1.93
9,446.00	89.14	178.97	5,576.78	-4,117.83	-346.61	4,131.16	1.61	-0.81	1.40
9,538.00	89.67	177.87	5,577.73	-4,209.79	-344.07	4,222.81	1.33	0.58	-1.20
9,630.00	89.93	180.98	5,578.06	-4,301.77	-343.15	4,314.57	3.39	0.28	3.38
9,722.00	89.19	180.09	5,578.76	-4,393.76	-344.01	4,406.45	1.26	-0.80	-0.97
9,813.00	90.51	181.03	5,579.00	-4,484.76	-344.90	4,497.33	1.78	1.45	1.03
9,905.00	88.92	182.15	5,579.46	-4,576.72	-347.45	4,589.28	2.11	-1.73	1.22
9,997.00	88.48	181.95	5,581.55	-4,668.63	-350.74	4,681.23	0.53	-0.48	-0.22
10,089.00	88.84	181.05	5,583.70	-4,760.57	-353.15	4,773.15	1.05	0.39	-0.98
10,181.00	89.58	181.37	5,584.97	-4,852.54	-355.09	4,865.08	0.88	0.80	0.35
10,273.00	90.55	182.02	5,584.86	-4,944.50	-357.81	4,957.03	1.27	1.05	0.71
10,365.00	90.68	181.70	5,583.87	-5,036.45	-360.80	5,049.00	0.38	0.14	-0.35
10,458.00	90.20	181.95	5,583.16	-5,129.40	-363.76	5,141.96	0.58	-0.52	0.27
10,549.00	90.02	181.18	5,582.98	-5,220.36	-366.24	5,232.91	0.87	-0.20	-0.85
10,641.00	91.30	180.21	5,581.92	-5,312.35	-367.36	5,324.80	1.75	1.39	-1.05
10,733.00	90.77	179.78	5,580.26	-5,404.33	-367.35	5,416.62	0.74	-0.58	-0.47
10,826.00	92.18	180.76	5,577.87	-5,497.30	-367.79	5,509.44	1.85	1.52	1.05
10,917.00	92.09	180.34	5,574.48	-5,588.23	-368.66	5,600.27	0.47	-0.10	-0.46
11,009.00	91.21	180.15	5,571.83	-5,680.19	-369.05	5,692.09	0.98	-0.96	-0.21
11,101.00	91.56	179.75	5,569.61	-5,772.16	-368.97	5,783.89	0.58	0.38	-0.43
11,192.00	92.26	180.49	5,566.57	-5,863.11	-369.16	5,874.69	1.12	0.77	0.81

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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)
11,285.00	89.45	180.40	5,565.19	-5,956.09	-369.89	5,967.54	3.02	-3.02	-0.10
11,377.00	89.45	180.01	5,566.07	-6,048.08	-370.22	6,059.40	0.42	0.00	-0.42
11,469.00	89.80	180.53	5,566.67	-6,140.08	-370.65	6,151.25	0.68	0.38	0.57
11,562.00	90.20	180.91	5,566.67	-6,233.07	-371.82	6,244.15	0.59	0.43	0.41
11,654.00	90.02	179.47	5,566.49	-6,325.07	-372.12	6,336.00	1.58	-0.20	-1.57
11,745.00	89.85	179.30	5,566.60	-6,416.06	-371.15	6,426.78	0.26	-0.19	-0.19
11,836.00	89.32	178.81	5,567.26	-6,507.05	-369.65	6,517.51	0.79	-0.58	-0.54
11,928.00	88.48	178.39	5,569.02	-6,599.00	-367.40	6,609.17	1.02	-0.91	-0.46
12,020.00	90.24	178.59	5,570.05	-6,690.96	-364.97	6,700.82	1.93	1.91	0.22
12,112.00	89.54	178.10	5,570.23	-6,782.92	-362.32	6,792.46	0.93	-0.76	-0.53
12,204.00	90.51	178.47	5,570.19	-6,874.88	-359.56	6,884.09	1.13	1.05	0.40
12,296.00	90.51	179.85	5,569.37	-6,966.86	-358.22	6,975.83	1.50	0.00	1.50
12,388.00	90.55	179.37	5,568.52	-7,058.86	-357.59	7,067.63	0.52	0.04	-0.52
12,480.00	90.24	179.42	5,567.88	-7,150.85	-356.62	7,159.40	0.34	-0.34	0.05
12,572.00	90.68	179.54	5,567.14	-7,242.84	-355.78	7,251.18	0.50	0.48	0.13
12,663.00	89.80	178.74	5,566.76	-7,333.83	-354.42	7,341.92	1.31	-0.97	-0.88
12,755.00	88.84	178.36	5,567.85	-7,425.79	-352.09	7,433.58	1.12	-1.04	-0.41
12,846.00	88.09	178.78	5,570.29	-7,516.73	-349.82	7,524.22	0.94	-0.82	0.46
12,939.00	87.65	178.59	5,573.75	-7,609.64	-347.69	7,616.84	0.52	-0.47	-0.20
12,963.00	87.38	178.50	5,574.79	-7,633.61	-347.08	7,640.73	1.19	-1.13	-0.38
13,002.00	87.38	178.50	5,576.57	-7,672.56	-346.06	7,679.55	0.00	0.00	0.00
HL Crossing MD: 13002' TVD: 5577'									
13,013.00	87.38	178.50	5,577.07	-7,683.54	-345.77	7,690.50	0.00	0.00	0.00

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,588.00	1,585.28	9 5/8"	9-5/8	12-1/4
5,972.00	5,567.61	7"	7	7-1/2

Design Annotations

	Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
			+N/-S (usft)	+E/-W (usft)	
	13,002.00	5,576.57	-7,672.56	-346.06	HL Crossing MD: 13002' TVD: 5577'

WHITING PETROLEUM CORPORATION

**Weld County, CO
Horsetail #30F
3105**

OH

Design: OH

Survey Report - Geographic

12 November, 2014

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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 #30F			
Site Position:		Northing:	1,542,711.44 usft	Latitude:	40° 48' 38.459 N
From:	Lat/Long	Easting:	3,471,699.09 usft	Longitude:	103° 47' 45.319 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.10 °

Well	3105					
Well Position	+N-S	0.00 usft	Northing:	1,542,660.16 usft	Latitude:	40° 48' 37.969 N
	+E-W	0.00 usft	Easting:	3,471,610.09 usft	Longitude:	103° 47' 46.489 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,780.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	04/30/14	8.01	67.42	53,055

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	183.41	

Survey Program	Date	11/12/14			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
141.00	12,963.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag	
13,013.00	13,013.00	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	1,542,660.16	3,471,610.09	40° 48' 37.969 N	103° 47' 46.489 W	
141.00	0.73	211.67	141.00	-0.76	-0.47	1,542,659.39	3,471,609.64	40° 48' 37.962 N	103° 47' 46.495 W	
233.00	0.06	208.70	232.99	-1.31	-0.80	1,542,658.84	3,471,609.32	40° 48' 37.956 N	103° 47' 46.500 W	
326.00	0.20	195.63	325.99	-1.50	-0.87	1,542,658.64	3,471,609.25	40° 48' 37.954 N	103° 47' 46.501 W	
418.00	0.11	205.94	417.99	-1.74	-0.95	1,542,658.40	3,471,609.17	40° 48' 37.952 N	103° 47' 46.502 W	
510.00	0.56	265.39	509.99	-1.85	-1.44	1,542,658.28	3,471,608.69	40° 48' 37.951 N	103° 47' 46.508 W	
602.00	0.12	321.25	601.99	-1.82	-1.95	1,542,658.31	3,471,608.18	40° 48' 37.951 N	103° 47' 46.515 W	
693.00	0.32	121.48	692.99	-1.87	-1.79	1,542,658.25	3,471,608.34	40° 48' 37.951 N	103° 47' 46.512 W	
784.00	0.37	133.62	783.99	-2.21	-1.36	1,542,657.93	3,471,608.78	40° 48' 37.947 N	103° 47' 46.507 W	
876.00	0.44	106.41	875.99	-2.51	-0.81	1,542,657.63	3,471,609.34	40° 48' 37.944 N	103° 47' 46.500 W	
967.00	0.63	345.34	966.98	-2.13	-0.60	1,542,658.02	3,471,609.54	40° 48' 37.948 N	103° 47' 46.497 W	

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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
1,059.00	1.45	269.63	1,058.97	-1.65	-1.89	1,542,658.48	3,471,608.24	40° 48' 37.953 N	103° 47' 46.514 W
1,151.00	2.54	275.31	1,150.91	-1.47	-5.08	1,542,658.60	3,471,605.04	40° 48' 37.955 N	103° 47' 46.555 W
1,243.00	4.58	282.38	1,242.73	-0.49	-10.70	1,542,659.47	3,471,599.40	40° 48' 37.964 N	103° 47' 46.628 W
1,335.00	7.53	287.35	1,334.21	2.10	-20.05	1,542,661.87	3,471,590.01	40° 48' 37.990 N	103° 47' 46.750 W
1,426.00	6.94	281.55	1,424.48	4.98	-31.12	1,542,664.54	3,471,578.88	40° 48' 38.018 N	103° 47' 46.894 W
1,519.00	7.01	277.30	1,516.80	6.82	-42.26	1,542,666.17	3,471,567.71	40° 48' 38.036 N	103° 47' 47.039 W
1,552.00	7.06	274.63	1,549.55	7.24	-46.28	1,542,666.51	3,471,563.69	40° 48' 38.041 N	103° 47' 47.091 W
1,588.00	7.06	272.45	1,585.28	7.51	-50.69	1,542,666.70	3,471,559.26	40° 48' 38.043 N	103° 47' 47.148 W
9 5/8"									
1,679.00	7.12	266.98	1,675.58	7.46	-61.92	1,542,666.43	3,471,548.05	40° 48' 38.043 N	103° 47' 47.294 W
1,771.00	7.31	270.78	1,766.85	7.24	-73.46	1,542,665.98	3,471,536.51	40° 48' 38.041 N	103° 47' 47.445 W
1,862.00	8.74	278.31	1,856.96	8.31	-86.09	1,542,666.82	3,471,523.86	40° 48' 38.051 N	103° 47' 47.609 W
1,954.00	8.43	276.44	1,947.93	10.08	-99.71	1,542,668.32	3,471,510.21	40° 48' 38.069 N	103° 47' 47.786 W
2,046.00	8.31	272.27	2,038.95	11.10	-113.05	1,542,669.09	3,471,496.85	40° 48' 38.079 N	103° 47' 47.959 W
2,137.00	8.13	281.13	2,129.02	12.60	-125.94	1,542,670.34	3,471,483.93	40° 48' 38.094 N	103° 47' 48.127 W
2,229.00	7.69	280.13	2,220.15	14.94	-138.38	1,542,672.44	3,471,471.45	40° 48' 38.117 N	103° 47' 48.289 W
2,321.00	7.34	280.42	2,311.35	17.09	-150.22	1,542,674.36	3,471,459.57	40° 48' 38.138 N	103° 47' 48.443 W
2,413.00	6.77	275.25	2,402.66	18.65	-161.40	1,542,675.70	3,471,448.36	40° 48' 38.153 N	103° 47' 48.588 W
2,505.00	7.47	275.94	2,493.95	19.76	-172.75	1,542,676.60	3,471,437.00	40° 48' 38.164 N	103° 47' 48.736 W
2,598.00	8.31	280.12	2,586.07	21.57	-185.38	1,542,678.16	3,471,424.33	40° 48' 38.182 N	103° 47' 48.900 W
2,690.00	8.00	276.85	2,677.14	23.50	-198.28	1,542,679.85	3,471,411.40	40° 48' 38.201 N	103° 47' 49.068 W
2,782.00	8.00	275.84	2,768.24	24.91	-211.01	1,542,681.02	3,471,398.65	40° 48' 38.215 N	103° 47' 49.233 W
2,873.00	8.00	276.60	2,858.36	26.29	-223.59	1,542,682.15	3,471,386.03	40° 48' 38.229 N	103° 47' 49.397 W
2,965.00	7.63	272.48	2,949.50	27.29	-236.06	1,542,682.91	3,471,373.56	40° 48' 38.239 N	103° 47' 49.559 W
3,057.00	7.74	269.83	3,040.68	27.53	-248.35	1,542,682.92	3,471,361.26	40° 48' 38.241 N	103° 47' 49.719 W
3,148.00	7.70	272.33	3,130.85	27.76	-260.57	1,542,682.91	3,471,349.03	40° 48' 38.243 N	103° 47' 49.878 W
3,241.00	7.34	277.94	3,223.05	28.84	-272.68	1,542,683.75	3,471,336.91	40° 48' 38.254 N	103° 47' 50.035 W
3,333.00	7.42	274.92	3,314.29	30.16	-284.42	1,542,684.85	3,471,325.14	40° 48' 38.267 N	103° 47' 50.188 W
3,425.00	7.65	281.99	3,405.50	31.94	-296.33	1,542,686.40	3,471,313.20	40° 48' 38.285 N	103° 47' 50.343 W
3,518.00	7.85	281.63	3,497.65	34.51	-308.61	1,542,688.73	3,471,300.88	40° 48' 38.310 N	103° 47' 50.503 W
3,610.00	8.09	281.57	3,588.76	37.07	-321.10	1,542,691.06	3,471,288.34	40° 48' 38.335 N	103° 47' 50.665 W
3,702.00	5.54	277.58	3,680.10	38.95	-331.85	1,542,692.73	3,471,277.56	40° 48' 38.354 N	103° 47' 50.805 W
3,794.00	4.40	271.72	3,771.76	39.65	-339.78	1,542,693.27	3,471,269.62	40° 48' 38.361 N	103° 47' 50.908 W
3,886.00	2.45	248.78	3,863.59	39.04	-345.14	1,542,692.56	3,471,264.27	40° 48' 38.355 N	103° 47' 50.978 W
3,978.00	1.77	288.19	3,955.53	38.77	-348.32	1,542,692.23	3,471,261.09	40° 48' 38.352 N	103° 47' 51.019 W
4,069.00	0.70	98.50	4,046.52	39.13	-349.11	1,542,692.58	3,471,260.30	40° 48' 38.356 N	103° 47' 51.029 W
4,161.00	0.88	104.72	4,138.51	38.87	-347.87	1,542,692.34	3,471,261.54	40° 48' 38.353 N	103° 47' 51.013 W
4,253.00	0.18	64.39	4,230.51	38.75	-347.05	1,542,692.24	3,471,262.36	40° 48' 38.352 N	103° 47' 51.003 W
4,345.00	0.04	331.77	4,322.51	38.84	-346.94	1,542,692.33	3,471,262.47	40° 48' 38.353 N	103° 47' 51.001 W
4,437.00	0.36	241.84	4,414.51	38.73	-347.21	1,542,692.22	3,471,262.20	40° 48' 38.352 N	103° 47' 51.005 W
4,530.00	0.94	261.27	4,507.50	38.48	-348.22	1,542,691.94	3,471,261.20	40° 48' 38.349 N	103° 47' 51.018 W
4,622.00	0.39	205.61	4,599.50	38.08	-349.10	1,542,691.53	3,471,260.32	40° 48' 38.345 N	103° 47' 51.029 W
4,715.00	0.37	227.33	4,692.50	37.59	-349.46	1,542,691.03	3,471,259.98	40° 48' 38.341 N	103° 47' 51.034 W
4,806.00	0.44	188.15	4,783.49	37.05	-349.73	1,542,690.48	3,471,259.72	40° 48' 38.335 N	103° 47' 51.037 W
4,897.00	0.48	174.81	4,874.49	36.32	-349.74	1,542,689.76	3,471,259.72	40° 48' 38.328 N	103° 47' 51.037 W
4,989.00	2.24	189.34	4,966.46	34.16	-350.00	1,542,687.59	3,471,259.50	40° 48' 38.307 N	103° 47' 51.041 W
5,080.00	14.29	178.87	5,056.35	21.13	-350.06	1,542,674.56	3,471,259.69	40° 48' 38.178 N	103° 47' 51.042 W
5,172.00	25.49	185.83	5,142.74	-10.02	-351.86	1,542,643.39	3,471,258.49	40° 48' 37.870 N	103° 47' 51.065 W
5,265.00	32.91	181.33	5,223.87	-55.25	-354.48	1,542,598.11	3,471,256.74	40° 48' 37.423 N	103° 47' 51.099 W
5,357.00	39.69	180.29	5,297.98	-109.68	-355.21	1,542,543.68	3,471,257.06	40° 48' 36.885 N	103° 47' 51.109 W
5,387.00	40.53	181.03	5,320.92	-129.00	-355.43	1,542,524.35	3,471,257.20	40° 48' 36.694 N	103° 47' 51.111 W
5,418.00	43.03	178.84	5,344.04	-149.65	-355.40	1,542,503.71	3,471,257.63	40° 48' 36.490 N	103° 47' 51.111 W
5,448.00	47.43	178.06	5,365.16	-170.94	-354.82	1,542,482.44	3,471,258.62	40° 48' 36.280 N	103° 47' 51.103 W
5,479.00	52.93	178.62	5,385.00	-194.73	-354.13	1,542,458.66	3,471,259.76	40° 48' 36.045 N	103° 47' 51.095 W
5,510.00	54.59	178.35	5,403.33	-219.72	-353.47	1,542,433.69	3,471,260.91	40° 48' 35.798 N	103° 47' 51.086 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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
5,541.00	55.38	178.52	5,421.12	-245.10	-352.78	1,542,408.33	3,471,262.09	40° 48' 35.547 N	103° 47' 51.077 W
5,571.00	57.19	179.39	5,437.77	-270.05	-352.33	1,542,383.39	3,471,263.02	40° 48' 35.301 N	103° 47' 51.071 W
5,602.00	60.09	180.75	5,453.90	-296.52	-352.36	1,542,356.93	3,471,263.49	40° 48' 35.039 N	103° 47' 51.072 W
5,633.00	62.33	182.12	5,468.83	-323.68	-353.05	1,542,329.76	3,471,263.33	40° 48' 34.771 N	103° 47' 51.080 W
5,663.00	63.38	182.58	5,482.52	-350.35	-354.14	1,542,303.07	3,471,262.75	40° 48' 34.507 N	103° 47' 51.095 W
5,694.00	64.79	182.10	5,496.06	-378.21	-355.28	1,542,275.20	3,471,262.14	40° 48' 34.232 N	103° 47' 51.109 W
5,724.00	67.34	182.13	5,508.23	-405.61	-356.29	1,542,247.79	3,471,261.66	40° 48' 33.961 N	103° 47' 51.123 W
5,755.00	69.89	181.59	5,519.54	-434.45	-357.23	1,542,218.92	3,471,261.28	40° 48' 33.676 N	103° 47' 51.135 W
5,785.00	71.38	181.99	5,529.48	-462.74	-358.11	1,542,190.62	3,471,260.94	40° 48' 33.397 N	103° 47' 51.146 W
5,816.00	72.62	181.26	5,539.06	-492.21	-358.95	1,542,161.14	3,471,260.67	40° 48' 33.106 N	103° 47' 51.157 W
5,846.00	75.12	179.78	5,547.40	-521.03	-359.21	1,542,132.33	3,471,260.96	40° 48' 32.821 N	103° 47' 51.160 W
5,877.00	77.19	179.24	5,554.82	-551.12	-358.95	1,542,102.24	3,471,261.80	40° 48' 32.523 N	103° 47' 51.157 W
5,908.00	79.74	179.82	5,561.01	-581.49	-358.70	1,542,071.88	3,471,262.63	40° 48' 32.223 N	103° 47' 51.154 W
5,943.00	84.97	179.87	5,565.67	-616.17	-358.61	1,542,037.22	3,471,263.39	40° 48' 31.881 N	103° 47' 51.153 W
5,972.00	87.37	179.91	5,567.61	-645.10	-358.55	1,542,008.29	3,471,264.00	40° 48' 31.595 N	103° 47' 51.152 W
7"									
6,015.00	90.92	179.98	5,568.25	-688.09	-358.51	1,541,965.31	3,471,264.87	40° 48' 31.170 N	103° 47' 51.151 W
6,105.00	89.54	178.99	5,567.89	-778.08	-357.70	1,541,875.35	3,471,267.40	40° 48' 30.281 N	103° 47' 51.141 W
6,194.00	90.20	178.75	5,568.09	-867.07	-355.95	1,541,786.42	3,471,270.87	40° 48' 29.402 N	103° 47' 51.118 W
6,284.00	90.30	179.84	5,567.70	-957.06	-354.84	1,541,696.46	3,471,273.70	40° 48' 28.512 N	103° 47' 51.104 W
6,373.00	88.05	179.87	5,568.98	-1,046.04	-354.62	1,541,607.50	3,471,275.64	40° 48' 27.633 N	103° 47' 51.101 W
6,463.00	89.91	179.69	5,570.58	-1,136.02	-354.27	1,541,517.54	3,471,277.71	40° 48' 26.744 N	103° 47' 51.096 W
6,552.00	92.11	179.98	5,569.01	-1,225.00	-354.01	1,541,428.58	3,471,279.68	40° 48' 25.865 N	103° 47' 51.093 W
6,642.00	90.15	178.40	5,567.24	-1,314.97	-352.74	1,541,338.66	3,471,282.68	40° 48' 24.976 N	103° 47' 51.076 W
6,732.00	90.51	180.08	5,566.72	-1,404.96	-351.55	1,541,248.71	3,471,285.60	40° 48' 24.087 N	103° 47' 51.061 W
6,821.00	89.98	180.27	5,566.34	-1,493.95	-351.82	1,541,159.72	3,471,287.04	40° 48' 23.207 N	103° 47' 51.064 W
6,911.00	87.65	180.06	5,568.20	-1,583.93	-352.08	1,541,069.76	3,471,288.51	40° 48' 22.318 N	103° 47' 51.068 W
7,001.00	87.99	179.81	5,571.62	-1,673.86	-351.98	1,540,979.84	3,471,290.34	40° 48' 21.430 N	103° 47' 51.066 W
7,090.00	89.47	180.24	5,573.60	-1,762.84	-352.02	1,540,890.88	3,471,292.01	40° 48' 20.551 N	103° 47' 51.067 W
7,179.00	91.38	179.93	5,572.94	-1,851.83	-352.15	1,540,801.91	3,471,293.59	40° 48' 19.671 N	103° 47' 51.068 W
7,269.00	88.64	179.15	5,572.92	-1,941.82	-351.43	1,540,711.95	3,471,296.04	40° 48' 18.782 N	103° 47' 51.059 W
7,359.00	89.94	179.17	5,574.03	-2,031.80	-350.11	1,540,622.01	3,471,299.09	40° 48' 17.893 N	103° 47' 51.042 W
7,446.00	90.19	177.27	5,573.94	-2,118.76	-347.40	1,540,535.12	3,471,303.46	40° 48' 17.034 N	103° 47' 51.007 W
7,530.00	89.23	178.03	5,574.36	-2,202.68	-343.96	1,540,451.28	3,471,308.51	40° 48' 16.205 N	103° 47' 50.962 W
7,618.00	89.80	181.21	5,575.11	-2,290.67	-343.38	1,540,363.32	3,471,310.79	40° 48' 15.335 N	103° 47' 50.954 W
7,706.00	89.06	180.71	5,575.98	-2,378.65	-344.85	1,540,275.33	3,471,311.00	40° 48' 14.466 N	103° 47' 50.973 W
7,795.00	89.37	180.91	5,577.20	-2,467.63	-346.11	1,540,186.34	3,471,311.46	40° 48' 13.587 N	103° 47' 50.990 W
7,883.00	89.91	181.16	5,577.75	-2,555.61	-347.70	1,540,098.34	3,471,311.56	40° 48' 12.717 N	103° 47' 51.010 W
7,975.00	89.86	178.63	5,577.94	-2,647.61	-347.53	1,540,006.37	3,471,313.49	40° 48' 11.808 N	103° 47' 51.008 W
8,068.00	90.03	180.17	5,578.03	-2,740.60	-346.56	1,539,913.41	3,471,316.25	40° 48' 10.889 N	103° 47' 50.996 W
8,160.00	91.21	179.93	5,577.03	-2,832.59	-346.64	1,539,821.43	3,471,317.94	40° 48' 9.980 N	103° 47' 50.997 W
8,253.00	92.54	180.16	5,573.99	-2,925.54	-346.71	1,539,728.50	3,471,319.65	40° 48' 9.062 N	103° 47' 50.998 W
8,344.00	90.75	179.86	5,571.38	-3,016.50	-346.73	1,539,637.56	3,471,321.39	40° 48' 8.163 N	103° 47' 50.998 W
8,436.00	88.74	178.37	5,571.79	-3,108.48	-345.30	1,539,545.62	3,471,324.57	40° 48' 7.254 N	103° 47' 50.979 W
8,527.00	89.01	178.08	5,573.57	-3,199.42	-342.49	1,539,454.75	3,471,329.14	40° 48' 6.356 N	103° 47' 50.943 W
8,619.00	87.96	179.25	5,576.01	-3,291.36	-340.34	1,539,362.87	3,471,333.05	40° 48' 5.447 N	103° 47' 50.915 W
8,710.00	87.16	181.43	5,579.88	-3,382.27	-340.88	1,539,271.97	3,471,334.25	40° 48' 4.549 N	103° 47' 50.922 W
8,802.00	88.79	181.99	5,583.13	-3,474.17	-343.63	1,539,180.04	3,471,333.28	40° 48' 3.641 N	103° 47' 50.957 W
8,894.00	90.55	182.38	5,583.66	-3,566.09	-347.13	1,539,088.06	3,471,331.54	40° 48' 2.733 N	103° 47' 51.003 W
8,985.00	90.02	182.12	5,583.21	-3,657.02	-350.71	1,538,997.08	3,471,329.71	40° 48' 1.834 N	103° 47' 51.049 W
9,077.00	91.69	180.20	5,581.84	-3,748.98	-352.57	1,538,905.10	3,471,329.62	40° 48' 0.926 N	103° 47' 51.074 W
9,169.00	91.47	179.60	5,579.30	-3,840.95	-352.41	1,538,813.15	3,471,331.54	40° 48' 0.017 N	103° 47' 51.071 W
9,261.00	91.38	179.45	5,577.01	-3,932.92	-351.65	1,538,721.21	3,471,334.07	40° 47' 59.108 N	103° 47' 51.061 W
9,353.00	89.89	177.67	5,575.99	-4,024.88	-349.33	1,538,629.32	3,471,338.15	40° 47' 58.200 N	103° 47' 51.031 W
9,446.00	89.14	178.97	5,576.78	-4,117.83	-346.61	1,538,536.43	3,471,342.66	40° 47' 57.281 N	103° 47' 50.996 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	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
9,538.00	89.67	177.87	5,577.73	-4,209.79	-344.07	1,538,444.54	3,471,346.97	40° 47' 56.372 N	103° 47' 50.963 W
9,630.00	89.93	180.98	5,578.06	-4,301.77	-343.15	1,538,352.59	3,471,349.66	40° 47' 55.464 N	103° 47' 50.951 W
9,722.00	89.19	180.09	5,578.76	-4,393.76	-344.01	1,538,260.60	3,471,350.56	40° 47' 54.555 N	103° 47' 50.962 W
9,813.00	90.51	181.03	5,579.00	-4,484.76	-344.90	1,538,169.61	3,471,351.42	40° 47' 53.656 N	103° 47' 50.974 W
9,905.00	88.92	182.15	5,579.46	-4,576.72	-347.45	1,538,077.62	3,471,350.64	40° 47' 52.747 N	103° 47' 51.007 W
9,997.00	88.48	181.95	5,581.55	-4,668.63	-350.74	1,537,985.65	3,471,349.11	40° 47' 51.839 N	103° 47' 51.050 W
10,089.00	88.84	181.05	5,583.70	-4,760.57	-353.15	1,537,893.68	3,471,348.47	40° 47' 50.930 N	103° 47' 51.081 W
10,181.00	89.58	181.37	5,584.97	-4,852.54	-355.09	1,537,801.69	3,471,348.30	40° 47' 50.021 N	103° 47' 51.106 W
10,273.00	90.55	182.02	5,584.86	-4,944.50	-357.81	1,537,709.70	3,471,347.34	40° 47' 49.113 N	103° 47' 51.141 W
10,365.00	90.68	181.70	5,583.87	-5,036.45	-360.80	1,537,617.71	3,471,346.13	40° 47' 48.204 N	103° 47' 51.180 W
10,458.00	90.20	181.95	5,583.16	-5,129.40	-363.76	1,537,524.72	3,471,344.95	40° 47' 47.286 N	103° 47' 51.219 W
10,549.00	90.02	181.18	5,582.98	-5,220.36	-366.24	1,537,433.73	3,471,344.21	40° 47' 46.387 N	103° 47' 51.251 W
10,641.00	91.30	180.21	5,581.92	-5,312.35	-367.36	1,537,341.74	3,471,344.86	40° 47' 45.478 N	103° 47' 51.266 W
10,733.00	90.77	179.78	5,580.26	-5,404.33	-367.35	1,537,249.77	3,471,346.64	40° 47' 44.569 N	103° 47' 51.265 W
10,826.00	92.18	180.76	5,577.87	-5,497.30	-367.79	1,537,156.81	3,471,347.99	40° 47' 43.651 N	103° 47' 51.271 W
10,917.00	92.09	180.34	5,574.48	-5,588.23	-368.66	1,537,065.88	3,471,348.86	40° 47' 42.752 N	103° 47' 51.282 W
11,009.00	91.21	180.15	5,571.83	-5,680.19	-369.05	1,536,973.93	3,471,350.24	40° 47' 41.843 N	103° 47' 51.288 W
11,101.00	91.56	179.75	5,569.61	-5,772.16	-368.97	1,536,881.98	3,471,352.08	40° 47' 40.935 N	103° 47' 51.286 W
11,192.00	92.26	180.49	5,566.57	-5,863.11	-369.16	1,536,791.04	3,471,353.64	40° 47' 40.036 N	103° 47' 51.289 W
11,285.00	89.45	180.40	5,565.19	-5,956.09	-369.89	1,536,698.07	3,471,354.70	40° 47' 39.117 N	103° 47' 51.298 W
11,377.00	89.45	180.01	5,566.07	-6,048.08	-370.22	1,536,606.08	3,471,356.14	40° 47' 38.208 N	103° 47' 51.303 W
11,469.00	89.80	180.53	5,566.67	-6,140.08	-370.65	1,536,514.09	3,471,357.48	40° 47' 37.299 N	103° 47' 51.308 W
11,562.00	90.20	180.91	5,566.67	-6,233.07	-371.82	1,536,421.10	3,471,358.09	40° 47' 36.380 N	103° 47' 51.323 W
11,654.00	90.02	179.47	5,566.49	-6,325.07	-372.12	1,536,329.11	3,471,359.56	40° 47' 35.471 N	103° 47' 51.327 W
11,745.00	89.85	179.30	5,566.60	-6,416.06	-371.15	1,536,238.15	3,471,362.28	40° 47' 34.572 N	103° 47' 51.315 W
11,836.00	89.32	178.81	5,567.26	-6,507.05	-369.65	1,536,147.21	3,471,365.53	40° 47' 33.673 N	103° 47' 51.295 W
11,928.00	88.48	178.39	5,569.02	-6,599.00	-367.40	1,536,055.32	3,471,369.54	40° 47' 32.765 N	103° 47' 51.266 W
12,020.00	90.24	178.59	5,570.05	-6,690.96	-364.97	1,535,963.42	3,471,373.73	40° 47' 31.856 N	103° 47' 51.234 W
12,112.00	89.54	178.10	5,570.23	-6,782.92	-362.32	1,535,871.53	3,471,378.16	40° 47' 30.947 N	103° 47' 51.200 W
12,204.00	90.51	178.47	5,570.19	-6,874.88	-359.56	1,535,779.64	3,471,382.68	40° 47' 30.039 N	103° 47' 51.164 W
12,296.00	90.51	179.85	5,569.37	-6,966.86	-358.22	1,535,687.70	3,471,385.79	40° 47' 29.130 N	103° 47' 51.146 W
12,388.00	90.55	179.37	5,568.52	-7,058.86	-357.59	1,535,595.74	3,471,388.19	40° 47' 28.221 N	103° 47' 51.138 W
12,480.00	90.24	179.42	5,567.88	-7,150.85	-356.62	1,535,503.78	3,471,390.93	40° 47' 27.312 N	103° 47' 51.126 W
12,572.00	90.68	179.54	5,567.14	-7,242.84	-355.78	1,535,411.82	3,471,393.53	40° 47' 26.403 N	103° 47' 51.115 W
12,663.00	89.80	178.74	5,566.76	-7,333.83	-354.42	1,535,320.88	3,471,396.64	40° 47' 25.504 N	103° 47' 51.097 W
12,755.00	88.84	178.36	5,567.85	-7,425.79	-352.09	1,535,228.98	3,471,400.74	40° 47' 24.595 N	103° 47' 51.067 W
12,846.00	88.09	178.78	5,570.29	-7,516.73	-349.82	1,535,138.10	3,471,404.75	40° 47' 23.697 N	103° 47' 51.037 W
12,939.00	87.65	178.59	5,573.75	-7,609.64	-347.69	1,535,045.24	3,471,408.67	40° 47' 22.779 N	103° 47' 51.009 W
12,963.00	87.38	178.50	5,574.79	-7,633.61	-347.08	1,535,021.29	3,471,409.74	40° 47' 22.542 N	103° 47' 51.001 W
13,002.00	87.38	178.50	5,576.57	-7,672.56	-346.06	1,534,982.37	3,471,411.51	40° 47' 22.157 N	103° 47' 50.988 W
HL Crossing MD: 13002' TVD: 5577'									
13,013.00	87.38	178.50	5,577.07	-7,683.54	-345.77	1,534,971.39	3,471,412.01	40° 47' 22.048 N	103° 47' 50.984 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3105
Project:	Weld County, CO	TVD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Site:	Horsetail #30F	MD Reference:	GE 4780' + KB 17' @ 4797.00usft (Xtreme 18)
Well:	3105	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi User Db

Design 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
SHL(30F-3105) - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,542,660.16	3,471,610.09	40° 48' 37.969 N	103° 47' 46.489 W
BHL(30F-3105) - actual wellpath hits target center - Point	0.00	0.00	5,577.07	-7,683.54	-345.77	1,534,971.40	3,471,412.00	40° 47' 22.048 N	103° 47' 50.984 W
PBHL(30F-3105) - actual wellpath misses target center by 14.12usft at 13002.00usft MD (5576.57 TVD, -7672.56 N, -346.06 E) - Point	0.00	0.00	5,587.00	-7,673.31	-355.55	1,534,981.44	3,471,402.03	40° 47' 22.150 N	103° 47' 51.112 W

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,588.00	1,585.28	9 5/8"	9-5/8	12-1/4
5,972.00	5,567.61	7"	7	7-1/2

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
13,002.00	5,576.57	-7,672.56	-346.06	HL Crossing MD: 13002' TVD: 5577'