

WHITING PETROLEUM CORPORATION

Project: Weld County, CO
Site: Horsetail #30F
Well: 3106
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

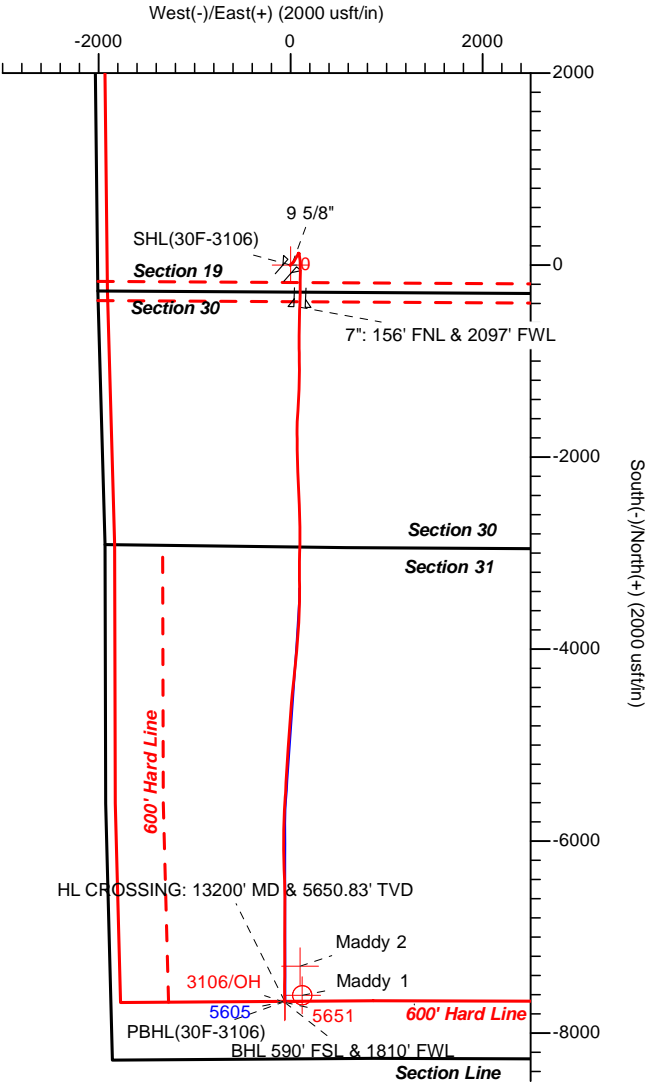
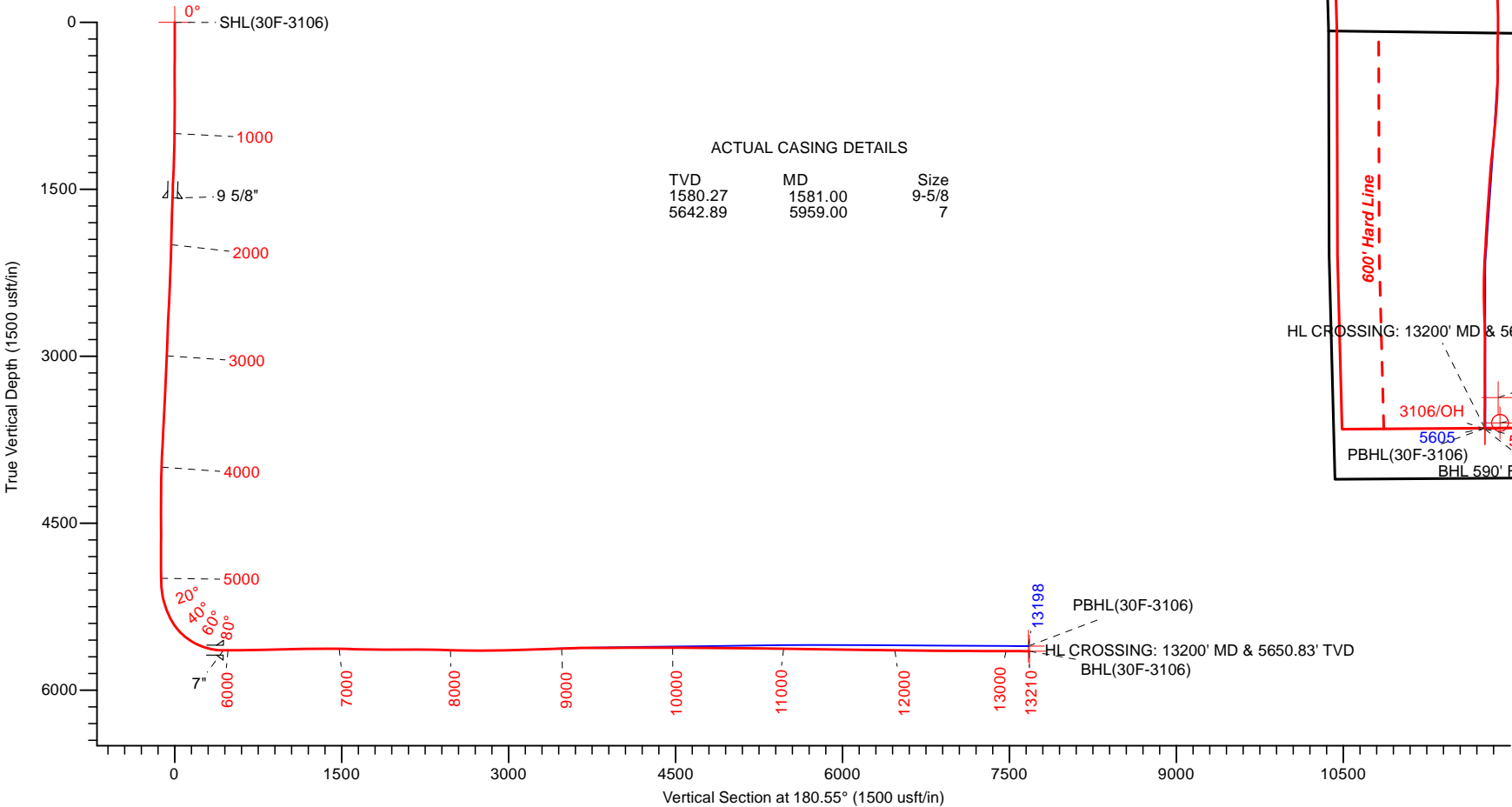
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL(30F-3106)	0.00	0.00	0.00	1542659.64	3471640.01	40° 48' 37.958 N	103° 47' 46.100 W
PBHL(30F-3106)	5605.00	-7669.29	-55.17	1534990.70	3471732.20	40° 47' 22.178 N	103° 47' 46.818 W
BHL(30F-3106)	5650.89	-7679.37	-60.37	1534980.53	3471727.20	40° 47' 22.079 N	103° 47' 46.885 W

ACTUAL CASING DETAILS

TVD	MD	Size
1580.27	1581.00	9-5/8
5642.89	5959.00	7



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

Design: OH (3106/OH)
Horsetail #30F
Created By: Elio Reyes
Date: 16:10, November 17 2014
Approved: _____
Date: _____

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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	3106					
Well Position	+N-S	0.00 usft	Northing:	1,542,659.64 usft	Latitude:	40° 48' 37.958 N
	+E-W	0.00 usft	Easting:	3,471,640.01 usft	Longitude:	103° 47' 46.100 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	4/30/2014	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	180.55	

Survey Program	Date	8/15/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
141.00	13,160.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag Projection	
13,210.00	13,210.00	Survey #2 (OH)	Project		

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
SHL(30F-3106)									
141.00	0.44	275.97	141.00	0.06	-0.54	-0.05	0.31	0.31	0.00
233.00	0.75	301.54	232.99	0.41	-1.40	-0.39	0.44	0.34	27.79
326.00	0.57	277.14	325.99	0.78	-2.38	-0.76	0.35	-0.19	-26.24
418.00	0.97	285.65	417.98	1.05	-3.58	-1.02	0.45	0.43	9.25
510.00	0.18	128.33	509.98	1.17	-4.22	-1.13	1.24	-0.86	-171.00
602.00	0.40	198.77	601.97	0.78	-4.21	-0.74	0.41	0.24	76.57
693.00	0.66	66.49	692.97	0.69	-3.83	-0.65	1.07	0.29	-145.36
784.00	0.70	41.88	783.97	1.31	-2.98	-1.28	0.32	0.04	-27.04

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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)
876.00	0.88	83.17	875.96	1.81	-1.90	-1.79	0.63	0.20	44.88
967.00	0.70	60.27	966.95	2.17	-0.73	-2.16	0.40	-0.20	-25.16
1,059.00	1.49	50.74	1,058.93	3.21	0.69	-3.21	0.88	0.86	-10.36
1,151.00	2.33	46.23	1,150.88	5.26	2.96	-5.28	0.93	0.91	-4.90
1,243.00	3.03	43.46	1,242.78	8.32	5.99	-8.37	0.77	0.76	-3.01
1,335.00	3.60	55.85	1,334.63	11.70	10.05	-11.80	0.99	0.62	13.47
1,426.00	3.65	41.68	1,425.45	15.47	14.34	-15.61	0.98	0.05	-15.57
1,518.00	2.02	46.56	1,517.33	18.77	17.46	-18.94	1.79	-1.77	5.30
1,550.00	2.64	40.27	1,549.30	19.72	18.35	-19.90	2.09	1.94	-19.66
1,581.00	2.59	41.23	1,580.27	20.79	19.27	-20.98	0.22	-0.17	3.08
9 5/8"									
1,679.00	2.42	44.52	1,678.18	23.93	22.18	-24.14	0.22	-0.17	3.36
1,770.00	1.76	31.87	1,769.12	26.49	24.27	-26.72	0.88	-0.73	-13.90
1,862.00	1.58	28.32	1,861.08	28.80	25.61	-29.05	0.23	-0.20	-3.86
1,953.00	2.64	54.55	1,952.02	31.12	27.92	-31.39	1.55	1.16	28.82
2,045.00	2.07	45.20	2,043.94	33.52	30.82	-33.82	0.75	-0.62	-10.16
2,137.00	2.64	35.58	2,135.86	36.42	33.23	-36.73	0.75	0.62	-10.46
2,229.00	2.68	38.67	2,227.76	39.82	35.81	-40.16	0.16	0.04	3.36
2,321.00	2.55	32.12	2,319.67	43.23	38.24	-43.60	0.35	-0.14	-7.12
2,412.00	2.95	34.04	2,410.56	46.89	40.63	-47.27	0.45	0.44	2.11
2,503.00	2.95	32.63	2,501.44	50.80	43.20	-51.21	0.08	0.00	-1.55
2,596.00	3.12	24.37	2,594.31	55.12	45.54	-55.55	0.50	0.18	-8.88
2,689.00	3.16	20.37	2,687.17	59.83	47.47	-60.28	0.24	0.04	-4.30
2,781.00	2.51	35.18	2,779.06	63.85	49.52	-64.32	1.06	-0.71	16.10
2,873.00	2.37	34.55	2,870.98	67.07	51.76	-67.56	0.15	-0.15	-0.68
2,963.00	2.46	31.54	2,960.90	70.24	53.82	-70.76	0.17	0.10	-3.34
3,055.00	2.46	17.81	3,052.81	73.81	55.46	-74.34	0.64	0.00	-14.92
3,147.00	2.99	30.32	3,144.71	77.76	57.27	-78.30	0.86	0.58	13.60
3,239.00	3.16	32.65	3,236.58	81.96	59.85	-82.53	0.23	0.18	2.53
3,331.00	3.21	30.50	3,328.43	86.32	62.53	-86.91	0.14	0.05	-2.34
3,424.00	3.34	38.03	3,421.28	90.70	65.52	-91.32	0.48	0.14	8.10
3,516.00	3.47	35.23	3,513.12	95.08	68.78	-95.74	0.23	0.14	-3.04
3,608.00	3.65	25.96	3,604.94	99.99	71.66	-100.67	0.65	0.20	-10.08
3,700.00	3.12	30.61	3,696.78	104.78	74.22	-105.48	0.65	-0.58	5.05
3,792.00	2.59	11.23	3,788.67	108.97	75.90	-109.69	1.19	-0.58	-21.07
3,884.00	2.59	22.24	3,880.58	112.93	77.09	-113.67	0.54	0.00	11.97
3,977.00	3.25	33.12	3,973.46	117.09	79.33	-117.84	0.92	0.71	11.70
4,069.00	3.08	47.15	4,065.32	120.95	82.56	-121.74	0.86	-0.18	15.25
4,160.00	2.24	64.87	4,156.22	123.37	85.97	-124.19	1.28	-0.92	19.47
4,252.00	1.14	88.21	4,248.18	124.16	88.51	-125.00	1.39	-1.20	25.37
4,344.00	0.53	192.14	4,340.17	123.77	89.33	-124.63	1.49	-0.66	112.97
4,435.00	0.92	240.86	4,431.17	123.01	88.61	-123.85	0.76	0.43	53.54
4,528.00	1.32	255.69	4,524.15	122.38	86.92	-123.21	0.53	0.43	15.95

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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)
4,620.00	0.75	327.46	4,616.14	122.62	85.57	-123.44	1.41	-0.62	78.01
4,713.00	0.75	319.16	4,709.13	123.60	84.84	-124.41	0.12	0.00	-8.92
4,805.00	0.26	265.98	4,801.13	124.04	84.24	-124.84	0.68	-0.53	-57.80
4,897.00	0.79	164.44	4,893.12	123.41	84.20	-124.22	0.96	0.58	-110.37
4,987.00	0.57	117.84	4,983.12	122.61	84.76	-123.41	0.64	-0.24	-51.78
5,079.00	4.09	153.68	5,075.03	119.45	86.62	-120.28	3.96	3.83	38.96
5,171.00	12.22	166.51	5,166.03	107.02	90.36	-107.88	9.00	8.84	13.95
5,263.00	19.87	172.60	5,254.38	82.01	94.65	-82.91	8.50	8.32	6.62
5,356.00	25.14	175.41	5,340.27	46.62	98.27	-47.56	5.78	5.67	3.02
5,448.00	34.81	178.14	5,419.88	0.78	100.69	-1.75	10.61	10.51	2.97
5,479.00	39.08	179.52	5,444.65	-17.84	101.06	16.87	14.03	13.77	4.45
5,510.00	42.02	178.32	5,468.20	-37.99	101.44	37.01	9.81	9.48	-3.87
5,541.00	44.97	178.69	5,490.69	-59.32	102.00	58.33	9.55	9.52	1.19
5,571.00	49.45	179.84	5,511.06	-81.32	102.27	80.34	15.20	14.93	3.83
5,602.00	53.76	180.93	5,530.31	-105.61	102.10	104.63	14.17	13.90	3.52
5,633.00	55.30	181.59	5,548.30	-130.85	101.55	129.87	5.26	4.97	2.13
5,664.00	58.07	181.96	5,565.32	-156.74	100.74	155.77	8.99	8.94	1.19
5,694.00	62.29	181.21	5,580.24	-182.75	100.03	181.79	14.23	14.07	-2.50
5,724.00	65.45	180.04	5,593.45	-209.68	99.74	208.72	11.10	10.53	-3.90
5,755.00	69.10	179.31	5,605.42	-238.27	99.90	237.30	11.97	11.77	-2.35
5,786.00	72.88	178.96	5,615.52	-267.57	100.35	266.60	12.24	12.19	-1.13
5,816.00	75.25	180.88	5,623.76	-296.41	100.38	295.44	10.01	7.90	6.40
5,847.00	77.67	182.24	5,631.01	-326.54	99.56	325.57	8.90	7.81	4.39
5,877.00	80.57	182.26	5,636.68	-355.97	98.40	355.01	9.67	9.67	0.07
5,908.00	84.53	181.04	5,640.69	-386.69	97.52	385.74	13.36	12.77	-3.94
5,933.00	88.00	182.26	5,642.32	-411.63	96.80	410.68	14.71	13.88	4.88
5,959.00	89.50	182.02	5,642.89	-437.60	95.83	436.66	5.85	5.78	-0.91
7"									
5,987.00	91.12	181.77	5,642.74	-465.58	94.90	464.65	5.85	5.78	-0.91
6,076.00	90.90	181.38	5,641.17	-554.54	92.46	553.62	0.50	-0.25	-0.44
6,166.00	89.98	180.90	5,640.48	-644.51	90.67	643.61	1.15	-1.02	-0.53
6,256.00	90.95	180.48	5,639.75	-734.50	89.58	733.61	1.17	1.08	-0.47
6,345.00	90.99	179.85	5,638.24	-823.49	89.33	822.59	0.71	0.04	-0.71
6,435.00	90.86	178.72	5,636.79	-913.47	90.45	912.56	1.26	-0.14	-1.26
6,524.00	91.91	179.41	5,634.64	-1,002.43	91.90	1,001.50	1.41	1.18	0.78
6,614.00	92.48	180.08	5,631.19	-1,092.36	92.30	1,091.43	0.98	0.63	0.74
6,704.00	91.08	181.20	5,628.39	-1,182.31	91.30	1,181.38	1.99	-1.56	1.24
6,793.00	89.80	182.84	5,627.71	-1,271.25	88.16	1,270.34	2.34	-1.44	1.84
6,883.00	89.14	180.51	5,628.54	-1,361.20	85.53	1,360.31	2.69	-0.73	-2.59
6,973.00	89.67	183.79	5,629.48	-1,451.12	82.15	1,450.26	3.69	0.59	3.64
7,062.00	89.10	184.67	5,630.43	-1,539.87	75.59	1,539.07	1.18	-0.64	0.99
7,152.00	88.13	183.07	5,632.61	-1,629.63	69.52	1,628.89	2.08	-1.08	-1.78
7,241.00	88.92	179.86	5,634.90	-1,718.56	67.24	1,717.84	3.71	0.89	-3.61
7,331.00	89.01	178.77	5,636.53	-1,808.54	68.32	1,807.80	1.22	0.10	-1.21

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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)	
7,424.00	89.93	179.48	5,637.39	-1,901.52	69.74	1,900.77	1.25	0.99	0.76	
7,516.00	90.68	179.24	5,636.90	-1,993.51	70.77	1,992.74	0.86	0.82	-0.26	
7,609.00	89.63	177.87	5,636.64	-2,086.48	73.11	2,085.68	1.86	-1.13	-1.47	
7,701.00	90.29	177.21	5,636.71	-2,178.40	77.06	2,177.56	1.01	0.72	-0.72	
7,792.00	89.19	177.69	5,637.12	-2,269.30	81.11	2,268.42	1.32	-1.21	0.53	
7,884.00	89.58	177.32	5,638.11	-2,361.21	85.11	2,360.28	0.58	0.42	-0.40	
7,976.00	87.82	177.29	5,640.20	-2,453.08	89.44	2,452.11	1.91	-1.91	-0.03	
8,067.00	88.31	178.80	5,643.27	-2,543.97	92.54	2,542.97	1.74	0.54	1.66	
8,158.00	88.84	178.31	5,645.53	-2,634.92	94.84	2,633.88	0.79	0.58	-0.54	
8,250.00	90.68	179.61	5,645.92	-2,726.89	96.50	2,725.84	2.45	2.00	1.41	
8,342.00	90.29	179.44	5,645.14	-2,818.89	97.27	2,817.82	0.46	-0.42	-0.18	
8,434.00	90.99	181.38	5,644.11	-2,910.87	96.61	2,909.81	2.24	0.76	2.11	
8,523.00	90.68	180.75	5,642.81	-2,999.85	94.96	2,998.80	0.79	-0.35	-0.71	
8,615.00	91.65	180.73	5,640.94	-3,091.82	93.77	3,090.78	1.05	1.05	-0.02	
8,706.00	92.75	179.89	5,637.45	-3,182.75	93.28	3,181.71	1.52	1.21	-0.92	
8,799.00	91.56	179.91	5,633.95	-3,275.68	93.44	3,274.63	1.28	-1.28	0.02	
8,891.00	92.75	179.48	5,630.49	-3,367.61	93.93	3,366.56	1.38	1.29	-0.47	
8,984.00	92.04	180.21	5,626.61	-3,460.53	94.18	3,459.47	1.09	-0.76	0.78	
9,076.00	91.56	181.17	5,623.72	-3,552.48	93.07	3,551.42	1.17	-0.52	1.04	
9,168.00	90.59	182.58	5,621.99	-3,644.41	90.06	3,643.38	1.86	-1.05	1.53	
9,259.00	91.08	184.17	5,620.66	-3,735.24	84.70	3,734.25	1.83	0.54	1.75	
9,351.00	88.66	183.94	5,620.87	-3,827.00	78.20	3,826.07	2.64	-2.63	-0.25	
9,442.00	89.80	184.82	5,622.10	-3,917.72	71.25	3,916.86	1.58	1.25	0.97	
9,535.00	90.59	185.30	5,621.78	-4,010.36	63.05	4,009.57	0.99	0.85	0.52	
9,627.00	91.21	183.85	5,620.33	-4,102.05	55.71	4,101.33	1.71	0.67	-1.58	
9,719.00	90.02	184.10	5,619.35	-4,193.83	49.33	4,193.16	1.32	-1.29	0.27	
9,811.00	90.29	187.73	5,619.10	-4,285.32	39.85	4,284.74	3.96	0.29	3.95	
9,904.00	89.80	187.22	5,619.03	-4,377.53	27.76	4,377.06	0.76	-0.53	-0.55	
9,996.00	88.79	185.84	5,620.16	-4,468.92	17.29	4,468.55	1.86	-1.10	-1.50	
10,088.00	89.27	184.00	5,621.72	-4,560.57	9.41	4,560.26	2.07	0.52	-2.00	
10,180.00	90.55	185.10	5,621.86	-4,652.27	2.11	4,652.04	1.83	1.39	1.20	
10,272.00	90.37	183.81	5,621.12	-4,743.99	-5.04	4,743.82	1.42	-0.20	-1.40	
10,364.00	89.23	183.98	5,621.44	-4,835.77	-11.29	4,835.66	1.25	-1.24	0.18	
10,456.00	89.58	182.66	5,622.40	-4,927.61	-16.62	4,927.55	1.48	0.38	-1.43	
10,547.00	89.54	184.79	5,623.10	-5,018.41	-22.53	5,018.40	2.34	-0.04	2.34	
10,639.00	89.05	183.78	5,624.23	-5,110.15	-29.40	5,110.19	1.22	-0.53	-1.10	
10,731.00	90.51	184.35	5,624.58	-5,201.91	-35.92	5,202.02	1.70	1.59	0.62	
10,824.00	88.44	183.09	5,625.43	-5,294.71	-41.96	5,294.86	2.61	-2.23	-1.35	
10,916.00	89.49	182.89	5,627.10	-5,386.56	-46.75	5,386.76	1.16	1.14	-0.22	
11,008.00	89.10	182.65	5,628.23	-5,478.45	-51.20	5,478.69	0.50	-0.42	-0.26	
11,101.00	89.14	185.34	5,629.66	-5,571.20	-57.68	5,571.50	2.89	0.04	2.89	
11,193.00	88.75	182.34	5,631.35	-5,662.97	-63.84	5,663.32	3.29	-0.42	-3.26	
11,283.00	89.45	182.61	5,632.76	-5,752.88	-67.72	5,753.26	0.83	0.78	0.30	

LEAM Drilling Systems LLC

Survey Report

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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)
11,375.00	89.49	180.82	5,633.62	-5,844.83	-70.48	5,845.23	1.95	0.04	-1.95
11,466.00	88.92	180.58	5,634.88	-5,935.81	-71.59	5,936.22	0.68	-0.63	-0.26
11,559.00	89.67	179.92	5,636.02	-6,028.80	-71.99	6,029.21	1.07	0.81	-0.71
11,651.00	88.62	179.73	5,637.39	-6,120.79	-71.71	6,121.20	1.16	-1.14	-0.21
11,742.00	88.97	178.69	5,639.31	-6,211.76	-70.46	6,212.15	1.21	0.38	-1.14
11,835.00	90.33	177.37	5,639.88	-6,304.70	-67.26	6,305.05	2.04	1.46	-1.42
11,927.00	89.27	177.84	5,640.20	-6,396.62	-63.42	6,396.93	1.26	-1.15	0.51
12,018.00	89.19	178.89	5,641.42	-6,487.57	-60.82	6,487.85	1.16	-0.09	1.15
12,110.00	88.57	179.11	5,643.22	-6,579.54	-59.21	6,579.80	0.72	-0.67	0.24
12,202.00	88.22	180.30	5,645.80	-6,671.50	-58.74	6,671.75	1.35	-0.38	1.29
12,293.00	90.29	181.49	5,646.98	-6,762.47	-60.16	6,762.74	2.62	2.27	1.31
12,385.00	88.84	179.99	5,647.68	-6,854.46	-61.35	6,854.73	2.27	-1.58	-1.63
12,478.00	89.05	179.98	5,649.39	-6,947.44	-61.33	6,947.71	0.23	0.23	-0.01
12,570.00	89.67	178.95	5,650.42	-7,039.43	-60.47	7,039.69	1.31	0.67	-1.12
12,661.00	89.58	180.63	5,651.01	-7,130.42	-60.13	7,130.67	1.85	-0.10	1.85
12,754.00	90.42	179.47	5,651.01	-7,223.42	-60.22	7,223.67	1.54	0.90	-1.25
12,845.00	91.08	180.85	5,649.82	-7,314.41	-60.47	7,314.65	1.68	0.73	1.52
12,846.49	91.05	180.85	5,649.79	-7,315.90	-60.49	7,316.15	2.00	-1.99	-0.19
Maddy 2									
12,938.00	89.23	180.67	5,649.57	-7,407.40	-61.70	7,407.65	2.00	-1.99	-0.19
13,030.00	89.89	180.24	5,650.28	-7,499.39	-62.43	7,499.65	0.86	0.72	-0.47
13,122.00	89.93	179.26	5,650.42	-7,591.39	-62.03	7,591.64	1.07	0.04	-1.07
Maddy 1									
13,160.00	89.63	178.82	5,650.57	-7,629.38	-61.40	7,629.62	1.40	-0.79	-1.16
13,199.73	89.63	178.82	5,650.82	-7,669.11	-60.58	7,669.33	0.00	0.00	0.00
PBHL(30F-3106)									
13,210.00	89.63	178.82	5,650.89	-7,679.37	-60.37	7,679.60	0.00	0.00	0.00
BHL(30F-3106)									

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,581.00	1,580.27	9 5/8"	9-5/8	12-1/4
5,959.00	5,642.89	7"	7	7-1/2

WHITING PETROLEUM CORPORATION

**Weld County, CO
Horsetail #30F
3106**

OH

Design: OH

Survey Report - Geographic

17 November, 2014

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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	3106					
Well Position	+N/-S	0.00 usft	Northing:	1,542,659.64 usft	Latitude:	40° 48' 37.958 N
	+E/-W	0.00 usft	Easting:	3,471,640.01 usft	Longitude:	103° 47' 46.100 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	4/30/2014	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	180.55	

Survey Program	Date	11/17/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
141.00	13,160.00	Survey #1 (OH)	MWD+IFR1+MS+sag	Fixed:v2:crustal dec & 3-axis correction + sag Projection	
13,210.00	13,210.00	Survey #2 (OH)	Project		

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	1,542,659.64	3,471,640.01	40° 48' 37.958 N	103° 47' 46.100 W
SHL(30F-3106)									
141.00	0.44	275.97	141.00	0.06	-0.54	1,542,659.69	3,471,639.47	40° 48' 37.959 N	103° 47' 46.107 W
233.00	0.75	301.54	232.99	0.41	-1.40	1,542,660.02	3,471,638.59	40° 48' 37.962 N	103° 47' 46.119 W
326.00	0.57	277.14	325.99	0.78	-2.38	1,542,660.38	3,471,637.61	40° 48' 37.966 N	103° 47' 46.131 W
418.00	0.97	285.65	417.98	1.05	-3.58	1,542,660.62	3,471,636.40	40° 48' 37.969 N	103° 47' 46.147 W
510.00	0.18	128.33	509.98	1.17	-4.22	1,542,660.73	3,471,635.76	40° 48' 37.970 N	103° 47' 46.155 W
602.00	0.40	198.77	601.97	0.78	-4.21	1,542,660.34	3,471,635.78	40° 48' 37.966 N	103° 47' 46.155 W
693.00	0.66	66.49	692.97	0.69	-3.83	1,542,660.26	3,471,636.16	40° 48' 37.965 N	103° 47' 46.150 W
784.00	0.70	41.88	783.97	1.31	-2.98	1,542,660.89	3,471,637.00	40° 48' 37.971 N	103° 47' 46.139 W
876.00	0.88	83.17	875.96	1.81	-1.90	1,542,661.42	3,471,638.07	40° 48' 37.976 N	103° 47' 46.125 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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
967.00	0.70	60.27	966.95	2.17	-0.73	1,542,661.80	3,471,639.24	40° 48' 37.980 N	103° 47' 46.110 W
1,059.00	1.49	50.74	1,058.93	3.21	0.69	1,542,662.86	3,471,640.63	40° 48' 37.990 N	103° 47' 46.091 W
1,151.00	2.33	46.23	1,150.88	5.26	2.96	1,542,664.96	3,471,642.87	40° 48' 38.010 N	103° 47' 46.062 W
1,243.00	3.03	43.46	1,242.78	8.32	5.99	1,542,668.07	3,471,645.83	40° 48' 38.040 N	103° 47' 46.023 W
1,335.00	3.60	55.85	1,334.63	11.70	10.05	1,542,671.54	3,471,649.83	40° 48' 38.074 N	103° 47' 45.970 W
1,426.00	3.65	41.68	1,425.45	15.47	14.34	1,542,675.38	3,471,654.04	40° 48' 38.111 N	103° 47' 45.914 W
1,518.00	2.02	46.56	1,517.33	18.77	17.46	1,542,678.75	3,471,657.11	40° 48' 38.144 N	103° 47' 45.873 W
1,550.00	2.64	40.27	1,549.30	19.72	18.35	1,542,679.71	3,471,657.97	40° 48' 38.153 N	103° 47' 45.862 W
1,581.00	2.59	41.23	1,580.27	20.79	19.27	1,542,680.80	3,471,658.87	40° 48' 38.164 N	103° 47' 45.850 W
9 5/8"									
1,679.00	2.42	44.52	1,678.18	23.93	22.18	1,542,683.99	3,471,661.72	40° 48' 38.195 N	103° 47' 45.812 W
1,770.00	1.76	31.87	1,769.12	26.49	24.27	1,542,686.59	3,471,663.76	40° 48' 38.220 N	103° 47' 45.785 W
1,862.00	1.58	28.32	1,861.08	28.80	25.61	1,542,688.93	3,471,665.06	40° 48' 38.243 N	103° 47' 45.767 W
1,953.00	2.64	54.55	1,952.02	31.12	27.92	1,542,691.30	3,471,667.32	40° 48' 38.266 N	103° 47' 45.737 W
2,045.00	2.07	45.20	2,043.94	33.52	30.82	1,542,693.75	3,471,670.18	40° 48' 38.290 N	103° 47' 45.700 W
2,137.00	2.64	35.58	2,135.86	36.42	33.23	1,542,696.69	3,471,672.53	40° 48' 38.318 N	103° 47' 45.668 W
2,229.00	2.68	38.67	2,227.76	39.82	35.81	1,542,700.14	3,471,675.04	40° 48' 38.352 N	103° 47' 45.635 W
2,321.00	2.55	32.12	2,319.67	43.23	38.24	1,542,703.60	3,471,677.41	40° 48' 38.385 N	103° 47' 45.603 W
2,412.00	2.95	34.04	2,410.56	46.89	40.63	1,542,707.30	3,471,679.72	40° 48' 38.422 N	103° 47' 45.572 W
2,503.00	2.95	32.63	2,501.44	50.80	43.20	1,542,711.26	3,471,682.22	40° 48' 38.460 N	103° 47' 45.539 W
2,596.00	3.12	24.37	2,594.31	55.12	45.54	1,542,715.63	3,471,684.47	40° 48' 38.503 N	103° 47' 45.508 W
2,689.00	3.16	20.37	2,687.17	59.83	47.47	1,542,720.37	3,471,686.32	40° 48' 38.549 N	103° 47' 45.483 W
2,781.00	2.51	35.18	2,779.06	63.85	49.52	1,542,724.43	3,471,688.29	40° 48' 38.589 N	103° 47' 45.456 W
2,873.00	2.37	34.55	2,870.98	67.07	51.76	1,542,727.69	3,471,690.46	40° 48' 38.621 N	103° 47' 45.427 W
2,963.00	2.46	31.54	2,960.90	70.24	53.82	1,542,730.91	3,471,692.47	40° 48' 38.652 N	103° 47' 45.400 W
3,055.00	2.46	17.81	3,052.81	73.81	55.46	1,542,734.50	3,471,694.03	40° 48' 38.688 N	103° 47' 45.379 W
3,147.00	2.99	30.32	3,144.71	77.76	57.27	1,542,738.49	3,471,695.77	40° 48' 38.727 N	103° 47' 45.356 W
3,239.00	3.16	32.65	3,236.58	81.96	59.85	1,542,742.74	3,471,698.27	40° 48' 38.768 N	103° 47' 45.322 W
3,331.00	3.21	30.50	3,328.43	86.32	62.53	1,542,747.15	3,471,700.86	40° 48' 38.811 N	103° 47' 45.287 W
3,424.00	3.34	38.03	3,421.28	90.70	65.52	1,542,751.58	3,471,703.77	40° 48' 38.854 N	103° 47' 45.248 W
3,516.00	3.47	35.23	3,513.12	95.08	68.78	1,542,756.03	3,471,706.94	40° 48' 38.898 N	103° 47' 45.206 W
3,608.00	3.65	25.96	3,604.94	99.99	71.66	1,542,760.99	3,471,709.73	40° 48' 38.946 N	103° 47' 45.168 W
3,700.00	3.12	30.61	3,696.78	104.78	74.22	1,542,765.83	3,471,712.20	40° 48' 38.994 N	103° 47' 45.135 W
3,792.00	2.59	11.23	3,788.67	108.97	75.90	1,542,770.05	3,471,713.80	40° 48' 39.035 N	103° 47' 45.113 W
3,884.00	2.59	22.24	3,880.58	112.93	77.09	1,542,774.04	3,471,714.91	40° 48' 39.074 N	103° 47' 45.098 W
3,977.00	3.25	33.12	3,973.46	117.09	79.33	1,542,778.23	3,471,717.07	40° 48' 39.115 N	103° 47' 45.069 W
4,069.00	3.08	47.15	4,065.32	120.95	82.56	1,542,782.16	3,471,720.23	40° 48' 39.153 N	103° 47' 45.027 W
4,160.00	2.24	64.87	4,156.22	123.37	85.97	1,542,784.64	3,471,723.59	40° 48' 39.177 N	103° 47' 44.982 W
4,252.00	1.14	88.21	4,248.18	124.16	88.51	1,542,785.48	3,471,726.11	40° 48' 39.185 N	103° 47' 44.949 W
4,344.00	0.53	192.14	4,340.17	123.77	89.33	1,542,785.11	3,471,726.95	40° 48' 39.181 N	103° 47' 44.939 W
4,435.00	0.92	240.86	4,431.17	123.01	88.61	1,542,784.33	3,471,726.23	40° 48' 39.174 N	103° 47' 44.948 W
4,528.00	1.32	255.69	4,524.15	122.38	86.92	1,542,783.67	3,471,724.56	40° 48' 39.167 N	103° 47' 44.970 W
4,620.00	0.75	327.46	4,616.14	122.62	85.57	1,542,783.89	3,471,723.20	40° 48' 39.170 N	103° 47' 44.988 W
4,713.00	0.75	319.16	4,709.13	123.60	84.84	1,542,784.85	3,471,722.46	40° 48' 39.180 N	103° 47' 44.997 W
4,805.00	0.26	265.98	4,801.13	124.04	84.24	1,542,785.28	3,471,721.85	40° 48' 39.184 N	103° 47' 45.005 W
4,897.00	0.79	164.44	4,893.12	123.41	84.20	1,542,784.65	3,471,721.82	40° 48' 39.178 N	103° 47' 45.005 W
4,987.00	0.57	117.84	4,983.12	122.61	84.76	1,542,783.85	3,471,722.40	40° 48' 39.170 N	103° 47' 44.998 W
5,079.00	4.09	153.68	5,075.03	119.45	86.62	1,542,780.74	3,471,724.32	40° 48' 39.139 N	103° 47' 44.974 W
5,171.00	12.22	166.51	5,166.03	107.02	90.36	1,542,768.38	3,471,728.29	40° 48' 39.016 N	103° 47' 44.925 W
5,263.00	19.87	172.60	5,254.38	82.01	94.65	1,542,743.45	3,471,733.06	40° 48' 38.769 N	103° 47' 44.870 W
5,356.00	25.14	175.41	5,340.27	46.62	98.27	1,542,708.14	3,471,737.36	40° 48' 38.419 N	103° 47' 44.822 W
5,448.00	34.81	178.14	5,419.88	0.78	100.69	1,542,662.36	3,471,740.66	40° 48' 37.966 N	103° 47' 44.791 W
5,479.00	39.08	179.52	5,444.65	-17.84	101.06	1,542,643.75	3,471,741.39	40° 48' 37.782 N	103° 47' 44.786 W
5,510.00	42.02	178.32	5,468.20	-37.99	101.44	1,542,623.61	3,471,742.16	40° 48' 37.583 N	103° 47' 44.781 W
5,541.00	44.97	178.69	5,490.69	-59.32	102.00	1,542,602.30	3,471,743.13	40° 48' 37.372 N	103° 47' 44.774 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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
5,571.00	49.45	179.84	5,511.06	-81.32	102.27	1,542,580.30	3,471,743.82	40° 48' 37.155 N	103° 47' 44.770 W
5,602.00	53.76	180.93	5,530.31	-105.61	102.10	1,542,556.01	3,471,744.12	40° 48' 36.915 N	103° 47' 44.773 W
5,633.00	55.30	181.59	5,548.30	-130.85	101.55	1,542,530.77	3,471,744.05	40° 48' 36.665 N	103° 47' 44.780 W
5,664.00	58.07	181.96	5,565.32	-156.74	100.74	1,542,504.86	3,471,743.74	40° 48' 36.410 N	103° 47' 44.790 W
5,694.00	62.29	181.21	5,580.24	-182.75	100.03	1,542,478.84	3,471,743.53	40° 48' 36.152 N	103° 47' 44.800 W
5,724.00	65.45	180.04	5,593.45	-209.68	99.74	1,542,451.92	3,471,743.75	40° 48' 35.886 N	103° 47' 44.803 W
5,755.00	69.10	179.31	5,605.42	-238.27	99.90	1,542,423.34	3,471,744.47	40° 48' 35.604 N	103° 47' 44.801 W
5,786.00	72.88	178.96	5,615.52	-267.57	100.35	1,542,394.05	3,471,745.47	40° 48' 35.314 N	103° 47' 44.795 W
5,816.00	75.25	180.88	5,623.76	-296.41	100.38	1,542,365.21	3,471,746.06	40° 48' 35.029 N	103° 47' 44.795 W
5,847.00	77.67	182.24	5,631.01	-326.54	99.56	1,542,335.08	3,471,745.82	40° 48' 34.732 N	103° 47' 44.806 W
5,877.00	80.57	182.26	5,636.68	-355.97	98.40	1,542,305.63	3,471,745.23	40° 48' 34.441 N	103° 47' 44.821 W
5,908.00	84.53	181.04	5,640.69	-386.69	97.52	1,542,274.90	3,471,744.94	40° 48' 34.137 N	103° 47' 44.832 W
5,933.00	88.00	182.26	5,642.32	-411.63	96.80	1,542,249.95	3,471,744.70	40° 48' 33.891 N	103° 47' 44.842 W
5,959.00	89.50	182.02	5,642.89	-437.60	95.83	1,542,223.97	3,471,744.23	40° 48' 33.634 N	103° 47' 44.854 W
7"									
5,987.00	91.12	181.77	5,642.74	-465.58	94.90	1,542,195.97	3,471,743.84	40° 48' 33.358 N	103° 47' 44.866 W
6,076.00	90.90	181.38	5,641.17	-554.54	92.46	1,542,106.99	3,471,743.10	40° 48' 32.479 N	103° 47' 44.898 W
6,166.00	89.98	180.90	5,640.48	-644.51	90.67	1,542,016.99	3,471,743.04	40° 48' 31.590 N	103° 47' 44.921 W
6,256.00	90.95	180.48	5,639.75	-734.50	89.58	1,541,927.00	3,471,743.68	40° 48' 30.701 N	103° 47' 44.935 W
6,345.00	90.99	179.85	5,638.24	-823.49	89.33	1,541,838.02	3,471,745.14	40° 48' 29.821 N	103° 47' 44.939 W
6,435.00	90.86	178.72	5,636.79	-913.47	90.45	1,541,748.08	3,471,747.99	40° 48' 28.932 N	103° 47' 44.924 W
6,524.00	91.91	179.41	5,634.64	-1,002.43	91.90	1,541,659.16	3,471,751.15	40° 48' 28.053 N	103° 47' 44.905 W
6,614.00	92.48	180.08	5,631.19	-1,092.36	92.30	1,541,569.26	3,471,753.28	40° 48' 27.165 N	103° 47' 44.900 W
6,704.00	91.08	181.20	5,628.39	-1,182.31	91.30	1,541,479.31	3,471,754.00	40° 48' 26.276 N	103° 47' 44.913 W
6,793.00	89.80	182.84	5,627.71	-1,271.25	88.16	1,541,390.33	3,471,752.57	40° 48' 25.397 N	103° 47' 44.954 W
6,883.00	89.14	180.51	5,628.54	-1,361.20	85.53	1,541,300.34	3,471,751.67	40° 48' 24.508 N	103° 47' 44.988 W
6,973.00	89.67	183.79	5,629.48	-1,451.12	82.15	1,541,210.37	3,471,750.03	40° 48' 23.620 N	103° 47' 45.032 W
7,062.00	89.10	184.67	5,630.43	-1,539.87	75.59	1,541,121.51	3,471,745.17	40° 48' 22.743 N	103° 47' 45.117 W
7,152.00	88.13	183.07	5,632.61	-1,629.63	69.52	1,541,031.65	3,471,740.82	40° 48' 21.856 N	103° 47' 45.196 W
7,241.00	88.92	179.86	5,634.90	-1,718.56	67.24	1,540,942.69	3,471,740.26	40° 48' 20.977 N	103° 47' 45.226 W
7,331.00	89.01	178.77	5,636.53	-1,808.54	68.32	1,540,852.75	3,471,743.06	40° 48' 20.088 N	103° 47' 45.212 W
7,424.00	89.93	179.48	5,637.39	-1,901.52	69.74	1,540,759.81	3,471,746.27	40° 48' 19.169 N	103° 47' 45.194 W
7,516.00	90.68	179.24	5,636.90	-1,993.51	70.77	1,540,667.86	3,471,749.06	40° 48' 18.261 N	103° 47' 45.180 W
7,609.00	89.63	177.87	5,636.64	-2,086.48	73.11	1,540,574.95	3,471,753.19	40° 48' 17.342 N	103° 47' 45.150 W
7,701.00	90.29	177.21	5,636.71	-2,178.40	77.06	1,540,483.13	3,471,758.91	40° 48' 16.434 N	103° 47' 45.098 W
7,792.00	89.19	177.69	5,637.12	-2,269.30	81.11	1,540,392.32	3,471,764.70	40° 48' 15.535 N	103° 47' 45.046 W
7,884.00	89.58	177.32	5,638.11	-2,361.21	85.11	1,540,300.50	3,471,770.47	40° 48' 14.627 N	103° 47' 44.994 W
7,976.00	87.82	177.29	5,640.20	-2,453.08	89.44	1,540,208.73	3,471,776.56	40° 48' 13.720 N	103° 47' 44.937 W
8,067.00	88.31	178.80	5,643.27	-2,543.97	92.54	1,540,117.92	3,471,781.41	40° 48' 12.821 N	103° 47' 44.897 W
8,158.00	88.84	178.31	5,645.53	-2,634.92	94.84	1,540,027.04	3,471,785.45	40° 48' 11.923 N	103° 47' 44.867 W
8,250.00	90.68	179.61	5,645.92	-2,726.89	96.50	1,539,935.11	3,471,788.89	40° 48' 11.014 N	103° 47' 44.846 W
8,342.00	90.29	179.44	5,645.14	-2,818.89	97.27	1,539,843.15	3,471,791.42	40° 48' 10.105 N	103° 47' 44.836 W
8,434.00	90.99	181.38	5,644.11	-2,910.87	96.61	1,539,751.16	3,471,792.52	40° 48' 9.196 N	103° 47' 44.844 W
8,523.00	90.68	180.75	5,642.81	-2,999.85	94.96	1,539,662.17	3,471,792.58	40° 48' 8.317 N	103° 47' 44.866 W
8,615.00	91.65	180.73	5,640.94	-3,091.82	93.77	1,539,570.19	3,471,793.16	40° 48' 7.408 N	103° 47' 44.881 W
8,706.00	92.75	179.89	5,637.45	-3,182.75	93.28	1,539,479.27	3,471,794.41	40° 48' 6.510 N	103° 47' 44.888 W
8,799.00	91.56	179.91	5,633.95	-3,275.68	93.44	1,539,386.36	3,471,796.36	40° 48' 5.592 N	103° 47' 44.885 W
8,891.00	92.75	179.48	5,630.49	-3,367.61	93.93	1,539,294.46	3,471,798.62	40° 48' 4.683 N	103° 47' 44.879 W
8,984.00	92.04	180.21	5,626.61	-3,460.53	94.18	1,539,201.56	3,471,800.65	40° 48' 3.765 N	103° 47' 44.876 W
9,076.00	91.56	181.17	5,623.72	-3,552.48	93.07	1,539,109.61	3,471,801.31	40° 48' 2.857 N	103° 47' 44.890 W
9,168.00	90.59	182.58	5,621.99	-3,644.41	90.06	1,539,017.64	3,471,800.07	40° 48' 1.948 N	103° 47' 44.929 W
9,259.00	91.08	184.17	5,620.66	-3,735.24	84.70	1,538,926.72	3,471,796.46	40° 48' 1.051 N	103° 47' 44.999 W
9,351.00	88.66	183.94	5,620.87	-3,827.00	78.20	1,538,834.85	3,471,791.72	40° 48' 0.144 N	103° 47' 45.084 W
9,442.00	89.80	184.82	5,622.10	-3,917.72	71.25	1,538,744.01	3,471,786.52	40° 47' 59.248 N	103° 47' 45.174 W
9,535.00	90.59	185.30	5,621.78	-4,010.36	63.05	1,538,651.23	3,471,780.09	40° 47' 58.332 N	103° 47' 45.281 W

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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
9,627.00	91.21	183.85	5,620.33	-4,102.05	55.71	1,538,559.42	3,471,774.52	40° 47' 57.426 N	103° 47' 45.376 W
9,719.00	90.02	184.10	5,619.35	-4,193.83	49.33	1,538,467.54	3,471,769.91	40° 47' 56.519 N	103° 47' 45.459 W
9,811.00	90.29	187.73	5,619.10	-4,285.32	39.85	1,538,375.88	3,471,762.19	40° 47' 55.615 N	103° 47' 45.582 W
9,904.00	89.80	187.22	5,619.03	-4,377.53	27.76	1,538,283.46	3,471,751.86	40° 47' 54.704 N	103° 47' 45.740 W
9,996.00	88.79	185.84	5,620.16	-4,468.92	17.29	1,538,191.88	3,471,743.16	40° 47' 53.801 N	103° 47' 45.876 W
10,088.00	89.27	184.00	5,621.72	-4,560.57	9.41	1,538,100.10	3,471,737.03	40° 47' 52.896 N	103° 47' 45.978 W
10,180.00	90.55	185.10	5,621.86	-4,652.27	2.11	1,538,008.27	3,471,731.50	40° 47' 51.990 N	103° 47' 46.073 W
10,272.00	90.37	183.81	5,621.12	-4,743.99	-5.04	1,537,916.43	3,471,726.12	40° 47' 51.083 N	103° 47' 46.166 W
10,364.00	89.23	183.98	5,621.44	-4,835.77	-11.29	1,537,824.54	3,471,721.63	40° 47' 50.176 N	103° 47' 46.247 W
10,456.00	89.58	182.66	5,622.40	-4,927.61	-16.62	1,537,732.62	3,471,718.07	40° 47' 49.269 N	103° 47' 46.316 W
10,547.00	89.54	184.79	5,623.10	-5,018.41	-22.53	1,537,641.72	3,471,713.90	40° 47' 48.372 N	103° 47' 46.393 W
10,639.00	89.05	183.78	5,624.23	-5,110.15	-29.40	1,537,549.87	3,471,708.79	40° 47' 47.465 N	103° 47' 46.483 W
10,731.00	90.51	184.35	5,624.58	-5,201.91	-35.92	1,537,458.00	3,471,704.04	40° 47' 46.559 N	103° 47' 46.567 W
10,824.00	88.44	183.09	5,625.43	-5,294.71	-41.96	1,537,365.11	3,471,699.79	40° 47' 45.642 N	103° 47' 46.646 W
10,916.00	89.49	182.89	5,627.10	-5,386.56	-46.75	1,537,273.18	3,471,696.76	40° 47' 44.734 N	103° 47' 46.708 W
11,008.00	89.10	182.65	5,628.23	-5,478.45	-51.20	1,537,181.22	3,471,694.08	40° 47' 43.826 N	103° 47' 46.766 W
11,101.00	89.14	185.34	5,629.66	-5,571.20	-57.68	1,537,088.36	3,471,689.38	40° 47' 42.910 N	103° 47' 46.850 W
11,193.00	88.75	182.34	5,631.35	-5,662.97	-63.84	1,536,996.49	3,471,684.99	40° 47' 42.003 N	103° 47' 46.930 W
11,283.00	89.45	182.61	5,632.76	-5,752.88	-67.72	1,536,906.53	3,471,682.83	40° 47' 41.115 N	103° 47' 46.981 W
11,375.00	89.49	180.82	5,633.62	-5,844.83	-70.48	1,536,814.54	3,471,681.84	40° 47' 40.206 N	103° 47' 47.017 W
11,466.00	88.92	180.58	5,634.88	-5,935.81	-71.59	1,536,723.55	3,471,682.48	40° 47' 39.307 N	103° 47' 47.031 W
11,559.00	89.67	179.92	5,636.02	-6,028.80	-71.99	1,536,630.57	3,471,683.86	40° 47' 38.388 N	103° 47' 47.036 W
11,651.00	88.62	179.73	5,637.39	-6,120.79	-71.71	1,536,538.61	3,471,685.91	40° 47' 37.479 N	103° 47' 47.033 W
11,742.00	88.97	178.69	5,639.31	-6,211.76	-70.46	1,536,447.68	3,471,688.91	40° 47' 36.580 N	103° 47' 47.016 W
11,835.00	90.33	177.37	5,639.88	-6,304.70	-67.26	1,536,354.82	3,471,693.89	40° 47' 35.662 N	103° 47' 46.975 W
11,927.00	89.27	177.84	5,640.20	-6,396.62	-63.42	1,536,262.99	3,471,699.50	40° 47' 34.754 N	103° 47' 46.925 W
12,018.00	89.19	178.89	5,641.42	-6,487.57	-60.82	1,536,172.10	3,471,703.85	40° 47' 33.855 N	103° 47' 46.891 W
12,110.00	88.57	179.11	5,643.22	-6,579.54	-59.21	1,536,080.18	3,471,707.22	40° 47' 32.946 N	103° 47' 46.870 W
12,202.00	88.22	180.30	5,645.80	-6,671.50	-58.74	1,535,988.25	3,471,709.46	40° 47' 32.038 N	103° 47' 46.864 W
12,293.00	90.29	181.49	5,646.98	-6,762.47	-60.16	1,535,897.26	3,471,709.78	40° 47' 31.139 N	103° 47' 46.883 W
12,385.00	88.84	179.99	5,647.68	-6,854.46	-61.35	1,535,805.27	3,471,710.36	40° 47' 30.230 N	103° 47' 46.898 W
12,478.00	89.05	179.98	5,649.39	-6,947.44	-61.33	1,535,712.31	3,471,712.17	40° 47' 29.311 N	103° 47' 46.898 W
12,570.00	89.67	178.95	5,650.42	-7,039.43	-60.47	1,535,620.35	3,471,714.80	40° 47' 28.402 N	103° 47' 46.887 W
12,661.00	89.58	180.63	5,651.01	-7,130.42	-60.13	1,535,529.38	3,471,716.88	40° 47' 27.503 N	103° 47' 46.882 W
12,754.00	90.42	179.47	5,651.01	-7,223.42	-60.22	1,535,436.40	3,471,718.59	40° 47' 26.584 N	103° 47' 46.883 W
12,845.00	91.08	180.85	5,649.82	-7,314.41	-60.47	1,535,345.42	3,471,720.08	40° 47' 25.685 N	103° 47' 46.887 W
12,846.49	91.05	180.85	5,649.79	-7,315.90	-60.49	1,535,343.93	3,471,720.09	40° 47' 25.670 N	103° 47' 46.887 W
Maddy 2									
12,938.00	89.23	180.67	5,649.57	-7,407.40	-61.70	1,535,252.43	3,471,720.64	40° 47' 24.766 N	103° 47' 46.903 W
13,030.00	89.89	180.24	5,650.28	-7,499.39	-62.43	1,535,160.44	3,471,721.67	40° 47' 23.857 N	103° 47' 46.912 W
13,122.00	89.93	179.26	5,650.42	-7,591.39	-62.03	1,535,068.46	3,471,723.84	40° 47' 22.948 N	103° 47' 46.907 W
Maddy 1									
13,160.00	89.63	178.82	5,650.57	-7,629.38	-61.40	1,535,030.49	3,471,725.21	40° 47' 22.573 N	103° 47' 46.899 W
13,199.73	89.63	178.82	5,650.82	-7,669.11	-60.58	1,534,990.79	3,471,726.79	40° 47' 22.180 N	103° 47' 46.888 W
PBHL(30F-3106)									
13,200.00	89.63	178.82	5,650.83	-7,669.37	-60.57	1,534,990.52	3,471,726.80	40° 47' 22.178 N	103° 47' 46.888 W
HL CROSSING: 13200' MD & 5650.83' TVD									
13,210.00	89.63	178.82	5,650.89	-7,679.37	-60.37	1,534,980.53	3,471,727.20	40° 47' 22.079 N	103° 47' 46.885 W
BHL(30F-3106)									

LEAM Drilling Systems LLC

Survey Report - Geographic

Company:	WHITING PETROLEUM CORPORATION	Local Co-ordinate Reference:	Well 3106
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:	3106	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-3106) - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,542,659.64	3,471,640.01	40° 48' 37.958 N	103° 47' 46.100 W
PBHL(30F-3106) - actual wellpath misses target center by 46.14usft at 13199.73usft MD (5650.82 TVD, -7669.11 N, -60.58 E) - Point	0.00	0.00	5,605.00	-7,669.29	-55.17	1,534,990.71	3,471,732.20	40° 47' 22.178 N	103° 47' 46.818 W
BHL(30F-3106) - actual wellpath hits target center - Point	0.00	0.00	5,650.89	-7,679.37	-60.37	1,534,980.53	3,471,727.19	40° 47' 22.079 N	103° 47' 46.885 W

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")	Hole Diameter (")
1,581.00	1,580.27	9 5/8"		9-5/8	12-1/4
5,959.00	5,642.89	7"		7	7-1/2

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
13,200.00	5,650.83	-7,669.37	-60.57	HL CROSSING: 13200' MD & 5650.83' TVD	