



## Survey Report

<b>Company:</b>	Whiting Petroleum Corporation	<b>Local Co-ordinate Reference:</b>	Well HORSETAIL 08D-1704
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	18.5' KB @ 4976.7usft (UNIT 406)
<b>Site:</b>	S8-T10N-R57W	<b>MD Reference:</b>	18.5' KB @ 4976.7usft (UNIT 406)
<b>Well:</b>	HORSETAIL 08D-1704	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	SURVEYS	<b>Database:</b>	USA EDM 5000 Multi Users DB

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

Site		S8-T10N-R57W			
Site Position:		Northing:	1,560,717.72 usft	Latitude:	40.859783
From:	Lat/Long	Easting:	3,477,578.15 usft	Longitude:	-103.773422
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.12 °

Well	HORSETAIL 08D-1704					
Well Position	+N/-S	0.0 usft	Northing:	1,560,656.79 usft	Latitude:	40.859761
	+E/-W	0.0 usft	Easting:	3,474,851.73 usft	Longitude:	-103.783281
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,958.2 usft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	3/30/2015	7.65	67.37	52,962

<b>Design</b>	SURVEYS				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	175.99	

<b>Survey Program</b>	<b>Date</b>	4/30/2015			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
165.0	5,839.0	Survey #1 (OH)	ISCWSA MWD	MWD - ISCWSA	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usf)</b>	<b>Build Rate (°/100u)</b>	<b>Formations / Comments</b>	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
165.0	0.53	165.68	165.0	-0.7	0.2	0.8	0.32	0.32		
259.0	0.58	178.87	259.0	-1.6	0.3	1.7	0.15	0.05		
352.0	0.68	112.04	352.0	-2.3	0.8	2.4	0.75	0.11		
446.0	2.16	75.41	446.0	-2.1	3.1	2.3	1.77	1.57		
539.0	4.55	67.24	538.8	-0.2	8.2	0.8	2.61	2.57		
632.0	6.79	64.04	631.3	3.6	16.5	-2.5	2.43	2.41		
726.0	9.04	68.15	724.4	8.8	28.4	-6.8	2.47	2.39		
819.0	11.67	69.24	815.9	14.9	43.9	-11.8	2.84	2.83		
913.0	11.18	70.61	908.0	21.3	61.4	-16.9	0.60	-0.52		
1,006.0	10.07	70.92	999.5	26.9	77.6	-21.4	1.20	-1.19		
1,100.0	8.75	70.10	1,092.2	32.0	92.1	-25.5	1.41	-1.40		
1,193.0	7.87	70.13	1,184.2	36.6	104.7	-29.2	0.95	-0.95		

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<b>Site:</b>	S8-T10N-R57W	<b>MD Reference:</b>	18.5' KB @ 4976.7usft (UNIT 406)
<b>Well:</b>	HORSETAIL 08D-1704	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	SURVEYS	<b>Database:</b>	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
1,287.0	9.53	62.82	1,277.1	42.3	117.7	-34.0	2.12	1.77	
1,380.0	8.99	62.31	1,368.9	49.2	131.0	-40.0	0.59	-0.58	
1,474.0	8.62	63.39	1,461.8	55.8	143.8	-45.6	0.43	-0.39	
1,567.0	8.28	66.35	1,553.8	61.6	156.2	-50.5	0.59	-0.37	
1,615.0	7.97	65.73	1,601.3	64.4	162.4	-52.9	0.67	-0.65	
1,674.0	7.56	68.13	1,659.8	67.5	169.7	-55.5	0.89	-0.69	
1,768.0	7.60	66.96	1,753.0	72.2	181.2	-59.4	0.17	0.04	
1,861.0	9.70	71.40	1,844.9	77.1	194.2	-63.4	2.37	2.26	
1,954.0	9.25	71.72	1,936.6	82.0	208.8	-67.2	0.49	-0.48	
2,048.0	11.50	72.85	2,029.1	87.1	224.9	-71.2	2.40	2.39	
2,141.0	11.41	71.13	2,120.2	92.8	242.5	-75.6	0.38	-0.10	
2,235.0	11.27	69.40	2,212.4	99.1	259.9	-80.6	0.39	-0.15	
2,328.0	10.82	66.70	2,303.7	105.7	276.4	-86.1	0.74	-0.48	
2,422.0	10.65	61.69	2,396.0	113.3	292.1	-92.6	1.01	-0.18	
2,515.0	10.08	58.89	2,487.5	121.6	306.7	-99.9	0.82	-0.61	
2,609.0	9.50	55.20	2,580.1	130.3	320.1	-107.6	0.91	-0.62	
2,702.0	10.61	57.93	2,671.7	139.2	333.6	-115.5	1.30	1.19	
2,796.0	11.33	64.44	2,764.0	147.8	349.3	-123.0	1.52	0.77	
2,890.0	11.48	62.05	2,856.1	156.2	365.9	-130.2	0.53	0.16	
2,983.0	10.88	60.97	2,947.4	164.7	381.7	-137.7	0.68	-0.65	
3,077.0	10.46	58.31	3,039.7	173.5	396.8	-145.4	0.69	-0.45	
3,171.0	10.57	69.58	3,132.2	181.0	412.1	-151.8	2.19	0.12	
3,264.0	8.98	66.10	3,223.8	186.9	426.7	-156.6	1.82	-1.71	
3,358.0	9.61	75.18	3,316.6	191.9	441.0	-160.6	1.70	0.67	
3,451.0	8.43	71.60	3,408.4	196.1	455.0	-163.8	1.40	-1.27	
3,545.0	10.85	79.10	3,501.1	199.9	470.2	-166.5	2.90	2.57	
3,639.0	10.41	76.93	3,593.5	203.5	487.2	-168.9	0.63	-0.47	
3,732.0	10.39	74.74	3,685.0	207.6	503.5	-171.9	0.43	-0.02	
3,826.0	9.99	73.34	3,777.5	212.2	519.4	-175.3	0.50	-0.43	
3,919.0	8.85	72.97	3,869.2	216.6	534.0	-178.7	1.23	-1.23	
4,013.0	9.52	71.75	3,962.0	221.1	548.3	-182.3	0.74	0.71	
4,107.0	8.11	72.34	4,054.9	225.6	562.0	-185.7	1.50	-1.50	
4,200.0	10.18	66.58	4,146.7	230.8	575.8	-190.0	2.43	2.23	
4,294.0	11.54	64.06	4,239.0	238.3	591.9	-196.3	1.53	1.45	
4,387.0	10.98	60.25	4,330.3	246.7	607.9	-203.6	1.00	-0.60	
4,481.0	9.95	54.95	4,422.7	255.8	622.4	-211.7	1.50	-1.10	
4,575.0	11.13	60.93	4,515.1	264.9	636.9	-219.7	1.71	1.26	
4,668.0	10.28	57.91	4,606.5	273.7	651.8	-227.4	1.09	-0.91	
4,762.0	8.74	51.01	4,699.2	282.6	664.5	-235.5	2.04	-1.64	
4,855.0	7.58	48.50	4,791.3	291.1	674.6	-243.2	1.30	-1.25	
4,949.0	4.88	67.10	4,884.7	296.8	682.9	-248.3	3.55	-2.87	
5,042.0	4.16	59.07	4,977.4	300.1	689.4	-251.1	1.03	-0.77	
5,136.0	1.43	58.04	5,071.3	302.4	693.3	-253.2	2.90	-2.90	
5,230.0	1.17	120.48	5,165.3	302.6	695.2	-253.2	1.45	-0.28	
5,323.0	3.20	127.01	5,258.2	300.5	698.1	-251.0	2.20	2.18	
5,417.0	14.42	171.27	5,351.0	287.3	701.9	-237.5	13.11	11.94	
5,511.0	21.79	171.17	5,440.3	258.5	706.4	-208.5	7.84	7.84	
5,604.0	27.02	178.60	5,525.0	220.3	709.6	-170.1	6.51	5.62	
5,698.0	32.92	169.75	5,606.4	173.7	714.7	-123.3	7.83	6.28	
5,792.0	28.89	175.88	5,687.1	125.9	720.8	-75.2	5.44	-4.29	LAST CES SVY @ 5792' MD
5,839.0	28.89	175.88	5,728.2	103.3	722.5	-52.5	0.00	0.00	

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<b>Design:</b>	SURVEYS	<b>Database:</b>	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
HORSETAIL 08D-1704 F	0.00	0.00	5,835.0	-10,148.0	711.1	1,550,524.50	3,475,759.11	40.831908	-103.780711
- actual wellpath misses target center by 10251.8usft at 5839.0usft MD (5728.2 TVD, 103.3 N, 722.5 E)									
- Point									
HORSETAIL 08D-1704 F	0.00	0.00	5,964.0	-10,148.0	711.1	1,550,524.50	3,475,759.11	40.831908	-103.780711
- actual wellpath misses target center by 10253.9usft at 5839.0usft MD (5728.2 TVD, 103.3 N, 722.5 E)									
- Point									

Design Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(usft)	(usft)	+N/-S	+E/-W	Comment	
(usft)	(usft)	(usft)	(usft)		
5,792.0	5,687.1	125.9	720.8	LAST CES SVY @ 5792' MD	
5,839.0	5,728.2	103.3	722.5	PTB @ 5839' MD (278' FNL, 1314' FWL)	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_