

Mustang Fuel

Saline County (NAD-83)

Sec 13-T15S-R03W

Muir 1-13H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

13 October, 2014

Survey Report

Company: Mustang Fuel	Local Co-ordinate Reference: Well Muir 1-13H
Project: Saline County (NAD-83)	TVD Reference: KB @ 1264.0usft
Site: Sec 13-T15S-R03W	MD Reference: KB @ 1264.0usft
Well: Muir 1-13H	North Reference: Grid
Wellbore: Wellbore #1	Survey Calculation Method: Minimum Curvature
Design: Wellbore #1	Database: EDM 5000.1 Single User Db

Project Saline County (NAD-83)	
Map System: US State Plane 1983	System Datum: Mean Sea Level
Geo Datum: North American Datum 1983	
Map Zone: Kansas Northern Zone	

Site Sec 13-T15S-R03W		
Site Position:	Northing: 153,625.00 usft	Latitude: 38° 45' 15.946 N
From: Map	Easting: 1,427,918.00 usft	Longitude: 97° 35' 40.925 W
Position Uncertainty: 0.0 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0.26 °

Well Muir 1-13H			
Well Position	+N/-S 0.0 usft	Northing: 153,377.00 usft	Latitude: 38° 45' 13.538 N
	+E/-W 0.0 usft	Easting: 1,426,930.00 usft	Longitude: 97° 35' 53.411 W
Position Uncertainty	0.0 usft	Wellhead Elevation: 0.0 usft	Ground Level: 1,252.0 usft

Wellbore Wellbore #1					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/11/2014	4.03	66.56	52,540

Design Wellbore #1					
Audit Notes:					
Version: 1.0	Phase: ACTUAL	Tie On Depth: 0.0			
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	174.02	

Survey Program		Date 10/13/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
2,402.0	7,645.0	Drillright MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,402.0	1.00	231.60	2,401.9	-13.0	-16.4	11.2	0.04	0.04	0.00	
First Drillright MWD Survey										
2,435.0	1.00	244.50	2,434.9	-13.3	-16.9	11.5	0.68	0.00	39.09	
2,466.0	0.90	249.00	2,465.9	-13.5	-17.4	11.6	0.40	-0.32	14.52	
2,498.0	1.30	217.80	2,497.9	-13.9	-17.8	12.0	2.21	1.25	-97.50	
2,528.0	3.40	204.80	2,527.8	-15.0	-18.4	13.0	7.18	7.00	-43.33	
2,559.0	5.20	191.60	2,558.7	-17.2	-19.1	15.1	6.59	5.81	-42.58	
2,591.0	7.20	184.40	2,590.6	-20.6	-19.5	18.5	6.69	6.25	-22.50	
2,621.0	9.30	187.20	2,620.2	-24.9	-20.0	22.7	7.12	7.00	9.33	

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Well:	Muir 1-13H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single 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)	
2,653.0	11.70	185.90	2,651.7	-30.7	-20.6	28.4	7.54	7.50	-4.06	
2,685.0	13.80	179.90	2,682.9	-37.7	-21.0	35.3	7.75	6.56	-18.75	
2,716.0	15.80	173.30	2,712.9	-45.6	-20.5	43.2	8.43	6.45	-21.29	
2,748.0	18.50	169.90	2,743.5	-54.9	-19.1	52.7	9.00	8.44	-10.63	
2,779.0	21.30	169.60	2,772.6	-65.3	-17.2	63.2	9.04	9.03	-0.97	
2,810.0	23.80	169.70	2,801.2	-77.0	-15.1	75.0	8.07	8.06	0.32	
2,842.0	26.30	170.70	2,830.2	-90.4	-12.8	88.6	7.92	7.81	3.13	
2,873.0	28.70	169.90	2,857.7	-104.5	-10.3	102.8	7.83	7.74	-2.58	
2,905.0	31.60	169.40	2,885.4	-120.3	-7.5	118.9	9.10	9.06	-1.56	
2,937.0	34.40	170.80	2,912.2	-137.5	-4.5	136.2	9.07	8.75	4.38	
2,968.0	36.90	171.10	2,937.4	-155.3	-1.6	154.3	8.08	8.06	0.97	
2,999.0	39.50	171.40	2,961.8	-174.2	1.3	173.4	8.41	8.39	0.97	
3,031.0	41.90	171.80	2,986.0	-194.9	4.3	194.3	7.54	7.50	1.25	
3,062.0	43.50	172.60	3,008.8	-215.7	7.2	215.3	5.45	5.16	2.58	
3,094.0	45.10	174.20	3,031.7	-237.9	9.8	237.6	6.10	5.00	5.00	
3,125.0	47.20	175.20	3,053.2	-260.2	11.8	260.0	7.16	6.77	3.23	
3,157.0	49.50	174.90	3,074.5	-284.0	13.9	283.9	7.22	7.19	-0.94	
3,188.0	51.30	174.80	3,094.2	-307.8	16.0	307.8	5.81	5.81	-0.32	
3,219.0	54.30	173.70	3,113.0	-332.3	18.5	332.5	10.08	9.68	-3.55	
3,251.0	57.70	173.40	3,130.9	-358.7	21.5	359.0	10.65	10.63	-0.94	
3,283.0	61.30	173.30	3,147.1	-386.1	24.7	386.6	11.25	11.25	-0.31	
3,315.0	65.00	172.40	3,161.5	-414.4	28.2	415.1	11.83	11.56	-2.81	
3,346.0	68.20	171.70	3,173.8	-442.6	32.2	443.5	10.53	10.32	-2.26	
3,377.0	70.00	171.20	3,184.9	-471.2	36.5	472.5	6.00	5.81	-1.61	
3,409.0	70.40	171.00	3,195.7	-501.0	41.1	502.5	1.38	1.25	-0.63	
3,441.0	70.50	171.30	3,206.5	-530.8	45.8	532.6	0.94	0.31	0.94	
3,472.0	70.70	171.20	3,216.8	-559.7	50.2	561.8	0.71	0.65	-0.32	
3,503.0	73.00	171.30	3,226.4	-588.8	54.7	591.3	7.43	7.42	0.32	
3,535.0	76.10	171.70	3,234.9	-619.3	59.3	622.1	9.76	9.69	1.25	
3,566.0	78.60	172.70	3,241.7	-649.2	63.4	652.3	8.66	8.06	3.23	
3,597.0	81.10	173.30	3,247.2	-679.5	67.1	682.8	8.29	8.06	1.94	
3,628.0	83.10	173.50	3,251.4	-710.0	70.6	713.5	6.48	6.45	0.65	
3,660.0	84.30	173.40	3,255.0	-741.6	74.2	745.3	3.76	3.75	-0.31	
3,690.0	86.70	174.10	3,257.3	-771.3	77.5	775.2	8.33	8.00	2.33	
3,722.0	88.90	174.00	3,258.5	-803.2	80.8	807.2	6.88	6.88	-0.31	
3,754.0	88.00	173.60	3,259.4	-835.0	84.3	839.2	3.08	-2.81	-1.25	
3,786.0	88.30	173.50	3,260.4	-866.7	87.9	871.2	0.99	0.94	-0.31	
3,817.0	89.40	173.60	3,261.1	-897.5	91.3	902.2	3.56	3.55	0.32	
3,849.0	89.20	174.70	3,261.4	-929.4	94.6	934.2	3.49	-0.63	3.44	
3,881.0	87.60	175.60	3,262.3	-961.2	97.3	966.1	5.74	-5.00	2.81	
3,942.0	87.70	176.50	3,264.8	-1,022.0	101.5	1,027.0	1.48	0.16	1.48	
3,973.0	87.60	176.20	3,266.1	-1,052.9	103.5	1,058.0	1.02	-0.32	-0.97	
4,004.0	87.60	176.00	3,267.4	-1,083.8	105.6	1,088.9	0.64	0.00	-0.65	

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Survey										
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4,035.0	89.00	176.00	3,268.3	-1,114.8	107.7	1,119.9	4.52	4.52	0.00	
4,066.0	88.40	175.90	3,269.0	-1,145.7	109.9	1,150.9	1.96	-1.94	-0.32	
4,097.0	88.90	175.90	3,269.8	-1,176.6	112.1	1,181.9	1.61	1.61	0.00	
4,128.0	88.90	174.50	3,270.4	-1,207.5	114.7	1,212.9	4.52	0.00	-4.52	
4,159.0	89.10	173.20	3,270.9	-1,238.3	118.1	1,243.8	4.24	0.65	-4.19	
4,190.0	89.60	173.20	3,271.3	-1,269.1	121.7	1,274.8	1.61	1.61	0.00	
4,222.0	90.70	173.00	3,271.2	-1,300.8	125.6	1,306.8	3.49	3.44	-0.63	
4,253.0	90.80	173.30	3,270.8	-1,331.6	129.3	1,337.8	1.02	0.32	0.97	
4,284.0	90.80	173.40	3,270.3	-1,362.4	132.9	1,368.8	0.32	0.00	0.32	
4,315.0	91.00	173.50	3,269.8	-1,393.2	136.4	1,399.8	0.72	0.65	0.32	
4,346.0	91.30	174.10	3,269.2	-1,424.0	139.7	1,430.8	2.16	0.97	1.94	
4,377.0	90.70	173.40	3,268.7	-1,454.8	143.1	1,461.8	2.97	-1.94	-2.26	
4,408.0	89.80	173.40	3,268.5	-1,485.6	146.7	1,492.8	2.90	-2.90	0.00	
4,439.0	90.40	174.60	3,268.5	-1,516.4	149.9	1,523.8	4.33	1.94	3.87	
4,470.0	90.20	174.10	3,268.3	-1,547.3	153.0	1,554.8	1.74	-0.65	-1.61	
4,501.0	89.50	173.30	3,268.4	-1,578.1	156.4	1,585.8	3.43	-2.26	-2.58	
4,532.0	90.30	172.80	3,268.5	-1,608.9	160.1	1,616.8	3.04	2.58	-1.61	
4,563.0	91.00	172.10	3,268.1	-1,639.6	164.2	1,647.8	3.19	2.26	-2.26	
4,594.0	90.70	173.20	3,267.7	-1,670.3	168.2	1,678.8	3.68	-0.97	3.55	
4,625.0	88.70	174.50	3,267.8	-1,701.2	171.5	1,709.8	7.69	-6.45	4.19	
4,656.0	87.40	174.70	3,268.9	-1,732.0	174.4	1,740.7	4.24	-4.19	0.65	
4,688.0	87.40	174.50	3,270.3	-1,763.8	177.4	1,772.7	0.62	0.00	-0.63	
4,719.0	87.20	174.00	3,271.8	-1,794.6	180.5	1,803.7	1.74	-0.65	-1.61	
4,749.0	87.90	173.90	3,273.1	-1,824.4	183.7	1,833.6	2.36	2.33	-0.33	
4,780.0	88.30	173.70	3,274.1	-1,855.2	187.0	1,864.6	1.44	1.29	-0.65	
4,811.0	90.30	173.50	3,274.5	-1,886.0	190.5	1,895.6	6.48	6.45	-0.65	
4,842.0	89.80	173.20	3,274.4	-1,916.8	194.1	1,926.6	1.88	-1.61	-0.97	
4,874.0	88.30	173.80	3,275.0	-1,948.6	197.7	1,958.6	5.05	-4.69	1.88	
4,905.0	88.70	173.70	3,275.8	-1,979.4	201.1	1,989.6	1.33	1.29	-0.32	
4,936.0	89.70	173.50	3,276.2	-2,010.2	204.5	2,020.6	3.29	3.23	-0.65	
4,967.0	90.70	173.60	3,276.1	-2,041.0	208.0	2,051.6	3.24	3.23	0.32	
4,998.0	90.00	173.60	3,275.9	-2,071.8	211.4	2,082.6	2.26	-2.26	0.00	
5,029.0	90.00	173.40	3,275.9	-2,102.6	215.0	2,113.6	0.65	0.00	-0.65	
5,060.0	88.70	172.50	3,276.3	-2,133.4	218.8	2,144.6	5.10	-4.19	-2.90	
5,091.0	88.50	171.80	3,277.0	-2,164.1	223.0	2,175.6	2.35	-0.65	-2.26	
5,122.0	89.00	171.00	3,277.7	-2,194.8	227.6	2,206.5	3.04	1.61	-2.58	
5,153.0	89.20	171.50	3,278.2	-2,225.4	232.3	2,237.5	1.74	0.65	1.61	
5,184.0	89.50	172.50	3,278.5	-2,256.1	236.7	2,268.5	3.37	0.97	3.23	
5,216.0	89.10	172.10	3,278.9	-2,287.8	240.9	2,300.4	1.77	-1.25	-1.25	
5,248.0	90.40	172.20	3,279.1	-2,319.5	245.3	2,332.4	4.07	4.06	0.31	
5,279.0	90.70	172.00	3,278.8	-2,350.2	249.6	2,363.4	1.16	0.97	-0.65	
5,311.0	89.70	171.70	3,278.7	-2,381.9	254.1	2,395.4	3.26	-3.13	-0.94	
5,343.0	91.90	172.00	3,278.2	-2,413.5	258.6	2,427.4	6.94	6.88	0.94	

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Well:	Muir 1-13H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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Survey										
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5,374.0	92.10	173.20	3,277.1	-2,444.3	262.6	2,458.3	3.92	0.65		3.87
5,406.0	92.00	173.30	3,276.0	-2,476.0	266.4	2,490.3	0.44	-0.31		0.31
5,438.0	92.20	173.40	3,274.8	-2,507.8	270.1	2,522.3	0.70	0.63		0.31
5,469.0	90.60	172.80	3,274.1	-2,538.6	273.8	2,553.3	5.51	-5.16		-1.94
5,501.0	88.80	172.90	3,274.2	-2,570.3	277.8	2,585.3	5.63	-5.63		0.31
5,532.0	88.60	172.70	3,274.9	-2,601.1	281.7	2,616.2	0.91	-0.65		-0.65
5,564.0	90.50	173.10	3,275.2	-2,632.8	285.6	2,648.2	6.07	5.94		1.25
5,595.0	92.80	173.90	3,274.3	-2,663.6	289.2	2,679.2	7.85	7.42		2.58
5,627.0	92.70	174.00	3,272.8	-2,695.4	292.5	2,711.2	0.44	-0.31		0.31
5,659.0	92.20	173.90	3,271.4	-2,727.2	295.9	2,743.2	1.59	-1.56		-0.31
5,690.0	92.30	173.80	3,270.2	-2,758.0	299.2	2,774.1	0.46	0.32		-0.32
5,722.0	92.30	174.20	3,268.9	-2,789.8	302.6	2,806.1	1.25	0.00		1.25
5,753.0	92.40	174.00	3,267.6	-2,820.6	305.7	2,837.1	0.72	0.32		-0.65
5,785.0	92.60	174.50	3,266.2	-2,852.4	308.9	2,869.0	1.68	0.63		1.56
5,816.0	92.40	174.50	3,264.9	-2,883.2	311.9	2,900.0	0.65	-0.65		0.00
5,848.0	91.30	175.60	3,263.8	-2,915.1	314.7	2,932.0	4.86	-3.44		3.44
5,880.0	91.80	176.00	3,263.0	-2,947.0	317.0	2,964.0	2.00	1.56		1.25
5,912.0	91.90	176.30	3,261.9	-2,978.9	319.2	2,995.9	0.99	0.31		0.94
5,943.0	90.00	175.50	3,261.4	-3,009.8	321.4	3,026.9	6.65	-6.13		-2.58
5,975.0	90.10	175.20	3,261.4	-3,041.7	324.0	3,058.9	0.99	0.31		-0.94
6,006.0	90.30	175.50	3,261.3	-3,072.6	326.5	3,089.9	1.16	0.65		0.97
6,038.0	90.40	175.60	3,261.1	-3,104.5	329.0	3,121.9	0.44	0.31		0.31
6,069.0	89.40	174.70	3,261.1	-3,135.4	331.6	3,152.9	4.34	-3.23		-2.90
6,101.0	89.40	174.70	3,261.5	-3,167.2	334.5	3,184.9	0.00	0.00		0.00
6,132.0	89.00	174.10	3,261.9	-3,198.1	337.6	3,215.9	2.33	-1.29		-1.94
6,164.0	89.10	173.50	3,262.4	-3,229.9	341.0	3,247.9	1.90	0.31		-1.88
6,196.0	89.60	173.80	3,262.8	-3,261.7	344.6	3,279.9	1.82	1.56		0.94
6,227.0	88.90	174.00	3,263.2	-3,292.5	347.9	3,310.8	2.35	-2.26		0.65
6,259.0	89.30	173.90	3,263.7	-3,324.3	351.2	3,342.8	1.29	1.25		-0.31
6,291.0	91.10	174.70	3,263.6	-3,356.2	354.4	3,374.8	6.16	5.63		2.50
6,322.0	91.30	175.80	3,263.0	-3,387.1	357.0	3,405.8	3.61	0.65		3.55
6,369.0	92.00	175.70	3,261.6	-3,433.9	360.5	3,452.8	1.50	1.49		-0.21
6,401.0	92.20	175.90	3,260.4	-3,465.8	362.8	3,484.7	0.88	0.63		0.63
6,432.0	91.20	174.70	3,259.5	-3,496.7	365.3	3,515.7	5.04	-3.23		-3.87
6,464.0	91.40	174.40	3,258.8	-3,528.5	368.4	3,547.7	1.13	0.63		-0.94
6,496.0	91.70	174.30	3,257.9	-3,560.4	371.5	3,579.7	0.99	0.94		-0.31
6,527.0	90.90	173.90	3,257.2	-3,591.2	374.7	3,610.7	2.89	-2.58		-1.29
6,559.0	90.90	173.60	3,256.7	-3,623.0	378.2	3,642.7	0.94	0.00		-0.94
6,590.0	90.40	173.60	3,256.4	-3,653.8	381.6	3,673.7	1.61	-1.61		0.00
6,622.0	90.20	173.50	3,256.2	-3,685.6	385.2	3,705.7	0.70	-0.63		-0.31
6,654.0	90.40	173.30	3,256.0	-3,717.4	388.9	3,737.7	0.88	0.63		-0.63
6,685.0	90.50	173.80	3,255.8	-3,748.2	392.4	3,768.7	1.64	0.32		1.61
6,717.0	90.60	173.80	3,255.5	-3,780.0	395.9	3,800.7	0.31	0.31		0.00
6,748.0	90.40	174.00	3,255.2	-3,810.8	399.2	3,831.7	0.91	-0.65		0.65

Survey Report

Company:	Mustang Fuel	Local Co-ordinate Reference:	Well Muir 1-13H
Project:	Saline County (NAD-83)	TVD Reference:	KB @ 1264.0usft
Site:	Sec 13-T15S-R03W	MD Reference:	KB @ 1264.0usft
Well:	Muir 1-13H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single 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)	
6,780.0	90.70	174.20	3,254.9	-3,842.7	402.4	3,863.7	1.13	0.94	0.63	
6,811.0	89.80	174.20	3,254.8	-3,873.5	405.6	3,894.7	2.90	-2.90	0.00	
6,843.0	89.20	174.20	3,255.0	-3,905.3	408.8	3,926.7	1.88	-1.88	0.00	
6,875.0	90.10	174.20	3,255.2	-3,937.2	412.0	3,958.7	2.81	2.81	0.00	
6,906.0	90.60	174.00	3,255.0	-3,968.0	415.2	3,989.7	1.74	1.61	-0.65	
6,938.0	89.40	174.30	3,255.0	-3,999.8	418.5	4,021.7	3.87	-3.75	0.94	
6,970.0	90.20	174.30	3,255.2	-4,031.7	421.7	4,053.7	2.50	2.50	0.00	
7,001.0	91.30	173.90	3,254.8	-4,062.5	424.9	4,084.7	3.78	3.55	-1.29	
7,033.0	91.40	173.90	3,254.0	-4,094.3	428.3	4,116.7	0.31	0.31	0.00	
7,065.0	91.50	173.80	3,253.2	-4,126.1	431.7	4,148.7	0.44	0.31	-0.31	
7,096.0	91.60	173.70	3,252.4	-4,156.9	435.1	4,179.6	0.46	0.32	-0.32	
7,128.0	91.50	174.00	3,251.5	-4,188.7	438.5	4,211.6	0.99	-0.31	0.94	
7,160.0	89.20	173.10	3,251.3	-4,220.5	442.1	4,243.6	7.72	-7.19	-2.81	
7,191.0	88.30	173.10	3,252.0	-4,251.3	445.8	4,274.6	2.90	-2.90	0.00	
7,223.0	90.20	173.20	3,252.4	-4,283.1	449.6	4,306.6	5.95	5.94	0.31	
7,254.0	90.30	173.30	3,252.3	-4,313.9	453.3	4,337.6	0.46	0.32	0.32	
7,286.0	90.10	172.70	3,252.1	-4,345.6	457.2	4,369.6	1.98	-0.63	-1.88	
7,318.0	90.80	172.70	3,251.9	-4,377.4	461.2	4,401.6	2.19	2.19	0.00	
7,350.0	90.80	172.30	3,251.4	-4,409.1	465.4	4,433.6	1.25	0.00	-1.25	
7,381.0	90.80	172.20	3,251.0	-4,439.8	469.6	4,464.6	0.32	0.00	-0.32	
7,413.0	89.70	172.30	3,250.9	-4,471.5	473.9	4,496.5	3.45	-3.44	0.31	
7,445.0	88.80	172.90	3,251.3	-4,503.2	478.0	4,528.5	3.38	-2.81	1.88	
7,476.0	89.40	172.80	3,251.8	-4,534.0	481.9	4,559.5	1.96	1.94	-0.32	
7,508.0	90.20	172.70	3,251.9	-4,565.7	485.9	4,591.5	2.52	2.50	-0.31	
7,540.0	90.00	172.70	3,251.8	-4,597.5	490.0	4,623.5	0.63	-0.63	0.00	
7,571.0	89.40	172.60	3,252.0	-4,628.2	493.9	4,654.5	1.96	-1.94	-0.32	
7,599.0	89.50	172.30	3,252.3	-4,656.0	497.6	4,682.5	1.13	0.36	-1.07	
Last Drillright MWD Survey										
7,645.0	89.50	172.30	3,252.7	-4,701.6	503.8	4,728.5	0.00	0.00	0.00	
Projection to TD - PBHL Muir 1-13H										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
2,402.0	2,401.9	-13.0	-16.4	First Drillright MWD Survey	
7,599.0	3,252.3	-4,656.0	497.6	Last Drillright MWD Survey	
7,645.0	3,252.7	-4,701.6	503.8	Projection to TD	

Checked By: _____ Approved By: _____ Date: _____