

Noble Energy Inc.- Weld County, CO (Grid North)

Well Name: **Heartland State C31-79-1HN**

Surface Location: Heartland C30-79-1HN Pad Sec.25-T4N-R65W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

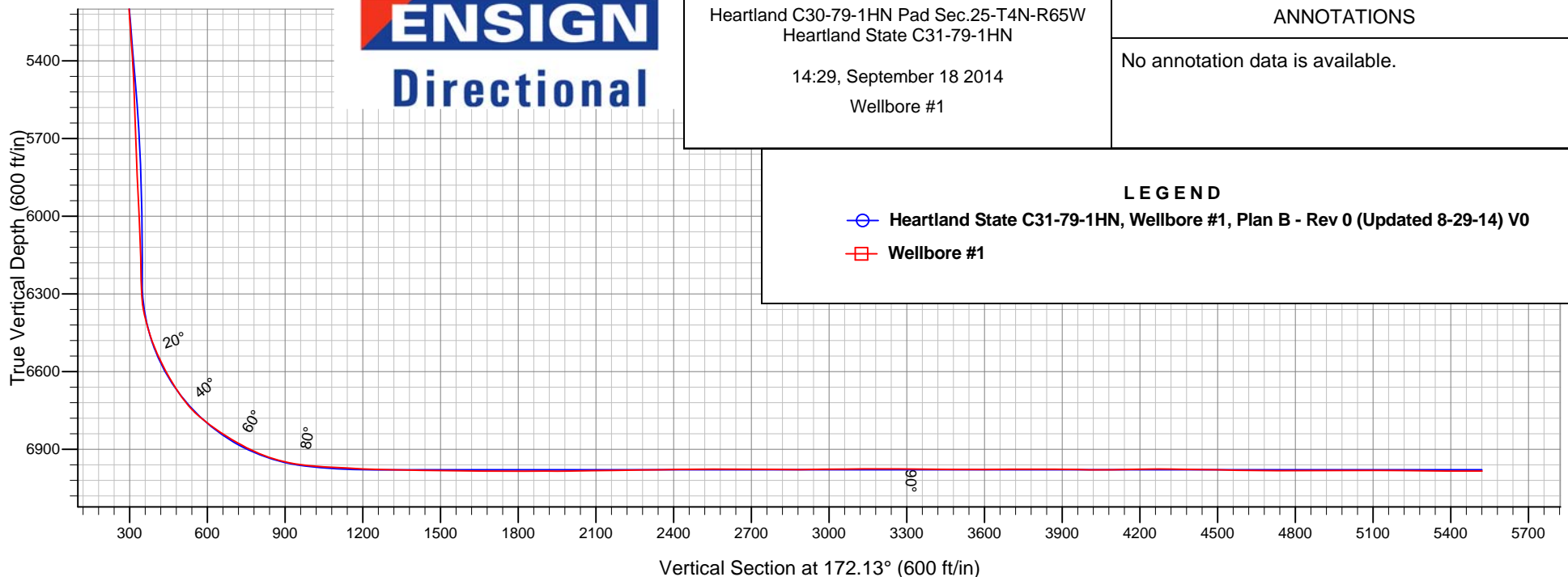
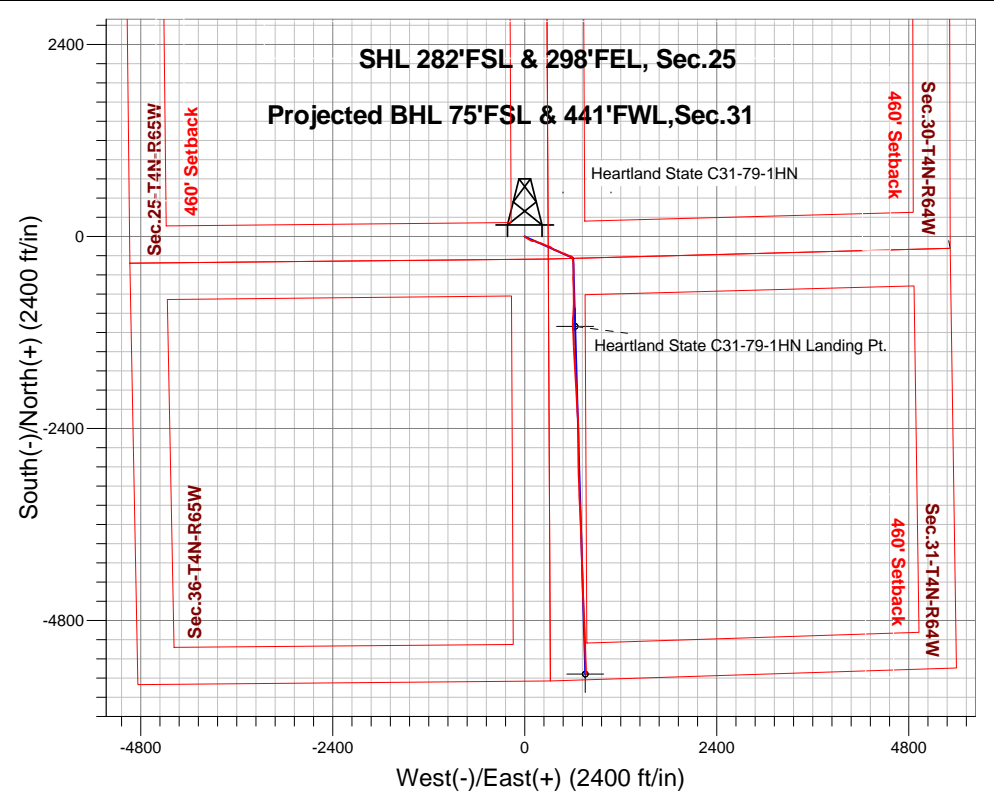
Ground Elevation: 4845.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1344918.79	3250162.18	40.276730	-104.603400	

Precision 828 RKB - 16' WELL @ 4861.0ft (Precision 828 RKB - 16')

FINAL SURVEY

Projected Bottom Hole Location
11911'MD 6984'TVD 5468'S & 767'E of SHL
89.8 degree Incl @ 177.9 degree AZM





Noble Energy Inc.- Weld County, CO (Grid North)

Sec.25-T4N-R65W

Heartland C30-79-1HN Pad Sec.25-T4N-R65W

Heartland State C31-79-1HN

Wellbore #1

Design: Wellbore #1

Standard Survey Report

18 September, 2014

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Heartland State C31-79-1HN
Project:	Sec.25-T4N-R65W	TVD Reference:	WELL @ 4861.0ft (Precision 828 RKB - 16')
Site:	Heartland C30-79-1HN Pad Sec.25-T4N-R65W	MD Reference:	WELL @ 4861.0ft (Precision 828 RKB - 16')
Well:	Heartland State C31-79-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	Sec.25-T4N-R65W, Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		Heartland C30-79-1HN Pad Sec.25-T4N-R65W			
Site Position:		Northing:	1,344,918.58ft	Latitude:	40.276730
From:	Lat/Long	Easting:	3,250,139.86ft	Longitude:	-104.603480
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.58 °

Well	Heartland State C31-79-1HN					
Well Position	+N/-S	0.0 ft	Northing:	1,344,918.79 ft	Latitude:	40.276730
	+E/-W	0.0 ft	Easting:	3,250,162.18 ft	Longitude:	-104.603400
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,845.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/29/2014	8.34	66.87	52,746

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	172.13	

Survey Program	Date 9/18/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
721.0	721.0	Surface (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool
799.0	7,328.0	Intermediate/Curve (Wellbore #1)	MWD	MWD - Standard
7,444.0	11,911.0	Lateral (Wellbore #1)	MWD	MWD - Standard

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
721.0	0.10	2.40	721.0	0.6	0.0	-0.6	0.01	0.01	0.00
799.0	0.60	300.30	799.0	0.9	-0.3	-0.9	0.72	0.64	-79.62
889.0	0.40	315.80	889.0	1.4	-0.9	-1.5	0.27	-0.22	17.22
979.0	0.30	20.70	979.0	1.8	-1.1	-1.9	0.43	-0.11	72.11
1,068.0	1.10	187.50	1,068.0	1.2	-1.1	-1.3	1.57	0.90	187.42
1,163.0	2.40	134.10	1,162.9	-1.1	0.2	1.1	2.06	1.37	-56.21
1,257.0	4.20	136.30	1,256.8	-5.0	4.0	5.5	1.92	1.91	2.34
1,351.0	5.10	120.20	1,350.5	-9.6	10.0	10.8	1.68	0.96	-17.13
1,445.0	6.00	116.60	1,444.0	-13.9	18.0	16.2	1.03	0.96	-3.83

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	Local Co-ordinate Reference:	Well Heartland State C31-79-1HN
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Site:	Heartland C30-79-1HN Pad Sec.25-T4N-R65W	MD Reference:	WELL @ 4861.0ft (Precision 828 RKB - 16')
Well:	Heartland State C31-79-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,539.0	7.60	114.40	1,537.4	-18.6	28.0	22.3	1.72	1.70	-2.34
1,633.0	8.40	121.90	1,630.5	-24.8	39.5	30.0	1.40	0.85	7.98
1,728.0	9.70	122.20	1,724.3	-32.8	52.2	39.6	1.37	1.37	0.32
1,823.0	8.30	119.70	1,818.1	-40.4	64.9	48.9	1.53	-1.47	-2.63
1,918.0	6.90	116.50	1,912.3	-46.4	76.0	56.3	1.54	-1.47	-3.37
2,013.0	7.80	110.70	2,006.5	-51.2	87.1	62.6	1.23	0.95	-6.11
2,105.0	7.30	96.40	2,097.7	-54.0	98.8	67.1	2.11	-0.54	-15.54
2,195.0	7.60	93.10	2,186.9	-55.0	110.4	69.6	0.58	0.33	-3.67
2,285.0	7.00	100.60	2,276.2	-56.3	121.7	72.5	1.25	-0.67	8.33
2,375.0	7.70	110.60	2,365.5	-59.5	132.8	77.1	1.62	0.78	11.11
2,465.0	8.90	114.00	2,454.5	-64.4	144.8	83.6	1.44	1.33	3.78
2,555.0	8.80	110.00	2,543.5	-69.6	157.6	90.5	0.69	-0.11	-4.44
2,645.0	8.60	103.60	2,632.4	-73.5	170.6	96.2	1.10	-0.22	-7.11
2,735.0	8.70	105.80	2,721.4	-77.0	183.7	101.4	0.38	0.11	2.44
2,824.0	9.60	114.60	2,809.3	-81.9	196.9	108.1	1.87	1.01	9.89
2,914.0	9.60	112.70	2,898.0	-87.9	210.7	115.9	0.35	0.00	-2.11
3,004.0	9.20	109.90	2,986.8	-93.3	224.4	123.1	0.67	-0.44	-3.11
3,094.0	8.90	116.30	3,075.7	-98.8	237.4	130.4	1.17	-0.33	7.11
3,184.0	8.50	115.30	3,164.7	-104.7	249.6	137.9	0.48	-0.44	-1.11
3,274.0	7.50	110.40	3,253.8	-109.6	261.1	144.3	1.34	-1.11	-5.44
3,364.0	8.60	113.40	3,342.9	-114.3	272.8	150.6	1.31	1.22	3.33
3,453.0	7.80	107.30	3,431.0	-118.8	284.7	156.6	1.33	-0.90	-6.85
3,543.0	7.70	112.70	3,520.2	-122.9	296.1	162.3	0.82	-0.11	6.00
3,633.0	7.90	107.20	3,609.3	-127.1	307.6	168.0	0.86	0.22	-6.11
3,723.0	7.60	118.00	3,698.5	-131.7	318.7	174.1	1.65	-0.33	12.00
3,813.0	7.00	124.40	3,787.8	-137.6	328.5	181.3	1.12	-0.67	7.11
3,903.0	8.70	131.40	3,876.9	-145.2	338.1	190.1	2.16	1.89	7.78
3,992.0	9.80	124.00	3,964.8	-153.9	349.5	200.3	1.82	1.24	-8.31
4,082.0	10.10	115.30	4,053.4	-161.5	362.9	209.7	1.70	0.33	-9.67
4,172.0	9.00	113.00	4,142.2	-167.7	376.6	217.6	1.29	-1.22	-2.56
4,261.0	8.00	106.50	4,230.2	-172.1	388.9	223.8	1.56	-1.12	-7.30
4,351.0	9.80	112.20	4,319.1	-176.8	402.0	230.2	2.22	2.00	6.33
4,441.0	9.10	107.60	4,407.9	-181.9	415.9	237.1	1.14	-0.78	-5.11
4,531.0	9.00	117.60	4,496.8	-187.3	428.9	244.2	1.75	-0.11	11.11
4,621.0	8.50	114.60	4,585.7	-193.3	441.2	251.9	0.75	-0.56	-3.33
4,711.0	9.00	118.20	4,674.7	-199.4	453.4	259.6	0.82	0.56	4.00
4,800.0	8.20	109.30	4,762.7	-204.8	465.6	266.6	1.74	-0.90	-10.00
4,890.0	9.10	111.80	4,851.7	-209.5	478.2	273.1	1.08	1.00	2.78
4,980.0	8.40	105.20	4,940.6	-213.9	491.2	279.2	1.36	-0.78	-7.33
5,069.0	8.70	112.00	5,028.6	-218.1	503.7	285.1	1.18	0.34	7.64
5,159.0	8.50	112.30	5,117.6	-223.2	516.2	291.8	0.23	-0.22	0.33
5,249.0	7.60	112.40	5,206.7	-228.0	527.8	298.1	1.00	-1.00	0.11
5,339.0	7.60	117.00	5,296.0	-233.0	538.6	304.5	0.68	0.00	5.11
5,429.0	7.10	111.50	5,385.2	-237.7	549.1	310.7	0.96	-0.56	-6.11
5,518.0	5.80	109.80	5,473.6	-241.3	558.5	315.4	1.48	-1.46	-1.91
5,608.0	5.50	102.80	5,563.2	-243.7	566.9	319.1	0.83	-0.33	-7.78
5,698.0	4.20	102.30	5,652.9	-245.4	574.4	321.7	1.45	-1.44	-0.56
5,788.0	4.10	124.10	5,742.7	-247.9	580.3	325.0	1.75	-0.11	24.22
5,878.0	3.10	130.90	5,832.5	-251.3	584.8	329.0	1.21	-1.11	7.56
5,967.0	3.80	135.50	5,921.3	-255.0	588.6	333.2	0.85	0.79	5.17
6,057.0	2.70	143.10	6,011.2	-258.8	592.0	337.4	1.31	-1.22	8.44
6,147.0	1.80	159.00	6,101.1	-261.8	593.8	340.7	1.21	-1.00	17.67
6,237.0	1.60	152.90	6,191.1	-264.3	594.9	343.2	0.30	-0.22	-6.78
6,327.0	1.90	141.30	6,281.0	-266.5	596.4	345.7	0.51	0.33	-12.89

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,372.0	5.50	165.50	6,325.9	-269.2	597.4	348.5	8.55	8.00	53.78
6,417.0	11.30	171.10	6,370.4	-275.7	598.6	355.0	13.00	12.89	12.44
6,461.0	15.30	172.60	6,413.2	-285.7	600.0	365.2	9.12	9.09	3.41
6,506.0	17.60	171.80	6,456.4	-298.3	601.8	377.9	5.14	5.11	-1.78
6,551.0	21.50	172.00	6,498.8	-313.2	603.9	393.0	8.67	8.67	0.44
6,596.0	25.20	174.80	6,540.1	-330.9	605.9	410.8	8.58	8.22	6.22
6,641.0	26.90	177.50	6,580.5	-350.6	607.2	430.5	4.61	3.78	6.00
6,686.0	29.40	176.90	6,620.2	-371.8	608.2	451.6	5.59	5.56	-1.33
6,731.0	32.70	177.70	6,658.7	-395.0	609.3	474.7	7.39	7.33	1.78
6,776.0	35.10	180.60	6,696.1	-420.1	609.7	499.6	6.43	5.33	6.44
6,821.0	41.10	182.80	6,731.5	-447.9	608.8	527.0	13.67	13.33	4.89
6,866.0	48.10	183.50	6,763.5	-479.4	607.1	558.0	15.59	15.56	1.56
6,911.0	52.60	183.30	6,792.2	-514.0	605.0	592.0	10.01	10.00	-0.44
6,956.0	54.90	179.80	6,818.8	-550.2	604.1	627.8	8.09	5.11	-7.78
7,001.0	57.50	176.20	6,843.9	-587.6	605.4	664.9	8.81	5.78	-8.00
7,046.0	59.70	175.30	6,867.3	-625.9	608.2	703.3	5.18	4.89	-2.00
7,090.0	62.00	176.00	6,888.7	-664.2	611.1	741.6	5.41	5.23	1.59
7,135.0	65.50	178.00	6,908.6	-704.5	613.2	781.8	8.74	7.78	4.44
7,180.0	69.60	180.20	6,925.8	-746.1	613.9	823.1	10.17	9.11	4.89
7,225.0	74.00	181.60	6,939.9	-788.8	613.2	865.3	10.21	9.78	3.11
7,270.0	78.00	182.00	6,950.8	-832.4	611.8	908.4	8.93	8.89	0.89
7,315.0	82.10	182.40	6,958.5	-876.7	610.1	952.0	9.15	9.11	0.89
7,328.0	83.40	182.40	6,960.2	-889.6	609.6	964.7	10.00	10.00	0.00
7,444.0	86.90	182.40	6,970.0	-1,005.1	604.7	1,078.4	3.02	3.02	0.00
7,538.0	87.30	180.10	6,974.7	-1,098.9	602.7	1,171.1	2.48	0.43	-2.45
7,560.6	87.56	179.69	6,975.8	-1,121.5	602.7	1,193.4	2.15	1.17	-1.81
Heartland State C31-79-1HN Landing Pt.									
7,632.0	88.40	178.40	6,978.3	-1,192.8	603.9	1,264.3	2.15	1.17	-1.81
7,726.0	89.10	177.10	6,980.3	-1,286.7	607.6	1,357.8	1.57	0.74	-1.38
7,819.0	88.90	176.60	6,981.9	-1,379.6	612.7	1,450.5	0.58	-0.22	-0.54
7,914.0	89.80	176.60	6,983.0	-1,474.4	618.4	1,545.2	0.95	0.95	0.00
8,007.0	88.90	176.60	6,984.1	-1,567.2	623.9	1,637.9	0.97	-0.97	0.00
8,096.0	90.30	176.90	6,984.7	-1,656.1	628.9	1,726.6	1.61	1.57	0.34
8,186.0	90.20	176.20	6,984.3	-1,745.9	634.3	1,816.3	0.79	-0.11	-0.78
8,276.0	89.70	177.00	6,984.4	-1,835.8	639.7	1,906.1	1.05	-0.56	0.89
8,366.0	90.70	177.30	6,984.1	-1,925.6	644.2	1,995.7	1.16	1.11	0.33
8,456.0	90.80	177.10	6,982.9	-2,015.5	648.5	2,085.4	0.25	0.11	-0.22
8,545.0	90.80	176.90	6,981.6	-2,104.4	653.2	2,174.0	0.22	0.00	-0.22
8,635.0	90.90	176.50	6,980.3	-2,194.2	658.4	2,263.7	0.46	0.11	-0.44
8,725.0	90.50	176.40	6,979.2	-2,284.1	664.0	2,353.5	0.46	-0.44	-0.11
8,815.0	91.00	177.80	6,978.0	-2,373.9	668.5	2,443.1	1.65	0.56	1.56
8,905.0	90.30	180.40	6,977.0	-2,463.9	669.9	2,532.4	2.99	-0.78	2.89
8,995.0	89.90	180.10	6,976.9	-2,553.9	669.5	2,621.5	0.56	-0.44	-0.33
9,084.0	89.50	179.80	6,977.3	-2,642.9	669.6	2,709.7	0.56	-0.45	-0.34
9,174.0	89.20	179.60	6,978.3	-2,732.9	670.1	2,798.9	0.40	-0.33	-0.22
9,264.0	90.60	179.20	6,978.5	-2,822.9	671.0	2,888.2	1.62	1.56	-0.44
9,354.0	90.50	178.90	6,977.6	-2,912.9	672.5	2,977.5	0.35	-0.11	-0.33
9,444.0	90.20	178.00	6,977.1	-3,002.8	675.0	3,067.0	1.05	-0.33	-1.00
9,534.0	90.90	177.80	6,976.2	-3,092.8	678.2	3,156.5	0.81	0.78	-0.22
9,623.0	89.70	179.10	6,975.8	-3,181.7	680.7	3,245.0	1.99	-1.35	1.46
9,713.0	89.50	177.20	6,976.4	-3,271.7	683.6	3,334.5	2.12	-0.22	-2.11
9,803.0	89.10	176.40	6,977.5	-3,361.5	688.6	3,424.2	0.99	-0.44	-0.89
9,893.0	90.20	177.90	6,978.0	-3,451.4	693.1	3,513.8	2.07	1.22	1.67

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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Survey									
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9,983.0	90.00	176.90	6,977.9	-3,541.3	697.1	3,603.4	1.13	-0.22	-1.11
10,073.0	90.40	177.00	6,977.6	-3,631.2	701.9	3,693.1	0.46	0.44	0.11
10,162.0	89.80	179.10	6,977.4	-3,720.1	705.0	3,781.6	2.45	-0.67	2.36
10,252.0	90.00	178.70	6,977.6	-3,810.1	706.7	3,871.0	0.50	0.22	-0.44
10,342.0	89.40	177.90	6,978.0	-3,900.1	709.4	3,960.5	1.11	-0.67	-0.89
10,432.0	89.30	177.70	6,979.1	-3,990.0	712.8	4,050.0	0.25	-0.11	-0.22
10,522.0	91.10	178.40	6,978.7	-4,080.0	715.9	4,139.5	2.15	2.00	0.78
10,612.0	91.30	178.00	6,976.9	-4,169.9	718.7	4,229.0	0.50	0.22	-0.44
10,702.0	89.00	178.40	6,976.6	-4,259.8	721.5	4,318.5	2.59	-2.56	0.44
10,792.0	89.40	178.50	6,977.9	-4,349.8	724.0	4,408.0	0.46	0.44	0.11
10,881.0	89.00	178.10	6,979.1	-4,438.8	726.6	4,496.4	0.64	-0.45	-0.45
10,971.0	88.50	177.60	6,981.1	-4,528.7	730.0	4,586.0	0.79	-0.56	-0.56
11,061.0	89.70	177.70	6,982.5	-4,618.6	733.7	4,675.5	1.34	1.33	0.11
11,151.0	89.80	177.10	6,982.9	-4,708.5	737.7	4,765.2	0.68	0.11	-0.67
11,241.0	90.20	177.70	6,982.9	-4,798.4	741.8	4,854.8	0.80	0.44	0.67
11,331.0	90.50	177.50	6,982.3	-4,888.3	745.6	4,944.4	0.40	0.33	-0.22
11,421.0	90.10	176.80	6,981.9	-4,978.2	750.1	5,034.0	0.90	-0.44	-0.78
11,510.0	89.80	179.10	6,981.9	-5,067.1	753.3	5,122.5	2.61	-0.34	2.58
11,600.0	89.50	178.40	6,982.5	-5,157.1	755.2	5,211.9	0.85	-0.33	-0.78
11,690.0	89.30	177.80	6,983.4	-5,247.1	758.2	5,301.5	0.70	-0.22	-0.67
11,780.0	90.00	177.70	6,984.0	-5,337.0	761.7	5,391.0	0.79	0.78	-0.11
11,853.0	89.80	177.90	6,984.1	-5,409.9	764.5	5,463.7	0.39	-0.27	0.27
11,910.8	89.80	177.90	6,984.3	-5,467.7	766.7	5,521.2	0.00	0.00	0.00
Heartland State C31-79-1HN BHL 75'FSL & 430'FWL									
11,911.0	89.80	177.90	6,984.3	-5,467.9	766.7	5,521.4	0.00	0.00	0.00

Checked By: _____ Approved By: _____ Date: _____