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

Well Name: **Mahalo State AA09-72-1BHNC**

Surface Location: Mahalo State AA09-72-A Sec.4-T6N-R63W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

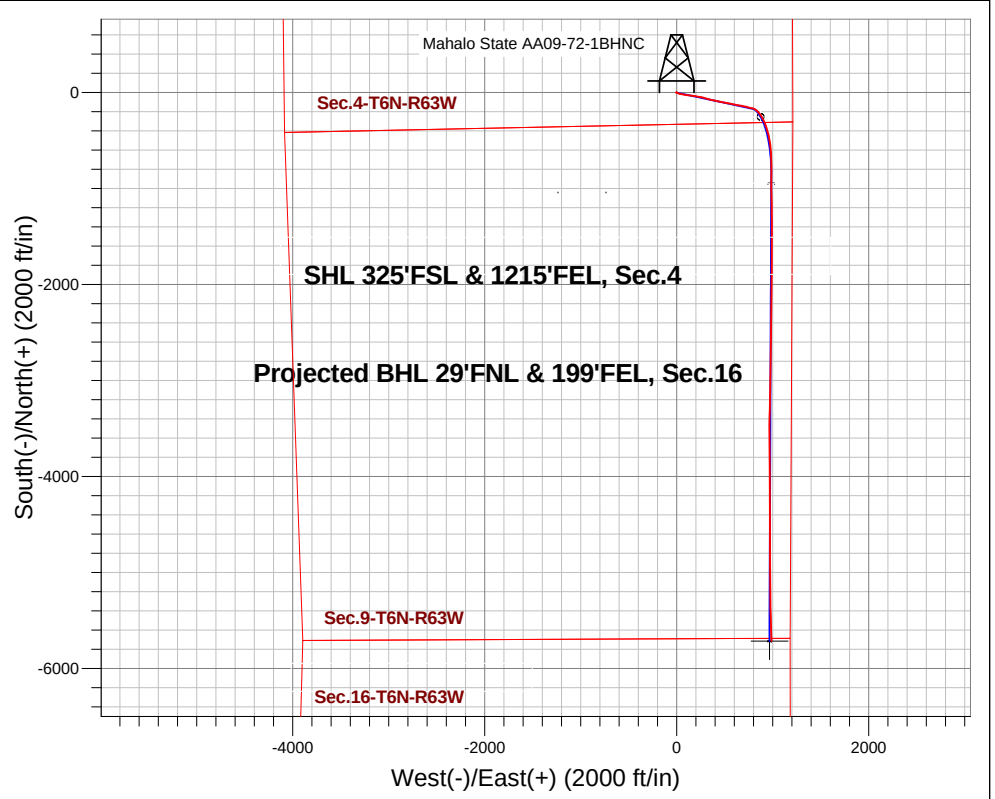
Ground Elevation: 4700.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1430231.80	3295699.04	40.509520	-104.436540	

PD 828 RKB - 16' WELL @ 4716.0ft (PD 828 RKB - 16')

FINAL SURVEY

Projected Bottom Hole Location
12036'MD 6685'TVD 5712'S & 988'E of SHL
89.6 degree Incl @ 177.8 degree AZM

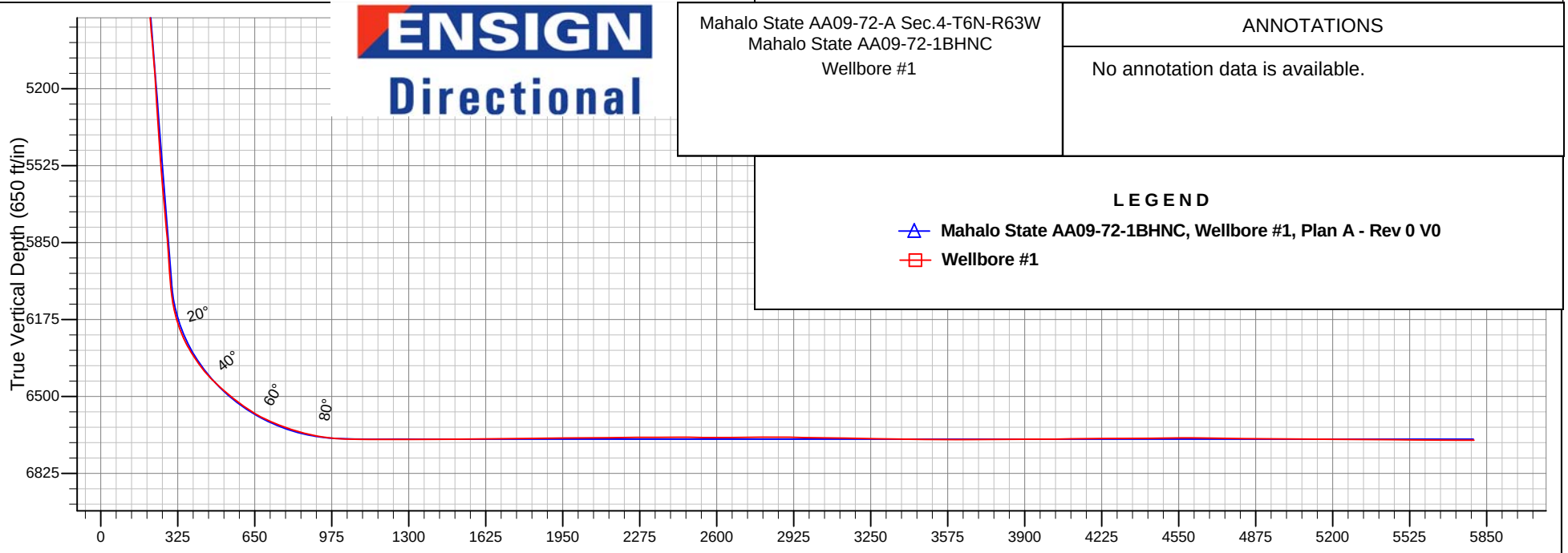


ENSIGN Directional

Mahalo State AA09-72-A Sec.4-T6N-R63W
Mahalo State AA09-72-1BHNC
Wellbore #1

ANNOTATIONS

No annotation data is available.



LEGEND

Mahalo State AA09-72-1BHNC, Wellbore #1, Plan A - Rev 0 V0

Wellbore #1

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

Sec.4-T6N-R63W
Mahalo State AA09-72-A Sec.4-T6N-R63W
Mahalo State AA09-72-1BHNC
Wellbore #1

Design: Wellbore #1

Final Survey

07 January, 2015

Company:	Noble Energy Inc.- Weld County, CO (Grid North)	**Local Co-ordinate Reference:**	Well Mahalo State AA09-72-1BHNC
Project:	Sec.4-T6N-R63W	**TVD Reference:**	WELL @ 4716.0ft (PD 828 RKB - 16')
Site:	Mahalo State AA09-72-A Sec.4-T6N-R63W	**MD Reference:**	WELL @ 4716.0ft (PD 828 RKB - 16')
Well:	Mahalo State AA09-72-1BHNC	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Wellbore #1	**Database:**	Landmark

Project Sec.4-T6N-R63W, Weld County, Colorado

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 Mahalo State AA09-72-A Sec.4-T6N-R63W

Site Position:		**Northing:**	1,430,231.84 ft	**Latitude:**	40.509520
From:	Lat/Long	**Easting:**	3,295,699.04 ft	**Longitude:**	-104.436540
Position Uncertainty:	0.0 ft	**Slot Radius:**	"	**Grid Convergence:**	0.69 °

Well Mahalo State AA09-72-1BHNC

Well Position	**+N/-S**	0.0 ft	**Northing:**	1,430,231.80 ft	**Latitude:**	40.509520
	+E/-W	0.0 ft	**Easting:**	3,295,699.04 ft	**Longitude:**	-104.436540
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	ft	**Ground Level:**	4,700.0 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/8/2014	8.23	67.07	52,856

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	170.39

Survey Program **Date** 1/7/2015

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
311.0	602.0	Survey #1 (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool
887.0	7,130.0	Survey #2 (Wellbore #1)	MWD	MWD - Standard
7,210.0	12,036.0	Survey #3 (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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
311.0	0.30	235.34	311.0	-0.5	-0.7	0.3	0.10
602.0	0.20	273.94	602.0	-0.9	-1.8	0.5	0.07
887.0	0.60	296.40	887.0	-0.2	-3.6	-0.4	0.15
977.0	0.10	42.80	977.0	0.1	-4.0	-0.8	0.71
1,066.0	0.20	215.50	1,066.0	0.0	-4.0	-0.7	0.34
1,161.0	0.60	357.00	1,161.0	0.4	-4.2	-1.1	0.81
1,255.0	0.30	52.60	1,255.0	1.0	-4.0	-1.7	0.53
1,349.0	0.50	6.00	1,349.0	1.6	-3.8	-2.2	0.39
1,443.0	0.40	338.90	1,443.0	2.3	-3.8	-2.9	0.25

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Well:	Mahalo State AA09-72-1BHNC	**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)
1,538.0	0.30	243.30	1,538.0	2.5	-4.2	-3.2	0.55
1,631.0	0.40	303.60	1,631.0	2.6	-4.7	-3.3	0.39
1,726.0	0.20	92.20	1,726.0	2.8	-4.8	-3.5	0.61
1,821.0	1.80	123.60	1,821.0	1.9	-3.4	-2.5	1.72
1,916.0	3.00	114.20	1,915.9	0.1	0.1	-0.1	1.33
2,013.0	4.40	111.00	2,012.7	-2.3	5.9	3.3	1.46
2,103.0	4.60	112.90	2,102.4	-4.9	12.5	7.0	0.28
2,193.0	6.80	115.70	2,191.9	-8.7	20.6	12.0	2.46
2,283.0	6.90	104.00	2,281.3	-12.3	30.7	17.2	1.55
2,373.0	8.40	99.60	2,370.5	-14.7	42.4	21.5	1.79
2,462.0	10.60	98.60	2,458.3	-17.0	56.9	26.2	2.48
2,552.0	12.60	101.20	2,546.4	-20.1	74.7	32.3	2.30
2,642.0	11.90	99.80	2,634.4	-23.6	93.5	38.9	0.84
2,732.0	11.30	97.70	2,722.5	-26.4	111.4	44.6	0.82
2,821.0	12.60	98.30	2,809.6	-28.9	129.6	50.2	1.47
2,911.0	12.60	96.40	2,897.4	-31.5	149.1	55.9	0.46
3,000.0	12.10	96.00	2,984.4	-33.5	168.0	61.1	0.57
3,090.0	11.30	97.80	3,072.5	-35.7	186.1	66.3	0.98
3,180.0	12.40	101.60	3,160.6	-38.8	204.3	72.4	1.50
3,270.0	11.90	99.60	3,248.6	-42.3	222.9	78.9	0.73
3,360.0	10.10	99.40	3,336.9	-45.2	239.9	84.6	2.00
3,450.0	11.60	98.40	3,425.3	-47.8	256.6	89.9	1.68
3,539.0	12.00	102.90	3,512.4	-51.1	274.5	96.2	1.13
3,629.0	12.70	106.90	3,600.4	-56.1	293.1	104.2	1.23
3,719.0	13.10	106.30	3,688.1	-61.9	312.3	113.1	0.47
3,809.0	13.20	102.70	3,775.7	-67.0	332.1	121.5	0.92
3,899.0	12.70	106.50	3,863.4	-72.0	351.6	129.7	1.10
3,988.0	13.10	106.70	3,950.2	-77.7	370.7	138.5	0.45
4,078.0	11.70	103.40	4,038.1	-82.8	389.3	146.6	1.74
4,168.0	11.40	102.20	4,126.3	-86.8	406.9	153.5	0.43
4,258.0	9.90	101.00	4,214.7	-90.1	423.2	159.5	1.68
4,348.0	11.50	98.50	4,303.1	-92.9	439.7	165.0	1.85
4,438.0	12.70	98.50	4,391.1	-95.7	458.3	170.9	1.33
4,528.0	12.70	100.90	4,478.9	-99.0	477.8	177.4	0.59
4,618.0	11.30	99.00	4,567.0	-102.3	496.2	183.7	1.62
4,708.0	11.30	101.10	4,655.2	-105.4	513.6	189.6	0.46
4,797.0	11.80	102.70	4,742.4	-109.0	531.0	196.2	0.67
4,887.0	12.40	103.40	4,830.4	-113.3	549.4	203.4	0.69
4,977.0	11.90	100.90	4,918.4	-117.3	567.9	210.4	0.81
5,066.0	13.00	103.30	5,005.3	-121.3	586.7	217.6	1.37
5,156.0	12.10	102.10	5,093.2	-125.6	605.8	225.0	1.04
5,246.0	10.90	98.90	5,181.4	-128.9	623.4	231.2	1.51
5,336.0	12.20	97.40	5,269.5	-131.5	641.2	236.7	1.48
5,425.0	11.30	99.20	5,356.7	-134.1	659.2	242.2	1.09
5,515.0	11.60	99.90	5,444.9	-137.1	676.8	248.1	0.37

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Well:	Mahalo State AA09-72-1BHNC	**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)
5,605.0	11.40	104.40	5,533.1	-140.8	694.3	254.7	1.02
5,695.0	11.90	102.90	5,621.2	-145.1	712.0	261.9	0.65
5,785.0	12.00	105.50	5,709.3	-149.7	730.0	269.4	0.61
5,875.0	11.80	105.70	5,797.3	-154.7	747.9	277.3	0.23
5,964.0	11.70	101.10	5,884.5	-158.9	765.5	284.4	1.06
6,054.0	11.60	100.50	5,972.6	-162.3	783.4	290.7	0.17
6,099.0	11.30	100.80	6,016.7	-163.9	792.2	293.8	0.68
6,144.0	12.90	111.10	6,060.7	-166.6	801.2	297.9	5.96
6,189.0	14.90	120.00	6,104.4	-171.3	810.9	304.2	6.49
6,234.0	19.30	125.20	6,147.4	-178.4	822.0	313.1	10.34
6,279.0	22.80	129.20	6,189.4	-188.2	834.8	324.9	8.40
6,324.0	26.20	135.60	6,230.4	-200.9	848.5	339.7	9.58
6,370.0	29.50	144.60	6,271.0	-217.4	862.2	358.2	11.60
6,415.0	32.90	147.20	6,309.5	-236.7	875.2	379.4	8.13
6,434.5	34.29	147.47	6,325.8	-245.8	881.1	389.4	7.15
Mahalo State AA09-72-1BHNC Curve KOP							
6,460.0	36.10	147.80	6,346.6	-258.2	888.9	402.9	7.15
6,505.0	39.10	153.90	6,382.3	-282.1	902.2	428.8	10.62
6,550.0	44.30	157.30	6,415.9	-309.4	914.6	457.7	12.60
6,595.0	46.80	160.30	6,447.4	-339.4	926.2	489.2	7.31
6,640.0	49.90	163.10	6,477.3	-371.3	936.7	522.4	8.31
6,685.0	51.40	164.40	6,505.8	-404.7	946.4	557.0	4.01
6,730.0	53.60	166.20	6,533.2	-439.2	955.5	592.5	5.83
6,774.0	56.80	168.40	6,558.3	-474.5	963.4	628.6	8.35
6,819.0	61.40	170.80	6,581.4	-512.4	970.3	667.2	11.20
6,864.0	65.30	173.60	6,601.6	-552.3	975.8	707.4	10.30
6,909.0	68.80	175.20	6,619.2	-593.5	979.8	748.7	8.44
6,954.0	71.30	176.50	6,634.5	-635.7	982.9	790.8	6.18
6,999.0	73.60	178.30	6,648.1	-678.5	984.8	833.4	6.38
7,044.0	77.00	180.00	6,659.5	-722.0	985.5	876.4	8.39
7,089.0	80.00	179.40	6,668.5	-766.1	985.7	919.9	6.79
7,130.0	83.50	179.30	6,674.3	-806.7	986.2	960.0	8.54
7,210.0	88.50	179.50	6,679.9	-886.5	987.0	1,038.8	6.25
7,268.4	89.38	179.69	6,681.0	-944.9	987.4	1,096.4	1.54
Mahalo State AA09-72-1BHNC Landing Pt.							
7,303.0	89.90	179.80	6,681.2	-979.5	987.6	1,130.5	1.54
7,396.0	90.00	179.50	6,681.3	-1,072.5	988.1	1,222.3	0.34
7,490.0	90.20	179.30	6,681.1	-1,166.5	989.1	1,315.2	0.30
7,584.0	90.20	179.20	6,680.8	-1,260.4	990.3	1,408.1	0.11
7,677.0	90.10	180.10	6,680.6	-1,353.4	990.9	1,499.8	0.97
7,770.0	91.10	179.80	6,679.6	-1,446.4	991.0	1,591.5	1.12
7,864.0	90.90	180.60	6,678.0	-1,540.4	990.7	1,684.2	0.88
7,957.0	90.10	180.10	6,677.1	-1,633.4	990.1	1,775.8	1.01
8,051.0	90.70	180.10	6,676.5	-1,727.4	989.9	1,868.4	0.64

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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)
8,145.0	90.50	179.60	6,675.5	-1,821.4	990.2	1,961.1	0.57
8,237.0	90.30	180.90	6,674.9	-1,913.4	989.8	2,051.8	1.43
8,330.0	90.60	180.90	6,674.1	-2,006.4	988.3	2,143.2	0.32
8,451.0	90.40	180.60	6,673.1	-2,127.4	986.7	2,262.2	0.30
8,541.0	90.20	180.50	6,672.6	-2,217.4	985.9	2,350.8	0.25
8,631.0	90.10	180.20	6,672.4	-2,307.4	985.3	2,439.5	0.35
8,721.0	89.10	179.70	6,673.0	-2,397.4	985.4	2,528.2	1.24
8,810.0	90.00	180.20	6,673.7	-2,486.4	985.5	2,616.0	1.16
8,900.0	91.00	181.00	6,672.9	-2,576.3	984.5	2,704.5	1.42
8,990.0	90.30	181.70	6,671.9	-2,666.3	982.4	2,792.9	1.10
9,080.0	89.40	181.80	6,672.1	-2,756.3	979.7	2,881.1	1.01
9,170.0	89.10	181.60	6,673.3	-2,846.2	977.0	2,969.4	0.40
9,260.0	89.00	181.30	6,674.8	-2,936.2	974.7	3,057.7	0.35
9,349.0	89.10	181.10	6,676.3	-3,025.1	972.9	3,145.1	0.25
9,439.0	89.30	180.90	6,677.5	-3,115.1	971.3	3,233.5	0.31
9,529.0	88.60	180.20	6,679.2	-3,205.1	970.4	3,322.1	1.10
9,619.0	89.70	181.30	6,680.5	-3,295.1	969.2	3,410.6	1.73
9,709.0	89.50	181.10	6,681.1	-3,385.1	967.4	3,499.0	0.31
9,799.0	89.30	181.10	6,682.1	-3,475.0	965.6	3,587.5	0.22
9,889.0	90.60	179.80	6,682.2	-3,565.0	964.9	3,676.1	2.04
9,978.0	90.50	179.70	6,681.3	-3,654.0	965.3	3,763.9	0.16
10,068.0	90.40	179.30	6,680.6	-3,744.0	966.1	3,852.8	0.46
10,158.0	90.20	179.40	6,680.1	-3,834.0	967.1	3,941.7	0.25
10,248.0	90.30	179.40	6,679.7	-3,924.0	968.1	4,030.5	0.11
10,338.0	90.90	179.70	6,678.8	-4,014.0	968.8	4,119.4	0.75
10,428.0	91.00	179.40	6,677.3	-4,104.0	969.5	4,208.2	0.35
10,518.0	89.70	178.60	6,676.8	-4,194.0	971.0	4,297.2	1.70
10,608.0	90.20	179.90	6,676.8	-4,284.0	972.2	4,386.1	1.55
10,697.0	90.90	180.20	6,676.0	-4,373.0	972.1	4,473.9	0.86
10,787.0	90.40	179.80	6,675.0	-4,462.9	972.1	4,562.6	0.71
10,877.0	89.10	180.20	6,675.3	-4,552.9	972.1	4,651.3	1.51
10,967.0	89.10	180.20	6,676.8	-4,642.9	971.8	4,740.0	0.00
11,057.0	89.50	180.00	6,677.9	-4,732.9	971.7	4,828.7	0.50
11,146.0	89.70	180.10	6,678.5	-4,821.9	971.6	4,916.5	0.25
11,236.0	89.50	179.70	6,679.1	-4,911.9	971.8	5,005.2	0.50
11,326.0	89.60	179.60	6,679.8	-5,001.9	972.3	5,094.0	0.16
11,416.0	89.40	179.50	6,680.6	-5,091.9	973.0	5,182.9	0.25
11,506.0	89.40	179.10	6,681.5	-5,181.9	974.1	5,271.8	0.44
11,596.0	89.70	179.30	6,682.3	-5,271.9	975.4	5,360.7	0.40
11,686.0	89.50	178.60	6,682.9	-5,361.9	977.0	5,449.7	0.81
11,776.0	89.70	178.40	6,683.5	-5,451.8	979.4	5,538.8	0.31
11,866.0	89.80	178.20	6,683.9	-5,541.8	982.0	5,628.0	0.25
11,978.0	89.60	177.80	6,684.5	-5,653.7	985.9	5,739.0	0.40

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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)
12,035.7	89.60	177.80	6,684.9	-5,711.3	988.2	5,796.2	0.00
Mahalo State AA09-72-1BHNC BHL 30'FNL & 220'FEL							
12,036.0	89.60	177.80	6,684.9	-5,711.7	988.2	5,796.5	0.00

Checked By: _____ Approved By: _____ Date: _____