

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

Well Name: **Mahalo State AA09-73-1HNC**

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

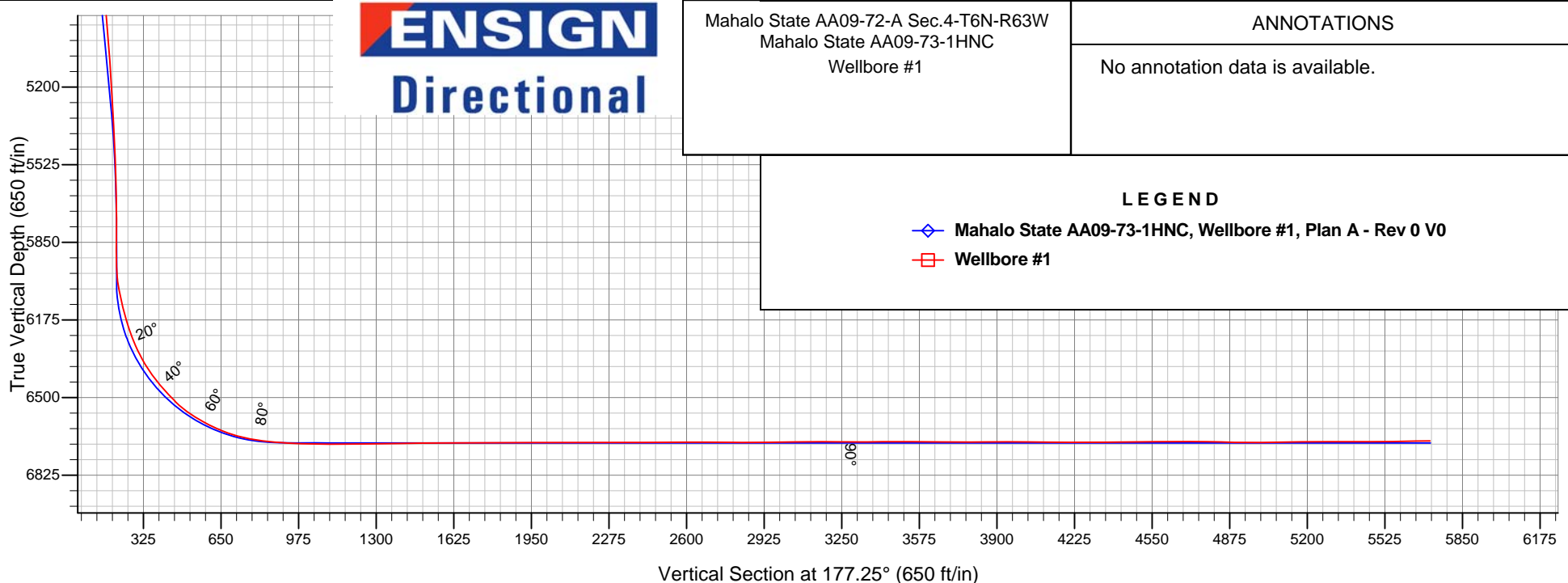
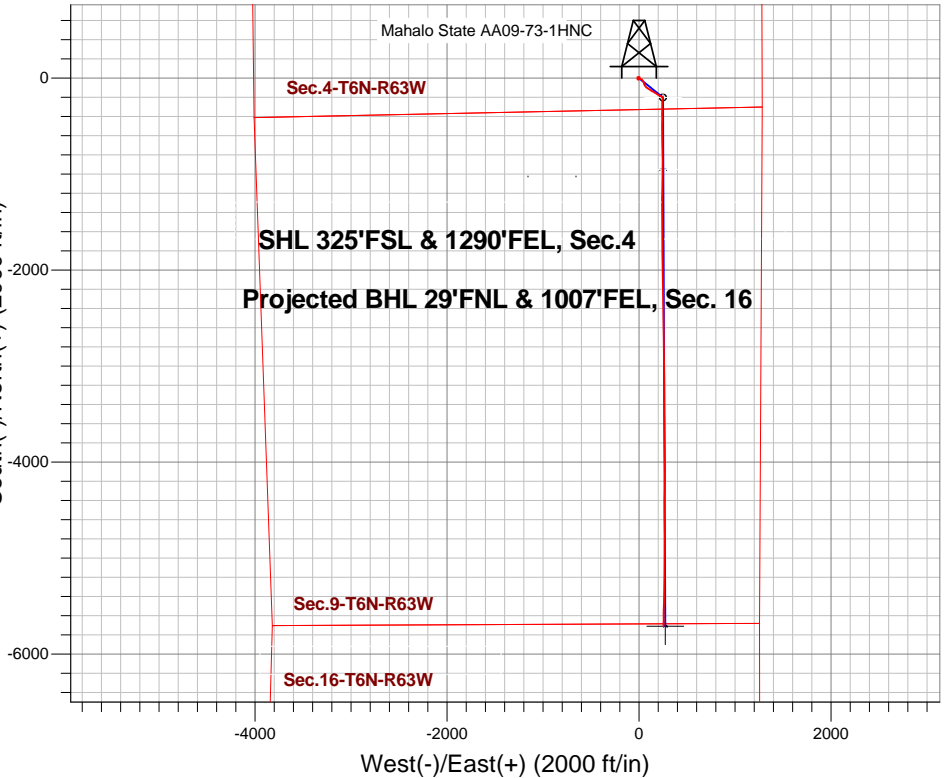
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1430227.29	3295624.02	40.509510	-104.436810	

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

## FINAL SURVEY

Projected Bottom Hole Location  
11910'MD 6681'TVD 5708'S & 257'E of SHL  
91.2 degree Incl @ 180.6 degree AZM

South(-)/North(+) (2000 ft/in)



**ENSIGN**  
Directional

Mahalo State AA09-72-A Sec.4-T6N-R63W  
Mahalo State AA09-73-1HNC  
Wellbore #1

### ANNOTATIONS

No annotation data is available.

### LEGEND

- ◆ Mahalo State AA09-73-1HNC, 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 AA09-73-1HNC**

**Wellbore #1**

**Design: Wellbore #1**

## **Final Survey**

**28 January, 2015**



<b>Company:</b>	Noble Energy Inc.- Weld County, CO (Grid North)	<b>Local Co-ordinate Reference:</b>	Well Mahalo State AA09-73-1HNC
<b>Project:</b>	Sec.4-T6N-R63W	<b>TVD Reference:</b>	WELL @ 4716.0ft (PD 828 RKB - 16')
<b>Site:</b>	Mahalo State AA09-72-A Sec.4-T6N-R63W	<b>MD Reference:</b>	WELL @ 4716.0ft (PD 828 RKB - 16')
<b>Well:</b>	Mahalo State AA09-73-1HNC	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

Survey							
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
1,521.0	1.60	284.10	1,520.6	11.6	-8.7	-12.0	0.51
1,615.0	1.50	228.50	1,614.6	11.1	-10.9	-11.6	1.54
1,710.0	1.30	265.90	1,709.6	10.2	-12.9	-10.8	0.97
1,805.0	2.10	191.70	1,804.5	8.4	-14.3	-9.1	2.26
1,900.0	1.80	188.00	1,899.5	5.2	-14.9	-5.9	0.34
1,963.0	1.80	181.80	1,962.4	3.3	-15.1	-4.0	0.31
2,056.0	2.10	185.30	2,055.4	0.1	-15.3	-0.8	0.35
2,146.0	2.20	176.50	2,145.3	-3.3	-15.3	2.5	0.38
2,236.0	2.20	184.90	2,235.3	-6.7	-15.4	6.0	0.36
2,326.0	1.80	139.80	2,325.2	-9.5	-14.6	8.8	1.75
2,416.0	1.50	145.90	2,415.2	-11.6	-13.0	10.9	0.39
2,505.0	1.70	134.50	2,504.1	-13.5	-11.4	12.9	0.42
2,595.0	2.10	94.00	2,594.1	-14.5	-8.8	14.1	1.52
2,685.0	1.80	89.50	2,684.0	-14.6	-5.8	14.3	0.37
2,775.0	3.20	64.30	2,773.9	-13.5	-2.1	13.4	1.94
2,865.0	2.90	61.70	2,863.8	-11.3	2.2	11.4	0.37
2,955.0	4.00	68.40	2,953.7	-9.1	7.1	9.4	1.30
3,045.0	3.70	96.80	3,043.5	-8.3	12.9	8.9	2.12
3,134.0	3.70	91.90	3,132.3	-8.7	18.6	9.6	0.36
3,224.0	3.60	119.80	3,222.1	-10.2	24.0	11.4	1.96
3,314.0	4.80	128.30	3,311.9	-14.0	29.4	15.4	1.50
3,404.0	5.00	143.20	3,401.5	-19.4	34.7	21.1	1.43
3,493.0	4.70	142.30	3,490.2	-25.4	39.2	27.3	0.35
3,583.0	4.80	140.50	3,579.9	-31.3	43.9	33.3	0.20
3,673.0	4.80	159.20	3,669.6	-37.7	47.6	39.9	1.73
3,763.0	5.90	164.70	3,759.2	-45.7	50.2	48.0	1.35
3,853.0	7.30	163.90	3,848.6	-55.6	53.0	58.1	1.56
3,943.0	7.40	160.60	3,937.9	-66.6	56.5	69.2	0.48
4,033.0	8.40	147.50	4,027.0	-77.6	62.0	80.5	2.28
4,122.0	9.20	138.40	4,115.0	-88.4	70.2	91.7	1.80
4,212.0	10.40	126.50	4,203.7	-98.6	81.5	102.4	2.61
4,302.0	11.40	123.60	4,292.0	-108.4	95.4	112.8	1.27
4,392.0	10.80	120.60	4,380.4	-117.6	110.1	122.7	0.93
4,482.0	10.50	121.00	4,468.8	-126.1	124.4	131.9	0.34
4,571.0	9.50	121.90	4,556.5	-134.1	137.6	140.6	1.14
4,661.0	9.00	121.20	4,645.3	-141.7	149.9	148.8	0.57
4,751.0	8.20	120.30	4,734.3	-148.6	161.5	156.2	0.90
4,841.0	8.00	123.30	4,823.4	-155.3	172.2	163.4	0.52
4,931.0	7.60	122.60	4,912.5	-161.9	182.5	170.5	0.46
5,021.0	8.50	122.10	5,001.7	-168.7	193.1	177.7	1.00
5,110.0	7.70	118.90	5,089.8	-175.0	203.9	184.6	1.03
5,200.0	6.90	113.20	5,179.0	-180.1	214.2	190.2	1.20
5,290.0	6.50	120.10	5,268.4	-184.8	223.5	195.3	1.00
5,380.0	6.10	114.10	5,357.9	-189.3	232.3	200.2	0.86
5,470.0	4.70	127.20	5,447.5	-193.5	239.6	204.7	2.06

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<b>Site:</b>	Mahalo State AA09-72-A Sec.4-T6N-R63W	<b>MD Reference:</b>	WELL @ 4716.0ft (PD 828 RKB - 16')
<b>Well:</b>	Mahalo State AA09-73-1HNC	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

Survey							
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,560.0	3.30	116.50	5,537.3	-196.8	244.9	208.4	1.76
5,649.0	1.80	138.60	5,626.2	-199.0	248.1	210.7	1.99
5,739.0	0.50	114.70	5,716.2	-200.3	249.4	212.0	1.51
5,829.0	0.40	91.30	5,806.2	-200.4	250.1	212.2	0.23
5,919.0	0.40	121.70	5,896.1	-200.6	250.6	212.4	0.23
5,964.0	0.50	147.00	5,941.1	-200.9	250.9	212.7	0.49
6,009.0	4.90	191.70	5,986.1	-202.9	250.6	214.7	10.13
6,036.2	7.68	192.22	6,013.1	-205.8	250.0	217.6	10.22
<b>Mahalo State AA09-73-1HNC Curve KOP</b>							
6,054.0	9.50	192.40	6,030.7	-208.4	249.4	220.1	10.22
6,099.0	12.40	194.20	6,074.9	-216.7	247.4	228.4	6.49
6,143.0	14.80	191.60	6,117.7	-226.8	245.1	238.3	5.63
6,188.0	16.10	186.00	6,161.0	-238.7	243.3	250.1	4.39
6,233.0	17.80	182.70	6,204.1	-251.7	242.4	263.1	4.34
6,278.0	20.40	178.90	6,246.6	-266.4	242.2	277.8	6.40
6,323.0	24.20	178.00	6,288.2	-283.5	242.6	294.8	8.48
6,368.0	28.00	178.70	6,328.6	-303.3	243.2	314.6	8.47
6,413.0	31.90	182.90	6,367.6	-325.7	242.8	337.0	9.84
6,458.0	35.80	182.30	6,405.0	-350.8	241.7	362.0	8.70
6,503.0	39.90	179.00	6,440.5	-378.4	241.4	389.5	10.16
6,548.0	42.60	178.90	6,474.3	-408.0	242.0	419.2	6.00
6,593.0	43.60	181.90	6,507.2	-438.8	241.8	449.9	5.07
6,637.0	48.70	180.00	6,537.7	-470.5	241.3	481.5	12.00
6,683.0	56.00	179.90	6,565.8	-506.9	241.3	517.9	15.87
6,727.0	60.00	180.20	6,589.1	-544.2	241.3	555.1	9.11
6,772.0	61.90	179.40	6,610.9	-583.5	241.4	594.4	4.50
6,817.0	66.40	179.30	6,630.5	-624.0	241.9	634.9	10.00
6,862.0	70.40	178.50	6,647.1	-665.8	242.7	676.7	9.04
6,907.0	74.20	177.70	6,660.8	-708.7	244.1	719.6	8.61
6,952.0	78.90	177.70	6,671.2	-752.4	245.8	763.3	10.44
6,997.0	82.20	179.10	6,678.6	-796.8	247.1	807.7	7.95
7,014.0	83.20	179.50	6,680.8	-813.6	247.3	824.5	6.33
7,121.0	86.50	180.80	6,690.4	-920.2	247.0	931.0	3.31
7,152.2	87.34	180.83	6,692.1	-951.3	246.6	962.1	2.69
<b>Mahalo State AA09-73-1HNC Landing Pt.</b>							
7,214.0	89.00	180.90	6,694.0	-1,013.1	245.6	1,023.7	2.69
7,307.0	90.20	181.00	6,694.7	-1,106.1	244.1	1,116.5	1.29
7,401.0	90.50	181.30	6,694.1	-1,200.0	242.2	1,210.3	0.45
7,494.0	90.40	180.20	6,693.4	-1,293.0	241.0	1,303.1	1.19
7,586.0	91.10	180.20	6,692.2	-1,385.0	240.7	1,395.0	0.76
7,680.0	90.90	179.50	6,690.5	-1,479.0	240.9	1,488.9	0.77
7,774.0	90.10	179.00	6,689.7	-1,573.0	242.1	1,582.8	1.00
7,869.0	90.10	179.10	6,689.6	-1,668.0	243.7	1,677.7	0.11
7,963.0	90.50	179.00	6,689.1	-1,762.0	245.3	1,771.7	0.44

**Company:** Noble Energy Inc.- Weld County, CO (Grid North)  
**Project:** Sec.4-T6N-R63W  
**Site:** Mahalo State AA09-72-A Sec.4-T6N-R63W  
**Well:** Mahalo State AA09-73-1HNC  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well Mahalo State AA09-73-1HNC  
**TVD Reference:** WELL @ 4716.0ft (PD 828 RKB - 16')  
**MD Reference:** WELL @ 4716.0ft (PD 828 RKB - 16')  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Landmark

**Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,057.0	90.30	178.90	6,688.4	-1,855.9	247.0	1,865.7	0.24
8,151.0	89.80	179.40	6,688.3	-1,949.9	248.4	1,959.6	0.75
8,244.0	90.10	179.50	6,688.4	-2,042.9	249.3	2,052.5	0.34
8,339.0	90.20	179.50	6,688.2	-2,137.9	250.1	2,147.5	0.11
8,429.0	90.50	179.70	6,687.6	-2,227.9	250.7	2,237.4	0.40
8,518.0	89.60	179.10	6,687.5	-2,316.9	251.7	2,326.3	1.22
8,608.0	90.10	179.00	6,687.8	-2,406.9	253.2	2,416.3	0.57
8,698.0	90.30	178.90	6,687.5	-2,496.9	254.8	2,506.2	0.25
8,788.0	90.80	178.90	6,686.6	-2,586.9	256.5	2,596.2	0.56
8,878.0	89.50	179.10	6,686.4	-2,676.8	258.1	2,686.2	1.46
8,968.0	89.80	179.30	6,686.9	-2,766.8	259.4	2,776.1	0.40
9,058.0	90.00	178.90	6,687.1	-2,856.8	260.8	2,866.0	0.50
9,147.0	90.20	179.30	6,686.9	-2,945.8	262.2	2,955.0	0.50
9,237.0	91.30	179.20	6,685.7	-3,035.8	263.4	3,044.9	1.23
9,327.0	89.80	179.00	6,684.9	-3,125.8	264.8	3,134.9	1.68
9,417.0	89.40	180.20	6,685.5	-3,215.8	265.4	3,224.8	1.41
9,507.0	90.00	180.20	6,686.0	-3,305.8	265.1	3,314.7	0.67
9,597.0	91.40	180.20	6,684.9	-3,395.8	264.8	3,404.6	1.56
9,687.0	89.10	179.20	6,684.5	-3,485.8	265.2	3,494.5	2.79
9,777.0	89.50	179.50	6,685.6	-3,575.7	266.3	3,584.4	0.56
9,866.0	89.80	179.40	6,686.1	-3,664.7	267.1	3,673.3	0.36
9,956.0	90.20	179.40	6,686.1	-3,754.7	268.1	3,763.3	0.44
10,046.0	90.50	179.20	6,685.6	-3,844.7	269.2	3,853.2	0.40
10,136.0	89.80	178.80	6,685.3	-3,934.7	270.7	3,943.2	0.90
10,226.0	89.50	180.40	6,685.9	-4,024.7	271.4	4,033.1	1.81
10,316.0	89.60	180.20	6,686.6	-4,114.7	270.9	4,123.0	0.25
10,406.0	89.80	180.90	6,687.1	-4,204.7	270.0	4,212.8	0.81
10,496.0	90.20	181.00	6,687.1	-4,294.7	268.5	4,302.6	0.46
10,586.0	90.60	180.80	6,686.4	-4,384.7	267.1	4,392.4	0.50
10,676.0	91.10	180.20	6,685.1	-4,474.6	266.3	4,482.3	0.87
10,765.0	89.70	179.50	6,684.5	-4,563.6	266.6	4,571.2	1.76
10,855.0	90.00	179.50	6,684.7	-4,653.6	267.4	4,661.1	0.33
10,945.0	90.30	179.60	6,684.5	-4,743.6	268.1	4,751.0	0.35
11,035.0	87.60	179.10	6,686.1	-4,833.6	269.1	4,841.0	3.05
11,125.0	90.20	180.50	6,687.8	-4,923.6	269.4	4,930.8	3.28
11,215.0	90.50	180.40	6,687.3	-5,013.6	268.7	5,020.7	0.35
11,304.0	90.40	181.40	6,686.6	-5,102.6	267.3	5,109.5	1.13
11,394.0	91.20	180.90	6,685.3	-5,192.5	265.5	5,199.3	1.05
11,484.0	89.70	181.20	6,684.6	-5,282.5	263.8	5,289.1	1.70
11,574.0	90.00	181.50	6,684.9	-5,372.5	261.7	5,378.9	0.47
11,664.0	90.30	180.70	6,684.6	-5,462.5	260.0	5,468.7	0.95
11,754.0	90.70	180.60	6,683.8	-5,552.5	259.0	5,558.5	0.46
11,852.0	91.20	180.60	6,682.2	-5,650.4	257.9	5,656.3	0.51

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<b>Design:</b>	Wellbore #1	<b>Database:</b>	Landmark

Survey							
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11,910.0	91.20	180.60	6,681.0	-5,708.4	257.3	5,714.2	0.00
Mahalo State AA09-73-1HNC BHL 30'FNL & 990'FEL							

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