

Noble Energy

Weld County, CO (NAD 83)
Sec. 4-T6N-R63W (Mahalo State PAD)
Mahalo State AA09-79HNC
05-123-39105
Plan B

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

20 January, 2015

Surface UWI : 05-123-39105

Well Coordinates: 1,429,912.53 N, 3,292,452.08 E (40° 30' 31.50" N, 104° 26' 53.63" W)
Ground Level: 4,699.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Mahalo State AA09-79HNC

KB=24 @ 4723.00usft (H&P 322)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 4-T6N-R63W (Mahalo State PAD)
 Well: Mahalo State AA09-79HNC
 Wellbore: Plan B
 Design: Actual Surveys



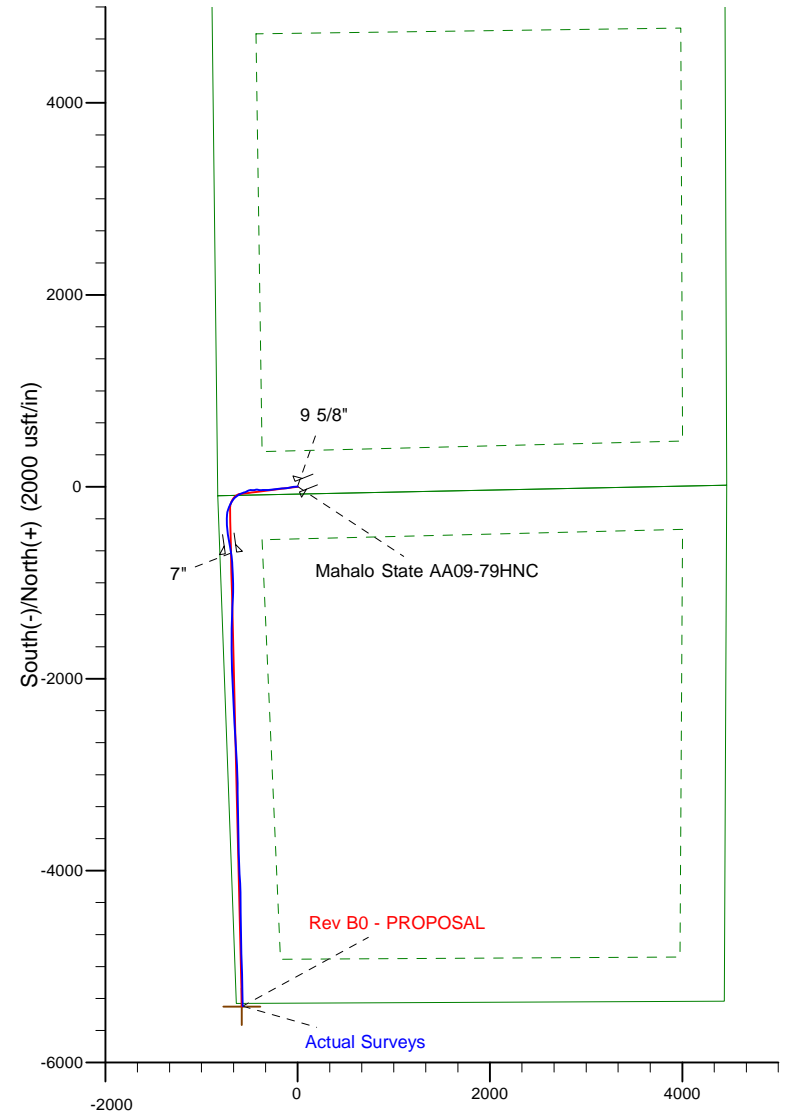
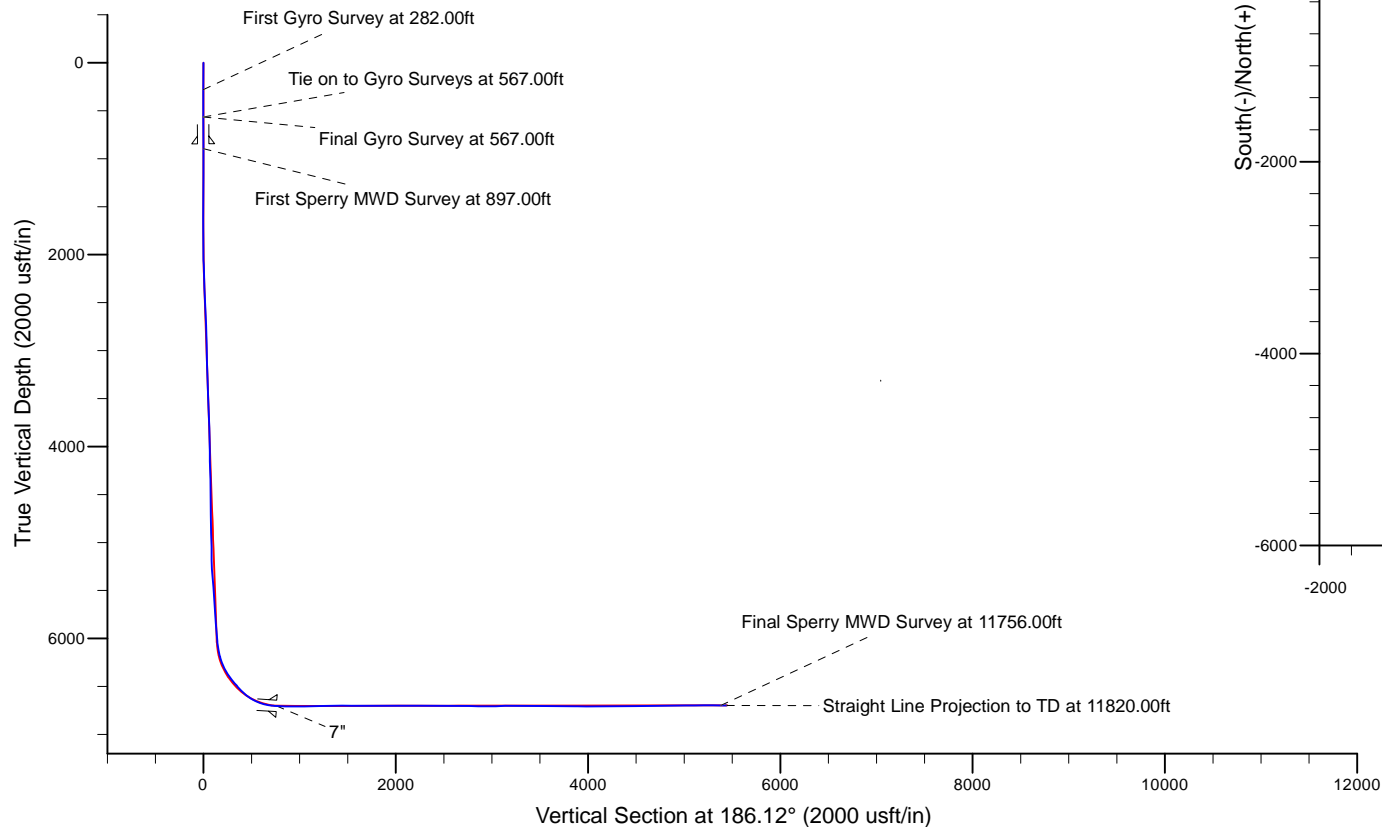
Platted SHL: 75' FSL, 833' FWL
 Platted Lat/Long: 40.50875 N, 104.44823 W
 Location: Sec. 4-T6N-R63W

~7" Casing: 598' FNL, 118' FWL
 Lat/Long: 40.506877 N, 104.450749 W
 State Planes - CO Northern: 1,429,222.11' N, 3,291,759.86' E
 Location: Sec. 9-T6N-R63W

Platted BHL: 30' FNL, 60' FWL
 Lat/Long: 40.4939 N, 40.4939 W
 State Planes - CO Northern: 1,424,563.13' N, 3,291,879.43' E
 Location: Sec. 16-T6N-R63W

LEGEND

- Mahalo State AA09-79HNC, Plan B, Rev B0 - PROPOSAL V0
- Actual Surveys



WELL DETAILS: Mahalo State AA09-79HNC

Ground Level: 4699.00
 KB=24 @ 4723.00usft (H&P 322)

Created By: Tatiana Gomez
 Created On: 1/21/2015

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
282.00	0.20	285.05	282.00	0.13	-0.48	0.49	0.07
First Gyro Survey at 282.00ft							
567.00	0.20	285.05	567.00	0.39	-1.44	1.49	0.00
Tie on to Gyro Surveys at 567.00ft - Final Gyro Survey at 567.00ft							
848.00	0.23	248.45	848.00	0.31	-2.43	2.43	0.05
9 5/8"							
897.00	0.24	243.48	897.00	0.23	-2.61	2.58	0.05
First Sperry MWD Survey at 897.00ft							
990.00	0.19	267.65	989.99	0.13	-2.94	2.87	0.11
1,175.00	0.16	332.97	1,174.99	0.35	-3.36	3.34	0.10
1,361.00	0.18	70.40	1,360.99	0.68	-3.21	3.27	0.14
1,454.00	0.14	54.93	1,453.99	0.79	-2.98	3.08	0.06
1,546.00	0.07	341.07	1,545.99	0.91	-2.90	3.04	0.15
1,639.00	0.25	310.27	1,638.99	1.10	-3.07	3.25	0.21
1,732.00	0.15	346.67	1,731.99	1.35	-3.26	3.50	0.17
1,825.00	1.61	275.59	1,824.98	1.59	-4.59	4.84	1.69
1,918.00	3.74	265.07	1,917.87	1.46	-8.91	8.98	2.34
2,011.00	5.10	264.15	2,010.59	0.78	-16.04	15.69	1.46
2,103.00	6.69	263.47	2,102.11	-0.25	-25.44	24.50	1.73
2,196.00	7.84	266.19	2,194.36	-1.29	-37.15	35.54	1.29
2,289.00	8.56	261.15	2,286.41	-2.77	-50.31	47.87	1.09
2,382.00	8.76	260.03	2,378.35	-5.06	-64.13	60.61	0.28
2,475.00	8.30	255.76	2,470.32	-7.94	-77.61	72.89	0.84
2,568.00	9.42	260.34	2,562.21	-10.87	-91.62	85.65	1.42
2,662.00	8.91	260.05	2,655.01	-13.42	-106.37	99.24	0.54
2,757.00	8.43	266.27	2,748.92	-15.14	-120.57	112.50	1.11
2,852.00	8.36	267.46	2,842.91	-15.90	-134.42	125.68	0.20
2,947.00	8.74	267.18	2,936.85	-16.56	-148.53	139.13	0.40
3,042.00	8.50	265.78	3,030.78	-17.43	-162.74	152.63	0.34
3,137.00	8.31	264.02	3,124.76	-18.67	-176.57	165.66	0.34
3,231.00	7.69	262.54	3,217.84	-20.19	-189.56	177.81	0.69
3,326.00	7.62	261.45	3,312.00	-21.95	-202.09	189.46	0.17
3,421.00	9.30	263.71	3,405.96	-23.73	-215.95	202.38	1.80
3,516.00	8.16	263.82	3,499.86	-25.30	-230.28	215.81	1.20
3,611.00	9.14	260.71	3,593.78	-27.24	-244.43	228.97	1.14
3,706.00	10.01	260.42	3,687.45	-29.83	-260.02	243.35	0.92
3,801.00	10.58	265.98	3,780.92	-31.82	-276.86	259.10	1.21
3,896.00	10.08	268.63	3,874.38	-32.63	-293.87	275.32	0.73
3,991.00	8.82	271.61	3,968.09	-32.62	-309.46	290.38	1.42
4,086.00	8.46	271.07	4,062.02	-32.29	-323.73	304.24	0.39
4,180.00	8.07	271.32	4,155.04	-32.01	-337.24	317.36	0.42
4,275.00	8.63	264.60	4,249.03	-32.52	-351.00	330.52	1.18
4,370.00	7.19	265.92	4,343.13	-33.62	-364.03	342.82	1.53
4,465.00	8.68	266.22	4,437.22	-34.51	-377.11	355.22	1.57
4,560.00	8.58	271.07	4,531.14	-34.85	-391.35	368.88	0.77
4,655.00	7.86	278.58	4,625.17	-33.75	-404.86	382.21	1.36
4,749.00	7.76	279.02	4,718.30	-31.80	-417.49	394.91	0.12
4,844.00	8.79	268.30	4,812.31	-31.01	-431.08	408.24	1.95
4,939.00	9.08	257.98	4,906.16	-32.78	-445.66	421.86	1.71

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,034.00	10.05	268.07	4,999.85	-34.62	-461.28	436.47	2.04
5,129.00	8.77	275.00	5,093.57	-34.27	-476.78	451.53	1.80
5,224.00	7.16	267.51	5,187.65	-33.90	-489.91	464.31	2.01
5,319.00	8.14	249.20	5,281.82	-36.54	-502.12	475.41	2.75
5,413.00	8.59	246.16	5,374.82	-41.74	-514.76	486.26	0.67
5,508.00	8.43	241.88	5,468.78	-47.89	-527.39	496.86	0.69
5,603.00	8.77	246.35	5,562.71	-54.08	-540.17	507.60	0.79
5,697.00	9.58	254.02	5,655.51	-59.11	-554.25	519.89	1.56
5,792.00	8.36	249.76	5,749.35	-63.68	-568.33	532.30	1.46
5,887.00	7.66	250.66	5,843.42	-68.16	-580.79	543.16	0.75
5,982.00	8.81	249.84	5,937.44	-72.77	-593.59	554.33	1.22
6,077.00	9.81	236.60	6,031.20	-79.73	-607.18	565.65	2.48
6,124.00	12.81	234.56	6,077.28	-84.96	-614.77	571.62	6.44
6,171.00	16.28	236.50	6,122.77	-91.62	-624.51	579.30	7.45
6,218.00	19.80	235.42	6,167.45	-99.77	-636.56	588.82	7.52
6,266.00	22.11	228.35	6,212.28	-110.39	-650.01	599.05	7.13
6,361.00	26.97	214.11	6,298.75	-140.15	-675.48	615.92	8.03
6,456.00	36.61	207.49	6,379.42	-183.23	-700.71	629.09	10.78
6,503.00	39.19	202.62	6,416.52	-209.38	-712.89	634.07	8.40
6,551.00	40.01	198.47	6,453.51	-238.02	-723.62	636.99	5.77
6,646.00	41.82	184.56	6,525.45	-298.69	-735.84	633.04	9.76
6,741.00	51.30	176.36	6,590.75	-367.48	-736.00	615.33	11.77
6,836.00	62.02	176.45	6,642.89	-446.57	-731.04	590.00	11.28
6,930.00	72.73	170.31	6,679.03	-532.56	-720.87	557.86	12.88
6,977.00	78.68	167.82	6,690.63	-577.25	-712.23	537.90	13.66
7,025.00	81.94	169.59	6,698.71	-623.65	-702.96	516.91	7.70
7,036.00	82.99	169.91	6,700.15	-634.38	-701.02	512.25	9.97
7,093.00	86.46	172.27	6,705.39	-690.44	-692.24	489.21	7.35
7"							
7,131.00	88.77	173.84	6,706.97	-728.12	-687.65	475.00	7.35
7,226.00	89.45	176.61	6,708.45	-822.77	-679.74	442.79	3.00
7,319.00	89.66	177.42	6,709.17	-915.64	-674.90	414.00	0.90
7,412.00	91.02	178.93	6,708.62	-1,008.59	-671.94	387.00	2.19
7,596.00	91.97	182.66	6,703.82	-1,192.47	-674.49	341.72	2.09
7,691.00	88.95	182.76	6,703.06	-1,287.35	-678.98	321.42	3.18
7,786.00	90.99	183.20	6,703.11	-1,382.22	-683.92	301.55	2.20
7,881.00	89.69	180.50	6,702.54	-1,477.16	-686.99	279.86	3.15
7,976.00	89.94	180.09	6,702.85	-1,572.16	-687.48	255.67	0.51
8,071.00	89.72	179.79	6,703.13	-1,667.15	-687.38	230.90	0.39
8,166.00	89.75	178.58	6,703.57	-1,762.14	-686.02	204.93	1.27
8,260.00	91.08	178.51	6,702.89	-1,856.11	-683.64	178.23	1.42
8,355.00	89.85	178.26	6,702.12	-1,951.06	-680.96	150.99	1.32
8,450.00	91.51	178.72	6,700.99	-2,046.02	-678.46	123.91	1.81
8,545.00	89.08	177.36	6,700.50	-2,140.96	-675.21	96.12	2.93
8,640.00	88.77	176.99	6,702.28	-2,235.82	-670.53	66.97	0.51
8,734.00	89.17	176.49	6,703.97	-2,329.65	-665.18	37.44	0.68
8,829.00	89.54	176.15	6,705.04	-2,424.45	-659.09	6.94	0.53
8,924.00	90.89	176.35	6,704.69	-2,519.25	-652.87	-23.67	1.44
9,019.00	88.92	175.79	6,704.84	-2,614.02	-646.36	-54.57	2.16
9,114.00	89.75	177.33	6,705.95	-2,708.84	-640.66	-84.69	1.84
9,209.00	89.78	176.96	6,706.34	-2,803.72	-635.93	-113.90	0.39

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,304.00	89.75	177.66	6,706.73	-2,898.61	-631.47	-142.85	0.74
9,398.00	91.02	178.11	6,706.09	-2,992.54	-628.00	-170.59	1.43
9,493.00	91.51	179.36	6,704.00	-3,087.49	-625.91	-197.27	1.41
9,588.00	88.61	178.90	6,703.90	-3,182.47	-624.46	-223.32	3.09
9,683.00	89.45	179.08	6,705.51	-3,277.44	-622.79	-249.60	0.90
9,778.00	90.43	178.45	6,705.60	-3,372.42	-620.74	-276.24	1.23
9,873.00	90.65	179.40	6,704.71	-3,467.40	-618.96	-302.62	1.03
9,968.00	89.35	179.58	6,704.71	-3,562.39	-618.11	-328.10	1.38
10,063.00	88.95	178.51	6,706.12	-3,657.37	-616.53	-354.29	1.20
10,157.00	90.03	179.15	6,706.96	-3,751.34	-614.61	-380.55	1.34
10,252.00	88.74	177.57	6,707.98	-3,846.29	-611.89	-407.83	2.15
10,347.00	90.92	178.07	6,708.26	-3,941.22	-608.28	-435.97	2.35
10,442.00	89.88	177.21	6,707.59	-4,036.13	-604.37	-464.39	1.42
10,536.00	89.75	177.36	6,707.90	-4,130.03	-599.92	-493.07	0.21
10,631.00	90.43	177.72	6,707.75	-4,224.94	-595.84	-521.65	0.81
10,726.00	91.20	179.42	6,706.40	-4,319.89	-593.47	-548.60	1.96
10,821.00	89.97	180.02	6,705.43	-4,414.89	-593.00	-573.71	1.44
10,916.00	90.40	179.29	6,705.12	-4,509.88	-592.43	-598.93	0.89
11,011.00	90.03	178.85	6,704.76	-4,604.87	-590.89	-625.09	0.61
11,105.00	90.74	179.19	6,704.13	-4,698.85	-589.28	-651.04	0.84
11,200.00	91.08	178.46	6,702.62	-4,793.82	-587.33	-677.58	0.85
11,295.00	91.17	178.54	6,700.76	-4,888.77	-584.85	-704.64	0.13
11,390.00	90.74	178.22	6,699.17	-4,983.72	-582.16	-731.89	0.56
11,485.00	90.19	177.79	6,698.40	-5,078.66	-578.86	-759.73	0.73
11,580.00	90.34	179.20	6,697.96	-5,173.62	-576.36	-786.80	1.49
11,675.00	89.97	178.83	6,697.71	-5,268.61	-574.73	-813.04	0.55
11,756.00	89.26	178.25	6,698.25	-5,349.58	-572.66	-836.06	1.13
Final Sperry MWD Survey at 11756.00ft							
11,820.00	89.26	178.25	6,699.08	-5,413.54	-570.71	-854.56	0.00
Straight Line Projection to TD at 11820.00ft - Mahalo St AA09-79HNC_BHL							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
282.00	282.00	0.13	-0.48	First Gyro Survey at 282.00ft
567.00	567.00	0.39	-1.44	Tie on to Gyro Surveys at 567.00ft
567.00	567.00	0.39	-1.44	Final Gyro Survey at 567.00ft
897.00	897.00	0.23	-2.61	First Sperry MWD Survey at 897.00ft
11,756.00	6,698.25	-5,349.58	-572.66	Final Sperry MWD Survey at 11756.00ft
11,820.00	6,699.08	-5,413.54	-570.71	Straight Line Projection to TD at 11820.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	285.05	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
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Design Report for Mahalo State AA09-79HNC - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
282.00	567.00	Surface Surveys	Flexi-Shot
897.00	7,036.00	Intermediate Surveys	MWD
7,131.00	11,820.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
848.00	848.00	9 5/8"	9-5/8	13-3/4
7,093.00	6,705.39	7"	7	8-3/4

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Mahalo St AA09-79HN	0.00	0.00	6,696.92	-5,417.33	-581.06	1,424,495.38	3,291,871.04	40.493900	-104.450550
- actual wellpath misses target center by 11.23usft at 11820.00usft MD (6699.08 TVD, -5413.54 N, -570.71 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.82 °/100usft	Maximum Dogleg over Survey:	13.66 °/100usft at 6,977.00 usft
Net Tortousity applicable to Plans:	0.93 °/100usft	Directional Difficulty Index:	6.358

Audit Info

North Reference Sheet for Sec. 4-T6N-R63W (Mahalo State PAD) - Mahalo State
AA09-79HNC - Plan B

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB=24 @ 4723.00usft (H&P 322). Northing and Easting are relative to Mahalo State AA09-79HNC

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996696

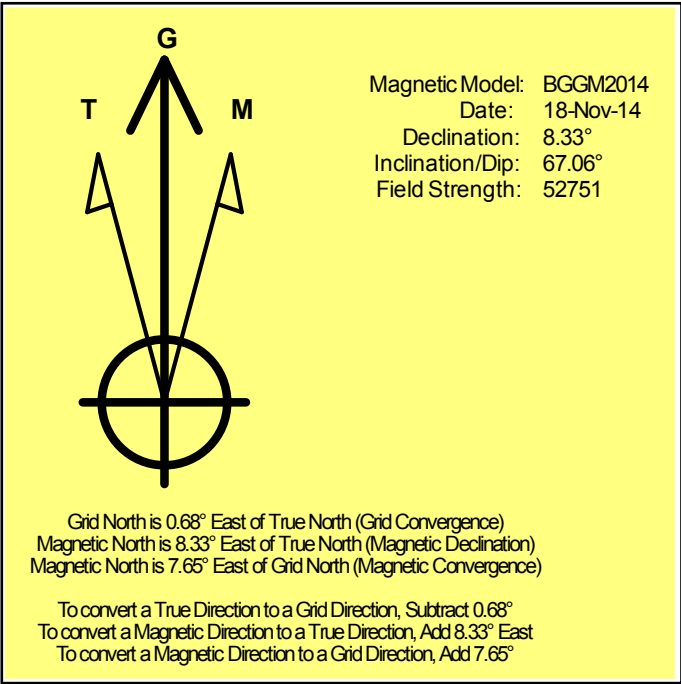
Grid Coordinates of Well: 1,429,912.53 usft N, 3,292,452.08 usft E

Geographical Coordinates of Well: 40° 30' 31.50" N, 104° 26' 53.63" W

Grid Convergence at Surface is: 0.68°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,820.00usft
the Bottom Hole Displacement is 5,443.54usft in the Direction of 186.02° (Grid).

Magnetic Convergence at surface is: -7.65° (18 November 2014, , BGGM2014)



Noble Energy

Weld County, CO (NAD 83)

Sec. 4-T6N-R63W (Mahalo State PAD)

Mahalo State AA09-79HNC

05-123-39105

Plan B

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

20 January, 2015

Well Coordinates: 1,429,912.53 N, 3,292,452.08 E (40° 30' 31.50" N, 104° 26' 53.63" W)

Ground Level: 4,699.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Mahalo State AA09-79HNC

KB=24 @ 4723.00usft (H&P 322)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.508750	-104.448230	1,429,912.53	3,292,452.08
282.00	0.20	285.05	282.00	0.13	-0.48	40.508750	-104.448232	1,429,912.66	3,292,451.60
567.00	0.20	285.05	567.00	0.39	-1.44	40.508751	-104.448235	1,429,912.91	3,292,450.64
848.00	0.23	248.45	848.00	0.31	-2.43	40.508751	-104.448239	1,429,912.84	3,292,449.65
897.00	0.24	243.48	897.00	0.23	-2.61	40.508751	-104.448240	1,429,912.76	3,292,449.46
990.00	0.19	267.65	989.99	0.13	-2.94	40.508750	-104.448241	1,429,912.66	3,292,449.14
1,175.00	0.16	332.97	1,174.99	0.35	-3.36	40.508751	-104.448242	1,429,912.88	3,292,448.71
1,361.00	0.18	70.40	1,360.99	0.68	-3.21	40.508752	-104.448242	1,429,913.21	3,292,448.87
1,454.00	0.14	54.93	1,453.99	0.79	-2.98	40.508752	-104.448241	1,429,913.32	3,292,449.10
1,546.00	0.07	341.07	1,545.99	0.91	-2.90	40.508753	-104.448241	1,429,913.44	3,292,449.17
1,639.00	0.25	310.27	1,638.99	1.10	-3.07	40.508753	-104.448241	1,429,913.63	3,292,449.00
1,732.00	0.15	346.67	1,731.99	1.35	-3.26	40.508754	-104.448242	1,429,913.88	3,292,448.82
1,825.00	1.61	275.59	1,824.98	1.59	-4.59	40.508754	-104.448247	1,429,914.12	3,292,447.49
1,918.00	3.74	265.07	1,917.87	1.46	-8.91	40.508754	-104.448262	1,429,913.99	3,292,443.17
2,011.00	5.10	264.15	2,010.59	0.78	-16.04	40.508753	-104.448288	1,429,913.31	3,292,436.03
2,103.00	6.69	263.47	2,102.11	-0.25	-25.44	40.508750	-104.448322	1,429,912.28	3,292,426.64
2,196.00	7.84	266.19	2,194.36	-1.29	-37.15	40.508748	-104.448364	1,429,911.24	3,292,414.93
2,289.00	8.56	261.15	2,286.41	-2.77	-50.31	40.508744	-104.448411	1,429,909.76	3,292,401.76
2,382.00	8.76	260.03	2,378.35	-5.06	-64.13	40.508738	-104.448461	1,429,907.46	3,292,387.95
2,475.00	8.30	255.76	2,470.32	-7.94	-77.61	40.508731	-104.448510	1,429,904.59	3,292,374.47
2,568.00	9.42	260.34	2,562.21	-10.87	-91.62	40.508723	-104.448560	1,429,901.66	3,292,360.46
2,662.00	8.91	260.05	2,655.01	-13.42	-106.37	40.508717	-104.448613	1,429,899.11	3,292,345.71
2,757.00	8.43	266.27	2,748.92	-15.14	-120.57	40.508712	-104.448664	1,429,897.39	3,292,331.51
2,852.00	8.36	267.46	2,842.91	-15.90	-134.42	40.508711	-104.448714	1,429,896.63	3,292,317.66
2,947.00	8.74	267.18	2,936.85	-16.56	-148.53	40.508709	-104.448765	1,429,895.97	3,292,303.56
3,042.00	8.50	265.78	3,030.78	-17.43	-162.74	40.508707	-104.448816	1,429,895.09	3,292,289.34
3,137.00	8.31	264.02	3,124.76	-18.67	-176.57	40.508704	-104.448866	1,429,893.86	3,292,275.52
3,231.00	7.69	262.54	3,217.84	-20.19	-189.56	40.508701	-104.448913	1,429,892.34	3,292,262.52
3,326.00	7.62	261.45	3,312.00	-21.95	-202.09	40.508696	-104.448958	1,429,890.58	3,292,249.99
3,421.00	9.30	263.71	3,405.96	-23.73	-215.95	40.508692	-104.449008	1,429,888.80	3,292,236.13
3,516.00	8.16	263.82	3,499.86	-25.30	-230.28	40.508688	-104.449059	1,429,887.23	3,292,221.80
3,611.00	9.14	260.71	3,593.78	-27.24	-244.43	40.508683	-104.449110	1,429,885.29	3,292,207.65
3,706.00	10.01	260.42	3,687.45	-29.83	-260.02	40.508677	-104.449167	1,429,882.70	3,292,192.06
3,801.00	10.58	265.98	3,780.92	-31.82	-276.86	40.508672	-104.449227	1,429,880.71	3,292,175.22
3,896.00	10.08	268.63	3,874.38	-32.63	-293.87	40.508670	-104.449288	1,429,879.90	3,292,158.21
3,991.00	8.82	271.61	3,968.09	-32.62	-309.46	40.508670	-104.449344	1,429,879.91	3,292,142.62
4,086.00	8.46	271.07	4,062.02	-32.29	-323.73	40.508672	-104.449396	1,429,880.24	3,292,128.35
4,180.00	8.07	271.32	4,155.04	-32.01	-337.24	40.508673	-104.449444	1,429,880.52	3,292,114.85
4,275.00	8.63	264.60	4,249.03	-32.52	-351.00	40.508672	-104.449494	1,429,880.01	3,292,101.08
4,370.00	7.19	265.92	4,343.13	-33.62	-364.03	40.508670	-104.449541	1,429,878.91	3,292,088.06
4,465.00	8.68	266.22	4,437.22	-34.51	-377.11	40.508668	-104.449588	1,429,878.02	3,292,074.97
4,560.00	8.58	271.07	4,531.14	-34.85	-391.35	40.508667	-104.449639	1,429,877.68	3,292,060.74

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
4,655.00	7.86	278.58	4,625.17	-33.75	-404.86	40.508670	-104.449688	1,429,878.78	3,292,047.23
4,749.00	7.76	279.02	4,718.30	-31.80	-417.49	40.508676	-104.449733	1,429,880.73	3,292,034.60
4,844.00	8.79	268.30	4,812.31	-31.01	-431.08	40.508679	-104.449782	1,429,881.52	3,292,021.01
4,939.00	9.08	257.98	4,906.16	-32.78	-445.66	40.508674	-104.449834	1,429,879.75	3,292,006.43
5,034.00	10.05	268.07	4,999.85	-34.62	-461.28	40.508670	-104.449890	1,429,877.90	3,291,990.81
5,129.00	8.77	275.00	5,093.57	-34.27	-476.78	40.508671	-104.449946	1,429,878.26	3,291,975.31
5,224.00	7.16	267.51	5,187.65	-33.90	-489.91	40.508673	-104.449993	1,429,878.63	3,291,962.18
5,319.00	8.14	249.20	5,281.82	-36.54	-502.12	40.508666	-104.450037	1,429,875.99	3,291,949.97
5,413.00	8.59	246.16	5,374.82	-41.74	-514.76	40.508652	-104.450083	1,429,870.78	3,291,937.33
5,508.00	8.43	241.88	5,468.78	-47.89	-527.39	40.508636	-104.450129	1,429,864.64	3,291,924.70
5,603.00	8.77	246.35	5,562.71	-54.08	-540.17	40.508619	-104.450175	1,429,858.45	3,291,911.93
5,697.00	9.58	254.02	5,655.51	-59.11	-554.25	40.508606	-104.450226	1,429,853.42	3,291,897.84
5,792.00	8.36	249.76	5,749.35	-63.68	-568.33	40.508594	-104.450277	1,429,848.85	3,291,883.76
5,887.00	7.66	250.66	5,843.42	-68.16	-580.79	40.508582	-104.450322	1,429,844.37	3,291,871.31
5,982.00	8.81	249.84	5,937.44	-72.77	-593.59	40.508570	-104.450368	1,429,839.76	3,291,858.51
6,077.00	9.81	236.60	6,031.20	-79.73	-607.18	40.508551	-104.450417	1,429,832.80	3,291,844.92
6,124.00	12.81	234.56	6,077.28	-84.96	-614.77	40.508537	-104.450445	1,429,827.57	3,291,837.33
6,171.00	16.28	236.50	6,122.77	-91.62	-624.51	40.508519	-104.450480	1,429,820.92	3,291,827.59
6,218.00	19.80	235.42	6,167.45	-99.77	-636.56	40.508497	-104.450524	1,429,812.76	3,291,815.54
6,266.00	22.11	228.35	6,212.28	-110.39	-650.01	40.508468	-104.450572	1,429,802.14	3,291,802.09
6,361.00	26.97	214.11	6,298.75	-140.15	-675.48	40.508387	-104.450665	1,429,772.38	3,291,776.61
6,456.00	36.61	207.49	6,379.42	-183.23	-700.71	40.508270	-104.450758	1,429,729.30	3,291,751.39
6,503.00	39.19	202.62	6,416.52	-209.38	-712.89	40.508198	-104.450803	1,429,703.15	3,291,739.21
6,551.00	40.01	198.47	6,453.51	-238.02	-723.62	40.508120	-104.450842	1,429,674.51	3,291,728.48
6,646.00	41.82	184.56	6,525.45	-298.69	-735.84	40.507954	-104.450889	1,429,613.84	3,291,716.26
6,741.00	51.30	176.36	6,590.75	-367.48	-736.00	40.507765	-104.450893	1,429,545.06	3,291,716.10
6,836.00	62.02	176.45	6,642.89	-446.57	-731.04	40.507548	-104.450878	1,429,465.97	3,291,721.06
6,930.00	72.73	170.31	6,679.03	-532.56	-720.87	40.507312	-104.450845	1,429,379.98	3,291,731.23
6,977.00	78.68	167.82	6,690.63	-577.25	-712.23	40.507189	-104.450816	1,429,335.29	3,291,739.87
7,025.00	81.94	169.59	6,698.71	-623.65	-702.96	40.507061	-104.450785	1,429,288.90	3,291,749.14
7,036.00	82.99	169.91	6,700.15	-634.38	-701.02	40.507032	-104.450778	1,429,278.17	3,291,751.08
7,093.00	86.46	172.27	6,705.39	-690.44	-692.24	40.506877	-104.450749	1,429,222.11	3,291,759.86
7,131.00	88.77	173.84	6,706.97	-728.12	-687.65	40.506774	-104.450734	1,429,184.43	3,291,764.45
7,226.00	89.45	176.61	6,708.45	-822.77	-679.74	40.506514	-104.450710	1,429,089.78	3,291,772.35
7,319.00	89.66	177.42	6,709.17	-915.64	-674.90	40.506259	-104.450696	1,428,996.92	3,291,777.20
7,412.00	91.02	178.93	6,708.62	-1,008.59	-671.94	40.506004	-104.450689	1,428,903.97	3,291,780.16
7,596.00	91.97	182.66	6,703.82	-1,192.47	-674.49	40.505499	-104.450706	1,428,720.09	3,291,777.61
7,691.00	88.95	182.76	6,703.06	-1,287.35	-678.98	40.505239	-104.450727	1,428,625.22	3,291,773.12
7,786.00	90.99	183.20	6,703.11	-1,382.22	-683.92	40.504978	-104.450748	1,428,530.35	3,291,768.18
7,881.00	89.69	180.50	6,702.54	-1,477.16	-686.99	40.504718	-104.450763	1,428,435.42	3,291,765.11
7,976.00	89.94	180.09	6,702.85	-1,572.16	-687.48	40.504457	-104.450769	1,428,340.42	3,291,764.62
8,071.00	89.72	179.79	6,703.13	-1,667.15	-687.38	40.504197	-104.450773	1,428,245.43	3,291,764.72

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
8,166.00	89.75	178.58	6,703.57	-1,762.14	-686.02	40.503936	-104.450772	1,428,150.44	3,291,766.07
8,260.00	91.08	178.51	6,702.89	-1,856.11	-683.64	40.503678	-104.450768	1,428,056.48	3,291,768.46
8,355.00	89.85	178.26	6,702.12	-1,951.06	-680.96	40.503417	-104.450762	1,427,961.53	3,291,771.14
8,450.00	91.51	178.72	6,700.99	-2,046.02	-678.46	40.503156	-104.450757	1,427,866.57	3,291,773.64
8,545.00	89.08	177.36	6,700.50	-2,140.96	-675.21	40.502896	-104.450749	1,427,771.64	3,291,776.89
8,640.00	88.77	176.99	6,702.28	-2,235.82	-670.53	40.502635	-104.450737	1,427,676.78	3,291,781.57
8,734.00	89.17	176.49	6,703.97	-2,329.65	-665.18	40.502377	-104.450721	1,427,582.95	3,291,786.91
8,829.00	89.54	176.15	6,705.04	-2,424.45	-659.09	40.502117	-104.450703	1,427,488.16	3,291,793.01
8,924.00	90.89	176.35	6,704.69	-2,519.25	-652.87	40.501857	-104.450685	1,427,393.37	3,291,799.22
9,019.00	88.92	175.79	6,704.84	-2,614.02	-646.36	40.501596	-104.450666	1,427,298.60	3,291,805.73
9,114.00	89.75	177.33	6,705.95	-2,708.84	-640.66	40.501336	-104.450649	1,427,203.78	3,291,811.43
9,209.00	89.78	176.96	6,706.34	-2,803.72	-635.93	40.501075	-104.450636	1,427,108.90	3,291,816.17
9,304.00	89.75	177.66	6,706.73	-2,898.61	-631.47	40.500815	-104.450624	1,427,014.01	3,291,820.62
9,398.00	91.02	178.11	6,706.09	-2,992.54	-628.00	40.500557	-104.450616	1,426,920.08	3,291,824.09
9,493.00	91.51	179.36	6,704.00	-3,087.49	-625.91	40.500296	-104.450612	1,426,825.14	3,291,826.19
9,588.00	88.61	178.90	6,703.90	-3,182.47	-624.46	40.500035	-104.450611	1,426,730.16	3,291,827.63
9,683.00	89.45	179.08	6,705.51	-3,277.44	-622.79	40.499775	-104.450609	1,426,635.19	3,291,829.31
9,778.00	90.43	178.45	6,705.60	-3,372.42	-620.74	40.499514	-104.450606	1,426,540.22	3,291,831.35
9,873.00	90.65	179.40	6,704.71	-3,467.40	-618.96	40.499253	-104.450604	1,426,445.24	3,291,833.14
9,968.00	89.35	179.58	6,704.71	-3,562.39	-618.11	40.498992	-104.450605	1,426,350.25	3,291,833.98
10,063.00	88.95	178.51	6,706.12	-3,657.37	-616.53	40.498732	-104.450603	1,426,255.28	3,291,835.56
10,157.00	90.03	179.15	6,706.96	-3,751.34	-614.61	40.498474	-104.450600	1,426,161.31	3,291,837.48
10,252.00	88.74	177.57	6,707.98	-3,846.29	-611.89	40.498213	-104.450594	1,426,066.36	3,291,840.20
10,347.00	90.92	178.07	6,708.26	-3,941.22	-608.28	40.497952	-104.450585	1,425,971.44	3,291,843.82
10,442.00	89.88	177.21	6,707.59	-4,036.13	-604.37	40.497692	-104.450575	1,425,876.53	3,291,847.73
10,536.00	89.75	177.36	6,707.90	-4,130.03	-599.92	40.497434	-104.450563	1,425,782.64	3,291,852.18
10,631.00	90.43	177.72	6,707.75	-4,224.94	-595.84	40.497173	-104.450553	1,425,687.73	3,291,856.26
10,726.00	91.20	179.42	6,706.40	-4,319.89	-593.47	40.496913	-104.450548	1,425,592.78	3,291,858.63
10,821.00	89.97	180.02	6,705.43	-4,414.89	-593.00	40.496652	-104.450551	1,425,497.79	3,291,859.09
10,916.00	90.40	179.29	6,705.12	-4,509.88	-592.43	40.496391	-104.450553	1,425,402.79	3,291,859.66
11,011.00	90.03	178.85	6,704.76	-4,604.87	-590.89	40.496130	-104.450551	1,425,307.81	3,291,861.21
11,105.00	90.74	179.19	6,704.13	-4,698.85	-589.28	40.495872	-104.450549	1,425,213.83	3,291,862.81
11,200.00	91.08	178.46	6,702.62	-4,793.82	-587.33	40.495612	-104.450546	1,425,118.87	3,291,864.76
11,295.00	91.17	178.54	6,700.76	-4,888.77	-584.85	40.495351	-104.450541	1,425,023.92	3,291,867.25
11,390.00	90.74	178.22	6,699.17	-4,983.72	-582.16	40.495090	-104.450536	1,424,928.97	3,291,869.93
11,485.00	90.19	177.79	6,698.40	-5,078.66	-578.86	40.494830	-104.450528	1,424,834.04	3,291,873.24
11,580.00	90.34	179.20	6,697.96	-5,173.62	-576.36	40.494569	-104.450523	1,424,739.08	3,291,875.73
11,675.00	89.97	178.83	6,697.71	-5,268.61	-574.73	40.494308	-104.450521	1,424,644.10	3,291,877.37
11,756.00	89.26	178.25	6,698.25	-5,349.58	-572.66	40.494086	-104.450517	1,424,563.13	3,291,879.43
11,820.00	89.26	178.25	6,699.08	-5,413.54	-570.71	40.493910	-104.450513	1,424,499.17	3,291,881.39

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
282.00	282.00	0.13	-0.48	First Gyro Survey at 282.00ft
567.00	567.00	0.39	-1.44	Tie on to Gyro Surveys at 567.00ft
567.00	567.00	0.39	-1.44	Final Gyro Survey at 567.00ft
897.00	897.00	0.23	-2.61	First Sperry MWD Survey at 897.00ft
11,756.00	6,698.25	-5,349.58	-572.66	Final Sperry MWD Survey at 11756.00ft
11,820.00	6,699.08	-5,413.54	-570.71	Straight Line Projection to TD at 11820.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	285.05	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
282.00	567.00	Surface Surveys	Flexi-Shot
897.00	7,036.00	Intermediate Surveys	MWD
7,131.00	11,820.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
848.00	848.00	9 5/8"	9-5/8	13-3/4
7,093.00	6,705.39	7"	7	8-3/4

Design Report for Mahalo State AA09-79HNC - Actual Surveys

Design Targets

Shape	Target Name	TVD ()	Northing ()	Easting ()	+N/-S	+E/-W	Created	Updated
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Directional Difficulty Index

Average Dogleg over Survey:	1.82 °/100usft	Maximum Dogleg over Survey:	13.66 °/100usft at 6,977.00 usft
Net Tortosity applicable to Plans:	0.93 °/100usft	Directional Difficulty Index:	6.358

Audit Info

North Reference Sheet for Sec. 4-T6N-R63W (Mahalo State PAD) - Mahalo State AA09-79HNC - Plan B

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB=24 @ 4723.00usft (H&P 322). Northing and Easting are relative to Mahalo State AA09-79HNC

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996696

Grid Coordinates of Well: 1,429,912.53 usft N, 3,292,452.08 usft E

Geographical Coordinates of Well: 40° 30' 31.50" N, 104° 26' 53.63" W

Grid Convergence at Surface is: 0.68°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,820.00usft

the Bottom Hole Displacement is 5,443.54usft in the Direction of 186.02° (Grid).

Magnetic Convergence at surface is: -7.65° (18 November 2014, , BGGM2014)

