

# Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T6N-R63W (Aggie State AA17)

Aggie State AA17-623

05-123-40903

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Final Survey Report

17 March, 2015

Surface UWI : 05-123-40903

Well Coordinates: 1,420,120.84 N, 3,286,996.02 E (40° 28' 55.38" N, 104° 28' 05.74" W)

Ground Level: 4,666.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Aggie State AA17-623

KB = 24' @ 4690.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

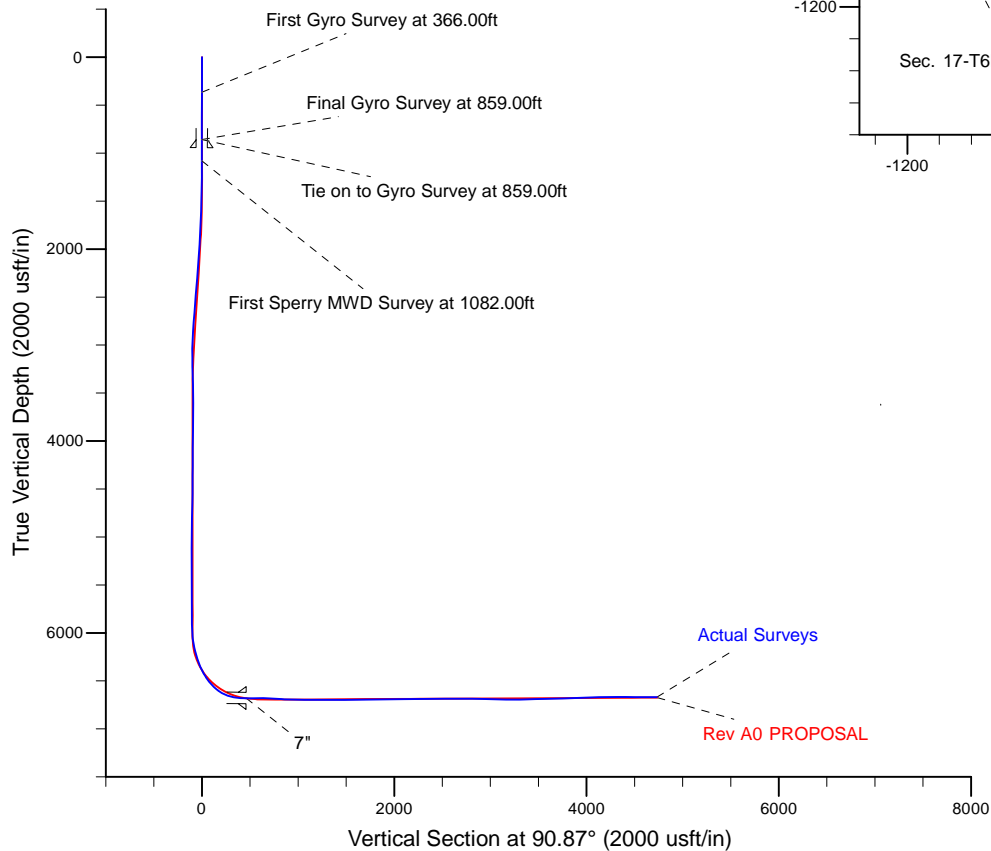
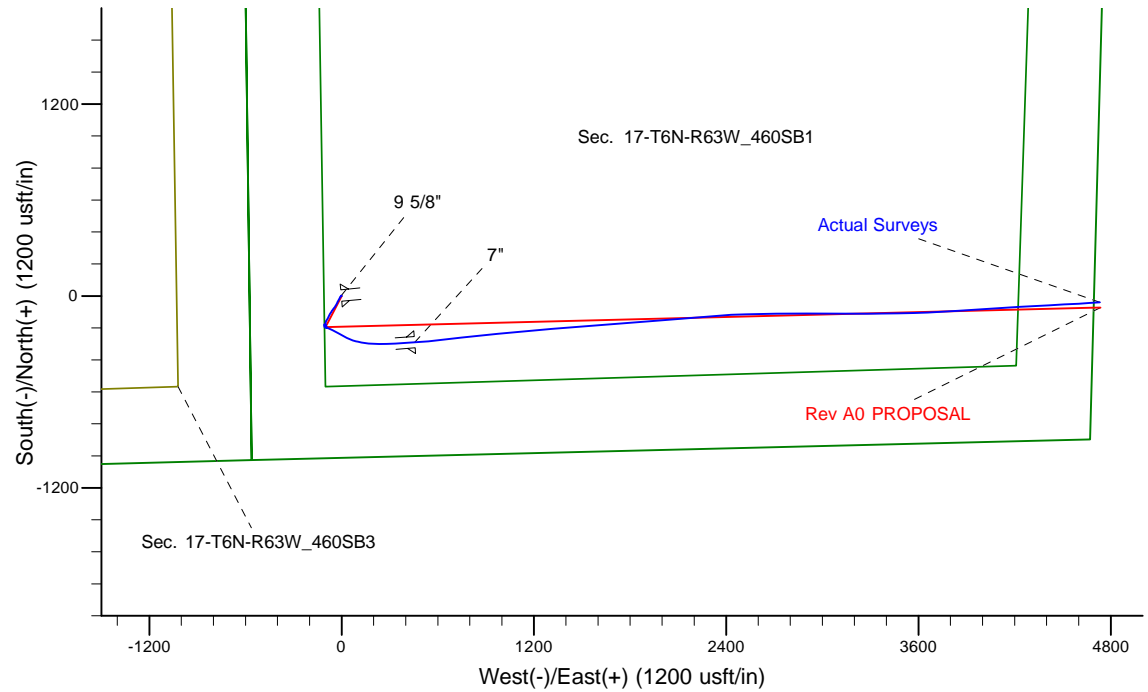
Project: Weld County, CO (NAD 83)  
 Site: Sec. 17-T6N-R63W (Aggie State AA17)  
 Well: Aggie State AA17-623  
 Wellbore: Plan A  
 Design: Actual Surveys



Platted SHL: 1013' FSL, 574' FWL  
 Platted Lat/Long: 40.482050 N, 104.468260 W  
 Location: Sec. 17-T6N-R63W

~7" Casing: 824' FSL, 1060' FWL  
 Lat/Long: 40.481240 N, 104.466633 W  
 State Planes - CO Northern: 1,419,830.87 N, 3,287,452.15 E  
 Sec. 17-T6N-R63W

Platted BHL: 825' FSL, 50' FWL  
 Platted Lat/Long: 40.4817 N, 104.451240 W  
 State Planes - CO Northern: 1,420,077.01 N, 3,291,663.30 E  
 Location: Sec. 16-T6N-R63W



#### LEGEND

- ✗ Aggie State AA17-623, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Aggie State AA17-623

Ground Level: 4666.00  
 KB = 24' @ 4690.00usft (H&P 273)

Created By: Tatiana Gomez  
 Created On: 3/18/2015

**Design Report for Aggie State AA17-623 - 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
<b>Aggie State AA17-623_SHL</b>							
366.00	0.10	137.04	366.00	-0.23	0.22	0.22	0.03
<b>First Gyro Survey at 366.00ft</b>							
613.00	0.60	329.64	613.00	0.72	-0.29	-0.30	0.28
859.00	0.20	282.04	858.99	1.93	-1.36	-1.39	0.20
<b>Final Gyro Survey at 859.00ft - Tie on to Gyro Survey at 859.00ft</b>							
945.00	0.14	264.68	944.99	1.95	-1.61	-1.64	0.09
<b>9 5/8"</b>							
1,082.00	0.11	204.87	1,081.99	1.81	-1.83	-1.86	0.09
<b>First Sperry MWD Survey at 1082.00ft</b>							
1,358.00	0.18	196.62	1,357.99	1.16	-2.07	-2.08	0.03
1,451.00	0.47	234.33	1,450.99	0.79	-2.42	-2.43	0.37
1,543.00	2.69	228.49	1,542.95	-0.86	-4.34	-4.33	2.42
1,636.00	4.78	213.41	1,635.75	-5.54	-8.11	-8.02	2.46
1,730.00	6.60	209.80	1,729.28	-13.50	-12.95	-12.74	1.97
1,919.00	7.06	204.09	1,916.94	-33.52	-23.09	-22.58	0.43
2,013.00	7.92	209.25	2,010.14	-44.45	-28.61	-27.93	1.16
2,108.00	7.28	206.65	2,104.30	-55.54	-34.51	-33.66	0.76
2,202.00	8.80	214.23	2,197.38	-66.81	-41.23	-40.21	1.97
2,297.00	8.09	216.87	2,291.35	-78.16	-49.33	-48.13	0.85
2,391.00	7.60	216.90	2,384.47	-88.43	-57.03	-55.68	0.52
2,485.00	9.38	211.42	2,477.44	-99.94	-64.75	-63.23	2.08
2,581.00	8.95	208.27	2,572.21	-113.19	-72.37	-70.64	0.69
2,675.00	8.85	208.43	2,665.08	-125.99	-79.27	-77.35	0.11
2,770.00	9.10	208.27	2,758.92	-139.03	-86.31	-84.19	0.26
2,865.00	9.32	210.16	2,852.69	-152.30	-93.73	-91.41	0.39
2,959.00	7.77	197.86	2,945.65	-164.93	-99.51	-96.99	2.54
3,053.00	6.76	181.37	3,038.91	-176.51	-101.59	-98.90	2.45
3,148.00	5.45	180.01	3,133.37	-186.61	-101.72	-98.88	1.39
3,243.00	3.69	169.89	3,228.06	-194.13	-101.19	-98.23	2.03
3,337.00	2.71	132.24	3,321.92	-198.60	-99.01	-95.98	2.41
3,432.00	2.12	75.86	3,416.85	-199.69	-95.64	-92.60	2.46
3,526.00	1.02	359.32	3,510.82	-198.42	-93.97	-90.94	2.26
3,621.00	1.02	353.52	3,605.81	-196.74	-94.07	-91.07	0.11
3,716.00	0.97	348.53	3,700.79	-195.11	-94.33	-91.35	0.11
3,810.00	1.21	340.19	3,794.78	-193.40	-94.82	-91.87	0.31
3,905.00	1.23	333.69	3,889.76	-191.54	-95.62	-92.69	0.15
3,999.00	1.40	336.21	3,983.73	-189.58	-96.53	-93.63	0.19
4,093.00	1.18	338.35	4,077.71	-187.63	-97.35	-94.48	0.24
4,187.00	0.94	337.14	4,171.69	-186.02	-98.00	-95.17	0.26
4,282.00	1.03	343.74	4,266.68	-184.49	-98.54	-95.73	0.15
4,376.00	1.09	349.40	4,360.66	-182.80	-98.95	-96.16	0.13
4,470.00	1.10	0.70	4,454.64	-181.01	-99.10	-96.34	0.23
4,564.00	0.96	268.25	4,548.63	-180.14	-99.87	-97.13	1.59
4,658.00	1.17	271.89	4,642.62	-180.13	-101.62	-98.87	0.23
4,753.00	1.05	275.84	4,737.60	-180.01	-103.46	-100.71	0.15
5,037.00	0.82	285.16	5,021.56	-179.21	-108.01	-105.27	0.10
5,131.00	1.52	188.23	5,115.55	-180.27	-108.83	-106.08	1.93
5,319.00	1.56	167.90	5,303.48	-185.24	-108.65	-105.83	0.29

## Design Report for Aggie State AA17-623 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,509.00	1.07	171.71	5,493.43	-189.52	-107.86	-104.97	0.26
5,698.00	0.84	166.69	5,682.40	-192.62	-107.28	-104.35	0.13
5,793.00	0.42	145.14	5,777.40	-193.58	-106.92	-103.97	0.50
5,929.00	0.24	280.98	5,913.40	-193.94	-106.92	-103.96	0.45
6,077.00	7.62	106.26	6,060.97	-196.63	-97.79	-94.79	5.31
6,172.00	13.54	111.70	6,154.32	-202.51	-81.39	-78.31	6.31
6,267.00	18.72	116.76	6,245.55	-213.49	-57.43	-54.18	5.64
6,361.00	24.12	119.27	6,333.03	-229.69	-27.19	-23.69	5.83
6,456.00	30.94	119.58	6,417.22	-251.26	11.03	14.85	7.18
6,504.00	35.07	115.58	6,457.47	-263.31	34.21	38.21	9.72
6,550.00	38.47	110.66	6,494.32	-274.07	59.53	63.69	9.77
6,598.00	42.15	103.32	6,530.94	-283.06	89.20	93.49	12.51
6,645.00	46.27	102.02	6,564.62	-290.23	121.17	125.57	8.98
6,739.00	58.95	93.10	6,621.66	-299.53	194.99	199.52	15.43
6,834.00	73.04	87.31	6,660.24	-299.60	281.51	286.03	15.83
6,890.00	79.68	87.83	6,673.44	-297.30	335.85	340.33	11.89
6,963.00	88.49	86.06	6,680.95	-293.42	408.28	412.69	12.31
7,011.00	89.25	85.73	6,681.90	-289.99	456.15	460.50	1.73
7"							
7,097.00	90.62	85.15	6,681.99	-283.16	541.88	546.11	1.73
7,193.00	89.11	82.79	6,682.22	-273.07	637.34	641.41	2.92
7,288.00	87.01	83.18	6,685.44	-261.48	731.56	735.45	2.25
7,382.00	86.64	83.69	6,690.64	-250.75	824.80	828.52	0.67
7,477.00	88.71	84.66	6,694.50	-241.11	919.23	922.79	2.41
7,571.00	88.68	84.85	6,696.64	-232.52	1,012.81	1,016.23	0.20
7,666.00	88.00	84.77	6,699.39	-223.93	1,107.38	1,110.66	0.72
7,760.00	89.85	85.26	6,701.15	-215.77	1,201.01	1,204.14	2.04
7,855.00	90.77	85.22	6,700.64	-207.88	1,295.68	1,298.68	0.97
7,951.00	90.65	85.09	6,699.45	-199.78	1,391.33	1,394.20	0.18
8,045.00	90.62	85.48	6,698.41	-192.05	1,485.00	1,487.75	0.42
8,140.00	90.99	85.55	6,697.07	-184.62	1,579.70	1,582.32	0.40
8,235.00	91.76	85.95	6,694.79	-177.58	1,674.41	1,676.92	0.91
8,330.00	89.69	85.16	6,693.59	-170.22	1,769.11	1,771.49	2.33
8,425.00	89.82	85.61	6,694.00	-162.58	1,863.80	1,866.06	0.49
8,520.00	90.22	85.47	6,693.96	-155.19	1,958.52	1,960.65	0.45
8,614.00	91.57	85.13	6,692.50	-147.49	2,052.19	2,054.19	1.48
8,709.00	89.91	85.41	6,691.27	-139.66	2,146.85	2,148.72	1.77
8,805.00	90.00	85.27	6,691.34	-131.86	2,242.53	2,244.28	0.17
8,899.00	91.48	86.27	6,690.13	-124.92	2,336.27	2,337.89	1.90
8,994.00	90.22	85.65	6,688.72	-118.23	2,431.02	2,432.53	1.48
9,088.00	91.02	89.46	6,687.70	-114.22	2,524.91	2,526.35	4.14
9,183.00	90.49	89.73	6,686.45	-113.55	2,619.90	2,621.32	0.63
9,277.00	89.97	87.37	6,686.07	-111.17	2,713.86	2,715.23	2.57
9,372.00	89.63	90.27	6,686.41	-109.22	2,808.83	2,810.16	3.07
9,467.00	87.97	90.49	6,688.39	-109.85	2,903.80	2,905.13	1.76
9,561.00	87.66	89.90	6,691.98	-110.17	2,997.73	2,999.06	0.71
9,656.00	89.08	90.18	6,694.68	-110.23	3,092.69	3,094.01	1.52
9,750.00	89.78	90.23	6,695.62	-110.57	3,186.68	3,188.00	0.75
9,845.00	90.92	89.69	6,695.04	-110.50	3,281.68	3,282.98	1.33
9,939.00	91.33	89.23	6,693.19	-109.62	3,375.66	3,376.93	0.66
10,034.00	91.51	89.13	6,690.84	-108.26	3,470.62	3,471.86	0.22

## Design Report for Aggie State AA17-623 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,128.00	91.32	88.75	6,688.51	-106.52	3,564.57	3,565.78	0.45
10,222.00	91.60	87.45	6,686.12	-103.40	3,658.49	3,659.64	1.41
10,317.00	92.12	86.88	6,683.04	-98.71	3,753.32	3,754.39	0.81
10,412.00	91.42	86.31	6,680.10	-93.07	3,848.11	3,849.08	0.95
10,506.00	92.68	85.47	6,676.74	-86.34	3,941.80	3,942.66	1.61
10,600.00	91.70	86.72	6,673.15	-79.94	4,035.52	4,036.26	1.69
10,695.00	90.58	86.72	6,671.26	-74.51	4,130.34	4,130.99	1.18
10,789.00	90.95	86.57	6,670.00	-69.00	4,224.17	4,224.73	0.42
10,884.00	89.75	86.67	6,669.42	-63.40	4,319.00	4,319.47	1.27
10,978.00	89.72	87.24	6,669.86	-58.41	4,412.87	4,413.24	0.61
11,073.00	89.88	86.84	6,670.19	-53.51	4,507.74	4,508.03	0.45
11,167.00	90.15	86.43	6,670.16	-47.99	4,601.58	4,601.77	0.52
11,233.00	89.91	86.35	6,670.13	-43.83	4,667.45	4,667.57	0.38
<b>Final Sperry MWD Survey at 11233.00ft</b>							
11,298.00	89.91	86.35	6,670.23	-39.69	4,732.31	4,732.37	0.00
<b>Straight Line Projection to TD at 11298.00ft - Aggie State AA17-623_BHL</b>							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
366.00	366.00	-0.23	0.22	First Gyro Survey at 366.00ft
859.00	858.99	1.93	-1.36	Final Gyro Survey at 859.00ft
859.00	858.99	1.93	-1.36	Tie on to Gyro Survey at 859.00ft
1,082.00	1,081.99	1.81	-1.83	First Sperry MWD Survey at 1082.00ft
11,233.00	6,670.13	-43.83	4,667.45	Final Sperry MWD Survey at 11233.00ft
11,298.00	6,670.23	-39.69	4,732.31	Straight Line Projection to TD at 11298.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Aggie State AA17-623_BHL	90.87	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
366.00	859.00	Surface Surveys	Flexi-Shot
1,082.00	6,963.00	Intermediate Surveys	MWD+IFR1+MS_WY
7,097.00	11,298.00	Production Survey	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
945.00	944.99	9 5/8"	9-5/8	13-3/4
7,011.00	6,681.90	7"	7	8-3/4

## Design Report for Aggie State AA17-623 - Actual Surveys

### Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Aggie State AA17-623 - actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	0.02	0.00	1,420,120.86	3,286,996.02	40.482050	-104.468260
Aggie State AA17-623 - actual wellpath misses target center by 32.79usft at 11298.00usft MD (6670.23 TVD, -39.69 N, 4732.31 E) - Point	0.00	0.00	6,675.00	-71.94	4,735.86	1,420,048.90	3,291,731.71	40.481700	-104.451240

### Directional Difficulty Index

Average Dogleg over Survey:	1.67 °/100usft	Maximum Dogleg over Survey:	15.83 °/100usft at 6,834.00 usft
Net Tortousity applicable to Plans:	0.73 °/100usft	Directional Difficulty Index:	6.215

### Audit Info

North Reference Sheet for Sec. 17-T6N-R63W (Aggie State AA17) - Aggie State  
AA17-623 - Plan A

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' @ 4690.00usft (H&P 273). Northing and Easting are relative to Aggie State AA17-623

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: 0.99996497

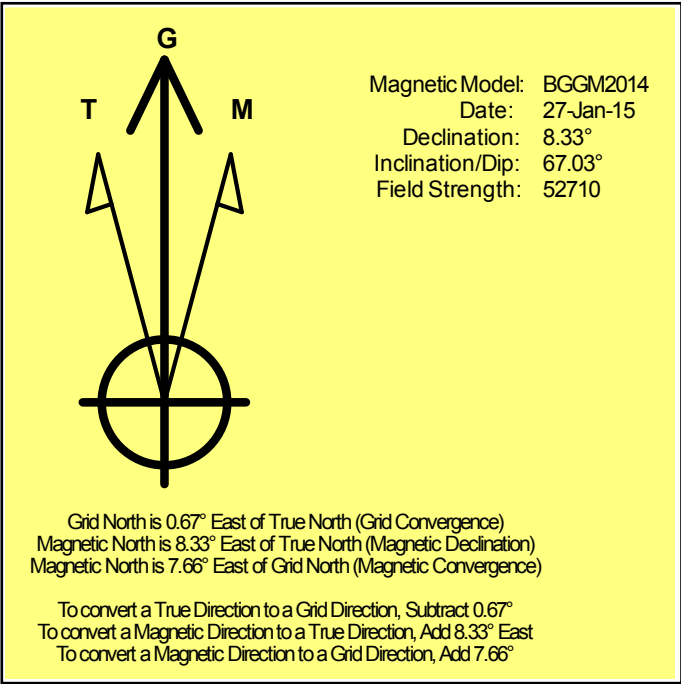
Grid Coordinates of Well: 1,420,120.84 usft N, 3,286,996.02 usft E

Geographical Coordinates of Well: 40° 28' 55.38" N, 104° 28' 05.74" W

Grid Convergence at Surface is: 0.67°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,298.00usft  
the Bottom Hole Displacement is 4,732.48usft in the Direction of 90.48° (Grid).

Magnetic Convergence at surface is: -7.66° (27 January 2015, , BGGM2014)



# Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T6N-R63W (Aggie State AA17)

Aggie State AA17-623

05-123-40903

Plan A

Design: Actual Surveys

## Sperry Drilling Services

### Geodetic Report

17 March, 2015

Well Coordinates: 1,420,120.84 N, 3,286,996.02 E (40° 28' 55.38" N, 104° 28' 05.74" W)

Ground Level: 4,666.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Aggie State AA17-623

KB = 24' @ 4690.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**



## Design Report for Aggie State AA17-623 - Actual Surveys

Measured			Vertical			Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)	+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.482050	-104.468260	40.482050	-104.468260	1,420,120.84	3,286,996.02
366.00	0.10	137.04	366.00	-0.23	0.22	40.482049	-104.468259	40.482049	-104.468259	1,420,120.61	3,286,996.23
613.00	0.60	329.64	613.00	0.72	-0.29	40.482052	-104.468261	40.482052	-104.468261	1,420,121.57	3,286,995.73
859.00	0.20	282.04	858.99	1.93	-1.36	40.482055	-104.468265	40.482055	-104.468265	1,420,122.77	3,286,994.66
945.00	0.14	264.68	944.99	1.95	-1.61	40.482055	-104.468266	40.482055	-104.468266	1,420,122.79	3,286,994.41
1,082.00	0.11	204.87	1,081.99	1.81	-1.83	40.482055	-104.468267	40.482055	-104.468267	1,420,122.66	3,286,994.19
1,358.00	0.18	196.62	1,357.99	1.16	-2.07	40.482053	-104.468268	40.482053	-104.468268	1,420,122.00	3,286,993.95
1,451.00	0.47	234.33	1,450.99	0.79	-2.42	40.482052	-104.468269	40.482052	-104.468269	1,420,121.64	3,286,993.60
1,543.00	2.69	228.49	1,542.95	-0.86	-4.34	40.482048	-104.468276	40.482048	-104.468276	1,420,119.99	3,286,991.68
1,636.00	4.78	213.41	1,635.75	-5.54	-8.11	40.482035	-104.468290	40.482035	-104.468290	1,420,115.31	3,286,987.91
1,730.00	6.60	209.80	1,729.28	-13.50	-12.95	40.482013	-104.468307	40.482013	-104.468307	1,420,107.35	3,286,983.07
1,919.00	7.06	204.09	1,916.94	-33.52	-23.09	40.481959	-104.468345	40.481959	-104.468345	1,420,087.32	3,286,972.93
2,013.00	7.92	209.25	2,010.14	-44.45	-28.61	40.481929	-104.468365	40.481929	-104.468365	1,420,076.40	3,286,967.41
2,108.00	7.28	206.65	2,104.30	-55.54	-34.51	40.481899	-104.468387	40.481899	-104.468387	1,420,065.31	3,286,961.51
2,202.00	8.80	214.23	2,197.38	-66.81	-41.23	40.481868	-104.468411	40.481868	-104.468411	1,420,054.04	3,286,954.79
2,297.00	8.09	216.87	2,291.35	-78.16	-49.33	40.481837	-104.468441	40.481837	-104.468441	1,420,042.68	3,286,946.69
2,391.00	7.60	216.90	2,384.47	-88.43	-57.03	40.481809	-104.468469	40.481809	-104.468469	1,420,032.42	3,286,938.99
2,485.00	9.38	211.42	2,477.44	-99.94	-64.75	40.481778	-104.468497	40.481778	-104.468497	1,420,020.91	3,286,931.27
2,581.00	8.95	208.27	2,572.21	-113.19	-72.37	40.481742	-104.468525	40.481742	-104.468525	1,420,007.66	3,286,923.65
2,675.00	8.85	208.43	2,665.08	-125.99	-79.27	40.481707	-104.468550	40.481707	-104.468550	1,419,994.86	3,286,916.75
2,770.00	9.10	208.27	2,758.92	-139.03	-86.31	40.481671	-104.468576	40.481671	-104.468576	1,419,981.82	3,286,909.71
2,865.00	9.32	210.16	2,852.69	-152.30	-93.73	40.481635	-104.468604	40.481635	-104.468604	1,419,968.55	3,286,902.29
2,959.00	7.77	197.86	2,945.65	-164.93	-99.51	40.481601	-104.468625	40.481601	-104.468625	1,419,955.92	3,286,896.51
3,053.00	6.76	181.37	3,038.91	-176.51	-101.59	40.481569	-104.468633	40.481569	-104.468633	1,419,944.34	3,286,894.43
3,148.00	5.45	180.01	3,133.37	-186.61	-101.72	40.481541	-104.468634	40.481541	-104.468634	1,419,934.24	3,286,894.30
3,243.00	3.69	169.89	3,228.06	-194.13	-101.19	40.481520	-104.468632	40.481520	-104.468632	1,419,926.72	3,286,894.83
3,337.00	2.71	132.24	3,321.92	-198.60	-99.01	40.481508	-104.468624	40.481508	-104.468624	1,419,922.25	3,286,897.01
3,432.00	2.12	75.86	3,416.85	-199.69	-95.64	40.481505	-104.468612	40.481505	-104.468612	1,419,921.17	3,286,900.38
3,526.00	1.02	359.32	3,510.82	-198.42	-93.97	40.481508	-104.468606	40.481508	-104.468606	1,419,922.43	3,286,902.05
3,621.00	1.02	353.52	3,605.81	-196.74	-94.07	40.481513	-104.468607	40.481513	-104.468607	1,419,924.11	3,286,901.95
3,716.00	0.97	348.53	3,700.79	-195.11	-94.33	40.481518	-104.468607	40.481518	-104.468607	1,419,925.74	3,286,901.69
3,810.00	1.21	340.19	3,794.78	-193.40	-94.82	40.481522	-104.468609	40.481522	-104.468609	1,419,927.46	3,286,901.20
3,905.00	1.23	333.69	3,889.76	-191.54	-95.62	40.481527	-104.468612	40.481527	-104.468612	1,419,929.31	3,286,900.41
3,999.00	1.40	336.21	3,983.73	-189.58	-96.53	40.481533	-104.468615	40.481533	-104.468615	1,419,931.27	3,286,899.50
4,093.00	1.18	338.35	4,077.71	-187.63	-97.35	40.481538	-104.468618	40.481538	-104.468618	1,419,933.22	3,286,898.67
4,187.00	0.94	337.14	4,171.69	-186.02	-98.00	40.481543	-104.468620	40.481543	-104.468620	1,419,934.83	3,286,898.02
4,282.00	1.03	343.74	4,266.68	-184.49	-98.54	40.481547	-104.468622	40.481547	-104.468622	1,419,936.37	3,286,897.48
4,376.00	1.09	349.40	4,360.66	-182.80	-98.95	40.481551	-104.468624	40.481551	-104.468624	1,419,938.06	3,286,897.08
4,470.00	1.10	0.70	4,454.64	-181.01	-99.10	40.481556	-104.468624	40.481556	-104.468624	1,419,939.84	3,286,896.92
4,564.00	0.96	268.25	4,548.63	-180.14	-99.87	40.481559	-104.468627	40.481559	-104.468627	1,419,940.71	3,286,896.15
4,658.00	1.17	271.89	4,642.62	-180.13	-101.62	40.481559	-104.468633	40.481559	-104.468633	1,419,940.72	3,286,894.40
4,753.00	1.05	275.84	4,737.60	-180.01	-103.46	40.481559	-104.468640	40.481559	-104.468640	1,419,940.84	3,286,892.56

## Design Report for Aggie State AA17-623 - 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)
5,037.00	0.82	285.16	5,021.56	-179.21	-108.01	40.481562	-104.468656	1,419,941.64	3,286,888.01
5,131.00	1.52	188.23	5,115.55	-180.27	-108.83	40.481559	-104.468659	1,419,940.58	3,286,887.19
5,319.00	1.56	167.90	5,303.48	-185.24	-108.65	40.481545	-104.468659	1,419,935.61	3,286,887.37
5,509.00	1.07	171.71	5,493.43	-189.52	-107.86	40.481533	-104.468656	1,419,931.33	3,286,888.16
5,698.00	0.84	166.69	5,682.40	-192.62	-107.28	40.481525	-104.468654	1,419,928.23	3,286,888.74
5,793.00	0.42	145.14	5,777.40	-193.58	-106.92	40.481522	-104.468653	1,419,927.27	3,286,889.10
5,929.00	0.24	280.98	5,913.40	-193.94	-106.92	40.481521	-104.468653	1,419,926.91	3,286,889.10
6,077.00	7.62	106.26	6,060.97	-196.63	-97.79	40.481513	-104.468620	1,419,924.22	3,286,898.23
6,172.00	13.54	111.70	6,154.32	-202.51	-81.39	40.481497	-104.468561	1,419,918.34	3,286,914.63
6,267.00	18.72	116.76	6,245.55	-213.49	-57.43	40.481466	-104.468476	1,419,907.36	3,286,938.59
6,361.00	24.12	119.27	6,333.03	-229.69	-27.19	40.481420	-104.468368	1,419,891.16	3,286,968.83
6,456.00	30.94	119.58	6,417.22	-251.26	11.03	40.481360	-104.468231	1,419,869.59	3,287,007.05
6,504.00	35.07	115.58	6,457.47	-263.31	34.21	40.481326	-104.468148	1,419,857.54	3,287,030.23
6,550.00	38.47	110.66	6,494.32	-274.07	59.53	40.481296	-104.468058	1,419,846.78	3,287,055.55
6,598.00	42.15	103.32	6,530.94	-283.06	89.20	40.481270	-104.467951	1,419,837.80	3,287,085.22
6,645.00	46.27	102.02	6,564.62	-290.23	121.17	40.481250	-104.467837	1,419,830.62	3,287,117.19
6,739.00	58.95	93.10	6,621.66	-299.53	194.99	40.481222	-104.467572	1,419,821.32	3,287,191.00
6,834.00	73.04	87.31	6,660.24	-299.60	281.51	40.481219	-104.467261	1,419,821.25	3,287,277.52
6,890.00	79.68	87.83	6,673.44	-297.30	335.85	40.481223	-104.467065	1,419,823.56	3,287,331.86
6,963.00	88.49	86.06	6,680.95	-293.42	408.28	40.481232	-104.466805	1,419,827.43	3,287,404.29
7,011.00	89.25	85.73	6,681.90	-289.99	456.15	40.481240	-104.466633	1,419,830.87	3,287,452.15
7,097.00	90.62	85.15	6,681.99	-283.16	541.88	40.481256	-104.466324	1,419,837.70	3,287,537.87
7,193.00	89.11	82.79	6,682.22	-273.07	637.34	40.481280	-104.465981	1,419,847.78	3,287,633.33
7,288.00	87.01	83.18	6,685.44	-261.48	731.56	40.481309	-104.465642	1,419,859.38	3,287,727.56
7,382.00	86.64	83.69	6,690.64	-250.75	824.80	40.481335	-104.465306	1,419,870.11	3,287,820.79
7,477.00	88.71	84.66	6,694.50	-241.11	919.23	40.481359	-104.464966	1,419,879.74	3,287,915.21
7,571.00	88.68	84.85	6,696.64	-232.52	1,012.81	40.481379	-104.464629	1,419,888.33	3,288,008.79
7,666.00	88.00	84.77	6,699.39	-223.93	1,107.38	40.481400	-104.464289	1,419,896.92	3,288,103.36
7,760.00	89.85	85.26	6,701.15	-215.77	1,201.01	40.481419	-104.463952	1,419,905.09	3,288,196.98
7,855.00	90.77	85.22	6,700.64	-207.88	1,295.68	40.481438	-104.463612	1,419,912.97	3,288,291.65
7,951.00	90.65	85.09	6,699.45	-199.78	1,391.33	40.481457	-104.463268	1,419,921.08	3,288,387.29
8,045.00	90.62	85.48	6,698.41	-192.05	1,485.00	40.481475	-104.462930	1,419,928.80	3,288,480.97
8,140.00	90.99	85.55	6,697.07	-184.62	1,579.70	40.481493	-104.462590	1,419,936.23	3,288,575.66
8,235.00	91.76	85.95	6,694.79	-177.58	1,674.41	40.481509	-104.462249	1,419,943.27	3,288,670.37
8,330.00	89.69	85.16	6,693.59	-170.22	1,769.11	40.481526	-104.461908	1,419,950.63	3,288,765.07
8,425.00	89.82	85.61	6,694.00	-162.58	1,863.80	40.481544	-104.461568	1,419,958.27	3,288,859.76
8,520.00	90.22	85.47	6,693.96	-155.19	1,958.52	40.481561	-104.461227	1,419,965.66	3,288,954.46
8,614.00	91.57	85.13	6,692.50	-147.49	2,052.19	40.481579	-104.460890	1,419,973.36	3,289,048.13
8,709.00	89.91	85.41	6,691.27	-139.66	2,146.85	40.481598	-104.460549	1,419,981.19	3,289,142.79
8,805.00	90.00	85.27	6,691.34	-131.86	2,242.53	40.481616	-104.460205	1,419,988.99	3,289,238.47
8,899.00	91.48	86.27	6,690.13	-124.92	2,336.27	40.481632	-104.459868	1,419,995.92	3,289,332.20
8,994.00	90.22	85.65	6,688.72	-118.23	2,431.02	40.481648	-104.459527	1,420,002.62	3,289,426.95

## Design Report for Aggie State AA17-623 - 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)
9,088.00	91.02	89.46	6,687.70	-114.22	2,524.91	40.481656	-104.459189	1,420,006.63	3,289,520.84
9,183.00	90.49	89.73	6,686.45	-113.55	2,619.90	40.481654	-104.458848	1,420,007.30	3,289,615.82
9,277.00	89.97	87.37	6,686.07	-111.17	2,713.86	40.481658	-104.458510	1,420,009.68	3,289,709.78
9,372.00	89.63	90.27	6,686.41	-109.22	2,808.83	40.481660	-104.458169	1,420,011.63	3,289,804.75
9,467.00	87.97	90.49	6,688.39	-109.85	2,903.80	40.481655	-104.457827	1,420,011.00	3,289,899.72
9,561.00	87.66	89.90	6,691.98	-110.17	2,997.73	40.481651	-104.457490	1,420,010.68	3,289,993.64
9,656.00	89.08	90.18	6,694.68	-110.23	3,092.69	40.481648	-104.457148	1,420,010.62	3,290,088.60
9,750.00	89.78	90.23	6,695.62	-110.57	3,186.68	40.481644	-104.456810	1,420,010.28	3,290,182.59
9,845.00	90.92	89.69	6,695.04	-110.50	3,281.68	40.481641	-104.456469	1,420,010.35	3,290,277.58
9,939.00	91.33	89.23	6,693.19	-109.62	3,375.66	40.481641	-104.456131	1,420,011.23	3,290,371.56
10,034.00	91.51	89.13	6,690.84	-108.26	3,470.62	40.481641	-104.455790	1,420,012.59	3,290,466.52
10,128.00	91.32	88.75	6,688.51	-106.52	3,564.57	40.481643	-104.455452	1,420,014.33	3,290,560.47
10,222.00	91.60	87.45	6,686.12	-103.40	3,658.49	40.481649	-104.455114	1,420,017.44	3,290,654.38
10,317.00	92.12	86.88	6,683.04	-98.71	3,753.32	40.481658	-104.454773	1,420,022.14	3,290,749.21
10,412.00	91.42	86.31	6,680.10	-93.07	3,848.11	40.481671	-104.454432	1,420,027.78	3,290,843.99
10,506.00	92.68	85.47	6,676.74	-86.34	3,941.80	40.481686	-104.454095	1,420,034.51	3,290,937.68
10,600.00	91.70	86.72	6,673.15	-79.94	4,035.52	40.481701	-104.453758	1,420,040.91	3,291,031.39
10,695.00	90.58	86.72	6,671.26	-74.51	4,130.34	40.481713	-104.453417	1,420,046.34	3,291,126.21
10,789.00	90.95	86.57	6,670.00	-69.00	4,224.17	40.481725	-104.453079	1,420,051.84	3,291,220.04
10,884.00	89.75	86.67	6,669.42	-63.40	4,319.00	40.481737	-104.452738	1,420,057.44	3,291,314.87
10,978.00	89.72	87.24	6,669.86	-58.41	4,412.87	40.481748	-104.452401	1,420,062.44	3,291,408.73
11,073.00	89.88	86.84	6,670.19	-53.51	4,507.74	40.481758	-104.452059	1,420,067.34	3,291,503.60
11,167.00	90.15	86.43	6,670.16	-47.99	4,601.58	40.481770	-104.451722	1,420,072.86	3,291,597.43
11,233.00	89.91	86.35	6,670.13	-43.83	4,667.45	40.481779	-104.451485	1,420,077.01	3,291,663.30
11,298.00	89.91	86.35	6,670.23	-39.69	4,732.31	40.481789	-104.451252	1,420,081.15	3,291,728.17

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
366.00	366.00	-0.23	0.22	First Gyro Survey at 366.00ft
859.00	858.99	1.93	-1.36	Final Gyro Survey at 859.00ft
859.00	858.99	1.93	-1.36	Tie on to Gyro Survey at 859.00ft
1,082.00	1,081.99	1.81	-1.83	First Sperry MWD Survey at 1082.00ft
11,233.00	6,670.13	-43.83	4,667.45	Final Sperry MWD Survey at 11233.00ft
11,298.00	6,670.23	-39.69	4,732.31	Straight Line Projection to TD at 11298.00ft

## Design Report for Aggie State AA17-623 - Actual Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Aggie State AA17-623_BHL	90.87	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
366.00	859.00	Surface Surveys	Flexi-Shot
1,082.00	6,963.00	Intermediate Surveys	MWD+IFR1+MS_WY
7,097.00	11,298.00	Production Survey	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
945.00	944.99	9 5/8"	9-5/8	13-3/4
7,011.00	6,681.90	7"	7	8-3/4

Design Targets

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

Directional Difficulty Index

Average Dogleg over Survey:	1.67 °/100usft	Maximum Dogleg over Survey:	15.83 °/100usft at 6,834.00 usft
Net Tortousity applicable to Plans:	0.73 °/100usft	Directional Difficulty Index:	6.215

---

**Design Report for Aggie State AA17-623 - Actual Surveys**

---

*Audit Info*

**North Reference Sheet for Sec. 17-T6N-R63W (Aggie State AA17) - Aggie State AA17-623 - Plan A**

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' @ 4690.00usft (H&P 273). Northing and Easting are relative to Aggie State AA 17-623

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: 0.99996497

Grid Coordinates of Well: 1,420,120.84 usft N, 3,286,996.02 usft E

Geographical Coordinates of Well: 40° 28' 55.38" N, 104° 28' 05.74" W

Grid Convergence at Surface is: 0.67°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,298.00usft

the Bottom Hole Displacement is 4,732.48usft in the Direction of 90.48° (Grid).

Magnetic Convergence at surface is: -7.66° (27 January 2015, , BGGM2014)

