

Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T6N-R63W

Aggie State AA17-645

05-123-40917

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

15 April, 2015

Surface UWI : 05-123-40917

Well Coordinates: 1,422,184.53 N, 3,286,819.01 E (40° 29' 15.79" N, 104° 28' 07.72" W)

Ground Level: 4,661.00 usft

Local Coordinate Origin:

Centered on Well Aggie State AA17-645

Viewing Datum:

KB @ 4685.00usft (HP 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

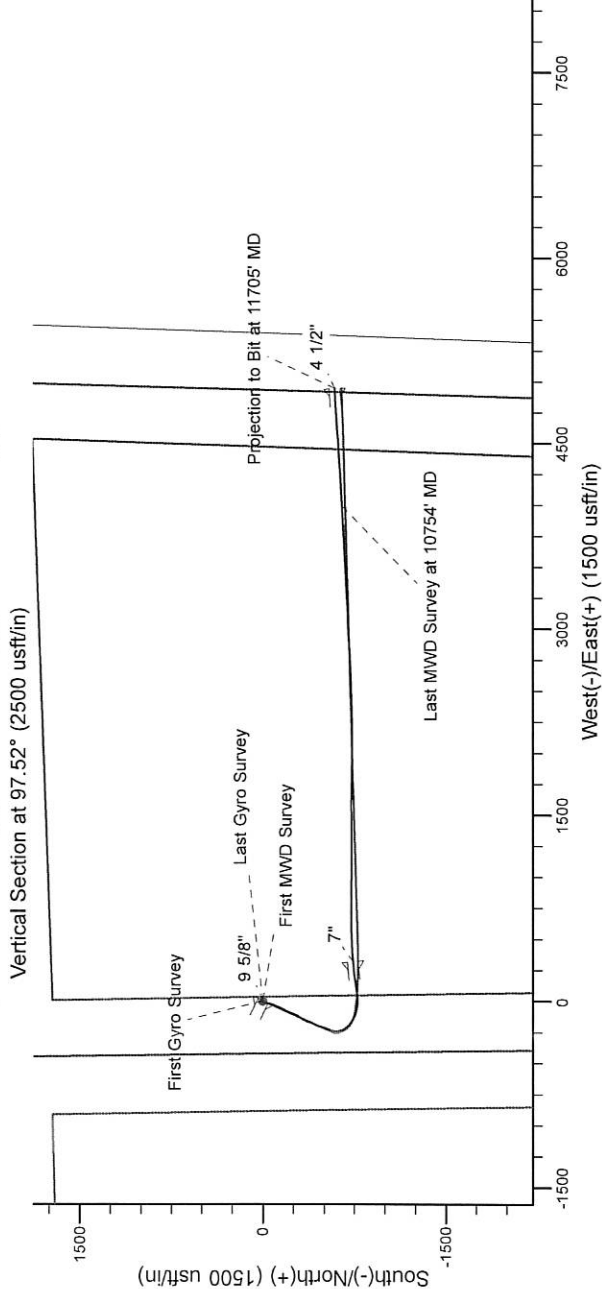
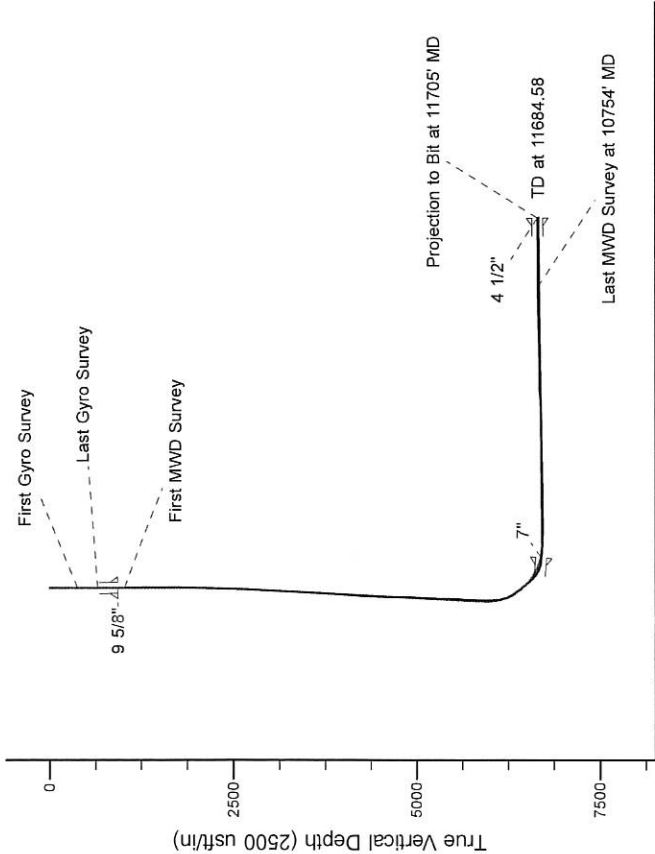
Version: 5000.1 Build: 73

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 17-T6N-R63W
Well: Aggie State AA17-645
Wellbore: Original Wellbore
Design: Actual Surveys

Noble Energy

HALLIBURTON
Sperry Drilling



Platted SHL: 2195 FNL 424' FWL
Platted Lat/Long: 40.487720 N, 104.468810 W
Location: Sec. 17-T6N-R63W

~7" Casing: 2306' FSL, 775' FWL
Lat/Long: 40.485679 N, 104.467697 W
State Planes - CO Northern: 1421444.65 N, 3287137.16 E
Location: Sec. 17-T6N-R63W

Platted BHL: 2310' FSL, 50' FWL
Lat/Long: 40.485770 N, 104.451070 W
State Planes - CO Northern: 1421532.08 N, 3291761.46 E
Location: Sec. 16-T6N-R63W

LEGEND

- Aggie State AA17-645, Original Wellbore, Rev C0 V0
- Actual Surveys

WELL DETAILS: Aggie State AA17-645

Ground Level: 4661.00
KB @ 4685.00ust (HP 343)

Created By: Amanda Marchand
Created On: 4/13/2015

Design Report for Aggie State AA17-645 - 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
374.00	0.20	141.87	374.00	-0.51	0.40	0.47	0.05
First Gyro Survey							
653.00	0.20	157.57	653.00	-1.35	0.89	1.06	0.02
Last Gyro Survey							
1,020.00	1.54	113.61	1,019.95	-3.91	5.65	6.12	0.38
First MWD Survey							
1,115.00	1.29	111.33	1,114.92	-4.81	7.82	8.38	0.27
1,208.00	1.11	28.18	1,207.90	-4.40	9.22	9.72	1.72
1,393.00	1.39	48.43	1,392.86	-1.33	11.74	11.82	0.28
1,486.00	2.07	356.01	1,485.82	1.09	12.47	12.22	1.77
1,579.00	2.06	351.51	1,578.76	4.42	12.11	11.43	0.17
1,764.00	1.52	335.22	1,763.67	9.94	10.59	9.20	0.40
1,949.00	1.60	319.01	1,948.61	14.11	7.87	5.95	0.24
2,136.00	2.69	227.13	2,135.51	13.10	2.94	1.20	1.70
2,227.00	5.98	213.06	2,226.24	7.67	-1.22	-2.21	3.77
2,320.00	8.33	201.11	2,318.52	-2.68	-6.29	-5.88	2.98
2,412.00	10.37	193.89	2,409.29	-16.93	-10.67	-8.37	2.55
2,504.00	10.39	191.86	2,499.79	-33.09	-14.37	-9.91	0.40
2,596.00	11.61	200.80	2,590.10	-49.86	-19.36	-12.67	2.28
2,689.00	11.06	198.92	2,681.29	-67.05	-25.58	-16.58	0.71
2,782.00	10.72	196.65	2,772.62	-83.78	-30.95	-19.72	0.59
2,875.00	11.65	206.87	2,863.86	-100.44	-37.67	-24.20	2.35
3,065.00	11.25	204.30	3,050.08	-134.45	-53.97	-35.91	0.34
3,160.00	10.92	199.10	3,143.31	-151.39	-60.73	-40.39	1.11
3,255.00	10.52	210.02	3,236.66	-167.41	-68.01	-45.51	2.18
3,350.00	9.19	207.59	3,330.25	-181.64	-75.86	-51.44	1.47
3,446.00	7.22	205.80	3,425.27	-193.87	-82.04	-55.96	2.07
3,541.00	8.49	200.24	3,519.38	-205.82	-87.06	-59.38	1.56
3,636.00	10.40	199.94	3,613.08	-220.47	-92.41	-62.77	2.01
3,730.00	11.16	200.21	3,705.42	-236.98	-98.45	-66.59	0.81
3,825.00	12.40	204.53	3,798.42	-254.89	-105.86	-71.59	1.60
3,920.00	12.97	204.41	3,891.10	-273.87	-114.50	-77.67	0.60
4,015.00	11.32	214.28	3,983.98	-291.29	-124.16	-84.97	2.79
4,110.00	10.58	215.10	4,077.25	-306.13	-134.43	-93.21	0.80
4,205.00	9.51	212.86	4,170.80	-319.86	-143.70	-100.60	1.20
4,300.00	7.74	211.76	4,264.72	-331.89	-151.33	-106.59	1.87
4,394.00	6.76	208.66	4,357.97	-342.13	-157.31	-111.18	1.12
4,489.00	7.36	204.55	4,452.25	-352.57	-162.52	-114.98	0.83
4,584.00	6.72	200.32	4,546.53	-363.31	-166.98	-118.00	0.87
4,679.00	4.49	192.71	4,641.07	-372.16	-169.73	-119.56	2.47
4,774.00	5.47	188.81	4,735.71	-380.26	-171.24	-120.00	1.09
4,869.00	6.09	195.29	4,830.23	-389.59	-173.26	-120.78	0.95
4,964.00	7.60	208.00	4,924.55	-400.00	-177.54	-123.66	2.24
5,059.00	11.49	210.24	5,018.22	-413.73	-185.26	-129.52	4.11
5,155.00	10.05	206.43	5,112.53	-429.49	-193.80	-135.93	1.67
5,250.00	9.93	198.48	5,206.09	-444.68	-200.09	-140.17	1.46
5,345.00	10.48	195.21	5,299.59	-460.79	-204.95	-142.88	0.84
5,440.00	9.54	191.55	5,393.15	-476.84	-208.80	-144.59	1.19
5,535.00	11.84	197.98	5,486.49	-493.83	-213.38	-146.92	2.72

Design Report for Aggie State AA17-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,630.00	10.77	196.61	5,579.65	-511.60	-218.93	-150.09	1.16
5,725.00	11.63	203.16	5,672.84	-528.91	-225.23	-154.07	1.62
5,820.00	10.75	199.77	5,766.04	-546.06	-231.99	-158.53	1.16
5,915.00	13.87	194.57	5,858.84	-565.42	-237.86	-161.81	3.48
6,010.00	16.74	186.68	5,950.48	-590.04	-242.31	-163.01	3.73
6,104.00	14.30	177.61	6,041.05	-615.09	-243.41	-160.81	3.65
6,199.00	18.41	162.40	6,132.23	-641.13	-238.38	-152.42	6.21
6,294.00	29.99	144.59	6,218.85	-674.94	-220.00	-129.77	14.29
6,389.00	35.67	131.55	6,298.74	-712.74	-185.44	-90.56	9.52
6,484.00	37.21	120.74	6,375.24	-745.83	-139.97	-41.16	6.94
6,579.00	38.79	103.62	6,450.31	-767.58	-86.21	14.99	11.19
6,674.00	40.52	94.66	6,523.51	-777.11	-26.47	75.46	6.28
6,769.00	47.00	83.31	6,592.20	-775.56	38.96	140.13	10.69
6,864.00	61.05	80.56	6,647.87	-764.64	114.85	213.94	14.97
6,959.00	76.34	82.58	6,682.29	-751.79	202.15	298.80	16.22
7,023.00	83.11	84.54	6,693.70	-744.74	264.69	359.88	11.00
7,156.00	86.55	86.01	6,705.68	-733.84	396.68	489.31	2.81
7,248.00	88.58	87.46	6,709.59	-728.60	488.44	579.59	2.71
7,340.00	88.49	89.75	6,711.94	-726.36	580.37	670.44	2.49
7,433.00	88.00	90.20	6,714.79	-726.32	673.33	762.60	0.72
7,526.00	91.20	90.65	6,715.44	-727.01	766.31	854.87	3.47
7,619.00	91.14	90.48	6,713.54	-727.93	859.29	947.16	0.19
7,714.00	90.22	90.36	6,712.41	-728.63	954.28	1,041.43	0.98
7,809.00	89.82	89.78	6,712.38	-728.74	1,049.28	1,135.63	0.74
7,904.00	90.43	90.62	6,712.17	-729.07	1,144.27	1,229.85	1.09
7,999.00	90.03	89.89	6,711.79	-729.50	1,239.27	1,324.09	0.88
8,094.00	92.22	89.30	6,709.93	-728.82	1,334.25	1,418.15	2.39
8,189.00	91.94	88.99	6,706.48	-727.41	1,429.17	1,512.08	0.44
8,284.00	91.42	89.17	6,703.69	-725.88	1,524.12	1,606.01	0.58
8,379.00	91.05	91.40	6,701.64	-726.36	1,619.09	1,700.23	2.38
8,474.00	90.62	91.51	6,700.26	-728.77	1,714.05	1,794.68	0.47
8,569.00	90.22	90.97	6,699.56	-730.82	1,809.02	1,889.11	0.71
8,664.00	90.09	91.25	6,699.31	-732.66	1,904.00	1,983.52	0.32
8,759.00	91.11	90.27	6,698.31	-733.92	1,998.99	2,077.85	1.49
8,854.00	90.59	90.32	6,696.90	-734.41	2,093.98	2,172.08	0.55
8,949.00	91.02	89.14	6,695.57	-733.97	2,188.96	2,266.19	1.32
9,044.00	92.16	88.62	6,692.93	-732.11	2,283.91	2,360.08	1.32
9,139.00	93.09	89.06	6,688.58	-730.19	2,378.79	2,453.89	1.08
9,234.00	93.67	89.09	6,682.98	-728.66	2,473.61	2,547.70	0.61
9,329.00	92.96	88.30	6,677.49	-726.50	2,568.42	2,641.41	1.12
9,424.00	89.85	87.48	6,675.16	-723.00	2,663.32	2,735.03	3.39
9,519.00	90.03	86.95	6,675.26	-718.38	2,758.21	2,828.50	0.59
9,615.00	89.69	86.11	6,675.49	-712.57	2,854.03	2,922.74	0.94
9,709.00	92.07	87.45	6,674.05	-707.29	2,947.86	3,015.07	2.91
9,804.00	91.88	87.72	6,670.77	-703.29	3,042.72	3,108.59	0.35
9,899.00	91.54	87.22	6,667.94	-699.10	3,137.58	3,202.09	0.64
9,994.00	90.89	86.99	6,665.92	-694.31	3,232.44	3,295.51	0.73
10,089.00	91.64	87.23	6,663.83	-689.52	3,327.30	3,388.92	0.83
10,184.00	91.76	86.74	6,661.01	-684.52	3,422.12	3,482.28	0.53
10,279.00	91.39	85.95	6,658.40	-678.47	3,516.89	3,575.44	0.92
10,373.00	91.11	87.20	6,656.35	-672.85	3,610.70	3,667.70	1.36

Design Report for Aggie State AA17-645 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,468.00	90.99	88.13	6,654.61	-668.98	3,705.60	3,761.29	0.99
10,563.00	90.49	87.26	6,653.38	-665.16	3,800.52	3,854.88	1.06
10,659.00	90.68	86.88	6,652.40	-660.26	3,896.39	3,949.29	0.44
10,754.00	90.31	86.34	6,651.58	-654.64	3,991.22	4,042.56	0.69
Last MWD Survey at 10754' MD							
10,800.00	90.31	86.34	6,651.33	-651.70	4,037.12	4,087.69	0.00
10,900.00	90.31	86.34	6,650.79	-645.32	4,136.92	4,185.79	0.00
11,000.00	90.31	86.34	6,650.25	-638.94	4,236.71	4,283.89	0.00
11,100.00	90.31	86.34	6,649.71	-632.55	4,336.51	4,381.99	0.00
11,200.00	90.31	86.34	6,649.17	-626.17	4,436.30	4,480.09	0.00
11,300.00	90.31	86.34	6,648.62	-619.79	4,536.10	4,578.20	0.00
11,400.00	90.31	86.34	6,648.08	-613.40	4,635.89	4,676.30	0.00
11,500.00	90.31	86.34	6,647.54	-607.02	4,735.69	4,774.40	0.00
11,600.00	90.31	86.34	6,647.00	-600.64	4,835.48	4,872.50	0.00
11,705.00	90.31	86.34	6,646.43	-593.93	4,940.26	4,975.50	0.00
Projection to Bit at 11705' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
374.00	374.00	-0.51	0.40	First Gyro Survey
653.00	653.00	-1.35	0.89	Last Gyro Survey
1,020.00	1,019.95	-3.91	5.65	First MWD Survey
10,754.00	6,651.58	-654.64	3,991.22	Last MWD Survey at 10754' MD
11,705.00	6,646.43	-593.93	4,940.26	Projection to Bit at 11705' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Aggie State AA17-645_BHL	97.52	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
374.00	653.00	Gyro Surveys	Flexi-Shot
1,020.00	7,023.00	Sperry MWD	MWD+IFR1+MS_WY
7,156.00	10,754.00	Production Surveys	MWD+IFR1+MS_WY
10,800.00	11,705.00	Projection to Bit	BLIND

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
927.00	926.97	9 5/8"	9-5/8	13-3/4
7,077.00	6,699.52	7"	7	8-3/4
11,705.00	6,646.43	4 1/2"	4-1/2	6-1/8

Design Report for Aggie State AA17-645 - 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 AA17-645 - actual wellpath misses target center by 59.54usft at 11703.55usft MD (6646.44 TVD, -594.03 N, 4938.82 E) - Point	0.00	0.00	6,657.10	-652.48	4,942.62	1,421,532.08	3,291,761.46	40.485770	-104.451070
Aggie State AA17-645 - actual wellpath misses target center by 39.92usft at 7109.35usft MD (6702.38 TVD, -737.28 N, 350.27 E) - Point	0.00	0.00	6,680.00	-769.99	355.00	1,421,414.57	3,287,174.00	40.485595	-104.467566

Directional Difficulty Index

Average Dogleg over Survey:	1.91 °/100usft	Maximum Dogleg over Survey:	16.22 °/100usft at 6,959.00 usft
Net Tortosity applicable to Plans:	0.92 °/100usft	Directional Difficulty Index:	6.367

Audit Info