

Noble Energy

Weld County, CO (NAD 83)

Sec. 17-T6N-R63W

Aggie State AA17-643

05-123-40924

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services Final Survey Report

15 April, 2015

05-123-40924

Well Coordinates: 1,422,144.46 N, 3,286,819.48 E (40° 29' 15.40" N, 104° 28' 07.72" W)

Ground Level: 4,660.00 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 AA17-643

KB @ 4684.00usft (HP 343)

N

Grid

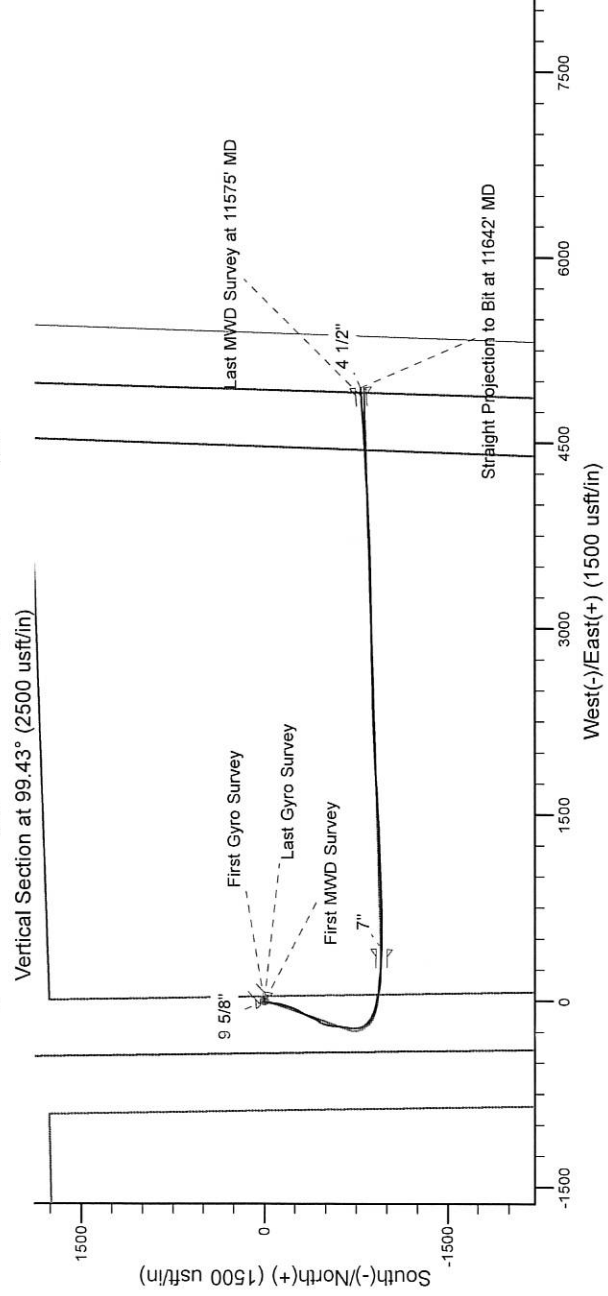
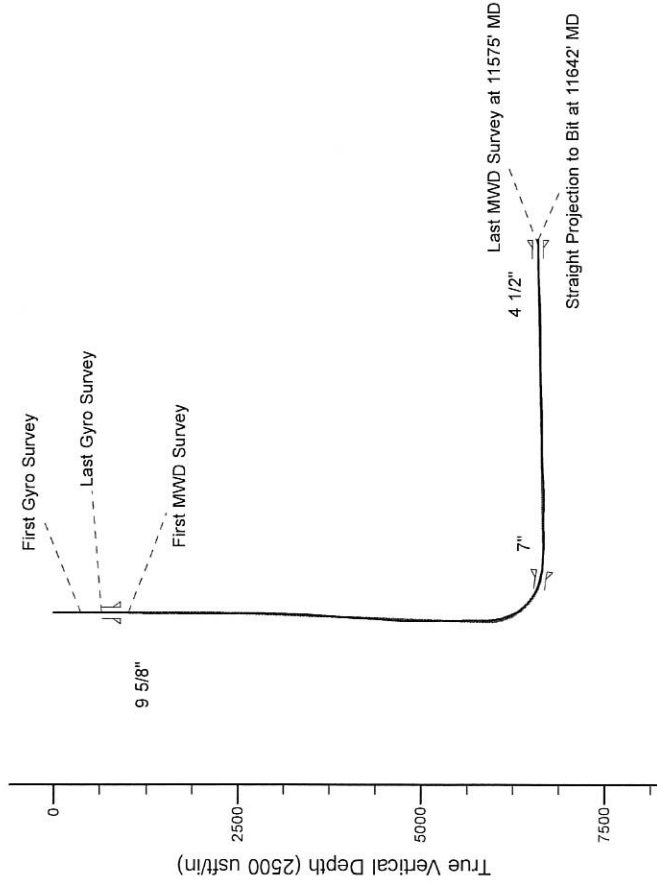
Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 17-T6N-R63W
Well: Aggie State AA17-643
Wellbore: Original Wellbore
Design: Actual Surveys

Noble Energy

HALLIBURTON
Sperry Drilling



Platted SHL: 2232 FNL 424' FWL
Platted Lat/Long: 40.487610 N, 104.468810 W
Location: Sec. 17-T6N-R63W

~7" Casing: 2100' FSL, 797' FWL
Lat/Long: 40.484961 N, 104.467358 W
State Planes - CO Northern: 1421184.08 N, 3287234.54 E
Location: Sec. 17-T6N-R63W

Platted BHL: 2100' FSL, 50' FWL
Lat/Long: 40.48520 N, 104.45110 W
State Planes - CO Northern: 1421324.34 N, 3291755.57 E
Location: Sec. 16-T6N-R63W

LEGEND

- Aggie State AA17-643, Original Wellbore, Rev B0 V0
- Actual Surveys

WELL DETAILS: Aggie State AA17-643
Ground Level: 4660.00
KB @ 4694.00usft (HP 343)

Created By: Amanda Marchand
Created On: 4/15/2015

Design Report for Aggie State AA17-643 - 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
377.00	0.20	23.30	377.00	0.60	0.26	0.16	0.05
First Gyro Survey							
655.00	0.90	223.80	654.99	-0.53	-1.06	-0.96	0.39
Last Gyro Survey							
1,018.00	0.40	228.69	1,017.97	-3.42	-3.98	-3.37	0.14
First MWD Survey							
1,206.00	0.61	279.33	1,205.96	-3.69	-5.46	-4.79	0.25
1,298.00	0.61	311.18	1,297.95	-3.29	-6.32	-5.69	0.36
1,577.00	0.62	308.66	1,576.94	-1.37	-8.61	-8.27	0.01
1,669.00	0.62	331.24	1,668.93	-0.62	-9.24	-9.01	0.26
1,763.00	0.56	329.69	1,762.93	0.22	-9.72	-9.62	0.07
1,855.00	0.54	352.94	1,854.92	1.04	-10.00	-10.03	0.24
1,948.00	1.71	202.23	1,947.91	0.19	-10.58	-10.46	2.36
2,040.00	3.32	212.86	2,039.82	-3.32	-12.54	-11.83	1.81
2,133.00	6.28	197.86	2,132.49	-10.42	-15.56	-13.64	3.43
2,225.00	7.88	188.41	2,223.79	-21.45	-18.03	-14.27	2.15
2,318.00	10.35	185.51	2,315.61	-36.08	-19.76	-13.58	2.70
2,410.00	9.74	184.16	2,406.19	-52.07	-21.12	-12.30	0.71
2,502.00	11.18	179.34	2,496.67	-68.75	-21.58	-10.02	1.83
2,594.00	11.71	187.83	2,586.84	-86.92	-22.75	-8.20	1.92
2,687.00	12.77	192.77	2,677.73	-106.29	-26.31	-8.53	1.60
2,781.00	11.95	192.82	2,769.55	-125.91	-30.77	-9.71	0.87
2,874.00	12.03	193.12	2,860.52	-144.74	-35.10	-10.91	0.11
2,969.00	11.03	194.00	2,953.60	-163.20	-39.55	-12.27	1.07
3,064.00	11.01	200.25	3,046.85	-180.53	-44.89	-14.69	1.26
3,159.00	10.61	192.12	3,140.17	-197.59	-49.86	-16.80	1.66
3,254.00	9.17	194.70	3,233.76	-213.46	-53.62	-17.91	1.59
3,349.00	8.83	206.35	3,327.60	-227.32	-58.78	-20.73	1.95
3,444.00	9.84	200.63	3,421.34	-241.45	-64.88	-24.42	1.44
3,539.00	9.36	205.43	3,515.01	-256.03	-71.05	-28.13	0.98
3,634.00	11.08	213.09	3,608.51	-270.65	-79.36	-33.92	2.30
3,729.00	14.65	210.70	3,701.11	-288.64	-90.48	-41.94	3.80
3,824.00	15.48	209.17	3,792.84	-310.04	-102.79	-50.58	0.97
3,919.00	13.88	204.95	3,884.74	-331.44	-113.78	-57.91	2.02
4,015.00	12.73	205.63	3,978.16	-351.42	-123.21	-63.94	1.21
4,109.00	11.69	206.14	4,070.03	-369.31	-131.88	-69.57	1.11
4,204.00	9.93	200.64	4,163.35	-385.61	-139.01	-73.93	2.15
4,299.00	7.28	201.37	4,257.27	-398.89	-144.09	-76.77	2.79
4,394.00	9.70	204.24	4,351.22	-411.79	-149.57	-80.06	2.59
4,489.00	14.14	215.89	4,444.16	-428.50	-159.67	-87.28	5.29
4,584.00	12.80	213.07	4,536.55	-446.72	-172.21	-96.67	1.57
4,678.00	9.51	208.92	4,628.76	-462.25	-181.65	-103.43	3.60
4,774.00	9.78	195.71	4,723.42	-477.04	-187.70	-106.97	2.32
4,868.00	10.45	200.12	4,815.96	-492.73	-192.79	-109.43	1.09
4,964.00	10.00	196.24	4,910.43	-508.91	-198.12	-112.03	0.86
5,058.00	11.88	187.14	5,002.73	-526.35	-201.60	-112.61	2.71
5,153.00	13.43	187.37	5,095.42	-546.99	-204.23	-111.82	1.63
5,248.00	12.18	187.22	5,188.05	-567.88	-206.91	-111.04	1.32
5,344.00	9.88	183.58	5,282.27	-586.15	-208.70	-109.80	2.50

Design Report for Aggie State AA17-643 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,439.00	11.43	182.79	5,375.63	-603.68	-209.66	-107.88	1.64
5,534.00	12.03	181.86	5,468.65	-622.98	-210.44	-105.49	0.66
5,629.00	10.38	182.71	5,561.83	-641.43	-211.17	-103.18	1.75
5,724.00	9.54	187.98	5,655.40	-657.77	-212.67	-101.98	1.30
5,819.00	10.54	195.00	5,748.95	-673.96	-216.01	-102.62	1.66
5,914.00	16.12	187.23	5,841.36	-695.46	-219.92	-102.96	6.16
6,009.00	27.24	184.55	5,929.50	-730.32	-223.32	-100.59	11.75
6,104.00	25.66	168.73	6,014.66	-772.22	-221.02	-91.46	7.58
6,199.00	24.97	149.88	6,100.68	-809.80	-206.91	-71.39	8.48
6,294.00	26.27	137.64	6,186.40	-842.71	-182.67	-42.08	5.73
6,389.00	27.07	125.03	6,271.36	-870.67	-150.77	-6.03	6.01
6,484.00	38.44	109.59	6,351.26	-893.09	-105.02	42.78	14.77
6,579.00	42.78	103.63	6,423.39	-910.61	-45.80	104.07	6.12
6,674.00	50.85	100.62	6,488.36	-925.03	21.88	173.20	8.80
6,769.00	59.15	97.75	6,542.81	-937.34	98.64	250.93	9.08
6,864.00	67.96	94.58	6,585.08	-946.37	183.11	335.75	9.74
6,959.00	74.56	93.70	6,615.59	-952.85	272.79	425.28	7.00
7,050.00	78.04	93.37	6,637.14	-958.30	361.02	513.21	3.84
7,156.00	84.32	89.08	6,653.39	-960.50	465.67	616.80	7.15
7,248.00	84.78	90.03	6,662.13	-959.79	557.25	707.02	1.14
7,340.00	86.36	90.23	6,669.23	-960.00	648.97	797.54	1.73
7,433.00	87.72	88.25	6,674.04	-958.77	741.83	888.94	2.58
7,526.00	91.85	87.68	6,674.39	-955.47	834.75	980.07	4.48
7,619.00	92.90	87.78	6,670.53	-951.79	927.60	1,071.05	1.13
7,714.00	91.94	88.86	6,666.52	-949.00	1,022.47	1,164.19	1.52
7,809.00	88.34	87.95	6,666.29	-946.36	1,117.42	1,257.41	3.91
7,904.00	87.97	88.06	6,669.35	-943.06	1,212.31	1,350.48	0.41
7,999.00	90.52	87.53	6,670.60	-939.40	1,307.22	1,443.51	2.74
8,094.00	91.29	87.30	6,669.10	-935.12	1,402.11	1,536.42	0.85
8,189.00	89.20	86.74	6,668.69	-930.18	1,496.98	1,629.19	2.28
8,284.00	91.72	86.43	6,667.93	-924.52	1,591.80	1,721.80	2.67
8,379.00	92.80	86.44	6,664.18	-918.62	1,686.54	1,814.29	1.14
8,474.00	93.23	86.66	6,659.19	-912.91	1,781.24	1,906.77	0.51
8,569.00	93.21	87.13	6,653.85	-907.77	1,875.95	1,999.36	0.49
8,664.00	93.79	87.31	6,648.05	-903.17	1,970.66	2,092.04	0.64
8,759.00	90.06	87.88	6,644.86	-899.19	2,065.50	2,184.95	3.97
8,854.00	90.46	88.25	6,644.43	-895.98	2,160.45	2,278.08	0.57
8,949.00	90.18	88.17	6,643.90	-893.01	2,255.40	2,371.26	0.31
9,044.00	89.57	88.12	6,644.11	-889.94	2,350.35	2,464.43	0.64
9,139.00	89.17	88.54	6,645.15	-887.17	2,445.30	2,557.64	0.61
9,234.00	89.72	88.82	6,646.07	-884.98	2,540.27	2,650.97	0.65
9,329.00	92.74	89.05	6,644.03	-883.22	2,635.22	2,744.35	3.19
9,425.00	92.28	89.03	6,639.83	-881.61	2,731.12	2,838.68	0.48
9,520.00	92.06	88.84	6,636.23	-879.85	2,826.03	2,932.02	0.31
9,615.00	91.60	88.87	6,633.20	-877.95	2,920.96	3,025.36	0.49
9,709.00	91.39	88.94	6,630.74	-876.15	3,014.92	3,117.75	0.24
9,804.00	90.80	89.03	6,628.93	-874.47	3,109.88	3,211.15	0.63
9,994.00	90.43	89.07	6,626.89	-871.32	3,299.84	3,398.03	0.20
10,089.00	89.82	89.01	6,626.68	-869.73	3,394.83	3,491.47	0.65
10,184.00	89.82	88.99	6,626.98	-868.07	3,489.82	3,584.90	0.02
10,279.00	89.85	88.92	6,627.25	-866.34	3,584.80	3,678.32	0.08

Design Report for Aggie State AA17-643 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,373.00	91.32	87.63	6,626.29	-863.51	3,678.75	3,770.53	2.08
10,564.00	90.03	87.29	6,624.04	-855.04	3,869.54	3,957.36	0.70
10,659.00	92.13	87.34	6,622.25	-850.60	3,964.42	4,050.22	2.21
10,754.00	92.49	87.08	6,618.43	-845.97	4,059.23	4,142.99	0.47
10,848.00	92.31	86.95	6,614.49	-841.08	4,153.02	4,234.71	0.24
10,943.00	92.03	86.89	6,610.89	-835.98	4,247.81	4,327.39	0.30
11,038.00	92.13	86.85	6,607.44	-830.80	4,342.61	4,420.05	0.11
11,133.00	92.37	86.77	6,603.71	-825.52	4,437.39	4,512.68	0.27
11,228.00	91.79	86.65	6,600.27	-820.07	4,532.17	4,605.29	0.62
11,323.00	91.73	86.66	6,597.35	-814.53	4,626.96	4,697.89	0.06
11,418.00	90.31	86.00	6,595.66	-808.45	4,721.75	4,790.40	1.65
11,513.00	89.82	85.84	6,595.55	-801.69	4,816.51	4,882.77	0.54
11,575.00	89.72	85.89	6,595.80	-797.22	4,878.34	4,943.04	0.18
Last MWD Survey at 11575' MD							
11,642.00	89.72	85.89	6,596.13	-792.42	4,945.17	5,008.17	0.00
Straight Projection to Bit at 11642' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
377.00	377.00	0.60	0.26	First Gyro Survey
655.00	654.99	-0.53	-1.06	Last Gyro Survey
1,018.00	1,017.97	-3.42	-3.98	First MWD Survey
11,575.00	6,595.80	-797.22	4,878.34	Last MWD Survey at 11575' MD
11,642.00	6,596.13	-792.42	4,945.17	Straight Projection to Bit at 11642' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Aggie State AA17-643_BHL	99.43	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
377.00	655.00	Surface Surveys	Flexi-Shot
1,018.00	7,050.00	Intermediate Surveys	MWD+IFR1+MS_WY
7,156.00	11,642.00	Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
915.00		9 5/8"	9-5/8	13-3/4
7,105.00	6,647.00	7"	4-1/2	8-3/4
11,642.00	6,596.13	4 1/2"	4-1/2	6-1/8

Design Report for Aggie State AA17-643 - 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 AA17-643 - actual wellpath misses target center by 27.08usft at 11631.12usft MD (6596.07 TVD, -793.20 N, 4934.32 E) - Point	0.00	0.00	6,594.39	-820.15	4,936.26	1,421,324.34	3,291,755.57	40.485200	-104.451100
Aggie State AA17-643 - actual wellpath misses target center by 31.71usft at 7065.64usft MD (6640.26 TVD, -959.12 N, 376.33 E) - Point	0.00	0.00	6,620.00	-934.99	380.00	1,421,209.50	3,287,199.46	40.485032	-104.467483

Directional Difficulty Index

Average Dogleg over Survey:	2.00 °/100usft	Maximum Dogleg over Survey:	14.77 °/100usft at 6,484.00 usft
Net Tortousity applicable to Plans:	1.01 °/100usft	Directional Difficulty Index:	6.392

Audit Info