

# **Noble Energy**

**Weld County, CO (NAD 83)**  
**Sec. 11-T6N-R63W (Wells Ranch PAD)**  
**Wells Ranch AA11-682**  
**05-123-41210**  
**Original Wellbore**

**Design: Final Surveys**

## **Sperry Drilling Services**

### **Standard Report**

**01 October, 2015**

Surface UWI : 05-123-41210

Well Coordinates: 1,429,279.22 N, 3,307,181.79 E (40° 30' 23.47" N, 104° 23' 43.04" W)  
Ground Level: 4,856.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch AA11-682

Viewing Datum:

KB @ 4886.00usft (HP 321)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

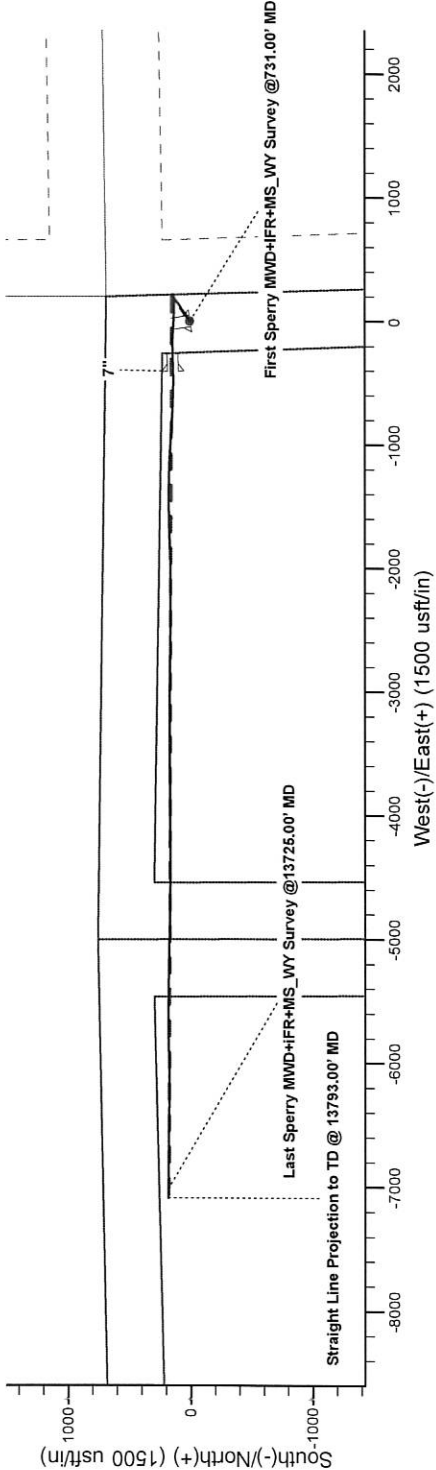
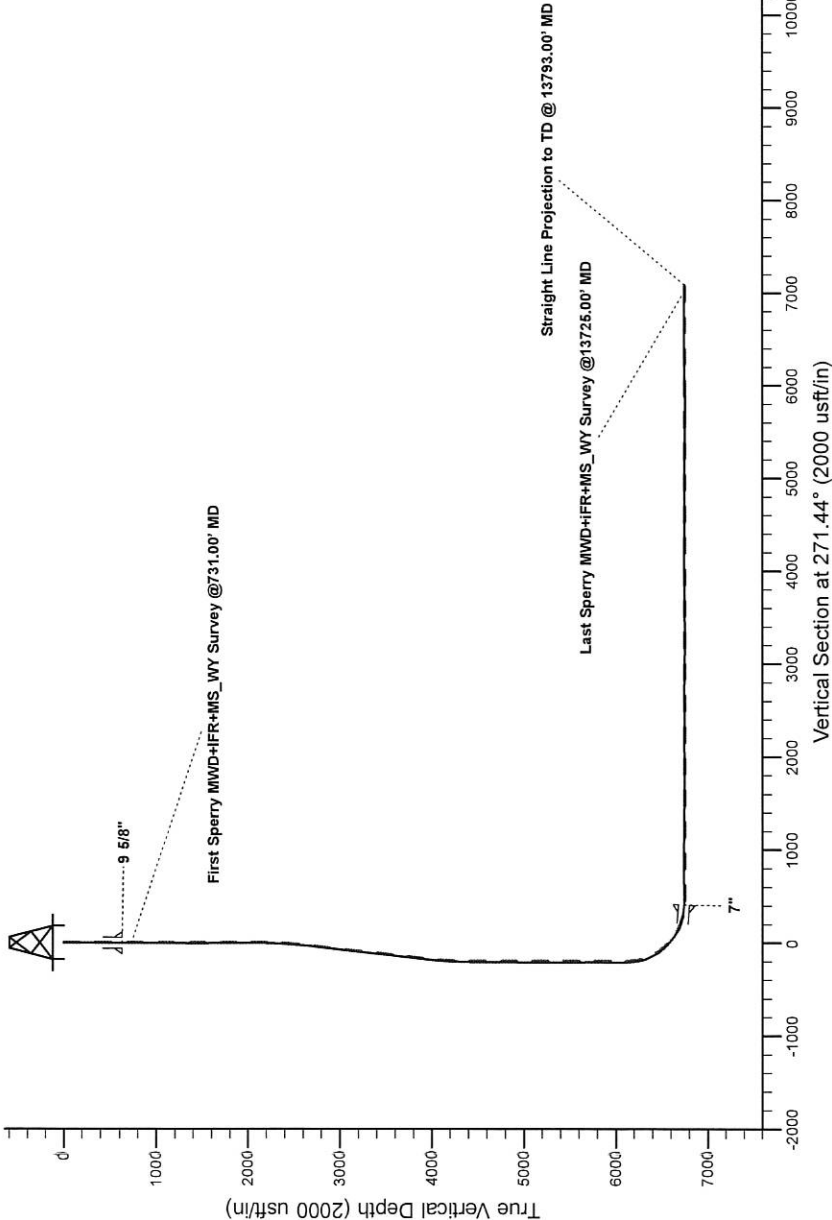
Version: 5000.1 Build: 73

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
Site: Sec. 11-T6N-R63W (Wells Ranch PAD)  
Well: Wells Ranch AA11-682  
Wellbore: Original Wellbore  
Design: Final Surveys

# Noble Energy

**HALLIBURTON**  
Sperry Drilling



Platted SHL: 687' FNL, 215' FEL  
Platted Lat/Long: 40.50852° N, 104.39529° W  
Location: Sec. 11-T6N-R63W  
~7" Casing: ~549' FNL, ~608' FEL  
Lat/Long: 40.50691° N, 104.39675° W  
State Planes - CO Northern: 1,429,415.3 N, 3,306,773.5 E  
Location: Sec. 11-T6N-R63W  
Platted BHL: 535' FNL, 2085' FEL  
Lat/Long: 40.50725° N, 104.42077° W  
State Planes - CO Northern: 1424587.09 N, 3300119.71 E  
Location: Sec. 10-T6N-R63W

## LEGEND

-- Wells Ranch AA11-682, Original Wellbore, Rev A0 V0  
— Final Surveys

WELL DETAILS: Wells Ranch AA11-682  
Ground Level: 4856.00  
KB @4856.00usft (HP 321)

Created By: Jerry Popp  
Created On: 2015.10.01

## Design Report for Wells Ranch AA11-682 - Final 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
731.00	0.52	171.05	730.99	-3.28	0.52	-0.60	0.07
<b>First Sperry MWD+IFR+MS_WY Survey @731.00' MD</b>							
823.00	0.46	198.26	822.99	-4.04	0.47	-0.57	0.26
1,008.00	0.25	161.11	1,007.98	-5.13	0.36	-0.49	0.16
1,100.00	0.47	150.69	1,099.98	-5.65	0.61	-0.76	0.25
1,210.00	1.02	134.05	1,209.97	-6.72	1.54	-1.71	0.53
1,301.00	0.58	128.07	1,300.96	-7.57	2.48	-2.67	0.49
1,393.00	0.65	164.34	1,392.96	-8.36	2.99	-3.20	0.42
1,486.00	0.34	328.03	1,485.96	-8.63	2.99	-3.20	1.05
1,579.00	0.41	303.73	1,578.95	-8.21	2.56	-2.77	0.18
1,670.00	0.50	0.69	1,669.95	-7.63	2.30	-2.49	0.48
1,763.00	0.80	352.29	1,762.95	-6.58	2.21	-2.38	0.34
1,854.00	0.92	2.99	1,853.94	-5.23	2.17	-2.30	0.22
1,945.00	0.90	11.68	1,944.92	-3.80	2.35	-2.45	0.15
2,037.00	0.87	20.47	2,036.91	-2.43	2.74	-2.80	0.15
2,128.00	0.97	22.00	2,127.90	-1.07	3.27	-3.30	0.11
2,220.00	0.94	35.10	2,219.89	0.27	4.00	-3.99	0.24
2,312.00	2.10	53.62	2,311.86	1.88	5.79	-5.74	1.35
2,404.00	3.90	62.27	2,403.73	4.34	9.91	-9.80	2.01
2,497.00	5.65	52.48	2,496.40	8.60	16.35	-16.12	2.07
2,588.00	7.63	49.65	2,586.79	15.24	24.50	-24.11	2.20
2,679.00	9.06	45.92	2,676.82	24.14	34.26	-33.64	1.68
2,771.00	9.10	47.41	2,767.67	34.10	44.82	-43.94	0.26
2,866.00	7.87	56.78	2,861.63	42.75	55.79	-54.69	1.94
3,055.00	8.36	59.51	3,048.74	56.81	78.45	-77.00	0.33
3,150.00	8.84	60.46	3,142.67	63.91	90.75	-89.12	0.53
3,245.00	7.52	63.23	3,236.70	70.31	102.66	-100.85	1.45
3,340.00	7.67	59.28	3,330.87	76.35	113.66	-111.70	0.57
3,434.00	7.44	56.12	3,424.05	82.95	124.10	-121.97	0.51
3,529.00	6.50	56.68	3,518.35	89.33	133.70	-131.41	0.99
3,624.00	8.02	47.39	3,612.59	96.77	143.07	-140.59	2.02
3,718.00	8.99	45.93	3,705.55	106.32	153.18	-150.45	1.06
3,813.00	8.43	51.82	3,799.46	115.78	163.98	-161.01	1.11
4,002.00	7.07	57.90	3,986.73	130.53	184.73	-181.38	0.84
4,097.00	6.00	55.73	4,081.11	136.43	193.78	-190.28	1.16
4,191.00	4.86	50.43	4,174.69	141.74	200.91	-197.28	1.32
4,286.00	2.22	51.35	4,269.50	145.45	205.45	-201.72	2.78
4,381.00	0.88	118.15	4,364.47	146.25	207.53	-203.78	2.15
4,476.00	0.98	133.52	4,459.46	145.35	208.77	-205.04	0.28
4,570.00	0.66	123.85	4,553.45	144.50	209.80	-206.09	0.37
4,665.00	0.92	118.03	4,648.44	143.83	210.93	-207.23	0.29
4,760.00	0.64	124.79	4,743.43	143.17	212.04	-208.36	0.31
4,855.00	1.14	127.60	4,838.42	142.29	213.22	-209.57	0.53
4,950.00	0.52	342.64	4,933.41	142.13	213.84	-210.19	1.68
5,045.00	0.51	315.28	5,028.41	142.84	213.41	-209.75	0.26
5,139.00	0.52	296.92	5,122.41	143.33	212.74	-209.06	0.18
5,329.00	0.46	135.28	5,312.40	143.18	212.51	-208.83	0.51
5,424.00	0.75	124.30	5,407.40	142.56	213.29	-209.63	0.33
5,519.00	0.75	273.14	5,502.40	142.24	213.18	-209.53	1.52

## Design Report for Wells Ranch AA11-682 - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,613.00	0.81	242.89	5,596.39	141.97	211.98	-208.33	0.44
5,708.00	0.68	231.64	5,691.38	141.31	210.94	-207.31	0.21
5,803.00	0.28	155.41	5,786.38	140.75	210.59	-206.98	0.71
5,898.00	0.89	158.26	5,881.37	139.86	210.96	-207.37	0.64
5,992.00	1.52	146.32	5,975.35	138.14	211.92	-208.37	0.72
6,087.00	1.89	145.29	6,070.31	135.81	213.51	-210.02	0.39
6,134.00	1.42	182.49	6,117.29	134.59	213.93	-210.47	2.44
6,182.00	4.90	263.21	6,165.22	133.75	211.87	-208.43	10.16
6,229.00	9.21	273.90	6,211.86	133.77	206.12	-202.68	9.55
6,276.00	13.13	271.22	6,257.96	134.14	197.02	-193.58	8.41
6,323.00	17.90	266.97	6,303.23	133.87	184.47	-181.03	10.43
6,371.00	23.37	266.26	6,348.14	132.86	167.59	-164.19	11.41
6,418.00	25.30	265.10	6,390.96	131.39	148.28	-144.92	4.23
6,466.00	29.75	264.87	6,433.52	129.45	126.19	-122.88	9.27
6,513.00	34.92	268.30	6,473.22	128.01	101.11	-97.85	11.67
6,560.00	40.93	274.20	6,510.29	128.74	72.27	-69.00	14.92
6,607.00	45.22	274.80	6,544.61	131.26	40.28	-36.96	9.17
6,655.00	48.44	273.84	6,577.45	133.89	5.38	-2.00	6.86
6,702.00	51.09	274.31	6,607.80	136.44	-30.41	33.84	5.69
6,750.00	53.56	273.47	6,637.14	139.01	-68.31	71.79	5.33
6,844.00	62.77	271.91	6,686.67	142.70	-148.00	151.54	9.90
6,891.00	71.95	269.68	6,704.75	143.28	-191.32	194.87	20.02
6,938.00	77.48	267.67	6,717.13	142.22	-236.63	240.13	12.47
6,985.00	79.56	267.69	6,726.49	140.35	-282.64	286.09	4.43
7,032.00	80.52	267.95	6,734.61	138.59	-328.90	332.29	2.11
7,066.00	83.24	268.05	6,739.42	137.42	-362.54	365.89	8.01
7,260.00	93.15	270.74	6,745.52	135.39	-556.17	559.41	5.29
7,308.00	92.10	271.59	6,743.32	136.36	-604.11	607.35	2.81
7,403.00	91.20	272.51	6,740.59	139.76	-699.01	702.31	1.35
7,498.00	88.92	274.43	6,740.49	145.51	-793.82	797.24	3.14
7,593.00	89.66	273.86	6,741.66	152.37	-888.57	892.12	0.98
7,685.00	90.49	273.96	6,741.54	158.65	-980.35	984.04	0.91
7,776.00	89.75	273.54	6,741.35	164.60	-1,071.16	1,074.96	0.94
7,868.00	89.26	272.46	6,742.15	169.41	-1,163.02	1,166.92	1.29
7,960.00	88.46	270.97	6,743.98	172.17	-1,254.96	1,258.90	1.84
8,053.00	87.94	270.71	6,746.90	173.53	-1,347.90	1,351.85	0.63
8,145.00	89.48	269.87	6,748.97	173.99	-1,439.88	1,443.80	1.91
8,237.00	89.97	269.35	6,749.41	173.37	-1,531.87	1,535.76	0.78
8,329.00	90.52	268.51	6,749.02	171.65	-1,623.85	1,627.66	1.09
8,420.00	90.74	267.86	6,748.02	168.77	-1,714.80	1,718.51	0.75
8,512.00	90.99	267.64	6,746.63	165.16	-1,806.72	1,810.31	0.36
8,603.00	90.83	268.83	6,745.18	162.35	-1,897.67	1,901.15	1.32
8,695.00	89.75	268.56	6,744.72	160.26	-1,989.64	1,993.05	1.21
8,787.00	90.25	269.84	6,744.72	158.97	-2,081.63	2,084.97	1.49
8,879.00	88.86	270.05	6,745.43	158.89	-2,173.62	2,176.94	1.53
8,971.00	89.75	270.56	6,746.55	159.38	-2,265.61	2,268.91	1.11
9,063.00	89.11	269.27	6,747.46	159.24	-2,357.61	2,360.87	1.57
9,154.00	90.46	271.09	6,747.81	159.53	-2,448.60	2,451.84	2.49
9,246.00	90.68	270.78	6,746.89	161.03	-2,540.58	2,543.83	0.41
9,341.00	91.23	270.59	6,745.31	162.16	-2,635.56	2,638.81	0.61
9,435.00	89.35	271.85	6,744.83	164.16	-2,729.53	2,732.80	2.41

## Design Report for Wells Ranch AA11-682 - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,530.00	87.26	270.35	6,747.64	165.99	-2,824.47	2,827.75	2.71
9,625.00	88.98	271.15	6,750.76	167.23	-2,919.40	2,922.69	2.00
9,719.00	89.91	270.29	6,751.67	168.41	-3,013.39	3,016.68	1.35
9,814.00	89.91	270.49	6,751.82	169.06	-3,108.39	3,111.66	0.21
9,909.00	90.28	269.92	6,751.66	169.40	-3,203.39	3,206.64	0.72
10,003.00	90.03	269.33	6,751.41	168.78	-3,297.38	3,300.59	0.68
10,098.00	90.18	269.72	6,751.23	168.00	-3,392.38	3,395.53	0.44
10,193.00	90.00	269.19	6,751.08	167.09	-3,487.37	3,490.48	0.59
10,287.00	90.62	270.39	6,750.57	166.75	-3,581.37	3,584.43	1.44
10,382.00	91.11	270.03	6,749.14	167.10	-3,676.36	3,679.40	0.64
10,477.00	90.89	270.61	6,747.48	167.63	-3,771.34	3,774.37	0.65
10,571.00	90.12	270.00	6,746.65	168.13	-3,865.34	3,868.34	1.05
10,666.00	90.22	269.86	6,746.37	168.01	-3,960.33	3,963.31	0.18
10,761.00	89.85	268.96	6,746.31	167.03	-4,055.33	4,058.25	1.02
10,855.00	90.46	268.55	6,746.06	164.99	-4,149.31	4,152.15	0.78
10,950.00	89.88	269.42	6,745.78	163.31	-4,244.29	4,247.06	1.10
11,045.00	90.12	269.08	6,745.78	162.06	-4,339.28	4,341.99	0.44
11,139.00	89.11	271.36	6,746.41	162.42	-4,433.27	4,435.96	2.65
11,234.00	89.69	271.06	6,747.40	164.43	-4,528.24	4,530.95	0.69
11,329.00	89.41	270.65	6,748.15	165.85	-4,623.23	4,625.94	0.52
11,423.00	89.97	270.64	6,748.66	166.91	-4,717.22	4,719.93	0.60
11,517.00	90.68	270.54	6,748.13	167.87	-4,811.21	4,813.92	0.76
11,612.00	89.29	272.00	6,748.15	169.98	-4,906.19	4,908.91	2.12
11,706.00	89.88	271.14	6,748.83	172.55	-5,000.15	5,002.91	1.11
11,801.00	91.02	271.06	6,748.09	174.38	-5,095.13	5,097.90	1.20
11,895.00	88.92	271.01	6,748.13	176.08	-5,189.10	5,191.89	2.23
11,989.00	89.35	271.16	6,749.55	177.86	-5,283.08	5,285.88	0.48
12,084.00	89.32	271.07	6,750.66	179.70	-5,378.05	5,380.87	0.10
12,178.00	88.80	270.53	6,752.20	181.02	-5,472.03	5,474.85	0.80
12,273.00	88.30	270.23	6,754.60	181.65	-5,567.00	5,569.81	0.61
12,368.00	89.26	269.47	6,756.62	181.40	-5,661.97	5,664.75	1.29
12,462.00	90.83	269.27	6,756.55	180.36	-5,755.96	5,758.68	1.68
12,557.00	91.14	269.00	6,754.92	178.93	-5,850.94	5,853.59	0.43
12,651.00	91.73	268.42	6,752.56	176.81	-5,944.89	5,947.45	0.88
12,746.00	90.83	269.25	6,750.44	174.88	-6,039.84	6,042.33	1.29
12,840.00	91.45	269.02	6,748.57	173.46	-6,133.81	6,136.23	0.70
12,935.00	90.52	270.50	6,746.94	173.07	-6,228.79	6,231.18	1.84
13,029.00	91.39	270.03	6,745.37	173.50	-6,322.78	6,325.14	1.05
13,123.00	90.12	271.37	6,744.13	174.65	-6,416.76	6,419.12	1.96
13,218.00	90.62	271.02	6,743.52	176.63	-6,511.73	6,514.12	0.64
13,313.00	89.88	270.86	6,743.10	178.19	-6,606.72	6,609.11	0.80
13,407.00	90.40	270.39	6,742.88	179.22	-6,700.71	6,703.10	0.75
13,502.00	89.23	270.95	6,743.18	180.33	-6,795.70	6,798.09	1.37
13,596.00	88.95	270.80	6,744.67	181.76	-6,889.68	6,892.07	0.34
13,691.00	88.49	270.70	6,746.80	183.00	-6,984.65	6,987.04	0.50
13,725.00	88.06	270.29	6,747.82	183.30	-7,018.63	7,021.02	1.75
Last Sperry MWD+iFR+MS_WY Survey @13725.00' MD							
13,793.00	88.06	270.29	6,750.12	183.64	-7,086.59	7,088.97	0.00
Straight Line Projection to TD @ 13793.00' MD							

## Design Report for Wells Ranch AA11-682 - Final Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
731.00	730.99	-3.28	0.52	First Sperry MWD+IFR+MS_WY Survey @731.00' MD
13,725.00	6,747.82	183.30	-7,018.63	Last Sperry MWD+IFR+MS_WY Survey @13725.00' MD
13,793.00	6,750.12	183.64	-7,086.59	Straight Line Projection to TD @ 13793.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch AA11-682_BHL	271.44	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
731.00	7,066.00	Intermediate Surveys	MWD+IFR1+MS_WY
7,066.00	13,793.00	Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
628.00	627.99	9 5/8"	9-5/8	13-3/4
7,112.00	6,743.89	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									
Wells Ranch AA11-682	0.00	0.00	0.00	178.69	-7,088.23	1,429,457.90	3,300,093.80	40.507250	-104.420770
- actual wellpath misses target center by 6747.33usft at 13643.78usft MD (6745.65 TVD, 182.41 N, -6937.44 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.54 °/100usft	Maximum Dogleg over Survey:	20.02 °/100usft at 6,891.00 usft
Net Tortousity applicable to Plans:	0.77 °/100usft	Directional Difficulty Index:	6.518

Audit Info

## North Reference Sheet for Sec. 11-T6N-R63W (Wells Ranch PAD) - Wells Ranch AA11-682 - Original Wellbore

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

Vertical Depths are relative to KB @ 4886.00usft (HP 321). Northing and Easting are relative to Wells Ranch AA11-682

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: 0.99996679

Grid Coordinates of Well: 1,429,279.22 usft N, 3,307,181.79 usft E

Geographical Coordinates of Well: 40° 30' 23.47" N, 104° 23' 43.04" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,793.00usft  
the Bottom Hole Displacement is 7,088.97usft in the Direction of 271.48° (Grid).

Magnetic Convergence at surface is: -7.65° (18 May 2015, , BGGM2015)

