

Noble Energy

Weld County, CO (NAD 83)

Sec. 30-T6N-R63W (Shadow PAD)

Shadow State A26-614

05-123-42920

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

18 May, 2016

Surface UWI : 05-123-42920

Well Coordinates: 1,408,938.67 N, 3,285,024.83 E (40° 27' 05.11" N, 104° 28' 32.92" W)

Ground Level: 4,638.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 81

Centered on Well Shadow State A26-614

KB = 24' @ 4662.00usft (H&P 343)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

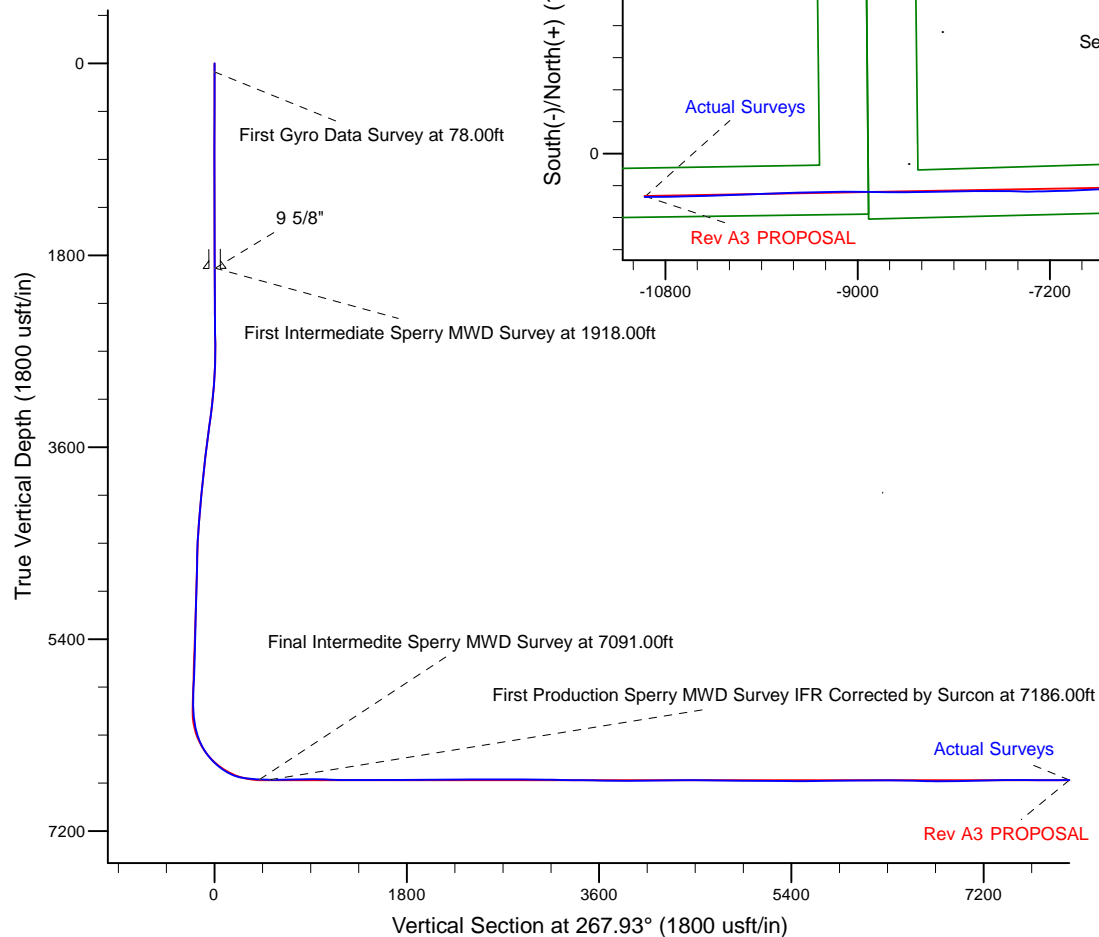
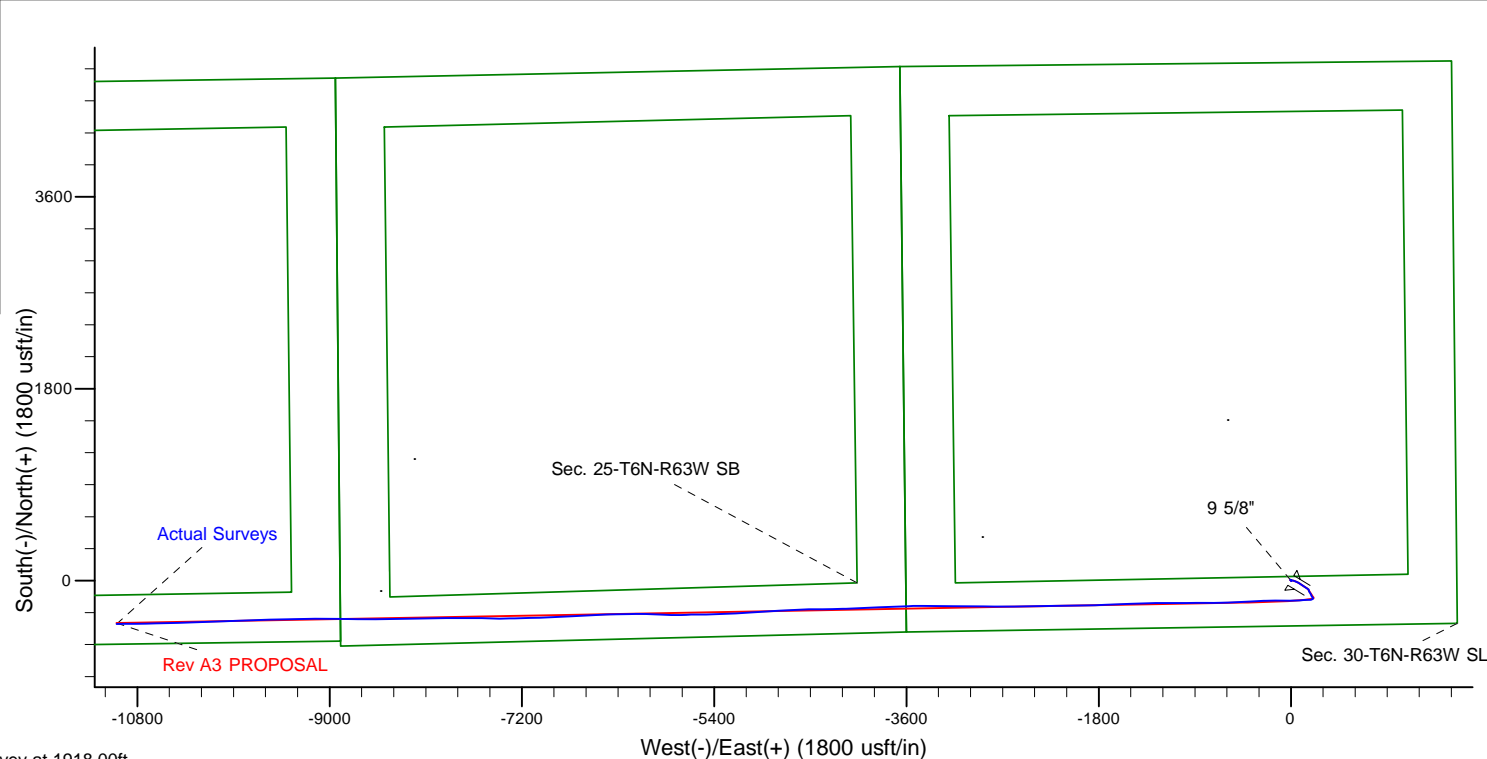
HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 30-T6N-R63W (Shadow PAD)
 Well: Shadow State A26-614
 Wellbore: Plan A
 Design: Actual Surveys



Platted SHL: 425' FSL, 1553' FEL
 Platted Lat/Long: 40.45142, -104.47581
 Location: Sec. 30-T6N-R63W

Platted BHL: 220' FSL, 2097' FEL
 Platted Lat/Long: 40.45067 N, -104.51533 W
 State Planes - CO Northern: 1,408,532.78 N, 3,274,091.80 E
 Location: Sec. 26-T6N-R64W



LEGEND

- Shadow State A26-614, Plan A, Rev A3 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Shadow State A26-614

Ground Level: 4638.00
 KB = 24' @ 4662.00usft (H&P 343)

Created By: Tatiana Gomez
 Created On: 5-18-16

Design Report for Shadow State A26-614 - 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
78.00	0.03	330.60	78.00	0.02	-0.01	0.01	0.04
First Gyro Data Survey at 78.00ft							
172.00	0.37	16.96	172.00	0.33	0.07	-0.08	0.37
270.00	0.46	22.75	270.00	0.99	0.31	-0.35	0.10
365.00	0.19	193.16	365.00	1.19	0.42	-0.47	0.68
459.00	0.13	73.91	459.00	1.07	0.49	-0.53	0.30
554.00	0.33	62.52	553.99	1.23	0.84	-0.88	0.21
648.00	0.37	87.49	647.99	1.37	1.38	-1.43	0.17
743.00	0.14	323.31	742.99	1.47	1.62	-1.67	0.49
837.00	0.29	338.53	836.99	1.79	1.46	-1.52	0.17
932.00	0.03	235.28	931.99	1.99	1.35	-1.42	0.31
1,026.00	0.08	234.67	1,025.99	1.94	1.28	-1.35	0.05
1,121.00	0.15	216.62	1,120.99	1.80	1.15	-1.21	0.08
1,215.00	0.09	278.68	1,214.99	1.72	1.00	-1.07	0.14
1,310.00	0.09	216.97	1,309.99	1.67	0.89	-0.94	0.10
1,404.00	0.44	295.12	1,403.99	1.76	0.51	-0.58	0.46
1,499.00	0.21	324.63	1,498.99	2.06	0.08	-0.16	0.29
1,593.00	0.07	329.94	1,592.99	2.25	-0.05	-0.04	0.15
1,688.00	0.21	209.42	1,687.99	2.15	-0.16	0.08	0.27
1,782.00	0.40	232.54	1,781.99	1.80	-0.51	0.44	0.24
1,877.00	0.37	251.15	1,876.98	1.50	-1.06	1.00	0.13
Final Gyro Data Survey at 1877.00ft - Tie on to Gyro Data Survey at 1877.00ft							
1,918.00	0.48	296.58	1,917.98	1.53	-1.34	1.28	0.84
First Intermediate Sperry MWD Survey at 1918.00ft							
1,923.00	0.47	301.43	1,922.98	1.55	-1.37	1.32	0.84
9 5/8"							
1,963.00	0.50	341.88	1,962.98	1.80	-1.57	1.50	0.84
2,057.00	0.68	333.23	2,056.98	2.69	-1.95	1.85	0.21
2,152.00	0.60	332.88	2,151.97	3.64	-2.43	2.29	0.08
2,246.00	0.67	320.81	2,245.97	4.50	-3.00	2.83	0.16
2,341.00	0.73	301.52	2,340.96	5.25	-3.87	3.67	0.25
2,435.00	0.68	304.32	2,434.95	5.88	-4.84	4.62	0.06
2,530.00	0.53	322.71	2,529.95	6.54	-5.57	5.33	0.26
2,624.00	0.39	321.36	2,623.94	7.14	-6.03	5.77	0.15
2,719.00	0.50	309.03	2,718.94	7.65	-6.56	6.27	0.15
2,813.00	1.03	124.33	2,812.94	7.43	-6.18	5.90	1.63
2,908.00	2.80	107.17	2,907.88	6.27	-3.25	3.03	1.94
3,002.00	4.97	109.41	3,001.66	4.24	2.78	-2.93	2.31
3,097.00	6.84	104.52	3,096.15	1.45	12.14	-12.18	2.04
3,191.00	6.55	102.92	3,189.51	-1.15	22.78	-22.73	0.37
3,310.00	7.54	106.97	3,307.61	-4.95	36.87	-36.66	0.93
3,404.00	8.13	113.97	3,400.73	-9.45	48.84	-48.47	1.19
3,499.00	8.65	121.53	3,494.72	-15.91	61.07	-60.45	1.28
3,593.00	8.56	121.78	3,587.66	-23.29	73.04	-72.15	0.10
3,688.00	8.68	122.51	3,681.59	-30.87	85.09	-83.92	0.17
3,782.00	8.82	122.28	3,774.50	-38.53	97.17	-95.71	0.15
3,877.00	7.09	120.27	3,868.58	-45.38	108.39	-106.68	1.84
3,972.00	6.24	124.32	3,962.94	-51.24	117.72	-115.79	1.02
4,066.00	5.71	128.66	4,056.43	-57.05	125.59	-123.45	0.74

Design Report for Shadow State A26-614 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,160.00	6.62	125.65	4,149.88	-63.12	133.64	-131.27	1.03
4,255.00	6.39	122.09	4,244.27	-69.12	142.57	-139.98	0.49
4,349.00	5.68	122.89	4,337.75	-74.43	150.91	-148.12	0.76
4,444.00	5.17	123.87	4,432.32	-79.37	158.41	-155.44	0.55
4,539.00	4.15	142.33	4,527.01	-84.48	164.07	-160.91	1.90
4,633.00	3.74	164.27	4,620.79	-90.12	166.98	-163.61	1.65
4,728.00	3.05	178.85	4,715.63	-95.63	167.87	-164.30	1.16
4,822.00	3.15	157.54	4,809.49	-100.52	168.91	-165.16	1.22
4,917.00	4.00	148.60	4,904.31	-105.76	171.63	-167.69	1.07
5,012.00	3.80	144.36	4,999.09	-111.14	175.19	-171.06	0.37
5,106.00	3.18	144.02	5,092.91	-115.78	178.54	-174.23	0.66
5,201.00	3.77	156.57	5,187.74	-120.78	181.33	-176.84	1.01
5,296.00	3.84	158.22	5,282.53	-126.60	183.75	-179.05	0.14
5,390.00	3.26	154.03	5,376.35	-131.93	186.09	-181.19	0.68
5,485.00	3.95	153.33	5,471.16	-137.28	188.74	-183.65	0.73
5,674.00	2.92	151.44	5,659.82	-147.33	193.96	-188.51	0.55
5,768.00	3.73	145.98	5,753.66	-151.96	196.82	-191.19	0.92
5,863.00	3.85	142.25	5,848.45	-157.05	200.50	-194.69	0.29
5,957.00	3.05	137.55	5,942.28	-161.39	204.12	-198.15	0.90
6,052.00	3.56	154.24	6,037.13	-165.91	207.11	-200.97	1.14
6,147.00	9.31	228.42	6,131.60	-173.68	202.63	-196.22	9.48
6,241.00	13.61	263.59	6,223.82	-179.97	185.93	-179.30	8.52
6,336.00	18.71	270.94	6,315.04	-180.97	159.56	-152.92	5.77
6,430.00	26.98	267.90	6,401.60	-181.50	123.12	-116.47	8.88
6,525.00	36.38	264.26	6,482.36	-185.12	73.43	-66.69	10.09
6,619.00	45.42	269.92	6,553.36	-187.96	12.07	-5.26	10.39
6,714.00	53.67	271.10	6,614.95	-187.27	-60.15	66.88	8.74
6,808.00	64.38	269.95	6,663.26	-186.58	-140.62	147.28	11.44
6,903.00	76.24	268.07	6,695.21	-188.18	-229.89	236.54	12.62
6,997.00	86.41	266.51	6,709.37	-192.58	-322.59	329.34	10.94
7,091.00	87.27	266.27	6,714.55	-198.49	-416.25	423.16	0.95
Final Intermedite Sperry MWD Survey at 7091.00ft							
7,186.00	89.46	268.06	6,717.26	-203.19	-511.09	518.10	2.98
First Production Sperry MWD Survey IFR Corrected by Surcon at 7186.00ft							
7,280.00	91.41	269.62	6,716.55	-205.09	-605.06	612.08	2.66
7,375.00	89.86	268.90	6,715.50	-206.32	-700.04	707.05	1.80
7,469.00	90.73	268.72	6,715.01	-208.27	-794.02	801.03	0.95
7,563.00	89.21	269.68	6,715.06	-209.58	-888.01	895.01	1.91
7,658.00	89.55	269.33	6,716.09	-210.40	-983.00	989.96	0.51
7,752.00	88.51	269.82	6,717.68	-211.10	-1,076.98	1,083.91	1.22
7,847.00	88.81	270.07	6,719.90	-211.19	-1,171.96	1,178.82	0.41
7,942.00	89.64	270.08	6,721.19	-211.07	-1,266.95	1,273.75	0.87
8,036.00	89.52	268.25	6,721.88	-212.44	-1,360.93	1,367.72	1.95
8,131.00	90.39	267.63	6,721.95	-215.85	-1,455.87	1,462.72	1.12
8,226.00	91.37	267.29	6,720.49	-220.06	-1,550.76	1,557.70	1.09
8,320.00	89.83	268.28	6,719.51	-223.69	-1,644.68	1,651.69	1.95
8,415.00	90.41	268.05	6,719.31	-226.74	-1,739.63	1,746.69	0.66
8,509.00	91.34	268.04	6,717.87	-229.94	-1,833.56	1,840.68	0.99
8,604.00	89.74	268.64	6,716.98	-232.69	-1,928.52	1,935.67	1.80
8,699.00	89.67	269.47	6,717.47	-234.26	-2,023.50	2,030.65	0.88
8,793.00	90.48	269.23	6,717.34	-235.33	-2,117.50	2,124.62	0.90

Design Report for Shadow State A26-614 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,888.00	91.49	268.81	6,715.71	-236.95	-2,212.47	2,219.59	1.15
8,983.00	89.46	269.31	6,714.92	-238.51	-2,307.44	2,314.56	2.20
9,077.00	88.78	269.39	6,716.36	-239.58	-2,401.43	2,408.52	0.72
9,172.00	90.04	268.93	6,717.34	-240.97	-2,496.41	2,503.49	1.41
9,266.00	91.46	268.98	6,716.11	-242.68	-2,590.38	2,597.46	1.51
9,361.00	90.14	270.12	6,714.78	-243.43	-2,685.37	2,692.41	1.84
9,456.00	90.44	270.95	6,714.30	-242.54	-2,780.36	2,787.31	0.93
9,550.00	89.30	271.18	6,714.51	-240.79	-2,874.34	2,881.17	1.24
9,645.00	89.24	270.51	6,715.72	-239.39	-2,969.32	2,976.04	0.71
9,739.00	90.19	270.10	6,716.19	-238.89	-3,063.32	3,069.96	1.10
9,834.00	88.41	270.06	6,717.35	-238.76	-3,158.31	3,164.88	1.87
9,929.00	88.44	269.79	6,719.96	-238.89	-3,253.27	3,259.78	0.29
10,023.00	88.84	270.71	6,722.19	-238.48	-3,347.25	3,353.68	1.07
10,118.00	89.70	269.99	6,723.40	-237.90	-3,442.23	3,448.58	1.18
10,212.00	89.70	269.47	6,723.89	-238.34	-3,536.23	3,542.54	0.55
10,307.00	89.09	268.03	6,724.89	-240.41	-3,631.20	3,637.52	1.65
10,401.00	88.65	267.45	6,726.75	-244.12	-3,725.11	3,731.50	0.77
10,496.00	89.30	267.65	6,728.45	-248.18	-3,820.01	3,826.48	0.72
10,590.00	89.98	267.41	6,729.04	-252.23	-3,913.92	3,920.48	0.77
10,685.00	90.97	267.09	6,728.25	-256.79	-4,008.80	4,015.47	1.10
10,780.00	92.23	267.02	6,725.60	-261.66	-4,103.64	4,110.42	1.33
10,874.00	90.84	268.76	6,723.08	-265.12	-4,197.53	4,204.38	2.37
10,969.00	90.44	269.43	6,722.02	-266.62	-4,292.52	4,299.35	0.82
11,064.00	89.55	268.89	6,722.03	-268.02	-4,387.50	4,394.33	1.10
11,158.00	90.20	270.17	6,722.23	-268.79	-4,481.50	4,488.29	1.53
11,253.00	89.03	268.16	6,722.87	-270.17	-4,576.48	4,583.26	2.45
11,347.00	88.78	266.04	6,724.67	-274.93	-4,670.34	4,677.22	2.27
11,442.00	90.04	267.19	6,725.65	-280.53	-4,765.16	4,772.19	1.80
11,537.00	89.30	265.52	6,726.19	-286.57	-4,859.97	4,867.15	1.92
11,632.00	89.95	265.56	6,726.81	-293.96	-4,954.67	4,962.06	0.69
11,821.00	89.45	267.42	6,727.80	-305.53	-5,143.31	5,150.99	1.02
12,010.00	89.41	268.69	6,729.68	-311.95	-5,332.19	5,339.98	0.67
12,104.00	89.45	268.22	6,730.62	-314.48	-5,426.15	5,433.97	0.50
12,199.00	90.51	268.67	6,730.65	-317.06	-5,521.11	5,528.96	1.21
12,293.00	90.84	268.98	6,729.54	-318.99	-5,615.08	5,622.95	0.48
12,388.00	91.73	267.90	6,727.41	-321.57	-5,710.02	5,717.92	1.47
12,482.00	89.82	271.99	6,726.14	-321.66	-5,803.99	5,811.83	4.80
12,577.00	90.28	272.19	6,726.06	-318.20	-5,898.93	5,906.57	0.53
12,672.00	90.75	272.37	6,725.21	-314.42	-5,993.85	6,001.30	0.53
12,766.00	90.75	270.84	6,723.98	-311.78	-6,087.80	6,095.09	1.63
12,861.00	90.10	268.36	6,723.27	-312.45	-6,182.79	6,190.04	2.70
13,050.00	89.39	268.83	6,724.11	-317.08	-6,371.73	6,379.02	0.45
13,144.00	88.53	267.28	6,725.82	-320.27	-6,465.65	6,473.01	1.89
13,239.00	87.97	266.87	6,728.72	-325.12	-6,560.48	6,567.95	0.73
13,333.00	88.71	267.48	6,731.44	-329.75	-6,654.33	6,661.90	1.02
13,428.00	89.97	266.78	6,732.54	-334.50	-6,749.20	6,756.88	1.52
13,522.00	90.46	267.47	6,732.18	-339.22	-6,843.08	6,850.87	0.90
13,617.00	90.86	267.62	6,731.09	-343.29	-6,937.99	6,945.86	0.45
13,711.00	91.57	267.89	6,729.10	-346.97	-7,031.89	7,039.84	0.81
13,806.00	91.33	268.35	6,726.69	-350.08	-7,126.81	7,134.81	0.55
13,900.00	91.88	268.02	6,724.06	-353.06	-7,220.73	7,228.77	0.68

Design Report for Shadow State A26-614 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
13,995.00	90.46	269.10	6,722.12	-355.45	-7,315.67	7,323.74	1.88
14,089.00	89.88	270.33	6,721.84	-355.91	-7,409.67	7,417.69	1.45
14,184.00	90.71	270.98	6,721.35	-354.83	-7,504.66	7,512.58	1.11
14,278.00	89.57	270.67	6,721.12	-353.47	-7,598.65	7,606.46	1.26
14,373.00	89.69	270.89	6,721.74	-352.18	-7,693.64	7,701.34	0.26
14,468.00	89.54	270.35	6,722.37	-351.15	-7,788.63	7,796.23	0.59
14,562.00	90.55	270.39	6,722.30	-350.55	-7,882.63	7,890.15	1.08
14,657.00	90.92	269.58	6,721.08	-350.57	-7,977.62	7,985.08	0.94
14,752.00	89.41	268.33	6,720.81	-352.30	-8,072.60	8,080.06	2.06
14,846.00	89.36	267.76	6,721.82	-355.51	-8,166.54	8,174.05	0.61
14,941.00	89.94	269.11	6,722.40	-358.10	-8,261.50	8,269.04	1.55
15,036.00	90.34	269.47	6,722.16	-359.28	-8,356.49	8,364.02	0.57
15,130.00	89.76	268.14	6,722.08	-361.24	-8,450.47	8,458.00	1.54
15,225.00	89.51	270.09	6,722.69	-362.71	-8,545.45	8,552.98	2.07
15,414.00	88.89	270.88	6,725.33	-361.11	-8,734.42	8,741.77	0.53
15,509.00	88.92	270.78	6,727.14	-359.73	-8,829.39	8,836.63	0.11
15,604.00	89.32	270.47	6,728.60	-358.70	-8,924.38	8,931.51	0.53
15,793.00	89.97	269.41	6,729.77	-358.90	-9,113.37	9,120.39	0.66
15,888.00	89.97	269.86	6,729.82	-359.50	-9,208.37	9,215.34	0.47
15,982.00	90.53	269.13	6,729.41	-360.33	-9,302.36	9,309.31	0.98
16,075.00	90.31	269.17	6,728.73	-361.71	-9,395.35	9,402.28	0.24
16,171.00	90.59	268.60	6,727.98	-363.58	-9,491.33	9,498.27	0.66
16,266.00	90.59	268.60	6,727.00	-365.90	-9,586.29	9,593.26	0.00
16,360.00	90.65	268.04	6,725.98	-368.65	-9,680.25	9,687.25	0.60
16,455.00	90.37	267.37	6,725.14	-372.46	-9,775.17	9,782.24	0.76
16,549.00	90.01	266.94	6,724.82	-377.12	-9,869.05	9,876.23	0.60
16,644.00	89.36	267.64	6,725.35	-381.61	-9,963.94	9,971.22	1.01
16,738.00	90.71	268.46	6,725.29	-384.81	-10,057.88	10,065.22	1.68
16,833.00	90.59	268.18	6,724.21	-387.60	-10,152.84	10,160.21	0.32
16,927.00	90.65	268.34	6,723.19	-390.45	-10,246.79	10,254.21	0.18
17,022.00	90.80	268.15	6,721.99	-393.36	-10,341.74	10,349.20	0.25
17,116.00	90.77	268.31	6,720.70	-396.26	-10,435.68	10,443.19	0.17
17,211.00	90.68	267.78	6,719.50	-399.51	-10,530.62	10,538.18	0.57
17,305.00	89.66	268.93	6,719.22	-402.20	-10,624.58	10,632.17	1.64
17,399.00	88.53	269.50	6,720.71	-403.49	-10,718.55	10,726.13	1.35
17,494.00	88.31	269.46	6,723.33	-404.35	-10,813.51	10,821.06	0.24
17,614.00	87.66	269.06	6,727.55	-405.90	-10,933.43	10,940.96	0.64
Final Production Sperry MWD Survey IFR Corrected by Surcon at 17614.00ft							
17,675.00	87.66	269.06	6,730.04	-406.90	-10,994.37	11,001.89	0.00
Straight Line Projection to TD at 17675.00ft							

Design Report for Shadow State A26-614 - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
78.00	78.00	0.02	-0.01	First Gyro Data Survey at 78.00ft
1,877.00	1,876.98	1.50	-1.06	Final Gyro Data Survey at 1877.00ft
1,877.00	1,876.98	1.50	-1.06	Tie on to Gyro Data Survey at 1877.00ft
1,918.00	1,917.98	1.53	-1.34	First Intermediate Sperry MWD Survey at 1918.00ft
7,091.00	6,714.55	-198.49	-416.25	Final Intermediate Sperry MWD Survey at 7091.00ft
7,186.00	6,717.26	-203.19	-511.09	First Production Sperry MWD Survey IFR Corrected by Surcon at 7186.00ft
17,614.00	6,727.55	-405.90	-10,933.43	Final Production Sperry MWD Survey IFR Corrected by Surcon at 17614.00ft
17,675.00	6,730.04	-406.90	-10,994.37	Straight Line Projection to TD at 17675.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Shadow State A26-614_Rev A2_BHL	267.93	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
78.00	1,877.00	Gyro Data Surveys	NS-GYRO-MS
1,918.00	7,091.00	Intermediate Sperry MWD Surveys	MWD
7,186.00	17,675.00	Production Sperry MWD Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,923.00	1,922.98	9 5/8"	9-5/8	13-3/4

Design Report for Shadow State A26-614 - Actual Surveys

Wellbore Targets

Target Name - hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Shadow State A26-614 - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,408,938.67	3,285,024.83	40.451420	-104.475810
Shadow State A26-614 - actual wellpath misses target center by 10.37usft at 7077.57usft MD (6713.90 TVD, -197.62 N, -402.87 E) - Point	0.00	0.00	6,721.13	-205.00	-402.00	1,408,733.68	3,284,622.84	40.450870	-104.477263
Shadow State A26-614 - actual wellpath misses target center by 10.37usft at 7077.57usft MD (6713.90 TVD, -197.62 N, -402.87 E) - Point	0.00	0.00	6,721.13	-205.00	-402.00	1,408,733.68	3,284,622.84	40.450870	-104.477263
Shadow State A26-614 - actual wellpath misses target center by 10.37usft at 7077.57usft MD (6713.90 TVD, -197.62 N, -402.87 E) - Point	0.00	0.00	6,721.13	-205.00	-402.00	1,408,733.68	3,284,622.84	40.450870	-104.477263
Shadow State A26-614 - actual wellpath misses target center by 12.16usft at 17675.00usft MD (6730.04 TVD, -406.90 N, -10994.37 E) - Point	0.00	0.00	6,722.00	-397.80	-10,995.05	1,408,540.89	3,274,030.19	40.450670	-104.515330
Shadow State A26-614 - actual wellpath misses target center by 12.16usft at 17675.00usft MD (6730.04 TVD, -406.90 N, -10994.37 E) - Point	0.00	0.00	6,722.00	-397.80	-10,995.05	1,408,540.89	3,274,030.19	40.450670	-104.515330
Shadow State A26-614 - actual wellpath misses target center by 12.16usft at 17675.00usft MD (6730.04 TVD, -406.90 N, -10994.37 E) - Point	0.00	0.00	6,722.00	-397.80	-10,995.05	1,408,540.89	3,274,030.19	40.450670	-104.515330
Shadow State A26-614 - actual wellpath misses target center by 12.16usft at 17675.00usft MD (6730.04 TVD, -406.90 N, -10994.37 E) - Point	0.00	0.00	6,722.00	-397.80	-10,995.05	1,408,540.89	3,274,030.19	40.450670	-104.515330

Directional Difficulty Index

Average Dogleg over Survey:	1.40 °/100usft	Maximum Dogleg over Survey:	12.62 °/100usft at 6,903.00 usft
Net Tortousity applicable to Plans:	0.73 °/100usft	Directional Difficulty Index:	6.873

Audit Info

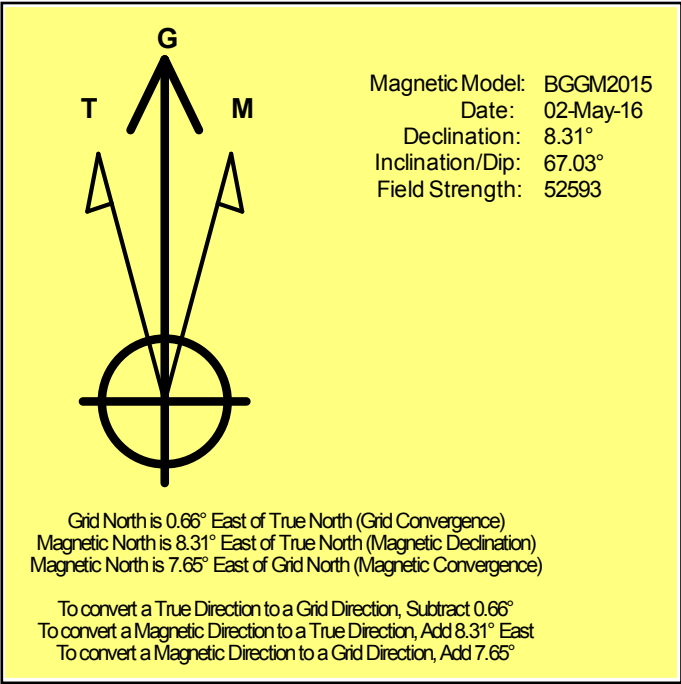
North Reference Sheet for Sec. 30-T6N-R63W (Shadow PAD) - Shadow State
A26-614 - Plan A

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' @ 4662.00usft (H&P 343). Northing and Easting are relative to Shadow State A26-614
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: 0.99996296

Grid Coordinates of Well: 1,408,938.67 usft N, 3,285,024.83 usft E
Geographical Coordinates of Well: 40° 27' 05.11" N, 104° 28' 32.92" W
Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,675.00usft
the Bottom Hole Displacement is 11,001.90usft in the Direction of 267.88° (Grid).

Magnetic Convergence at surface is: -7.65° (2 May 2016, , BGGM2015)



Noble Energy

Weld County, CO (NAD 83)

Sec. 30-T6N-R63W (Shadow PAD)

Shadow State A26-614

05-123-42920

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

18 May, 2016

Well Coordinates: 1,408,938.67 N, 3,285,024.83 E (40° 27' 05.11" N, 104° 28' 32.92" W)

Ground Level: 4,638.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 81

Centered on Well Shadow State A26-614

KB = 24' @ 4662.00usft (H&P 343)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Shadow State A26-614 - 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)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.451420	-104.475810	1,408,938.67	3,285,024.83
78.00	0.03	330.60	78.00	0.02	-0.01	40.451420	-104.475810	1,408,938.69	3,285,024.82
172.00	0.37	16.96	172.00	0.33	0.07	40.451421	-104.475810	1,408,939.00	3,285,024.89
270.00	0.46	22.75	270.00	0.99	0.31	40.451423	-104.475809	1,408,939.67	3,285,025.14
365.00	0.19	193.16	365.00	1.19	0.42	40.451423	-104.475809	1,408,939.86	3,285,025.25
459.00	0.13	73.91	459.00	1.07	0.49	40.451423	-104.475808	1,408,939.74	3,285,025.32
554.00	0.33	62.52	553.99	1.23	0.84	40.451423	-104.475807	1,408,939.90	3,285,025.66
648.00	0.37	87.49	647.99	1.37	1.38	40.451424	-104.475805	1,408,940.04	3,285,026.21
743.00	0.14	323.31	742.99	1.47	1.62	40.451424	-104.475804	1,408,940.14	3,285,026.44
837.00	0.29	338.53	836.99	1.79	1.46	40.451425	-104.475805	1,408,940.46	3,285,026.29
932.00	0.03	235.28	931.99	1.99	1.35	40.451426	-104.475805	1,408,940.67	3,285,026.18
1,026.00	0.08	234.67	1,025.99	1.94	1.28	40.451425	-104.475806	1,408,940.61	3,285,026.11
1,121.00	0.15	216.62	1,120.99	1.80	1.15	40.451425	-104.475806	1,408,940.48	3,285,025.98
1,215.00	0.09	278.68	1,214.99	1.72	1.00	40.451425	-104.475807	1,408,940.39	3,285,025.83
1,310.00	0.09	216.97	1,309.99	1.67	0.89	40.451425	-104.475807	1,408,940.34	3,285,025.71
1,404.00	0.44	295.12	1,403.99	1.76	0.51	40.451425	-104.475808	1,408,940.43	3,285,025.34
1,499.00	0.21	324.63	1,498.99	2.06	0.08	40.451426	-104.475810	1,408,940.73	3,285,024.91
1,593.00	0.07	329.94	1,592.99	2.25	-0.05	40.451426	-104.475810	1,408,940.92	3,285,024.78
1,688.00	0.21	209.42	1,687.99	2.15	-0.16	40.451426	-104.475811	1,408,940.82	3,285,024.67
1,782.00	0.40	232.54	1,781.99	1.80	-0.51	40.451425	-104.475812	1,408,940.47	3,285,024.32
1,877.00	0.37	251.15	1,876.98	1.50	-1.06	40.451424	-104.475814	1,408,940.17	3,285,023.77
1,918.00	0.48	296.58	1,917.98	1.53	-1.34	40.451424	-104.475815	1,408,940.20	3,285,023.49
1,923.00	0.47	301.43	1,922.98	1.55	-1.37	40.451424	-104.475815	1,408,940.22	3,285,023.45
1,963.00	0.50	341.88	1,962.98	1.80	-1.57	40.451425	-104.475816	1,408,940.47	3,285,023.26
2,057.00	0.68	333.23	2,056.98	2.69	-1.95	40.451428	-104.475817	1,408,941.36	3,285,022.88
2,152.00	0.60	332.88	2,151.97	3.64	-2.43	40.451430	-104.475819	1,408,942.31	3,285,022.40
2,246.00	0.67	320.81	2,245.97	4.50	-3.00	40.451433	-104.475821	1,408,943.17	3,285,021.83
2,341.00	0.73	301.52	2,340.96	5.25	-3.87	40.451435	-104.475824	1,408,943.92	3,285,020.96
2,435.00	0.68	304.32	2,434.95	5.88	-4.84	40.451436	-104.475827	1,408,944.55	3,285,019.99
2,530.00	0.53	322.71	2,529.95	6.54	-5.57	40.451438	-104.475830	1,408,945.21	3,285,019.26
2,624.00	0.39	321.36	2,623.94	7.14	-6.03	40.451440	-104.475832	1,408,945.81	3,285,018.80
2,719.00	0.50	309.03	2,718.94	7.65	-6.56	40.451441	-104.475833	1,408,946.32	3,285,018.27
2,813.00	1.03	124.33	2,812.94	7.43	-6.18	40.451441	-104.475832	1,408,946.10	3,285,018.65
2,908.00	2.80	107.17	2,907.88	6.27	-3.25	40.451437	-104.475822	1,408,944.94	3,285,021.57
3,002.00	4.97	109.41	3,001.66	4.24	2.78	40.451432	-104.475800	1,408,942.91	3,285,027.61
3,097.00	6.84	104.52	3,096.15	1.45	12.14	40.451424	-104.475767	1,408,940.12	3,285,036.97
3,191.00	6.55	102.92	3,189.51	-1.15	22.78	40.451416	-104.475728	1,408,937.52	3,285,047.61
3,310.00	7.54	106.97	3,307.61	-4.95	36.87	40.451405	-104.475678	1,408,933.72	3,285,061.69
3,404.00	8.13	113.97	3,400.73	-9.45	48.84	40.451393	-104.475635	1,408,929.22	3,285,073.67
3,499.00	8.65	121.53	3,494.72	-15.91	61.07	40.451374	-104.475592	1,408,922.76	3,285,085.89
3,593.00	8.56	121.78	3,587.66	-23.29	73.04	40.451354	-104.475549	1,408,915.38	3,285,097.87
3,688.00	8.68	122.51	3,681.59	-30.87	85.09	40.451333	-104.475506	1,408,907.80	3,285,109.92

Design Report for Shadow State A26-614 - 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)	Northing (usft)	Easting (usft)
3,782.00	8.82	122.28	3,774.50		-38.53	97.17	40.451311	-104.475463	1,408,900.14	3,285,121.99
3,877.00	7.09	120.27	3,868.58		-45.38	108.39	40.451292	-104.475423	1,408,893.30	3,285,133.22
3,972.00	6.24	124.32	3,962.94		-51.24	117.72	40.451276	-104.475389	1,408,887.43	3,285,142.54
4,066.00	5.71	128.66	4,056.43		-57.05	125.59	40.451260	-104.475361	1,408,881.63	3,285,150.41
4,160.00	6.62	125.65	4,149.88		-63.12	133.64	40.451243	-104.475333	1,408,875.55	3,285,158.47
4,255.00	6.39	122.09	4,244.27		-69.12	142.57	40.451226	-104.475301	1,408,869.55	3,285,167.40
4,349.00	5.68	122.89	4,337.75		-74.43	150.91	40.451211	-104.475271	1,408,864.24	3,285,175.73
4,444.00	5.17	123.87	4,432.32		-79.37	158.41	40.451197	-104.475244	1,408,859.31	3,285,183.23
4,539.00	4.15	142.33	4,527.01		-84.48	164.07	40.451183	-104.475224	1,408,854.20	3,285,188.89
4,633.00	3.74	164.27	4,620.79		-90.12	166.98	40.451167	-104.475214	1,408,848.56	3,285,191.80
4,728.00	3.05	178.85	4,715.63		-95.63	167.87	40.451152	-104.475211	1,408,843.05	3,285,192.69
4,822.00	3.15	157.54	4,809.49		-100.52	168.91	40.451139	-104.475208	1,408,838.16	3,285,193.73
4,917.00	4.00	148.60	4,904.31		-105.76	171.63	40.451124	-104.475198	1,408,832.92	3,285,196.45
5,012.00	3.80	144.36	4,999.09		-111.14	175.19	40.451109	-104.475185	1,408,827.53	3,285,200.01
5,106.00	3.18	144.02	5,092.91		-115.78	178.54	40.451097	-104.475174	1,408,822.89	3,285,203.36
5,201.00	3.77	156.57	5,187.74		-120.78	181.33	40.451083	-104.475164	1,408,817.89	3,285,206.15
5,296.00	3.84	158.22	5,282.53		-126.60	183.75	40.451067	-104.475155	1,408,812.07	3,285,208.57
5,390.00	3.26	154.03	5,376.35		-131.93	186.09	40.451052	-104.475147	1,408,806.75	3,285,210.91
5,485.00	3.95	153.33	5,471.16		-137.28	188.74	40.451037	-104.475138	1,408,801.40	3,285,213.56
5,674.00	2.92	151.44	5,659.82		-147.33	193.96	40.451010	-104.475120	1,408,791.35	3,285,218.78
5,768.00	3.73	145.98	5,753.66		-151.96	196.82	40.450997	-104.475109	1,408,786.71	3,285,221.64
5,863.00	3.85	142.25	5,848.45		-157.05	200.50	40.450983	-104.475096	1,408,781.63	3,285,225.32
5,957.00	3.05	137.55	5,942.28		-161.39	204.12	40.450971	-104.475084	1,408,777.29	3,285,228.94
6,052.00	3.56	154.24	6,037.13		-165.91	207.11	40.450958	-104.475073	1,408,772.77	3,285,231.93
6,147.00	9.31	228.42	6,131.60		-173.68	202.63	40.450937	-104.475089	1,408,765.00	3,285,227.45
6,241.00	13.61	263.59	6,223.82		-179.97	185.93	40.450920	-104.475150	1,408,758.71	3,285,210.75
6,336.00	18.71	270.94	6,315.04		-180.97	159.56	40.450918	-104.475244	1,408,757.71	3,285,184.39
6,430.00	26.98	267.90	6,401.60		-181.50	123.12	40.450918	-104.475375	1,408,757.17	3,285,147.94
6,525.00	36.38	264.26	6,482.36		-185.12	73.43	40.450910	-104.475554	1,408,753.56	3,285,098.26
6,619.00	45.42	269.92	6,553.36		-187.96	12.07	40.450904	-104.475775	1,408,750.72	3,285,036.90
6,714.00	53.67	271.10	6,614.95		-187.27	-60.15	40.450908	-104.476034	1,408,751.40	3,284,964.68
6,808.00	64.38	269.95	6,663.26		-186.58	-140.62	40.450912	-104.476323	1,408,752.10	3,284,884.21
6,903.00	76.24	268.07	6,695.21		-188.18	-229.89	40.450911	-104.476644	1,408,750.50	3,284,794.95
6,997.00	86.41	266.51	6,709.37		-192.58	-322.59	40.450902	-104.476977	1,408,746.09	3,284,702.26
7,091.00	87.27	266.27	6,714.55		-198.49	-416.25	40.450888	-104.477314	1,408,740.19	3,284,608.59
7,186.00	89.46	268.06	6,717.26		-203.19	-511.09	40.450879	-104.477655	1,408,735.49	3,284,513.76
7,280.00	91.41	269.62	6,716.55		-205.09	-605.06	40.450876	-104.477993	1,408,733.59	3,284,419.79
7,375.00	89.86	268.90	6,715.50		-206.32	-700.04	40.450876	-104.478334	1,408,732.36	3,284,324.81
7,469.00	90.73	268.72	6,715.01		-208.27	-794.02	40.450874	-104.478672	1,408,730.41	3,284,230.84
7,563.00	89.21	269.68	6,715.06		-209.58	-888.01	40.450873	-104.479009	1,408,729.10	3,284,136.85
7,658.00	89.55	269.33	6,716.09		-210.40	-983.00	40.450874	-104.479351	1,408,728.28	3,284,041.87
7,752.00	88.51	269.82	6,717.68		-211.10	-1,076.98	40.450875	-104.479688	1,408,727.58	3,283,947.89

Design Report for Shadow State A26-614 - 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)
7,847.00	88.81	270.07	6,719.90	-211.19	-1,171.96	40.450877	-104.480030	1,408,727.49	3,283,852.92
7,942.00	89.64	270.08	6,721.19	-211.07	-1,266.95	40.450881	-104.480371	1,408,727.61	3,283,757.93
8,036.00	89.52	268.25	6,721.88	-212.44	-1,360.93	40.450880	-104.480709	1,408,726.24	3,283,663.95
8,131.00	90.39	267.63	6,721.95	-215.85	-1,455.87	40.450874	-104.481050	1,408,722.83	3,283,569.02
8,226.00	91.37	267.29	6,720.49	-220.06	-1,550.76	40.450865	-104.481391	1,408,718.62	3,283,474.13
8,320.00	89.83	268.28	6,719.51	-223.69	-1,644.68	40.450858	-104.481729	1,408,714.99	3,283,380.21
8,415.00	90.41	268.05	6,719.31	-226.74	-1,739.63	40.450853	-104.482070	1,408,711.94	3,283,285.26
8,509.00	91.34	268.04	6,717.87	-229.94	-1,833.56	40.450847	-104.482408	1,408,708.74	3,283,191.33
8,604.00	89.74	268.64	6,716.98	-232.69	-1,928.52	40.450842	-104.482749	1,408,705.99	3,283,096.38
8,699.00	89.67	269.47	6,717.47	-234.26	-2,023.50	40.450841	-104.483090	1,408,704.42	3,283,001.40
8,793.00	90.48	269.23	6,717.34	-235.33	-2,117.50	40.450841	-104.483428	1,408,703.35	3,282,907.41
8,888.00	91.49	268.81	6,715.71	-236.95	-2,212.47	40.450840	-104.483769	1,408,701.73	3,282,812.44
8,983.00	89.46	269.31	6,714.92	-238.51	-2,307.44	40.450838	-104.484110	1,408,700.17	3,282,717.47
9,077.00	88.78	269.39	6,716.36	-239.58	-2,401.43	40.450838	-104.484448	1,408,699.10	3,282,623.49
9,172.00	90.04	268.93	6,717.34	-240.97	-2,496.41	40.450837	-104.484789	1,408,697.71	3,282,528.51
9,266.00	91.46	268.98	6,716.11	-242.68	-2,590.38	40.450836	-104.485127	1,408,696.00	3,282,434.54
9,361.00	90.14	270.12	6,714.78	-243.43	-2,685.37	40.450837	-104.485468	1,408,695.25	3,282,339.56
9,456.00	90.44	270.95	6,714.30	-242.54	-2,780.36	40.450842	-104.485810	1,408,696.14	3,282,244.57
9,550.00	89.30	271.18	6,714.51	-240.79	-2,874.34	40.450850	-104.486147	1,408,697.88	3,282,150.59
9,645.00	89.24	270.51	6,715.72	-239.39	-2,969.32	40.450857	-104.486489	1,408,699.29	3,282,055.61
9,739.00	90.19	270.10	6,716.19	-238.89	-3,063.32	40.450861	-104.486826	1,408,699.79	3,281,961.62
9,834.00	88.41	270.06	6,717.35	-238.76	-3,158.31	40.450864	-104.487168	1,408,699.92	3,281,866.64
9,929.00	88.44	269.79	6,719.96	-238.89	-3,253.27	40.450867	-104.487509	1,408,699.79	3,281,771.67
10,023.00	88.84	270.71	6,722.19	-238.48	-3,347.25	40.450871	-104.487846	1,408,697.20	3,281,677.71
10,118.00	89.70	269.99	6,723.40	-237.90	-3,442.23	40.450876	-104.488188	1,408,700.78	3,281,582.72
10,212.00	89.70	269.47	6,723.89	-238.34	-3,536.23	40.450877	-104.488525	1,408,700.34	3,281,488.73
10,307.00	89.09	268.03	6,724.89	-240.41	-3,631.20	40.450875	-104.488867	1,408,698.27	3,281,393.76
10,401.00	88.65	267.45	6,726.75	-244.12	-3,725.11	40.450867	-104.489204	1,408,694.56	3,281,299.86
10,496.00	89.30	267.65	6,728.45	-248.18	-3,820.01	40.450859	-104.489545	1,408,690.50	3,281,204.96
10,590.00	89.98	267.41	6,729.04	-252.23	-3,913.92	40.450851	-104.489883	1,408,686.45	3,281,111.06
10,685.00	90.97	267.09	6,728.25	-256.79	-4,008.80	40.450841	-104.490224	1,408,681.90	3,281,016.17
10,780.00	92.23	267.02	6,725.60	-261.66	-4,103.64	40.450831	-104.490565	1,408,677.02	3,280,921.34
10,874.00	90.84	268.76	6,723.08	-265.12	-4,197.53	40.450824	-104.490902	1,408,673.56	3,280,827.45
10,969.00	90.44	269.43	6,722.02	-266.62	-4,292.52	40.450823	-104.491244	1,408,672.06	3,280,732.47
11,064.00	89.55	268.89	6,722.03	-268.02	-4,387.50	40.450822	-104.491585	1,408,670.66	3,280,637.49
11,158.00	90.20	270.17	6,722.23	-268.79	-4,481.50	40.450823	-104.491923	1,408,669.89	3,280,543.50
11,253.00	89.03	268.16	6,722.87	-270.17	-4,576.48	40.450822	-104.492264	1,408,668.51	3,280,448.52
11,347.00	88.78	266.04	6,724.67	-274.93	-4,670.34	40.450812	-104.492601	1,408,663.76	3,280,354.66
11,442.00	90.04	267.19	6,725.65	-280.53	-4,765.16	40.450800	-104.492942	1,408,658.15	3,280,259.84
11,537.00	89.30	265.52	6,726.19	-286.57	-4,859.97	40.450786	-104.493283	1,408,652.11	3,280,165.04
11,632.00	89.95	265.56	6,726.81	-293.96	-4,954.67	40.450769	-104.493624	1,408,644.72	3,280,070.34
11,821.00	89.45	267.42	6,727.80	-305.53	-5,143.31	40.450743	-104.494302	1,408,633.15	3,279,881.71

Design Report for Shadow State A26-614 - Actual Surveys

Measured			Vertical			Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth	Inclination	Azimuth	Depth	+N/-S	+E/-W	Latitude	Longitude	Latitude	Longitude	Northing	Easting
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)
12,010.00	89.41	268.69	6,729.68	-311.95	-5,332.19	40.450731	-104.494981	40.450731	-104.494981	1,408,626.74	3,279,692.84
12,104.00	89.45	268.22	6,730.62	-314.48	-5,426.15	40.450727	-104.495319	40.450727	-104.495319	1,408,624.20	3,279,598.88
12,199.00	90.51	268.67	6,730.65	-317.06	-5,521.11	40.450723	-104.495660	40.450723	-104.495660	1,408,621.62	3,279,503.92
12,293.00	90.84	268.98	6,729.54	-318.99	-5,615.08	40.450721	-104.495998	40.450721	-104.495998	1,408,619.70	3,279,409.95
12,388.00	91.73	267.90	6,727.41	-321.57	-5,710.02	40.450717	-104.496339	40.450717	-104.496339	1,408,617.11	3,279,315.02
12,482.00	89.82	271.99	6,726.14	-321.66	-5,803.99	40.450719	-104.496676	40.450719	-104.496676	1,408,617.02	3,279,221.05
12,577.00	90.28	272.19	6,726.06	-318.20	-5,898.93	40.450732	-104.497017	40.450732	-104.497017	1,408,620.49	3,279,126.12
12,672.00	90.75	272.37	6,725.21	-314.42	-5,993.85	40.450745	-104.497358	40.450745	-104.497358	1,408,624.27	3,279,031.20
12,766.00	90.75	270.84	6,723.98	-311.78	-6,087.80	40.450755	-104.497696	40.450755	-104.497696	1,408,626.90	3,278,937.25
12,861.00	90.10	268.36	6,723.27	-312.45	-6,182.79	40.450756	-104.498037	40.450756	-104.498037	1,408,626.24	3,278,842.27
13,050.00	89.39	268.83	6,724.11	-317.08	-6,371.73	40.450750	-104.498716	40.450750	-104.498716	1,408,621.60	3,278,653.34
13,144.00	88.53	267.28	6,725.82	-320.27	-6,465.65	40.450744	-104.499054	40.450744	-104.499054	1,408,618.41	3,278,559.41
13,239.00	87.97	266.87	6,728.72	-325.12	-6,560.48	40.450733	-104.499395	40.450733	-104.499395	1,408,613.57	3,278,464.59
13,333.00	88.71	267.48	6,731.44	-329.75	-6,654.33	40.450724	-104.499732	40.450724	-104.499732	1,408,608.94	3,278,370.75
13,428.00	89.97	266.78	6,732.54	-334.50	-6,749.20	40.450713	-104.500073	40.450713	-104.500073	1,408,604.18	3,278,275.88
13,522.00	90.46	267.47	6,732.18	-339.22	-6,843.08	40.450703	-104.500410	40.450703	-104.500410	1,408,599.47	3,278,182.00
13,617.00	90.86	267.62	6,731.09	-343.29	-6,937.99	40.450695	-104.500752	40.450695	-104.500752	1,408,595.40	3,278,087.10
13,711.00	91.57	267.89	6,729.10	-346.97	-7,031.89	40.450688	-104.501089	40.450688	-104.501089	1,408,591.72	3,277,993.19
13,806.00	91.33	268.35	6,726.69	-350.08	-7,126.81	40.450682	-104.501430	40.450682	-104.501430	1,408,588.60	3,277,898.28
13,900.00	91.88	268.02	6,724.06	-353.06	-7,220.73	40.450677	-104.501768	40.450677	-104.501768	1,408,585.62	3,277,804.37
13,995.00	90.46	269.10	6,722.12	-355.45	-7,315.67	40.450673	-104.502109	40.450673	-104.502109	1,408,583.24	3,277,709.43
14,089.00	89.88	270.33	6,721.84	-355.91	-7,409.67	40.450675	-104.502447	40.450675	-104.502447	1,408,582.77	3,277,615.43
14,184.00	90.71	270.98	6,721.35	-354.83	-7,504.66	40.450681	-104.502788	40.450681	-104.502788	1,408,583.86	3,277,520.44
14,278.00	89.57	270.67	6,721.12	-353.47	-7,598.65	40.450688	-104.503126	40.450688	-104.503126	1,408,585.21	3,277,426.46
14,373.00	89.69	270.89	6,721.74	-352.18	-7,693.64	40.450694	-104.503467	40.450694	-104.503467	1,408,586.50	3,277,331.47
14,468.00	89.54	270.35	6,722.37	-351.15	-7,788.63	40.450700	-104.503808	40.450700	-104.503808	1,408,587.53	3,277,236.49
14,562.00	90.55	270.39	6,722.30	-350.55	-7,882.63	40.450704	-104.504146	40.450704	-104.504146	1,408,588.14	3,277,142.49
14,657.00	90.92	269.58	6,721.08	-350.57	-7,977.62	40.450707	-104.504487	40.450707	-104.504487	1,408,588.11	3,277,047.50
14,752.00	89.41	268.33	6,720.81	-352.30	-8,072.60	40.450705	-104.504828	40.450705	-104.504828	1,408,586.38	3,276,952.53
14,846.00	89.36	267.76	6,721.82	-355.51	-8,166.54	40.450699	-104.505166	40.450699	-104.505166	1,408,583.17	3,276,858.59
14,941.00	89.94	269.11	6,722.40	-358.10	-8,261.50	40.450695	-104.505507	40.450695	-104.505507	1,408,580.58	3,276,763.64
15,036.00	90.34	269.47	6,722.16	-359.28	-8,356.49	40.450695	-104.505849	40.450695	-104.505849	1,408,579.40	3,276,668.65
15,130.00	89.76	268.14	6,722.08	-361.24	-8,450.47	40.450693	-104.506186	40.450693	-104.506186	1,408,577.44	3,276,574.67
15,225.00	89.51	270.09	6,722.69	-362.71	-8,545.45	40.450691	-104.506528	40.450691	-104.506528	1,408,575.97	3,276,479.70
15,414.00	88.89	270.88	6,725.33	-361.11	-8,734.42	40.450702	-104.507207	40.450702	-104.507207	1,408,577.57	3,276,290.73
15,509.00	88.92	270.78	6,727.14	-359.73	-8,829.39	40.450708	-104.507548	40.450708	-104.507548	1,408,578.95	3,276,195.76
15,604.00	89.32	270.47	6,728.60	-358.70	-8,924.38	40.450714	-104.507889	40.450714	-104.507889	1,408,579.99	3,276,100.78
15,793.00	89.97	269.41	6,729.77	-358.90	-9,113.37	40.450719	-104.508568	40.450719	-104.508568	1,408,579.79	3,275,911.80
15,888.00	89.97	269.86	6,729.82	-359.50	-9,208.37	40.450721	-104.508909	40.450721	-104.508909	1,408,579.18	3,275,816.80
15,982.00	90.53	269.13	6,729.41	-360.33	-9,302.36	40.450721	-104.509247	40.450721	-104.509247	1,408,578.35	3,275,722.81
16,075.00	90.31	269.17	6,728.73	-361.71	-9,395.35	40.450720	-104.509581	40.450720	-104.509581	1,408,576.98	3,275,629.83
16,171.00	90.59	268.60	6,727.98	-363.58	-9,491.33	40.450718	-104.509926	40.450718	-104.509926	1,408,575.11	3,275,533.85

Design Report for Shadow State A26-614 - 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)
16,266.00	90.59	268.60	6,727.00	-365.90	-9,586.29	40.450715	-104.510268	1,408,572.79	3,275,438.89
16,360.00	90.65	268.04	6,725.98	-368.65	-9,680.25	40.450710	-104.510605	1,408,570.03	3,275,344.94
16,455.00	90.37	267.37	6,725.14	-372.46	-9,775.17	40.450702	-104.510946	1,408,566.23	3,275,250.02
16,549.00	90.01	266.94	6,724.82	-377.12	-9,869.05	40.450692	-104.511284	1,408,561.56	3,275,156.14
16,644.00	89.36	267.64	6,725.35	-381.61	-9,963.94	40.450683	-104.511625	1,408,557.07	3,275,061.26
16,738.00	90.71	268.46	6,725.29	-384.81	-10,057.88	40.450677	-104.511963	1,408,553.87	3,274,967.32
16,833.00	90.59	268.18	6,724.21	-387.60	-10,152.84	40.450672	-104.512304	1,408,551.09	3,274,872.37
16,927.00	90.65	268.34	6,723.19	-390.45	-10,246.79	40.450667	-104.512642	1,408,548.23	3,274,778.42
17,022.00	90.80	268.15	6,721.99	-393.36	-10,341.74	40.450662	-104.512983	1,408,545.32	3,274,683.48
17,116.00	90.77	268.31	6,720.70	-396.26	-10,435.68	40.450657	-104.513320	1,408,542.42	3,274,589.53
17,211.00	90.68	267.78	6,719.50	-399.51	-10,530.62	40.450651	-104.513662	1,408,539.18	3,274,494.60
17,305.00	89.66	268.93	6,719.22	-402.20	-10,624.58	40.450647	-104.513999	1,408,536.48	3,274,400.64
17,399.00	88.53	269.50	6,720.71	-403.49	-10,718.55	40.450646	-104.514337	1,408,535.19	3,274,306.67
17,494.00	88.31	269.46	6,723.33	-404.35	-10,813.51	40.450647	-104.514678	1,408,534.33	3,274,211.71
17,614.00	87.66	269.06	6,727.55	-405.90	-10,933.43	40.450646	-104.515109	1,408,532.78	3,274,091.80
17,675.00	87.66	269.06	6,730.04	-406.90	-10,994.37	40.450645	-104.515328	1,408,531.78	3,274,030.87

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
78.00	78.00	0.02	-0.01	First Gyro Data Survey at 78.00ft
1,877.00	1,876.98	1.50	-1.06	Final Gyro Data Survey at 1877.00ft
1,877.00	1,876.98	1.50	-1.06	Tie on to Gyro Data Survey at 1877.00ft
1,918.00	1,917.98	1.53	-1.34	First Intermediate Sperry MWD Survey at 1918.00ft
7,091.00	6,714.55	-198.49	-416.25	Final Intermediate Sperry MWD Survey at 7091.00ft
7,186.00	6,717.26	-203.19	-511.09	First Production Sperry MWD Survey IFR Corrected by Surcon at 7186.00ft
17,614.00	6,727.55	-405.90	-10,933.43	Final Production Sperry MWD Survey IFR Corrected by Surcon at 17614.00ft
17,675.00	6,730.04	-406.90	-10,994.37	Straight Line Projection to TD at 17675.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Shadow State A26-614_Rev A2_BHL	267.93	Slot	0.00	0.00	0.00

Design Report for Shadow State A26-614 - Actual Surveys

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
78.00	1,877.00	Gyro Data Surveys	NS-GYRO-MS
1,918.00	7,091.00	Intermediate Sperry MWD Surveys	MWD
7,186.00	17,675.00	Production Sperry MWD Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,923.00	1,922.98	9 5/8"	9-5/8	13-3/4

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:	1.40 °/100usft	Maximum Dogleg over Survey:	12.62 °/100usft at 6,903.00 usft
Net Tortousity applicable to Plans:	0.73 °/100usft	Directional Difficulty Index:	6.873

Audit Info

North Reference Sheet for Sec. 30-T6N-R63W (Shadow PAD) - Shadow State A26-614 - 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' @ 4662.00usft (H&P 343). Northing and Easting are relative to Shadow State A26-614

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: 0.99996296

Grid Coordinates of Well: 1,408,938.67 usft N, 3,285,024.83 usft E

Geographical Coordinates of Well: 40° 27' 05.11" N, 104° 28' 32.92" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,675.00usft

the Bottom Hole Displacement is 11,001.90usft in the Direction of 267.88° (Grid).

Magnetic Convergence at surface is: -7.65° (2 May 2016, , BGGM2015)

