

Noble Energy

Weld County, CO (NAD 83)
Sec. 30-T6N-R63W (Shadow PAD)
Shadow A26-622
05-123-42919
Plan A

Survey: Production Sperry MWD Surveys

Sperry Drilling Services

Final Survey Report

08 June, 2016

Surface UWI : 05-123-42919

Well Coordinates: 1,409,015.13 N, 3,285,021.16 E (40° 27' 05.87" N, 104° 28' 32.95" W)
Ground Level: 4,638.00 usft

Local Coordinate Origin:

Centered on Well Shadow A26-622

Viewing Datum:

KB = 24' @ 4662.00usft (H&P 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: 81

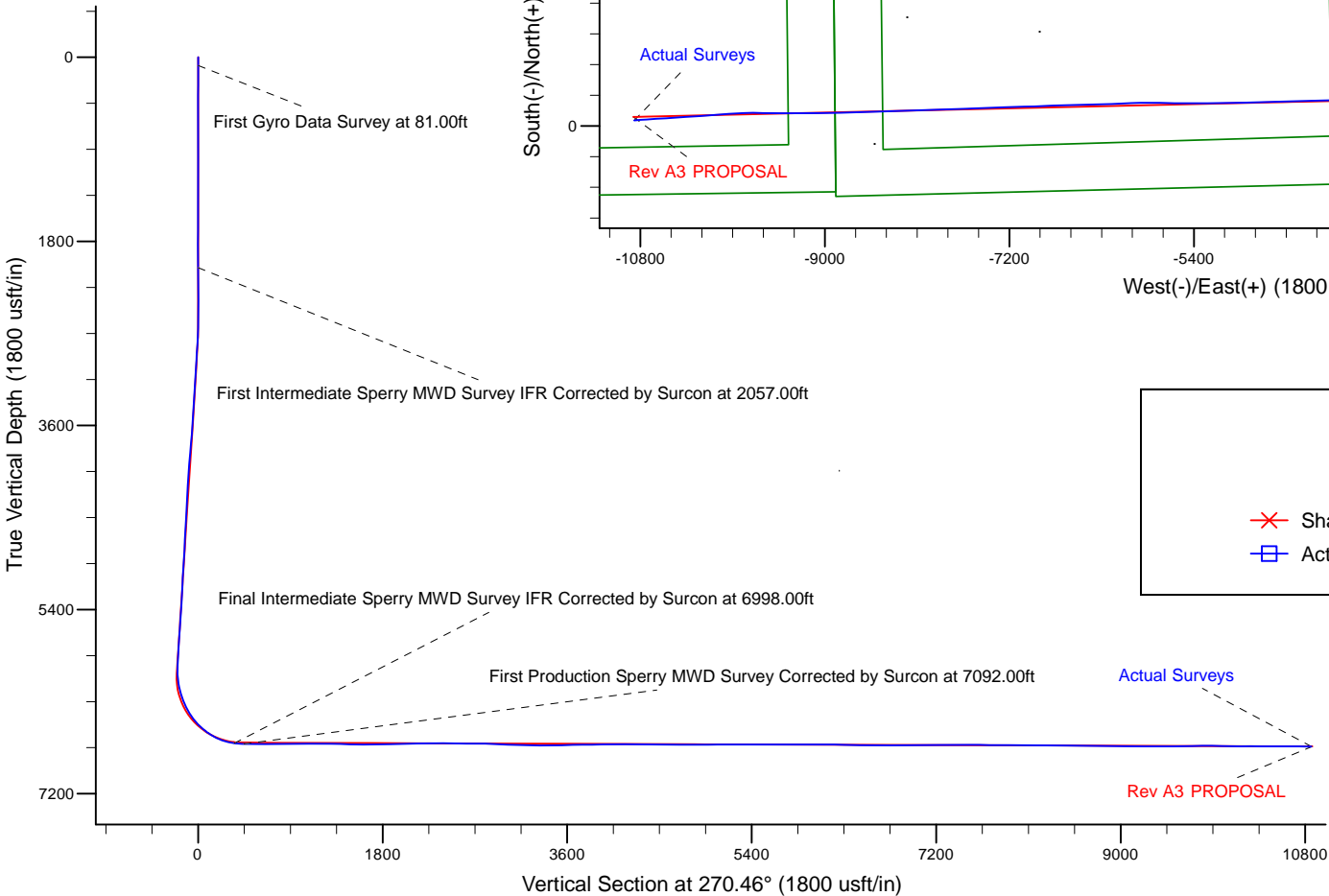
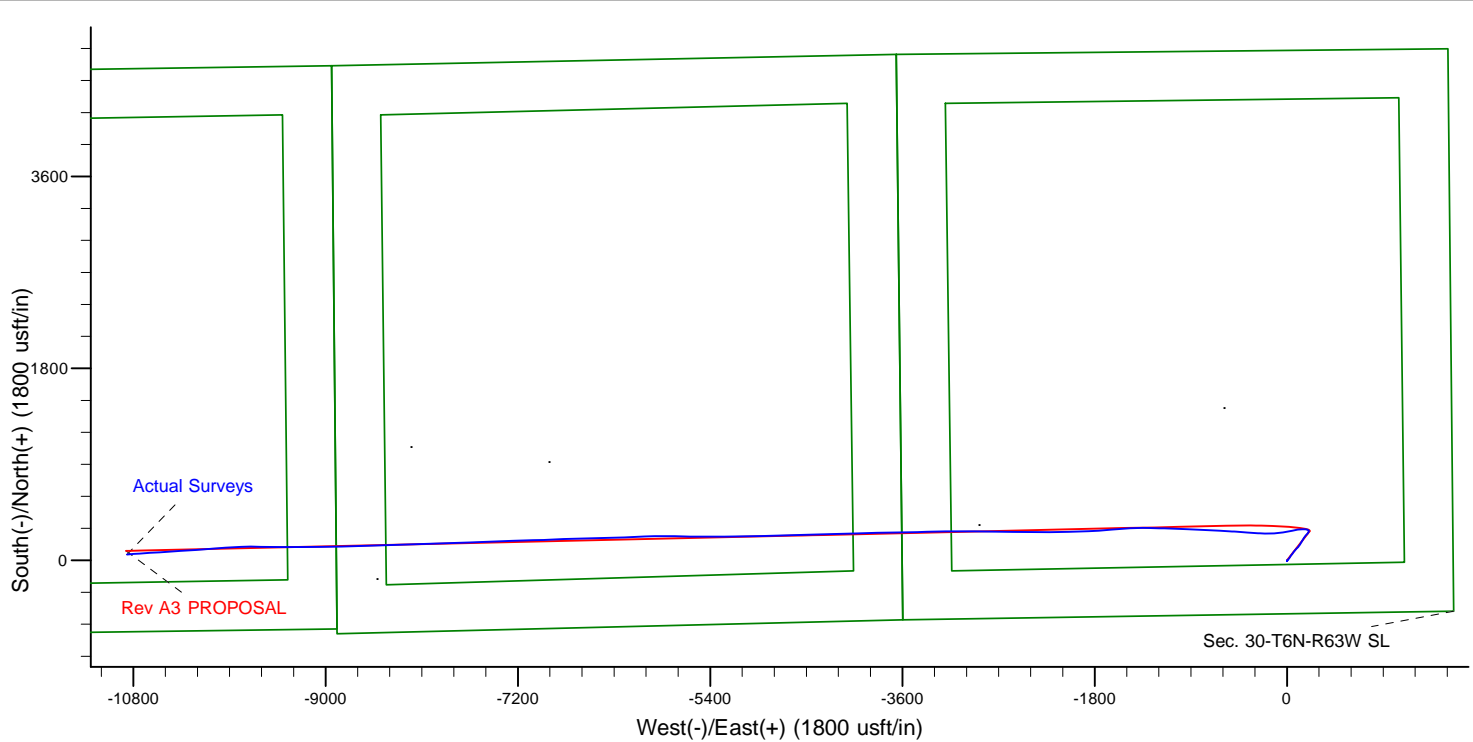
HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 30-T6N-R63W (Shadow PAD)
 Well: Shadow A26-622
 Wellbore: Plan A
 Design: Actual Surveys



Platted SHL: 500' FSL, 1553' FEL
 Platted Lat/Long: 40.45163, -104.47582
 Location: Sec. 30-T6N-R63W

Platted BHL: 780' FSL, 1970' FEL
 Platted Lat/Long: 40.452124 N, -104.514623 W
 State Planes - CO Northern: 1,409,072.81 N, 3,274,221.12 E
 Location: Sec. 26-T6N-R64W



LEGEND

- ✗ Shadow A26-622, Plan A, Rev A3 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Shadow A26-622	
Ground Level:	4638.00
KB = 24' @ 4662.00usft (H&P 343)	
Created By:	Tatiana Gomez
Created On:	6-9-2016



Survey Report for Shadow A26-622 - Production Sperry MWD Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
6,998.00	83.03	274.46	6,705.44	258.85	-348.10	350.19	0.00
Shadow A26-622_Rev A0_SHL - Shadow A26-622_Rev A0_CSG PT							
7,056.06	88.10	273.80	6,709.93	263.02	-405.82	407.94	8.81
Shadow A26-622_Rev A3_CSG PT							
7,057.39	88.22	273.79	6,709.97	263.11	-407.15	409.27	8.81
Shadow A26-622_Rev A2_CSG PT							
7,092.00	91.24	273.40	6,710.14	265.28	-441.68	443.82	8.81
First Production Sperry MWD Survey Corrected by Surcon at 7092.00ft							
7,187.00	91.11	273.45	6,708.19	270.95	-536.49	538.67	0.15
7,281.00	90.13	272.81	6,707.17	276.08	-630.34	632.56	1.25
7,376.00	90.25	273.10	6,706.85	280.98	-725.22	727.47	0.33
7,470.00	90.12	272.35	6,706.55	285.45	-819.11	821.40	0.81
7,564.00	90.50	272.35	6,706.04	289.30	-913.03	915.35	0.40
7,659.00	90.40	272.49	6,705.30	293.32	-1,007.94	1,010.29	0.18
7,753.00	90.83	272.25	6,704.29	297.20	-1,101.86	1,104.23	0.52
7,848.00	89.63	271.18	6,703.91	300.05	-1,196.81	1,199.20	1.69
7,942.00	89.02	270.80	6,705.01	301.67	-1,290.79	1,293.19	0.76
8,037.00	88.30	269.90	6,707.24	302.25	-1,385.76	1,388.17	1.21
8,132.00	88.61	267.55	6,709.80	300.14	-1,480.69	1,483.08	2.49
8,226.00	88.55	264.04	6,712.13	293.25	-1,574.40	1,576.72	3.73
8,320.00	90.77	264.41	6,712.68	283.79	-1,667.91	1,670.16	2.39
8,415.00	91.41	267.33	6,710.88	276.95	-1,762.64	1,764.83	3.15
8,509.00	91.23	267.42	6,708.71	272.65	-1,856.51	1,858.67	0.21
8,604.00	91.32	267.20	6,706.60	268.19	-1,951.39	1,953.50	0.25
8,698.00	91.23	269.14	6,704.51	265.19	-2,045.31	2,047.39	2.07
8,793.00	91.78	268.93	6,702.01	263.59	-2,140.26	2,142.33	0.62
8,887.00	90.58	270.37	6,700.08	263.01	-2,234.24	2,236.30	1.99
8,982.00	90.55	270.29	6,699.14	263.56	-2,329.23	2,331.29	0.09
9,076.00	88.89	270.63	6,699.60	264.32	-2,423.22	2,425.29	1.80
9,171.00	89.10	270.43	6,701.26	265.19	-2,518.21	2,520.27	0.31
9,266.00	89.63	270.60	6,702.32	266.05	-2,613.20	2,615.27	0.59
9,360.00	90.12	270.52	6,702.52	266.97	-2,707.19	2,709.27	0.53
9,454.00	88.55	271.18	6,703.61	268.36	-2,801.17	2,803.26	1.81
9,549.00	87.25	270.77	6,707.09	269.98	-2,896.09	2,898.19	1.43
9,643.00	86.82	270.37	6,711.96	270.91	-2,989.96	2,992.06	0.62
9,738.00	87.87	269.75	6,716.36	271.01	-3,084.86	3,086.95	1.28
9,833.00	89.32	269.06	6,718.69	270.02	-3,179.82	3,181.91	1.69
9,928.00	88.86	268.69	6,720.20	268.16	-3,274.79	3,276.86	0.62
10,022.00	90.83	268.81	6,720.45	266.11	-3,368.76	3,370.81	2.10
10,117.00	90.92	268.52	6,719.00	263.90	-3,463.72	3,465.75	0.32
10,211.00	91.20	268.98	6,717.26	261.85	-3,557.69	3,559.69	0.57
10,306.00	90.74	269.05	6,715.65	260.21	-3,652.66	3,654.65	0.49
10,400.00	90.49	268.55	6,714.64	258.24	-3,746.63	3,748.60	0.59
10,495.00	90.74	268.68	6,713.62	255.95	-3,841.60	3,843.55	0.30
10,589.00	90.92	268.68	6,712.26	253.78	-3,935.56	3,937.49	0.19
10,684.00	90.92	268.41	6,710.74	251.37	-4,030.52	4,032.43	0.28
10,778.00	91.26	268.40	6,708.95	248.75	-4,124.47	4,126.35	0.36
10,873.00	89.04	268.85	6,708.70	246.48	-4,219.43	4,221.29	2.38
10,968.00	90.12	268.64	6,709.40	244.39	-4,314.41	4,316.25	1.16
11,062.00	88.80	267.47	6,710.28	241.20	-4,408.34	4,410.16	1.88

Survey Report for Shadow A26-622 - Production Sperry MWD Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
11,157.00	88.52	268.26	6,712.50	237.67	-4,503.25	4,505.03	0.88
11,251.00	90.00	268.39	6,713.72	234.92	-4,597.20	4,598.95	1.58
11,346.00	90.00	268.47	6,713.72	232.32	-4,692.16	4,693.89	0.08
11,440.00	90.46	267.85	6,713.34	229.30	-4,786.11	4,787.82	0.82
11,535.00	89.07	267.53	6,713.73	225.47	-4,881.03	4,882.70	1.50
11,629.00	90.77	270.11	6,713.86	223.53	-4,975.00	4,976.65	3.29
11,724.00	91.01	270.60	6,712.38	224.12	-5,069.99	5,071.64	0.57
11,818.00	90.06	269.85	6,711.51	224.49	-5,163.98	5,165.63	1.29
12,008.00	89.90	268.79	6,711.57	222.24	-5,353.97	5,355.59	0.56
12,102.00	89.53	268.70	6,712.04	220.18	-5,447.94	5,449.55	0.41
12,197.00	90.03	270.87	6,712.41	219.82	-5,542.94	5,544.54	2.34
12,291.00	90.06	271.93	6,712.33	222.12	-5,636.91	5,638.52	1.13
12,386.00	89.87	271.49	6,712.39	224.95	-5,731.86	5,733.50	0.50
12,481.00	89.60	269.87	6,712.83	226.08	-5,826.85	5,828.49	1.73
12,575.00	90.83	268.77	6,712.48	224.96	-5,920.84	5,922.47	1.76
12,670.00	90.02	267.46	6,711.77	221.84	-6,015.78	6,017.39	1.62
12,764.00	90.35	267.64	6,711.47	217.82	-6,109.70	6,111.26	0.40
12,859.00	88.33	267.82	6,712.56	214.06	-6,204.61	6,206.14	2.13
12,954.00	88.85	268.13	6,714.90	210.70	-6,299.52	6,301.03	0.64
13,048.00	89.16	268.16	6,716.53	207.66	-6,393.46	6,394.93	0.33
13,143.00	89.53	268.85	6,717.62	205.18	-6,488.42	6,489.87	0.82
13,237.00	89.53	269.26	6,718.39	203.63	-6,582.41	6,583.84	0.44
13,332.00	90.45	268.10	6,718.41	201.44	-6,677.38	6,678.79	1.56
13,427.00	89.65	267.66	6,718.32	197.93	-6,772.31	6,773.69	0.96
13,521.00	89.56	267.54	6,718.97	193.99	-6,866.23	6,867.57	0.16
13,616.00	90.21	267.94	6,719.16	190.25	-6,961.15	6,962.47	0.80
13,710.00	90.45	268.35	6,718.62	187.20	-7,055.10	7,056.39	0.51
13,805.00	90.70	268.52	6,717.67	184.61	-7,150.06	7,151.32	0.32
13,899.00	90.95	268.28	6,716.31	181.99	-7,244.01	7,245.25	0.37
13,994.00	89.46	267.73	6,715.97	178.68	-7,338.95	7,340.16	1.67
14,182.00	90.70	267.91	6,715.71	171.53	-7,526.81	7,527.96	0.67
14,277.00	89.19	267.70	6,715.80	167.89	-7,621.74	7,622.85	1.60
14,372.00	89.59	267.85	6,716.81	164.20	-7,716.66	7,717.74	0.45
14,466.00	90.33	268.30	6,716.88	161.04	-7,810.61	7,811.66	0.92
14,655.00	88.67	267.83	6,718.53	154.66	-7,999.49	8,000.48	0.91
14,750.00	89.37	268.11	6,720.15	151.30	-8,094.41	8,095.37	0.79
14,939.00	90.11	268.29	6,721.01	145.36	-8,283.32	8,284.22	0.40
15,033.00	90.55	268.49	6,720.47	142.72	-8,377.28	8,378.16	0.51
15,128.00	88.94	268.23	6,720.89	140.00	-8,472.23	8,473.09	1.72
15,222.00	88.85	268.07	6,722.71	136.97	-8,566.17	8,567.00	0.20
15,317.00	89.19	268.40	6,724.33	134.04	-8,661.11	8,661.91	0.50
15,411.00	89.13	268.61	6,725.71	131.59	-8,755.07	8,755.85	0.23
15,506.00	89.13	268.73	6,727.15	129.38	-8,850.03	8,850.79	0.13
15,601.00	89.46	268.73	6,728.32	127.28	-8,945.00	8,945.74	0.35
15,695.00	89.74	269.11	6,728.98	125.51	-9,038.98	9,039.70	0.50
15,884.00	89.90	269.75	6,729.57	123.63	-9,227.97	9,228.67	0.35
15,979.00	89.90	269.89	6,729.74	123.33	-9,322.97	9,323.66	0.15
16,073.00	90.05	270.06	6,729.78	123.30	-9,416.97	9,417.66	0.24
16,168.00	90.11	270.55	6,729.64	123.80	-9,511.97	9,512.66	0.52
16,262.00	91.16	271.72	6,728.60	125.66	-9,605.94	9,606.64	1.67
16,357.00	91.83	270.93	6,726.12	127.86	-9,700.88	9,701.60	1.09

Survey Report for Shadow A26-622 - Production Sperry MWD Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
16,451.00	89.98	266.65	6,724.64	125.87	-9,794.82	9,795.52	4.96
16,546.00	89.24	266.34	6,725.28	120.07	-9,889.64	9,890.29	0.84
16,640.00	88.93	265.93	6,726.79	113.73	-9,983.41	9,984.01	0.55
16,735.00	89.15	265.80	6,728.38	106.88	-10,078.15	10,078.69	0.27
16,830.00	89.77	265.65	6,729.27	99.80	-10,172.88	10,173.36	0.67
16,924.00	90.45	265.60	6,729.09	92.63	-10,266.61	10,267.02	0.73
17,019.00	89.40	266.90	6,729.22	86.42	-10,361.40	10,361.76	1.76
17,208.00	89.86	266.37	6,730.44	75.32	-10,550.07	10,550.34	0.37
17,303.00	90.23	266.19	6,730.36	69.16	-10,644.87	10,645.08	0.43
17,397.00	89.15	265.41	6,730.87	62.28	-10,738.62	10,738.77	1.42
17,459.00	89.40	266.09	6,731.66	57.68	-10,800.44	10,800.55	1.17
Final Production Sperry MWD Survey Corrected by Surcon at 17459.00ft							
17,520.00	89.40	266.09	6,732.29	53.52	-10,861.29	10,861.37	0.00
Straight Line Projection to TD at 17520.00ft - Shadow A26-622_Rev A2_BHL - Shadow A26-622_Rev A1_BHL - Shadow A							

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,092.00	6,710.14	265.28	-441.68	First Production Sperry MWD Survey Corrected by Surcon at 7092.00ft
17,459.00	6,731.66	57.68	-10,800.44	Final Production Sperry MWD Survey Corrected by Surcon at 17459.00ft
17,520.00	6,732.29	53.52	-10,861.29	Straight Line Projection to TD at 17520.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Shadow A26-622_Rev A3_BHL	270.46	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
81.00	1,875.00	Gyro Data Surveys	NS-GYRO-MS
2,057.00	7,092.00	Intermediate Sperry MWD Surveys	MWD+IFR1+MS_WY
7,187.00	17,520.00	Production Sperry MWD Surveys	MWD+IFR1+MS_WY

Survey Report for Shadow A26-622 - Production Sperry MWD 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
Shadow A26-622_Rev - survey misses target center by 6719.46usft at 6998.00usft MD (6705.44 TVD, 258.85 N, -348.10 E) - Point	0.00	0.00	0.00	0.01	0.00	1,409,015.14	3,285,021.16	40.451630	-104.475820
Shadow A26-622_Rev - survey misses target center by 64.92usft at 7056.15usft MD (6709.93 TVD, 263.03 N, -405.91 E) - Point	0.00	0.00	6,699.58	327.00	-402.00	1,409,342.12	3,284,619.18	40.452540	-104.477251
Shadow A26-622_Rev - survey misses target center by 65.83usft at 7056.97usft MD (6709.96 TVD, 263.08 N, -406.72 E) - Point	0.00	0.00	6,724.96	327.00	-402.00	1,409,342.12	3,284,619.18	40.452540	-104.477251
Shadow A26-622_Rev - survey misses target center by 84.56usft at 6998.00usft MD (6705.44 TVD, 258.85 N, -348.10 E) - Point	0.00	0.00	6,724.96	327.00	-302.00	1,409,342.12	3,284,719.17	40.452537	-104.476891
Shadow A26-622_Rev - survey misses target center by 36.18usft at 17520.00usft MD (6732.29 TVD, 53.52 N, -10861.29 E) - Point	0.00	0.00	6,726.00	88.17	-10,869.60	1,409,103.30	3,274,151.97	40.452210	-104.514870
Shadow A26-622_Rev - survey misses target center by 36.18usft at 17520.00usft MD (6732.29 TVD, 53.52 N, -10861.29 E) - Point	0.00	0.00	6,726.00	88.17	-10,869.60	1,409,103.30	3,274,151.97	40.452210	-104.514870
Shadow A26-622_Rev - survey misses target center by 36.18usft at 17520.00usft MD (6732.29 TVD, 53.52 N, -10861.29 E) - Point	0.00	0.00	6,726.00	88.17	-10,869.60	1,409,103.30	3,274,151.97	40.452210	-104.514870
Shadow A26-622_Rev - survey misses target center by 35.94usft at 17520.00usft MD (6732.29 TVD, 53.52 N, -10861.29 E) - Point	0.00	0.00	6,737.00	88.17	-10,869.60	1,409,103.30	3,274,151.97	40.452210	-104.514870

Directional Difficulty Index

Average Dogleg over Survey:	1.04 °/100usft	Maximum Dogleg over Survey:	8.81 °/100usft at 7,092.00 usft
Net Tortosity applicable to Plans:	-2.61 °/100usft	Directional Difficulty Index:	6.697

Audit Info

North Reference Sheet for Sec. 30-T6N-R63W (Shadow PAD) - Shadow A26-622 - 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 A26-622

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: 0.99996298

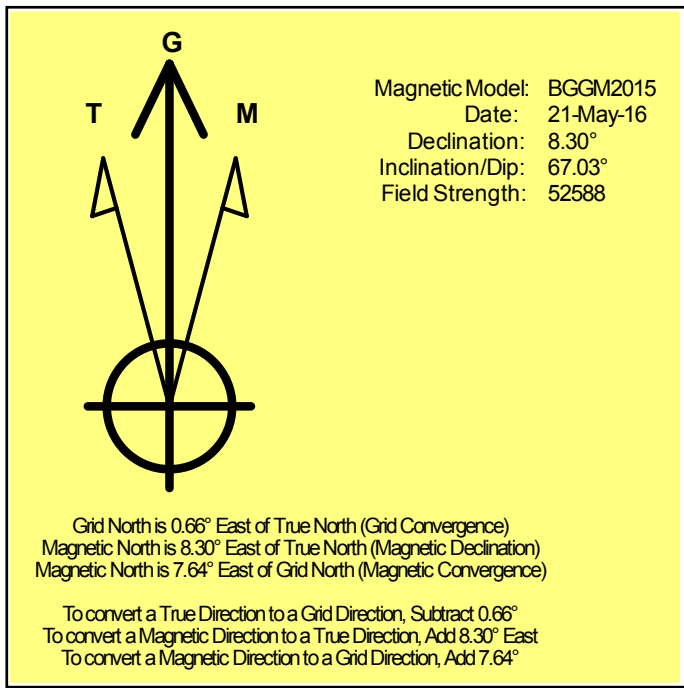
Grid Coordinates of Well: 1,409,015.13 usft N, 3,285,021.16 usft E

Geographical Coordinates of Well: 40° 27' 05.87" N, 104° 28' 32.95" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,520.00usft the Bottom Hole Displacement is 10,861.43usft in the Direction of 270.28° (Grid).

Magnetic Convergence at surface is: -7.64° (21 May 2016, , BGGM2015)



Noble Energy

Weld County, CO (NAD 83)

Sec. 30-T6N-R63W (Shadow PAD)

Shadow A26-622

05-123-42919

Plan A

Survey: Production Sperry MWD Surveys

Sperry Drilling Services

Geodetic Report

08 June, 2016

Well Coordinates: 1,409,015.13 N, 3,285,021.16 E (40° 27' 05.87" N, 104° 28' 32.95" W)

Ground Level: 4,638.00 usft

Local Coordinate Origin:

Centered on Well Shadow A26-622

Viewing Datum:

KB = 24' @ 4662.00usft (H&P 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: 81

HALLIBURTON

Survey Report for Shadow A26-622 - Production Sperry MWD 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)
6,998.00	83.03	274.46	6,705.44	258.85	-348.10	40.452352	-104.477060	1,409,273.98	3,284,673.07
7,056.06	88.10	273.80	6,709.93	263.02	-405.82	40.452365	-104.477267	1,409,278.14	3,284,615.36
7,057.39	88.22	273.79	6,709.97	263.11	-407.15	40.452365	-104.477272	1,409,278.23	3,284,614.03
7,092.00	91.24	273.40	6,710.14	265.28	-441.68	40.452372	-104.477396	1,409,280.40	3,284,579.50
7,187.00	91.11	273.45	6,708.19	270.95	-536.49	40.452391	-104.477737	1,409,286.07	3,284,484.69
7,281.00	90.13	272.81	6,707.17	276.08	-630.34	40.452408	-104.478074	1,409,291.21	3,284,390.84
7,376.00	90.25	273.10	6,706.85	280.98	-725.22	40.452424	-104.478414	1,409,296.10	3,284,295.97
7,470.00	90.12	272.35	6,706.55	285.45	-819.11	40.452439	-104.478751	1,409,300.57	3,284,202.08
7,564.00	90.50	272.35	6,706.04	289.30	-913.03	40.452453	-104.479089	1,409,304.43	3,284,108.17
7,659.00	90.40	272.49	6,705.30	293.32	-1,007.94	40.452467	-104.479430	1,409,308.44	3,284,013.26
7,753.00	90.83	272.25	6,704.29	297.20	-1,101.86	40.452481	-104.479767	1,409,312.32	3,283,919.35
7,848.00	89.63	271.18	6,703.91	300.05	-1,196.81	40.452491	-104.480108	1,409,315.17	3,283,824.40
7,942.00	89.02	270.80	6,705.01	301.67	-1,290.79	40.452499	-104.480445	1,409,316.79	3,283,730.42
8,037.00	88.30	269.90	6,707.24	302.25	-1,385.76	40.452503	-104.480787	1,409,317.37	3,283,635.45
8,132.00	88.61	267.55	6,709.80	300.14	-1,480.69	40.452501	-104.481128	1,409,315.26	3,283,540.52
8,226.00	88.55	264.04	6,712.13	293.25	-1,574.40	40.452485	-104.481465	1,409,308.37	3,283,446.82
8,320.00	90.77	264.41	6,712.68	283.79	-1,667.91	40.452462	-104.481801	1,409,298.91	3,283,353.31
8,415.00	91.41	267.33	6,710.88	276.95	-1,762.64	40.452446	-104.482142	1,409,292.07	3,283,258.59
8,509.00	91.23	267.42	6,708.71	272.65	-1,856.51	40.452437	-104.482479	1,409,287.77	3,283,164.72
8,604.00	91.32	267.20	6,706.60	268.19	-1,951.39	40.452428	-104.482820	1,409,283.31	3,283,069.85
8,698.00	91.23	269.14	6,704.51	265.19	-2,045.31	40.452423	-104.483158	1,409,280.31	3,282,975.93
8,793.00	91.78	268.93	6,702.01	263.59	-2,140.26	40.452421	-104.483499	1,409,278.71	3,282,880.98
8,887.00	90.58	270.37	6,700.88	263.01	-2,234.24	40.452423	-104.483837	1,409,278.14	3,282,787.01
8,982.00	90.55	270.29	6,699.14	263.56	-2,329.23	40.452427	-104.484178	1,409,278.68	3,282,692.02
9,076.00	88.89	270.63	6,699.60	264.32	-2,423.22	40.452432	-104.484516	1,409,279.44	3,282,598.03
9,171.00	89.10	270.43	6,701.26	265.19	-2,518.21	40.452437	-104.484857	1,409,280.32	3,282,503.05
9,266.00	89.63	270.60	6,702.32	266.05	-2,613.20	40.452443	-104.485198	1,409,281.17	3,282,408.06
9,360.00	90.12	270.52	6,702.52	266.97	-2,707.19	40.452448	-104.485536	1,409,282.09	3,282,314.07
9,454.00	88.55	271.18	6,703.61	268.36	-2,801.17	40.452455	-104.485874	1,409,283.48	3,282,220.09
9,549.00	87.25	270.77	6,707.09	269.98	-2,896.09	40.452462	-104.486215	1,409,285.10	3,282,125.18
9,643.00	86.82	270.37	6,711.96	270.91	-2,989.96	40.452468	-104.486552	1,409,286.03	3,282,031.31
9,738.00	87.87	269.75	6,716.36	271.01	-3,084.86	40.452471	-104.486893	1,409,286.13	3,281,936.42
9,833.00	89.32	269.06	6,718.69	270.02	-3,179.82	40.452471	-104.487234	1,409,285.15	3,281,841.46
9,928.00	88.86	268.69	6,720.20	268.16	-3,274.79	40.452469	-104.487575	1,409,283.28	3,281,746.49
10,022.00	90.83	268.81	6,720.45	266.11	-3,368.76	40.452467	-104.487913	1,409,281.23	3,281,652.53
10,117.00	90.92	268.52	6,719.00	263.90	-3,463.72	40.452464	-104.488254	1,409,279.02	3,281,557.57
10,211.00	91.20	268.98	6,717.26	261.85	-3,557.69	40.452461	-104.488592	1,409,276.97	3,281,463.61
10,306.00	90.74	269.05	6,715.65	260.21	-3,652.66	40.452459	-104.488933	1,409,275.34	3,281,368.64
10,400.00	90.49	268.55	6,714.64	258.24	-3,746.63	40.452457	-104.489271	1,409,273.37	3,281,274.67
10,495.00	90.74	268.68	6,713.62	255.95	-3,841.60	40.452454	-104.489612	1,409,271.07	3,281,179.71
10,589.00	90.92	268.68	6,712.26	253.78	-3,935.56	40.452451	-104.489950	1,409,268.91	3,281,085.74
10,684.00	90.92	268.41	6,710.74	251.37	-4,030.52	40.452447	-104.490291	1,409,266.49	3,280,990.79



Survey Report for Shadow A26-622 - Production Sperry MWD 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)
10,778.00	91.26	268.40	6,708.95	248.75	-4,124.47	40.452443	-104.490629	1,409,263.88	3,280,896.85
10,873.00	89.04	268.85	6,708.70	246.48	-4,219.43	40.452439	-104.490970	1,409,261.60	3,280,801.89
10,968.00	90.12	268.64	6,709.40	244.39	-4,314.41	40.452437	-104.491312	1,409,259.52	3,280,706.92
11,062.00	88.80	267.47	6,710.28	241.20	-4,408.34	40.452431	-104.491649	1,409,256.33	3,280,612.98
11,157.00	88.52	268.26	6,712.50	237.67	-4,503.25	40.452424	-104.491990	1,409,252.79	3,280,518.08
11,251.00	90.00	268.39	6,713.72	234.92	-4,597.20	40.452419	-104.492328	1,409,250.04	3,280,424.13
11,346.00	90.00	268.47	6,713.72	232.32	-4,692.16	40.452415	-104.492669	1,409,247.44	3,280,329.17
11,440.00	90.46	267.85	6,713.34	229.30	-4,786.11	40.452410	-104.493007	1,409,244.42	3,280,235.22
11,535.00	89.07	267.53	6,713.73	225.47	-4,881.03	40.452402	-104.493348	1,409,240.59	3,280,140.31
11,629.00	90.77	270.11	6,713.86	223.53	-4,975.00	40.452400	-104.493686	1,409,238.66	3,280,046.34
11,724.00	91.01	270.60	6,712.38	224.12	-5,069.99	40.452405	-104.494027	1,409,239.25	3,279,951.36
11,818.00	90.06	269.85	6,711.51	224.49	-5,163.98	40.452408	-104.494365	1,409,239.62	3,279,857.37
12,008.00	89.90	268.79	6,711.57	222.24	-5,353.97	40.452408	-104.495048	1,409,237.36	3,279,667.39
12,102.00	89.53	268.70	6,712.04	220.18	-5,447.94	40.452405	-104.495385	1,409,235.30	3,279,573.42
12,197.00	90.03	270.87	6,712.41	219.82	-5,542.94	40.452407	-104.495727	1,409,234.95	3,279,478.43
12,291.00	90.06	271.93	6,712.33	222.12	-5,636.91	40.452417	-104.496064	1,409,237.24	3,279,384.46
12,386.00	89.87	271.49	6,712.39	224.95	-5,731.86	40.452427	-104.496405	1,409,240.08	3,279,289.51
12,481.00	89.60	269.87	6,712.83	226.08	-5,826.85	40.452433	-104.496746	1,409,241.20	3,279,194.53
12,575.00	90.83	268.77	6,712.48	224.96	-5,920.84	40.452433	-104.497084	1,409,240.09	3,279,100.54
12,670.00	90.02	267.46	6,711.77	221.84	-6,015.78	40.452428	-104.497425	1,409,236.96	3,279,005.60
12,764.00	90.35	267.64	6,711.47	217.82	-6,109.70	40.452420	-104.497763	1,409,232.95	3,278,911.69
12,859.00	88.33	267.82	6,712.56	214.06	-6,204.61	40.452412	-104.498104	1,409,229.18	3,278,816.78
12,954.00	88.85	268.13	6,714.90	210.70	-6,299.52	40.452406	-104.498445	1,409,225.83	3,278,721.87
13,048.00	89.16	268.16	6,716.53	207.66	-6,393.46	40.452400	-104.498783	1,409,222.79	3,278,627.94
13,143.00	89.53	268.85	6,717.62	205.18	-6,488.42	40.452397	-104.499124	1,409,220.31	3,278,532.98
13,237.00	89.53	269.26	6,718.39	203.63	-6,582.41	40.452395	-104.499462	1,409,218.76	3,278,439.00
13,332.00	90.45	268.10	6,718.41	201.44	-6,677.38	40.452392	-104.499803	1,409,216.57	3,278,344.03
13,427.00	89.65	267.66	6,718.32	197.93	-6,772.31	40.452385	-104.500145	1,409,213.06	3,278,249.10
13,521.00	89.56	267.54	6,718.97	193.99	-6,866.23	40.452378	-104.500482	1,409,209.12	3,278,155.19
13,616.00	90.21	267.94	6,719.16	190.25	-6,961.15	40.452370	-104.500823	1,409,205.37	3,278,060.27
13,710.00	90.45	268.35	6,718.62	187.20	-7,055.10	40.452365	-104.501161	1,409,202.33	3,277,966.32
13,805.00	90.70	268.52	6,717.67	184.61	-7,150.06	40.452361	-104.501502	1,409,199.74	3,277,871.37
13,899.00	90.95	268.28	6,716.31	181.99	-7,244.01	40.452356	-104.501840	1,409,197.11	3,277,777.42
13,994.00	89.46	267.73	6,715.97	178.68	-7,338.95	40.452350	-104.502181	1,409,193.80	3,277,682.48
14,182.00	90.70	267.91	6,715.71	171.53	-7,526.81	40.452336	-104.502856	1,409,186.65	3,277,494.63
14,277.00	89.19	267.70	6,715.80	167.89	-7,621.74	40.452329	-104.503198	1,409,183.02	3,277,399.70
14,372.00	89.59	267.85	6,716.81	164.20	-7,716.66	40.452322	-104.503539	1,409,179.33	3,277,304.78
14,466.00	90.33	268.30	6,716.88	161.04	-7,810.61	40.452316	-104.503877	1,409,176.17	3,277,210.84
14,655.00	88.67	267.83	6,718.53	154.66	-7,999.49	40.452305	-104.504555	1,409,169.79	3,277,021.97
14,750.00	89.37	268.11	6,720.15	151.30	-8,094.41	40.452298	-104.504897	1,409,166.42	3,276,927.05
14,939.00	90.11	268.29	6,721.01	145.36	-8,283.32	40.452288	-104.505576	1,409,160.49	3,276,738.15
15,033.00	90.55	268.49	6,720.47	142.72	-8,377.28	40.452283	-104.505913	1,409,157.85	3,276,644.20

Survey Report for Shadow A26-622 - Production Sperry MWD 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)
15,128.00	88.94	268.23	6,720.89	140.00	-8,472.23	40.452279	-104.506255	1,409,155.13	3,276,549.24
15,222.00	88.85	268.07	6,722.71	136.97	-8,566.17	40.452273	-104.506592	1,409,152.10	3,276,455.31
15,317.00	89.19	268.40	6,724.33	134.04	-8,661.11	40.452268	-104.506933	1,409,149.17	3,276,360.37
15,411.00	89.13	268.61	6,725.71	131.59	-8,755.07	40.452265	-104.507271	1,409,146.72	3,276,266.42
15,506.00	89.13	268.73	6,727.15	129.38	-8,850.03	40.452261	-104.507612	1,409,144.51	3,276,171.46
15,601.00	89.46	268.73	6,728.32	127.28	-8,945.00	40.452259	-104.507954	1,409,142.41	3,276,076.49
15,695.00	89.74	269.11	6,728.98	125.51	-9,038.98	40.452257	-104.508291	1,409,140.64	3,275,982.52
15,884.00	89.90	269.75	6,729.57	123.63	-9,227.97	40.452257	-104.508971	1,409,138.76	3,275,793.54
15,979.00	89.90	269.89	6,729.74	123.33	-9,322.97	40.452259	-104.509312	1,409,138.46	3,275,698.54
16,073.00	90.05	270.06	6,729.78	123.30	-9,416.97	40.452262	-104.509650	1,409,138.42	3,275,604.54
16,168.00	90.11	270.55	6,729.64	123.80	-9,511.97	40.452266	-104.509991	1,409,138.93	3,275,509.55
16,262.00	91.16	271.72	6,728.60	125.66	-9,605.94	40.452274	-104.510329	1,409,140.79	3,275,415.58
16,357.00	91.83	270.93	6,726.12	127.86	-9,700.88	40.452283	-104.510670	1,409,142.99	3,275,320.64
16,451.00	89.98	266.65	6,724.64	125.87	-9,794.82	40.452281	-104.511007	1,409,141.00	3,275,226.70
16,546.00	89.24	266.34	6,725.28	120.07	-9,889.64	40.452268	-104.511348	1,409,135.20	3,275,131.89
16,640.00	88.93	265.93	6,726.79	113.73	-9,983.41	40.452253	-104.511685	1,409,128.86	3,275,038.12
16,735.00	89.15	265.80	6,728.38	106.88	-10,078.15	40.452237	-104.512026	1,409,122.01	3,274,943.38
16,830.00	89.77	265.65	6,729.27	99.80	-10,172.88	40.452221	-104.512367	1,409,114.93	3,274,848.65
16,924.00	90.45	265.60	6,729.09	92.63	-10,266.61	40.452204	-104.512704	1,409,107.76	3,274,754.93
17,019.00	89.40	266.90	6,729.22	86.42	-10,361.40	40.452190	-104.513044	1,409,101.55	3,274,660.14
17,208.00	89.86	266.37	6,730.44	75.32	-10,550.07	40.452165	-104.513723	1,409,090.45	3,274,471.48
17,303.00	90.23	266.19	6,730.36	69.16	-10,644.87	40.452151	-104.514064	1,409,084.29	3,274,376.68
17,397.00	89.15	265.41	6,730.87	62.28	-10,738.62	40.452135	-104.514401	1,409,077.41	3,274,282.94
17,459.00	89.40	266.09	6,731.66	57.68	-10,800.44	40.452124	-104.514623	1,409,072.81	3,274,221.12
17,520.00	89.40	266.09	6,732.29	53.52	-10,861.29	40.452115	-104.514842	1,409,068.65	3,274,160.27

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
7,092.00	6,710.14	265.28	-441.68	First Production Sperry MWD Survey Corrected by Surcon at 7092.00ft
17,459.00	6,731.66	57.68	-10,800.44	Final Production Sperry MWD Survey Corrected by Surcon at 17459.00ft
17,520.00	6,732.29	53.52	-10,861.29	Straight Line Projection to TD at 17520.00ft

Survey Report for Shadow A26-622 - Production Sperry MWD Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Shadow A26-622_Rev A3_BHL	270.46	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
81.00	1,875.00	Gyro Data Surveys	NS-GYRO-MS
2,057.00	7,092.00	Intermediate Sperry MWD Surveys	MWD+IFR1+MS_WY
7,187.00	17,520.00	Production Sperry MWD Surveys	MWD+IFR1+MS_WY

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:	1.04 °/100usft	Maximum Dogleg over Survey:	8.81 °/100usft at 7,092.00 usft
Net Tortosity applicable to Plans:	-2.61 °/100usft	Directional Difficulty Index:	6.697

Audit Info

North Reference Sheet for Sec. 30-T6N-R63W (Shadow PAD) - Shadow A26-622 - 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 A26-622
 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: 0.99996298

Grid Coordinates of Well: 1,409,015.13 usft N, 3,285,021.16 usft E
 Geographical Coordinates of Well: 40° 27' 05.87" N, 104° 28' 32.95" W
 Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,520.00usft
 the Bottom Hole Displacement is 10,861.43usft in the Direction of 270.28° (Grid).
 Magnetic Convergence at surface is: -7.64° (21 May 2016, , BGGM2015)

