

Noble Energy

Weld County, CO (NAD 83)

Sec. 7-T4N-R66W (Shable K08-30-A PAD)

Shable K08-69-1HN

Sperry Surveys 671' to 7339' and Gyro Data Surveys 7408' to 15809'

Original Wellbore

Design: Sperry MWD Surveys and Gyro Data Surveys

Sperry Drilling Services

Final Survey Report

22 January, 2015

Surface UWI : Sperry Surveys 671' to 7339' and Gyro Data Surveys 7408' to 15809'

Well Coordinates: 1,364,683.26 N, 3,191,522.64 E (40° 19' 56.71" N, 104° 48' 46.84" W)

Ground Level: 4,715.00 usft

Local Coordinate Origin:

Centered on Well Shable K08-69-1HN

Viewing Datum:

RKB=30 @ 4745.00usft (H&P 321)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

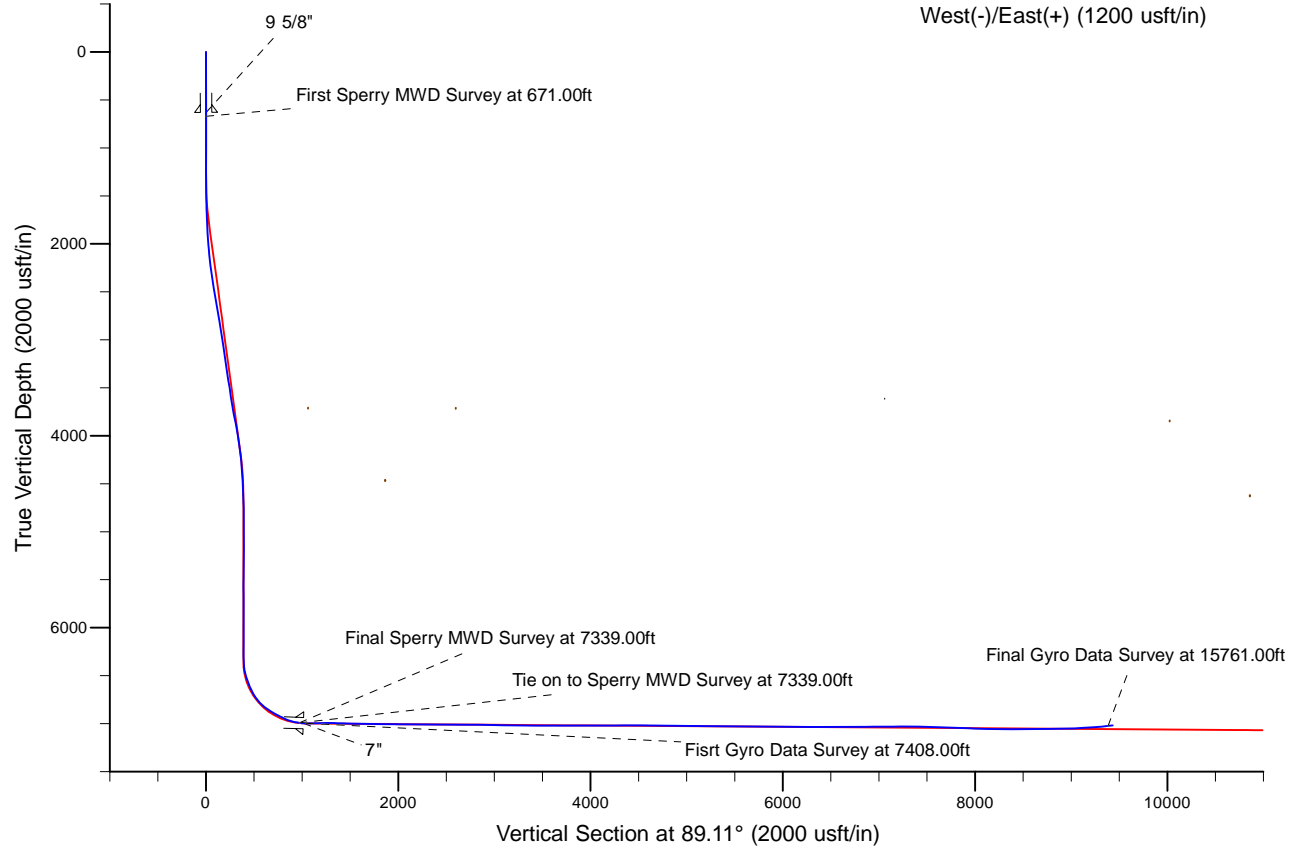
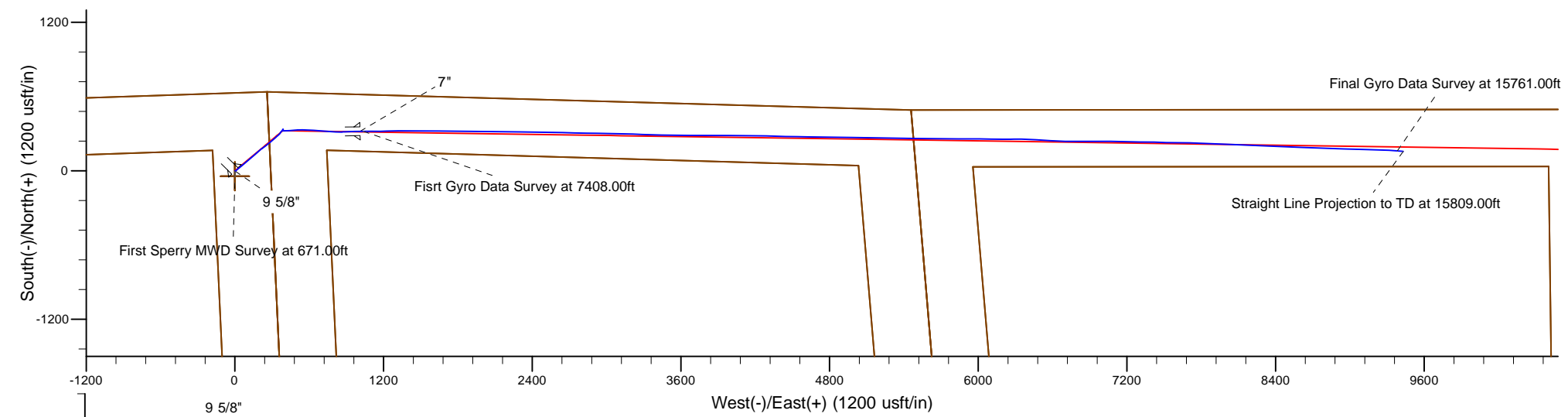
Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 7-T4N-R66W (Shable K08-30-A PAD)
 Well: Shable K08-69-1HN
 Wellbore: Original Wellbore
 Design: Sperry MWD Surveys and Gyro Data Surveys

Noble Energy



LEGEND

- Shable K08-69-1HN, Original Wellbore, Plan A0 Proposal V0
- Sperry MWD Surveys and Gyro Data Surveys

WELL DETAILS: Shable K08-69-1HN	
Ground Level:	4715.00
RKB=30 @ 4745.00usft (H&P 321)	
Created By:	Tatiana Gomez
Created On:	January 22 2015

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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
Sable K08-69-1HN SHL							
0.14	0.00	134.45	0.14	0.00	0.00	0.00	0.00
Sable K08-67HN_Sec 8_SL							
631.00	0.52	134.45	630.99	-1.99	2.03	2.00	0.08
9 5/8"							
671.00	0.55	134.45	670.99	-2.26	2.30	2.26	0.08
First Sperry MWD Survey at 671.00ft							
724.00	0.62	150.14	723.99	-2.68	2.62	2.58	0.33
815.00	0.59	141.07	814.98	-3.47	3.16	3.11	0.11
907.00	0.44	170.57	906.98	-4.19	3.52	3.45	0.33
1,000.00	0.15	139.44	999.98	-4.64	3.66	3.58	0.35
1,092.00	0.22	307.72	1,091.98	-4.62	3.59	3.52	0.40
1,183.00	0.28	306.97	1,182.98	-4.38	3.28	3.21	0.07
1,275.00	0.29	321.84	1,274.97	-4.06	2.96	2.89	0.08
1,367.00	0.63	19.52	1,366.97	-3.40	2.98	2.93	0.58
1,459.00	0.70	36.35	1,458.97	-2.47	3.48	3.44	0.22
1,552.00	1.05	49.04	1,551.96	-1.45	4.46	4.44	0.43
1,644.00	2.24	57.84	1,643.92	0.06	6.62	6.62	1.32
1,737.00	3.33	50.39	1,736.80	2.74	10.24	10.28	1.23
1,829.00	4.08	49.75	1,828.61	6.56	14.80	14.90	0.82
1,921.00	4.82	48.60	1,920.33	11.23	20.20	20.37	0.81
2,015.00	6.02	49.54	2,013.91	17.04	26.91	27.17	1.28
2,110.00	7.46	49.71	2,108.25	24.27	35.40	35.77	1.52
2,205.00	7.88	50.79	2,202.40	32.37	45.15	45.65	0.47
2,300.00	9.98	49.80	2,296.25	41.80	56.49	57.13	2.22
2,394.00	11.55	49.48	2,388.59	53.17	69.86	70.68	1.67
2,489.00	11.19	50.29	2,481.72	65.24	84.18	85.18	0.41
2,584.00	12.15	50.20	2,574.76	77.53	98.96	100.14	1.01
2,679.00	13.59	50.01	2,667.37	91.10	115.19	116.59	1.52
2,774.00	12.16	47.83	2,759.98	104.99	131.16	132.77	1.59
2,869.00	11.57	49.61	2,852.95	117.89	145.83	147.64	0.73
2,964.00	11.61	50.58	2,946.01	130.13	160.47	162.46	0.21
3,058.00	11.60	50.33	3,038.09	142.17	175.05	177.23	0.05
3,153.00	10.76	47.23	3,131.29	154.29	188.91	191.28	1.09
3,248.00	10.39	49.38	3,224.68	165.89	201.93	204.47	0.57
3,343.00	10.17	49.20	3,318.15	176.94	214.78	217.49	0.23
3,438.00	10.60	55.44	3,411.60	187.38	228.32	231.19	1.27
3,532.00	11.60	54.99	3,503.84	197.71	243.18	246.21	1.07
3,627.00	11.12	49.52	3,596.98	209.14	257.98	261.18	1.24
3,722.00	11.76	51.61	3,690.09	221.09	272.53	275.92	0.80
3,817.00	13.65	50.35	3,782.76	234.26	288.75	292.34	2.01
3,911.00	14.54	48.94	3,873.93	249.09	306.19	310.01	1.01
4,006.00	12.86	46.63	3,966.23	264.18	322.87	326.92	1.86
4,101.00	11.00	50.02	4,059.17	277.27	337.50	341.75	2.09
4,195.00	9.94	47.46	4,151.60	288.52	350.35	354.77	1.23
4,290.00	8.48	44.03	4,245.38	299.10	361.26	365.84	1.64
4,385.00	6.52	35.53	4,339.56	308.52	369.26	373.99	2.37
4,479.00	5.88	33.18	4,433.01	316.90	375.00	379.86	0.73
4,574.00	4.42	41.15	4,527.63	323.73	380.07	385.04	1.71

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,669.00	3.63	40.18	4,622.39	328.78	384.42	389.46	0.83
4,764.00	2.94	33.36	4,717.24	333.11	387.70	392.81	0.83
4,858.00	1.34	35.60	4,811.17	336.02	389.67	394.82	1.70
4,953.00	0.44	202.19	4,906.16	336.59	390.18	395.34	1.86
5,048.00	0.42	208.89	5,001.16	335.94	389.87	395.02	0.06
5,143.00	0.41	196.79	5,096.16	335.31	389.60	394.74	0.09
5,237.00	0.65	196.70	5,190.15	334.48	389.35	394.48	0.26
5,332.00	0.84	222.30	5,285.14	333.45	388.73	393.84	0.40
5,427.00	0.81	213.58	5,380.13	332.37	387.89	392.99	0.14
5,522.00	0.86	217.32	5,475.12	331.25	387.09	392.16	0.08
5,616.00	1.55	172.10	5,569.11	329.43	386.83	391.88	1.20
5,711.00	1.20	160.10	5,664.08	327.22	387.35	392.36	0.48
5,806.00	0.34	174.99	5,759.07	326.00	387.71	392.71	0.92
5,901.00	0.32	173.03	5,854.07	325.46	387.77	392.76	0.02
5,996.00	0.41	152.46	5,949.07	324.89	387.96	392.94	0.17
6,090.00	0.28	169.94	6,043.06	324.37	388.15	393.13	0.18
6,185.00	0.36	189.86	6,138.06	323.85	388.14	393.11	0.14
6,286.00	0.19	212.95	6,239.06	323.39	388.00	392.95	0.20
6,374.00	0.14	202.61	6,327.06	323.17	387.88	392.83	0.07
6,468.00	7.53	89.65	6,420.79	323.10	394.00	398.95	8.07
6,563.00	17.37	87.34	6,513.44	323.80	414.44	419.40	10.37
6,658.00	22.19	85.65	6,602.81	325.82	446.51	451.50	5.11
6,753.00	29.43	85.35	6,688.28	329.08	487.72	492.75	7.62
6,848.00	39.90	88.86	6,766.32	331.58	541.60	546.67	11.22
6,942.00	52.70	93.90	6,831.15	329.63	609.35	614.37	14.15
7,037.00	60.27	95.49	6,883.56	323.11	688.22	693.14	8.09
7,085.00	61.70	94.34	6,906.85	319.51	730.04	734.90	3.64
7,132.00	63.18	92.94	6,928.59	316.87	771.62	776.43	4.11
7,180.00	65.76	92.04	6,949.28	314.99	814.89	819.67	5.63
7,226.00	69.82	89.83	6,966.66	314.31	857.46	862.22	9.88
7,274.00	74.78	87.61	6,981.26	315.34	903.16	907.93	11.23
7,339.00	83.08	87.08	6,993.72	318.30	966.82	971.63	12.79
Final Sperry MWD Survey at 7339.00ft - Tie on to Sperry MWD Survey at 7339.00ft							
7,383.00	87.90	88.92	6,997.18	319.83	1,010.65	1,015.47	11.72
7"							
7,408.00	90.64	89.96	6,997.50	320.07	1,035.64	1,040.47	11.72
Fisrt Gyro Data Survey at 7408.00ft							
7,502.00	90.53	90.22	6,996.54	319.92	1,129.64	1,134.45	0.30
7,597.00	90.62	88.42	6,995.59	321.05	1,224.62	1,229.44	1.90
7,692.00	89.36	88.04	6,995.61	323.99	1,319.57	1,324.43	1.39
7,786.00	88.27	90.93	6,997.55	324.83	1,413.54	1,418.39	3.29
7,881.00	88.71	91.88	7,000.05	322.50	1,508.47	1,513.28	1.10
7,976.00	89.22	90.19	7,001.77	320.79	1,603.44	1,608.21	1.86
8,070.00	89.13	89.94	7,003.12	320.68	1,697.43	1,702.19	0.28
8,165.00	88.43	90.68	7,005.15	320.17	1,792.41	1,797.14	1.07
8,260.00	89.61	89.24	7,006.77	320.23	1,887.39	1,892.12	1.96
8,355.00	88.99	90.97	7,007.93	320.06	1,982.38	1,987.09	1.93
8,450.00	89.36	92.18	7,009.30	317.45	2,077.33	2,081.99	1.33
8,544.00	90.64	88.86	7,009.30	316.60	2,171.31	2,175.95	3.79
8,639.00	89.19	91.59	7,009.44	316.22	2,266.30	2,270.92	3.25
8,734.00	89.83	91.20	7,010.25	313.91	2,361.27	2,365.84	0.79

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,828.00	90.17	91.49	7,010.25	311.70	2,455.24	2,459.77	0.48
8,923.00	89.64	90.44	7,010.41	310.10	2,550.22	2,554.72	1.24
9,018.00	88.71	91.08	7,011.78	308.84	2,645.20	2,649.66	1.19
9,112.00	89.55	91.71	7,013.21	306.56	2,739.16	2,743.58	1.12
9,207.00	89.75	91.24	7,013.79	304.11	2,834.13	2,838.50	0.54
9,302.00	88.77	90.54	7,015.01	302.63	2,929.11	2,933.44	1.27
9,396.00	89.52	90.95	7,016.42	301.41	3,023.09	3,027.39	0.91
9,491.00	88.69	91.55	7,017.90	299.34	3,118.05	3,122.31	1.08
9,585.00	89.36	92.02	7,019.50	296.41	3,211.99	3,216.20	0.87
9,680.00	89.72	92.11	7,020.26	292.99	3,306.93	3,311.07	0.39
9,775.00	88.71	92.31	7,021.56	289.33	3,401.85	3,405.92	1.08
9,870.00	89.19	90.64	7,023.30	286.88	3,496.80	3,500.82	1.83
9,965.00	90.48	90.50	7,023.58	285.94	3,591.79	3,595.78	1.37
10,059.00	90.81	89.03	7,022.52	286.32	3,685.78	3,689.77	1.60
10,154.00	90.45	89.21	7,021.47	287.78	3,780.76	3,784.76	0.42
10,248.00	89.86	91.23	7,021.22	287.42	3,874.76	3,878.74	2.24
10,343.00	91.01	90.47	7,020.50	286.01	3,969.74	3,973.69	1.45
10,438.00	89.44	90.36	7,020.13	285.32	4,064.74	4,068.66	1.66
10,533.00	90.39	90.98	7,020.27	284.21	4,159.73	4,163.63	1.19
10,627.00	89.78	92.55	7,020.13	281.32	4,253.68	4,257.52	1.79
10,722.00	90.75	90.52	7,019.69	278.77	4,348.64	4,352.43	2.37
10,817.00	89.58	91.11	7,019.41	277.42	4,443.63	4,447.39	1.38
10,912.00	89.75	90.54	7,019.97	276.05	4,538.61	4,542.34	0.63
11,006.00	88.80	91.43	7,021.16	274.44	4,632.59	4,636.28	1.38
11,100.00	90.42	90.20	7,021.80	273.10	4,726.57	4,730.23	2.16
11,192.00	88.88	90.31	7,022.36	272.69	4,818.57	4,822.21	1.68
11,285.00	88.77	91.90	7,024.27	270.90	4,911.53	4,915.13	1.71
11,376.00	90.25	90.04	7,025.05	269.36	5,002.51	5,006.07	2.61
11,468.00	88.91	91.85	7,025.72	267.84	5,094.49	5,098.02	2.45
11,559.00	90.08	90.19	7,026.52	266.22	5,185.46	5,188.96	2.23
11,651.00	88.57	91.70	7,027.61	264.70	5,277.44	5,280.90	2.32
11,742.00	89.24	91.86	7,029.35	261.88	5,368.38	5,371.79	0.76
11,834.00	89.86	88.98	7,030.07	261.20	5,460.36	5,463.75	3.20
11,927.00	88.99	91.41	7,031.00	260.89	5,553.35	5,556.72	2.78
12,019.00	90.87	89.19	7,031.11	260.41	5,645.34	5,648.69	3.16
12,110.00	89.08	91.11	7,031.15	260.17	5,736.33	5,739.67	2.88
12,202.00	89.41	91.29	7,032.37	258.24	5,828.30	5,831.60	0.41
12,294.00	90.67	89.25	7,032.30	257.81	5,920.29	5,923.57	2.61
12,386.00	89.19	90.32	7,032.41	258.15	6,012.29	6,015.56	1.99
12,479.00	88.80	91.48	7,034.05	256.69	6,105.26	6,108.50	1.32
12,571.00	89.55	90.40	7,035.37	255.18	6,197.24	6,200.44	1.43
12,664.00	91.31	88.08	7,034.67	256.42	6,290.22	6,293.43	3.13
12,756.00	89.38	93.09	7,034.12	255.48	6,382.18	6,385.36	5.84
12,848.00	88.91	92.97	7,035.49	250.62	6,474.04	6,477.14	0.53
12,942.00	90.03	94.01	7,036.36	244.89	6,567.86	6,570.86	1.63
13,038.00	89.22	92.54	7,036.99	239.41	6,663.69	6,666.60	1.75
13,133.00	91.62	89.19	7,036.29	237.98	6,758.66	6,761.53	4.34
13,228.00	90.28	90.08	7,034.72	238.58	6,853.64	6,856.51	1.69
13,323.00	91.26	90.05	7,033.44	238.47	6,948.63	6,951.49	1.03
13,418.00	90.06	90.30	7,032.35	238.18	7,043.62	7,046.46	1.29
13,513.00	89.36	91.24	7,032.83	236.91	7,138.61	7,141.42	1.23

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
13,607.00	91.17	91.06	7,032.39	235.02	7,232.59	7,235.36	1.94
13,702.00	90.92	90.41	7,030.66	233.80	7,327.56	7,330.30	0.73
13,797.00	87.76	91.88	7,031.75	231.90	7,422.52	7,425.22	3.67
13,892.00	87.34	92.03	7,035.82	228.67	7,517.38	7,520.02	0.47
13,986.00	88.83	90.06	7,038.96	226.95	7,611.31	7,613.91	2.63
14,081.00	88.69	91.05	7,041.01	226.03	7,706.28	7,708.85	1.05
14,176.00	87.45	92.73	7,044.21	222.90	7,801.17	7,803.68	2.20
14,271.00	88.13	91.54	7,047.88	219.37	7,896.03	7,898.48	1.44
14,365.00	86.81	93.00	7,052.03	215.65	7,989.86	7,992.24	2.09
14,460.00	89.30	92.58	7,055.25	211.03	8,084.68	8,086.98	2.66
14,555.00	88.55	92.63	7,057.03	206.71	8,179.57	8,181.79	0.79
14,650.00	89.94	91.39	7,058.28	203.38	8,274.50	8,276.65	1.96
14,745.00	88.94	92.92	7,059.21	199.81	8,369.42	8,371.51	1.92
14,839.00	91.40	92.00	7,058.93	195.77	8,463.33	8,465.34	2.79
14,934.00	89.94	92.71	7,057.82	191.87	8,558.24	8,560.18	1.71
15,029.00	89.55	91.89	7,058.25	188.06	8,653.16	8,655.03	0.96
15,124.00	93.25	90.94	7,055.92	185.71	8,748.08	8,749.91	4.02
15,219.00	88.60	94.11	7,054.39	181.53	8,842.94	8,844.69	5.92
15,314.00	92.07	91.53	7,053.84	176.85	8,937.80	8,939.47	4.55
15,409.00	91.79	92.20	7,050.64	173.76	9,032.70	9,034.30	0.76
15,503.00	94.11	90.35	7,045.80	171.67	9,126.54	9,128.10	3.15
15,598.00	94.00	91.78	7,039.08	169.91	9,221.28	9,222.81	1.51
15,693.00	94.20	93.32	7,032.29	165.70	9,315.94	9,317.39	1.63
15,761.00	97.84	94.46	7,025.16	161.11	9,383.40	9,384.77	5.61
Final Gyro Data Survey at 15761.00ft							
15,809.00	97.84	94.46	7,018.61	157.41	9,430.81	9,432.11	0.00
Straight Line Projection to TD at 15809.00ft - Sable K08-69-1HN BHL - Sable K08-69-1HN BHL_Rev 1							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
671.00	670.99	-2.26	2.30	First Sperry MWD Survey at 671.00ft
7,339.00	6,993.72	318.30	966.82	Final Sperry MWD Survey at 7339.00ft
7,339.00	6,993.72	318.30	966.82	Tie on to Sperry MWD Survey at 7339.00ft
7,408.00	6,997.50	320.07	1,035.64	First Gyro Data Survey at 7408.00ft
15,761.00	7,025.16	161.11	9,383.40	Final Gyro Data Survey at 15761.00ft
15,809.00	7,018.61	157.41	9,430.81	Straight Line Projection to TD at 15809.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Sable K08-69-1HN BHL_Rev 1	89.11	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
671.00	7,339.00	Sperry MWD Intermediate Surveys	MWD+IFR1+MS_WY
7,408.00	15,809.00	Gyro Data - Production Surveys	MWD+IFR1+MS_WY

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
631.00	630.99	9 5/8"	9-5/8	13-3/4
7,383.00	6,997.18	7"	7	8-3/4

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	517.95	-4,679.53	1,365,157.49	3,186,843.65	
Point 2				0.00	-4,807.90	-4,619.76	1,359,831.86	3,186,903.42	
Point 3				0.00	-4,735.83	507.97	1,359,903.93	3,192,030.93	
Point 4				0.00	683.29	259.57	1,365,322.82	3,191,782.54	
Sable K08-69-1HN SH	0.00	0.00	0.00	0.01	0.00	1,364,683.27	3,191,522.64	40.332420	-104.813010
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	73.24	-4,214.49	1,364,712.80	3,187,308.67	
Point 2				0.00	-4,341.44	-4,164.95	1,360,298.30	3,187,358.21	
Point 3				0.00	-4,282.53	26.69	1,360,357.21	3,191,549.67	
Point 4				0.00	208.33	-179.16	1,364,847.88	3,191,343.83	
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	209.30	741.80	1,364,848.85	3,192,264.75	
Point 2				0.00	-4,283.55	947.74	1,360,356.19	3,192,470.68	
Point 3				0.00	-4,362.78	5,404.03	1,360,276.97	3,196,926.79	
Point 4				0.00	86.64	5,033.33	1,364,726.20	3,196,556.10	
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	75.16	5,957.51	1,364,714.72	3,197,480.24	
Point 2				0.00	-4,368.02	6,327.70	1,360,271.73	3,197,850.42	
Point 3				0.00	-4,329.94	10,659.00	1,360,309.80	3,202,181.53	
Point 4				0.00	79.47	10,604.39	1,364,719.03	3,202,126.93	
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	683.29	259.57	1,365,322.82	3,191,782.54	
Point 2				0.00	-4,735.83	507.97	1,359,903.93	3,192,030.93	
Point 3				0.00	-4,831.76	5,904.73	1,359,808.00	3,197,427.46	
Point 4				0.00	534.72	5,457.61	1,365,174.26	3,196,980.36	
Sable K08-67HN_Sec	0.00	0.00	0.00	-43.70	0.34	1,364,639.56	3,191,522.98	40.332300	-104.813010
- actual wellpath misses target center by 43.70usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	534.72	5,457.61	1,365,174.26	3,196,980.36	
Point 2				0.00	-4,831.76	5,904.73	1,359,808.00	3,197,427.46	
Point 3				0.00	-4,785.89	11,124.70	1,359,853.87	3,202,647.21	
Point 4				0.00	539.91	11,058.74	1,365,179.45	3,202,581.26	
Sable K08-69-1HN BH	0.00	0.00	7,069.00	170.00	10,989.31	1,364,853.26	3,202,511.49	40.332646	-104.773590
- actual wellpath misses target center by 1559.37usft at 15809.00usft MD (7018.61 TVD, 157.41 N, 9430.81 E)									
- Point									
Sable K08-69-1HN BH	0.00	0.00	7,069.00	164.11	10,989.31	1,364,847.36	3,202,511.49	40.332630	-104.773590
- actual wellpath misses target center by 1559.33usft at 15809.00usft MD (7018.61 TVD, 157.41 N, 9430.81 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.89 °/100usft	Maximum Dogleg over Survey:	14.15 °/100usft at 6,942.00 usft
Net Tortosity applicable to Plans:	1.19 °/100usft	Directional Difficulty Index:	6.806

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Audit Info

North Reference Sheet for Sec. 7-T4N-R66W (Shable K08-30-A PAD) - Shable
K08-69-1HN - 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 RKB=30 @ 4745.00usft (H&P 321). Northing and Easting are relative to Shable K08-69-1HN

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: 0.99995786

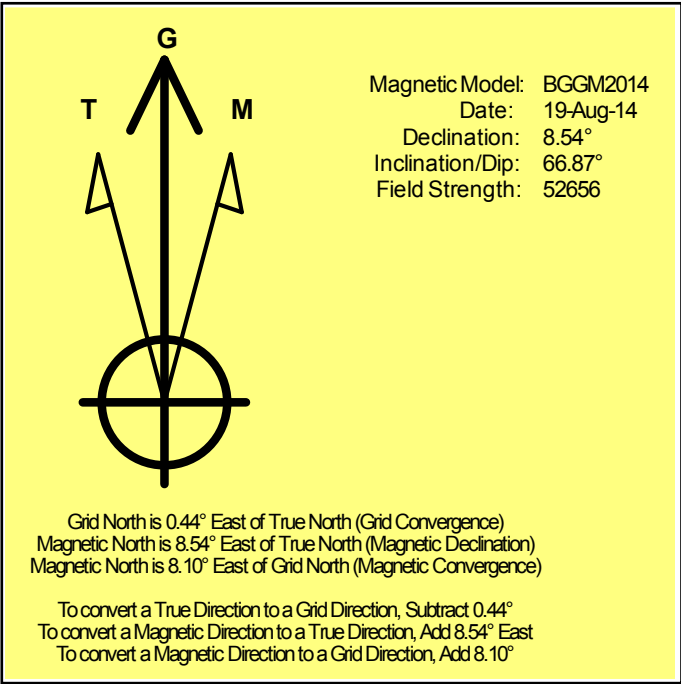
Grid Coordinates of Well: 1,364,683.26 usft N, 3,191,522.64 usft E

Geographical Coordinates of Well: 40° 19' 56.71" N, 104° 48' 46.84" W

Grid Convergence at Surface is: 0.44°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,809.00usft
the Bottom Hole Displacement is 9,432.12usft in the Direction of 89.04° (Grid).

Magnetic Convergence at surface is: -8.10° (19 August 2014, , BGGM2014)



Noble Energy

Weld County, CO (NAD 83)

Sec. 7-T4N-R66W (Shable K08-30-A PAD)

Shable K08-69-1HN

Sperry Surveys 671' to 7339' and Gyro Data Surveys 7408' to 15809'

Original Wellbore

Design: Sperry MWD Surveys and Gyro Data Surveys

Sperry Drilling Services

Geodetic Report

22 January, 2015

Well Coordinates: 1,364,683.26 N, 3,191,522.64 E (40° 19' 56.71" N, 104° 48' 46.84" W)

Ground Level: 4,715.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Shable K08-69-1HN

RKB=30 @ 4745.00usft (H&P 321)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.332420	-104.813010	40.332420	-104.813010	1,364,683.26	3,191,522.64
0.14	0.00	134.45	0.14	0.00	0.00	40.332420	-104.813010	40.332420	-104.813010	1,364,683.26	3,191,522.64
631.00	0.52	134.45	630.99	-1.99	2.03	40.332415	-104.813003	40.332415	-104.813003	1,364,681.26	3,191,524.68
671.00	0.55	134.45	670.99	-2.26	2.30	40.332414	-104.813002	40.332414	-104.813002	1,364,681.00	3,191,524.94
724.00	0.62	150.14	723.99	-2.68	2.62	40.332413	-104.813001	40.332413	-104.813001	1,364,680.58	3,191,525.27
815.00	0.59	141.07	814.98	-3.47	3.16	40.332410	-104.812999	40.332410	-104.812999	1,364,679.79	3,191,525.81
907.00	0.44	170.57	906.98	-4.19	3.52	40.332408	-104.812998	40.332408	-104.812998	1,364,679.07	3,191,526.16
1,000.00	0.15	139.44	999.98	-4.64	3.66	40.332407	-104.812997	40.332407	-104.812997	1,364,678.62	3,191,526.30
1,092.00	0.22	307.72	1,091.98	-4.62	3.59	40.332407	-104.812997	40.332407	-104.812997	1,364,678.64	3,191,526.24
1,183.00	0.28	306.97	1,182.98	-4.38	3.28	40.332408	-104.812999	40.332408	-104.812999	1,364,678.88	3,191,525.92
1,275.00	0.29	321.84	1,274.97	-4.06	2.96	40.332409	-104.813000	40.332409	-104.813000	1,364,679.20	3,191,525.60
1,367.00	0.63	19.52	1,366.97	-3.40	2.98	40.332411	-104.813000	40.332411	-104.813000	1,364,679.86	3,191,525.63
1,459.00	0.70	36.35	1,458.97	-2.47	3.48	40.332413	-104.812998	40.332413	-104.812998	1,364,680.79	3,191,526.13
1,552.00	1.05	49.04	1,551.96	-1.45	4.46	40.332416	-104.812994	40.332416	-104.812994	1,364,681.80	3,191,527.11
1,644.00	2.24	57.84	1,643.92	0.06	6.62	40.332420	-104.812987	40.332420	-104.812987	1,364,683.31	3,191,529.27
1,737.00	3.33	50.39	1,736.80	2.74	10.24	40.332427	-104.812973	40.332427	-104.812973	1,364,686.00	3,191,532.89
1,829.00	4.08	49.75	1,828.61	6.56	14.80	40.332438	-104.812957	40.332438	-104.812957	1,364,689.82	3,191,537.44
1,921.00	4.82	48.60	1,920.33	11.23	20.20	40.332450	-104.812938	40.332450	-104.812938	1,364,694.49	3,191,542.84
2,015.00	6.02	49.54	2,013.91	17.04	26.91	40.332466	-104.812913	40.332466	-104.812913	1,364,700.30	3,191,549.55
2,110.00	7.46	49.71	2,108.25	24.27	35.40	40.332486	-104.812883	40.332486	-104.812883	1,364,707.52	3,191,558.05
2,205.00	7.88	50.79	2,202.40	32.37	45.15	40.332508	-104.812847	40.332508	-104.812847	1,364,715.63	3,191,567.80
2,300.00	9.98	49.80	2,296.25	41.80	56.49	40.332534	-104.812806	40.332534	-104.812806	1,364,725.06	3,191,579.13
2,394.00	11.55	49.48	2,388.59	53.17	69.86	40.332565	-104.812758	40.332565	-104.812758	1,364,736.43	3,191,592.51
2,489.00	11.19	50.29	2,481.72	65.24	84.18	40.332597	-104.812707	40.332597	-104.812707	1,364,748.50	3,191,606.83
2,584.00	12.15	50.20	2,574.76	77.53	98.96	40.332631	-104.812653	40.332631	-104.812653	1,364,760.79	3,191,621.60
2,679.00	13.59	50.01	2,667.37	91.10	115.19	40.332668	-104.812595	40.332668	-104.812595	1,364,774.36	3,191,637.83
2,774.00	12.16	47.83	2,759.98	104.99	131.16	40.332705	-104.812537	40.332705	-104.812537	1,364,788.25	3,191,653.80
2,869.00	11.57	49.61	2,852.95	117.89	145.83	40.332741	-104.812484	40.332741	-104.812484	1,364,801.14	3,191,668.47
2,964.00	11.61	50.58	2,946.01	130.13	160.47	40.332774	-104.812431	40.332774	-104.812431	1,364,813.38	3,191,683.11
3,058.00	11.60	50.33	3,038.09	142.17	175.05	40.332807	-104.812378	40.332807	-104.812378	1,364,825.42	3,191,697.69
3,153.00	10.76	47.23	3,131.29	154.29	188.91	40.332840	-104.812328	40.332840	-104.812328	1,364,837.54	3,191,711.55
3,248.00	10.39	49.38	3,224.68	165.89	201.93	40.332871	-104.812281	40.332871	-104.812281	1,364,849.14	3,191,724.56
3,343.00	10.17	49.20	3,318.15	176.94	214.78	40.332901	-104.812235	40.332901	-104.812235	1,364,860.20	3,191,737.41
3,438.00	10.60	55.44	3,411.60	187.38	228.32	40.332930	-104.812186	40.332930	-104.812186	1,364,870.63	3,191,750.96
3,532.00	11.60	54.99	3,503.84	197.71	243.18	40.332958	-104.812133	40.332958	-104.812133	1,364,880.96	3,191,765.82
3,627.00	11.12	49.52	3,596.98	209.14	257.98	40.332989	-104.812079	40.332989	-104.812079	1,364,892.38	3,191,780.61
3,722.00	11.76	51.61	3,690.09	221.09	272.53	40.333021	-104.812027	40.333021	-104.812027	1,364,904.34	3,191,795.17
3,817.00	13.65	50.35	3,782.76	234.26	288.75	40.333057	-104.811968	40.333057	-104.811968	1,364,917.51	3,191,811.39
3,911.00	14.54	48.94	3,873.93	249.09	306.19	40.333097	-104.811905	40.333097	-104.811905	1,364,932.34	3,191,828.82
4,006.00	12.86	46.63	3,966.23	264.18	322.87	40.333138	-104.811845	40.333138	-104.811845	1,364,947.43	3,191,845.50
4,101.00	11.00	50.02	4,059.17	277.27	337.50	40.333174	-104.811792	40.333174	-104.811792	1,364,960.51	3,191,860.13
4,195.00	9.94	47.46	4,151.60	288.52	350.35	40.333205	-104.811746	40.333205	-104.811746	1,364,971.76	3,191,872.98

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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)
4,290.00	8.48	44.03	4,245.38	299.10	361.26	40.333233	-104.811706	1,364,982.34	3,191,883.89
4,385.00	6.52	35.53	4,339.56	308.52	369.26	40.333259	-104.811677	1,364,991.77	3,191,891.89
4,479.00	5.88	33.18	4,433.01	316.90	375.00	40.333282	-104.811656	1,365,000.14	3,191,897.63
4,574.00	4.42	41.15	4,527.63	323.73	380.07	40.333301	-104.811638	1,365,006.97	3,191,902.70
4,669.00	3.63	40.18	4,622.39	328.78	384.42	40.333314	-104.811622	1,365,012.02	3,191,907.05
4,764.00	2.94	33.36	4,717.24	333.11	387.70	40.333326	-104.811610	1,365,016.36	3,191,910.33
4,858.00	1.34	35.60	4,811.17	336.02	389.67	40.333334	-104.811603	1,365,019.26	3,191,912.30
4,953.00	0.44	202.19	4,906.16	336.59	390.18	40.333336	-104.811601	1,365,019.83	3,191,912.81
5,048.00	0.42	208.89	5,001.16	335.94	389.87	40.333334	-104.811603	1,365,019.19	3,191,912.50
5,143.00	0.41	196.79	5,096.16	335.31	389.60	40.333332	-104.811604	1,365,018.56	3,191,912.23
5,237.00	0.65	196.70	5,190.15	334.48	389.35	40.333330	-104.811604	1,365,017.72	3,191,911.98
5,332.00	0.84	222.30	5,285.14	333.45	388.73	40.333327	-104.811607	1,365,016.69	3,191,911.36
5,427.00	0.81	213.58	5,380.13	332.37	387.89	40.333324	-104.811610	1,365,015.62	3,191,910.52
5,522.00	0.86	217.32	5,475.12	331.25	387.09	40.333321	-104.811613	1,365,014.49	3,191,909.72
5,616.00	1.55	172.10	5,569.11	329.43	386.83	40.333316	-104.811614	1,365,012.67	3,191,909.46
5,711.00	1.20	160.10	5,664.08	327.22	387.35	40.333310	-104.811612	1,365,010.46	3,191,909.98
5,806.00	0.34	174.99	5,759.07	326.00	387.71	40.333307	-104.811611	1,365,009.25	3,191,910.34
5,901.00	0.32	173.03	5,854.07	325.46	387.77	40.333305	-104.811610	1,365,008.70	3,191,910.40
5,996.00	0.41	152.46	5,949.07	324.89	387.96	40.333304	-104.811610	1,365,008.14	3,191,910.59
6,090.00	0.28	169.94	6,043.06	324.37	388.15	40.333302	-104.811609	1,365,007.61	3,191,910.78
6,185.00	0.36	189.86	6,138.06	323.85	388.14	40.333301	-104.811609	1,365,007.09	3,191,910.77
6,286.00	0.19	212.95	6,239.06	323.39	388.00	40.333299	-104.811610	1,365,006.64	3,191,910.63
6,374.00	0.14	202.61	6,327.06	323.17	387.88	40.333299	-104.811610	1,365,006.42	3,191,910.51
6,468.00	7.53	89.65	6,420.79	323.10	394.00	40.333299	-104.811588	1,365,006.35	3,191,916.63
6,563.00	17.37	87.34	6,513.44	323.80	414.44	40.333300	-104.811515	1,365,007.05	3,191,937.07
6,658.00	22.19	85.65	6,602.81	325.82	446.51	40.333305	-104.811400	1,365,009.07	3,191,969.14
6,753.00	29.43	85.35	6,688.28	329.08	487.72	40.333313	-104.811252	1,365,012.32	3,192,010.34
6,848.00	39.90	88.86	6,766.32	331.58	541.60	40.333319	-104.811058	1,365,014.83	3,192,064.22
6,942.00	52.70	93.90	6,831.15	329.63	609.35	40.333312	-104.810816	1,365,012.88	3,192,131.97
7,037.00	60.27	95.49	6,883.56	323.11	688.22	40.333292	-104.810533	1,365,006.35	3,192,210.84
7,085.00	61.70	94.34	6,906.85	319.51	730.04	40.333281	-104.810383	1,365,002.76	3,192,252.66
7,132.00	63.18	92.94	6,928.59	316.87	771.62	40.333273	-104.810234	1,365,000.12	3,192,294.24
7,180.00	65.76	92.04	6,949.28	314.99	814.89	40.333267	-104.810079	1,364,998.24	3,192,337.50
7,226.00	69.82	89.83	6,966.66	314.31	857.46	40.333264	-104.809926	1,364,997.56	3,192,380.07
7,274.00	74.78	87.61	6,981.26	315.34	903.16	40.333266	-104.809762	1,364,998.59	3,192,425.77
7,339.00	83.08	87.08	6,993.72	318.30	966.82	40.333273	-104.809534	1,365,001.55	3,192,489.43
7,383.00	87.90	88.92	6,997.18	319.83	1,010.65	40.333276	-104.809376	1,365,003.07	3,192,533.25
7,408.00	90.64	89.96	6,997.50	320.07	1,035.64	40.333277	-104.809287	1,365,003.32	3,192,558.24
7,502.00	90.53	90.22	6,996.54	319.92	1,129.64	40.333274	-104.808950	1,365,003.17	3,192,652.23
7,597.00	90.62	88.42	6,995.59	321.05	1,224.62	40.333275	-104.808609	1,365,004.30	3,192,747.21
7,692.00	89.36	88.04	6,995.61	323.99	1,319.57	40.333281	-104.808268	1,365,007.23	3,192,842.16
7,786.00	88.27	90.93	6,997.55	324.83	1,413.54	40.333281	-104.807931	1,365,008.08	3,192,936.12

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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)
7,881.00	88.71	91.88	7,000.05	322.50	1,508.47	40.333273	-104.807591	1,365,005.75	3,193,031.06
7,976.00	89.22	90.19	7,001.77	320.79	1,603.44	40.333266	-104.807250	1,365,004.03	3,193,126.02
8,070.00	89.13	89.94	7,003.12	320.68	1,697.43	40.333264	-104.806913	1,365,003.93	3,193,220.00
8,165.00	88.43	90.68	7,005.15	320.17	1,792.41	40.333261	-104.806572	1,365,003.41	3,193,314.98
8,260.00	89.61	89.24	7,006.77	320.23	1,887.39	40.333259	-104.806232	1,365,003.48	3,193,409.95
8,355.00	88.99	90.97	7,007.93	320.06	1,982.38	40.333256	-104.805891	1,365,003.30	3,193,504.94
8,450.00	89.36	92.18	7,009.30	317.45	2,077.33	40.333247	-104.805551	1,365,000.69	3,193,599.89
8,544.00	90.64	88.86	7,009.30	316.60	2,171.31	40.333243	-104.805214	1,364,999.84	3,193,693.86
8,639.00	89.19	91.59	7,009.44	316.22	2,266.30	40.333240	-104.804873	1,364,999.47	3,193,788.85
8,734.00	89.83	91.20	7,010.25	313.91	2,361.27	40.333231	-104.804532	1,364,997.16	3,193,883.81
8,828.00	90.17	91.49	7,010.25	311.70	2,455.24	40.333223	-104.804195	1,364,994.95	3,193,977.78
8,923.00	89.64	90.44	7,010.41	310.10	2,550.22	40.333217	-104.803855	1,364,993.35	3,194,072.76
9,018.00	88.71	91.08	7,011.78	308.84	2,645.20	40.333211	-104.803514	1,364,992.09	3,194,167.74
9,112.00	89.55	91.71	7,013.21	306.56	2,739.16	40.333203	-104.803177	1,364,989.80	3,194,261.69
9,207.00	89.75	91.24	7,013.79	304.11	2,834.13	40.333194	-104.802837	1,364,987.36	3,194,356.66
9,302.00	88.77	90.54	7,015.01	302.63	2,929.11	40.333188	-104.802496	1,364,985.88	3,194,451.63
9,396.00	89.52	90.95	7,016.42	301.41	3,023.09	40.333183	-104.802159	1,364,984.66	3,194,545.61
9,491.00	88.69	91.55	7,017.90	299.34	3,118.05	40.333175	-104.801818	1,364,982.59	3,194,640.57
9,585.00	89.36	92.02	7,019.50	296.41	3,211.99	40.333165	-104.801481	1,364,979.66	3,194,734.50
9,680.00	89.72	92.11	7,020.26	292.99	3,306.93	40.333153	-104.801141	1,364,976.24	3,194,829.44
9,775.00	88.71	92.31	7,021.56	289.33	3,401.85	40.333141	-104.800801	1,364,972.57	3,194,924.35
9,870.00	89.19	90.64	7,023.30	286.88	3,496.80	40.333132	-104.800460	1,364,970.13	3,195,019.30
9,965.00	90.48	90.50	7,023.58	285.94	3,591.79	40.333128	-104.800120	1,364,969.18	3,195,114.28
10,059.00	90.81	89.03	7,022.52	286.32	3,685.78	40.333127	-104.799782	1,364,969.57	3,195,208.27
10,154.00	90.45	89.21	7,021.47	287.78	3,780.76	40.333129	-104.799442	1,364,971.03	3,195,303.25
10,248.00	89.86	91.23	7,021.22	287.42	3,874.76	40.333126	-104.799105	1,364,970.67	3,195,397.24
10,343.00	91.01	90.47	7,020.50	286.01	3,969.74	40.333120	-104.798764	1,364,969.26	3,195,492.22
10,438.00	89.44	90.36	7,020.13	285.32	4,064.74	40.333116	-104.798423	1,364,968.57	3,195,587.21
10,533.00	90.39	90.98	7,020.27	284.21	4,159.73	40.333111	-104.798083	1,364,967.46	3,195,682.20
10,627.00	89.78	92.55	7,020.13	281.32	4,253.68	40.333101	-104.797746	1,364,964.56	3,195,776.15
10,722.00	90.75	90.52	7,019.69	278.77	4,348.64	40.333092	-104.797405	1,364,962.02	3,195,871.10
10,817.00	89.58	91.11	7,019.41	277.42	4,443.63	40.333086	-104.797064	1,364,960.67	3,195,966.08
10,912.00	89.75	90.54	7,019.97	276.05	4,538.61	40.333080	-104.796724	1,364,959.30	3,196,061.07
11,006.00	88.80	91.43	7,021.16	274.44	4,632.59	40.333074	-104.796387	1,364,957.68	3,196,155.04
11,100.00	90.42	90.20	7,021.80	273.10	4,726.57	40.333068	-104.796050	1,364,956.35	3,196,249.02
11,192.00	88.88	90.31	7,022.36	272.69	4,818.57	40.333065	-104.795720	1,364,955.94	3,196,341.01
11,285.00	88.77	91.90	7,024.27	270.90	4,911.53	40.333058	-104.795386	1,364,954.15	3,196,433.97
11,376.00	90.25	90.04	7,025.05	269.36	5,002.51	40.333052	-104.795060	1,364,952.61	3,196,524.94
11,468.00	88.91	91.85	7,025.72	267.84	5,094.49	40.333045	-104.794730	1,364,951.09	3,196,616.92
11,559.00	90.08	90.19	7,026.52	266.22	5,185.46	40.333039	-104.794404	1,364,949.47	3,196,707.89
11,651.00	88.57	91.70	7,027.61	264.70	5,277.44	40.333033	-104.794074	1,364,947.95	3,196,799.86
11,742.00	89.24	91.86	7,029.35	261.88	5,368.38	40.333023	-104.793748	1,364,945.13	3,196,890.80

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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)
11,834.00	89.86	88.98	7,030.07	261.20	5,460.36	40.333019	-104.793418	1,364,944.45	3,196,982.78
11,927.00	88.99	91.41	7,031.00	260.89	5,553.35	40.333016	-104.793085	1,364,944.14	3,197,075.76
12,019.00	90.87	89.19	7,031.11	260.41	5,645.34	40.333013	-104.792755	1,364,943.65	3,197,167.74
12,110.00	89.08	91.11	7,031.15	260.17	5,736.33	40.333010	-104.792428	1,364,943.42	3,197,258.73
12,202.00	89.41	91.29	7,032.37	258.24	5,828.30	40.333003	-104.792099	1,364,941.49	3,197,350.70
12,294.00	90.67	89.25	7,032.30	257.81	5,920.29	40.333000	-104.791769	1,364,941.06	3,197,442.69
12,386.00	89.19	90.32	7,032.41	258.15	6,012.29	40.332999	-104.791439	1,364,941.40	3,197,534.68
12,479.00	88.80	91.48	7,034.05	256.69	6,105.26	40.332993	-104.791105	1,364,939.94	3,197,627.65
12,571.00	89.55	90.40	7,035.37	255.18	6,197.24	40.332987	-104.790775	1,364,938.43	3,197,719.62
12,664.00	91.31	88.08	7,034.67	256.42	6,290.22	40.332988	-104.790442	1,364,939.66	3,197,812.60
12,756.00	89.38	93.09	7,034.12	255.48	6,382.18	40.332983	-104.790112	1,364,938.73	3,197,904.55
12,848.00	88.91	92.97	7,035.49	250.62	6,474.04	40.332968	-104.789783	1,364,933.86	3,197,996.41
12,942.00	90.03	94.01	7,036.36	244.89	6,567.86	40.332950	-104.789446	1,364,928.14	3,198,090.22
13,038.00	89.22	92.54	7,036.99	239.41	6,663.69	40.332933	-104.789103	1,364,922.66	3,198,186.06
13,133.00	91.62	89.19	7,036.29	237.98	6,758.66	40.332927	-104.788762	1,364,921.22	3,198,281.02
13,228.00	90.28	90.08	7,034.72	238.58	6,853.64	40.332927	-104.788422	1,364,921.83	3,198,376.00
13,323.00	91.26	90.05	7,033.44	238.47	6,948.63	40.332924	-104.788081	1,364,921.72	3,198,470.98
13,418.00	90.06	90.30	7,032.35	238.18	7,043.62	40.332921	-104.787740	1,364,921.43	3,198,565.97
13,513.00	89.36	91.24	7,032.83	236.91	7,138.61	40.332916	-104.787399	1,364,920.15	3,198,660.96
13,607.00	91.17	91.06	7,032.39	235.02	7,232.59	40.332908	-104.787062	1,364,918.27	3,198,754.93
13,702.00	90.92	90.41	7,030.66	233.80	7,327.56	40.332903	-104.786722	1,364,917.05	3,198,849.90
13,797.00	87.76	91.88	7,031.75	231.90	7,422.52	40.332896	-104.786381	1,364,915.15	3,198,944.86
13,892.00	87.34	92.03	7,035.82	228.67	7,517.38	40.332885	-104.786041	1,364,911.91	3,199,039.71
13,986.00	88.83	90.06	7,038.96	226.95	7,611.31	40.332878	-104.785704	1,364,910.20	3,199,133.63
14,081.00	88.69	91.05	7,041.01	226.03	7,706.28	40.332873	-104.785364	1,364,909.28	3,199,228.60
14,176.00	87.45	92.73	7,044.21	222.90	7,801.17	40.332863	-104.785023	1,364,906.15	3,199,323.48
14,271.00	88.13	91.54	7,047.88	219.37	7,896.03	40.332851	-104.784683	1,364,902.61	3,199,418.34
14,365.00	86.81	93.00	7,052.03	215.65	7,989.86	40.332838	-104.784347	1,364,898.90	3,199,512.17
14,460.00	89.30	92.58	7,055.25	211.03	8,084.68	40.332824	-104.784007	1,364,894.28	3,199,606.99
14,555.00	88.55	92.63	7,057.03	206.71	8,179.57	40.332810	-104.783667	1,364,889.96	3,199,701.87
14,650.00	89.94	91.39	7,058.28	203.38	8,274.50	40.332799	-104.783326	1,364,886.63	3,199,796.79
14,745.00	88.94	92.92	7,059.21	199.81	8,369.42	40.332787	-104.782986	1,364,883.06	3,199,891.71
14,839.00	91.40	92.00	7,058.93	195.77	8,463.33	40.332773	-104.782649	1,364,879.02	3,199,985.61
14,934.00	89.94	92.71	7,057.82	191.87	8,558.24	40.332761	-104.782309	1,364,875.12	3,200,080.52
15,029.00	89.55	91.89	7,058.25	188.06	8,653.16	40.332748	-104.781969	1,364,871.31	3,200,175.44
15,124.00	93.25	90.94	7,055.92	185.71	8,748.08	40.332739	-104.781628	1,364,868.96	3,200,270.36
15,219.00	88.60	94.11	7,054.39	181.53	8,842.94	40.332726	-104.781288	1,364,864.78	3,200,365.21
15,314.00	92.07	91.53	7,053.84	176.85	8,937.80	40.332711	-104.780948	1,364,860.10	3,200,460.07
15,409.00	91.79	92.20	7,050.64	173.76	9,032.70	40.332700	-104.780608	1,364,857.01	3,200,554.96
15,503.00	94.11	90.35	7,045.80	171.67	9,126.54	40.332693	-104.780271	1,364,854.92	3,200,648.80
15,598.00	94.00	91.78	7,039.08	169.91	9,221.28	40.332686	-104.779931	1,364,853.16	3,200,743.54
15,693.00	94.20	93.32	7,032.29	165.70	9,315.94	40.332672	-104.779592	1,364,848.95	3,200,838.19

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data 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)
15,761.00	97.84	94.46	7,025.16	161.11	9,383.40	40.332658	-104.779350	1,364,844.36	3,200,905.65
15,809.00	97.84	94.46	7,018.61	157.41	9,430.81	40.332647	-104.779180	1,364,840.66	3,200,953.05

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
671.00	670.99	-2.26	2.30	First Sperry MWD Survey at 671.00ft
7,339.00	6,993.72	318.30	966.82	Final Sperry MWD Survey at 7339.00ft
7,339.00	6,993.72	318.30	966.82	Tie on to Sperry MWD Survey at 7339.00ft
7,408.00	6,997.50	320.07	1,035.64	First Gyro Data Survey at 7408.00ft
15,761.00	7,025.16	161.11	9,383.40	Final Gyro Data Survey at 15761.00ft
15,809.00	7,018.61	157.41	9,430.81	Straight Line Projection to TD at 15809.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Sable K08-69-1HN BHL_Rev 1	89.11	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
671.00	7,339.00	Sperry MWD Intermediate Surveys	MWD+IFR1+MS_WY
7,408.00	15,809.00	Gyro Data - Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
631.00	630.99	9 5/8"	9-5/8	13-3/4
7,383.00	6,997.18	7"	7	8-3/4

Design Report for Shable K08-69-1HN - Sperry MWD Surveys and Gyro Data Surveys

Design Targets

Shape	Target Name	TVD (usft)	Northing (usft)	Easting (usft)	+N/-S usft	+E/-W usft	Created	Updated
Polygon	Sable K08-67HN_ Sec 8_ξ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014
Polygon	Sable K08-67HN_ Sec 7_ζ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014
Polygon	Sable K08-67HN_ Sec 8_ζ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014
Polygon	Sable K08-67HN_ Sec 9_ζ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014
Polygon	Sable K08-67HN_ Sec 7_ξ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014
Polygon	Sable K08-67HN_ Sec 9_ξ	0.00	1,364,639.56	3,191,522.98	-43.70	0.34	6/24/2014	6/25/2014

Directional Difficulty Index

Average Dogleg over Survey:	1.89 °/100usft	Maximum Dogleg over Survey:	14.15 °/100usft at 6,942.00 usft
Net Tortousity applicable to Plans:	1.19 °/100usft	Directional Difficulty Index:	6.806

Audit Info

North Reference Sheet for Sec. 7-T4N-R66W (Shable K08-30-A PAD) - Shable K08-69-1HN - 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 RKB=30 @ 4745.00usft (H&P 321). Northing and Easting are relative to Shable K08-69-1HN

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: 0.99995786

Grid Coordinates of Well: 1,364,683.26 usft N, 3,191,522.64 usft E

Geographical Coordinates of Well: 40° 19' 56.71" N, 104° 48' 46.84" W

Grid Convergence at Surface is: 0.44°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,809.00usft

the Bottom Hole Displacement is 9,432.12usft in the Direction of 89.04° (Grid).

Magnetic Convergence at surface is: -8.10° (19 August 2014, , BGGM2014)

