

Noble Energy

Weld County, CO (NAD 83)
Sec. 34-T6N-R65W
LDS E35-79HC

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

14 April, 2013

Well Coordinates: 1,407,500.37 N, 3,239,128.42 E (40°26' 55.72" N, 104°38' 26.77" W)
Ground Level: 4,681.00 ft

Local Coordinate Origin:	Centered on Well LDS E35-79HC
Viewing Datum:	KB=30' @ 4711.00ft (H&P 321)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 2003.16 Build: 431

HALLIBURTON

Design Report for LDS E35-79HC - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
665.00	0.00	0.00	665.00	0.00	0.00	0.00	0.00
716.00	0.93	211.15	716.00	-0.35	-0.21	0.34	1.82
First MWD Survey							
991.00	1.27	204.68	990.95	-5.02	-2.63	4.86	0.13
1,083.00	0.68	150.51	1,082.94	-6.42	-2.79	6.25	1.12
1,368.00	0.33	86.18	1,367.93	-7.84	-1.13	7.76	0.22
1,652.00	0.56	40.55	1,651.92	-6.73	0.59	6.76	0.14
1,935.00	0.06	124.00	1,934.91	-5.78	1.61	5.86	0.20
2,125.00	0.19	27.85	2,124.91	-5.56	1.84	5.65	0.11
2,220.00	0.83	54.37	2,219.91	-5.02	2.47	5.15	0.70
2,315.00	3.03	35.89	2,314.85	-2.58	4.50	2.84	2.38
2,409.00	5.56	34.17	2,408.58	3.19	8.51	-2.70	2.69
2,504.00	8.53	32.00	2,502.85	12.98	14.83	-12.10	3.14
2,599.00	9.53	35.42	2,596.67	25.37	23.12	-23.99	1.19
2,694.00	11.71	39.22	2,690.04	39.25	33.78	-37.23	2.41
2,789.00	13.87	39.13	2,782.68	55.55	47.06	-52.74	2.28
2,883.00	13.13	38.27	2,874.08	72.68	60.79	-69.04	0.82
2,978.00	13.18	40.70	2,966.59	89.36	74.53	-84.90	0.58
3,073.00	12.58	39.99	3,059.20	105.49	88.24	-100.22	0.65
3,168.00	11.58	38.04	3,152.09	120.93	100.77	-114.90	1.14
3,263.00	12.33	43.48	3,245.03	135.80	113.62	-129.00	1.42
3,358.00	12.74	37.93	3,337.77	151.42	127.04	-143.82	1.34
3,453.00	12.79	42.51	3,430.43	167.44	140.59	-159.03	1.07
3,547.00	10.57	41.50	3,522.48	181.56	153.33	-172.40	2.38
3,642.00	9.69	40.15	3,616.00	194.20	164.26	-184.38	0.96
3,737.00	9.17	40.66	3,709.71	206.05	174.34	-195.62	0.55
3,832.00	7.23	39.91	3,803.74	216.37	183.11	-205.43	2.05
3,927.00	5.76	29.54	3,898.13	225.10	189.29	-213.79	1.97
4,022.00	2.71	21.17	3,992.86	231.34	192.45	-219.83	3.27
4,117.00	1.25	323.33	4,087.81	234.27	192.64	-222.74	2.42
4,401.00	1.94	341.59	4,371.70	241.32	189.27	-229.98	0.30
4,496.00	0.65	358.84	4,466.67	243.39	188.75	-232.07	1.41
4,781.00	0.98	149.75	4,751.66	242.92	189.94	-231.53	0.55
5,065.00	2.18	173.03	5,035.55	235.47	191.81	-223.99	0.47
5,160.00	0.60	244.73	5,130.52	233.47	191.58	-222.00	2.18
5,445.00	0.91	267.85	5,415.50	232.75	187.98	-221.49	0.15
5,729.00	0.13	64.57	5,699.49	232.80	186.02	-221.66	0.36
6,014.00	0.76	34.30	5,984.48	234.50	187.37	-223.28	0.23
6,181.00	0.98	44.91	6,151.46	236.43	189.01	-225.11	0.16
6,242.00	0.77	46.91	6,212.45	237.08	189.67	-225.72	0.35
6,285.00	0.75	56.44	6,255.45	237.43	190.12	-226.04	0.30
6,333.00	2.53	160.52	6,303.43	236.61	190.73	-225.18	5.85
6,380.00	6.22	180.30	6,350.29	233.08	191.06	-221.65	8.36
6,428.00	9.97	177.60	6,397.80	226.33	191.22	-214.90	7.86
6,475.00	13.19	174.94	6,443.84	216.92	191.87	-205.47	6.94
6,570.00	22.48	182.36	6,534.19	187.91	192.08	-176.50	10.05
6,618.00	29.70	181.71	6,577.27	166.83	191.34	-155.49	15.06
6,665.00	35.27	179.15	6,616.90	141.60	191.19	-130.31	12.21
6,713.00	38.34	177.78	6,655.33	112.86	191.98	-101.57	6.60
6,760.00	40.80	177.49	6,691.55	82.95	193.21	-71.64	5.26

Design Report for LDS E35-79HC - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,808.00	42.37	176.87	6,727.46	51.13	194.78	-39.78	3.38
6,855.00	44.36	178.43	6,761.63	18.89	196.10	-7.52	4.80
6,903.00	46.74	179.13	6,795.24	-15.36	196.82	26.72	5.07
6,950.00	50.51	177.27	6,826.30	-50.61	197.95	61.96	8.56
6,998.00	53.54	177.52	6,855.83	-88.40	199.67	99.80	6.32
7,045.00	58.64	177.81	6,882.04	-127.36	201.25	138.78	10.87
7,093.00	63.97	177.61	6,905.08	-169.42	202.94	180.87	11.09
7,139.00	67.95	179.22	6,923.82	-211.40	204.09	222.85	9.23
7,187.00	71.26	179.07	6,940.54	-256.38	204.76	267.79	6.91
7,234.00	75.44	178.84	6,954.00	-301.39	205.58	312.77	8.90
7,282.00	78.53	179.22	6,964.81	-348.15	206.38	359.50	6.49
7,325.00	82.14	178.84	6,972.03	-390.53	207.10	401.84	8.43
7,380.00	83.97	178.24	6,978.68	-445.10	208.49	456.41	3.51
7" Casing Estimated from Section Lines 754' FNL 63' FEL (Not a survey point)							
7,407.00	84.87	177.95	6,981.30	-471.96	209.38	483.27	3.51
7,502.00	85.31	178.53	6,989.43	-566.57	212.29	577.89	0.75
7,597.00	89.35	179.97	6,993.86	-661.43	213.53	672.67	4.52
7,692.00	91.82	182.47	6,992.89	-756.39	211.51	767.35	3.69
7,787.00	90.77	180.10	6,990.74	-851.33	209.38	862.01	2.72
7,882.00	89.38	180.67	6,990.61	-946.33	208.74	956.81	1.58
7,976.00	91.30	183.32	6,990.06	-1,040.26	205.46	1,050.40	3.48
8,071.00	90.34	181.38	6,988.70	-1,135.16	201.56	1,144.92	2.28
8,166.00	88.27	178.39	6,989.85	-1,230.14	201.74	1,239.74	3.83
8,261.00	89.60	178.04	6,991.61	-1,325.07	204.69	1,334.69	1.44
8,356.00	90.15	177.58	6,991.82	-1,420.00	208.32	1,429.67	0.76
8,451.00	88.27	177.72	6,993.12	-1,514.91	212.21	1,524.65	1.98
8,546.00	87.84	178.02	6,996.34	-1,609.79	215.74	1,619.57	0.56
8,640.00	89.10	180.23	6,998.85	-1,703.74	217.18	1,713.44	2.70
8,735.00	90.31	179.55	6,999.34	-1,798.74	217.37	1,808.29	1.45
8,830.00	90.40	178.69	6,998.75	-1,893.72	218.82	1,903.20	0.90
8,925.00	90.25	178.30	6,998.21	-1,988.69	221.31	1,998.15	0.44
9,020.00	88.40	175.99	6,999.33	-2,083.55	226.04	2,093.13	3.12
9,115.00	89.66	176.41	7,000.94	-2,178.33	232.34	2,188.12	1.40
9,210.00	88.40	176.02	7,002.56	-2,273.10	238.61	2,283.10	1.39
9,305.00	88.83	179.19	7,004.86	-2,367.98	242.58	2,378.04	3.37
9,400.00	92.07	180.54	7,004.12	-2,462.96	242.80	2,472.88	3.69
9,494.00	92.07	179.92	7,000.73	-2,556.90	242.42	2,566.64	0.66
9,589.00	91.26	178.86	6,997.97	-2,651.85	243.44	2,661.49	1.40
9,684.00	87.78	179.20	6,998.76	-2,746.82	245.05	2,756.39	3.69
9,779.00	90.28	178.95	7,000.37	-2,841.79	246.59	2,851.29	2.64
9,874.00	90.22	180.80	6,999.96	-2,936.78	246.80	2,946.14	1.95
9,969.00	90.89	180.90	6,999.04	-3,031.77	245.39	3,040.88	0.72
10,063.00	91.08	179.51	6,997.42	-3,125.75	245.05	3,134.69	1.49
10,158.00	88.33	176.54	6,997.90	-3,220.67	248.32	3,229.64	4.26
10,253.00	87.56	177.44	7,001.30	-3,315.48	253.31	3,324.58	1.25
10,348.00	89.14	179.09	7,004.04	-3,410.39	256.19	3,419.50	2.40
10,443.00	89.48	181.45	7,005.19	-3,505.37	255.74	3,514.30	2.51
10,537.00	90.74	181.29	7,005.01	-3,599.35	253.49	3,607.98	1.36
10,632.00	90.55	180.02	7,003.94	-3,694.33	252.40	3,702.74	1.35
10,727.00	91.73	179.90	7,002.04	-3,789.31	252.47	3,797.57	1.24
10,821.00	92.07	179.07	6,998.93	-3,883.25	253.32	3,891.40	0.96

Design Report for LDS E35-79HC - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
10,916.00	91.54	179.56	6,995.94	-3,978.20	254.46	3,986.26	0.76
11,011.00	91.05	179.66	6,993.79	-4,073.17	255.11	4,081.11	0.53
11,106.00	91.05	178.99	6,992.06	-4,168.15	256.23	4,175.99	0.70
11,200.00	88.21	177.57	6,992.66	-4,262.09	259.04	4,269.94	3.38
11,295.00	87.90	177.57	6,995.89	-4,356.95	263.07	4,364.87	0.32
11,322.00	86.94	177.41	6,997.10	-4,383.90	264.25	4,391.84	3.60
Final MWD Survey							
11,384.00	86.94	177.41	7,000.41	-4,445.75	267.05	4,453.75	0.01
Bit Projection - Estimated BHL 534' FSL 63' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
716.00	716.00	-0.35	-0.21	First MWD Survey
7,380.00	6,978.68	-445.10	208.49	7" Casing Estimated from Section Lines 754' FNL 63' FEL (Not a survey point)
11,322.00	6,997.10	-4,383.90	264.25	Final MWD Survey
11,384.00	7,000.41	-4,445.75	267.05	Bit Projection
11,384.00	7,000.41	-4,445.75	267.05	Estimated BHL 534' FSL 63' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	LDS E35-79HC_PlanA - Rev0_BHL	176.69	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
716.00	11,384.00	MWD Survey	MWD
7,380.00	11,384.00	MWD Survey	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,380.00	6,978.68	7"	7	7-1/2

Design Report for LDS E35-79HC - MWD Survey

Targets

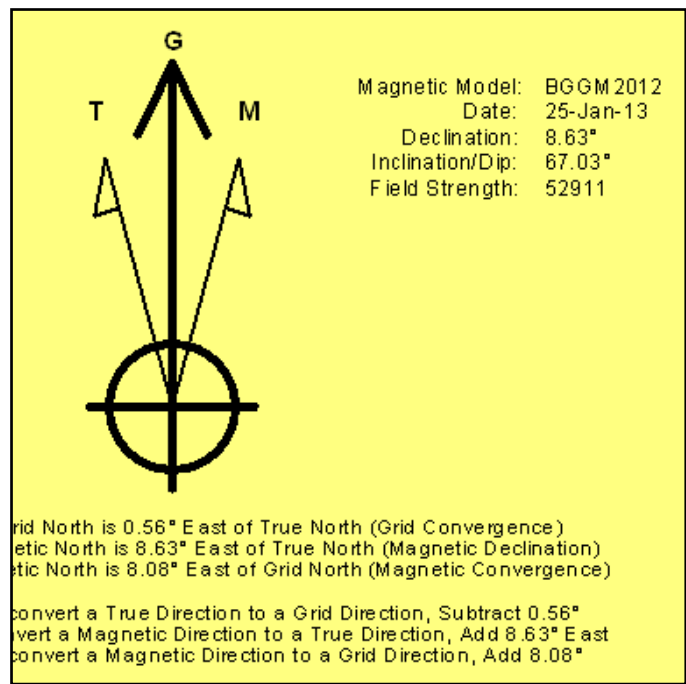
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
LDS E35-79HC_Sec.	0.00	0.00	0.00	0.00	0.00	1,407,500.37	3,239,128.42	40.44881	-104.64077
- actual wellpath misses target center by 665.00ft at 665.00ft MD (665.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				-199.00	-151.00	1,407,349.37	3,238,929.42		
Point 2				-122.00	-4,521.00	1,402,979.53	3,239,006.42		
Point 3				-4,478.00	-4,495.00	1,403,005.53	3,234,650.58		
Point 4				-4,562.00	-126.00	1,407,374.37	3,234,566.59		
Point 5				-199.00	-151.00	1,407,349.37	3,238,929.42		
LDS	0.00	0.00	7,010.34	-4,445.99	257.44	1,403,054.55	3,239,385.84	40.43660	-104.64000
- actual wellpath misses target center by 13.82ft at 11384.00ft MD (7000.41 TVD, -4445.75 N, 267.05 E)									
- Point									
LDS E35-79HC_Sec.	0.00	0.00	0.00	0.00	0.00	1,407,500.37	3,239,128.42	40.44881	-104.64077
- actual wellpath misses target center by 665.00ft at 665.00ft MD (665.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				261.00	309.00	1,407,809.36	3,239,389.41		
Point 2				338.00	-4,981.00	1,402,519.55	3,239,466.40		
Point 3				-4,938.00	-4,955.00	1,402,545.55	3,234,190.60		
Point 4				-5,022.00	334.00	1,407,834.35	3,234,106.60		
Point 5				261.00	309.00	1,407,809.36	3,239,389.41		

North Reference Sheet for Sec. 34-T6N-R65W - LDS E35-79HC

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.
Vertical Depths are relative to KB=30' @ 4711.00ft (H&P 321). Northing and Easting are relative to LDS E35-79HC
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 -105.50000°; Longitude Origin:0.00000°; Latitude Origin:40.78333°
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996281

Grid Coordinates of Well: 1,407,500.37 ft N, 3,239,128.42 ft E
Geographical Coordinates of Well: 40°26' 55.72" N, 104°38' 26.77" W
Grid Convergence at Surface is: 0.56°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,384.00ft
the Bottom Hole Displacement is 4,453.76ft in the Direction of 176.56°(Grid).
Magnetic Convergence at surface is: -8.08°(25 January 2013, , BGGM2012)



Project: Weld County, CO (NAD 83)
Site: Sec. 34-T6N-R65W
Well: LDS E35-79HC

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.55°
Magnetic North: 8.08°

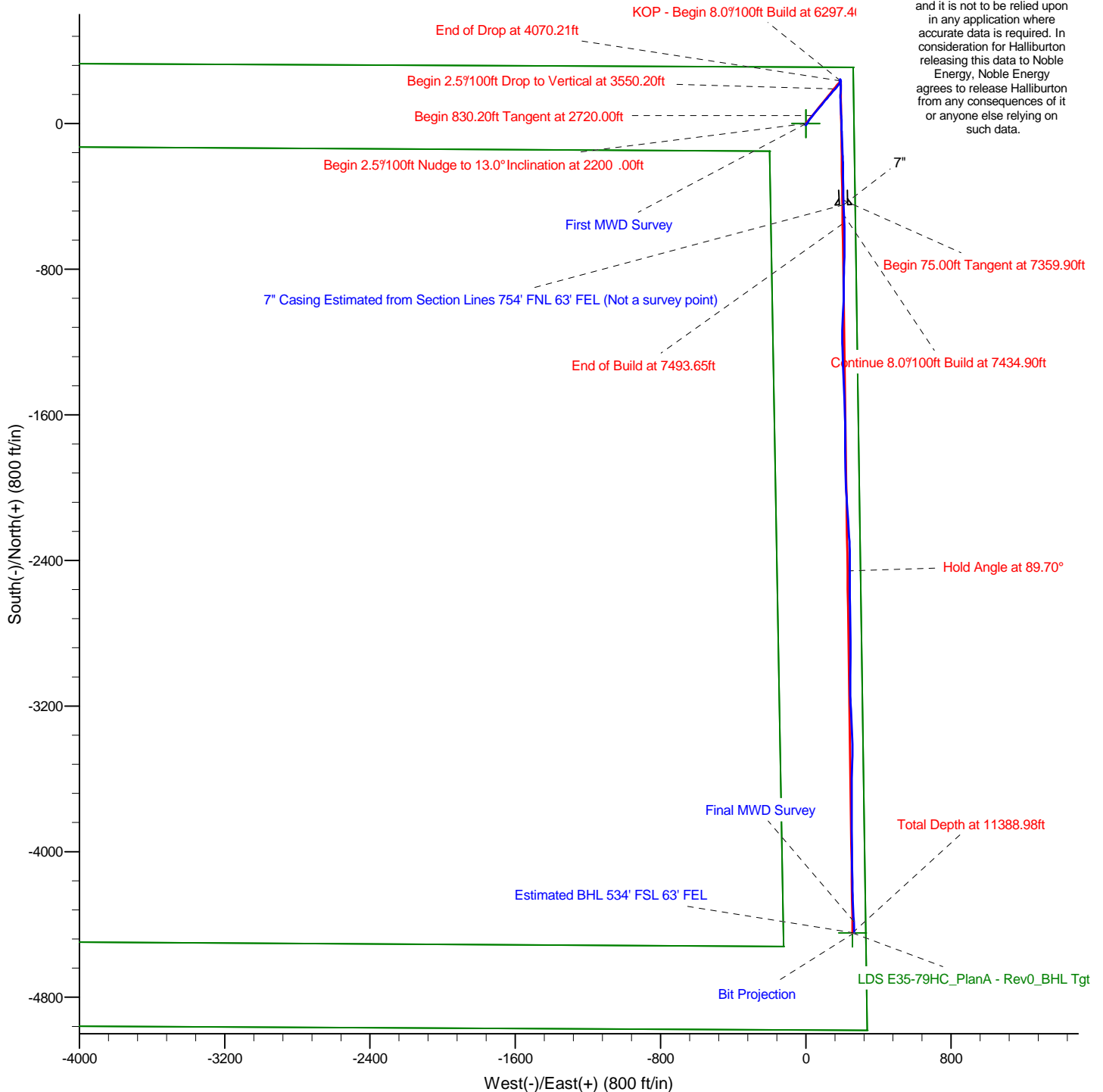
Magnetic Field
Strength: 52911.5snT
Dip Angle: 67.03°
Date: 1/25/2013
Model: BGGM2012

LEGEND

- LDS E35-79HC, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 535' FSL, 75' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the LDS E35-79HC well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

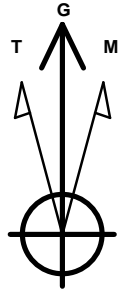


Project: Weld County, CO (NAD 83)
Site: Sec. 34-T6N-R65W
Well: LDS E35-79HC

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.55°
Magnetic North: 8.08°

Magnetic Field
Strength: 52911.5snT
Dip Angle: 67.03°
Date: 1/25/2013
Model: BGGM2012

LEGEND

- LDS E35-79HC, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the LDS E35-79HC well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

