

# Noble Energy

Weld County, CO (NAD 83)

Sec. 16-T6N-R62W (Degenhart 16 PAD)

Degenhart State AE16-63HN - A1

Design: MWD Surveys

## Sperry Drilling Services

### Final Survey Report

28 October, 2011

Well Coordinates: 1,420,945.03 N, 3,323,559.78 E (40° 28' 59.05" N, 104° 20' 12.44" W)

Ground Level: 4,913.00 ft

Local Coordinate Origin: Centered on Well Degenhart State AE16-63HN - Slot

Viewing Datum: KB @ 4937.00ft (H&P 315)

TVDs to System: N

North Reference: Grid

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

HALLIBURTON

## Survey Report for Degenhart State AE16-63HN - Sperry MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
704.00	0.44	148.49	703.99	-2.30	1.41	1.29	0.06
First Sperry MWD Survey @ 704.00 ft							
980.00	0.28	138.79	979.99	-3.72	2.41	2.21	0.06
1,255.00	0.37	140.16	1,254.98	-4.90	3.42	3.16	0.03
1,538.00	0.40	107.69	1,537.98	-5.90	4.95	4.63	0.08
1,822.00	0.41	122.94	1,821.97	-6.76	6.75	6.38	0.04
2,106.00	0.25	227.62	2,105.97	-7.73	7.14	6.73	0.19
2,394.00	0.53	307.93	2,393.96	-7.33	5.63	5.23	0.19
2,681.00	0.70	265.71	2,680.95	-6.65	2.83	2.48	0.16
2,968.00	0.65	275.27	2,967.93	-6.63	-0.54	-0.89	0.04
3,255.00	1.06	311.82	3,254.90	-4.71	-4.14	-4.38	0.23
3,541.00	1.66	200.14	3,540.85	-6.84	-7.54	-7.88	0.80
3,827.00	2.26	187.79	3,826.68	-16.31	-9.73	-10.57	0.26
4,113.00	2.42	180.13	4,112.44	-27.94	-10.50	-11.96	0.12
4,401.00	1.28	162.69	4,400.29	-37.09	-9.56	-11.50	0.44
4,689.00	1.79	173.77	4,688.19	-44.63	-8.12	-10.45	0.20
4,975.00	1.55	164.53	4,974.07	-52.80	-6.60	-9.36	0.13
5,262.00	0.49	80.52	5,261.03	-56.34	-4.35	-7.31	0.55
5,549.00	0.93	316.74	5,548.01	-54.44	-4.74	-7.59	0.44
5,804.00	0.40	261.82	5,803.00	-53.06	-7.04	-9.82	0.30
5,867.00	0.61	316.41	5,866.00	-52.85	-7.49	-10.25	0.79
5,937.00	2.35	61.02	5,935.98	-51.88	-6.49	-9.21	3.67
5,969.00	6.56	76.19	5,967.87	-51.13	-4.14	-6.82	13.55
6,000.00	10.09	80.09	5,998.54	-50.24	0.26	-2.38	11.53
6,032.00	13.44	80.59	6,029.87	-49.15	6.69	4.10	10.47
6,079.00	16.52	82.27	6,075.26	-47.36	18.70	16.19	6.62
6,128.00	19.06	81.46	6,121.92	-45.23	33.52	31.10	5.21
6,175.00	21.72	82.38	6,165.97	-42.94	49.73	47.41	5.70
6,223.00	25.78	83.51	6,209.89	-40.58	68.91	66.69	8.51
6,270.00	31.13	81.31	6,251.20	-37.58	91.10	88.99	11.60
6,319.00	35.42	79.99	6,292.16	-33.20	117.61	115.71	8.88
6,366.00	37.36	79.84	6,329.99	-28.32	145.06	143.38	4.13
6,414.00	38.87	80.93	6,367.76	-23.37	174.27	172.81	3.44
6,461.00	42.26	82.38	6,403.46	-18.95	204.51	203.23	7.49
6,510.00	48.02	82.89	6,438.01	-14.51	238.94	237.85	11.78
6,557.00	52.77	81.85	6,467.96	-9.69	274.82	273.93	10.25
6,605.00	55.58	81.04	6,496.05	-3.90	313.30	312.66	6.01
6,652.00	55.64	81.17	6,522.60	2.10	351.62	351.25	0.26
6,701.00	57.86	82.88	6,549.46	7.78	392.20	392.07	5.39
6,748.00	61.82	84.30	6,573.07	12.30	432.57	432.62	8.82
6,797.00	67.53	87.47	6,594.03	15.45	476.73	476.88	13.04
6,844.00	72.26	88.67	6,610.18	16.93	520.82	520.99	10.35
6,893.00	76.40	89.52	6,623.41	17.67	567.99	568.13	8.61
6,940.00	78.33	89.95	6,633.69	17.88	613.85	613.94	4.20
6,987.00	82.34	88.63	6,641.58	18.46	660.16	660.22	8.97
7,105.00	86.82	87.09	6,652.73	22.85	777.52	777.65	4.01
7,201.00	87.78	87.28	6,657.25	27.56	873.30	873.54	1.02
7,296.00	89.10	86.81	6,659.84	32.45	968.13	968.50	1.47
7,392.00	90.71	86.01	6,659.99	38.47	1,063.94	1,064.49	1.87

## Survey Report for Degenhart State AE16-63HN - Sperry MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
7,488.00	92.69	85.51	6,657.15	45.56	1,159.63	1,160.42	2.13
7,583.00	93.11	82.29	6,652.34	55.64	1,253.96	1,255.15	3.41
7,679.00	91.23	81.49	6,648.70	69.17	1,348.93	1,350.70	2.13
7,774.00	91.21	81.47	6,646.68	83.24	1,442.86	1,445.24	0.03
7,870.00	90.71	82.33	6,645.07	96.77	1,537.88	1,540.85	1.04
7,965.00	90.46	84.38	6,644.10	107.76	1,632.24	1,635.64	2.17
8,061.00	91.94	85.72	6,642.09	116.04	1,727.85	1,731.56	2.08
8,156.00	90.59	85.59	6,640.00	123.24	1,822.55	1,826.51	1.43
8,252.00	90.31	86.23	6,639.24	130.08	1,918.31	1,922.49	0.73
8,348.00	90.92	88.65	6,638.21	134.37	2,014.20	2,018.48	2.60
8,443.00	90.34	88.74	6,637.17	136.54	2,109.17	2,113.43	0.62
8,539.00	89.94	88.53	6,636.93	138.82	2,205.14	2,209.39	0.47
8,635.00	92.13	89.36	6,635.20	140.59	2,301.10	2,305.31	2.44
8,731.00	90.31	88.25	6,633.15	142.59	2,397.05	2,401.23	2.22
8,827.00	90.06	88.42	6,632.84	145.38	2,493.01	2,497.21	0.31
8,922.00	90.25	88.34	6,632.59	148.07	2,587.97	2,592.18	0.22
9,018.00	90.59	87.94	6,631.88	151.18	2,683.92	2,688.16	0.55
9,113.00	90.43	87.19	6,631.04	155.22	2,778.83	2,783.15	0.81
9,209.00	88.43	86.69	6,631.99	160.34	2,874.68	2,879.14	2.15
9,305.00	90.25	86.97	6,633.10	165.65	2,970.52	2,975.13	1.92
9,400.00	90.03	87.04	6,632.87	170.61	3,065.39	3,070.12	0.24
9,496.00	91.76	87.81	6,631.37	174.93	3,161.28	3,166.11	1.97
9,592.00	88.89	86.67	6,630.82	179.55	3,257.16	3,262.09	3.22
9,687.00	90.71	87.48	6,631.15	184.40	3,352.03	3,357.09	2.10
9,782.00	90.59	87.51	6,630.08	188.55	3,446.93	3,452.08	0.13
9,877.00	88.89	85.59	6,630.51	194.26	3,541.75	3,547.06	2.70
9,972.00	90.93	86.11	6,630.66	201.14	3,636.50	3,642.04	2.22
10,068.00	91.45	86.20	6,628.66	207.57	3,732.26	3,738.01	0.55
10,164.00	90.52	85.96	6,627.01	214.14	3,828.02	3,833.98	1.00
10,260.00	89.78	86.09	6,626.76	220.79	3,923.79	3,929.97	0.78
10,355.00	90.34	85.15	6,626.66	228.05	4,018.51	4,024.94	1.15
10,451.00	90.37	84.58	6,626.07	236.64	4,114.12	4,120.87	0.59
10,547.00	92.29	87.63	6,623.84	243.16	4,209.86	4,216.82	3.75
10,643.00	92.69	89.57	6,619.67	245.50	4,305.73	4,312.68	2.06
10,738.00	92.93	89.21	6,615.01	246.51	4,400.61	4,407.49	0.46
10,834.00	92.96	88.47	6,610.08	248.45	4,496.47	4,503.31	0.77
10,929.00	92.78	87.76	6,605.32	251.57	4,591.29	4,598.17	0.77
10,991.00	93.51	87.40	6,601.92	254.19	4,653.15	4,660.07	1.31
Final Sperry MWD Survey @ 10991.00 ft							
11,050.00	93.51	87.40	6,598.31	256.86	4,711.97	4,718.96	0.00
Straight Line Projection to TD @ 11050.00 ft - Estimated BHL: 1329' FSL, 539' FEL							

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
704.00	703.99	-2.30	1.41	First Sperry MWD Survey @ 704.00 ft
10,991.00	6,601.92	254.19	4,653.15	Final Sperry MWD Survey @ 10991.00 ft
11,050.00	6,598.31	256.86	4,711.97	Straight Line Projection to TD @ 11050.00 ft
11,050.00	6,598.31	256.86	4,711.97	Estimated BHL: 1329' FSL, 539' FEL

## Survey Report for Degenhart State AE16-63HN - Sperry MWD Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Degenhart State AE16-63HN_PlanA - Rev0_BH L Tgt	86.99	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
704.00	11,050.00	Sperry MWD Surveys	MWD

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
Degenhart State - survey misses target center by 25.59ft at 11050.00ft MD (6598.31 TVD, 256.86 N, 4711.97 E) - Point	0.00	0.00	6,622.16	248.12	4,715.03	1,421,193.14	3,328,274.64	40° 29' 0.888 N	104° 19' 11.388 W
Degenhart State - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,420,945.03	3,323,559.78	40° 28' 59.052 N	104° 20' 12.444 W
Degenhart State - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,420,945.03	3,323,559.78	40° 28' 59.052 N	104° 20' 12.444 W



**North Reference Sheet for Sec. 16-T6N-R62W (Degenhart 16 PAD) - Degenhart State AE16-63HN**

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

Vertical Depths are relative to KB @ 4937.00ft (H&P 315). Northing and Easting are relative to Degenhart State AE16-63HN - Slot A1

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° 30' 0.000 W°, Longitude Origin: 0° 0' 0.000 E°, Latitude Origin: 40° 47' 0.000 N°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996505

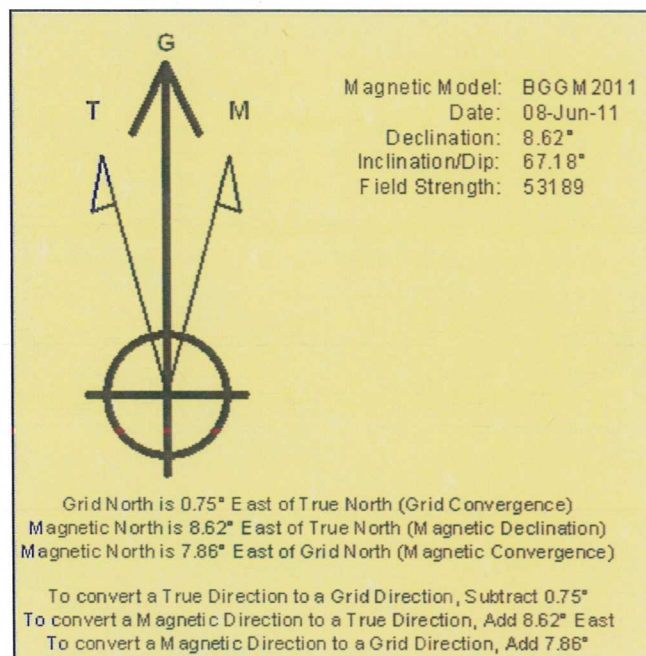
Grid Coordinates of Well: 1,420,945.03 ft N, 3,323,559.78 ft E

Geographical Coordinates of Well: 40° 28' 59.05" N, 104° 20' 12.44" W

Grid Convergence at Surface is: 0.75°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,050.00ft the Bottom Hole Displacement is 4,718.97ft in the Direction of 86.88° (Grid).

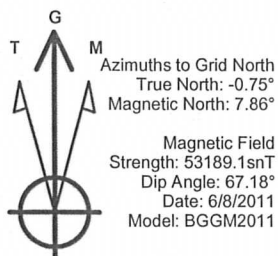
Magnetic Convergence at surface is: -7.86° ( 8 June 2011, , BGGM2011)



Project: Weld County, CO (NAD 83)  
 Site: Sec. 16-T6N-R62W (Degenhart 16 PAD)  
 Well: Degenhart State AE16-63HN

# Noble Energy

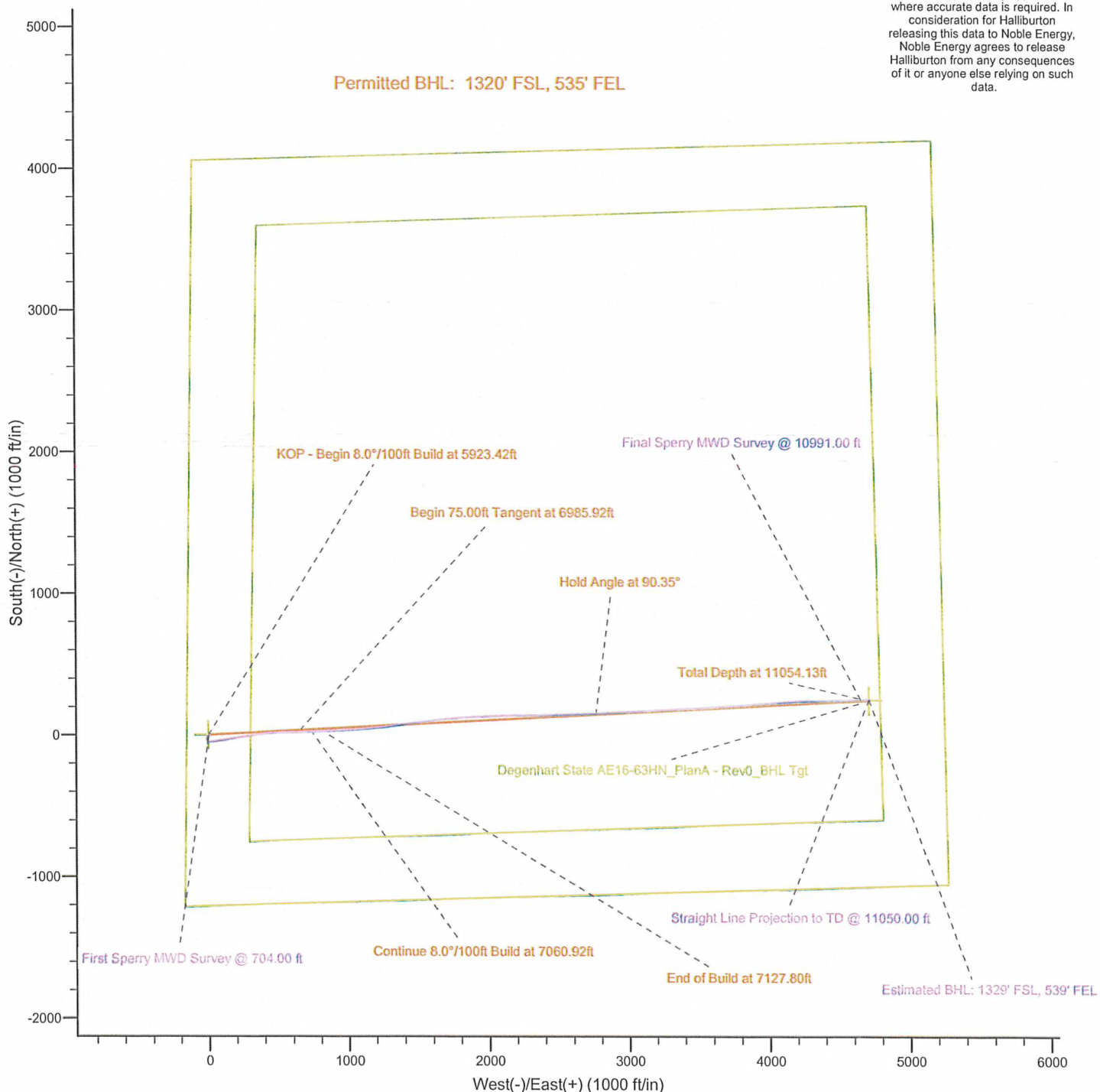
**HALLIBURTON**  
 Sperry Drilling



## LEGEND

- Degenhart State AE16-63HN, Plan A, Plan A - Rev 0 V0
- MWD Survey

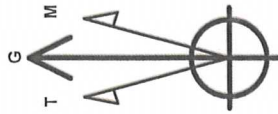
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Degenhart State AE16-63HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide 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.



# Noble Energy

Project: Weld County, CO (NAD 83)  
Site: Sec. 16-T6N-R62W (Degenhart 16 PAD)  
Well: Degenhart State AE16-63HN

**HALLIBURTON**  
Sperry Drilling



Azimuths to Grid North  
True North: -0.75°  
Magnetic North: 7.86°  
Magnetic Field  
Strength: 53189.1snT  
Dip Angle: 67.18°  
Date: 6/8/2011  
Model: BGGM2011

## LEGEND

- Degenhart State AE16-63HN, Plan A, Plan A - Rev 0 V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Degenhart State AE16-63HN 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.

