

# Noble Energy

Weld County, CO (NAD 83)  
Sec. 2-T4N-R64W (Panther 2 PAD)  
Panther C11-28D - A1

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

27 June, 2012

Well Coordinates: 1,366,782.28 N, 3,275,634.16 E (40° 20' 09.60" N, 104° 30' 40.46" W)  
Ground Level: 4,618.00 ft

Local Coordinate Origin:	Centered on Well Panther C11-28D - Slot A1
Viewing Datum:	KB @ 4642.00ft (H&P 322)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom

Geodetic Scale Factor Applied  
Version: 2003.16 Build: 43I

**HALLIBURTON**

## Design Report for Panther C11-28D - MWD Survey

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
785.00	1.25	140.41	784.94	-6.60	5.46	-3.11	0.16
<b>First MWD Survey</b>							
876.00	1.54	145.47	875.91	-8.37	6.78	-3.81	0.35
966.00	1.59	129.51	965.88	-10.16	8.43	-4.81	0.49
1,061.00	2.92	235.35	1,060.83	-12.38	7.46	-3.19	3.88
1,155.00	5.31	253.05	1,154.58	-15.01	1.33	3.46	2.85
1,249.00	8.32	252.68	1,247.91	-18.30	-9.33	14.61	3.20
1,343.00	11.03	255.49	1,340.56	-22.58	-24.53	30.38	2.93
1,438.00	13.77	253.33	1,433.34	-28.10	-44.16	50.76	2.92
1,532.00	15.14	250.70	1,524.36	-35.37	-66.47	74.21	1.62
1,626.00	16.82	249.07	1,614.73	-44.28	-90.76	100.08	1.85
1,721.00	19.03	246.36	1,705.11	-55.40	-117.79	129.23	2.49
1,815.00	20.66	247.47	1,793.53	-67.90	-147.15	161.03	1.78
1,909.00	22.74	249.26	1,880.86	-80.69	-179.46	195.73	2.32
2,003.00	24.22	249.01	1,967.08	-94.04	-214.45	233.14	1.58
2,097.00	26.17	251.24	2,052.13	-107.61	-252.09	273.13	2.31
2,192.00	27.68	253.66	2,136.83	-120.56	-293.10	316.14	1.96
2,286.00	28.68	255.54	2,219.69	-132.33	-335.89	360.46	1.42
2,380.00	30.39	254.48	2,301.48	-144.33	-380.65	406.72	1.90
2,475.00	32.83	255.93	2,382.38	-157.02	-428.79	456.41	2.69
2,569.00	33.73	254.64	2,460.96	-170.13	-478.67	507.89	1.22
2,663.00	31.39	254.24	2,540.18	-183.69	-527.41	558.41	2.50
2,757.00	34.45	253.04	2,619.08	-198.10	-576.41	609.46	3.33
2,852.00	34.37	252.13	2,697.46	-214.17	-627.63	663.14	0.55
2,946.00	33.99	251.59	2,775.22	-230.61	-677.82	715.95	0.52
3,040.00	32.41	250.78	2,853.87	-247.20	-726.54	767.41	1.75
3,134.00	34.13	250.45	2,932.46	-264.32	-775.18	818.97	1.84
3,229.00	32.35	249.11	3,011.92	-282.30	-824.04	871.01	2.03
3,323.00	30.34	251.49	3,092.20	-298.81	-870.06	919.88	2.51
3,417.00	29.35	251.56	3,173.73	-313.63	-914.43	966.66	1.05
3,512.00	29.09	252.29	3,256.64	-328.02	-958.51	1,013.04	0.46
3,606.00	31.26	252.25	3,337.90	-342.41	-1,003.51	1,060.28	2.31
3,700.00	32.59	250.74	3,417.68	-358.20	-1,050.64	1,109.98	1.65
3,795.00	37.06	249.51	3,495.65	-376.66	-1,101.64	1,164.20	4.76
3,889.00	37.48	248.95	3,570.45	-396.85	-1,154.86	1,221.07	0.57
3,983.00	38.22	253.71	3,644.69	-415.28	-1,209.47	1,278.71	3.20
4,078.00	35.71	253.39	3,720.59	-431.46	-1,264.26	1,335.80	2.65
4,172.00	34.03	253.46	3,797.71	-446.79	-1,315.77	1,389.51	1.79
4,266.00	32.36	252.75	3,876.37	-461.74	-1,365.01	1,440.96	1.82
4,361.00	33.33	252.74	3,956.18	-477.02	-1,414.21	1,492.47	1.02
4,455.00	31.03	252.40	4,035.73	-492.01	-1,461.98	1,542.53	2.45
4,549.00	28.80	252.02	4,117.21	-506.33	-1,506.61	1,589.40	2.38
4,644.00	30.30	252.31	4,199.85	-520.67	-1,551.21	1,636.25	1.59
4,738.00	29.96	252.42	4,281.15	-534.97	-1,596.18	1,683.43	0.37
4,832.00	28.40	251.61	4,363.21	-549.11	-1,639.77	1,729.26	1.71
4,927.00	26.00	251.72	4,447.70	-562.77	-1,680.99	1,772.68	2.53
5,021.00	24.62	250.87	4,532.68	-575.65	-1,719.05	1,812.86	1.52
5,115.00	21.68	256.05	4,619.11	-586.26	-1,754.41	1,849.76	3.80
5,209.00	16.92	258.19	4,707.80	-593.25	-1,784.67	1,880.69	5.12

## Design Report for Panther C11-28D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,304.00	14.66	258.82	4,799.21	-598.41	-1,810.00	1,906.35	2.39
5,398.00	12.04	259.42	4,890.66	-602.51	-1,831.31	1,927.87	2.79
5,492.00	7.52	255.30	4,983.27	-605.88	-1,846.90	1,943.74	4.86
5,587.00	4.31	251.65	5,077.76	-608.58	-1,856.31	1,953.51	3.40
5,681.00	3.30	254.19	5,171.55	-610.43	-1,862.26	1,959.75	1.09
5,776.00	2.41	251.92	5,266.43	-611.79	-1,866.79	1,964.48	0.94
5,870.00	0.72	84.80	5,360.41	-612.35	-1,868.08	1,965.88	3.31
5,964.00	0.66	96.98	5,454.40	-612.37	-1,866.96	1,964.81	0.17
6,153.00	0.91	96.04	5,643.38	-612.66	-1,864.38	1,962.46	0.13
6,341.00	1.20	94.17	5,831.35	-612.96	-1,860.94	1,959.28	0.16
6,530.00	0.95	95.45	6,020.32	-613.25	-1,857.40	1,956.02	0.13
6,719.00	0.57	82.92	6,209.30	-613.28	-1,854.91	1,953.66	0.22
6,907.00	0.50	79.43	6,397.29	-613.02	-1,853.18	1,951.93	0.04
7,096.00	0.66	90.57	6,586.28	-612.87	-1,851.28	1,950.09	0.10
7,342.00	0.61	80.46	6,832.27	-612.67	-1,848.57	1,947.45	0.05
<b>Final MWD Survey</b>							
7,400.00	0.61	80.46	6,890.26	-612.57	-1,847.96	1,946.84	0.00
<b>Survey Projection to TD - Estimated BHL: 73' FSL, 2561' FWL</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
785.00	784.94	-6.60	5.46	First MWD Survey
7,342.00	6,832.27	-612.67	-1,848.57	Final MWD Survey
7,400.00	6,890.26	-612.57	-1,847.96	Survey Projection to TD
7,400.00	6,890.26	-612.57	-1,847.96	Estimated BHL: 73' FSL, 2561' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Panther C11-28D_PlanA - Rev1_BHL Tgt	251.68	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
785.00	7,400.00	Sperry MWD Surveys	MWD

## Design Report for Panther C11-28D - 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
Panther	0.00	0.00	0.00	0.00	0.00	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath hits target center									
- Polygon									
Point 1			840.00	-656.00		1,366,126.31	3,276,474.12		
Point 2			-4,408.00	-713.00		1,366,069.31	3,271,226.34		
Point 3			-4,427.00	4,541.00		1,371,323.09	3,271,207.34		
Point 4			815.00	4,617.00		1,371,399.09	3,276,449.12		
Point 5			840.00	-656.00		1,366,126.31	3,276,474.12		
Panther	0.00	0.00	6,897.00	-610.71	-1,844.48	1,366,171.59	3,273,789.75	40° 20' 3.768 N	104° 31' 4.368 W
- actual wellpath misses target center by 7.81ft at 7400.00ft MD (6890.26 TVD, -612.57 N, -1847.96 E)									
- Point									
Panther	0.00	0.00	5,400.00	-610.71	-1,844.48	1,366,171.59	3,273,789.75	40° 20' 3.768 N	104° 31' 4.368 W
- actual wellpath misses target center by 23.17ft at 5909.87ft MD (5400.28 TVD, -612.33 N, -1867.59 E)									
- Point									
Panther	0.00	0.00	6,477.00	-610.71	-1,844.48	1,366,171.59	3,273,789.75	40° 20' 3.768 N	104° 31' 4.368 W
- actual wellpath misses target center by 8.26ft at 6986.79ft MD (6477.08 TVD, -612.92 N, -1852.44 E)									
- Circle (radius 75.00)									
Panther	0.00	0.00	0.00	0.00	0.00	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath hits target center									
- Polygon									
Point 1			380.00	-196.00		1,366,586.29	3,276,014.14		
Point 2			-3,948.00	-253.00		1,366,529.29	3,271,686.32		
Point 3			-3,967.00	4,081.00		1,370,863.11	3,271,667.33		
Point 4			355.00	4,157.00		1,370,939.11	3,275,989.14		
Point 5			380.00	-196.00		1,366,586.29	3,276,014.14		

**North Reference Sheet for Sec. 2-T4N-R64W (Panther 2 PAD) - Panther C11-28D**

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

Vertical Depths are relative to KB @ 4642.00ft (H&P 322). Northing and Easting are relative to Panther C11-28D - 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: 0.99995795

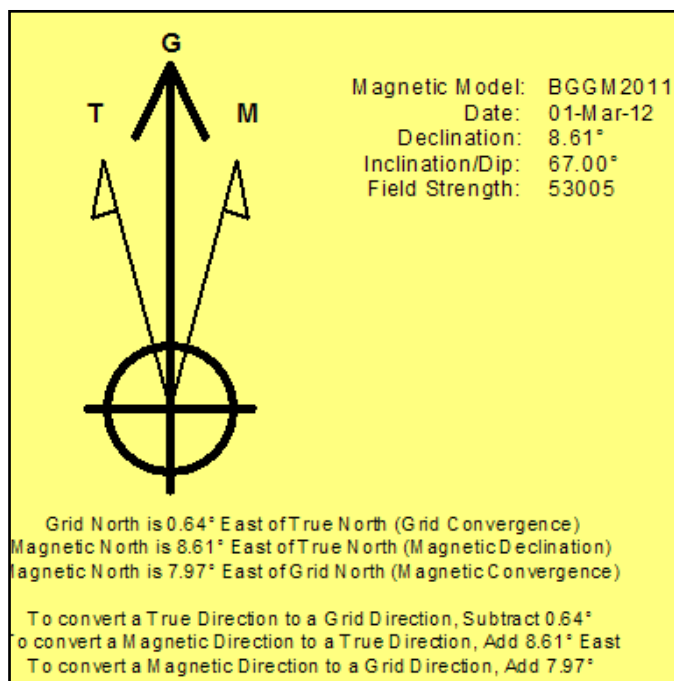
Grid Coordinates of Well: 1,366,782.28 ft N, 3,275,634.16 ft E

Geographical Coordinates of Well: 40° 20' 09.60" N, 104° 30' 40.46" W

Grid Convergence at Surface is: 0.64°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,400.00ft  
the Bottom Hole Displacement is 1,946.84ft in the Direction of 251.66° (Grid).

Magnetic Convergence at surface is: -7.97° ( 1 March 2012, , BGGM2011)



Project: Weld County, CO (NAD 83)  
Site: Sec. 2-T4N-R64W (Panther 2 PAD)  
Well: Panther C11-28D

# Noble Energy

**HALLIBURTON**

Sperry Drilling



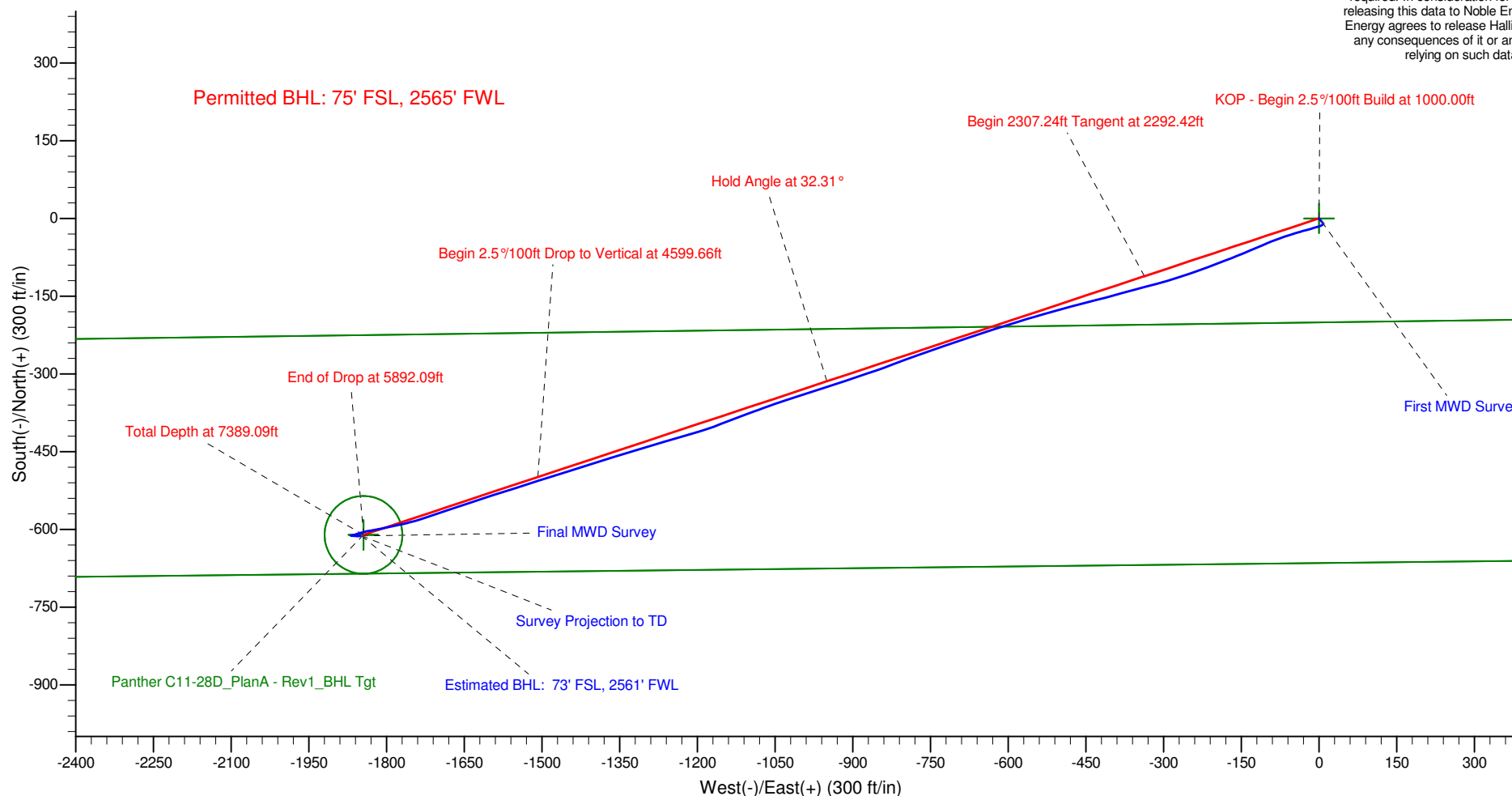
Azimuths to Grid North  
True North:  $-0.64^\circ$   
Magnetic North:  $7.97^\circ$

Magnetic Field  
Strength: 53004.8nT  
Dip Angle:  $67.00^\circ$   
Date: 3/1/2012  
Model: BGGM2011

## LEGEND

- Panther C11-28D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Panther C11-28D 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

**HALLIBURTON**

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## LEGEND

— Panther C11-28D, Plan A, Plan A - Rev 1 Proposal V0

— MWD Survey

