

Noble Energy

Weld County, CO (NAD 83)
Sec. 2-T4N-R64W (Panther 2 PAD)
Panther C11-27D - A2

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

27 June, 2012

Well Coordinates: 1,366,782.50 N, 3,275,653.67 E (40° 20' 09.60" N, 104° 30' 40.21" W)
Ground Level: 4,618.00 ft

Local Coordinate Origin:	Centered on Well Panther C11-27D - Slot A2
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

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Design Report for Panther C11-27D - 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	0.59	251.76	784.99	-1.27	-3.84	3.44	0.08
First MWD Survey							
876.00	1.07	166.42	875.98	-2.24	-4.08	4.34	1.30
966.00	1.32	170.12	965.96	-4.08	-3.71	5.51	0.29
1,061.00	1.15	167.43	1,060.94	-6.08	-3.31	6.79	0.19
1,155.00	0.97	169.81	1,154.92	-7.79	-2.97	7.87	0.20
1,249.00	0.92	172.91	1,248.91	-9.32	-2.73	8.89	0.08
1,343.00	0.92	194.14	1,342.90	-10.80	-2.82	10.09	0.36
1,438.00	0.96	194.56	1,437.88	-12.31	-3.21	11.49	0.04
1,532.00	3.39	206.68	1,531.81	-15.56	-4.66	14.91	2.62
1,626.00	5.47	218.74	1,625.53	-21.54	-8.71	22.09	2.41
1,721.00	8.26	219.25	1,719.83	-30.35	-15.86	33.44	2.94
1,815.00	10.28	220.65	1,812.60	-41.95	-25.60	48.58	2.16
1,909.00	12.31	218.13	1,904.78	-56.19	-37.25	66.99	2.22
2,003.00	14.56	224.60	1,996.20	-72.49	-51.74	88.78	2.88
2,097.00	15.20	225.13	2,087.05	-89.60	-68.77	112.84	0.70
2,192.00	12.89	222.13	2,179.21	-106.25	-84.70	135.83	2.55
2,286.00	14.10	218.26	2,270.61	-123.01	-98.83	157.76	1.61
2,380.00	14.61	215.18	2,361.68	-141.69	-112.75	181.01	0.98
2,475.00	15.17	218.74	2,453.49	-161.18	-127.43	205.38	1.13
2,569.00	14.26	220.76	2,544.41	-179.55	-142.69	229.25	1.11
2,663.00	16.18	227.78	2,635.11	-197.12	-159.95	253.81	2.83
2,757.00	16.26	225.63	2,725.37	-215.12	-179.05	279.89	0.64
2,852.00	15.67	223.95	2,816.71	-233.66	-197.47	305.92	0.79
2,946.00	14.53	224.89	2,907.46	-251.15	-214.60	330.34	1.24
3,040.00	13.13	224.66	2,998.73	-267.10	-230.43	352.73	1.49
3,134.00	14.20	217.63	3,090.08	-283.83	-244.97	374.90	2.10
3,229.00	14.32	219.52	3,182.15	-302.12	-259.56	398.29	0.51
3,323.00	16.31	219.73	3,272.81	-321.24	-275.40	423.11	2.12
3,417.00	13.24	215.54	3,363.69	-340.16	-290.10	447.05	3.46
3,512.00	13.61	213.08	3,456.10	-358.37	-302.52	468.99	0.72
3,606.00	16.43	213.31	3,546.88	-378.76	-315.86	493.17	3.00
3,700.00	17.48	218.17	3,636.79	-400.97	-331.89	520.49	1.88
3,795.00	17.44	217.36	3,727.42	-423.50	-349.34	548.97	0.26
3,889.00	14.99	218.81	3,817.67	-444.17	-365.51	575.20	2.64
3,983.00	14.79	223.26	3,908.52	-462.38	-381.35	599.33	1.23
4,078.00	14.96	222.84	4,000.33	-480.20	-398.00	623.68	0.21
4,172.00	13.68	221.32	4,091.41	-497.45	-413.59	646.92	1.42
4,266.00	14.51	221.01	4,182.58	-514.68	-428.66	669.80	0.89
4,361.00	13.20	223.51	4,274.82	-531.53	-443.93	692.53	1.52
4,455.00	14.20	221.43	4,366.14	-547.96	-458.95	714.77	1.19
4,549.00	11.35	219.34	4,457.80	-563.76	-472.45	735.55	3.07
4,644.00	8.96	218.86	4,551.31	-576.75	-483.02	752.30	2.52
4,738.00	7.00	217.71	4,644.40	-586.99	-491.11	765.34	2.09
4,832.00	5.17	223.43	4,737.86	-594.59	-497.53	775.29	2.05
4,927.00	4.59	218.50	4,832.52	-600.68	-502.84	783.36	0.75
5,021.00	2.06	239.35	4,926.36	-604.48	-506.63	788.72	2.94
5,115.00	1.58	235.19	5,020.31	-606.08	-509.15	791.56	0.53
5,304.00	1.42	208.63	5,209.25	-609.63	-512.41	796.37	0.37

Design Report for Panther C11-27D - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,492.00	1.49	210.60	5,397.18	-613.77	-514.77	801.07	0.05
5,681.00	1.00	216.38	5,586.14	-617.22	-517.00	805.14	0.27
5,870.00	1.02	175.29	5,775.11	-620.22	-517.84	807.98	0.38
6,059.00	0.86	159.08	5,964.09	-623.22	-517.20	809.86	0.16
6,247.00	0.97	145.67	6,152.06	-625.86	-515.80	810.97	0.13
6,436.00	0.47	87.75	6,341.05	-627.15	-514.12	810.88	0.44
6,624.00	0.40	33.04	6,529.05	-626.57	-512.99	809.71	0.22
6,813.00	0.46	48.12	6,718.04	-625.51	-512.07	808.31	0.07
6,921.00	0.15	59.05	6,826.04	-625.14	-511.62	807.74	0.29
Final MWD Survey							
6,979.00	0.15	59.05	6,884.04	-625.07	-511.49	807.60	0.00
Survey Projection to TD - Estimated BHL: 46' FSL, 1331' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
785.00	784.99	-1.27	-3.84	First MWD Survey
6,921.00	6,826.04	-625.14	-511.62	Final MWD Survey
6,979.00	6,884.04	-625.07	-511.49	Survey Projection to TD
6,979.00	6,884.04	-625.07	-511.49	Estimated BHL: 46' FSL, 1331' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Panther C11-27D_PlanA - Rev1_BHL Tgt	220.05	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
785.00	6,979.00	Sperry MWD Surveys	MWD

Design Report for Panther C11-27D - 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	-0.22	-19.51	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 19.51ft at 0.10ft MD (0.10 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				820.49	-656.22	1,366,126.31	3,276,474.12		
Point 2				-4,427.51	-713.22	1,366,069.31	3,271,226.34		
Point 3				-4,446.51	4,540.78	1,371,323.09	3,271,207.34		
Point 4				795.49	4,616.78	1,371,399.09	3,276,449.12		
Point 5				820.49	-656.22	1,366,126.31	3,276,474.12		
Panther	0.00	0.00	5,000.00	-595.80	-500.79	1,366,186.73	3,275,152.90	40° 20' 3.768 N	104° 30' 46.764 W
- actual wellpath misses target center by 12.70ft at 5094.30ft MD (4999.62 TVD, -605.75 N, -508.67 E)									
- Point									
Panther	0.00	0.00	0.00	-0.22	-19.51	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 19.51ft at 0.10ft MD (0.10 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				360.49	-196.22	1,366,586.29	3,276,014.14		
Point 2				-3,967.51	-253.22	1,366,529.29	3,271,686.32		
Point 3				-3,986.51	4,080.78	1,370,863.11	3,271,667.33		
Point 4				335.49	4,156.78	1,370,939.11	3,275,989.14		
Point 5				360.49	-196.22	1,366,586.29	3,276,014.14		
Panther	0.00	0.00	6,447.00	-595.80	-500.79	1,366,186.73	3,275,152.90	40° 20' 3.768 N	104° 30' 46.764 W
- actual wellpath misses target center by 33.60ft at 6542.12ft MD (6447.17 TVD, -626.95 N, -513.38 E)									
- Circle (radius 75.00)									
Panther	0.00	0.00	6,887.00	-595.80	-500.79	1,366,186.73	3,275,152.90	40° 20' 3.768 N	104° 30' 46.764 W
- actual wellpath misses target center by 31.31ft at 6979.00ft MD (6884.04 TVD, -625.07 N, -511.49 E)									
- Point									

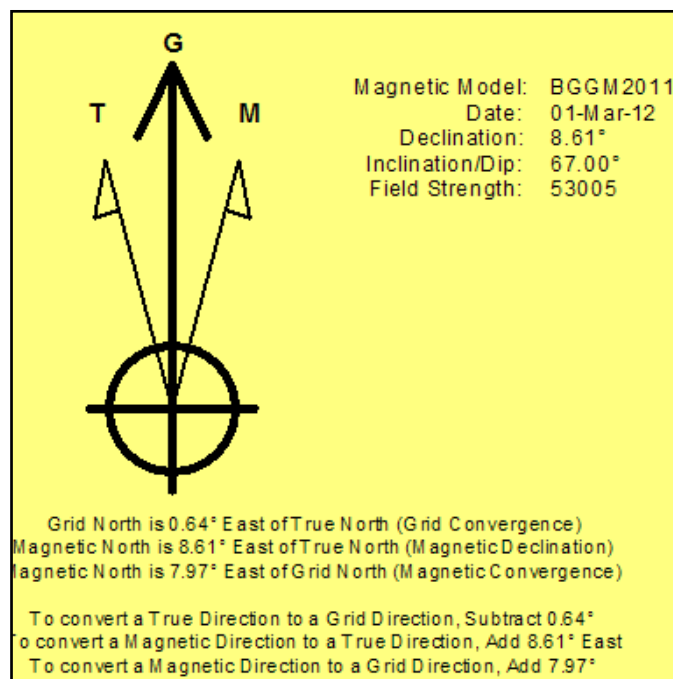
North Reference Sheet for Sec. 2-T4N-R64W (Panther 2 PAD) - Panther C11-27D

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 C11-27D - Slot A2
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: 1,366,782.50 ft N, 3,275,653.67 ft E
Geographical Coordinates of Well: 40° 20' 09.60" N, 104° 30' 40.21" W
Grid Convergence at Surface is: 0.64°

Based upon Minimum Curvature type calculations, at a Measured Depth of 6,979.00ft
the Bottom Hole Displacement is 807.67ft in the Direction of 219.29° (Grid).

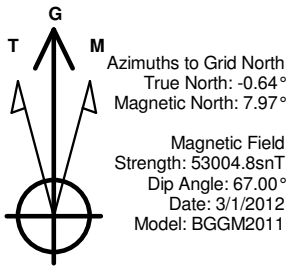
Magnetic Convergence at surface is: -7.97° (1 March 2012, , BGGM2011)



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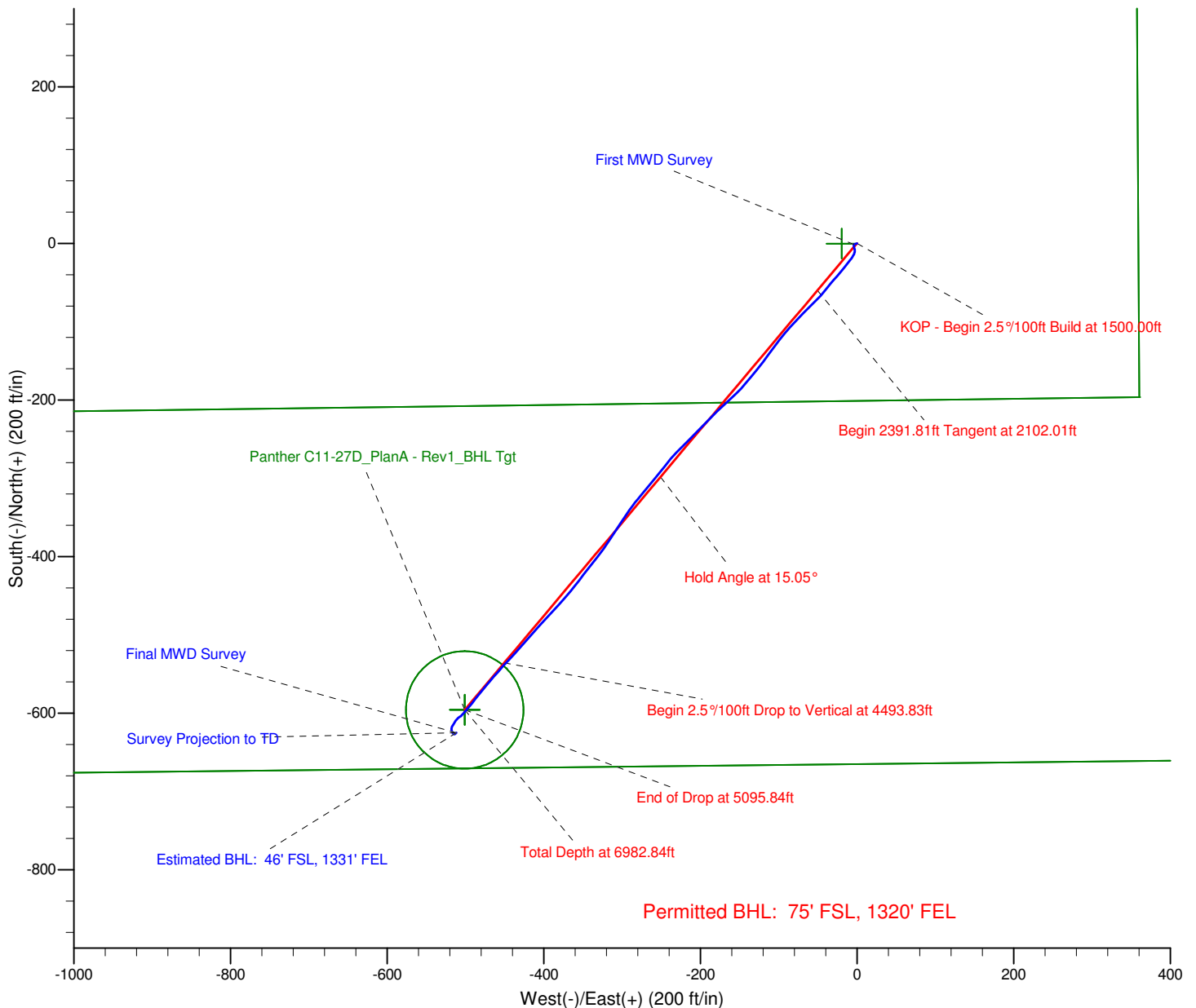
Sperry Drilling



LEGEND

- Panther C11-27D, 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.



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LEGEND

- Panther C11-27D, Plan A, Plan A - Rev 1 Proposal V0
- MWD Survey

