

Noble Energy

Weld County, CO (NAD 83)
Sec. 2-T4N-R64W (Panther 2 PAD)
Toby C12-79HN - A4

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

13 December, 2012

Well Coordinates: 1,366,782.96 N, 3,275,695.48 E (40° 20' 09.60" N, 104° 30' 39.67" W)
Ground Level: 4,617.00 ft

Local Coordinate Origin:	Centered on Well Toby C12-79HN - Slot A4
Viewing Datum:	KB @ 4641.00ft (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: 431

HALLIBURTON

Design Report for Toby C12-79HN - 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
783.00	1.37	5.08	782.93	9.32	0.83	-9.11	0.17
First MWD Survey							
874.00	0.84	116.09	873.92	10.11	1.52	-9.79	2.03
964.00	3.14	125.20	963.86	8.40	4.13	-7.72	2.57
1,059.00	3.28	129.51	1,058.71	5.17	8.35	-3.91	0.29
1,153.00	5.23	122.76	1,152.44	1.14	14.03	0.90	2.14
1,247.00	7.68	122.17	1,245.84	-4.52	22.95	7.79	2.61
1,341.00	10.60	127.20	1,338.64	-13.09	35.16	18.05	3.22
1,436.00	13.18	129.36	1,431.59	-25.25	50.50	32.29	2.76
1,530.00	13.76	125.32	1,523.01	-38.51	67.90	47.93	1.18
1,624.00	14.73	123.01	1,614.12	-51.48	87.05	63.54	1.20
1,719.00	16.61	126.98	1,705.59	-66.23	108.02	81.17	2.28
1,813.00	15.93	128.23	1,795.82	-82.29	128.89	100.09	0.81
1,907.00	15.73	129.18	1,886.26	-98.33	148.90	118.85	0.35
2,001.00	15.66	122.87	1,976.76	-113.26	169.44	136.60	1.82
2,095.00	16.02	125.39	2,067.19	-127.66	190.66	153.92	0.83
2,190.00	15.07	122.76	2,158.71	-141.94	211.74	171.10	1.24
2,284.00	14.08	130.24	2,249.70	-155.94	230.74	187.70	2.26
2,378.00	18.18	135.41	2,339.98	-173.77	249.78	208.11	4.62
2,473.00	20.66	139.36	2,429.57	-197.05	271.10	234.23	2.95
2,567.00	19.08	134.46	2,517.98	-220.40	292.87	260.48	2.44
2,661.00	20.46	130.17	2,606.44	-241.76	316.39	285.02	2.13
2,755.00	22.76	127.83	2,693.83	-263.51	343.31	310.44	2.61
2,850.00	18.64	128.39	2,782.68	-284.22	369.74	334.76	4.34
2,944.00	19.49	123.51	2,871.53	-302.21	394.59	356.16	1.92
3,038.00	17.32	123.95	2,960.71	-318.68	419.27	376.03	2.31
3,132.00	14.73	124.93	3,051.05	-333.34	440.68	393.64	2.77
3,227.00	12.38	126.75	3,143.40	-346.35	458.74	409.13	2.51
3,321.00	12.25	127.27	3,235.24	-358.42	474.75	423.38	0.18
3,415.00	14.66	128.56	3,326.65	-371.87	491.99	439.19	2.58
3,510.00	14.50	131.46	3,418.59	-387.24	510.31	457.05	0.79
3,604.00	19.98	130.80	3,508.34	-405.54	531.30	478.20	5.83
3,698.00	21.97	129.79	3,596.10	-427.29	556.97	503.44	2.15
3,793.00	22.29	129.95	3,684.11	-450.23	584.44	530.11	0.34
3,887.00	21.29	128.90	3,771.39	-472.39	611.38	555.94	1.14
3,981.00	16.07	127.25	3,860.41	-491.00	635.04	577.78	5.58
4,076.00	15.53	127.93	3,951.82	-506.77	655.54	596.36	0.60
4,170.00	14.10	132.00	4,042.69	-522.17	673.97	614.26	1.88
4,264.00	12.43	132.96	4,134.18	-536.73	689.89	630.97	1.79
4,359.00	13.18	132.34	4,226.82	-550.99	705.37	647.32	0.80
4,453.00	14.80	135.22	4,318.03	-566.73	721.75	665.27	1.88
4,547.00	14.96	124.79	4,408.89	-582.18	740.18	683.22	2.85
4,642.00	14.61	127.05	4,500.75	-596.40	759.81	700.13	0.71
4,736.00	14.14	128.80	4,591.80	-610.73	778.22	716.98	0.68
4,830.00	10.96	129.24	4,683.55	-623.58	794.09	732.00	3.38
4,925.00	11.00	130.55	4,776.81	-635.19	807.97	745.49	0.27
5,019.00	10.07	128.59	4,869.22	-646.15	821.21	758.25	1.06
5,113.00	6.70	127.00	4,962.20	-654.57	832.02	768.15	3.59
5,207.00	4.72	122.18	5,055.73	-659.93	839.67	774.56	2.17

Design Report for Toby C12-79HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,302.00	2.83	122.02	5,150.52	-663.26	844.97	778.62	1.99
5,396.00	2.22	119.59	5,244.43	-665.39	848.52	781.24	0.66
5,490.00	1.95	103.60	5,338.37	-666.66	851.66	782.96	0.68
5,585.00	1.73	89.69	5,433.32	-667.04	854.66	783.76	0.52
5,679.00	1.72	89.20	5,527.28	-667.01	857.49	784.15	0.02
5,842.00	1.31	104.82	5,690.22	-667.45	861.74	785.20	0.35
5,962.00	1.89	138.29	5,810.18	-669.28	864.38	787.39	0.90
6,009.00	5.21	173.57	5,857.09	-671.98	865.14	790.17	8.14
6,057.00	9.83	176.53	5,904.66	-678.24	865.63	796.43	9.66
6,104.00	11.58	177.04	5,950.84	-686.95	866.12	805.13	3.73
6,151.00	12.99	188.30	5,996.77	-696.89	865.60	814.89	5.90
6,198.00	13.77	195.77	6,042.50	-707.51	863.31	825.06	4.03
6,245.00	16.80	193.23	6,087.83	-719.50	860.24	836.48	6.60
6,292.00	19.47	192.67	6,132.49	-733.76	856.96	850.12	5.69
6,339.00	24.35	191.70	6,176.08	-750.90	853.28	866.54	10.41
6,386.00	29.83	188.19	6,217.91	-771.98	849.65	886.87	12.14
6,434.00	35.97	187.14	6,258.20	-797.81	846.19	911.93	12.85
6,481.00	41.89	185.47	6,294.74	-827.15	842.98	940.49	12.79
6,528.00	45.60	183.39	6,328.69	-859.54	840.49	972.19	8.47
6,560.00	49.13	184.41	6,350.36	-883.02	838.88	995.19	11.28
6,591.00	51.23	184.27	6,370.21	-906.76	837.08	1,018.42	6.78
6,622.00	53.74	183.81	6,389.09	-931.29	835.35	1,042.43	8.18
6,654.00	56.29	182.35	6,407.44	-957.47	833.94	1,068.13	8.80
6,685.00	57.83	182.55	6,424.29	-983.46	832.83	1,093.69	5.00
6,717.00	60.51	182.41	6,440.69	-1,010.91	831.64	1,120.68	8.38
6,748.00	62.50	180.97	6,455.48	-1,038.14	830.84	1,147.51	7.61
6,780.00	66.70	180.05	6,469.21	-1,067.04	830.59	1,176.06	13.38
6,811.00	69.72	178.65	6,480.71	-1,095.82	830.92	1,204.59	10.61
6,842.00	72.52	176.39	6,490.74	-1,125.12	832.19	1,233.76	11.36
6,874.00	74.72	179.56	6,499.77	-1,155.79	833.27	1,264.27	11.73
6,905.00	76.62	178.38	6,507.44	-1,185.82	833.82	1,294.06	7.15
6,936.00	78.08	178.58	6,514.23	-1,216.06	834.62	1,324.09	4.75
6,968.00	80.28	179.72	6,520.24	-1,247.48	835.08	1,355.26	7.71
6,997.00	82.15	180.37	6,524.67	-1,276.14	835.06	1,383.61	6.82
7,065.00	83.98	179.23	6,532.88	-1,343.64	835.30	1,450.43	3.16
7,160.00	86.79	179.95	6,540.52	-1,438.32	835.97	1,544.21	3.05
7,255.00	89.97	178.02	6,543.21	-1,533.25	837.66	1,638.38	3.92
7,350.00	90.65	177.18	6,542.69	-1,628.16	841.63	1,732.87	1.14
7,445.00	91.66	177.67	6,540.78	-1,723.04	845.90	1,827.37	1.18
7,540.00	89.29	177.81	6,539.99	-1,817.96	849.65	1,921.83	2.50
7,635.00	89.45	176.88	6,541.03	-1,912.85	854.05	2,016.36	0.99
7,730.00	90.46	176.92	6,541.11	-2,007.71	859.18	2,110.96	1.06
7,825.00	90.37	177.86	6,540.42	-2,102.61	863.51	2,205.49	0.99
7,920.00	90.68	178.86	6,539.55	-2,197.57	866.23	2,299.84	1.10
8,014.00	90.71	182.09	6,538.41	-2,291.54	865.45	2,392.71	3.44
8,109.00	89.02	181.73	6,538.63	-2,386.49	862.28	2,486.19	1.82
8,204.00	90.68	181.59	6,538.88	-2,481.44	859.53	2,579.75	1.75
8,298.00	88.52	182.43	6,539.54	-2,575.38	856.24	2,672.22	2.47
8,393.00	89.94	180.58	6,540.81	-2,670.33	853.74	2,765.81	2.45
8,488.00	88.55	179.83	6,542.07	-2,765.32	853.40	2,859.75	1.66
8,583.00	90.22	180.23	6,543.09	-2,860.31	853.35	2,953.73	1.81

Design Report for Toby C12-79HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,678.00	91.63	180.72	6,541.55	-2,955.29	852.56	3,047.60	1.57
8,773.00	89.91	178.76	6,540.28	-3,050.27	853.00	3,141.64	2.74
8,868.00	88.77	178.35	6,541.37	-3,145.23	855.39	3,235.95	1.28
8,963.00	89.97	178.40	6,542.41	-3,240.19	858.08	3,330.29	1.26
9,058.00	90.43	178.90	6,542.08	-3,335.16	860.32	3,424.59	0.72
9,153.00	91.91	179.51	6,540.14	-3,430.13	861.64	3,518.74	1.68
9,248.00	89.66	178.53	6,538.84	-3,525.10	863.27	3,612.95	2.58
9,343.00	90.31	178.71	6,538.87	-3,620.07	865.55	3,707.25	0.71
9,438.00	88.06	179.33	6,540.22	-3,715.04	867.18	3,801.45	2.46
9,533.00	88.71	178.99	6,542.89	-3,809.99	868.57	3,895.61	0.77
9,628.00	89.51	179.02	6,544.37	-3,904.96	870.22	3,989.82	0.84
9,724.00	90.37	178.61	6,544.47	-4,000.94	872.21	4,085.07	0.99
9,819.00	92.19	177.55	6,542.35	-4,095.86	875.39	4,179.45	2.22
9,913.00	89.14	179.06	6,541.26	-4,189.80	878.17	4,272.80	3.62
10,008.00	90.49	178.62	6,541.56	-4,284.78	880.09	4,367.06	1.49
10,102.00	89.60	178.74	6,541.49	-4,378.75	882.25	4,460.35	0.96
10,197.00	90.43	178.71	6,541.47	-4,473.73	884.37	4,554.63	0.87
10,292.00	91.70	178.75	6,539.70	-4,568.68	886.47	4,648.90	1.34
10,387.00	89.38	178.79	6,538.80	-4,663.65	888.51	4,743.16	2.44
10,482.00	90.19	178.75	6,539.16	-4,758.63	890.55	4,837.43	0.85
10,577.00	89.78	178.72	6,539.19	-4,853.61	892.65	4,931.71	0.43
10,673.00	90.00	178.46	6,539.37	-4,949.58	895.01	5,027.01	0.35
10,767.00	90.03	178.11	6,539.35	-5,043.53	897.82	5,120.39	0.37
10,862.00	90.18	177.76	6,539.17	-5,138.47	901.25	5,214.82	0.40
10,957.00	90.43	178.53	6,538.67	-5,233.42	904.32	5,309.21	0.85
11,052.00	89.72	179.91	6,538.54	-5,328.41	905.62	5,403.39	1.63
11,147.00	90.92	179.82	6,538.01	-5,423.40	905.84	5,497.41	1.27
11,242.00	88.28	180.75	6,538.67	-5,518.39	905.37	5,591.33	2.95
11,338.00	89.11	180.95	6,540.86	-5,614.36	903.94	5,686.08	0.89
11,432.00	90.71	181.47	6,541.01	-5,708.33	901.96	5,778.77	1.79
11,527.00	89.41	182.15	6,540.91	-5,803.28	898.96	5,872.29	1.54
11,622.00	90.68	182.57	6,540.83	-5,898.20	895.05	5,965.64	1.41
11,743.00	91.79	182.63	6,538.23	-6,019.04	889.56	6,084.42	0.92
Final MWD Survey							
11,793.00	91.79	182.63	6,536.66	-6,068.97	887.27	6,133.48	0.00
Survey Projection to TD - Estimated BHL: 134' FNL, 71' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
783.00	782.93	9.32	0.83	First MWD Survey
11,743.00	6,538.23	-6,019.04	889.56	Final MWD Survey
11,793.00	6,536.66	-6,068.97	887.27	Survey Projection to TD
11,793.00	6,536.66	-6,068.97	887.27	Estimated BHL: 134' FNL, 71' FWL

Design Report for Toby C12-79HN - MWD Survey

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Toby C12-79HN_PlanA - Rev2_BHL	171.67	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
783.00	11,793.00	Sperry MWD Surveys	MWD

Design Report for Toby C12-79HN - 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	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				778.68	-656.68	1,366,126.31	3,276,474.12		
Point 2				-4,469.32	-713.68	1,366,069.31	3,271,226.34		
Point 3				-4,488.32	4,540.32	1,371,323.09	3,271,207.34		
Point 4				753.68	4,616.32	1,371,399.09	3,276,449.12		
Point 5				778.68	-656.68	1,366,126.31	3,276,474.12		
Panther	0.00	0.00	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,238.68	-196.68	1,366,586.29	3,276,934.10		
Point 2				1,213.68	4,156.32	1,370,939.11	3,276,909.10		
Point 3				5,486.68	4,230.32	1,371,013.10	3,281,181.92		
Point 4				5,523.68	-141.68	1,366,641.29	3,281,218.92		
Point 5				1,238.68	-196.68	1,366,586.29	3,276,934.10		
Panther	0.00	0.00	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				778.68	-656.68	1,366,126.31	3,276,474.12		
Point 2				5,983.68	-601.68	1,366,181.31	3,281,678.90		
Point 3				6,020.68	-5,894.68	1,360,888.53	3,281,715.90		
Point 4				813.68	-5,934.68	1,360,848.53	3,276,509.12		
Point 5				778.68	-656.68	1,366,126.31	3,276,474.12		
Panther	0.00	0.00	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,238.68	-1,116.68	1,365,666.33	3,276,934.10		
Point 2				5,523.68	-1,061.68	1,365,721.33	3,281,218.92		
Point 3				5,560.68	-5,434.68	1,361,348.51	3,281,255.92		
Point 4				1,273.68	-5,474.68	1,361,308.51	3,276,969.10		
Point 5				1,238.68	-1,116.68	1,365,666.33	3,276,934.10		
Toby	0.00	0.00	6,543.00	-6,085.28	890.55	1,360,697.94	3,276,585.99	40° 19' 9.372 N	104° 30' 29.052 W
- actual wellpath misses target center by 17.80ft at 11793.00ft MD (6536.66 TVD, -6068.97 N, 887.27 E)									
- Point									
Panther	0.00	0.00	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				318.68	-196.68	1,366,586.29	3,276,014.14		
Point 2				-4,009.32	-253.68	1,366,529.29	3,271,686.32		
Point 3				-4,028.32	4,080.32	1,370,863.11	3,271,667.33		
Point 4				293.68	4,156.32	1,370,939.11	3,275,989.14		
Point 5				318.68	-196.68	1,366,586.29	3,276,014.14		
Panther	0.00	0.00	-1.00	-0.68	-61.32	1,366,782.28	3,275,634.16	40° 20' 9.600 N	104° 30' 40.464 W
- actual wellpath misses target center by 61.34ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				778.68	-656.68	1,366,126.31	3,276,474.12		
Point 2				753.68	4,616.32	1,371,399.09	3,276,449.12		
Point 3				5,946.68	4,690.32	1,371,473.08	3,281,641.91		
Point 4				5,983.68	-601.68	1,366,181.31	3,281,678.90		
Point 5				778.68	-656.68	1,366,126.31	3,276,474.12		

North Reference Sheet for Sec. 2-T4N-R64W (Panther 2 PAD) - Toby C12-79HN

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

Vertical Depths are relative to KB @ 4641.00ft (H&P 322). Northing and Easting are relative to Toby C12-79HN - Slot A4

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

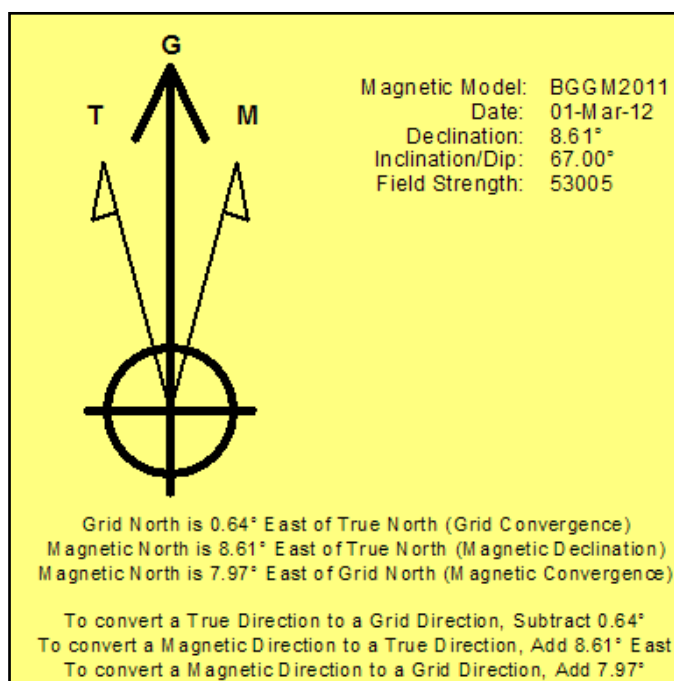
Grid Coordinates of Well: 1,366,782.96 ft N, 3,275,695.48 ft E

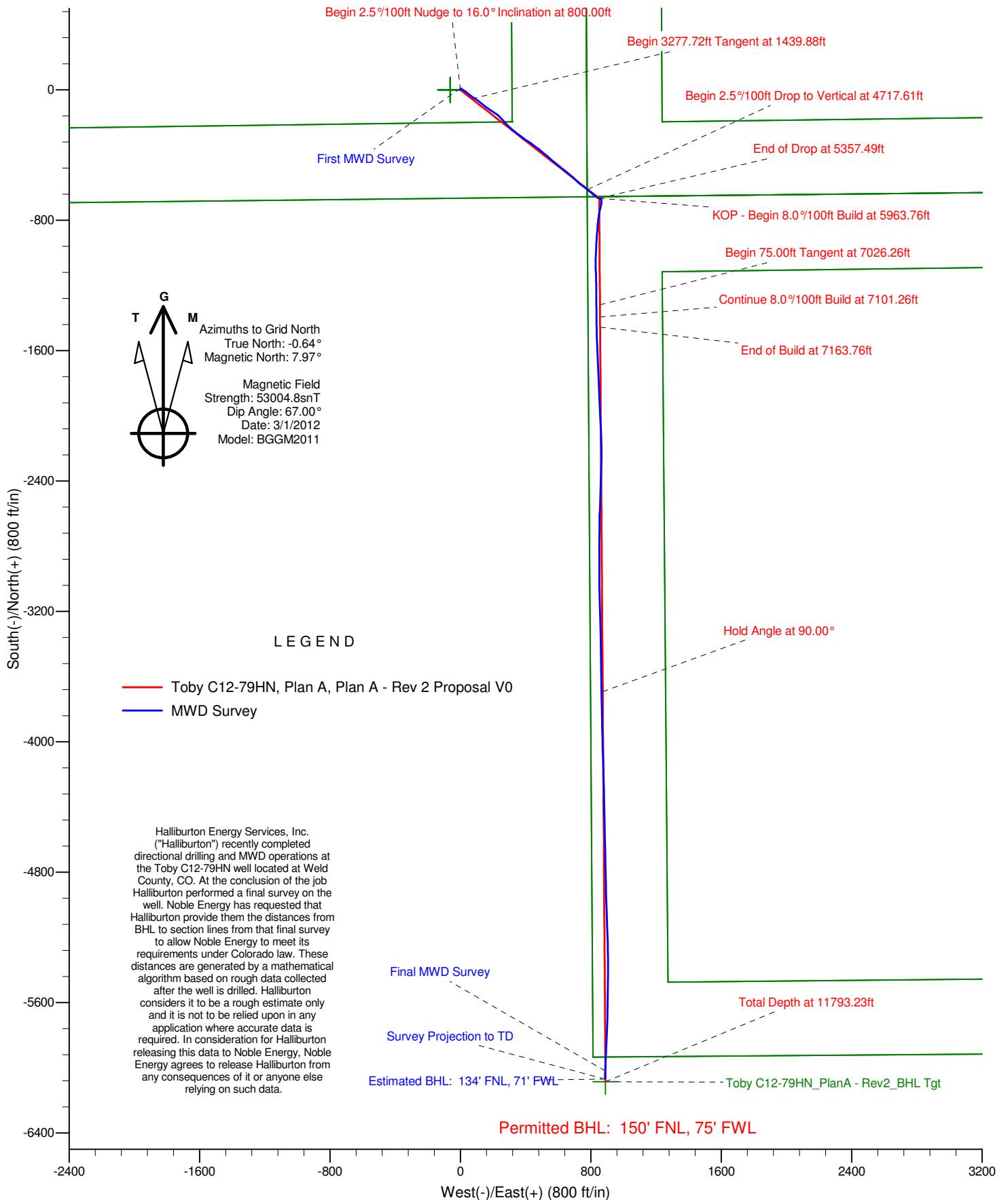
Geographical Coordinates of Well: 40° 20' 09.60" N, 104° 30' 39.67" W

Grid Convergence at Surface is: 0.64°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,793.00ft
the Bottom Hole Displacement is 6,133.48ft in the Direction of 171.68° (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: Toby C12-79HN

Noble Energy

HALLIBURTON

Sperry Drilling



Azimuths to Grid North
True North: -0.64°
Magnetic North: 7.97°

Magnetic Field
Strength: 53004.8snT
Dip Angle: 67.00°
Date: 3/1/2012
Model: BGGM2011

LEGEND

- Toby C12-79HN, Plan A, Plan A - Rev 2 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Toby C12-79HN 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.

