

# Noble Energy

Weld County, CO (NAD 83)

Sec. 25-T4N-R65W (Shelton 25 PAD)

Shelton PC G24-74-1HN

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

13 April, 2013

Well Coordinates: 1,349,615.11 N, 3,248,030.72 E (40°17' 22.85" N, 104°36' 39.13" W)

Ground Level: 4,794.00 ft

Local Coordinate Origin: Centered on Well Shelton PC G24-74-1HN - Slot A2

Viewing Datum: KB=30' @ 4824.00ft (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 Shelton PC G24-74-1HN - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (7100ft)
660.00	0.00	0.00	660.00	0.00	0.00	0.00	0.00
721.00	0.83	34.16	721.00	0.37	0.25	0.40	1.36
<b>First MWD Survey</b>							
997.00	0.89	36.18	996.97	3.75	2.64	4.10	0.02
1,272.00	0.54	358.30	1,271.95	6.77	3.86	7.26	0.21
1,364.00	0.38	340.23	1,363.94	7.49	3.74	7.96	0.23
1,456.00	3.05	60.41	1,455.90	8.99	5.77	9.74	3.27
1,551.00	4.11	65.09	1,550.71	11.67	11.05	13.17	1.16
1,646.00	5.23	64.12	1,645.39	14.99	18.04	17.49	1.18
1,741.00	8.48	66.13	1,739.70	19.72	28.34	23.68	3.43
1,836.00	10.88	65.87	1,833.34	26.22	42.93	32.27	2.53
1,931.00	12.18	64.40	1,926.43	34.21	60.15	42.71	1.40
2,025.00	12.87	64.78	2,018.19	42.96	78.57	54.08	0.74
2,120.00	14.98	66.22	2,110.39	52.42	99.38	66.50	2.25
2,215.00	16.52	62.36	2,201.82	63.64	122.58	81.02	1.96
2,310.00	13.48	61.01	2,293.58	75.27	144.23	95.72	3.22
2,404.00	14.66	69.57	2,384.76	84.73	164.97	108.14	2.54
2,499.00	16.52	65.16	2,476.27	94.61	188.49	121.38	2.32
2,594.00	16.44	62.83	2,567.37	106.42	212.71	136.63	0.70
2,689.00	16.21	65.00	2,658.54	118.16	236.69	151.78	0.69
2,784.00	19.35	66.69	2,748.99	129.99	263.17	167.39	3.35
2,879.00	19.10	65.73	2,838.69	142.61	291.79	184.09	0.42
2,974.00	19.01	64.70	2,928.49	155.61	319.95	201.10	0.37
3,068.00	15.77	64.93	3,018.18	167.57	345.37	216.68	3.45
3,163.00	16.57	64.92	3,109.42	178.78	369.33	231.30	0.84
3,258.00	13.21	64.83	3,201.22	189.14	391.43	244.81	3.54
3,353.00	11.88	64.34	3,293.95	197.99	410.07	256.31	1.40
3,448.00	12.72	62.56	3,386.76	207.04	428.17	267.94	0.97
3,543.00	13.50	65.84	3,479.29	216.40	447.57	280.05	1.13
3,637.00	14.56	64.83	3,570.48	225.92	468.27	292.52	1.16
3,732.00	15.64	61.35	3,662.20	237.14	490.32	306.87	1.49
3,827.00	17.44	66.60	3,753.27	248.93	514.62	322.12	2.46
3,922.00	19.33	66.48	3,843.42	260.86	542.11	337.97	1.99
4,017.00	19.02	66.31	3,933.15	273.36	570.70	354.55	0.33
4,112.00	17.48	65.48	4,023.37	285.50	597.86	370.57	1.64
4,207.00	13.59	68.05	4,114.88	295.60	621.20	384.00	4.16
4,301.00	14.92	68.76	4,205.99	304.11	642.72	395.59	1.43
4,396.00	12.95	69.50	4,298.19	312.27	664.09	406.81	2.08
4,491.00	10.83	69.77	4,391.14	319.09	682.44	416.26	2.23
4,586.00	10.14	67.97	4,484.56	325.31	698.57	424.79	0.80
4,681.00	9.40	66.79	4,578.18	331.50	713.45	433.11	0.81
4,776.00	7.51	67.29	4,672.14	336.96	726.31	440.41	1.99
4,871.00	6.35	63.32	4,766.45	341.71	736.73	446.65	1.32
4,966.00	5.46	54.30	4,860.94	346.71	745.10	452.82	1.35
5,061.00	3.71	59.79	4,955.64	350.89	751.42	457.89	1.90
5,156.00	0.20	88.10	5,050.57	352.44	754.25	459.85	3.72
5,441.00	0.15	101.82	5,335.56	352.38	755.11	459.91	0.02
5,725.00	0.64	216.75	5,619.56	351.04	754.52	458.49	0.25
6,010.00	1.82	303.80	5,904.50	352.28	749.81	459.03	0.67
6,104.00	1.46	253.50	5,998.47	352.77	747.42	459.16	1.52

## Design Report for Shelton PC G24-74-1HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,259.00	1.10	42.70	6,153.45	353.30	746.54	459.56	1.59
6,321.00	1.09	64.22	6,215.44	354.00	747.47	460.38	0.66
6,388.00	3.08	11.36	6,282.40	356.04	748.40	462.54	3.84
6,436.00	7.30	8.38	6,330.19	360.32	749.10	466.88	8.81
6,483.00	10.71	5.95	6,376.61	367.62	749.99	474.23	7.30
6,531.00	13.97	5.91	6,423.49	377.82	751.05	484.48	6.79
6,578.00	16.79	4.92	6,468.80	390.23	752.21	496.92	6.03
6,626.00	19.65	6.18	6,514.39	405.17	753.68	511.91	6.01
6,673.00	22.33	8.35	6,558.27	421.86	755.82	528.74	5.94
6,721.00	25.60	7.80	6,602.13	441.16	758.56	548.23	6.83
6,768.00	29.54	7.36	6,643.78	462.72	761.42	569.97	8.39
6,816.00	33.64	4.70	6,684.66	487.72	764.03	595.08	9.02
6,862.00	37.67	3.29	6,722.03	514.46	765.88	621.81	8.94
6,910.00	41.89	359.86	6,758.92	545.15	766.68	652.27	9.91
6,957.00	46.51	357.38	6,792.60	577.89	765.86	684.54	10.49
7,005.00	52.56	356.11	6,823.74	614.33	763.77	720.27	12.76
7,052.00	58.77	356.32	6,850.24	653.04	761.21	758.18	13.22
7,100.00	62.01	356.98	6,873.95	694.69	758.78	799.02	6.86
7,147.00	64.09	358.33	6,895.25	736.55	757.07	840.16	5.11
7,195.00	65.35	359.70	6,915.75	779.94	756.33	882.97	3.69
7,242.00	68.30	0.45	6,934.25	823.15	756.39	925.71	6.44
7,290.00	73.11	0.29	6,950.10	868.44	756.68	970.55	10.03
7,337.00	77.83	0.59	6,961.89	913.92	757.03	1,015.59	10.06
7,398.00	83.57	0.24	6,971.74	974.09	757.47	1,075.17	9.43
7,452.00	86.49	359.70	6,976.42	1,027.88	757.44	1,128.36	5.50
<b>7" Casing Point Estimated from section lines 717' FSL 1625' FEL (Not a survey point)</b>							
7,472.00	87.57	359.50	6,977.46	1,047.85	757.31	1,148.10	5.50
7,508.00	87.72	359.07	6,978.94	1,083.82	756.86	1,183.60	1.28
7,603.00	88.27	358.85	6,982.26	1,178.74	755.13	1,277.24	0.62
7,697.00	88.49	358.49	6,984.92	1,272.68	752.95	1,369.82	0.45
7,792.00	88.43	0.43	6,987.47	1,367.64	752.05	1,463.61	2.04
7,887.00	88.36	359.86	6,990.13	1,462.60	752.29	1,557.57	0.60
7,982.00	88.89	0.80	6,992.41	1,557.57	752.84	1,651.58	1.13
8,076.00	91.14	1.30	6,992.39	1,651.55	754.56	1,744.78	2.45
8,171.00	91.23	0.05	6,990.42	1,746.52	755.68	1,838.88	1.31
8,266.00	90.28	1.13	6,989.17	1,841.50	756.67	1,932.97	1.51
8,361.00	90.25	0.22	6,988.73	1,936.49	757.79	2,027.09	0.96
8,456.00	90.25	358.98	6,988.32	2,031.49	757.12	2,120.95	1.31
8,550.00	89.54	0.90	6,988.49	2,125.48	757.02	2,213.90	2.18
8,645.00	89.29	1.47	6,989.46	2,220.46	758.98	2,308.12	0.65
8,740.00	89.75	1.32	6,990.26	2,315.43	761.29	2,402.39	0.51
8,835.00	91.26	1.44	6,989.42	2,410.39	763.58	2,496.66	1.59
8,930.00	91.51	1.05	6,987.12	2,505.34	765.65	2,590.87	0.48
9,024.00	92.34	359.98	6,983.96	2,599.28	766.49	2,683.91	1.44
9,119.00	90.31	1.34	6,981.77	2,694.24	767.58	2,778.00	2.57
9,214.00	91.57	3.41	6,980.21	2,789.14	771.52	2,872.44	2.55
9,309.00	90.31	0.58	6,978.65	2,884.06	774.81	2,966.80	3.26
9,404.00	90.90	357.90	6,977.65	2,979.04	773.55	3,060.55	2.89
9,499.00	89.04	358.58	6,977.70	3,073.99	770.63	3,154.04	2.09
9,594.00	87.81	0.05	6,980.31	3,168.94	769.50	3,247.78	2.01
9,689.00	87.85	359.54	6,983.91	3,263.87	769.16	3,341.63	0.54

## Design Report for Shelton PC G24-74-1HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,783.00	89.29	359.37	6,986.25	3,357.84	768.26	3,434.43	1.54
9,878.00	90.55	1.80	6,986.38	3,452.82	769.24	3,528.52	2.88
9,973.00	90.22	0.84	6,985.75	3,547.79	771.43	3,622.78	1.07
10,068.00	89.78	359.75	6,985.75	3,642.79	771.92	3,716.81	1.23
10,162.00	89.01	358.42	6,986.74	3,736.77	770.42	3,809.54	1.64
10,257.00	90.49	1.57	6,987.15	3,831.76	770.42	3,903.48	3.66
10,351.00	90.03	0.74	6,986.73	3,925.73	772.32	3,996.71	1.02
10,446.00	91.48	2.67	6,985.47	4,020.68	775.14	4,091.03	2.54
10,540.00	91.02	1.87	6,983.42	4,114.58	778.86	4,184.46	0.98
10,635.00	90.99	1.62	6,981.76	4,209.52	781.76	4,278.79	0.27
10,730.00	91.33	0.81	6,979.83	4,304.48	783.77	4,373.00	0.92
10,825.00	92.25	358.96	6,976.87	4,399.43	783.58	4,466.89	2.18
10,919.00	88.92	0.75	6,975.91	4,493.41	783.34	4,559.80	4.02
11,014.00	89.20	0.28	6,977.47	4,588.39	784.19	4,653.87	0.58
11,109.00	87.04	1.89	6,980.58	4,683.31	785.98	4,748.02	2.84
11,203.00	87.84	2.21	6,984.78	4,777.16	789.35	4,841.33	0.92
11,250.00	87.69	1.49	6,986.61	4,824.10	790.87	4,887.98	1.56
<b>Final MWD Survey</b>							
11,311.00	87.69	1.49	6,989.07	4,885.03	792.45	4,948.48	0.00
<b>Bit Projection - Estimated BHL 755' FNL 1589' FEL</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
721.00	721.00	0.37	0.25	First MWD Survey
7,452.00	6,976.42	1,027.88	757.44	7" Casing Point Estimated from section lines 717' FSL 1625' FEL (Not a survey point)
11,250.00	6,986.61	4,824.10	790.87	Final MWD Survey
11,311.00	6,989.07	4,885.03	792.45	Bit Projection
11,311.00	6,989.07	4,885.03	792.45	Estimated BHL 755' FNL 1589' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	+E/-W (ft)	Start TVD (ft)
User	Shelton PC G24-74-1HN_PlanE - Rev0_B HL Tgt (Drill)	8.48	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
721.00	11,311.00	MWD Survey	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,452.00	6,976.42	7"	7	7-1/2

## Design Report for Shelton PC G24-74-1HN - 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
Shelton PC	0.00	0.00	6,982.30	4,885.72	778.80	1,354,500.62	3,248,809.49	40.30307	-104.60790
- actual wellpath misses target center by 15.26ft at 11311.00ft MD (6989.07 TVD, 4885.03 N, 792.45 E)									
- Point									
Shelton PC	0.00	0.00	-1.00	0.23	22.32	1,349,615.34	3,248,053.04	40.28968	-104.61079
- actual wellpath misses target center by 661.38ft at 660.00ft MD (660.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			2,402.32	301.23		1,349,916.33	3,250,432.94		
Point 2			-2,859.68	266.23		1,349,881.33	3,245,171.16		
Point 3			-2,820.68	5,633.23		1,355,248.10	3,245,210.16		
Point 4			2,378.32	5,642.23		1,355,257.10	3,250,408.94		
Point 5			2,402.32	301.23		1,349,916.33	3,250,432.94		
Shelton PC	0.00	0.00	-1.00	0.23	22.32	1,349,615.34	3,248,053.04	40.28968	-104.61079
- actual wellpath misses target center by 661.38ft at 660.00ft MD (660.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			2,402.32	301.23		1,349,916.33	3,250,432.94		
Point 2			2,427.32	-4,970.77		1,344,644.55	3,250,457.94		
Point 3			-2,801.68	-5,022.77		1,344,592.55	3,245,229.16		
Point 4			-2,859.68	266.23		1,349,881.33	3,245,171.16		
Point 5			2,402.32	301.23		1,349,916.33	3,250,432.94		
Shelton PC	0.00	0.00	6,981.92	5,104.00	780.00	1,354,718.89	3,248,810.69	40.30367	-104.60789
- actual wellpath misses target center by 219.44ft at 11311.00ft MD (6989.07 TVD, 4885.03 N, 792.45 E)									
- Point									
Shelton PC	0.00	0.00	-1.00	0.23	22.32	1,349,615.34	3,248,053.04	40.28968	-104.61079
- actual wellpath misses target center by 661.38ft at 660.00ft MD (660.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			1,942.32	761.23		1,350,376.31	3,249,972.96		
Point 2			-2,399.68	726.23		1,350,341.31	3,245,631.14		
Point 3			-2,365.68	5,173.23		1,354,788.12	3,245,665.14		
Point 4			1,918.32	5,182.23		1,354,797.12	3,249,948.96		
Point 5			1,942.32	761.23		1,350,376.31	3,249,972.96		
Shelton PC	0.00	0.00	-1.00	0.23	22.32	1,349,615.34	3,248,053.04	40.28968	-104.61079
- actual wellpath misses target center by 661.38ft at 660.00ft MD (660.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			1,942.32	-158.77		1,349,456.34	3,249,972.96		
Point 2			1,967.32	-4,510.77		1,345,104.53	3,249,997.96		
Point 3			-2,341.68	-4,562.77		1,345,052.53	3,245,689.14		
Point 4			-2,399.68	-193.77		1,349,421.35	3,245,631.14		
Point 5			1,942.32	-158.77		1,349,456.34	3,249,972.96		

## North Reference Sheet for Sec. 25-T4N-R65W (Shelton 25 PAD) - Shelton PC G24-74-1HN

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' @ 4824.00ft (H&P 321). Northing and Easting are relative to Shelton PC G24-74-1HN - 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 -105.50000°; Longitude Origin:0.00000°; Latitude Origin:40.78333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99995708

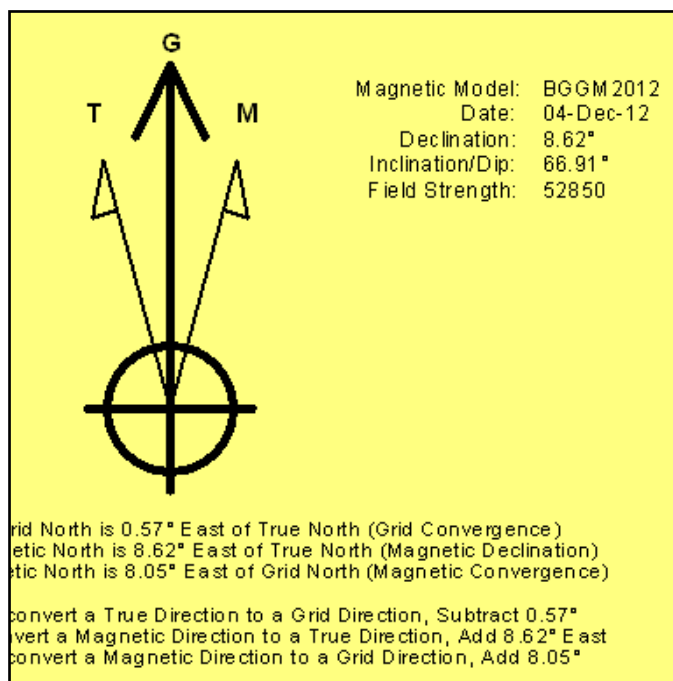
Grid Coordinates of Well: 1,349,615.11 ft N, 3,248,030.72 ft E

Geographical Coordinates of Well: 40°17' 22.85" N, 104°36' 39.13" W

Grid Convergence at Surface is: 0.57°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,311.00ft the Bottom Hole Displacement is 4,948.88ft in the Direction of 9.21°(Grid).

Magnetic Convergence at surface is: -8.05° ( 4 December 2012, , BGGM2012)



Project: Weld County, CO (NAD 83)  
Site: Sec. 25-T4N-R65W (Shelton 25 PAD)  
Well: Shelton PC G24-74-1HN

# Noble Energy

**HALLIBURTON**

Sperry Drilling



Azimuths to Grid North  
True North: -0.57°  
Magnetic North: 8.05°

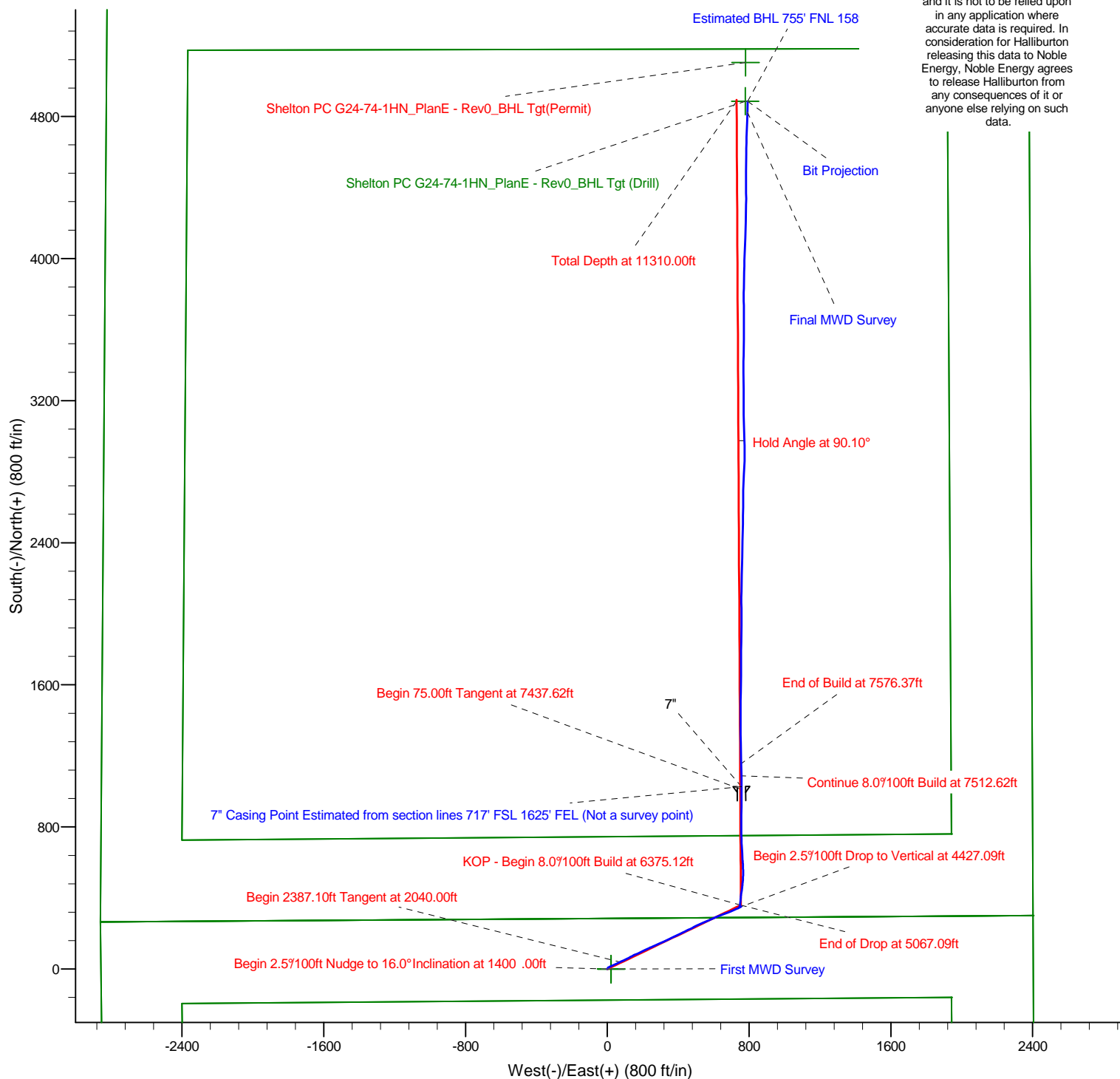
Magnetic Field  
Strength: 52849.8snT  
Dip Angle: 66.91°  
Date: 12/4/2012  
Model: BGGM2012

## LEGEND

- Shelton PC G24-74-1HN, Plan E, Plan E - Rev 0 Proposal V0
- MWD Survey

Permitted BHL: 535' FNL, 1650' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Shelton PC G24-74-1HN 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.

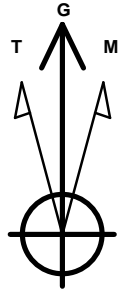


Project: Weld County, CO (NAD 83)  
Site: Sec. 25-T4N-R65W (Shelton 25 PAD)  
Well: Shelton PC G24-74-1HN

# Noble Energy

**HALLIBURTON**

Sperry Drilling



Azimuths to Grid North  
True North:  $-0.57^\circ$   
Magnetic North:  $8.05^\circ$

Magnetic Field  
Strength: 52849.8snT  
Dip Angle:  $66.91^\circ$   
Date: 12/4/2012  
Model: BGGM2012

## LEGEND

- Shelton PC G24-74-1HN, Plan E, Plan E - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Shelton PC G24-74-1HN 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.

