

# Noble Energy

Weld County, CO (NAD 83)

Sec. 18-T7N-R63W

Bashor AC18-62HN

MWD Survey

## Sperry Drilling Services Final Survey Report

08 January, 2013

Well Coordinates: 1,451,238.62 N, 3,285,753.19 E (40° 34' 03.00" N, 104° 28' 17.15" W)

Ground Level: 4,792.00 ft

Local Coordinate Origin:

Centered on Well Bashor AC18-62HN

Viewing Datum:

KB @ 4816.00ft (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 Bashor AC18-62HN - 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
1,104.00	0.00	0.00	1,104.00	0.00	0.00	0.00	0.00
Tie On To Surface Casing Assumed Vertical							
1,181.00	0.40	198.92	1,181.00	-0.25	-0.09	0.08	0.52
First MWD Survey							
1,457.00	0.17	180.85	1,457.00	-1.58	-0.41	0.35	0.09
1,743.00	0.13	191.47	1,742.99	-2.32	-0.48	0.39	0.02
1,933.00	0.53	107.20	1,932.99	-2.79	0.32	-0.43	0.28
2,027.00	3.54	42.68	2,026.93	-0.78	2.70	-2.73	3.56
2,122.00	4.29	36.00	2,121.71	4.25	6.78	-6.61	0.92
2,218.00	6.65	23.13	2,217.26	12.27	11.08	-10.60	2.76
2,313.00	9.86	22.11	2,311.27	24.86	16.30	-15.34	3.38
2,407.00	11.78	23.40	2,403.59	41.13	23.14	-21.56	2.06
2,503.00	12.95	27.45	2,497.37	59.67	31.99	-29.70	1.52
2,598.00	13.83	33.29	2,589.79	78.61	43.13	-40.12	1.70
2,693.00	13.49	32.70	2,682.10	97.42	55.35	-51.61	0.39
2,788.00	13.31	32.61	2,774.51	115.96	67.23	-62.78	0.19
2,883.00	14.65	28.54	2,866.70	135.73	78.86	-73.65	1.75
2,979.00	14.66	28.51	2,959.58	157.06	90.46	-84.43	0.01
3,073.00	14.47	29.06	3,050.56	177.78	101.84	-95.02	0.25
3,168.00	15.27	24.16	3,142.38	199.57	112.73	-105.07	1.57
3,263.00	15.23	24.00	3,234.03	222.39	122.92	-114.40	0.06
3,358.00	14.85	24.51	3,325.78	244.86	133.05	-123.66	0.42
3,453.00	14.02	23.09	3,417.78	266.53	142.61	-132.39	0.95
3,549.00	13.00	20.14	3,511.12	287.36	150.89	-139.88	1.28
3,643.00	12.99	27.34	3,602.72	306.67	159.38	-147.63	1.72
3,739.00	12.78	28.48	3,696.30	325.59	169.40	-156.92	0.34
3,833.00	13.69	28.65	3,787.81	344.49	179.69	-166.49	0.97
3,927.00	12.26	23.80	3,879.41	363.38	189.06	-175.13	1.91
4,022.00	9.06	27.53	3,972.76	379.25	196.59	-182.05	3.44
4,117.00	6.46	29.13	4,066.88	390.55	202.64	-187.68	2.75
4,211.00	4.12	13.60	4,160.47	398.46	206.01	-190.74	2.90
4,306.00	2.34	20.87	4,255.32	403.59	207.51	-192.04	1.92
4,402.00	0.94	234.05	4,351.30	404.96	207.57	-192.05	3.30
4,687.00	1.72	225.85	4,636.22	400.60	202.61	-187.26	0.28
4,971.00	1.37	210.08	4,920.12	394.70	197.85	-182.72	0.19
5,257.00	0.61	200.06	5,206.07	390.31	195.61	-180.66	0.27
5,541.00	1.08	164.34	5,490.04	386.31	195.81	-181.01	0.24
5,825.00	0.86	147.30	5,774.00	381.94	197.69	-183.05	0.13
6,008.00	1.20	180.19	5,956.97	378.87	198.42	-183.90	0.37
6,104.00	1.37	255.88	6,052.96	377.58	197.31	-182.84	1.65
6,149.00	5.44	251.64	6,097.87	376.78	194.76	-180.32	9.06
6,200.00	10.13	257.19	6,148.38	375.02	188.09	-173.72	9.30
6,245.00	14.22	262.25	6,192.36	373.40	178.75	-164.45	9.38
6,295.00	17.70	273.69	6,240.44	373.06	165.07	-150.79	9.35
6,340.00	20.08	281.88	6,283.02	375.09	150.68	-136.34	7.91
6,389.00	20.06	281.79	6,329.05	378.54	134.22	-119.76	0.08
6,434.00	22.16	273.52	6,371.03	380.64	118.19	-103.66	8.09
6,484.00	25.68	263.47	6,416.75	379.99	98.00	-83.51	10.75
6,529.00	30.38	262.23	6,456.46	377.34	77.03	-62.65	10.52

## Design Report for Bashor AC18-62HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,579.00	36.13	263.10	6,498.26	373.85	49.84	-35.62	11.54
6,624.00	40.43	266.36	6,533.58	371.33	22.10	-7.99	10.55
6,673.00	44.84	266.45	6,569.62	369.25	-11.02	25.03	9.00
6,718.00	49.52	264.79	6,600.19	366.71	-43.92	57.80	10.75
6,768.00	53.61	264.75	6,631.27	363.14	-82.91	96.63	8.18
6,813.00	58.27	264.58	6,656.47	359.68	-120.02	133.58	10.36
6,864.00	61.36	267.73	6,682.11	356.74	-163.99	177.41	8.07
6,909.00	63.47	268.90	6,702.95	355.57	-203.86	217.21	5.22
6,959.00	67.43	269.13	6,723.72	354.79	-249.32	262.61	7.93
7,004.00	71.42	269.14	6,739.53	354.16	-291.44	304.67	8.87
7,053.00	75.56	267.50	6,753.45	352.77	-338.39	351.53	9.04
7,098.00	78.29	267.31	6,763.63	350.79	-382.17	395.21	6.08
7,142.00	80.59	267.93	6,771.69	348.99	-425.38	438.32	5.41
7,220.00	85.65	269.10	6,781.03	346.99	-502.77	515.58	6.66
7,315.00	90.65	269.67	6,784.10	345.97	-597.68	610.38	5.30
7,409.00	91.60	269.11	6,782.25	344.97	-691.66	704.25	1.17
7,504.00	90.12	267.46	6,780.83	342.13	-786.60	799.02	2.33
7,599.00	88.55	266.75	6,781.93	337.33	-881.47	893.64	1.81
7,695.00	88.49	267.84	6,784.41	332.80	-977.33	989.26	1.14
7,790.00	87.32	266.88	6,787.88	328.43	-1,072.16	1,083.85	1.59
7,885.00	89.08	267.07	6,790.87	323.42	-1,166.98	1,178.41	1.86
7,980.00	89.23	266.55	6,792.27	318.13	-1,261.82	1,272.99	0.57
8,075.00	89.94	266.39	6,792.96	312.28	-1,356.64	1,367.51	0.77
8,170.00	89.26	265.68	6,793.62	305.72	-1,451.41	1,461.96	1.03
8,265.00	90.40	264.31	6,793.90	297.43	-1,546.04	1,556.21	1.88
8,359.00	89.32	263.86	6,794.13	287.74	-1,639.54	1,649.28	1.24
8,454.00	89.88	264.32	6,794.79	277.96	-1,734.03	1,743.33	0.76
8,550.00	93.30	266.79	6,792.13	270.52	-1,829.68	1,838.63	4.39
8,645.00	95.80	267.44	6,784.60	265.76	-1,924.26	1,932.95	2.72
8,740.00	95.03	263.68	6,775.63	258.43	-2,018.53	2,026.88	4.02
8,834.00	90.06	263.78	6,771.45	248.18	-2,111.85	2,119.74	5.29
8,929.00	92.49	266.29	6,769.34	239.96	-2,206.45	2,213.97	3.68
9,024.00	87.69	268.83	6,769.19	235.92	-2,301.33	2,308.62	5.72
9,119.00	86.51	270.27	6,774.00	235.17	-2,396.20	2,403.40	1.96
9,214.00	86.45	270.53	6,779.83	235.83	-2,491.02	2,498.17	0.28
9,309.00	87.04	270.61	6,785.22	236.78	-2,585.86	2,592.98	0.63
9,404.00	84.59	269.47	6,792.16	236.85	-2,680.60	2,687.66	2.84
9,499.00	85.87	269.23	6,800.06	235.77	-2,775.26	2,782.21	1.37
9,594.00	88.86	268.94	6,804.42	234.26	-2,870.14	2,876.96	3.16
9,689.00	88.80	266.27	6,806.36	230.29	-2,965.03	2,971.63	2.81
9,785.00	91.91	266.65	6,805.77	224.36	-3,060.83	3,067.14	3.26
9,880.00	86.67	266.36	6,806.95	218.57	-3,155.61	3,161.63	5.52
9,975.00	89.29	266.58	6,810.29	212.73	-3,250.36	3,256.10	2.77
10,071.00	91.95	265.57	6,809.26	206.16	-3,346.12	3,351.54	2.96
10,166.00	91.91	266.16	6,806.06	199.31	-3,440.82	3,445.91	0.62
10,261.00	90.71	266.65	6,803.88	193.36	-3,535.61	3,540.40	1.36
10,356.00	89.78	268.21	6,803.48	189.10	-3,630.51	3,635.07	1.91
10,451.00	90.22	266.31	6,803.48	184.55	-3,725.40	3,729.72	2.05
10,546.00	90.18	265.82	6,803.15	178.04	-3,820.17	3,824.18	0.52
10,641.00	87.57	263.44	6,805.01	169.15	-3,914.72	3,918.32	3.72
10,736.00	91.11	263.25	6,806.11	158.14	-4,009.06	4,012.17	3.73

## Design Report for Bashor AC18-62HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
10,797.00	93.42	263.46	6,803.70	151.09	-4,069.60	4,072.40	3.80
Final MWD Survey							
10,860.00	93.42	263.46	6,799.94	143.93	-4,132.08	4,134.56	0.00
Estimated BHL 648'FSL 526'FWL - Bit Projection							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,104.00	1,104.00	0.00	0.00	Tie On To Surface Casing Assumed Vertical
1,181.00	1,181.00	-0.25	-0.09	First MWD Survey
10,797.00	6,803.70	151.09	-4,069.60	Final MWD Survey
10,860.00	6,799.94	143.93	-4,132.08	Estimated BHL 648'FSL 526'FWL
10,860.00	6,799.94	143.93	-4,132.08	Bit Projection

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Bashor AC18-62HN_PlanB - Rev0_BH	272.18	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
1,104.00	10,860.00	Sperry MWD Surveys	MWD

## Design Report for Bashor AC18-62HN - MWD Survey

### Targets

Target Name - hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- Shape									
Bashor	0.00	0.00	0.00	0.00	0.00	1,451,238.62	3,285,753.19	40° 34' 3.000 N	104° 28' 17.148 W
- actual wellpath hits target center									
- Polygon									
Point 1				278.00	-255.00	1,450,983.63	3,286,031.18		
Point 2				-2,204.00	-397.00	1,450,841.63	3,283,549.25		
Point 3				-4,659.00	-535.00	1,450,703.63	3,281,094.32		
Point 4				-4,653.00	2,103.00	1,453,341.56	3,281,100.32		
Point 5				-4,647.00	4,741.00	1,455,979.49	3,281,106.32		
Point 6				191.00	5,078.00	1,456,316.48	3,285,944.18		
Point 7				278.00	-255.00	1,450,983.63	3,286,031.18		
Bashor	0.00	0.00	0.00	0.00	0.00	1,451,238.62	3,285,753.19	40° 34' 3.000 N	104° 28' 17.148 W
- actual wellpath hits target center									
- Polygon									
Point 1				-182.00	205.00	1,451,443.61	3,285,571.19		
Point 2				-2,204.00	63.00	1,451,301.62	3,283,549.25		
Point 3				-4,199.00	-75.00	1,451,163.62	3,281,554.30		
Point 4				-4,193.00	2,103.00	1,453,341.56	3,281,560.30		
Point 5				-4,187.00	4,281.00	1,455,519.50	3,281,566.30		
Point 6				-269.00	4,618.00	1,455,856.49	3,285,484.19		
Point 7				-182.00	205.00	1,451,443.61	3,285,571.19		
Bashor	0.00	0.00	6,811.23	156.56	-4,122.28	1,451,395.18	3,281,631.02	40° 34' 5.016 N	104° 29' 10.536 W
- actual wellpath misses target center by 15.60ft at 10848.17ft MD (6800.64 TVD, 145.27 N, -4120.35 E)									
- Point									

**North Reference Sheet for Sec. 18-T7N-R63W - Bashor AC18-62HN**

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

Vertical Depths are relative to KB @ 4816.00ft (H&P 322). Northing and Easting are relative to Bashor AC18-62HN

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: 0.99997209

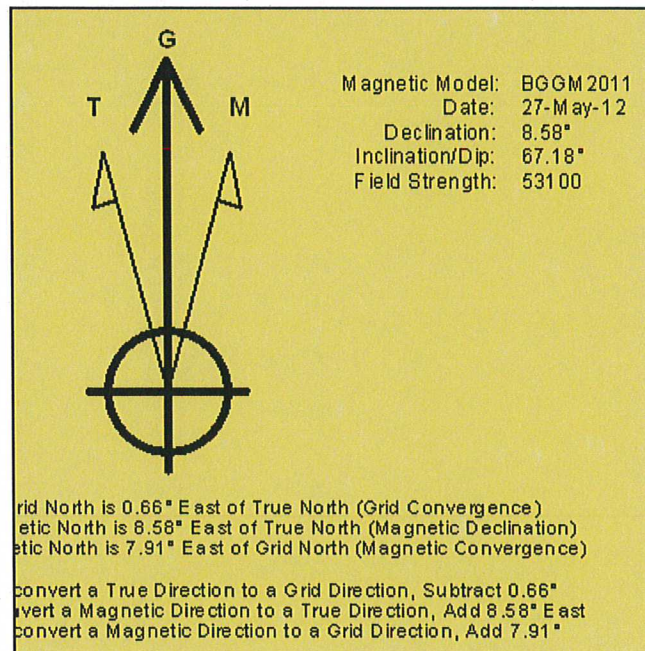
Grid Coordinates of Well: 1,451,238.62 ft N, 3,285,753.19 ft E

Geographical Coordinates of Well: 40° 34' 03.00" N, 104° 28' 17.15" W

Grid Convergence at Surface is: 0.66°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,860.00ft  
the Bottom Hole Displacement is 4,134.58ft in the Direction of 271.99° (Grid).

Magnetic Convergence at surface is: -7.91° (27 May 2012, , BGGM2011)

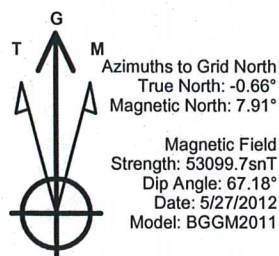


Project: Weld County, CO (NAD 83)  
 Site: Sec. 18-T7N-R63W  
 Well: Bashor AC18-62HN

# Noble Energy

**HALLIBURTON**

Sperry Drilling

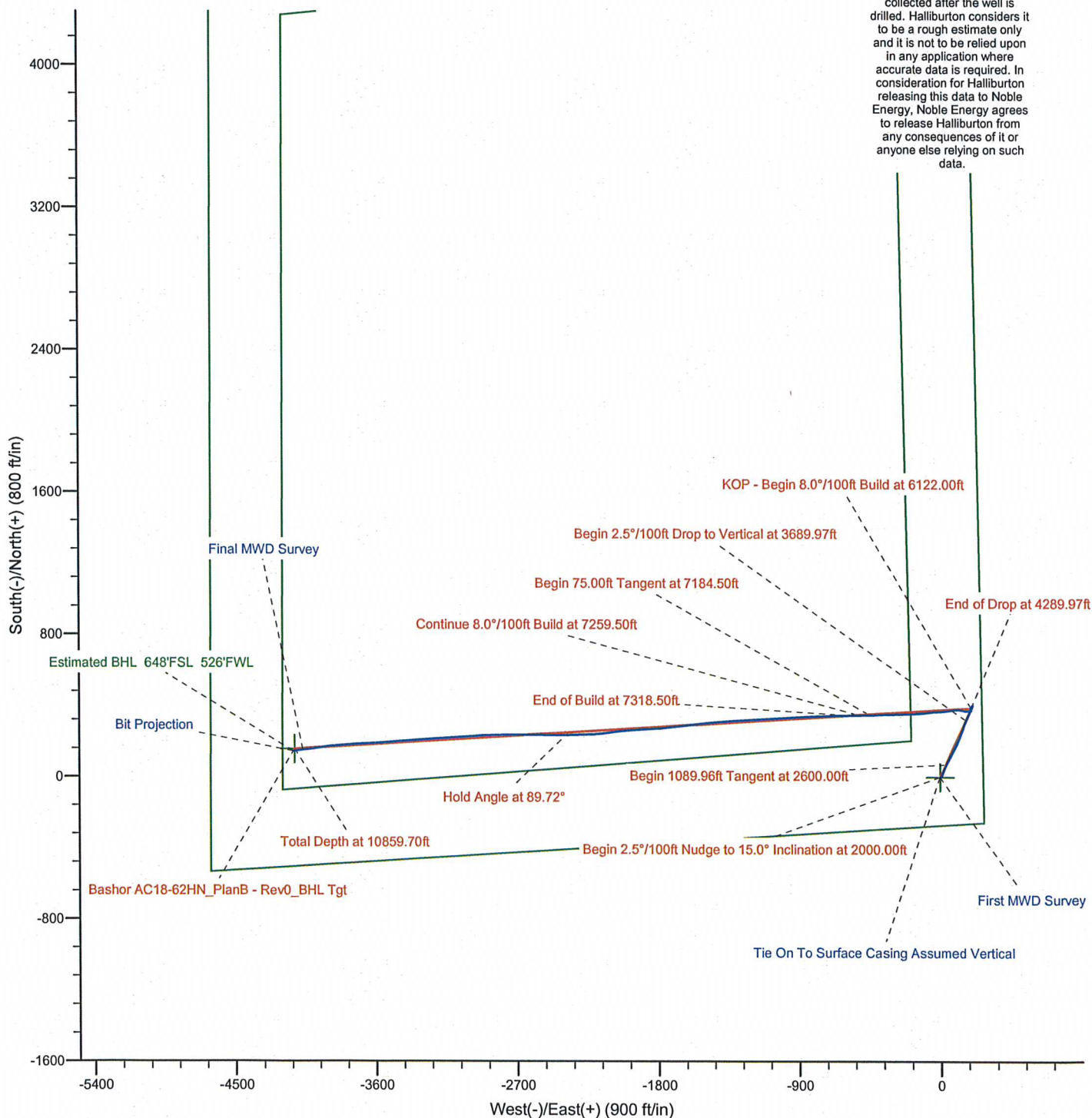


## LEGEND

- Bashor AC18-62HN, Plan B, Plan B - Rev 0 Proposal V0
- MWD Survey

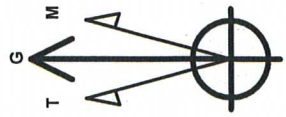
Permitted BHL: 660' FSL, 535' FWL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Bashor AC18-62HN 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. 18-T7N-R63W  
Well: Bashor AC18-62HN

# Noble Energy



Azimuths to Grid North  
True North: -0.66°  
Magnetic North: 7.91°  
  
Magnetic Field  
Strength: 53099.7nT  
Dip Angle: 67.18°  
Date: 5/27/2012  
Model: BGGM2011

## LEGEND

- Bashor AC18-62HN, Plan B, Plan B - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Bashor AC18-62HN 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.

