

# Noble Energy

Weld County, CO (NAD 83)

Sec. 13-T3N-R65W

Karakakes H14-63HN

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

04 April, 2013

Well Coordinates: 1,324,946.99 N, 3,245,734.06 E (40° 13' 19.31" N, 104° 37' 11.93" W)

Ground Level: 4,836.00 ft

Local Coordinate Origin:

Centered on Well Karakakes H14-63HN

Viewing Datum:

KB=24' @ 4860.00ft (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 Karakakes H14-63HN - 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
764.00	0.00	0.00	764.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 764.00ft							
827.00	1.05	55.75	827.00	0.32	0.48	-0.48	1.67
First MWD Survey							
920.00	2.88	186.33	919.96	-1.52	0.92	-0.93	3.93
1,013.00	5.78	193.01	1,012.69	-8.40	-0.39	0.36	3.16
1,106.00	6.62	202.24	1,105.14	-17.93	-3.47	3.40	1.40
1,199.00	7.48	214.44	1,197.45	-27.88	-8.92	8.82	1.85
1,292.00	7.73	228.55	1,289.64	-37.02	-17.04	16.90	2.02
1,385.00	8.66	237.79	1,381.69	-44.89	-27.65	27.48	1.73
1,479.00	8.52	253.19	1,474.65	-50.68	-40.30	40.11	2.44
1,572.00	9.61	256.46	1,566.48	-54.49	-54.45	54.24	1.30
1,665.00	9.23	254.99	1,658.23	-58.24	-69.20	68.98	0.48
1,758.00	8.65	253.03	1,750.10	-62.21	-83.09	82.86	0.70
1,853.00	9.60	257.19	1,843.90	-66.05	-97.65	97.40	1.22
1,947.00	9.26	255.50	1,936.63	-69.68	-112.61	112.35	0.47
2,042.00	8.95	255.06	2,030.43	-73.50	-127.15	126.88	0.33
2,137.00	7.10	259.58	2,124.50	-76.47	-140.07	139.78	2.06
2,232.00	4.81	252.39	2,218.98	-78.74	-149.64	149.34	2.53
2,327.00	4.96	231.14	2,313.64	-82.52	-156.64	156.33	1.90
2,422.00	1.89	227.98	2,408.46	-86.14	-161.00	160.67	3.24
2,518.00	0.87	253.03	2,504.43	-87.42	-162.87	162.54	1.21
2,613.00	0.94	227.34	2,599.42	-88.16	-164.13	163.80	0.43
2,708.00	0.33	185.00	2,694.42	-88.96	-164.73	164.40	0.77
2,803.00	0.49	211.49	2,789.41	-89.57	-164.97	164.63	0.26
2,898.00	0.31	173.82	2,884.41	-90.18	-165.15	164.81	0.33
2,993.00	1.83	79.20	2,979.39	-90.15	-163.63	163.30	1.98
3,088.00	1.79	75.65	3,074.35	-89.50	-160.71	160.37	0.13
3,183.00	1.63	78.32	3,169.30	-88.85	-157.95	157.61	0.19
3,373.00	1.02	94.89	3,359.25	-88.45	-153.61	153.28	0.38
3,657.00	0.41	32.10	3,643.23	-87.81	-150.56	150.23	0.32
3,942.00	0.96	331.09	3,928.22	-84.85	-151.17	150.85	0.30
4,227.00	1.58	298.32	4,213.15	-80.90	-155.78	155.48	0.33
4,322.00	1.74	287.49	4,308.11	-79.84	-158.31	158.01	0.37
4,417.00	2.18	219.20	4,403.06	-80.81	-160.83	160.52	2.35
4,512.00	0.25	143.38	4,498.04	-82.38	-161.85	161.54	2.24
4,797.00	1.86	327.76	4,783.00	-78.96	-163.94	163.65	0.74
4,893.00	0.29	272.05	4,878.98	-77.64	-165.02	164.73	1.78
5,178.00	0.34	339.22	5,163.97	-76.82	-166.04	165.75	0.12
5,463.00	0.62	332.28	5,448.96	-74.67	-167.06	166.77	0.10
5,748.00	0.59	92.04	5,733.95	-73.35	-166.31	166.03	0.37
6,033.00	0.50	107.59	6,018.94	-73.78	-163.65	163.38	0.06
6,128.00	0.22	95.10	6,113.94	-73.92	-163.08	162.80	0.30
6,215.00	0.33	284.59	6,200.94	-73.87	-163.15	162.88	0.63
6,310.00	3.69	277.30	6,295.87	-73.42	-166.45	166.18	3.54
6,358.00	8.79	280.43	6,343.57	-72.56	-171.59	171.32	10.64
6,405.00	12.08	280.68	6,389.78	-70.99	-179.96	179.69	7.00
6,453.00	15.38	272.38	6,436.41	-69.80	-191.26	191.00	7.99
6,500.00	17.45	266.36	6,481.50	-69.99	-204.52	204.26	5.70

## Design Report for Karakakes H14-63HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,548.00	20.27	266.29	6,526.91	-70.98	-220.01	219.74	5.88
6,595.00	23.32	268.81	6,570.55	-71.70	-237.44	237.17	6.79
6,643.00	27.30	271.65	6,613.94	-71.58	-257.95	257.68	8.67
6,689.00	31.32	273.90	6,654.04	-70.46	-280.43	280.16	9.06
6,737.00	37.18	272.28	6,693.70	-69.04	-307.39	307.13	12.35
6,785.00	43.78	272.01	6,730.19	-67.88	-338.51	338.26	13.75
6,833.00	48.99	269.28	6,763.29	-67.52	-373.25	372.99	11.61
6,879.00	52.68	269.30	6,792.34	-67.96	-408.90	408.64	8.02
6,927.00	55.11	269.34	6,820.62	-68.42	-447.68	447.42	5.06
6,974.00	57.67	269.03	6,846.64	-68.98	-486.81	486.55	5.47
7,022.00	59.54	270.11	6,871.64	-69.29	-527.78	527.52	4.34
7,069.00	62.00	270.90	6,894.59	-68.92	-568.79	568.53	5.44
7,117.00	64.33	272.01	6,916.26	-67.83	-611.60	611.35	5.27
7,164.00	68.10	273.00	6,935.21	-65.94	-654.56	654.31	8.25
7,212.00	71.34	273.50	6,951.84	-63.39	-699.51	699.27	6.82
7,259.00	75.61	272.97	6,965.21	-60.85	-744.48	744.25	9.15
7,323.00	81.24	272.90	6,978.05	-57.64	-807.08	806.85	8.80
7,368.00	83.76	273.54	6,983.92	-55.13	-851.62	851.40	5.78
<b>Estimated 7" Casing Point: 1430' FSL, 573' FEL (Not a Survey Point)</b>							
7,420.00	86.68	274.28	6,988.25	-51.60	-903.31	903.11	5.78
7,468.00	86.68	274.08	6,991.03	-48.11	-951.10	950.91	0.42
7,515.00	87.53	271.52	6,993.40	-45.81	-997.98	997.80	5.73
7,563.00	88.12	269.13	6,995.23	-45.54	-1,045.94	1,045.76	5.13
7,609.00	87.97	268.69	6,996.79	-46.42	-1,091.91	1,091.73	1.01
7,704.00	89.60	269.98	6,998.81	-47.52	-1,186.87	1,186.69	2.19
7,799.00	89.82	269.18	6,999.29	-48.21	-1,281.87	1,281.68	0.87
7,894.00	89.97	268.68	6,999.46	-49.99	-1,376.85	1,376.66	0.55
7,989.00	89.38	267.86	7,000.00	-52.86	-1,471.81	1,471.60	1.06
8,084.00	88.92	265.12	7,001.41	-58.67	-1,566.61	1,566.38	2.92
8,179.00	89.14	263.48	7,003.02	-68.10	-1,661.12	1,660.85	1.74
8,227.00	89.29	264.63	7,003.68	-73.08	-1,708.86	1,708.57	2.42
8,273.00	90.00	265.48	7,003.96	-77.04	-1,754.69	1,754.38	2.41
8,321.00	91.60	268.98	7,003.29	-79.36	-1,802.62	1,802.31	8.02
8,368.00	92.34	271.77	7,001.68	-79.05	-1,849.58	1,849.27	6.14
8,463.00	88.95	272.33	7,000.61	-75.66	-1,944.50	1,944.20	3.62
8,558.00	90.31	272.43	7,001.22	-71.71	-2,039.41	2,039.13	1.44
8,653.00	89.45	274.82	7,001.42	-65.70	-2,134.22	2,133.96	2.67
8,747.00	90.18	274.79	7,001.72	-57.83	-2,227.88	2,227.65	0.78
8,842.00	89.85	275.14	7,001.70	-49.61	-2,322.53	2,322.33	0.51
8,937.00	89.45	272.94	7,002.28	-42.92	-2,417.28	2,417.11	2.35
9,032.00	89.57	272.55	7,003.09	-38.37	-2,512.17	2,512.01	0.43
9,127.00	89.88	272.00	7,003.55	-34.60	-2,607.10	2,606.95	0.66
9,222.00	89.88	272.09	7,003.75	-31.21	-2,702.03	2,701.90	0.09
9,317.00	88.67	272.93	7,004.95	-27.05	-2,796.93	2,796.81	1.55
9,412.00	89.78	275.54	7,006.23	-20.03	-2,891.66	2,891.56	2.99
9,507.00	90.15	272.77	7,006.29	-13.15	-2,986.40	2,986.33	2.94
9,602.00	89.82	270.13	7,006.32	-10.74	-3,081.36	3,081.30	2.80
9,697.00	87.90	270.85	7,008.21	-9.93	-3,176.33	3,176.27	2.16
9,791.00	86.93	270.20	7,012.45	-9.07	-3,270.23	3,270.17	1.24
9,886.00	88.09	272.97	7,016.57	-6.45	-3,365.09	3,365.04	3.16
9,981.00	88.92	270.84	7,019.05	-3.29	-3,460.00	3,459.96	2.41

## Design Report for Karakakes H14-63HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
10,076.00	90.83	271.77	7,019.26	-1.13	-3,554.97	3,554.94	2.24
10,171.00	90.00	271.30	7,018.57	1.42	-3,649.93	3,649.91	1.00
10,266.00	90.74	270.91	7,017.96	3.25	-3,744.91	3,744.90	0.88
10,361.00	90.37	271.41	7,017.04	5.17	-3,839.89	3,839.88	0.65
10,456.00	89.20	270.89	7,017.39	7.08	-3,934.87	3,934.86	1.35
10,551.00	88.95	271.20	7,018.93	8.81	-4,029.84	4,029.84	0.42
10,646.00	88.43	270.42	7,021.10	10.16	-4,124.80	4,124.81	0.99
10,741.00	88.52	270.42	7,023.63	10.85	-4,219.77	4,219.78	0.09
10,836.00	89.72	270.31	7,025.09	11.46	-4,314.75	4,314.76	1.27
10,931.00	90.52	269.78	7,024.89	11.53	-4,409.75	4,409.76	1.01
11,026.00	89.72	269.71	7,024.69	11.11	-4,504.75	4,504.76	0.85
11,120.00	90.19	270.46	7,024.76	11.25	-4,598.75	4,598.76	0.94
11,215.00	90.86	270.25	7,023.89	11.84	-4,693.74	4,693.75	0.74
11,310.00	90.09	270.21	7,023.11	12.22	-4,788.74	4,788.75	0.81
11,405.00	91.17	271.08	7,022.06	13.29	-4,883.72	4,883.74	1.46
11,499.00	90.98	270.91	7,020.30	14.92	-4,977.69	4,977.71	0.27
11,561.00	92.56	271.19	7,018.38	16.05	-5,039.65	5,039.67	2.59
<b>Final MWD Survey</b>							
11,623.00	92.56	271.19	7,015.61	17.34	-5,101.57	5,101.60	0.00
<b>Survey Projection to TD - Estimated BHL: 1498' FSL, 536' FWL</b>							

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
764.00	764.00	0.00	0.00	Surface Casing Assumed Vertical at 764.00ft
827.00	827.00	0.32	0.48	First MWD Survey
7,368.00	6,983.92	-55.13	-851.62	Estimated 7" Casing Point: 1430' FSL, 573' FEL (Not a Survey Point)
11,561.00	7,018.38	16.05	-5,039.65	Final MWD Survey
11,623.00	7,015.61	17.34	-5,101.57	Survey Projection to TD
11,623.00	7,015.61	17.34	-5,101.57	Estimated BHL: 1498' FSL, 536' FWL

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Karakakes	270.21	Slot	0.00	0.00	0.00
	H14-63HN_PlanC - Rev0_BHL					

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
764.00	11,623.00	Sperry MWD Surveys	MWD
7,368.00	11,623.00	Sperry MWD Surveys	MWD

### Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,368.00	6,983.92	7" Csg	7	8-3/4

## Design Report for Karakakes H14-63HN - 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
Karakakes	0.00	0.00	0.00	0.00	0.00	1,324,946.99	3,245,734.06	40.22203	-104.61998
- actual wellpath hits target center									
- Polygon									
Point 1				-276.00	-1,486.00	1,323,461.05	3,245,458.07		
Point 2				-5,624.00	-1,480.00	1,323,467.05	3,240,110.30		
Point 3				-5,667.00	3,799.00	1,328,745.83	3,240,067.30		
Point 4				-289.00	3,786.00	1,328,732.83	3,245,445.07		
Point 5				-276.00	-1,486.00	1,323,461.05	3,245,458.07		
Karakakes	0.00	0.00	0.00	0.00	0.00	1,324,946.99	3,245,734.06	40.22203	-104.61998
- actual wellpath hits target center									
- Polygon									
Point 1				-736.00	-1,026.00	1,323,921.03	3,244,998.09		
Point 2				-5,164.00	-1,020.00	1,323,927.03	3,240,570.28		
Point 3				-5,207.00	3,339.00	1,328,285.85	3,240,527.28		
Point 4				-749.00	3,326.00	1,328,272.85	3,244,985.09		
Point 5				-736.00	-1,026.00	1,323,921.03	3,244,998.09		
Karakakes	0.00	0.00	0.00	0.00	0.00	1,324,946.99	3,245,734.06	40.22203	-104.61998
- actual wellpath hits target center									
- Polygon									
Point 1				184.00	-1,026.00	1,323,921.03	3,245,918.05		
Point 2				171.00	3,326.00	1,328,272.85	3,245,905.05		
Point 3				4,357.00	3,399.00	1,328,345.84	3,250,090.87		
Point 4				4,389.00	-978.00	1,323,969.03	3,250,122.87		
Point 5				184.00	-1,026.00	1,323,921.03	3,245,918.05		
Karakakes	0.00	0.00	6,994.00	19.11	-5,102.39	1,324,966.10	3,240,631.89	40.22222	-104.63825
- actual wellpath misses target center by 21.70ft at 11623.00ft MD (7015.61 TVD, 17.34 N, -5101.57 E)									
- Point									
Karakakes	0.00	0.00	0.00	0.00	0.00	1,324,946.99	3,245,734.06	40.22203	-104.61998
- actual wellpath hits target center									
- Polygon									
Point 1				-276.00	-1,486.00	1,323,461.05	3,245,458.07		
Point 2				-289.00	3,786.00	1,328,732.83	3,245,445.07		
Point 3				4,817.00	3,859.00	1,328,805.82	3,250,550.85		
Point 4				4,849.00	-1,438.00	1,323,509.05	3,250,582.85		
Point 5				-276.00	-1,486.00	1,323,461.05	3,245,458.07		

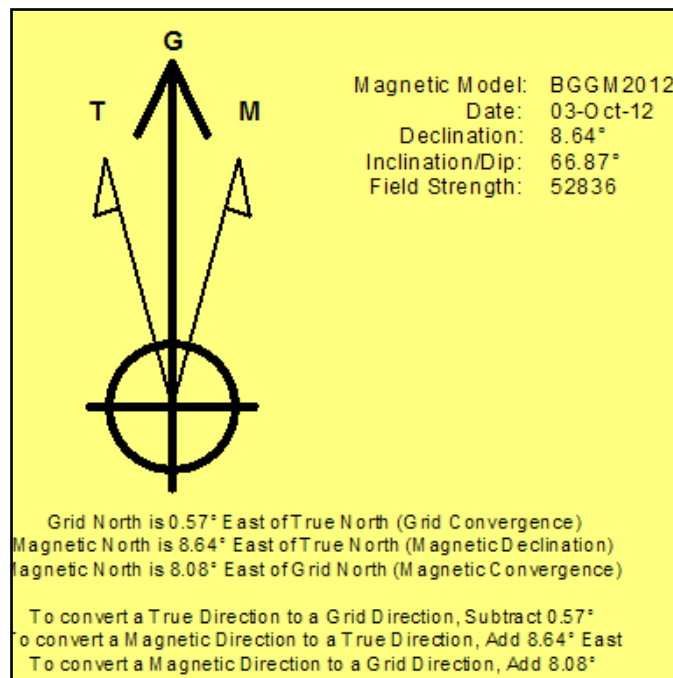
# North Reference Sheet for Sec. 13-T3N-R65W - Karakakes H14-63HN

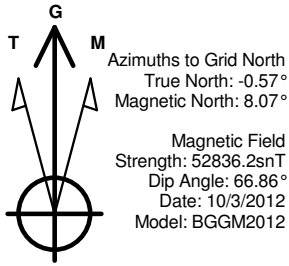
All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.  
Vertical Depths are relative to KB=24' @ 4860.00ft (H&P 322). Northing and Easting are relative to Karakakes H14-63HN  
Coordinate System is US State Plane 1983, Colorado Northern Zone using 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: 0.99995697

Grid Coordinates of Well: 1,324,946.99 ft N, 3,245,734.06 ft E  
Geographical Coordinates of Well: 40° 13' 19.31" N, 104° 37' 11.93" W  
Grid Convergence at Surface is: 0.57°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,623.00ft  
the Bottom Hole Displacement is 5,101.60ft in the Direction of 270.19° (Grid).

Magnetic Convergence at surface is: -8.08° ( 3 October 2012, , BGGM2012)

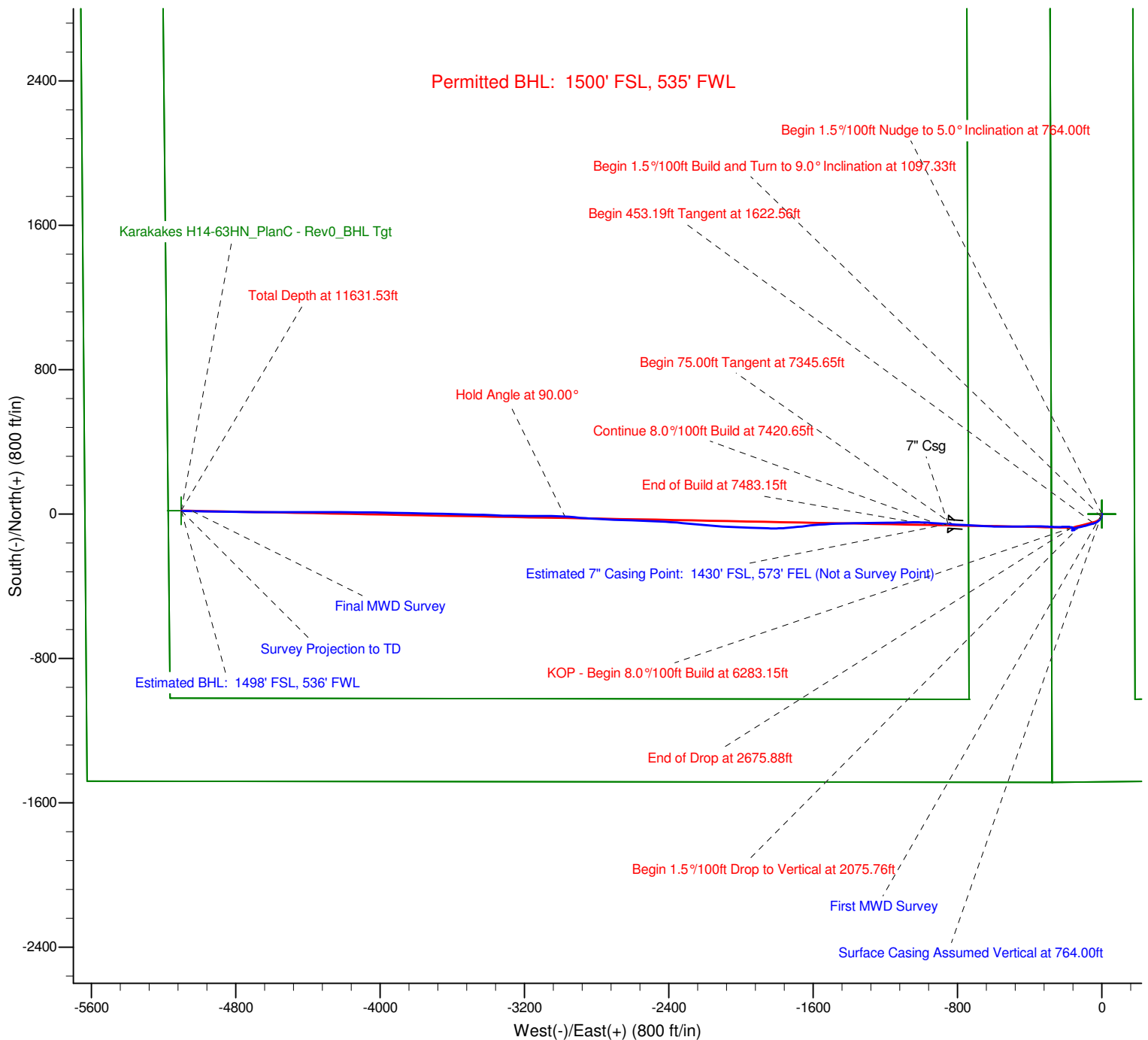




### LEGEND

- Karakakes H14-63HN, Plan C, Plan C - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Karakakes H14-63HN 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.

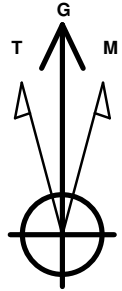


Project: Weld County, CO (NAD 83)  
Site: Sec. 13-T3N-R65W  
Well: Karakakes H14-63HN

# Noble Energy

**HALLIBURTON**

Sperry Drilling



Azimuths to Grid North  
True North:  $-0.57^\circ$   
Magnetic North:  $8.07^\circ$

Magnetic Field  
Strength: 52836.2snT  
Dip Angle:  $66.86^\circ$   
Date: 10/3/2012  
Model: BGGM2012

## LEGEND

- Karakakes H14-63HN, Plan C, Plan C - Rev 0 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Karakakes H14-63HN 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.

