

# Noble Energy

Weld County, CO (NAD 83)

Sec. 13-T11N-R62W

Gallegos PC GJ13-99HZ

Design: MWD Survey

## Sperry Drilling Services

### Final Survey Report

24 March, 2011

Well Coordinates: 1,583,198.50 N, 3,338,980.48 E (40° 55' 40.12" N, 104° 16' 23.84" W)

Ground Level: 5,168.00 ft

Local Coordinate Origin:

Centered on Well Gallegos PC GJ13-99HZ

Viewing Datum:

RKB 24' @ 5192.00ft (H&P 315)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

HALLIBURTON

## Design Report for Gallegos PC GJ13-99HZ - 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
1,664.00	0.61	23.00	1,663.97	8.15	3.46	-3.40	0.04
First MWD Survey							
1,758.00	0.68	13.68	1,757.96	9.16	3.79	-3.89	0.13
1,853.00	0.35	35.41	1,852.96	9.94	4.09	-4.24	0.40
1,947.00	0.83	358.86	1,946.95	10.86	4.24	-4.78	0.62
2,042.00	0.80	322.59	2,041.94	12.07	3.83	-5.94	0.53
2,136.00	0.21	296.67	2,135.94	12.67	3.27	-6.76	0.66
2,231.00	0.81	9.09	2,230.94	13.41	3.22	-7.32	0.81
2,325.00	0.80	329.04	2,324.93	14.63	2.99	-8.35	0.59
2,420.00	0.17	344.30	2,419.92	15.33	2.61	-9.12	0.67
2,514.00	0.68	294.70	2,513.92	15.70	2.07	-9.76	0.62
2,609.00	0.53	333.51	2,608.92	16.33	1.36	-10.71	0.45
2,703.00	0.51	296.58	2,702.91	16.91	0.79	-11.52	0.35
2,798.00	0.69	347.58	2,797.91	17.65	0.29	-12.40	0.57
2,987.00	0.59	321.74	2,986.90	19.53	-0.56	-14.34	0.16
3,177.00	0.18	271.32	3,176.89	20.30	-1.46	-15.52	0.26
3,460.00	0.66	224.02	3,459.89	19.14	-3.04	-15.80	0.20
3,555.00	0.46	205.71	3,554.88	18.40	-3.58	-15.65	0.28
3,649.00	0.55	238.95	3,648.88	17.83	-4.13	-15.63	0.32
3,743.00	0.78	273.41	3,742.87	17.64	-5.16	-16.21	0.48
3,838.00	1.08	255.72	3,837.86	17.46	-6.67	-17.14	0.43
3,932.00	0.97	266.43	3,931.84	17.19	-8.33	-18.10	0.23
4,027.00	1.31	282.17	4,026.83	17.37	-10.19	-19.53	0.48
4,310.00	1.65	298.45	4,309.73	19.99	-16.93	-26.13	0.19
4,404.00	2.01	269.52	4,403.69	20.62	-19.77	-28.57	1.04
4,688.00	1.76	257.27	4,687.53	19.62	-29.01	-34.31	0.17
4,783.00	1.62	229.88	4,782.49	18.43	-31.46	-35.18	0.85
4,877.00	1.23	232.50	4,876.46	16.96	-33.27	-35.40	0.42
4,972.00	1.36	232.41	4,971.44	15.65	-34.98	-35.66	0.14
5,067.00	1.95	221.01	5,066.40	13.74	-36.93	-35.67	0.71
5,161.00	2.43	221.22	5,160.33	11.04	-39.29	-35.39	0.51
5,256.00	2.17	227.41	5,255.25	8.31	-41.94	-35.29	0.38
5,350.00	0.90	216.94	5,349.22	6.51	-43.70	-35.24	1.38
5,445.00	0.54	243.46	5,444.21	5.72	-44.55	-35.26	0.51
5,539.00	0.14	38.43	5,538.21	5.61	-44.87	-35.41	0.71
5,634.00	0.48	9.96	5,633.21	6.09	-44.73	-35.66	0.38
5,728.00	1.02	70.20	5,727.20	6.76	-43.87	-35.54	0.94
5,917.00	0.76	77.21	5,916.18	7.61	-41.07	-34.18	0.15
6,106.00	0.35	89.85	6,105.17	7.89	-39.27	-33.12	0.23
6,169.00	0.74	58.79	6,168.17	8.10	-38.73	-32.89	0.76
6,235.00	0.26	109.92	6,234.16	8.27	-38.22	-32.66	0.93
6,298.00	4.68	110.65	6,297.09	7.31	-35.68	-30.20	7.02
6,329.00	7.97	118.36	6,327.90	5.85	-32.61	-27.00	10.94
6,361.00	10.79	122.62	6,359.47	3.18	-28.13	-21.96	9.07
6,392.00	13.12	124.56	6,389.79	-0.38	-22.79	-15.68	7.63
6,424.00	15.11	130.68	6,420.83	-5.16	-16.63	-7.96	7.77
6,455.00	16.99	137.10	6,450.62	-11.12	-10.49	0.60	8.33
6,487.00	19.08	134.01	6,481.05	-18.18	-3.54	10.50	7.18
6,519.00	20.62	132.49	6,511.14	-25.62	4.38	21.36	5.08

## Design Report for Gallegos PC GJ13-99HZ - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,550.00	23.22	131.34	6,539.90	-33.34	12.99	32.90	8.50
6,582.00	26.58	131.72	6,568.92	-42.27	23.07	46.34	10.51
6,613.00	29.28	132.11	6,596.31	-51.97	33.88	60.83	8.73
6,645.00	30.73	133.01	6,624.02	-62.80	45.66	76.81	4.74
6,676.00	33.96	132.76	6,650.21	-74.08	57.81	93.38	10.43
6,708.00	36.38	133.40	6,676.36	-86.67	71.27	111.79	7.65
6,739.00	38.47	132.39	6,700.98	-99.49	85.08	130.61	7.03
6,771.00	41.29	132.37	6,725.53	-113.32	100.23	151.09	8.81
6,803.00	43.84	134.04	6,749.10	-128.14	116.00	172.71	8.72
6,834.00	46.85	135.53	6,770.89	-143.68	131.64	194.76	10.29
6,865.00	48.75	135.75	6,791.71	-160.10	147.70	217.72	6.15
6,897.00	50.33	136.29	6,812.47	-177.62	164.60	242.07	5.10
6,928.00	53.13	136.34	6,831.67	-195.22	181.41	266.40	9.03
6,960.00	56.77	136.09	6,850.05	-214.13	199.54	292.59	11.39
6,991.00	60.02	135.42	6,866.29	-233.04	217.96	318.99	10.64
7,023.00	60.74	135.27	6,882.11	-252.82	237.51	346.81	2.29
7,054.00	61.01	135.76	6,897.19	-272.14	256.49	373.89	1.63
7,086.00	63.03	135.79	6,912.21	-292.39	276.19	402.15	6.31
7,117.00	65.78	136.18	6,925.60	-312.50	295.62	430.10	8.94
7,149.00	69.93	136.71	6,937.66	-333.98	316.04	459.73	13.06
7,181.00	73.43	136.18	6,947.71	-355.99	336.97	490.10	11.05
7,212.00	74.37	136.32	6,956.31	-377.50	357.56	519.88	3.06
7,244.00	75.73	135.97	6,964.57	-399.80	378.98	550.80	4.38
7,275.00	78.76	135.40	6,971.41	-421.43	400.10	581.03	9.94
7,307.00	80.74	135.75	6,977.10	-443.91	422.14	612.52	6.28
7,346.00	82.06	136.20	6,982.94	-471.64	448.94	651.08	3.57
7,422.00	87.84	138.05	6,989.62	-527.10	500.42	726.72	7.98
7,485.00	88.27	138.44	6,991.76	-574.07	542.35	789.61	0.92
7,550.00	89.26	138.33	6,993.16	-622.65	585.51	854.52	1.53
7,614.00	88.33	137.80	6,994.51	-670.25	628.27	918.44	1.67
7,677.00	88.76	138.01	6,996.11	-716.98	670.49	981.37	0.76
7,740.00	89.88	137.86	6,996.86	-763.75	712.69	1,044.31	1.79
7,805.00	90.62	136.58	6,996.57	-811.46	756.84	1,109.28	2.27
7,869.00	90.99	136.50	6,995.67	-857.91	800.86	1,173.27	0.59
7,933.00	92.16	136.44	6,993.91	-904.29	844.92	1,237.23	1.83
7,997.00	91.36	134.54	6,991.95	-949.90	889.76	1,301.20	3.22
8,061.00	90.43	133.88	6,990.95	-994.52	935.63	1,365.17	1.78
8,125.00	90.12	133.29	6,990.64	-1,038.65	981.99	1,429.13	1.04
8,189.00	90.86	133.14	6,990.09	-1,082.47	1,028.63	1,493.08	1.18
8,251.00	90.00	132.62	6,989.63	-1,124.66	1,074.06	1,555.01	1.62
8,315.00	90.68	133.24	6,989.25	-1,168.25	1,120.92	1,618.94	1.44
8,380.00	88.89	133.89	6,989.49	-1,213.04	1,168.01	1,683.89	2.93
8,444.00	89.51	133.79	6,990.39	-1,257.36	1,214.17	1,747.86	0.98
8,509.00	90.99	134.50	6,990.10	-1,302.63	1,260.81	1,812.83	2.53
8,572.00	90.19	133.61	6,989.45	-1,346.44	1,306.08	1,875.81	1.90
8,637.00	91.91	133.82	6,988.26	-1,391.35	1,353.05	1,940.76	2.67
8,732.00	90.93	133.13	6,985.91	-1,456.69	1,421.97	2,035.66	1.26
8,797.00	89.94	132.89	6,985.42	-1,501.03	1,469.50	2,100.60	1.57
8,860.00	91.17	132.47	6,984.81	-1,543.73	1,515.81	2,163.51	2.06
8,925.00	88.52	131.20	6,984.98	-1,587.08	1,564.24	2,228.37	4.52
8,989.00	88.70	131.47	6,986.53	-1,629.34	1,612.28	2,292.17	0.51



## Design Report for Gallegos PC GJ13-99HZ - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,054.00	90.86	132.30	6,986.78	-1,672.73	1,660.66	2,357.03	3.56
9,119.00	92.59	132.60	6,984.83	-1,716.58	1,708.60	2,421.91	2.70
9,215.00	89.94	131.96	6,982.71	-1,781.14	1,779.61	2,517.71	2.84
9,280.00	90.80	133.07	6,982.29	-1,825.07	1,827.51	2,582.62	2.16
9,344.00	89.26	132.81	6,982.25	-1,868.66	1,874.37	2,646.55	2.44
9,409.00	89.57	132.75	6,982.92	-1,912.81	1,922.07	2,711.47	0.49
9,472.00	89.44	132.84	6,983.46	-1,955.61	1,968.30	2,774.39	0.25
9,538.00	90.93	136.72	6,983.25	-2,002.09	2,015.14	2,840.37	6.30
9,602.00	89.14	134.09	6,983.21	-2,047.65	2,060.06	2,904.36	4.97
9,667.00	89.88	134.49	6,983.77	-2,093.04	2,106.59	2,969.34	1.29
9,732.00	90.56	134.32	6,983.52	-2,138.52	2,153.03	3,034.33	1.08
9,796.00	90.74	134.66	6,982.79	-2,183.37	2,198.68	3,098.31	0.60
9,861.00	90.99	134.43	6,981.81	-2,228.96	2,245.00	3,163.30	0.52
9,925.00	89.75	133.95	6,981.40	-2,273.57	2,290.89	3,227.27	2.08
9,989.00	90.06	134.15	6,981.50	-2,318.07	2,336.88	3,291.25	0.58
10,053.00	89.57	135.63	6,981.71	-2,363.23	2,382.22	3,355.24	2.44
10,117.00	90.00	135.79	6,981.95	-2,409.05	2,426.92	3,419.24	0.72
10,180.00	90.99	136.59	6,981.40	-2,454.51	2,470.53	3,482.24	2.02
10,245.00	90.12	134.96	6,980.77	-2,501.08	2,515.86	3,547.23	2.84
10,310.00	90.25	136.11	6,980.56	-2,547.47	2,561.39	3,612.23	1.78
10,375.00	90.06	135.37	6,980.39	-2,594.02	2,606.75	3,677.23	1.18
10,439.00	89.63	136.15	6,980.56	-2,639.87	2,651.40	3,741.23	1.39
10,503.00	90.62	139.03	6,980.		2,694.56	3,805.18	4.76
10,566.00	90.00	137.99	6,980.08	-2,734.31	2,736.30	3,868.09	1.92
10,630.00	91.05	139.58	6,979.49	-2,782.45	2,778.46	3,931.99	2.98
10,694.00	91.67	140.53	6,977.98	-2,831.50	2,819.54	3,995.77	1.77
10,757.00	92.10	140.15	6,975.90	-2,879.97	2,859.73	4,058.52	0.91
10,822.00	90.43	140.27	6,974.47	-2,929.90	2,901.31	4,123.29	2.58
10,886.00	90.62	139.88	6,973.88	-2,978.98	2,942.39	4,187.09	0.68
10,950.00	91.05	139.37	6,972.95	-3,027.73	2,983.84	4,250.92	1.04
11,014.00	91.48	139.48	6,971.54	-3,076.33	3,025.46	4,314.76	0.69
11,078.00	91.73	139.56	6,969.74	-3,125.00	3,066.99	4,378.59	0.41
11,143.00	89.57	139.04	6,969.01	-3,174.27	3,109.37	4,443.44	3.42
11,239.00	89.94	138.67	6,969.42	-3,246.56	3,172.53	4,539.28	0.55
11,336.00	91.36	138.89	6,968.32	-3,319.51	3,236.45	4,636.12	1.48
11,400.00	91.17	137.47	6,966.90	-3,367.20	3,279.11	4,700.04	2.24
Final MWD Survey							
11,440.00	91.17	137.47	6,966.09	-3,396.67	3,306.14	4,740.01	0.00
Survey Projection to TD - Estimated BHL: 1255' FSL, 649' FEL							

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,664.00	1,663.97	8.15	3.46	First MWD Survey
11,400.00	6,966.90	-3,367.20	3,279.11	Final MWD Survey
11,440.00	6,966.09	-3,396.67	3,306.14	Survey Projection to TD
11,440.00	6,966.09	-3,396.67	3,306.14	Estimated BHL: 1255' FSL, 649' FEL

## Design Report for Gallegos PC GJ13-99HZ - MWD Survey

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Gallegos PC GJ13-99HZ	135.57	Slot	0.00	0.00	0.00

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
1,664.00	11,440.00	Sperry MWD Survey	MWD

## Design Report for Gallegos PC GJ13-99HZ - 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
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-1,260.00	656.00	1,583,837.02	3,337,711.49		
Point 2				3,955.00	534.00	1,583,787.17	3,342,927.82		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-660.00	-4,125.00	1,579,064.65	3,338,377.59		
Point 2				3,355.00	-4,052.00	1,579,193.19	3,342,391.30		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-1,260.00	-4,725.00	1,578,456.39	3,337,785.93		
Point 2				3,955.00	-4,652.00	1,578,601.53	3,342,999.56		
Gallegos PC	0.00	0.00	6,969.00	-3,391.82	3,324.76	1,579,852.91	3,342,351.93	40° 55' 6.600 N	104° 15' 40.536 W
- actual wellpath misses target center by 19.46ft at 11440.00ft MD (6966.09 TVD, -3396.67 N, 3306.14 E)									
- Point									
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-660.00	56.00	1,583,245.36	3,338,319.75		
Point 2				-660.00	-4,125.00	1,579,064.65	3,338,377.59		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-660.00	56.00	1,583,245.36	3,338,319.75		
Point 2				3,355.00	-66.00	1,583,178.91	3,342,336.16		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				3,955.00	534.00	1,583,787.17	3,342,927.82		
Point 2				3,955.00	-4,652.00	1,578,601.53	3,342,999.56		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				-1,260.00	656.00	1,583,837.02	3,337,711.49		
Point 2				-1,260.00	-4,725.00	1,578,456.39	3,337,785.93		
Gallegos PC	0.00	0.00	8.00	0.00	0.00	1,583,198.50	3,338,980.48	40° 55' 40.116 N	104° 16' 23.844 W
- actual wellpath hits target center									
- Polygon									
Point 1				3,355.00	-66.00	1,583,178.91	3,342,336.16		
Point 2				3,355.00	-4,052.00	1,579,193.19	3,342,391.30		

**North Reference Sheet for Sec. 13-T11N-R62W - Gallegos PC GJ13-99HZ**

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

Vertical Depths are relative to RKB 24' @ 5192.00ft (H&P 315). Northing and Easting are relative to Gallegos PC GJ13-99HZ

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: 1.00002664

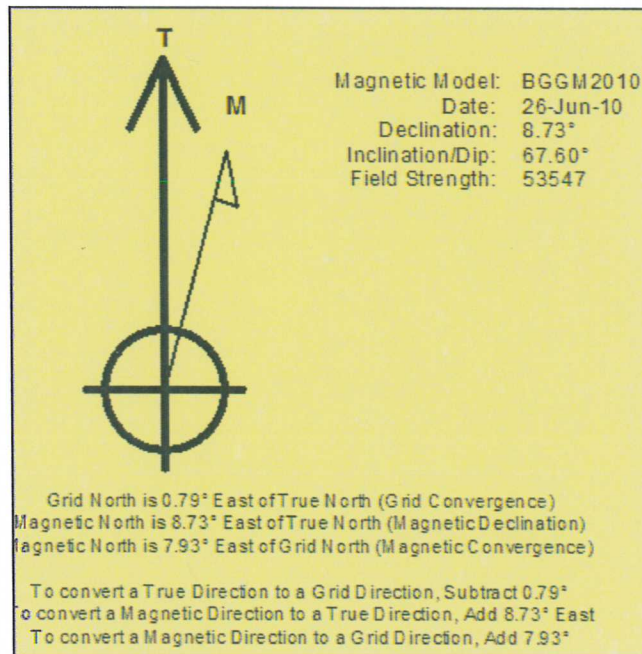
Grid Coordinates of Well: 1,583,198.50 ft N, 3,338,980.48 ft E

Geographical Coordinates of Well: 40° 55' 40.12" N, 104° 16' 23.84" W

Grid Convergence at Surface is: 0.79°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,440.00ft  
the Bottom Hole Displacement is 4,740.04ft in the Direction of 135.77° (True).

Magnetic Convergence at surface is: -7.93° (26 June 2010, , BGGM2010)





Project: Weld County, CO (NAD 83)  
 Site: Sec. 13-T11N-R62W  
 Well: Gallegos PC GJ13-99HZ

# Noble Energy

**HALLIBURTON**

Sperry Drilling



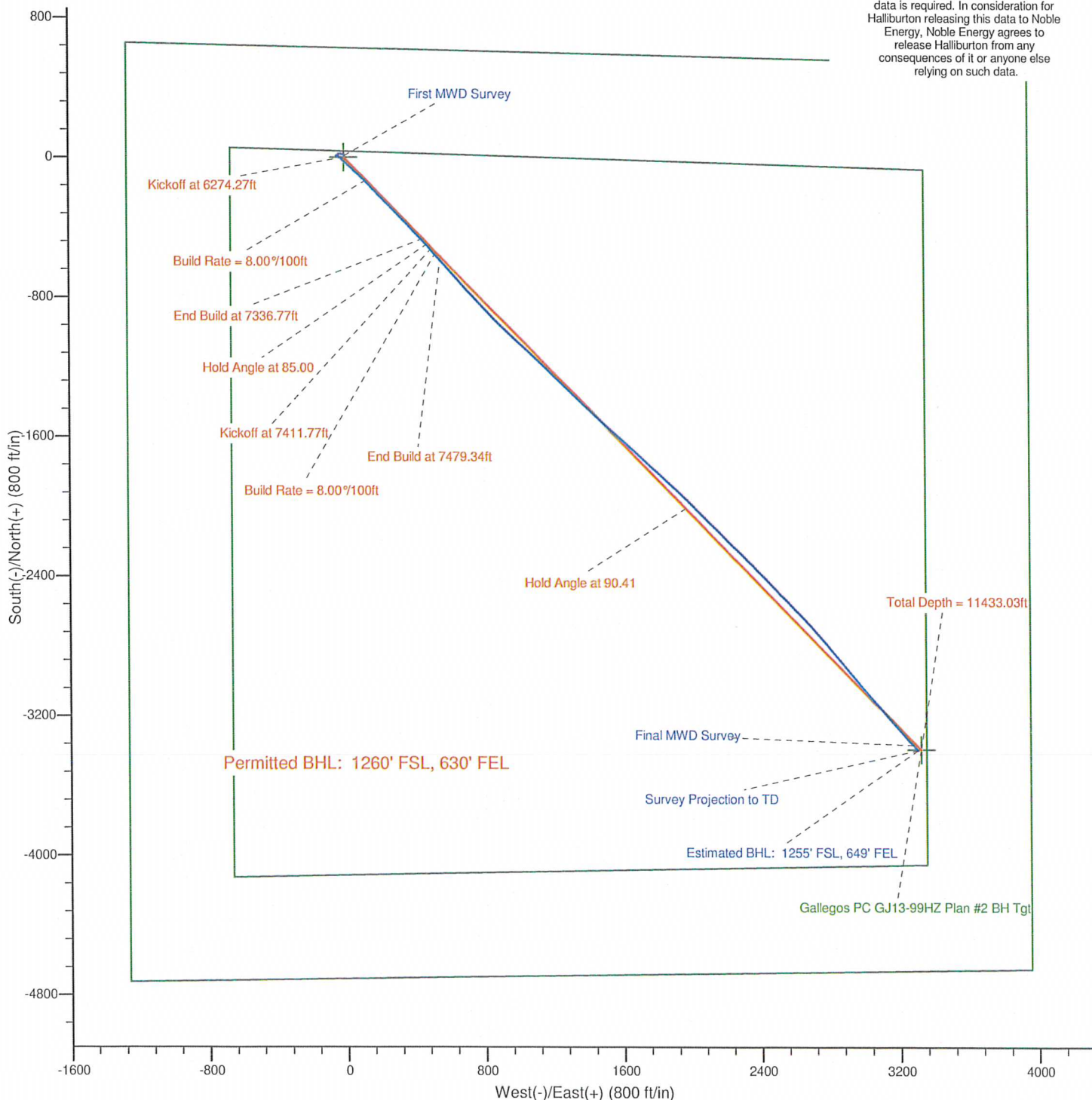
Azimuths to True North  
 Magnetic North: 8.72°

Magnetic Field  
 Strength: 53546.6snT  
 Dip Angle: 67.60°  
 Date: 6/26/2010  
 Model: BGGM2010

## LEGEND

Gallegos PC GJ13-99HZ,  
 MWD Survey

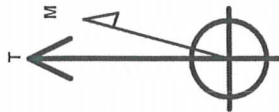
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Gallegos PC GJ13-99HZ well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide 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-T11N-R62W  
 Well: Gallegos PC GJ13-99HZ

# Noble Energy



Azimuths to True North  
 Magnetic North: 8.72°  
 Magnetic Field  
 Strength: 53546.6snT  
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## LEGEND

- Gallegos PC GJ13-99HZ,
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