

# **Noble Energy**

**Weld County, CO (NAD 83)  
Sec. 19-T9N-R59W  
Ptasnik Federal LC19-74HN**

**Design: MWD Survey**

## **Sperry Drilling Services** **Final Survey Report**

**04 April, 2013**

Well Coordinates: 1,516,745.26 N, 3,410,136.38 E (40° 44' 32.85" N, 104° 01' 11.45" W)  
Ground Level: 5,005.00 ft

Local Coordinate Origin:	Centered on Well Ptasnik Federal LC19-74HN
Viewing Datum:	KB=24' @ 5029.00ft (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 Ptasnik Federal LC19-74HN - 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
762.00	0.00	0.00	762.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 762.00ft							
825.00	1.27	198.29	824.99	-0.66	-0.22	0.64	2.02
First MWD Survey							
1,104.00	1.23	172.88	1,103.93	-6.57	-0.82	6.46	0.20
1,383.00	0.93	143.00	1,382.88	-11.35	0.92	11.39	0.23
1,666.00	0.65	136.70	1,665.86	-14.35	3.40	14.61	0.10
1,951.00	0.73	140.80	1,950.84	-16.94	5.65	17.39	0.03
2,046.00	2.07	91.59	2,045.81	-17.45	7.75	18.10	1.77
2,141.00	3.50	65.08	2,140.70	-16.28	12.10	17.34	1.99
2,236.00	6.78	63.93	2,235.30	-12.59	19.77	14.38	3.45
2,331.00	8.78	61.11	2,329.42	-6.62	31.15	9.50	2.14
2,426.00	11.56	60.45	2,422.92	1.58	45.78	2.71	2.93
2,521.00	12.94	60.78	2,515.76	11.46	63.35	-5.50	1.45
2,616.00	14.98	58.16	2,607.95	23.13	83.07	-15.28	2.25
2,806.00	14.28	55.16	2,791.79	49.48	123.16	-37.76	0.54
3,091.00	14.43	51.59	3,067.89	91.62	179.84	-74.43	0.31
3,281.00	12.46	55.41	3,252.68	117.97	215.26	-97.35	1.14
3,471.00	8.63	50.82	3,439.44	138.62	243.20	-115.30	2.06
3,661.00	10.23	54.16	3,626.87	157.50	267.93	-131.80	0.89
3,850.00	11.60	52.61	3,812.45	178.87	296.63	-150.39	0.74
3,946.00	9.90	57.08	3,906.76	189.22	311.23	-159.33	1.97
4,041.00	6.63	44.61	4,000.77	197.56	321.94	-166.64	3.91
4,135.00	4.41	42.89	4,094.32	204.07	328.21	-172.53	2.37
4,230.00	3.24	42.09	4,189.11	208.74	332.50	-176.78	1.23
4,325.00	0.90	43.69	4,284.04	211.27	334.81	-179.09	2.46
4,515.00	1.17	104.32	4,474.02	211.87	337.72	-179.41	0.56
4,706.00	1.97	40.78	4,664.96	213.88	341.76	-181.03	0.94
4,896.00	1.02	41.00	4,854.89	217.63	345.00	-184.46	0.50
4,991.00	1.76	242.37	4,949.88	217.59	344.26	-184.49	2.88
5,181.00	0.18	255.06	5,139.84	216.16	341.39	-183.34	0.83
5,371.00	1.09	37.19	5,329.83	217.52	342.19	-184.62	0.65
5,485.00	0.42	18.57	5,443.82	218.78	342.98	-185.80	0.62
5,552.00	0.92	22.82	5,510.82	219.51	343.27	-186.50	0.75
5,647.00	5.14	169.14	5,605.71	216.03	344.36	-182.93	6.24
5,694.00	8.36	165.07	5,652.37	210.66	345.64	-177.46	6.92
5,742.00	11.96	168.38	5,699.61	202.41	347.54	-169.08	7.59
5,789.00	16.27	162.59	5,745.19	191.36	350.50	-157.79	9.64
5,837.00	20.19	165.22	5,790.77	176.92	354.62	-143.04	8.34
5,932.00	27.67	171.83	5,877.56	139.18	361.95	-104.77	8.35
6,027.00	34.86	178.13	5,958.73	90.13	365.98	-55.56	8.31
6,122.00	43.50	179.49	6,032.30	30.19	367.16	4.23	9.14
6,169.00	48.61	178.43	6,064.91	-3.64	367.78	37.96	10.99
6,217.00	53.66	178.91	6,095.02	-40.99	368.65	75.23	10.55
6,264.00	56.49	177.76	6,121.92	-79.50	369.77	113.68	6.35
6,312.00	58.80	177.67	6,147.61	-120.01	371.39	154.17	4.82
6,359.00	60.85	177.90	6,171.23	-160.61	372.96	194.74	4.38
6,407.00	63.13	178.69	6,193.77	-202.97	374.22	237.03	4.97
6,454.00	66.57	179.17	6,213.75	-245.50	375.01	279.44	7.38



## Design Report for Ptasnik Federal LC19-74HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,502.00	70.56	181.09	6,231.28	-290.17	374.90	323.91	9.11
6,549.00	74.84	180.61	6,245.26	-335.03	374.23	368.51	9.16
6,597.00	78.18	180.43	6,256.45	-381.69	373.81	414.93	6.97
6,621.00	80.18	180.96	6,260.96	-405.26	373.52	438.37	8.61
6,678.00	82.93	181.31	6,269.33	-461.63	372.41	494.39	4.87
Estimated 7" Casing Point: 733' FNL, 1951' FEL (Not a Survey Point)							
6,758.00	86.80	181.80	6,276.48	-541.26	370.24	573.47	4.87
6,853.00	89.14	181.46	6,279.85	-636.16	367.54	667.70	2.49
6,948.00	89.88	180.71	6,280.66	-731.14	365.74	762.09	1.11
7,043.00	90.34	180.43	6,280.48	-826.13	364.80	856.59	0.57
7,138.00	89.60	179.91	6,280.53	-921.13	364.52	951.14	0.95
7,233.00	91.36	180.11	6,279.73	-1,016.12	364.50	1,045.72	1.86
7,329.00	89.44	180.38	6,279.06	-1,112.12	364.09	1,141.25	2.02
7,423.00	88.27	179.79	6,280.94	-1,206.09	363.95	1,234.81	1.39
7,518.00	89.97	179.61	6,282.40	-1,301.08	364.45	1,329.43	1.80
7,613.00	91.08	179.43	6,281.53	-1,396.07	365.24	1,424.08	1.18
7,708.00	90.03	178.96	6,280.61	-1,491.05	366.58	1,518.77	1.21
7,803.00	89.88	178.85	6,280.68	-1,586.04	368.39	1,613.51	0.20
7,898.00	90.00	179.12	6,280.78	-1,681.02	370.08	1,708.23	0.31
7,993.00	90.71	179.39	6,280.19	-1,776.01	371.31	1,802.92	0.80
8,088.00	90.15	178.83	6,279.48	-1,871.00	372.79	1,897.63	0.83
8,183.00	90.95	179.05	6,278.57	-1,965.97	374.54	1,992.36	0.87
8,278.00	88.70	177.79	6,278.86	-2,060.93	377.16	2,087.14	2.71
8,373.00	90.71	179.50	6,279.35	-2,155.89	379.41	2,181.90	2.78
8,468.00	90.31	179.80	6,278.50	-2,250.89	379.99	2,276.54	0.53
8,563.00	89.17	179.37	6,278.93	-2,345.88	380.68	2,371.18	1.28
8,657.00	90.28	179.19	6,279.38	-2,439.87	381.86	2,464.87	1.20
8,752.00	89.48	178.77	6,279.58	-2,534.86	383.55	2,559.60	0.95
8,847.00	90.68	178.17	6,279.45	-2,629.82	386.09	2,654.38	1.41
8,942.00	89.88	177.79	6,278.99	-2,724.76	389.43	2,749.22	0.93
9,037.00	90.96	177.72	6,278.29	-2,819.68	393.16	2,844.07	1.14
9,132.00	90.31	177.96	6,277.24	-2,914.61	396.74	2,938.92	0.73
9,226.00	89.23	179.39	6,277.62	-3,008.58	398.91	3,032.68	1.91
9,322.00	89.94	178.68	6,278.31	-3,104.56	400.53	3,128.40	1.05
9,416.00	89.41	179.86	6,278.84	-3,198.55	401.72	3,222.09	1.38
9,511.00	90.74	179.60	6,278.72	-3,293.55	402.17	3,316.71	1.43
9,606.00	89.78	180.24	6,278.29	-3,388.54	402.30	3,411.31	1.21
9,701.00	89.91	179.61	6,278.55	-3,483.54	402.43	3,505.90	0.68
9,796.00	91.42	178.81	6,277.44	-3,578.52	403.74	3,600.59	1.80
9,891.00	89.85	180.94	6,276.39	-3,673.51	403.94	3,695.18	2.79
9,986.00	89.63	181.40	6,276.82	-3,768.49	402.01	3,789.56	0.54
10,081.00	89.17	181.27	6,277.82	-3,863.46	399.79	3,883.91	0.50
10,176.00	90.25	181.35	6,278.30	-3,958.43	397.62	3,978.26	1.14
10,271.00	89.48	179.40	6,278.52	-4,053.42	397.00	4,072.78	2.21
10,366.00	90.37	179.04	6,278.64	-4,148.41	398.29	4,167.48	1.01
10,460.00	90.68	177.66	6,277.78	-4,242.37	401.00	4,261.28	1.50
10,536.00	91.02	177.05	6,276.66	-4,318.28	404.50	4,337.18	0.92
Final MWD Survey							
10,590.00	91.02	177.05	6,275.69	-4,372.20	407.28	4,391.13	0.00
Survey Projection to TD - Estimated BHL: 671' FSL, 1984' FEL							

## Design Report for Ptasnik Federal LC19-74HN - MWD Survey

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
762.00	762.00	0.00	0.00	Surface Casing Assumed Vertical at 762.00ft
825.00	824.99	-0.66	-0.22	First MWD Survey
6,678.00	6,269.33	-461.63	372.41	Estimated 7" Casing Point: 733' FNL, 1951' FEL (Not a Survey Point)
10,536.00	6,276.66	-4,318.28	404.50	Final MWD Survey
10,590.00	6,275.69	-4,372.20	407.28	Survey Projection to TD
10,590.00	6,275.69	-4,372.20	407.28	Estimated BHL: 671' FSL, 1984' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Ptasnik Federal LC19-74HN_PlanA - Rev0_BH L Tgt	174.64	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
762.00	6,678.00	MWD Survey	MWD
6,678.00	10,590.00	MWD Survey	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
6,678.00	6,269.33	7" Csg	7	8-3/4

## Design Report for Ptasnik Federal LC19-74HN - 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
Ptasnik Federal	0.00	0.00	0.00	0.00	0.00	1,516,745.26	3,410,136.38	40.74246	-104.01985
- actual wellpath hits target center									
- Polygon									
Point 1				-292.00	-332.00	1,516,413.26	3,409,844.38		
Point 2				1,712.00	-319.00	1,516,426.26	3,411,848.37		
Point 3				1,756.00	-2,380.00	1,514,365.27	3,411,892.37		
Point 4				1,807.00	-4,445.00	1,512,300.28	3,411,943.37		
Point 5				-182.00	-4,446.00	1,512,299.28	3,409,954.38		
Point 6				-2,219.00	-4,471.00	1,512,274.28	3,407,917.39		
Point 7				-2,274.00	-2,447.00	1,514,298.27	3,407,862.39		
Point 8				-2,334.00	-338.00	1,516,407.26	3,407,802.39		
Point 9				-292.00	-332.00	1,516,413.26	3,409,844.38		
Ptasnik Federal	0.00	0.00	6,281.00	-4,382.86	411.06	1,512,362.42	3,410,547.44	40.73041	-104.01863
- actual wellpath misses target center by 12.49ft at 10590.00ft MD (6275.69 TVD, -4372.20 N, 407.28 E)									
- Point									
Ptasnik Federal	0.00	0.00	0.00	0.00	0.00	1,516,745.26	3,410,136.38	40.74246	-104.01985
- actual wellpath hits target center									
- Polygon									
Point 1				-292.00	268.00	1,517,013.25	3,409,844.38		
Point 2				2,312.00	281.00	1,517,026.25	3,412,448.37		
Point 3				2,356.00	-2,380.00	1,514,365.27	3,412,492.36		
Point 4				2,407.00	-5,045.00	1,511,700.29	3,412,543.36		
Point 5				-182.00	-5,046.00	1,511,699.29	3,409,954.38		
Point 6				-2,819.00	-5,071.00	1,511,674.29	3,407,317.40		
Point 7				-2,874.00	-2,447.00	1,514,298.27	3,407,262.40		
Point 8				-2,934.00	262.00	1,517,007.25	3,407,202.40		
Point 9				-292.00	268.00	1,517,013.25	3,409,844.38		



## North Reference Sheet for Sec. 19-T9N-R59W - Ptasnik Federal LC19-74HN

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' @ 5029.00ft (H&P 322). Northing and Easting are relative to Ptasnik Federal LC19-74HN

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: 0.99999362

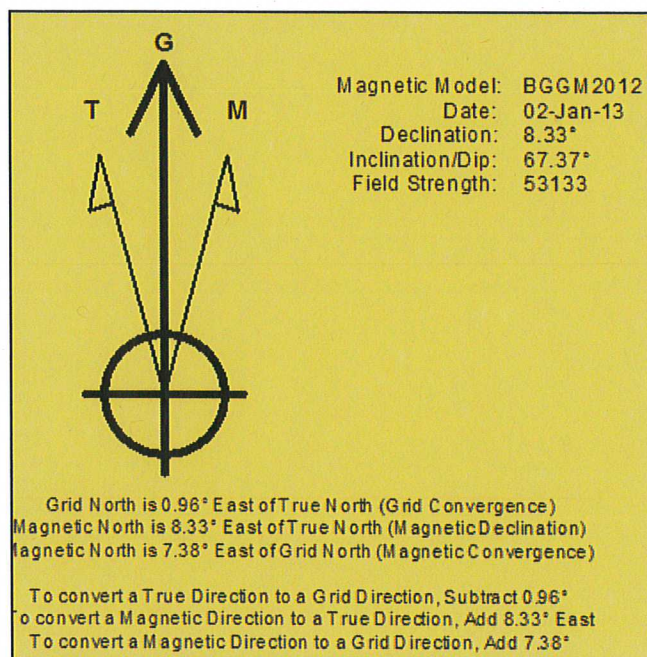
Grid Coordinates of Well: 1,516,745.26 ft N, 3,410,136.38 ft E

Geographical Coordinates of Well: 40° 44' 32.85" N, 104° 01' 11.45" W

Grid Convergence at Surface is: 0.96°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,590.00ft  
the Bottom Hole Displacement is 4,391.13ft in the Direction of 174.68° (Grid).

Magnetic Convergence at surface is: -7.38° ( 2 January 2013, , BGGM2012)

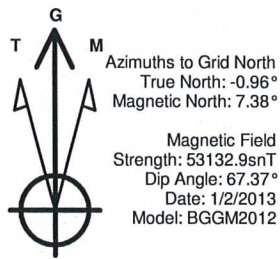


Project: Weld County, CO (NAD 83)  
 Site: Sec. 19-T9N-R59W  
 Well: Ptasnik Federal LC19-74HN

# Noble Energy

**HALLIBURTON**

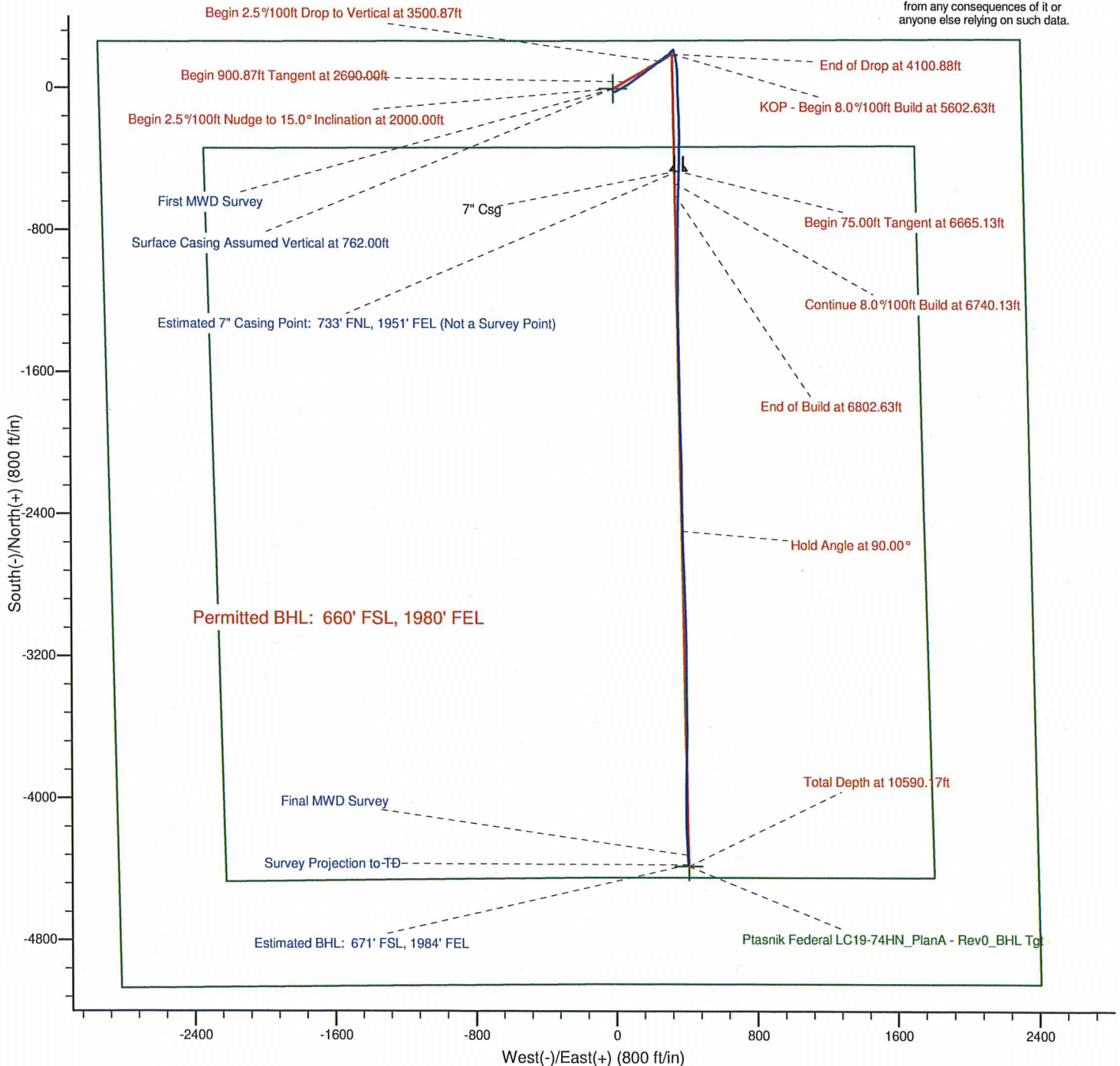
Sperry Drilling



## LEGEND

- Ptasnik Federal LC19-74HN, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

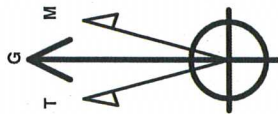
Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Ptasnik Federal LC19-74HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide 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. 19-T9N-R59W  
 Well: Ptasnik Federal LC19-74HN

# Noble Energy

**HALLIBURTON**  
 Sperry Drilling



Azimuths to Grid North  
 True North: -0.96°  
 Magnetic North: 7.38°  
 Magnetic Field  
 Strength: 53132.9snT  
 Dip Angle: 67.37°  
 Date: 1/2/2013  
 Model: BCGM2012

## LEGEND

— Ptasnik Federal LC19-74HN, Plan A, Plan A - Rev 0 Proposal V0  
 — MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Ptasnik Federal LC19-74HN 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.

