

# Noble Energy

Garfield County, CO (NAD 83)  
Sec. 2-T8S-R96W (SGV 20 PAD)  
Hyrup 11-41B

Plan #2

Design: Vaughn Gyro and Sperry MWD Survey

## Sperry Drilling Services

### Final Survey Report

07 March, 2011

Well Coordinates: 1,571,004.62 N, 2,272,731.89 E (39° 22' 22.39" N, 108° 04' 22.72" W)  
Ground Level: 5,800.60 ft

Local Coordinate Origin:	Centered on Well Hyrup 11-41B
Viewing Datum:	RKB 24' @ 5824.60ft (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: 43I	

**HALLIBURTON**

## Design Report for Hyrup 11-41B - Vaughn Gyro and Sperry 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
97.00	0.50	106.08	97.00	-0.12	0.41	0.36	0.52
Surveys from 97.00ft to 403.00ft are Vaughn Gyro Surveys							
128.00	0.88	116.44	128.00	-0.26	0.75	0.70	1.29
159.00	1.55	131.82	158.99	-0.65	1.28	1.34	2.38
189.00	2.30	161.33	188.97	-1.49	1.77	2.29	4.06
220.00	2.52	183.81	219.95	-2.76	1.92	3.33	3.11
281.00	4.65	189.34	280.82	-6.53	1.43	5.80	3.53
342.00	5.91	189.67	341.56	-12.07	0.51	9.27	2.07
403.00	7.72	186.49	402.13	-19.24	-0.49	13.90	3.03
Tie-On to Vaughn Gyro Survey							
492.00	10.03	193.77	490.06	-32.71	-3.01	22.16	2.88
First Sperry MWD Survey							
523.00	10.88	195.24	520.55	-38.15	-4.42	25.24	2.87
615.00	13.27	189.45	610.51	-56.95	-8.43	36.44	2.91
709.00	16.88	183.92	701.26	-81.22	-11.14	52.56	4.13
803.00	20.02	180.80	790.42	-110.93	-12.30	73.76	3.50
898.00	21.80	177.01	879.17	-144.81	-11.60	99.28	2.35
992.00	23.81	171.67	965.82	-181.02	-7.94	128.52	3.07
1,087.00	23.73	165.94	1,052.78	-218.54	-0.52	161.27	2.43
1,181.00	24.10	160.75	1,138.72	-255.01	10.40	195.59	2.27
1,275.00	24.15	153.30	1,224.53	-290.32	25.37	231.78	3.24
1,370.00	23.22	144.27	1,311.55	-322.89	45.05	269.12	3.94
1,450.00	23.16	137.24	1,385.10	-347.25	64.94	300.52	3.46
1,558.00	22.27	133.53	1,484.73	-376.94	94.20	342.17	1.56
1,653.00	22.15	127.98	1,572.69	-400.36	121.37	377.78	2.21
1,747.00	21.57	122.76	1,659.94	-420.62	149.87	411.95	2.16
1,841.00	21.56	122.21	1,747.36	-439.17	179.02	445.29	0.22
1,935.00	24.04	124.25	1,834.01	-459.16	209.46	480.56	2.77
2,030.00	27.98	123.02	1,919.37	-482.20	244.16	520.95	4.19
2,124.00	27.03	122.24	2,002.75	-505.61	280.71	562.87	1.08
2,218.00	24.77	123.13	2,087.30	-527.77	315.27	602.53	2.44
2,313.00	26.17	122.87	2,173.06	-550.02	349.54	642.04	1.48
2,407.00	25.11	123.54	2,257.81	-572.29	383.57	681.42	1.17
2,501.00	23.65	123.56	2,343.42	-593.74	415.91	719.05	1.55
2,595.00	25.33	120.43	2,428.97	-614.35	448.96	756.54	2.26
2,690.00	23.81	120.47	2,515.36	-634.36	483.01	794.26	1.60
2,784.00	24.12	119.64	2,601.26	-653.48	516.06	830.65	0.49
2,879.00	24.02	120.53	2,688.00	-672.91	549.59	867.57	0.40
2,973.00	24.22	122.32	2,773.79	-692.93	582.36	904.45	0.81
3,067.00	24.44	122.00	2,859.44	-713.55	615.15	941.76	0.27
3,162.00	23.90	124.33	2,946.12	-734.82	647.70	979.40	1.15
3,256.00	22.59	124.69	3,032.49	-755.83	678.28	1,015.52	1.40
3,350.00	21.00	124.31	3,119.76	-775.60	707.04	1,049.50	1.70
3,445.00	19.80	124.83	3,208.80	-794.39	734.30	1,081.75	1.28
3,539.00	17.92	125.16	3,297.75	-811.81	759.20	1,111.39	2.00
3,633.00	16.98	125.89	3,387.43	-828.18	782.14	1,138.94	1.03
3,727.00	15.99	127.30	3,477.56	-844.08	803.56	1,165.11	1.14
3,822.00	14.68	122.40	3,569.18	-858.46	824.13	1,189.60	1.94
3,916.00	13.28	121.29	3,660.39	-870.45	843.42	1,211.45	1.52

## Design Report for Hyrup 11-41B - Vaughn Gyro and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,010.00	12.19	123.46	3,752.08	-881.53	860.92	1,231.42	1.27
4,105.00	10.38	121.05	3,845.24	-891.47	876.63	1,249.35	1.97
4,199.00	9.11	123.32	3,937.88	-899.93	890.10	1,264.67	1.41
4,293.00	6.09	129.93	4,031.05	-907.22	900.14	1,276.82	3.34
4,387.00	5.06	127.38	4,124.60	-912.93	907.26	1,285.84	1.13
4,482.00	3.17	137.62	4,219.35	-917.42	912.36	1,292.59	2.13
4,576.00	1.71	177.49	4,313.27	-920.74	914.18	1,296.27	2.29
4,670.00	1.12	210.61	4,407.25	-922.93	913.77	1,297.61	1.05
4,765.00	1.60	189.24	4,502.22	-925.04	913.08	1,298.71	0.73
4,859.00	2.15	177.58	4,596.17	-928.10	912.95	1,300.88	0.71
4,953.00	2.57	183.60	4,690.09	-931.96	912.89	1,303.70	0.52
5,048.00	2.41	188.53	4,785.00	-936.06	912.46	1,306.44	0.28
5,142.00	2.63	194.70	4,878.91	-940.10	911.62	1,308.87	0.37
5,237.00	2.42	193.48	4,973.82	-944.16	910.60	1,311.18	0.23
5,331.00	3.01	199.31	5,067.71	-948.42	909.32	1,313.47	0.69
5,425.00	3.12	207.98	5,161.58	-953.01	907.30	1,315.51	0.51
5,520.00	3.02	206.61	5,256.44	-957.53	904.97	1,317.28	0.13
5,614.00	2.75	205.69	5,350.32	-961.78	902.88	1,319.01	0.29
5,708.00	2.23	208.59	5,444.23	-965.41	901.03	1,320.46	0.57
5,826.00	2.70	210.41	5,562.12	-969.83	898.52	1,322.03	0.40
<b>Final Sperry MWD Survey</b>							
5,885.00	2.70	210.41	5,621.06	-972.22	897.12	1,322.86	0.00
<b>Survey Projection to TD - Estimated BHL: 620' FNL, 753' FEL</b>							

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
97.00	97.00	-0.12	0.41	Surveys from 97.00ft to 403.00ft are Vaughn Gyro Surveys
403.00	402.13	-19.24	-0.49	Tie-On to Vaughn Gyro Survey
492.00	490.06	-32.71	-3.01	First Sperry MWD Survey
5,826.00	5,562.12	-969.83	898.52	Final Sperry MWD Survey
5,885.00	5,621.06	-972.22	897.12	Survey Projection to TD
5,885.00	5,621.06	-972.22	897.12	Estimated BHL: 620' FNL, 753' FEL

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Hyrup 11-41B Plan #2 BH Tgt	137.69	Slot	0.00	0.00	0.00

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
97.00	403.00	Vaughn Gyro Surveys	NS-GYRO-MS
492.00	5,885.00	Sperry MWD Surveys	MWD

**Design Report for Hyrup 11-41B - Vaughn Gyro and Sperry 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
Hyrup 11-41B Plan	0.00	360.00	4,011.00	-945.42	860.48	1,570,059.25	2,273,592.33	39° 22' 13.294 N	108° 4' 11.424 W
- actual wellpath misses target center by 54.83ft at 4271.85ft MD (4010.03 TVD, -905.73 N, 898.30 E)									
- Rectangle (sides W100.00 H200.00 D1,644.00)									
Hyrup 11-41B Plan	0.00	1.62	5,655.00	-945.42	860.48	1,570,059.25	2,273,592.33	39° 22' 13.294 N	108° 4' 11.424 W
- actual wellpath misses target center by 56.68ft at 5885.00ft MD (5621.06 TVD, -972.22 N, 897.12 E)									
- Point									
Hyrup 11-41B Plan	0.00	0.00	4,011.00	-920.42	910.48	1,570,084.25	2,273,642.32	39° 22' 13.555 N	108° 4' 10.796 W
- actual wellpath misses target center by 18.85ft at 4275.25ft MD (4013.41 TVD, -905.98 N, 898.61 E)									
- Rectangle (sides W25.00 H25.00 D0.00)									

## North Reference Sheet for Sec. 2-T8S-R96W (SGV 2O PAD) - Hyrup 11-41B - Plan #2

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

Vertical Depths are relative to RKB 24' @ 5824.60ft (H&P 322). Northing and Easting are relative to Hyrup 11-41B

Coordinate System is US State Plane 1983, Colorado Central 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:39° 45' 0.000 N°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99994714

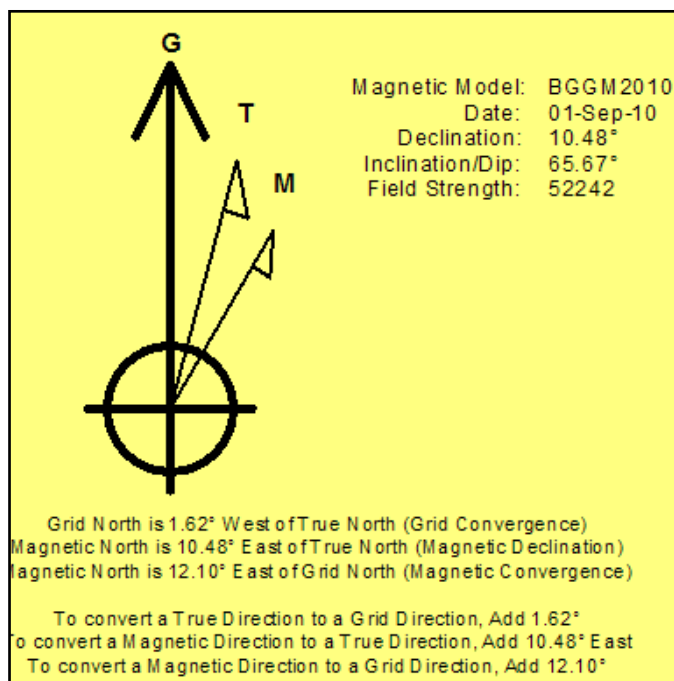
Grid Coordinates of Well: 1,571,004.62 ft N, 2,272,731.89 ft E

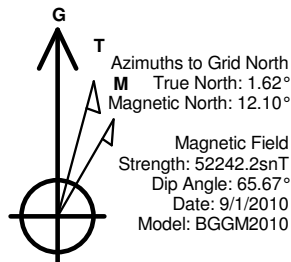
Geographical Coordinates of Well: 39° 22' 22.39" N, 108° 04' 22.72" W

Grid Convergence at Surface is: -1.62°

Based upon Minimum Curvature type calculations, at a Measured Depth of 5,885.00ft  
the Bottom Hole Displacement is 1,322.89ft in the Direction of 137.30° (Grid).

Magnetic Convergence at surface is: -12.10° ( 1 September 2010, , BGGM2010)

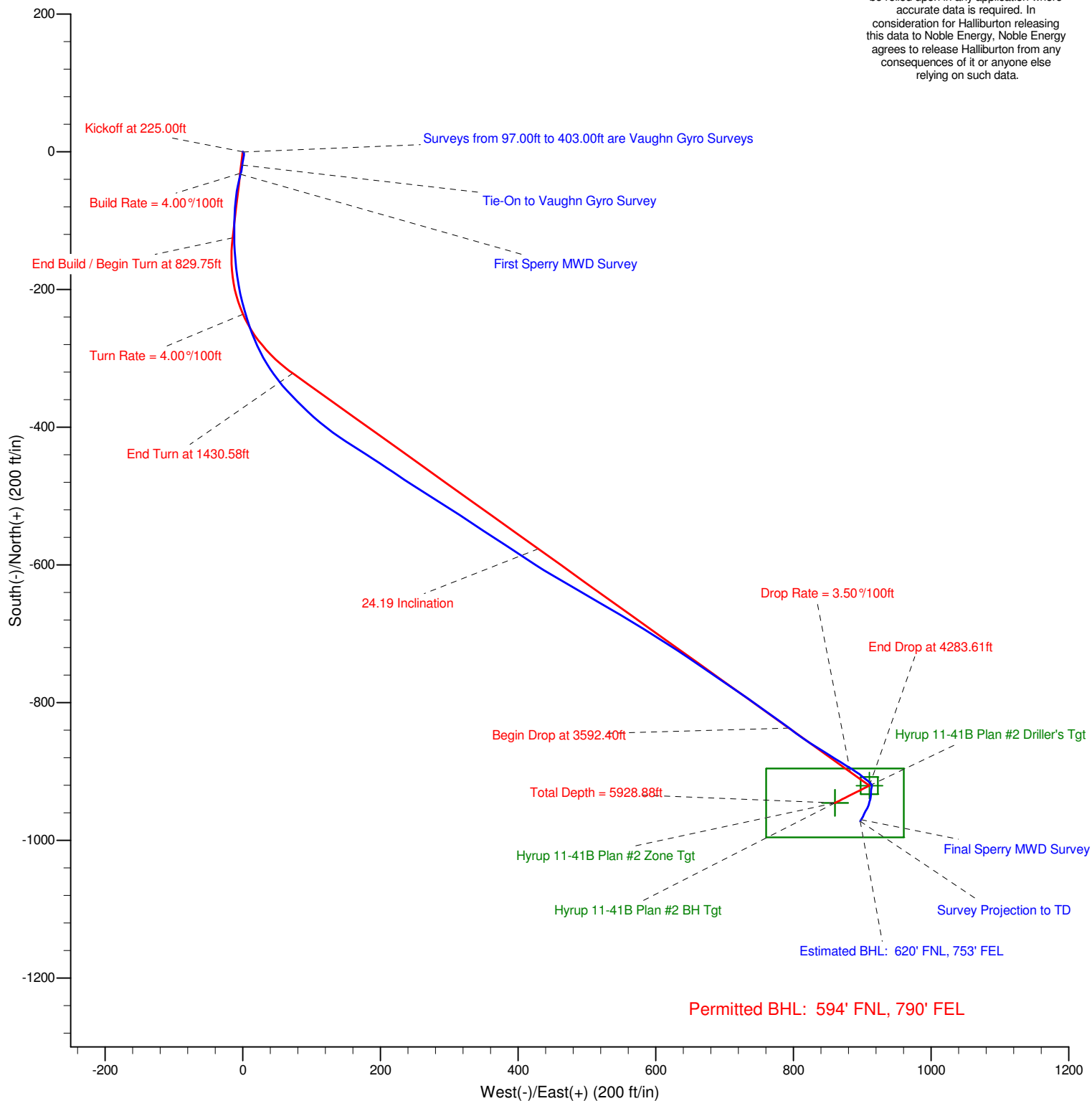


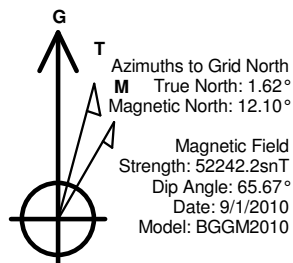


### LEGEND

- Hyrup 11-41B, Plan #2, Plan #2 Proposal V0
- Vaughn Gyro and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hyrup 11-41B well located at Garfield 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.





### LEGEND

- Hyrup 11-41B, Plan #2, Plan #2 Proposal V0
- Vaughn Gyro and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Hyrup 11-41B well located at Garfield 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.

