

Noble Energy

Garfield County, CO (NAD 83)
Sec. 17-T7S-R94W (Rulison 17M PAD)
Double B Ranch 18-44D

Plan A Rev 1

Design: Vaughn Gyro and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

19 May, 2011

Well Coordinates: 1,591,816.98 N, 2,317,165.49 E (39° 26' 00.08" N, 107° 55' 04.13" W)
Ground Level: 7,545.00 ft

Local Coordinate Origin:	Centered on Well Double B Ranch 18-44D
Viewing Datum:	RKB 24' @ 7569.00ft (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: 43I

HALLIBURTON

Design Report for Double B Ranch 18-44D - 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
124.00	1.63	172.34	123.98	-1.75	0.24	0.35	1.31
Surveys from 124.00ft to 613.00ft are Vaughn Gyro Surveys							
155.00	2.51	178.04	154.96	-2.86	0.32	0.63	2.91
217.00	3.05	216.89	216.89	-5.54	-0.63	2.39	3.09
278.00	3.02	251.73	277.81	-7.34	-3.13	5.34	2.98
339.00	5.17	255.38	338.66	-8.54	-7.31	9.69	3.55
400.00	7.28	252.93	399.29	-10.37	-13.67	16.29	3.49
461.00	8.38	255.05	459.72	-12.65	-21.66	24.59	1.86
522.00	9.15	266.96	520.01	-14.05	-30.80	33.69	3.22
613.00	10.01	256.48	609.75	-16.29	-45.71	48.52	2.13
Tie-On to Vaughn Gyro Survey							
694.00	10.57	257.10	689.45	-19.59	-59.80	62.92	0.70
First Sperry MWD Survey							
785.00	11.18	253.13	778.82	-24.01	-76.38	80.04	1.06
880.00	11.42	251.94	871.97	-29.60	-94.13	98.64	0.35
974.00	11.87	251.71	964.04	-35.52	-112.16	117.61	0.48
1,068.00	12.61	251.14	1,055.90	-41.87	-131.05	137.54	0.80
1,162.00	13.41	250.86	1,147.49	-48.76	-151.06	158.70	0.85
1,256.00	12.17	251.45	1,239.15	-55.49	-170.75	179.51	1.33
1,351.00	12.57	251.22	1,331.95	-62.00	-190.03	199.86	0.42
1,445.00	13.32	250.16	1,423.56	-68.97	-209.90	220.92	0.84
1,480.00	13.49	249.09	1,457.61	-71.80	-217.50	229.03	0.86
1,634.00	13.27	249.75	1,607.42	-84.32	-250.87	264.65	0.17
1,728.00	12.88	251.04	1,698.99	-91.46	-270.90	285.92	0.52
1,822.00	12.35	249.86	1,790.72	-98.33	-290.24	306.44	0.63
1,917.00	11.93	249.66	1,883.59	-105.24	-308.99	326.42	0.44
2,011.00	12.40	248.40	1,975.48	-112.33	-327.48	346.21	0.57
2,105.00	12.34	251.14	2,067.30	-119.29	-346.37	366.34	0.63
2,199.00	12.12	249.44	2,159.17	-126.01	-365.12	386.25	0.45
2,294.00	11.72	251.50	2,252.12	-132.57	-383.60	405.86	0.61
2,388.00	12.32	253.01	2,344.06	-138.53	-402.25	425.43	0.72
2,482.00	12.34	250.20	2,435.89	-144.86	-421.29	445.50	0.64
2,576.00	12.30	246.97	2,527.73	-152.18	-439.95	465.53	0.73
2,671.00	12.34	250.75	2,620.54	-159.49	-458.85	485.78	0.85
2,765.00	12.54	250.16	2,712.34	-166.26	-477.93	506.02	0.25
2,859.00	13.06	248.58	2,804.00	-173.61	-497.42	526.84	0.67
2,954.00	13.14	252.06	2,896.53	-180.85	-517.69	548.36	0.83
3,048.00	12.68	260.45	2,988.16	-185.85	-538.03	569.22	2.05
3,142.00	12.58	261.44	3,079.89	-189.09	-558.32	589.47	0.25
3,237.00	11.87	259.34	3,172.73	-192.44	-578.16	609.31	0.88
3,331.00	12.21	256.54	3,264.66	-196.54	-597.32	628.77	0.72
3,425.00	12.56	254.17	3,356.48	-201.64	-616.82	648.87	0.66
3,520.00	12.06	253.99	3,449.29	-207.20	-636.30	669.10	0.53
3,614.00	12.59	251.80	3,541.13	-213.10	-655.47	689.15	0.75
3,708.00	12.19	251.13	3,632.94	-219.51	-674.60	709.32	0.45
3,802.00	12.40	251.06	3,724.78	-226.00	-693.53	729.33	0.22
3,897.00	11.68	251.34	3,817.69	-232.39	-712.29	749.15	0.76
3,991.00	12.08	248.92	3,909.68	-238.97	-730.48	768.50	0.68
4,085.00	12.23	249.66	4,001.57	-245.97	-749.00	788.28	0.23

Design Report for Double B Ranch 18-44D - 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)
4,180.00	11.71	250.37	4,094.50	-252.70	-767.51	807.98	0.57
4,274.00	11.90	249.56	4,186.52	-259.29	-785.58	827.20	0.27
4,368.00	12.22	248.33	4,278.44	-266.35	-803.91	846.83	0.44
4,463.00	11.60	248.69	4,371.40	-273.53	-822.15	866.42	0.66
4,557.00	12.43	247.94	4,463.34	-280.77	-840.33	885.96	0.90
4,651.00	11.76	248.02	4,555.25	-288.15	-858.59	905.63	0.71
4,746.00	11.42	248.62	4,648.31	-295.21	-876.32	924.69	0.38
4,840.00	10.80	249.40	4,740.55	-301.70	-893.23	942.79	0.68
4,934.00	10.46	249.07	4,832.94	-307.84	-909.45	960.13	0.37
5,028.00	10.14	248.74	4,925.42	-313.89	-925.13	976.92	0.35
5,123.00	9.75	250.28	5,018.99	-319.64	-940.49	993.32	0.50
5,217.00	9.43	249.45	5,111.68	-325.03	-955.20	1,008.98	0.37
5,311.00	8.35	256.41	5,204.55	-329.34	-969.04	1,023.47	1.62
5,406.00	7.61	263.19	5,298.63	-331.70	-981.99	1,036.49	1.26
5,500.00	6.06	264.50	5,391.96	-332.92	-993.11	1,047.40	1.66
5,595.00	4.18	270.15	5,486.58	-333.39	-1,001.57	1,055.55	2.05
5,689.00	2.72	272.67	5,580.41	-333.27	-1,007.22	1,060.86	1.56
5,784.00	1.76	264.13	5,675.33	-333.32	-1,010.92	1,064.38	1.07
5,878.00	1.38	258.80	5,769.30	-333.69	-1,013.47	1,066.90	0.43
5,972.00	1.43	256.78	5,863.27	-334.17	-1,015.72	1,069.19	0.07
6,067.00	1.14	244.56	5,958.25	-334.85	-1,017.73	1,071.31	0.42
6,161.00	1.52	237.14	6,052.22	-335.93	-1,019.62	1,073.45	0.44
6,255.00	1.41	269.06	6,146.19	-336.62	-1,021.83	1,075.76	0.86
6,350.00	1.98	261.82	6,241.15	-336.88	-1,024.62	1,078.48	0.64
6,444.00	0.78	312.67	6,335.12	-336.67	-1,026.70	1,080.38	1.71
6,538.00	0.81	283.71	6,429.12	-336.08	-1,027.81	1,081.25	0.42
6,632.00	1.01	253.37	6,523.10	-336.16	-1,029.25	1,082.63	0.55
6,727.00	1.33	229.83	6,618.08	-337.11	-1,030.90	1,084.50	0.60
6,821.00	0.75	224.15	6,712.07	-338.26	-1,032.16	1,086.06	0.63
6,915.00	1.74	225.31	6,806.05	-339.70	-1,033.60	1,087.90	1.05
7,010.00	2.35	232.78	6,900.98	-341.90	-1,036.18	1,091.05	0.70
7,104.00	2.12	217.06	6,994.91	-344.45	-1,038.76	1,094.32	0.69
7,198.00	1.59	183.12	7,088.87	-347.14	-1,039.88	1,096.25	1.27
7,293.00	0.50	275.15	7,183.85	-348.42	-1,040.36	1,097.12	1.77
7,387.00	0.89	282.22	7,277.85	-348.23	-1,041.49	1,098.12	0.42
7,481.00	1.36	244.80	7,371.83	-348.55	-1,043.21	1,099.86	0.90
7,576.00	1.88	238.56	7,466.79	-349.84	-1,045.56	1,102.50	0.58
7,670.00	2.73	237.61	7,560.71	-351.84	-1,048.76	1,106.18	0.91
7,765.00	1.69	232.46	7,655.64	-353.91	-1,051.79	1,109.71	1.11
7,859.00	1.72	236.94	7,749.60	-355.52	-1,054.07	1,112.39	0.15
7,953.00	2.46	247.09	7,843.54	-357.08	-1,057.11	1,115.77	0.88
8,048.00	3.28	248.88	7,938.42	-358.85	-1,061.52	1,120.52	0.87
8,142.00	3.73	240.77	8,032.24	-361.31	-1,066.70	1,126.22	0.71
8,236.00	4.07	240.29	8,126.02	-364.46	-1,072.26	1,132.50	0.36
8,331.00	4.16	236.66	8,220.78	-368.02	-1,078.07	1,139.15	0.29
8,362.00	3.41	216.35	8,251.71	-369.39	-1,079.56	1,141.00	4.92
8,425.00	3.81	213.11	8,314.59	-372.65	-1,081.81	1,144.19	0.71
8,519.00	3.09	210.57	8,408.42	-377.44	-1,084.80	1,148.58	0.78
8,614.00	2.91	219.09	8,503.29	-381.52	-1,087.63	1,152.58	0.51
8,708.00	1.97	228.39	8,597.20	-384.45	-1,090.34	1,156.09	1.08
8,802.00	3.11	243.36	8,691.11	-386.66	-1,093.83	1,160.11	1.39

Design Report for Double B Ranch 18-44D - 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)
8,897.00	2.49	248.16	8,785.99	-388.59	-1,098.05	1,164.73	0.70
8,991.00	2.71	262.47	8,879.90	-389.64	-1,102.14	1,168.94	0.73
9,086.00	3.07	258.43	8,974.78	-390.44	-1,106.86	1,173.67	0.44
9,180.00	3.18	254.65	9,068.64	-391.64	-1,111.84	1,178.77	0.25
9,258.00	2.97	254.18	9,146.53	-392.76	-1,115.87	1,182.94	0.27
Final Sperry MWD Survey							
9,316.00	2.97	254.18	9,204.45	-393.58	-1,118.77	1,185.94	0.00
Survey Projection to TD - Estimated BHL: 168' FSL, 640' FEL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N-S (ft)	+E-W (ft)	
124.00	123.98	-1.75	0.24	Surveys from 124.00ft to 613.00ft are Vaughn Gyro Surveys
613.00	609.75	-16.29	-45.71	Tie-On to Vaughn Gyro Survey
694.00	689.45	-19.59	-59.80	First Sperry MWD Survey
9,258.00	9,146.53	-392.76	-1,115.87	Final Sperry MWD Survey
9,316.00	9,204.45	-393.58	-1,118.77	Survey Projection to TD
9,316.00	9,204.45	-393.58	-1,118.77	Estimated BHL: 168' FSL, 640' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N_S (ft)	+E-W (ft)	
Target	Double B Ranch 18-44D Plan A Rev 1 BH Tgt	251.04	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
124.00	613.00	Vaughn Gyro Surveys	NS-GYRO-MS
694.00	9,316.00	Sperry MWD Surveys	MWD

Design Report for Double B Ranch 18-44D - 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
Double B Ranch	0.00	360.00	0.00	0.00	0.00	1,591,816.98	2,317,165.49	39° 26' 0.084 N	107° 55' 4.126 W
- actual wellpath hits target center									
- Polygon									
Point 1				-1,273.51	-436.81	1,591,380.19	2,315,892.04		
Point 2				-873.51	-436.81	1,591,380.19	2,316,292.02		
Double B Ranch	0.00	360.00	5,910.00	-343.81	-1,023.51	1,591,473.19	2,316,142.03	39° 25' 56.418 N	107° 55' 17.049 W
- actual wellpath misses target center by 11.50ft at 6018.95ft MD (5910.21 TVD, -334.47 N, -1016.79 E)									
- Rectangle (sides W25.00 H25.00 D0.00)									
Double B Ranch	0.00	360.00	7,035.00	-368.81	-1,073.51	1,591,448.18	2,316,092.03	39° 25' 56.158 N	107° 55' 17.677 W
- actual wellpath misses target center by 41.17ft at 7145.18ft MD (7036.07 TVD, -345.65 N, -1039.49 E)									
- Rectangle (sides W100.00 H200.00 D2,219.00)									
Double B Ranch	0.00	360.00	9,254.00	-368.81	-1,073.51	1,591,448.18	2,316,092.03	39° 25' 56.158 N	107° 55' 17.677 W
- actual wellpath misses target center by 71.53ft at 9316.00ft MD (9204.45 TVD, -393.58 N, -1118.77 E)									
- Point									

**North Reference Sheet for Sec. 17-T7S-R94W (Rulison 17M PAD) - Double B Ranch
18-44D - Plan A Rev 1**

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' @ 7569.00ft (H&P 322). Northing and Easting are relative to Double B Ranch 18-44D

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: 0.99995269

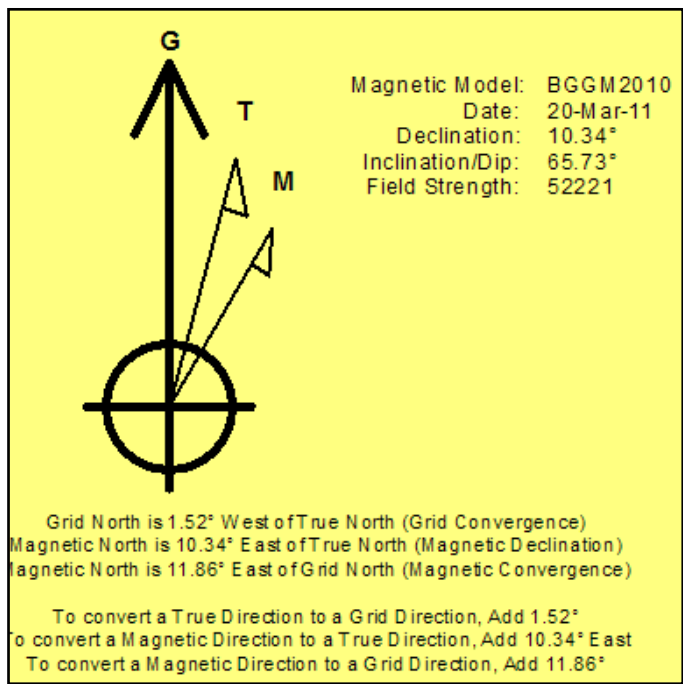
Grid Coordinates of Well: 1,591,816.98 ft N, 2,317,165.49 ft E

Geographical Coordinates of Well: 39° 26' 00.08" N, 107° 55' 04.13" W

Grid Convergence at Surface is: -1.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,316.00ft
the Bottom Hole Displacement is 1,185.98ft in the Direction of 250.62° (Grid).

Magnetic Convergence at surface is: -11.86° (20 March 2011, , BGGM2010)



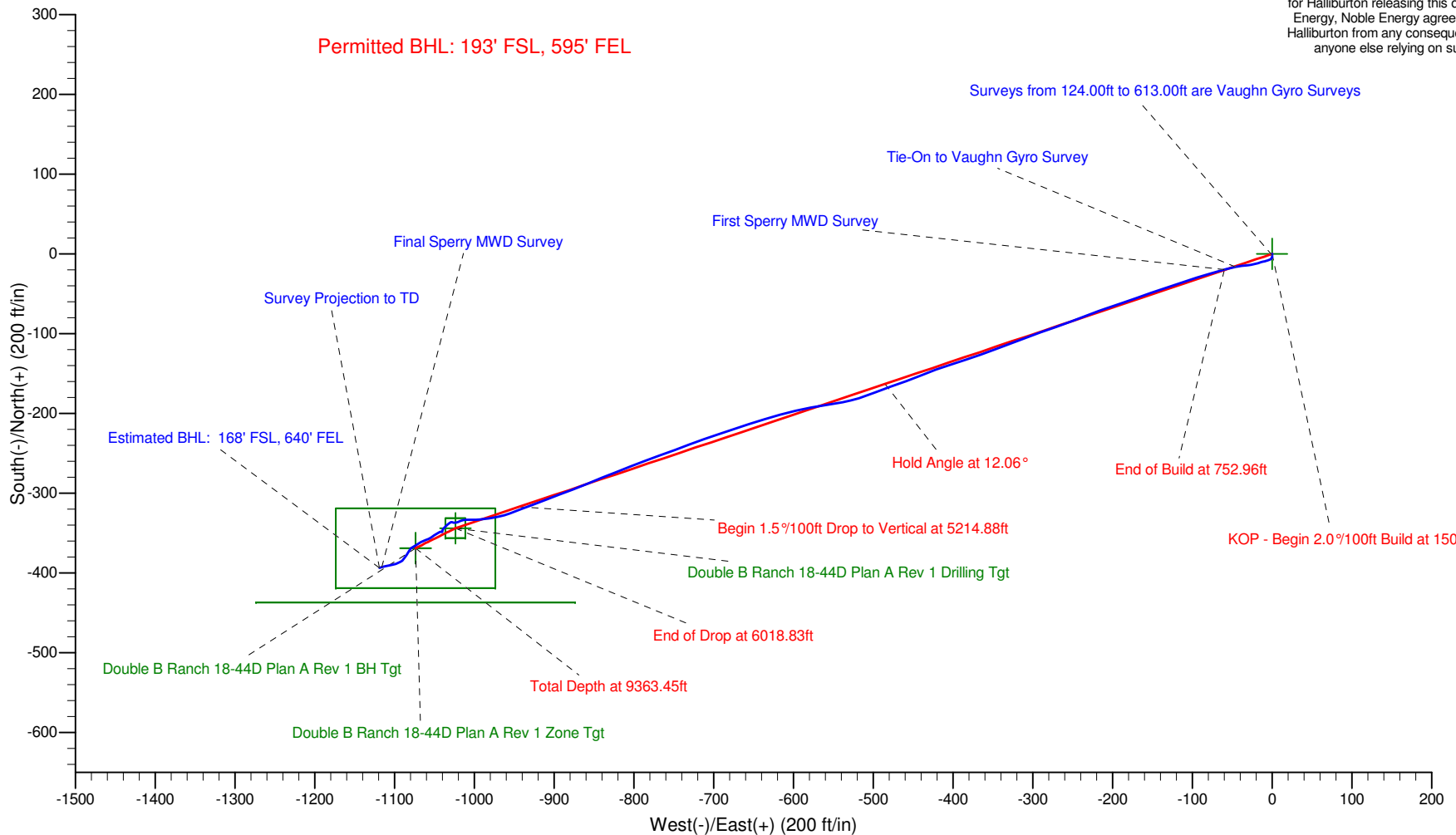


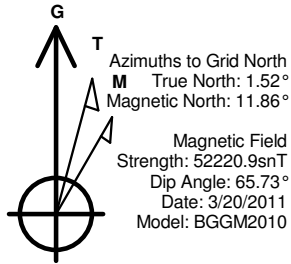
Azimuths to Grid North
 True North: 1.52°
 Magnetic North: 11.86°
 Magnetic Field
 Strength: 52220.9snT
 Dip Angle: 65.73°
 Date: 3/20/2011
 Model: BGGM2010

LEGEND

- Double B Ranch 18-44D, Plan A Rev 1, Plan A Rev 1 Proposal V0
- Vaughn Gyro and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Double B Ranch 18-44D 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

- Double B Ranch 18-44D, Plan A Rev 1, Plan A Rev 1 Proposal
- Vaughn Gyro and Sperry MWD Survey

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