Noble Energy

Garfield County, CO (NAD 83)
Sec. 17-T7S-R94W (Rulison 17M PAD)
Rulison Federal 20-11C

Plan A Rev 1

Design: Gyro and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

13 April, 2011

Well Coordinates: 1,591,772.22 N, 2,317,163.43 E (39° 25' 59.64" N, 107° 55' 04.14" W)
Ground Level: 7,545.00 ft

Local Coordinate Origin:	Centered on Well Rulison Federal 20-11C
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 Rulison Federal 20-11C - 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
126.00	0.36	160.08	126.00	-0.37	0.13	0.39	0.29
Surveys from 126.00ft to 615.00ft are Gyro Surveys							
157.00	0.97	180.74	157.00	-0.73	0.16	0.74	2.08
219.00	3.03	159.48	218.96	-2.79	0.73	2.86	3.48
280.00	4.63	187.97	279.82	-6.73	0.96	6.80	4.00
341.00	5.79	169.51	340.57	-12.20	1.17	12.25	3.32
432.00	7.95	168.61	430.92	-22.88	3.25	23.11	2.38
524.00	10.07	177.55	521.78	-37.16	4.85	37.47	2.75
615.00	10.17	175.35	611.36	-53.11	5.85	53.42	0.44
Tie-On to Gyro Survey							
694.00	11.67	179.73	688.93	-68.06	6.45	68.30	2.17
First Sperry MWD Survey							
785.00	12.82	174.40	777.86	-87.31	7.48	87.52	1.77
880.00	13.73	169.25	870.33	-108.88	10.61	109.31	1.57
974.00	14.77	168.60	961.43	-131.58	15.06	132.41	1.12
1,068.00	15.83	168.91	1,052.10	-155.91	19.89	157.17	1.13
1,162.00	16.91	168.12	1,142.29	-181.87	25.17	183.60	1.17
1,256.00	15.98	167.34	1,232.44	-207.87	30.82	210.13	1.02
1,351.00	16.67	167.29	1,323.61	-233.92	36.69	236.73	0.73
1,445.00	16.27	169.97	1,413.76	-260.04	41.95	263.32	0.91
1,500.00	16.45	170.24	1,466.53	-275.30	44.61	278.81	0.36
1,634.00	16.24	170.52	1,595.11	-312.48	50.91	316.50	0.17
1,728.00	15.40	169.98	1,685.55	-337.74	55.25	342.11	0.91
1,822.00	16.45	170.86	1,775.94	-363.17	59.53	367.88	1.15
1,917.00	15.71	169.79	1,867.23	-389.11	63.95	394.18	0.84
2,011.00	15.92	168.15	1,957.67	-414.25	68.85	419.75	0.53
2,105.00	15.37	167.79	2,048.19	-439.04	74.14	445.03	0.59
2,199.00	15.93	168.32	2,138.70	-463.85	79.38	470.32	0.61
2,294.00	14.84	167.34	2,230.30	-488.49	84.69	495.45	1.18
2,388.00	15.32	168.28	2,321.06	-512.40	89.85	519.83	0.57
2,482.00	15.10	170.50	2,411.77	-536.63	94.39	544.46	0.66
2,576.00	15.56	174.52	2,502.42	-561.26	97.62	569.30	1.23
2,671.00	14.90	172.59	2,594.09	-586.05	100.41	594.24	0.88
2,765.00	15.02	173.21	2,684.90	-610.13	103.41	618.51	0.21
2,859.00	14.87	168.77	2,775.73	-634.06	107.20	642.72	1.23
2,954.00	15.26	170.76	2,867.46	-658.35	111.58	667.39	0.68
3,048.00	15.40	170.79	2,958.12	-682.88	115.56	692.23	0.15
3,142.00	14.90	171.24	3,048.85	-707.15	119.40	716.79	0.55
3,237.00	15.65	171.11	3,140.49	-731.88	123.24	741.82	0.79
3,331.00	15.78	172.11	3,230.98	-757.07	126.95	767.28	0.32
3,425.00	14.86	170.07	3,321.64	-781.60	130.79	792.10	1.13
3,520.00	15.55	168.94	3,413.31	-806.10	135.33	816.99	0.79
3,614.00	15.75	166.81	3,503.83	-830.89	140.66	842.27	0.65
3,708.00	14.19	165.94	3,594.64	-854.48	146.37	866.42	1.68
3,802.00	15.26	166.30	3,685.55	-877.68	152.10	890.18	1.14
3,897.00	15.63	166.47	3,777.12	-902.27	158.05	915.35	0.39
3,991.00	15.18	166.17	3,867.74	-926.53	163.96	940.18	0.49
4,085.00	15.21	169.10	3,958.45	-950.59	169.23	964.73	0.82
4,180.00	15.15	169.14	4,050.14	-975.02	173.93	989.57	0.06

Design Report for Rulison Federal 20-11C - 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)
4,274.00	15.59	171.00	4,140.78	-999.56	178.22	1,014.47	0.70
4,369.00	15.55	169.47	4,232.29	-1,024.69	182.54	1,039.95	0.43
4,463.00	14.92	168.15	4,322.99	-1,048.92	187.33	1,064.60	0.77
4,557.00	15.83	169.22	4,413.62	-1,073.36	192.21	1,089.48	1.01
4,651.00	14.82	168.47	4,504.28	-1,097.73	197.01	1,114.28	1.09
4,746.00	13.73	168.67	4,596.34	-1,120.69	201.66	1,137.65	1.15
4,840.00	13.14	169.10	4,687.77	-1,142.12	205.87	1,159.45	0.64
4,934.00	12.38	168.97	4,779.45	-1,162.50	209.82	1,180.18	0.81
5,028.00	11.84	169.19	4,871.36	-1,181.86	213.55	1,199.87	0.58
5,123.00	10.04	169.32	4,964.63	-1,199.58	216.92	1,217.88	1.89
5,217.00	9.66	170.54	5,057.24	-1,215.41	219.73	1,233.94	0.46
5,311.00	9.24	171.05	5,149.97	-1,230.64	222.20	1,249.37	0.46
5,406.00	8.58	170.39	5,243.82	-1,245.16	224.57	1,264.08	0.70
5,500.00	8.15	170.75	5,336.82	-1,258.65	226.81	1,277.75	0.46
5,595.00	7.38	170.91	5,430.95	-1,271.32	228.86	1,290.58	0.81
5,689.00	6.97	174.53	5,524.21	-1,282.96	230.36	1,302.32	0.65
5,784.00	6.43	174.34	5,618.56	-1,294.00	231.43	1,313.39	0.57
5,878.00	4.42	173.72	5,712.14	-1,302.83	232.35	1,322.27	2.14
5,972.00	3.64	167.43	5,805.90	-1,309.35	233.39	1,328.87	0.95
6,067.00	2.55	173.31	5,900.76	-1,314.39	234.29	1,333.99	1.19
6,161.00	2.74	184.22	5,994.66	-1,318.71	234.37	1,338.27	0.57
6,255.00	1.36	167.60	6,088.60	-1,322.04	234.45	1,341.58	1.58
6,350.00	1.37	184.67	6,183.58	-1,324.27	234.60	1,343.82	0.43
6,444.00	1.69	196.38	6,277.54	-1,326.72	234.11	1,346.18	0.47
6,538.00	0.74	237.58	6,371.52	-1,328.38	233.21	1,347.70	1.31
6,632.00	1.29	247.77	6,465.51	-1,329.10	231.72	1,348.22	0.61
6,727.00	1.58	244.61	6,560.48	-1,330.07	229.55	1,348.88	0.32
6,821.00	1.70	238.07	6,654.44	-1,331.36	227.19	1,349.84	0.24
6,915.00	2.04	232.30	6,748.39	-1,333.12	224.69	1,351.25	0.41
7,010.00	1.82	237.20	6,843.33	-1,334.97	222.08	1,352.73	0.29
7,104.00	2.04	231.07	6,937.28	-1,336.83	219.52	1,354.23	0.32
7,199.00	2.21	228.45	7,032.22	-1,339.11	216.84	1,356.12	0.21
7,293.00	1.94	233.64	7,126.15	-1,341.26	214.20	1,357.89	0.35
7,387.00	2.34	233.77	7,220.09	-1,343.33	211.37	1,359.57	0.43
7,481.00	2.51	227.77	7,314.00	-1,345.85	208.30	1,361.65	0.32
7,576.00	2.59	230.00	7,408.91	-1,348.63	205.11	1,363.97	0.13
7,670.00	3.07	224.56	7,502.80	-1,351.79	201.72	1,366.64	0.58
7,765.00	2.53	238.90	7,597.68	-1,354.68	198.14	1,369.03	0.93
7,859.00	2.90	231.29	7,691.58	-1,357.24	194.51	1,371.07	0.55
7,953.00	3.06	234.16	7,785.45	-1,360.20	190.62	1,373.48	0.23
8,048.00	3.91	234.95	7,880.27	-1,363.54	185.91	1,376.16	0.90
8,142.00	3.51	237.37	7,974.08	-1,366.93	180.86	1,378.84	0.46
8,236.00	2.78	243.86	8,067.93	-1,369.49	176.39	1,380.77	0.86
8,331.00	3.07	238.68	8,162.81	-1,371.83	172.15	1,382.51	0.41
8,425.00	3.24	237.93	8,256.67	-1,374.55	167.75	1,384.61	0.19
8,519.00	3.43	240.90	8,350.51	-1,377.32	163.04	1,386.73	0.27
8,614.00	2.42	253.70	8,445.39	-1,379.27	158.64	1,388.06	1.26
8,708.00	3.04	254.92	8,539.28	-1,380.48	154.32	1,388.67	0.66
8,802.00	3.45	261.46	8,633.13	-1,381.54	149.12	1,389.03	0.59
8,897.00	3.40	262.63	8,727.96	-1,382.33	143.50	1,389.05	0.09
8,991.00	4.06	265.68	8,821.76	-1,382.94	137.42	1,388.83	0.73

Design Report for Rulison Federal 20-11C - 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)
9,086.00	2.73	264.93	8,916.59	-1,383.39	131.81	1,388.52	1.40
9,180.00	2.09	256.93	9,010.51	-1,383.98	127.91	1,388.58	0.77
9,274.00	1.75	237.87	9,104.45	-1,385.13	125.02	1,389.33	0.76
9,374.00	1.89	235.32	9,204.40	-1,386.88	122.38	1,390.70	0.16
Final Sperry MWD Survey							
9,432.00	1.89	235.32	9,262.37	-1,387.97	120.80	1,391.57	0.00
Survey Projection to TD - Estimated BHL: 837' FNL, 624' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
126.00	126.00	-0.37	0.13	Surveys from 126.00ft to 615.00ft are Gyro Surveys
615.00	611.36	-53.11	5.85	Tie-On to Gyro Survey
694.00	688.93	-68.06	6.45	First Sperry MWD Survey
9,374.00	9,204.40	-1,386.88	122.38	Final Sperry MWD Survey
9,432.00	9,262.37	-1,387.97	120.80	Survey Projection to TD
9,432.00	9,262.37	-1,387.97	120.80	Estimated BHL: 837' FNL, 624' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Rulison Federal 20-11C Plan A Rev 1 BH Tgt	172.24	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
126.00	615.00	Gyro Surveys	NS-GYRO-MS
694.00	9,432.00	Sperry MWD Surveys	MWD

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
Rulison Federal	0.00	360.00	5,910.00	-1,329.81	234.55	1,590,442.47	2,317,397.97	39° 25' 46.565 N	107° 55' 0.698 W
- actual wellpath misses target center by 15.00ft at 6076.94ft MD (5910.69 TVD, -1314.83 N, 234.34 E) - Rectangle (sides W25.00 H25.00 D0.00)									
Rulison Federal	0.00	360.00	9,254.00	-1,354.81	184.55	1,590,417.47	2,317,347.97	39° 25' 46.304 N	107° 55' 1.326 W
- actual wellpath misses target center by 71.54ft at 9421.28ft MD (9251.66 TVD, -1387.77 N, 121.09 E) - Point									
Rulison Federal	0.00	360.00	7,035.00	-1,354.81	184.55	1,590,417.47	2,317,347.97	39° 25' 46.304 N	107° 55' 1.326 W
- actual wellpath misses target center by 35.77ft at 7203.05ft MD (7036.26 TVD, -1339.21 N, 216.72 E) - Rectangle (sides W100.00 H200.00 D2,219.00)									

North Reference Sheet for Sec. 17-T7S-R94W (Rulison 17M PAD) - Rulison Federal 20-11C - 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 Rulison Federal 20-11C

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: 0.99995268

Grid Coordinates of Well: 1,591,772.22 ft N, 2,317,163.43 ft E

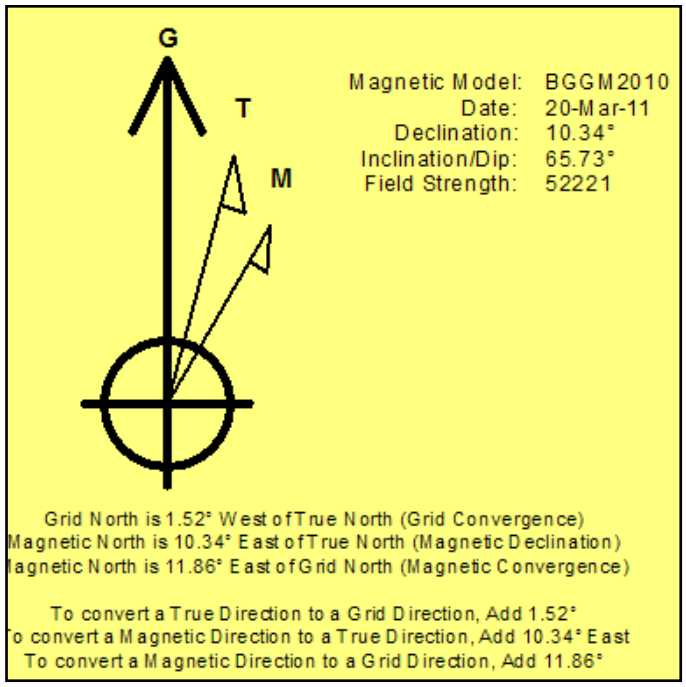
Geographical Coordinates of Well: 39° 25' 59.64" N, 107° 55' 04.14" W

Grid Convergence at Surface is: -1.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,432.00ft

the Bottom Hole Displacement is 1,393.21ft in the Direction of 175.03° (Grid).

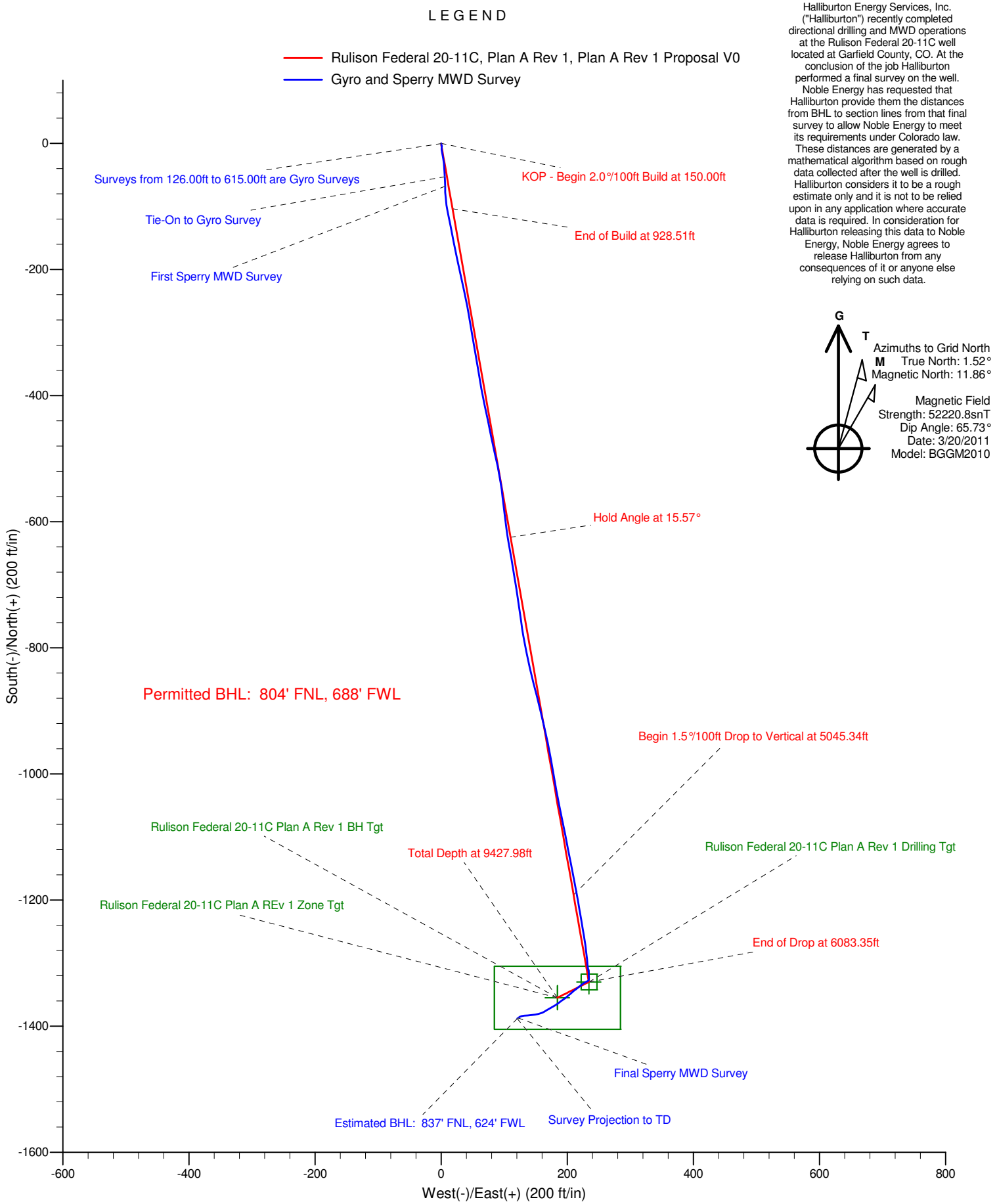
Magnetic Convergence at surface is: -11.86° (20 March 2011, , BGGM2010)



Project: Garfield County, CO (NAD 83)
Site: Sec. 17-T7S-R94W (Rulison 17M PAD)
Well: Rulison Federal 20-11C

Noble Energy

HALLIBURTON
Sperry Drilling



Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Rulison Federal 20-11C 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.

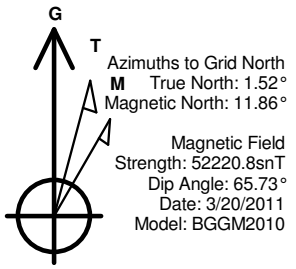
Azimuths to Grid North
True North: 1.52°
Magnetic North: 11.86°

Magnetic Field
Strength: 52220.8snT
Dip Angle: 65.73°
Date: 3/20/2011
Model: BGGM2010

Project: Garfield County, CO (NAD 83)
Site: Sec. 17-T7S-R94W (Rulison 17M PAD)
Well: Rulison Federal 20-11C

Noble Energy

HALLIBURTON
Sperry Drilling



LEGEND

Rulison Federal 20-11C, Plan A Rev 1, Plan A Rev 1 Proposal \
Gyro and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Rulison Federal 20-111C 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.