

Noble Energy

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

Plan A Rev 1

Design: Customer Supplied Gyro and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

19 May, 2011

Well Coordinates: 1,591,779.19 N, 2,317,173.26 E (39° 25' 59.71" N, 107° 55' 04.01" W)
Ground Level: 7,545.00 ft

Local Coordinate Origin:	Centered on Well Rulison Federal 20-11A
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 20-11A - Customer Supplied 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	0.22	154.41	97.00	-0.17	0.08	0.18	0.23
Surveys from 97.00ft to 617.00ft are Customer Supplied Gyro Surveys							
128.00	1.11	115.55	128.00	-0.35	0.38	0.44	3.06
190.00	2.00	113.66	189.97	-1.04	1.91	1.52	1.44
251.00	2.07	157.44	250.94	-2.49	3.31	3.28	2.49
343.00	5.15	170.26	342.75	-8.09	4.64	9.04	3.44
434.00	5.16	180.19	433.38	-16.21	5.32	17.04	0.98
526.00	5.93	162.12	524.96	-24.87	6.77	25.78	2.06
617.00	6.29	174.41	615.44	-34.31	8.70	35.38	1.49
Tie-On to Customer Supplied Gyro Survey							
694.00	7.25	150.95	691.92	-42.76	11.47	44.26	3.77
First Sperry MWD Survey							
785.00	7.84	148.06	782.13	-53.04	17.54	55.80	0.77
880.00	8.35	153.33	876.19	-64.70	24.06	68.78	0.95
974.00	7.92	162.78	969.24	-76.99	29.04	81.95	1.49
1,068.00	8.45	163.44	1,062.29	-89.80	32.93	95.33	0.57
1,162.00	7.93	165.51	1,155.33	-102.69	36.52	108.72	0.64
1,256.00	8.57	165.69	1,248.35	-115.76	39.87	122.20	0.68
1,351.00	7.58	169.04	1,342.41	-128.77	42.81	135.53	1.15
1,445.00	8.17	169.52	1,435.53	-141.42	45.21	148.36	0.63
1,480.00	8.41	173.08	1,470.16	-146.41	45.97	153.37	1.62
1,571.00	7.92	175.96	1,560.24	-159.27	47.21	166.09	0.70
1,634.00	7.76	175.89	1,622.65	-167.84	47.82	174.52	0.25
1,728.00	7.84	165.61	1,715.78	-180.38	49.87	187.15	1.48
1,822.00	7.32	167.95	1,808.96	-192.45	52.71	199.54	0.64
1,917.00	8.07	159.79	1,903.11	-204.63	56.28	212.23	1.39
2,011.00	7.56	158.74	1,996.24	-216.58	60.80	224.95	0.56
2,105.00	7.22	156.46	2,089.45	-227.76	65.40	236.95	0.48
2,199.00	8.23	155.95	2,182.60	-239.32	70.51	249.46	1.08
2,294.00	7.68	153.14	2,276.69	-251.19	76.14	262.40	0.71
2,388.00	8.30	151.85	2,369.77	-262.78	82.18	275.18	0.69
2,482.00	7.87	159.82	2,462.84	-274.80	87.60	288.21	1.28
2,576.00	7.72	159.75	2,555.97	-286.76	92.01	300.92	0.16
2,671.00	7.37	157.88	2,650.15	-298.40	96.51	313.33	0.45
2,765.00	7.06	156.91	2,743.41	-309.29	101.05	325.05	0.35
2,859.00	7.73	159.26	2,836.62	-320.52	105.55	337.07	0.78
2,954.00	7.15	155.23	2,930.82	-331.86	110.29	349.26	0.82
3,048.00	7.94	157.89	3,024.01	-343.19	115.19	361.49	0.92
3,142.00	7.62	158.61	3,117.14	-355.01	119.90	374.13	0.36
3,237.00	7.55	159.89	3,211.31	-366.73	124.35	386.62	0.19
3,331.00	6.49	158.63	3,304.61	-377.48	128.41	398.06	1.14
3,425.00	7.61	155.02	3,397.90	-388.07	132.97	409.48	1.28
3,519.00	8.05	159.04	3,491.02	-399.86	137.95	422.17	0.75
3,614.00	7.73	160.15	3,585.12	-412.08	142.50	435.17	0.37
3,708.00	7.58	161.23	3,678.28	-423.90	146.64	447.66	0.22
3,802.00	7.30	162.83	3,771.49	-435.47	150.40	459.82	0.37
3,897.00	8.23	160.27	3,865.62	-447.64	154.48	472.63	1.04
3,991.00	7.30	158.87	3,958.76	-459.54	158.90	485.29	1.01
4,085.00	8.21	158.84	4,051.90	-471.37	163.48	497.91	0.97

Design Report for Rulison Federal 20-11A - Customer Supplied 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	7.83	157.42	4,145.97	-483.67	168.41	511.08	0.45
4,274.00	7.38	159.22	4,239.14	-495.23	173.01	523.44	0.54
4,368.00	7.78	156.38	4,332.32	-506.70	177.70	535.75	0.58
4,463.00	7.34	157.20	4,426.49	-518.19	182.63	548.14	0.48
4,557.00	7.56	154.54	4,519.70	-529.31	187.62	560.18	0.44
4,651.00	8.28	153.84	4,612.80	-540.97	193.26	572.93	0.77
4,745.00	8.36	160.09	4,705.81	-553.47	198.57	586.39	0.97
4,840.00	8.28	160.55	4,799.81	-566.41	203.20	600.10	0.11
4,934.00	7.76	160.06	4,892.90	-578.76	207.62	613.18	0.56
5,028.00	7.26	162.82	4,986.09	-590.40	211.54	625.44	0.66
5,123.00	6.94	162.71	5,080.36	-601.61	215.02	637.18	0.34
5,217.00	6.68	165.57	5,173.70	-612.33	218.07	648.32	0.45
5,311.00	6.08	164.06	5,267.11	-622.41	220.80	658.77	0.66
5,406.00	5.97	164.91	5,361.59	-632.02	223.46	668.74	0.15
5,500.00	4.55	155.60	5,455.19	-640.14	226.28	677.31	1.76
5,595.00	4.14	160.94	5,549.92	-646.81	228.95	684.45	0.61
5,689.00	3.52	160.81	5,643.71	-652.74	231.01	690.72	0.66
5,784.00	2.09	155.37	5,738.59	-657.07	232.69	695.34	1.53
5,878.00	1.76	153.25	5,832.54	-659.92	234.05	698.45	0.36
5,972.00	0.98	274.34	5,926.53	-661.15	233.90	699.59	2.57
6,067.00	1.45	273.25	6,021.50	-661.02	231.89	698.93	0.50
6,161.00	1.75	259.59	6,115.47	-661.21	229.29	698.42	0.51
6,255.00	0.30	142.07	6,209.45	-661.66	228.03	698.52	2.03
6,350.00	0.66	215.55	6,304.45	-662.30	227.87	699.10	0.68
6,444.00	1.17	236.26	6,398.44	-663.28	226.75	699.74	0.64
6,538.00	1.56	236.37	6,492.41	-664.52	224.89	700.44	0.41
6,632.00	1.86	224.24	6,586.37	-666.32	222.76	701.61	0.50
6,727.00	0.73	307.53	6,681.35	-667.06	221.21	701.90	2.02
6,821.00	0.80	292.19	6,775.34	-666.44	220.12	701.02	0.23
6,915.00	0.81	264.51	6,869.33	-666.26	218.85	700.50	0.41
7,010.00	0.94	243.18	6,964.32	-666.67	217.49	700.54	0.37
7,104.00	1.38	229.09	7,058.30	-667.76	215.95	701.18	0.55
7,198.00	1.45	237.75	7,152.27	-669.14	214.09	702.01	0.24
7,293.00	2.12	238.32	7,247.23	-670.70	211.57	702.84	0.71
7,387.00	2.24	238.11	7,341.16	-672.59	208.53	703.85	0.13
7,481.00	2.30	234.48	7,435.09	-674.65	205.44	705.01	0.17
7,576.00	2.53	229.61	7,530.00	-677.12	202.29	706.55	0.32
7,670.00	0.75	257.92	7,623.96	-678.59	200.11	707.39	2.02
7,764.00	1.20	246.91	7,717.95	-679.11	198.60	707.48	0.52
7,859.00	1.31	252.11	7,812.92	-679.83	196.65	707.66	0.17
7,953.00	1.86	243.62	7,906.89	-680.84	194.26	707.99	0.63
8,048.00	2.49	236.69	8,001.82	-682.66	191.16	708.91	0.72
8,142.00	2.81	229.52	8,095.72	-685.27	187.70	710.51	0.49
8,236.00	3.56	229.62	8,189.57	-688.66	183.72	712.72	0.80
8,331.00	1.42	244.31	8,284.48	-691.08	180.42	714.17	2.33
8,425.00	1.77	243.51	8,378.44	-692.24	178.07	714.65	0.37
8,519.00	2.69	230.72	8,472.37	-694.28	175.06	715.82	1.11
8,614.00	3.32	219.90	8,567.24	-697.80	171.57	718.28	0.89
8,708.00	3.79	222.87	8,661.06	-702.17	167.71	721.46	0.54
8,802.00	0.98	212.57	8,754.97	-705.12	165.16	723.62	3.01
8,897.00	0.91	205.65	8,849.96	-706.49	164.40	724.73	0.14

Design Report for Rulison Federal 20-11A - Customer Supplied 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)
8,991.00	0.52	161.46	8,943.95	-707.56	164.21	725.72	0.69
9,085.00	1.08	186.34	9,037.94	-708.85	164.25	726.97	0.69
9,180.00	1.05	192.59	9,132.92	-710.59	163.96	728.57	0.13
9,260.00	1.07	198.11	9,212.91	-712.01	163.57	729.84	0.13
Final Sperry MWD Survey							
9,318.00	1.07	198.11	9,270.90	-713.04	163.23	730.74	0.00
Survey Projection to TD - Estimated BHL: 155' FNL, 658' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
97.00	97.00	-0.17	0.08	Surveys from 97.00ft to 617.00ft are Customer Supplied Gyro Surveys
617.00	615.44	-34.31	8.70	Tie-On to Customer Supplied Gyro Survey
694.00	691.92	-42.76	11.47	First Sperry MWD Survey
9,260.00	9,212.91	-712.01	163.57	Final Sperry MWD Survey
9,318.00	9,270.90	-713.04	163.23	Survey Projection to TD
9,318.00	9,270.90	-713.04	163.23	Estimated BHL: 155' FNL, 658' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Rulison Federal 20-11A Plan A Rev 1 BH Tgt	164.52	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
97.00	617.00	Gyro Surveys	NS-GYRO-MS
694.00	9,318.00	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 - actual wellpath misses target center by 52.32ft at 5986.42ft MD (5940.95 TVD, -661.13 N, 233.65 E) - Rectangle (sides W25.00 H25.00 D0.00)	0.00	0.00	5,940.00	-685.47	187.35	1,591,093.75	2,317,360.60	39° 25' 52.990 N	107° 55' 1.394 W
Rulison Federal - actual wellpath misses target center by 31.37ft at 7111.47ft MD (7065.77 TVD, -667.88 N, 215.81 E) - Rectangle (sides W78.00 H200.00 D2,219.00)	0.00	360.00	7,065.00	-685.54	189.89	1,591,093.69	2,317,363.14	39° 25' 52.990 N	107° 55' 1.362 W
Rulison Federal - actual wellpath misses target center by 40.48ft at 9318.00ft MD (9270.90 TVD, -713.04 N, 163.23 E) - Point	0.00	360.00	9,284.00	-685.54	189.89	1,591,093.69	2,317,363.14	39° 25' 52.990 N	107° 55' 1.362 W
Rulison Federal - actual wellpath hits target center - Polygon Point 1 Point 2	0.00	360.00	0.00	0.00	0.00	1,591,779.19	2,317,173.26	39° 25' 59.713 N	107° 55' 4.014 W
				-10.00 390.00	-657.54 -657.54	1,591,121.68 1,591,121.68	2,317,163.26 2,317,563.24		

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

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

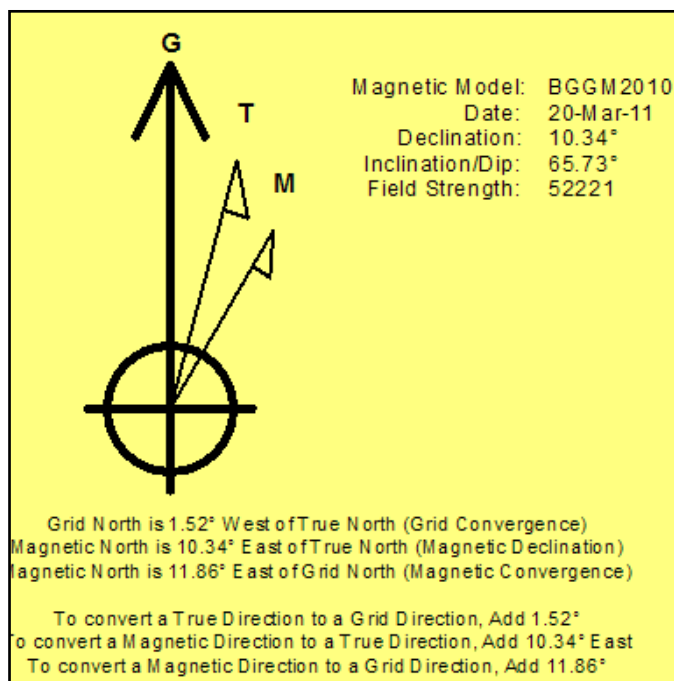
Grid Coordinates of Well: 1,591,779.19 ft N, 2,317,173.26 ft E

Geographical Coordinates of Well: 39° 25' 59.71" N, 107° 55' 04.01" W

Grid Convergence at Surface is: -1.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,318.00ft the Bottom Hole Displacement is 731.49ft in the Direction of 167.11° (Grid).

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

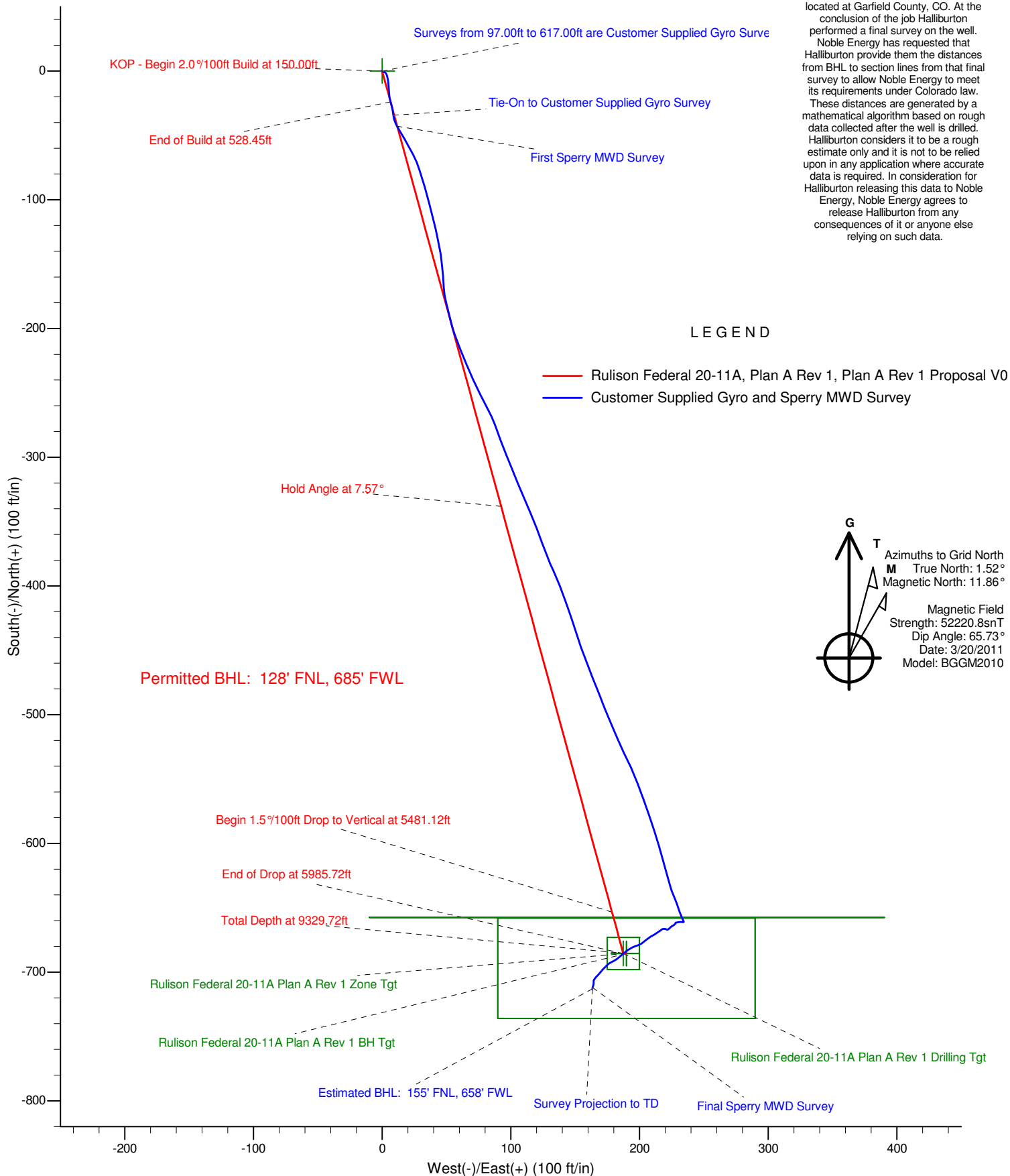


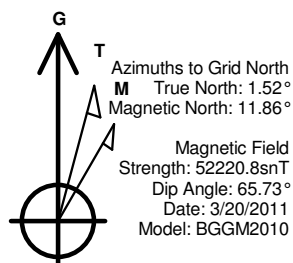
Noble Energy

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Sperry Drilling

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

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

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

