

# Noble Energy

Garfield County, CO (NAD 83)

Sec. 17-T7S-R94W (Rulison 17M PAD)

Double B Ranch 18-44C

Plan A Rev 1

Design: GTI Gyro and Sperry MWD Survey

## Sperry Drilling Services

### Final Survey Report

18 May, 2011

Well Coordinates: 1,591,824.62 N, 2,317,164.80 E (39° 26' 00.16" N, 107° 55' 04.14" W)

Ground Level: 7,545.00 ft

Local Coordinate Origin:

Centered on Well Double B Ranch 18-44C

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 18-44C - GTI 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
155.00	2.00	255.14	154.97	-0.69	-2.61	2.66	1.29
<b>Surveys from 155.00ft to 613.00ft are GTI Gyro Surveys</b>							
217.00	2.41	278.65	216.92	-0.78	-4.95	5.00	1.59
278.00	4.00	286.07	277.83	0.01	-8.26	8.23	2.69
339.00	5.51	279.99	338.62	1.10	-13.19	13.05	2.61
430.00	6.42	275.73	429.12	2.37	-22.56	22.28	1.11
522.00	8.25	284.51	520.37	4.54	-34.06	33.57	2.33
613.00	10.15	284.30	610.19	8.15	-48.16	47.31	2.09
<b>Tie-On to GTI Gyro Survey</b>							
694.00	9.55	275.87	690.00	10.60	-61.76	60.66	1.93
<b>First Sperry MWD Survey</b>							
785.00	9.62	272.55	779.73	11.71	-76.86	75.62	0.61
880.00	9.88	268.19	873.36	11.81	-92.94	91.63	0.82
974.00	10.53	267.93	965.88	11.25	-109.58	108.26	0.69
1,068.00	11.53	268.21	1,058.14	10.64	-127.56	126.22	1.07
1,162.00	12.37	267.45	1,150.10	9.90	-147.01	145.67	0.91
1,256.00	11.99	264.56	1,241.98	8.53	-166.79	165.49	0.76
1,351.00	12.63	263.18	1,334.80	6.36	-186.92	185.74	0.74
1,445.00	13.39	261.81	1,426.39	3.59	-207.90	206.87	0.87
1,477.00	13.79	261.99	1,457.49	2.53	-215.34	214.38	1.26
1,633.00	12.64	263.17	1,609.36	-2.09	-250.70	250.00	0.76
1,727.00	11.78	258.17	1,701.23	-5.28	-270.31	269.80	1.45
1,821.00	12.25	260.49	1,793.17	-8.90	-289.53	289.27	0.72
1,916.00	11.65	259.87	1,886.11	-12.25	-308.92	308.86	0.65
2,010.00	11.74	266.19	1,978.17	-14.56	-327.80	327.87	1.37
2,104.00	11.45	265.48	2,070.25	-15.93	-346.64	346.76	0.34
2,198.00	11.09	263.55	2,162.44	-17.68	-364.93	365.13	0.55
2,293.00	11.28	266.29	2,255.63	-19.30	-383.28	383.55	0.59
2,387.00	11.71	266.30	2,347.75	-20.52	-401.97	402.28	0.46
2,481.00	11.15	265.78	2,439.88	-21.80	-420.56	420.91	0.61
2,575.00	11.96	266.81	2,531.98	-23.01	-439.35	439.73	0.89
2,670.00	11.36	265.71	2,625.02	-24.26	-458.50	458.93	0.67
2,764.00	11.63	264.62	2,717.13	-25.84	-477.17	477.66	0.37
2,858.00	12.25	267.77	2,809.10	-27.12	-496.57	497.10	0.96
2,953.00	11.23	267.56	2,902.11	-27.90	-515.88	516.41	1.07
3,047.00	12.09	267.06	2,994.17	-28.80	-534.86	535.39	0.92
3,141.00	11.73	265.08	3,086.14	-30.12	-554.21	554.79	0.58
3,236.00	10.78	265.55	3,179.32	-31.64	-572.69	573.33	1.00
3,330.00	11.35	267.19	3,271.57	-32.77	-590.69	591.36	0.69
3,424.00	12.32	265.30	3,363.57	-34.05	-609.92	610.64	1.11
3,519.00	11.55	267.19	3,456.52	-35.35	-629.52	630.28	0.91
3,613.00	10.98	266.67	3,548.70	-36.33	-647.86	648.63	0.62
3,707.00	11.08	266.52	3,640.97	-37.40	-665.81	666.61	0.11
3,802.00	12.49	269.15	3,733.96	-38.10	-685.20	685.99	1.59
3,896.00	11.93	268.89	3,825.84	-38.44	-705.08	705.82	0.60
3,990.00	11.22	270.55	3,917.93	-38.54	-723.93	724.63	0.83
4,084.00	11.74	269.12	4,010.04	-38.60	-742.64	743.27	0.63
4,179.00	11.34	269.34	4,103.12	-38.86	-761.64	762.23	0.42
4,273.00	11.11	265.89	4,195.33	-39.61	-779.92	780.50	0.76

## Design Report for Double B Ranch 18-44C - GTI 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)
4,368.00	11.40	267.35	4,288.50	-40.70	-798.43	799.04	0.43
4,462.00	11.52	272.82	4,380.63	-40.67	-817.08	817.63	1.16
4,556.00	10.89	273.59	4,472.84	-39.65	-835.32	835.72	0.69
4,650.00	11.46	273.58	4,565.05	-38.51	-853.50	853.74	0.61
4,745.00	10.84	272.28	4,658.26	-37.57	-871.85	871.94	0.70
4,839.00	10.35	273.73	4,750.66	-36.67	-889.11	889.06	0.59
4,933.00	8.99	272.10	4,843.32	-35.85	-904.87	904.71	1.48
5,027.00	7.75	270.55	4,936.32	-35.52	-918.55	918.31	1.34
5,122.00	6.84	268.11	5,030.55	-35.64	-930.61	930.34	1.01
5,216.00	6.55	251.56	5,123.91	-37.52	-941.29	941.14	2.07
5,310.00	6.15	253.28	5,217.34	-40.67	-951.20	951.28	0.47
5,405.00	5.85	254.00	5,311.82	-43.47	-960.73	961.00	0.33
5,499.00	5.76	258.42	5,405.34	-45.73	-969.95	970.39	0.49
5,594.00	5.02	260.80	5,499.92	-47.36	-978.73	979.26	0.81
5,688.00	3.67	274.68	5,593.65	-47.77	-985.78	986.33	1.81
5,783.00	3.55	276.35	5,688.46	-47.19	-991.74	992.22	0.17
5,877.00	2.34	278.89	5,782.33	-46.58	-996.53	996.94	1.29
5,971.00	0.84	248.26	5,876.29	-46.53	-999.06	999.46	1.78
6,066.00	1.03	221.29	5,971.28	-47.43	-1,000.27	1,000.74	0.50
6,160.00	1.10	234.80	6,065.27	-48.59	-1,001.57	1,002.13	0.28
6,254.00	1.31	231.07	6,159.24	-49.78	-1,003.14	1,003.80	0.24
6,349.00	1.36	221.63	6,254.22	-51.31	-1,004.73	1,005.51	0.24
6,443.00	1.51	230.37	6,348.19	-52.93	-1,006.43	1,007.34	0.28
6,537.00	1.41	224.37	6,442.16	-54.55	-1,008.19	1,009.23	0.19
6,631.00	1.83	222.39	6,536.12	-56.49	-1,010.01	1,011.20	0.45
6,726.00	2.57	219.28	6,631.05	-59.25	-1,012.38	1,013.80	0.79
6,820.00	2.30	221.86	6,724.97	-62.29	-1,014.98	1,016.63	0.31
6,914.00	0.96	260.22	6,818.93	-63.83	-1,017.01	1,018.79	1.76
7,009.00	1.04	271.12	6,913.91	-63.95	-1,018.66	1,020.44	0.22
7,103.00	1.13	268.27	7,007.90	-63.96	-1,020.44	1,022.22	0.11
7,198.00	1.45	249.12	7,102.87	-64.42	-1,022.50	1,024.31	0.56
7,292.00	1.73	237.67	7,196.84	-65.60	-1,024.81	1,026.71	0.45
7,386.00	1.85	243.78	7,290.79	-67.03	-1,027.37	1,029.38	0.24
7,480.00	2.19	246.00	7,384.73	-68.43	-1,030.37	1,032.49	0.37
7,575.00	2.33	238.09	7,479.66	-70.19	-1,033.67	1,035.92	0.36
7,669.00	2.24	248.04	7,573.58	-71.88	-1,036.99	1,039.37	0.43
7,764.00	2.26	254.11	7,668.51	-73.09	-1,040.52	1,042.99	0.25
7,858.00	2.30	253.82	7,762.44	-74.12	-1,044.11	1,046.65	0.04
7,952.00	2.82	253.04	7,856.34	-75.32	-1,048.13	1,050.76	0.55
8,047.00	1.79	265.57	7,951.27	-76.12	-1,051.85	1,054.53	1.20
8,141.00	1.99	249.28	8,045.21	-76.81	-1,054.84	1,057.57	0.61
8,235.00	1.98	245.26	8,139.16	-78.07	-1,057.84	1,060.66	0.15
8,330.00	3.04	250.77	8,234.07	-79.59	-1,061.71	1,064.65	1.14
8,424.00	3.56	258.51	8,327.91	-80.99	-1,066.92	1,069.96	0.73
8,518.00	3.99	257.97	8,421.71	-82.25	-1,072.98	1,076.10	0.46
8,613.00	3.86	247.53	8,516.48	-84.16	-1,079.17	1,082.43	0.76
8,707.00	4.19	245.09	8,610.25	-86.82	-1,085.21	1,088.67	0.40
8,801.00	4.45	245.70	8,703.99	-89.76	-1,091.64	1,095.33	0.28
8,896.00	2.98	249.22	8,798.78	-92.16	-1,097.31	1,101.18	1.57
8,990.00	2.80	265.14	8,892.67	-93.22	-1,101.88	1,105.82	0.87
9,085.00	2.95	262.10	8,987.55	-93.75	-1,106.62	1,110.58	0.23

## Design Report for Double B Ranch 18-44C - GTI 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)
9,179.00	2.52	258.13	9,081.44	-94.51	-1,111.04	1,115.05	0.50
9,273.00	2.42	264.50	9,175.35	-95.12	-1,115.03	1,119.08	0.31
9,307.00	2.30	257.35	9,209.32	-95.34	-1,116.41	1,120.48	0.93
<b>Final Sperry MWD Survey</b>							
9,365.00	2.30	257.35	9,267.28	-95.85	-1,118.69	1,122.78	0.00
<b>Survey Projection to TD - Estimated BHL: 473' FSL, 648' FEL</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
155.00	154.97	-0.69	-2.61	Surveys from 155.00ft to 613.00ft are GTI Gyro Surveys
613.00	610.19	8.15	-48.16	Tie-On to GTI Gyro Survey
694.00	690.00	10.60	-61.76	First Sperry MWD Survey
9,307.00	9,209.32	-95.34	-1,116.41	Final Sperry MWD Survey
9,365.00	9,267.28	-95.85	-1,118.69	Survey Projection to TD
9,365.00	9,267.28	-95.85	-1,118.69	Estimated BHL: 473' FSL, 648' FEL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Double B Ranch 18-44C Plan A Rev 1 BH Tgt	265.21	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
155.00	613.00	GTI Gyro Surveys	NS-GYRO-MS
694.00	9,365.00	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
Double B Ranch	0.00	360.00	5,920.00	-64.17	-1,014.88	1,591,760.45	2,316,149.97	39° 25' 59.258 N	107° 55' 17.045 W
- actual wellpath misses target center by 23.07ft at 6015.07ft MD (5920.36 TVD, -46.86 N, -999.64 E)									
- Rectangle (sides W25.00 H25.00 D0.00)									
Double B Ranch	0.00	360.00	7,045.00	-89.17	-1,064.88	1,591,735.45	2,316,099.97	39° 25' 58.998 N	107° 55' 17.674 W
- actual wellpath misses target center by 50.38ft at 7141.18ft MD (7046.07 TVD, -64.05 N, -1021.22 E)									
- Rectangle (sides W100.00 H200.00 D2,219.00)									
Double B Ranch	0.00	360.00	9,264.00	-89.17	-1,064.88	1,591,735.45	2,316,099.97	39° 25' 58.998 N	107° 55' 17.674 W
- actual wellpath misses target center by 54.05ft at 9359.56ft MD (9261.84 TVD, -95.80 N, -1118.47 E)									
- Point									

## North Reference Sheet for Sec. 17-T7S-R94W (Rulison 17M PAD) - Double B Ranch 18-44C - 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 18-44C

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

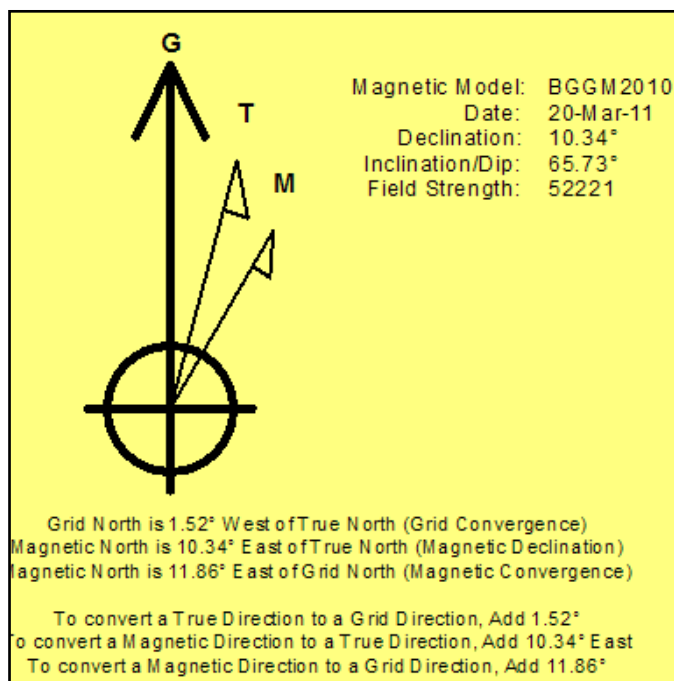
Grid Coordinates of Well: 1,591,824.62 ft N, 2,317,164.80 ft E

Geographical Coordinates of Well: 39° 26' 00.16" N, 107° 55' 04.14" W

Grid Convergence at Surface is: -1.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,365.00ft  
the Bottom Hole Displacement is 1,122.78ft in the Direction of 265.10° (Grid).

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

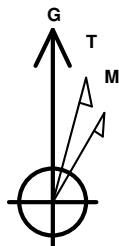


Project: Garfield County, CO (NAD 83)  
 Site: Sec. 17-T7S-R94W (Rulison 17M PAD)  
 Well: Double B Ranch 18-44C

# Noble Energy

**HALLIBURTON**

Sperry Drilling



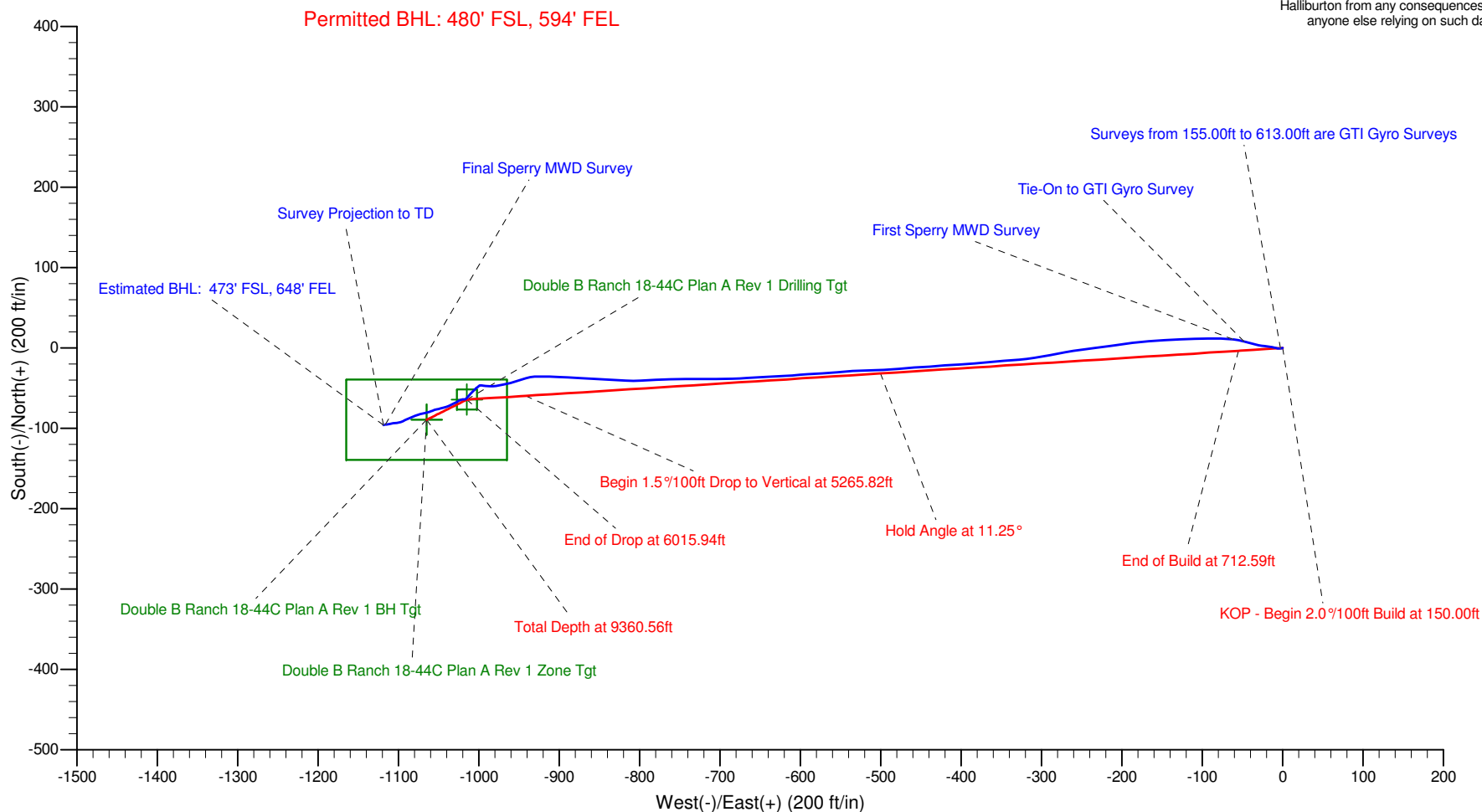
Azimuths to Grid North  
 True North: 1.52°  
 Magnetic North: 11.86°

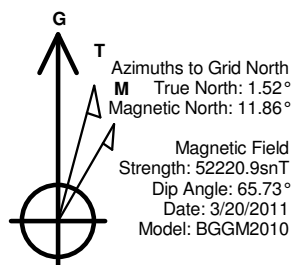
Magnetic Field  
 Strength: 52220.9snT  
 Dip Angle: 65.73°  
 Date: 3/20/2011  
 Model: BGGM2010

## LEGEND

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

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Double B Ranch 18-44C 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 18-44C, Plan A Rev 1, Plan A Rev 1 Proposal
- GTI Gyro and Sperry MWD Survey

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

