

KGH Operating

Rio Blanco, Colorado

Sec. 14-T1S-R104W

Meagher 14-1H

Plan A Rev 0

Survey: Rig MWD Surveys

Sperry Drilling Services Standard Report

15 July, 2013

Well Coordinates: 1,249,494.92 N, 2,009,170.30 E (39° 57' 50.45" N, 109° 02' 08.91" W)
Ground Level: 6,535.00 ft

Local Coordinate Origin:	Centered on Well Meagher 14-1H
Viewing Datum:	RKB 20 ft. @ 6555.00ft (Aztec 920)
TVDs to System:	N
North Reference:	True
Unit System:	API - US Survey Feet - Custom
Geodetic Scale Factor Applied	
Version: 2003.16 Build: 431	

HALLIBURTON

Survey Report for Meagher 14-1H - Rig MWD Surveys

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
813.00	0.00	0.00	813.00	0.00	0.00	0.00	0.00
901.00	1.66	150.06	900.99	-1.10	0.64	0.62	1.89
992.00	1.87	146.94	991.94	-3.49	2.10	2.04	0.25
1,083.00	1.96	152.26	1,082.89	-6.11	3.64	3.53	0.22
1,174.00	1.71	144.06	1,173.85	-8.59	5.16	5.01	0.40
1,265.00	1.45	149.32	1,264.81	-10.68	6.54	6.36	0.33
1,357.00	1.41	146.36	1,356.78	-12.62	7.76	7.54	0.09
1,448.00	1.51	155.41	1,447.75	-14.64	8.88	8.63	0.28
1,545.00	1.71	155.81	1,544.72	-17.13	10.01	9.71	0.21
1,641.00	1.60	157.27	1,640.68	-19.67	11.11	10.77	0.12
1,737.00	1.95	160.68	1,736.63	-22.45	12.17	11.78	0.38
1,833.00	1.09	142.80	1,832.60	-24.72	13.26	12.83	1.01
1,929.00	1.36	124.40	1,928.57	-26.09	14.76	14.30	0.49
2,025.00	1.16	136.80	2,024.55	-27.44	16.36	15.88	0.35
2,121.00	1.36	133.42	2,120.53	-28.93	17.85	17.35	0.22
2,217.00	0.89	157.07	2,216.51	-30.40	18.97	18.44	0.68
2,313.00	0.74	160.35	2,312.50	-31.67	19.47	18.92	0.16
2,409.00	0.41	114.51	2,408.50	-32.40	19.99	19.43	0.56
2,505.00	0.44	184.13	2,504.49	-32.91	20.28	19.70	0.51
2,600.00	0.25	149.97	2,599.49	-33.45	20.36	19.77	0.29
2,697.00	0.25	222.99	2,696.49	-33.79	20.32	19.73	0.31
2,793.00	0.18	306.18	2,792.49	-33.85	20.05	19.46	0.30
2,889.00	0.34	31.81	2,888.49	-33.52	20.08	19.50	0.39
2,985.00	0.32	36.41	2,984.49	-33.06	20.39	19.81	0.03
3,082.00	0.40	74.13	3,081.49	-32.75	20.88	20.31	0.25
3,177.00	0.68	118.90	3,176.48	-32.93	21.69	21.11	0.51
3,273.00	0.86	146.17	3,272.47	-33.81	22.59	22.00	0.42
3,370.00	0.55	15.19	3,369.47	-33.96	23.12	22.52	1.33
3,466.00	0.48	43.46	3,465.47	-33.23	23.51	22.93	0.27
3,561.00	0.64	112.79	3,560.46	-33.14	24.28	23.70	0.68
3,657.00	1.33	129.28	3,656.45	-34.06	25.63	25.04	0.77
3,753.00	1.28	142.69	3,752.42	-35.62	27.15	26.52	0.32
3,849.00	0.92	109.30	3,848.41	-36.72	28.52	27.88	0.75
3,946.00	1.50	102.50	3,945.38	-37.26	30.50	29.85	0.61
4,042.00	2.66	93.97	4,041.32	-37.68	33.95	33.29	1.25
4,139.00	2.33	77.19	4,138.23	-37.40	38.11	37.46	0.82
4,235.00	2.80	93.00	4,234.13	-37.09	42.36	41.71	0.88
4,331.00	2.63	102.28	4,330.03	-37.68	46.85	46.19	0.49
4,426.00	1.33	108.67	4,424.97	-38.50	50.03	49.35	1.39
4,521.00	1.32	163.71	4,519.95	-39.90	51.38	50.68	1.29
4,617.00	1.62	172.67	4,615.91	-42.31	51.86	51.12	0.39
4,680.00	1.92	164.35	4,678.88	-44.21	52.26	51.49	0.63
4,745.00	2.33	159.60	4,743.84	-46.49	53.01	52.20	0.69
4,777.00	3.03	123.62	4,775.81	-47.57	53.95	53.11	5.57
4,808.00	5.62	100.26	4,806.72	-48.30	56.12	55.28	9.94
4,840.00	9.37	94.79	4,838.44	-48.79	60.26	59.41	11.92
4,872.00	12.37	94.29	4,869.86	-49.27	66.28	65.41	9.38
4,904.00	15.18	91.14	4,900.94	-49.61	73.89	73.01	9.09
4,936.00	16.19	87.74	4,931.75	-49.51	82.53	81.66	4.27

Survey Report for Meagher 14-1H - Rig MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,968.00	16.97	84.79	4,962.42	-48.91	91.64	90.78	3.59
5,000.00	17.28	83.72	4,993.00	-47.97	101.02	100.17	1.38
5,032.00	17.82	83.88	5,023.51	-46.93	110.61	109.78	1.69
5,064.00	19.49	82.95	5,053.83	-45.75	120.78	119.96	5.30
5,096.00	21.73	81.67	5,083.78	-44.24	131.94	131.15	7.14
5,128.00	23.90	82.66	5,113.27	-42.55	144.23	143.47	6.89
5,160.00	26.31	83.73	5,142.25	-40.95	157.71	156.97	7.66
5,193.00	28.20	85.86	5,171.58	-39.59	172.76	172.04	6.44
5,225.00	30.77	86.73	5,199.44	-38.57	188.47	187.77	8.14
5,257.00	32.97	85.13	5,226.61	-37.37	205.32	204.64	7.36
5,289.00	36.33	82.26	5,252.93	-35.35	223.40	222.75	11.67
5,321.00	41.07	80.74	5,277.90	-32.38	243.18	242.58	15.11
5,353.00	47.49	77.85	5,300.80	-28.20	265.11	264.58	21.03
5,385.00	51.59	75.63	5,321.56	-22.61	288.79	288.36	13.86
5,417.00	55.88	78.23	5,340.49	-16.79	313.92	313.58	14.92
5,449.00	61.00	76.66	5,357.23	-10.85	340.52	340.28	16.54
5,481.00	68.10	74.87	5,370.98	-3.74	368.51	368.39	22.75
5,512.00	74.22	74.76	5,380.98	3.94	396.81	396.82	19.74
5,544.00	81.52	74.63	5,387.70	12.19	426.97	427.11	22.82
5,576.00	88.15	75.01	5,390.58	20.53	457.71	457.99	20.75
5,608.00	92.43	80.70	5,390.19	36.93	533.91	534.47	9.13
5,640.00	92.84	80.58	5,388.81	41.81	563.48	564.12	1.42
5,672.00	93.21	80.32	5,387.17	46.94	594.01	594.73	1.46
5,704.00	92.06	80.45	5,385.79	51.95	623.55	624.36	3.86
5,736.00	92.44	80.86	5,384.57	56.98	654.12	655.01	1.80
5,768.00	93.61	81.30	5,382.99	61.62	683.71	684.68	4.17
5,800.00	92.13	82.06	5,379.94	70.44	743.99	745.10	2.73
5,832.00	89.69	83.52	5,378.49	81.86	834.25	835.55	3.12
5,864.00	90.03	84.73	5,378.72	91.27	925.77	927.21	1.37
5,896.00	91.20	85.89	5,377.75	98.63	1,015.46	1,017.02	1.83
5,928.00	91.05	90.07	5,375.94	101.87	1,107.36	1,108.96	4.55
5,960.00	91.85	90.86	5,373.64	101.14	1,198.33	1,199.90	1.24
5,992.00	90.89	92.36	5,371.46	98.58	1,289.26	1,290.78	1.96
6,024.00	88.61	91.94	5,371.86	95.17	1,380.19	1,381.64	2.55
6,056.00	88.40	91.18	5,374.37	92.55	1,476.12	1,477.51	0.82
6,088.00	88.24	90.67	5,377.18	91.00	1,572.07	1,573.41	0.56
6,120.00	89.54	89.47	5,379.02	90.89	1,667.05	1,668.37	1.86
6,152.00	93.76	89.11	5,376.29	92.06	1,761.98	1,763.31	4.46
6,184.00	92.53	88.16	5,371.02	94.35	1,857.81	1,859.16	1.62
6,216.00	92.77	88.56	5,366.58	97.09	1,953.66	1,955.05	0.49
6,248.00	92.43	87.68	5,362.23	100.24	2,049.51	2,050.94	0.98
6,280.00	93.11	88.50	5,357.64	103.40	2,144.35	2,145.82	1.12
6,312.00	92.28	89.40	5,353.12	105.16	2,240.22	2,241.71	1.27
6,344.00	92.99	90.22	5,348.66	105.48	2,337.12	2,338.60	1.12
6,376.00	93.11	90.27	5,343.55	105.07	2,432.98	2,434.44	0.14
6,408.00	92.87	89.90	5,338.55	104.93	2,528.85	2,530.29	0.46
6,440.00	93.92	89.73	5,332.86	105.24	2,624.68	2,626.11	1.11
6,472.00	94.50	90.18	5,325.74	105.31	2,721.42	2,722.83	0.76
6,504.00	94.57	90.44	5,318.15	104.80	2,817.12	2,818.51	0.28
6,536.00	94.25	90.18	5,310.77	104.28	2,912.83	2,914.20	0.43

Survey Report for Meagher 14-1H - Rig MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,136.00	94.22	90.13	5,303.68	104.02	3,008.57	3,009.92	0.06
8,232.00	92.16	88.69	5,298.34	105.01	3,104.41	3,105.76	2.62
8,328.00	92.87	90.24	5,294.12	105.90	3,200.31	3,201.66	1.77
8,424.00	92.65	88.72	5,289.50	106.77	3,296.19	3,297.54	1.60
8,520.00	93.95	88.85	5,283.97	108.81	3,392.00	3,393.38	1.36
8,616.00	91.79	87.51	5,279.17	111.85	3,487.83	3,489.24	2.65
8,685.00	92.56	87.56	5,276.55	114.82	3,556.71	3,558.17	1.12
8,782.00	91.70	87.53	5,272.94	118.97	3,653.56	3,655.07	0.89
8,868.00	92.77	87.43	5,269.59	122.75	3,739.41	3,740.97	1.25
8,964.00	95.49	87.59	5,262.68	126.91	3,835.06	3,836.68	2.84
9,060.00	96.05	88.05	5,253.03	130.54	3,930.50	3,932.18	0.75
9,157.00	95.37	88.16	5,243.38	133.73	4,026.97	4,028.68	0.71
9,255.00	95.68	89.92	5,233.94	135.37	4,124.49	4,126.22	1.82
9,351.00	95.68	89.23	5,224.44	136.08	4,220.02	4,221.75	0.72
9,447.00	95.99	89.31	5,214.68	137.29	4,315.51	4,317.25	0.33
9,542.00	95.25	90.76	5,205.37	137.23	4,410.05	4,411.77	1.71
9,638.00	95.24	92.18	5,196.60	134.78	4,505.62	4,507.28	1.47
9,689.00	95.09	92.15	5,192.01	132.86	4,556.38	4,557.99	0.30
9,755.00	95.09	92.15	5,186.15	130.40	4,622.07	4,623.64	0.00

Projection to TD

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
9,755.00	5,185.81	132.20	4,622.07	Projection to TD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	+E/-W (ft)	Start TVD (ft)
Target	Meagher 14-1H PARO (Permitting) BHL	89.01	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
813.00	9,755.00	Rig MWD Surveys	MWD

Survey Report for Meagher 14-1H - Rig MWD Surveys

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
Meagher 14-1H Sec. - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,249,494.92	2,009,170.30	39° 57' 50.451 N	109° 2' 8.913 W
Meagher 14-1H_Rev. - survey misses target center by 117.20ft at 5825.73ft MD (5381.83 TVD, 64.56 N, 703.19 E) - Point		0.00	5,486.00	12.42	716.09	1,249,478.78	2,009,886.29	39° 57' 50.574 N	109° 1' 59.716 W
Meagher 14-1H (SH) - survey hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,249,494.92	2,009,170.30	39° 57' 50.451 N	109° 2' 8.913 W
Meagher 14-1H Sec. - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,249,494.92	2,009,170.30	39° 57' 50.451 N	109° 2' 8.913 W
Meagher 14-1H Sec. - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,249,494.92	2,009,170.30	39° 57' 50.451 N	109° 2' 8.913 W
Meagher 14-1H Sec. - survey hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,249,494.92	2,009,170.30	39° 57' 50.451 N	109° 2' 8.913 W
Meagher 14-1H PAR - survey misses target center by 303.19ft at 9732.55ft MD (5188.14 TVD, 131.24 N, 4599.72 E) - Point	0.00	0.00	5,486.00	80.24	4,624.35	1,249,390.75	2,013,794.03	39° 57' 51.240 N	109° 1' 9.522 W
Meagher 14-1H PAR - survey misses target center by 117.20ft at 5825.73ft MD (5381.83 TVD, 64.56 N, 703.19 E) - Point		0.00	5,486.00	12.42	716.09	1,249,478.78	2,009,886.29	39° 57' 50.574 N	109° 1' 59.716 W

North Reference Sheet for Sec. 14-T1S-R104W - Meagher 14-1H - Plan A Rev 0

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

Vertical Depths are relative to RKB 20 ft. @ 6555.00ft (Aztec 920). Northing and Easting are relative to Meagher 14-1H

Coordinate System is US State Plane 1983, Colorado Northern 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: 40° 47' 0.000 N°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996930

Grid Coordinates of Well: 1,249,494.92 ft N, 2,009,170.30 ft E

Geographical Coordinates of Well: 39° 57' 50.45" N, 109° 02' 08.91" W

Grid Convergence at Surface is: -2.28°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,755.00ft
the Bottom Hole Displacement is 4,623.91ft in the Direction of 88.38° (True).

Magnetic Convergence at surface is: -12.97° (1 July 2013, , BGGM2013)

