

Noble Energy

Weld County, CO (NAD 83)

Sec. 28-T9N-R58W (Greyson & Brecken PAD)

Greyson LD28-767

05-123-41585

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

22 September, 2015

Surface UWI : 05-123-41585

Well Coordinates: 1,507,997.31 N, 3,451,111.99 E (40° 42' 59.33" N, 103° 52' 21.29" W)

Ground Level: 4,854.00 usft

Local Coordinate Origin:

Centered on Well Greyson LD28-767

Viewing Datum:

KB = 24' @ 4878.00usft (H&P 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

HALLIBURTON

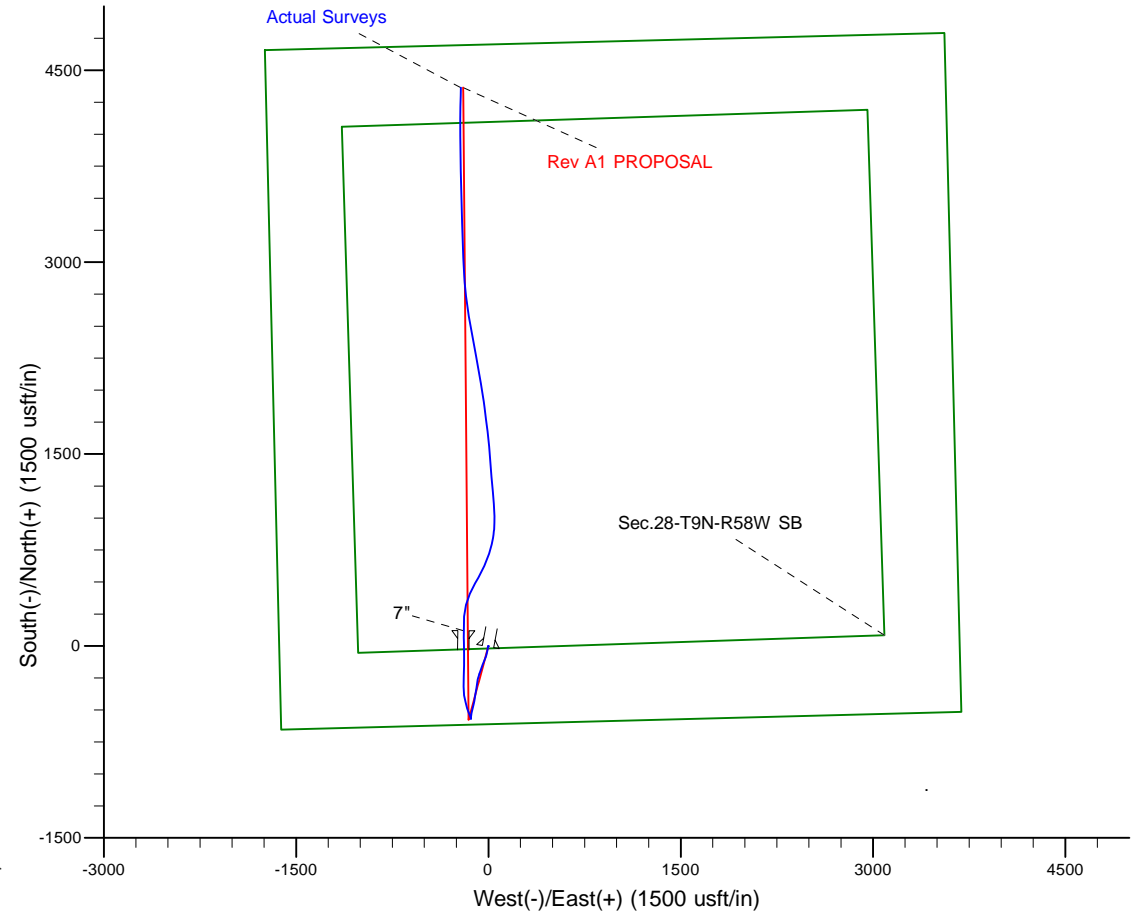
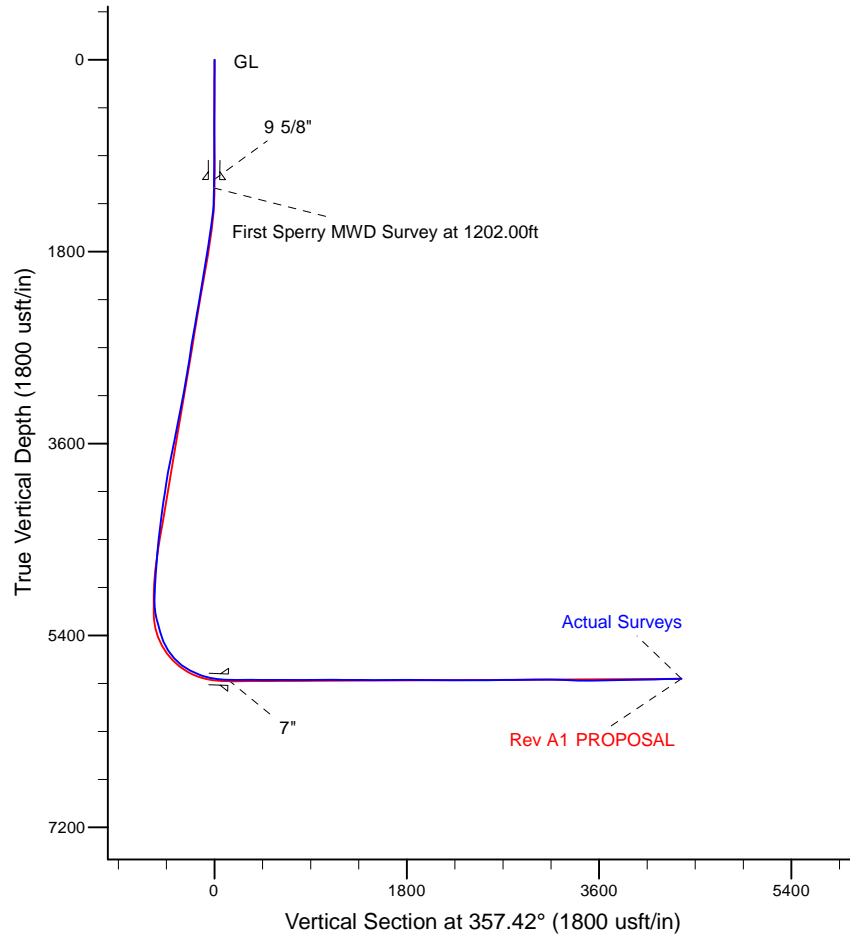
Project: Weld County, CO (NAD 83)
 Site: Sec. 28-T9N-R58W (Greyson & Brecken PAD)
 Well: Greyson LD28-767
 Wellbore: Plan A
 Design: Actual Surveys



Platted SHL: 610' FSL, 1635' FWL
 Platted Lat/Long: 40.716480, -103.872580
 Location: Sec. 28-T9N-R58W

~7" Casing: 728' FSL, 1432' FWL
 Lat/Long: 40.716819 N, -103.873271 W
 State Planes - CO Northern: 1,508,117.27 N, 3,450,918.32 E
 Sec. 28-T9N-R58W

Platted BHL: 330' FNL, 1540' FWL
 Platted Lat/Long: 40.728291 N, -103.873076 W
 State Planes - CO Northern: 1,512,297.04 N, 3,450,895.55 E
 Location: Sec. 28-T9N-R58W



LEGEND

—+— Greyson LD28-767, Plan A, Rev A1 PROPOSAL V0
—+— Actual Surveys

WELL DETAILS: Greyson LD28-767	
Ground Level:	4854.00
KB = 24' @ 4878.00usft (H&P 343)	
Created By:	Tatiana Gomez
Created On:	9/22/2015

Design Report for Greyson LD28-767 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Greyson LD28-767_Rev A0_SHL							
11.76	0.22	168.49	11.76	-0.02	0.00	-0.02	1.87
First Gyro Survey at 11.76ft							
103.03	0.60	185.44	103.03	-0.67	-0.01	-0.67	0.43
194.30	0.43	212.41	194.29	-1.43	-0.23	-1.42	0.32
285.57	0.57	211.05	285.56	-2.11	-0.65	-2.08	0.15
376.84	0.50	160.37	376.83	-2.88	-0.75	-2.84	0.51
468.11	0.09	318.27	468.10	-3.20	-0.67	-3.16	0.64
559.38	0.81	322.76	559.36	-2.63	-1.10	-2.58	0.79
650.65	0.37	247.11	650.63	-2.23	-1.77	-2.15	0.88
741.92	0.34	250.99	741.90	-2.43	-2.29	-2.33	0.04
833.19	0.26	160.71	833.17	-2.72	-2.48	-2.60	0.47
924.46	0.55	180.33	924.43	-3.35	-2.42	-3.24	0.35
1,015.73	0.28	136.12	1,015.70	-3.95	-2.26	-3.85	0.44
1,107.00	0.48	179.88	1,106.97	-4.49	-2.11	-4.39	0.37
Final Gyro Survey at 1107.00ft							
1,125.00	0.39	190.51	1,124.97	-4.63	-2.12	-4.53	0.68
9 5/8"							
1,202.00	0.38	275.94	1,201.97	-4.86	-2.42	-4.75	0.68
First Sperry MWD Survey at 1202.00ft							
1,294.00	1.81	193.87	1,293.95	-6.24	-3.07	-6.09	1.95
1,386.00	4.41	194.23	1,385.81	-11.08	-4.29	-10.87	2.83
1,479.00	6.82	189.02	1,478.36	-20.00	-6.04	-19.71	2.65
1,572.00	8.80	186.40	1,570.49	-32.52	-7.69	-32.14	2.16
1,665.00	9.78	195.33	1,662.27	-47.21	-10.58	-46.69	1.87
1,757.00	9.73	193.09	1,752.94	-62.32	-14.40	-61.61	0.42
1,850.00	9.42	192.58	1,844.65	-77.40	-17.84	-76.52	0.35
1,943.00	9.65	203.26	1,936.37	-91.99	-22.58	-90.88	1.92
2,034.00	9.65	203.27	2,026.08	-106.01	-28.60	-104.61	0.00
2,126.00	9.57	202.57	2,116.79	-120.15	-34.58	-118.48	0.15
2,218.00	11.13	201.32	2,207.29	-135.49	-40.75	-133.52	1.71
2,310.00	11.09	200.47	2,297.57	-152.05	-47.07	-149.78	0.18
2,403.00	10.89	200.32	2,388.86	-168.67	-53.25	-166.10	0.22
2,496.00	10.85	200.84	2,480.19	-185.09	-59.41	-182.23	0.11
2,589.00	10.92	200.31	2,571.52	-201.53	-65.58	-198.37	0.13
2,682.00	9.97	197.85	2,662.98	-217.45	-71.11	-214.03	1.13
2,776.00	9.69	196.53	2,755.60	-232.78	-75.86	-229.13	0.38
2,869.00	9.42	195.53	2,847.31	-247.62	-80.12	-243.76	0.34
2,963.00	8.94	193.65	2,940.10	-262.13	-83.90	-258.09	0.60
3,058.00	9.78	186.75	3,033.84	-277.31	-86.59	-273.14	1.47
3,153.00	9.65	184.74	3,127.48	-293.26	-88.20	-289.00	0.38
3,247.00	10.79	189.04	3,219.99	-309.80	-90.23	-305.43	1.46
3,342.00	11.48	189.56	3,313.20	-327.91	-93.20	-323.38	0.73
3,437.00	12.11	190.48	3,406.19	-347.03	-96.58	-342.33	0.69
3,531.00	11.78	189.77	3,498.16	-366.18	-100.01	-361.31	0.38
3,626.00	11.98	188.40	3,591.12	-385.49	-103.09	-380.46	0.36
3,721.00	11.69	188.25	3,684.10	-404.77	-105.91	-399.60	0.31
3,815.00	11.09	188.97	3,776.25	-423.12	-108.69	-417.81	0.66
3,910.00	10.20	192.96	3,869.62	-440.35	-112.00	-434.86	1.22

Design Report for Greyson LD28-767 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,004.00	9.48	193.36	3,962.23	-455.99	-115.66	-450.33	0.77
4,099.00	9.14	194.29	4,055.98	-470.91	-119.33	-465.07	0.39
4,193.00	8.56	194.40	4,148.86	-484.92	-122.91	-478.91	0.62
4,288.00	7.92	193.13	4,242.88	-498.15	-126.15	-491.97	0.70
4,382.00	7.28	191.88	4,336.05	-510.28	-128.85	-503.97	0.70
4,477.00	6.67	191.71	4,430.35	-521.57	-131.21	-515.14	0.64
4,571.00	6.11	190.82	4,523.77	-531.83	-133.26	-525.30	0.60
4,666.00	5.19	190.33	4,618.30	-541.03	-134.98	-534.41	0.97
4,761.00	4.57	182.48	4,712.96	-549.03	-135.91	-542.37	0.96
4,856.00	4.08	177.76	4,807.69	-556.19	-135.94	-549.52	0.64
4,950.00	3.67	186.10	4,901.48	-562.53	-136.13	-555.83	0.74
5,045.00	1.97	167.80	4,996.36	-567.15	-136.11	-560.45	2.00
5,139.00	1.74	155.62	5,090.31	-570.02	-135.18	-563.37	0.48
5,234.00	13.44	341.69	5,184.54	-560.80	-138.07	-554.03	15.97
5,329.00	14.80	335.16	5,276.67	-539.31	-146.63	-532.17	2.20
5,423.00	13.90	339.81	5,367.74	-517.82	-155.58	-510.29	1.55
5,518.00	25.71	342.70	5,456.97	-487.32	-165.68	-479.38	12.47
5,613.00	33.70	345.62	5,539.42	-442.04	-178.37	-433.57	8.55
5,707.00	41.02	351.95	5,614.11	-386.14	-189.19	-377.24	8.79
5,802.00	52.28	358.53	5,679.26	-317.45	-194.54	-308.38	12.87
5,896.00	63.95	2.94	5,728.84	-237.81	-193.32	-228.88	13.03
5,991.00	68.04	1.48	5,767.48	-151.12	-189.99	-142.42	4.53
6,085.00	76.91	359.14	5,795.76	-61.58	-189.55	-52.99	9.73
6,180.00	84.88	358.26	5,810.78	32.12	-191.69	40.71	8.44
6,213.00	87.04	358.06	5,813.11	65.02	-192.74	73.63	6.57
6,268.00	88.00	0.01	5,815.49	119.96	-193.67	128.55	3.94
7"							
6,379.00	89.94	3.93	5,817.49	230.85	-189.86	239.16	3.94
6,471.00	90.03	14.84	5,817.51	321.48	-174.88	329.02	11.86
6,563.00	90.00	22.90	5,817.49	408.47	-145.15	414.58	8.76
6,655.00	89.91	29.11	5,817.56	491.11	-104.83	495.33	6.75
6,748.00	90.12	28.91	5,817.53	572.44	-59.73	574.55	0.31
6,839.00	90.28	22.96	5,817.22	654.24	-19.95	654.48	6.54
6,932.00	89.17	16.88	5,817.66	741.63	11.72	740.36	6.65
7,024.00	90.40	10.10	5,818.01	831.04	33.17	828.71	7.49
7,118.00	91.42	3.87	5,816.51	924.28	44.59	921.34	6.71
7,208.00	89.72	359.21	5,815.62	1,014.22	47.01	1,011.08	5.51
7,305.00	89.88	355.62	5,815.96	1,111.10	42.64	1,108.06	3.70
7,400.00	89.45	355.05	5,816.51	1,205.79	34.91	1,203.00	0.75
7,495.00	89.82	355.22	5,817.12	1,300.44	26.86	1,297.92	0.43
7,589.00	89.38	355.28	5,817.77	1,394.12	19.07	1,391.85	0.47
7,684.00	89.57	355.55	5,818.64	1,488.81	11.48	1,486.79	0.35
7,778.00	90.52	354.76	5,818.57	1,582.47	3.54	1,580.71	1.31
7,873.00	90.83	353.13	5,817.45	1,676.93	-6.48	1,675.53	1.75
7,968.00	89.94	352.77	5,816.81	1,771.21	-18.14	1,770.23	1.01
8,062.00	90.43	352.22	5,816.51	1,864.40	-30.42	1,863.88	0.78
8,157.00	89.26	350.82	5,816.77	1,958.36	-44.43	1,958.38	1.92
8,252.00	88.98	350.43	5,818.23	2,052.08	-59.90	2,052.70	0.51
8,346.00	89.69	350.44	5,819.32	2,144.77	-75.52	2,145.99	0.76
8,441.00	89.54	349.93	5,819.95	2,238.37	-91.71	2,240.23	0.56
8,536.00	90.43	349.97	5,819.98	2,331.91	-108.29	2,334.43	0.94

Design Report for Greyson LD28-767 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,630.00	90.62	349.58	5,819.12	2,424.42	-124.98	2,427.59	0.46
8,725.00	90.25	349.59	5,818.40	2,517.85	-142.15	2,521.70	0.39
8,820.00	90.18	351.01	5,818.04	2,611.49	-158.15	2,615.96	1.50
8,914.00	90.46	352.83	5,817.52	2,704.55	-171.37	2,709.52	1.96
9,009.00	90.96	355.42	5,816.34	2,799.04	-181.09	2,804.35	2.78
9,104.00	91.08	356.23	5,814.65	2,893.77	-188.00	2,899.29	0.86
9,198.00	89.88	356.99	5,813.86	2,987.60	-193.56	2,993.28	1.51
9,292.00	90.80	358.04	5,813.30	3,081.50	-197.64	3,087.28	1.49
9,387.00	88.30	357.80	5,814.05	3,176.43	-201.09	3,182.26	2.64
9,482.00	87.38	358.13	5,817.63	3,271.30	-204.46	3,277.19	1.03
9,577.00	88.06	358.40	5,821.41	3,366.18	-207.33	3,372.10	0.77
9,671.00	90.62	359.23	5,822.49	3,460.15	-209.27	3,466.06	2.86
9,766.00	89.57	358.68	5,822.33	3,555.13	-211.01	3,561.02	1.25
9,861.00	91.51	358.26	5,821.44	3,650.09	-213.54	3,656.00	2.09
9,955.00	91.63	358.04	5,818.86	3,744.00	-216.58	3,749.96	0.27
10,050.00	91.17	359.52	5,816.54	3,838.95	-218.60	3,844.90	1.63
10,144.00	91.14	0.18	5,814.65	3,932.93	-218.84	3,938.79	0.70
10,239.00	90.40	359.10	5,813.37	4,027.92	-219.44	4,033.71	1.38
10,333.00	91.91	0.55	5,811.47	4,121.89	-219.73	4,127.61	2.23
10,428.00	91.85	1.31	5,808.36	4,216.83	-218.19	4,222.38	0.80
10,511.00	91.32	1.11	5,806.06	4,299.78	-216.44	4,305.16	0.68
Final Sperry MWD Survey at 10511.00ft							
10,576.00	91.32	1.11	5,804.57	4,364.75	-215.18	4,370.01	0.00
Straight Line Projection to TD at 10576.00ft - Greyson LD28-767_Rev A0_BHL - Greyson LD28-767_Rev A1_BHL							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
11.76	11.76	-0.02	0.00	First Gyro Survey at 11.76ft
1,107.00	1,106.97	-4.49	-2.11	Final Gyro Survey at 1107.00ft
1,202.00	1,201.97	-4.86	-2.42	First Sperry MWD Survey at 1202.00ft
10,511.00	5,806.06	4,299.78	-216.44	Final Sperry MWD Survey at 10511.00ft
10,576.00	5,804.57	4,364.75	-215.18	Straight Line Projection to TD at 10576.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Greyson LD28-767_Rev A1_BHL	357.42	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
11.76	1,107.00	Surface Surveys	Flexi-Shot
1,202.00	6,213.00	Intermediate Surveys	MWD
6,379.00	10,576.00	Production Surveys	MWD

Design Report for Greyson LD28-767 - Actual Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,125.00	1,124.97	9 5/8"	9-5/8	13-3/4
6,268.00	5,815.49	7"	7	8-3/4

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Greyson LD28-767_Rc - actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	0.02	0.00	1,507,997.32	3,451,111.99	40.716480	-103.872580
Greyson LD28-767_Rc - actual wellpath misses target center by 18.79usft at 10576.00usft MD (5804.57 TVD, 4364.75 N, -215.18 E) - Point	0.00	0.00	5,807.00	4,365.49	-196.56	1,512,362.75	3,450,915.43	40.728470	-103.873000
Greyson LD28-767_Rc - actual wellpath misses target center by 18.79usft at 10576.00usft MD (5804.57 TVD, 4364.75 N, -215.18 E) - Point	0.00	0.00	5,807.00	4,365.49	-196.56	1,512,362.75	3,450,915.43	40.728470	-103.873000

Directional Difficulty Index

Average Dogleg over Survey:	2.27 °/100usft	Maximum Dogleg over Survey:	15.97 °/100usft at 5,234.00 usft
Net Tortousity applicable to Plans:	1.22 °/100usft	Directional Difficulty Index:	6.388

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) -
Greyson LD28-767 - Plan A

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

Vertical Depths are relative to KB = 24' @ 4878.00usft (H&P 343). Northing and Easting are relative to Greyson LD28-767

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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99998984

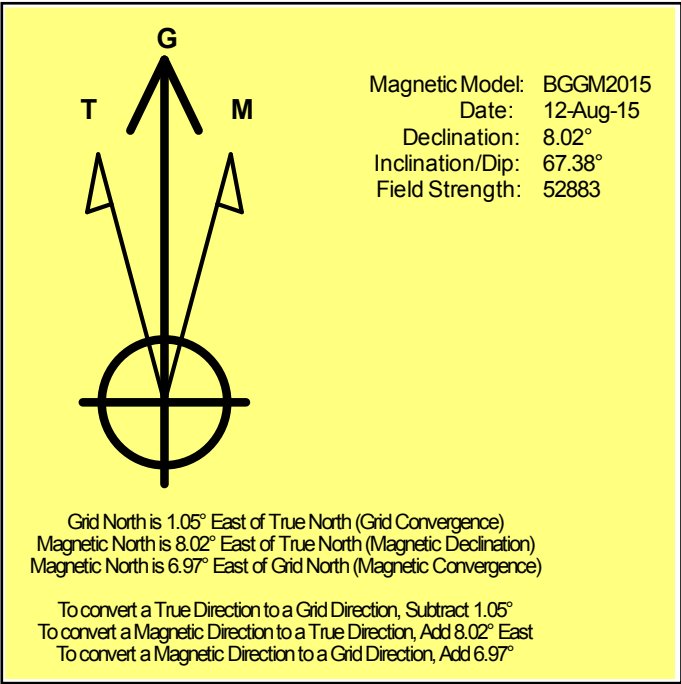
Grid Coordinates of Well: 1,507,997.31 usft N, 3,451,111.99 usft E

Geographical Coordinates of Well: 40° 42' 59.33" N, 103° 52' 21.29" W

Grid Convergence at Surface is: 1.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,576.00usft the Bottom Hole Displacement is 4,370.05usft in the Direction of 357.18° (Grid).

Magnetic Convergence at surface is: -6.97° (12 August 2015, , BGGM2015)



Noble Energy

Weld County, CO (NAD 83)

Sec. 28-T9N-R58W (Greyson & Brecken PAD)

Greyson LD28-767

05-123-41585

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

22 September, 2015

Well Coordinates: 1,507,997.31 N, 3,451,111.99 E (40° 42' 59.33" N, 103° 52' 21.29" W)

Ground Level: 4,854.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well Greyson LD28-767

KB = 24' @ 4878.00usft (H&P 343)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Greyson LD28-767 - Actual Surveys

Measured			Vertical			Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)	+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.716480	-103.872580	40.716480	-103.872580	1,507,997.31	3,451,111.99
11.76	0.22	168.49	11.76	-0.02	0.00	40.716480	-103.872580	40.716480	-103.872580	1,507,997.28	3,451,111.99
103.03	0.60	185.44	103.03	-0.67	-0.01	40.716478	-103.872580	40.716478	-103.872580	1,507,996.64	3,451,111.98
194.30	0.43	212.41	194.29	-1.43	-0.23	40.716476	-103.872581	40.716476	-103.872581	1,507,995.87	3,451,111.75
285.57	0.57	211.05	285.56	-2.11	-0.65	40.716474	-103.872583	40.716474	-103.872583	1,507,995.19	3,451,111.33
376.84	0.50	160.37	376.83	-2.88	-0.75	40.716472	-103.872583	40.716472	-103.872583	1,507,994.43	3,451,111.23
468.11	0.09	318.27	468.10	-3.20	-0.67	40.716471	-103.872583	40.716471	-103.872583	1,507,994.11	3,451,111.32
559.38	0.81	322.76	559.36	-2.63	-1.10	40.716473	-103.872584	40.716473	-103.872584	1,507,994.67	3,451,110.88
650.65	0.37	247.11	650.63	-2.23	-1.77	40.716474	-103.872587	40.716474	-103.872587	1,507,995.07	3,451,110.22
741.92	0.34	250.99	741.90	-2.43	-2.29	40.716473	-103.872589	40.716473	-103.872589	1,507,994.87	3,451,109.69
833.19	0.26	160.71	833.17	-2.72	-2.48	40.716473	-103.872589	40.716473	-103.872589	1,507,994.59	3,451,109.50
924.46	0.55	180.33	924.43	-3.35	-2.42	40.716471	-103.872589	40.716471	-103.872589	1,507,993.95	3,451,109.57
1,015.73	0.28	136.12	1,015.70	-3.95	-2.26	40.716469	-103.872589	40.716469	-103.872589	1,507,993.35	3,451,109.72
1,107.00	0.48	179.88	1,106.97	-4.49	-2.11	40.716468	-103.872588	40.716468	-103.872588	1,507,992.81	3,451,109.88
1,125.00	0.39	190.51	1,124.97	-4.63	-2.12	40.716467	-103.872588	40.716467	-103.872588	1,507,992.68	3,451,109.87
1,202.00	0.38	275.94	1,201.97	-4.86	-2.42	40.716467	-103.872589	40.716467	-103.872589	1,507,992.45	3,451,109.57
1,294.00	1.81	193.87	1,293.95	-6.24	-3.07	40.716463	-103.872592	40.716463	-103.872592	1,507,991.07	3,451,108.91
1,386.00	4.41	194.23	1,385.81	-11.08	-4.29	40.716450	-103.872596	40.716450	-103.872596	1,507,986.23	3,451,107.70
1,479.00	6.82	189.02	1,478.36	-20.00	-6.04	40.716425	-103.872603	40.716425	-103.872603	1,507,977.31	3,451,105.95
1,572.00	8.80	186.40	1,570.49	-32.52	-7.69	40.716391	-103.872610	40.716391	-103.872610	1,507,964.78	3,451,104.29
1,665.00	9.78	195.33	1,662.27	-47.21	-10.58	40.716351	-103.872622	40.716351	-103.872622	1,507,950.09	3,451,101.41
1,757.00	9.73	193.09	1,752.94	-62.32	-14.40	40.716310	-103.872636	40.716310	-103.872636	1,507,934.99	3,451,097.58
1,850.00	9.42	192.58	1,844.65	-77.40	-17.84	40.716269	-103.872650	40.716269	-103.872650	1,507,919.90	3,451,094.15
1,943.00	9.65	203.26	1,936.37	-91.99	-22.58	40.716229	-103.872668	40.716229	-103.872668	1,507,905.31	3,451,089.41
2,034.00	9.65	203.27	2,026.08	-106.01	-28.60	40.716191	-103.872690	40.716191	-103.872690	1,507,891.30	3,451,083.39
2,126.00	9.57	202.57	2,116.79	-120.15	-34.58	40.716152	-103.872713	40.716152	-103.872713	1,507,877.15	3,451,077.40
2,218.00	11.13	201.32	2,207.29	-135.49	-40.75	40.716110	-103.872736	40.716110	-103.872736	1,507,861.82	3,451,071.24
2,310.00	11.09	200.47	2,297.57	-152.05	-47.07	40.716065	-103.872760	40.716065	-103.872760	1,507,845.26	3,451,064.92
2,403.00	10.89	200.32	2,388.86	-168.67	-53.25	40.716020	-103.872783	40.716020	-103.872783	1,507,828.64	3,451,058.74
2,496.00	10.85	200.84	2,480.19	-185.09	-59.41	40.715975	-103.872807	40.715975	-103.872807	1,507,812.22	3,451,052.57
2,589.00	10.92	200.31	2,571.52	-201.53	-65.58	40.715930	-103.872830	40.715930	-103.872830	1,507,795.78	3,451,046.40
2,682.00	9.97	197.85	2,662.98	-217.45	-71.11	40.715887	-103.872851	40.715887	-103.872851	1,507,779.86	3,451,040.88
2,776.00	9.69	196.53	2,755.60	-232.78	-75.86	40.715845	-103.872869	40.715845	-103.872869	1,507,764.53	3,451,036.13
2,869.00	9.42	195.53	2,847.31	-247.62	-80.12	40.715805	-103.872886	40.715805	-103.872886	1,507,749.69	3,451,031.87
2,963.00	8.94	193.65	2,940.10	-262.13	-83.90	40.715765	-103.872900	40.715765	-103.872900	1,507,735.18	3,451,028.08
3,058.00	9.78	186.75	3,033.84	-277.31	-86.59	40.715723	-103.872911	40.715723	-103.872911	1,507,720.00	3,451,025.39
3,153.00	9.65	184.74	3,127.48	-293.26	-88.20	40.715680	-103.872918	40.715680	-103.872918	1,507,704.05	3,451,023.79
3,247.00	10.79	189.04	3,219.99	-309.80	-90.23	40.715634	-103.872926	40.715634	-103.872926	1,507,687.51	3,451,021.75
3,342.00	11.48	189.56	3,313.20	-327.91	-93.20	40.715585	-103.872938	40.715585	-103.872938	1,507,669.40	3,451,018.79
3,437.00	12.11	190.48	3,406.19	-347.03	-96.58	40.715533	-103.872952	40.715533	-103.872952	1,507,650.28	3,451,015.40
3,531.00	11.78	189.77	3,498.16	-366.18	-100.01	40.715480	-103.872965	40.715480	-103.872965	1,507,631.13	3,451,011.98
3,626.00	11.98	188.40	3,591.12	-385.49	-103.09	40.715427	-103.872978	40.715427	-103.872978	1,507,611.82	3,451,008.90

Design Report for Greyson LD28-767 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
3,721.00	11.69	188.25	3,684.10	-404.77	-105.91	40.715375	-103.872989	1,507,592.54	3,451,006.08
3,815.00	11.09	188.97	3,776.25	-423.12	-108.69	40.715324	-103.873000	1,507,574.19	3,451,003.30
3,910.00	10.20	192.96	3,869.62	-440.35	-112.00	40.715277	-103.873013	1,507,556.96	3,450,999.99
4,004.00	9.48	193.36	3,962.23	-455.99	-115.66	40.715235	-103.873028	1,507,541.32	3,450,996.33
4,099.00	9.14	194.29	4,055.98	-470.91	-119.33	40.715194	-103.873042	1,507,526.40	3,450,992.66
4,193.00	8.56	194.40	4,148.86	-484.92	-122.91	40.715155	-103.873056	1,507,512.39	3,450,989.08
4,288.00	7.92	193.13	4,242.88	-498.15	-126.15	40.715119	-103.873068	1,507,499.16	3,450,985.84
4,382.00	7.28	191.88	4,336.05	-510.28	-128.85	40.715086	-103.873079	1,507,487.03	3,450,983.14
4,477.00	6.67	191.71	4,430.35	-521.57	-131.21	40.715055	-103.873088	1,507,475.74	3,450,980.78
4,571.00	6.11	190.82	4,523.77	-531.83	-133.26	40.715027	-103.873096	1,507,465.48	3,450,978.73
4,666.00	5.19	190.33	4,618.30	-541.03	-134.98	40.715002	-103.873103	1,507,456.28	3,450,977.01
4,761.00	4.57	182.48	4,712.96	-549.03	-135.91	40.714980	-103.873107	1,507,448.28	3,450,976.08
4,856.00	4.08	177.76	4,807.69	-556.19	-135.94	40.714961	-103.873107	1,507,441.12	3,450,976.05
4,950.00	3.67	186.10	4,901.48	-562.53	-136.13	40.714943	-103.873108	1,507,434.79	3,450,975.86
5,045.00	1.97	167.80	4,996.36	-567.15	-136.11	40.714930	-103.873109	1,507,430.17	3,450,975.88
5,139.00	1.74	155.62	5,090.31	-570.02	-135.18	40.714923	-103.873106	1,507,427.29	3,450,976.81
5,234.00	13.44	341.69	5,184.54	-560.80	-138.07	40.714948	-103.873115	1,507,436.51	3,450,973.92
5,329.00	14.80	335.16	5,276.67	-539.31	-146.63	40.715007	-103.873145	1,507,458.00	3,450,965.35
5,423.00	13.90	339.81	5,367.74	-517.82	-155.58	40.715067	-103.873176	1,507,479.50	3,450,956.41
5,518.00	25.71	342.70	5,456.97	-487.32	-165.68	40.715151	-103.873210	1,507,509.99	3,450,946.31
5,613.00	33.70	345.62	5,539.42	-442.04	-178.37	40.715276	-103.873253	1,507,555.27	3,450,933.62
5,707.00	41.02	351.95	5,614.11	-386.14	-189.19	40.715430	-103.873288	1,507,611.17	3,450,922.80
5,802.00	52.28	358.53	5,679.26	-317.45	-194.54	40.715619	-103.873303	1,507,679.86	3,450,917.45
5,896.00	63.95	2.94	5,728.84	-237.81	-193.32	40.715837	-103.873293	1,507,759.49	3,450,918.67
5,991.00	68.04	1.48	5,767.48	-151.12	-189.99	40.716075	-103.873276	1,507,846.19	3,450,922.00
6,085.00	76.91	359.14	5,795.76	-61.58	-189.55	40.716321	-103.873268	1,507,935.73	3,450,922.44
6,180.00	84.88	358.26	5,810.78	32.12	-191.69	40.716578	-103.873269	1,508,029.43	3,450,920.30
6,213.00	87.04	358.06	5,813.11	65.02	-192.74	40.716668	-103.873271	1,508,062.33	3,450,919.25
6,268.00	88.00	0.01	5,815.49	119.96	-193.67	40.716819	-103.873271	1,508,117.27	3,450,918.32
6,379.00	89.94	3.93	5,817.49	230.85	-189.86	40.717123	-103.873250	1,508,228.15	3,450,922.13
6,471.00	90.03	14.84	5,817.51	321.48	-174.88	40.717371	-103.873190	1,508,318.78	3,450,937.11
6,563.00	90.00	22.90	5,817.49	408.47	-145.15	40.717608	-103.873077	1,508,405.77	3,450,966.84
6,655.00	89.91	29.11	5,817.56	491.11	-104.83	40.717833	-103.872926	1,508,488.41	3,451,007.16
6,748.00	90.12	28.91	5,817.53	572.44	-59.73	40.718054	-103.872758	1,508,569.74	3,451,052.26
6,839.00	90.28	22.96	5,817.22	654.24	-19.95	40.718276	-103.872609	1,508,651.54	3,451,092.04
6,932.00	89.17	16.88	5,817.66	741.63	11.72	40.718515	-103.872489	1,508,738.93	3,451,123.71
7,024.00	90.40	10.10	5,818.01	831.04	33.17	40.718759	-103.872406	1,508,828.34	3,451,145.16
7,118.00	91.42	3.87	5,816.51	924.28	44.59	40.719014	-103.872358	1,508,921.58	3,451,156.58
7,208.00	89.72	359.21	5,815.62	1,014.22	47.01	40.719261	-103.872344	1,509,011.51	3,451,159.00
7,305.00	89.88	355.62	5,815.96	1,111.10	42.64	40.719527	-103.872353	1,509,108.40	3,451,154.62
7,400.00	89.45	355.05	5,816.51	1,205.79	34.91	40.719787	-103.872375	1,509,203.08	3,451,146.90
7,495.00	89.82	355.22	5,817.12	1,300.44	26.86	40.720047	-103.872397	1,509,297.73	3,451,138.84

Design Report for Greyson LD28-767 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
7,589.00	89.38	355.28	5,817.77	1,394.12	19.07	40.720305	-103.872419	1,509,391.41	3,451,131.06
7,684.00	89.57	355.55	5,818.64	1,488.81	11.48	40.720565	-103.872440	1,509,486.10	3,451,123.46
7,778.00	90.52	354.76	5,818.57	1,582.47	3.54	40.720823	-103.872463	1,509,579.76	3,451,115.53
7,873.00	90.83	353.13	5,817.45	1,676.93	-6.48	40.721082	-103.872493	1,509,674.22	3,451,105.51
7,968.00	89.94	352.77	5,816.81	1,771.21	-18.14	40.721342	-103.872528	1,509,768.50	3,451,093.85
8,062.00	90.43	352.22	5,816.51	1,864.40	-30.42	40.721598	-103.872567	1,509,861.69	3,451,081.57
8,157.00	89.26	350.82	5,816.77	1,958.36	-44.43	40.721857	-103.872611	1,509,955.65	3,451,067.56
8,252.00	88.98	350.43	5,818.23	2,052.08	-59.90	40.722115	-103.872660	1,510,049.36	3,451,052.09
8,346.00	89.69	350.44	5,819.32	2,144.77	-75.52	40.722370	-103.872711	1,510,142.05	3,451,036.47
8,441.00	89.54	349.93	5,819.95	2,238.37	-91.71	40.722627	-103.872763	1,510,235.66	3,451,020.28
8,536.00	90.43	349.97	5,819.98	2,331.91	-108.29	40.722885	-103.872816	1,510,329.20	3,451,003.70
8,630.00	90.62	349.58	5,819.12	2,424.42	-124.98	40.723140	-103.872871	1,510,421.70	3,450,987.01
8,725.00	90.25	349.59	5,818.40	2,517.85	-142.15	40.723397	-103.872926	1,510,515.13	3,450,969.84
8,820.00	90.18	351.01	5,818.04	2,611.49	-158.15	40.723655	-103.872978	1,510,608.77	3,450,953.83
8,914.00	90.46	352.83	5,817.52	2,704.55	-171.37	40.723911	-103.873019	1,510,701.83	3,450,940.62
9,009.00	90.96	355.42	5,816.34	2,799.04	-181.09	40.724171	-103.873048	1,510,796.31	3,450,930.90
9,104.00	91.08	356.23	5,814.65	2,893.77	-188.00	40.724431	-103.873067	1,510,891.04	3,450,923.98
9,198.00	89.88	356.99	5,813.86	2,987.60	-193.56	40.724689	-103.873081	1,510,984.87	3,450,918.43
9,292.00	90.80	358.04	5,813.30	3,081.50	-197.64	40.724947	-103.873089	1,511,078.78	3,450,914.35
9,387.00	88.30	357.80	5,814.05	3,176.43	-201.09	40.725207	-103.873095	1,511,173.70	3,450,910.90
9,482.00	87.38	358.13	5,817.63	3,271.30	-204.46	40.725468	-103.873101	1,511,268.58	3,450,907.53
9,577.00	88.06	358.40	5,821.41	3,366.18	-207.33	40.725728	-103.873105	1,511,363.46	3,450,904.66
9,671.00	90.62	359.23	5,822.49	3,460.15	-209.27	40.725986	-103.873106	1,511,457.42	3,450,902.72
9,766.00	89.57	358.68	5,822.33	3,555.13	-211.01	40.726247	-103.873106	1,511,552.40	3,450,900.98
9,861.00	91.51	358.26	5,821.44	3,650.09	-213.54	40.726508	-103.873109	1,511,647.36	3,450,898.45
9,955.00	91.63	358.04	5,818.86	3,744.00	-216.58	40.726766	-103.873114	1,511,741.27	3,450,895.41
10,050.00	91.17	359.52	5,816.54	3,838.95	-218.60	40.727026	-103.873115	1,511,836.22	3,450,893.39
10,144.00	91.14	0.18	5,814.65	3,932.93	-218.84	40.727284	-103.873109	1,511,930.20	3,450,893.15
10,239.00	90.40	359.10	5,813.37	4,027.92	-219.44	40.727545	-103.873105	1,512,025.18	3,450,892.55
10,333.00	91.91	0.55	5,811.47	4,121.89	-219.73	40.727803	-103.873100	1,512,119.16	3,450,892.26
10,428.00	91.85	1.31	5,808.36	4,216.83	-218.19	40.728063	-103.873088	1,512,214.09	3,450,893.80
10,511.00	91.32	1.11	5,806.06	4,299.78	-216.44	40.728291	-103.873076	1,512,297.04	3,450,895.55
10,576.00	91.32	1.11	5,804.57	4,364.75	-215.18	40.728469	-103.873067	1,512,362.01	3,450,896.81

Design Report for Greyson LD28-767 - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
11.76	11.76	-0.02	0.00	First Gyro Survey at 11.76ft
1,107.00	1,106.97	-4.49	-2.11	Final Gyro Survey at 1107.00ft
1,202.00	1,201.97	-4.86	-2.42	First Sperry MWD Survey at 1202.00ft
10,511.00	5,806.06	4,299.78	-216.44	Final Sperry MWD Survey at 10511.00ft
10,576.00	5,804.57	4,364.75	-215.18	Straight Line Projection to TD at 10576.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Greyson LD28-767_Rev A1_BHL	357.42	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
11.76	1,107.00	Surface Surveys	Flexi-Shot
1,202.00	6,213.00	Intermediate Surveys	MWD
6,379.00	10,576.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,125.00	1,124.97	9 5/8"	9-5/8	13-3/4
6,268.00	5,815.49	7"	7	8-3/4

Design Report for Greyson LD28-767 - Actual Surveys

Design Targets

Shape	Target Name	TVD ()	Northing ()	Easting ()	+N/-S	+E/-W	Created	Updated
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Directional Difficulty Index

Average Dogleg over Survey:	2.27 °/100usft	Maximum Dogleg over Survey:	15.97 °/100usft at 5,234.00 usft
Net Tortosity applicable to Plans:	1.22 °/100usft	Directional Difficulty Index:	6.388

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) - Greyson LD28-767 - Plan A

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

Vertical Depths are relative to KB = 24' @ 4878.00usft (H&P 343). Northing and Easting are relative to Greyson LD28-767

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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99998984

Grid Coordinates of Well: 1,507,997.31 usft N, 3,451,111.99 usft E

Geographical Coordinates of Well: 40° 42' 59.33" N, 103° 52' 21.29" W

Grid Convergence at Surface is: 1.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,576.00usft

the Bottom Hole Displacement is 4,370.05usft in the Direction of 357.18° (Grid).

Magnetic Convergence at surface is: -6.97° (12 August 2015, , BGGM2015)

