

Noble Energy

Weld County, CO (NAD 83)

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

Greyson LD28-773

05-123-41588

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

06 October, 2015

Surface UWI : 05-123-41588

Well Coordinates: 1,507,996.65 N, 3,451,075.96 E (40° 42' 59.33" N, 103° 52' 21.76" W)

Ground Level: 4,855.00 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 LD28-773

KB = 24 @ 4879.00usft (H&P 343)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

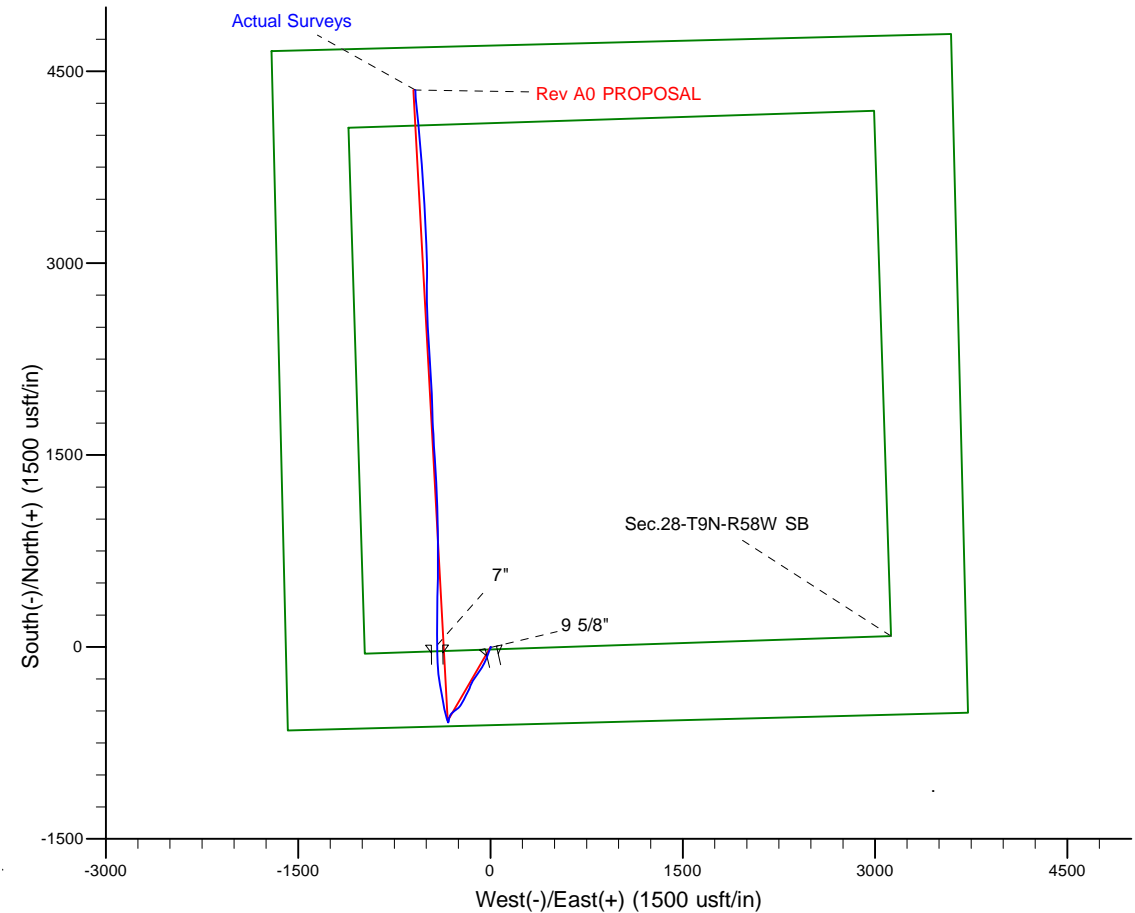
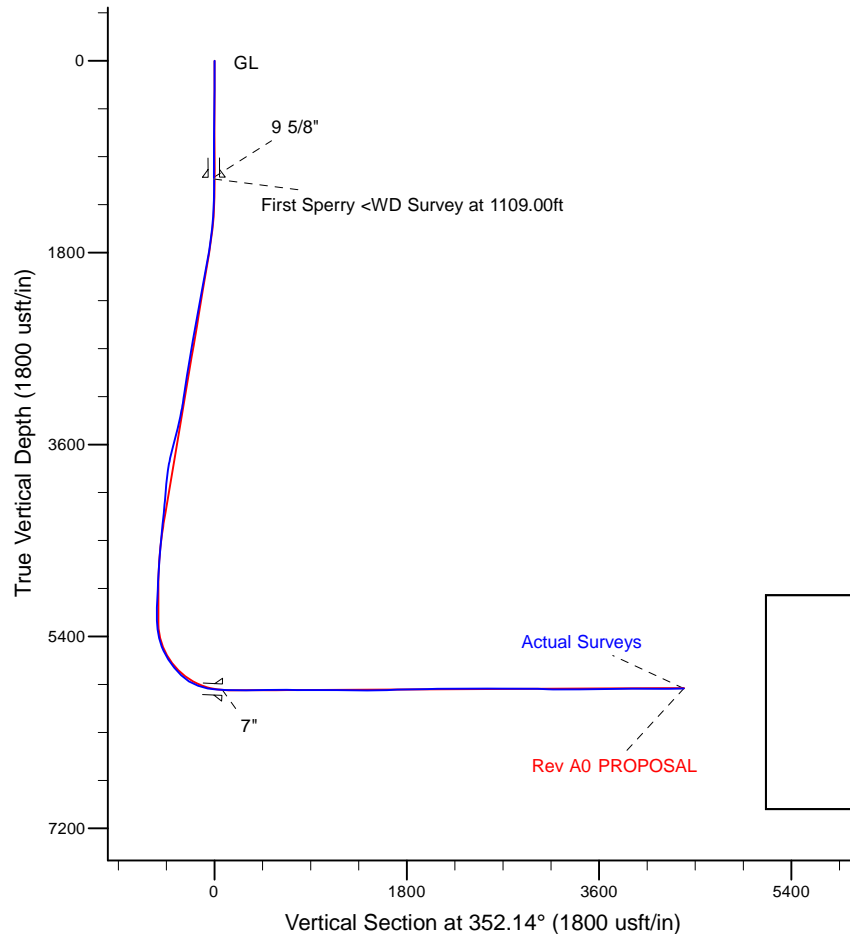
Project: Weld County, CO (NAD 83)
 Site: Sec. 28-T9N-R58W (Greyson & Brecken PAD)
 Well: Greyson LD28-773
 Wellbore: Plan A
 Design: Actual Surveys



Platted SHL: 610' FSL, 1597' FWL
 Platted Lat/Long: 40.716480, --103.872710
 Location: Sec. 28-T9N-R58W

~7" Casing: 635' FSL, 1173' FWL
 Lat/Long: 40.716541 S, -103.874208 W
 State Planes - CO Northern: 1,508,011.11 N, 3,450,660.40 E
 Sec. 28-T9N-R58W

Platted BHL: 330' FNL, 1100' FWL
 Platted Lat/Long: 40.728292 N, -103.874527 W
 State Planes - CO Northern: 1,512,290.06' N, 3,450,493.53 E
 Location: Sec. 28-T9N-R58W



LEGEND

- ◇ Greyson LD28-773, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Greyson LD28-773

Ground Level: 4855.00
 KB = 24 @ 4879.00usft (H&P 343)

Created By: Tatiana Gomez
 Created On: 9/22/2015

Design Report for Greyson LD28-773 - 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 LD28-773_Rev A0_SHL							
92.52	0.15	115.55	92.52	-0.05	0.11	-0.07	0.16
First Gyro Survey at 92.52ft							
183.20	0.39	126.86	183.20	-0.29	0.46	-0.35	0.27
273.88	0.73	107.57	273.87	-0.65	1.26	-0.81	0.42
364.56	0.69	118.77	364.55	-1.08	2.29	-1.39	0.16
455.24	0.78	140.28	455.22	-1.82	3.16	-2.24	0.32
545.92	0.42	132.34	545.90	-2.52	3.80	-3.01	0.41
636.60	0.41	118.93	636.57	-2.90	4.33	-3.46	0.11
727.28	0.41	173.41	727.25	-3.38	4.65	-3.98	0.42
817.96	0.31	191.22	817.93	-3.94	4.64	-4.54	0.17
908.64	0.24	272.40	908.61	-4.18	4.40	-4.74	0.40
999.32	0.13	275.87	999.29	-4.16	4.10	-4.68	0.13
1,090.00	0.06	327.35	1,089.97	-4.11	3.98	-4.61	0.11
Final Gyro Survey at 1090.00ft							
1,092.00	0.07	346.97	1,091.97	-4.10	3.97	-4.61	1.10
9 5/8"							
1,109.00	0.22	38.11	1,108.97	-4.07	3.99	-4.58	1.10
First Sperry <WD Survey at 1109.00ft							
1,202.00	0.26	259.77	1,201.97	-3.97	3.90	-4.46	0.48
1,386.00	4.03	217.65	1,385.81	-9.16	-0.47	-9.01	2.09
1,479.00	5.23	207.12	1,478.50	-15.52	-4.40	-14.77	1.58
1,572.00	6.83	200.67	1,570.99	-24.47	-8.28	-23.11	1.87
1,666.00	8.16	195.46	1,664.18	-36.13	-12.03	-34.14	1.59
1,758.00	9.03	198.46	1,755.15	-49.27	-16.06	-46.61	1.06
1,850.00	10.97	201.57	1,845.75	-64.26	-21.56	-60.71	2.19
1,943.00	11.80	200.49	1,936.92	-81.40	-28.14	-76.78	0.92
2,034.00	12.98	204.67	2,025.80	-99.40	-35.67	-93.59	1.63
2,126.00	13.38	207.41	2,115.38	-118.24	-44.88	-110.99	0.81
2,218.00	13.22	205.32	2,204.91	-137.20	-54.28	-128.49	0.55
2,310.00	13.27	212.75	2,294.47	-155.59	-64.49	-145.31	1.85
2,404.00	12.64	211.92	2,386.08	-173.39	-75.77	-161.40	0.70
2,497.00	12.12	211.78	2,476.91	-190.33	-86.29	-176.74	0.56
2,590.00	13.65	216.26	2,567.57	-207.48	-97.92	-192.14	1.96
2,682.00	13.84	216.09	2,656.94	-225.12	-110.82	-207.86	0.21
2,776.00	13.41	214.90	2,748.29	-243.15	-123.68	-223.95	0.55
2,869.00	12.55	213.30	2,838.91	-260.44	-135.40	-239.48	1.00
2,964.00	11.33	206.69	2,931.86	-277.41	-145.26	-254.94	1.93
3,058.00	9.01	197.25	3,024.38	-292.69	-151.59	-269.21	3.03
3,153.00	8.96	201.73	3,118.22	-306.66	-156.54	-282.38	0.74
3,248.00	10.91	203.85	3,211.79	-321.76	-162.91	-296.46	2.09
3,342.00	14.26	206.58	3,303.52	-340.26	-171.69	-313.58	3.62
3,437.00	15.16	205.42	3,395.41	-361.94	-182.26	-333.62	1.00
3,532.00	16.92	208.66	3,486.71	-385.29	-194.22	-355.11	2.08
3,626.00	17.73	208.22	3,576.44	-409.91	-207.55	-377.68	0.87
3,721.00	17.41	207.81	3,667.01	-435.22	-221.02	-400.91	0.36
3,815.00	15.95	215.63	3,757.06	-458.16	-235.11	-421.71	2.85
3,910.00	14.59	229.35	3,848.74	-476.57	-251.80	-437.67	4.05
4,004.00	11.09	231.28	3,940.37	-489.95	-267.84	-448.72	3.75

Design Report for Greyson LD28-773 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,099.00	9.97	231.93	4,033.77	-500.73	-281.44	-457.54	1.19
4,194.00	8.99	232.96	4,127.47	-510.27	-293.84	-465.30	1.05
4,383.00	7.68	205.99	4,314.54	-530.53	-311.17	-483.00	2.16
4,477.00	6.39	204.67	4,407.83	-540.93	-316.10	-492.62	1.38
4,572.00	5.96	202.37	4,502.28	-550.30	-320.19	-501.34	0.52
4,667.00	4.76	192.22	4,596.87	-558.71	-322.90	-509.31	1.61
4,761.00	4.07	183.37	4,690.59	-565.85	-323.92	-516.24	1.03
4,856.00	4.01	187.35	4,785.35	-572.51	-324.54	-522.75	0.30
4,951.00	3.53	186.56	4,880.15	-578.71	-325.30	-528.79	0.51
5,045.00	2.11	199.88	4,974.03	-583.21	-326.22	-533.13	1.65
5,140.00	2.08	204.81	5,068.97	-586.42	-327.54	-536.13	0.19
5,234.00	1.67	203.87	5,162.92	-589.22	-328.81	-538.73	0.44
5,329.00	0.62	222.57	5,257.90	-590.87	-329.72	-540.23	1.16
5,424.00	10.77	344.44	5,352.35	-582.67	-332.46	-531.74	11.69
5,518.00	16.93	341.89	5,443.58	-561.18	-339.07	-509.54	6.58
5,613.00	24.43	345.87	5,532.40	-528.93	-348.18	-476.36	8.03
5,708.00	32.39	347.24	5,615.89	-485.00	-358.61	-431.40	8.41
5,802.00	37.64	351.02	5,692.86	-432.05	-368.66	-377.58	6.04
5,897.00	46.95	349.37	5,763.05	-369.14	-379.62	-313.76	9.87
5,991.00	57.78	349.85	5,820.37	-296.02	-393.00	-239.50	11.53
6,086.00	69.11	353.27	5,862.78	-212.10	-405.33	-154.69	12.35
6,180.00	80.66	357.67	5,887.26	-121.81	-412.39	-64.27	13.09
6,257.00	85.59	358.93	5,896.47	-45.42	-414.65	11.71	6.61
6,317.00	87.49	359.32	5,900.10	14.46	-415.56	71.15	3.23
7"							
6,376.00	89.35	359.71	5,901.73	73.43	-416.06	129.63	3.23
6,468.00	89.26	359.94	5,902.84	165.43	-416.34	220.80	0.27
6,652.00	90.34	1.40	5,903.48	349.40	-414.19	402.76	0.99
6,746.00	90.92	1.07	5,902.45	443.38	-412.16	495.57	0.71
6,839.00	91.20	0.91	5,900.73	536.35	-410.55	587.45	0.35
6,932.00	89.45	359.86	5,900.20	629.34	-409.93	679.48	2.19
7,024.00	89.29	359.56	5,901.21	721.33	-410.40	770.67	0.37
7,118.00	89.72	359.71	5,902.03	815.32	-410.99	863.87	0.48
7,211.00	89.94	359.28	5,902.30	908.32	-411.81	956.10	0.52
7,305.00	90.43	359.50	5,902.00	1,002.31	-412.82	1,049.35	0.57
7,400.00	88.98	358.48	5,902.49	1,097.29	-414.49	1,143.67	1.87
7,495.00	88.77	357.24	5,904.35	1,192.21	-418.04	1,238.17	1.32
7,589.00	89.94	357.02	5,905.41	1,286.08	-422.74	1,331.81	1.27
7,684.00	89.32	355.83	5,906.03	1,380.89	-428.67	1,426.54	1.41
7,778.00	92.13	357.07	5,904.84	1,474.69	-434.49	1,520.25	3.27
7,873.00	92.13	356.72	5,901.30	1,569.49	-439.63	1,614.86	0.37
7,968.00	91.91	356.44	5,897.96	1,664.26	-445.29	1,709.52	0.37
8,062.00	90.77	357.51	5,895.76	1,758.10	-450.25	1,803.15	1.66
8,157.00	91.30	358.17	5,894.04	1,853.02	-453.83	1,897.67	0.89
8,252.00	91.14	357.47	5,892.02	1,947.93	-457.44	1,992.18	0.76
8,346.00	90.15	357.16	5,890.96	2,041.82	-461.85	2,085.79	1.10
8,441.00	89.94	357.05	5,890.89	2,136.69	-466.64	2,180.43	0.25
8,536.00	90.31	356.57	5,890.68	2,231.55	-471.93	2,275.12	0.64
8,630.00	90.77	356.23	5,889.79	2,325.36	-477.83	2,368.85	0.61
8,725.00	90.65	357.26	5,888.62	2,420.20	-483.23	2,463.54	1.09
8,820.00	89.32	356.37	5,888.64	2,515.05	-488.50	2,558.22	1.68

Design Report for Greyson LD28-773 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,914.00	89.57	357.52	5,889.55	2,608.91	-493.51	2,651.88	1.25
9,009.00	90.03	359.17	5,889.88	2,703.86	-496.26	2,746.32	1.80
9,104.00	90.00	1.65	5,889.86	2,798.85	-495.58	2,840.33	2.61
9,198.00	89.45	0.37	5,890.31	2,892.83	-493.92	2,933.20	1.48
9,292.00	88.77	358.78	5,891.77	2,986.82	-494.62	3,026.40	1.84
9,387.00	88.15	358.02	5,894.32	3,081.74	-497.27	3,120.79	1.03
9,482.00	89.85	357.49	5,895.98	3,176.65	-500.99	3,215.32	1.87
9,577.00	89.63	356.66	5,896.41	3,271.53	-505.84	3,309.97	0.90
9,671.00	90.68	357.20	5,896.16	3,365.39	-510.87	3,403.64	1.26
9,766.00	90.92	357.24	5,894.83	3,460.27	-515.48	3,498.25	0.26
9,861.00	90.96	356.46	5,893.27	3,555.11	-520.70	3,592.92	0.82
9,955.00	90.86	355.81	5,891.78	3,648.89	-527.03	3,686.68	0.70
10,050.00	90.06	355.96	5,891.02	3,743.64	-533.85	3,781.47	0.86
10,144.00	89.88	355.47	5,891.07	3,837.37	-540.87	3,875.29	0.56
10,239.00	89.57	354.92	5,891.52	3,932.04	-548.83	3,970.15	0.66
10,333.00	90.46	354.47	5,891.50	4,025.63	-557.52	4,064.06	1.06
10,428.00	90.37	354.36	5,890.81	4,120.18	-566.77	4,158.98	0.15
10,523.00	90.43	354.43	5,890.15	4,214.72	-576.05	4,253.90	0.10
10,602.00	91.48	356.30	5,888.83	4,293.45	-582.43	4,332.76	2.71
Final Sperry MWD Survey at 10602.00ft							
10,663.00	91.48	356.20	5,887.25	4,354.30	-586.42	4,393.59	0.16
Straight Line Projection to TD at 10663.00ft - Greyson LD28-773_Rev A0_BHL							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,090.00	1,089.97	-4.11	3.98	Final Gyro Survey at 1090.00ft
1,109.00	1,108.97	-4.07	3.99	First Sperry <WD Survey at 1109.00ft
10,602.00	5,888.83	4,293.45	-582.43	Final Sperry MWD Survey at 10602.00ft
10,663.00	5,887.25	4,354.30	-586.42	Straight Line Projection to TD at 10663.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Greyson LD28-773_Rev A0_BHL	352.14	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
92.52	1,090.00	Surface Surveys	Flexi-Shot
1,109.00	6,257.00	Intermediate Surveys	MWD
6,376.00	10,663.00	Production Surveys	MWD+IFR1+MS_WY

Design Report for Greyson LD28-773 - Actual Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,092.00	1,091.97	9 5/8"	9-5/8	13-3/4
6,317.00	5,900.10	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 LD28-773_Rc - actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	0.01	0.00	1,507,996.66	3,451,075.96	40.716480	-103.872710
Greyson LD28-773_Rc - actual wellpath misses target center by 15.26usft at 10663.00usft MD (5887.25 TVD, 4354.30 N, -586.42 E) - Point	0.00	0.00	5,883.00	4,354.42	-601.07	1,512,351.02	3,450,474.89	40.728460	-103.874590

Directional Difficulty Index

Average Dogleg over Survey:	1.88 °/100usft	Maximum Dogleg over Survey:	13.09 °/100usft at 6,047.00 usft
Net Tortosity applicable to Plans:	0.81 °/100usft	Directional Difficulty Index:	6.311

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) -
Greyson LD28-773 - 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 @ 4879.00usft (H&P 343). Northing and Easting are relative to Greyson LD28-773

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

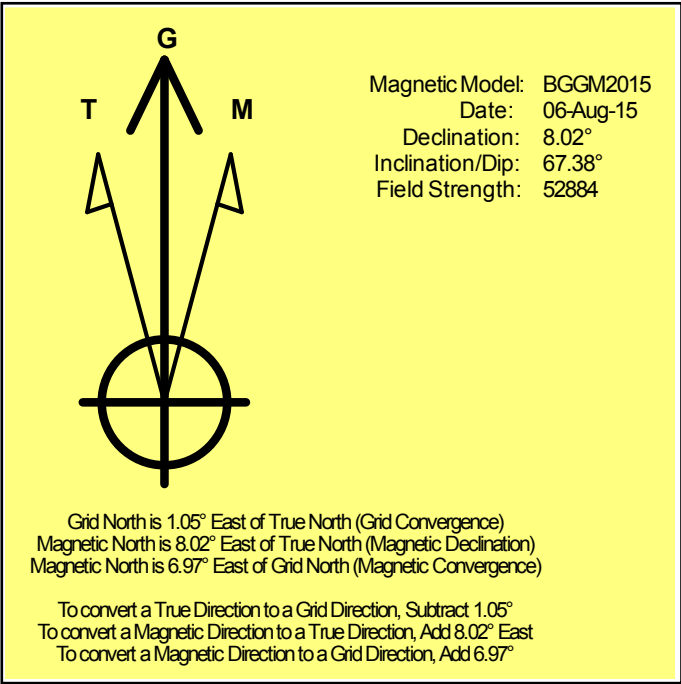
Grid Coordinates of Well: 1,507,996.65 usft N, 3,451,075.96 usft E

Geographical Coordinates of Well: 40° 42' 59.33" N, 103° 52' 21.76" W

Grid Convergence at Surface is: 1.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,663.00usft
the Bottom Hole Displacement is 4,393.61usft in the Direction of 352.33° (Grid).

Magnetic Convergence at surface is: -6.97° (6 August 2015, , BGGM2015)



Noble Energy

Weld County, CO (NAD 83)

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

Greyson LD28-773

05-123-41588

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

06 October, 2015

Well Coordinates: 1,507,996.65 N, 3,451,075.96 E (40° 42' 59.33" N, 103° 52' 21.76" W)

Ground Level: 4,855.00 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 LD28-773

KB = 24 @ 4879.00usft (H&P 343)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Greyson LD28-773 - Actual Surveys

Measured			Vertical	Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth	Inclination	Azimuth	Depth	+N/-S	+E/-W	Latitude	Longitude	Northing	Easting
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.716480	-103.872710	1,507,996.65	3,451,075.96
92.52	0.15	115.55	92.52	-0.05	0.11	40.716480	-103.872710	1,507,996.60	3,451,076.06
183.20	0.39	126.86	183.20	-0.29	0.46	40.716479	-103.872709	1,507,996.37	3,451,076.41
273.88	0.73	107.57	273.87	-0.65	1.26	40.716478	-103.872706	1,507,996.01	3,451,077.21
364.56	0.69	118.77	364.55	-1.08	2.29	40.716477	-103.872702	1,507,995.57	3,451,078.24
455.24	0.78	140.28	455.22	-1.82	3.16	40.716475	-103.872699	1,507,994.83	3,451,079.12
545.92	0.42	132.34	545.90	-2.52	3.80	40.716473	-103.872697	1,507,994.13	3,451,079.76
636.60	0.41	118.93	636.57	-2.90	4.33	40.716472	-103.872695	1,507,993.76	3,451,080.28
727.28	0.41	173.41	727.25	-3.38	4.65	40.716471	-103.872694	1,507,993.27	3,451,080.60
817.96	0.31	191.22	817.93	-3.94	4.64	40.716469	-103.872694	1,507,992.71	3,451,080.59
908.64	0.24	272.40	908.61	-4.18	4.40	40.716468	-103.872695	1,507,992.48	3,451,080.35
999.32	0.13	275.87	999.29	-4.16	4.10	40.716468	-103.872696	1,507,992.50	3,451,080.06
1,090.00	0.06	327.35	1,089.97	-4.11	3.98	40.716469	-103.872696	1,507,992.55	3,451,079.93
1,092.00	0.07	346.97	1,091.97	-4.10	3.97	40.716469	-103.872696	1,507,992.55	3,451,079.93
1,109.00	0.22	38.11	1,108.97	-4.07	3.99	40.716469	-103.872696	1,507,992.58	3,451,079.95
1,202.00	0.26	259.77	1,201.97	-3.97	3.90	40.716469	-103.872696	1,507,992.69	3,451,079.85
1,386.00	4.03	217.65	1,385.81	-9.16	-0.47	40.716455	-103.872713	1,507,987.49	3,451,075.49
1,479.00	5.23	207.12	1,478.50	-15.52	-4.40	40.716438	-103.872727	1,507,981.13	3,451,071.56
1,572.00	6.83	200.67	1,570.99	-24.47	-8.28	40.716413	-103.872742	1,507,972.18	3,451,067.68
1,666.00	8.16	195.46	1,664.18	-36.13	-12.03	40.716382	-103.872756	1,507,960.52	3,451,063.92
1,758.00	9.03	198.46	1,755.15	-49.27	-16.06	40.716346	-103.872771	1,507,947.38	3,451,059.90
1,850.00	10.97	201.57	1,845.75	-64.26	-21.56	40.716305	-103.872792	1,507,932.39	3,451,054.39
1,943.00	11.80	200.49	1,936.92	-81.40	-28.14	40.716258	-103.872817	1,507,915.26	3,451,047.81
2,034.00	12.98	204.67	2,025.80	-99.40	-35.67	40.716209	-103.872845	1,507,897.25	3,451,040.29
2,126.00	13.38	207.41	2,115.38	-118.24	-44.88	40.716158	-103.872880	1,507,878.41	3,451,031.08
2,218.00	13.22	205.32	2,204.91	-137.20	-54.28	40.716106	-103.872915	1,507,859.45	3,451,021.68
2,310.00	13.27	212.75	2,294.47	-155.59	-64.49	40.716056	-103.872953	1,507,841.06	3,451,011.46
2,404.00	12.64	211.92	2,386.08	-173.39	-75.77	40.716008	-103.872995	1,507,823.26	3,451,000.19
2,497.00	12.12	211.78	2,476.91	-190.33	-86.29	40.715962	-103.873034	1,507,806.32	3,450,989.67
2,590.00	13.65	216.26	2,567.57	-207.48	-97.92	40.715916	-103.873077	1,507,789.17	3,450,978.04
2,682.00	13.84	216.09	2,656.94	-225.12	-110.82	40.715868	-103.873125	1,507,771.53	3,450,965.13
2,776.00	13.41	214.90	2,748.29	-243.15	-123.68	40.715819	-103.873172	1,507,753.50	3,450,952.27
2,869.00	12.55	213.30	2,838.91	-260.44	-135.40	40.715772	-103.873216	1,507,736.21	3,450,940.56
2,964.00	11.33	206.69	2,931.86	-277.41	-145.26	40.715726	-103.873253	1,507,719.25	3,450,930.70
3,058.00	9.01	197.25	3,024.38	-292.69	-151.59	40.715684	-103.873276	1,507,703.97	3,450,924.37
3,153.00	8.96	201.73	3,118.22	-306.66	-156.54	40.715646	-103.873295	1,507,689.99	3,450,919.42
3,248.00	10.91	203.85	3,211.79	-321.76	-162.91	40.715605	-103.873319	1,507,674.89	3,450,913.05
3,342.00	14.26	206.58	3,303.52	-340.26	-171.69	40.715555	-103.873352	1,507,656.40	3,450,904.27
3,437.00	15.16	205.42	3,395.41	-361.94	-182.26	40.715496	-103.873392	1,507,634.72	3,450,893.70
3,532.00	16.92	208.66	3,486.71	-385.29	-194.22	40.715432	-103.873436	1,507,611.36	3,450,881.74
3,626.00	17.73	208.22	3,576.44	-409.91	-207.55	40.715366	-103.873486	1,507,586.75	3,450,868.41
3,721.00	17.41	207.81	3,667.01	-435.22	-221.02	40.715297	-103.873536	1,507,561.43	3,450,854.94

Design Report for Greyson LD28-773 - 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)
3,815.00	15.95	215.63	3,757.06	-458.16	-235.11	40.715235	-103.873589	1,507,538.49	3,450,840.85
3,910.00	14.59	229.35	3,848.74	-476.57	-251.80	40.715185	-103.873650	1,507,520.08	3,450,824.16
4,004.00	11.09	231.28	3,940.37	-489.95	-267.84	40.715149	-103.873709	1,507,506.71	3,450,808.12
4,099.00	9.97	231.93	4,033.77	-500.73	-281.44	40.715120	-103.873758	1,507,495.92	3,450,794.52
4,194.00	8.99	232.96	4,127.47	-510.27	-293.84	40.715095	-103.873804	1,507,486.38	3,450,782.12
4,383.00	7.68	205.99	4,314.54	-530.53	-311.17	40.715040	-103.873868	1,507,466.13	3,450,764.79
4,477.00	6.39	204.67	4,407.83	-540.93	-316.10	40.715012	-103.873886	1,507,455.73	3,450,759.85
4,572.00	5.96	202.37	4,502.28	-550.30	-320.19	40.714986	-103.873901	1,507,446.36	3,450,755.77
4,667.00	4.76	192.22	4,596.87	-558.71	-322.90	40.714963	-103.873912	1,507,437.95	3,450,753.06
4,761.00	4.07	183.37	4,690.59	-565.85	-323.92	40.714944	-103.873916	1,507,430.81	3,450,752.04
4,856.00	4.01	187.35	4,785.35	-572.51	-324.54	40.714925	-103.873919	1,507,424.15	3,450,751.41
4,951.00	3.53	186.56	4,880.15	-578.71	-325.30	40.714908	-103.873922	1,507,417.95	3,450,750.65
5,045.00	2.11	199.88	4,974.03	-583.21	-326.22	40.714896	-103.873925	1,507,413.44	3,450,749.74
5,140.00	2.08	204.81	5,068.97	-586.42	-327.54	40.714887	-103.873930	1,507,410.24	3,450,748.42
5,234.00	1.67	203.87	5,162.92	-589.22	-328.81	40.714880	-103.873935	1,507,407.43	3,450,747.15
5,329.00	0.62	222.57	5,257.90	-590.87	-329.72	40.714875	-103.873939	1,507,405.79	3,450,746.24
5,424.00	10.77	344.44	5,352.35	-582.67	-332.46	40.714898	-103.873948	1,507,413.99	3,450,743.50
5,518.00	16.93	341.89	5,443.58	-561.18	-339.07	40.714957	-103.873970	1,507,435.48	3,450,736.89
5,613.00	24.43	345.87	5,532.40	-528.93	-348.18	40.715046	-103.874001	1,507,467.72	3,450,727.78
5,708.00	32.39	347.24	5,615.89	-485.00	-358.61	40.715167	-103.874036	1,507,511.66	3,450,717.34
5,802.00	37.64	351.02	5,692.86	-432.05	-368.66	40.715313	-103.874069	1,507,564.61	3,450,707.30
5,897.00	46.95	349.37	5,763.05	-369.14	-379.62	40.715486	-103.874104	1,507,627.52	3,450,696.34
5,991.00	57.78	349.85	5,820.37	-296.02	-393.00	40.715687	-103.874147	1,507,700.63	3,450,682.96
6,086.00	69.11	353.27	5,862.78	-212.10	-405.33	40.715918	-103.874186	1,507,784.55	3,450,670.63
6,180.00	80.66	357.67	5,887.26	-121.81	-412.39	40.716167	-103.874206	1,507,874.84	3,450,663.57
6,257.00	85.59	358.93	5,896.47	-45.42	-414.65	40.716376	-103.874209	1,507,951.23	3,450,661.31
6,317.00	87.49	359.32	5,900.10	14.46	-415.56	40.716541	-103.874208	1,508,011.11	3,450,660.40
6,376.00	89.35	359.71	5,901.73	73.43	-416.06	40.716703	-103.874206	1,508,070.08	3,450,659.90
6,468.00	89.26	359.94	5,902.84	165.43	-416.34	40.716955	-103.874201	1,508,162.08	3,450,659.62
6,652.00	90.34	1.40	5,903.48	349.40	-414.19	40.717460	-103.874181	1,508,346.05	3,450,661.77
6,746.00	90.92	1.07	5,902.45	443.38	-412.16	40.717718	-103.874167	1,508,440.02	3,450,663.80
6,839.00	91.20	0.91	5,900.73	536.35	-410.55	40.717973	-103.874156	1,508,532.99	3,450,665.40
6,932.00	89.45	359.86	5,900.20	629.34	-409.93	40.718228	-103.874147	1,508,625.98	3,450,666.03
7,024.00	89.29	359.56	5,901.21	721.33	-410.40	40.718480	-103.874143	1,508,717.98	3,450,665.56
7,118.00	89.72	359.71	5,902.03	815.32	-410.99	40.718738	-103.874139	1,508,811.97	3,450,664.97
7,211.00	89.94	359.28	5,902.30	908.32	-411.81	40.718993	-103.874135	1,508,904.96	3,450,664.15
7,305.00	90.43	359.50	5,902.00	1,002.31	-412.82	40.719251	-103.874133	1,508,998.96	3,450,663.14
7,400.00	88.98	358.48	5,902.49	1,097.29	-414.49	40.719512	-103.874133	1,509,093.94	3,450,661.47
7,495.00	88.77	357.24	5,904.35	1,192.21	-418.04	40.719773	-103.874139	1,509,188.85	3,450,657.92
7,589.00	89.94	357.02	5,905.41	1,286.08	-422.74	40.720031	-103.874150	1,509,282.72	3,450,653.22
7,684.00	89.32	355.83	5,906.03	1,380.89	-428.67	40.720291	-103.874165	1,509,377.53	3,450,647.29
7,778.00	92.13	357.07	5,904.84	1,474.69	-434.49	40.720549	-103.874180	1,509,471.33	3,450,641.47

Design Report for Greyson LD28-773 - 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)
7,873.00	92.13	356.72	5,901.30	1,569.49	-439.63	40.720809	-103.874192	1,509,566.13	3,450,636.33
7,968.00	91.91	356.44	5,897.96	1,664.26	-445.29	40.721070	-103.874206	1,509,660.90	3,450,630.67
8,062.00	90.77	357.51	5,895.76	1,758.10	-450.25	40.721327	-103.874218	1,509,754.74	3,450,625.71
8,157.00	91.30	358.17	5,894.04	1,853.02	-453.83	40.721588	-103.874225	1,509,849.65	3,450,622.13
8,252.00	91.14	357.47	5,892.02	1,947.93	-457.44	40.721849	-103.874231	1,509,944.56	3,450,618.52
8,346.00	90.15	357.16	5,890.96	2,041.82	-461.85	40.722107	-103.874241	1,510,038.45	3,450,614.11
8,441.00	89.94	357.05	5,890.89	2,136.69	-466.64	40.722367	-103.874252	1,510,133.33	3,450,609.32
8,536.00	90.31	356.57	5,890.68	2,231.55	-471.93	40.722628	-103.874265	1,510,228.18	3,450,604.03
8,630.00	90.77	356.23	5,889.79	2,325.36	-477.83	40.722886	-103.874280	1,510,321.99	3,450,598.13
8,725.00	90.65	357.26	5,888.62	2,420.20	-483.23	40.723146	-103.874293	1,510,416.82	3,450,592.73
8,820.00	89.32	356.37	5,888.64	2,515.05	-488.50	40.723407	-103.874306	1,510,511.67	3,450,587.46
8,914.00	89.57	357.52	5,889.55	2,608.91	-493.51	40.723665	-103.874318	1,510,605.53	3,450,582.45
9,009.00	90.03	359.17	5,889.88	2,703.86	-496.26	40.723925	-103.874321	1,510,700.49	3,450,579.70
9,104.00	90.00	1.65	5,889.86	2,798.85	-495.58	40.724186	-103.874313	1,510,795.48	3,450,580.38
9,198.00	89.45	0.37	5,890.31	2,892.83	-493.92	40.724444	-103.874300	1,510,889.46	3,450,582.04
9,292.00	88.77	358.78	5,891.77	2,986.82	-494.62	40.724702	-103.874297	1,510,983.44	3,450,581.34
9,387.00	88.15	358.02	5,894.32	3,081.74	-497.27	40.724962	-103.874300	1,511,078.36	3,450,578.69
9,482.00	89.85	357.49	5,895.98	3,176.65	-500.99	40.725223	-103.874307	1,511,173.27	3,450,574.97
9,577.00	89.63	356.66	5,896.41	3,271.53	-505.84	40.725484	-103.874318	1,511,268.15	3,450,570.12
9,671.00	90.68	357.20	5,896.16	3,365.39	-510.87	40.725741	-103.874330	1,511,362.01	3,450,565.09
9,766.00	90.92	357.24	5,894.83	3,460.27	-515.48	40.726002	-103.874341	1,511,456.89	3,450,560.48
9,861.00	90.96	356.46	5,893.27	3,555.11	-520.70	40.726263	-103.874353	1,511,551.73	3,450,555.26
9,955.00	90.86	355.81	5,891.78	3,648.89	-527.03	40.726520	-103.874370	1,511,645.50	3,450,548.93
10,050.00	90.06	355.96	5,891.02	3,743.64	-533.85	40.726781	-103.874388	1,511,740.25	3,450,542.11
10,144.00	89.88	355.47	5,891.07	3,837.37	-540.87	40.727038	-103.874407	1,511,833.99	3,450,535.09
10,239.00	89.57	354.92	5,891.52	3,932.04	-548.83	40.727298	-103.874430	1,511,928.65	3,450,527.13
10,333.00	90.46	354.47	5,891.50	4,025.63	-557.52	40.727556	-103.874455	1,512,022.25	3,450,518.44
10,428.00	90.37	354.36	5,890.81	4,120.18	-566.77	40.727816	-103.874482	1,512,116.79	3,450,509.19
10,523.00	90.43	354.43	5,890.15	4,214.72	-576.05	40.728075	-103.874509	1,512,211.33	3,450,499.92
10,602.00	91.48	356.30	5,888.83	4,293.45	-582.43	40.728292	-103.874527	1,512,290.06	3,450,493.53
10,663.00	91.48	356.20	5,887.25	4,354.30	-586.42	40.728459	-103.874537	1,512,350.91	3,450,489.54

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
92.52	92.52	-0.05	0.11	First Gyro Survey at 92.52ft
1,090.00	1,089.97	-4.11	3.98	Final Gyro Survey at 1090.00ft
1,109.00	1,108.97	-4.07	3.99	First Sperry <WD Survey at 1109.00ft
10,602.00	5,888.83	4,293.45	-582.43	Final Sperry MWD Survey at 10602.00ft
10,663.00	5,887.25	4,354.30	-586.42	Straight Line Projection to TD at 10663.00ft

Design Report for Greyson LD28-773 - Actual Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Greyson LD28-773_Rev A0_BHL	352.14	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
92.52	1,090.00	Surface Surveys	Flexi-Shot
1,109.00	6,257.00	Intermediate Surveys	MWD
6,376.00	10,663.00	Production Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,092.00	1,091.97	9 5/8"	9-5/8	13-3/4
6,317.00	5,900.10	7"	7	8-3/4

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:	1.88 °/100usft	Maximum Dogleg over Survey:	13.09 °/100usft at 6,047.00 usft
Net Tortosity applicable to Plans:	0.81 °/100usft	Directional Difficulty Index:	6.311

Design Report for Greyson LD28-773 - Actual Surveys

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) - Greyson LD28-773 - 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 @ 4879.00usft (H&P 343). Northing and Easting are relative to Greyson LD28-773

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: 1,507,996.65 usft N, 3,451,075.96 usft E

Geographical Coordinates of Well: 40° 42' 59.33" N, 103° 52' 21.76" W

Grid Convergence at Surface is: 1.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,663.00usft

the Bottom Hole Displacement is 4,393.61usft in the Direction of 352.33° (Grid).

Magnetic Convergence at surface is: -6.97° (6 August 2015, , BGGM2015)

