

Noble Energy

Weld County, CO (NAD 83)

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

Brecken LD28-727

05-123-41567

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

06 October, 2015

Surface UWI : 05-123-41567

Well Coordinates: 1,507,796.79 N, 3,453,086.98 E (40° 42' 56.99" N, 103° 51' 55.69" W)

Ground Level: 4,829.00 usft

Local Coordinate Origin:

Centered on Well Brecken LD28-727

Viewing Datum:

KB = 24' @ 4853.00usft (H&P 273)

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

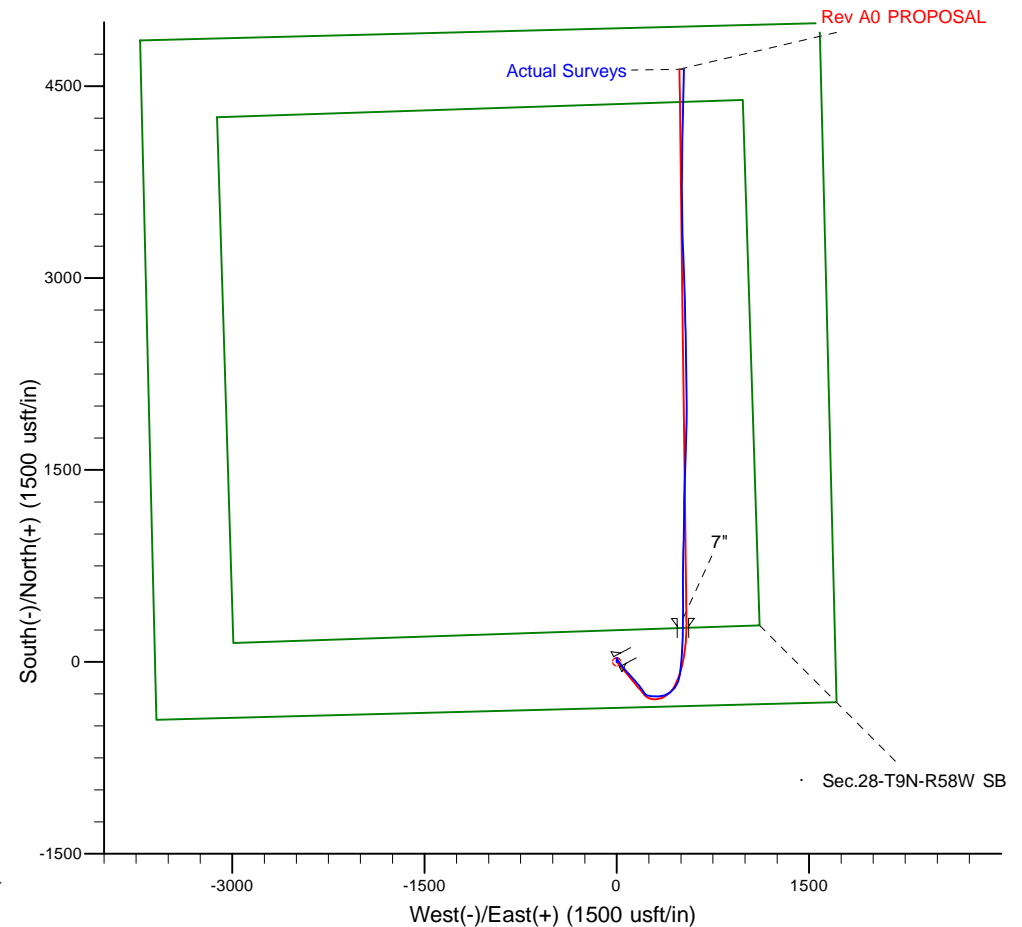
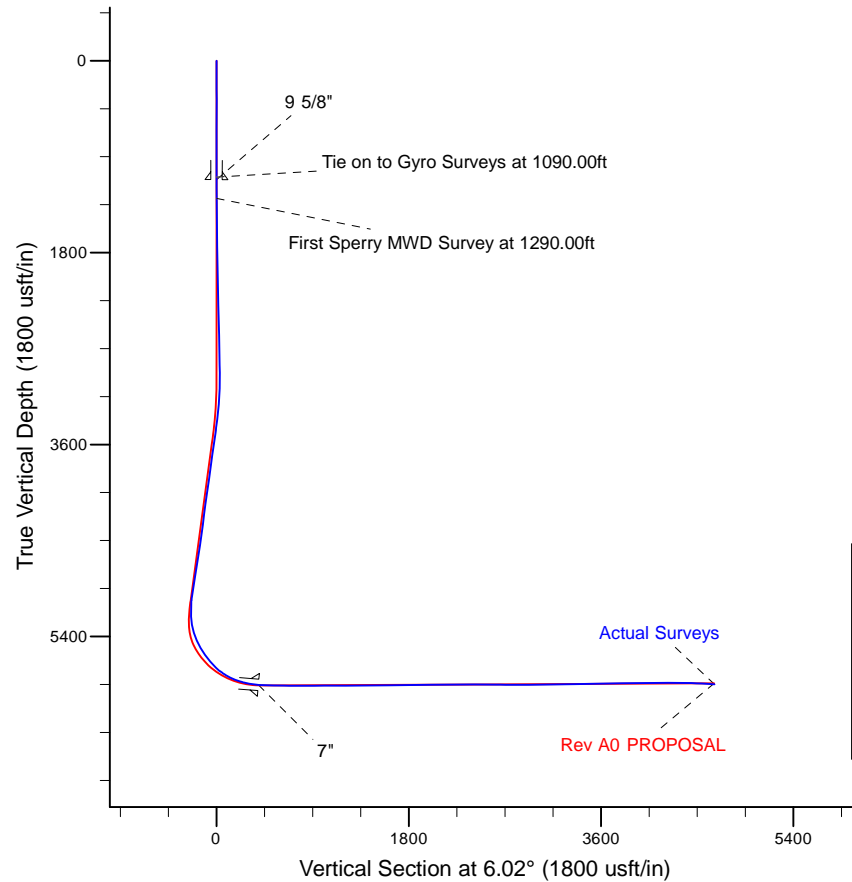
Project: Weld County, CO (NAD 83)
 Site: Sec. 28-T9N-R58W (Greyson & Brecken PAD)
 Well: Brecken LD28-727
 Wellbore: Plan A
 Design: Actual Surveys



Platted SHL: 358' FSL, 1704' FEL
 Platted Lat/Long: 40.71583, -103.86547
 Location: Sec. 28-T9N-R58W

~7" Casing: 682' FSL, 1187' FEL
 Lat/Long: 40.716736 N, -103.863588 W
 State Planes - CO Northern: 1,508,136.31 N, 3,453,602.66 E
 Sec. 28-T9N-R58W

Platted BHL: 330' FNL, 1100' FEL
 Platted Lat/Long: 40.728514 N, -103.863273 W
 State Planes - CO Northern: 1,512,428.37 N, 3,453,610.75 E
 Location: Sec. 28-T9N-R58W



LEGEND

- △ Brecken LD28-727, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys

WELL DETAILS: Brecken LD28-727

Ground Level: 4829.00
 KB = 24' @ 4853.00usft (H&P 273)

Created By: Tatiana Gomez
 Created On: 10/6/2015

Design Report for Brecken LD28-727 - 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
86.75	0.30	26.05	86.75	0.20	0.10	0.21	0.34
178.00	0.22	292.18	178.00	0.48	0.04	0.48	0.42
269.25	0.30	344.52	269.25	0.78	-0.18	0.75	0.26
360.50	0.18	283.58	360.50	1.04	-0.39	1.00	0.29
451.75	0.18	238.76	451.75	1.00	-0.65	0.93	0.15
543.00	0.01	223.79	543.00	0.92	-0.78	0.83	0.19
1,090.00	0.14	213.86	1,090.00	0.33	-1.18	0.21	0.02
Tie on to Gyro Surveys at 1090.00ft							
1,115.00	0.09	241.75	1,115.00	0.30	-1.22	0.17	0.29
9 5/8"							
1,290.00	0.48	348.95	1,289.99	0.95	-1.48	0.79	0.29
First Sperry MWD Survey at 1290.00ft							
1,381.00	0.75	1.53	1,380.99	1.92	-1.54	1.75	0.33
1,472.00	0.81	6.36	1,471.98	3.16	-1.45	2.99	0.10
1,564.00	0.65	24.74	1,563.97	4.28	-1.16	4.13	0.31
1,655.00	0.71	17.54	1,654.97	5.28	-0.77	5.17	0.11
1,747.00	0.87	2.27	1,746.96	6.52	-0.57	6.43	0.29
1,838.00	1.04	1.18	1,837.95	8.04	-0.53	7.94	0.19
1,930.00	1.05	357.86	1,929.93	9.72	-0.54	9.61	0.07
2,021.00	1.27	1.10	2,020.91	11.56	-0.56	11.44	0.25
2,113.00	1.16	10.10	2,112.89	13.49	-0.37	13.38	0.24
2,205.00	1.10	9.92	2,204.87	15.28	-0.06	15.19	0.07
2,297.00	1.14	1.14	2,296.86	17.07	0.11	16.98	0.19
2,389.00	1.30	358.24	2,388.83	19.02	0.10	18.93	0.19
2,480.00	1.30	349.12	2,479.81	21.07	-0.13	20.94	0.23
2,572.00	1.42	344.43	2,571.79	23.19	-0.63	23.00	0.18
2,663.00	1.31	340.43	2,662.76	25.26	-1.28	24.99	0.16
2,758.00	1.38	340.52	2,757.73	27.36	-2.03	27.00	0.07
2,853.00	1.32	333.86	2,852.71	29.42	-2.89	28.96	0.18
2,948.00	1.12	328.40	2,947.69	31.19	-3.86	30.62	0.24
3,042.00	1.55	137.65	3,041.68	31.04	-3.48	30.50	2.83
3,137.00	4.69	140.54	3,136.52	27.09	-0.15	26.92	3.31
3,232.00	6.41	147.07	3,231.08	19.64	5.20	20.08	1.93
3,326.00	8.43	148.43	3,324.28	9.36	11.66	10.53	2.16
3,421.00	8.42	148.55	3,418.26	-2.50	18.94	-0.51	0.02
3,516.00	11.57	139.98	3,511.81	-15.74	28.70	-12.64	3.66
3,611.00	11.70	140.82	3,604.86	-30.50	40.91	-26.04	0.22
3,705.00	11.39	142.46	3,696.96	-45.25	52.58	-39.49	0.48
3,800.00	10.04	143.22	3,790.30	-59.32	63.26	-52.36	1.43
3,895.00	10.95	140.60	3,883.71	-72.92	73.94	-64.77	1.08
3,989.00	13.12	137.12	3,975.64	-87.64	86.87	-78.05	2.43
4,084.00	12.58	137.14	4,068.26	-103.13	101.25	-91.95	0.57
4,179.00	11.78	135.57	4,161.12	-117.64	115.07	-104.92	0.91
4,273.00	11.07	134.48	4,253.26	-130.81	128.23	-116.65	0.79
4,368.00	11.10	138.04	4,346.48	-144.00	140.85	-128.44	0.72
4,463.00	10.14	139.09	4,439.86	-157.12	152.44	-140.28	1.03
4,557.00	10.92	143.49	4,532.27	-170.53	163.16	-152.49	1.19
4,652.00	12.70	145.05	4,625.26	-186.33	174.49	-167.01	1.90
4,747.00	11.66	143.04	4,718.12	-202.56	186.25	-181.92	1.18

Design Report for Brecken LD28-727 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,842.00	12.38	143.23	4,811.04	-218.39	198.12	-196.41	0.76
4,936.00	11.36	145.07	4,903.03	-234.05	209.45	-210.80	1.16
5,031.00	13.30	146.10	4,995.83	-250.79	220.90	-226.25	2.06
5,126.00	23.55	101.96	5,086.24	-263.88	245.74	-236.67	17.52
5,220.00	25.26	91.66	5,171.87	-268.36	284.18	-237.09	4.87
5,315.00	26.58	88.96	5,257.32	-268.56	325.69	-232.94	1.86
5,410.00	31.78	73.39	5,340.35	-261.01	371.01	-220.67	9.65
5,504.00	33.50	53.21	5,419.74	-238.33	415.64	-193.44	11.68
5,599.00	33.90	36.29	5,498.96	-201.19	452.40	-152.65	9.87
5,694.00	34.96	20.60	5,577.47	-154.26	477.71	-103.33	9.38
5,789.00	41.51	8.20	5,652.16	-97.48	491.81	-45.38	10.59
5,883.00	50.70	5.21	5,717.27	-30.28	499.58	22.26	10.04
5,978.00	60.71	3.78	5,770.73	47.87	505.66	100.61	10.61
6,073.00	69.61	3.71	5,810.60	133.81	511.28	186.67	9.37
6,168.00	78.27	1.74	5,836.86	224.91	515.58	277.72	9.33
6,236.00	81.68	359.25	5,848.70	291.85	516.16	344.35	6.18
6,284.00	85.23	359.62	5,854.17	339.53	515.68	391.72	7.43
7"							
6,339.00	89.29	0.03	5,856.80	394.45	515.51	446.32	7.43
6,431.00	89.08	359.99	5,858.11	486.44	515.53	537.81	0.23
6,525.00	88.00	0.25	5,860.50	580.41	515.73	631.28	1.18
6,619.00	89.88	0.45	5,862.24	674.39	516.30	724.80	2.01
6,809.00	90.52	1.38	5,861.58	864.36	519.34	914.04	0.59
6,904.00	90.40	0.77	5,860.82	959.34	521.12	1,008.68	0.65
6,999.00	90.28	1.22	5,860.25	1,054.32	522.77	1,103.32	0.49
7,093.00	89.94	0.60	5,860.07	1,148.31	524.26	1,196.94	0.75
7,188.00	89.01	0.48	5,860.94	1,243.30	525.16	1,291.51	0.99
7,283.00	90.62	1.91	5,861.25	1,338.27	527.14	1,386.16	2.27
7,377.00	91.29	2.17	5,859.68	1,432.20	530.48	1,479.92	0.76
7,472.00	90.83	2.08	5,857.92	1,527.12	534.00	1,574.69	0.49
7,566.00	91.23	1.97	5,856.23	1,621.05	537.33	1,668.44	0.44
7,661.00	90.43	1.10	5,854.86	1,716.00	539.87	1,763.14	1.24
7,756.00	91.36	1.82	5,853.37	1,810.96	542.29	1,857.83	1.24
7,851.00	90.77	0.52	5,851.61	1,905.92	544.23	1,952.47	1.50
7,945.00	89.88	359.98	5,851.08	1,999.91	544.64	2,045.99	1.11
8,040.00	89.48	359.78	5,851.61	2,094.91	544.44	2,140.44	0.47
8,135.00	89.72	359.06	5,852.27	2,189.90	543.48	2,234.81	0.80
8,230.00	90.59	359.01	5,852.01	2,284.89	541.88	2,329.11	0.92
8,325.00	90.77	359.10	5,850.88	2,379.87	540.31	2,423.40	0.21
8,419.00	90.00	359.10	5,850.25	2,473.85	538.84	2,516.71	0.82
8,514.00	88.83	358.58	5,851.22	2,568.83	536.91	2,610.96	1.35
8,609.00	89.91	358.41	5,852.27	2,663.79	534.42	2,705.14	1.15
8,704.00	89.85	358.87	5,852.47	2,758.76	532.16	2,799.35	0.49
8,798.00	89.14	358.46	5,853.29	2,852.73	529.97	2,892.57	0.87
8,893.00	90.86	358.45	5,853.29	2,947.69	527.41	2,986.74	1.81
8,988.00	91.11	357.98	5,851.66	3,042.63	524.45	3,080.85	0.56
9,083.00	90.92	357.54	5,849.98	3,137.54	520.74	3,174.85	0.50
9,177.00	91.51	356.94	5,847.99	3,231.41	516.22	3,267.72	0.90
9,272.00	91.26	359.02	5,845.69	3,326.32	512.87	3,361.76	2.20
9,367.00	90.65	359.27	5,844.11	3,421.30	511.45	3,456.06	0.69
9,462.00	90.49	358.59	5,843.16	3,516.28	509.68	3,550.33	0.74

Design Report for Brecken LD28-727 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,556.00	90.74	0.15	5,842.15	3,610.26	508.64	3,643.69	1.68
9,651.00	90.74	358.92	5,840.92	3,705.25	507.87	3,738.07	1.29
9,840.00	91.29	0.62	5,837.58	3,894.21	507.11	3,925.91	0.95
9,935.00	91.29	2.05	5,835.44	3,989.16	509.33	4,020.57	1.50
10,029.00	89.82	1.07	5,834.53	4,083.11	511.89	4,114.28	1.88
10,124.00	89.17	1.11	5,835.36	4,178.09	513.69	4,208.92	0.69
10,219.00	89.91	1.28	5,836.13	4,273.07	515.67	4,303.58	0.80
10,314.00	89.54	1.09	5,836.58	4,368.05	517.64	4,398.24	0.44
10,409.00	88.15	1.22	5,838.50	4,463.01	519.55	4,492.88	1.47
10,512.00	86.39	1.53	5,843.40	4,565.86	522.02	4,595.42	1.73
Final Sperry MWD Survey at 10512.00ft							
10,577.93	86.39	1.53	5,847.56	4,631.63	523.78	4,661.02	0.00
Brecken LD28-727_Rev A0_BHL							
10,579.00	86.39	1.53	5,847.62	4,632.70	523.81	4,662.08	0.00
Straight Line Projection to TD at 10579.00ft							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,090.00	1,090.00	0.33	-1.18	Tie on to Gyro Surveys at 1090.00ft
1,290.00	1,289.99	0.95	-1.48	First Sperry MWD Survey at 1290.00ft
10,512.00	5,843.40	4,565.86	522.02	Final Sperry MWD Survey at 10512.00ft
10,579.00	5,847.62	4,632.70	523.81	Straight Line Projection to TD at 10579.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Brecken LD28-727_Rev A0_BHL	6.02	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
87.00	543.00	Surface Surveys	NS-GYRO-MS
634.00	6,236.00	Intermediate Survey	MWD
6,339.00	10,579.00	Production Survey	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,115.00	1,115.00	9 5/8"	9-5/8	13-3/4
6,284.00	5,854.17	7"	7	8-3/4

Design Report for Brecken LD28-727 - Actual Surveys

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
Brecken LD28-727_Re - 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	1,507,796.80	3,453,086.98	40.715830	-103.865470
Brecken LD28-727_Re - actual wellpath misses target center by 36.67usft at 10577.93usft MD (5847.56 TVD, 4631.63 N, 523.78 E) - Point	0.00	0.00	5,838.00	4,633.18	488.41	1,512,429.92	3,453,575.39	40.728520	-103.863400

Directional Difficulty Index

Average Dogleg over Survey:	1.87 °/100usft	Maximum Dogleg over Survey:	17.52 °/100usft at 5,126.00 usft
Net Tortousity applicable to Plans:	0.70 °/100usft	Directional Difficulty Index:	6.294

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) - Brecken LD28-727 - 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' @ 4853.00usft (H&P 273). Northing and Easting are relative to Brecken LD28-727

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: 0.99998974

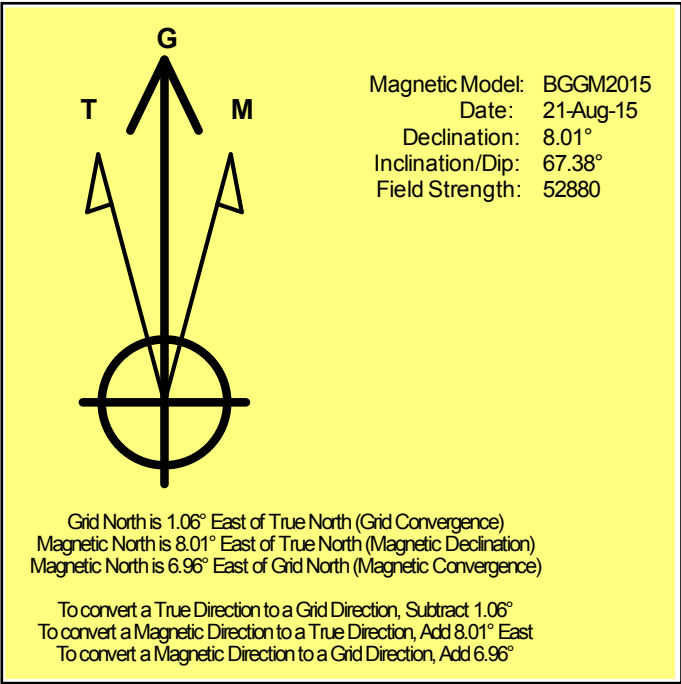
Grid Coordinates of Well: 1,507,796.79 usft N, 3,453,086.98 usft E

Geographical Coordinates of Well: 40° 42' 56.99" N, 103° 51' 55.69" W

Grid Convergence at Surface is: 1.06°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,579.00usft the Bottom Hole Displacement is 4,662.22usft in the Direction of 6.45° (Grid).

Magnetic Convergence at surface is: -6.96° (21 August 2015, , BGGM2015)



Noble Energy

Weld County, CO (NAD 83)

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

Brecken LD28-727

05-123-41567

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

06 October, 2015

Well Coordinates: 1,507,796.79 N, 3,453,086.98 E (40° 42' 56.99" N, 103° 51' 55.69" W)

Ground Level: 4,829.00 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 Brecken LD28-727

KB = 24' @ 4853.00usft (H&P 273)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Brecken LD28-727 - 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	40.715830	-103.865470	40.715830	-103.865470	1,507,796.79	3,453,086.98
86.75	0.30	26.05	86.75	0.20	0.10	40.715831	-103.865470	40.715831	-103.865470	1,507,796.99	3,453,087.08
178.00	0.22	292.18	178.00	0.48	0.04	40.715831	-103.865470	40.715831	-103.865470	1,507,797.27	3,453,087.02
269.25	0.30	344.52	269.25	0.78	-0.18	40.715832	-103.865471	40.715832	-103.865471	1,507,797.56	3,453,086.80
360.50	0.18	283.58	360.50	1.04	-0.39	40.715833	-103.865472	40.715833	-103.865472	1,507,797.83	3,453,086.59
451.75	0.18	238.76	451.75	1.00	-0.65	40.715833	-103.865473	40.715833	-103.865473	1,507,797.79	3,453,086.33
543.00	0.01	223.79	543.00	0.92	-0.78	40.715833	-103.865473	40.715833	-103.865473	1,507,797.71	3,453,086.20
1,090.00	0.14	213.86	1,090.00	0.33	-1.18	40.715831	-103.865475	40.715831	-103.865475	1,507,797.12	3,453,085.80
1,115.00	0.09	241.75	1,115.00	0.30	-1.22	40.715831	-103.865475	40.715831	-103.865475	1,507,797.08	3,453,085.76
1,290.00	0.48	348.95	1,289.99	0.95	-1.48	40.715833	-103.865476	40.715833	-103.865476	1,507,797.74	3,453,085.50
1,381.00	0.75	1.53	1,380.99	1.92	-1.54	40.715835	-103.865476	40.715835	-103.865476	1,507,798.71	3,453,085.45
1,472.00	0.81	6.36	1,471.98	3.16	-1.45	40.715839	-103.865475	40.715839	-103.865475	1,507,799.94	3,453,085.53
1,564.00	0.65	24.74	1,563.97	4.28	-1.16	40.715842	-103.865474	40.715842	-103.865474	1,507,801.06	3,453,085.82
1,655.00	0.71	17.54	1,654.97	5.28	-0.77	40.715845	-103.865473	40.715845	-103.865473	1,507,802.07	3,453,086.21
1,747.00	0.87	2.27	1,746.96	6.52	-0.57	40.715848	-103.865472	40.715848	-103.865472	1,507,803.31	3,453,086.41
1,838.00	1.04	1.18	1,837.95	8.04	-0.53	40.715852	-103.865472	40.715852	-103.865472	1,507,804.83	3,453,086.45
1,930.00	1.05	357.86	1,929.93	9.72	-0.54	40.715857	-103.865472	40.715857	-103.865472	1,507,806.50	3,453,086.44
2,021.00	1.27	1.10	2,020.91	11.56	-0.56	40.715862	-103.865471	40.715862	-103.865471	1,507,808.34	3,453,086.43
2,113.00	1.16	10.10	2,112.89	13.49	-0.37	40.715867	-103.865471	40.715867	-103.865471	1,507,810.28	3,453,086.61
2,205.00	1.10	9.92	2,204.87	15.28	-0.06	40.715872	-103.865469	40.715872	-103.865469	1,507,812.07	3,453,086.92
2,297.00	1.14	1.14	2,296.86	17.07	0.11	40.715877	-103.865469	40.715877	-103.865469	1,507,813.85	3,453,087.10
2,389.00	1.30	358.24	2,388.83	19.02	0.10	40.715882	-103.865469	40.715882	-103.865469	1,507,815.81	3,453,087.08
2,480.00	1.30	349.12	2,479.81	21.07	-0.13	40.715888	-103.865469	40.715888	-103.865469	1,507,817.86	3,453,086.85
2,572.00	1.42	344.43	2,571.79	23.19	-0.63	40.715894	-103.865471	40.715894	-103.865471	1,507,819.98	3,453,086.35
2,663.00	1.31	340.43	2,662.76	25.26	-1.28	40.715899	-103.865473	40.715899	-103.865473	1,507,822.04	3,453,085.70
2,758.00	1.38	340.52	2,757.73	27.36	-2.03	40.715905	-103.865476	40.715905	-103.865476	1,507,824.15	3,453,084.96
2,853.00	1.32	333.86	2,852.71	29.42	-2.89	40.715911	-103.865479	40.715911	-103.865479	1,507,826.21	3,453,084.09
2,948.00	1.12	328.40	2,947.69	31.19	-3.86	40.715916	-103.865482	40.715916	-103.865482	1,507,827.98	3,453,083.12
3,042.00	1.55	137.65	3,041.68	31.04	-3.48	40.715915	-103.865481	40.715915	-103.865481	1,507,827.82	3,453,083.50
3,137.00	4.69	140.54	3,136.52	27.09	-0.15	40.715904	-103.865469	40.715904	-103.865469	1,507,823.87	3,453,086.83
3,232.00	6.41	147.07	3,231.08	19.64	5.20	40.715884	-103.865450	40.715884	-103.865450	1,507,816.42	3,453,092.18
3,326.00	8.43	148.43	3,324.28	9.36	11.66	40.715855	-103.865428	40.715855	-103.865428	1,507,806.15	3,453,098.64
3,421.00	8.42	148.55	3,418.26	-2.50	18.94	40.715822	-103.865402	40.715822	-103.865402	1,507,794.28	3,453,105.92
3,516.00	11.57	139.98	3,511.81	-15.74	28.70	40.715785	-103.865368	40.715785	-103.865368	1,507,781.05	3,453,115.68
3,611.00	11.70	140.82	3,604.86	-30.50	40.91	40.715744	-103.865325	40.715744	-103.865325	1,507,766.29	3,453,127.89
3,705.00	11.39	142.46	3,696.96	-45.25	52.58	40.715703	-103.865284	40.715703	-103.865284	1,507,751.54	3,453,139.57
3,800.00	10.04	143.22	3,790.30	-59.32	63.26	40.715664	-103.865246	40.715664	-103.865246	1,507,737.47	3,453,150.24
3,895.00	10.95	140.60	3,883.71	-72.92	73.94	40.715626	-103.865208	40.715626	-103.865208	1,507,723.86	3,453,160.93
3,989.00	13.12	137.12	3,975.64	-87.64	86.87	40.715585	-103.865163	40.715585	-103.865163	1,507,709.14	3,453,173.85
4,084.00	12.58	137.14	4,068.26	-103.13	101.25	40.715542	-103.865112	40.715542	-103.865112	1,507,693.66	3,453,188.23
4,179.00	11.78	135.57	4,161.12	-117.64	115.07	40.715501	-103.865063	40.715501	-103.865063	1,507,679.15	3,453,202.05
4,273.00	11.07	134.48	4,253.26	-130.81	128.23	40.715465	-103.865016	40.715465	-103.865016	1,507,665.98	3,453,215.21

Design Report for Brecken LD28-727 - 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)
4,368.00	11.10	138.04	4,346.48	-144.00	140.85	40.715428	-103.864972	1,507,652.79	3,453,227.83
4,463.00	10.14	139.09	4,439.86	-157.12	152.44	40.715391	-103.864931	1,507,639.66	3,453,239.42
4,557.00	10.92	143.49	4,532.27	-170.53	163.16	40.715354	-103.864893	1,507,626.25	3,453,250.14
4,652.00	12.70	145.05	4,625.26	-186.33	174.49	40.715310	-103.864853	1,507,610.46	3,453,261.47
4,747.00	11.66	143.04	4,718.12	-202.56	186.25	40.715265	-103.864812	1,507,594.23	3,453,273.23
4,842.00	12.38	143.23	4,811.04	-218.39	198.12	40.715221	-103.864770	1,507,578.40	3,453,285.10
4,936.00	11.36	145.07	4,903.03	-234.05	209.45	40.715177	-103.864730	1,507,562.74	3,453,296.43
5,031.00	13.30	146.10	4,995.83	-250.79	220.90	40.715131	-103.864690	1,507,546.00	3,453,307.88
5,126.00	23.55	101.96	5,086.24	-263.88	245.74	40.715093	-103.864602	1,507,532.90	3,453,332.72
5,220.00	25.26	91.66	5,171.87	-268.36	284.18	40.715079	-103.864463	1,507,528.43	3,453,371.16
5,315.00	26.58	88.96	5,257.32	-268.56	325.69	40.715077	-103.864313	1,507,528.23	3,453,412.67
5,410.00	31.78	73.39	5,340.35	-261.01	371.01	40.715095	-103.864150	1,507,535.78	3,453,457.99
5,504.00	33.50	53.21	5,419.74	-238.33	415.64	40.715155	-103.863987	1,507,558.46	3,453,502.62
5,599.00	33.90	36.29	5,498.96	-201.19	452.40	40.715255	-103.863852	1,507,595.60	3,453,539.38
5,694.00	34.96	20.60	5,577.47	-154.26	477.71	40.715383	-103.863758	1,507,642.52	3,453,564.69
5,789.00	41.51	8.20	5,652.16	-97.48	491.81	40.715538	-103.863703	1,507,699.31	3,453,578.79
5,883.00	50.70	5.21	5,717.27	-30.28	499.58	40.715722	-103.863670	1,507,766.51	3,453,586.55
5,978.00	60.71	3.78	5,770.73	47.87	505.66	40.715936	-103.863643	1,507,844.65	3,453,592.64
6,073.00	69.61	3.71	5,810.60	133.81	511.28	40.716171	-103.863617	1,507,930.59	3,453,598.26
6,168.00	78.27	1.74	5,836.86	224.91	515.58	40.716421	-103.863596	1,508,021.69	3,453,602.56
6,236.00	81.68	359.25	5,848.70	291.85	516.16	40.716605	-103.863589	1,508,088.63	3,453,603.13
6,284.00	85.23	359.62	5,854.17	339.53	515.68	40.716736	-103.863588	1,508,136.31	3,453,602.66
6,339.00	89.29	0.03	5,856.80	394.45	515.51	40.716886	-103.863585	1,508,191.23	3,453,602.49
6,431.00	89.08	359.99	5,858.11	486.44	515.53	40.717139	-103.863579	1,508,283.22	3,453,602.51
6,525.00	88.00	0.25	5,860.50	580.41	515.73	40.717397	-103.863572	1,508,377.19	3,453,602.70
6,619.00	89.88	0.45	5,862.24	674.39	516.30	40.717655	-103.863563	1,508,471.17	3,453,603.28
6,809.00	90.52	1.38	5,861.58	864.36	519.34	40.718176	-103.863540	1,508,661.14	3,453,606.31
6,904.00	90.40	0.77	5,860.82	959.34	521.12	40.718436	-103.863527	1,508,756.12	3,453,608.09
6,999.00	90.28	1.22	5,860.25	1,054.32	522.77	40.718697	-103.863515	1,508,851.10	3,453,609.74
7,093.00	89.94	0.60	5,860.07	1,148.31	524.26	40.718955	-103.863503	1,508,945.08	3,453,611.24
7,188.00	89.01	0.48	5,860.94	1,243.30	525.16	40.719215	-103.863493	1,509,040.07	3,453,612.13
7,283.00	90.62	1.91	5,861.25	1,338.27	527.14	40.719476	-103.863480	1,509,135.05	3,453,614.11
7,377.00	91.29	2.17	5,859.68	1,432.20	530.48	40.719734	-103.863462	1,509,228.97	3,453,617.46
7,472.00	90.83	2.08	5,857.92	1,527.12	534.00	40.719994	-103.863443	1,509,323.89	3,453,620.98
7,566.00	91.23	1.97	5,856.23	1,621.05	537.33	40.720251	-103.863424	1,509,417.81	3,453,624.30
7,661.00	90.43	1.10	5,854.86	1,716.00	539.87	40.720512	-103.863409	1,509,512.77	3,453,626.85
7,756.00	91.36	1.82	5,853.37	1,810.96	542.29	40.720772	-103.863394	1,509,607.72	3,453,629.27
7,851.00	90.77	0.52	5,851.61	1,905.92	544.23	40.721033	-103.863381	1,509,702.68	3,453,631.21
7,945.00	89.88	359.98	5,851.08	1,999.91	544.64	40.721291	-103.863373	1,509,796.68	3,453,631.62
8,040.00	89.48	359.78	5,851.61	2,094.91	544.44	40.721552	-103.863367	1,509,891.68	3,453,631.42
8,135.00	89.72	359.06	5,852.27	2,189.90	543.48	40.721812	-103.863364	1,509,986.67	3,453,630.46
8,230.00	90.59	359.01	5,852.01	2,284.89	541.88	40.722073	-103.863364	1,510,081.65	3,453,628.86

Design Report for Brecken LD28-727 - 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)
8,325.00	90.77	359.10	5,850.88	2,379.87	540.31	40.722334	-103.863363	1,510,176.63	3,453,627.29
8,419.00	90.00	359.10	5,850.25	2,473.85	538.84	40.722592	-103.863362	1,510,270.62	3,453,625.81
8,514.00	88.83	358.58	5,851.22	2,568.83	536.91	40.722852	-103.863363	1,510,365.59	3,453,623.89
8,609.00	89.91	358.41	5,852.27	2,663.79	534.42	40.723113	-103.863365	1,510,460.55	3,453,621.39
8,704.00	89.85	358.87	5,852.47	2,758.76	532.16	40.723374	-103.863367	1,510,555.52	3,453,619.14
8,798.00	89.14	358.46	5,853.29	2,852.73	529.97	40.723632	-103.863369	1,510,649.49	3,453,616.95
8,893.00	90.86	358.45	5,853.29	2,947.69	527.41	40.723893	-103.863372	1,510,744.45	3,453,614.39
8,988.00	91.11	357.98	5,851.66	3,042.63	524.45	40.724153	-103.863376	1,510,839.39	3,453,611.43
9,083.00	90.92	357.54	5,849.98	3,137.54	520.74	40.724414	-103.863383	1,510,934.30	3,453,607.72
9,177.00	91.51	356.94	5,847.99	3,231.41	516.22	40.724672	-103.863393	1,511,028.17	3,453,603.19
9,272.00	91.26	359.02	5,845.69	3,326.32	512.87	40.724932	-103.863399	1,511,123.07	3,453,599.85
9,367.00	90.65	359.27	5,844.11	3,421.30	511.45	40.725193	-103.863398	1,511,218.05	3,453,598.43
9,462.00	90.49	358.59	5,843.16	3,516.28	509.68	40.725454	-103.863398	1,511,313.03	3,453,596.65
9,556.00	90.74	0.15	5,842.15	3,610.26	508.64	40.725712	-103.863395	1,511,407.01	3,453,595.62
9,651.00	90.74	358.92	5,840.92	3,705.25	507.87	40.725973	-103.863392	1,511,502.00	3,453,594.85
9,840.00	91.29	0.62	5,837.58	3,894.21	507.11	40.726491	-103.863382	1,511,690.96	3,453,594.09
9,935.00	91.29	2.05	5,835.44	3,989.16	509.33	40.726752	-103.863368	1,511,785.90	3,453,596.30
10,029.00	89.82	1.07	5,834.53	4,083.11	511.89	40.727009	-103.863352	1,511,879.86	3,453,598.86
10,124.00	89.17	1.11	5,835.36	4,178.09	513.69	40.727270	-103.863339	1,511,974.84	3,453,600.67
10,219.00	89.91	1.28	5,836.13	4,273.07	515.67	40.727530	-103.863326	1,512,069.81	3,453,602.65
10,314.00	89.54	1.09	5,836.58	4,368.05	517.64	40.727791	-103.863312	1,512,164.79	3,453,604.61
10,409.00	88.15	1.22	5,838.50	4,463.01	519.55	40.728052	-103.863299	1,512,259.75	3,453,606.53
10,512.00	86.39	1.53	5,843.40	4,565.86	522.02	40.728334	-103.863284	1,512,362.59	3,453,609.00
10,577.93	86.39	1.53	5,847.56	4,631.63	523.78	40.728514	-103.863273	1,512,428.37	3,453,610.75
10,579.00	86.39	1.53	5,847.62	4,632.70	523.81	40.728517	-103.863273	1,512,429.44	3,453,610.78

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,090.00	1,090.00	0.33	-1.18	Tie on to Gyro Surveys at 1090.00ft
1,290.00	1,289.99	0.95	-1.48	First Sperry MWD Survey at 1290.00ft
10,512.00	5,843.40	4,565.86	522.02	Final Sperry MWD Survey at 10512.00ft
10,579.00	5,847.62	4,632.70	523.81	Straight Line Projection to TD at 10579.00ft

Design Report for Brecken LD28-727 - Actual Surveys

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Brecken LD28-727_Rev A0_BHL	6.02	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
87.00	543.00	Surface Surveys	NS-GYRO-MS
634.00	6,236.00	Intermediate Survey	MWD
6,339.00	10,579.00	Production Survey	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,115.00	1,115.00	9 5/8"	9-5/8	13-3/4
6,284.00	5,854.17	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:	1.87 °/100usft	Maximum Dogleg over Survey:	17.52 °/100usft at 5,126.00 usft
Net Tortousity applicable to Plans:	0.70 °/100usft	Directional Difficulty Index:	6.294

Design Report for Brecken LD28-727 - Actual Surveys

Audit Info

North Reference Sheet for Sec. 28-T9N-R58W (Greyson & Brecken PAD) - Brecken LD28-727 - 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' @ 4853.00usft (H&P 273). Northing and Easting are relative to Brecken LD28-727

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: 0.99998974

Grid Coordinates of Well: 1,507,796.79 usft N, 3,453,086.98 usft E

Geographical Coordinates of Well: 40° 42' 56.99" N, 103° 51' 55.69" W

Grid Convergence at Surface is: 1.06°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,579.00usft

the Bottom Hole Displacement is 4,662.22usft in the Direction of 6.45° (Grid).

Magnetic Convergence at surface is: -6.96° (21 August 2015, , BGGM2015)

