

Noble Energy

Weld County, CO (NAD 83)

Sec. 34-T9N-R59W (FAITH, ANN LC34, REMORA)

Faith LC34-785

05-123-40647

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

17 February, 2016

Surface UWI : 05-123-40647

Well Coordinates: 1,505,870.36 N, 3,424,369.00 E (40° 42' 43.02" N, 103° 58' 09.01" W)

Ground Level: 4,828.00 usft

Local Coordinate Origin:

Centered on Well Faith LC34-785

Viewing Datum:

KB = 24' @ 4852.00usft (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. 34-T9N-R59W (FAITH, ANN LC34, REMORA)
 Well: Faith LC34-785
 Wellbore: Plan A
 Design: Actual Surveys



HALLIBURTON

Sperry Drilling

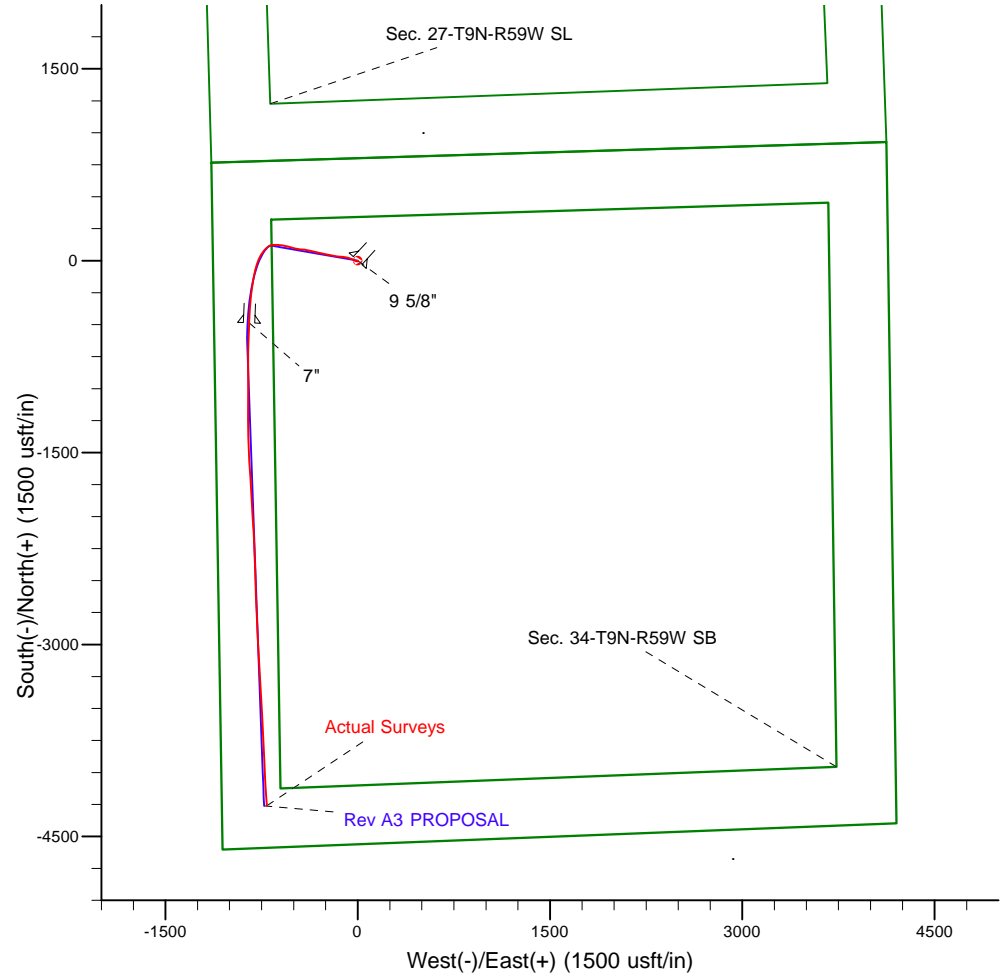
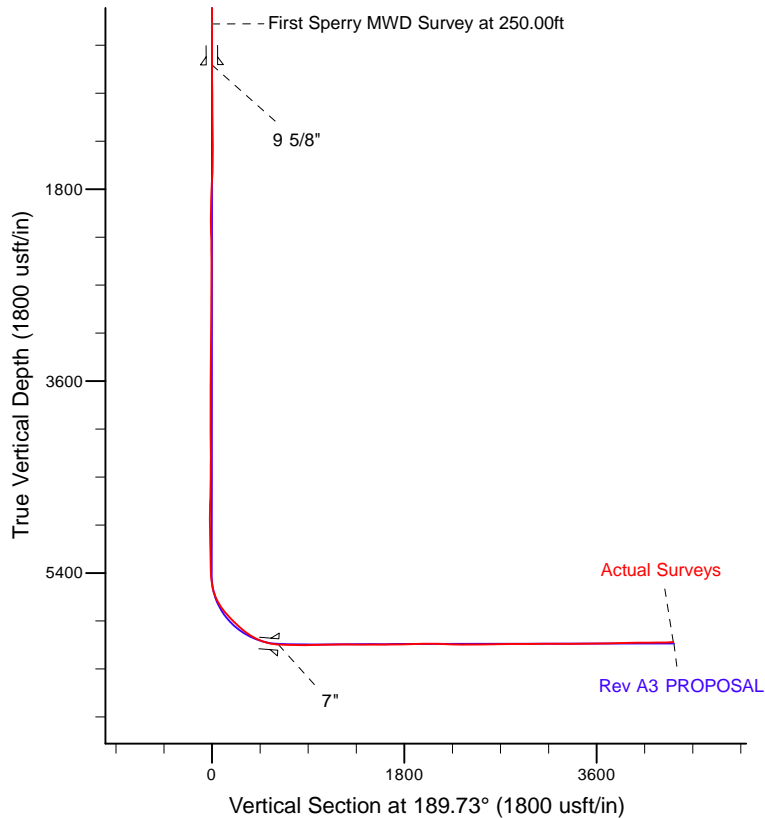
Platted SHL: 810' FNL, 1130' FWL
 Platted Lat/Long: 40.71195 N, -103.96917 W
 Location: Sec. 34-T9N-R59W

~7" Casing: 1258' FNL, 265 FWL
 Lat/Long: 40.710659 N, -103.972255 W
 State Planes - CO Northern: 1,505,385.20 N, 3,423,521.97 E
 Sec. 34-T9N-R59W

Platted BHL: 330' FSL, 330 FWL
 Platted Lat/Long: 40.700293 N, -103.971995 W
 State Planes - CO Northern: 1,501,610.68 N, 3,423,659.18 E
 Location: Sec. 34-T9N-R59W

LEGEND

- ◆ Faith LC34-785, Plan A, Rev A3 PROPOSAL V0
- ▣ Actual Surveys



WELL DETAILS: Faith LC34-785

Ground Level: 4828.00
 KB = 24' @ 4852.00usft (H&P 273)

Created By: Tatiana Gomez
 Created On: 2-17-2016



Design Report for Faith LC34-785 - 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 |
| Faith LC34-785_Rev A0_SHL | | | | | | | |
| 250.00 | 0.04 | 222.75 | 250.00 | -0.06 | -0.06 | 0.07 | 0.02 |
| First Sperry MWD Survey at 250.00ft | | | | | | | |
| 500.00 | 0.09 | 222.75 | 500.00 | -0.27 | -0.25 | 0.31 | 0.02 |
| 644.00 | 0.12 | 222.75 | 644.00 | -0.47 | -0.43 | 0.53 | 0.02 |
| 725.00 | 0.13 | 222.75 | 725.00 | -0.60 | -0.55 | 0.68 | 0.01 |
| 914.00 | 0.54 | 168.80 | 914.00 | -1.63 | -0.52 | 1.69 | 0.25 |
| 1,103.00 | 0.64 | 221.91 | 1,102.99 | -3.29 | -1.06 | 3.42 | 0.28 |
| 1,287.00 | 0.97 | 206.52 | 1,286.97 | -5.44 | -2.44 | 5.78 | 0.21 |
| 1,378.00 | 2.99 | 277.55 | 1,377.92 | -5.82 | -5.13 | 6.61 | 3.11 |
| 1,469.00 | 4.38 | 281.43 | 1,468.73 | -4.82 | -10.89 | 6.59 | 1.55 |
| 1,561.00 | 5.54 | 292.66 | 1,560.38 | -2.41 | -18.44 | 5.50 | 1.64 |
| 1,652.00 | 7.15 | 297.88 | 1,650.83 | 1.93 | -27.50 | 2.75 | 1.88 |
| 1,744.00 | 8.50 | 299.42 | 1,741.97 | 7.94 | -38.48 | -1.33 | 1.48 |
| 1,836.00 | 11.07 | 292.17 | 1,832.62 | 14.62 | -52.58 | -5.52 | 3.09 |
| 1,927.00 | 11.38 | 291.06 | 1,921.88 | 21.14 | -69.05 | -9.17 | 0.42 |
| 2,018.00 | 11.73 | 282.97 | 2,011.04 | 26.44 | -86.45 | -11.45 | 1.82 |
| 2,110.00 | 10.31 | 274.42 | 2,101.35 | 29.18 | -103.77 | -11.22 | 2.35 |
| 2,201.00 | 10.26 | 272.86 | 2,190.89 | 30.21 | -119.98 | -9.50 | 0.31 |
| 2,293.00 | 8.97 | 275.01 | 2,281.60 | 31.24 | -135.31 | -7.93 | 1.46 |
| 2,384.00 | 8.70 | 272.00 | 2,371.52 | 32.10 | -149.26 | -6.42 | 0.59 |
| 2,476.00 | 9.13 | 281.15 | 2,462.41 | 33.76 | -163.37 | -5.66 | 1.61 |
| 2,568.00 | 9.27 | 281.95 | 2,553.23 | 36.70 | -177.78 | -6.13 | 0.21 |
| 2,660.00 | 9.11 | 281.29 | 2,644.05 | 39.66 | -192.18 | -6.62 | 0.21 |
| 2,751.00 | 9.07 | 280.89 | 2,733.90 | 42.43 | -206.28 | -6.96 | 0.08 |
| 2,845.00 | 9.15 | 280.23 | 2,826.72 | 45.16 | -220.91 | -7.17 | 0.14 |
| 2,939.00 | 9.04 | 278.97 | 2,919.54 | 47.64 | -235.56 | -7.14 | 0.24 |
| 3,033.00 | 9.85 | 283.40 | 3,012.26 | 50.65 | -250.68 | -7.56 | 1.16 |
| 3,127.00 | 9.37 | 282.47 | 3,104.94 | 54.17 | -265.97 | -8.44 | 0.54 |
| 3,222.00 | 8.77 | 282.03 | 3,198.75 | 57.35 | -280.61 | -9.10 | 0.64 |
| 3,316.00 | 10.23 | 284.19 | 3,291.46 | 60.89 | -295.71 | -10.04 | 1.60 |
| 3,410.00 | 10.70 | 283.46 | 3,383.90 | 64.96 | -312.29 | -11.25 | 0.52 |
| 3,504.00 | 10.80 | 282.45 | 3,476.25 | 68.89 | -329.38 | -12.24 | 0.23 |
| 3,598.00 | 10.98 | 282.98 | 3,568.56 | 72.80 | -346.70 | -13.16 | 0.22 |
| 3,692.00 | 11.20 | 282.03 | 3,660.80 | 76.72 | -364.35 | -14.04 | 0.30 |
| 3,787.00 | 10.92 | 281.44 | 3,754.04 | 80.42 | -382.19 | -14.68 | 0.32 |
| 3,882.00 | 10.69 | 280.65 | 3,847.35 | 83.84 | -399.67 | -15.09 | 0.29 |
| 3,976.00 | 10.12 | 277.75 | 3,939.81 | 86.56 | -416.42 | -14.94 | 0.82 |
| 4,070.00 | 9.30 | 274.14 | 4,032.46 | 88.22 | -432.18 | -13.92 | 1.09 |
| 4,165.00 | 8.56 | 271.98 | 4,126.31 | 89.02 | -446.90 | -12.22 | 0.86 |
| 4,260.00 | 9.39 | 279.29 | 4,220.15 | 90.52 | -461.62 | -11.20 | 1.48 |
| 4,354.00 | 10.19 | 281.98 | 4,312.78 | 93.48 | -477.32 | -11.47 | 0.98 |
| 4,449.00 | 9.36 | 282.19 | 4,406.40 | 96.86 | -493.09 | -12.13 | 0.87 |
| 4,544.00 | 10.51 | 284.54 | 4,499.97 | 100.66 | -509.03 | -13.19 | 1.28 |
| 4,639.00 | 9.82 | 286.06 | 4,593.48 | 105.08 | -525.20 | -14.81 | 0.78 |
| 4,733.00 | 8.90 | 287.61 | 4,686.23 | 109.50 | -539.84 | -16.69 | 1.01 |
| 4,827.00 | 10.39 | 284.60 | 4,778.90 | 113.83 | -554.97 | -18.41 | 1.67 |
| 4,922.00 | 9.35 | 284.23 | 4,872.49 | 117.89 | -570.74 | -19.74 | 1.10 |
| 5,017.00 | 10.02 | 275.98 | 4,966.14 | 120.65 | -586.44 | -19.81 | 1.62 |



Design Report for Faith LC34-785 - Actual Surveys

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 5,112.00 | 8.81 | 273.67 | 5,059.86 | 121.98 | -601.92 | -18.50 | 1.33 |
| 5,206.00 | 10.60 | 272.36 | 5,152.51 | 122.79 | -617.75 | -16.63 | 1.92 |
| 5,301.00 | 9.39 | 272.75 | 5,246.07 | 123.52 | -634.22 | -14.57 | 1.28 |
| 5,395.00 | 10.29 | 269.33 | 5,338.68 | 123.79 | -650.27 | -12.12 | 1.14 |
| 5,490.00 | 10.01 | 263.64 | 5,432.20 | 122.78 | -666.96 | -8.30 | 1.10 |
| 5,584.00 | 17.62 | 242.99 | 5,523.46 | 115.40 | -687.80 | 2.50 | 9.53 |
| 5,679.00 | 26.41 | 229.29 | 5,611.51 | 95.04 | -716.70 | 27.45 | 10.66 |
| 5,774.00 | 33.52 | 213.33 | 5,693.89 | 59.24 | -747.22 | 67.89 | 11.19 |
| 5,869.00 | 41.02 | 201.71 | 5,769.53 | 8.22 | -773.23 | 122.57 | 10.80 |
| 5,964.00 | 44.13 | 196.04 | 5,839.50 | -52.57 | -793.92 | 185.98 | 5.20 |
| 6,059.00 | 48.55 | 190.00 | 5,905.10 | -119.48 | -809.25 | 254.52 | 6.54 |
| 6,153.00 | 53.37 | 189.35 | 5,964.29 | -191.43 | -821.50 | 327.51 | 5.16 |
| 6,248.00 | 64.02 | 186.26 | 6,013.59 | -271.74 | -832.39 | 408.50 | 11.55 |
| 6,343.00 | 72.63 | 184.12 | 6,048.65 | -359.57 | -840.31 | 496.41 | 9.30 |
| 6,426.00 | 82.84 | 182.68 | 6,066.26 | -440.43 | -845.10 | 576.91 | 12.42 |
| 6,520.00 | 89.05 | 181.86 | 6,072.90 | -534.07 | -848.81 | 669.84 | 6.66 |
| 6,614.00 | 88.71 | 182.12 | 6,074.74 | -628.00 | -852.07 | 762.96 | 0.46 |
| 6,708.00 | 89.60 | 180.75 | 6,076.13 | -721.95 | -854.43 | 855.97 | 1.74 |
| 6,803.00 | 91.11 | 180.27 | 6,075.54 | -816.95 | -855.27 | 949.73 | 1.67 |
| 6,897.00 | 91.79 | 179.70 | 6,073.16 | -910.92 | -855.25 | 1,042.35 | 0.94 |
| 7,085.00 | 89.85 | 180.40 | 6,070.47 | -1,098.89 | -855.41 | 1,227.64 | 1.10 |
| 7,179.00 | 89.26 | 180.14 | 6,071.20 | -1,192.88 | -855.85 | 1,320.36 | 0.69 |
| 7,273.00 | 89.91 | 178.71 | 6,071.88 | -1,286.87 | -854.91 | 1,412.84 | 1.67 |
| 7,368.00 | 89.75 | 178.52 | 6,072.16 | -1,381.84 | -852.61 | 1,506.06 | 0.26 |
| 7,462.00 | 90.37 | 177.77 | 6,072.07 | -1,475.79 | -849.57 | 1,598.14 | 1.04 |
| 7,556.00 | 90.95 | 177.41 | 6,070.98 | -1,569.70 | -845.62 | 1,690.03 | 0.73 |
| 7,651.00 | 91.02 | 176.37 | 6,069.35 | -1,664.55 | -840.47 | 1,782.64 | 1.10 |
| 7,745.00 | 92.09 | 176.06 | 6,066.80 | -1,758.31 | -834.26 | 1,874.00 | 1.19 |
| 7,840.00 | 90.77 | 176.58 | 6,064.43 | -1,853.08 | -828.17 | 1,966.38 | 1.49 |
| 7,935.00 | 89.44 | 176.84 | 6,064.25 | -1,947.92 | -822.72 | 2,058.94 | 1.43 |
| 8,030.00 | 88.24 | 175.86 | 6,066.18 | -2,042.70 | -816.67 | 2,151.34 | 1.63 |
| 8,124.00 | 88.18 | 177.15 | 6,069.11 | -2,136.48 | -810.94 | 2,242.80 | 1.37 |
| 8,219.00 | 89.14 | 177.75 | 6,071.33 | -2,231.36 | -806.72 | 2,335.60 | 1.19 |
| 8,314.00 | 90.55 | 177.95 | 6,071.59 | -2,326.29 | -803.15 | 2,428.56 | 1.50 |
| 8,408.00 | 90.96 | 178.01 | 6,070.35 | -2,420.22 | -799.84 | 2,520.58 | 0.44 |
| 8,503.00 | 91.42 | 178.18 | 6,068.38 | -2,515.15 | -796.68 | 2,613.61 | 0.52 |
| 8,597.00 | 90.25 | 178.34 | 6,067.01 | -2,609.10 | -793.83 | 2,705.72 | 1.26 |
| 8,692.00 | 89.97 | 177.90 | 6,066.83 | -2,704.04 | -790.71 | 2,798.78 | 0.55 |
| 8,787.00 | 90.43 | 177.66 | 6,066.50 | -2,798.97 | -787.03 | 2,891.72 | 0.55 |
| 8,881.00 | 90.46 | 177.37 | 6,065.77 | -2,892.88 | -782.96 | 2,983.59 | 0.31 |
| 8,976.00 | 90.28 | 176.88 | 6,065.15 | -2,987.76 | -778.19 | 3,076.30 | 0.55 |
| 9,071.00 | 90.55 | 177.01 | 6,064.46 | -3,082.62 | -773.13 | 3,168.94 | 0.32 |
| 9,165.00 | 90.31 | 176.47 | 6,063.76 | -3,176.47 | -767.78 | 3,260.53 | 0.63 |
| 9,260.00 | 89.97 | 176.54 | 6,063.53 | -3,271.29 | -761.99 | 3,353.01 | 0.37 |
| 9,355.00 | 90.12 | 176.63 | 6,063.45 | -3,366.12 | -756.33 | 3,445.52 | 0.18 |
| 9,450.00 | 90.46 | 176.72 | 6,062.97 | -3,460.96 | -750.82 | 3,538.06 | 0.37 |
| 9,544.00 | 91.05 | 177.07 | 6,061.73 | -3,554.81 | -745.73 | 3,629.71 | 0.73 |
| 9,639.00 | 91.79 | 176.75 | 6,059.38 | -3,649.64 | -740.61 | 3,722.31 | 0.85 |
| 9,734.00 | 90.92 | 177.35 | 6,057.13 | -3,744.49 | -735.73 | 3,814.97 | 1.11 |
| 9,828.00 | 91.48 | 177.31 | 6,055.16 | -3,838.37 | -731.35 | 3,906.75 | 0.60 |
| 9,923.00 | 90.12 | 178.10 | 6,053.84 | -3,933.28 | -727.54 | 3,999.66 | 1.66 |

Design Report for Faith LC34-785 - Actual Surveys

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|---|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 10,017.00 | 90.28 | 177.02 | 6,053.51 | -4,027.19 | -723.54 | 4,091.54 | 1.16 |
| 10,111.00 | 90.83 | 176.49 | 6,052.60 | -4,121.04 | -718.22 | 4,183.14 | 0.81 |
| 10,183.00 | 91.76 | 176.55 | 6,050.97 | -4,192.88 | -713.85 | 4,253.21 | 1.29 |
| Final Sperry MWD Survey at 10183.00ft | | | | | | | |
| 10,249.99 | 91.76 | 176.55 | 6,048.91 | -4,259.72 | -709.82 | 4,318.41 | 0.00 |
| Faith LC34-785_Rev A3_BHL - Faith LC34-785_Rev A1_BHL - Faith LC34-785_Rev A2_BHL - Faith LC34-785_Rev A0_BH | | | | | | | |
| 10,250.00 | 91.76 | 176.55 | 6,048.91 | -4,259.73 | -709.82 | 4,318.42 | 0.00 |
| Straight Line Projection to TD at 10250.00ft | | | | | | | |

Design Annotations

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | +E/-W (usft) | Comment |
|-----------------------|-----------------------|--------------------------------|--------------|--|
| 250.00 | 250.00 | -0.06 | -0.06 | First Sperry MWD Survey at 250.00ft |
| 10,183.00 | 6,050.97 | -4,192.88 | -713.85 | Final Sperry MWD Survey at 10183.00ft |
| 10,250.00 | 6,048.91 | -4,259.73 | -709.82 | Straight Line Projection to TD at 10250.00ft |

Vertical Section Information

| Angle Type | Target | Azimuth (°) | Origin Type | Origin +N/_S (usft) | +E/-W (usft) | Start TVD (usft) |
|------------|---------------------------|-------------|-------------|---------------------|--------------|------------------|
| Target | Faith LC34-785_Rev A3_BHL | 189.73 | Slot | 0.00 | 0.00 | 0.00 |

Survey tool program

| From (usft) | To (usft) | Survey/Plan | Survey Tool |
|-------------|-----------|---------------------------------|-------------|
| 250.00 | 6,426.00 | Intermediate Sperry MWD Surveys | MWD |
| 6,520.00 | 10,250.00 | Production Sperry MWD Surveys | MWD |

Wellbore Targets

| Target Name | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|---|---------------|--------------|------------|--------------|--------------|-----------------|----------------|-----------|-------------|
| Faith LC34-785_Rev A - hit/miss target - Shape | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 1,505,870.37 | 3,424,369.00 | 40.711950 | -103.969170 |
| - actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) | | | | | | | | | |
| - Point | | | | | | | | | |
| Faith LC34-785_Rev A - actual wellpath misses target center by 23.66usft at 10249.99usft MD (6048.91 TVD, -4259.72 N, -709.82 E) | 0.00 | 0.00 | 6,060.00 | -4,261.32 | -730.66 | 1,501,609.08 | 3,423,638.35 | 40.700290 | -103.972070 |
| - Point | | | | | | | | | |
| Faith LC34-785_Rev A - actual wellpath misses target center by 23.66usft at 10249.99usft MD (6048.91 TVD, -4259.72 N, -709.82 E) | 0.00 | 0.00 | 6,060.00 | -4,261.32 | -730.66 | 1,501,609.08 | 3,423,638.35 | 40.700290 | -103.972070 |
| - Point | | | | | | | | | |
| Faith LC34-785_Rev A - actual wellpath misses target center by 23.66usft at 10249.99usft MD (6048.91 TVD, -4259.72 N, -709.82 E) | 0.00 | 0.00 | 6,060.00 | -4,261.32 | -730.66 | 1,501,609.08 | 3,423,638.35 | 40.700290 | -103.972070 |
| - Point | | | | | | | | | |
| Faith LC34-785_Rev A - actual wellpath misses target center by 23.66usft at 10249.99usft MD (6048.91 TVD, -4259.72 N, -709.82 E) | 0.00 | 0.00 | 6,060.00 | -4,261.32 | -730.66 | 1,501,609.08 | 3,423,638.35 | 40.700290 | -103.972070 |
| - Point | | | | | | | | | |

Design Report for Faith LC34-785 - Actual Surveys

Directional Difficulty Index

| | | | |
|------------------------------------|----------------|-------------------------------|----------------------------------|
| Average Dogleg over Survey: | 1.69 °/100usft | Maximum Dogleg over Survey: | 12.42 °/100usft at 6,426.00 usft |
| Net Tortosity applicable to Plans: | 0.66 °/100usft | Directional Difficulty Index: | 6.176 |

Audit Info

North Reference Sheet for Sec. 34-T9N-R59W (FAITH, ANN LC34, REMORA) - Faith LC34-785 - 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' @ 4852.00usft (H&P 273). Northing and Easting are relative to Faith LC34-785

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: 0.99998920

Grid Coordinates of Well: 1,505,870.36 usft N, 3,424,369.00 usft E

Geographical Coordinates of Well: 40° 42' 43.02" N, 103° 58' 09.01" W

Grid Convergence at Surface is: 0.99°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,250.00usft the Bottom Hole Displacement is 4,318.47usft in the Direction of 189.46° (Grid).

Magnetic Convergence at surface is: -7.07° (24 November 2015, , BGGM2015)

Magnetic Model: BGGM2015
 Date: 24-Nov-15
 Declination: 8.05°
 Inclination/Dip: 67.35°
 Field Strength: 52836

Grid North is 0.99° East of True North (Grid Convergence)
 Magnetic North is 8.05° East of True North (Magnetic Declination)
 Magnetic North is 7.07° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 0.99°
 To convert a Magnetic Direction to a True Direction, Add 8.05° East
 To convert a Magnetic Direction to a Grid Direction, Add 7.07°