

Noble Energy

Weld County, CO (NAD 83)

Sec. 34-T9N-R59W

Haley LC27-711

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

28 May, 2015

05-123-40593

Well Coordinates: 1,506,122.19 N, 3,427,755.64 E (40° 42' 44.93" N, 103° 57' 24.98" W)

Ground Level: 4,814.00 usft

Local Coordinate Origin:

Centered on Well Haley LC27-711

Viewing Datum:

KB @ 4838.00usft (HP 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. 34-T9N-R59W
 Well: Haley LC27-711
 Wellbore: Original Wellbore
 Design: Actual Surveys

Noble Energy



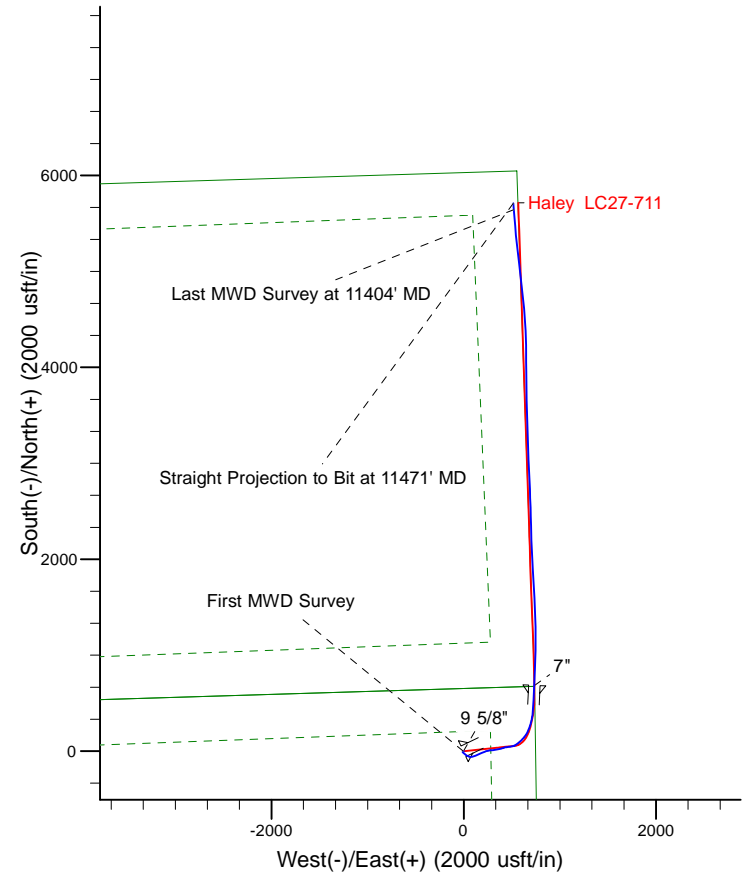
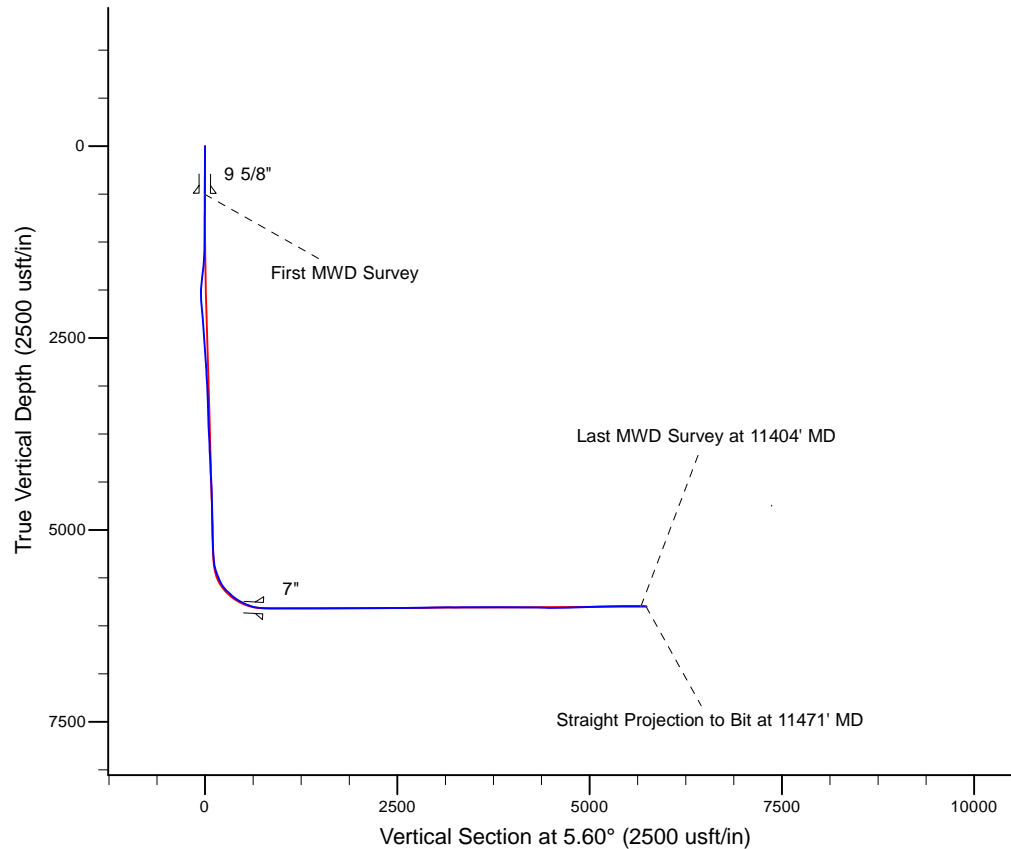
Platted SHL: 660' FNL, 748' FEL
 Platted Lat/Long: 40.712480 N, 103.956940 W
 Location: Sec. 34-T9N-R59W

-7" Casing: 12' FNL, 0' FEL
 Lat/Long: 40.714326 N, 103.954251 W
 State Planes - CO Northern: 1506807.69 N, 3428489.23 E
 Location: Sec. 34-T9N-R59W

Platted BHL: 330' FNL, 1' FEL
 Lat/Long: 40.728140 N, 103.954560 W
 State Planes - CO Northern: 1511838.19 N, 3428315.91 E
 Location: Sec. 27-T10N-R59W

LEGEND

- ✕ Haley LC27-711, Original Wellbore, Rev B0 V0
- Actual Surveys



| | |
|------------------------------|-----------------|
| WELL DETAILS: Haley LC27-711 | |
| Ground Level: | 4814.00 |
| KB @ 4838.00usft (HP 343) | |
| Created By: | Amanda Marchand |
| Created On: | 5/28/2015 |



Design Report for Haley LC27-711 - 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 |
| 630.00 | 0.56 | 244.49 | 629.99 | -1.33 | -2.78 | -1.59 | 0.09 |
| First MWD Survey | | | | | | | |
| 725.00 | 0.82 | 225.96 | 724.98 | -2.00 | -3.69 | -2.35 | 0.36 |
| 820.00 | 0.94 | 235.71 | 819.97 | -2.91 | -4.82 | -3.37 | 0.20 |
| 915.00 | 0.88 | 225.44 | 914.96 | -3.86 | -5.98 | -4.43 | 0.18 |
| 1,010.00 | 0.63 | 242.09 | 1,009.95 | -4.62 | -6.96 | -5.27 | 0.35 |
| 1,194.00 | 1.30 | 238.83 | 1,193.92 | -6.17 | -9.64 | -7.08 | 0.37 |
| 1,285.00 | 1.28 | 234.92 | 1,284.90 | -7.29 | -11.36 | -8.36 | 0.10 |
| 1,378.00 | 1.78 | 139.57 | 1,377.88 | -8.99 | -11.27 | -10.04 | 2.46 |
| 1,471.00 | 5.88 | 135.49 | 1,470.65 | -13.48 | -6.99 | -14.10 | 4.42 |
| 1,655.00 | 11.83 | 130.25 | 1,652.38 | -32.41 | 14.03 | -30.89 | 3.26 |
| 1,749.00 | 12.09 | 124.93 | 1,744.34 | -44.27 | 29.45 | -41.19 | 1.20 |
| 1,841.00 | 14.57 | 113.12 | 1,833.87 | -54.34 | 48.00 | -49.39 | 3.99 |
| 1,934.00 | 12.97 | 95.84 | 1,924.24 | -59.99 | 69.15 | -52.96 | 4.72 |
| 2,027.00 | 11.20 | 73.77 | 2,015.22 | -58.53 | 88.22 | -49.65 | 5.28 |
| 2,120.00 | 10.26 | 68.76 | 2,106.60 | -53.01 | 104.61 | -42.55 | 1.42 |
| 2,214.00 | 10.04 | 68.04 | 2,199.12 | -46.91 | 120.01 | -34.98 | 0.27 |
| 2,305.00 | 9.95 | 67.68 | 2,288.74 | -40.96 | 134.64 | -27.63 | 0.12 |
| 2,398.00 | 10.24 | 66.50 | 2,380.30 | -34.61 | 149.66 | -19.84 | 0.38 |
| 2,491.00 | 7.83 | 65.27 | 2,472.14 | -28.66 | 162.99 | -12.62 | 2.60 |
| 2,584.00 | 7.20 | 68.34 | 2,564.34 | -23.86 | 174.16 | -6.76 | 0.80 |
| 2,676.00 | 7.43 | 68.37 | 2,655.59 | -19.54 | 185.05 | -1.39 | 0.25 |
| 2,769.00 | 7.43 | 68.14 | 2,747.81 | -15.08 | 196.22 | 4.13 | 0.03 |
| 2,864.00 | 7.52 | 66.26 | 2,842.01 | -10.29 | 207.61 | 10.01 | 0.27 |
| 2,959.00 | 7.46 | 63.56 | 2,936.20 | -5.05 | 218.82 | 16.32 | 0.38 |
| 3,054.00 | 9.45 | 75.32 | 3,030.17 | -0.32 | 231.89 | 22.30 | 2.76 |
| 3,148.00 | 9.47 | 75.53 | 3,122.89 | 3.57 | 246.85 | 27.63 | 0.04 |
| 3,243.00 | 9.55 | 75.31 | 3,216.58 | 7.52 | 262.04 | 33.04 | 0.09 |
| 3,338.00 | 8.63 | 87.20 | 3,310.40 | 9.86 | 276.78 | 36.82 | 2.20 |
| 3,433.00 | 9.24 | 92.73 | 3,404.24 | 9.85 | 291.52 | 38.24 | 1.11 |
| 3,528.00 | 8.54 | 82.52 | 3,498.11 | 10.40 | 306.13 | 40.22 | 1.81 |
| 3,623.00 | 8.26 | 78.26 | 3,592.09 | 12.71 | 319.81 | 43.85 | 0.72 |
| 3,718.00 | 8.33 | 78.00 | 3,686.10 | 15.53 | 333.22 | 47.96 | 0.08 |
| 3,813.00 | 8.36 | 77.71 | 3,780.09 | 18.43 | 346.70 | 52.16 | 0.05 |
| 3,908.00 | 8.32 | 77.80 | 3,874.09 | 21.35 | 360.16 | 56.39 | 0.04 |
| 4,003.00 | 7.90 | 77.82 | 3,968.14 | 24.18 | 373.26 | 60.48 | 0.44 |
| 4,098.00 | 7.58 | 77.05 | 4,062.27 | 26.96 | 385.75 | 64.47 | 0.35 |
| 4,194.00 | 7.55 | 75.01 | 4,157.44 | 30.01 | 398.01 | 68.70 | 0.28 |
| 4,288.00 | 7.41 | 72.67 | 4,250.64 | 33.42 | 409.77 | 73.23 | 0.36 |
| 4,383.00 | 7.02 | 66.09 | 4,344.88 | 37.60 | 420.92 | 78.48 | 0.96 |
| 4,478.00 | 6.46 | 87.21 | 4,439.24 | 40.21 | 431.57 | 82.12 | 2.66 |
| 4,573.00 | 6.03 | 83.62 | 4,533.68 | 41.02 | 441.86 | 83.93 | 0.61 |
| 4,668.00 | 6.22 | 77.79 | 4,628.14 | 42.67 | 451.85 | 86.54 | 0.68 |
| 4,763.00 | 5.75 | 76.36 | 4,722.62 | 44.88 | 461.51 | 89.68 | 0.52 |
| 4,858.00 | 6.59 | 89.25 | 4,817.07 | 46.07 | 471.58 | 91.85 | 1.70 |
| 4,953.00 | 6.21 | 82.57 | 4,911.48 | 46.81 | 482.13 | 93.62 | 0.88 |
| 5,048.00 | 5.69 | 78.77 | 5,005.97 | 48.39 | 491.85 | 96.14 | 0.69 |
| 5,143.00 | 5.41 | 76.53 | 5,100.52 | 50.35 | 500.82 | 98.96 | 0.37 |
| 5,238.00 | 5.75 | 75.11 | 5,195.07 | 52.61 | 509.77 | 102.09 | 0.39 |

Design Report for Haley LC27-711 - Actual Surveys

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 5,333.00 | 4.93 | 73.14 | 5,289.66 | 55.02 | 518.28 | 105.32 | 0.88 |
| 5,428.00 | 10.36 | 66.32 | 5,383.78 | 59.64 | 530.02 | 111.06 | 5.79 |
| 5,523.00 | 18.36 | 53.91 | 5,475.76 | 71.91 | 549.97 | 125.21 | 8.98 |
| 5,618.00 | 26.28 | 48.59 | 5,563.58 | 94.67 | 577.88 | 150.59 | 8.60 |
| 5,713.00 | 29.10 | 44.19 | 5,647.70 | 125.15 | 609.76 | 184.04 | 3.66 |
| 5,808.00 | 36.39 | 36.30 | 5,727.59 | 164.50 | 642.61 | 226.40 | 8.88 |
| 5,902.00 | 47.79 | 21.47 | 5,797.40 | 219.69 | 672.03 | 284.20 | 16.03 |
| 5,998.00 | 48.90 | 17.23 | 5,861.22 | 287.34 | 695.76 | 353.84 | 3.50 |
| 6,093.00 | 59.50 | 7.99 | 5,916.79 | 362.38 | 712.12 | 430.12 | 13.65 |
| 6,188.00 | 65.09 | 3.80 | 5,960.96 | 445.99 | 720.68 | 514.17 | 7.06 |
| 6,283.00 | 72.09 | 3.04 | 5,995.62 | 534.22 | 725.94 | 602.49 | 7.41 |
| 6,378.00 | 83.08 | 3.00 | 6,016.01 | 626.73 | 730.82 | 695.03 | 11.57 |
| 6,393.00 | 85.87 | 2.79 | 6,017.45 | 641.64 | 731.57 | 709.95 | 18.65 |
| 6,523.00 | 89.20 | 2.00 | 6,023.04 | 771.39 | 737.00 | 839.60 | 2.63 |
| 6,616.00 | 89.63 | 2.02 | 6,023.99 | 864.33 | 740.26 | 932.42 | 0.46 |
| 6,708.00 | 90.31 | 2.21 | 6,024.04 | 956.26 | 743.65 | 1,024.24 | 0.77 |
| 6,801.00 | 89.63 | 0.77 | 6,024.09 | 1,049.23 | 746.07 | 1,117.00 | 1.71 |
| 6,894.00 | 90.25 | 0.46 | 6,024.19 | 1,142.22 | 747.07 | 1,209.65 | 0.75 |
| 6,986.00 | 90.77 | 359.36 | 6,023.37 | 1,234.22 | 746.93 | 1,301.19 | 1.32 |
| 7,080.00 | 90.46 | 358.30 | 6,022.36 | 1,328.19 | 745.01 | 1,394.53 | 1.17 |
| 7,172.00 | 89.38 | 357.84 | 6,022.49 | 1,420.14 | 741.91 | 1,485.74 | 1.28 |
| 7,265.00 | 89.54 | 357.37 | 6,023.37 | 1,513.05 | 738.02 | 1,577.83 | 0.53 |
| 7,359.00 | 90.12 | 357.65 | 6,023.64 | 1,606.96 | 733.94 | 1,670.89 | 0.69 |
| 7,450.00 | 90.34 | 357.11 | 6,023.28 | 1,697.86 | 729.78 | 1,760.96 | 0.64 |
| 7,543.00 | 89.69 | 356.30 | 6,023.26 | 1,790.71 | 724.43 | 1,852.84 | 1.12 |
| 7,636.00 | 90.03 | 356.59 | 6,023.48 | 1,883.53 | 718.67 | 1,944.65 | 0.48 |
| 7,729.00 | 90.37 | 357.03 | 6,023.16 | 1,976.38 | 713.49 | 2,036.56 | 0.60 |
| 7,821.00 | 91.14 | 357.58 | 6,021.95 | 2,068.27 | 709.17 | 2,127.59 | 1.03 |
| 7,914.00 | 91.73 | 358.69 | 6,019.62 | 2,161.19 | 706.14 | 2,219.77 | 1.35 |
| 8,009.00 | 90.06 | 358.07 | 6,018.13 | 2,256.14 | 703.45 | 2,314.00 | 1.88 |
| 8,104.00 | 89.35 | 357.83 | 6,018.62 | 2,351.08 | 700.06 | 2,408.15 | 0.79 |
| 8,199.00 | 90.40 | 357.86 | 6,018.83 | 2,446.01 | 696.48 | 2,502.28 | 1.11 |
| 8,294.00 | 91.08 | 358.77 | 6,017.60 | 2,540.96 | 693.69 | 2,596.51 | 1.20 |
| 8,389.00 | 90.99 | 358.27 | 6,015.89 | 2,635.91 | 691.24 | 2,690.77 | 0.53 |
| 8,483.00 | 91.60 | 357.90 | 6,013.76 | 2,729.83 | 688.10 | 2,783.94 | 0.76 |
| 8,578.00 | 90.49 | 357.35 | 6,012.03 | 2,824.73 | 684.16 | 2,878.00 | 1.30 |
| 8,673.00 | 90.74 | 357.28 | 6,011.01 | 2,919.62 | 679.71 | 2,972.01 | 0.27 |
| 8,768.00 | 90.37 | 357.20 | 6,010.09 | 3,014.51 | 675.14 | 3,065.99 | 0.40 |
| 8,863.00 | 90.00 | 357.56 | 6,009.78 | 3,109.41 | 670.79 | 3,160.02 | 0.54 |
| 8,958.00 | 89.72 | 357.23 | 6,010.01 | 3,204.31 | 666.48 | 3,254.04 | 0.46 |
| 9,053.00 | 90.59 | 359.12 | 6,009.76 | 3,299.26 | 663.45 | 3,348.24 | 2.19 |
| 9,148.00 | 89.78 | 357.71 | 6,009.45 | 3,394.22 | 660.82 | 3,442.49 | 1.71 |
| 9,243.00 | 90.18 | 358.98 | 6,009.48 | 3,489.18 | 658.08 | 3,536.73 | 1.40 |
| 9,337.00 | 89.88 | 358.57 | 6,009.43 | 3,583.15 | 656.07 | 3,630.06 | 0.54 |
| 9,432.00 | 90.28 | 359.02 | 6,009.30 | 3,678.13 | 654.07 | 3,724.39 | 0.63 |
| 9,527.00 | 89.78 | 359.08 | 6,009.25 | 3,773.12 | 652.50 | 3,818.77 | 0.53 |
| 9,622.00 | 90.31 | 359.34 | 6,009.18 | 3,868.11 | 651.19 | 3,913.18 | 0.62 |
| 9,716.00 | 89.69 | 359.41 | 6,009.18 | 3,962.10 | 650.16 | 4,006.63 | 0.66 |
| 9,811.00 | 89.41 | 359.70 | 6,009.92 | 4,057.10 | 649.42 | 4,101.10 | 0.42 |
| 9,906.00 | 89.32 | 358.69 | 6,010.98 | 4,152.08 | 648.09 | 4,195.50 | 1.07 |
| 10,000.00 | 89.63 | 359.54 | 6,011.84 | 4,246.06 | 646.64 | 4,288.89 | 0.96 |

Design Report for Haley LC27-711 - Actual Surveys

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|--|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 10,095.00 | 88.70 | 356.98 | 6,013.22 | 4,341.00 | 643.75 | 4,383.10 | 2.87 |
| 10,189.00 | 88.80 | 357.47 | 6,015.27 | 4,434.87 | 639.20 | 4,476.07 | 0.53 |
| 10,284.00 | 89.38 | 356.40 | 6,016.78 | 4,529.72 | 634.13 | 4,569.97 | 1.28 |
| 10,378.00 | 91.97 | 353.83 | 6,015.67 | 4,623.36 | 626.12 | 4,662.38 | 3.88 |
| 10,474.00 | 92.03 | 353.95 | 6,012.32 | 4,718.75 | 615.91 | 4,756.33 | 0.14 |
| 10,568.00 | 91.60 | 354.07 | 6,009.35 | 4,812.19 | 606.11 | 4,848.37 | 0.47 |
| 10,663.00 | 91.42 | 353.24 | 6,006.84 | 4,906.58 | 595.61 | 4,941.28 | 0.89 |
| 10,757.00 | 91.51 | 353.37 | 6,004.44 | 4,999.90 | 584.66 | 5,033.09 | 0.17 |
| 10,852.00 | 91.60 | 353.54 | 6,001.86 | 5,094.25 | 573.83 | 5,125.93 | 0.20 |
| 10,947.00 | 91.36 | 353.47 | 5,999.41 | 5,188.61 | 563.09 | 5,218.79 | 0.26 |
| 11,042.00 | 91.88 | 354.07 | 5,996.72 | 5,283.01 | 552.78 | 5,311.74 | 0.84 |
| 11,137.00 | 90.62 | 354.50 | 5,994.65 | 5,377.51 | 543.33 | 5,404.87 | 1.40 |
| 11,232.00 | 90.40 | 355.49 | 5,993.80 | 5,472.15 | 535.04 | 5,498.24 | 1.07 |
| 11,327.00 | 89.41 | 355.15 | 5,993.96 | 5,566.83 | 527.29 | 5,591.71 | 1.10 |
| 11,404.00 | 89.11 | 355.32 | 5,994.96 | 5,643.55 | 520.89 | 5,667.45 | 0.45 |
| Last MWD Survey at 11404' MD | | | | | | | |
| 11,471.00 | 89.11 | 355.32 | 5,996.00 | 5,710.32 | 515.43 | 5,733.37 | 0.00 |
| Straight Projection to Bit at 11471' MD | | | | | | | |

Design Annotations

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates | | Comment |
|-----------------------|-----------------------|-------------------|--------------|---|
| | | +N/-S (usft) | +E/-W (usft) | |
| 630.00 | 629.99 | -1.33 | -2.78 | First MWD Survey |
| 11,404.00 | 5,994.96 | 5,643.55 | 520.89 | Last MWD Survey at 11404' MD |
| 11,471.00 | 5,996.00 | 5,710.32 | 515.43 | Straight Projection to Bit at 11471' MD |

Vertical Section Information

| Angle Type | Target | Azimuth (°) | Origin Type | Origin | | Start TVD (usft) |
|------------|--------------------|-------------|-------------|--------------|--------------|------------------|
| | | | | +N/_S (usft) | +E/-W (usft) | |
| Target | Haley LC27-711_BHL | 5.60 | Slot | 0.00 | 0.00 | 0.00 |

Survey tool program

| From (usft) | To (usft) | Survey/Plan | Survey Tool |
|-------------|-----------|----------------------|-------------|
| 630.00 | 6,393.00 | Intermediate Surveys | MWD |
| 6,523.00 | 11,471.00 | Production Surveys | MWD |

Casing Details

| Measured Depth (usft) | Vertical Depth (usft) | Name | Casing Diameter (") | Hole Diameter (") |
|-----------------------|-----------------------|--------|---------------------|-------------------|
| 617.00 | 616.99 | 9 5/8" | 9-5/8 | 13-3/4 |
| 6,437.00 | 6,020.19 | 7" | 7 | 8-3/4 |

Design Report for Haley LC27-711 - 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 |
|--|---------------------|--------------------|---------------|-----------------|-----------------|--------------------|-------------------|-----------|-------------|
| Haley LC27-711_LNDF - actual wellpath misses target center by 217.79usft at 5493.70usft MD (5447.76 TVD, 66.98 N, 542.91 E) - Point | 0.00 | 0.00 | 5,400.00 | 80.00 | 755.00 | 1,506,202.19 | 3,428,510.63 | 40.712663 | -103.954212 |
| Haley LC27-711_BHL - actual wellpath misses target center by 45.61usft at 11471.00usft MD (5996.00 TVD, 5710.32 N, 515.43 E) - Point | 0.00 | 0.00 | 5,990.00 | 5,716.07 | 560.28 | 1,511,838.19 | 3,428,315.91 | 40.728140 | -103.954560 |

Directional Difficulty Index

| | | | |
|------------------------------------|----------------|-------------------------------|----------------------------------|
| Average Dogleg over Survey: | 1.72 °/100usft | Maximum Dogleg over Survey: | 18.65 °/100usft at 6,393.00 usft |
| Net Tortosity applicable to Plans: | 0.81 °/100usft | Directional Difficulty Index: | 6.376 |

Audit Info

North Reference Sheet for Sec. 34-T9N-R59W - Haley LC27-711 - Original Wellbore

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

Vertical Depths are relative to KB @ 4838.00usft (HP 343). Northing and Easting are relative to Haley LC27-711

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: 0.99998927

Grid Coordinates of Well: 1,506,122.19 usft N, 3,427,755.64 usft E

Geographical Coordinates of Well: 40° 42' 44.93" N, 103° 57' 24.98" W

Grid Convergence at Surface is: 1.00°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,471.00usft the Bottom Hole Displacement is 5,733.54usft in the Direction of 5.16° (Grid).

Magnetic Convergence at surface is: -7.12° (30 March 2015, , BGGM2015)

Magnetic Model: BGGM2015
 Date: 30-Mar-15
 Declination: 8.12°
 Inclination/Dip: 67.37°
 Field Strength: 52913

Grid North is 1.00° East of True North (Grid Convergence)
 Magnetic North is 8.12° East of True North (Magnetic Declination)
 Magnetic North is 7.12° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 1.00°
 To convert a Magnetic Direction to a True Direction, Add 8.12° East
 To convert a Magnetic Direction to a Grid Direction, Add 7.12°