

Tug Hill Operating LLC

Comanche County, Kansas

Sec 10, T34S, R18W

Haley Unit #1-10H

Original Wellbore

Survey: MWD Surveys

Standard Survey Report

17 September, 2012



| | | | |
|------------------|-------------------------|-------------------------------------|--|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Site Sec 10, T34S, R18W |
| Project: | Comanche County, Kansas | TVD Reference: | WELL @ 1861.0usft (Original Well Elev) |
| Site: | Sec 10, T34S, R18W | MD Reference: | WELL @ 1861.0usft (Original Well Elev) |
| Well: | Haley Unit #1-10H | North Reference: | Grid |
| Wellbore: | Original Wellbore | Survey Calculation Method: | Minimum Curvature |
| Design: | Original Wellbore | Database: | EDM 5000.1 Single User Db |

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|--------------------|--------------------------------------|----------------------|----------------|
| Project | Comanche County, Kansas | | |
| Map System: | US State Plane 1927 (Exact solution) | System Datum: | Mean Sea Level |
| Geo Datum: | NAD 1927 (NADCON CONUS) | | |
| Map Zone: | Kansas South 1502 | | |

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|------------------------------|--------------------|---------------------|-------------------|--------------------------|-----------------|
| Site | Sec 10, T34S, R18W | | | | |
| Site Position: | | Northing: | 155,798.02 usft | Latitude: | 37° 5' 31.229 N |
| From: | Lat/Long | Easting: | 1,775,962.48 usft | Longitude: | 99° 16' 4.991 W |
| Position Uncertainty: | 0.0 usft | Slot Radius: | 13-3/16 " | Grid Convergence: | -0.47 ° |

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|-----------------------------|-------------------|----------|----------------------------|-------------------|----------------------|-----------------|
| Well | Haley Unit #1-10H | | | | | |
| Well Position | +N/-S | 0.0 usft | Northing: | 155,798.02 usft | Latitude: | 37° 5' 31.229 N |
| | +E/-W | 0.0 usft | Easting: | 1,775,962.48 usft | Longitude: | 99° 16' 4.991 W |
| Position Uncertainty | | 0.0 usft | Wellhead Elevation: | usft | Ground Level: | 1,838.0 usft |

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|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | Original Wellbore | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2010 | 8/22/2012 | 5.35 | 65.09 | 51,741 |

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|--------------------------|--------------------------------|---------------------|---------------------|----------------------|-----|
| Design | Original Wellbore | | | | |
| Audit Notes: | | | | | |
| Version: | 1.0 | Phase: | ACTUAL | Tie On Depth: | 0.0 |
| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) | |
| | 0.0 | 0.0 | 0.0 | 359.36 | |

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|-----------------------|------------------|----------------------------------|------------------|----------------------|--|
| Survey Program | Date | 9/17/2012 | | | |
| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description | |
| 100.0 | 4,730.0 | Gyro Surveys (Original Wellbore) | NS-GYRO-SS | NS Gyro single shots | |
| 4,798.0 | 9,856.0 | MWD Surveys (Original Wellbore) | MWD | MWD - Standard | |

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|------------------------------|------------------------|--------------------|------------------------------|---------------------|---------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|--|
| Survey | | | | | | | | | | |
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | |
| 4,730.0 | 0.90 | 318.54 | 4,729.9 | 22.7 | -0.3 | 22.7 | 0.00 | 0.00 | 0.00 | |
| 4,798.0 | 2.00 | 4.60 | 4,797.8 | 24.3 | -0.5 | 24.3 | 2.24 | 1.62 | 67.74 | |
| First MWD Survey | | | | | | | | | | |
| 4,829.0 | 5.60 | 20.80 | 4,828.8 | 26.2 | 0.1 | 26.2 | 12.00 | 11.61 | 52.26 | |
| 4,861.0 | 9.30 | 22.00 | 4,860.5 | 30.1 | 1.6 | 30.1 | 11.57 | 11.56 | 3.75 | |
| 4,893.0 | 12.80 | 21.60 | 4,891.9 | 35.8 | 3.9 | 35.7 | 10.94 | 10.94 | -1.25 | |
| 4,925.0 | 16.20 | 23.00 | 4,922.9 | 43.2 | 6.9 | 43.1 | 10.68 | 10.63 | 4.38 | |
| 4,957.0 | 19.00 | 24.60 | 4,953.4 | 52.0 | 10.8 | 51.9 | 8.88 | 8.75 | 5.00 | |
| 4,989.0 | 22.50 | 24.60 | 4,983.3 | 62.3 | 15.5 | 62.2 | 10.94 | 10.94 | 0.00 | |
| 5,021.0 | 26.50 | 22.90 | 5,012.4 | 74.5 | 20.9 | 74.3 | 12.69 | 12.50 | -5.31 | |

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|------------------|-------------------------|-------------------------------------|--|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Site Sec 10, T34S, R18W |
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| Site: | Sec 10, T34S, R18W | MD Reference: | WELL @ 1861.0usft (Original Well Elev) |
| Well: | Haley Unit #1-10H | North Reference: | Grid |
| Wellbore: | Original Wellbore | Survey Calculation Method: | Minimum Curvature |
| Design: | Original Wellbore | Database: | EDM 5000.1 Single User Db |

| Survey | | | | | | | | | | |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | |
| 5,052.0 | 31.20 | 20.80 | 5,039.5 | 88.4 | 26.4 | 88.1 | 15.51 | 15.16 | -6.77 | |
| 5,084.0 | 35.50 | 17.40 | 5,066.3 | 105.0 | 32.1 | 104.6 | 14.65 | 13.44 | -10.63 | |
| 5,116.0 | 40.70 | 15.00 | 5,091.5 | 124.0 | 37.6 | 123.5 | 16.89 | 16.25 | -7.50 | |
| 5,148.0 | 45.70 | 14.40 | 5,114.8 | 145.1 | 43.2 | 144.7 | 15.68 | 15.63 | -1.88 | |
| 5,179.0 | 50.50 | 13.70 | 5,135.5 | 167.5 | 48.8 | 167.0 | 15.57 | 15.48 | -2.26 | |
| 5,211.0 | 55.20 | 11.30 | 5,154.8 | 192.4 | 54.3 | 191.8 | 15.86 | 14.69 | -7.50 | |
| 5,242.0 | 60.40 | 10.40 | 5,171.3 | 218.2 | 59.2 | 217.5 | 16.95 | 16.77 | -2.90 | |
| 5,273.0 | 62.30 | 10.90 | 5,186.2 | 244.9 | 64.2 | 244.2 | 6.29 | 6.13 | 1.61 | |
| 5,305.0 | 62.60 | 10.90 | 5,201.0 | 272.8 | 69.6 | 272.0 | 0.94 | 0.94 | 0.00 | |
| 5,336.0 | 62.20 | 11.10 | 5,215.3 | 299.7 | 74.8 | 298.9 | 1.41 | -1.29 | 0.65 | |
| 5,368.0 | 60.00 | 11.10 | 5,230.8 | 327.2 | 80.2 | 326.3 | 6.88 | -6.88 | 0.00 | |
| 5,399.0 | 65.30 | 11.40 | 5,245.0 | 354.2 | 85.6 | 353.2 | 17.12 | 17.10 | 0.97 | |
| 5,431.0 | 69.80 | 11.10 | 5,257.2 | 383.2 | 91.4 | 382.2 | 14.09 | 14.06 | -0.94 | |
| 5,462.0 | 73.30 | 9.30 | 5,267.1 | 412.2 | 96.6 | 411.0 | 12.56 | 11.29 | -5.81 | |
| 5,494.0 | 76.00 | 7.20 | 5,275.5 | 442.7 | 101.0 | 441.5 | 10.55 | 8.44 | -6.56 | |
| 5,526.0 | 77.60 | 4.40 | 5,282.8 | 473.7 | 104.1 | 472.5 | 9.88 | 5.00 | -8.75 | |
| 5,558.0 | 78.60 | 0.40 | 5,289.4 | 505.0 | 105.5 | 503.7 | 12.62 | 3.13 | -12.50 | |
| 5,589.0 | 80.10 | 357.90 | 5,295.2 | 535.4 | 105.0 | 534.2 | 9.29 | 4.84 | -8.06 | |
| 5,621.0 | 83.70 | 357.40 | 5,299.7 | 567.1 | 103.7 | 565.9 | 11.36 | 11.25 | -1.56 | |
| 5,652.0 | 86.00 | 357.40 | 5,302.5 | 597.9 | 102.3 | 596.7 | 7.42 | 7.42 | 0.00 | |
| 5,683.0 | 90.00 | 357.90 | 5,303.5 | 628.9 | 101.0 | 627.7 | 13.00 | 12.90 | 1.61 | |
| 5,746.0 | 92.20 | 356.50 | 5,302.3 | 691.8 | 98.0 | 690.6 | 4.14 | 3.49 | -2.22 | |
| 5,825.0 | 91.60 | 355.60 | 5,299.7 | 770.5 | 92.5 | 769.4 | 1.37 | -0.76 | -1.14 | |
| 5,917.0 | 90.50 | 356.70 | 5,298.0 | 862.3 | 86.3 | 861.3 | 1.69 | -1.20 | 1.20 | |
| 6,009.0 | 89.50 | 358.50 | 5,298.0 | 954.2 | 82.5 | 953.2 | 2.24 | -1.09 | 1.96 | |
| 6,101.0 | 89.30 | 359.10 | 5,299.0 | 1,046.2 | 80.6 | 1,045.2 | 0.69 | -0.22 | 0.65 | |
| 6,193.0 | 89.00 | 359.90 | 5,300.4 | 1,138.2 | 79.8 | 1,137.2 | 0.93 | -0.33 | 0.87 | |
| 6,285.0 | 89.50 | 0.10 | 5,301.6 | 1,230.2 | 79.8 | 1,229.2 | 0.59 | 0.54 | 0.22 | |
| 6,377.0 | 88.80 | 1.30 | 5,302.9 | 1,322.2 | 80.9 | 1,321.2 | 1.51 | -0.76 | 1.30 | |
| 6,469.0 | 89.60 | 1.60 | 5,304.2 | 1,414.1 | 83.2 | 1,413.1 | 0.93 | 0.87 | 0.33 | |
| 6,561.0 | 89.90 | 1.20 | 5,304.6 | 1,506.1 | 85.5 | 1,505.0 | 0.54 | 0.33 | -0.43 | |
| 6,653.0 | 89.30 | 0.00 | 5,305.2 | 1,598.1 | 86.4 | 1,597.0 | 1.46 | -0.65 | -1.30 | |
| 6,745.0 | 88.00 | 359.80 | 5,307.4 | 1,690.0 | 86.3 | 1,689.0 | 1.43 | -1.41 | -0.22 | |
| 6,837.0 | 88.20 | 359.80 | 5,310.5 | 1,782.0 | 85.9 | 1,780.9 | 0.22 | 0.22 | 0.00 | |
| 6,930.0 | 88.60 | 0.60 | 5,313.1 | 1,875.0 | 86.3 | 1,873.9 | 0.96 | 0.43 | 0.86 | |
| 7,022.0 | 88.00 | 359.10 | 5,315.8 | 1,966.9 | 86.0 | 1,965.8 | 1.76 | -0.65 | -1.63 | |
| 7,114.0 | 87.60 | 358.80 | 5,319.3 | 2,058.8 | 84.3 | 2,057.8 | 0.54 | -0.43 | -0.33 | |
| 7,209.0 | 88.70 | 358.50 | 5,322.4 | 2,153.8 | 82.1 | 2,152.7 | 1.20 | 1.16 | -0.32 | |
| 7,304.0 | 90.30 | 358.40 | 5,323.2 | 2,248.7 | 79.5 | 2,247.7 | 1.69 | 1.68 | -0.11 | |
| 7,399.0 | 90.80 | 358.70 | 5,322.3 | 2,343.7 | 77.1 | 2,342.7 | 0.61 | 0.53 | 0.32 | |
| 7,495.0 | 91.30 | 358.90 | 5,320.5 | 2,439.6 | 75.1 | 2,438.6 | 0.56 | 0.52 | 0.21 | |
| 7,590.0 | 90.80 | 358.80 | 5,318.8 | 2,534.6 | 73.2 | 2,533.6 | 0.54 | -0.53 | -0.11 | |
| 7,685.0 | 90.60 | 358.00 | 5,317.6 | 2,629.6 | 70.6 | 2,628.6 | 0.87 | -0.21 | -0.84 | |

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| Design: | Original Wellbore | Database: | EDM 5000.1 Single User Db |

| Survey | | | | | | | | | | |
|------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|--|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | |
| 7,780.0 | 91.30 | 358.50 | 5,316.1 | 2,724.5 | 67.7 | 2,723.6 | 0.91 | 0.74 | 0.53 | |
| 7,876.0 | 90.20 | 358.90 | 5,314.8 | 2,820.5 | 65.5 | 2,819.6 | 1.22 | -1.15 | 0.42 | |
| 7,971.0 | 91.00 | 359.40 | 5,313.8 | 2,915.4 | 64.1 | 2,914.5 | 0.99 | 0.84 | 0.53 | |
| 8,066.0 | 90.90 | 359.50 | 5,312.2 | 3,010.4 | 63.2 | 3,009.5 | 0.15 | -0.11 | 0.11 | |
| 8,161.0 | 91.60 | 359.80 | 5,310.2 | 3,105.4 | 62.6 | 3,104.5 | 0.80 | 0.74 | 0.32 | |
| 8,256.0 | 90.30 | 359.60 | 5,308.6 | 3,200.4 | 62.1 | 3,199.5 | 1.38 | -1.37 | -0.21 | |
| 8,350.0 | 90.40 | 359.70 | 5,308.0 | 3,294.4 | 61.5 | 3,293.5 | 0.15 | 0.11 | 0.11 | |
| 8,445.0 | 91.10 | 0.70 | 5,306.8 | 3,389.4 | 61.8 | 3,388.5 | 1.28 | 0.74 | 1.05 | |
| 8,540.0 | 90.60 | 359.10 | 5,305.4 | 3,484.4 | 61.7 | 3,483.4 | 1.76 | -0.53 | -1.68 | |
| 8,635.0 | 90.60 | 359.00 | 5,304.4 | 3,579.3 | 60.1 | 3,578.4 | 0.11 | 0.00 | -0.11 | |
| 8,730.0 | 91.70 | 359.60 | 5,302.5 | 3,674.3 | 58.9 | 3,673.4 | 1.32 | 1.16 | 0.63 | |
| 8,826.0 | 90.20 | 358.60 | 5,300.9 | 3,770.3 | 57.4 | 3,769.4 | 1.88 | -1.56 | -1.04 | |
| 8,921.0 | 91.00 | 358.30 | 5,299.9 | 3,865.2 | 54.9 | 3,864.4 | 0.90 | 0.84 | -0.32 | |
| 9,016.0 | 90.50 | 358.00 | 5,298.6 | 3,960.2 | 51.8 | 3,959.4 | 0.61 | -0.53 | -0.32 | |
| 9,111.0 | 90.20 | 357.70 | 5,298.1 | 4,055.1 | 48.2 | 4,054.3 | 0.45 | -0.32 | -0.32 | |
| 9,206.0 | 89.40 | 358.50 | 5,298.4 | 4,150.1 | 45.1 | 4,149.3 | 1.19 | -0.84 | 0.84 | |
| 9,301.0 | 89.90 | 358.90 | 5,299.0 | 4,245.0 | 42.9 | 4,244.3 | 0.67 | 0.53 | 0.42 | |
| 9,396.0 | 91.10 | 359.30 | 5,298.1 | 4,340.0 | 41.4 | 4,339.3 | 1.33 | 1.26 | 0.42 | |
| 9,491.0 | 91.60 | 359.80 | 5,295.9 | 4,435.0 | 40.7 | 4,434.3 | 0.74 | 0.53 | 0.53 | |
| 9,586.0 | 91.10 | 0.20 | 5,293.7 | 4,530.0 | 40.7 | 4,529.2 | 0.67 | -0.53 | 0.42 | |
| 9,680.0 | 90.70 | 0.20 | 5,292.2 | 4,624.0 | 41.0 | 4,623.2 | 0.43 | -0.43 | 0.00 | |
| 9,776.0 | 90.90 | 0.20 | 5,290.9 | 4,719.9 | 41.4 | 4,719.2 | 0.21 | 0.21 | 0.00 | |
| 9,805.0 | 91.20 | 0.60 | 5,290.3 | 4,748.9 | 41.6 | 4,748.2 | 1.72 | 1.03 | 1.38 | |
| Last MWD Survey | | | | | | | | | | |
| 9,856.0 | 91.20 | 0.60 | 5,289.3 | 4,799.9 | 42.1 | 4,799.1 | 0.00 | 0.00 | 0.00 | |
| PTB - TD | | | | | | | | | | |

| Survey Annotations | | | | | |
|-----------------------|-----------------------|-------------------|--------------|------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates | | Comment | |
| | | +N/-S (usft) | +E/-W (usft) | | |
| 4,798.0 | 4,797.8 | 24.3 | -0.5 | First MWD Survey | |
| 9,805.0 | 5,290.3 | 4,748.9 | 41.6 | Last MWD Survey | |
| 9,856.0 | 5,289.3 | 4,799.9 | 42.1 | PTB - TD | |

Checked By: _____ Approved By: _____ Date: _____