



NM OIL CONSERVATION  
ARTESIA DISTRICT

JUN 01 2018

RECEIVED

October 24, 2017

Devon Energy Production Company, LP  
Well: Emerald PWU 20-22 12H (ST01)  
County/Parish: Eddy County, NM

30.015.44097

LEAM MWD: (ST01) from 8,119' MD – 21,600' MD  
Projection; 21,670' MD

This Borehole Survey taken between 10/01/2017 and 10/18/2017 had been conducted and calculated according to the highest professional standards and complies with all known State and Federal requirements.

Reviewed and Approved:

Date: October 24, 2017



## Survey Certification Form

State of New Mexico

Eddy County

I, Randy W. Rakowitz, certify that; I am employed by LEAM Drilling Services, that I did on the day(s) of 10/01/2017 through 10/18/2017, conduct or supervise the taking of MWD Survey from a depth of 8,119' MD to 21,670' MD; that the data is true, correct, complete and within the limitations of the tools as set forth by LEAM Drilling Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Devon Energy Production Company, LP for the Emerald PWU 20-22 12H (ST01) in Eddy County, New Mexico; and that I reviewed this report and find that it conforms to the principals and procedures as set forth by LEAM Drilling Services.

A handwritten signature in black ink, appearing to read 'Randy W. Rakowitz', is written over a horizontal line.

Randy W. Rakowitz  
MWD Operations Coordinator

# LEAM Drilling Systems LLC

## Survey Report

|                  |                          |                                     |                                     |
|------------------|--------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | Devon Energy             | <b>Local Co-ordinate Reference:</b> | Well 12H                            |
| <b>Project:</b>  | Eddy County, NM (NAD-83) | <b>TVD Reference:</b>               | 3313.8' GE + 23.5' KB @ 3337.30usft |
| <b>Site:</b>     | Emerald PWU 20-22        | <b>MD Reference:</b>                | 3313.8' GE + 23.5' KB @ 3337.30usft |
| <b>Well:</b>     | 12H                      | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | ST01                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | ST01                     | <b>Database:</b>                    | EDM 5000.1 MULTI User DB            |

|                    |                           |                      |                |
|--------------------|---------------------------|----------------------|----------------|
| <b>Project</b>     | Eddy County, NM (NAD-83)  |                      |                |
| <b>Map System:</b> | US State Plane 1983       | <b>System Datum:</b> | Mean Sea Level |
| <b>Geo Datum:</b>  | North American Datum 1983 |                      |                |
| <b>Map Zone:</b>   | New Mexico Eastern Zone   |                      |                |

|                       |                   |              |                 |                   |                   |
|-----------------------|-------------------|--------------|-----------------|-------------------|-------------------|
| Site                  | Emerald PWU 20-22 |              |                 |                   |                   |
| Site Position:        |                   | Northing:    | 596,335.26 usft | Latitude:         | 32° 38' 20.9983 N |
| From:                 | Map               | Easting:     | 611,703.17 usft | Longitude:        | 104° 6' 17.0598 W |
| Position Uncertainty: | 0.00 usft         | Slot Radius: | 13-3/16 "       | Grid Convergence: | 0.12 °            |

|                      |       |           |                     |                 |               |                   |
|----------------------|-------|-----------|---------------------|-----------------|---------------|-------------------|
| Well                 | 12H   |           |                     |                 |               |                   |
| Well Position        | +N/-S | 0.00 usft | Northing:           | 596,335.26 usft | Latitude:     | 32° 38' 20.9983 N |
|                      | +E/-W | 0.00 usft | Easting:            | 611,703.17 usft | Longitude:    | 104° 6' 17.0598 W |
| Position Uncertainty |       | 0.00 usft | Wellhead Elevation: | 0.00 usft       | Ground Level: | 3,313.80 usft     |

|                  |                   |                    |                    |                  |                       |
|------------------|-------------------|--------------------|--------------------|------------------|-----------------------|
| <b>Wellbore</b>  | ST01              |                    |                    |                  |                       |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination</b> | <b>Dip Angle</b> | <b>Field Strength</b> |
|                  | HDGM              | 9/8/2017           | 7.42               | 60.50            | 48,177                |

|                          |                         |               |              |                      |          |
|--------------------------|-------------------------|---------------|--------------|----------------------|----------|
| <b>Design</b>            | ST01                    |               |              |                      |          |
| <b>Audit Notes:</b>      |                         |               |              |                      |          |
| <b>Version:</b>          | 1.0                     | <b>Phase:</b> | ACTUAL       | <b>Tie On Depth:</b> | 8,033.00 |
| <b>Vertical Section:</b> | <b>Depth From (TVD)</b> | <b>+N/-S</b>  | <b>+E/-W</b> | <b>Direction</b>     |          |
|                          | (usft)                  | (usft)        | (usft)       | (°)                  |          |
|                          | 0.00                    | 0.00          | 0.00         | 88.43                |          |

|                       |                        |                          |                  |                                       |  |
|-----------------------|------------------------|--------------------------|------------------|---------------------------------------|--|
| <b>Survey Program</b> | <b>Date</b> 10/23/2017 |                          |                  |                                       |  |
| <b>From</b>           | <b>To</b>              | <b>Survey (Wellbore)</b> | <b>Tool Name</b> | <b>Description</b>                    |  |
| (usft)                | (usft)                 |                          |                  |                                       |  |
| 50.00                 | 150.00                 | Survey #1 (OH)           | VES GyroFlex V2  |                                       |  |
| 285.00                | 8,033.00               | Survey #2 (OH)           | LEAM MWD+HDGM    | MWD+HDGM                              |  |
| 8,119.00              | 21,600.00              | Survey #1 - MWD (ST01)   | MWD+IFR1+MS      | MWD + IFR1 + Multi-Station Correction |  |
| 21,670.00             | 21,670.00              | Survey #2 (ST01)         | Project          | Projection                            |  |

|                 |                    |                |                 |               |               |                 |                    |                    |                    |  |
|-----------------|--------------------|----------------|-----------------|---------------|---------------|-----------------|--------------------|--------------------|--------------------|--|
| <b>Survey</b>   |                    |                |                 |               |               |                 |                    |                    |                    |  |
| <b>Measured</b> | <b>Inclination</b> | <b>Azimuth</b> | <b>Vertical</b> | <b>+N/-S</b>  | <b>+E/-W</b>  | <b>Vertical</b> | <b>Dogleg</b>      | <b>Build</b>       | <b>Turn</b>        |  |
| <b>Depth</b>    | <b>(°)</b>         | <b>(°)</b>     | <b>Depth</b>    | <b>(usft)</b> | <b>(usft)</b> | <b>Section</b>  | <b>Rate</b>        | <b>Rate</b>        | <b>Rate</b>        |  |
| <b>(usft)</b>   |                    |                | <b>(usft)</b>   |               |               | <b>(usft)</b>   | <b>(°/100usft)</b> | <b>(°/100usft)</b> | <b>(°/100usft)</b> |  |
| 0.00            | 0.00               | 0.00           | 0.00            | 0.00          | 0.00          | 0.00            | 0.00               | 0.00               | 0.00               |  |
| 50.00           | 0.09               | 354.90         | 50.00           | 0.04          | 0.00          | 0.00            | 0.18               | 0.18               | 0.00               |  |
| 100.00          | 0.29               | 335.65         | 100.00          | 0.19          | -0.06         | -0.05           | 0.41               | 0.40               | -38.50             |  |
| 150.00          | 0.57               | 324.69         | 150.00          | 0.51          | -0.26         | -0.24           | 0.58               | 0.56               | -21.92             |  |
| 285.00          | 1.50               | 247.30         | 284.98          | 0.38          | -2.27         | -2.26           | 1.10               | 0.69               | -57.33             |  |
| 338.00          | 1.50               | 253.60         | 337.96          | -0.09         | -3.58         | -3.58           | 0.31               | 0.00               | 11.89              |  |
| 438.00          | 1.80               | 251.50         | 437.92          | -0.95         | -6.32         | -6.35           | 0.31               | 0.30               | -2.10              |  |
| 529.00          | 1.90               | 260.30         | 528.87          | -1.66         | -9.17         | -9.21           | 0.33               | 0.11               | 9.67               |  |

# LEAM Drilling Systems LLC

## Survey Report

Company: Devon Energy  
Project: Eddy County, NM (NAD-83)  
Site: Emerald PWU 20-22  
Well: 12H  
Wellbore: ST01  
Design: ST01

Local Co-ordinate Reference: Well 12H  
TVD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
MD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 MULTI 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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 620.00                | 1.90            | 257.60      | 619.82                | -2.24        | -12.13       | -12.18                  | 0.10                    | 0.00                   | -2.97                 |
| 711.00                | 1.80            | 254.60      | 710.77                | -2.94        | -14.98       | -15.05                  | 0.15                    | -0.11                  | -3.30                 |
| 803.00                | 1.80            | 254.60      | 802.73                | -3.71        | -17.76       | -17.86                  | 0.00                    | 0.00                   | 0.00                  |
| 894.00                | 1.70            | 267.10      | 893.69                | -4.16        | -20.49       | -20.60                  | 0.43                    | -0.11                  | 13.74                 |
| 985.00                | 1.50            | 262.90      | 984.65                | -4.37        | -23.02       | -23.13                  | 0.25                    | -0.22                  | -4.62                 |
| 1,077.00              | 1.40            | 260.80      | 1,076.62              | -4.70        | -25.32       | -25.44                  | 0.12                    | -0.11                  | -2.28                 |
| 1,169.00              | 1.40            | 253.10      | 1,168.60              | -5.21        | -27.51       | -27.64                  | 0.20                    | 0.00                   | -8.37                 |
| 1,261.00              | 1.50            | 257.80      | 1,260.57              | -5.79        | -29.76       | -29.91                  | 0.17                    | 0.11                   | 5.11                  |
| 1,353.00              | 0.80            | 280.10      | 1,352.55              | -5.93        | -31.57       | -31.72                  | 0.89                    | -0.76                  | 24.24                 |
| 1,449.00              | 0.50            | 270.50      | 1,448.54              | -5.81        | -32.65       | -32.80                  | 0.33                    | -0.31                  | -10.00                |
| 1,544.00              | 0.90            | 277.10      | 1,543.53              | -5.71        | -33.80       | -33.95                  | 0.43                    | 0.42                   | 6.95                  |
| 1,640.00              | 0.70            | 269.00      | 1,639.52              | -5.63        | -35.14       | -35.28                  | 0.24                    | -0.21                  | -8.44                 |
| 1,736.00              | 0.90            | 276.60      | 1,735.51              | -5.56        | -36.47       | -36.61                  | 0.24                    | 0.21                   | 7.92                  |
| 1,831.00              | 0.70            | 294.20      | 1,830.51              | -5.23        | -37.74       | -37.87                  | 0.33                    | -0.21                  | 18.53                 |
| 1,927.00              | 1.10            | 282.80      | 1,926.49              | -4.79        | -39.18       | -39.29                  | 0.45                    | 0.42                   | -11.88                |
| 2,022.00              | 0.70            | 308.20      | 2,021.48              | -4.23        | -40.52       | -40.62                  | 0.58                    | -0.42                  | 26.74                 |
| 2,118.00              | 0.40            | 293.50      | 2,117.48              | -3.73        | -41.29       | -41.38                  | 0.34                    | -0.31                  | -15.31                |
| 2,214.00              | 0.40            | 295.90      | 2,213.48              | -3.45        | -41.90       | -41.98                  | 0.02                    | 0.00                   | 2.50                  |
| 2,310.00              | 0.60            | 324.20      | 2,309.47              | -2.90        | -42.50       | -42.56                  | 0.33                    | 0.21                   | 29.48                 |
| 2,405.00              | 0.70            | 289.40      | 2,404.47              | -2.30        | -43.33       | -43.38                  | 0.42                    | 0.11                   | -36.63                |
| 2,501.00              | 1.10            | 317.20      | 2,500.45              | -1.43        | -44.51       | -44.54                  | 0.61                    | 0.42                   | 28.96                 |
| 2,596.00              | 1.50            | 318.10      | 2,595.43              | 0.17         | -45.96       | -45.94                  | 0.42                    | 0.42                   | 0.95                  |
| 2,724.00              | 3.00            | 318.10      | 2,723.33              | 3.91         | -49.32       | -49.19                  | 1.17                    | 1.17                   | 0.00                  |
| 2,788.00              | 3.30            | 322.10      | 2,787.23              | 6.61         | -51.57       | -51.37                  | 0.58                    | 0.47                   | 6.25                  |
| 2,883.00              | 3.80            | 319.30      | 2,882.05              | 11.15        | -55.30       | -54.97                  | 0.56                    | 0.53                   | -2.95                 |
| 2,979.00              | 4.60            | 321.30      | 2,977.79              | 16.57        | -59.78       | -59.31                  | 0.85                    | 0.83                   | 2.08                  |
| 3,074.00              | 5.10            | 319.80      | 3,072.45              | 22.76        | -64.89       | -64.24                  | 0.54                    | 0.53                   | -1.58                 |
| 3,170.00              | 5.70            | 322.80      | 3,168.02              | 29.82        | -70.53       | -69.68                  | 0.69                    | 0.63                   | 3.13                  |
| 3,265.00              | 6.10            | 320.70      | 3,262.52              | 37.49        | -76.58       | -75.52                  | 0.48                    | 0.42                   | -2.21                 |
| 3,361.00              | 6.20            | 320.40      | 3,357.97              | 45.43        | -83.11       | -81.84                  | 0.11                    | 0.10                   | -0.31                 |
| 3,406.00              | 6.10            | 320.20      | 3,402.71              | 49.14        | -86.19       | -84.81                  | 0.23                    | -0.22                  | -0.44                 |
| 3,543.00              | 6.10            | 319.00      | 3,538.93              | 60.22        | -95.63       | -93.94                  | 0.09                    | 0.00                   | -0.88                 |
| 3,639.00              | 5.40            | 325.60      | 3,634.45              | 67.80        | -101.52      | -99.63                  | 1.00                    | -0.73                  | 6.88                  |
| 3,734.00              | 5.30            | 337.10      | 3,729.04              | 75.53        | -105.76      | -103.65                 | 1.13                    | -0.11                  | 12.11                 |
| 3,830.00              | 5.20            | 335.80      | 3,824.64              | 83.58        | -109.27      | -106.93                 | 0.16                    | -0.10                  | -1.35                 |
| 3,925.00              | 4.80            | 342.70      | 3,919.28              | 91.30        | -112.21      | -109.67                 | 0.76                    | -0.42                  | 7.26                  |
| 4,021.00              | 4.50            | 343.20      | 4,014.96              | 98.74        | -114.49      | -111.75                 | 0.32                    | -0.31                  | 0.52                  |
| 4,116.00              | 4.60            | 345.70      | 4,109.66              | 106.00       | -116.51      | -113.57                 | 0.23                    | 0.11                   | 2.63                  |
| 4,212.00              | 5.20            | 348.30      | 4,205.31              | 113.99       | -118.35      | -115.18                 | 0.67                    | 0.63                   | 2.71                  |
| 4,307.00              | 6.20            | 345.00      | 4,299.84              | 123.16       | -120.55      | -117.13                 | 1.11                    | 1.05                   | -3.47                 |
| 4,403.00              | 5.80            | 351.00      | 4,395.31              | 132.96       | -122.65      | -118.96                 | 0.77                    | -0.42                  | 6.25                  |
| 4,498.00              | 5.80            | 339.50      | 4,489.83              | 142.20       | -125.08      | -121.14                 | 1.22                    | 0.00                   | -12.11                |
| 4,594.00              | 5.30            | 338.80      | 4,585.38              | 150.88       | -128.38      | -124.20                 | 0.53                    | -0.52                  | -0.73                 |

# LEAM Drilling Systems LLC

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Wellbore: ST01  
Design: ST01

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### Survey

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|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 4,689.00              | 5.10            | 339.50      | 4,679.99              | 158.92       | -131.45      | -127.04                 | 0.22                    | -0.21                  | 0.74                  |
| 4,785.00              | 5.40            | 339.70      | 4,775.59              | 167.16       | -134.51      | -129.88                 | 0.31                    | 0.31                   | 0.21                  |
| 4,881.00              | 4.90            | 339.00      | 4,871.20              | 175.22       | -137.55      | -132.69                 | 0.52                    | -0.52                  | -0.73                 |
| 4,976.00              | 4.70            | 342.50      | 4,965.86              | 182.72       | -140.17      | -135.11                 | 0.37                    | -0.21                  | 3.68                  |
| 5,072.00              | 4.50            | 346.20      | 5,061.56              | 190.13       | -142.25      | -136.99                 | 0.37                    | -0.21                  | 3.85                  |
| 5,168.00              | 4.80            | 338.80      | 5,157.24              | 197.53       | -144.60      | -139.14                 | 0.70                    | 0.31                   | -7.71                 |
| 5,263.00              | 5.50            | 343.10      | 5,251.86              | 205.59       | -147.36      | -141.67                 | 0.84                    | 0.74                   | 4.53                  |
| 5,359.00              | 5.30            | 344.50      | 5,347.43              | 214.27       | -149.88      | -143.96                 | 0.25                    | -0.21                  | 1.46                  |
| 5,454.00              | 4.80            | 353.20      | 5,442.06              | 222.44       | -151.53      | -145.38                 | 0.96                    | -0.53                  | 9.16                  |
| 5,550.00              | 5.50            | 348.10      | 5,537.68              | 230.93       | -152.95      | -146.57                 | 0.87                    | 0.73                   | -5.31                 |
| 5,645.00              | 5.80            | 340.20      | 5,632.22              | 239.90       | -155.52      | -148.89                 | 0.88                    | 0.32                   | -8.32                 |
| 5,741.00              | 5.30            | 339.50      | 5,727.76              | 248.62       | -158.71      | -151.84                 | 0.53                    | -0.52                  | -0.73                 |
| 5,836.00              | 4.70            | 342.90      | 5,822.40              | 256.45       | -161.39      | -154.31                 | 0.70                    | -0.63                  | 3.58                  |
| 5,932.00              | 4.60            | 342.00      | 5,918.09              | 263.87       | -163.74      | -156.45                 | 0.13                    | -0.10                  | -0.94                 |
| 6,027.00              | 5.50            | 336.50      | 6,012.72              | 271.67       | -166.73      | -159.23                 | 1.07                    | 0.95                   | -5.79                 |
| 6,123.00              | 5.00            | 336.20      | 6,108.31              | 279.72       | -170.26      | -162.53                 | 0.52                    | -0.52                  | -0.31                 |
| 6,218.00              | 4.90            | 339.20      | 6,202.96              | 287.30       | -173.37      | -165.43                 | 0.29                    | -0.11                  | 3.16                  |
| 6,314.00              | 6.00            | 339.70      | 6,298.53              | 295.84       | -176.56      | -168.39                 | 1.15                    | 1.15                   | 0.52                  |
| 6,410.00              | 5.50            | 340.90      | 6,394.04              | 304.89       | -179.81      | -171.39                 | 0.54                    | -0.52                  | 1.25                  |
| 6,505.00              | 4.50            | 338.50      | 6,488.68              | 312.66       | -182.67      | -174.03                 | 1.08                    | -1.05                  | -2.53                 |
| 6,601.00              | 4.70            | 336.90      | 6,584.37              | 319.78       | -185.59      | -176.76                 | 0.25                    | 0.21                   | -1.67                 |
| 6,696.00              | 5.70            | 340.80      | 6,678.98              | 327.82       | -188.67      | -179.61                 | 1.12                    | 1.05                   | 4.11                  |
| 6,792.00              | 6.10            | 342.30      | 6,774.47              | 337.18       | -191.79      | -182.48                 | 0.45                    | 0.42                   | 1.56                  |
| 6,887.00              | 5.30            | 339.40      | 6,869.00              | 346.09       | -194.86      | -185.31                 | 0.89                    | -0.84                  | -3.05                 |
| 6,983.00              | 4.90            | 336.40      | 6,964.62              | 354.00       | -198.07      | -188.29                 | 0.50                    | -0.42                  | -3.13                 |
| 7,079.00              | 5.50            | 337.10      | 7,060.22              | 362.00       | -201.50      | -191.50                 | 0.63                    | 0.63                   | 0.73                  |
| 7,174.00              | 6.10            | 336.40      | 7,154.74              | 370.81       | -205.29      | -195.05                 | 0.64                    | 0.63                   | -0.74                 |
| 7,269.00              | 5.50            | 332.50      | 7,249.25              | 379.48       | -209.41      | -198.94                 | 0.76                    | -0.63                  | -4.11                 |
| 7,365.00              | 4.70            | 336.00      | 7,344.87              | 387.15       | -213.14      | -202.45                 | 0.89                    | -0.83                  | 3.65                  |
| 7,461.00              | 3.70            | 326.40      | 7,440.61              | 393.33       | -216.45      | -205.59                 | 1.27                    | -1.04                  | -10.00                |
| 7,556.00              | 3.30            | 341.60      | 7,535.44              | 398.47       | -219.01      | -208.01                 | 1.06                    | -0.42                  | 16.00                 |
| 7,651.00              | 3.70            | 344.60      | 7,630.26              | 404.02       | -220.69      | -209.53                 | 0.46                    | 0.42                   | 3.16                  |
| 7,746.00              | 2.50            | 337.40      | 7,725.12              | 408.89       | -222.30      | -211.01                 | 1.33                    | -1.26                  | -7.58                 |
| 7,842.00              | 3.10            | 347.80      | 7,821.00              | 413.36       | -223.65      | -212.24                 | 0.82                    | 0.63                   | 10.83                 |
| 7,938.00              | 2.60            | 354.30      | 7,916.89              | 418.07       | -224.42      | -212.88                 | 0.62                    | -0.52                  | 6.77                  |
| 8,033.00              | 2.20            | 356.40      | 8,011.80              | 422.03       | -224.74      | -213.10                 | 0.43                    | -0.42                  | 2.21                  |
| 8,119.00              | 5.90            | 150.70      | 8,097.68              | 419.82       | -222.68      | -211.10                 | 9.23                    | 4.30                   | 179.42                |
| 8,151.00              | 8.00            | 144.90      | 8,129.44              | 416.56       | -220.60      | -209.10                 | 6.91                    | 6.56                   | -18.13                |
| 8,248.00              | 8.80            | 144.93      | 8,225.40              | 404.97       | -212.45      | -201.28                 | 0.82                    | 0.82                   | 0.03                  |
| 8,344.00              | 8.20            | 145.43      | 8,320.35              | 393.32       | -204.35      | -193.49                 | 0.63                    | -0.63                  | 0.52                  |
| 8,439.00              | 8.13            | 145.54      | 8,414.38              | 382.20       | -196.70      | -186.16                 | 0.08                    | -0.07                  | 0.12                  |
| 8,535.00              | 12.07           | 124.41      | 8,508.91              | 370.92       | -184.57      | -174.34                 | 5.57                    | 4.10                   | -22.01                |
| 8,583.00              | 18.08           | 115.08      | 8,555.24              | 364.93       | -173.67      | -163.61                 | 13.46                   | 12.52                  | -19.44                |
| 8,631.00              | 21.97           | 101.63      | 8,600.36              | 359.95       | -158.12      | -148.20                 | 12.51                   | 8.10                   | -28.02                |

# LEAM Drilling Systems LLC

## Survey Report

|                  |                          |                                     |                                     |
|------------------|--------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | Devon Energy             | <b>Local Co-ordinate Reference:</b> | Well 12H                            |
| <b>Project:</b>  | Eddy County, NM (NAD-83) | <b>TVD Reference:</b>               | 3313.8' GE + 23.5' KB @ 3337.30usft |
| <b>Site:</b>     | Emerald PWU 20-22        | <b>MD Reference:</b>                | 3313.8' GE + 23.5' KB @ 3337.30usft |
| <b>Well:</b>     | 12H                      | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | ST01                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | ST01                     | <b>Database:</b>                    | EDM 5000.1 MULTI User DB            |

### Survey

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 8,679.00                    | 27.38              | 90.89          | 8,643.98                    | 357.97          | -138.26         | -128.40                       | 14.60                         | 11.27                        | -22.38                      |
| 8,726.00                    | 32.64              | 85.41          | 8,684.67                    | 358.82          | -114.80         | -104.93                       | 12.61                         | 11.19                        | -11.66                      |
| 8,774.00                    | 39.00              | 82.00          | 8,723.58                    | 361.96          | -86.91          | -76.96                        | 13.88                         | 13.25                        | -7.10                       |
| 8,822.00                    | 45.51              | 83.74          | 8,759.09                    | 365.93          | -54.90          | -44.85                        | 13.78                         | 13.56                        | 3.63                        |
| 8,870.00                    | 52.02              | 88.16          | 8,790.72                    | 368.41          | -18.92          | -8.82                         | 15.22                         | 13.56                        | 9.21                        |
| 8,918.00                    | 55.74              | 90.32          | 8,819.01                    | 368.91          | 19.84           | 29.94                         | 8.56                          | 7.75                         | 4.50                        |
| 8,966.00                    | 59.72              | 90.14          | 8,844.63                    | 368.74          | 60.41           | 70.49                         | 8.30                          | 8.29                         | -0.38                       |
| 9,013.00                    | 63.50              | 89.60          | 8,866.98                    | 368.84          | 101.75          | 111.82                        | 8.11                          | 8.04                         | -1.15                       |
| 9,061.00                    | 66.76              | 90.22          | 8,887.16                    | 368.91          | 145.29          | 155.35                        | 6.89                          | 6.79                         | 1.29                        |
| 9,109.00                    | 69.44              | 90.95          | 8,905.06                    | 368.45          | 189.82          | 199.85                        | 5.76                          | 5.58                         | 1.52                        |
| 9,157.00                    | 70.99              | 90.96          | 8,921.31                    | 367.70          | 234.98          | 244.97                        | 3.23                          | 3.23                         | 0.02                        |
| 9,205.00                    | 73.19              | 91.17          | 8,936.07                    | 366.85          | 280.65          | 290.59                        | 4.60                          | 4.58                         | 0.44                        |
| 9,253.00                    | 77.87              | 91.21          | 8,948.06                    | 365.88          | 327.10          | 337.00                        | 9.75                          | 9.75                         | 0.08                        |
| 9,300.00                    | 81.44              | 91.36          | 8,956.50                    | 364.85          | 373.32          | 383.17                        | 7.60                          | 7.60                         | 0.32                        |
| 9,392.00                    | 87.10              | 91.28          | 8,965.68                    | 362.74          | 464.80          | 474.56                        | 6.15                          | 6.15                         | -0.09                       |
| 9,487.00                    | 90.07              | 93.01          | 8,968.03                    | 359.18          | 559.69          | 569.32                        | 3.62                          | 3.13                         | 1.82                        |
| 9,583.00                    | 90.40              | 92.30          | 8,967.63                    | 354.74          | 655.58          | 665.06                        | 0.82                          | 0.34                         | -0.74                       |
| 9,679.00                    | 90.72              | 92.04          | 8,966.69                    | 351.10          | 751.51          | 760.85                        | 0.43                          | 0.33                         | -0.27                       |
| 9,774.00                    | 89.89              | 92.79          | 8,966.19                    | 347.10          | 846.42          | 855.61                        | 1.18                          | -0.87                        | 0.79                        |
| 9,870.00                    | 89.17              | 93.03          | 8,966.98                    | 342.22          | 942.29          | 951.32                        | 0.79                          | -0.75                        | 0.25                        |
| 9,965.00                    | 89.63              | 92.75          | 8,967.97                    | 337.43          | 1,037.17        | 1,046.02                      | 0.57                          | 0.48                         | -0.29                       |
| 10,061.00                   | 89.36              | 92.52          | 8,968.82                    | 333.02          | 1,133.06        | 1,141.76                      | 0.37                          | -0.28                        | -0.24                       |
| 10,157.00                   | 88.21              | 92.11          | 8,970.85                    | 329.14          | 1,228.96        | 1,237.52                      | 1.27                          | -1.20                        | -0.43                       |
| 10,252.00                   | 88.69              | 91.63          | 8,973.42                    | 326.05          | 1,323.87        | 1,332.31                      | 0.71                          | 0.51                         | -0.51                       |
| 10,348.00                   | 88.65              | 89.59          | 8,975.65                    | 325.02          | 1,419.84        | 1,428.21                      | 2.12                          | -0.04                        | -2.13                       |
| 10,444.00                   | 87.56              | 88.10          | 8,978.83                    | 326.96          | 1,515.76        | 1,524.15                      | 1.92                          | -1.14                        | -1.55                       |
| 10,539.00                   | 89.29              | 87.80          | 8,981.44                    | 330.35          | 1,610.66        | 1,619.11                      | 1.85                          | 1.82                         | -0.32                       |
| 10,635.00                   | 90.23              | 87.23          | 8,981.84                    | 334.52          | 1,706.57        | 1,715.09                      | 1.15                          | 0.98                         | -0.59                       |
| 10,730.00                   | 89.86              | 88.71          | 8,981.76                    | 337.88          | 1,801.51        | 1,810.09                      | 1.61                          | -0.39                        | 1.56                        |
| 10,826.00                   | 90.57              | 88.71          | 8,981.40                    | 340.04          | 1,897.48        | 1,906.08                      | 0.74                          | 0.74                         | 0.00                        |
| 10,922.00                   | 90.55              | 88.92          | 8,980.47                    | 342.03          | 1,993.46        | 2,002.08                      | 0.22                          | -0.02                        | 0.22                        |
| 11,018.00                   | 90.35              | 90.28          | 8,979.71                    | 342.70          | 2,089.45        | 2,098.05                      | 1.43                          | -0.21                        | 1.42                        |
| 11,113.00                   | 89.25              | 90.80          | 8,980.04                    | 341.80          | 2,184.44        | 2,192.99                      | 1.28                          | -1.16                        | 0.55                        |
| 11,209.00                   | 88.87              | 89.17          | 8,981.62                    | 341.83          | 2,280.42        | 2,288.93                      | 1.74                          | -0.40                        | -1.70                       |
| 11,304.00                   | 89.69              | 88.98          | 8,982.81                    | 343.36          | 2,375.40        | 2,383.92                      | 0.89                          | 0.86                         | -0.20                       |
| 11,400.00                   | 91.02              | 88.87          | 8,982.22                    | 345.16          | 2,471.38        | 2,479.91                      | 1.39                          | 1.39                         | -0.11                       |
| 11,496.00                   | 89.77              | 89.92          | 8,981.56                    | 346.18          | 2,567.37        | 2,575.89                      | 1.70                          | -1.30                        | 1.09                        |
| 11,591.00                   | 88.31              | 88.81          | 8,983.15                    | 347.23          | 2,662.35        | 2,670.86                      | 1.93                          | -1.54                        | -1.17                       |
| 11,687.00                   | 89.09              | 88.81          | 8,985.32                    | 349.22          | 2,758.30        | 2,766.84                      | 0.81                          | 0.81                         | 0.00                        |
| 11,782.00                   | 88.99              | 89.88          | 8,986.92                    | 350.31          | 2,853.28        | 2,861.81                      | 1.13                          | -0.11                        | 1.13                        |
| 11,878.00                   | 88.64              | 90.74          | 8,988.90                    | 349.79          | 2,949.26        | 2,957.74                      | 0.97                          | -0.36                        | 0.90                        |
| 11,974.00                   | 88.73              | 90.95          | 8,991.11                    | 348.37          | 3,045.22        | 3,053.62                      | 0.24                          | 0.09                         | 0.22                        |
| 12,069.00                   | 89.03              | 90.17          | 8,992.96                    | 347.45          | 3,140.20        | 3,148.54                      | 0.88                          | 0.32                         | -0.82                       |

# LEAM Drilling Systems LLC

## Survey Report

Company: Devon Energy  
Project: Eddy County, NM (NAD-83)  
Site: Emerald PWU 20-22  
Well: 12H  
Wellbore: ST01  
Design: ST01

Local Co-ordinate Reference: Well 12H  
TVD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
MD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 MULTI User DB

### Survey

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 12,165.00                   | 89.81              | 90.03          | 8,993.93                    | 347.28          | 3,236.19        | 3,244.49                      | 0.83                          | 0.81                         | -0.15                       |
| 12,260.00                   | 89.76              | 89.75          | 8,994.29                    | 347.46          | 3,331.19        | 3,339.46                      | 0.30                          | -0.05                        | -0.29                       |
| 12,356.00                   | 91.02              | 89.94          | 8,993.64                    | 347.72          | 3,427.19        | 3,435.43                      | 1.33                          | 1.31                         | 0.20                        |
| 12,451.00                   | 90.12              | 90.12          | 8,992.69                    | 347.67          | 3,522.18        | 3,530.39                      | 0.97                          | -0.95                        | 0.19                        |
| 12,547.00                   | 89.26              | 89.85          | 8,993.21                    | 347.70          | 3,618.18        | 3,626.35                      | 0.94                          | -0.90                        | -0.28                       |
| 12,642.00                   | 88.35              | 90.11          | 8,995.19                    | 347.73          | 3,713.16        | 3,721.29                      | 1.00                          | -0.96                        | 0.27                        |
| 12,738.00                   | 89.77              | 89.46          | 8,996.77                    | 348.09          | 3,809.14        | 3,817.25                      | 1.63                          | 1.48                         | -0.68                       |
| 12,834.00                   | 89.60              | 90.59          | 8,997.30                    | 348.05          | 3,905.14        | 3,913.21                      | 1.19                          | -0.18                        | 1.18                        |
| 12,929.00                   | 89.39              | 90.75          | 8,998.13                    | 346.94          | 4,000.13        | 4,008.13                      | 0.28                          | -0.22                        | 0.17                        |
| 13,025.00                   | 88.57              | 89.77          | 8,999.84                    | 346.50          | 4,096.11        | 4,104.07                      | 1.33                          | -0.85                        | -1.02                       |
| 13,120.00                   | 88.81              | 88.41          | 9,002.01                    | 348.01          | 4,191.07        | 4,199.03                      | 1.45                          | 0.25                         | -1.43                       |
| 13,216.00                   | 89.99              | 88.31          | 9,003.02                    | 350.76          | 4,287.03        | 4,295.03                      | 1.23                          | 1.23                         | -0.10                       |
| 13,311.00                   | 90.71              | 88.81          | 9,002.44                    | 353.14          | 4,381.99        | 4,390.02                      | 0.92                          | 0.76                         | 0.53                        |
| 13,407.00                   | 91.75              | 90.49          | 9,000.38                    | 353.73          | 4,477.96        | 4,485.97                      | 2.06                          | 1.08                         | 1.75                        |
| 13,502.00                   | 91.00              | 91.09          | 8,998.10                    | 352.42          | 4,572.93        | 4,580.87                      | 1.01                          | -0.79                        | 0.63                        |
| 13,598.00                   | 89.18              | 91.24          | 8,997.95                    | 350.47          | 4,668.90        | 4,676.75                      | 1.90                          | -1.90                        | 0.16                        |
| 13,693.00                   | 88.57              | 89.60          | 8,999.81                    | 349.77          | 4,763.88        | 4,771.67                      | 1.84                          | -0.64                        | -1.73                       |
| 13,784.00                   | 89.59              | 89.03          | 9,001.27                    | 350.86          | 4,854.86        | 4,862.65                      | 1.28                          | 1.12                         | -0.63                       |
| 13,876.00                   | 89.15              | 89.86          | 9,002.29                    | 351.75          | 4,946.85        | 4,954.63                      | 1.02                          | -0.48                        | 0.90                        |
| 13,968.00                   | 89.03              | 88.92          | 9,003.75                    | 352.73          | 5,038.83        | 5,046.60                      | 1.03                          | -0.13                        | -1.02                       |
| 14,060.00                   | 89.77              | 89.33          | 9,004.71                    | 354.14          | 5,130.81        | 5,138.59                      | 0.92                          | 0.80                         | 0.45                        |
| 14,151.00                   | 89.33              | 90.21          | 9,005.42                    | 354.50          | 5,221.81        | 5,229.56                      | 1.08                          | -0.48                        | 0.97                        |
| 14,243.00                   | 89.45              | 90.50          | 9,006.40                    | 353.93          | 5,313.80        | 5,321.50                      | 0.34                          | 0.13                         | 0.32                        |
| 14,334.00                   | 90.35              | 90.86          | 9,006.56                    | 352.85          | 5,404.79        | 5,412.43                      | 1.07                          | 0.99                         | 0.40                        |
| 14,426.00                   | 90.73              | 91.71          | 9,005.70                    | 350.79          | 5,496.76        | 5,504.31                      | 1.01                          | 0.41                         | 0.92                        |
| 14,518.00                   | 90.38              | 91.83          | 9,004.80                    | 347.95          | 5,588.72        | 5,596.15                      | 0.40                          | -0.38                        | 0.13                        |
| 14,609.00                   | 89.07              | 91.33          | 9,005.24                    | 345.44          | 5,679.68        | 5,687.01                      | 1.54                          | -1.44                        | -0.55                       |
| 14,701.00                   | 87.96              | 90.50          | 9,007.63                    | 343.97          | 5,771.63        | 5,778.89                      | 1.51                          | -1.21                        | -0.90                       |
| 14,792.00                   | 87.78              | 90.93          | 9,011.01                    | 342.83          | 5,862.56        | 5,869.76                      | 0.51                          | -0.20                        | 0.47                        |
| 14,883.00                   | 87.26              | 89.23          | 9,014.95                    | 342.71          | 5,953.47        | 5,960.63                      | 1.95                          | -0.57                        | -1.87                       |
| 14,974.00                   | 86.82              | 89.46          | 9,019.64                    | 343.75          | 6,044.35        | 6,051.50                      | 0.55                          | -0.48                        | 0.25                        |
| 15,070.00                   | 87.80              | 89.28          | 9,024.15                    | 344.80          | 6,140.23        | 6,147.38                      | 1.04                          | 1.02                         | -0.19                       |
| 15,165.00                   | 89.16              | 88.44          | 9,026.67                    | 346.69          | 6,235.18        | 6,242.34                      | 1.68                          | 1.43                         | -0.88                       |
| 15,261.00                   | 90.66              | 89.08          | 9,026.82                    | 348.77          | 6,331.15        | 6,338.33                      | 1.70                          | 1.56                         | 0.67                        |
| 15,356.00                   | 91.09              | 89.44          | 9,025.37                    | 349.99          | 6,426.13        | 6,433.31                      | 0.59                          | 0.45                         | 0.38                        |
| 15,452.00                   | 91.48              | 89.88          | 9,023.22                    | 350.56          | 6,522.11        | 6,529.26                      | 0.61                          | 0.41                         | 0.46                        |
| 15,549.00                   | 91.65              | 90.18          | 9,020.57                    | 350.51          | 6,619.07        | 6,626.19                      | 0.36                          | 0.18                         | 0.31                        |
| 15,644.00                   | 92.08              | 90.41          | 9,017.48                    | 350.02          | 6,714.02        | 6,721.09                      | 0.51                          | 0.45                         | 0.24                        |
| 15,739.00                   | 90.39              | 90.91          | 9,015.43                    | 348.93          | 6,808.99        | 6,815.99                      | 1.86                          | -1.78                        | 0.53                        |
| 15,835.00                   | 90.49              | 91.36          | 9,014.69                    | 347.03          | 6,904.97        | 6,911.88                      | 0.48                          | 0.10                         | 0.47                        |
| 15,931.00                   | 89.94              | 90.13          | 9,014.33                    | 345.78          | 7,000.95        | 7,007.80                      | 1.40                          | -0.57                        | -1.28                       |
| 16,026.00                   | 89.38              | 88.46          | 9,014.90                    | 346.95          | 7,095.94        | 7,102.78                      | 1.85                          | -0.59                        | -1.76                       |
| 16,122.00                   | 89.74              | 89.14          | 9,015.63                    | 348.96          | 7,191.92        | 7,198.78                      | 0.80                          | 0.38                         | 0.71                        |

# LEAM Drilling Systems LLC

## Survey Report

Company: Devon Energy  
Project: Eddy County, NM (NAD-83)  
Site: Emerald PWU 20-22  
Well: 12H  
Wellbore: ST01  
Design: ST01

Local Co-ordinate Reference: Well 12H  
TVD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
MD Reference: 3313.8' GE + 23.5' KB @ 3337.30usft  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 MULTI User DB

### Survey

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 16,217.00                   | 89.98              | 89.45          | 9,015.86                    | 350.13          | 7,286.91        | 7,293.77                      | 0.41                          | 0.25                         | 0.33                        |
| 16,313.00                   | 90.36              | 89.52          | 9,015.58                    | 350.99          | 7,382.90        | 7,389.75                      | 0.40                          | 0.40                         | 0.07                        |
| 16,409.00                   | 89.13              | 89.82          | 9,016.01                    | 351.54          | 7,478.90        | 7,485.72                      | 1.32                          | -1.28                        | 0.31                        |
| 16,504.00                   | 87.75              | 88.75          | 9,018.59                    | 352.73          | 7,573.85        | 7,580.67                      | 1.84                          | -1.45                        | -1.13                       |
| 16,600.00                   | 88.46              | 89.04          | 9,021.77                    | 354.58          | 7,669.78        | 7,676.62                      | 0.80                          | 0.74                         | 0.30                        |
| 16,695.00                   | 88.14              | 88.35          | 9,024.59                    | 356.74          | 7,764.72        | 7,771.58                      | 0.80                          | -0.34                        | -0.73                       |
| 16,791.00                   | 89.35              | 88.77          | 9,026.69                    | 359.15          | 7,860.66        | 7,867.55                      | 1.33                          | 1.26                         | 0.44                        |
| 16,886.00                   | 90.40              | 88.86          | 9,026.90                    | 361.12          | 7,955.64        | 7,962.55                      | 1.11                          | 1.11                         | 0.09                        |
| 16,982.00                   | 91.10              | 89.46          | 9,025.64                    | 362.52          | 8,051.62        | 8,058.53                      | 0.96                          | 0.73                         | 0.63                        |
| 17,078.00                   | 91.28              | 89.91          | 9,023.65                    | 363.05          | 8,147.60        | 8,154.48                      | 0.50                          | 0.19                         | 0.47                        |
| 17,173.00                   | 91.19              | 91.35          | 9,021.60                    | 362.01          | 8,242.57        | 8,249.39                      | 1.52                          | -0.09                        | 1.52                        |
| 17,269.00                   | 91.38              | 91.85          | 9,019.44                    | 359.33          | 8,338.50        | 8,345.22                      | 0.56                          | 0.20                         | 0.52                        |
| 17,364.00                   | 90.74              | 92.58          | 9,017.69                    | 355.66          | 8,433.42        | 8,439.99                      | 1.02                          | -0.67                        | 0.77                        |
| 17,460.00                   | 89.76              | 92.56          | 9,017.27                    | 351.35          | 8,529.32        | 8,535.74                      | 1.02                          | -1.02                        | -0.02                       |
| 17,556.00                   | 88.81              | 91.73          | 9,018.47                    | 347.76          | 8,625.24        | 8,631.53                      | 1.31                          | -0.99                        | -0.86                       |
| 17,651.00                   | 87.99              | 90.85          | 9,021.12                    | 345.62          | 8,720.18        | 8,726.37                      | 1.27                          | -0.86                        | -0.93                       |
| 17,747.00                   | 88.35              | 90.18          | 9,024.18                    | 344.76          | 8,816.12        | 8,822.26                      | 0.79                          | 0.38                         | -0.70                       |
| 17,842.00                   | 88.76              | 90.47          | 9,026.58                    | 344.22          | 8,911.09        | 8,917.18                      | 0.53                          | 0.43                         | 0.31                        |
| 17,936.00                   | 87.69              | 87.64          | 9,029.49                    | 345.77          | 9,005.02        | 9,011.12                      | 3.22                          | -1.14                        | -3.01                       |
| 18,031.00                   | 89.38              | 88.06          | 9,031.92                    | 349.33          | 9,099.92        | 9,106.08                      | 1.83                          | 1.78                         | 0.44                        |
| 18,126.00                   | 89.72              | 88.26          | 9,032.67                    | 352.38          | 9,194.87        | 9,201.07                      | 0.42                          | 0.36                         | 0.21                        |
| 18,221.00                   | 90.07              | 88.69          | 9,032.84                    | 354.91          | 9,289.84        | 9,296.07                      | 0.58                          | 0.37                         | 0.45                        |
| 18,316.00                   | 90.86              | 90.38          | 9,032.07                    | 355.68          | 9,384.83        | 9,391.05                      | 1.96                          | 0.83                         | 1.78                        |
| 18,411.00                   | 91.25              | 90.45          | 9,030.32                    | 354.99          | 9,479.81        | 9,485.97                      | 0.42                          | 0.41                         | 0.07                        |
| 18,505.00                   | 91.53              | 90.70          | 9,028.04                    | 354.05          | 9,573.77        | 9,579.88                      | 0.40                          | 0.30                         | 0.27                        |
| 18,600.00                   | 91.15              | 90.50          | 9,025.82                    | 353.06          | 9,668.74        | 9,674.79                      | 0.45                          | -0.40                        | -0.21                       |
| 18,695.00                   | 90.35              | 90.57          | 9,024.58                    | 352.17          | 9,763.73        | 9,769.71                      | 0.85                          | -0.84                        | 0.07                        |
| 18,790.00                   | 90.47              | 90.84          | 9,023.90                    | 351.00          | 9,858.72        | 9,864.64                      | 0.31                          | 0.13                         | 0.28                        |
| 18,884.00                   | 89.28              | 91.00          | 9,024.10                    | 349.49          | 9,952.71        | 9,958.54                      | 1.28                          | -1.27                        | 0.17                        |
| 18,979.00                   | 89.29              | 90.88          | 9,025.29                    | 347.93          | 10,047.69       | 10,053.45                     | 0.13                          | 0.01                         | -0.13                       |
| 19,074.00                   | 88.59              | 89.97          | 9,027.04                    | 347.23          | 10,142.66       | 10,148.37                     | 1.21                          | -0.74                        | -0.96                       |
| 19,168.00                   | 88.58              | 89.38          | 9,029.37                    | 347.76          | 10,236.63       | 10,242.32                     | 0.63                          | -0.01                        | -0.63                       |
| 19,262.00                   | 88.52              | 89.74          | 9,031.74                    | 348.48          | 10,330.60       | 10,336.27                     | 0.39                          | -0.06                        | 0.38                        |
| 19,357.00                   | 88.36              | 89.67          | 9,034.33                    | 348.97          | 10,425.56       | 10,431.21                     | 0.18                          | -0.17                        | -0.07                       |
| 19,452.00                   | 88.64              | 89.27          | 9,036.82                    | 349.85          | 10,520.53       | 10,526.16                     | 0.51                          | 0.29                         | -0.42                       |
| 19,547.00                   | 89.35              | 89.28          | 9,038.48                    | 351.05          | 10,615.51       | 10,621.14                     | 0.75                          | 0.75                         | 0.01                        |
| 19,641.00                   | 89.95              | 88.96          | 9,039.06                    | 352.50          | 10,709.49       | 10,715.13                     | 0.72                          | 0.64                         | -0.34                       |
| 19,737.00                   | 90.45              | 88.89          | 9,038.72                    | 354.30          | 10,805.47       | 10,811.12                     | 0.53                          | 0.52                         | -0.07                       |
| 19,832.00                   | 90.08              | 89.82          | 9,038.28                    | 355.37          | 10,900.47       | 10,906.11                     | 1.05                          | -0.39                        | 0.98                        |
| 19,926.00                   | 89.35              | 90.03          | 9,038.75                    | 355.49          | 10,994.46       | 11,000.08                     | 0.81                          | -0.78                        | 0.22                        |
| 20,022.00                   | 89.38              | 89.96          | 9,039.81                    | 355.50          | 11,090.46       | 11,096.03                     | 0.08                          | 0.03                         | -0.07                       |
| 20,117.00                   | 89.53              | 90.09          | 9,040.72                    | 355.46          | 11,185.45       | 11,190.99                     | 0.21                          | 0.16                         | 0.14                        |
| 20,211.00                   | 89.78              | 90.24          | 9,041.28                    | 355.18          | 11,279.45       | 11,284.95                     | 0.31                          | 0.27                         | 0.16                        |
| 20,306.00                   | 89.99              | 90.26          | 9,041.47                    | 354.77          | 11,374.45       | 11,379.90                     | 0.22                          | 0.22                         | 0.02                        |



# LEAM Drilling Systems LLC

## Survey Report

**Company:** Devon Energy  
**Project:** Eddy County, NM (NAD-83)  
**Site:** Emerald PWU 20-22  
**Well:** 12H  
**Wellbore:** ST01  
**Design:** ST01

**Local Co-ordinate Reference:** Well 12H  
**TVD Reference:** 3313.8' GE + 23.5' KB @ 3337.30usft  
**MD Reference:** 3313.8' GE + 23.5' KB @ 3337.30usft  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM 5000.1 MULTI User DB

### Survey

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 20,401.00                   | 88.78              | 90.10          | 9,042.49                    | 354.47          | 11,469.44       | 11,474.85                     | 1.28                          | -1.27                        | -0.17                       |
| 20,496.00                   | 88.95              | 90.04          | 9,044.38                    | 354.36          | 11,564.42       | 11,569.79                     | 0.19                          | 0.18                         | -0.06                       |
| 20,591.00                   | 89.22              | 90.27          | 9,045.89                    | 354.10          | 11,659.41       | 11,664.74                     | 0.37                          | 0.28                         | 0.24                        |
| 20,686.00                   | 89.49              | 90.61          | 9,046.96                    | 353.37          | 11,754.40       | 11,759.67                     | 0.46                          | 0.28                         | 0.36                        |
| 20,780.00                   | 89.66              | 90.54          | 9,047.66                    | 352.43          | 11,848.39       | 11,853.60                     | 0.20                          | 0.18                         | -0.07                       |
| 20,875.00                   | 88.49              | 90.35          | 9,049.19                    | 351.69          | 11,943.38       | 11,948.53                     | 1.25                          | -1.23                        | -0.20                       |
| 20,969.00                   | 88.57              | 90.17          | 9,051.61                    | 351.26          | 12,037.35       | 12,042.45                     | 0.21                          | 0.09                         | -0.19                       |
| 21,063.00                   | 88.92              | 90.45          | 9,053.66                    | 350.75          | 12,131.32       | 12,136.38                     | 0.48                          | 0.37                         | 0.30                        |
| 21,158.00                   | 89.17              | 90.59          | 9,055.25                    | 349.89          | 12,226.30       | 12,231.30                     | 0.30                          | 0.26                         | 0.15                        |
| 21,252.00                   | 89.70              | 90.97          | 9,056.17                    | 348.61          | 12,320.29       | 12,325.22                     | 0.69                          | 0.56                         | 0.40                        |
| 21,346.00                   | 90.25              | 91.27          | 9,056.22                    | 346.77          | 12,414.27       | 12,419.11                     | 0.67                          | 0.59                         | 0.32                        |
| 21,442.00                   | 90.83              | 91.85          | 9,055.31                    | 344.16          | 12,510.23       | 12,514.96                     | 0.85                          | 0.60                         | 0.60                        |
| 21,536.00                   | 91.30              | 92.01          | 9,053.56                    | 341.00          | 12,604.16       | 12,608.77                     | 0.53                          | 0.50                         | 0.17                        |
| 21,600.00                   | 91.34              | 92.02          | 9,052.09                    | 338.75          | 12,668.11       | 12,672.63                     | 0.06                          | 0.06                         | 0.02                        |
| 21,670.00                   | 91.34              | 92.02          | 9,050.45                    | 336.28          | 12,738.04       | 12,742.47                     | 0.00                          | 0.00                         | 0.00                        |
| <b>Projection</b>           |                    |                |                             |                 |                 |                               |                               |                              |                             |