

**District I**  
1625 N. French Dr., Hobbs, NM 88240  
Phone:(575) 393-6161 Fax:(575) 393-0720

**District II**  
811 S. First St., Artesia, NM 88210  
Phone:(575) 748-1283 Fax:(575) 748-9720

**District III**  
1000 Rio Brazos Rd., Aztec, NM 87410  
Phone:(505) 334-6178 Fax:(505) 334-6170

**District IV**  
1220 S. St Francis Dr., Santa Fe, NM 87505  
Phone:(505) 476-3470 Fax:(505) 476-3462

**State of New Mexico**  
**Energy, Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

Form C-101  
August 1, 2011  
Permit 272645

**APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE**

|                                                                                              |  |                               |
|----------------------------------------------------------------------------------------------|--|-------------------------------|
| 1. Operator Name and Address<br>COG OPERATING LLC<br>600 W Illinois Ave<br>Midland, TX 79701 |  | 2. OGRID Number<br>229137     |
| 4. Property Code<br>326152                                                                   |  | 3. API Number<br>30-025-46419 |
| 5. Property Name<br>PICKELHAUBE STATE                                                        |  | 6. Well No.<br>601H           |

**7. Surface Location**

|          |         |          |       |         |           |          |           |          |        |
|----------|---------|----------|-------|---------|-----------|----------|-----------|----------|--------|
| UL - Lot | Section | Township | Range | Lot Idn | Feet From | N/S Line | Feet From | E/W Line | County |
| B        | 36      | 24S      | 34E   | B       | 324       | N        | 2473      | E        | Lea    |

**8. Proposed Bottom Hole Location**

|          |         |          |       |         |           |          |           |          |        |
|----------|---------|----------|-------|---------|-----------|----------|-----------|----------|--------|
| UL - Lot | Section | Township | Range | Lot Idn | Feet From | N/S Line | Feet From | E/W Line | County |
| O        | 36      | 24S      | 34E   | O       | 50        | S        | 1980      | E        | Lea    |

**9. Pool Information**

|                              |       |
|------------------------------|-------|
| RED HILLS;BONE SPRING, NORTH | 96434 |
|------------------------------|-------|

**Additional Well Information**

|                           |                             |                                        |                         |                                    |
|---------------------------|-----------------------------|----------------------------------------|-------------------------|------------------------------------|
| 11. Work Type<br>New Well | 12. Well Type<br>OIL        | 13. Cable/Rotary                       | 14. Lease Type<br>State | 15. Ground Level Elevation<br>3387 |
| 16. Multiple<br>N         | 17. Proposed Depth<br>17690 | 18. Formation<br>3rd Bone Spring Sand  | 19. Contractor          | 20. Spud Date<br>10/25/2019        |
| Depth to Ground water     |                             | Distance from nearest fresh water well |                         | Distance to nearest surface water  |

☒ We will be using a closed-loop system in lieu of lined pits

**21. Proposed Casing and Cement Program**

| Type | Hole Size | Casing Size | Casing Weight/ft | Setting Depth | Sacks of Cement | Estimated TOC |
|------|-----------|-------------|------------------|---------------|-----------------|---------------|
| Surf | 14.75     | 10.75       | 45.5             | 1300          | 805             | 0             |
| Int1 | 9.875     | 7.625       | 29.7             | 5500          | 940             | 0             |
| Int1 | 9.875     | 7.625       | 29.7             | 12000         | 825             | 5500          |
| Prod | 6.75      | 5.5         | 23               | 11500         | 0               | 0             |
| Prod | 6.75      | 5           | 18               | 17690         | 1040            | 0             |

**Casing/Cement Program: Additional Comments**

Drill a 14-3/4" hole to 1300' with Fresh Water into the Rustler to cover FW water depth. Run 10-3/4", 45.5# J-55 BTC casing and cement to surface. Drill 9-7/8" hole to 12,000' MD with a 541' tangent to the east-northeast. Mud system will be Diesel-Brine Emulsion. Run 12,000' of 7-5/8" 29.7# N/L80 and cement to surface in two stages with DV Tool set at approximately 5500' (~T/ Lamar). Drill a 6-3/4" curve and lateral with Oil Based Mud to approximately 17,690' MD. Run 5" 18# P110 BTC casing from TD to 11,500' and 5-1/2" 23# P110 BTC casing from 11,500' to surface. Cement to surface in one stage.

**22. Proposed Blowout Prevention Program**

| Type    | Working Pressure | Test Pressure | Manufacturer |
|---------|------------------|---------------|--------------|
| Annular | 3000             | 3000          | Cameron      |
| Annular | 10000            | 10000         | Cameron      |

|                                                                                                                                                                                                                                                                                                                      |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief.<br>I further certify I have complied with 19.15.14.9 (A) NMAC <input checked="" type="checkbox"/> and/or 19.15.14.9 (B) NMAC <input checked="" type="checkbox"/> if applicable.<br><br>Signature: | <b>OIL CONSERVATION DIVISION</b>                           |
| Printed Name: Electronically filed by Diane Kuykendall                                                                                                                                                                                                                                                               | Approved By: Paul F Kautz                                  |
| Title: Production Accounting Director                                                                                                                                                                                                                                                                                | Title: Geologist                                           |
| Email Address: dkuykendall@concho.com                                                                                                                                                                                                                                                                                | Approved Date: 10/10/2019      Expiration Date: 10/10/2021 |
| Date: 10/4/2019      Phone: 432-685-4372                                                                                                                                                                                                                                                                             | Conditions of Approval Attached                            |

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State of New Mexico  
Energy, Minerals & Natural Resources Department  
OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-102  
Revised August 1, 2011  
Submit one copy to appropriate  
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

|                                             |                                                         |                                        |                                                                |
|---------------------------------------------|---------------------------------------------------------|----------------------------------------|----------------------------------------------------------------|
| <sup>1</sup> API Number<br><b>30-025-</b>   |                                                         | <sup>2</sup> Pool Code<br><b>96434</b> | <sup>3</sup> Pool Name<br><b>Red Hills; Bone Spring, North</b> |
| <sup>4</sup> Property Code<br><b>325162</b> | <sup>5</sup> Property Name<br><b>PICKELHAUBE STATE</b>  |                                        | <sup>6</sup> Well Number<br><b>601H</b>                        |
| <sup>7</sup> OGRID NO.<br><b>229137</b>     | <sup>8</sup> Operator Name<br><b>COG OPERATING, LLC</b> |                                        | <sup>9</sup> Elevation<br><b>3387'</b>                         |

<sup>10</sup> Surface Location

| UL or lot no. | Section   | Township   | Range      | Lot Idn | Feet from the | North/South line | Feet From the | East/West line | County     |
|---------------|-----------|------------|------------|---------|---------------|------------------|---------------|----------------|------------|
| <b>B</b>      | <b>36</b> | <b>24S</b> | <b>34E</b> |         | <b>324</b>    | <b>NORTH</b>     | <b>2473</b>   | <b>EAST</b>    | <b>LEA</b> |

<sup>11</sup> Bottom Hole Location If Different From Surface

| UL or lot no.                               | Section   | Township                      | Range      | Lot Idn                          | Feet from the | North/South line        | Feet from the | East/West line | County     |
|---------------------------------------------|-----------|-------------------------------|------------|----------------------------------|---------------|-------------------------|---------------|----------------|------------|
| <b>0</b>                                    | <b>36</b> | <b>24S</b>                    | <b>34E</b> |                                  | <b>50</b>     | <b>SOUTH</b>            | <b>1980</b>   | <b>EAST</b>    | <b>LEA</b> |
| <sup>12</sup> Dedicated Acres<br><b>160</b> |           | <sup>13</sup> Joint or Infill |            | <sup>14</sup> Consolidation Code |               | <sup>15</sup> Order No. |               |                |            |

No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.

16

324'

S.L.

FTP

2473'

1

E

17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

10/04/19

Signature

Date

Robyn M. Russell

Printed Name

Rrussell@concho.com

E-mail Address

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

09-05-2019

Date of Survey

Signature and Seal of Professional Surveyor

19680

Certificate Number

16

GEODETIC DATA  
NAD 83 GRID - NM EAST

SURFACE LOCATION (SL)  
N: 430537.0 - E: 822938.2  
LAT: 32.1803490° N  
LONG: 103.4231395° W

FIRST TAKE POINT (FTP)  
100' FNL & 1980' FEL (Sec.36)  
N: 430764.8 - E: 823429.3  
LAT: 32.1809639° N  
LON: 103.4215461° W

LAST TAKE POINT (LTP)  
100' FSL & 1980' FEL (Sec.36)  
N: 425684.1 - E: 823474.0  
LAT: 32.1669979° N  
LON: 103.4215408° W

BOTTOM HOLE (BH)  
N: 425634.1 - E: 823474.4  
LAT: 32.1668605° N  
LON: 103.4215408° W

GEODETIC DATA  
NAD 83 GRID - NM EAST

A: FOUND BRASS CAP "1913"  
N: 425562.2 - E: 820175.3

B: FOUND BRASS CAP "1913"  
N: 428201.6 - E: 820152.9

C: CALCULATED CORNER  
N: 430839.4 - E: 820133.8

D: COTTON SPINDLE  
N: 430860.0 - E: 822773.2

E: COTTON SPINDLE  
N: 430879.3 - E: 825408.0

F: FOUND BRASS CAP "1913"  
N: 428239.1 - E: 825431.6

G: FOUND STONE MOUND  
N: 425596.6 - E: 825454.5

H: FOUND BRASS CAP "1913"  
N: 425579.9 - E: 822814.8

CALCULATED POINTS  
1: N: 430869.7 - E: 824090.6  
2: N: 425588.3 - E: 824134.6

36

5081.84' (HORIZ) FTP-LTP

S 00°30'14" E (GRID)

LTP

B.H.

50'

1980'

2

G

Job No.: LS19090867

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**State of New Mexico**  
**Energy, Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

**GAS CAPTURE PLAN**

Date: 10/10/2019

☒ Original

Operator & OGRID No.: [229137] COG OPERATING LLC

☐ Amended - Reason for  
Amendment: \_\_\_\_\_

This Gas Capture Plan outlines actions to be taken by the Operator to reduce well/production facility flaring/venting for new completion (new drill, recomple to new zone, re-frac) activity.

*Note: Form C-129 must be submitted and approved prior to exceeding 60 days allowed by Rule (Subsection A of 19.15.18.12 NMAC).*

**Well(s)/Production Facility – Name of facility**

The well(s) that will be located at the production facility are shown in the table below.

| Well Name               | API          | Well Location<br>(ULSTR) | Footages    | Expected<br>MCF/D | Flared or<br>Vented | Comments                                             |
|-------------------------|--------------|--------------------------|-------------|-------------------|---------------------|------------------------------------------------------|
| PICKELHAUBE STATE #601H | 30-025-46419 | B-36-24S-34E             | 0324N 2473E | 1559              | None                | Length of additional line is not known at this time. |

**Gathering System and Pipeline Notification**

Well(s) will be connected to a production facility after flowback operations are complete, if gas transporter system is in place. The gas produced from production facility is dedicated to VERSADO GAS PROCESSORS,LLC and will be connected to VERSADO GAS PROCESSORS,LLC Low Pressure gathering system located in Lea County, New Mexico. It will require 0' of pipeline to connect the facility to Low Pressure gathering system. COG OPERATING LLC provides (periodically) to VERSADO GAS PROCESSORS,LLC a drilling, completion and estimated first production date for wells that are scheduled to be drilled in the foreseeable future. In addition, COG OPERATING LLC and VERSADO GAS PROCESSORS,LLC have periodic conference calls to discuss changes to drilling and completion schedules. Gas from these wells will be processed at VERSADO GAS PROCESSORS,LLC Processing Plant located in Sec. 36, Twn. 22S, Rng. 37E, Lea County, New Mexico. The actual flow of the gas will be based on compression operating parameters and gathering system pressures.

**Flowback Strategy**

After the fracture treatment/completion operations, well(s) will be produced to temporary production tanks and gas will be flared or vented. During flowback, the fluids and sand content will be monitored. When the produced fluids contain minimal sand, the wells will be turned to production facilities. Gas sales should start as soon as the wells start flowing through the production facilities, unless there are operational issues on VERSADO GAS PROCESSORS,LLC system at that time. Based on current information, it is COG OPERATING LLC's belief the system can take this gas upon completion of the well(s).

Safety requirements during cleanout operations from the use of underbalanced air cleanout systems may necessitate that sand and non-pipeline quality gas be vented and/or flared rather than sold on a temporary basis.

**Alternatives to Reduce Flaring**

Below are alternatives considered from a conceptual standpoint to reduce the amount of gas flared.

- Power Generation – On lease
  - Only a portion of gas is consumed operating the generator, remainder of gas will be flared
- Compressed Natural Gas – On lease
  - Gas flared would be minimal, but might be uneconomical to operate when gas volume declines
- NGL Removal – On lease
  - Plants are expensive, residue gas is still flared, and uneconomical to operate when gas volume declines

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**Energy, Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

Form APD Comments

Permit 272645

**PERMIT COMMENTS**

|                                                                                                     |  |                                  |
|-----------------------------------------------------------------------------------------------------|--|----------------------------------|
| Operator Name and Address:<br>COG OPERATING LLC [229137]<br>600 W Illinois Ave<br>Midland, TX 79701 |  | API Number:<br>30-025-46419      |
|                                                                                                     |  | Well:<br>PICKELHAUBE STATE #601H |

| Created By | Comment                                                                                                             | Comment Date |
|------------|---------------------------------------------------------------------------------------------------------------------|--------------|
| rodrom     | H2S concentrations of wells in this area from surface to TD are low enough that a contingency plan is not required. | 10/4/2019    |

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Form APD Conditions

Permit 272645

**State of New Mexico**  
**Energy, Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 S. St Francis Dr.**  
**Santa Fe, NM 87505**

**PERMIT CONDITIONS OF APPROVAL**

|                                                                                                     |                                  |
|-----------------------------------------------------------------------------------------------------|----------------------------------|
| Operator Name and Address:<br>COG OPERATING LLC [229137]<br>600 W Illinois Ave<br>Midland, TX 79701 | API Number:<br>30-025-46419      |
|                                                                                                     | Well:<br>PICKELHAUBE STATE #601H |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OCD<br>Reviewer | Condition                                                                                                                                                                                                                                                                                                                                                                                              |
| pkautz          | Will require a directional survey with the C-104                                                                                                                                                                                                                                                                                                                                                       |
| pkautz          | 1) SURFACE & INTERMEDIATE CASING - Cement must circulate to surface -- 2) PRODUCTION CASING - Cement must tie back into intermediate casing --                                                                                                                                                                                                                                                         |
| pkautz          | If cement does not circulate to surface, must run temperature survey or other log to determine top of cement                                                                                                                                                                                                                                                                                           |
| pkautz          | Surface casing must be set 25' below top of Rustler Anhydrite in order to seal off protectable water                                                                                                                                                                                                                                                                                                   |
| pkautz          | 1)- The Operator is to notify NMOCD by sundry (Form C-103) within ten (10) days of the well being spud 2)- Drilling Sundries Form C-103 (Casing and Cement test are to be submitted within 10 days 3)- Completion Reports & Logs are to be submitted within 45 days 4)- Deviation / Directional Drill Survey are to be filed with or prior to C-104                                                    |
| pkautz          | It is the operator's responsibility to monitor cancellation dates of approved APDs. APD's are good for 2 years and may be extended for one year. Only one 1 year extension will be granted if submitted by C-103 before expiration date. After expiration date or after a 1 year extension must submit new APD. If an APD expires and if site construction has occurred, site remediation is required. |
| pkautz          | Stage Tool 1) Must notify OCD Hobbs Office prior to running Stage Tool at 5753703186 2) If using Stage Tool on Surface casing, Stage Tool must be set greater than 350' from surface and a minimum of 200 feet above surface shoe. 3) When using a Stage Tool on Intermediate or Production Casing Stage must be a minimum of 50 feet below previous casing shoe.                                      |



C O N C H O

# **NORTHERN DELAWARE BASIN**

**LEA COUNTY, NM**

**BULLDOG**

**PICKELHAUBE ST #601H**

**OWB**

**Plan: PWP1**

## **Standard Survey Report**

**01 October, 2019**

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

|                    |                                      |                      |                |
|--------------------|--------------------------------------|----------------------|----------------|
| <b>Project</b>     | LEA COUNTY, NM                       |                      |                |
| <b>Map System:</b> | US State Plane 1927 (Exact solution) | <b>System Datum:</b> | Mean Sea Level |
| <b>Geo Datum:</b>  | NAD 1927 (NADCON CONUS)              |                      |                |
| <b>Map Zone:</b>   | New Mexico East 3001                 |                      |                |

|                       |          |              |                 |                   |                  |
|-----------------------|----------|--------------|-----------------|-------------------|------------------|
| Site                  | BULLDOG  |              |                 |                   |                  |
| Site Position:        |          | Northing:    | 398,637.10 usft | Latitude:         | 32° 5' 36.820 N  |
| From:                 | Map      | Easting:     | 741,887.40 usft | Longitude:        | 103° 33' 8.116 W |
| Position Uncertainty: | 0.0 usft | Slot Radius: | 13-3/16 "       | Grid Convergence: | 0.42 °           |

| Well                 | PICKELHAUBE ST #601H |          |                     |                 |               |                   |
|----------------------|----------------------|----------|---------------------|-----------------|---------------|-------------------|
| Well Position        | +N/-S                | 0.0 usft | Northing:           | 430,478.40 usft | Latitude:     | 32° 10' 48.806 N  |
|                      | +E/-W                | 0.0 usft | Easting:            | 781,752.60 usft | Longitude:    | 103° 25' 21.610 W |
| Position Uncertainty |                      | 3.0 usft | Wellhead Elevation: | usft            | Ground Level: | 3,387.0 usft      |

|                  |                   |                    |                        |                      |                            |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | OWB               |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | IGRF2015          | 9/9/2019           | 6.64                   | 60.02                | 47,698.51924058            |

|                          |                                |                     |                     |                      |     |
|--------------------------|--------------------------------|---------------------|---------------------|----------------------|-----|
| <b>Design</b>            | PWP1                           |                     |                     |                      |     |
| <b>Audit Notes:</b>      |                                |                     |                     |                      |     |
| <b>Version:</b>          |                                | <b>Phase:</b>       | PLAN                | <b>Tie On Depth:</b> | 0.0 |
| <b>Vertical Section:</b> | <b>Depth From (TVD) (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b> | <b>Direction (°)</b> |     |
|                          | 0.0                            | 0.0                 | 0.0                 | 173.76               |     |

|                            |                  |                          |                     |                                    |  |
|----------------------------|------------------|--------------------------|---------------------|------------------------------------|--|
| <b>Survey Tool Program</b> | <b>Date</b>      | 10/1/2019                |                     |                                    |  |
| <b>From (usft)</b>         | <b>To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b>    | <b>Description</b>                 |  |
| 0.0                        | 12,221.0         | PWP1 (OWB)               | Standard Keeper 104 | Standard Wireline Keeper ver 1.0.4 |  |
| 12,221.0                   | 17,689.6         | PWP1 (OWB)               | MWD+IFR1+FDIR       | OWSG MWD + IFR1 + FDIR Correction  |  |

|                              |                        |                    |                              |                     |                     |                                |                                |                               |                              |  |
|------------------------------|------------------------|--------------------|------------------------------|---------------------|---------------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|--|
| <b>Planned Survey</b>        |                        |                    |                              |                     |                     |                                |                                |                               |                              |  |
| <b>Measured Depth (usft)</b> | <b>Inclination (°)</b> | <b>Azimuth (°)</b> | <b>Vertical Depth (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b> | <b>Vertical Section (usft)</b> | <b>Dogleg Rate (°/100usft)</b> | <b>Build Rate (°/100usft)</b> | <b>Turn Rate (°/100usft)</b> |  |
| 0.0                          | 0.00                   | 0.00               | 0.0                          | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 100.0                        | 0.00                   | 0.00               | 100.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 200.0                        | 0.00                   | 0.00               | 200.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 300.0                        | 0.00                   | 0.00               | 300.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 400.0                        | 0.00                   | 0.00               | 400.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 500.0                        | 0.00                   | 0.00               | 500.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 600.0                        | 0.00                   | 0.00               | 600.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 700.0                        | 0.00                   | 0.00               | 700.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 800.0                        | 0.00                   | 0.00               | 800.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |
| 900.0                        | 0.00                   | 0.00               | 900.0                        | 0.0                 | 0.0                 | 0.0                            | 0.00                           | 0.00                          | 0.00                         |  |

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

### Planned 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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 1,000.0               | 0.00            | 0.00        | 1,000.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,100.0               | 0.00            | 0.00        | 1,100.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,200.0               | 0.00            | 0.00        | 1,200.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,300.0               | 0.00            | 0.00        | 1,300.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,400.0               | 0.00            | 0.00        | 1,400.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,500.0               | 0.00            | 0.00        | 1,500.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,600.0               | 0.00            | 0.00        | 1,600.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,700.0               | 0.00            | 0.00        | 1,700.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,800.0               | 0.00            | 0.00        | 1,800.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 1,900.0               | 0.00            | 0.00        | 1,900.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,000.0               | 0.00            | 0.00        | 2,000.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,100.0               | 0.00            | 0.00        | 2,100.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,200.0               | 0.00            | 0.00        | 2,200.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,300.0               | 0.00            | 0.00        | 2,300.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,400.0               | 0.00            | 0.00        | 2,400.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,500.0               | 0.00            | 0.00        | 2,500.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,600.0               | 0.00            | 0.00        | 2,600.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,700.0               | 0.00            | 0.00        | 2,700.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,800.0               | 0.00            | 0.00        | 2,800.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 2,900.0               | 0.00            | 0.00        | 2,900.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,000.0               | 0.00            | 0.00        | 3,000.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,100.0               | 0.00            | 0.00        | 3,100.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,200.0               | 0.00            | 0.00        | 3,200.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,300.0               | 0.00            | 0.00        | 3,300.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,400.0               | 0.00            | 0.00        | 3,400.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,500.0               | 0.00            | 0.00        | 3,500.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,600.0               | 0.00            | 0.00        | 3,600.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,700.0               | 0.00            | 0.00        | 3,700.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,800.0               | 0.00            | 0.00        | 3,800.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 3,900.0               | 0.00            | 0.00        | 3,900.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,000.0               | 0.00            | 0.00        | 4,000.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,100.0               | 0.00            | 0.00        | 4,100.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,200.0               | 0.00            | 0.00        | 4,200.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,300.0               | 0.00            | 0.00        | 4,300.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,400.0               | 0.00            | 0.00        | 4,400.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,500.0               | 0.00            | 0.00        | 4,500.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,600.0               | 0.00            | 0.00        | 4,600.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,700.0               | 0.00            | 0.00        | 4,700.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,800.0               | 0.00            | 0.00        | 4,800.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 4,900.0               | 0.00            | 0.00        | 4,900.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 5,000.0               | 0.00            | 0.00        | 5,000.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 5,100.0               | 0.00            | 0.00        | 5,100.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 5,200.0               | 0.00            | 0.00        | 5,200.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

### Planned 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) |
|---------------------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 5,300.0                               | 0.00            | 0.00        | 5,300.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 5,400.0                               | 0.00            | 0.00        | 5,400.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| 5,500.0                               | 0.00            | 0.00        | 5,500.0               | 0.0          | 0.0          | 0.0                     | 0.00                    | 0.00                   | 0.00                  |
| <b>Start Build 2.00</b>               |                 |             |                       |              |              |                         |                         |                        |                       |
| 5,600.0                               | 2.00            | 59.32       | 5,600.0               | 0.9          | 1.5          | -0.7                    | 2.00                    | 2.00                   | 0.00                  |
| 5,700.0                               | 4.00            | 59.32       | 5,699.8               | 3.6          | 6.0          | -2.9                    | 2.00                    | 2.00                   | 0.00                  |
| 5,732.4                               | 4.65            | 59.32       | 5,732.2               | 4.8          | 8.1          | -3.9                    | 2.00                    | 2.00                   | 0.00                  |
| <b>Start 6488.5 hold at 5732.4 MD</b> |                 |             |                       |              |              |                         |                         |                        |                       |
| 5,800.0                               | 4.65            | 59.32       | 5,799.5               | 7.6          | 12.8         | -6.2                    | 0.00                    | 0.00                   | 0.00                  |
| 5,900.0                               | 4.65            | 59.32       | 5,899.2               | 11.7         | 19.8         | -9.5                    | 0.00                    | 0.00                   | 0.00                  |
| 6,000.0                               | 4.65            | 59.32       | 5,998.9               | 15.9         | 26.8         | -12.9                   | 0.00                    | 0.00                   | 0.00                  |
| 6,100.0                               | 4.65            | 59.32       | 6,098.5               | 20.0         | 33.7         | -16.2                   | 0.00                    | 0.00                   | 0.00                  |
| 6,200.0                               | 4.65            | 59.32       | 6,198.2               | 24.1         | 40.7         | -19.6                   | 0.00                    | 0.00                   | 0.00                  |
| 6,300.0                               | 4.65            | 59.32       | 6,297.9               | 28.3         | 47.7         | -22.9                   | 0.00                    | 0.00                   | 0.00                  |
| 6,400.0                               | 4.65            | 59.32       | 6,397.5               | 32.4         | 54.6         | -26.3                   | 0.00                    | 0.00                   | 0.00                  |
| 6,500.0                               | 4.65            | 59.32       | 6,497.2               | 36.5         | 61.6         | -29.6                   | 0.00                    | 0.00                   | 0.00                  |
| 6,600.0                               | 4.65            | 59.32       | 6,596.9               | 40.7         | 68.6         | -33.0                   | 0.00                    | 0.00                   | 0.00                  |
| 6,700.0                               | 4.65            | 59.32       | 6,696.6               | 44.8         | 75.5         | -36.3                   | 0.00                    | 0.00                   | 0.00                  |
| 6,800.0                               | 4.65            | 59.32       | 6,796.2               | 49.0         | 82.5         | -39.7                   | 0.00                    | 0.00                   | 0.00                  |
| 6,900.0                               | 4.65            | 59.32       | 6,895.9               | 53.1         | 89.5         | -43.0                   | 0.00                    | 0.00                   | 0.00                  |
| 7,000.0                               | 4.65            | 59.32       | 6,995.6               | 57.2         | 96.4         | -46.4                   | 0.00                    | 0.00                   | 0.00                  |
| 7,100.0                               | 4.65            | 59.32       | 7,095.2               | 61.4         | 103.4        | -49.8                   | 0.00                    | 0.00                   | 0.00                  |
| 7,200.0                               | 4.65            | 59.32       | 7,194.9               | 65.5         | 110.4        | -53.1                   | 0.00                    | 0.00                   | 0.00                  |
| 7,300.0                               | 4.65            | 59.32       | 7,294.6               | 69.6         | 117.4        | -56.5                   | 0.00                    | 0.00                   | 0.00                  |
| 7,400.0                               | 4.65            | 59.32       | 7,394.3               | 73.8         | 124.3        | -59.8                   | 0.00                    | 0.00                   | 0.00                  |
| 7,500.0                               | 4.65            | 59.32       | 7,493.9               | 77.9         | 131.3        | -63.2                   | 0.00                    | 0.00                   | 0.00                  |
| 7,600.0                               | 4.65            | 59.32       | 7,593.6               | 82.0         | 138.3        | -66.5                   | 0.00                    | 0.00                   | 0.00                  |
| 7,700.0                               | 4.65            | 59.32       | 7,693.3               | 86.2         | 145.2        | -69.9                   | 0.00                    | 0.00                   | 0.00                  |
| 7,800.0                               | 4.65            | 59.32       | 7,792.9               | 90.3         | 152.2        | -73.2                   | 0.00                    | 0.00                   | 0.00                  |
| 7,900.0                               | 4.65            | 59.32       | 7,892.6               | 94.4         | 159.2        | -76.6                   | 0.00                    | 0.00                   | 0.00                  |
| 8,000.0                               | 4.65            | 59.32       | 7,992.3               | 98.6         | 166.1        | -79.9                   | 0.00                    | 0.00                   | 0.00                  |
| 8,100.0                               | 4.65            | 59.32       | 8,092.0               | 102.7        | 173.1        | -83.3                   | 0.00                    | 0.00                   | 0.00                  |
| 8,200.0                               | 4.65            | 59.32       | 8,191.6               | 106.8        | 180.1        | -86.6                   | 0.00                    | 0.00                   | 0.00                  |
| 8,300.0                               | 4.65            | 59.32       | 8,291.3               | 111.0        | 187.0        | -90.0                   | 0.00                    | 0.00                   | 0.00                  |
| 8,400.0                               | 4.65            | 59.32       | 8,391.0               | 115.1        | 194.0        | -93.3                   | 0.00                    | 0.00                   | 0.00                  |
| 8,500.0                               | 4.65            | 59.32       | 8,490.6               | 119.2        | 201.0        | -96.7                   | 0.00                    | 0.00                   | 0.00                  |
| 8,600.0                               | 4.65            | 59.32       | 8,590.3               | 123.4        | 208.0        | -100.0                  | 0.00                    | 0.00                   | 0.00                  |
| 8,700.0                               | 4.65            | 59.32       | 8,690.0               | 127.5        | 214.9        | -103.4                  | 0.00                    | 0.00                   | 0.00                  |
| 8,800.0                               | 4.65            | 59.32       | 8,789.7               | 131.6        | 221.9        | -106.8                  | 0.00                    | 0.00                   | 0.00                  |
| 8,900.0                               | 4.65            | 59.32       | 8,889.3               | 135.8        | 228.9        | -110.1                  | 0.00                    | 0.00                   | 0.00                  |
| 9,000.0                               | 4.65            | 59.32       | 8,989.0               | 139.9        | 235.8        | -113.5                  | 0.00                    | 0.00                   | 0.00                  |
| 9,100.0                               | 4.65            | 59.32       | 9,088.7               | 144.1        | 242.8        | -116.8                  | 0.00                    | 0.00                   | 0.00                  |
| 9,200.0                               | 4.65            | 59.32       | 9,188.3               | 148.2        | 249.8        | -120.2                  | 0.00                    | 0.00                   | 0.00                  |
| 9,300.0                               | 4.65            | 59.32       | 9,288.0               | 152.3        | 256.7        | -123.5                  | 0.00                    | 0.00                   | 0.00                  |

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

### Planned 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) |
|----------------------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 9,400.0                                | 4.65            | 59.32       | 9,387.7               | 156.5        | 263.7        | -126.9                  | 0.00                    | 0.00                   | 0.00                  |
| 9,500.0                                | 4.65            | 59.32       | 9,487.4               | 160.6        | 270.7        | -130.2                  | 0.00                    | 0.00                   | 0.00                  |
| 9,600.0                                | 4.65            | 59.32       | 9,587.0               | 164.7        | 277.7        | -133.6                  | 0.00                    | 0.00                   | 0.00                  |
| 9,700.0                                | 4.65            | 59.32       | 9,686.7               | 168.9        | 284.6        | -136.9                  | 0.00                    | 0.00                   | 0.00                  |
| 9,800.0                                | 4.65            | 59.32       | 9,786.4               | 173.0        | 291.6        | -140.3                  | 0.00                    | 0.00                   | 0.00                  |
| 9,900.0                                | 4.65            | 59.32       | 9,886.0               | 177.1        | 298.6        | -143.6                  | 0.00                    | 0.00                   | 0.00                  |
| 10,000.0                               | 4.65            | 59.32       | 9,985.7               | 181.3        | 305.5        | -147.0                  | 0.00                    | 0.00                   | 0.00                  |
| 10,100.0                               | 4.65            | 59.32       | 10,085.4              | 185.4        | 312.5        | -150.3                  | 0.00                    | 0.00                   | 0.00                  |
| 10,200.0                               | 4.65            | 59.32       | 10,185.1              | 189.5        | 319.5        | -153.7                  | 0.00                    | 0.00                   | 0.00                  |
| 10,300.0                               | 4.65            | 59.32       | 10,284.7              | 193.7        | 326.4        | -157.0                  | 0.00                    | 0.00                   | 0.00                  |
| 10,400.0                               | 4.65            | 59.32       | 10,384.4              | 197.8        | 333.4        | -160.4                  | 0.00                    | 0.00                   | 0.00                  |
| 10,500.0                               | 4.65            | 59.32       | 10,484.1              | 201.9        | 340.4        | -163.8                  | 0.00                    | 0.00                   | 0.00                  |
| 10,600.0                               | 4.65            | 59.32       | 10,583.7              | 206.1        | 347.3        | -167.1                  | 0.00                    | 0.00                   | 0.00                  |
| 10,700.0                               | 4.65            | 59.32       | 10,683.4              | 210.2        | 354.3        | -170.5                  | 0.00                    | 0.00                   | 0.00                  |
| 10,800.0                               | 4.65            | 59.32       | 10,783.1              | 214.3        | 361.3        | -173.8                  | 0.00                    | 0.00                   | 0.00                  |
| 10,900.0                               | 4.65            | 59.32       | 10,882.7              | 218.5        | 368.3        | -177.2                  | 0.00                    | 0.00                   | 0.00                  |
| 11,000.0                               | 4.65            | 59.32       | 10,982.4              | 222.6        | 375.2        | -180.5                  | 0.00                    | 0.00                   | 0.00                  |
| 11,100.0                               | 4.65            | 59.32       | 11,082.1              | 226.7        | 382.2        | -183.9                  | 0.00                    | 0.00                   | 0.00                  |
| 11,200.0                               | 4.65            | 59.32       | 11,181.8              | 230.9        | 389.2        | -187.2                  | 0.00                    | 0.00                   | 0.00                  |
| 11,300.0                               | 4.65            | 59.32       | 11,281.4              | 235.0        | 396.1        | -190.6                  | 0.00                    | 0.00                   | 0.00                  |
| 11,400.0                               | 4.65            | 59.32       | 11,381.1              | 239.2        | 403.1        | -193.9                  | 0.00                    | 0.00                   | 0.00                  |
| 11,500.0                               | 4.65            | 59.32       | 11,480.8              | 243.3        | 410.1        | -197.3                  | 0.00                    | 0.00                   | 0.00                  |
| 11,600.0                               | 4.65            | 59.32       | 11,580.4              | 247.4        | 417.0        | -200.6                  | 0.00                    | 0.00                   | 0.00                  |
| 11,700.0                               | 4.65            | 59.32       | 11,680.1              | 251.6        | 424.0        | -204.0                  | 0.00                    | 0.00                   | 0.00                  |
| 11,800.0                               | 4.65            | 59.32       | 11,779.8              | 255.7        | 431.0        | -207.3                  | 0.00                    | 0.00                   | 0.00                  |
| 11,900.0                               | 4.65            | 59.32       | 11,879.5              | 259.8        | 437.9        | -210.7                  | 0.00                    | 0.00                   | 0.00                  |
| 12,000.0                               | 4.65            | 59.32       | 11,979.1              | 264.0        | 444.9        | -214.0                  | 0.00                    | 0.00                   | 0.00                  |
| 12,100.0                               | 4.65            | 59.32       | 12,078.8              | 268.1        | 451.9        | -217.4                  | 0.00                    | 0.00                   | 0.00                  |
| 12,200.0                               | 4.65            | 59.32       | 12,178.5              | 272.2        | 458.9        | -220.8                  | 0.00                    | 0.00                   | 0.00                  |
| 12,220.9                               | 4.65            | 59.32       | 12,199.3              | 273.1        | 460.3        | -221.5                  | 0.00                    | 0.00                   | 0.00                  |
| <b>Start DLS 12.00 TFO 120.14</b>      |                 |             |                       |              |              |                         |                         |                        |                       |
| 12,300.0                               | 8.20            | 150.37      | 12,278.1              | 269.8        | 465.9        | -217.6                  | 12.00                   | 4.49                   | 115.08                |
| 12,400.0                               | 19.56           | 168.13      | 12,375.0              | 247.2        | 472.9        | -194.3                  | 12.00                   | 11.36                  | 17.76                 |
| 12,500.0                               | 31.39           | 172.93      | 12,465.1              | 204.8        | 479.5        | -151.4                  | 12.00                   | 11.83                  | 4.79                  |
| 12,600.0                               | 43.31           | 175.26      | 12,544.5              | 144.5        | 485.6        | -90.9                   | 12.00                   | 11.92                  | 2.34                  |
| 12,700.0                               | 55.25           | 176.74      | 12,609.6              | 69.1         | 490.8        | -15.3                   | 12.00                   | 11.95                  | 1.48                  |
| 12,800.0                               | 67.22           | 177.85      | 12,657.6              | -18.3        | 494.9        | 72.0                    | 12.00                   | 11.96                  | 1.10                  |
| 12,900.0                               | 79.18           | 178.77      | 12,686.5              | -113.9       | 497.7        | 167.3                   | 12.00                   | 11.97                  | 0.92                  |
| 12,991.7                               | 90.16           | 179.55      | 12,695.0              | -205.0       | 499.0        | 258.0                   | 12.00                   | 11.97                  | 0.85                  |
| <b>Start 4698.0 hold at 12991.7 MD</b> |                 |             |                       |              |              |                         |                         |                        |                       |
| 13,000.0                               | 90.16           | 179.55      | 12,695.0              | -213.3       | 499.1        | 266.3                   | 0.00                    | 0.00                   | 0.00                  |
| 13,100.0                               | 90.16           | 179.55      | 12,694.7              | -313.3       | 499.9        | 365.8                   | 0.00                    | 0.00                   | 0.00                  |
| 13,200.0                               | 90.16           | 179.55      | 12,694.4              | -413.3       | 500.6        | 465.3                   | 0.00                    | 0.00                   | 0.00                  |

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

### Planned 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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 13,300.0              | 90.16           | 179.55      | 12,694.1              | -513.3       | 501.4        | 564.8                   | 0.00                    | 0.00                   | 0.00                  |
| 13,400.0              | 90.16           | 179.55      | 12,693.9              | -613.3       | 502.2        | 664.2                   | 0.00                    | 0.00                   | 0.00                  |
| 13,500.0              | 90.16           | 179.55      | 12,693.6              | -713.3       | 503.0        | 763.7                   | 0.00                    | 0.00                   | 0.00                  |
| 13,600.0              | 90.16           | 179.55      | 12,693.3              | -813.3       | 503.8        | 863.2                   | 0.00                    | 0.00                   | 0.00                  |
| 13,700.0              | 90.16           | 179.55      | 12,693.0              | -913.3       | 504.6        | 962.7                   | 0.00                    | 0.00                   | 0.00                  |
| 13,800.0              | 90.16           | 179.55      | 12,692.8              | -1,013.3     | 505.4        | 1,062.2                 | 0.00                    | 0.00                   | 0.00                  |
| 13,900.0              | 90.16           | 179.55      | 12,692.5              | -1,113.3     | 506.2        | 1,161.7                 | 0.00                    | 0.00                   | 0.00                  |
| 14,000.0              | 90.16           | 179.55      | 12,692.2              | -1,213.3     | 506.9        | 1,261.2                 | 0.00                    | 0.00                   | 0.00                  |
| 14,100.0              | 90.16           | 179.55      | 12,691.9              | -1,313.3     | 507.7        | 1,360.7                 | 0.00                    | 0.00                   | 0.00                  |
| 14,200.0              | 90.16           | 179.55      | 12,691.7              | -1,413.3     | 508.5        | 1,460.2                 | 0.00                    | 0.00                   | 0.00                  |
| 14,300.0              | 90.16           | 179.55      | 12,691.4              | -1,513.3     | 509.3        | 1,559.7                 | 0.00                    | 0.00                   | 0.00                  |
| 14,400.0              | 90.16           | 179.55      | 12,691.1              | -1,613.3     | 510.1        | 1,659.1                 | 0.00                    | 0.00                   | 0.00                  |
| 14,500.0              | 90.16           | 179.55      | 12,690.8              | -1,713.3     | 510.9        | 1,758.6                 | 0.00                    | 0.00                   | 0.00                  |
| 14,600.0              | 90.16           | 179.55      | 12,690.5              | -1,813.3     | 511.7        | 1,858.1                 | 0.00                    | 0.00                   | 0.00                  |
| 14,700.0              | 90.16           | 179.55      | 12,690.3              | -1,913.3     | 512.5        | 1,957.6                 | 0.00                    | 0.00                   | 0.00                  |
| 14,800.0              | 90.16           | 179.55      | 12,690.0              | -2,013.3     | 513.2        | 2,057.1                 | 0.00                    | 0.00                   | 0.00                  |
| 14,900.0              | 90.16           | 179.55      | 12,689.7              | -2,113.2     | 514.0        | 2,156.6                 | 0.00                    | 0.00                   | 0.00                  |
| 15,000.0              | 90.16           | 179.55      | 12,689.4              | -2,213.2     | 514.8        | 2,256.1                 | 0.00                    | 0.00                   | 0.00                  |
| 15,100.0              | 90.16           | 179.55      | 12,689.2              | -2,313.2     | 515.6        | 2,355.6                 | 0.00                    | 0.00                   | 0.00                  |
| 15,200.0              | 90.16           | 179.55      | 12,688.9              | -2,413.2     | 516.4        | 2,455.1                 | 0.00                    | 0.00                   | 0.00                  |
| 15,300.0              | 90.16           | 179.55      | 12,688.6              | -2,513.2     | 517.2        | 2,554.6                 | 0.00                    | 0.00                   | 0.00                  |
| 15,400.0              | 90.16           | 179.55      | 12,688.3              | -2,613.2     | 518.0        | 2,654.0                 | 0.00                    | 0.00                   | 0.00                  |
| 15,500.0              | 90.16           | 179.55      | 12,688.1              | -2,713.2     | 518.8        | 2,753.5                 | 0.00                    | 0.00                   | 0.00                  |
| 15,600.0              | 90.16           | 179.55      | 12,687.8              | -2,813.2     | 519.5        | 2,853.0                 | 0.00                    | 0.00                   | 0.00                  |
| 15,700.0              | 90.16           | 179.55      | 12,687.5              | -2,913.2     | 520.3        | 2,952.5                 | 0.00                    | 0.00                   | 0.00                  |
| 15,800.0              | 90.16           | 179.55      | 12,687.2              | -3,013.2     | 521.1        | 3,052.0                 | 0.00                    | 0.00                   | 0.00                  |
| 15,900.0              | 90.16           | 179.55      | 12,687.0              | -3,113.2     | 521.9        | 3,151.5                 | 0.00                    | 0.00                   | 0.00                  |
| 16,000.0              | 90.16           | 179.55      | 12,686.7              | -3,213.2     | 522.7        | 3,251.0                 | 0.00                    | 0.00                   | 0.00                  |
| 16,100.0              | 90.16           | 179.55      | 12,686.4              | -3,313.2     | 523.5        | 3,350.5                 | 0.00                    | 0.00                   | 0.00                  |
| 16,200.0              | 90.16           | 179.55      | 12,686.1              | -3,413.2     | 524.3        | 3,450.0                 | 0.00                    | 0.00                   | 0.00                  |
| 16,300.0              | 90.16           | 179.55      | 12,685.8              | -3,513.2     | 525.1        | 3,549.5                 | 0.00                    | 0.00                   | 0.00                  |
| 16,400.0              | 90.16           | 179.55      | 12,685.6              | -3,613.2     | 525.8        | 3,648.9                 | 0.00                    | 0.00                   | 0.00                  |
| 16,500.0              | 90.16           | 179.55      | 12,685.3              | -3,713.2     | 526.6        | 3,748.4                 | 0.00                    | 0.00                   | 0.00                  |
| 16,600.0              | 90.16           | 179.55      | 12,685.0              | -3,813.2     | 527.4        | 3,847.9                 | 0.00                    | 0.00                   | 0.00                  |
| 16,700.0              | 90.16           | 179.55      | 12,684.7              | -3,913.2     | 528.2        | 3,947.4                 | 0.00                    | 0.00                   | 0.00                  |
| 16,800.0              | 90.16           | 179.55      | 12,684.5              | -4,013.2     | 529.0        | 4,046.9                 | 0.00                    | 0.00                   | 0.00                  |
| 16,900.0              | 90.16           | 179.55      | 12,684.2              | -4,113.2     | 529.8        | 4,146.4                 | 0.00                    | 0.00                   | 0.00                  |
| 17,000.0              | 90.16           | 179.55      | 12,683.9              | -4,213.2     | 530.6        | 4,245.9                 | 0.00                    | 0.00                   | 0.00                  |
| 17,100.0              | 90.16           | 179.55      | 12,683.6              | -4,313.2     | 531.4        | 4,345.4                 | 0.00                    | 0.00                   | 0.00                  |
| 17,200.0              | 90.16           | 179.55      | 12,683.4              | -4,413.2     | 532.1        | 4,444.9                 | 0.00                    | 0.00                   | 0.00                  |
| 17,300.0              | 90.16           | 179.55      | 12,683.1              | -4,513.2     | 532.9        | 4,544.4                 | 0.00                    | 0.00                   | 0.00                  |
| 17,400.0              | 90.16           | 179.55      | 12,682.8              | -4,613.2     | 533.7        | 4,643.8                 | 0.00                    | 0.00                   | 0.00                  |
| 17,500.0              | 90.16           | 179.55      | 12,682.5              | -4,713.2     | 534.5        | 4,743.3                 | 0.00                    | 0.00                   | 0.00                  |
| 17,600.0              | 90.16           | 179.55      | 12,682.2              | -4,813.2     | 535.3        | 4,842.8                 | 0.00                    | 0.00                   | 0.00                  |

## Survey Report

|                  |                         |                                     |                                     |
|------------------|-------------------------|-------------------------------------|-------------------------------------|
| <b>Company:</b>  | NORTHERN DELAWARE BASIN | <b>Local Co-ordinate Reference:</b> | Well PICKELHAUBE ST #601H           |
| <b>Project:</b>  | LEA COUNTY, NM          | <b>TVD Reference:</b>               | KB=31' @ 3418.0usft (Precision 106) |
| <b>Site:</b>     | BULLDOG                 | <b>MD Reference:</b>                | KB=31' @ 3418.0usft (Precision 106) |
| <b>Well:</b>     | PICKELHAUBE ST #601H    | <b>North Reference:</b>             | Grid                                |
| <b>Wellbore:</b> | OWB                     | <b>Survey Calculation Method:</b>   | Minimum Curvature                   |
| <b>Design:</b>   | PWP1                    | <b>Database:</b>                    | EDM_Users                           |

### Planned 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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 17,689.6              | 90.16           | 179.55      | 12,682.0              | -4,902.8     | 536.0        | 4,932.0                 | 0.00                    | 0.00                   | 0.00                  |
| TD at 17689.6         |                 |             |                       |              |              |                         |                         |                        |                       |

### Design Targets

| Target Name<br>- hit/miss target<br>- Shape                                                                                 | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude         | Longitude         |
|-----------------------------------------------------------------------------------------------------------------------------|---------------|--------------|------------|--------------|--------------|-----------------|----------------|------------------|-------------------|
| PBHL (PICKELHAUBE)<br>- plan hits target center<br>- Point                                                                  | 0.00          | 0.00         | 12,682.0   | -4,902.8     | 536.0        | 425,575.60      | 782,288.60     | 32° 10' 0.246 N  | 103° 25' 15.857 W |
| FTP (PICKELHAUBE)<br>- plan misses target center by 166.0usft at 12635.6usft MD (12569.5 TVD, 119.3 N, 487.6 E)<br>- Point  | 0.00          | 0.00         | 12,695.0   | 227.8        | 491.1        | 430,706.20      | 782,243.70     | 32° 10' 51.018 N | 103° 25' 15.874 W |
| LTP (PICKELHAUBE)<br>- plan misses target center by 41.6usft at 17600.0usft MD (12682.2 TVD, -4813.2 N, 535.3 E)<br>- Point | 0.00          | 0.00         | 12,695.0   | -4,852.8     | 535.6        | 425,625.60      | 782,288.20     | 32° 10' 0.741 N  | 103° 25' 15.857 W |

### Plan Annotations

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              | Comment                         |
|-----------------------|-----------------------|-------------------|--------------|---------------------------------|
|                       |                       | +N/-S (usft)      | +E/-W (usft) |                                 |
| 5500                  | 5500                  | 0                 | 0            | Start Build 2.00                |
| 5732                  | 5732                  | 5                 | 8            | Start 6488.5 hold at 5732.4 MD  |
| 12,221                | 12,199                | 273               | 460          | Start DLS 12.00 TFO 120.14      |
| 12,992                | 12,695                | -205              | 499          | Start 4698.0 hold at 12991.7 MD |
| 17,690                | 12,682                | -4903             | 536          | TD at 17689.6                   |

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_



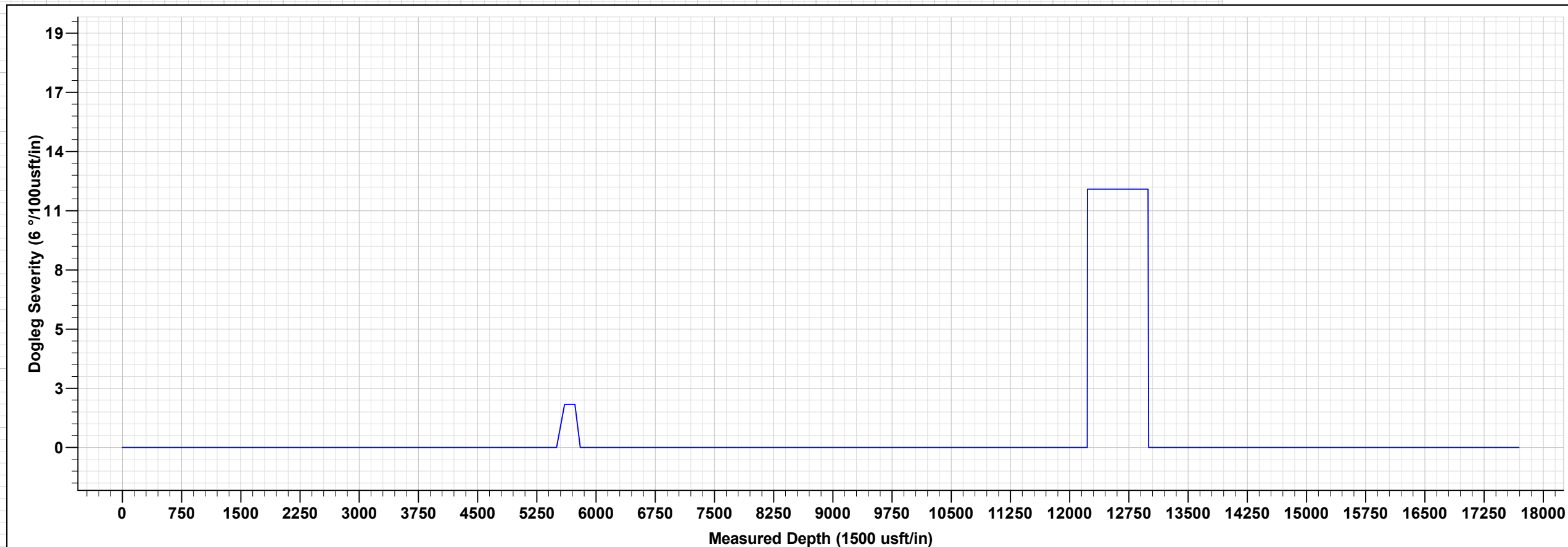
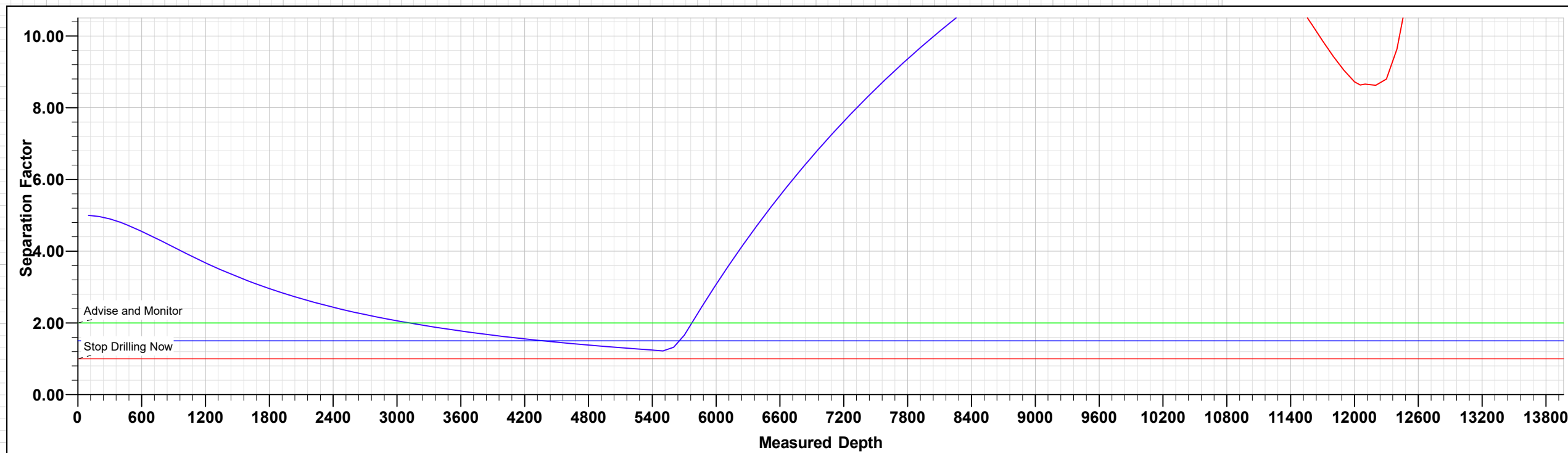
Project: LEA COUNTY, NM  
Site: BULLDOG  
Well: PICKELHAUBE ST #601H  
Wellbore: OWP  
Design: PWP1  
GL: 3387.0  
KB=31' @ 3418.0ustf (Precision 106)

WELL DETAILS: PICKELHAUBE ST #601H

| +N/-S | +E/-W | Northing  | Easting   | Latitude         | Longitude         |
|-------|-------|-----------|-----------|------------------|-------------------|
| 0.0   | 0.0   | 430478.40 | 781752.60 | 32° 10' 48.806 N | 103° 25' 21.610 W |

DESIGN TARGET DETAILS

| Name                        | TVD     | +N/-S   | +E/-W | Northing  | Easting   |
|-----------------------------|---------|---------|-------|-----------|-----------|
| PBHL (PICKELHAUBE ST #601H) | 12682.0 | -4902.8 | 536.0 | 425575.60 | 782288.60 |
| FTP (PICKELHAUBE ST #601H)  | 12695.0 | 227.8   | 491.1 | 430706.20 | 782243.70 |
| LTP (PICKELHAUBE ST #601H)  | 12695.0 | -4852.8 | 535.6 | 425625.60 | 782288.20 |



PICKELHAUBE ST #601H

| MD      | Inc   | Azi    | TVD     | +N/-S   | +E/-W | Dleg  | TFace  | Vsect  | Annotation                      |
|---------|-------|--------|---------|---------|-------|-------|--------|--------|---------------------------------|
| 0.0     | 0.00  | 0.00   | 0.0     | 0.0     | 0.0   | 0.00  | 0.00   | 0.0    |                                 |
| 5500.0  | 0.00  | 0.00   | 5500.0  | 0.0     | 0.0   | 0.00  | 0.00   | 0.0    | Start Build 2.00                |
| 5732.4  | 4.65  | 59.32  | 5732.2  | 4.8     | 8.1   | 2.00  | 59.32  | -3.9   | Start 6488.5 hold at 5732.4 MD  |
| 12220.9 | 4.65  | 59.32  | 12199.3 | 273.1   | 460.3 | 0.00  | 0.00   | -221.5 | Start DLS 12.00 TFO 120.14      |
| 12991.7 | 90.16 | 179.55 | 12695.0 | -205.0  | 499.0 | 12.00 | 120.14 | 258.0  | Start 4698.0 hold at 12991.7 MD |
| 17689.6 | 90.16 | 179.55 | 12682.0 | -4902.8 | 536.0 | 0.00  | 0.00   | 4932.0 | TD at 17689.6                   |

ANNOTATIONS

| MD      | Inc   | Azi    | TVD     | +N/-S   | +E/-W | Vsect  | Departure | Annotation                      |
|---------|-------|--------|---------|---------|-------|--------|-----------|---------------------------------|
| 5500.0  | 0.00  | 0.00   | 5500.0  | 0.0     | 0.0   | 0.0    | 0.0       | Start Build 2.00                |
| 5732.4  | 4.65  | 59.32  | 5732.2  | 4.8     | 8.1   | -3.9   | 9.4       | Start 6488.5 hold at 5732.4 MD  |
| 12220.9 | 4.65  | 59.32  | 12199.3 | 273.1   | 460.3 | -221.5 | 535.2     | Start DLS 12.00 TFO 120.14      |
| 12991.7 | 90.16 | 179.55 | 12695.0 | -205.0  | 499.0 | 258.0  | 1051.4    | Start 4698.0 hold at 12991.7 MD |
| 17689.6 | 90.16 | 179.55 | 12682.0 | -4902.8 | 536.0 | 4932.0 | 5749.4    | TD at 17689.6                   |

