Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

## SUNDRY NOTICES AND REPORTS ON WELLS

***Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.***

***SUBMIT IN TRIPLICATE - Other instructions on page 2***

Carlsbad Field Office
OCD Hobbs
HOBBS OCD
FEB 07 2019
RECEIVED

5. Lease Serial No.
NMNM94186

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
THISTLE UNIT 157H

2. Name of Operator
DEVON ENERGY PRODUCTION COMPAN

Contact: REBECCA DEAL
Email: Rebecca.Deal@dvn.com

9. API Well No.
30-025-43728

3a. Address
333 WEST SHERIDAN AVE
OKLAHOMA CITY, OK 73102

3b. Phone No. (include area code)
Ph: 405-228-8429

10. Field and Pool or Exploratory Area
TRIPLE X; BONE SPRING

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 33 T23S R33E Mer NMP SWSW 340FSL 1280FWL

11. County or Parish, State
LEA COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

| TYPE OF SUBMISSION | TYPE OF ACTION | | | |
|---|---|---|---|---|
| ☒ Notice of Intent | ☐ Acidize | ☐ Deepen | ☐ Production (Start/Resume) | ☐ Water Shut-Off |
| ☐ Subsequent Report | ☐ Alter Casing | ☐ Hydraulic Fracturing | ☐ Reclamation | ☐ Well Integrity |
| ☐ Final Abandonment Notice | ☐ Casing Repair | ☐ New Construction | ☐ Recomplete | ☒ Other Change to Original APD |
| | ☐ Change Plans | ☐ Plug and Abandon | ☐ Temporarily Abandon | |
| | ☐ Convert to Injection | ☐ Plug Back | ☐ Water Disposal | |

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Devon Energy Production Co. requests the following changes to the Thistle Unit 157H APD:

? BHL change from 330 FNL & 1270 FWL to 20 FNL & 2230 FWL, both 28-23S-33E

? MD/TVD change from 20,016/10,005' to 19,838.56'/9650'

Please see attached C-102, drilling plan, directional & AC plan and plot.

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

14. I hereby certify that the foregoing is true and correct.

**Electronic Submission #450711 verified by the BLM Well Information System**
**For DEVON ENERGY PRODUCTION COMPAN, sent to the Hobbs**
**Committed to AFMSS for processing by MUSTAFA HAQUE on 01/16/2019 ()**

Name *(Printed/Typed)* REBECCA DEAL — Title REGULATORY COMPLIANCE PROFESSI

Signature (Electronic Submission) — Date 01/15/2019

### THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By Mustafa Haque — Title Petroleum Engineer — Date 01-18-2019

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Carlsbad Field Office

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****

KB

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 Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

| [1] API Number | [2] Pool Code | [3] Pool Name |
|---|---|---|
| 30-025-43728 | 59900 | Triple X; Bone Spring |

| [4] Property Code | [5] Property Name | [6] Well Number |
|---|---|---|
| | THISTLE UNIT | 157H |

| [7] OGRID No. | [8] Operator Name | [9] Elevation |
|---|---|---|
| 6137 | DEVON ENERGY PRODUCTION COMPANY, L.P. | 3660.7 |

## [10] Surface Location

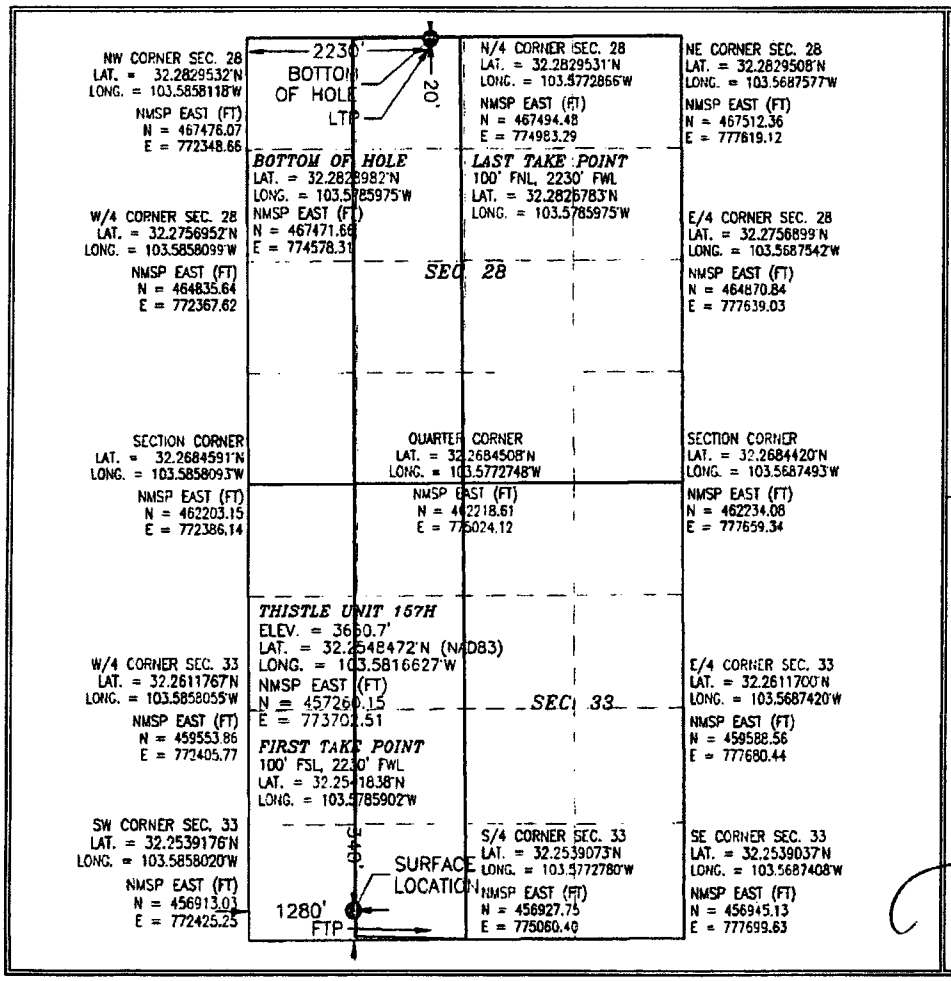
| UL or lot no. | Section | Township | Range | Lot Idn | Feet from the | North/South line | Feet from the | East/West line | County |
|---|---|---|---|---|---|---|---|---|---|
| M | 33 | 23 S | 33 E | | 340 | SOUTH | 1280 | WEST | LEA |

## [11] 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 |
|---|---|---|---|---|---|---|---|---|---|
| C | 28 | 23 S | 33 E | | 20 | NORTH | 2230 | WEST | LEA |

| [12] Dedicated Acres | [13] Joint or Infill | [14] Consolidation Code | [15] Order No. |
|---|---|---|---|
| 320 | | | |

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




## [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.*

Rebecca Deal — 1/9/2019
Signature — Date

**Rebecca Deal, Regulatory Analyst**
Printed Name

**rebecca.deal@dvn.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.*

DECEMBER 31, 2018
Date of Survey

FILIMON F. JARAMILLO — NEW MEXICO — 12797 — PROFESSIONAL SURVEYOR

Signature and Seal of Professional Surveyor:

Certificate Number: FILIMON F. JARAMILLO, PLS 12797

SURVEY NO. 4719A

Intent [X] As Drilled [ ]

| API # |
|---|
| 30-025-43728 |

| Operator Name: | Property Name: | Well Number |
|---|---|---|
| DEVON ENERGY PRODUCTION COMPANY, L.P. | THISTLE UNIT | 157H |

Kick Off Point (KOP)

| UL | Section | Township | Range | Lot | Feet | From N/S | Feet | From E/W | County |
|---|---|---|---|---|---|---|---|---|---|
| | 33 | 23S | 33E | | 200 | FSL | 2180 | FWL | LEA |

| Latitude | Longitude | NAD |
|---|---|---|
| 32.254462 | -103.578752 | 83 |

First Take Point (FTP)

| UL | Section | Township | Range | Lot | Feet | From N/S | Feet | From E/W | County |
|---|---|---|---|---|---|---|---|---|---|
| N | 33 | 23S | 33E | | 100 | SOUTH | 2230 | WEST | LEA |

| Latitude | Longitude | NAD |
|---|---|---|
| 32.2541838 | 103.5785902 | 83 |

Last Take Point (LTP)

| UL | Section | Township | Range | Lot | Feet | From N/S | Feet | From E/W | County |
|---|---|---|---|---|---|---|---|---|---|
| C | 28 | 23S | 33E | | 100 | NORTH | 2230 | WEST | LEA |

| Latitude | Longitude | NAD |
|---|---|---|
| 32.2826783 | 103.5785975 | 83 |

Is this well the defining well for the Horizontal Spacing Unit? [ ]

Is this well an infill well? [ ]

If infill is yes please provide API if available, Operator Name and well number for Defining well for Horizontal Spacing Unit.

| API # |
|---|
| |

| Operator Name: | Property Name: | Well Number |
|---|---|---|
| | | |

KZ 06/29/2018

# Devon Energy – Thistle Unit 157H

## 1. Geologic Formations

| | | | |
|---|---|---|---|
| TVD of target | 9650 | Pilot hole depth | N/A |
| MD at TD: | 19838 | Deepest expected fresh water: | |

**Basin**

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/ Target Zone? | Hazards* |
|---|---|---|---|
| Rustler | 1225 | | |
| Salado | 1735 | | |
| B/Salt | 5150 | | |
| Delaware | 5240 | | |
| Bone Spring | 9150 | | |
| 2BSSS | 10920 | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

*H2S, water flows, loss of circulation, abnormal pressures, etc.

## 2. Casing Program -> SEE COA

| Hole Size | Casing Interval | | Csg. Size | Weight (PPF) | Grade | Conn. |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| 17.5" | 0 | ~~1250~~ 1400' | 13.375" | 48 | H-40 | STC |
| 12.25" | 0 | ~~5340~~ 5100' | 9.625" | 40 | J-55 | BTC |
| 8.75" | 0 | TD | 5.5" | 17 | P-110 | BTC |
| BLM Minimum Safety Factor | | | | Collapse: 1.125 | Burst: 1.00 | Tension: 1.6 Dry 1.8 Wet |

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h Must have table for contingency casing
- Rustler top will be validated via drilling parameters (i.e. reduction in ROP) and surface casing setting depth revised accordingly if needed.
- Variance is requested for collapse rating on intermediate casing. Operator will keep pipe full while running casing. No losses are expected in subsequent hole section.
- Int casing shoe will be selected based on drilling data, gamma, and flows experienced while drilling. Setting depth with be revised accordingly if needed.
- A variance is requested to wave the centralizer requirement for the intermediate and production casing strings if drilling conditions dictate

| | Y or N |
|---|---|
| Is casing new? If used, attach certification as required in Onshore Order #1 | Y |
| Does casing meet API specifications? If no, attach casing specification sheet. | Y |
| Is premium or uncommon casing planned? If yes attach casing specification sheet. | N |
| Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria). | Y |
| Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing? | Y |
| | |
| Is well located within Capitan Reef? | N |
| If yes, does production casing cement tie back a minimum of 50' above the Reef? | |
| Is well within the designated 4 string boundary. | |
| | |
| Is well located in SOPA but not in R-111-P? | N |
| If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing? | |
| | |
| Is well located in R-111-P and SOPA? | N |
| If yes, are the first three strings cemented to surface? | |
| Is 2nd string set 100' to 600' below the base of salt? | |
| | |
| Is well located in high Cave/Karst? | N |
| If yes, are there two strings cemented to surface? | |
| (For 2 string wells) If yes, is there a contingency casing if lost circulation occurs? | |
| | |
| Is well located in critical Cave/Karst? | N |
| If yes, are there three strings cemented to surface? | |

**3. Cementing Program (3-String Primary Design)**

| Casing | # Sks | TOC | Wt. (lb/gal) | $H_20$ (gal/sk) | Yld (ft3/sack) | Slurry Description |
|---|---|---|---|---|---|---|
| Surface | 1305 | Surf | 13.2 | 6.33 | 1.33 | Lead: Class C Cement + additives |
| Int | 818 | Surf | 9 | 20.6 | 1.94 | Lead: Class C Cement + additives |
| | 196 | 500' above shoe | 13.2 | 6.42 | 1.33 | Tail: Class H / C + additives |
| Production | 336 | 500' tieback | 9 | 20.6 | 1.94 | Lead: Class H / C + additives |
| | 1860 | KOP | 13.2 | 5.31 | 1.6 | Tail: Class H / C + additives |

If a DV tool is ran the depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Slurry weights will be adjusted based on estimated fracture gradient of the formation. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. If cement is not returned to surface during the primary cement job on the surface casing string, a planned top job will be conducted immediately after completion of the primary job.

| Casing String | % Excess |
|---|---|
| Surface | 100% |
| Intermediate | 50% |
| Production | 10% |

**4. Pressure Control Equipment**

| BOP installed and tested before drilling which hole? | Size? | Min. Required WP | Type | ✓ | Tested to: |
|---|---|---|---|---|---|
| Int 1 | 13-5/8" | 3M | Annular | X | 50% of rated working pressure |
| | | | Blind Ram | | 3M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other* | | |
| Production | 13-5/8" | 5M | Annular | X | 50% of rated working pressure |
| | | | Blind Ram | | 5M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other * | | |
| | | | Annular | | |
| | | | Blind Ram | | |
| | | | Pipe Ram | | |
| | | | Double Ram | | |
| | | | Other * | | |

## 5. Mud Program

| Interval | Type | Weight (ppg) | Vis | Water Loss |
|---|---|---|---|---|
| Surface | FW | 8.5 – 9.0 | 28-34 | N/C |
| Intermediate | Brine | 10 – 10.5 | 28-34 | N/C |
| Production | WBM | 8.5 – 9.0 | 28-34 | N/C |

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

| | |
|---|---|
| What will be used to monitor the loss or gain of fluid? | PVT/Pason/Visual Monitoring |

## 6. Logging and Testing Procedures

| Logging, Coring and Testing. | |
|---|---|
| X | Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM. |
| | No Logs are planned based on well control or offset log information. |
| | Drill stem test? If yes, explain |
| | Coring? If yes, explain |

| Additional logs planned | | Interval |
|---|---|---|
| | Resistivity | |
| | Density | |
| X | CBL | Production casing |
| X | Mud log | KOP to TD |
| | | |

## 7. Drilling Conditions

| Condition | Specify what type and where? |
|---|---|
| BH Pressure at deepest TVD | 4516 psi |
| Abnormal Temperature | No |

Mitigation measure for abnormal conditions. Describe. Lost circulation material/sweeps/mud scavengers.

| Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM. | |
|---|---|
| N | H2S is present |
| Y | H2S Plan attached |

**8. Other facets of operation**

Is this a walking operation? Potentially

1. If operator elects, drilling rig will batch drill the surface holes and run/cement surface casing; walking the rig to next wells on the pad.
2. The drilling rig will then batch drill the intermediate sections and run/cement intermediate casing; the wellbore will be isolated with a blind flange and pressure gauge installed for monitoring the well before walking to the next well.
3. The drilling rig will then batch drill the production hole sections on the wells with OBM, run/cement production casing, and install TA caps or tubing heads for completions.

NOTE: During batch operations the drilling rig will be moved from well to well however, it will not be removed from the pad until all wells have production casing run/cemented.

Will be pre-setting casing? Potentially

1. Spudder rig will move in and drill surface hole.
    a. Rig will utilize fresh water based mud to drill surface hole to TD. Solids control will be handled entirely on a closed loop basis.
2. After drilling the surface hole section, the spudder rig will run casing and cement following all of the applicable rules and regulations (OnShore Order 2, all COAs and NMOCD regulations).
3. The wellhead will be installed and tested once the surface casing is cut off and the WOC time has been reached.
4. A blind flange with the same pressure rating as the wellhead will be installed to seal the wellbore. Pressure will be monitored with a pressure gauge installed on the wellhead.
5. Spudder rig operations is expected to take 4-5 days per well on a multi well pad.
6. The NMOCD will be contacted and notified 24 hours prior to commencing spudder rig operations.
7. Drilling operations will be performed with the drilling rig. At that time an approved BOP stack will be nippled up and tested on the wellhead before drilling operations commences on each well.
    a. The NMOCD will be contacted / notified 24 hours before the drilling rig moves back on to the pad with the pre-set surface casing.

Attachments

_x_ Directional Plan

___ Other, describe

# Devon Energy

WELL DETAILS: Thistle Unit 157H

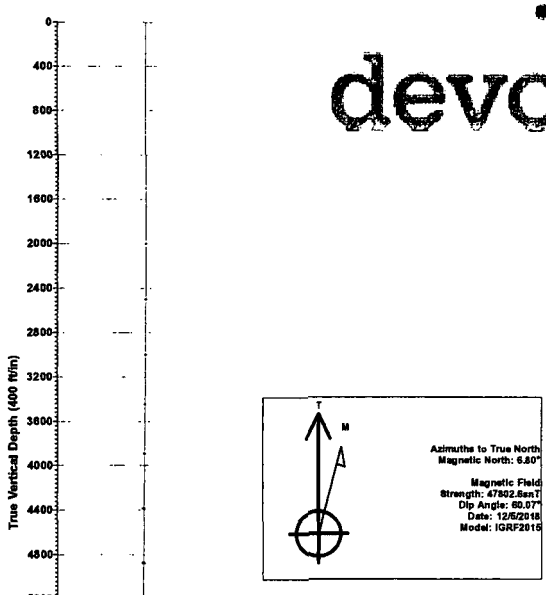
RKB @ 3685.70ft
3660.70

| Northing | Easting | Latitude | Longitude |
|---|---|---|---|
| 457260.15 | 773702.51 | 32.254847 | -103.581663 |

SECTION DETAILS Permit Plan 1

| MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | VSect | Annotation |
|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2500.00 | 0.00 | 0.00 | 2500.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3451.88 | 9.52 | 98.84 | 3447.51 | -12.13 | 77.95 | 1.00 | -4.74 | |
| 8164.59 | 9.52 | 98.84 | 8095.33 | -131.92 | 848.03 | 0.00 | -51.52 | |
| 8799.17 | 0.00 | 0.00 | 8727.00 | -140.00 | 900.00 | 1.50 | -54.68 | |
| 9149.21 | 0.00 | 0.00 | 9077.04 | -140.00 | 900.00 | 0.00 | -54.68 | KOP & FTP @ 9149' MD, 200' FSL, 2180' FWL |
| 10049.22 | 90.00 | 0.00 | 9650.00 | 432.96 | 900.00 | 10.00 | 515.73 | |
| 18500.00 | 90.00 | 0.00 | 9650.00 | 8883.74 | 900.00 | 0.00 | 8929.01 | |
| 18650.00 | 90.00 | 3.00 | 9650.00 | 9033.67 | 903.93 | 2.00 | 9078.65 | |
| 19838.56 | 90.00 | 3.00 | 9650.00 | 10220.60 | 966.13 | 0.00 | 10266.17 | PBHL; 20' FNL, 2230' FWL |

devon



# WCDSC Permian NM

**Lea County (NAD83 New Mexico East)**
**Sec 33-T23S-R33E**
**Thistle Unit 157H**

**Wellbore #1**

**Plan: Permit Plan 1**

# Standard Planning Report - Geographic

**09 January, 2019**

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Project** Lea County (NAD83 New Mexico East)

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | |
| **Map Zone:** | New Mexico Eastern Zone | | |

**Site** Sec 33-T23S-R33E

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 462,265.86 usft | **Latitude:** | 32.268581 |
| **From:** | Lat/Long | **Easting:** | 775,000.24 usft | **Longitude:** | -103.577351 |
| **Position Uncertainty:** | 0.00 ft | **Slot Radius:** | 13-3/16 " | **Grid Convergence:** | 0.40 ° |

**Well** Thistle Unit 157H

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.00 ft | **Northing:** | 457,260.15 usft | **Latitude:** | 32.254847 |
| | **+E/-W** | 0.00 ft | **Easting:** | 773,702.51 usft | **Longitude:** | -103.581663 |
| **Position Uncertainty** | | 0.50 ft | **Wellhead Elevation:** | | **Ground Level:** | 3,660.70 ft |

**Wellbore** Wellbore #1

| **Magnetics** | **Model Name** | **Sample Date** | **Declination (°)** | **Dip Angle (°)** | **Field Strength (nT)** |
|---|---|---|---|---|---|
| | IGRF2015 | 12/5/2018 | 6.80 | 60.07 | 47,802.59076108 |

**Design** Permit Plan 1

**Audit Notes:**

| | | | | | |
|---|---|---|---|---|---|
| **Version:** | | **Phase:** | PROTOTYPE | **Tie On Depth:** | 0.00 |
| **Vertical Section:** | **Depth From (TVD) (ft)** | **+N/-S (ft)** | **+E/-W (ft)** | **Direction (°)** | |
| | 0.00 | 0.00 | 0.00 | 5.40 | |

**Plan Survey Tool Program** **Date** 1/9/2019

| | Depth From (ft) | Depth To (ft) | Survey (Wellbore) | Tool Name | Remarks |
|---|---|---|---|---|---|
| 1 | 0.00 | 19,838.56 | Permit Plan 1 (Wellbore #1) | MWD+IFR1<br>OWSG MWD + IFR1 | |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Plan Sections**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2,500.00 | 0.00 | 0.00 | 2,500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3,451.88 | 9.52 | 98.84 | 3,447.51 | -12.13 | 77.95 | 1.00 | 1.00 | 0.00 | 98.84 | |
| 8,164.59 | 9.52 | 98.84 | 8,095.33 | -131.92 | 848.03 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 8,799.18 | 0.00 | 0.00 | 8,727.00 | -140.00 | 900.00 | 1.50 | -1.50 | 0.00 | 180.00 | |
| 9,149.22 | 0.00 | 0.00 | 9,077.04 | -140.00 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 10,049.22 | 90.00 | 0.00 | 9,650.00 | 432.96 | 900.00 | 10.00 | 10.00 | 0.00 | 0.00 | |
| 18,500.00 | 90.00 | 0.00 | 9,650.00 | 8,883.74 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 18,650.00 | 90.00 | 3.00 | 9,650.00 | 9,033.67 | 903.93 | 2.00 | 0.00 | 2.00 | 90.00 | |
| 19,838.56 | 90.00 | 3.00 | 9,650.00 | 10,220.61 | 966.13 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 100.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 200.00 | 0.00 | 0.00 | 200.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 300.00 | 0.00 | 0.00 | 300.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 400.00 | 0.00 | 0.00 | 400.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 500.00 | 0.00 | 0.00 | 500.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 600.00 | 0.00 | 0.00 | 600.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 700.00 | 0.00 | 0.00 | 700.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 800.00 | 0.00 | 0.00 | 800.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 900.00 | 0.00 | 0.00 | 900.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,000.00 | 0.00 | 0.00 | 1,000.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,100.00 | 0.00 | 0.00 | 1,100.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,200.00 | 0.00 | 0.00 | 1,200.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,300.00 | 0.00 | 0.00 | 1,300.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,400.00 | 0.00 | 0.00 | 1,400.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,500.00 | 0.00 | 0.00 | 1,500.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,600.00 | 0.00 | 0.00 | 1,600.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,700.00 | 0.00 | 0.00 | 1,700.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,800.00 | 0.00 | 0.00 | 1,800.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 1,900.00 | 0.00 | 0.00 | 1,900.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,000.00 | 0.00 | 0.00 | 2,000.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,100.00 | 0.00 | 0.00 | 2,100.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,200.00 | 0.00 | 0.00 | 2,200.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,300.00 | 0.00 | 0.00 | 2,300.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,400.00 | 0.00 | 0.00 | 2,400.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,500.00 | 0.00 | 0.00 | 2,500.00 | 0.00 | 0.00 | 457,260.15 | 773,702.51 | 32.254847 | -103.581663 |
| 2,600.00 | 1.00 | 98.84 | 2,599.99 | -0.13 | 0.86 | 457,260.02 | 773,703.37 | 32.254847 | -103.581660 |
| 2,700.00 | 2.00 | 98.84 | 2,699.96 | -0.54 | 3.45 | 457,259.64 | 773,705.96 | 32.254846 | -103.581652 |
| 2,800.00 | 3.00 | 98.84 | 2,799.86 | -1.21 | 7.76 | 457,259.00 | 773,710.27 | 32.254844 | -103.581638 |
| 2,900.00 | 4.00 | 98.84 | 2,899.68 | -2.15 | 13.79 | 457,258.10 | 773,716.31 | 32.254841 | -103.581618 |
| 3,000.00 | 5.00 | 98.84 | 2,999.37 | -3.35 | 21.54 | 457,256.95 | 773,724.07 | 32.254838 | -103.581593 |
| 3,100.00 | 6.00 | 98.84 | 3,098.90 | -4.82 | 31.01 | 457,255.54 | 773,733.55 | 32.254834 | -103.581563 |
| 3,200.00 | 7.00 | 98.84 | 3,198.26 | -6.56 | 42.20 | 457,253.88 | 773,744.75 | 32.254829 | -103.581526 |
| 3,300.00 | 8.00 | 98.84 | 3,297.40 | -8.57 | 55.10 | 457,251.97 | 773,757.66 | 32.254824 | -103.581485 |
| 3,400.00 | 9.00 | 98.84 | 3,396.30 | -10.84 | 69.70 | 457,249.80 | 773,772.28 | 32.254817 | -103.581438 |
| 3,451.88 | 9.52 | 98.84 | 3,447.51 | -12.13 | 77.95 | 457,248.57 | 773,780.54 | 32.254814 | -103.581411 |
| 3,500.00 | 9.52 | 98.84 | 3,494.96 | -13.35 | 85.81 | 457,247.40 | 773,788.41 | 32.254811 | -103.581385 |
| 3,600.00 | 9.52 | 98.84 | 3,593.59 | -15.89 | 102.15 | 457,244.98 | 773,804.77 | 32.254804 | -103.581333 |
| 3,700.00 | 9.52 | 98.84 | 3,692.21 | -18.43 | 118.49 | 457,242.55 | 773,821.13 | 32.254797 | -103.581280 |
| 3,800.00 | 9.52 | 98.84 | 3,790.83 | -20.97 | 134.84 | 457,240.12 | 773,837.49 | 32.254790 | -103.581227 |
| 3,900.00 | 9.52 | 98.84 | 3,889.46 | -23.52 | 151.18 | 457,237.69 | 773,853.84 | 32.254783 | -103.581174 |
| 4,000.00 | 9.52 | 98.84 | 3,988.08 | -26.06 | 167.52 | 457,235.27 | 773,870.20 | 32.254776 | -103.581121 |
| 4,100.00 | 9.52 | 98.84 | 4,086.70 | -28.60 | 183.86 | 457,232.84 | 773,886.56 | 32.254769 | -103.581068 |
| 4,200.00 | 9.52 | 98.84 | 4,185.33 | -31.14 | 200.20 | 457,230.41 | 773,902.92 | 32.254762 | -103.581015 |
| 4,300.00 | 9.52 | 98.84 | 4,283.95 | -33.68 | 216.54 | 457,227.98 | 773,919.28 | 32.254755 | -103.580963 |
| 4,400.00 | 9.52 | 98.84 | 4,382.57 | -36.23 | 232.88 | 457,225.56 | 773,935.63 | 32.254748 | -103.580910 |
| 4,500.00 | 9.52 | 98.84 | 4,481.20 | -38.77 | 249.22 | 457,223.13 | 773,951.99 | 32.254741 | -103.580857 |
| 4,600.00 | 9.52 | 98.84 | 4,579.82 | -41.31 | 265.56 | 457,220.70 | 773,968.35 | 32.254734 | -103.580804 |
| 4,700.00 | 9.52 | 98.84 | 4,678.44 | -43.85 | 281.90 | 457,218.27 | 773,984.71 | 32.254727 | -103.580751 |
| 4,800.00 | 9.52 | 98.84 | 4,777.07 | -46.39 | 298.24 | 457,215.85 | 774,001.07 | 32.254720 | -103.580698 |
| 4,900.00 | 9.52 | 98.84 | 4,875.69 | -48.93 | 314.58 | 457,213.42 | 774,017.42 | 32.254713 | -103.580645 |
| 5,000.00 | 9.52 | 98.84 | 4,974.31 | -51.48 | 330.92 | 457,210.99 | 774,033.78 | 32.254706 | -103.580593 |
| 5,100.00 | 9.52 | 98.84 | 5,072.94 | -54.02 | 347.26 | 457,208.56 | 774,050.14 | 32.254699 | -103.580540 |
| 5,200.00 | 9.52 | 98.84 | 5,171.56 | -56.56 | 363.60 | 457,206.14 | 774,066.50 | 32.254692 | -103.580487 |
| 5,300.00 | 9.52 | 98.84 | 5,270.18 | -59.10 | 379.94 | 457,203.71 | 774,082.85 | 32.254685 | -103.580434 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| 5,400.00 | 9.52 | 98.84 | 5,368.80 | -61.64 | 396.28 | 457,201.28 | 774,099.21 | 32.254678 | -103.580381 |
| 5,500.00 | 9.52 | 98.84 | 5,467.43 | -64.19 | 412.62 | 457,198.86 | 774,115.57 | 32.254671 | -103.580328 |
| 5,600.00 | 9.52 | 98.84 | 5,566.05 | -66.73 | 428.97 | 457,196.43 | 774,131.93 | 32.254664 | -103.580275 |
| 5,700.00 | 9.52 | 98.84 | 5,664.67 | -69.27 | 445.31 | 457,194.00 | 774,148.29 | 32.254657 | -103.580223 |
| 5,800.00 | 9.52 | 98.84 | 5,763.30 | -71.81 | 461.65 | 457,191.57 | 774,164.64 | 32.254650 | -103.580170 |
| 5,900.00 | 9.52 | 98.84 | 5,861.92 | -74.35 | 477.99 | 457,189.15 | 774,181.00 | 32.254643 | -103.580117 |
| 6,000.00 | 9.52 | 98.84 | 5,960.54 | -76.90 | 494.33 | 457,186.72 | 774,197.36 | 32.254636 | -103.580064 |
| 6,100.00 | 9.52 | 98.84 | 6,059.17 | -79.44 | 510.67 | 457,184.29 | 774,213.72 | 32.254629 | -103.580011 |
| 6,200.00 | 9.52 | 98.84 | 6,157.79 | -81.98 | 527.01 | 457,181.86 | 774,230.08 | 32.254622 | -103.579958 |
| 6,300.00 | 9.52 | 98.84 | 6,256.41 | -84.52 | 543.35 | 457,179.44 | 774,246.43 | 32.254615 | -103.579905 |
| 6,400.00 | 9.52 | 98.84 | 6,355.04 | -87.06 | 559.69 | 457,177.01 | 774,262.79 | 32.254608 | -103.579853 |
| 6,500.00 | 9.52 | 98.84 | 6,453.66 | -89.60 | 576.03 | 457,174.58 | 774,279.15 | 32.254601 | -103.579800 |
| 6,600.00 | 9.52 | 98.84 | 6,552.28 | -92.15 | 592.37 | 457,172.15 | 774,295.51 | 32.254594 | -103.579747 |
| 6,700.00 | 9.52 | 98.84 | 6,650.91 | -94.69 | 608.71 | 457,169.73 | 774,311.87 | 32.254587 | -103.579694 |
| 6,800.00 | 9.52 | 98.84 | 6,749.53 | -97.23 | 625.05 | 457,167.30 | 774,328.22 | 32.254580 | -103.579641 |
| 6,900.00 | 9.52 | 98.84 | 6,848.15 | -99.77 | 641.39 | 457,164.87 | 774,344.58 | 32.254573 | -103.579588 |
| 7,000.00 | 9.52 | 98.84 | 6,946.78 | -102.31 | 657.73 | 457,162.44 | 774,360.94 | 32.254566 | -103.579535 |
| 7,100.00 | 9.52 | 98.84 | 7,045.40 | -104.86 | 674.07 | 457,160.02 | 774,377.30 | 32.254559 | -103.579483 |
| 7,200.00 | 9.52 | 98.84 | 7,144.02 | -107.40 | 690.41 | 457,157.59 | 774,393.65 | 32.254552 | -103.579430 |
| 7,300.00 | 9.52 | 98.84 | 7,242.64 | -109.94 | 706.75 | 457,155.16 | 774,410.01 | 32.254545 | -103.579377 |
| 7,400.00 | 9.52 | 98.84 | 7,341.27 | -112.48 | 723.10 | 457,152.74 | 774,426.37 | 32.254538 | -103.579324 |
| 7,500.00 | 9.52 | 98.84 | 7,439.89 | -115.02 | 739.44 | 457,150.31 | 774,442.73 | 32.254531 | -103.579271 |
| 7,600.00 | 9.52 | 98.84 | 7,538.51 | -117.57 | 755.78 | 457,147.88 | 774,459.09 | 32.254524 | -103.579218 |
| 7,700.00 | 9.52 | 98.84 | 7,637.14 | -120.11 | 772.12 | 457,145.45 | 774,475.44 | 32.254517 | -103.579165 |
| 7,800.00 | 9.52 | 98.84 | 7,735.76 | -122.65 | 788.46 | 457,143.03 | 774,491.80 | 32.254510 | -103.579113 |
| 7,900.00 | 9.52 | 98.84 | 7,834.38 | -125.19 | 804.80 | 457,140.60 | 774,508.16 | 32.254503 | -103.579060 |
| 8,000.00 | 9.52 | 98.84 | 7,933.01 | -127.73 | 821.14 | 457,138.17 | 774,524.52 | 32.254496 | -103.579007 |
| 8,100.00 | 9.52 | 98.84 | 8,031.63 | -130.27 | 837.48 | 457,135.74 | 774,540.88 | 32.254489 | -103.578954 |
| 8,164.59 | 9.52 | 98.84 | 8,095.33 | -131.92 | 848.03 | 457,134.18 | 774,551.44 | 32.254485 | -103.578920 |
| 8,200.00 | 8.99 | 98.84 | 8,130.28 | -132.79 | 853.66 | 457,133.34 | 774,557.07 | 32.254482 | -103.578902 |
| 8,300.00 | 7.49 | 98.84 | 8,229.24 | -134.99 | 867.82 | 457,131.24 | 774,571.25 | 32.254476 | -103.578856 |
| 8,400.00 | 5.99 | 98.84 | 8,328.55 | -136.80 | 879.41 | 457,129.51 | 774,582.85 | 32.254471 | -103.578818 |
| 8,500.00 | 4.49 | 98.84 | 8,428.13 | -138.20 | 888.43 | 457,128.17 | 774,591.88 | 32.254467 | -103.578789 |
| 8,600.00 | 2.99 | 98.84 | 8,527.92 | -139.20 | 894.87 | 457,127.22 | 774,598.33 | 32.254465 | -103.578768 |
| 8,700.00 | 1.49 | 98.84 | 8,627.84 | -139.80 | 898.73 | 457,126.64 | 774,602.19 | 32.254463 | -103.578756 |
| 8,799.18 | 0.00 | 0.00 | 8,727.00 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| 8,800.00 | 0.00 | 0.00 | 8,727.83 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| 8,900.00 | 0.00 | 0.00 | 8,827.83 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| 9,000.00 | 0.00 | 0.00 | 8,927.83 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| 9,100.00 | 0.00 | 0.00 | 9,027.83 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| 9,149.21 | 0.00 | 0.00 | 9,077.04 | -140.00 | 900.00 | 457,126.46 | 774,603.46 | 32.254462 | -103.578752 |
| **KOP & FTP @ 9149' MD, 200' FSL, 2180' FWL** | | | | | | | | | |
| 9,200.00 | 5.08 | 0.00 | 9,127.76 | -137.75 | 900.00 | 457,128.71 | 774,603.45 | 32.254469 | -103.578752 |
| 9,300.00 | 15.08 | 0.00 | 9,226.09 | -120.27 | 900.00 | 457,146.18 | 774,603.33 | 32.254517 | -103.578752 |
| 9,400.00 | 25.08 | 0.00 | 9,319.89 | -85.99 | 900.00 | 457,180.47 | 774,603.09 | 32.254611 | -103.578752 |
| 9,500.00 | 35.08 | 0.00 | 9,406.32 | -35.93 | 900.00 | 457,230.52 | 774,602.74 | 32.254748 | -103.578752 |
| 9,600.00 | 45.08 | 0.00 | 9,482.74 | 28.37 | 900.00 | 457,294.82 | 774,602.28 | 32.254925 | -103.578752 |
| 9,700.00 | 55.08 | 0.00 | 9,546.83 | 104.97 | 900.00 | 457,371.42 | 774,601.75 | 32.255136 | -103.578752 |
| 9,800.00 | 65.08 | 0.00 | 9,596.65 | 191.53 | 900.00 | 457,457.97 | 774,601.14 | 32.255374 | -103.578752 |
| 9,900.00 | 75.08 | 0.00 | 9,630.68 | 285.42 | 900.00 | 457,551.87 | 774,600.48 | 32.255632 | -103.578752 |
| 10,000.00 | 85.08 | 0.00 | 9,647.89 | 383.80 | 900.00 | 457,650.24 | 774,599.80 | 32.255902 | -103.578752 |
| 10,049.22 | 90.00 | 0.00 | 9,650.00 | 432.96 | 900.00 | 457,699.40 | 774,599.45 | 32.256037 | -103.578752 |
| 10,100.00 | 90.00 | 0.00 | 9,650.00 | 483.74 | 900.00 | 457,750.18 | 774,599.10 | 32.256177 | -103.578752 |
| 10,200.00 | 90.00 | 0.00 | 9,650.00 | 583.74 | 900.00 | 457,850.18 | 774,598.40 | 32.256452 | -103.578752 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| 10,300.00 | 90.00 | 0.00 | 9,650.00 | 683.74 | 900.00 | 457,950.18 | 774,597.70 | 32.256727 | -103.578752 |
| 10,400.00 | 90.00 | 0.00 | 9,650.00 | 783.74 | 900.00 | 458,050.17 | 774,597.00 | 32.257002 | -103.578752 |
| 10,500.00 | 90.00 | 0.00 | 9,650.00 | 883.74 | 900.00 | 458,150.17 | 774,596.30 | 32.257276 | -103.578752 |
| 10,600.00 | 90.00 | 0.00 | 9,650.00 | 983.74 | 900.00 | 458,250.17 | 774,595.60 | 32.257551 | -103.578752 |
| 10,700.00 | 90.00 | 0.00 | 9,650.00 | 1,083.74 | 900.00 | 458,350.17 | 774,594.89 | 32.257826 | -103.578752 |
| 10,800.00 | 90.00 | 0.00 | 9,650.00 | 1,183.74 | 900.00 | 458,450.16 | 774,594.19 | 32.258101 | -103.578752 |
| 10,900.00 | 90.00 | 0.00 | 9,650.00 | 1,283.74 | 900.00 | 458,550.16 | 774,593.49 | 32.258376 | -103.578752 |
| 11,000.00 | 90.00 | 0.00 | 9,650.00 | 1,383.74 | 900.00 | 458,650.16 | 774,592.79 | 32.258651 | -103.578752 |
| 11,100.00 | 90.00 | 0.00 | 9,650.00 | 1,483.74 | 900.00 | 458,750.16 | 774,592.09 | 32.258926 | -103.578752 |
| 11,200.00 | 90.00 | 0.00 | 9,650.00 | 1,583.74 | 900.00 | 458,850.15 | 774,591.39 | 32.259201 | -103.578752 |
| 11,300.00 | 90.00 | 0.00 | 9,650.00 | 1,683.74 | 900.00 | 458,950.15 | 774,590.69 | 32.259475 | -103.578752 |
| 11,400.00 | 90.00 | 0.00 | 9,650.00 | 1,783.74 | 900.00 | 459,050.15 | 774,589.99 | 32.259750 | -103.578752 |
| 11,500.00 | 90.00 | 0.00 | 9,650.00 | 1,883.74 | 900.00 | 459,150.14 | 774,589.29 | 32.260025 | -103.578752 |
| 11,600.00 | 90.00 | 0.00 | 9,650.00 | 1,983.74 | 900.00 | 459,250.14 | 774,588.59 | 32.260300 | -103.578752 |
| 11,700.00 | 90.00 | 0.00 | 9,650.00 | 2,083.74 | 900.00 | 459,350.14 | 774,587.89 | 32.260575 | -103.578752 |
| 11,800.00 | 90.00 | 0.00 | 9,650.00 | 2,183.74 | 900.00 | 459,450.14 | 774,587.19 | 32.260850 | -103.578752 |
| 11,900.00 | 90.00 | 0.00 | 9,650.00 | 2,283.74 | 900.00 | 459,550.13 | 774,586.49 | 32.261125 | -103.578752 |
| 12,000.00 | 90.00 | 0.00 | 9,650.00 | 2,383.74 | 900.00 | 459,650.13 | 774,585.79 | 32.261399 | -103.578752 |
| 12,100.00 | 90.00 | 0.00 | 9,650.00 | 2,483.74 | 900.00 | 459,750.13 | 774,585.09 | 32.261674 | -103.578752 |
| 12,200.00 | 90.00 | 0.00 | 9,650.00 | 2,583.74 | 900.00 | 459,850.13 | 774,584.39 | 32.261949 | -103.578752 |
| 12,300.00 | 90.00 | 0.00 | 9,650.00 | 2,683.74 | 900.00 | 459,950.12 | 774,583.69 | 32.262224 | -103.578752 |
| 12,400.00 | 90.00 | 0.00 | 9,650.00 | 2,783.74 | 900.00 | 460,050.12 | 774,582.99 | 32.262499 | -103.578752 |
| 12,500.00 | 90.00 | 0.00 | 9,650.00 | 2,883.74 | 900.00 | 460,150.12 | 774,582.29 | 32.262774 | -103.578752 |
| 12,600.00 | 90.00 | 0.00 | 9,650.00 | 2,983.74 | 900.00 | 460,250.12 | 774,581.59 | 32.263049 | -103.578751 |
| 12,700.00 | 90.00 | 0.00 | 9,650.00 | 3,083.74 | 900.00 | 460,350.11 | 774,580.89 | 32.263324 | -103.578751 |
| 12,800.00 | 90.00 | 0.00 | 9,650.00 | 3,183.74 | 900.00 | 460,450.11 | 774,580.19 | 32.263598 | -103.578751 |
| 12,900.00 | 90.00 | 0.00 | 9,650.00 | 3,283.74 | 900.00 | 460,550.11 | 774,579.49 | 32.263873 | -103.578751 |
| 13,000.00 | 90.00 | 0.00 | 9,650.00 | 3,383.74 | 900.00 | 460,650.10 | 774,578.79 | 32.264148 | -103.578751 |
| 13,100.00 | 90.00 | 0.00 | 9,650.00 | 3,483.74 | 900.00 | 460,750.10 | 774,578.09 | 32.264423 | -103.578751 |
| 13,200.00 | 90.00 | 0.00 | 9,650.00 | 3,583.74 | 900.00 | 460,850.10 | 774,577.39 | 32.264698 | -103.578751 |
| 13,300.00 | 90.00 | 0.00 | 9,650.00 | 3,683.74 | 900.00 | 460,950.10 | 774,576.69 | 32.264973 | -103.578751 |
| 13,400.00 | 90.00 | 0.00 | 9,650.00 | 3,783.74 | 900.00 | 461,050.09 | 774,575.99 | 32.265248 | -103.578751 |
| 13,500.00 | 90.00 | 0.00 | 9,650.00 | 3,883.74 | 900.00 | 461,150.09 | 774,575.29 | 32.265523 | -103.578751 |
| 13,600.00 | 90.00 | 0.00 | 9,650.00 | 3,983.74 | 900.00 | 461,250.09 | 774,574.59 | 32.265797 | -103.578751 |
| 13,700.00 | 90.00 | 0.00 | 9,650.00 | 4,083.74 | 900.00 | 461,350.09 | 774,573.89 | 32.266072 | -103.578751 |
| 13,800.00 | 90.00 | 0.00 | 9,650.00 | 4,183.74 | 900.00 | 461,450.08 | 774,573.19 | 32.266347 | -103.578751 |
| 13,900.00 | 90.00 | 0.00 | 9,650.00 | 4,283.74 | 900.00 | 461,550.08 | 774,572.49 | 32.266622 | -103.578751 |
| 14,000.00 | 90.00 | 0.00 | 9,650.00 | 4,383.74 | 900.00 | 461,650.08 | 774,571.79 | 32.266897 | -103.578751 |
| 14,100.00 | 90.00 | 0.00 | 9,650.00 | 4,483.74 | 900.00 | 461,750.08 | 774,571.09 | 32.267172 | -103.578751 |
| 14,200.00 | 90.00 | 0.00 | 9,650.00 | 4,583.74 | 900.00 | 461,850.07 | 774,570.39 | 32.267447 | -103.578751 |
| 14,300.00 | 90.00 | 0.00 | 9,650.00 | 4,683.74 | 900.00 | 461,950.07 | 774,569.69 | 32.267722 | -103.578751 |
| 14,400.00 | 90.00 | 0.00 | 9,650.00 | 4,783.74 | 900.00 | 462,050.07 | 774,568.99 | 32.267996 | -103.578751 |
| 14,500.00 | 90.00 | 0.00 | 9,650.00 | 4,883.74 | 900.00 | 462,150.07 | 774,568.29 | 32.268271 | -103.578751 |
| 14,556.00 | 90.00 | 0.00 | 9,650.00 | 4,939.74 | 900.00 | 462,206.06 | 774,567.89 | 32.268425 | -103.578751 |
| **Cross Section @ 14556' MD, 0' FSL, 2180' FWL** | | | | | | | | | |
| 14,600.00 | 90.00 | 0.00 | 9,650.00 | 4,983.74 | 900.00 | 462,250.06 | 774,567.59 | 32.268546 | -103.578751 |
| 14,700.00 | 90.00 | 0.00 | 9,650.00 | 5,083.74 | 900.00 | 462,350.06 | 774,566.89 | 32.268821 | -103.578751 |
| 14,800.00 | 90.00 | 0.00 | 9,650.00 | 5,183.74 | 900.00 | 462,450.06 | 774,566.19 | 32.269096 | -103.578751 |
| 14,900.00 | 90.00 | 0.00 | 9,650.00 | 5,283.74 | 900.00 | 462,550.05 | 774,565.49 | 32.269371 | -103.578751 |
| 15,000.00 | 90.00 | 0.00 | 9,650.00 | 5,383.74 | 900.00 | 462,650.05 | 774,564.79 | 32.269646 | -103.578751 |
| 15,100.00 | 90.00 | 0.00 | 9,650.00 | 5,483.74 | 900.00 | 462,750.05 | 774,564.08 | 32.269920 | -103.578751 |
| 15,200.00 | 90.00 | 0.00 | 9,650.00 | 5,583.74 | 900.00 | 462,850.05 | 774,563.38 | 32.270195 | -103.578751 |
| 15,300.00 | 90.00 | 0.00 | 9,650.00 | 5,683.74 | 900.00 | 462,950.04 | 774,562.68 | 32.270470 | -103.578751 |
| 15,400.00 | 90.00 | 0.00 | 9,650.00 | 5,783.74 | 900.00 | 463,050.04 | 774,561.98 | 32.270745 | -103.578751 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| 15,500.00 | 90.00 | 0.00 | 9,650.00 | 5,883.74 | 900.00 | 463,150.04 | 774,561.28 | 32.271020 | -103.578751 |
| 15,600.00 | 90.00 | 0.00 | 9,650.00 | 5,983.74 | 900.00 | 463,250.04 | 774,560.58 | 32.271295 | -103.578751 |
| 15,700.00 | 90.00 | 0.00 | 9,650.00 | 6,083.74 | 900.00 | 463,350.03 | 774,559.88 | 32.271570 | -103.578751 |
| 15,800.00 | 90.00 | 0.00 | 9,650.00 | 6,183.74 | 900.00 | 463,450.03 | 774,559.18 | 32.271845 | -103.578751 |
| 15,900.00 | 90.00 | 0.00 | 9,650.00 | 6,283.74 | 900.00 | 463,550.03 | 774,558.48 | 32.272119 | -103.578751 |
| 16,000.00 | 90.00 | 0.00 | 9,650.00 | 6,383.74 | 900.00 | 463,650.03 | 774,557.78 | 32.272394 | -103.578751 |
| 16,100.00 | 90.00 | 0.00 | 9,650.00 | 6,483.74 | 900.00 | 463,750.02 | 774,557.08 | 32.272669 | -103.578751 |
| 16,200.00 | 90.00 | 0.00 | 9,650.00 | 6,583.74 | 900.00 | 463,850.02 | 774,556.38 | 32.272944 | -103.578751 |
| 16,300.00 | 90.00 | 0.00 | 9,650.00 | 6,683.74 | 900.00 | 463,950.02 | 774,555.68 | 32.273219 | -103.578751 |
| 16,400.00 | 90.00 | 0.00 | 9,650.00 | 6,783.74 | 900.00 | 464,050.01 | 774,554.98 | 32.273494 | -103.578751 |
| 16,500.00 | 90.00 | 0.00 | 9,650.00 | 6,883.74 | 900.00 | 464,150.01 | 774,554.28 | 32.273769 | -103.578751 |
| 16,600.00 | 90.00 | 0.00 | 9,650.00 | 6,983.74 | 900.00 | 464,250.01 | 774,553.58 | 32.274044 | -103.578751 |
| 16,700.00 | 90.00 | 0.00 | 9,650.00 | 7,083.74 | 900.00 | 464,350.01 | 774,552.88 | 32.274318 | -103.578751 |
| 16,800.00 | 90.00 | 0.00 | 9,650.00 | 7,183.74 | 900.00 | 464,450.00 | 774,552.18 | 32.274593 | -103.578751 |
| 16,900.00 | 90.00 | 0.00 | 9,650.00 | 7,283.74 | 900.00 | 464,550.00 | 774,551.48 | 32.274868 | -103.578751 |
| 17,000.00 | 90.00 | 0.00 | 9,650.00 | 7,383.74 | 900.00 | 464,650.00 | 774,550.78 | 32.275143 | -103.578751 |
| 17,100.00 | 90.00 | 0.00 | 9,650.00 | 7,483.74 | 900.00 | 464,750.00 | 774,550.08 | 32.275418 | -103.578751 |
| 17,200.00 | 90.00 | 0.00 | 9,650.00 | 7,583.74 | 900.00 | 464,849.99 | 774,549.38 | 32.275693 | -103.578751 |
| 17,300.00 | 90.00 | 0.00 | 9,650.00 | 7,683.74 | 900.00 | 464,949.99 | 774,548.68 | 32.275968 | -103.578751 |
| 17,400.00 | 90.00 | 0.00 | 9,650.00 | 7,783.74 | 900.00 | 465,049.99 | 774,547.98 | 32.276243 | -103.578751 |
| 17,500.00 | 90.00 | 0.00 | 9,650.00 | 7,883.74 | 900.00 | 465,149.99 | 774,547.28 | 32.276517 | -103.578751 |
| 17,600.00 | 90.00 | 0.00 | 9,650.00 | 7,983.74 | 900.00 | 465,249.98 | 774,546.58 | 32.276792 | -103.578751 |
| 17,700.00 | 90.00 | 0.00 | 9,650.00 | 8,083.74 | 900.00 | 465,349.98 | 774,545.88 | 32.277067 | -103.578751 |
| 17,800.00 | 90.00 | 0.00 | 9,650.00 | 8,183.74 | 900.00 | 465,449.98 | 774,545.18 | 32.277342 | -103.578751 |
| 17,900.00 | 90.00 | 0.00 | 9,650.00 | 8,283.74 | 900.00 | 465,549.98 | 774,544.48 | 32.277617 | -103.578751 |
| 18,000.00 | 90.00 | 0.00 | 9,650.00 | 8,383.74 | 900.00 | 465,649.97 | 774,543.78 | 32.277892 | -103.578751 |
| 18,100.00 | 90.00 | 0.00 | 9,650.00 | 8,483.74 | 900.00 | 465,749.97 | 774,543.08 | 32.278167 | -103.578751 |
| 18,200.00 | 90.00 | 0.00 | 9,650.00 | 8,583.74 | 900.00 | 465,849.97 | 774,542.38 | 32.278441 | -103.578751 |
| 18,300.00 | 90.00 | 0.00 | 9,650.00 | 8,683.74 | 900.00 | 465,949.96 | 774,541.68 | 32.278716 | -103.578751 |
| 18,400.00 | 90.00 | 0.00 | 9,650.00 | 8,783.74 | 900.00 | 466,049.96 | 774,540.98 | 32.278991 | -103.578751 |
| 18,500.00 | 90.00 | 0.00 | 9,650.00 | 8,883.74 | 900.00 | 466,149.96 | 774,540.28 | 32.279266 | -103.578751 |
| 18,600.00 | 90.00 | 2.00 | 9,650.00 | 8,983.72 | 901.75 | 466,249.95 | 774,541.32 | 32.279541 | -103.578745 |
| 18,650.00 | 90.00 | 3.00 | 9,650.00 | 9,033.67 | 903.93 | 466,299.91 | 774,543.15 | 32.279678 | -103.578738 |
| 18,700.00 | 90.00 | 3.00 | 9,650.00 | 9,083.61 | 906.54 | 466,349.86 | 774,545.42 | 32.279815 | -103.578730 |
| 18,800.00 | 90.00 | 3.00 | 9,650.00 | 9,183.47 | 911.78 | 466,449.76 | 774,549.95 | 32.280090 | -103.578713 |
| 18,900.00 | 90.00 | 3.00 | 9,650.00 | 9,283.33 | 917.01 | 466,549.66 | 774,554.49 | 32.280364 | -103.578696 |
| 19,000.00 | 90.00 | 3.00 | 9,650.00 | 9,383.19 | 922.24 | 466,649.55 | 774,559.02 | 32.280639 | -103.578679 |
| 19,100.00 | 90.00 | 3.00 | 9,650.00 | 9,483.06 | 927.48 | 466,749.45 | 774,563.56 | 32.280913 | -103.578662 |
| 19,200.00 | 90.00 | 3.00 | 9,650.00 | 9,582.92 | 932.71 | 466,849.35 | 774,568.09 | 32.281188 | -103.578645 |
| 19,300.00 | 90.00 | 3.00 | 9,650.00 | 9,682.78 | 937.94 | 466,949.24 | 774,572.63 | 32.281462 | -103.578628 |
| 19,400.00 | 90.00 | 3.00 | 9,650.00 | 9,782.65 | 943.18 | 467,049.14 | 774,577.16 | 32.281737 | -103.578611 |
| 19,500.00 | 90.00 | 3.00 | 9,650.00 | 9,882.51 | 948.41 | 467,149.04 | 774,581.69 | 32.282011 | -103.578594 |
| 19,600.00 | 90.00 | 3.00 | 9,650.00 | 9,982.37 | 953.65 | 467,248.94 | 774,586.23 | 32.282286 | -103.578577 |
| 19,700.00 | 90.00 | 3.00 | 9,650.00 | 10,082.24 | 958.88 | 467,348.83 | 774,590.76 | 32.282560 | -103.578560 |
| 19,758.56 | 90.00 | 3.00 | 9,650.00 | 10,140.71 | 961.94 | 467,407.33 | 774,593.42 | 32.282721 | -103.578550 |
| **LTP @ 19758' MD, 100' FNL, 2230' FWL** | | | | | | | | | |
| 19,800.00 | 90.00 | 3.00 | 9,650.00 | 10,182.10 | 964.11 | 467,448.73 | 774,595.30 | 32.282835 | -103.578543 |
| 19,838.56 | 90.00 | 3.00 | 9,650.00 | 10,220.61 | 966.13 | 467,487.25 | 774,597.04 | 32.282941 | -103.578537 |
| **PBHL; 20' FNL, 2230' FWL** | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 157H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3685.70ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3685.70ft |
| **Site:** | Sec 33-T23S-R33E | **North Reference:** | True |
| **Well:** | Thistle Unit 157H | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Permit Plan 1 | | |

**Design Targets**

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (usft) | Easting (usft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| PBHL - Thistle Unit 157H | 0.00 | 0.00 | 0.00 | 10,204.85 | 2,668.58 | 467,483.42 | 776,299.56 | 32.282897 | -103.573028 |
| - plan misses target center by 9799.03ft at 19838.56ft MD (9650.00 TVD, 10220.60 N, 966.13 E) | | | | | | | | | |
| - Point | | | | | | | | | |
| PBHL - Thistle Unit 157H | 0.00 | 0.00 | 0.00 | 10,204.30 | 119.69 | 467,465.02 | 773,750.74 | 32.282896 | -103.581276 |
| - plan misses target center by 9686.87ft at 19777.98ft MD (9650.00 TVD, 10160.11 N, 962.96 E) | | | | | | | | | |
| - Point | | | | | | | | | |

**Plan Annotations**

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates +N/-S (ft) | +E/-W (ft) | Comment |
|---|---|---|---|---|
| 9,149.21 | 9,077.04 | -140.00 | 900.00 | KOP & FTP @ 9149' MD, 200' FSL, 2180' FWL |
| 14,556.00 | 9,650.00 | 4,939.74 | 900.00 | Cross Section @ 14556' MD, 0' FSL, 2180' FWL |
| 19,758.56 | 9,650.00 | 10,140.71 | 961.94 | LTP @ 19758' MD, 100' FNL, 2230' FWL |
| 19,838.56 | 9,650.00 | 10,220.61 | 966.13 | PBHL; 20' FNL, 2230' FWL |

# PECOS DISTRICT
# DRILLING CONDITIONS OF APPROVAL

| | |
|---|---|
| OPERATOR'S NAME: | Devon Energy Production Company, LP |
| LEASE NO.: | NMNM94186 |
| WELL NAME & NO.: | 157H-Thistle Unit |
| SURFACE HOLE FOOTAGE: | 340'/S & 1280'/W |
| BOTTOM HOLE FOOTAGE | 20'/N & 2230'/W |
| LOCATION: | Section 33, T.23 S., R.33 E., NMPM |
| COUNTY: | Lea County, New Mexico |

| | | | |
|---|---|---|---|
| Potash | ◉ None | ○ Secretary | ○ R-111-P |
| Cave/Karst Potential | ◉ Low | ○ Medium | ○ High |
| Variance | ○ None | ◉ Flex Hose | ○ Other |
| Wellhead | ◉ Conventional | ○ Multibowl | |
| Other | ☐4 String Area | ☐Capitan Reef | ☐WIPP |

**All previous COAs still apply, except for the following:**

## A. CASING

1. The **13 3/8** inch surface casing shall be set at approximately **1400** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

    c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

    d. If cement falls back, remedial cementing will be done prior to drilling out that string.

2. The minimum required fill of cement behind the **9 5/8** inch intermediate casing, which shall be set at approximately **5100** feet, is:

**Option 1 (Single Stage):**

- Cement to surface. If cement does not circulate see B.1.a, c-d above. **Excess calculates to 8% - additional cement will be required.**

**Option 2:**

Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office.

3. The minimum required fill of cement behind the **5 1/2** inch production casing is:

- Cement should tie-back at least **200** feet into previous casing string. Operator shall provide method of verification. **Excess calculates to negative 4% - additional cement will be required.**

## B. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **3000 (3M)** psi.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** intermediate casing shoe shall be **5000 (5M)** psi.

**MHH 01182019**

# GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

☒ Eddy County
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.

3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
c. Manufacturer representative shall install the test plug for the initial BOP test.
d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.

c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall

have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

e. The results of the test shall be reported to the appropriate BLM office.

f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.

g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.