Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Carlsbad Field Office
OCD Hobbs Copy

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***

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 121H

2. Name of Operator
DEVON ENERGY PRODUCTION COM LP
Contact: REBECCA DEAL
E-Mail: Rebecca.Deal@dvn.com

9. API Well No.
30-025-43732-00-X1

3a. Address
P O BOX 250
ARTESIA, NM 88201

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

10. Field and Pool or Exploratory Area
TRIPLE X

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 21 T23S R33E NENE 285FNL 850FEL
32.296696 N Lat, 103.571510 W Lon

HOBBS OCD
DEC 27 2019

11. County or Parish, State
LEA COUNTY, NM

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

RECEIVED

| 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., L.P. (Devon) respectfully requests SHL & BHL moves for the Thistle Unit 121H.

SHL move from 285 FNL & 850 FEL to 438 FNL & 764 FEL, both 21-23S-33E
BHL move from 2630 FNL & 1340 FEL, 28-23S-33E to 20 FSL & 2105 FEL, 33-23S-33E
TVD/MD change from 10,138'/17,625' Bone Spring to 12,600'/28,248' Wolfcamp
Annular Variance Request

SEE ATTACHED FOR CONDITIONS OF APPROVAL

Please see attached revised C-102, drill plan and directional plans, spec sheets, annular variance request documents and other supporting drilling documentation.

Engineering Review by Yolanda Jimenez NRS JJ 11-27-19

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

**Electronic Submission #492468 verified by the BLM Well Information System**
**For DEVON ENERGY PRODUCTION COM LP, sent to the Hobbs**
**Committed to AFMSS for processing by PRISCILLA PEREZ on 11/15/2019 (20PP0392SE)**

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

Signature (Electronic Submission) — Date 11/14/2019

**THIS SPACE FOR FEDERAL OR STATE OFFICE USE**

Approved By Wells — Acting Title AFM — Date 11/27/19

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 CFO

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)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

# PECOS DISTRICT
# DRILLING CONDITIONS OF APPROVAL

| | |
|---|---|
| **OPERATOR'S NAME:** | Devon Energy Production Company, LP |
| **LEASE NO.:** | NMNM94186 |
| **WELL NAME & NO.:** | 121H-Thistle Unit |
| **SURFACE HOLE FOOTAGE:** | 438'/N & 764'/E |
| **BOTTOM HOLE FOOTAGE** | 20'/N & 2105'/E |
| **LOCATION:** | Section 21, T.23 S., R.33 E., NMPM |
| **COUNTY:** | Lea County, New Mexico |

COA

| | | | |
|---|---|---|---|
| H2S | ◉ Yes | ○ No | |
| Potash | ◉ None | ○ Secretary | ○ R-111-P |
| Cave/Karst Potential | ◉ Low | ○ Medium | ○ High |
| Cave/Karst Potential | ○ Critical | | |
| Variance | ○ None | ◉ Flex Hose | ○ Other |
| Wellhead | ○ Conventional | ◉ Multibowl | ○ Both |
| Other | ☐ 4 String Area | ☐ Capitan Reef | ☐ WIPP |
| Other | ☑ Fluid Filled | ☑ Cement Squeeze | ☐ Pilot Hole |
| Special Requirements | ☐ Water Disposal | ☐ COM | ☑ Unit |

## A. HYDROGEN SULFIDE

A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Wolfcamp** formation. As a result, the Hydrogen Sulfide area must meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, please provide measured values and formations to the BLM.

## B. CASING

**Primary Casing Design:**

1. The **13-3/8** inch surface casing shall be set at approximately **1450** feet (a minimum of **25 feet (Lea County)** 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.

**Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.**

2. The minimum required fill of cement behind the **7-5/8** inch intermediate casing is:

**Option 1 (Single Stage):**

- Cement to surface. If cement does not circulate see B.1.a, c-d above.
- **Cement excess is below 25%. More cement might 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.
- **Cement excess is below 25%. More cement might be required.**

**Operator has proposed to pump down 13-3/8" X 7-5/8" annulus. Operator must run a CBL from TD of the 7-5/8" casing to surface. Submit results to BLM.**

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.
- **Cement excess is below 25%. More cement might be required.**

**Alternate Casing Design:**

4. The **13-3/8** inch surface casing shall be set at approximately **1450** feet (a minimum of **25 feet (Lea County)** 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.

    **Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.**

5. The minimum required fill of cement behind the **8-5/8** inch intermediate casing is:

    **Option 1 (Single Stage):**

    - Cement to surface. If cement does not circulate see B.1.a, c-d above.

    **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.

    c. 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.

    d. Second stage above DV tool:

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

**Operator has proposed to pump down 13-3/8" X 8-5/8" annulus. Operator must run a CBL from TD of the 8-5/8" casing to surface. Submit results to BLM.**

**Operator is approved to drill 10.625" hole for Intermediate 1 with BTC connection.**

6. 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.

## C. 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. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.

    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. 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.
    e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

**Yolanda Jimenez**

## D. SPECIAL REQUIREMENT (S)

**Unit Wells**

The well sign for a unit well shall include the unit number in addition to the surface and bottom hole lease numbers. This also applies to participating area numbers. If a participating area has not been established, the operator can use the general unit designation, but will replace the unit number with the participating area number when the sign is replaced.

**Commercial Well Determination**

A commercial well determination shall be submitted after production has been established for at least six months.

# 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)

☒ 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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.

   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig
      - Notify the BLM when moving in and removing the Spudder Rig.
      - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

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. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

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. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

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: The flex line must meet the requirements of API 16C. 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, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).

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.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

## Devon Energy Annular Preventer Summary

### 1. Component and Preventer Compatibility Table

The table below, which covers the drilling and casing of the 10M MASP portion of the well, outlines the tubulars and the compatible preventers in use. This table, combined with the mud program, documents that two barriers to flow can be maintained at all times, independent of the rating of the annular preventer.

6-3/4" Production hole section, 10M requirement

| Component | OD | Preventer | RWP |
|---|---|---|---|
| Drillpipe | 4.5" | Fixed lower 4.5"<br>Upper 4.5-7" VBR | 10M |
| HWDP | 4.5" | Fixed lower 4.5"<br>Upper 4.5-7" VBR | 10M |
| Drill collars and MWD tools | 4.75" | Upper 4.5-7" VBR | 10M |
| Mud Motor | 4.75" | Upper 4.5-7" VBR | 10M |
| Production casing | 5.5" | Upper 4.5-7" VBR | 10M |
| ALL | 0-13-5/8" | Annular | 5M |
| Open-hole | - | Blind Rams | 10M |

VBR = Variable Bore Ram. Compatible range listed in chart.

### 2. Well Control Procedures

Well control procedures are specific to the rig equipment and the operation at the time the kick occurs. Below are the minimal high-level tasks prescribed to assure a proper shut-in while drilling, tripping, running casing, pipe out of the hole (open hole), and moving the BHA through the BOPs. The pressure at which control is swapped from the annular to another compatible ram is variable, but the operator will document in the submission their operating pressure limit. The operator may chose an operating pressure less than or equal to RWP, but in no case will it exceed the RWP of the annular preventer.

<u>General Procedure While Drilling</u>

1. Sound alarm (alert crew)
2. Space out drill string
3. Shut down pumps (stop pumps and rotary)
4. Shut-in Well (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to the upper pipe ram.

## Devon Energy Annular Preventer Summary

General Procedure While Tripping

1. Sound alarm (alert crew)
2. Stab full opening safety valve and close
3. Space out drill string
4. Shut-in (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to the upper pipe ram.

General Procedure While Running Casing

1. Sound alarm (alert crew)
2. Stab crossover and full opening safety valve and close
3. Space out string
4. Shut-in (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to compatible pipe ram.

General Procedure With No Pipe In Hole (Open Hole)

1. Sound alarm (alert crew)
2. Shut-in with blind rams or BSR. (HCR and choke will already be in the closed position.)
3. Confirm shut-in
4. Notify toolpusher/company representative
5. Read and record the following:
    a. SICP
    b. Pit gain
    c. Time
6. Regroup and identify forward plan

## Devon Energy Annular Preventer Summary

General Procedures While Pulling BHA thru Stack

1. PRIOR to pulling last joint of drillpipe thru the stack.
    a. Perform flowcheck, if flowing:
    b. Sound alarm (alert crew)
    c. Stab full opening safety valve and close
    d. Space out drill string with tool joint just beneath the upper pipe ram.
    e. Shut-in using upper pipe ram. (HCR and choke will already be in the closed position.)
    f. Confirm shut-in
    g. Notify toolpusher/company representative
    h. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    i. Regroup and identify forward plan

2. With BHA in the stack and compatible ram preventer and pipe combo immediately available.
    a. Sound alarm (alert crew)
    b. Stab crossover and full opening safety valve and close
    c. Space out drill string with upset just beneath the compatible pipe ram.
    d. Shut-in using compatible pipe ram. (HCR and choke will already be in the closed position.)
    e. Confirm shut-in
    f. Notify toolpusher/company representative
    g. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    h. Regroup and identify forward plan

3. With BHA in the stack and NO compatible ram preventer and pipe combo immediately available.
    a. Sound alarm (alert crew)
    b. If possible to pick up high enough, pull string clear of the stack and follow "Open Hole" scenario.
    c. If impossible to pick up high enough to pull the string clear of the stack:
    d. Stab crossover, make up one joint/stand of drillpipe, and full opening safety valve and close
    e. Space out drill string with tooljoint just beneath the upper pipe ram.
    f. Shut-in using upper pipe ram. (HCR and choke will already be in the closed position.)
    g. Confirm shut-in
    h. Notify toolpusher/company representative
    i. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    j. Regroup and identify forward plan

A multibowl wellhead may be used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

Devon proposes using a multi-bowl wellhead assembly. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 5000 (5M) psi.

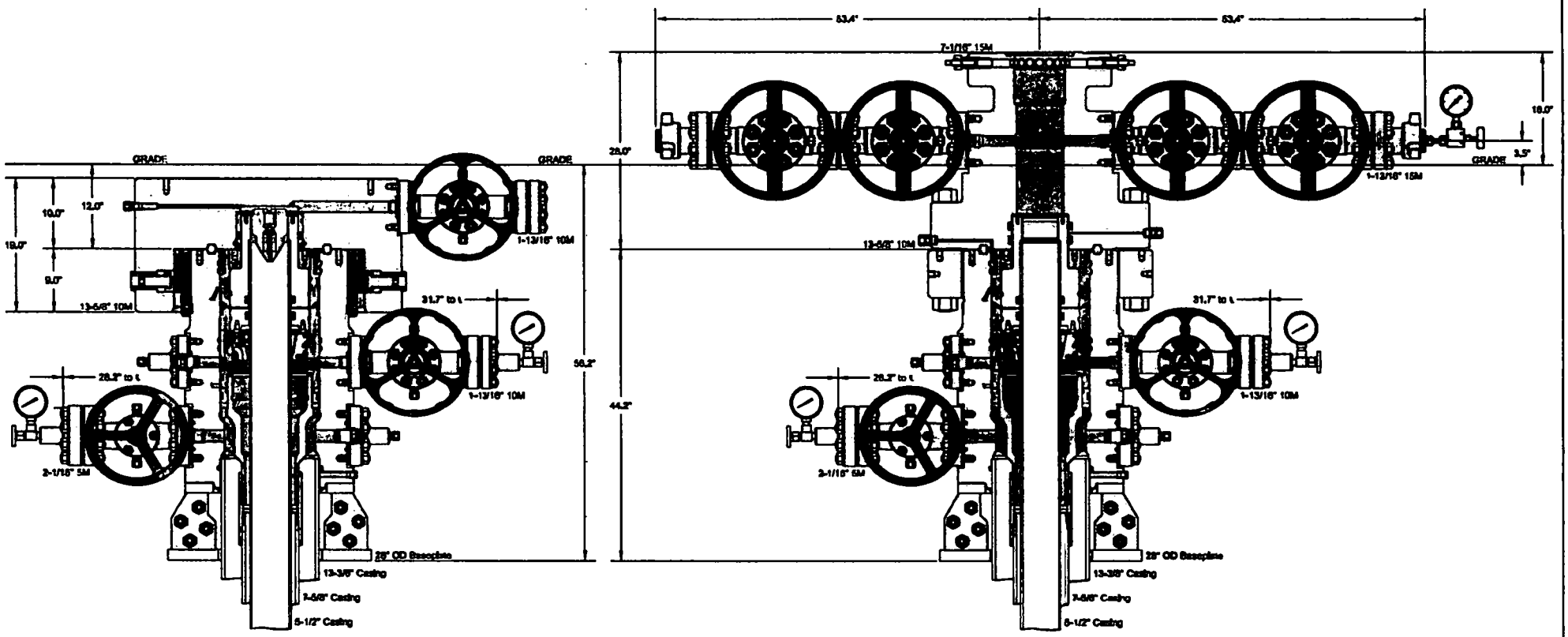
- Wellhead will be installed by wellhead representatives.
- If the welding is performed by a third party, the wellhead representative will monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
- Wellhead representative will install the test plug for the initial BOP test.
- Wellhead company will install a solid steel body pack-off to completely isolate the lower head after cementing intermediate casing. After installation of the pack-off, the pack-off and the lower flange will be tested to 5M, as shown on the attached schematic. Everything above the pack-off will not have been altered whatsoever from the initial nipple up. Therefore the BOP components will not be retested at that time.
- If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head will be cut and top out operations will be conducted.
- Devon will pressure test all seals above and below the mandrel (but still above the casing) to full working pressure rating.
- Devon will test the casing to 0.22 psi/ft or 1500 psi, whichever is greater, as per Onshore Order #2.

After running the surface casing, a 13-5/8" BOP/BOPE system with a minimum rating of 5M will be installed on the wellhead system and will undergo a 250 psi low pressure test followed by a 5,000 psi high pressure test. The 5,000 psi high and 250 psi low test will cover testing requirements a maximum of 30 days, as per Onshore Order #2. If the well is not complete within 30 days of this BOP test, another full BOP test will be conducted, as per Onshore Order #2.

After running the intermediate casing with a mandrel hanger, the 13-5/8" BOP/BOPE system with a minimum rating of 10M will be installed and tested, with 5M annular being tested to 100% of rated working pressure.

The pipe rams will be operated and checked each 24 hour period and each time the drill pipe is out of the hole. These tests will be logged in the daily driller's log. A 2" kill line and 3" choke line will be incorporated into the drilling spool below the ram BOP. In addition to the rams and annular preventer, additional BOP accessories include a kelly cock, floor safety valve, choke lines, and choke manifold rated at 10,000 psi WP.

Devon's proposed wellhead manufactures will be FMC Technologies, Cactus Wellhead, or Cameron.






| CACTUS WELLHEAD LLC | DEVON ENERGY CORPORATION | | |
|---|---|---|---|
| 13-3/8" x 7-5/8" x 5-1/2" 5M MBU-3T Wellhead System<br>With 7-5/8" Mandrel Hanger, 5-1/2" Emergency Slips And<br>13-5/8" 10M x 7-1/16" 15M CTH-DBLHPS Tubing Head | DRAWN | DLE | 15DEC17 |
| | APPRV | | |
| | DRAWING NO. | ODE0001902 | |

**1. Geologic Formations**

| | | | |
|---|---|---|---|
| TVD of target | 12600 | Pilot hole depth | N/A |
| MD at TD: | 28248 | Deepest expected fresh water | |

**Basin**

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/Target Zone? | Hazards* |
|---|---|---|---|
| | | | |
| Rustler | 1365 | | |
| Salt | 1869 | | |
| Base of Salt | 5180 | | |
| Delaware | 5214 | | |
| Bone Spring 1st | 9095 | | |
| Bone Spring 2nd | 10466 | | |
| Bone Spring 3rd | 11308 | | |
| Wolfcamp | 12285 | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

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

**2. Casing Program (Primary Design)**

| Hole Size | Casing Interval From | Casing Interval To | Csg. Size | Wt (PPF) | Grade | Conn | Min SF Collapse | Min SF Burst | Min SF Tension |
|---|---|---|---|---|---|---|---|---|---|
| 17 1/2 | 0 | ~~1390~~ 1450 TVD | 13 3/8 | 48.0 | H40 | STC | 1.125 | 1.25 | 1.6 |
| 9 7/8 | 0 | 11308 TVD | 7 5/8 | 29.7 | P110 | Flushmax III | 1.125 | 1.25 | 1.6 |
| 6 3/4 | 0 | TD | 5 1/2 | 20.0 | P110 | Vam SG | 1.125 | 1.25 | 1.6 |
| | | | | BLM Minimum Safety Factor | | | 1.125 | 1 | 1.6 Dry<br>1.8 Wet |

Fluid Fill

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 IILB.1.h Must have table for continengcy casing.
- Rustler top will be validated via drilling parameters (i.e. reduction in ROP) and surface casing setting depth revised accordingly if needed.
- A variance is requested for collapse rating on intermediate casing. Operator will keep pipe full while running casing.
- Int casing shoe will be selected based on drilling data/gamma, setting depth with be revised accordingly if needed.
- A variance is requested to wave the centralizer requirement for the Intermediate casing and production casing.
- A variance is requested to set intermediate casing in the curve if hole conditions dictate that a higher shoe strength is required.

**Casing Program (Alternative Design)**

| Hole Size | Casing Interval From | Casing Interval To | Csg. Size | Wt (PPF) | Grade | Conn | Min SF Collapse | Min SF Burst | Min SF Tension |
|---|---|---|---|---|---|---|---|---|---|
| 17 1/2 | 0 | 1390 TVD | 13 3/8 | 48.0 | H40 | STC | 1.125 | 1.25 | 1.6 |
| 9 7/8 | 0 | 11308 TVD | 8 5/8 | 32.0 | P110 | TLW | 1.125 | 1.25 | 1.6 |
| 7 7/8 | 0 | TD | 5 1/2 | 17.0 | P110 | BTC | 1.125 | 1.25 | 1.6 |
| | | | | BLM Minimum Safety Factor | | | 1.125 | 1 | 1.6 Dry<br>1.8 Wet |

Fluid Fill

Fluid Fill

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 IILB.1.h Must have table for continengcy casing.
- Rustler top will be validated via drilling parameters (i.e. reduction in ROP) and surface casing setting depth revised accordingly if needed.
- A variance is requested for collapse rating on intermediate casing. Operator will keep pipe full while running casing.
- Int casing shoe will be selected based on drilling data/gamma, setting depth with be revised accordingly if needed.
- A variance is requested to wave the centralizer requirement for the Intermediate casing and production casing.
- [redacted] ck
- A variance is requested to set intermediate casing in the curve if hole conditions dictate that a higher shoe strength is required.

| | 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 specficition 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 (Primary Design)**

| Casing | # Sks | TOC | Wt. (lb/gal) | Yld (ft3/sack) | Slurry Description |
|---|---|---|---|---|---|
| Surface | 1044 | Surf | 13.2 | 1.44 | Lead: Class C Cement + additives |
| Int 1 (cement less than 25% excess ~~access~~) | 745 | Surf | 9 | 3.27 | Lead: Class C Cement + additives |
| | 783 | 4000' above shoe | 13.2 | 1.44 | Tail: Class H / C + additives |
| Int 1 Two Stage w/ DV @ TVD of Delaware (excess) | 887 | Surf | 9 | 3.27 | 1st stage Lead: Class C Cement + additives |
| | 93 | 500' above shoe | 13.2 | 1.44 | 1st stage Tail: Class H / C + additives |
| | 513 | Surf | 9 | 3.27 | 2nd stage Lead: Class C Cement + additives |
| | 93 | 500' above DV | 13.2 | 1.44 | 2nd stage Tail: Class H / C + additives |
| Int 1 Intermediate Squeeze | As Needed | Surf | 9 | 1.44 | Squeeze Lead: Class C Cement + additives |
| | 745 | Surf | 9 | 3.27 | Lead: Class C Cement + additives |
| | 783 | 4000' above shoe | 13.2 | 1.44 | Tail: Class H / C + additives |
| Production (less than 25% excess) | 60 | 10130 | 9.0 | 3.3 | Lead: Class H /C + additives |
| | 1028 | 12130 | 13.2 | 1.4 | Tail: Class H / C + additives |

ok

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 | 50% |
| Intermediate 1 | 30% |
| Intermediate 1 (Two Stage) | 25% |
| Prod | 10% |

**3. Cementing Program (Alternative Design)**

| Casing | # Sks | TOC | Wt. ppg | Yld (ft3/sack) | Slurry Description |
|---|---|---|---|---|---|
| Surface | 1044 | Surf | 13.2 | 1.44 | Lead: Class C Cement + additives |
| less than 25% Int 1 | 499 | Surf | 9 | 3.27 | Lead: Class C Cement + additives |
| Excess | 465 | 4000' above shoe | 13.2 | 1.44 | Tail: Class H / C + additives |
| Int 1 Two Stage w DV @ ~4500 | 521 | Surf | 9 | 3.27 | 1st stage Lead: Class C Cement + additives |
| | 55 | 500' above shoe | 13.2 | 1.44 | 1st stage Tail: Class H / C + additives |
| | 363 | Surf | 9 | 3.27 | 2nd stage Lead: Class C Cement + additives |
| | 55 | 500' above DV | 13.2 | 1.44 | 2nd stage Tail: Class H / C + additives |
| Int 1 Intermediate Squeeze | As Needed | Surf | 13.2 | 1.44 | Squeeze Lead: Class C Cement + additives |
| | 499 | Surf | 9 | 3.27 | Lead: Class C Cement + additives |
| | 465 | 4000' above shoe | 13.2 | 1.44 | Tail: Class H / C + additives |
| Int 1 (10.625" Hole Size) | 696 | Surf | 9 | 3.27 | Lead: Class C Cement + additives |
| | 768 | 4000' above shoe | 13.2 | 1.44 | Tail: Class H / C + additives |
| Less than 25% Production | 117 | 10130 | 9.0 | 3.3 | Lead: Class H /C + additives |
| Excess | 2133 | 12130 | 13.2 | 1.4 | 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 | 50% |
| Intermediate 1 | 30% |
| Intermediate 1 (Two Stage) | 25% |
| Prod | 10% |

**4. Pressure Control Equipment (Three String Design)**

| BOP installed and tested before drilling which hole? | Size? | Min. Required WP | Type | ✓ | Tested to: |
|---|---|---|---|---|---|
| Int 1 | 13-58" | 5M | Annular | X | 50% of rated working pressure |
| | | | Blind Ram | X | 5M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other* | | |
| Production | 13-5/8" | 10M | Annular (5M) | X | 100% of rated working pressure |
| | | | Blind Ram | X | 10M |
| | | | Pipe Ram | | |
| | | | Double Ram | X | |
| | | | Other* | | |
| | | | Annular (5M) | | |
| | | | Blind Ram | | |
| | | | Pipe Ram | | |
| | | | Double Ram | | |
| | | | Other* | | |
| N | A variance is requested for the use of a diverter on the surface casing. See attached for schematic. | | | | |
| Y | A variance is requested to run a 5 M annular on a 10M system | | | | |

**5. Mud Program (Three String Design)**

| Section | Type | Weight (ppg) |
|---|---|---|
| Surface | FW Gel | 8.5-9 |
| Intermediate | DBE / Cut Brine | 10-10.5 |
| Production | OBM | 10-10.5 |

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 Rpeort and sbumitted 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 | Int. shoe to KOP |
| | Density | Int. shoe to KOP |
| X | CBL | Production casing |
| X | Mud log | Intermediate shoe to TD |
| | PEX | |

**7. Drilling Conditions**

| Condition | Specfiy what type and where? |
|---|---|
| BH pressure at deepest TVD | 6880 |
| Abnormal temperature | No |

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

| Hydrogren 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 batch 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 pa.
6 The NMOCD will be contacted and notified 24 hours prior to commencing spudder rig operations.
7 Drilling operations will be performed with drilling rig. A 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

# WCDSC Permian NM

**Lea County (NAD83 New Mexico East)**
**Sec 21-T23S-R33E**
**Thistle Unit 121H**

**Wellbore #1**

**Plan: Permit Plan 1**

# Standard Planning Report - Geographic

**12 November, 2019**

# Planning Report - Geographic

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 21-T23S-R33E | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 472,758.13 usft | **Latitude:** | 32.297473 |
| **From:** | Map | **Easting:** | 772,310.54 usft | **Longitude:** | -103.585816 |
| **Position Uncertainty:** | 0.00 ft | **Slot Radius:** | 13-3/16 " | **Grid Convergence:** | 0.40 ° |

| **Well** | Thistle Unit 121H | | | | |
|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.00 ft | **Northing:** | 472,353.00 usft | **Latitude:** 32.296272 |
| | **+E/-W** | 0.00 ft | **Easting:** | 776,816.84 usft | **Longitude:** -103.571243 |
| **Position Uncertainty** | | 0.50 ft | **Wellhead Elevation:** | | **Ground Level:** 3,724.20 ft |

| **Wellbore** | Wellbore #1 | | | |
|---|---|---|---|---|
| **Magnetics** | **Model Name** | **Sample Date** | **Declination (°)** | **Dip Angle (°)** | **Field Strength (nT)** |
| | IGRF2015 | 11/12/2019 | 6.70 | 60.10 | 47,731.28337678 |

| **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 | 184.53 |

**Plan Survey Tool Program** **Date** 11/12/2019

| | Depth From (ft) | Depth To (ft) | Survey (Wellbore) | Tool Name | Remarks |
|---|---|---|---|---|---|
| 1 | 0.00 | 28,247.52 | Permit Plan 1 (Wellbore #1) | MWD+HDGM<br>OWSG MWD + HDGM | |

**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 | |
| 1,800.00 | 0.00 | 0.00 | 1,800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2,667.19 | 8.67 | 286.14 | 2,663.88 | 18.21 | -62.92 | 1.00 | 1.00 | 0.00 | 286.14 | |
| 11,201.95 | 8.67 | 286.14 | 11,101.08 | 375.86 | -1,299.05 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11,780.08 | 0.00 | 0.00 | 11,677.00 | 388.00 | -1,341.00 | 1.50 | -1.50 | 0.00 | 180.00 | |
| 12,130.12 | 0.00 | 0.00 | 12,027.04 | 388.00 | -1,341.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 13,030.12 | 90.00 | 179.56 | 12,600.00 | -184.94 | -1,336.61 | 10.00 | 10.00 | 0.00 | 179.56 | PBHL - Thistle Unit 12 |
| 28,247.52 | 90.00 | 179.56 | 12,600.00 | -15,401.89 | -1,219.91 | 0.00 | 0.00 | 0.00 | 0.00 | PBHL - Thistle Unit 12 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 100.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 200.00 | 0.00 | 0.00 | 200.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 300.00 | 0.00 | 0.00 | 300.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 400.00 | 0.00 | 0.00 | 400.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 500.00 | 0.00 | 0.00 | 500.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 600.00 | 0.00 | 0.00 | 600.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 700.00 | 0.00 | 0.00 | 700.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 800.00 | 0.00 | 0.00 | 800.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 900.00 | 0.00 | 0.00 | 900.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,000.00 | 0.00 | 0.00 | 1,000.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,100.00 | 0.00 | 0.00 | 1,100.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,200.00 | 0.00 | 0.00 | 1,200.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,300.00 | 0.00 | 0.00 | 1,300.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,400.00 | 0.00 | 0.00 | 1,400.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,500.00 | 0.00 | 0.00 | 1,500.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,600.00 | 0.00 | 0.00 | 1,600.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,700.00 | 0.00 | 0.00 | 1,700.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,800.00 | 0.00 | 0.00 | 1,800.00 | 0.00 | 0.00 | 472,353.00 | 776,816.84 | 32.296272 | -103.571243 |
| 1,900.00 | 1.00 | 286.14 | 1,899.99 | 0.24 | -0.84 | 472,353.24 | 776,816.00 | 32.296272 | -103.571245 |
| 2,000.00 | 2.00 | 286.14 | 1,999.96 | 0.97 | -3.35 | 472,353.97 | 776,813.48 | 32.296274 | -103.571253 |
| 2,100.00 | 3.00 | 286.14 | 2,099.86 | 2.18 | -7.54 | 472,355.18 | 776,809.29 | 32.296278 | -103.571267 |
| 2,200.00 | 4.00 | 286.14 | 2,199.68 | 3.88 | -13.41 | 472,356.88 | 776,803.43 | 32.296283 | -103.571286 |
| 2,300.00 | 5.00 | 286.14 | 2,299.37 | 6.06 | -20.94 | 472,359.06 | 776,795.89 | 32.296289 | -103.571310 |
| 2,400.00 | 6.00 | 286.14 | 2,398.90 | 8.72 | -30.15 | 472,361.72 | 776,786.69 | 32.296296 | -103.571340 |
| 2,500.00 | 7.00 | 286.14 | 2,498.26 | 11.87 | -41.02 | 472,364.87 | 776,775.81 | 32.296305 | -103.571375 |
| 2,600.00 | 8.00 | 286.14 | 2,597.40 | 15.50 | -53.56 | 472,368.50 | 776,763.27 | 32.296315 | -103.571416 |
| 2,667.19 | 8.67 | 286.14 | 2,663.88 | 18.21 | -62.92 | 472,371.21 | 776,753.92 | 32.296323 | -103.571446 |
| 2,700.00 | 8.67 | 286.14 | 2,696.32 | 19.58 | -67.67 | 472,372.58 | 776,749.17 | 32.296327 | -103.571461 |
| 2,800.00 | 8.67 | 286.14 | 2,795.17 | 23.77 | -82.16 | 472,376.77 | 776,734.68 | 32.296339 | -103.571508 |
| 2,900.00 | 8.67 | 286.14 | 2,894.03 | 27.96 | -96.64 | 472,380.96 | 776,720.20 | 32.296351 | -103.571555 |
| 3,000.00 | 8.67 | 286.14 | 2,992.89 | 32.15 | -111.12 | 472,385.15 | 776,705.72 | 32.296362 | -103.571601 |
| 3,100.00 | 8.67 | 286.14 | 3,091.75 | 36.34 | -125.61 | 472,389.34 | 776,691.23 | 32.296374 | -103.571648 |
| 3,200.00 | 8.67 | 286.14 | 3,190.60 | 40.53 | -140.09 | 472,393.53 | 776,676.75 | 32.296386 | -103.571695 |
| 3,300.00 | 8.67 | 286.14 | 3,289.46 | 44.72 | -154.57 | 472,397.72 | 776,662.26 | 32.296398 | -103.571742 |
| 3,400.00 | 8.67 | 286.14 | 3,388.32 | 48.91 | -169.06 | 472,401.91 | 776,647.78 | 32.296410 | -103.571788 |
| 3,500.00 | 8.67 | 286.14 | 3,487.17 | 53.10 | -183.54 | 472,406.11 | 776,633.30 | 32.296421 | -103.571835 |
| 3,600.00 | 8.67 | 286.14 | 3,586.03 | 57.30 | -198.02 | 472,410.30 | 776,618.81 | 32.296433 | -103.571882 |
| 3,700.00 | 8.67 | 286.14 | 3,684.89 | 61.49 | -212.51 | 472,414.49 | 776,604.33 | 32.296445 | -103.571929 |
| 3,800.00 | 8.67 | 286.14 | 3,783.74 | 65.68 | -226.99 | 472,418.68 | 776,589.85 | 32.296457 | -103.571976 |
| 3,900.00 | 8.67 | 286.14 | 3,882.60 | 69.87 | -241.47 | 472,422.87 | 776,575.36 | 32.296469 | -103.572022 |
| 4,000.00 | 8.67 | 286.14 | 3,981.46 | 74.06 | -255.96 | 472,427.06 | 776,560.88 | 32.296480 | -103.572069 |
| 4,100.00 | 8.67 | 286.14 | 4,080.31 | 78.25 | -270.44 | 472,431.25 | 776,546.40 | 32.296492 | -103.572116 |
| 4,200.00 | 8.67 | 286.14 | 4,179.17 | 82.44 | -284.92 | 472,435.44 | 776,531.91 | 32.296504 | -103.572163 |
| 4,300.00 | 8.67 | 286.14 | 4,278.03 | 86.63 | -299.41 | 472,439.63 | 776,517.43 | 32.296516 | -103.572209 |
| 4,400.00 | 8.67 | 286.14 | 4,376.88 | 90.82 | -313.89 | 472,443.82 | 776,502.95 | 32.296528 | -103.572256 |
| 4,500.00 | 8.67 | 286.14 | 4,475.74 | 95.01 | -328.38 | 472,448.01 | 776,488.46 | 32.296539 | -103.572303 |
| 4,600.00 | 8.67 | 286.14 | 4,574.60 | 99.20 | -342.86 | 472,452.20 | 776,473.98 | 32.296551 | -103.572350 |
| 4,700.00 | 8.67 | 286.14 | 4,673.45 | 103.39 | -357.34 | 472,456.39 | 776,459.50 | 32.296563 | -103.572397 |
| 4,800.00 | 8.67 | 286.14 | 4,772.31 | 107.58 | -371.83 | 472,460.58 | 776,445.01 | 32.296575 | -103.572443 |
| 4,900.00 | 8.67 | 286.14 | 4,871.17 | 111.77 | -386.31 | 472,464.77 | 776,430.53 | 32.296587 | -103.572490 |
| 5,000.00 | 8.67 | 286.14 | 4,970.02 | 115.96 | -400.79 | 472,468.96 | 776,416.05 | 32.296598 | -103.572537 |
| 5,100.00 | 8.67 | 286.14 | 5,068.88 | 120.15 | -415.28 | 472,473.15 | 776,401.56 | 32.296610 | -103.572584 |
| 5,200.00 | 8.67 | 286.14 | 5,167.74 | 124.35 | -429.76 | 472,477.35 | 776,387.08 | 32.296622 | -103.572630 |
| 5,300.00 | 8.67 | 286.14 | 5,266.59 | 128.54 | -444.24 | 472,481.54 | 776,372.60 | 32.296634 | -103.572677 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 | 8.67 | 286.14 | 5,385.45 | 132.73 | -458.73 | 472,485.73 | 776,358.11 | 32.296646 | -103.572724 |
| 5,500.00 | 8.67 | 286.14 | 5,484.31 | 136.92 | -473.21 | 472,489.92 | 776,343.63 | 32.296657 | -103.572771 |
| 5,600.00 | 8.67 | 286.14 | 5,583.17 | 141.11 | -487.69 | 472,494.11 | 776,329.14 | 32.296669 | -103.572818 |
| 5,700.00 | 8.67 | 286.14 | 5,682.02 | 145.30 | -502.18 | 472,498.30 | 776,314.66 | 32.296681 | -103.572864 |
| 5,800.00 | 8.67 | 286.14 | 5,780.88 | 149.49 | -516.66 | 472,502.49 | 776,300.18 | 32.296693 | -103.572911 |
| 5,900.00 | 8.67 | 286.14 | 5,879.74 | 153.68 | -531.14 | 472,506.68 | 776,285.69 | 32.296705 | -103.572958 |
| 6,000.00 | 8.67 | 286.14 | 5,978.59 | 157.87 | -545.63 | 472,510.87 | 776,271.21 | 32.296716 | -103.573005 |
| 6,100.00 | 8.67 | 286.14 | 6,077.45 | 162.06 | -560.11 | 472,515.06 | 776,256.73 | 32.296728 | -103.573051 |
| 6,200.00 | 8.67 | 286.14 | 6,176.31 | 166.25 | -574.59 | 472,519.25 | 776,242.24 | 32.296740 | -103.573098 |
| 6,300.00 | 8.67 | 286.14 | 6,275.16 | 170.44 | -589.08 | 472,523.44 | 776,227.76 | 32.296752 | -103.573145 |
| 6,400.00 | 8.67 | 286.14 | 6,374.02 | 174.63 | -603.56 | 472,527.63 | 776,213.28 | 32.296764 | -103.573192 |
| 6,500.00 | 8.67 | 286.14 | 6,472.88 | 178.82 | -618.05 | 472,531.82 | 776,198.79 | 32.296775 | -103.573238 |
| 6,600.00 | 8.67 | 286.14 | 6,571.73 | 183.01 | -632.53 | 472,536.01 | 776,184.31 | 32.296787 | -103.573285 |
| 6,700.00 | 8.67 | 286.14 | 6,670.59 | 187.20 | -647.01 | 472,540.20 | 776,169.83 | 32.296799 | -103.573332 |
| 6,800.00 | 8.67 | 286.14 | 6,769.45 | 191.39 | -661.50 | 472,544.39 | 776,155.34 | 32.296811 | -103.573379 |
| 6,900.00 | 8.67 | 286.14 | 6,868.30 | 195.59 | -675.98 | 472,548.59 | 776,140.86 | 32.296823 | -103.573426 |
| 7,000.00 | 8.67 | 286.14 | 6,967.16 | 199.78 | -690.46 | 472,552.78 | 776,126.38 | 32.296834 | -103.573472 |
| 7,100.00 | 8.67 | 286.14 | 7,066.02 | 203.97 | -704.95 | 472,556.97 | 776,111.89 | 32.296846 | -103.573519 |
| 7,200.00 | 8.67 | 286.14 | 7,164.87 | 208.16 | -719.43 | 472,561.16 | 776,097.41 | 32.296858 | -103.573566 |
| 7,300.00 | 8.67 | 286.14 | 7,263.73 | 212.35 | -733.91 | 472,565.35 | 776,082.93 | 32.296870 | -103.573613 |
| 7,400.00 | 8.67 | 286.14 | 7,362.59 | 216.54 | -748.40 | 472,569.54 | 776,068.44 | 32.296882 | -103.573659 |
| 7,500.00 | 8.67 | 286.14 | 7,461.44 | 220.73 | -762.88 | 472,573.73 | 776,053.96 | 32.296893 | -103.573706 |
| 7,600.00 | 8.67 | 286.14 | 7,560.30 | 224.92 | -777.36 | 472,577.92 | 776,039.47 | 32.296905 | -103.573753 |
| 7,700.00 | 8.67 | 286.14 | 7,659.16 | 229.11 | -791.85 | 472,582.11 | 776,024.99 | 32.296917 | -103.573800 |
| 7,800.00 | 8.67 | 286.14 | 7,758.01 | 233.30 | -806.33 | 472,586.30 | 776,010.51 | 32.296928 | -103.573847 |
| 7,900.00 | 8.67 | 286.14 | 7,856.87 | 237.49 | -820.81 | 472,590.49 | 775,996.02 | 32.296941 | -103.573893 |
| 8,000.00 | 8.67 | 286.14 | 7,955.73 | 241.68 | -835.30 | 472,594.68 | 775,981.54 | 32.296952 | -103.573940 |
| 8,100.00 | 8.67 | 286.14 | 8,054.59 | 245.87 | -849.78 | 472,598.87 | 775,967.06 | 32.296964 | -103.573987 |
| 8,200.00 | 8.67 | 286.14 | 8,153.44 | 250.06 | -864.27 | 472,603.06 | 775,952.57 | 32.296976 | -103.574034 |
| 8,300.00 | 8.67 | 286.14 | 8,252.30 | 254.25 | -878.75 | 472,607.25 | 775,938.09 | 32.296988 | -103.574080 |
| 8,400.00 | 8.67 | 286.14 | 8,351.16 | 258.44 | -893.23 | 472,611.44 | 775,923.61 | 32.297000 | -103.574127 |
| 8,500.00 | 8.67 | 286.14 | 8,450.01 | 262.64 | -907.72 | 472,615.64 | 775,909.12 | 32.297011 | -103.574174 |
| 8,600.00 | 8.67 | 286.14 | 8,548.87 | 266.83 | -922.20 | 472,619.83 | 775,894.64 | 32.297023 | -103.574221 |
| 8,700.00 | 8.67 | 286.14 | 8,647.73 | 271.02 | -936.68 | 472,624.02 | 775,880.16 | 32.297035 | -103.574268 |
| 8,800.00 | 8.67 | 286.14 | 8,746.58 | 275.21 | -951.17 | 472,628.21 | 775,865.67 | 32.297047 | -103.574314 |
| 8,900.00 | 8.67 | 286.14 | 8,845.44 | 279.40 | -965.65 | 472,632.40 | 775,851.19 | 32.297059 | -103.574361 |
| 9,000.00 | 8.67 | 286.14 | 8,944.30 | 283.59 | -980.13 | 472,636.59 | 775,836.71 | 32.297070 | -103.574408 |
| 9,100.00 | 8.67 | 286.14 | 9,043.15 | 287.78 | -994.62 | 472,640.78 | 775,822.22 | 32.297082 | -103.574455 |
| 9,200.00 | 8.67 | 286.14 | 9,142.01 | 291.97 | -1,009.10 | 472,644.97 | 775,807.74 | 32.297094 | -103.574501 |
| 9,300.00 | 8.67 | 286.14 | 9,240.87 | 296.16 | -1,023.58 | 472,649.16 | 775,793.26 | 32.297106 | -103.574548 |
| 9,400.00 | 8.67 | 286.14 | 9,339.72 | 300.35 | -1,038.07 | 472,653.35 | 775,778.77 | 32.297118 | -103.574595 |
| 9,500.00 | 8.67 | 286.14 | 9,438.58 | 304.54 | -1,052.55 | 472,657.54 | 775,764.29 | 32.297129 | -103.574642 |
| 9,600.00 | 8.67 | 286.14 | 9,537.44 | 308.73 | -1,067.03 | 472,661.73 | 775,749.81 | 32.297141 | -103.574688 |
| 9,700.00 | 8.67 | 286.14 | 9,636.29 | 312.92 | -1,081.52 | 472,665.92 | 775,735.32 | 32.297153 | -103.574735 |
| 9,800.00 | 8.67 | 286.14 | 9,735.15 | 317.11 | -1,096.00 | 472,670.11 | 775,720.84 | 32.297165 | -103.574782 |
| 9,900.00 | 8.67 | 286.14 | 9,834.01 | 321.30 | -1,110.48 | 472,674.30 | 775,706.35 | 32.297177 | -103.574829 |
| 10,000.00 | 8.67 | 286.14 | 9,932.86 | 325.49 | -1,124.97 | 472,678.49 | 775,691.87 | 32.297188 | -103.574876 |
| 10,100.00 | 8.67 | 286.14 | 10,031.72 | 329.68 | -1,139.45 | 472,682.68 | 775,677.39 | 32.297200 | -103.574922 |
| 10,200.00 | 8.67 | 286.14 | 10,130.58 | 333.88 | -1,153.94 | 472,686.88 | 775,662.90 | 32.297212 | -103.574969 |
| 10,300.00 | 8.67 | 286.14 | 10,229.43 | 338.07 | -1,168.42 | 472,691.07 | 775,648.42 | 32.297224 | -103.575016 |
| 10,400.00 | 8.67 | 286.14 | 10,328.29 | 342.26 | -1,182.90 | 472,695.26 | 775,633.94 | 32.297236 | -103.575063 |
| 10,500.00 | 8.67 | 286.14 | 10,427.15 | 346.45 | -1,197.39 | 472,699.45 | 775,619.45 | 32.297247 | -103.575109 |
| 10,600.00 | 8.67 | 286.14 | 10,526.01 | 350.64 | -1,211.87 | 472,703.64 | 775,604.97 | 32.297259 | -103.575156 |
| 10,700.00 | 8.67 | 286.14 | 10,624.86 | 354.83 | -1,226.35 | 472,707.83 | 775,590.49 | 32.297271 | -103.575203 |
| 10,800.00 | 8.67 | 286.14 | 10,723.72 | 359.02 | -1,240.84 | 472,712.02 | 775,576.00 | 32.297283 | -103.575250 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 |
|---|---|---|---|---|---|---|---|---|---|
| 10,900.00 | 8.67 | 286.14 | 10,802.58 | 363.21 | -1,255.32 | 472,716.21 | 775,581.52 | 32.297295 | -103.575297 |
| 11,000.00 | 8.67 | 286.14 | 10,901.43 | 367.40 | -1,269.80 | 472,720.40 | 775,547.04 | 32.297308 | -103.575343 |
| 11,100.00 | 8.67 | 286.14 | 11,000.29 | 371.59 | -1,284.29 | 472,724.59 | 775,532.55 | 32.297318 | -103.575390 |
| 11,200.00 | 8.67 | 286.14 | 11,099.15 | 375.78 | -1,298.77 | 472,728.78 | 775,518.07 | 32.297330 | -103.575437 |
| 11,201.95 | 8.67 | 286.14 | 11,101.08 | 375.86 | -1,299.05 | 472,728.86 | 775,517.79 | 32.297330 | -103.575438 |
| 11,300.00 | 7.20 | 286.14 | 11,198.18 | 379.63 | -1,312.06 | 472,732.63 | 775,504.78 | 32.297341 | -103.575480 |
| 11,400.00 | 5.70 | 286.14 | 11,297.55 | 382.75 | -1,322.85 | 472,735.75 | 775,493.99 | 32.297350 | -103.575515 |
| 11,500.00 | 4.20 | 286.14 | 11,397.17 | 385.15 | -1,331.14 | 472,738.15 | 775,485.70 | 32.297356 | -103.575541 |
| 11,600.00 | 2.70 | 286.14 | 11,496.99 | 386.82 | -1,336.92 | 472,739.82 | 775,479.92 | 32.297361 | -103.575560 |
| 11,700.00 | 1.20 | 286.14 | 11,596.92 | 387.77 | -1,340.19 | 472,740.77 | 775,476.65 | 32.297364 | -103.575571 |
| 11,780.08 | 0.00 | 0.00 | 11,677.00 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| 11,800.00 | 0.00 | 0.00 | 11,696.92 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| 11,900.00 | 0.00 | 0.00 | 11,796.92 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| 12,000.00 | 0.00 | 0.00 | 11,896.92 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| 12,100.00 | 0.00 | 0.00 | 11,996.92 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| 12,130.12 | 0.00 | 0.00 | 12,027.04 | 388.00 | -1,341.00 | 472,741.00 | 775,475.84 | 32.297364 | -103.575573 |
| **KOP @ 12130' MD, 50' FNL, 2105' FEL** | | | | | | | | | |
| 12,200.00 | 6.99 | 179.56 | 12,096.75 | 383.74 | -1,340.97 | 472,736.74 | 775,475.87 | 32.297353 | -103.575573 |
| 12,300.00 | 16.99 | 179.56 | 12,194.44 | 363.00 | -1,340.81 | 472,716.00 | 775,476.03 | 32.297298 | -103.575573 |
| 12,371.00 | 24.09 | 179.56 | 12,260.89 | 338.11 | -1,340.62 | 472,691.11 | 775,476.22 | 32.297227 | -103.575573 |
| **FTP @ 12371' MD, 100' FNL, 2105' FEL** | | | | | | | | | |
| 12,400.00 | 26.99 | 179.56 | 12,287.05 | 325.61 | -1,340.52 | 472,678.61 | 775,476.32 | 32.297193 | -103.575573 |
| 12,500.00 | 36.99 | 179.56 | 12,371.76 | 272.70 | -1,340.12 | 472,625.70 | 775,476.72 | 32.297047 | -103.575573 |
| 12,600.00 | 46.99 | 179.56 | 12,445.99 | 205.89 | -1,339.60 | 472,558.89 | 775,477.24 | 32.296864 | -103.575573 |
| 12,700.00 | 56.99 | 179.56 | 12,507.50 | 127.21 | -1,339.00 | 472,480.21 | 775,477.84 | 32.296647 | -103.575573 |
| 12,800.00 | 66.99 | 179.56 | 12,554.40 | 39.04 | -1,338.32 | 472,392.04 | 775,478.52 | 32.296405 | -103.575573 |
| 12,900.00 | 76.99 | 179.56 | 12,585.29 | -55.94 | -1,337.60 | 472,297.08 | 775,479.24 | 32.296144 | -103.575572 |
| 13,000.00 | 86.99 | 179.56 | 12,599.21 | -154.83 | -1,336.84 | 472,198.17 | 775,480.00 | 32.295872 | -103.575572 |
| 13,030.12 | 90.00 | 179.56 | 12,600.00 | -184.94 | -1,336.61 | 472,168.06 | 775,480.23 | 32.295789 | -103.575572 |
| 13,100.00 | 90.00 | 179.56 | 12,600.00 | -254.82 | -1,336.07 | 472,098.18 | 775,480.77 | 32.295597 | -103.575572 |
| 13,200.00 | 90.00 | 179.56 | 12,600.00 | -354.81 | -1,335.30 | 471,998.19 | 775,481.54 | 32.295323 | -103.575572 |
| 13,300.00 | 90.00 | 179.56 | 12,600.00 | -454.81 | -1,334.54 | 471,898.19 | 775,482.30 | 32.295048 | -103.575572 |
| 13,400.00 | 90.00 | 179.56 | 12,600.00 | -554.81 | -1,333.77 | 471,798.19 | 775,483.07 | 32.294773 | -103.575571 |
| 13,500.00 | 90.00 | 179.56 | 12,600.00 | -654.81 | -1,333.00 | 471,698.20 | 775,483.84 | 32.294498 | -103.575571 |
| 13,600.00 | 90.00 | 179.56 | 12,600.00 | -754.80 | -1,332.24 | 471,598.20 | 775,484.60 | 32.294223 | -103.575571 |
| 13,700.00 | 90.00 | 179.56 | 12,600.00 | -854.80 | -1,331.47 | 471,498.20 | 775,485.37 | 32.293948 | -103.575571 |
| 13,800.00 | 90.00 | 179.56 | 12,600.00 | -954.80 | -1,330.70 | 471,398.21 | 775,486.14 | 32.293673 | -103.575571 |
| 13,900.00 | 90.00 | 179.56 | 12,600.00 | -1,054.79 | -1,329.94 | 471,298.21 | 775,486.90 | 32.293398 | -103.575570 |
| 14,000.00 | 90.00 | 179.56 | 12,600.00 | -1,154.79 | -1,329.17 | 471,198.21 | 775,487.67 | 32.293124 | -103.575570 |
| 14,100.00 | 90.00 | 179.56 | 12,600.00 | -1,254.79 | -1,328.40 | 471,098.22 | 775,488.44 | 32.292849 | -103.575570 |
| 14,200.00 | 90.00 | 179.56 | 12,600.00 | -1,354.78 | -1,327.64 | 470,998.22 | 775,489.20 | 32.292574 | -103.575570 |
| 14,300.00 | 90.00 | 179.56 | 12,600.00 | -1,454.78 | -1,326.87 | 470,898.22 | 775,489.97 | 32.292299 | -103.575570 |
| 14,400.00 | 90.00 | 179.56 | 12,600.00 | -1,554.78 | -1,326.10 | 470,798.22 | 775,490.74 | 32.292024 | -103.575569 |
| 14,500.00 | 90.00 | 179.56 | 12,600.00 | -1,654.78 | -1,325.33 | 470,698.23 | 775,491.51 | 32.291749 | -103.575569 |
| 14,600.00 | 90.00 | 179.56 | 12,600.00 | -1,754.77 | -1,324.57 | 470,598.23 | 775,492.27 | 32.291474 | -103.575569 |
| 14,700.00 | 90.00 | 179.56 | 12,600.00 | -1,854.77 | -1,323.80 | 470,498.23 | 775,493.04 | 32.291199 | -103.575569 |
| 14,800.00 | 90.00 | 179.56 | 12,600.00 | -1,954.77 | -1,323.03 | 470,398.24 | 775,493.81 | 32.290925 | -103.575569 |
| 14,900.00 | 90.00 | 179.56 | 12,600.00 | -2,054.76 | -1,322.27 | 470,298.24 | 775,494.57 | 32.290650 | -103.575568 |
| 15,000.00 | 90.00 | 179.56 | 12,600.00 | -2,154.76 | -1,321.50 | 470,198.24 | 775,495.34 | 32.290375 | -103.575568 |
| 15,100.00 | 90.00 | 179.56 | 12,600.00 | -2,254.76 | -1,320.73 | 470,098.25 | 775,496.11 | 32.290100 | -103.575568 |
| 15,200.00 | 90.00 | 179.56 | 12,600.00 | -2,354.76 | -1,319.97 | 469,998.25 | 775,496.87 | 32.289825 | -103.575568 |
| 15,300.00 | 90.00 | 179.56 | 12,600.00 | -2,454.75 | -1,319.20 | 469,898.25 | 775,497.64 | 32.289550 | -103.575568 |
| 15,400.00 | 90.00 | 179.56 | 12,600.00 | -2,554.75 | -1,318.43 | 469,798.26 | 775,498.41 | 32.289275 | -103.575568 |
| 15,500.00 | 90.00 | 179.56 | 12,600.00 | -2,654.75 | -1,317.67 | 469,698.26 | 775,499.17 | 32.289001 | -103.575567 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 |
|---|---|---|---|---|---|---|---|---|---|
| 15,600.00 | 90.00 | 179.56 | 12,600.00 | -2,754.74 | -1,316.90 | 469,598.26 | 775,499.94 | 32.288726 | -103.575567 |
| 15,700.00 | 90.00 | 179.56 | 12,600.00 | -2,854.74 | -1,316.13 | 469,498.27 | 775,500.71 | 32.288451 | -103.575567 |
| 15,800.00 | 90.00 | 179.56 | 12,600.00 | -2,954.74 | -1,315.37 | 469,398.27 | 775,501.47 | 32.288176 | -103.575567 |
| 15,900.00 | 90.00 | 179.56 | 12,600.00 | -3,054.73 | -1,314.60 | 469,298.27 | 775,502.24 | 32.287901 | -103.575567 |
| 16,000.00 | 90.00 | 179.56 | 12,600.00 | -3,154.73 | -1,313.83 | 469,198.28 | 775,503.01 | 32.287626 | -103.575566 |
| 16,100.00 | 90.00 | 179.56 | 12,600.00 | -3,254.73 | -1,313.07 | 469,098.28 | 775,503.77 | 32.287351 | -103.575566 |
| 16,200.00 | 90.00 | 179.56 | 12,600.00 | -3,354.73 | -1,312.30 | 468,998.28 | 775,504.54 | 32.287076 | -103.575566 |
| 16,300.00 | 90.00 | 179.56 | 12,600.00 | -3,454.72 | -1,311.53 | 468,898.28 | 775,505.31 | 32.286802 | -103.575566 |
| 16,400.00 | 90.00 | 179.56 | 12,600.00 | -3,554.72 | -1,310.76 | 468,798.29 | 775,506.08 | 32.286527 | -103.575566 |
| 16,500.00 | 90.00 | 179.56 | 12,600.00 | -3,654.72 | -1,310.00 | 468,698.29 | 775,506.84 | 32.286252 | -103.575565 |
| 16,600.00 | 90.00 | 179.56 | 12,600.00 | -3,754.71 | -1,309.23 | 468,598.29 | 775,507.61 | 32.285977 | -103.575565 |
| 16,700.00 | 90.00 | 179.56 | 12,600.00 | -3,854.71 | -1,308.46 | 468,498.30 | 775,508.38 | 32.285702 | -103.575565 |
| 16,800.00 | 90.00 | 179.56 | 12,600.00 | -3,954.71 | -1,307.70 | 468,398.30 | 775,509.14 | 32.285427 | -103.575565 |
| 16,900.00 | 90.00 | 179.56 | 12,600.00 | -4,054.71 | -1,306.93 | 468,298.30 | 775,509.91 | 32.285152 | -103.575565 |
| 17,000.00 | 90.00 | 179.56 | 12,600.00 | -4,154.70 | -1,306.16 | 468,198.31 | 775,510.68 | 32.284877 | -103.575564 |
| 17,100.00 | 90.00 | 179.56 | 12,600.00 | -4,254.70 | -1,305.40 | 468,098.31 | 775,511.44 | 32.284603 | -103.575564 |
| 17,200.00 | 90.00 | 179.56 | 12,600.00 | -4,354.70 | -1,304.63 | 467,998.31 | 775,512.21 | 32.284328 | -103.575564 |
| 17,300.00 | 90.00 | 179.56 | 12,600.00 | -4,454.69 | -1,303.86 | 467,898.32 | 775,512.98 | 32.284053 | -103.575564 |
| 17,400.00 | 90.00 | 179.56 | 12,600.00 | -4,554.69 | -1,303.10 | 467,798.32 | 775,513.74 | 32.283778 | -103.575564 |
| 17,500.00 | 90.00 | 179.56 | 12,600.00 | -4,654.69 | -1,302.33 | 467,698.32 | 775,514.51 | 32.283503 | -103.575563 |
| 17,600.00 | 90.00 | 179.56 | 12,600.00 | -4,754.68 | -1,301.56 | 467,598.33 | 775,515.28 | 32.283228 | -103.575563 |
| 17,692.00 | 90.00 | 179.56 | 12,600.00 | -4,846.68 | -1,300.86 | 467,506.33 | 775,515.98 | 32.282975 | -103.575563 |
| Cross section @ 17692' MD, 0' FNL, 2105' FEL | | | | | | | | | |
| 17,700.00 | 90.00 | 179.56 | 12,600.00 | -4,854.68 | -1,300.80 | 467,498.33 | 775,516.04 | 32.282953 | -103.575563 |
| 17,800.00 | 90.00 | 179.56 | 12,600.00 | -4,954.68 | -1,300.03 | 467,398.33 | 775,516.81 | 32.282678 | -103.575563 |
| 17,900.00 | 90.00 | 179.56 | 12,600.00 | -5,054.68 | -1,299.26 | 467,298.33 | 775,517.58 | 32.282404 | -103.575563 |
| 18,000.00 | 90.00 | 179.56 | 12,600.00 | -5,154.67 | -1,298.50 | 467,198.34 | 775,518.34 | 32.282129 | -103.575562 |
| 18,100.00 | 90.00 | 179.56 | 12,600.00 | -5,254.67 | -1,297.73 | 467,098.34 | 775,519.11 | 32.281854 | -103.575562 |
| 18,200.00 | 90.00 | 179.56 | 12,600.00 | -5,354.67 | -1,296.96 | 466,998.34 | 775,519.88 | 32.281579 | -103.575562 |
| 18,300.00 | 90.00 | 179.56 | 12,600.00 | -5,454.66 | -1,296.19 | 466,898.35 | 775,520.65 | 32.281304 | -103.575562 |
| 18,400.00 | 90.00 | 179.56 | 12,600.00 | -5,554.66 | -1,295.43 | 466,798.35 | 775,521.41 | 32.281029 | -103.575562 |
| 18,500.00 | 90.00 | 179.56 | 12,600.00 | -5,654.66 | -1,294.66 | 466,698.35 | 775,522.18 | 32.280754 | -103.575561 |
| 18,600.00 | 90.00 | 179.56 | 12,600.00 | -5,754.66 | -1,293.89 | 466,598.36 | 775,522.95 | 32.280480 | -103.575561 |
| 18,700.00 | 90.00 | 179.56 | 12,600.00 | -5,854.65 | -1,293.13 | 466,498.36 | 775,523.71 | 32.280205 | -103.575561 |
| 18,800.00 | 90.00 | 179.56 | 12,600.00 | -5,954.65 | -1,292.36 | 466,398.36 | 775,524.48 | 32.279930 | -103.575561 |
| 18,900.00 | 90.00 | 179.56 | 12,600.00 | -6,054.65 | -1,291.59 | 466,298.37 | 775,525.25 | 32.279655 | -103.575561 |
| 19,000.00 | 90.00 | 179.56 | 12,600.00 | -6,154.64 | -1,290.83 | 466,198.37 | 775,526.01 | 32.279380 | -103.575560 |
| 19,100.00 | 90.00 | 179.56 | 12,600.00 | -6,254.64 | -1,290.06 | 466,098.37 | 775,526.78 | 32.279105 | -103.575560 |
| 19,200.00 | 90.00 | 179.56 | 12,600.00 | -6,354.64 | -1,289.29 | 465,998.38 | 775,527.55 | 32.278830 | -103.575560 |
| 19,300.00 | 90.00 | 179.56 | 12,600.00 | -6,454.63 | -1,288.53 | 465,898.38 | 775,528.31 | 32.278555 | -103.575560 |
| 19,400.00 | 90.00 | 179.56 | 12,600.00 | -6,554.63 | -1,287.76 | 465,798.38 | 775,529.08 | 32.278281 | -103.575560 |
| 19,500.00 | 90.00 | 179.56 | 12,600.00 | -6,654.63 | -1,286.99 | 465,698.38 | 775,529.85 | 32.278006 | -103.575559 |
| 19,600.00 | 90.00 | 179.56 | 12,600.00 | -6,754.63 | -1,286.23 | 465,598.39 | 775,530.61 | 32.277731 | -103.575559 |
| 19,700.00 | 90.00 | 179.56 | 12,600.00 | -6,854.62 | -1,285.46 | 465,498.39 | 775,531.38 | 32.277456 | -103.575559 |
| 19,800.00 | 90.00 | 179.56 | 12,600.00 | -6,954.62 | -1,284.69 | 465,398.39 | 775,532.15 | 32.277181 | -103.575559 |
| 19,900.00 | 90.00 | 179.56 | 12,600.00 | -7,054.62 | -1,283.93 | 465,298.40 | 775,532.91 | 32.276906 | -103.575559 |
| 20,000.00 | 90.00 | 179.56 | 12,600.00 | -7,154.61 | -1,283.16 | 465,198.40 | 775,533.68 | 32.276631 | -103.575559 |
| 20,100.00 | 90.00 | 179.56 | 12,600.00 | -7,254.61 | -1,282.39 | 465,098.40 | 775,534.45 | 32.276356 | -103.575558 |
| 20,200.00 | 90.00 | 179.56 | 12,600.00 | -7,354.61 | -1,281.62 | 464,998.41 | 775,535.22 | 32.276082 | -103.575558 |
| 20,300.00 | 90.00 | 179.56 | 12,600.00 | -7,454.61 | -1,280.86 | 464,898.41 | 775,535.98 | 32.275807 | -103.575558 |
| 20,400.00 | 90.00 | 179.56 | 12,600.00 | -7,554.60 | -1,280.09 | 464,798.41 | 775,536.75 | 32.275532 | -103.575558 |
| 20,500.00 | 90.00 | 179.56 | 12,600.00 | -7,654.60 | -1,279.32 | 464,698.42 | 775,537.52 | 32.275257 | -103.575558 |
| 20,600.00 | 90.00 | 179.56 | 12,600.00 | -7,754.60 | -1,278.56 | 464,598.42 | 775,538.28 | 32.274982 | -103.575557 |
| 20,700.00 | 90.00 | 179.56 | 12,600.00 | -7,854.59 | -1,277.79 | 464,498.42 | 775,539.05 | 32.274707 | -103.575557 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 |
|---|---|---|---|---|---|---|---|---|---|
| 20,800.00 | 90.00 | 179.56 | 12,600.00 | -7,954.59 | -1,277.02 | 464,398.43 | 775,539.82 | 32.274432 | -103.575557 |
| 20,900.00 | 90.00 | 179.56 | 12,600.00 | -8,054.59 | -1,276.26 | 464,298.43 | 775,540.58 | 32.274158 | -103.575557 |
| 21,000.00 | 90.00 | 179.56 | 12,600.00 | -8,154.58 | -1,275.49 | 464,198.43 | 775,541.35 | 32.273883 | -103.575557 |
| 21,100.00 | 90.00 | 179.56 | 12,600.00 | -8,254.58 | -1,274.72 | 464,098.44 | 775,542.12 | 32.273608 | -103.575556 |
| 21,200.00 | 90.00 | 179.56 | 12,600.00 | -8,354.58 | -1,273.96 | 463,998.44 | 775,542.88 | 32.273333 | -103.575556 |
| 21,300.00 | 90.00 | 179.56 | 12,600.00 | -8,454.58 | -1,273.19 | 463,898.44 | 775,543.65 | 32.273058 | -103.575556 |
| 21,400.00 | 90.00 | 179.56 | 12,600.00 | -8,554.57 | -1,272.42 | 463,798.44 | 775,544.42 | 32.272783 | -103.575556 |
| 21,500.00 | 90.00 | 179.56 | 12,600.00 | -8,654.57 | -1,271.66 | 463,698.45 | 775,545.18 | 32.272508 | -103.575556 |
| 21,600.00 | 90.00 | 179.56 | 12,600.00 | -8,754.57 | -1,270.89 | 463,598.45 | 775,545.95 | 32.272233 | -103.575555 |
| 21,700.00 | 90.00 | 179.56 | 12,600.00 | -8,854.56 | -1,270.12 | 463,498.45 | 775,546.72 | 32.271959 | -103.575555 |
| 21,800.00 | 90.00 | 179.56 | 12,600.00 | -8,954.56 | -1,269.35 | 463,398.46 | 775,547.48 | 32.271684 | -103.575555 |
| 21,900.00 | 90.00 | 179.56 | 12,600.00 | -9,054.56 | -1,268.59 | 463,298.46 | 775,548.25 | 32.271409 | -103.575555 |
| 22,000.00 | 90.00 | 179.56 | 12,600.00 | -9,154.56 | -1,267.82 | 463,198.46 | 775,549.02 | 32.271134 | -103.575555 |
| 22,100.00 | 90.00 | 179.56 | 12,600.00 | -9,254.55 | -1,267.05 | 463,098.47 | 775,549.79 | 32.270859 | -103.575554 |
| 22,200.00 | 90.00 | 179.56 | 12,600.00 | -9,354.55 | -1,266.29 | 462,998.47 | 775,550.55 | 32.270584 | -103.575554 |
| 22,300.00 | 90.00 | 179.56 | 12,600.00 | -9,454.55 | -1,265.52 | 462,898.47 | 775,551.32 | 32.270309 | -103.575554 |
| 22,400.00 | 90.00 | 179.56 | 12,600.00 | -9,554.54 | -1,264.75 | 462,798.48 | 775,552.09 | 32.270034 | -103.575554 |
| 22,500.00 | 90.00 | 179.56 | 12,600.00 | -9,654.54 | -1,263.99 | 462,698.48 | 775,552.85 | 32.269760 | -103.575554 |
| 22,600.00 | 90.00 | 179.56 | 12,600.00 | -9,754.54 | -1,263.22 | 462,598.48 | 775,553.62 | 32.269485 | -103.575553 |
| 22,700.00 | 90.00 | 179.56 | 12,600.00 | -9,854.53 | -1,262.45 | 462,498.49 | 775,554.39 | 32.269210 | -103.575553 |
| 22,800.00 | 90.00 | 179.56 | 12,600.00 | -9,954.53 | -1,261.69 | 462,398.49 | 775,555.15 | 32.268935 | -103.575553 |
| 22,900.00 | 90.00 | 179.56 | 12,600.00 | -10,054.53 | -1,260.92 | 462,298.49 | 775,555.92 | 32.268660 | -103.575553 |
| 22,970.00 | 90.00 | 179.56 | 12,600.00 | -10,124.53 | -1,260.38 | 462,228.49 | 775,556.46 | 32.268468 | -103.575553 |
| **Cross section @ 22970' MD, 0' FNL, 2105' FEL** | | | | | | | | | |
| 23,000.00 | 90.00 | 179.56 | 12,600.00 | -10,154.53 | -1,260.15 | 462,198.49 | 775,556.69 | 32.268385 | -103.575553 |
| 23,100.00 | 90.00 | 179.56 | 12,600.00 | -10,254.52 | -1,259.39 | 462,098.50 | 775,557.45 | 32.268110 | -103.575552 |
| 23,200.00 | 90.00 | 179.56 | 12,600.00 | -10,354.52 | -1,258.62 | 461,998.50 | 775,558.22 | 32.267835 | -103.575552 |
| 23,300.00 | 90.00 | 179.56 | 12,600.00 | -10,454.52 | -1,257.85 | 461,898.50 | 775,558.99 | 32.267561 | -103.575552 |
| 23,400.00 | 90.00 | 179.56 | 12,600.00 | -10,554.51 | -1,257.09 | 461,798.51 | 775,559.75 | 32.267286 | -103.575552 |
| 23,500.00 | 90.00 | 179.56 | 12,600.00 | -10,654.51 | -1,256.32 | 461,698.51 | 775,560.52 | 32.267011 | -103.575552 |
| 23,600.00 | 90.00 | 179.56 | 12,600.00 | -10,754.51 | -1,255.55 | 461,598.51 | 775,561.29 | 32.266736 | -103.575551 |
| 23,700.00 | 90.00 | 179.56 | 12,600.00 | -10,854.51 | -1,254.78 | 461,498.52 | 775,562.05 | 32.266461 | -103.575551 |
| 23,800.00 | 90.00 | 179.56 | 12,600.00 | -10,954.50 | -1,254.02 | 461,398.52 | 775,562.82 | 32.266186 | -103.575551 |
| 23,900.00 | 90.00 | 179.56 | 12,600.00 | -11,054.50 | -1,253.25 | 461,298.52 | 775,563.59 | 32.265911 | -103.575551 |
| 24,000.00 | 90.00 | 179.56 | 12,600.00 | -11,154.50 | -1,252.48 | 461,198.53 | 775,564.36 | 32.265637 | -103.575551 |
| 24,100.00 | 90.00 | 179.56 | 12,600.00 | -11,254.49 | -1,251.72 | 461,098.53 | 775,565.12 | 32.265362 | -103.575550 |
| 24,200.00 | 90.00 | 179.56 | 12,600.00 | -11,354.49 | -1,250.95 | 460,998.53 | 775,565.89 | 32.265087 | -103.575550 |
| 24,300.00 | 90.00 | 179.56 | 12,600.00 | -11,454.49 | -1,250.18 | 460,898.54 | 775,566.66 | 32.264812 | -103.575550 |
| 24,400.00 | 90.00 | 179.56 | 12,600.00 | -11,554.48 | -1,249.42 | 460,798.54 | 775,567.42 | 32.264537 | -103.575550 |
| 24,500.00 | 90.00 | 179.56 | 12,600.00 | -11,654.48 | -1,248.65 | 460,698.54 | 775,568.19 | 32.264262 | -103.575550 |
| 24,600.00 | 90.00 | 179.56 | 12,600.00 | -11,754.48 | -1,247.88 | 460,598.55 | 775,568.96 | 32.263987 | -103.575549 |
| 24,700.00 | 90.00 | 179.56 | 12,600.00 | -11,854.48 | -1,247.12 | 460,498.55 | 775,569.72 | 32.263712 | -103.575549 |
| 24,800.00 | 90.00 | 179.56 | 12,600.00 | -11,954.47 | -1,246.35 | 460,398.55 | 775,570.49 | 32.263438 | -103.575549 |
| 24,900.00 | 90.00 | 179.56 | 12,600.00 | -12,054.47 | -1,245.58 | 460,298.55 | 775,571.26 | 32.263163 | -103.575549 |
| 25,000.00 | 90.00 | 179.56 | 12,600.00 | -12,154.47 | -1,244.82 | 460,198.56 | 775,572.02 | 32.262888 | -103.575549 |
| 25,100.00 | 90.00 | 179.56 | 12,600.00 | -12,254.46 | -1,244.05 | 460,098.56 | 775,572.79 | 32.262613 | -103.575549 |
| 25,200.00 | 90.00 | 179.56 | 12,600.00 | -12,354.46 | -1,243.28 | 459,998.56 | 775,573.56 | 32.262338 | -103.575548 |
| 25,300.00 | 90.00 | 179.56 | 12,600.00 | -12,454.46 | -1,242.52 | 459,898.57 | 775,574.32 | 32.262063 | -103.575548 |
| 25,400.00 | 90.00 | 179.56 | 12,600.00 | -12,554.46 | -1,241.75 | 459,798.57 | 775,575.09 | 32.261788 | -103.575548 |
| 25,500.00 | 90.00 | 179.56 | 12,600.00 | -12,654.45 | -1,240.98 | 459,698.57 | 775,575.86 | 32.261513 | -103.575548 |
| 25,600.00 | 90.00 | 179.56 | 12,600.00 | -12,754.45 | -1,240.21 | 459,598.58 | 775,576.63 | 32.261239 | -103.575548 |
| 25,700.00 | 90.00 | 179.56 | 12,600.00 | -12,854.45 | -1,239.45 | 459,498.58 | 775,577.39 | 32.260964 | -103.575547 |
| 25,800.00 | 90.00 | 179.56 | 12,600.00 | -12,954.44 | -1,238.68 | 459,398.58 | 775,578.16 | 32.260689 | -103.575547 |
| 25,900.00 | 90.00 | 179.56 | 12,600.00 | -13,054.44 | -1,237.91 | 459,298.59 | 775,578.93 | 32.260414 | -103.575547 |

| | | | |
|---|---|---|---|
| **Database:** | EDM r5000.141_Prod US | **Local Co-ordinate Reference:** | Well Thistle Unit 121H |
| **Company:** | WCDSC Permian NM | **TVD Reference:** | RKB @ 3749.20ft |
| **Project:** | Lea County (NAD83 New Mexico East) | **MD Reference:** | RKB @ 3749.20ft |
| **Site:** | Sec 21-T23S-R33E | **North Reference:** | Grid |
| **Well:** | Thistle Unit 121H | **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 |
|---|---|---|---|---|---|---|---|---|---|
| 26,000.00 | 90.00 | 179.56 | 12,600.00 | -13,154.44 | -1,237.15 | 459,198.59 | 775,579.69 | 32.260139 | -103.575547 |
| 26,100.00 | 90.00 | 179.56 | 12,600.00 | -13,254.43 | -1,236.38 | 459,098.59 | 775,580.46 | 32.259884 | -103.575547 |
| 26,200.00 | 90.00 | 179.56 | 12,600.00 | -13,354.43 | -1,235.61 | 458,998.60 | 775,581.23 | 32.259589 | -103.575546 |
| 26,300.00 | 90.00 | 179.56 | 12,600.00 | -13,454.43 | -1,234.85 | 458,898.60 | 775,581.99 | 32.259314 | -103.575546 |
| 26,400.00 | 90.00 | 179.56 | 12,600.00 | -13,554.43 | -1,234.08 | 458,798.60 | 775,582.76 | 32.259040 | -103.575546 |
| 26,500.00 | 90.00 | 179.56 | 12,600.00 | -13,654.42 | -1,233.31 | 458,698.60 | 775,583.53 | 32.258765 | -103.575546 |
| 26,600.00 | 90.00 | 179.56 | 12,600.00 | -13,754.42 | -1,232.55 | 458,598.61 | 775,584.29 | 32.258490 | -103.575548 |
| 26,700.00 | 90.00 | 179.56 | 12,600.00 | -13,854.42 | -1,231.78 | 458,498.61 | 775,585.06 | 32.258215 | -103.575545 |
| 26,800.00 | 90.00 | 179.56 | 12,600.00 | -13,954.41 | -1,231.01 | 458,398.61 | 775,585.83 | 32.257940 | -103.575545 |
| 26,900.00 | 90.00 | 179.56 | 12,600.00 | -14,054.41 | -1,230.25 | 458,298.62 | 775,586.59 | 32.257665 | -103.575545 |
| 27,000.00 | 90.00 | 179.56 | 12,600.00 | -14,154.41 | -1,229.48 | 458,198.62 | 775,587.36 | 32.257390 | -103.575545 |
| 27,100.00 | 90.00 | 179.56 | 12,600.00 | -14,254.41 | -1,228.71 | 458,098.62 | 775,588.13 | 32.257116 | -103.575545 |
| 27,200.00 | 90.00 | 179.56 | 12,600.00 | -14,354.40 | -1,227.95 | 457,998.63 | 775,588.89 | 32.256841 | -103.575544 |
| 27,300.00 | 90.00 | 179.56 | 12,600.00 | -14,454.40 | -1,227.18 | 457,898.63 | 775,589.66 | 32.256566 | -103.575544 |
| 27,400.00 | 90.00 | 179.56 | 12,600.00 | -14,554.40 | -1,226.41 | 457,798.63 | 775,590.43 | 32.256291 | -103.575544 |
| 27,500.00 | 90.00 | 179.56 | 12,600.00 | -14,654.39 | -1,225.64 | 457,698.64 | 775,591.20 | 32.256016 | -103.575544 |
| 27,600.00 | 90.00 | 179.56 | 12,600.00 | -14,754.39 | -1,224.88 | 457,598.64 | 775,591.96 | 32.255741 | -103.575544 |
| 27,700.00 | 90.00 | 179.56 | 12,600.00 | -14,854.39 | -1,224.11 | 457,498.64 | 775,592.73 | 32.255466 | -103.575543 |
| 27,800.00 | 90.00 | 179.56 | 12,600.00 | -14,954.39 | -1,223.34 | 457,398.65 | 775,593.50 | 32.255191 | -103.575543 |
| 27,900.00 | 90.00 | 179.56 | 12,600.00 | -15,054.38 | -1,222.58 | 457,298.65 | 775,594.26 | 32.254917 | -103.575543 |
| 28,000.00 | 90.00 | 179.56 | 12,600.00 | -15,154.38 | -1,221.81 | 457,198.65 | 775,595.03 | 32.254642 | -103.575543 |
| 28,100.00 | 90.00 | 179.56 | 12,600.00 | -15,254.38 | -1,221.04 | 457,098.65 | 775,595.80 | 32.254367 | -103.575543 |
| 28,168.00 | 90.00 | 179.56 | 12,600.00 | -15,322.37 | -1,220.52 | 457,030.66 | 775,596.32 | 32.254180 | -103.575542 |
| LTP @ 28168' MD, 100' FSL, 2105' FEL | | | | | | | | | |
| 28,200.00 | 90.00 | 179.56 | 12,600.00 | -15,354.37 | -1,220.28 | 456,998.66 | 775,596.56 | 32.254092 | -103.575542 |
| 28,247.51 | 90.00 | 179.56 | 12,600.00 | -15,401.88 | -1,219.91 | 456,951.15 | 775,596.93 | 32.253961 | -103.575542 |
| PBHL; 20' FSL, 2105' FEL | | | | | | | | | |
| 28,247.52 | 90.00 | 179.56 | 12,600.00 | -15,401.89 | -1,219.91 | 456,951.14 | 775,596.93 | 32.253961 | -103.575542 |

**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 121H | 0.00 | 0.00 | 0.00 | -15,401.89 | -1,219.91 | 456,951.14 | 775,596.93 | 32.253961 | -103.575542 |
| - plan misses target center by 12600.00ft at 28247.52ft MD (12600.00 TVD, -15401.89 N, -1219.91 E) | | | | | | | | | |
| - Point | | | | | | | | | |

**Plan Annotations**

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates +N/-S (ft) | Local Coordinates +E/-W (ft) | Comment |
|---|---|---|---|---|
| 12,130.12 | 12,027.04 | 388.00 | -1,341.00 | KOP @ 12130' MD, 50' FNL, 2105' FEL |
| 12,371.00 | 12,260.89 | 338.11 | -1,340.62 | FTP @ 12371' MD, 100' FNL, 2105' FEL |
| 17,692.00 | 12,600.00 | -4,846.68 | -1,300.86 | Cross section @ 17692' MD, 0' FNL, 2105' FEL |
| 22,970.00 | 12,600.00 | -10,124.53 | -1,260.38 | Cross section @ 22970' MD, 0' FNL, 2105' FEL |
| 28,168.00 | 12,600.00 | -15,322.37 | -1,220.52 | LTP @ 28168' MD, 100' FSL, 2105' FEL |
| 28,247.51 | 12,600.00 | -15,401.88 | -1,219.91 | PBHL; 20' FSL, 2105' FEL |

# Devon Energy

WELL DETAILS: Thistle Unit 121H

RKB @ 3749.20ft
3724.20

| Northing | Easting | Latitude | Longitude |
|---|---|---|---|
| 472353.00 | 776816.84 | 32.258272 | -103.671242 |

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 | |
| | 1800.00 | 0.00 | 0.00 | 1800.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| | 2667.19 | 8.67 | 266.14 | 2663.88 | 16.21 | -82.82 | 1.00 | -13.18 | |
| | 11201.85 | 8.67 | 266.14 | 11101.06 | 375.88 | -1259.05 | 0.00 | -272.12 | |
| 5 | 11760.08 | 0.00 | 0.00 | 11677.00 | 388.00 | -1341.00 | 1.50 | -280.91 | |
| 6 | 12130.12 | 0.00 | 0.00 | 12027.04 | 388.00 | -1341.00 | 0.00 | -280.91 | KOP @ 12130' MD, 50' FNL, 2105' FEL |
| 7 | 13030.12 | 90.00 | 179.56 | 12600.00 | -184.94 | -1336.61 | 10.00 | 259.90 | |
| 8 | 28247.82 | 90.00 | 179.56 | 12600.00 | -15401.89 | -1219.91 | 0.00 | 15450.13 | PBHL: 20' FSL, 2105' FEL |