# PECOS DISTRICT
# DRILLING CONDITIONS OF APPROVAL



| | |
|---|---|
| **OPERATOR'S NAME:** | **Cimarex Energy Co** |
| **LEASE NO.:** | **NM129267** |
| **WELL NAME & NO.:** | **4H – West Grama Ridge 8-5 Fed** |
| **SURFACE HOLE FOOTAGE:** | **457'/S & 610'/W** |
| **BOTTOM HOLE FOOTAGE** | **330'/N & 1020'/W, sec. 5** |
| **LOCATION:** | **Section 8, T. 22 S., R. 34 E.** |
| **COUNTY:** | **Lea County, New Mexico** |

COA

| | | | |
|---|---|---|---|
| H2S | ◉ Yes | ○ No | |
| Potash | ◉ None | ○ Secretary | ○ R-111-P |
| Cave/Karst Potential | ◉ Low | ○ Medium | ○ High |
| Variance | ○ None | ◉ Flex Hose | ○ Other |
| Wellhead | ○ Conventional | ◉ Multibowl | ○ Both |
| Other | ☐ 4 String Area | ☑ Capitan Reef | ☐ WIPP |

**A. Hydrogen Sulfide**

A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Delaware** 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**

1. The **13-3/8** inch surface casing shall be set at approximately **1630** 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.

**Operator shall filled 1/3rd casing with fluid while running intermediate and production casing to maintain collapse safety factor.**

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
   - Cement to surface. If cement does not circulate see B.1.a, c-d above.

❖ **Special Capitan Reef requirements.** If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall do the following:
**(Use this for 3 string wells in the Capitan Reef, if 4 string well ensure FW based mud used across the capitan interval)**

- Switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

- Daily drilling reports from the Base of the Salt to the setting of the intermediate casing are to be submitted to the BLM CFO engineering staff via e-mail by 0800 hours each morning. Any lost circulation encountered is to be recorded on these drilling reports. The daily drilling report should show mud volume per shift/tour. Failure to submit these reports will result in an Incidence of Non-Compliance being issued for failure to comply with the Conditions of Approval. If not already planned, the operator shall run a caliper survey for the intermediate well bore and submit to 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.**Additional cement maybe required. Excess calculates to 15%.**

## 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. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** 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 **3000 (3M)** psi.

# 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

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. 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.

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

    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. 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.

    f. 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. This test shall be performed prior to the test at full stack pressure.

    g. 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.

**Waste Minimization Plan (WMP)**

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

**ZS 042518**

# PECOS DISTRICT
# SURFACE USE
# CONDITIONS OF APPROVAL

| | |
|---|---|
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| LEASE NO.: | NM129267 |
| WELL NAME & NO.: | 4H – West Grama Ridge 8-5 Fed |
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| LOCATION: | Section 8, T. 22 S., R. 34 E. |
| COUNTY: | Lea County, New Mexico |

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Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.





**Approval Date: 05/01/2018**

## I. GENERAL PROVISIONS

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

## II. PERMIT EXPIRATION

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

## III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

## IV. NOXIOUS WEEDS

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

## V. SPECIAL REQUIREMENT(S)

**Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken**: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

**Ground-level Abandoned Well Marker to avoid raptor perching**: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

This authorization is subject to your Certificate of Participation and/or Certificate of Inclusion under the New Mexico Candidate Conservation Agreement. Because it involves surface disturbing activities covered under your Certificate, your Habitat Conservation Fund Account with the Center of Excellence for Hazardous Materials Management (CEHMM) will be debited according to Exhibit B Part 2 of the Certificate of Participation.

## Watershed:

The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. Topsoil shall not be used to construct the berm. No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad. The berm shall be maintained through the life of the well and after interim reclamation has been completed. Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion.

# VI. CONSTRUCTION

## A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

## B. TOPSOIL

The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall be spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation.

## C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

## D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

## E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

## F. EXCLOSURE FENCING (CELLARS & PITS)

**Exclosure Fencing**
The operator will install and maintain exclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of exclosure fencing design, refer to BLM's Oil and Gas Gold Book, Exclosure Fence Illustrations, Figure 1, Page 18.)

## G. ON LEASE ACCESS ROADS

**Road Width**
The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

**Surfacing**
Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

**Crowning**
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

**Ditching**
Ditching shall be required on both sides of the road.

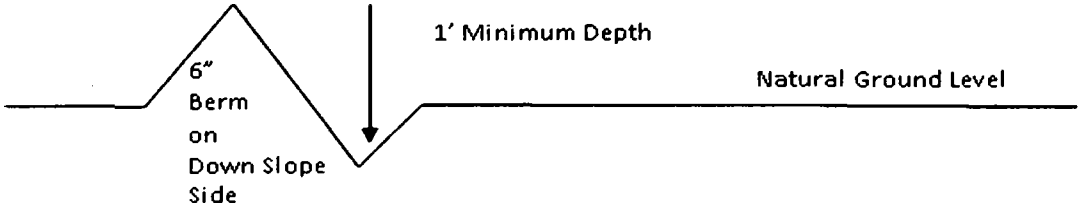
**Turnouts**
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

**Drainage**

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

**Cross Section of a Typical Lead-off Ditch**




All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

**Formula for Spacing Interval of Lead-off Ditches**

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

400 foot road with 4% road slope: $\frac{400'}{4\%} + 100' = 200'$ lead-off ditch interval

**Cattle guards**

An appropriately sized cattle guard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattle guards on the access road route shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattle guards that are in place and are utilized during lease operations.

**Fence Requirement**

Where entry is granted across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting. The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fences.

**Public Access**

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

**Construction Steps**

1. Salvage topsoil
2. Construct road
3. Redistribute topsoil
4. Revegetate slopes

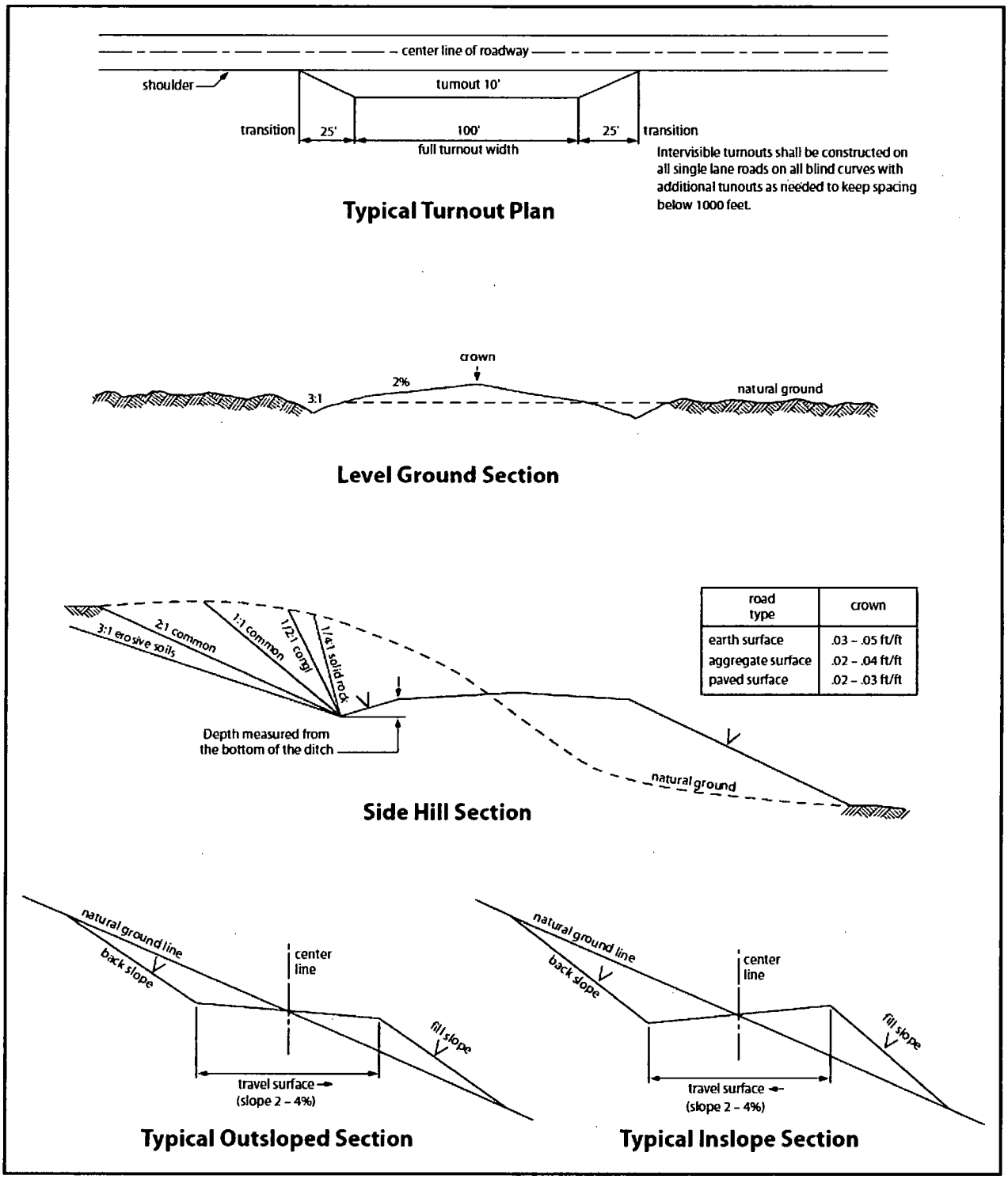



Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

# VII. PRODUCTION (POST DRILLING)

## A. WELL STRUCTURES & FACILITIES

**Placement of Production Facilities**
Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

**Exclosure Netting (Open-top Tanks)**
Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. Use a maximum netting mesh size of 1 ½ inches. The netting must not be in contact with fluids and must not have holes or gaps.

**Chemical and Fuel Secondary Containment and Exclosure Screening**
The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation. The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. Use a maximum netting mesh size of 1 ½ inches.

**Open-Vent Exhaust Stack Exclosures**
The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

**Containment Structures**

Proposed production facilities such as storage tanks and other vessels will have a secondary containment structure that is constructed to hold the capacity of 1.5 times the largest tank, plus freeboard to account for precipitation, unless more stringent protective requirements are deemed necessary.

**Painting Requirement**
All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color, **Shale Green** from the BLM Standard Environmental Color Chart (CC-001: June 2008).

## B. PIPELINES

BURIED PIPELINE STIPULATIONS

A copy of the application (Grant, APD, or Sundry Notice) and attachments, including conditions of approval, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The Holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.

2. The Holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C.6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil or other pollutant should be discharged from the pipeline system, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of holder, regardless of fault. Upon failure of holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he deems necessary to control and clean up the discharge and restore the area, including where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve holder of any responsibility as provided herein.

5. All construction and maintenance activity will be confined to the authorized right-of-way.

6. The pipeline will be buried with a minimum cover of **36** inches between the top of the pipe and ground level.

7. The maximum allowable disturbance for construction in this right-of-way will be **30** feet:

1. Blading of vegetation within the right-of-way will be allowed: maximum width of blading operations will not exceed **20** feet. The trench is included in this area. (*Blading is defined as the complete removal of brush and ground vegetation.*)

2. Clearing of brush species within the right-of-way will be allowed: maximum width of clearing operations will not exceed **30** feet. The trench and bladed area are included in this area. (*Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, etc.) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface.*)

3. The remaining area of the right-of-way (if any) shall only be disturbed by compressing the vegetation. (*Compressing can be caused by vehicle tires, placement of equipment, etc.*)

8. The holder shall stockpile an adequate amount of topsoil where blading is allowed. The topsoil to be stripped is approximately 6 inches in depth. The topsoil will be segregated from other spoil piles from trench construction. The topsoil will be evenly distributed over the bladed area for the preparation of seeding.

9. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

10. Vegetation, soil, and rocks left as a result of construction or maintenance activity will be randomly scattered on this right-of-way and will not be left in rows, piles, or berms, unless otherwise approved by the Authorized Officer. The entire right-of-way shall be recontoured to match the surrounding landscape. The backfilled soil shall be compacted and a 6 inch berm will be left over the ditch line to allow for settling back to grade.

11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.

12. The holder will reseed all disturbed areas. Seeding will be done according to the attached seeding requirements, using the following seed mix.

| | |
|---|---|
| ( ) seed mixture 1 | ( ) seed mixture 3 |
| (X) seed mixture 2 | ( ) seed mixture 4 |
| ( ) seed mixture 2/LPC | ( ) Aplomado Falcon Mixture |

13. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2.

14. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. All signs and information thereon will be posted in a permanent, conspicuous manner, and will be maintained in a legible condition for the life of the pipeline.

15. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder before maintenance begins. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway. As determined necessary during the life of the pipeline, the Authorized Officer may ask the holder to construct temporary deterrence structures.

16. Any cultural and/or paleontological resources (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.

17. The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes associated roads, pipeline corridor and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

18. Escape Ramps - The operator will construct and maintain pipeline/utility trenches [that are not otherwise fenced, screened, or netted] to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in the trenches according to the following criteria:

1. Any trench left open for eight (8) hours or less is not required to have escape ramps; however, before the trench is backfilled, the contractor/operator shall inspect the trench for wildlife, remove all trapped wildlife, and release them at least 100 yards from the trench.
2. For trenches left open for eight (8) hours or more, earthen escape ramps (built at no more than a 30 degree slope and spaced no more than 500 feet apart) shall be placed in the trench.

19. Special Stipulations:

**Lesser Prairie-Chicken**

Oil and gas activities will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 ft. from the source of the noise.

## C. ELECTRIC LINES

STANDARD STIPULATIONS FOR OVERHEAD ELECTRIC DISTRIBUTION LINES

**A copy of the grant and attachments, including stipulations, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.**

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.

2. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.

3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. There will be no clearing or blading of the right-of-way unless otherwise agreed to in writing by the Authorized Officer.

5. Power lines shall be constructed and designed in accordance to standards outlined in "Suggested Practices for Avian Protection on Power lines: The State of the Art in 2006" Edison Electric Institute, APLIC, and the California Energy Commission 2006 . The holder shall assume the burden and expense of proving that pole designs not shown in the above publication deter raptor perching, roosting, and nesting. Such proof shall be provided by a raptor expert approved by the Authorized Officer. The BLM reserves the right to require modification or additions to all powerline structures placed on this right-of-way, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the United States.

Raptor deterrence will consist of but not limited to the following: triangle perch discouragers shall be placed on each side of the cross arms and a nonconductive perching deterrence shall be placed on all vertical poles that extend past the cross arms.

6. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When

necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

7. The BLM serial number assigned to this authorization shall be posted in a permanent, conspicuous manner where the power line crosses roads and at all serviced facilities. Numbers will be at least two inches high and will be affixed to the pole nearest the road crossing and at the facilities served.

8. Upon cancellation, relinquishment, or expiration of this grant, the holder shall comply with those abandonment procedures as prescribed by the Authorized Officer.

9. All surface structures (poles, lines, transformers, etc.) shall be removed within 180 days of abandonment, relinquishment, or termination of use of the serviced facility or facilities or within 180 days of abandonment, relinquishment, cancellation, or expiration of this grant, whichever comes first. This will not apply where the power line extends service to an active, adjoining facility or facilities.

10. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.

1. Special Stipulations:
    1. For reclamation remove poles, lines, transformer, etc. and dispose of properly.
    2. Fill in any holes from the poles removed.

**Timing Limitation Stipulation/Condition of Approval for Lesser Prairie-Chicken**: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 ft. from the source of the noise.

## VIII. INTERIM RECLAMATION

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

## IX. FINAL ABANDONMENT & RECLAMATION

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

Seed Mixture for LPC Sand/Shinnery Sites

Holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed shall be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed shall be either certified or registered seed. The seed container shall be tagged in accordance with State law(s) and available for inspection by the Authorized Officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). Holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. Seeding shall be repeated until a satisfactory stand is established as determined by the Authorized Officer. Evaluation of growth may not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

| Species | lb/acre |
|---|---|
| Plains Bristlegrass | 5lbs/A |
| Sand Bluestem | 5lbs/A |
| Little Bluestem | 3lbs/A |
| Big Bluestem | 6lbs/A |
| Plains Coreopsis | 2lbs/A |
| Sand Dropseed | 1lbs/A |

*Pounds of pure live seed:

Pounds of seed **x** percent purity **x** percent germination = pounds pure live seed

Hydrogen Sulfide Drilling Operations Plan
**West Grama Ridge 8-5 Federal Com 4H**
Cimarex Energy Co.
UL: M, Sec. 8, 22S, 34E
Lea Co., NM

1 All Company and Contract personnel admitted on location must be trained by a qualified H2S safety instructor to the following:

A. Characteristics of $H_2S$
B. Physical effects and hazards
C. Principal and operation of H2S detectors, warning system and briefing areas.
D. Evacuation procedure, routes and first aid.
E. Proper use of safety equipment & life support systems
F. Essential personnel meeting Medical Evaluation criteria will receive additional training on the proper use of 30 minute pressure demand air packs.

$H_2S$ Detection and Alarm Systems:

A. H2S sensors/detectors to be located on the drilling rig floor, in the base of the sub structure/cellar area, on the mud pits in the shale shaker area. Additional H2S detectors may play placed as deemed necessary.

B. An audio alarm system will be installed on the derrick floor and in the top doghouse.

3 Windsock and/or wind streamers:

A. Windsock at mudpit area should be high enough to be visible.

B. Windsock on the rig floor and / or top doghouse should be high enough to be visible.

4 Condition Flags and Signs

A. Warning sign on access road to location.
B. Flags to be displayed on sign at entrance to location. Green flag indicates normal safe condition. Yellow flag indicates potential pressure and danger. Red flag indicates danger ($H_2S$ present in dangerous concentration). Only H2S trained and certified personnel admitted to location.

5 Well control equipment:

A. See exhibit "E-1"

6 Communication:

A. While working under masks chalkboards will be used for communication.
B. Hand signals will be used where chalk board is inappropriate.
C. Two way radio will be used to communicate off location in case of emergency help is required. In most cases cellular telephones will be available at most drilling foreman's trailer or living quarters.

7 Drillstem Testing:
No DSTs r cores are planned at this time.

8 Drilling contractor supervisor will be required to be familiar with the effects $H_2S$ has on tubular goods and other mechanical equipment.

9 If H2S is encountered, mud system will be altered if necessary to maintain control of formation. A mud gas separator will be brought into service along with H2S scavengers if necessary.

# West Grama Ridge 8-5 Federal Com 4H

Casing Assumptions

## Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|
| 17 1/2 | 0 | 1630 | 13-3/8" | 54.50 | J-55 | ST&C | 1.52 | 3.67 | 5.79 |
| 12 1/4 | 0 | 5190 | 9-5/8" | 40.00 | J-55 | LT&C | 1.34 | 1.43 | 2.50 |
| 8 3/4 | 0 | 10152 | 5-1/2" | 17.00 | L-80 | LT&C | 1.32 | 1.63 | 1.83 |
| 8 3/4 | 10152 | 20294 | 5-1/2" | 17.00 | L-80 | BT&C | 1.24 | 1.52 | 33.22 |
| | | | | BLM Minimum Safety Factor | | | 1.125 | 1 | 1.6 Dry<br>1.8 Wet |

TVD was used on all calculations.

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

$H_2S$ Contingency Plan
**West Grama Ridge 8-5 Federal Com 4H**
Cimarex Energy Co.
UL: M, Sec. 8, 22S, 34E
Lea Co., NM

**Emergency Procedures**

In the event of a release of gas containing $H_2S$, the first responder(s) must:

« Isolate the area and prevent entry by other persons into the 100 ppm ROE.
« Evacuate any public places encompassed by the 100 ppm ROE.
« Be equipped with $H_2S$ monitors and air packs in order to control the release.
« Use the "buddy system" to ensure no injuries occur during the 432-620-1975
« Take precautions to avoid personal injury during this operation.
« Contact operator and/or local officials to aid in operation. See list of phone numbers attached.
« Have received training in the:
  - Detection of $H_2S$, and
  - Measures for protection against the gas,
  - Equipment used for protection and emergency response.

**Ignition of Gas Source**

Should control of the well be considered lost and ignition considered, take care to protect against exposure to Sulfur Dioxide ($SO_2$). Intentional ignition must be coordinated with the NMOCD and local officials. Additionally, the NM State Police may become involved. NM State Police shall be the Incident Command on scene of any major release. Take care to protect downwind whenever there is an ignition of the gas.

**Characteristics of $H_2S$ and $SO_2$**

Please see attached International Chemical Safety Cards.

**Contacting Authorities**

Cimarex Energy Co. of Colorado's personnel must liaise with local and state agencies to ensure a proper response to a major release. Additionally, the OCD must be notified of the release as soon as possible but no later than 4 hours. Agencies will ask for information such as type and volume of release, wind direction, location of release, etc. Be prepared with all information available including directions to site. The following call list of essential and potential responders has been prepared for use during a release. Cimarex Energy Co. of Colorado's response must be in coordination with the State of New Mexico's "Hazardous Materials Emergency Response Plan" (HMER).

$H_2S$ Contingency Plan Emergency Contacts
**West Grama Ridge 8-5 Federal Com 4H**
Cimarex Energy Co.
UL: M, Sec. 8, 22S, 34E
Lea Co., NM

| **Company Office** | | | |
|---|---|---|---|
| Cimarex Energy Co. of Colorado | | 800-969-4789 | |
| Co. Office and After-Hours Menu | | | |

**Key Personnel**

| **Name** | **Title** | **Office** | **Mobile** |
|---|---|---|---|
| Larry Seigrist | Drilling Manager | 432-620-1934 | 580-243-8485 |
| Charlie Pritchard | Drilling Superintendent | 432-620-1975 | 432-238-7084 |
| Roy Shirley | Construction Superintendent | | 432-634-2136 |

| **Artesia** | | |
|---|---|---|
| Ambulance | 911 | |
| State Police | 575-746-2703 | |
| City Police | 575-746-2703 | |
| Sheriff's Office | 575-746-9888 | |
| **Fire Department** | **575-746-2701** | |
| Local Emergency Planning Committee | 575-746-2122 | |
| New Mexico Oil Conservation Division | 575-748-1283 | |

| **Carlsbad** | | |
|---|---|---|
| Ambulance | 911 | |
| State Police | 575-885-3137 | |
| City Police | 575-885-2111 | |
| Sheriff's Office | 575-887-7551 | |
| **Fire Department** | **575-887-3798** | |
| Local Emergency Planning Committee | 575-887-6544 | |
| US Bureau of Land Management | 575-887-6544 | |

| **Santa Fe** | | |
|---|---|---|
| New Mexico Emergency Response Commission (Santa Fe) | 505-476-9600 | |
| New Mexico Emergency Response Commission (Santa Fe) 24 Hrs | 505-827-9126 | |
| New Mexico State Emergency Operations Center | 505-476-9635 | |

| **National** | | |
|---|---|---|
| National Emergency Response Center (Washington, D.C.) | 800-424-8802 | |

| **Medical** | | |
|---|---|---|
| Flight for Life - 4000 24th St.; Lubbock, TX | 806-743-9911 | |
| Aerocare - R3, Box 49F; Lubbock, TX | 806-747-8923 | |
| Med Flight Air Amb - 2301 Yale Blvd S.E., #D3; Albuquerque, NM | 505-842-4433 | |
| SB Air Med Service - 2505 Clark Carr Loop S.E.; Albuquerque, NM | 505-842-4949 | |

| **Other** | | | |
|---|---|---|---|
| Boots & Coots IWC | 800-256-9688 | or | 281-931-8884 |
| Cudd Pressure Control | 432-699-0139 | or | 432-563-3356 |
| Halliburton | 575-746-2757 | | |
| B.J. Services | 575-746-3569 | | |

Schlumberger

# Cimarex West Grama Ridge 8-5 Federal Com 4H Rev1 RM 15Nov17
## Proposal Geodetic Report
(Non-Def Plan)

CIMAREX

| | | | |
|---|---|---|---|
| **Report Date:** | November 15, 2017 - 09:56 AM | **Survey / DLS Computation:** | Minimum Curvature / Lubinski |
| **Client:** | Cimarex | **Vertical Section Azimuth:** | 359.669 ° (Grid North) |
| **Field:** | NM Lea County (NAD 83) | **Vertical Section Origin:** | 0.000 ft, 0.000 ft |
| **Structure / Slot:** | Cimarex West Grama Ridge 8-5 Federal Com 4H / Cimarex West Grama Ridge 8-5 Federal Com 4H | **TVD Reference Datum:** | RKB |
| **Well:** | Cimarex West Grama Ridge 8-5 Federal Com 4H | **TVD Reference Elevation:** | 3549.500 ft above MSL |
| **Borehole:** | Original Borehole | **Seabed / Ground Elevation:** | 3525.500 ft above MSL |
| **UWI / API#:** | Unknown / Unknown | **Magnetic Declination:** | 6.804 ° |
| **Survey Name:** | Cimarex West Grama Ridge 8-5 Federal Com 4H Rev1 RM 15Nov17 | **Total Gravity Field Strength:** | 998.4756mgn (9.80665 Based) |
| **Survey Date:** | November 14, 2017 | **Gravity Model:** | GARM |
| **Tort / AHD / DDI / ERD Ratio:** | 102.040 ° / 10282.708 ft / 6.293 / 0.947 | **Total Magnetic Field Strength:** | 48203.060 nT |
| **Coordinate Reference System:** | NAD83 New Mexico State Plane, Eastern Zone, US Feet | **Magnetic Dip Angle:** | 60.266 ° |
| **Location Lat / Long:** | N 32° 24' 0.81919", W 103° 29' 55.01405" | **Declination Date:** | November 15, 2017 |
| **Location Grid N/E Y/X:** | N 510339.740 ftUS, E 798963.840 ftUS | **Magnetic Declination Model:** | HDGM 2017 |
| **CRS Grid Convergence Angle:** | 0.4473 ° | **North Reference:** | Grid North |
| **Grid Scale Factor:** | 0.9999851 | **Grid Convergence Used:** | 0.4473 ° |
| **Version / Patch:** | 2.10.565.0 | **Total Corr Mag North->Grid North:** | 6.3565 ° |
| | | **Local Coord Referenced To:** | Structure Reference Point |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHL [457' FSL, 610' FWL] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N/A | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 100.00 | 0.00 | 100.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 200.00 | 0.00 | 100.00 | 200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 300.00 | 0.00 | 100.00 | 300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 400.00 | 0.00 | 100.00 | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 500.00 | 0.00 | 100.00 | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 600.00 | 0.00 | 100.00 | 600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 700.00 | 0.00 | 100.00 | 700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 800.00 | 0.00 | 100.00 | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 900.00 | 0.00 | 100.00 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 1000.00 | 0.00 | 100.00 | 1000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 1100.00 | 0.00 | 100.00 | 1100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 1200.00 | 0.00 | 100.00 | 1200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 1300.00 | 0.00 | 100.00 | 1300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| | 1400.00 | 0.00 | 100.00 | 1400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| Nudge 2°/100' DLS | 1500.00 | 0.00 | 100.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 510339.74 | 798963.84 | N 32 24 0.82 | W 103 29 55.01 |
| *Rustler* | *1580.01* | *1.60* | *100.00* | *1580.00* | *-0.20* | *-0.19* | *1.10* | *2.00* | *510339.55* | *798964.94* | *N 32 24 0.82* | *W 103 29 55.00* |
| | 1600.00 | 2.00 | 100.00 | 1599.98 | -0.31 | -0.30 | 1.72 | 2.00 | 510339.44 | 798965.56 | N 32 24 0.82 | W 103 29 54.99 |
| | 1700.00 | 4.00 | 100.00 | 1699.84 | -1.25 | -1.21 | 6.87 | 2.00 | 510338.53 | 798970.71 | N 32 24 0.81 | W 103 29 54.93 |
| *Salado (Top Salt)* | *1730.25* | *4.60* | *100.00* | *1730.00* | *-1.66* | *-1.61* | *9.11* | *2.00* | *510338.13* | *798972.95* | *N 32 24 0.80* | *W 103 29 54.91* |
| | 1800.00 | 6.00 | 100.00 | 1799.45 | -2.81 | -2.73 | 15.46 | 2.00 | 510337.01 | 798979.29 | N 32 24 0.79 | W 103 29 54.83 |
| Hold Nudge | 1839.08 | 6.78 | 100.00 | 1838.29 | -3.59 | -3.48 | 19.74 | 2.00 | 510336.26 | 798983.58 | N 32 24 0.78 | W 103 29 54.78 |
| | 1900.00 | 6.78 | 100.00 | 1898.78 | -4.88 | -4.73 | 26.82 | 0.00 | 510335.01 | 798990.66 | N 32 24 0.77 | W 103 29 54.70 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000.00 | 6.78 | 100.00 | 1998.08 | -7.00 | -6.78 | 38.45 | 0.00 | 510332.96 | 799002.29 | N 32 24 0.75 | W 103 29 54.57 |
| | 2100.00 | 6.78 | 100.00 | 2097.38 | -9.12 | -8.83 | 50.08 | 0.00 | 510330.91 | 799013.92 | N 32 24 0.73 | W 103 29 54.43 |
| | 2200.00 | 6.78 | 100.00 | 2196.68 | -11.24 | -10.88 | 61.71 | 0.00 | 510328.86 | 799025.55 | N 32 24 0.71 | W 103 29 54.30 |
| | 2300.00 | 6.78 | 100.00 | 2295.98 | -13.36 | -12.93 | 73.34 | 0.00 | 510326.81 | 799037.18 | N 32 24 0.69 | W 103 29 54.16 |
| | 2400.00 | 6.78 | 100.00 | 2395.28 | -15.47 | -14.98 | 84.97 | 0.00 | 510324.76 | 799048.81 | N 32 24 0.66 | W 103 29 54.02 |
| | 2500.00 | 6.78 | 100.00 | 2494.58 | -17.59 | -17.03 | 96.60 | 0.00 | 510322.71 | 799060.44 | N 32 24 0.64 | W 103 29 53.89 |
| | 2600.00 | 6.78 | 100.00 | 2593.89 | -19.71 | -19.08 | 108.23 | 0.00 | 510320.66 | 799072.07 | N 32 24 0.62 | W 103 29 53.75 |
| | 2700.00 | 6.78 | 100.00 | 2693.19 | -21.83 | -21.13 | 119.86 | 0.00 | 510318.61 | 799083.69 | N 32 24 0.60 | W 103 29 53.62 |
| | 2800.00 | 6.78 | 100.00 | 2792.49 | -23.94 | -23.18 | 131.49 | 0.00 | 510316.56 | 799095.32 | N 32 24 0.58 | W 103 29 53.48 |
| | 2900.00 | 6.78 | 100.00 | 2891.79 | -26.06 | -25.23 | 143.11 | 0.00 | 510314.51 | 799106.95 | N 32 24 0.56 | W 103 29 53.35 |
| | 3000.00 | 6.78 | 100.00 | 2991.09 | -28.18 | -27.29 | 154.74 | 0.00 | 510312.45 | 799118.58 | N 32 24 0.54 | W 103 29 53.21 |
| | 3100.00 | 6.78 | 100.00 | 3090.39 | -30.30 | -29.34 | 166.37 | 0.00 | 510310.40 | 799130.21 | N 32 24 0.52 | W 103 29 53.08 |
| | 3200.00 | 6.78 | 100.00 | 3189.69 | -32.41 | -31.39 | 178.00 | 0.00 | 510308.35 | 799141.84 | N 32 24 0.49 | W 103 29 52.94 |
| | 3300.00 | 6.78 | 100.00 | 3288.99 | -34.53 | -33.44 | 189.63 | 0.00 | 510306.30 | 799153.47 | N 32 24 0.47 | W 103 29 52.81 |
| | 3400.00 | 6.78 | 100.00 | 3388.29 | -36.65 | -35.49 | 201.26 | 0.00 | 510304.25 | 799165.10 | N 32 24 0.45 | W 103 29 52.67 |
| | 3500.00 | 6.78 | 100.00 | 3487.59 | -38.77 | -37.54 | 212.89 | 0.00 | 510302.20 | 799176.73 | N 32 24 0.43 | W 103 29 52.53 |
| | 3600.00 | 6.78 | 100.00 | 3586.89 | -40.89 | -39.59 | 224.52 | 0.00 | 510300.15 | 799188.35 | N 32 24 0.41 | W 103 29 52.40 |
| | 3700.00 | 6.78 | 100.00 | 3686.19 | -43.00 | -41.64 | 236.15 | 0.00 | 510298.10 | 799199.98 | N 32 24 0.39 | W 103 29 52.26 |
| | 3800.00 | 6.78 | 100.00 | 3785.49 | -45.12 | -43.69 | 247.78 | 0.00 | 510296.05 | 799211.61 | N 32 24 0.37 | W 103 29 52.13 |
| *Base of Salt* | *3804.54* | *6.78* | *100.00* | *3790.00* | *-45.22* | *-43.78* | *248.30* | *0.00* | *510295.96* | *799212.14* | *N 32 24 0.37* | *W 103 29 52.12* |
| | 3900.00 | 6.78 | 100.00 | 3884.79 | -47.24 | -45.74 | 259.41 | 0.00 | 510294.00 | 799223.24 | N 32 24 0.35 | W 103 29 51.99 |
| | 4000.00 | 6.78 | 100.00 | 3984.09 | -49.36 | -47.79 | 271.03 | 0.00 | 510291.95 | 799234.87 | N 32 24 0.33 | W 103 29 51.86 |
| | 4100.00 | 6.78 | 100.00 | 4083.39 | -51.47 | -49.84 | 282.66 | 0.00 | 510289.90 | 799246.50 | N 32 24 0.30 | W 103 29 51.72 |
| | 4200.00 | 6.78 | 100.00 | 4182.69 | -53.59 | -51.89 | 294.29 | 0.00 | 510287.85 | 799258.13 | N 32 24 0.28 | W 103 29 51.59 |
| | 4300.00 | 6.78 | 100.00 | 4281.99 | -55.71 | -53.94 | 305.92 | 0.00 | 510285.80 | 799269.76 | N 32 24 0.26 | W 103 29 51.45 |
| *Capitan Reef* | *4308.07* | *6.78* | *100.00* | *4290.00* | *-55.88* | *-54.11* | *306.86* | *0.00* | *510285.63* | *799270.69* | *N 32 24 0.26* | *W 103 29 51.44* |
| | 4400.00 | 6.78 | 100.00 | 4381.29 | -57.83 | -55.99 | 317.55 | 0.00 | 510283.75 | 799281.39 | N 32 24 0.24 | W 103 29 51.32 |
| | 4500.00 | 6.78 | 100.00 | 4480.59 | -59.94 | -58.04 | 329.18 | 0.00 | 510281.70 | 799293.01 | N 32 24 0.22 | W 103 29 51.18 |
| | 4600.00 | 6.78 | 100.00 | 4579.89 | -62.06 | -60.09 | 340.81 | 0.00 | 510279.65 | 799304.64 | N 32 24 0.20 | W 103 29 51.04 |
| | 4700.00 | 6.78 | 100.00 | 4679.19 | -64.18 | -62.14 | 352.44 | 0.00 | 510277.60 | 799316.27 | N 32 24 0.18 | W 103 29 50.91 |
| | 4800.00 | 6.78 | 100.00 | 4778.49 | -66.30 | -64.19 | 364.07 | 0.00 | 510275.55 | 799327.90 | N 32 24 0.16 | W 103 29 50.77 |
| | 4900.00 | 6.78 | 100.00 | 4877.79 | -68.41 | -66.25 | 375.70 | 0.00 | 510273.50 | 799339.53 | N 32 24 0.13 | W 103 29 50.64 |
| | 5000.00 | 6.78 | 100.00 | 4977.09 | -70.53 | -68.30 | 387.33 | 0.00 | 510271.45 | 799351.16 | N 32 24 0.11 | W 103 29 50.50 |
| Drop to Vertical | 5023.07 | 6.78 | 100.00 | 5000.00 | -71.02 | -68.77 | 390.01 | 0.00 | 510270.97 | 799353.84 | N 32 24 0.11 | W 103 29 50.47 |
| | 5100.00 | 5.24 | 100.00 | 5076.51 | -72.47 | -70.17 | 397.94 | 2.00 | 510269.57 | 799361.78 | N 32 24 0.09 | W 103 29 50.38 |
| | 5200.00 | 3.24 | 100.00 | 5176.23 | -73.79 | -71.45 | 405.23 | 2.00 | 510268.29 | 799369.06 | N 32 24 0.08 | W 103 29 50.29 |
| *Delaware Sands* | *5233.82* | *2.57* | *100.00* | *5210.00* | *-74.10* | *-71.75* | *406.92* | *2.00* | *510267.99* | *799370.75* | *N 32 24 0.08* | *W 103 29 50.27* |
| | 5300.00 | 1.24 | 100.00 | 5276.15 | -74.49 | -72.13 | 409.08 | 2.00 | 510267.61 | 799372.92 | N 32 24 0.07 | W 103 29 50.25 |
| Hold | 5362.15 | 0.00 | 100.00 | 5338.29 | -74.62 | -72.25 | 409.75 | 2.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5400.00 | 0.00 | 100.00 | 5376.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5500.00 | 0.00 | 100.00 | 5476.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5600.00 | 0.00 | 100.00 | 5576.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5700.00 | 0.00 | 100.00 | 5676.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5800.00 | 0.00 | 100.00 | 5776.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 5900.00 | 0.00 | 100.00 | 5876.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6000.00 | 0.00 | 100.00 | 5976.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6100.00 | 0.00 | 100.00 | 6076.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6200.00 | 0.00 | 100.00 | 6176.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6300.00 | 0.00 | 100.00 | 6276.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6400.00 | 0.00 | 100.00 | 6376.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6500.00 | 0.00 | 100.00 | 6476.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6600.00 | 0.00 | 100.00 | 6576.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6700.00 | 0.00 | 100.00 | 6676.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6800.00 | 0.00 | 100.00 | 6776.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 6900.00 | 0.00 | 100.00 | 6876.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7000.00 | 0.00 | 100.00 | 6976.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7100.00 | 0.00 | 100.00 | 7076.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7200.00 | 0.00 | 100.00 | 7176.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7300.00 | 0.00 | 100.00 | 7276.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7400.00 | 0.00 | 100.00 | 7376.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7500.00 | 0.00 | 100.00 | 7476.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7600.00 | 0.00 | 100.00 | 7576.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7700.00 | 0.00 | 100.00 | 7676.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7800.00 | 0.00 | 100.00 | 7776.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 7900.00 | 0.00 | 100.00 | 7876.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8000.00 | 0.00 | 100.00 | 7976.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8100.00 | 0.00 | 100.00 | 8076.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8200.00 | 0.00 | 100.00 | 8176.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8300.00 | 0.00 | 100.00 | 8276.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8400.00 | 0.00 | 100.00 | 8376.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8500.00 | 0.00 | 100.00 | 8476.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8600.00 | 0.00 | 100.00 | 8576.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8700.00 | 0.00 | 100.00 | 8676.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| *Bone Spring* | *8703.86* | *0.00* | *100.00* | *8680.00* | *-74.62* | *-72.25* | *409.75* | *0.00* | *510267.49* | *799373.58* | *N 32 24 0.07* | *W 103 29 50.24* |
| | 8800.00 | 0.00 | 100.00 | 8776.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 8900.00 | 0.00 | 100.00 | 8876.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9000.00 | 0.00 | 100.00 | 8976.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9100.00 | 0.00 | 100.00 | 9076.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9200.00 | 0.00 | 100.00 | 9176.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9300.00 | 0.00 | 100.00 | 9276.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9400.00 | 0.00 | 100.00 | 9376.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9500.00 | 0.00 | 100.00 | 9476.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9600.00 | 0.00 | 100.00 | 9576.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9700.00 | 0.00 | 100.00 | 9676.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| *1st Bone Spring Sand* | *9793.86* | *0.00* | *100.00* | *9770.00* | *-74.62* | *-72.25* | *409.75* | *0.00* | *510267.49* | *799373.58* | *N 32 24 0.07* | *W 103 29 50.24* |
| | 9800.00 | 0.00 | 100.00 | 9776.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 9900.00 | 0.00 | 100.00 | 9876.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 10000.00 | 0.00 | 100.00 | 9976.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| *2nd Bone Spring Carb* | *10013.86* | *0.00* | *100.00* | *9990.00* | *-74.62* | *-72.25* | *409.75* | *0.00* | *510267.49* | *799373.58* | *N 32 24 0.07* | *W 103 29 50.24* |
| | 10100.00 | 0.00 | 100.00 | 10076.14 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| KOP - Build 12°/100' DLS | 10151.56 | 0.00 | 100.00 | 10127.70 | -74.62 | -72.25 | 409.75 | 0.00 | 510267.49 | 799373.58 | N 32 24 0.07 | W 103 29 50.24 |
| | 10200.00 | 5.81 | 359.67 | 10176.06 | -72.16 | -69.79 | 409.73 | 12.00 | 510269.95 | 799373.57 | N 32 24 0.10 | W 103 29 50.24 |
| | 10300.00 | 17.81 | 359.67 | 10273.76 | -51.73 | -49.36 | 409.62 | 12.00 | 510290.38 | 799373.45 | N 32 24 0.30 | W 103 29 50.24 |
| *2nd Bone Spring Sand* | *10306.57* | *18.60* | *359.67* | *10280.00* | *-49.68* | *-47.31* | *409.60* | *12.00* | *510292.43* | *799373.44* | *N 32 24 0.32* | *W 103 29 50.24* |
| | 10400.00 | 29.81 | 359.67 | 10365.08 | -11.43 | -9.06 | 409.38 | 12.00 | 510330.68 | 799373.22 | N 32 24 0.70 | W 103 29 50.24 |
| | 10500.00 | 41.81 | 359.67 | 10446.03 | 46.98 | 49.34 | 409.05 | 12.00 | 510389.08 | 799372.88 | N 32 24 1.28 | W 103 29 50.24 |
| | 10600.00 | 53.81 | 359.67 | 10513.06 | 120.94 | 123.30 | 408.62 | 12.00 | 510463.04 | 799372.45 | N 32 24 2.01 | W 103 29 50.24 |
| | 10700.00 | 65.81 | 359.67 | 10563.25 | 207.22 | 209.58 | 408.12 | 12.00 | 510549.32 | 799371.95 | N 32 24 2.86 | W 103 29 50.24 |
| | 10800.00 | 77.81 | 359.67 | 10594.41 | 302.05 | 304.41 | 407.57 | 12.00 | 510644.14 | 799371.40 | N 32 24 3.80 | W 103 29 50.23 |
| Landing Point | 10888.87 | 88.48 | 359.67 | 10605.00 | 390.16 | 392.52 | 407.06 | 12.00 | 510732.25 | 799370.90 | N 32 24 4.67 | W 103 29 50.23 |
| | 10900.00 | 88.48 | 359.67 | 10605.30 | 401.28 | 403.64 | 407.00 | 0.00 | 510743.38 | 799370.83 | N 32 24 4.78 | W 103 29 50.23 |
| | 11000.00 | 88.48 | 359.67 | 10607.95 | 501.25 | 503.60 | 406.42 | 0.00 | 510843.34 | 799370.25 | N 32 24 5.77 | W 103 29 50.23 |
| | 11100.00 | 88.48 | 359.67 | 10610.61 | 601.21 | 603.57 | 405.84 | 0.00 | 510943.30 | 799369.68 | N 32 24 6.76 | W 103 29 50.23 |
| | 11200.00 | 88.48 | 359.67 | 10613.27 | 701.18 | 703.53 | 405.27 | 0.00 | 511043.26 | 799369.10 | N 32 24 7.75 | W 103 29 50.22 |
| | 11300.00 | 88.48 | 359.67 | 10615.93 | 801.14 | 803.49 | 404.69 | 0.00 | 511143.22 | 799368.52 | N 32 24 8.74 | W 103 29 50.22 |
| | 11400.00 | 88.48 | 359.67 | 10618.59 | 901.11 | 903.46 | 404.11 | 0.00 | 511243.18 | 799367.94 | N 32 24 9.73 | W 103 29 50.22 |
| | 11500.00 | 88.48 | 359.67 | 10621.24 | 1001.07 | 1003.42 | 403.53 | 0.00 | 511343.14 | 799367.37 | N 32 24 10.72 | W 103 29 50.22 |
| | 11600.00 | 88.48 | 359.67 | 10623.90 | 1101.04 | 1103.38 | 402.96 | 0.00 | 511443.10 | 799366.79 | N 32 24 11.71 | W 103 29 50.21 |
| | 11700.00 | 88.48 | 359.67 | 10626.56 | 1201.00 | 1203.35 | 402.38 | 0.00 | 511543.07 | 799366.21 | N 32 24 12.69 | W 103 29 50.21 |
| | 11800.00 | 88.48 | 359.67 | 10629.22 | 1300.97 | 1303.31 | 401.80 | 0.00 | 511643.03 | 799365.64 | N 32 24 13.68 | W 103 29 50.21 |
| | 11900.00 | 88.48 | 359.67 | 10631.88 | 1400.93 | 1403.27 | 401.22 | 0.00 | 511742.99 | 799365.06 | N 32 24 14.67 | W 103 29 50.21 |
| | 12000.00 | 88.48 | 359.67 | 10634.54 | 1500.90 | 1503.23 | 400.65 | 0.00 | 511842.95 | 799364.48 | N 32 24 15.66 | W 103 29 50.20 |
| | 12100.00 | 88.48 | 359.67 | 10637.19 | 1600.86 | 1603.20 | 400.07 | 0.00 | 511942.91 | 799363.90 | N 32 24 16.65 | W 103 29 50.20 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12200.00 | 88.48 | 359.67 | 10639.85 | 1700.82 | 1703.16 | 399.49 | 0.00 | 512042.87 | 799363.33 | N 32 24 17.64 | W 103 29 50.20 |
| | 12300.00 | 88.48 | 359.67 | 10642.51 | 1800.79 | 1803.12 | 398.91 | 0.00 | 512142.83 | 799362.75 | N 32 24 18.63 | W 103 29 50.20 |
| | 12400.00 | 88.48 | 359.67 | 10645.17 | 1900.75 | 1903.09 | 398.34 | 0.00 | 512242.79 | 799362.17 | N 32 24 19.62 | W 103 29 50.19 |
| | 12500.00 | 88.48 | 359.67 | 10647.83 | 2000.72 | 2003.05 | 397.76 | 0.00 | 512342.76 | 799361.59 | N 32 24 20.61 | W 103 29 50.19 |
| | 12600.00 | 88.48 | 359.67 | 10650.48 | 2100.68 | 2103.01 | 397.18 | 0.00 | 512442.72 | 799361.02 | N 32 24 21.60 | W 103 29 50.19 |
| | 12700.00 | 88.48 | 359.67 | 10653.14 | 2200.65 | 2202.98 | 396.61 | 0.00 | 512542.68 | 799360.44 | N 32 24 22.59 | W 103 29 50.19 |
| | 12800.00 | 88.48 | 359.67 | 10655.80 | 2300.61 | 2302.94 | 396.03 | 0.00 | 512642.64 | 799359.86 | N 32 24 23.58 | W 103 29 50.19 |
| | 12900.00 | 88.48 | 359.67 | 10658.46 | 2400.58 | 2402.90 | 395.45 | 0.00 | 512742.60 | 799359.28 | N 32 24 24.56 | W 103 29 50.18 |
| | 13000.00 | 88.48 | 359.67 | 10661.12 | 2500.54 | 2502.86 | 394.87 | 0.00 | 512842.56 | 799358.71 | N 32 24 25.55 | W 103 29 50.18 |
| | 13100.00 | 88.48 | 359.67 | 10663.77 | 2600.51 | 2602.83 | 394.30 | 0.00 | 512942.52 | 799358.13 | N 32 24 26.54 | W 103 29 50.18 |
| | 13200.00 | 88.48 | 359.67 | 10666.43 | 2700.47 | 2702.79 | 393.72 | 0.00 | 513042.49 | 799357.55 | N 32 24 27.53 | W 103 29 50.18 |
| | 13300.00 | 88.48 | 359.67 | 10669.09 | 2800.44 | 2802.75 | 393.14 | 0.00 | 513142.45 | 799356.97 | N 32 24 28.52 | W 103 29 50.17 |
| | 13400.00 | 88.48 | 359.67 | 10671.75 | 2900.40 | 2902.72 | 392.56 | 0.00 | 513242.41 | 799356.40 | N 32 24 29.51 | W 103 29 50.17 |
| | 13500.00 | 88.48 | 359.67 | 10674.41 | 3000.37 | 3002.68 | 391.99 | 0.00 | 513342.37 | 799355.82 | N 32 24 30.50 | W 103 29 50.17 |
| | 13600.00 | 88.48 | 359.67 | 10677.06 | 3100.33 | 3102.64 | 391.41 | 0.00 | 513442.33 | 799355.24 | N 32 24 31.49 | W 103 29 50.17 |
| | 13700.00 | 88.48 | 359.67 | 10679.72 | 3200.29 | 3202.61 | 390.83 | 0.00 | 513542.29 | 799354.66 | N 32 24 32.48 | W 103 29 50.16 |
| | 13800.00 | 88.48 | 359.67 | 10682.38 | 3300.26 | 3302.57 | 390.25 | 0.00 | 513642.25 | 799354.09 | N 32 24 33.47 | W 103 29 50.16 |
| | 13900.00 | 88.48 | 359.67 | 10685.04 | 3400.22 | 3402.53 | 389.68 | 0.00 | 513742.21 | 799353.51 | N 32 24 34.46 | W 103 29 50.16 |
| | 14000.00 | 88.48 | 359.67 | 10687.70 | 3500.19 | 3502.49 | 389.10 | 0.00 | 513842.18 | 799352.93 | N 32 24 35.44 | W 103 29 50.16 |
| | 14100.00 | 88.48 | 359.67 | 10690.36 | 3600.15 | 3602.46 | 388.52 | 0.00 | 513942.14 | 799352.35 | N 32 24 36.43 | W 103 29 50.15 |
| | 14200.00 | 88.48 | 359.67 | 10693.01 | 3700.12 | 3702.42 | 387.94 | 0.00 | 514042.10 | 799351.78 | N 32 24 37.42 | W 103 29 50.15 |
| | 14300.00 | 88.48 | 359.67 | 10695.67 | 3800.08 | 3802.38 | 387.37 | 0.00 | 514142.06 | 799351.20 | N 32 24 38.41 | W 103 29 50.15 |
| | 14400.00 | 88.48 | 359.67 | 10698.33 | 3900.05 | 3902.35 | 386.79 | 0.00 | 514242.02 | 799350.62 | N 32 24 39.40 | W 103 29 50.15 |
| | 14500.00 | 88.48 | 359.67 | 10700.99 | 4000.01 | 4002.31 | 386.21 | 0.00 | 514341.98 | 799350.05 | N 32 24 40.39 | W 103 29 50.14 |
| | 14600.00 | 88.48 | 359.67 | 10703.65 | 4099.98 | 4102.27 | 385.63 | 0.00 | 514441.94 | 799349.47 | N 32 24 41.38 | W 103 29 50.14 |
| | 14700.00 | 88.48 | 359.67 | 10706.30 | 4199.94 | 4202.24 | 385.06 | 0.00 | 514541.90 | 799348.89 | N 32 24 42.37 | W 103 29 50.14 |
| | 14800.00 | 88.48 | 359.67 | 10708.96 | 4299.91 | 4302.20 | 384.48 | 0.00 | 514641.87 | 799348.31 | N 32 24 43.36 | W 103 29 50.14 |
| | 14900.00 | 88.48 | 359.67 | 10711.62 | 4399.87 | 4402.16 | 383.90 | 0.00 | 514741.83 | 799347.74 | N 32 24 44.35 | W 103 29 50.14 |
| | 15000.00 | 88.48 | 359.67 | 10714.28 | 4499.84 | 4502.12 | 383.32 | 0.00 | 514841.79 | 799347.16 | N 32 24 45.34 | W 103 29 50.13 |
| | 15100.00 | 88.48 | 359.67 | 10716.94 | 4599.80 | 4602.09 | 382.75 | 0.00 | 514941.75 | 799346.58 | N 32 24 46.33 | W 103 29 50.13 |
| | 15200.00 | 88.48 | 359.67 | 10719.59 | 4699.76 | 4702.05 | 382.17 | 0.00 | 515041.71 | 799346.00 | N 32 24 47.31 | W 103 29 50.13 |
| *3rd Bone Spring* | *15215.26* | *88.48* | *359.67* | *10720.00* | *4715.02* | *4717.30* | *382.08* | *0.00* | *515056.96* | *799345.92* | *N 32 24 47.47* | *W 103 29 50.13* |
| | 15300.00 | 88.48 | 359.67 | 10722.25 | 4799.73 | 4802.01 | 381.59 | 0.00 | 515141.67 | 799345.43 | N 32 24 48.30 | W 103 29 50.13 |
| | 15400.00 | 88.48 | 359.67 | 10724.91 | 4899.69 | 4901.98 | 381.01 | 0.00 | 515241.63 | 799344.85 | N 32 24 49.29 | W 103 29 50.12 |
| | 15500.00 | 88.48 | 359.67 | 10727.57 | 4999.66 | 5001.94 | 380.44 | 0.00 | 515341.60 | 799344.27 | N 32 24 50.28 | W 103 29 50.12 |
| | 15600.00 | 88.48 | 359.67 | 10730.23 | 5099.62 | 5101.90 | 379.86 | 0.00 | 515441.56 | 799343.69 | N 32 24 51.27 | W 103 29 50.12 |
| | 15700.00 | 88.48 | 359.67 | 10732.88 | 5199.59 | 5201.87 | 379.28 | 0.00 | 515541.52 | 799343.12 | N 32 24 52.26 | W 103 29 50.12 |
| | 15800.00 | 88.48 | 359.67 | 10735.54 | 5299.55 | 5301.83 | 378.71 | 0.00 | 515641.48 | 799342.54 | N 32 24 53.25 | W 103 29 50.11 |
| | 15900.00 | 88.48 | 359.67 | 10738.20 | 5399.52 | 5401.79 | 378.13 | 0.00 | 515741.44 | 799341.96 | N 32 24 54.24 | W 103 29 50.11 |
| | 16000.00 | 88.48 | 359.67 | 10740.86 | 5499.48 | 5501.75 | 377.55 | 0.00 | 515841.40 | 799341.38 | N 32 24 55.23 | W 103 29 50.11 |
| | 16100.00 | 88.48 | 359.67 | 10743.52 | 5599.45 | 5601.72 | 376.97 | 0.00 | 515941.36 | 799340.81 | N 32 24 56.22 | W 103 29 50.11 |
| | 16200.00 | 88.48 | 359.67 | 10746.18 | 5699.41 | 5701.68 | 376.40 | 0.00 | 516041.32 | 799340.23 | N 32 24 57.21 | W 103 29 50.10 |
| | 16300.00 | 88.48 | 359.67 | 10748.83 | 5799.38 | 5801.64 | 375.82 | 0.00 | 516141.29 | 799339.65 | N 32 24 58.19 | W 103 29 50.10 |
| | 16400.00 | 88.48 | 359.67 | 10751.49 | 5899.34 | 5901.61 | 375.24 | 0.00 | 516241.25 | 799339.07 | N 32 24 59.18 | W 103 29 50.10 |
| | 16500.00 | 88.48 | 359.67 | 10754.15 | 5999.31 | 6001.57 | 374.66 | 0.00 | 516341.21 | 799338.50 | N 32 25 0.17 | W 103 29 50.10 |
| | 16600.00 | 88.48 | 359.67 | 10756.81 | 6099.27 | 6101.53 | 374.09 | 0.00 | 516441.17 | 799337.92 | N 32 25 1.16 | W 103 29 50.09 |
| | 16700.00 | 88.48 | 359.67 | 10759.47 | 6199.23 | 6201.50 | 373.51 | 0.00 | 516541.13 | 799337.34 | N 32 25 2.15 | W 103 29 50.09 |
| | 16800.00 | 88.48 | 359.67 | 10762.12 | 6299.20 | 6301.46 | 372.93 | 0.00 | 516641.09 | 799336.76 | N 32 25 3.14 | W 103 29 50.09 |
| | 16900.00 | 88.48 | 359.67 | 10764.78 | 6399.16 | 6401.42 | 372.35 | 0.00 | 516741.05 | 799336.19 | N 32 25 4.13 | W 103 29 50.09 |
| | 17000.00 | 88.48 | 359.67 | 10767.44 | 6499.13 | 6501.38 | 371.78 | 0.00 | 516841.01 | 799335.61 | N 32 25 5.12 | W 103 29 50.09 |
| | 17100.00 | 88.48 | 359.67 | 10770.10 | 6599.09 | 6601.35 | 371.20 | 0.00 | 516940.98 | 799335.03 | N 32 25 6.11 | W 103 29 50.08 |
| | 17200.00 | 88.48 | 359.67 | 10772.76 | 6699.06 | 6701.31 | 370.62 | 0.00 | 517040.94 | 799334.46 | N 32 25 7.10 | W 103 29 50.08 |
| | 17300.00 | 88.48 | 359.67 | 10775.41 | 6799.02 | 6801.27 | 370.04 | 0.00 | 517140.90 | 799333.88 | N 32 25 8.09 | W 103 29 50.08 |
| | 17400.00 | 88.48 | 359.67 | 10778.07 | 6898.99 | 6901.24 | 369.47 | 0.00 | 517240.86 | 799333.30 | N 32 25 9.08 | W 103 29 50.08 |
| | 17500.00 | 88.48 | 359.67 | 10780.73 | 6998.95 | 7001.20 | 368.89 | 0.00 | 517340.82 | 799332.72 | N 32 25 10.06 | W 103 29 50.07 |
| | 17600.00 | 88.48 | 359.67 | 10783.39 | 7098.92 | 7101.16 | 368.31 | 0.00 | 517440.78 | 799332.15 | N 32 25 11.05 | W 103 29 50.07 |
| | 17700.00 | 88.48 | 359.67 | 10786.05 | 7198.88 | 7201.13 | 367.73 | 0.00 | 517540.74 | 799331.57 | N 32 25 12.04 | W 103 29 50.07 |
| | 17800.00 | 88.48 | 359.67 | 10788.71 | 7298.85 | 7301.09 | 367.16 | 0.00 | 517640.71 | 799330.99 | N 32 25 13.03 | W 103 29 50.07 |

| Comments | MD (ft) | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft) | DLS (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ' ") | Longitude (E/W ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 17900.00 | 88.48 | 359.67 | 10791.36 | 7398.81 | 7401.05 | 366.58 | 0.00 | 517740.67 | 799330.41 | N 32 25 14.02 | W 103 29 50.06 |
| | 18000.00 | 88.48 | 359.67 | 10794.02 | 7498.78 | 7501.01 | 366.00 | 0.00 | 517840.63 | 799329.84 | N 32 25 15.01 | W 103 29 50.06 |
| | 18100.00 | 88.48 | 359.67 | 10796.68 | 7598.74 | 7600.98 | 365.42 | 0.00 | 517940.59 | 799329.26 | N 32 25 16.00 | W 103 29 50.06 |
| | 18200.00 | 88.48 | 359.67 | 10799.34 | 7698.70 | 7700.94 | 364.85 | 0.00 | 518040.55 | 799328.68 | N 32 25 16.99 | W 103 29 50.06 |
| | 18300.00 | 88.48 | 359.67 | 10802.00 | 7798.67 | 7800.90 | 364.27 | 0.00 | 518140.51 | 799328.10 | N 32 25 17.98 | W 103 29 50.05 |
| | 18400.00 | 88.48 | 359.67 | 10804.65 | 7898.63 | 7900.87 | 363.69 | 0.00 | 518240.47 | 799327.53 | N 32 25 18.97 | W 103 29 50.05 |
| | 18500.00 | 88.48 | 359.67 | 10807.31 | 7998.60 | 8000.83 | 363.12 | 0.00 | 518340.43 | 799326.95 | N 32 25 19.96 | W 103 29 50.05 |
| | 18600.00 | 88.48 | 359.67 | 10809.97 | 8098.56 | 8100.79 | 362.54 | 0.00 | 518440.40 | 799326.37 | N 32 25 20.94 | W 103 29 50.05 |
| | 18700.00 | 88.48 | 359.67 | 10812.63 | 8198.53 | 8200.76 | 361.96 | 0.00 | 518540.36 | 799325.79 | N 32 25 21.93 | W 103 29 50.04 |
| | 18800.00 | 88.48 | 359.67 | 10815.29 | 8298.49 | 8300.72 | 361.38 | 0.00 | 518640.32 | 799325.22 | N 32 25 22.92 | W 103 29 50.04 |
| | 18900.00 | 88.48 | 359.67 | 10817.94 | 8398.46 | 8400.68 | 360.81 | 0.00 | 518740.28 | 799324.64 | N 32 25 23.91 | W 103 29 50.04 |
| | 19000.00 | 88.48 | 359.67 | 10820.60 | 8498.42 | 8500.64 | 360.23 | 0.00 | 518840.24 | 799324.06 | N 32 25 24.90 | W 103 29 50.04 |
| | 19100.00 | 88.48 | 359.67 | 10823.26 | 8598.39 | 8600.61 | 359.65 | 0.00 | 518940.20 | 799323.48 | N 32 25 25.89 | W 103 29 50.03 |
| | 19200.00 | 88.48 | 359.67 | 10825.92 | 8698.35 | 8700.57 | 359.07 | 0.00 | 519040.16 | 799322.91 | N 32 25 26.88 | W 103 29 50.03 |
| | 19300.00 | 88.48 | 359.67 | 10828.58 | 8798.32 | 8800.53 | 358.50 | 0.00 | 519140.13 | 799322.33 | N 32 25 27.87 | W 103 29 50.03 |
| | 19400.00 | 88.48 | 359.67 | 10831.23 | 8898.28 | 8900.50 | 357.92 | 0.00 | 519240.09 | 799321.75 | N 32 25 28.86 | W 103 29 50.03 |
| | 19500.00 | 88.48 | 359.67 | 10833.89 | 8998.25 | 9000.46 | 357.34 | 0.00 | 519340.05 | 799321.17 | N 32 25 29.85 | W 103 29 50.03 |
| | 19600.00 | 88.48 | 359.67 | 10836.55 | 9098.21 | 9100.42 | 356.76 | 0.00 | 519440.01 | 799320.60 | N 32 25 30.84 | W 103 29 50.02 |
| | 19700.00 | 88.48 | 359.67 | 10839.21 | 9198.17 | 9200.39 | 356.19 | 0.00 | 519539.97 | 799320.02 | N 32 25 31.83 | W 103 29 50.02 |
| | 19800.00 | 88.48 | 359.67 | 10841.87 | 9298.14 | 9300.35 | 355.61 | 0.00 | 519639.93 | 799319.44 | N 32 25 32.81 | W 103 29 50.02 |
| | 19900.00 | 88.48 | 359.67 | 10844.53 | 9398.10 | 9400.31 | 355.03 | 0.00 | 519739.89 | 799318.87 | N 32 25 33.80 | W 103 29 50.02 |
| | 20000.00 | 88.48 | 359.67 | 10847.18 | 9498.07 | 9500.27 | 354.45 | 0.00 | 519839.85 | 799318.29 | N 32 25 34.79 | W 103 29 50.01 |
| | 20100.00 | 88.48 | 359.67 | 10849.84 | 9598.03 | 9600.24 | 353.88 | 0.00 | 519939.82 | 799317.71 | N 32 25 35.78 | W 103 29 50.01 |
| | 20200.00 | 88.48 | 359.67 | 10852.50 | 9698.00 | 9700.20 | 353.30 | 0.00 | 520039.78 | 799317.13 | N 32 25 36.77 | W 103 29 50.01 |
| Cimarex West Grama Ridge 8-5 Federal Com 4H - PBHL [330' FNL, 1020' FWL] | 20294.06 | 88.48 | 359.67 | 10855.00 | 9792.02 | 9794.23 | 352.76 | 0.00 | 520133.80 | 799316.59 | N 32 25 37.70 | W 103 29 50.01 |

**Survey Type:** Non-Def Plan

**Survey Error Model:** ISCWSA Rev 0 *** 3-D 95.000% Confidence 2.7955 sigma

**Survey Program:**

| Description | Part | MD From (ft) | MD To (ft) | EOU Freq (ft) | Hole Size (in) | Casing Diameter (in) | Expected Max Inclination (deg) | Survey Tool Type | Borehole / Survey |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 0.000 | 24.000 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_PLUS_0.5_DEG-Depth Only | Original Borehole / Cimarex West Grama Ridge 8-5 Federal Com 4H Rev1 RM 15Nov17 |
| | 1 | 24.000 | 20294.060 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_PLUS_0.5_DEG | Original Borehole / Cimarex West Grama Ridge 8-5 Federal Com |

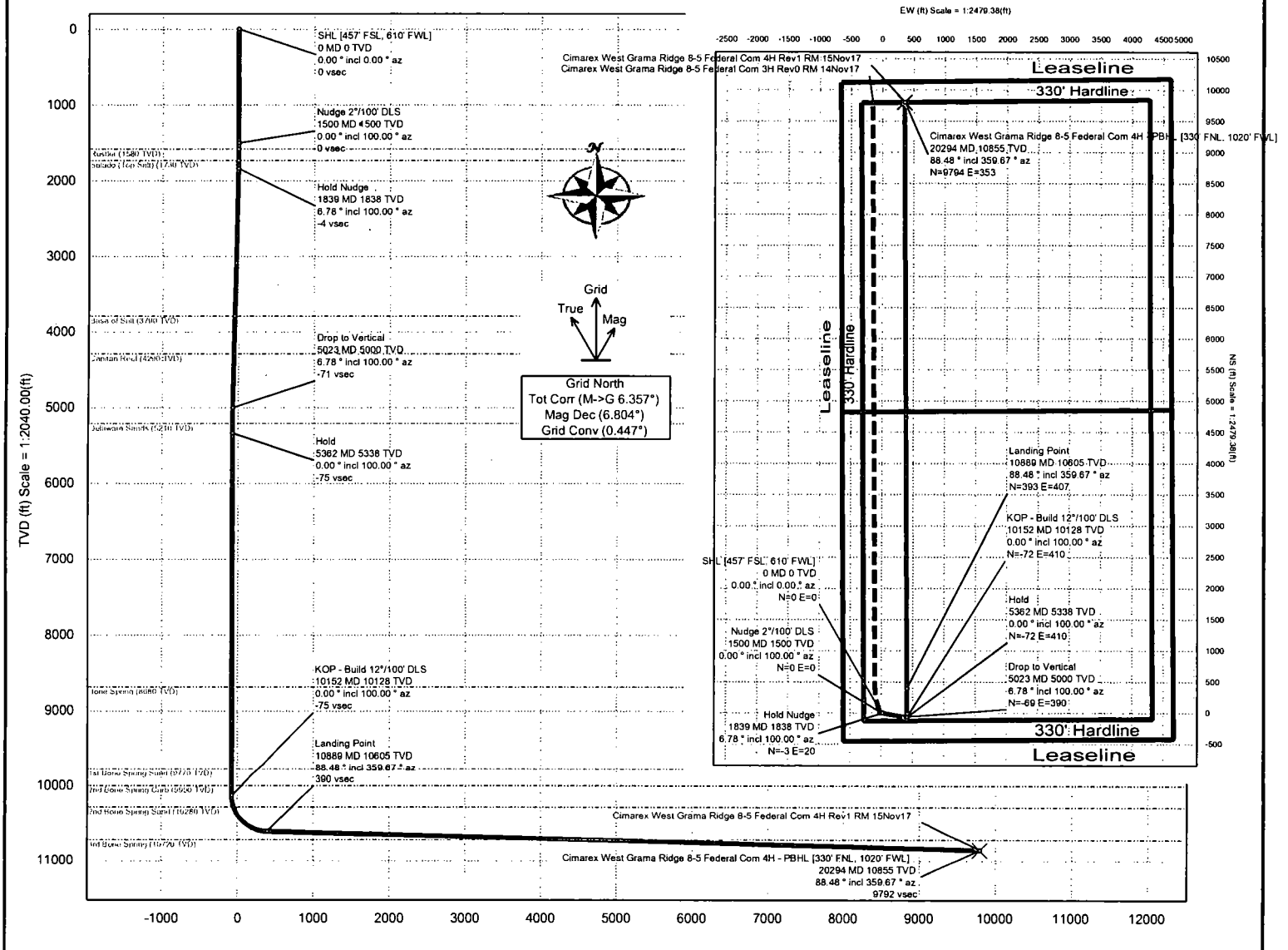
Schlumberger

# Cimarex Rev 1

CIMAREX

| Borehole: | Well: | Field: | Structure: |
|---|---|---|---|
| Original Borehole | Cimarex West Grama Ridge 8-5 Federal Com 4H | NM Lea County (NAD 83) | Cimarex West Grama Ridge 8-5 Federal Com 4H |

| Gravity & Magnetic Parameters | | | | | | Surface Location NAD83 New Mexico State Plane, Eastern Zone, US Feet | | | | | | Miscellaneous | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model: | HDGM 2017 | Dip: | 60.268° | Date: | 15-Nov-2017 | Lat: | N 32 24 0.82 | Northing: | 510339.74ftUS | Grid Conv: | 0.4473° | Slot: | Cimarex West Grama Ridge 8-5 Federal Com 4H | TVD Ref: RKB(3549.5ft above MSL) |
| MagDec: | 6.804° | FS: | 48203.06nT | Gravity FS: | 998.476mgn (9.80665 Based) | Lon: | W 103 29 55.01 | Easting: | 798983.84ftUS | Scale Fact: | 0.9999851 | Plan: | Cimarex West Grama Ridge 8-5 Federal Com 4H Rev1 RM 15Nov17 | |




Vertical Section (ft) Azim = 359.67° Scale = 1:2040.00(ft) Origin = 0N/-S, 0E/-W

## Critical Points

| Critical Point | MD | INCL | AZIM | TVD | VSEC | N(+)/S(-) | E(+)/W(-) | DLS |
|---|---|---|---|---|---|---|---|---|
| SHL [457' FSL, 610' FWL] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Nudge 2°/100' DLS | 1500.00 | 0.00 | 100.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rustler | 1580.01 | 1.60 | 100.00 | 1580.00 | -0.20 | -0.19 | 1.10 | 2.00 |
| Salado (Top Salt) | 1730.25 | 4.60 | 100.00 | 1730.00 | -1.68 | -1.61 | 9.11 | 2.00 |
| Hold Nudge | 1839.08 | 6.78 | 100.00 | 1838.29 | -3.59 | -3.48 | 19.74 | 2.00 |
| Base of Salt | 3804.54 | 6.78 | 100.00 | 3790.00 | -45.22 | -43.78 | 248.30 | 0.00 |
| Capitan Reef | 4308.07 | 6.78 | 100.00 | 4290.00 | -55.88 | -54.11 | 306.86 | 0.00 |
| Drop to Vertical | 5023.07 | 6.78 | 100.00 | 5000.00 | -71.02 | -68.77 | 390.01 | 0.00 |
| Delaware Sands | 5233.82 | 2.57 | 100.00 | 5210.00 | -74.10 | -71.75 | 406.92 | 2.00 |
| Hold | 5362.15 | 0.00 | 100.00 | 5338.29 | -74.62 | -72.25 | 409.75 | 2.00 |
| Bone Spring | 8703.88 | 0.00 | 100.00 | 8680.00 | -74.62 | -72.25 | 409.75 | 0.00 |
| 1st Bone Spring Sand | 9793.88 | 0.00 | 100.00 | 9770.00 | -74.62 | -72.25 | 409.75 | 0.00 |
| 2nd Bone Spring Carb | 10013.88 | 0.00 | 100.00 | 9990.00 | -74.62 | -72.25 | 409.75 | 0.00 |
| KOP - Build 12°/100' DLS | 10151.58 | 0.00 | 100.00 | 10127.70 | -74.62 | -72.25 | 409.75 | 0.00 |
| 2nd Bone Spring Sand | 10306.57 | 18.60 | 359.67 | 10280.00 | -49.88 | -47.31 | 409.60 | 12.00 |
| Landing Point | 10888.87 | 88.48 | 359.67 | 10605.00 | 390.16 | 392.52 | 407.06 | 12.00 |
| 3rd Bone Spring | 15215.26 | 88.48 | 359.67 | 10720.00 | 4715.02 | 4717.30 | 382.08 | 0.00 |
| Cimarex West Grama Ridge 8-5 Federal Com 4H - PBHL [330' FNL, 1020' FWL] | 20294.06 | 88.48 | 359.67 | 10855.00 | 9792.02 | 9794.23 | 352.76 | 0.00 |

Schlumberger

CIMAREX

# Cimarex West Grama Ridge 8-5 Federal Com 4H Rev1 RM 15Nov17 Anti-Collision Summary Report

| | | | |
|---|---|---|---|
| **Analysis Date-24hr Time:** | November 15, 2017 - 09:58 | **Analysis Method:** | 3D Least Distance |
| **Client:** | Cimarex | **Reference Trajectory:** | Plan) |
| **Field:** | NM Lea County (NAD 83) | **Depth Interval:** | Every 10.00 Measured Depth (ft) |
| **Structure:** | Cimarex West Grama Ridge 8-5 Federal Com 4H | **Rule Set:** | NAL Procedure: D&M AntiCollision Standard S002 |
| **Slot:** | Cimarex West Grama Ridge 8-5 Federal Com 4H | **Min Pts:** | All local minima indicated. |
| **Well:** | Cimarex West Grama Ridge 8-5 Federal Com 4H | **Version / Patch:** | 2.10.565.0 |
| **Borehole:** | Original Borehole | **Database \ Project:** | US1153APP452.dir.slb.com\drilling-NM Lea County 2.10 |
| **Scan MD Range:** | 0.00ft ~ 20294.06ft | | |

**Trajectory Error Model:** ISCWSA0 3-D 95.000% Confidence 2.7955 sigma, for subject well. For offset wells, error model version is specified with each well respectively.

**Offset Trajectories Summary**

**Offset Selection Criteria**

Wellhead distance scan: Restricted within 61388.54 ft

Selection filters: Definitive Surveys - Definitive Plans - Definitive surveys exclude definitive plans
- All Non-Def Surveys when no Def-Survey is set in a borehole - All Non-Def Plans when no Def-Plan is set in a borehole

| Offset Trajectory | Separation | | | Allow | Sep. | Controlling | Reference Trajectory | | Risk Level | | | Alert | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ct-Ct (ft) | MAS (ft) | EOU (ft) | Dev. (ft) | Fact. | Rule | MD (ft) | TVD (ft) | Alert | Minor | Major | | |
| Cimarex West Grama Ridge 8-5 Federal Com 3H Rev0 RM 14Nov17 (Non-Def Plan) | | | | | | | | | | | | Warning Alert | |
| | 19.97 | 16.47 | 17.47 | 3.50 | N/A | MAS = 5.02 (m) | 0.00 | 0.00 | CtCt<=15m<15.00 | | | Enter Alert | |
| | 19.96 | 16.47 | 17.46 | 3.49 | N/A | MAS = 5.02 (m) | 24.00 | 24.00 | | | | WRP | |
| | 19.96 | 16.47 | 8.43 | 3.49 | 1.93 | MAS = 5.02 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 19.98 | 16.47 | 8.40 | 3.51 | 1.92 | MAS = 5.02 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 20.12 | 16.47 | 8.45 | 3.65 | 1.92 | MAS = 5.02 (m) | 1530.00 | 1530.00 | | | | MinPt-O-SF | |
| | 55.25 | 18.61 | 42.01 | 36.64 | 4.91 | OSF1.50 | 1970.00 | 1968.29 | OSF>5.00 | | | Exit Alert | |
| | 435.71 | 80.15 | 381.45 | 355.56 | 8.37 | OSF1.50 | 9850.00 | 9826.14 | | | | MINPT-O-EOU | |
| | 435.76 | 80.21 | 381.45 | 355.54 | 8.36 | OSF1.50 | 9860.00 | 9836.14 | | | | MinPt-O-ADP | |
| | 436.29 | 80.38 | 381.86 | 355.90 | 8.35 | OSF1.50 | 9890.00 | 9866.14 | | | | MinPt-O-SF | |
| | 589.66 | 178.84 | 469.59 | 410.81 | 4.99 | OSF1.50 | 13500.00 | 10674.41 | OSF<5.00 | | | Enter Alert | |
| | 588.82 | 523.52 | 238.97 | 65.30 | 1.69 | OSF1.50 | 20280.00 | 10854.63 | | | | MinPt-CtCt | |
| | 588.85 | 523.65 | 238.92 | 65.20 | 1.69 | OSF1.50 | 20290.00 | 10854.89 | | | | MinPts | |
| | 588.91 | 523.59 | 239.02 | 65.32 | 1.69 | OSF1.50 | 20294.06 | 10855.00 | | | | TD | |

Results highlighted: Sep-Factor separation <= 1.50 ft

## 1. Geological Formations

TVD of target 10,855
MD at TD 20,294

Pilot Hole TD N/A
Deepest expected fresh water

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/Target Zone | Hazards |
|---|---|---|---|
| Rustler | 1580 | N/A | |
| Salado | 1730 | N/A | |
| Base of Salt | 3790 | N/A | |
| Capitan Reef | 4290 | N/A | |
| Delaware Sands | 5210 | Hydrocarbons | |
| Bone spring | 8680 | Hydrocarbons | |
| 1st Bone Spring Sand | 9770 | Hydrocarbons | |
| 2nd Bone Spring Carb | 9990 | Hydrocarbons | |
| 2nd Bone Spring Sand | 10280 | Hydrocarbons | |
| 2nd Bone Spring Target | 10605 | Hydrocarbons | |
| 3rd Bone Spring | 10720 | Hydrocarbons | |

## 2. Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|
| 17 1/2 | 0 | 1630 | 13-3/8" | 54.50 | J-55 | ST&C | 1.52 | 3.67 | 5.79 |
| 12 1/4 | 0 | 5190 | 9-5/8" | 40.00 | J-55 | LT&C | 1.34 | 1.43 | 2.50 |
| 8 3/4 | 0 | 10152 | 5-1/2" | 17.00 | L-80 | LT&C | 1.32 | 1.63 | 1.83 |
| 8 3/4 | 10152 | 20294 | 5-1/2" | 17.00 | L-80 | BT&C | 1.24 | 1.52 | 33.22 |
| | | | | BLM Minimum Safety Factor | | | 1.125 | 1 | 1.6 Dry<br>1.8 Wet |

TVD was used on all calculations.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h