Form 3160-3
(June 2015)

HOBBS OCD
AUG 22 2019
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

# APPLICATION FOR PERMIT TO DRILL OR REENTER

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

5. Lease Serial No.
NMNM043562

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☐ Oil Well ☑ Gas Well ☐ Other

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

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

8. Lease Name and Well No.
CASCADE 29 FEDERAL
44H (39781)

2. Name of Operator
CIMAREX ENERGY COMPANY (215099)

9. API Well No.
30-025-46310

3a. Address
600 N. Marienfeld St., Suite 600 Midland TX 79701

3b. Phone No. *(include area code)*
(432)620-1936

10. Field and Pool, or Exploratory (98180)
WOLFCAMP / WILDCAT;WOLFCAMP

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface SESW / 390 FSL / 2265 FWL / LAT 32.095389 / LONG -103.595542
At proposed prod. zone NENW / 100 FNL / 2010 FWL / LAT 32.108559 / LONG -103.595071

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 29 / T25S / R33E / 1PM

14. Distance in miles and direction from nearest town or post office*
23.9 miles

12. County or Parish
LEA

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)
390 feet

16. No of acres in lease
640

17. Spacing Unit dedicated to this well
320

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.
20 feet

19. Proposed Depth
12430 feet / 16994 feet

20. BLM/BIA Bond No. in file
FED: NMB001188

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3408 feet

22. Approximate date work will start*
02/07/2019

23. Estimated duration
30 days

## 24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification.
6. Such other site specific information and/or plans as may be requested by the BLM.

| 25. Signature | Name *(Printed/Typed)* | Date |
|---|---|---|
| (Electronic Submission) | Hope Knauls / Ph: (918)295-1799 | 11/14/2018 |

Title
Regulatory Technician

| Approved by *(Signature)* | Name *(Printed/Typed)* | Date |
|---|---|---|
| (Electronic Submission) | Cody Layton / Ph: (575)234-5959 | 08/15/2019 |

| Title | Office |
|---|---|
| Assistant Field Manager Lands & Minerals | CARLSBAD |

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

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

GCP Rec 08/23/19

APPROVED WITH CONDITIONS

KZ 08/26/19

(Continued on page 2)

SL

**Approval Date: 08/15/2019**

*(Instructions on page 2)

## INSTRUCTIONS

GENERAL: This form is designed for submitting proposals to perform certain well operations, as indicated on Federal and Indian lands and leases for action by appropriate Federal agencies, pursuant to applicable Federal laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from local Federal offices.

ITEM I: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable Federal regulations concerning subsequent work proposals or reports on the well.

ITEM 4: Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local Federal offices for specific instructions.

ITEM 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on the reverse side, showing the roads to, and the surveyed location of, the wen, and any other required information, should be furnished when required by Federal agency offices.

ITEMS 15 AND 18: If well is to be, or has been directionany drilled, give distances for subsurface location of hole in any present or objective productive zone.

ITEM 22: Consult applicable Federal regulations, or appropriate officials, concerning approval of the proposal before operations are started.

ITEM 24: If the proposal will involve hydraulic fracturing operations, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

## NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48( d) provide that you be furnished the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160
PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service wen or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.
ROUTINE USE: Information from the record and/or the record win be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.
EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM conects this information to anow evaluation of the technical, safety, and environmental factors involved with drilling for oil and/or gas on Federal and Indian oil and gas leases. This information will be used to analyze and approve applications. Response to this request is mandatory only if the operator elects to initiate drilling or reentry operations on an oil and gas lease. The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

**BURDEN HOURS STATEMENT:** Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0137), Bureau Information Conection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.



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AFMSS

U.S. Department of the Interior
Bureau of Land Management

*Application for Permit to Drill*

## APD Package Report

Date Printed: 08/20/2019 12:51 PM

| | |
|---|---|
| APD ID: 10400034713 | Well Status: AAPD |
| APD Received Date: 11/14/2018 04:49 PM | Well Name: CASCADE 29 FEDERAL |
| Operator: CIMAREX ENERGY COMPANY | Well Number: 44H |

APD Package Report Contents

- Form 3160-3

- Operator Certification Report

- Application Report
- Application Attachments
  -- Well Plat: 1 file(s)

- Drilling Plan Report
- Drilling Plan Attachments
  -- Blowout Prevention Choke Diagram Attachment: 2 file(s)
  -- Blowout Prevention BOP Diagram Attachment: 2 file(s)
  -- Casing Design Assumptions and Worksheet(s): 4 file(s)
  -- Hydrogen sulfide drilling operations plan: 1 file(s)
  -- Proposed horizontal/directional/multi-lateral plan submission: 2 file(s)
  -- Other Facets: 4 file(s)

- SUPO Report
- SUPO Attachments
  -- New Road Map: 4 file(s)
  -- Attach Well map: 1 file(s)
  -- Production Facilities map: 4 file(s)
  -- Water source and transportation map: 1 file(s)
  -- Well Site Layout Diagram: 1 file(s)
  -- Recontouring attachment: 1 file(s)
  -- Other SUPO Attachment: 11 file(s)

- PWD Report
- PWD Attachments
  -- None

- Bond Report
- Bond Attachments

# PECOS DISTRICT
# SURFACE USE
# CONDITIONS OF APPROVAL

## Cascade 29 Federal Com 15H
## Cascade 29 Federal Com 16H
## Cascade 29 Federal Com 17H
## Cascade 29 Federal Com 29H
## Cascade 29 Federal Com 30H
## Cascade 29 Federal Com 31H
## Cascade 29 Federal Com 43H
## Cascade 29 Federal Com 44H
## Cascade 29 Federal Com 45H

**Lease Number NMNM 0001917**
**Cimarex Energy CO**

## TABLE OF CONTENTS

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.

Federal Mineral Material Pits
Well Pads
Roads

☐ **Road Section Diagram**

☐ **Production (Post Drilling)**

Well Structures & Facilities
Pipelines
Electric Lines

☐ **Interim Reclamation**

☐ **Final Abandonment & Reclamation**

## 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.

### Hydrology

The entire well pad(s) will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. The compacted berm shall be constructed at a minimum of 12 inches with impermeable mineral material (e.g. caliche). 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 integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad 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. Stockpiling of topsoil is required. The top soil shall be stockpiled in an appropriate location to prevent loss of soil due to water or wind erosion and not used for berming or erosion control. If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.

Tank battery locations will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank or 24 hour production, whichever is greater. Automatic shut off, check valves, or similar systems will be installed for tanks to minimize the effects of catastrophic line failures used in production or drilling.

When crossing ephemeral drainages the pipeline(s) will be buried to a minimum depth of 48 inches from the top of pipe to ground level. Erosion control methods such as gabions and/or rock aprons should be placed on both up and downstream sides of the pipeline crossing. In addition, curled (weed free) wood/straw fiber wattles/logs and/or silt fences should be placed on the downstream side for sediment control during construction and maintained until soils and vegetation have stabilized. Water bars should be placed within the ROW to divert and dissipate surface runoff. A pipeline access road is not permitted to cross these ephemeral drainages. Traffic should be diverted to a preexisting route. Additional seeding may be required in floodplains and drainages to restore energy dissipating vegetation.

Prior to pipeline installation/construction a leak detection plan will be developed. The method(s) could incorporate gauges to detect pressure drops, situating valves and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

Any water erosion that may occur due to the construction of overhead electric line and during the life of the power line will be quickly corrected and proper measures will be taken to prevent future erosion. A power pole should not be placed in drainages, playas, wetlands, riparian areas, or floodplains and must span across the features at a distance away that would not promote further erosion.

# VI. CONSTRUCTION

## A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the 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 .

## 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.

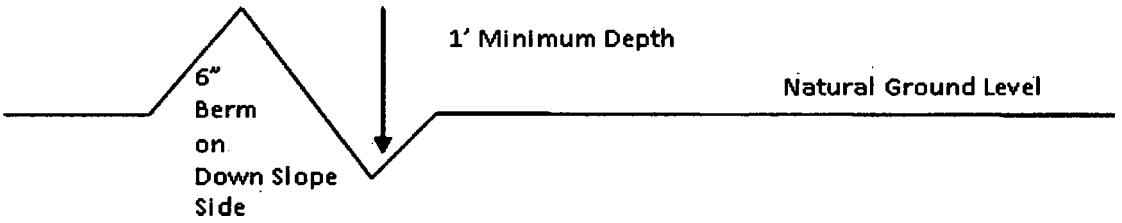
**Turnouts**

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, leadoff 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.




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 %);

**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

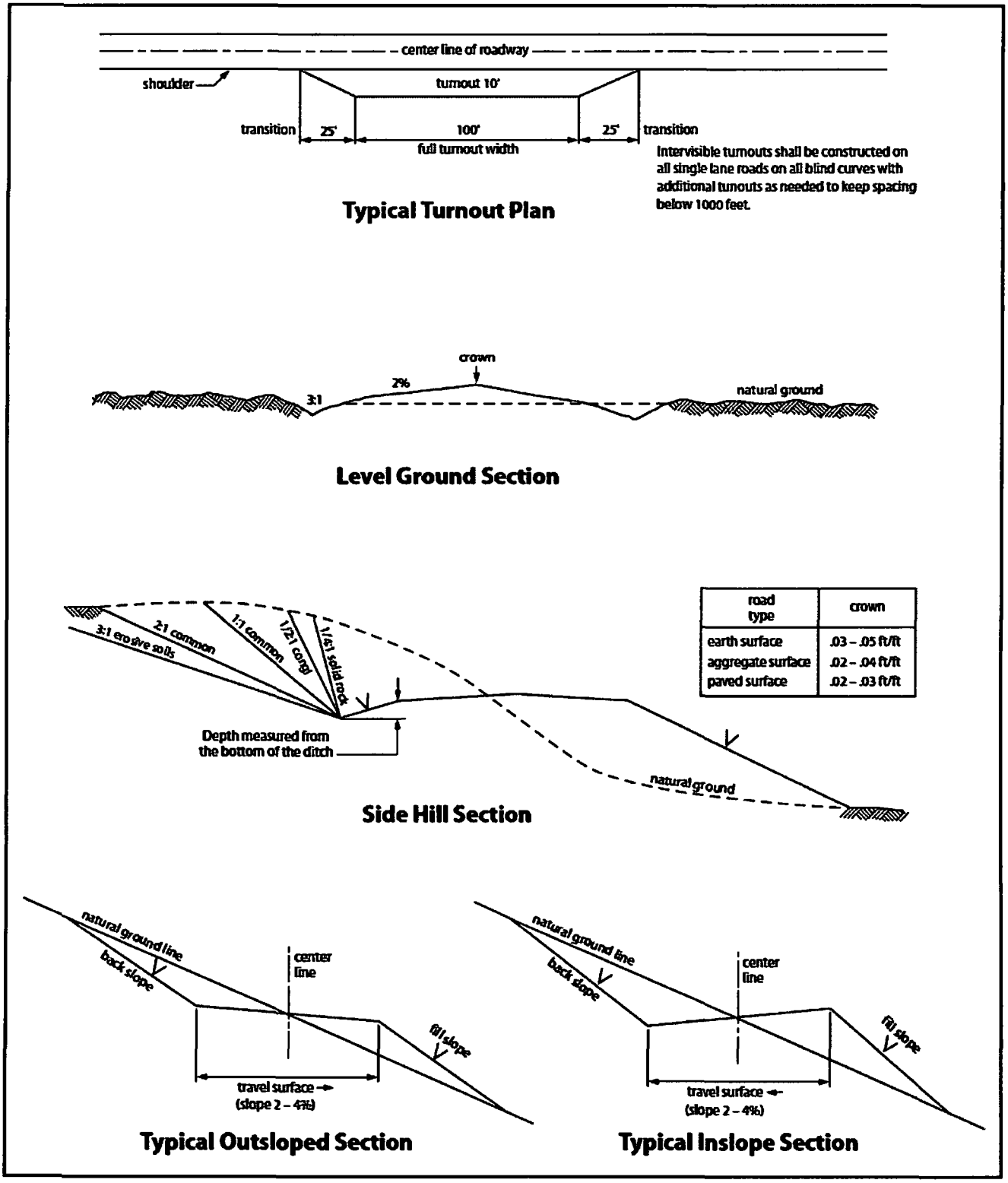



**Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.**

# 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:

- Blading of vegetation within the right-of-way will be allowed: maximum width of blading operations will not exceed **30** feet. The trench is included in this area. (*Blading is defined as the complete removal of brush and ground vegetation.*)

- 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.*)

- 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 |
| ( ) seed mixture 2 | ( ) seed mixture 4 |
| (**X**) 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:

a. 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.
b. 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.

# Temporary Water Line:

Subject to the terms and conditions which are shown below, is hereby approved:

- Surface pipelines 6.5 inch to 16 inch OD may be in place for no more than 180 days not including installation. In accordance with your request, this 180 day period is requested to begin 5/1//2018.

- Surface pipeline will be in operation for no more than 180 days; a maximum of seven (7) days authorized for installation of the lay flat poly line prior to operation.

- Surface pipelines larger than 6.5 inch to-16-inch OD may be in place for no more than 180 days from date of authorization; 5/1/2018, unless a SF-299 is submitted within 30 days of this decision expiring requesting a long term buried fresh water pipeline, and processing of the SF-299 is not yet complete at the end of 30 days, in which case the line(s) may be left in place until a decision is made on the SF-299.

- All lines will be removed when no longer in use.

- Width of authorized use is 15-feet.

• No blading and/or earthwork will be allowed in order to place the pipeline except burying the line under crossings.

• The pipeline will be buried under all intersecting routes, including BLM-designated trails and access roads into caliche pits, rancher watering stations, etc. All such buried crossings will be removed when the pipeline is removed, unless otherwise approved by the Authorized Officer. Pipelines larger than 6.5-inch OD may utilize other crossing methodologies (but any fill placed over pipeline must be brought in from off-site).

• Pipeline crossings of fences should be avoided where possible. If a crossing is necessary, contact fence owner [usually the grazing permittee] prior to installation, and install by threading pipeline under the lowest wire of the fence; pipeline should never cross on top of any fence wires.

• The pipeline shall stay within 10 feet maximum of existing disturbance (e.g. lease road, pipeline right-of-way etc.); placement should be within 5 feet whenever possible.

• Placement of pumps or other high-maintenance equipment shall be installed along maintained lease roads.
• Gas or diesel pumps, generators, or compressors shall be placed on visquen matting [or 20 mil plastic] and in a containment structure capable of containing all potentially released fuels. Containments must be protected against wildlife deaths in accordance with oilfield best management practices.

• Due to potential damage to natural resources, no work is allowed during inclement weather.

• Pipeline will be marked with your company's name and contact number, at beginning and ending points, at all public-road crossings, and at intervals not exceeding every 0.6 mile, unless otherwise approved by the Authorized Officer.

• Should unforeseen damage occur to resources, BLM will require reclamation of the impacted land.
• No water may be released into the environment without BLM consent.

• Placement of surface pipelines along or under public roadways may require permits from the road authority.

• This authorization is limited to lands under BLM jurisdiction. If your proposed pipeline crosses lands under private ownership or under other agency jurisdiction, you are responsible for obtaining all necessary permits and approvals from those parties.

## 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.

11. Special Stipulations:

- For reclamation remove poles, lines, transformer, etc. and dispose of properly.
- 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.

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.

## 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

The 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 will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will 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). The 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. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will 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

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# Operator Certification Data Report

08/20/2019

## Operator Certification

*I hereby certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions which currently exist; that I have full knowledge of state and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or the company I represent, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements.*

**NAME:** Hope Knauls **Signed on:** 11/14/2018

**Title:** Regulatory Technician

**Street Address:** 202 S. Cheyenne Ave, Ste 1000

**City:** Tulsa **State:** OK **Zip:** 74103

**Phone:** (918)295-1799

**Email address:** hknauls@cimarex.com

## Field Representative

**Representative Name:**

**Street Address:**

**City:** **State:** **Zip:**

**Phone:**

**Email address:**

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# Application Data Report

08/20/2019

**APD ID:** 10400034713 **Submission Date:** 11/14/2018

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Well Type:** CONVENTIONAL GAS WELL **Well Work Type:** Drill

Highlighted data reflects the most recent changes

Show Final Text

## Section 1 - General

**APD ID:** 10400034713 **Tie to previous NOS?** Y **Submission Date:** 11/14/2018

**BLM Office:** CARLSBAD **User:** Hope Knauls **Title:** Regulatory Technician

**Federal/Indian APD:** FED **Is the first lease penetrated for production Federal or Indian?** FED

**Lease number:** NMNM043562 **Lease Acres:** 640

**Surface access agreement in place?** **Allotted?** **Reservation:**

**Agreement in place?** NO **Federal or Indian agreement:**

**Agreement number:**

**Agreement name:**

**Keep application confidential?** YES

**Permitting Agent?** NO **APD Operator:** CIMAREX ENERGY COMPANY

**Operator letter of designation:**

## Operator Info

**Operator Organization Name:** CIMAREX ENERGY COMPANY

**Operator Address:** 600 N. Marienfeld St., Suite 600

**Zip:** 79701

**Operator PO Box:**

**Operator City:** Midland **State:** TX

**Operator Phone:** (432)620-1936

**Operator Internet Address:** tstathem@cimarex.com

## Section 2 - Well Information

**Well in Master Development Plan?** NO **Master Development Plan name:**

**Well in Master SUPO?** NO **Master SUPO name:**

**Well in Master Drilling Plan?** NO **Master Drilling Plan name:**

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H **Well API Number:**

**Field/Pool or Exploratory?** Field and Pool **Field Name:** WOLFCAMP **Pool Name:** WILDCAT;WOLFCAMP

**Is the proposed well in an area containing other mineral resources?** USEABLE WATER

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Describe other minerals:**

**Is the proposed well in a Helium production area?** N **Use Existing Well Pad?** NO **New surface disturbance?**

**Type of Well Pad:** MULTIPLE WELL **Multiple Well Pad Name:** CASCADE 29 FEDERAL **Number:** E2E2 PAD

**Well Class:** HORIZONTAL **Number of Legs:** 1

**Well Work Type:** Drill

**Well Type:** CONVENTIONAL GAS WELL

**Describe Well Type:**

**Well sub-Type:** EXPLORATORY (WILDCAT)

**Describe sub-type:**

**Distance to town:** 23.9 Miles **Distance to nearest well:** 20 FT **Distance to lease line:** 390 FT

**Reservoir well spacing assigned acres Measurement:** 320 Acres

**Well plat:** Cascade_29_Fed_44H_C102_20181114132927.pdf

**Well work start Date:** 02/07/2019 **Duration:** 30 DAYS

## Section 3 - Well Location Table

**Survey Type:** RECTANGULAR

**Describe Survey Type:**

**Datum:** NAD83 **Vertical Datum:** NAVD88

**Survey number:** 23782 **Reference Datum:**

| | NS-Foot | NS Indicator | EW-Foot | EW Indicator | Twsp | Range | Section | Aliquot/Lot/Tract | Latitude | Longitude | County | State | Meridian | Lease Type | Lease Number | Elevation | MD | TVD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHL Leg #1 | 390 | FSL | 2265 | FWL | 25S | 33E | 29 | Aliquot SESW | 32.095389 | -103.595542 | LEA | NEW MEXICO | FIRST PRIN | F | NMNM 043562 | 3408 | 0 | 0 |
| KOP Leg #1 | 390 | FSL | 2265 | FWL | 25S | 33E | 29 | Aliquot SESW | 32.095394 | -103.5965833 | LEA | NEW MEXICO | FIRST PRIN | F | NMNM 043562 | -8496 | 11914 | 11904 |
| PPP Leg #1 | 589 | FSL | 1998 | FWL | 25S | 33E | 29 | Aliquot SESW | 32.095939 | -103.5963972 | LEA | NEW MEXICO | FIRST PRIN | F | NMNM 043562 | -8894 | 12380 | 12302 |

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

| | NS-Foot | NS Indicator | EW-Foot | EW Indicator | Twsp | Range | Section | Aliquot/Lot/Tract | Latitude | Longitude | County | State | Meridian | Lease Type | Lease Number | Elevation | MD | TVD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXIT Leg #1 | 100 | FNL | 2010 | FWL | 25S | 33E | 29 | Aliquot NENW | 32.108559 | -103.595071 | LEA | NEW MEXICO | FIRST PRIN | F | NMNM 043562 | -9022 | 16994 | 12430 |
| BHL Leg #1 | 100 | FNL | 2010 | FWL | 25S | 33E | 29 | Aliquot NENW | 32.108559 | -103.595071 | LEA | NEW MEXICO | FIRST PRIN | F | NMNM 043562 | -9022 | 16994 | 12430 |

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# Drilling Plan Data Report

08/20/2019

**APD ID:** 10400034713 **Submission Date:** 11/14/2018

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Well Type:** CONVENTIONAL GAS WELL **Well Work Type:** Drill

Show Final Text

## Section 1 - Geologic Formations

| Formation ID | Formation Name | Elevation | True Vertical Depth | Measured Depth | Lithologies | Mineral Resources | Producing Formation |
|---|---|---|---|---|---|---|---|
| 1 | RUSTLER | 3408 | 935 | 935 | | NATURAL GAS,OIL | N |
| 2 | TOP SALT | 2110 | 1298 | 1298 | | NATURAL GAS,OIL | N |
| 3 | BASE OF SALT | -1306 | 4714 | 4714 | | NATURAL GAS,OIL | N |
| 4 | LAMAR | -1501 | 4909 | 4909 | | NATURAL GAS,OIL | N |
| 5 | BELL CANYON | -1529 | 4937 | 4937 | | NATURAL GAS,OIL | N |
| 6 | CHERRY CANYON | -2582 | 5990 | 5990 | | NATURAL GAS,OIL | N |
| 7 | BRUSHY CANYON | -4128 | 7536 | 7536 | | NATURAL GAS,OIL | N |
| 8 | BONE SPRING | -5624 | 9032 | 9032 | | NATURAL GAS,OIL | N |
| 9 | BONE SPRING 1ST | -6603 | 10011 | 10011 | | NATURAL GAS,OIL | N |
| 10 | BONE SPRING 2ND | -7175 | 10583 | 10583 | | NATURAL GAS,OIL | N |
| 11 | BONE SPRING 3RD | -8314 | 11722 | 11722 | | NATURAL GAS,OIL | N |
| 12 | WOLFCAMP | -8781 | 12189 | 12189 | | NATURAL GAS,OIL | N |
| 13 | WOLFCAMP | -9022 | 12430 | 12430 | | NATURAL GAS,OIL | Y |

## Section 2 - Blowout Prevention

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Pressure Rating (PSI):** 10M **Rating Depth:** 16994

**Equipment:** A BOP consisting of three rams, including one blind ram and two pipe rams and one annular preventer. An accumulator that meets the requirements in Onshore Order #2 for the pressure rating of the BOP stack. A rotating head may be installed as needed. A Kelly clock will be installed and maintained in operable condition and a drill string safety valve in the open position will be available on the rig floor.
**Requesting Variance?** YES

**Variance request:** Co-flex line between the BOP and choke manifold. Certification for proposed co-flex hose is attached. The hose is not required by the manufacturer to be anchored. In the event the specific hose is not available, one of equal or higher rating will be used. Variance to include Hammer Union connections on lines downstream of the buffer tank only. Cimarex requests a 5M annular variance for the 10M BOP system. See attached procedure
**Testing Procedure:** A multi-bowl wellhead system will be utilized. After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2. The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office. The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative. All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type. A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi. The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater. The casing string utilizing steel body pack-off will be tested to 70% of casing burst. If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.
**Choke Diagram Attachment:**

Cascade_29_Fed_44H_10M_Choke_20181114150137.pdf

**BOP Diagram Attachment:**

Cascade_29_Fed_44H_10M_BOP_20181114150519.pdf

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**Pressure Rating (PSI):** 5M **Rating Depth:** 12565

**Equipment:** A BOP consisting of three rams, including one blind ram and two pipe rams and one annular preventer. An accumulator that meets the requirements in Onshore Order #2 for the pressure rating of the BOP stack. A rotating head may be installed as needed. A Kelly clock will be installed and maintained in operable condition and a drill string safety valve in the open position will be available on the rig floor.
**Requesting Variance?** YES

**Variance request:** Co-flex line between the BOP and choke manifold. Certification for proposed co-flex hose is attached. The hose is not required by the manufacturer to be anchored. In the event the specific hose is not available, one of equal or higher rating will be used. Variance to include Hammer Union connections on lines downstream of the buffer tank only. Cimarex requests a 5M annular variance for the 10M BOP system. See attached procedure.
**Testing Procedure:** A multi-bowl wellhead system will be utilized. After running the 10-3/4" surface casing, a 13 5/8" BOP/BOPE system with a minimum working pressure of 10000 psi will be installed on the wellhead system and will be pressure tested to 250 psi low followed by a 10000 psi test. Annular will be tested to 50% of working pressure. The pressure test will be repeated at least every 30 days, as per Onshore Order No. 2. The multi-bowl wellhead will be installed by vendor's representative. A copy of the installation instructions has been sent to the BLM field office. The wellhead will be installed by a third-party welder while being monitored by the wellhead vendor representative. All BOP equipment will be tested utilizing a conventional test plug. Not a cup or J-packer type. A solid steel body pack-off will be utilized after running and cementing the intermediate casing. After installation the pack-off and lower flange will be pressure tested to 10000 psi. The surface casing string will be tested as per Onshore Order No. 2 to at least 0.22 psi/ft or 1500 psi, whichever is greater. The casing string utilizing steel body pack-off will be tested to 70% of casing burst. If well conditions dictate conventional slips will be set and BOPE will be tested to appropriate pressures based on permitted pressure requirements.
**Choke Diagram Attachment:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

Cascade_29_Fed_44H_5M_Choke_20181114145922.pdf

**BOP Diagram Attachment:**

Cascade_29_Fed_44H_5M_BOP_20181114145944.pdf

## Section 3 - Casing

| Casing ID | String Type | Hole Size | Csg Size | Condition | Standard | Tapered String | Top Set MD | Bottom Set MD | Top Set TVD | Bottom Set TVD | Top Set MSL | Bottom Set MSL | Calculated casing length MD | Grade | Weight | Joint Type | Collapse SF | Burst SF | Joint SF Type | Joint SF | Body SF Type | Body SF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SURFACE | 14.75 | 10.75 | NEW | API | N | 0 | 985 | 0 | 985 | 0 | 985 | 985 | J-55 | 40.5 | BUTT | 3.51 | 6.94 | BUOY | 15.77 | BUOY | 15.77 |
| 2 | PRODUCTION | 6.875 | 5.5 | NEW | API | N | 0 | 11914 | 0 | 11914 | 0 | 11914 | 11914 | L-80 | 20 | BUTT | 1.43 | 1.6 | BUOY | 2.86 | BUOY | 2.86 |
| 3 | INTERMEDIATE | 9.875 | 7.75 | NEW | API | N | 0 | 12565 | 0 | 12565 | 0 | 12565 | 12565 | L-80 | 29.7 | BUTT | 2.47 | 1.19 | BUOY | 1.81 | BUOY | 1.81 |
| 4 | PRODUCTION | 6.75 | 5.0 | NEW | API | N | 11914 | 16994 | 11914 | 16994 | 11914 | 16994 | 5080 | HCP-110 | 18 | BUTT | 1.66 | 1.69 | BUOY | 62.45 | BUOY | 62.45 |

**Casing Attachments**

**Casing ID:** 1 **String Type:** SURFACE

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Cascade_29_Fed_44H_Casing_Assumptions_20181114150930.pdf

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Casing Attachments**

**Casing ID:** 2 **String Type:** PRODUCTION

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Cascade_29_Fed_44H_Casing_Assumptions_20181114151551.pdf

**Casing ID:** 3 **String Type:** INTERMEDIATE

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Cascade_29_Fed_44H_Casing_Assumptions_20181114151605.pdf

**Casing ID:** 4 **String Type:** PRODUCTION

**Inspection Document:**

**Spec Document:**

**Tapered String Spec:**

**Casing Design Assumptions and Worksheet(s):**

Cascade_29_Fed_44H_Casing_Assumptions_20181114151618.pdf

## Section 4 - Cement

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

| String Type | Lead/Tail | Stage Tool Depth | Top MD | Bottom MD | Quantity(sx) | Yield | Density | Cu Ft | Excess% | Cement type | Additives |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SURFACE | Lead | | 0 | 985 | 332 | 1.72 | 13.5 | 571 | 50 | Class C | Bentonite |
| SURFACE | Tail | | 0 | 985 | 156 | 1.34 | 14.8 | 208 | 25 | Class C | LCM |
| PRODUCTION | Lead | | 0 | 11914 | 360 | 1.3 | 14.2 | 467 | 10 | 50:50 (Poz:H) | Salt, Bentonite, fluid Loss, Dispersant, SMS |
| INTERMEDIATE | Lead | | 0 | 12565 | 595 | 3.64 | 10.3 | 2164 | 50 | Tuned Light | LCM |
| INTERMEDIATE | Tail | | 0 | 12565 | 207 | 1.3 | 14.2 | 268 | 25 | 50:50 (PozH) | Salt, Bentonite, Fluid Loss, Dispersant, SMS |
| INTERMEDIATE | Lead | 4850 | 0 | 12565 | 786 | 1.88 | 12.9 | 1476 | 50 | 35:65 (Poz: C) | Salt, Bentonite |
| PRODUCTION | Lead | | 11914 | 16994 | 360 | 1.3 | 14.2 | 467 | 10 | 50:50 (Poz:H) | Salt, Bentonite, Fluid Loss, Dispersant, SMS |

## Section 5 - Circulating Medium

**Mud System Type:** Closed

**Will an air or gas system be Used?** NO

**Description of the equipment for the circulating system in accordance with Onshore Order #2:**

**Diagram of the equipment for the circulating system in accordance with Onshore Order #2:**

**Describe what will be on location to control well or mitigate other conditions:** Sufficient mud materials will be kept on location at all times in order to combat lost circulation or unexpected kicks. In order to run DSTs, open hole logs, and casing, the viscosity and water loss may have to be adjusted in order to meet these needs.
**Describe the mud monitoring system utilized:** PVT/Pason/Visual Monitoring

## Circulating Medium Table

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

| Top Depth | Bottom Depth | Mud Type | Min Weight (lbs/gal) | Max Weight (lbs/gal) | Density (lbs/cu ft) | Gel Strength (lbs/100 sqft) | PH | Viscosity (CP) | Salinity (ppm) | Filtration (cc) | Additional Characteristics |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 985 | 12565 | OTHER : Brine Diesel Emulsion | 8.5 | 9 | | | | | | | |
| 0 | 985 | SPUD MUD | 8.3 | 8.8 | | | | | | | |
| 12565 | 16994 | OIL-BASED MUD | 12 | 12.5 | | | | | | | |

## Section 6 - Test, Logging, Coring

**List of production tests including testing procedures, equipment and safety measures:**

No DST Planned

**List of open and cased hole logs run in the well:**

CNL,DS,GR

**Coring operation description for the well:**

N/A

## Section 7 - Pressure

**Anticipated Bottom Hole Pressure:** 8079 **Anticipated Surface Pressure:** 5344.4

**Anticipated Bottom Hole Temperature(F):** 192

**Anticipated abnormal pressures, temperatures, or potential geologic hazards?** YES

**Describe:**

Lost circulation may be encountered in the Delaware mountain group. Abnormal pressure as well as hole stability issues may be encountered in the Wolfcamp.
(Also if we are in the Capitan Reef area we should mention that it can have lost circulation)

**Contingency Plans geoharzards description:**

Lost circulation material will be available, as well as additional drilling fluid along with the fluid volume in the drilling rig pit system. Drilling fluid can be mixed on location or mixed in vendor mud plant and trucked to location if needed. Sufficient barite will be available to maintain appropriate mud weight for the Wolfcamp interval.
**Contingency Plans geohazards attachment:**

**Hydrogen Sulfide drilling operations plan required?** YES

**Hydrogen sulfide drilling operations plan:**

Cascade_29_Fed_44H_H2S_Plan_20181114154024.pdf

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

## Section 8 - Other Information

**Proposed horizontal/directional/multi-lateral plan submission:**

Cascade_29_Fed_44H_AC_Report_20181114154450.pdf

Cascade_29_Fed_44H_Directional_Plan_20190717163856.pdf

**Other proposed operations facets description:**

**Other proposed operations facets attachment:**

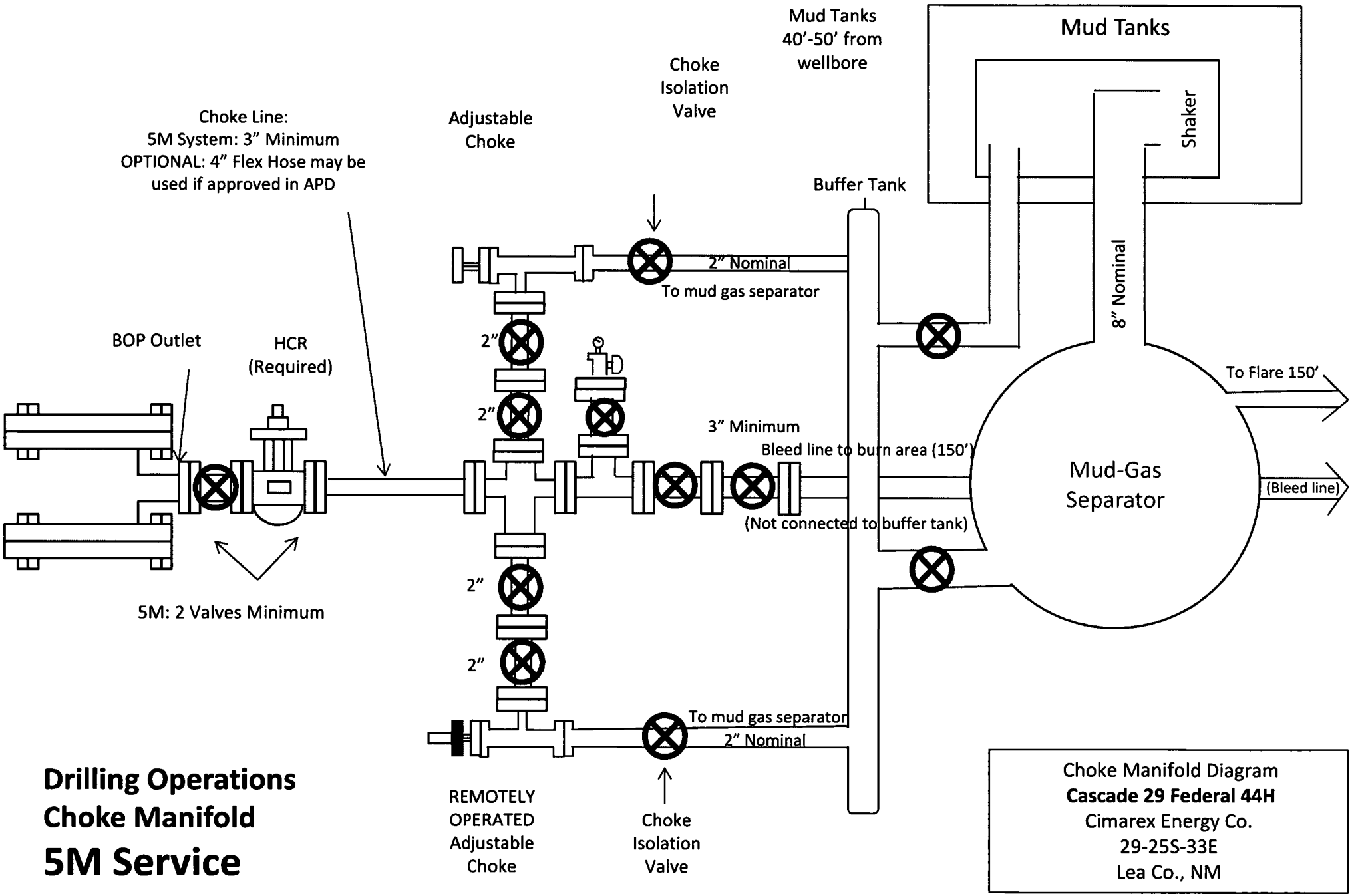
Cascade_29_Fed_44H_Drilling_Plan_20181114154558.pdf

Cascade_29_Fed_44H_Flex_Hose_20181114154616.pdf

Cascade_29_Fed_44H_Gas_Capture_Plan_20181114154617.pdf

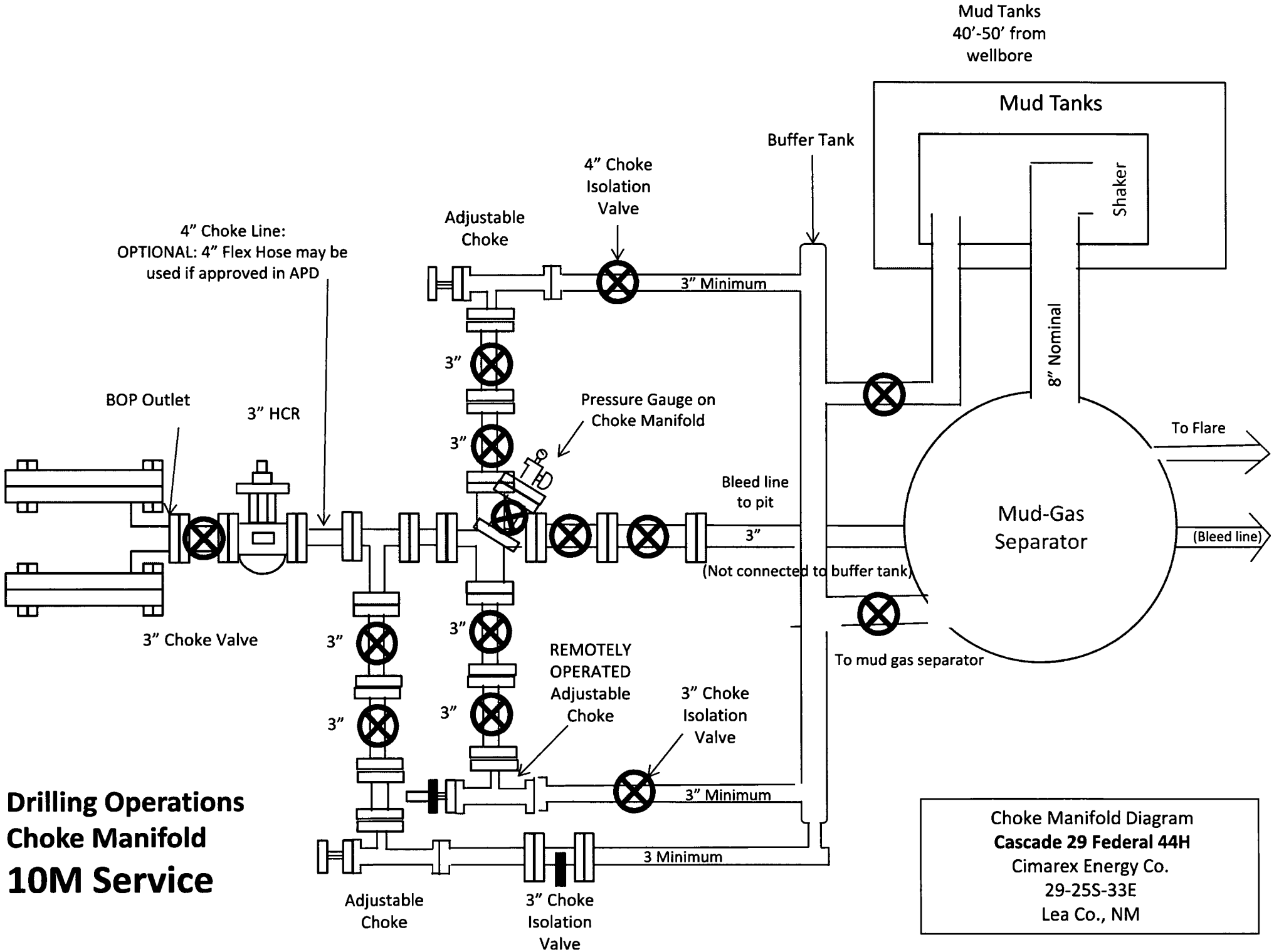
Cascade_29_Fed_44H_Well_Control_10M_w_5M_annular_Plan_20190415155850.pdf

**Other Variance attachment:**




**Drilling Operations**
**Choke Manifold**
**5M Service**

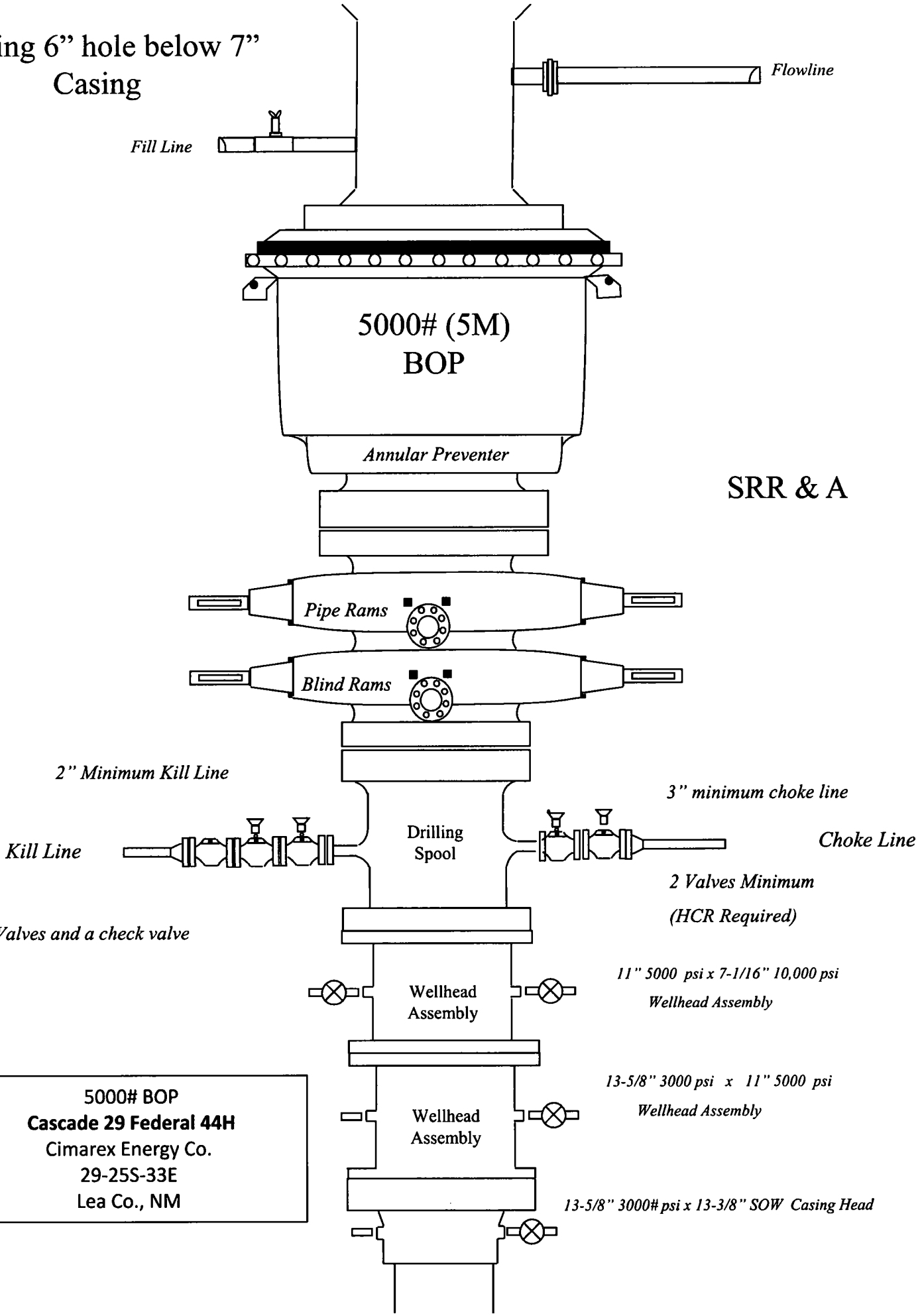
Choke Manifold Diagram
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM




**Drilling Operations**
**Choke Manifold**
**10M Service**

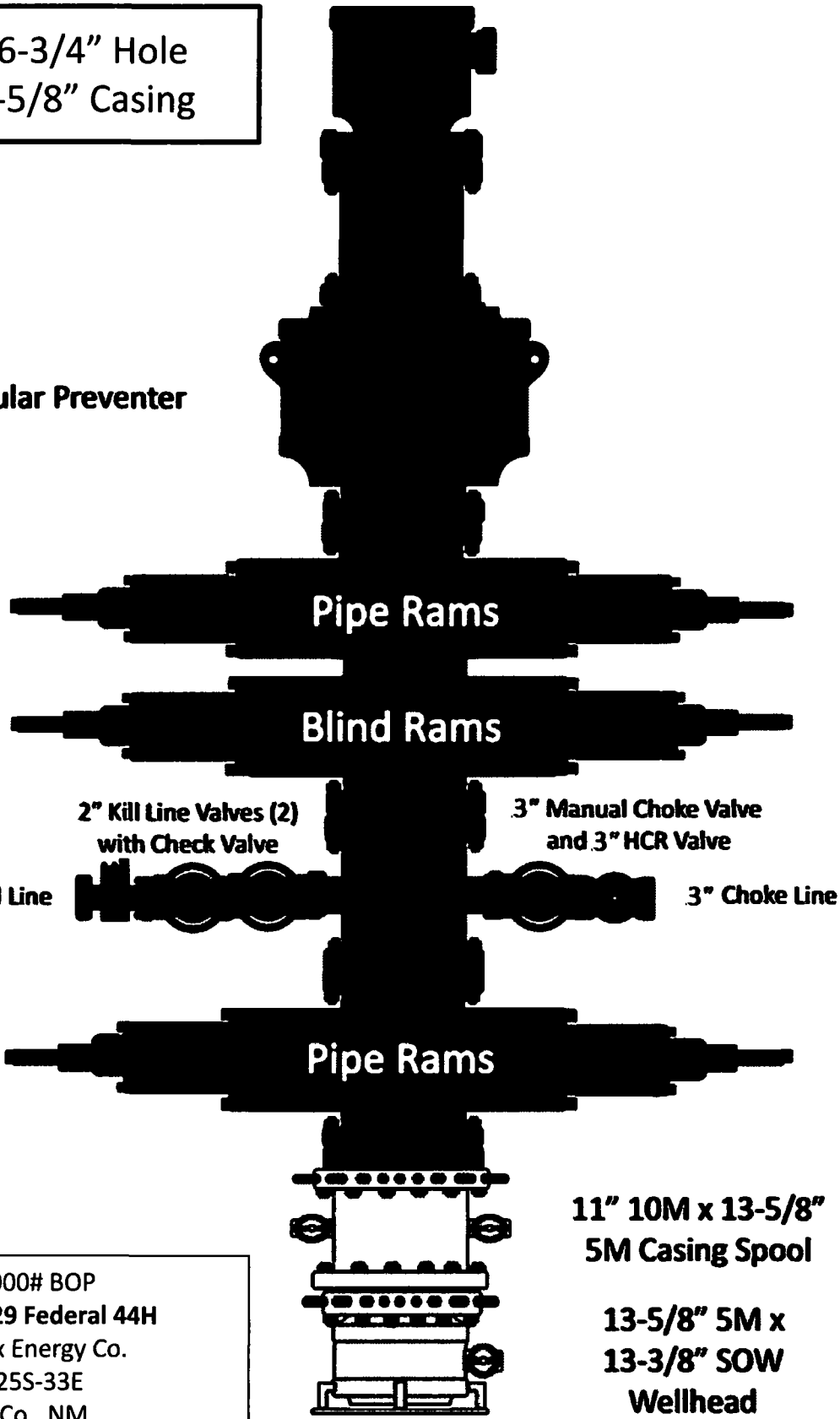
Choke Manifold Diagram
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

# Drilling 6" hole below 7" Casing




5000# BOP
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

Drilling 6-3/4" Hole
below 7-5/8" Casing




10,000# BOP
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

# Cascade 29 Federal 44H

## Casing Assumptions

**2. Casing Program**

| Hole Size | Casing Depth From | Casing Depth To | Setting Depth TVD | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 3/4 | 0 | 985 | 985 | 10-3/4" | 40.50 | J-55 | BT&C | 3.51 | 6.94 | 15.77 |
| 9 7/8 | 0 | 12565 | 12381 | 7-5/8" | 29.70 | L-80 | BT&C | 2.47 | 1.19 | 1.81 |
| 6 3/4 | 0 | 11914 | 11914 | 5-1/2" | 20.00 | P-110 | BT&C | 1.43 | 1.60 | 2.86 |
| 6 3/4 | 11914 | 16994 | 12430 | 5" | 18.00 | HCP-110 | BT&C | 1.66 | 1.69 | 62.45 |
| | | | | | | 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

Request Variance for 5-1/2" x 7-5/8" annular clearance. The portion that does not meet clearance will not be cemented

# Cascade 29 Federal 44H

## Casing Assumptions

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| Hole Size | Casing Depth From | Casing Depth To | Setting Depth TVD | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
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# Cascade 29 Federal 44H

## Casing Assumptions

**2. Casing Program**

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| 6 3/4 | 11914 | 16994 | 12430 | 5" | 18.00 | HCP-110 | BT&C | 1.66 | 1.69 | 62.45 |
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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

Request Variance for 5-1/2" x 7-5/8" annular clearance. The portion that does not meet clearance will not be cemented

Hydrogen Sulfide Drilling Operations Plan
**Cascade 29 Federal 44H**
Cimarex Energy Co.
UL: N, Sec. 29, 25S, 33E
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.

$H_2S$ Contingency Plan
**Cascade 29 Federal 44H**
Cimarex Energy Co.
UL: N, Sec. 29, 25S, 33E
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
**Cascade 29 Federal 44H**
Cimarex Energy Co.
UL: N, Sec. 29, 25S, 33E
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

# Cimarex Cascade 29 Federal #44H Rev1 RM 11Oct18 Anti-Collision Summary Report

| | | | |
|---|---|---|---|
| **Analysis Date-24hr Time:** | October 11, 2018 - 15:27 | **Analysis Method:** | 3D Least Distance |
| **Client:** | Cimarex Energy | **Reference Trajectory:** | Cimarex Cascade 29 Federal #44H Rev1 RM 11Oct18 (Non-Def Plan) |
| **Field:** | NM Lea County (NAD 83) | **Depth Interval:** | Every 10.00 Measured Depth (ft) |
| **Structure:** | Cimarex Cascade 29 Federal #44H | **Rule Set:** | NAL Procedure: D&M AntiCollision Standard S002 |
| **Slot:** | New Slot | **Min Pts:** | All local minima indicated. |
| **Well:** | Cascade 29 Federal #44H | **Version / Patch:** | 2.10.740.0 |
| **Borehole:** | Cascade 29 Federal #44H | **Database \ Project:** | US1153APP452.dir.slb.com\drilling-NM Lea County 2.10 |
| **Scan MD Range:** | 0.00ft ~ 16994.65ft | | |

**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: Not performed!

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 Cascade 29 Federal #2H Extreme+MWD 0ft to 14248ft (Def Survey) | | | | | | | | | | | | Fail Minor | |
| | 4575.73 | 32.81 | 4573.23 | 4542.92 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 4575.70 | 32.81 | 4573.15 | 4542.89 | 98873.36 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 4565.52 | 32.81 | 4555.64 | 4532.71 | 618.73 | MAS = 10.00 (m) | 1650.00 | 1650.00 | | | | MinPts | |
| | 4566.32 | 32.81 | 4554.47 | 4533.51 | 488.19 | MAS = 10.00 (m) | 2130.00 | 2130.00 | | | | MINPT-O-EOU | |
| | 4567.09 | 32.81 | 4554.46 | 4534.28 | 451.03 | MAS = 10.00 (m) | 2310.00 | 2310.00 | | | | MINPT-O-EOU | |
| | 4577.17 | 32.81 | 4559.05 | 4544.37 | 292.82 | MAS = 10.00 (m) | 3720.00 | 3719.80 | | | | MinPts | |
| | 419.53 | 128.33 | 333.14 | 291.19 | 4.97 | OSF1.50 | 9500.00 | 9489.71 | OSF<5.00 | | | Enter Alert | |
| | 195.73 | 204.23 | 58.75 | -8.50 | 1.44 | OSF1.50 | 9780.00 | 9769.71 | | OSF<1.50 | | Enter Minor | |
| | 164.65 | 235.46 | 6.85 | -70.81 | 1.04 | OSF1.50 | 9890.00 | 9879.71 | | | | MinPts | |
| | 200.27 | 202.62 | 64.36 | -2.35 | 1.48 | OSF1.50 | 10000.00 | 9989.71 | | OSF>1.50 | | Exit Minor | |
| | 417.85 | 130.96 | 329.71 | 286.89 | 4.85 | OSF1.50 | 10270.00 | 10259.71 | OSF>5.00 | | | Exit Alert | |
| | 2571.76 | 72.76 | 2522.42 | 2499.00 | 54.85 | OSF1.50 | 14330.00 | 12430.00 | | | | MinPts | |
| | 2572.04 | 72.82 | 2522.66 | 2499.22 | 54.81 | OSF1.50 | 14430.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2564.92 | 77.10 | 2512.69 | 2487.82 | 51.52 | OSF1.50 | 15240.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2560.77 | 90.94 | 2499.31 | 2469.83 | 43.39 | OSF1.50 | 16180.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2560.96 | 91.56 | 2499.09 | 2469.40 | 43.09 | OSF1.50 | 16220.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2561.21 | 91.86 | 2499.14 | 2469.35 | 42.95 | OSF1.50 | 16240.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2650.96 | 100.13 | 2583.37 | 2550.83 | 40.69 | OSF1.50 | 16940.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2664.71 | 100.61 | 2596.81 | 2564.11 | 40.70 | OSF1.50 | 16994.65 | 12430.00 | | | | TD | |
| Cimarex Cascade 29 Federal #45H Rev0 RM 09Oct18 (Non-Def Plan) | | | | | | | | | | | | Warning Alert | |
| | 19.99 | 16.49 | 17.49 | 3.50 | N/A | MAS = 5.03 (m) | 0.00 | 0.00 | CtCt<=15m<15.00 | | | Enter Alert | |
| | 19.99 | 16.49 | 17.49 | 3.50 | N/A | MAS = 5.03 (m) | 26.00 | 26.00 | | | | WRP | |
| | 19.99 | 16.49 | 8.46 | 3.50 | 1.94 | MAS = 5.03 (m) | 1500.00 | 1500.00 | | | | MinPts | |

Results highlighted: Sep-Factor separation <= 1.50 ft

| 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 | | |
| | 20.01 | 16.49 | 8.43 | 3.52 | 1.93 | MAS = 5.03 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 20.15 | 16.49 | 8.47 | 3.65 | 1.92 | MAS = 5.03 (m) | 1530.00 | 1530.00 | | | | MinPt-O-SF | |
| | 61.60 | 20.23 | 47.28 | 41.37 | 5.00 | OSF1.50 | 2180.00 | 2180.00 | OSF>5.00 | | | Exit Alert | |
| | 481.65 | 61.87 | 439.57 | 419.78 | 12.11 | OSF1.50 | 8500.00 | 8489.84 | | | | MinPt-O-SF | |
| | 486.36 | 62.34 | 443.97 | 424.02 | 12.13 | OSF1.50 | 8600.00 | 8589.72 | | | | MinPt-O-SF | |
| | 419.94 | 127.81 | 333.90 | 292.13 | 5.00 | OSF1.50 | 14540.00 | 12430.00 | OSF<5.00 | | | Enter Alert | |
| | 419.93 | 193.31 | 290.23 | 226.62 | 3.28 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #43H Rev0 RM 09Oct18 (Non-Def Plan) | | | | | | | | | | | | | Warning Alert |
| | 20.13 | 16.61 | 17.63 | 3.53 | N/A | MAS = 5.06 (m) | 0.00 | 0.00 | CtCt<=15m<15.00 | | | Enter Alert | |
| | 20.13 | 16.61 | 17.63 | 3.53 | N/A | MAS = 5.06 (m) | 26.00 | 26.00 | | | | WRP | |
| | 20.13 | 16.61 | 8.60 | 3.53 | 1.95 | MAS = 5.06 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 20.15 | 16.61 | 8.57 | 3.54 | 1.94 | MAS = 5.06 (m) | 1510.00 | 1510.00 | | | | MINPT-O-EOU | |
| | 20.28 | 16.61 | 8.61 | 3.68 | 1.94 | MAS = 5.06 (m) | 1530.00 | 1530.00 | | | | MinPt-O-SF | |
| | 57.32 | 18.99 | 43.82 | 38.32 | 4.99 | OSF1.50 | 2000.00 | 2000.00 | OSF>5.00 | | | Exit Alert | |
| | 404.76 | 58.55 | 364.90 | 346.21 | 10.77 | OSF1.50 | 7550.00 | 7541.82 | | | | MinPt-O-SF | |
| | 406.74 | 58.81 | 366.70 | 347.93 | 10.77 | OSF1.50 | 7610.00 | 7601.69 | | | | MinPt-O-SF | |
| | 352.38 | 61.84 | 310.32 | 290.55 | 8.84 | OSF1.50 | 8660.00 | 8649.71 | | | | MinPt-O-SF | |
| | 352.28 | 61.81 | 310.24 | 290.47 | 8.85 | OSF1.50 | 8680.00 | 8669.71 | | | | MinPts | |
| | 352.27 | 80.45 | 297.81 | 271.83 | 6.73 | OSF1.50 | 11914.87 | 11904.58 | | | | MinPt-CtCt | |
| | 352.28 | 80.48 | 297.80 | 271.80 | 6.73 | OSF1.50 | 11920.00 | 11909.71 | | | | MinPts | |
| | 352.72 | 80.67 | 298.11 | 272.05 | 6.72 | OSF1.50 | 11950.00 | 11939.67 | | | | MinPt-O-SF | |
| | 419.94 | 88.97 | 359.79 | 330.97 | 7.24 | OSF1.50 | 12939.89 | 12430.00 | | | | MinPt-CtCt | |
| | 419.94 | 127.97 | 333.79 | 291.97 | 4.99 | OSF1.50 | 14870.00 | 12430.00 | OSF<5.00 | | | Enter Alert | |
| | 419.94 | 186.64 | 294.68 | 233.30 | 3.40 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #5H Extreme+MWD 0ft to 14373ft MD (Def Survey) | | | | | | | | | | | | | Warning Alert |
| | 4861.32 | 32.81 | 4858.82 | 4828.51 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | MinPts | |
| | 4861.34 | 32.81 | 4858.81 | 4828.53 | 224776.10 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 4861.50 | 32.81 | 4857.61 | 4828.69 | 3496.99 | MAS = 10.00 (m) | 300.00 | 300.00 | | | | MinPts | |
| | 4862.03 | 32.81 | 4856.64 | 4829.22 | 1683.44 | MAS = 10.00 (m) | 580.00 | 580.00 | | | | MINPT-O-EOU | |
| | 4861.56 | 32.81 | 4854.71 | 4828.75 | 1115.60 | MAS = 10.00 (m) | 980.00 | 980.00 | | | | MinPts | |
| | 4861.65 | 32.81 | 4854.62 | 4828.85 | 1071.97 | MAS = 10.00 (m) | 1020.00 | 1020.00 | | | | MINPT-O-EOU | |
| | 4863.12 | 32.81 | 4854.89 | 4830.31 | 849.25 | MAS = 10.00 (m) | 1270.00 | 1270.00 | | | | MinPts | |
| | 4863.82 | 32.81 | 4853.84 | 4831.01 | 649.54 | MAS = 10.00 (m) | 1610.00 | 1610.00 | | | | MINPT-O-EOU | |
| | 4866.13 | 32.81 | 4854.69 | 4833.32 | 544.27 | MAS = 10.00 (m) | 1930.00 | 1930.00 | | | | MinPts | |
| | 4866.26 | 32.81 | 4854.57 | 4833.45 | 529.62 | MAS = 10.00 (m) | 1990.00 | 1990.00 | | | | MINPT-O-EOU | |
| | 4857.42 | 32.81 | 4837.30 | 4824.61 | 275.71 | MAS = 10.00 (m) | 4270.00 | 4268.65 | | | | MinPt-O-SF | |
| | 773.35 | 235.88 | 614.67 | 537.47 | 4.98 | OSF1.50 | 9700.00 | 9689.71 | OSF<5.00 | | | Enter Alert | |
| | 752.66 | 240.76 | 590.70 | 511.90 | 4.75 | OSF1.50 | 9870.00 | 9859.71 | | | | MinPt-O-SF | |
| | 752.62 | 240.74 | 590.67 | 511.88 | 4.75 | OSF1.50 | 9880.00 | 9869.71 | | | | MinPts | |
| | 772.04 | 235.25 | 613.83 | 536.79 | 4.98 | OSF1.50 | 10050.00 | 10039.71 | OSF>5.00 | | | Exit Alert | |
| | 2683.90 | 95.38 | 2619.48 | 2588.52 | 43.31 | OSF1.50 | 13410.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2683.58 | 94.41 | 2619.80 | 2589.17 | 43.75 | OSF1.50 | 13510.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2689.28 | 88.45 | 2629.48 | 2600.83 | 46.89 | OSF1.50 | 14090.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2689.28 | 88.47 | 2629.47 | 2600.81 | 46.88 | OSF1.50 | 14100.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2689.30 | 88.50 | 2629.47 | 2600.81 | 46.86 | OSF1.50 | 14110.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2690.58 | 88.81 | 2630.54 | 2601.77 | 46.72 | OSF1.50 | 14220.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2675.98 | 91.12 | 2614.41 | 2584.87 | 45.25 | OSF1.50 | 15660.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2676.48 | 92.74 | 2613.82 | 2583.74 | 44.45 | OSF1.50 | 15780.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2677.21 | 93.61 | 2613.97 | 2583.60 | 44.04 | OSF1.50 | 15840.00 | 12430.00 | | | | MinPt-O-ADP | |

| 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 | | |
| | 2680.51 | 96.18 | 2615.55 | 2584.33 | 42.88 | OSF1.50 | 16020.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2809.87 | 110.08 | 2735.65 | 2699.79 | 39.14 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPt-O-SF | |
| Cimarex Cascade 29 Federal #31H Rev1 RM 11Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1165.00 | 32.81 | 1162.50 | 1132.19 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1164.98 | 32.81 | 1162.48 | 1132.17 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 813.32 | 77.14 | 760.88 | 736.18 | 16.40 | OSF1.50 | 9180.00 | 9169.71 | | | | MinPts | |
| | 813.36 | 77.19 | 760.89 | 736.17 | 16.39 | OSF1.50 | 9190.00 | 9179.71 | | | | MinPt-O-ADP | |
| | 814.01 | 77.31 | 761.46 | 736.70 | 16.38 | OSF1.50 | 9220.00 | 9209.71 | | | | MinPt-O-SF | |
| | 3244.11 | 154.50 | 3140.28 | 3089.61 | 31.99 | OSF1.50 | 16990.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3244.11 | 154.62 | 3140.19 | 3089.48 | 31.96 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #17H Rev1 RM 11Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1854.73 | 32.81 | 1852.23 | 1821.92 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1854.72 | 32.81 | 1852.22 | 1821.91 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 990.28 | 59.41 | 949.46 | 930.86 | 26.53 | OSF1.50 | 8630.00 | 8619.71 | | | | MinPt-O-SF | |
| | 989.75 | 59.36 | 948.97 | 930.39 | 26.54 | OSF1.50 | 8680.00 | 8669.71 | | | | MinPt-O-ADP | |
| | 989.75 | 78.19 | 936.41 | 911.55 | 19.84 | OSF1.50 | 11690.00 | 11679.71 | | | | MinPts | |
| | 836.86 | 82.97 | 780.21 | 753.89 | 15.82 | OSF1.50 | 12270.00 | 12228.17 | | | | MinPt-CtCt | |
| | 837.00 | 83.43 | 780.04 | 753.57 | 15.74 | OSF1.50 | 12320.00 | 12263.82 | | | | MINPT-O-EOU | |
| | 837.21 | 83.68 | 780.08 | 753.53 | 15.69 | OSF1.50 | 12350.00 | 12283.53 | | | | MinPt-O-ADP | |
| | 839.91 | 89.35 | 778.99 | 750.56 | 14.70 | OSF1.50 | 12939.89 | 12430.00 | | | | MinPt-CtCt | |
| | 839.91 | 187.68 | 713.44 | 652.23 | 6.83 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #3H XEM+MWD 0ft to 14241ft MD (Def Survey) | | | | | | | | | | | | | Pass |
| | 4617.60 | 32.81 | 4615.10 | 4584.79 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 4617.60 | 32.81 | 4615.10 | 4584.79 | N/A | MAS = 10.00 (m) | 20.00 | 20.00 | | | | MinPts | |
| | 4617.60 | 32.81 | 4615.07 | 4584.79 | 155167.49 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 4617.45 | 32.81 | 4612.62 | 4584.64 | 1979.56 | MAS = 10.00 (m) | 410.00 | 410.00 | | | | MinPts | |
| | 4617.78 | 32.81 | 4612.02 | 4584.97 | 1414.53 | MAS = 10.00 (m) | 660.00 | 660.00 | | | | MINPT-O-EOU | |
| | 4618.07 | 32.81 | 4610.51 | 4585.26 | 911.21 | MAS = 10.00 (m) | 1090.00 | 1090.00 | | | | MinPts | |
| | 4618.06 | 32.81 | 4609.98 | 4585.25 | 827.28 | MAS = 10.00 (m) | 1220.00 | 1220.00 | | | | MinPts | |
| | 4618.58 | 32.81 | 4607.65 | 4585.77 | 547.19 | MAS = 10.00 (m) | 1870.00 | 1870.00 | | | | MinPts | |
| | 4619.42 | 32.81 | 4606.64 | 4586.61 | 449.31 | MAS = 10.00 (m) | 2330.00 | 2330.00 | | | | MINPT-O-EOU | |
| | 4621.68 | 32.81 | 4606.66 | 4588.87 | 369.20 | MAS = 10.00 (m) | 2850.00 | 2850.00 | | | | MinPts | |
| | 4621.76 | 32.81 | 4606.57 | 4588.95 | 364.10 | MAS = 10.00 (m) | 2890.00 | 2890.00 | | | | MINPT-O-EOU | |
| | 1085.16 | 295.56 | 887.29 | 789.60 | 5.54 | OSF1.50 | 9880.00 | 9869.71 | | | | MinPts | |
| | 1085.17 | 295.57 | 887.30 | 789.61 | 5.54 | OSF1.50 | 9890.00 | 9879.71 | | | | MinPt-O-SF | |
| | 2761.63 | 103.13 | 2692.05 | 2658.50 | 41.13 | OSF1.50 | 13210.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2761.40 | 102.82 | 2692.02 | 2658.58 | 41.25 | OSF1.50 | 13220.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2739.89 | 93.03 | 2677.03 | 2646.85 | 45.35 | OSF1.50 | 13780.00 | 12430.00 | | | | MinPts | |
| | 2739.85 | 92.93 | 2677.06 | 2646.91 | 45.40 | OSF1.50 | 13800.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2749.67 | 83.16 | 2693.40 | 2666.51 | 51.09 | OSF1.50 | 14550.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2749.61 | 83.09 | 2693.39 | 2666.52 | 51.13 | OSF1.50 | 14570.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2749.59 | 83.00 | 2693.43 | 2666.59 | 51.19 | OSF1.50 | 14600.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2748.31 | 82.02 | 2692.80 | 2666.29 | 51.79 | OSF1.50 | 14810.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2748.32 | 82.03 | 2692.80 | 2666.29 | 51.79 | OSF1.50 | 14820.00 | 12430.00 | | | | MinPts | |
| | 2748.96 | 82.20 | 2693.33 | 2666.76 | 51.69 | OSF1.50 | 14920.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2752.37 | 82.41 | 2696.59 | 2669.95 | 51.61 | OSF1.50 | 15130.00 | 12430.00 | | | | MinPt-O-SF | |
| | 2752.73 | 82.15 | 2697.13 | 2670.58 | 51.79 | OSF1.50 | 15200.00 | 12430.00 | | | | MinPt-CtCt | |

| 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 | | |
| | 2740.71 | 91.67 | 2678.76 | 2649.04 | 46.06 | OSF1.50 | 16190.00 | 12430.00 | | | | MinPt-CtCt | |
| | 2740.84 | 92.08 | 2678.62 | 2648.75 | 45.85 | OSF1.50 | 16220.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 2741.05 | 92.36 | 2678.64 | 2648.69 | 45.71 | OSF1.50 | 16240.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 2832.03 | 101.10 | 2763.80 | 2730.93 | 43.05 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPt-O-SF | |
| Cimarex Cascade 29 Federal #30H Rev0 RM 09Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1185.00 | 32.81 | 1182.50 | 1152.19 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1184.98 | 32.81 | 1182.48 | 1152.17 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1184.98 | 32.81 | 1173.47 | 1152.17 | 131.23 | MAS = 10.00 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 1185.00 | 32.81 | 1173.40 | 1152.20 | 129.82 | MAS = 10.00 (m) | 1520.00 | 1520.00 | | | | MINPT-O-EOU | |
| | 1409.03 | 39.08 | 1382.14 | 1369.95 | 57.68 | OSF1.50 | 5180.00 | 5176.76 | | | | MinPt-O-SF | |
| | 1192.15 | 64.66 | 1148.13 | 1127.48 | 28.81 | OSF1.50 | 9470.00 | 9459.71 | | | | MinPt-CtCt | |
| | 1192.32 | 65.71 | 1147.61 | 1126.62 | 28.33 | OSF1.50 | 9620.00 | 9609.71 | | | | MINPT-O-EOU | |
| | 1192.44 | 65.84 | 1147.64 | 1126.60 | 28.28 | OSF1.50 | 9640.00 | 9629.71 | | | | MinPt-O-ADP | |
| | 1201.88 | 67.28 | 1156.13 | 1134.60 | 27.84 | OSF1.50 | 9890.00 | 9879.71 | | | | MinPt-O-SF | |
| | 2784.86 | 164.69 | 2674.23 | 2620.17 | 25.73 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #16H Rev0 RM 05Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1874.73 | 32.81 | 1872.23 | 1841.92 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1874.72 | 32.81 | 1872.22 | 1841.91 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1193.73 | 81.38 | 1138.36 | 1112.36 | 22.88 | OSF1.50 | 11914.87 | 11904.58 | | | | MinPt-CtCt | |
| | 1193.74 | 81.42 | 1138.35 | 1112.33 | 22.87 | OSF1.50 | 11920.00 | 11909.71 | | | | MinPts | |
| | 1201.46 | 82.42 | 1145.41 | 1119.04 | 22.72 | OSF1.50 | 12060.00 | 12047.48 | | | | MinPt-O-SF | |
| | 1259.83 | 90.80 | 1198.25 | 1169.03 | 21.51 | OSF1.50 | 12939.89 | 12430.00 | | | | MinPt-CtCt | |
| | 1259.84 | 189.27 | 1132.61 | 1070.57 | 10.13 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #29H Rev1 RM 11Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1204.99 | 32.81 | 1202.49 | 1172.18 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1204.97 | 32.81 | 1202.47 | 1172.16 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1204.97 | 32.81 | 1193.46 | 1172.16 | 133.46 | MAS = 10.00 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 1204.99 | 32.81 | 1193.39 | 1172.19 | 132.02 | MAS = 10.00 (m) | 1520.00 | 1520.00 | | | | MINPT-O-EOU | |
| | 1719.58 | 51.91 | 1684.13 | 1667.66 | 52.12 | OSF1.50 | 6780.00 | 6773.42 | | | | MinPt-O-SF | |
| | 1612.84 | 59.72 | 1572.19 | 1553.11 | 42.21 | OSF1.50 | 8620.00 | 8609.71 | | | | MinPt-O-SF | |
| | 1612.10 | 60.34 | 1571.04 | 1551.76 | 41.75 | OSF1.50 | 8820.00 | 8809.71 | | | | MinPt-CtCt | |
| | 1612.26 | 61.14 | 1570.67 | 1551.12 | 41.18 | OSF1.50 | 8970.00 | 8959.71 | | | | MINPT-O-EOU | |
| | 1612.36 | 61.25 | 1570.69 | 1551.11 | 41.10 | OSF1.50 | 8990.00 | 8979.71 | | | | MinPt-O-ADP | |
| | 1630.71 | 63.28 | 1587.69 | 1567.43 | 40.18 | OSF1.50 | 9370.00 | 9359.71 | | | | MinPt-O-SF | |
| | 3555.25 | 168.68 | 3441.97 | 3386.57 | 32.07 | OSF1.50 | 16990.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3555.25 | 168.79 | 3441.89 | 3386.46 | 32.05 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal #1H (offset) Gyro+MWD 0ft to 14296ft (Def Survey) | | | | | | | | | | | | | Pass |
| | 4945.90 | 32.81 | 4943.40 | 4913.09 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | MinPts | |
| | 4945.90 | 32.81 | 4943.38 | 4913.09 | 178266.94 | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 4946.36 | 32.81 | 4942.95 | 4913.55 | 5410.31 | MAS = 10.00 (m) | 250.00 | 250.00 | | | | MINPT-O-EOU | |
| | 4947.90 | 32.81 | 4943.01 | 4915.09 | 2071.36 | MAS = 10.00 (m) | 510.00 | 510.00 | | | | MINPT-O-EOU | |
| | 4951.91 | 32.81 | 4944.20 | 4919.11 | 949.71 | MAS = 10.00 (m) | 1160.00 | 1160.00 | | | | MINPT-O-EOU | |
| | 4952.07 | 32.81 | 4944.21 | 4919.26 | 923.37 | MAS = 10.00 (m) | 1200.00 | 1200.00 | | | | MINPT-O-EOU | |
| | 4974.86 | 32.81 | 4955.87 | 4942.05 | 301.53 | MAS = 10.00 (m) | 3930.00 | 3929.36 | | | | MinPts | |

| 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 | | |
| | 4974.88 | 32.81 | 4955.85 | 4942.07 | 300.81 | MAS = 10.00 (m) | 3960.00 | 3959.30 | | | | MINPT-O-EOU | |
| | 4975.09 | 32.81 | 4955.80 | 4942.28 | 296.16 | MAS = 10.00 (m) | 4150.00 | 4148.90 | | | | MinPts | |
| | 4972.76 | 32.81 | 4953.22 | 4939.95 | 292.34 | MAS = 10.00 (m) | 4290.00 | 4288.61 | | | | MinPt-O-SF | |
| | 1532.95 | 245.56 | 1368.41 | 1287.39 | 9.44 | OSF1.50 | 9850.00 | 9839.71 | | | | MinPts | |
| | 1532.95 | 245.57 | 1368.41 | 1287.39 | 9.44 | OSF1.50 | 9860.00 | 9849.71 | | | | MinPt-O-SF | |
| | 3044.56 | 133.76 | 2954.55 | 2910.80 | 34.76 | OSF1.50 | 13030.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3061.01 | 114.77 | 2983.66 | 2946.24 | 40.86 | OSF1.50 | 13890.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3060.96 | 114.71 | 2983.66 | 2946.25 | 40.89 | OSF1.50 | 13900.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3060.91 | 114.59 | 2983.69 | 2946.33 | 40.93 | OSF1.50 | 13920.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3067.14 | 107.84 | 2994.41 | 2959.30 | 43.64 | OSF1.50 | 14340.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3067.12 | 107.82 | 2994.41 | 2959.30 | 43.65 | OSF1.50 | 14350.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3067.11 | 107.79 | 2994.42 | 2959.32 | 43.66 | OSF1.50 | 14360.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3060.40 | 103.40 | 2990.63 | 2957.00 | 45.46 | OSF1.50 | 14640.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3056.24 | 102.99 | 2986.74 | 2953.25 | 45.58 | OSF1.50 | 14780.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3053.63 | 102.87 | 2984.21 | 2950.76 | 45.60 | OSF1.50 | 14990.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3053.67 | 102.97 | 2984.19 | 2950.70 | 45.55 | OSF1.50 | 15010.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3053.72 | 103.03 | 2984.21 | 2950.70 | 45.53 | OSF1.50 | 15020.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3054.83 | 103.42 | 2985.04 | 2951.40 | 45.37 | OSF1.50 | 15100.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3056.34 | 102.43 | 2987.22 | 2953.91 | 45.84 | OSF1.50 | 15180.00 | 12430.00 | | | | MinPts | |
| | 3058.13 | 103.08 | 2988.57 | 2955.04 | 45.57 | OSF1.50 | 15390.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3058.12 | 102.82 | 2988.74 | 2955.31 | 45.69 | OSF1.50 | 15470.00 | 12430.00 | | | | MinPts | |
| | 3056.80 | 103.63 | 2986.88 | 2953.17 | 45.30 | OSF1.50 | 15660.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3056.73 | 103.60 | 2986.83 | 2953.13 | 45.32 | OSF1.50 | 15670.00 | 12430.00 | | | | MinPts | |
| | 3051.64 | 104.60 | 2981.08 | 2947.05 | 44.80 | OSF1.50 | 15840.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3046.11 | 106.64 | 2974.18 | 2939.46 | 43.84 | OSF1.50 | 16030.00 | 12430.00 | | | | MinPts | |
| | 3038.39 | 109.85 | 2964.32 | 2928.54 | 42.42 | OSF1.50 | 16290.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3038.55 | 110.47 | 2964.07 | 2928.08 | 42.18 | OSF1.50 | 16330.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3038.79 | 110.78 | 2964.10 | 2928.01 | 42.06 | OSF1.50 | 16350.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3102.09 | 119.81 | 3021.39 | 2982.29 | 39.63 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPt-O-SF | |
| Cimarex Cascade 29 Federal #15H Rev1 RM 11Oct18 (Non-Def Plan) | | | | | | | | | | | | | Pass |
| | 1894.72 | 32.81 | 1892.22 | 1861.91 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 1894.71 | 32.81 | 1892.21 | 1861.90 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 1894.71 | 32.81 | 1883.20 | 1861.90 | 209.97 | MAS = 10.00 (m) | 1500.00 | 1500.00 | | | | MinPts | |
| | 1894.79 | 32.81 | 1883.09 | 1861.98 | 205.89 | MAS = 10.00 (m) | 1550.00 | 1550.00 | | | | MINPT-O-EOU | |
| | 1936.58 | 32.81 | 1918.15 | 1903.77 | 121.45 | MAS = 10.00 (m) | 3630.00 | 3629.96 | | | | MinPt-O-SF | |
| | 1618.74 | 79.04 | 1565.05 | 1539.70 | 31.87 | OSF1.50 | 11914.87 | 11904.58 | | | | MinPt-CtCt | |
| | 1618.76 | 79.08 | 1565.04 | 1539.68 | 31.85 | OSF1.50 | 11920.00 | 11909.71 | | | | MinPts | |
| | 1635.77 | 80.77 | 1580.94 | 1555.00 | 31.46 | OSF1.50 | 12140.00 | 12121.46 | | | | MinPt-O-SF | |
| | 1679.78 | 89.22 | 1619.36 | 1590.55 | 29.11 | OSF1.50 | 12939.89 | 12430.00 | | | | MinPt-CtCt | |
| | 1679.78 | 189.02 | 1552.83 | 1490.76 | 13.51 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPts | |
| Cimarex Cascade 29 Federal 7H XEM+MWD Survey 0ft - 14306'MD (Def Survey) | | | | | | | | | | | | | Pass |
| | 5036.15 | 32.81 | 5033.65 | 5003.34 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 5036.12 | 32.81 | 5033.61 | 5003.31 | N/A | MAS = 10.00 (m) | 10.00 | 10.00 | | | | MinPt-O-SF | |
| | 5036.10 | 32.81 | 5033.60 | 5003.30 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 5001.26 | 32.81 | 4983.36 | 4968.46 | 324.84 | MAS = 10.00 (m) | 3510.00 | 3510.00 | | | | MinPts | |
| | 5001.29 | 32.81 | 4983.34 | 4968.48 | 323.88 | MAS = 10.00 (m) | 3530.00 | 3530.00 | | | | MINPT-O-EOU | |
| | 5001.80 | 32.81 | 4983.69 | 4968.99 | 320.67 | MAS = 10.00 (m) | 3600.00 | 3599.98 | | | | MinPt-O-SF | |
| | 2022.72 | 235.71 | 1864.70 | 1787.01 | 13.00 | OSF1.50 | 9870.00 | 9859.71 | | | | MinPt-O-SF | |
| | 2022.70 | 235.71 | 1864.68 | 1786.99 | 13.00 | OSF1.50 | 9880.00 | 9869.71 | | | | MinPts | |

| 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 | | |
| | 3202.48 | 134.64 | 3111.89 | 3067.84 | 36.32 | OSF1.50 | 12990.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3179.57 | 120.06 | 3098.69 | 3059.51 | 40.54 | OSF1.50 | 13520.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3176.92 | 117.36 | 3097.84 | 3059.56 | 41.46 | OSF1.50 | 13630.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3173.41 | 113.29 | 3097.05 | 3060.12 | 42.93 | OSF1.50 | 13820.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3167.76 | 108.08 | 3094.87 | 3059.68 | 44.97 | OSF1.50 | 14080.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3167.64 | 107.93 | 3094.86 | 3059.72 | 45.03 | OSF1.50 | 14100.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3167.57 | 107.70 | 3094.93 | 3059.86 | 45.13 | OSF1.50 | 14130.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3159.06 | 99.51 | 3091.89 | 3059.56 | 48.81 | OSF1.50 | 14460.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3149.74 | 96.11 | 3084.83 | 3053.62 | 50.43 | OSF1.50 | 14770.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3145.28 | 93.66 | 3082.01 | 3051.62 | 51.71 | OSF1.50 | 15080.00 | 12430.00 | | | | MinPts | |
| | 3142.77 | 93.04 | 3079.91 | 3049.73 | 52.02 | OSF1.50 | 15290.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3142.87 | 93.33 | 3079.81 | 3049.54 | 51.86 | OSF1.50 | 15320.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3143.04 | 93.52 | 3079.85 | 3049.51 | 51.75 | OSF1.50 | 15340.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3315.65 | 105.63 | 3244.40 | 3210.02 | 48.19 | OSF1.50 | 16550.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3454.60 | 109.05 | 3381.07 | 3345.55 | 48.60 | OSF1.50 | 16994.65 | 12430.00 | | | | TD | |
| Cimarex Cascade 29 Federal 4H XEM:MWD 0ft to 14230ft MD (Def Survey) | | | | | | | | | | | | | Pass |
| | 5102.55 | 32.81 | 5100.05 | 5069.74 | N/A | MAS = 10.00 (m) | 0.00 | 0.00 | | | | Surface | |
| | 5102.52 | 32.81 | 5100.02 | 5069.71 | N/A | MAS = 10.00 (m) | 10.00 | 10.00 | | | | MinPt-O-SF | |
| | 5102.51 | 32.81 | 5100.01 | 5069.70 | N/A | MAS = 10.00 (m) | 26.00 | 26.00 | | | | WRP | |
| | 5102.35 | 32.81 | 5099.39 | 5069.54 | 11108.02 | MAS = 10.00 (m) | 150.00 | 150.00 | | | | MinPts | |
| | 5102.43 | 32.81 | 5099.31 | 5069.62 | 8219.05 | MAS = 10.00 (m) | 190.00 | 190.00 | | | | MINPT-O-EOU | |
| | 5131.62 | 32.81 | 5115.90 | 5098.81 | 388.18 | MAS = 10.00 (m) | 3030.00 | 3030.00 | | | | MinPts | |
| | 5132.13 | 32.81 | 5115.63 | 5099.33 | 366.33 | MAS = 10.00 (m) | 3200.00 | 3200.00 | | | | MINPT-O-EOU | |
| | 5160.42 | 32.81 | 5141.94 | 5127.61 | 322.72 | MAS = 10.00 (m) | 4190.00 | 4188.82 | | | | MinPt-O-SF | |
| | 2941.70 | 232.58 | 2785.81 | 2709.11 | 19.16 | OSF1.50 | 9900.00 | 9889.71 | | | | MinPts | |
| | 2941.70 | 232.59 | 2785.81 | 2709.11 | 19.16 | OSF1.50 | 9910.00 | 9899.71 | | | | MinPt-O-ADP | |
| | 2941.75 | 232.60 | 2785.85 | 2709.15 | 19.16 | OSF1.50 | 9920.00 | 9909.71 | | | | MinPt-O-SF | |
| | 3768.37 | 150.37 | 3667.29 | 3618.00 | 38.20 | OSF1.50 | 13240.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3767.89 | 149.79 | 3667.19 | 3618.10 | 38.35 | OSF1.50 | 13280.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3767.61 | 148.93 | 3667.49 | 3618.68 | 38.57 | OSF1.50 | 13340.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3767.97 | 133.17 | 3678.36 | 3634.80 | 43.23 | OSF1.50 | 13730.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3765.70 | 130.16 | 3678.10 | 3635.54 | 44.22 | OSF1.50 | 13820.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3751.57 | 118.26 | 3671.90 | 3633.31 | 48.58 | OSF1.50 | 14280.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3750.74 | 117.30 | 3671.71 | 3633.44 | 48.98 | OSF1.50 | 14340.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3747.92 | 112.02 | 3672.41 | 3635.90 | 51.30 | OSF1.50 | 14430.00 | 12430.00 | | | | MinPts | |
| | 3665.12 | 96.97 | 3599.64 | 3568.15 | 58.15 | OSF1.50 | 15430.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3651.31 | 97.43 | 3585.52 | 3553.87 | 57.65 | OSF1.50 | 15720.00 | 12430.00 | | | | MinPt-O-SF | |
| | 3633.77 | 101.74 | 3565.11 | 3532.03 | 54.89 | OSF1.50 | 16170.00 | 12430.00 | | | | MinPt-CtCt | |
| | 3633.98 | 102.28 | 3564.97 | 3531.71 | 54.59 | OSF1.50 | 16210.00 | 12430.00 | | | | MINPT-O-EOU | |
| | 3634.23 | 102.55 | 3565.03 | 3531.68 | 54.45 | OSF1.50 | 16230.00 | 12430.00 | | | | MinPt-O-ADP | |
| | 3711.69 | 112.05 | 3636.16 | 3599.65 | 50.79 | OSF1.50 | 16994.65 | 12430.00 | | | | MinPt-O-SF | |

Schlumberger

# Cimarex Cascade 29 Federal #44H Rev1 RM 11Oct18 Proposal Geodetic Report

**(Non-Def Plan)**

CIMAREX

| | | | |
|---|---|---|---|
| **Report Date:** | October 11, 2018 - 03:26 PM | **Survey / DLS Computation:** | Minimum Curvature / Lubinski |
| **Client:** | Cimarex Energy | **Vertical Section Azimuth:** | 359.635 ° (Grid North) |
| **Field:** | NM Lea County (NAD 83) | **Vertical Section Origin:** | 0.000 ft, 0.000 ft |
| **Structure / Slot:** | Cimarex Cascade 29 Federal #44H / New Slot | **TVD Reference Datum:** | RKB |
| **Well:** | Cascade 29 Federal #44H | **TVD Reference Elevation:** | 3434.300 ft above MSL |
| **Borehole:** | Cascade 29 Federal #44H | **Seabed / Ground Elevation:** | 3408.300 ft above MSL |
| **UWI / API#:** | Unknown / Unknown | **Magnetic Declination:** | 6.722 ° |
| **Survey Name:** | Cimarex Cascade 29 Federal #44H Rev1 RM 11Oct18 | **Total Gravity Field Strength:** | 998.4290mgn (9.80665 Based) |
| **Survey Date:** | October 09, 2018 | **Gravity Model:** | GARM |
| **Tort / AHD / DDI / ERD Ratio:** | 100.402 ° / 5121.107 ft / 5.847 / 0.412 | **Total Magnetic Field Strength:** | 47822.079 nT |
| **Coordinate Reference System:** | NAD83 New Mexico State Plane, Eastern Zone, US Feet | **Magnetic Dip Angle:** | 59.738 ° |
| **Location Lat / Long:** | N 32° 5' 43.39880", W 103° 35' 43.95102" | **Declination Date:** | October 11, 2018 |
| **Location Grid N/E Y/X:** | N 399220.720 ftUS, E 769809.700 ftUS | **Magnetic Declination Model:** | HDGM 2018 |
| **CRS Grid Convergence Angle:** | 0.3920 ° | **North Reference:** | Grid North |
| **Grid Scale Factor:** | 0.99996888 | **Grid Convergence Used:** | 0.3920 ° |
| **Version / Patch:** | 2.10.740.0 | **Total Corr Mag North->Grid North:** | 6.3303 ° |
| | | **Local Coord Referenced To:** | Well Head |

| 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 [390' FSL, 2265' FWL] | 0.00 | 0.00 | 270.00 | 0.00 | 0.00 | 0.00 | 0.00 | N/A | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 100.00 | 0.00 | 270.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 200.00 | 0.00 | 270.00 | 200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 300.00 | 0.00 | 270.00 | 300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 400.00 | 0.00 | 270.00 | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 500.00 | 0.00 | 270.00 | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 600.00 | 0.00 | 270.00 | 600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 700.00 | 0.00 | 270.00 | 700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 800.00 | 0.00 | 270.00 | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 900.00 | 0.00 | 270.00 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| *Rustler* | *935.00* | *0.00* | *270.00* | *935.00* | *0.00* | *0.00* | *0.00* | *0.00* | *399220.72* | *769809.70* | *N 32 5 43.40* | *W 103 35 43.95* |
| | 1000.00 | 0.00 | 270.00 | 1000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1100.00 | 0.00 | 270.00 | 1100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1200.00 | 0.00 | 270.00 | 1200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| *Top of Salt* | *1298.00* | *0.00* | *270.00* | *1298.00* | *0.00* | *0.00* | *0.00* | *0.00* | *399220.72* | *769809.70* | *N 32 5 43.40* | *W 103 35 43.95* |
| | 1300.00 | 0.00 | 270.00 | 1300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1400.00 | 0.00 | 270.00 | 1400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1500.00 | 0.00 | 270.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1600.00 | 0.00 | 270.00 | 1600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1700.00 | 0.00 | 270.00 | 1700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1800.00 | 0.00 | 270.00 | 1800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 1900.00 | 0.00 | 270.00 | 1900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2000.00 | 0.00 | 270.00 | 2000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2100.00 | 0.00 | 270.00 | 2100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2200.00 | 0.00 | 270.00 | 2200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2300.00 | 0.00 | 270.00 | 2300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2400.00 | 0.00 | 270.00 | 2400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2500.00 | 0.00 | 270.00 | 2500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |

| 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 ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2600.00 | 0.00 | 270.00 | 2600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2700.00 | 0.00 | 270.00 | 2700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2800.00 | 0.00 | 270.00 | 2800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 2900.00 | 0.00 | 270.00 | 2900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3000.00 | 0.00 | 270.00 | 3000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3100.00 | 0.00 | 270.00 | 3100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3200.00 | 0.00 | 270.00 | 3200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3300.00 | 0.00 | 270.00 | 3300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3400.00 | 0.00 | 270.00 | 3400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| Nudge 2°/100' DLS | 3500.00 | 0.00 | 270.00 | 3500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 399220.72 | 769809.70 | N 32 5 43.40 | W 103 35 43.95 |
| | 3600.00 | 2.00 | 270.00 | 3599.98 | 0.01 | 0.00 | -1.75 | 2.00 | 399220.72 | 769807.95 | N 32 5 43.40 | W 103 35 43.97 |
| Hold Nudge | 3685.00 | 3.70 | 270.00 | 3684.87 | 0.04 | 0.00 | -5.97 | 2.00 | 399220.72 | 769803.73 | N 32 5 43.40 | W 103 35 44.02 |
| | 3700.00 | 3.70 | 270.00 | 3699.84 | 0.04 | 0.00 | -6.94 | 0.00 | 399220.72 | 769802.76 | N 32 5 43.40 | W 103 35 44.03 |
| | 3800.00 | 3.70 | 270.00 | 3799.63 | 0.09 | 0.00 | -13.39 | 0.00 | 399220.72 | 769796.31 | N 32 5 43.40 | W 103 35 44.11 |
| | 3900.00 | 3.70 | 270.00 | 3899.42 | 0.13 | 0.00 | -19.85 | 0.00 | 399220.72 | 769789.85 | N 32 5 43.40 | W 103 35 44.18 |
| | 4000.00 | 3.70 | 270.00 | 3999.21 | 0.17 | 0.00 | -26.30 | 0.00 | 399220.72 | 769783.40 | N 32 5 43.40 | W 103 35 44.26 |
| | 4100.00 | 3.70 | 270.00 | 4099.01 | 0.21 | 0.00 | -32.75 | 0.00 | 399220.72 | 769776.95 | N 32 5 43.40 | W 103 35 44.33 |
| | 4200.00 | 3.70 | 270.00 | 4198.80 | 0.25 | 0.00 | -39.21 | 0.00 | 399220.72 | 769770.50 | N 32 5 43.40 | W 103 35 44.41 |
| | 4300.00 | 3.70 | 270.00 | 4298.59 | 0.29 | 0.00 | -45.66 | 0.00 | 399220.72 | 769764.04 | N 32 5 43.40 | W 103 35 44.48 |
| | 4400.00 | 3.70 | 270.00 | 4398.38 | 0.33 | 0.00 | -52.11 | 0.00 | 399220.72 | 769757.59 | N 32 5 43.40 | W 103 35 44.56 |
| | 4500.00 | 3.70 | 270.00 | 4498.17 | 0.37 | 0.00 | -58.57 | 0.00 | 399220.72 | 769751.14 | N 32 5 43.40 | W 103 35 44.63 |
| | 4600.00 | 3.70 | 270.00 | 4597.96 | 0.41 | 0.00 | -65.02 | 0.00 | 399220.72 | 769744.68 | N 32 5 43.40 | W 103 35 44.71 |
| | 4700.00 | 3.70 | 270.00 | 4697.76 | 0.46 | 0.00 | -71.47 | 0.00 | 399220.72 | 769738.23 | N 32 5 43.40 | W 103 35 44.78 |
| *Base of Salt* | *4716.28* | *3.70* | *270.00* | *4714.00* | *0.46* | *0.00* | *-72.52* | *0.00* | *399220.72* | *769737.18* | *N 32 5 43.40* | *W 103 35 44.79* |
| | 4800.00 | 3.70 | 270.00 | 4797.55 | 0.50 | 0.00 | -77.92 | 0.00 | 399220.72 | 769731.78 | N 32 5 43.40 | W 103 35 44.86 |
| | 4900.00 | 3.70 | 270.00 | 4897.34 | 0.54 | 0.00 | -84.38 | 0.00 | 399220.72 | 769725.32 | N 32 5 43.40 | W 103 35 44.93 |
| *Lamar* | *4911.69* | *3.70* | *270.00* | *4909.00* | *0.54* | *0.00* | *-85.13* | *0.00* | *399220.72* | *769724.57* | *N 32 5 43.40* | *W 103 35 44.94* |
| *Bell Canyon* | *4939.74* | *3.70* | *270.00* | *4937.00* | *0.55* | *0.00* | *-86.94* | *0.00* | *399220.72* | *769722.76* | *N 32 5 43.40* | *W 103 35 44.96* |
| | 5000.00 | 3.70 | 270.00 | 4997.13 | 0.58 | 0.00 | -90.83 | 0.00 | 399220.72 | 769718.87 | N 32 5 43.40 | W 103 35 45.01 |
| | 5100.00 | 3.70 | 270.00 | 5096.92 | 0.62 | 0.00 | -97.28 | 0.00 | 399220.72 | 769712.42 | N 32 5 43.41 | W 103 35 45.08 |
| | 5200.00 | 3.70 | 270.00 | 5196.71 | 0.66 | 0.00 | -103.74 | 0.00 | 399220.72 | 769705.97 | N 32 5 43.41 | W 103 35 45.16 |
| | 5300.00 | 3.70 | 270.00 | 5296.51 | 0.70 | 0.00 | -110.19 | 0.00 | 399220.72 | 769699.51 | N 32 5 43.41 | W 103 35 45.23 |
| | 5400.00 | 3.70 | 270.00 | 5396.30 | 0.74 | 0.00 | -116.64 | 0.00 | 399220.72 | 769693.06 | N 32 5 43.41 | W 103 35 45.31 |
| | 5500.00 | 3.70 | 270.00 | 5496.09 | 0.78 | 0.00 | -123.10 | 0.00 | 399220.72 | 769686.61 | N 32 5 43.41 | W 103 35 45.38 |
| | 5600.00 | 3.70 | 270.00 | 5595.88 | 0.83 | 0.00 | -129.55 | 0.00 | 399220.72 | 769680.15 | N 32 5 43.41 | W 103 35 45.46 |
| | 5700.00 | 3.70 | 270.00 | 5695.67 | 0.87 | 0.00 | -136.00 | 0.00 | 399220.72 | 769673.70 | N 32 5 43.41 | W 103 35 45.53 |
| | 5800.00 | 3.70 | 270.00 | 5795.46 | 0.91 | 0.00 | -142.46 | 0.00 | 399220.72 | 769667.25 | N 32 5 43.41 | W 103 35 45.61 |
| | 5900.00 | 3.70 | 270.00 | 5895.25 | 0.95 | 0.00 | -148.91 | 0.00 | 399220.72 | 769660.79 | N 32 5 43.41 | W 103 35 45.68 |
| *Cherry Canyon* | *5994.94* | *3.70* | *270.00* | *5990.00* | *0.99* | *0.00* | *-155.04* | *0.00* | *399220.72* | *769654.67* | *N 32 5 43.41* | *W 103 35 45.75* |
| | 6000.00 | 3.70 | 270.00 | 5995.05 | 0.99 | 0.00 | -155.36 | 0.00 | 399220.72 | 769654.34 | N 32 5 43.41 | W 103 35 45.76 |
| | 6100.00 | 3.70 | 270.00 | 6094.84 | 1.03 | 0.00 | -161.82 | 0.00 | 399220.72 | 769647.89 | N 32 5 43.41 | W 103 35 45.83 |
| | 6200.00 | 3.70 | 270.00 | 6194.63 | 1.07 | 0.00 | -168.27 | 0.00 | 399220.72 | 769641.44 | N 32 5 43.41 | W 103 35 45.91 |
| | 6300.00 | 3.70 | 270.00 | 6294.42 | 1.11 | 0.00 | -174.72 | 0.00 | 399220.72 | 769634.98 | N 32 5 43.41 | W 103 35 45.98 |
| | 6400.00 | 3.70 | 270.00 | 6394.21 | 1.15 | 0.00 | -181.18 | 0.00 | 399220.72 | 769628.53 | N 32 5 43.41 | W 103 35 46.06 |
| | 6500.00 | 3.70 | 270.00 | 6494.00 | 1.20 | 0.00 | -187.63 | 0.00 | 399220.72 | 769622.08 | N 32 5 43.41 | W 103 35 46.13 |
| | 6600.00 | 3.70 | 270.00 | 6593.80 | 1.24 | 0.00 | -194.08 | 0.00 | 399220.72 | 769615.62 | N 32 5 43.41 | W 103 35 46.21 |
| | 6700.00 | 3.70 | 270.00 | 6693.59 | 1.28 | 0.00 | -200.54 | 0.00 | 399220.72 | 769609.17 | N 32 5 43.41 | W 103 35 46.28 |
| | 6800.00 | 3.70 | 270.00 | 6793.38 | 1.32 | 0.00 | -206.99 | 0.00 | 399220.72 | 769602.72 | N 32 5 43.41 | W 103 35 46.36 |
| | 6900.00 | 3.70 | 270.00 | 6893.17 | 1.36 | 0.00 | -213.44 | 0.00 | 399220.72 | 769596.26 | N 32 5 43.41 | W 103 35 46.43 |
| | 7000.00 | 3.70 | 270.00 | 6992.96 | 1.40 | 0.00 | -219.90 | 0.00 | 399220.72 | 769589.81 | N 32 5 43.41 | W 103 35 46.51 |
| | 7100.00 | 3.70 | 270.00 | 7092.75 | 1.44 | 0.00 | -226.35 | 0.00 | 399220.72 | 769583.36 | N 32 5 43.41 | W 103 35 46.58 |
| | 7200.00 | 3.70 | 270.00 | 7192.54 | 1.48 | 0.00 | -232.80 | 0.00 | 399220.72 | 769576.91 | N 32 5 43.41 | W 103 35 46.66 |
| | 7300.00 | 3.70 | 270.00 | 7292.34 | 1.52 | 0.00 | -239.26 | 0.00 | 399220.72 | 769570.45 | N 32 5 43.41 | W 103 35 46.73 |
| | 7400.00 | 3.70 | 270.00 | 7392.13 | 1.57 | 0.00 | -245.71 | 0.00 | 399220.72 | 769564.00 | N 32 5 43.42 | W 103 35 46.81 |
| | 7500.00 | 3.70 | 270.00 | 7491.92 | 1.61 | 0.00 | -252.16 | 0.00 | 399220.72 | 769557.55 | N 32 5 43.42 | W 103 35 46.88 |
| *Brushy Canyon* | *7544.17* | *3.70* | *270.00* | *7536.00* | *1.62* | *0.00* | *-255.01* | *0.00* | *399220.72* | *769554.70* | *N 32 5 43.42* | *W 103 35 46.92* |
| | 7600.00 | 3.70 | 270.00 | 7591.71 | 1.65 | 0.00 | -258.62 | 0.00 | 399220.72 | 769551.09 | N 32 5 43.42 | W 103 35 46.96 |
| | 7700.00 | 3.70 | 270.00 | 7691.50 | 1.69 | 0.00 | -265.07 | 0.00 | 399220.72 | 769544.64 | N 32 5 43.42 | W 103 35 47.03 |

| 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 ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7800.00 | 3.70 | 270.00 | 7791.29 | 1.73 | 0.00 | -271.52 | 0.00 | 399220.72 | 769538.19 | N 32 5 43.42 | W 103 35 47.11 |
| | 7900.00 | 3.70 | 270.00 | 7891.09 | 1.77 | 0.00 | -277.97 | 0.00 | 399220.72 | 769531.73 | N 32 5 43.42 | W 103 35 47.18 |
| | 8000.00 | 3.70 | 270.00 | 7990.88 | 1.81 | 0.00 | -284.43 | 0.00 | 399220.72 | 769525.28 | N 32 5 43.42 | W 103 35 47.26 |
| | 8100.00 | 3.70 | 270.00 | 8090.67 | 1.85 | 0.00 | -290.88 | 0.00 | 399220.72 | 769518.83 | N 32 5 43.42 | W 103 35 47.33 |
| | 8200.00 | 3.70 | 270.00 | 8190.46 | 1.89 | 0.00 | -297.33 | 0.00 | 399220.72 | 769512.38 | N 32 5 43.42 | W 103 35 47.41 |
| | 8300.00 | 3.70 | 270.00 | 8290.25 | 1.94 | 0.00 | -303.79 | 0.00 | 399220.72 | 769505.92 | N 32 5 43.42 | W 103 35 47.48 |
| | 8400.00 | 3.70 | 270.00 | 8390.04 | 1.98 | 0.00 | -310.24 | 0.00 | 399220.72 | 769499.47 | N 32 5 43.42 | W 103 35 47.56 |
| Drop to Vertical 2°/100' DLS | 8500.00 | 3.70 | 270.00 | 8489.84 | 2.02 | 0.00 | -316.69 | 0.00 | 399220.72 | 769493.02 | N 32 5 43.42 | W 103 35 47.63 |
| | 8600.00 | 1.70 | 270.00 | 8589.72 | 2.05 | 0.00 | -321.40 | 2.00 | 399220.72 | 769488.31 | N 32 5 43.42 | W 103 35 47.69 |
| Hold Vertical | 8685.00 | 0.00 | 270.00 | 8674.71 | 2.06 | 0.00 | -322.67 | 2.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 8700.00 | 0.00 | 270.00 | 8689.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 8800.00 | 0.00 | 270.00 | 8789.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 8900.00 | 0.00 | 270.00 | 8889.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9000.00 | 0.00 | 270.00 | 8989.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *Bone Spring Leonard Shale* | *9042.29* | *0.00* | *270.00* | *9032.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | *9097.29* | *0.00* | *270.00* | *9087.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 9100.00 | 0.00 | 270.00 | 9089.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9200.00 | 0.00 | 270.00 | 9189.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9300.00 | 0.00 | 270.00 | 9289.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *Avalon Shale* | *9322.29* | *0.00* | *270.00* | *9312.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 9400.00 | 0.00 | 270.00 | 9389.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9500.00 | 0.00 | 270.00 | 9489.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9600.00 | 0.00 | 270.00 | 9589.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9700.00 | 0.00 | 270.00 | 9689.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9800.00 | 0.00 | 270.00 | 9789.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 9900.00 | 0.00 | 270.00 | 9889.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10000.00 | 0.00 | 270.00 | 9989.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *1st Bone Spring Sand* | *10021.29* | *0.00* | *270.00* | *10011.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 10100.00 | 0.00 | 270.00 | 10089.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10200.00 | 0.00 | 270.00 | 10189.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *2nd Bone Spring Carb* | *10233.29* | *0.00* | *270.00* | *10223.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 10300.00 | 0.00 | 270.00 | 10289.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10400.00 | 0.00 | 270.00 | 10389.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10500.00 | 0.00 | 270.00 | 10489.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *2nd Bone Spring Sand* | *10593.29* | *0.00* | *270.00* | *10583.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 10600.00 | 0.00 | 270.00 | 10589.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10700.00 | 0.00 | 270.00 | 10689.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10800.00 | 0.00 | 270.00 | 10789.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 10900.00 | 0.00 | 270.00 | 10889.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11000.00 | 0.00 | 270.00 | 10989.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *3rd Bone Spring Carb* | *11081.29* | *0.00* | *270.00* | *11071.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 11100.00 | 0.00 | 270.00 | 11089.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11200.00 | 0.00 | 270.00 | 11189.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11300.00 | 0.00 | 270.00 | 11289.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11400.00 | 0.00 | 270.00 | 11389.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11500.00 | 0.00 | 270.00 | 11489.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11600.00 | 0.00 | 270.00 | 11589.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11700.00 | 0.00 | 270.00 | 11689.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| *3rd Bone Spring Sand* | *11732.29* | *0.00* | *270.00* | *11722.00* | *2.06* | *0.00* | *-322.67* | *0.00* | *399220.72* | *769487.04* | *N 32 5 43.42* | *W 103 35 47.70* |
| | 11800.00 | 0.00 | 270.00 | 11789.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| | 11900.00 | 0.00 | 270.00 | 11889.71 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |
| KOP - Build 12°/100' DLS | 11914.87 | 0.00 | 270.00 | 11904.58 | 2.06 | 0.00 | -322.67 | 0.00 | 399220.72 | 769487.04 | N 32 5 43.42 | W 103 35 47.70 |

| 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 ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12000.00 | 10.22 | 20.03 | 11989.26 | 9.15 | 7.11 | -320.07 | 12.00 | 399227.83 | 769489.64 | N 32 5 43.49 | W 103 35 47.67 |
| | 12100.00 | 22.22 | 20.03 | 12085.10 | 35.28 | 33.30 | -310.53 | 12.00 | 399254.02 | 769499.18 | N 32 5 43.75 | W 103 35 47.56 |
| | 12200.00 | 34.22 | 20.03 | 12173.06 | 79.51 | 77.64 | -294.37 | 12.00 | 399298.36 | 769515.34 | N 32 5 44.19 | W 103 35 47.37 |
| Build & Turn 12°/100' DLS | 12206.54 | 35.00 | 20.03 | 12178.44 | 82.99 | 81.13 | -293.10 | 12.00 | 399301.85 | 769516.61 | N 32 5 44.22 | W 103 35 47.35 |
| *Wolfcamp* | *12219.54* | *36.36* | *18.73* | *12189.00* | *90.13* | *88.28* | *-290.58* | *12.00* | *399309.00* | *769519.13* | *N 32 5 44.29* | *W 103 35 47.32* |
| | 12300.00 | 45.05 | 12.23 | 12249.96 | 140.58 | 138.82 | -276.86 | 12.00 | 399359.53 | 769532.85 | N 32 5 44.79 | W 103 35 47.16 |
| *Wolcamp Y Sand* | *12380.21* | *53.98* | *7.49* | *12302.00* | *200.55* | *198.86* | *-266.59* | *12.00* | *399419.57* | *769543.12* | *N 32 5 45.38* | *W 103 35 47.03* |
| | 12400.00 | 56.21 | 6.49 | 12313.33 | 216.65 | 214.97 | -264.62 | 12.00 | 399435.68 | 769545.09 | N 32 5 45.54 | W 103 35 47.01 |
| | 12500.00 | 67.57 | 2.10 | 12360.38 | 304.40 | 302.76 | -258.21 | 12.00 | 399523.47 | 769551.50 | N 32 5 46.41 | W 103 35 46.93 |
| Build 4°/100' DLS | 12564.89 | 75.00 | 359.64 | 12381.19 | 365.80 | 364.16 | -257.31 | 12.00 | 399584.87 | 769552.40 | N 32 5 47.02 | W 103 35 46.91 |
| | 12600.00 | 76.40 | 359.64 | 12389.86 | 399.82 | 398.19 | -257.53 | 4.00 | 399618.90 | 769552.18 | N 32 5 47.36 | W 103 35 46.91 |
| | 12700.00 | 80.40 | 359.64 | 12409.96 | 497.76 | 496.13 | -258.15 | 4.00 | 399716.83 | 769551.56 | N 32 5 48.33 | W 103 35 46.91 |
| | 12800.00 | 84.40 | 359.64 | 12423.17 | 596.86 | 595.23 | -258.78 | 4.00 | 399815.93 | 769550.93 | N 32 5 49.31 | W 103 35 46.91 |
| | 12900.00 | 88.40 | 359.64 | 12429.44 | 696.65 | 695.01 | -259.42 | 4.00 | 399915.70 | 769550.29 | N 32 5 50.29 | W 103 35 46.91 |
| Landing Point | 12939.89 | 90.00 | 359.64 | 12430.00 | 736.53 | 734.89 | -259.67 | 4.00 | 399955.58 | 769550.04 | N 32 5 50.69 | W 103 35 46.91 |
| | 13000.00 | 90.00 | 359.64 | 12430.00 | 796.64 | 795.00 | -260.06 | 0.00 | 400015.69 | 769549.65 | N 32 5 51.28 | W 103 35 46.91 |
| | 13100.00 | 90.00 | 359.64 | 12430.00 | 896.64 | 895.00 | -260.69 | 0.00 | 400115.69 | 769549.02 | N 32 5 52.27 | W 103 35 46.91 |
| | 13200.00 | 90.00 | 359.64 | 12430.00 | 996.64 | 995.00 | -261.33 | 0.00 | 400215.68 | 769548.38 | N 32 5 53.26 | W 103 35 46.91 |
| | 13300.00 | 90.00 | 359.64 | 12430.00 | 1096.64 | 1094.99 | -261.97 | 0.00 | 400315.68 | 769547.74 | N 32 5 54.25 | W 103 35 46.91 |
| | 13400.00 | 90.00 | 359.64 | 12430.00 | 1196.64 | 1194.99 | -262.60 | 0.00 | 400415.67 | 769547.11 | N 32 5 55.24 | W 103 35 46.91 |
| | 13500.00 | 90.00 | 359.64 | 12430.00 | 1296.64 | 1294.99 | -263.24 | 0.00 | 400515.67 | 769546.47 | N 32 5 56.23 | W 103 35 46.91 |
| | 13600.00 | 90.00 | 359.64 | 12430.00 | 1396.64 | 1394.99 | -263.88 | 0.00 | 400615.66 | 769545.83 | N 32 5 57.22 | W 103 35 46.91 |
| | 13700.00 | 90.00 | 359.64 | 12430.00 | 1496.64 | 1494.99 | -264.51 | 0.00 | 400715.66 | 769545.19 | N 32 5 58.21 | W 103 35 46.91 |
| | 13800.00 | 90.00 | 359.64 | 12430.00 | 1596.64 | 1594.98 | -265.15 | 0.00 | 400815.65 | 769544.56 | N 32 5 59.20 | W 103 35 46.91 |
| | 13900.00 | 90.00 | 359.64 | 12430.00 | 1696.64 | 1694.98 | -265.79 | 0.00 | 400915.65 | 769543.92 | N 32 6 0.19 | W 103 35 46.91 |
| | 14000.00 | 90.00 | 359.64 | 12430.00 | 1796.64 | 1794.98 | -266.42 | 0.00 | 401015.64 | 769543.28 | N 32 6 1.18 | W 103 35 46.91 |
| | 14100.00 | 90.00 | 359.64 | 12430.00 | 1896.64 | 1894.98 | -267.06 | 0.00 | 401115.63 | 769542.65 | N 32 6 2.17 | W 103 35 46.90 |
| | 14200.00 | 90.00 | 359.64 | 12430.00 | 1996.64 | 1994.98 | -267.70 | 0.00 | 401215.63 | 769542.01 | N 32 6 3.16 | W 103 35 46.90 |
| | 14300.00 | 90.00 | 359.64 | 12430.00 | 2096.64 | 2094.97 | -268.34 | 0.00 | 401315.62 | 769541.37 | N 32 6 4.15 | W 103 35 46.90 |
| | 14400.00 | 90.00 | 359.64 | 12430.00 | 2196.64 | 2194.97 | -268.97 | 0.00 | 401415.62 | 769540.74 | N 32 6 5.14 | W 103 35 46.90 |
| | 14500.00 | 90.00 | 359.64 | 12430.00 | 2296.64 | 2294.97 | -269.61 | 0.00 | 401515.61 | 769540.10 | N 32 6 6.13 | W 103 35 46.90 |
| | 14600.00 | 90.00 | 359.64 | 12430.00 | 2396.64 | 2394.97 | -270.25 | 0.00 | 401615.61 | 769539.46 | N 32 6 7.12 | W 103 35 46.90 |
| | 14700.00 | 90.00 | 359.64 | 12430.00 | 2496.64 | 2494.97 | -270.88 | 0.00 | 401715.60 | 769538.83 | N 32 6 8.11 | W 103 35 46.90 |
| | 14800.00 | 90.00 | 359.64 | 12430.00 | 2596.64 | 2594.96 | -271.52 | 0.00 | 401815.60 | 769538.19 | N 32 6 9.09 | W 103 35 46.90 |
| | 14900.00 | 90.00 | 359.64 | 12430.00 | 2696.64 | 2694.96 | -272.16 | 0.00 | 401915.59 | 769537.55 | N 32 6 10.08 | W 103 35 46.90 |
| | 15000.00 | 90.00 | 359.64 | 12430.00 | 2796.64 | 2794.96 | -272.79 | 0.00 | 402015.59 | 769536.91 | N 32 6 11.07 | W 103 35 46.90 |
| | 15100.00 | 90.00 | 359.64 | 12430.00 | 2896.64 | 2894.96 | -273.43 | 0.00 | 402115.58 | 769536.28 | N 32 6 12.06 | W 103 35 46.90 |
| | 15200.00 | 90.00 | 359.64 | 12430.00 | 2996.64 | 2994.96 | -274.07 | 0.00 | 402215.58 | 769535.64 | N 32 6 13.05 | W 103 35 46.90 |
| | 15300.00 | 90.00 | 359.64 | 12430.00 | 3096.64 | 3094.95 | -274.71 | 0.00 | 402315.57 | 769535.00 | N 32 6 14.04 | W 103 35 46.90 |
| | 15400.00 | 90.00 | 359.64 | 12430.00 | 3196.64 | 3194.95 | -275.34 | 0.00 | 402415.57 | 769534.37 | N 32 6 15.03 | W 103 35 46.90 |
| | 15500.00 | 90.00 | 359.64 | 12430.00 | 3296.64 | 3294.95 | -275.98 | 0.00 | 402515.56 | 769533.73 | N 32 6 16.02 | W 103 35 46.90 |
| | 15600.00 | 90.00 | 359.64 | 12430.00 | 3396.64 | 3394.95 | -276.62 | 0.00 | 402615.55 | 769533.09 | N 32 6 17.01 | W 103 35 46.90 |
| | 15700.00 | 90.00 | 359.64 | 12430.00 | 3496.64 | 3494.95 | -277.25 | 0.00 | 402715.55 | 769532.46 | N 32 6 18.00 | W 103 35 46.90 |
| | 15800.00 | 90.00 | 359.64 | 12430.00 | 3596.64 | 3594.94 | -277.89 | 0.00 | 402815.54 | 769531.82 | N 32 6 18.99 | W 103 35 46.90 |
| | 15900.00 | 90.00 | 359.64 | 12430.00 | 3696.64 | 3694.94 | -278.53 | 0.00 | 402915.54 | 769531.18 | N 32 6 19.98 | W 103 35 46.90 |
| | 16000.00 | 90.00 | 359.64 | 12430.00 | 3796.64 | 3794.94 | -279.16 | 0.00 | 403015.53 | 769530.55 | N 32 6 20.97 | W 103 35 46.89 |
| | 16100.00 | 90.00 | 359.64 | 12430.00 | 3896.64 | 3894.94 | -279.80 | 0.00 | 403115.53 | 769529.91 | N 32 6 21.96 | W 103 35 46.89 |
| | 16200.00 | 90.00 | 359.64 | 12430.00 | 3996.64 | 3994.93 | -280.44 | 0.00 | 403215.52 | 769529.27 | N 32 6 22.95 | W 103 35 46.89 |
| | 16300.00 | 90.00 | 359.64 | 12430.00 | 4096.64 | 4094.93 | -281.07 | 0.00 | 403315.52 | 769528.63 | N 32 6 23.94 | W 103 35 46.89 |
| | 16400.00 | 90.00 | 359.64 | 12430.00 | 4196.64 | 4194.93 | -281.71 | 0.00 | 403415.51 | 769528.00 | N 32 6 24.93 | W 103 35 46.89 |
| | 16500.00 | 90.00 | 359.64 | 12430.00 | 4296.64 | 4294.93 | -282.35 | 0.00 | 403515.51 | 769527.36 | N 32 6 25.92 | W 103 35 46.89 |
| | 16600.00 | 90.00 | 359.64 | 12430.00 | 4396.64 | 4394.93 | -282.99 | 0.00 | 403615.50 | 769526.72 | N 32 6 26.91 | W 103 35 46.89 |
| | 16700.00 | 90.00 | 359.64 | 12430.00 | 4496.64 | 4494.92 | -283.62 | 0.00 | 403715.50 | 769526.09 | N 32 6 27.90 | W 103 35 46.89 |
| | 16800.00 | 90.00 | 359.64 | 12430.00 | 4596.64 | 4594.92 | -284.26 | 0.00 | 403815.49 | 769525.45 | N 32 6 28.89 | W 103 35 46.89 |
| | 16900.00 | 90.00 | 359.64 | 12430.00 | 4696.64 | 4694.92 | -284.90 | 0.00 | 403915.49 | 769524.81 | N 32 6 29.87 | W 103 35 46.89 |

| 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 ° ' ") |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cimarex Cascade 29 Federal #44H - PBHL [100' FNL, 2010' FWL] | 16994.65 | 90.00 | 359.64 | 12430.00 | 4791.29 | 4789.57 | -285.50 | 0.00 | 404010.13 | 769524.21 | N 32 6 30.81 | W 103 35 46.89 |

**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 | 26.000 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_IFR1+MS-Depth Only | Cascade 29 Federal #44H / Cimarex Cascade 29 Federal #44H Rev1 RM 11Oct18 |
| | 1 | 26.000 | 16994.650 | 1/100.000 | 30.000 | 30.000 | | NAL_MWD_IFR1+MS | Cascade 29 Federal #44H / Cimarex Cascade 29 Federal |

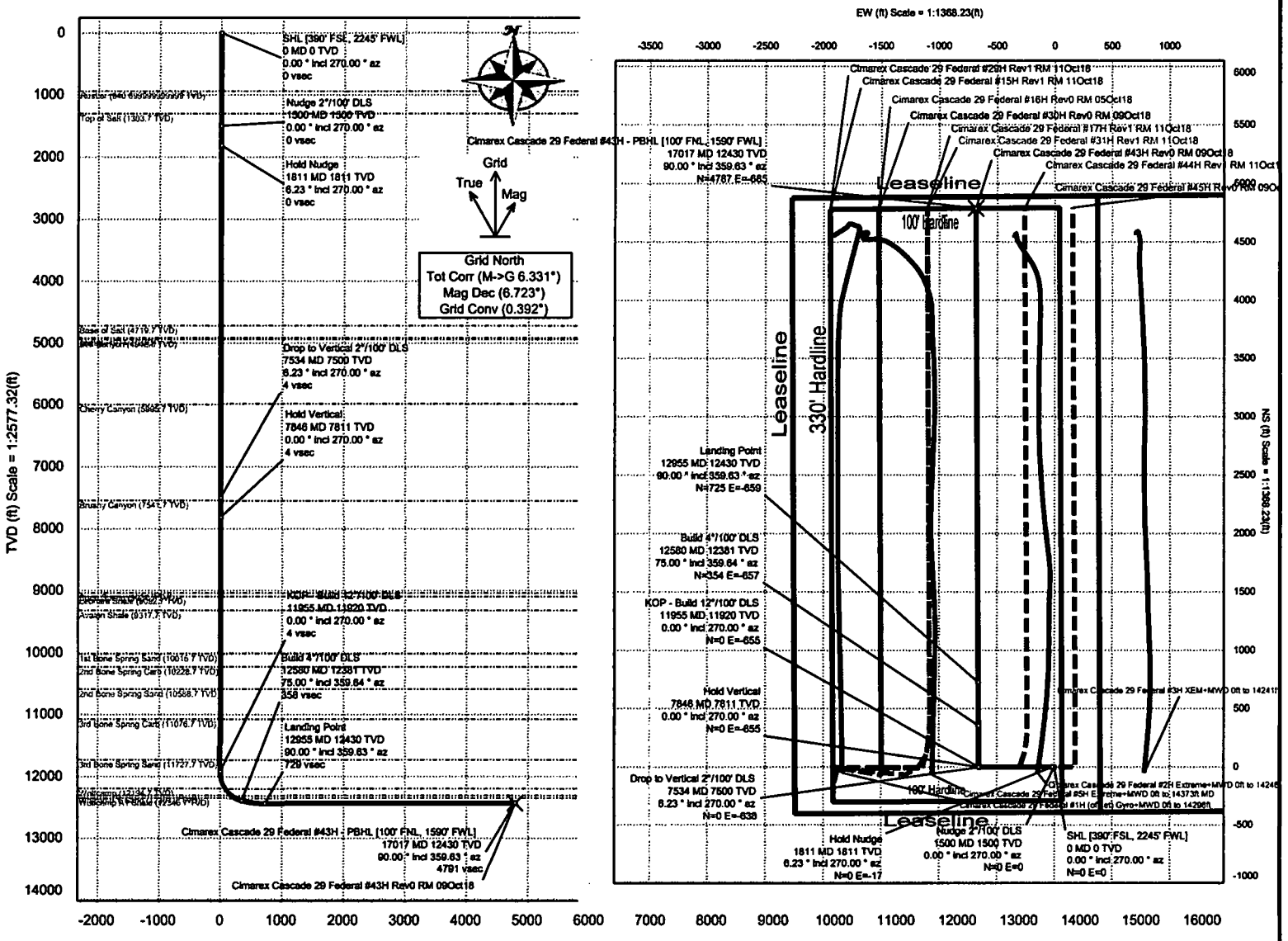
Schlumberger

# Cimarex Energy Rev 0

CIMAREX

| Borehole: | Well: | Field: | Structure: |
|---|---|---|---|
| Cascade 29 Federal #43H | Cascade 29 Federal #43H | NM Lea County (NAD 83) | Cimarex Cascade 29 Federal #43H |

| Gravity & Magnetic Parameters | | | | Surface Location | NAD83 New Mexico State Plane, Eastern Zone, US Feet | | | | Miscellaneous | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model: | HDGM 2018 | Dip: 59.738° | Date: 09-Oct-2018 | Lat: | N 32 5 43.40 | Northing: | 399220.68ftUS | Grid Conv: 0.392° | Slot: | New Slot | TVD Ref: | RKB(3434ft above MSL) |
| MagDec: | 6.723° | FS: 47832.726nT | Gravity FS: 998.429mgn (9.80665 Based) | Lon: | W 103 35 44.19 | Easting: | 783783.67ftUS | Scale Fact: 0.99996387 | Plan: | Cimarex Cascade 29 Federal #43H Rev0 RM 09Oct18 | | |




Vertical Section (ft) Azim = 359.64° Scale = 1:2577.32(ft) Origin = 0N/-S, 0E/-W

## Critical Points

| Critical Point | MD | INCL | AZIM | TVD | VSEC | N(+)/S(-) | E(+)/W(-) | DLS |
|---|---|---|---|---|---|---|---|---|
| SHL [390' FSL, 2245' FWL] | 0.00 | 0.00 | 270.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Nudge 2°/100' DLS | 1500.00 | 0.00 | 270.00 | 1500.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hold Nudge | 1811.46 | 6.23 | 270.00 | 1810.85 | 0.11 | 0.00 | -16.91 | 2.00 |
| Drop to Vertical 2°/100' DLS | 7534.40 | 6.23 | 270.00 | 7500.00 | 4.06 | 0.00 | -637.89 | 0.00 |
| Hold Vertical | 7845.87 | 0.00 | 270.00 | 7810.85 | 4.17 | 0.00 | -654.81 | 2.00 |
| KOP - Build 12°/100' DLS | 11955.01 | 0.00 | 270.00 | 11920.00 | 4.17 | 0.00 | -654.81 | 0.00 |
| Build 4°/100' DLS | 12580.01 | 75.00 | 359.64 | 12381.19 | 358.06 | 353.88 | -657.06 | 12.00 |
| Landing Point | 12955.01 | 90.00 | 359.63 | 12430.00 | 728.79 | 724.60 | -659.42 | 4.00 |
| Cimarex Cascade 29 Federal #43H - PBHL [100' FNL, 1590' FWL] | 17017.19 | 90.00 | 359.63 | 12430.00 | 4790.97 | 4786.70 | -685.30 | 0.00 |

## 1. Geological Formations

TVD of target 12,430
MD at TD 16,994

Pilot Hole TD N/A
Deepest expected fresh water

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/Target Zone | Hazards |
|---|---|---|---|
| Rustler | 935 | N/A | |
| Top of Salt | 1298 | N/A | |
| Base of Salt | 4714 | N/A | |
| Lamar | 4909 | N/A | |
| Bell Canyon | 4937 | N/A | |
| Cherry Canyon | 5990 | N/A | |
| Brushy Canyon | 7536 | N/A | |
| Bone Spring | 9032 | N/A | |
| Leonard Shale | 9087 | N/A | |
| Avalon Shale | 9312 | N/A | |
| 1st Bone Spring Sand | 10011 | N/A | |
| 2nd Bone Spring Sand | 10583 | N/A | |
| 3rd Bone Spring Sand | 11722 | N/A | |
| Wolfcamp | 12189 | N/A | |
| Wolfcamp Target | 12430 | N/A | |

## 2. Casing Program

| Hole Size | Casing Depth From | Casing Depth To | Setting Depth TVD | Casing Size | Weight (lb/ft) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 3/4 | 0 | 985 | 985 | 10-3/4" | 40.50 | J-55 | BT&C | 3.51 | 6.94 | 15.77 |
| 9 7/8 | 0 | 12565 | 12381 | 7-5/8" | 29.70 | L-80 | BT&C | 2.47 | 1.19 | 1.81 |
| 6 3/4 | 0 | 11914 | 11914 | 5-1/2" | 20.00 | P-110 | BT&C | 1.43 | 1.60 | 2.86 |
| 6 3/4 | 11914 | 16994 | 12430 | 5" | 18.00 | HCP-110 | BT&C | 1.66 | 1.69 | 62.45 |
| | | | | | 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

Request Variance for 5-1/2" x 7-5/8" annular clearance. The portion that does not meet clearance will not be cemented

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

### 3. Cementing Program

| Casing | # Sks | Wt. lb/gal | Yld ft3/sack | H2O gal/sk | 500# Comp. Strength (hours) | Slurry Description |
|---|---|---|---|---|---|---|
| **Surface** | 332 | 13.50 | 1.72 | 9.15 | 15.5 | Lead: Class C + Bentonite |
| | 156 | 14.80 | 1.34 | 6.32 | 9.5 | Tail: Class C + LCM |
| | | | | | | |
| **Intermediate Stage 1** | 595 | 10.30 | 3.64 | 22.18 | | Lead: Tuned Light + LCM |
| | 207 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |
| | | | | | | |
| **Intermediate Stage 2** | 786 | 12.90 | 1.88 | 9.65 | 12 | Lead: 35:65 (Poz:C) + Salt + Bentonite |
| | | | | | | |
| **Production** | 360 | 14.20 | 1.30 | 5.86 | 14:30 | Tail: 50:50 (Poz:H) + Salt + Bentonite + Fluid Loss + Dispersant + SMS |
| | | | | | | |

DV tool with possible annular casing packer as needed is proposed at a depth of +/- 4,850'.

| Casing String | TOC | % Excess |
|---|---|---|
| Surface | 0 | 42 |
| Intermediate Stage 1 | 4850 | 47 |
| Intermediate Stage 2 | 0 | 40 |
| Production | 12365 | 8 |

## 4. Pressure Control Equipment

| | |
|---|---|
| | A variance is requested for the use of a diverter on the surface casing. See attached for schematic. |

| BOP installed and tested before drilling which hole? | Size | Min Required WP | Type | | Tested To |
|---|---|---|---|---|---|
| 9 7/8 | 13 5/8 | 5M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 5M |
| | | | Pipe Ram | X | |
| | | | Double Ram | X | |
| | | | Other | | |
| 6 3/4 | 13 5/8 | 10M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 10M |
| | | | Pipe Ram | X | |
| | | | Double Ram | X | |
| | | | Other | | |

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

| | | |
|---|---|---|
| X | Formation integrity test will be performed per Onshore Order #2.<br>On Exploratory wells or 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. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i. | |
| X | A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart. | |
| | N | Are anchors required by manufacturer? |

## 5. Mud Program

| Depth | Type | Weight (ppg) | Viscosity | Water Loss |
|---|---|---|---|---|
| 0' to 985' | FW Spud Mud | 8.30 - 8.80 | 30-32 | N/C |
| 985' to 12565' | Brine Diesel Emulsion | 8.50 - 9.00 | 30-35 | N/C |
| 12565' to 16994' | Oil Based Mud | 12.00 - 12.50 | 50-70 | N/C |

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

The Brine Emulsion is completely saturated brine fluid that ties diesel into itself to lower the weight of the fluid. The drilling fluid is completely salt saturated.

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

## 6. Logging and Testing Procedures

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

| Additional Logs Planned | Interval |
|---|---|

## 7. Drilling Conditions

| Condition | |
|---|---|
| BH Pressure at deepest TVD | 8079 psi |
| Abnormal Temperature | No |

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

## 8. Other Facets of Operation

Co-Flex Hose

**Cascade 29 Federal 44H**

Cimarex Energy Co.

29-25S-33E

Lea Co., NM

Co-Flex Hose Hydrostatic Test
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

Midwest Hose & Specialty, Inc.

# INTERNAL HYDROSTATIC TEST REPORT

| | |
|---|---|
| **Customer:** Oderco Inc | **P.O. Number:** odyd-271 |

## HOSE SPECIFICATIONS

| | |
|---|---|
| **Type:** Stainless Steel Armor Choke & Kill Hose | **Hose Length:** 45'ft. |
| **I.D.** 4 *INCHES* | **O.D.** 9 *INCHES* |

| WORKING PRESSURE | TEST PRESSURE | BURST PRESSURE |
|---|---|---|
| 10,000 *PSI* | 15,000 *PSI* | 0 *PSI* |

## COUPLINGS

| Stem Part No. | Ferrule No. |
|---|---|
| OKC<br>OKC | OKC<br>OKC |
| **Type of Coupling:** Swage-It | |

## PROCEDURE

*Hose assembly pressure tested with water at ambient temperature.*

| TIME HELD AT TEST PRESSURE | ACTUAL BURST PRESSURE: |
|---|---|
| 15 *MIN.* | 0 *PSI* |
| **Hose Assembly Serial Number:** 79793 | **Hose Serial Number:** OKC |

**Comments:**

| Date: | Tested: | Approved: |
|---|---|---|
| 3/8/2011 | | |

Midwest Hose & Specialty, Inc.

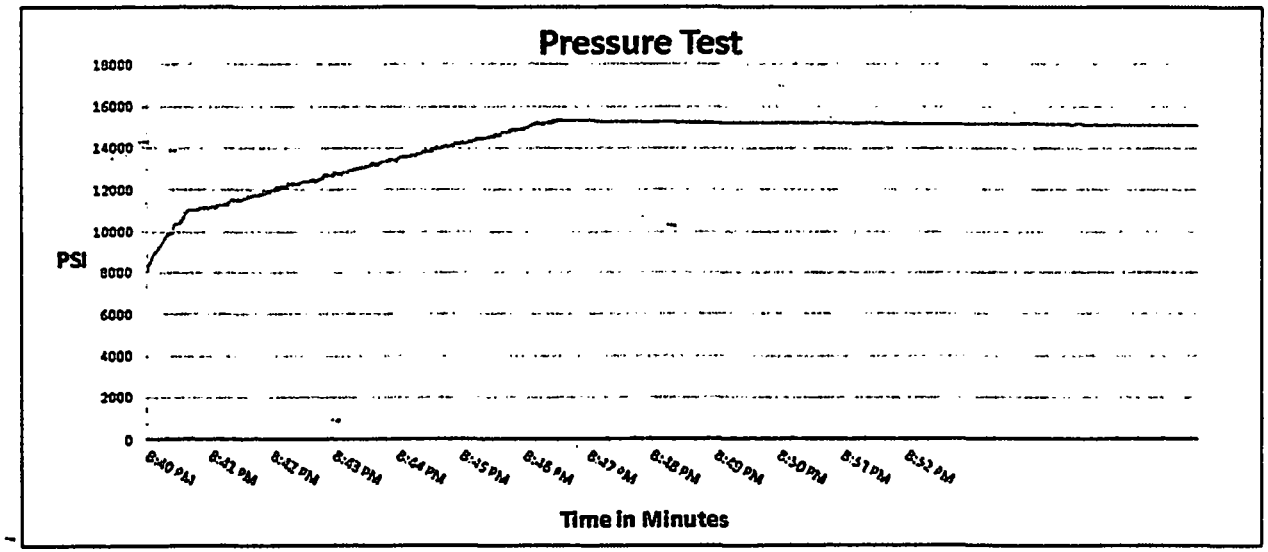
# Internal Hydrostatic Test Graph

March 3, 2011

**Customer:** Houston

**Pick Ticket #:** 94260

| Hose Specifications | | Verification | |
|---|---|---|---|
| **Hose Type** | **Length** | **Type of Fitting** | **Coupling Method** |
| C & K | 45' | 4 1/16 10K | Swage |
| **I.D.** | **O.D.** | **Die Size** | **Final O.D.** |
| 4" | 6.09" | 6.38" | 6.25" |
| **Working Pressure** | **Burst Pressure** | **Hose Serial #** | **Hose Assembly Serial #** |
| 10000 PSI | Standard Safety Multiplier Applies | 5544 | 79793 |




| Test Pressure | Time Held at Test Pressure | Actual Burst Pressure | Peak Pressure |
|---|---|---|---|
| 15000 PSI | 11 Minutes | | 15483 PSI |

**Comments:** Hose assembly pressure tested with water at ambient temperature.

**Tested By:** *Zac Mcconnell*

**Approved By:** *Kim Thomas*

Co-Flex Hose Hydrostatic Test
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

Co-Flex Hose
**Cascade 29 Federal 44H**
Cimarex Energy Co. 29-25S-33E
Lea Co., NM

Midwest Hose & Specialty, Inc.

## Certificate of Conformity

| **Customer:** DEM | **PO** ODYD-271 |
|---|---|

**SPECIFICATIONS**

| **Sales Order** 79793 | **Dated:** 3/8/2011 |
|---|---|

We hereby cerify that the material supplied for the referenced purchase order to be true according to the requirements of the purchase order and current industry standards

Supplier:
Midwest Hose & Specialty, Inc.
10640 Tanner Road
Houston, Texas 77041

**Comments:**

| **Approved:** | **Date:** 3/8/2011 |
|---|---|

Midwest Hose & Specialty, Inc.

Co-Flex Hose
**Cascade 29 Federal 44H**
Cimarex Energy Co.
29-25S-33E
Lea Co., NM

# Specification Sheet
# Choke & Kill Hose

The Midwest Hose & Specialty Choke & Kill hose is manufactured with only premium componets.The reinforcement cables, inner liner and cover are made of the highest quality material to handle the tough drilling applications of today's industry. The end connections are available with API flanges, API male threads, hubs, hammer unions or other special fittings upon request. Hose assembly is manufactured to API 7K. This assembly is wrapped with fire resistant vermculite coated fiberglass insulation, rated at 2000 degrees with stainless steel armor cover.

| | |
|---|---|
| **Working Pressure:** | 5,000 or 10,000 psi working pressure |
| **Test Pressure:** | 10,000 or 15,000 psi test pressure |
| **Reinforcement:** | Multiple steel cables |
| **Cover:** | Stainless Steel Armor |
| **Inner Tube:** | Petroleum resistant, Abrasion resistant |
| **End Fitting:** | API flanges, API male threads, threaded or butt weld hammer unions, unibolt and other special connections |
| **Maximum Length:** | 110 Feet |
| **ID:** | 2-1/2", 3", 3-1/2", 4" |
| **Operating Temperature:** | -22 deg F to +180 deg F (-30 deg C to +82 deg C) |

P.O. Box 96558 – 1421 S.E. 29th St. Oklahoma City, OK 73143 • (405) 670-6718 • Fax: (405) 670-6816


# Cimarex 10M Well Control Plan

Version 1.0

# BOPE Preventer Utilization

The table below displays all BHA components, drill pipe, casing, or open hole that could be present during a required shut in and the associated preventer component that would provide a barrier to flow. It is specific to the hole section that requires a 10M system. The mud system being utilized in the hole will always assumed to be the first barrier to flow. The below table, combined with the mud program, documents that two barriers to flow can be maintained at all times, independent of the rating of the annular preventer.

| Drill String Element | OD | Preventer | RWP |
|---|---|---|---|
| 4" Drillpipe | 4" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| 4.5" Drillpipe | 4.5" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| 4" HWDP Drillpipe | 4" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| 4.5" HWDP Drillpipe | 4.5" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| Drill Collars (including non-magnetic) | 4.75-5.25" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| Production Casing | 5.5" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| Production Casing | 5" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| Production Casing | 4.5" | Lower Ram 3 1/2" - 5 ½" VBR*<br>Upper Ram 3 1/2" - 5 ½" VBR* | 10M |
| ALL | 0-13 5/8" | Annular | 5M |
| Open Hole | | Blind Rams | 10M |

*VBR – Variable Bore Ram

# Well Control Procedures

Proper well control response is highly specific to current well conditions and must be adapted based on environment as needed. The procedures below are given in "common" operating conditions to cover the basic and most necessary operations required during the wellbore construction. These include drilling ahead, tripping pipe, tripping BHA, running casing, and pipe out of the hole/open hole. In some of the procedures below, there will be a switch of control from the lesser RWP annular to the appropriate 10M RWP ram. The pressure at which this is done is variable based on overall well conditions that must be evaluated situationally. The pressure that control is switched may be equal to or less than the RWP but at no time will the pressure on the annular preventer exceed the RWP of the annular. The annular will be tested to 5,000 psi. This will be the RWP of the annular preventer.

***Shutting In While Drilling***

1. Sound alarm to alert crew
2. Space out drill string
3. Shut down pumps

9. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

***Shutting In While Tripping***

1. Sound alarm and alert crew
2. Install open, full open safety valve and close valve
3. Shut in uppermost BOPE preventer (typically the annular preventer) and open HCR.
4. Verify well is shut-in and flow has stopped
5. Notify supervisory personnel
6. Record data (SIDP, SICP, Pit Gain, and Time)
7. Hold pre-job safety meeting and discuss kill procedure
8. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

***Shutting In While Running Casing***

1. Sound alarm and alert crew
2. Install circulating swedge. Close high pressure, low torque valves.
3. Shut in uppermost BOPE preventer (typically the annular preventer) and open HCR.
4. Verify well is shut-in and flow has stopped
5. Notify supervisory personnel
6. Record data (SIDP, SICP, Pit Gain, and Time)
7. Hold Pre-job safety meeting and discuss kill procedure
8. If pressure is anticipated to climb to the RWP of the annular preventer during kill procedure, swap control of the well to the upper pipe ram

***Shutting in while out of hole***

1. Sound alarm
2. Shut-in well: close blind rams
3. Verify well is shut-in and monitor pressures
4. Notify supervisory personnel
5. Record data (SIDP, SICP, Pit Gain, and Time)
6. Hold Pre-job safety meeting and discuss kill procedure

5. Verify well is shut-in and flow has stopped
6. Notify supervisory personnel
7. Record data (SIDP, SICP, Pit Gain, and Time)
8. Hold pre-job safety meeting and discuss kill procedure

***Shutting in while BHA is in the stack and ram preventer and combo immediately available***

1. Sound alarm and alert crew
2. Stab Crossover and install open, full open safety valve and close valve
3. Space out drill string with upset just beneath the compatible pipe ram.
4. Shut in upper compatible pipe ram and open HCR.
5. Verify well is shut-in and flow has stopped
6. Notify supervisory personnel
7. Record data (SIDP, SICP, Pit Gain, and Time)
8. Hold pre-job safety meeting and discuss kill procedure

***Shutting in while BHA is in the stack and no ram preventer or combo immediately available***

1. Sound alarm and alert crew
2. If possible pick up high enough, to pull string clear and follow "Open Hole" scenario
3. If not possible to pick up high enough:
    1. Stab Crossover, make up one joint/stand of drill pipe, and install open, full open safety valve and close valve
4. Space out drill string with upset just beneath the compatible pipe ram.
5. Shut in upper compatible pipe ram and open HCR.
6. Verify well is shut-in and flow has stopped
7. Notify supervisory personnel
8. Record data (SIDP, SICP, Pit Gain, and Time)
9. Hold pre-job safety meeting and discuss kill procedure

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BUREAU OF LAND MANAGEMENT

# SUPO Data Report

08/20/2019

**APD ID:** 10400034713 **Submission Date:** 11/14/2018

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Well Type:** CONVENTIONAL GAS WELL **Well Work Type:** Drill

[redacted]

Show Final Text

## Section 1 - Existing Roads

**Will existing roads be used?** NO

## Section 2 - New or Reconstructed Access Roads

**Will new roads be needed?** YES

**New Road Map:**

Cascade_29_Fed_and_Red_Hills_Road_ROW_20181114155304.pdf
Cascade_29_Fed_CTB_Road_ROW_20181114155308.pdf
Cascade_29_Fed_E2W2_Road_ROW_20181114155441.pdf
Cascade_29_Fed_CTB_Road_ROW_20181114155445.pdf

**New road type:** COLLECTOR

**Length:** 13484 Feet **Width (ft.):** 30

**Max slope (%):** 2 **Max grade (%):** 6

**Army Corp of Engineers (ACOE) permit required?** NO

**ACOE Permit Number(s):**

**New road travel width:** 18

**New road access erosion control:** The side slopes of any drainage channels or swales that are crossed will be re-contoured to original grade and compacted and mulched as necessary to avoid erosion. Where steeper slopes cannot be avoided, water bars or silt fence will be constructed, mulch/rip-rap applied, or other measures employed as necessary to control erosion. Hay bales, straw waddles or silt fence may also be installed to control erosion as needed. All disturbed areas will be seeded with a mix appropriate for the area unless specified otherwise by the landowner.

**New road access plan or profile prepared?** NO

**New road access plan attachment:**

**Access road engineering design?** NO

**Access road engineering design attachment:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Turnout?** N

**Access surfacing type:** GRAVEL

**Access topsoil source:** ONSITE

**Access surfacing type description:**

**Access onsite topsoil source depth:** 6

**Offsite topsoil source description:**

**Onsite topsoil removal process:** Push off and stockpile alongside the location.

**Access other construction information:** The operator will prevent and abate fugitive dust as needed, whether created by vehicular traffic, equipment operations or other events.

**Access miscellaneous information:**

**Number of access turnouts:** **Access turnout map:**

## Drainage Control

**New road drainage crossing:** CULVERT,LOW WATER,OTHER

**Drainage Control comments:** To control and prevent potentially contaminated precipitation from leaving the pad site, a perimeter berm and settlement pond will be installed. Contaminated water will be removed from pond, stored in waste tanks, and disposed of at a state approved facility. Standing water or puddles will not be allowed. Drainage ditches would be established and maintained on the pad and along access roads to divert water away from operations. Natural drainage areas disturbed during construction would be re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured, and reclaimed to near original condition to re-establish natural drainage.

**Road Drainage Control Structures (DCS) description:** N/A

**Road Drainage Control Structures (DCS) attachment:**

## Access Additional Attachments

**Additional Attachment(s):**

## Section 3 - Location of Existing Wells

**Existing Wells Map?** YES

**Attach Well map:**

Cascade_29_Fed_E2W2_One_Mile_Radius_20181114160609.pdf

**Existing Wells description:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

## Section 4 - Location of Existing and/or Proposed Production Facilities

**Submit or defer a Proposed Production Facilities plan?** SUBMIT

**Production Facilities description:** Production facilities will be the same for the Cascade 29 Federal 15H, 16H, 17H, 29H, 30H, 31H, 43H, 44H & 45H.

**Production Facilities map:**

Cascade_29_Fed_East_Zone_1_CTB_Layout_20181114160711.pdf

Cascade_29_Fed_East_Zone_2_CTB_Layout_20181114160723.pdf

Cascade_29_Fed_West_Zone_1_CTB_Layout_20181114160735.pdf

Cascade_29_Fed_West_Zone_2_CTB_Layout_20181114160746.pdf

## Section 5 - Location and Types of Water Supply

### Water Source Table

**Water source use type:** INTERMEDIATE/PRODUCTION CASING, SURFACE CASING

**Water source type:** MUNICIPAL

**Describe type:**

**Source latitude:**

**Source longitude:**

**Source datum:**

**Water source permit type:** WATER RIGHT

**Permit Number:**

**Source land ownership:** STATE

**Water source transport method:** PIPELINE,TRUCKING

**Source transportation land ownership:** STATE

**Water source volume (barrels):** 5000

**Source volume (acre-feet):** 0.6444655

**Source volume (gal):** 210000

**Water source and transportation map:**

Cascade_29_Fed_W2W2_Pad_2_Drilling_Water_Routes_20181114161130.pdf

**Water source comments:**

**New water well?** NO

### New Water Well Info

**Well latitude:**

**Well Longitude:**

**Well datum:**

**Well target aquifer:**

**Est. depth to top of aquifer(ft):**

**Est thickness of aquifer:**

**Aquifer comments:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Aquifer documentation:**

**Well depth (ft):** **Well casing type:**

**Well casing outside diameter (in.):** **Well casing inside diameter (in.):**

**New water well casing?** **Used casing source:**

**Drilling method:** **Drill material:**

**Grout material:** **Grout depth:**

**Casing length (ft.):** **Casing top depth (ft.):**

**Well Production type:** **Completion Method:**

**Water well additional information:**

**State appropriation permit:**

**Additional information attachment:**

## Section 6 - Construction Materials

**Using any construction materials:** YES

**Construction Materials description:** The drilling and testing operations will be conducted on a watered and compacted native soil grade. Soft spots will be covered with caliche, free of large rocks (3" diameter). Upon completion as a commercial producer the location will be covered with caliche, free of large rocks (3" dia.) from an existing privately owned gravel pit.
**Construction Materials source location attachment:**

## Section 7 - Methods for Handling Waste

**Waste type:** DRILLING

**Waste content description:** Drilling Fluids, drill cuttings, water and other waste produced from the well during drilling operations.
**Amount of waste:** 15000 barrels

**Waste disposal frequency :** Weekly

**Safe containment description:** N/A

**Safe containmant attachment:**

**Waste disposal type:** HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL
**Disposal type description:**

**Disposal location description:** Haul to R360 commercial Disposal

**Waste type:** GARBAGE

**Waste content description:** Garbage and trash produced during drilling and completion operations

**Amount of waste:** 32500 pounds

**Waste disposal frequency :** Weekly

**Safe containment description:** N/A

**Safe containmant attachment:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Waste disposal type:** HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

**Disposal type description:**

**Disposal location description:** Windmill Spraying Service hauls trash to Lea County Landfill

## Reserve Pit

**Reserve Pit being used?** NO

**Temporary disposal of produced water into reserve pit?**

**Reserve pit length (ft.)** **Reserve pit width (ft.)**

**Reserve pit depth (ft.)** **Reserve pit volume (cu. yd.)**

**Is at least 50% of the reserve pit in cut?**

**Reserve pit liner**

**Reserve pit liner specifications and installation description**

## Cuttings Area

**Cuttings Area being used?** NO

**Are you storing cuttings on location?** NO

**Description of cuttings location**

**Cuttings area length (ft.)** **Cuttings area width (ft.)**

**Cuttings area depth (ft.)** **Cuttings area volume (cu. yd.)**

**Is at least 50% of the cuttings area in cut?**

**WCuttings area liner**

**Cuttings area liner specifications and installation description**

## Section 8 - Ancillary Facilities

**Are you requesting any Ancillary Facilities?:** NO

**Ancillary Facilities attachment:**

**Comments:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

## Section 9 - Well Site Layout

**Well Site Layout Diagram:**

Cascade_29_Fed_44H_Wellsite_Layout_20181114161707.pdf

**Comments:**

## Section 10 - Plans for Surface Reclamation

**Type of disturbance:** New Surface Disturbance **Multiple Well Pad Name:** CASCADE 29 FEDERAL

**Multiple Well Pad Number:** E2E2 PAD

**Recontouring attachment:**

Cascade_29_Fed_E2W2_Pad_Interim_Reclaimation_20181114162513.pdf

**Drainage/Erosion control construction:** To control and prevent potentially contaminated precipitation from leaving the pad site, a perimeter berm and settlement pond will be installed. Contaminated water will be removed from pond, stored in waste tanks, and disposed of at a state approved facility. Standing water or puddles will not be allowed. Drainage ditches would be established and maintained on the pad and along access roads to divert water away from operations. Natural drainage areas disturbed during construction would be re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured to near original condition prior to construction. Erosion Control Best Management Practices would be used where necessary and consist of seeding, fiber rolls, water bars, silt fences, and temporary diversion dikes. Areas disturbed during construction that are no longer needed for operations would be obliterated, re-contoured, and reclaimed to near original condition to re-establish natural drainage.

**Drainage/Erosion control reclamation:** All disturbed and re-contoured areas would be reseeded according to specifications. Approved seed mixtures would be certified weed free and consist of grasses, forbs, or shrubs similar to the surrounding area. Compacted soil areas may need to be obliterated and reclaimed to near natural conditions by re-contouring all slopes to facilitate and re-establish natural drainage.

**Wellpad long term disturbance (acres):** 3.36 **Wellpad short term disturbance (acres):** 3.55

**Access road long term disturbance (acres):** 0 **Access road short term disturbance (acres):** 0

**Pipeline long term disturbance (acres):** 20.78 **Pipeline short term disturbance (acres):** 0

**Other long term disturbance (acres):** 20.99 **Other short term disturbance (acres):** 0

**Total long term disturbance:** 54.103 **Total short term disturbance:** 3.55

**Disturbance Comments:** Road: 13,484'; Power: 13,032'; SWD: 5043'; Oil: 5016'; Sales/Buyback: 4760'; Flow/ Gas lift: 6,484'; Temp Water: 27,237'; West Zone CTB 1: 5.235 acres; CTB 2: 5.209 acres, East Zone CTB 1: 5.267 acres, CTB 2:5.277 acres.

**Reconstruction method:** After well plugging, all disturbed areas would be returned to the original contour or a contour that blends with the surrounding landform including roads unless the surface owner requests that they be left intact. In consultation with the surface owners it will be determined if any gravel or similar materials used to reinforce an area are to be removed, buried, or left in place during final reclamation. Salvaged topsoil, if any, would be re-spread evenly over the surfaces to be re-vegetated. As necessary, the soil surface would be prepared to provide a seedbed for re-establishment of desirable vegetation. Site preparation may include gouging, scarifying, dozer track-walking, mulching, or fertilizing. Reclamation, Re-vegetation, and Drainage: All disturbed and re-contoured areas would be reseeded using techniques outlined under Phase I and II of this plan or as specified by the land owner. Approved seed mixtures would be certified weed free and consist of grasses, forbs, or shrubs similar to the surrounding area. Compacted soil areas may need to be

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Topsoil redistribution:** Salvaged topsoil, if any, would be re-spread evenly over the surfaces to be re-vegetated.

**Soil treatment:** As necessary, the soil surface would be prepared to provide a seedbed for re-establishment of desirable vegetation. Site preparation may include gouging, scarifying, dozer track-walking, mulching or fertilizing.

**Existing Vegetation at the well pad:**

**Existing Vegetation at the well pad attachment:**

**Existing Vegetation Community at the road:**

**Existing Vegetation Community at the road attachment:**

**Existing Vegetation Community at the pipeline:**

**Existing Vegetation Community at the pipeline attachment:**

**Existing Vegetation Community at other disturbances:**

**Existing Vegetation Community at other disturbances attachment:**

**Non native seed used?**

**Non native seed description:**

**Seedling transplant description:**

**Will seedlings be transplanted for this project?**

**Seedling transplant description attachment:**

**Will seed be harvested for use in site reclamation?**

**Seed harvest description:**

**Seed harvest description attachment:**

## Seed Management

### Seed Table

**Seed type:**

**Seed source:**

**Seed name:**

**Source name:**

**Source address:**

**Source phone:**

**Seed cultivar:**

**Seed use location:**

**PLS pounds per acre:**

**Proposed seeding season:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

| Seed Summary | |
|---|---|
| **Seed Type** | **Pounds/Acre** |

**Total pounds/Acre:**

**Seed reclamation attachment:**

## Operator Contact/Responsible Official Contact Info

**First Name:** **Last Name:**

**Phone:** **Email:**

**Seedbed prep:**

**Seed BMP:**

**Seed method:**

**Existing invasive species?** NO

**Existing invasive species treatment description:**

**Existing invasive species treatment attachment:**

**Weed treatment plan description:** N/A

**Weed treatment plan attachment:**

**Monitoring plan description:** N/A

**Monitoring plan attachment:**

**Success standards:** N/A

**Pit closure description:** N/A

**Pit closure attachment:**

## Section 11 - Surface Ownership

**Disturbance type:** WELL PAD

**Describe:**

**Surface Owner:** BUREAU OF LAND MANAGEMENT

**Other surface owner description:**

**BIA Local Office:**

**BOR Local Office:**

**COE Local Office:**

**DOD Local Office:**

**NPS Local Office:**

**State Local Office:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Military Local Office:**

**USFWS Local Office:**

**Other Local Office:**

**USFS Region:**

**USFS Forest/Grassland:** **USFS Ranger District:**

## Section 12 - Other Information

**Right of Way needed?** YES **Use APD as ROW?** YES

**ROW Type(s):** 281001 ROW - ROADS,288100 ROW – O&G Pipeline,288101 ROW – O&G Facility Sites,288103 ROW – Salt Water Disposal Pipeline/Facility,289001 ROW- O&G Well Pad,FLPMA (Powerline)

## ROW Applications

**SUPO Additional Information:** Surface disturbance will be the same for Flow/gas lift, Sales/buyback, oil, SWD & power forall Cascade 29 Fed Wells. 4 battery pads & battery road disturbances will be the same for all Cascade 29 Fed wells. Roads to well will be the same for Cascade 29 Fed 43H, 44H & 45H.
**Use a previously conducted onsite?** YES

**Previous Onsite information:** Onsite with BLM( Jeff Robertson) and Cimarex Barry Hunt on June 19, 2018

## Other SUPO Attachment

Cascade_29_Fed_CTB_Gas_Sales_Buyback_ROW_20181114163322.pdf
Cascade_29_Fed_CTB_Oil_Pipeline_ROW_20181114163325.pdf
Cascade_29_Fed_CTB_SWD_ROW_20181114163327.pdf
Cascade_29_Fed_Flow_Line_Gas_Lift_ROW_20181114163410.pdf
Cascade_29_Fed_Power_ROW_20181114163418.pdf
Cascade_29_Fed_E2W2_Public_Access_Road_20181114163514.pdf
Cascade_29_Fed_E2W2_Road_Description_20181114163547.pdf
Cascade_29_Fed_Temp_Water_Route_20181114163548.pdf
Cascade_29_Fed_44H_SUPO_Pack_2_for_Jeff_20181114164803.pdf
Cascade_29_Fed_44H_SUPO_Pack_1_for_Jeff_20190416071923.pdf
Cascade_29_Fed_44H_SUPO_20190416071948.pdf

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BUREAU OF LAND MANAGEMENT

# PWD Data Report

08/20/2019

**APD ID:** 10400034713 **Submission Date:** 11/14/2018

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Well Type:** CONVENTIONAL GAS WELL **Well Work Type:** Drill

## Section 1 - General

**Would you like to address long-term produced water disposal?** NO

## Section 2 - Lined Pits

**Would you like to utilize Lined Pit PWD options?** NO

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:** **PWD disturbance (acres):**

**Lined pit PWD on or off channel:**

**Lined pit PWD discharge volume (bbl/day):**

**Lined pit specifications:**

**Pit liner description:**

**Pit liner manufacturers information:**

**Precipitated solids disposal:**

**Decribe precipitated solids disposal:**

**Precipitated solids disposal permit:**

**Lined pit precipitated solids disposal schedule:**

**Lined pit precipitated solids disposal schedule attachment:**

**Lined pit reclamation description:**

**Lined pit reclamation attachment:**

**Leak detection system description:**

**Leak detection system attachment:**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Lined pit Monitor description:**

**Lined pit Monitor attachment:**

**Lined pit: do you have a reclamation bond for the pit?**

**Is the reclamation bond a rider under the BLM bond?**

**Lined pit bond number:**

**Lined pit bond amount:**

**Additional bond information attachment:**

## Section 3 - Unlined Pits

**Would you like to utilize Unlined Pit PWD options?** NO

**Produced Water Disposal (PWD) Location:**

**PWD disturbance (acres):** **PWD surface owner:**

**Unlined pit PWD on or off channel:**

**Unlined pit PWD discharge volume (bbl/day):**

**Unlined pit specifications:**

**Precipitated solids disposal:**

**Decribe precipitated solids disposal:**

**Precipitated solids disposal permit:**

**Unlined pit precipitated solids disposal schedule:**

**Unlined pit precipitated solids disposal schedule attachment:**

**Unlined pit reclamation description:**

**Unlined pit reclamation attachment:**

**Unlined pit Monitor description:**

**Unlined pit Monitor attachment:**

**Do you propose to put the produced water to beneficial use?**

***Beneficial use user confirmation:***

**Estimated depth of the shallowest aquifer (feet):**

**Does the produced water have an annual average Total Dissolved Solids (TDS) concentration equal to or less than that of the existing water to be protected?**

**TDS lab results:**

**Geologic and hydrologic evidence:**

**State authorization:**

**Unlined Produced Water Pit Estimated percolation:**

**Unlined pit: do you have a reclamation bond for the pit?**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Is the reclamation bond a rider under the BLM bond?**

**Unlined pit bond number:**

**Unlined pit bond amount:**

**Additional bond information attachment:**

## Section 4 - Injection

**Would you like to utilize Injection PWD options?** NO

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:** **PWD disturbance (acres):**

**Injection PWD discharge volume (bbl/day):**

***Injection well mineral owner:***

**Injection well type:**

**Injection well number:** **Injection well name:**

**Assigned injection well API number?** **Injection well API number:**

**Injection well new surface disturbance (acres):**

**Minerals protection information:**

**Mineral protection attachment:**

**Underground Injection Control (UIC) Permit?**

**UIC Permit attachment:**

## Section 5 - Surface Discharge

**Would you like to utilize Surface Discharge PWD options?** NO

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:** **PWD disturbance (acres):**

**Surface discharge PWD discharge volume (bbl/day):**

**Surface Discharge NPDES Permit?**

**Surface Discharge NPDES Permit attachment:**

**Surface Discharge site facilities information:**

**Surface discharge site facilities map:**

## Section 6 - Other

**Would you like to utilize Other PWD options?** NO

**Produced Water Disposal (PWD) Location:**

**PWD surface owner:** **PWD disturbance (acres):**

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Other PWD type description:**

**Other PWD type attachment:**

**Have other regulatory requirements been met?**

**Other regulatory requirements attachment:**

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BUREAU OF LAND MANAGEMENT

# Bond Info Data Report

08/20/2019

**APD ID:** 10400034713 **Submission Date:** 11/14/2018

**Operator Name:** CIMAREX ENERGY COMPANY

**Well Name:** CASCADE 29 FEDERAL **Well Number:** 44H

**Well Type:** CONVENTIONAL GAS WELL **Well Work Type:** Drill

[redacted]

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## Bond Information

**Federal/Indian APD:** FED

**BLM Bond number:** NMB001188

**BIA Bond number:**

**Do you have a reclamation bond?** NO

**Is the reclamation bond a rider under the BLM bond?**

**Is the reclamation bond BLM or Forest Service?**

**BLM reclamation bond number:**

**Forest Service reclamation bond number:**

**Forest Service reclamation bond attachment:**

**Reclamation bond number:**

**Reclamation bond amount:**

**Reclamation bond rider amount:**

**Additional reclamation bond information attachment:**