PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating
LEASE NO.:	NM0106040A
WELL NAME & NO.:	Tigercat Federal Com – 1H
SURFACE HOLE FOOTAGE:	355'/N & 1620'/E
BOTTOM HOLE FOOTAGE	200'/S & 990'/E, sec. 17
LOCATION:	Sec. 8, T. 26 S, R. 33 E
COUNTY:	Lea County

COA

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

A. Hydrogen Sulfide

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

B. CASING

1. The **13-3/8** inch surface casing shall be set at approximately **915** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement).
    c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

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

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

   ❖ In Medium Cave/Karst Areas if cement does not circulate to surface on the first two casing strings , the cement on the 3rd casing string must come to surface.

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:
   - Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification. **Additional cement maybe required. Excess calculates to be 1%.**

C. PRESSURE CONTROL

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

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

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** intermediate casing shoe shall be **3000 (3M)** psi.

GENERAL REQUIREMENTS

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

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)
   ☒ Lea County
   Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure

rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).

b. When the operator proposes to set surface casing with Spudder Rig
   - Notify the BLM when moving in and removing the Spudder Rig.
   - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
   - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

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

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

A. CASING

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

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

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

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

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

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

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

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

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

B. PRESSURE CONTROL

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

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

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

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

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

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

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

    c. The tests shall be done by an independent service company utilizing a test plug. The results of the test shall be reported to the appropriate BLM office.

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

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

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

f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes. This test shall be performed prior to the test at full stack pressure.

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

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

Waste Minimization Plan (WMP)

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

ZS 121817

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

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LEASE NO.:	NM0106040A
WELL NAME & NO.:	Tigercat Federal Com – 1H
SURFACE HOLE FOOTAGE:	355'/N & 1620'/E
BOTTOM HOLE FOOTAGE	200'/S & 990'/E, sec. 17
LOCATION:	Section 8, T. 26 S., R. 33 E., NMPM
COUNTY:	Lea County, New Mexico

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

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)

Wildlife Buried Pipeline Stipulations

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.

Watershed/Water Quality:

The entire perimeter of the well pad 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 24 inches high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- 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.
- 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 access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)

Pipelines:

A leak detection plan ***will be submitted to the BLM Carlsbad Field Office for approval*** prior to pipeline installation. The method could incorporate gauges to detect pressure drops, situating values 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. Regular monitoring is required to quickly identify leaks for their immediate and proper treatment. Any water erosion that may occur due to construction or during the life of the pipeline system will be quickly corrected and proper measures will be taken to prevent erosion. When crossing ephemeral drainages the soil crown should be level with the surface to allow water to flow without impedance.

Tank Battery Liners and Berms:
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. 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.

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.

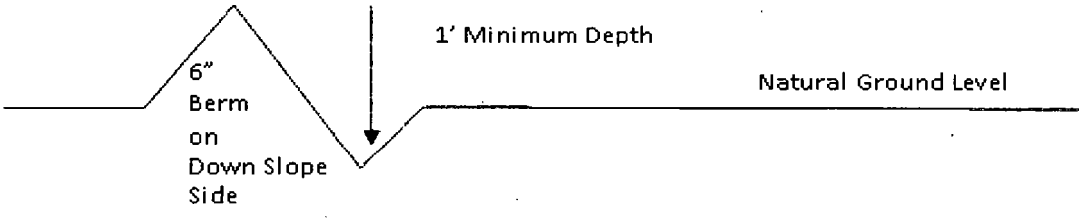
Crowning
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

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

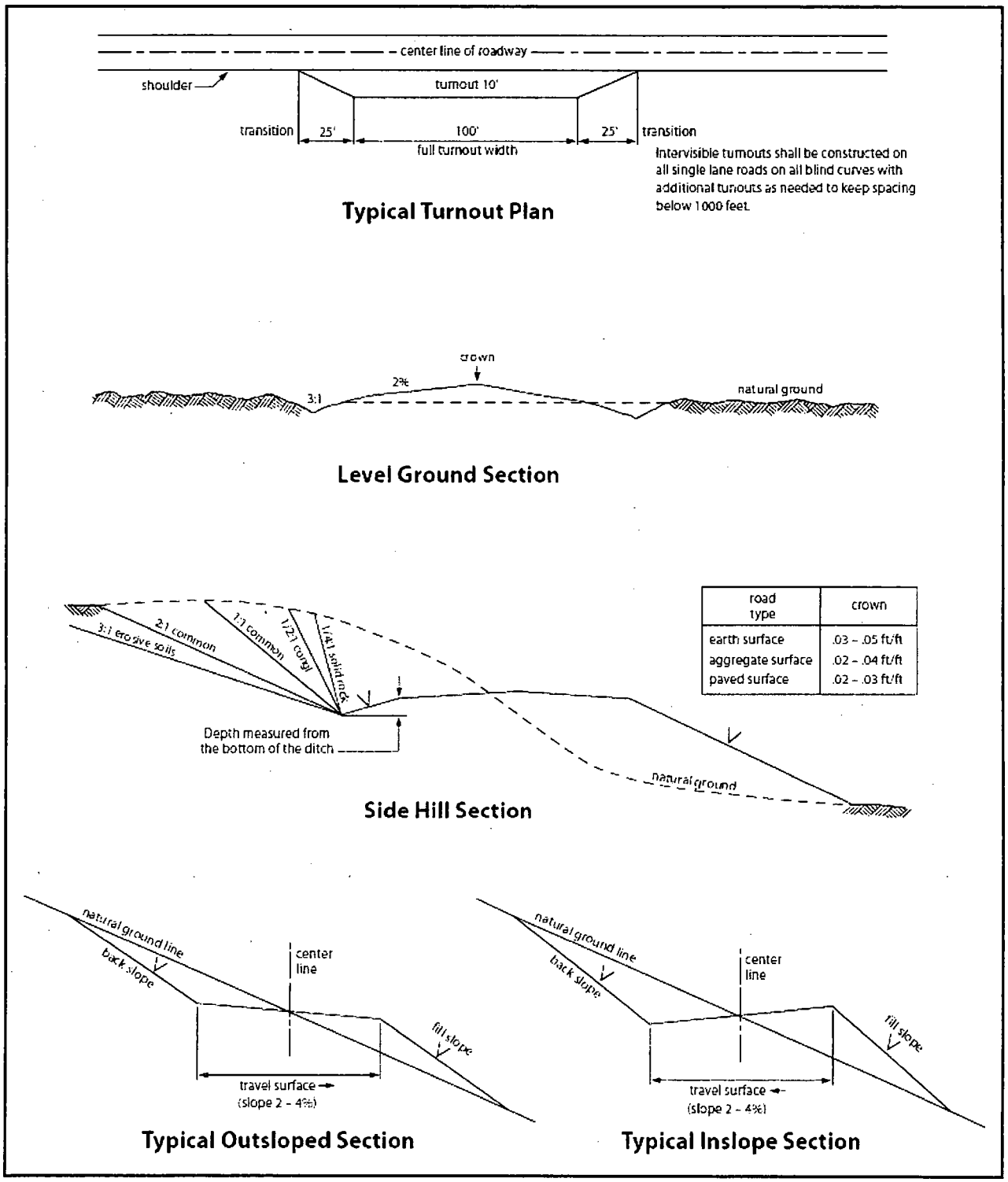


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

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 **20** 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	(X) seed mixture 3
( ) seed mixture 2	( ) seed mixture 4
( ) seed mixture 2/LPC	( ) Aplomado Falcon Mixture

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

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

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

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

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

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

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.

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).

Seed Mixture 3, for Shallow 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 (*Setaria macrostachya*)	1.0
Green Sprangletop (*Leptochloa dubia*)	2.0
Sideoats Grama (*Bouteloua curtipendula)*	5.0

*Pounds of pure live seed:

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

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

a. The hazards and characteristics of hydrogen sulfide (H_2S).
b. The proper use and maintenance of personal protective equipment and life support systems.
c. The proper use of H_2S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
d. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

a. The effects of H2S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
b. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
c. The contents and requirements of the H_2S Drilling Operations Plan and the Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H2S zone (within 3 days or 500 feet) and weekly H2S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H2S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received the proper training.

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H_2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H2S. If H2S greater than 100 ppm is encountered in the gas stream we will shut in and install H2S equipment.

a. Well Control Equipment:
   Flare line.
   Choke manifold with remotely operated choke.
   Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
   Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head.

b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.

c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.

d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.

f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.

g. Communication:
Company vehicles equipped with cellular telephone.

COG OPERATING LLC has conducted a review to determine if an H2S contingency plan is required for the above referenced well. We were able to conclude that any potential hazardous volume would be minimal. H2S concentrations of wells in this area from surface to TD are low enough; therefore, we do not believe that an H2S contingency plan is necessary.

WARNING

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

1. ***BEARDS OR CONTACT LENSES NOT ALLOWED***
2. ***HARD HATS REQUIRED***
3. ***SMOKING IN DESIGNATED AREAS ONLY***
4. ***BE WIND CONSCIOUS AT ALL TIMES***
5. ***CK WITH COG OPERATING LLC FOREMAN AT MAIN OFFICE***

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

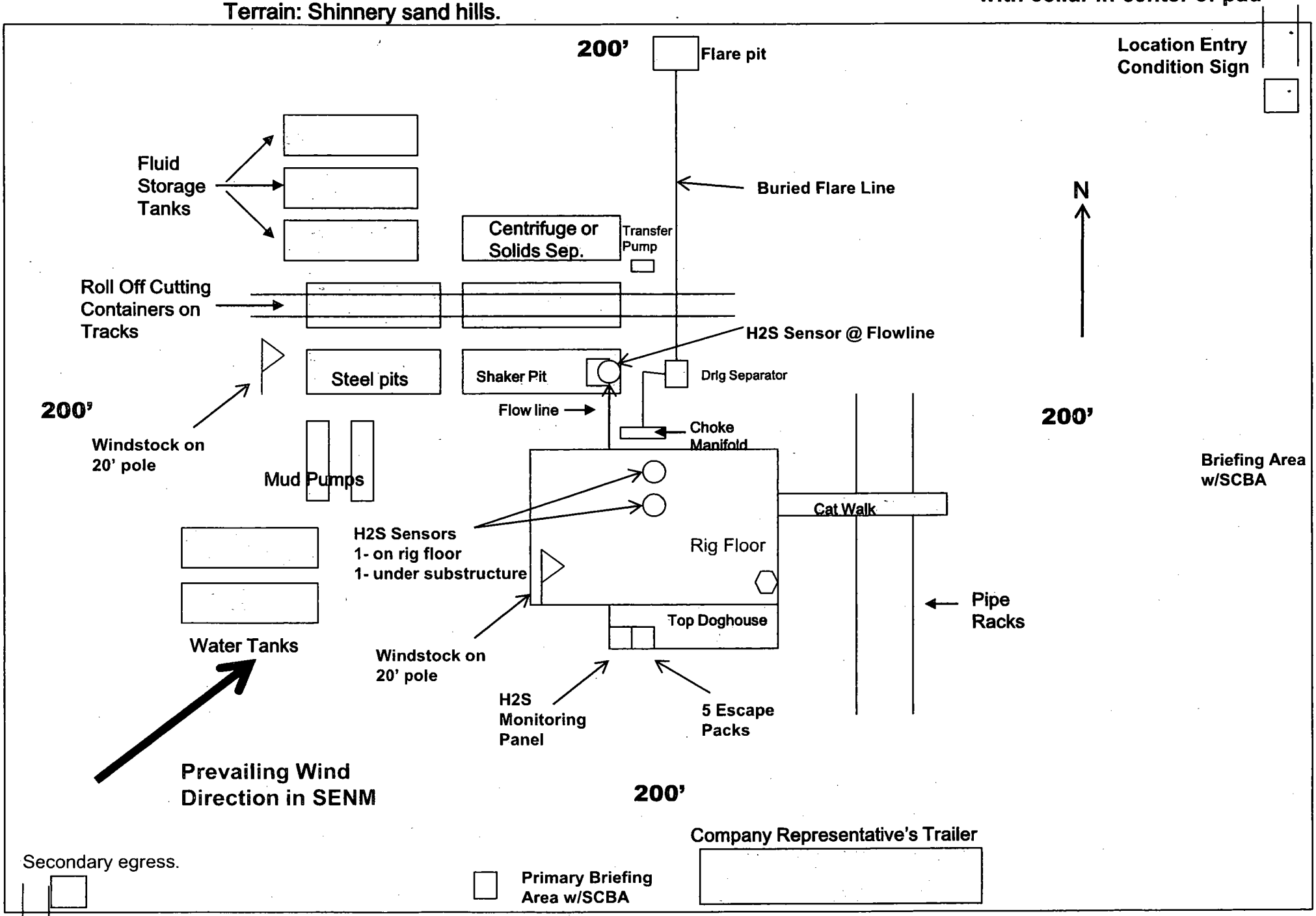
	OFFICE	MOBILE
COG OPERATING LLC OFFICE	575-748-6940	
SETH WILD	432-683-7443	432-528-3633
WALTER ROYE	575-748-6940	432-934-1886

EMERGENCY RESPONSE NUMBERS

	OFFICE
STATE POLICE	575-748-9718
EDDY COUNTY SHERIFF	575-746-2701
EMERGENCY MEDICAL SERVICES (AMBULANCE)	911 or 575-746-2701
EDDY COUNTY EMERGENCY MANAGEMENT (HARRY BURGESS)	575-887-9511
STATE EMERGENCY RESPONSE CENTER (SERC)	575-476-9620
CARLSBAD POLICE DEPARTMENT	575-885-2111
CARLSBAD FIRE DEPARTMENT	575-885-3125
NEW MEXICO OIL CONSERVATION DIVISION	575-748-1283
INDIAN FIRE & SAFETY	800-530-8693
HALLIBURTON SERVICES	800-844-8451

COG Operating LLC
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Well pad will be 400' x 400'
with cellar in center of pad



CONCHO

COG Operating, LLC

Lea County, NM
Sec 8, T26S, R33E
Tigercat Federal Com #1H

Wellbore #1
Design #1

QES Anticollision Report

06 September, 2017

QES
DIRECTIONAL DRILLING

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Reference Design #1

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0usft	**Error Model:**	ISCWSA
Depth Range:	0.0 to 30,000.0usft	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.00 **Sigma**		

Survey Tool Program **Date** 9/6/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	15,143.3	Design #1 (Wellbore #1)	MWD default	MWD - Standard

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Sec 8, T26S, R33E						
Tigercat Federal Com #2H - Wellbore #1 - Design #1	6,400.0	6,400.0	30.3	1.8	1.064	Level 2, CC, ES, SF

Offset Design Sec 8, T26S, R33E - Tigercat Federal Com #2H - Wellbore #1 - Design #1 — Offset Site Error: 0.0 usft

Survey Program: 0-MWD default — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-90.57	-0.3	-30.3	30.3			
100.0	100.0	100.0	100.0	0.1	0.1	-90.57	-0.3	-30.3	30.3	30.1	189.878	
200.0	200.0	200.0	200.0	0.3	0.3	-90.57	-0.3	-30.3	30.3	29.7	49.747	
300.0	300.0	300.0	300.0	0.5	0.5	-90.57	-0.3	-30.3	30.3	29.2	28.623	
400.0	400.0	400.0	400.0	0.8	0.8	-90.57	-0.3	-30.3	30.3	28.8	20.091	
500.0	500.0	500.0	500.0	1.0	1.0	-90.57	-0.3	-30.3	30.3	28.3	15.478	
600.0	600.0	600.0	600.0	1.2	1.2	-90.57	-0.3	-30.3	30.3	27.9	12.588	
700.0	700.0	700.0	700.0	1.4	1.4	-90.57	-0.3	-30.3	30.3	27.4	10.607	
800.0	800.0	800.0	800.0	1.7	1.7	-90.57	-0.3	-30.3	30.3	27.0	9.165	
900.0	900.0	900.0	900.0	1.9	1.9	-90.57	-0.3	-30.3	30.3	26.5	8.068	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-90.57	-0.3	-30.3	30.3	26.1	7.205	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.3	-90.57	-0.3	-30.3	30.3	25.6	6.510	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	-90.57	-0.3	-30.3	30.3	25.2	5.936	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	-90.57	-0.3	-30.3	30.3	24.7	5.456	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	-90.57	-0.3	-30.3	30.3	24.3	5.047	
1,500.0	1,500.0	1,500.0	1,500.0	3.2	3.2	-90.57	-0.3	-30.3	30.3	23.8	4.696	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	-90.57	-0.3	-30.3	30.3	23.4	4.390	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	-90.57	-0.3	-30.3	30.3	22.9	4.121	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	-90.57	-0.3	-30.3	30.3	22.5	3.884	
1,900.0	1,900.0	1,900.0	1,900.0	4.1	4.1	-90.57	-0.3	-30.3	30.3	22.1	3.672	
2,000.0	2,000.0	2,000.0	2,000.0	4.4	4.4	-90.57	-0.3	-30.3	30.3	21.6	3.483	
2,100.0	2,100.0	2,100.0	2,100.0	4.6	4.6	-90.57	-0.3	-30.3	30.3	21.2	3.312	
2,200.0	2,200.0	2,200.0	2,200.0	4.8	4.8	-90.57	-0.3	-30.3	30.3	20.7	3.156	
2,300.0	2,300.0	2,300.0	2,300.0	5.0	5.0	-90.57	-0.3	-30.3	30.3	20.3	3.015	
2,400.0	2,400.0	2,400.0	2,400.0	5.2	5.2	-90.57	-0.3	-30.3	30.3	19.8	2.886	
2,500.0	2,500.0	2,500.0	2,500.0	5.5	5.5	-90.57	-0.3	-30.3	30.3	19.4	2.768	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec 8, T26S, R33E - Tigercat Federal Com #2H - Wellbore #1 - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
2,600.0	2,600.0	2,600.0	2,600.0	5.7	5.7	-90.57	-0.3	-30.3	30.3	18.9	2.659	
2,700.0	2,700.0	2,700.0	2,700.0	5.9	5.9	-90.57	-0.3	-30.3	30.3	18.5	2.558	
2,800.0	2,800.0	2,800.0	2,800.0	6.1	6.1	-90.57	-0.3	-30.3	30.3	18.0	2.464	
2,900.0	2,900.0	2,900.0	2,900.0	6.4	6.4	-90.57	-0.3	-30.3	30.3	17.6	2.377	
3,000.0	3,000.0	3,000.0	3,000.0	6.6	6.6	-90.57	-0.3	-30.3	30.3	17.1	2.296	
3,100.0	3,100.0	3,100.0	3,100.0	6.8	6.8	-90.57	-0.3	-30.3	30.3	16.7	2.221	
3,200.0	3,200.0	3,200.0	3,200.0	7.0	7.0	-90.57	-0.3	-30.3	30.3	16.2	2.150	
3,300.0	3,300.0	3,300.0	3,300.0	7.3	7.3	-90.57	-0.3	-30.3	30.3	15.8	2.083	
3,400.0	3,400.0	3,400.0	3,400.0	7.5	7.5	-90.57	-0.3	-30.3	30.3	15.3	2.021	
3,500.0	3,500.0	3,500.0	3,500.0	7.7	7.7	-90.57	-0.3	-30.3	30.3	14.9	1.962	
3,600.0	3,600.0	3,600.0	3,600.0	7.9	7.9	-90.57	-0.3	-30.3	30.3	14.4	1.907	
3,700.0	3,700.0	3,700.0	3,700.0	8.2	8.2	-90.57	-0.3	-30.3	30.3	14.0	1.854	
3,800.0	3,800.0	3,800.0	3,800.0	8.4	8.4	-90.57	-0.3	-30.3	30.3	13.5	1.804	
3,900.0	3,900.0	3,900.0	3,900.0	8.6	8.6	-90.57	-0.3	-30.3	30.3	13.1	1.757	
4,000.0	4,000.0	4,000.0	4,000.0	8.8	8.8	-90.57	-0.3	-30.3	30.3	12.6	1.713	
4,100.0	4,100.0	4,100.0	4,100.0	9.1	9.1	-90.57	-0.3	-30.3	30.3	12.2	1.670	
4,200.0	4,200.0	4,200.0	4,200.0	9.3	9.3	-90.57	-0.3	-30.3	30.3	11.7	1.630	
4,300.0	4,300.0	4,300.0	4,300.0	9.5	9.5	-90.57	-0.3	-30.3	30.3	11.3	1.591	
4,400.0	4,400.0	4,400.0	4,400.0	9.7	9.7	-90.57	-0.3	-30.3	30.3	10.8	1.555	
4,500.0	4,500.0	4,500.0	4,500.0	10.0	10.0	-90.57	-0.3	-30.3	30.3	10.4	1.520	
4,600.0	4,600.0	4,600.0	4,600.0	10.2	10.2	-90.57	-0.3	-30.3	30.3	9.9	1.486	Level 3
4,700.0	4,700.0	4,700.0	4,700.0	10.4	10.4	-90.57	-0.3	-30.3	30.3	9.5	1.454	Level 3
4,800.0	4,800.0	4,800.0	4,800.0	10.6	10.6	-90.57	-0.3	-30.3	30.3	9.0	1.423	Level 3
4,900.0	4,900.0	4,900.0	4,900.0	10.9	10.9	-90.57	-0.3	-30.3	30.3	8.6	1.394	Level 3
5,000.0	5,000.0	5,000.0	5,000.0	11.1	11.1	-90.57	-0.3	-30.3	30.3	8.1	1.366	Level 3
5,100.0	5,100.0	5,100.0	5,100.0	11.3	11.3	-90.57	-0.3	-30.3	30.3	7.7	1.339	Level 3
5,200.0	5,200.0	5,200.0	5,200.0	11.5	11.5	-90.57	-0.3	-30.3	30.3	7.2	1.313	Level 3
5,300.0	5,300.0	5,300.0	5,300.0	11.8	11.8	-90.57	-0.3	-30.3	30.3	6.8	1.287	Level 3
5,400.0	5,400.0	5,400.0	5,400.0	12.0	12.0	-90.57	-0.3	-30.3	30.3	6.3	1.263	Level 3
5,500.0	5,500.0	5,500.0	5,500.0	12.2	12.2	-90.57	-0.3	-30.3	30.3	5.9	1.240	Level 2
5,600.0	5,600.0	5,600.0	5,600.0	12.4	12.4	-90.57	-0.3	-30.3	30.3	5.4	1.218	Level 2
5,700.0	5,700.0	5,700.0	5,700.0	12.7	12.7	-90.57	-0.3	-30.3	30.3	5.0	1.196	Level 2
5,800.0	5,800.0	5,800.0	5,800.0	12.9	12.9	-90.57	-0.3	-30.3	30.3	4.5	1.175	Level 2
5,900.0	5,900.0	5,900.0	5,900.0	13.1	13.1	-90.57	-0.3	-30.3	30.3	4.1	1.155	Level 2
6,000.0	6,000.0	6,000.0	6,000.0	13.3	13.3	-90.57	-0.3	-30.3	30.3	3.6	1.136	Level 2
6,100.0	6,100.0	6,100.0	6,100.0	13.6	13.6	-90.57	-0.3	-30.3	30.3	3.2	1.117	Level 2
6,200.0	6,200.0	6,200.0	6,200.0	13.8	13.8	-90.57	-0.3	-30.3	30.3	2.7	1.099	Level 2
6,300.0	6,300.0	6,300.0	6,300.0	14.0	14.0	-90.57	-0.3	-30.3	30.3	2.3	1.081	Level 2
6,400.0	6,400.0	6,400.0	6,400.0	14.2	14.2	-90.57	-0.3	-30.3	30.3	1.8	1.064	Level 2, CC, ES, SF
6,500.0	6,500.0	6,500.0	6,500.0	14.5	14.5	-155.75	-0.3	-30.3	31.9	3.0	1.102	Level 2
6,600.0	6,599.8	6,599.8	6,599.8	14.7	14.7	-159.07	-0.3	-30.3	36.7	7.4	1.251	Level 3
6,700.0	6,699.5	6,699.5	6,699.5	14.9	14.9	-162.99	-0.3	-30.3	45.0	15.2	1.510	
6,800.0	6,798.7	6,798.7	6,798.7	15.1	15.1	-166.54	-0.3	-30.3	56.7	26.5	1.878	
6,900.0	6,897.5	6,897.5	6,897.5	15.3	15.4	-169.37	-0.3	-30.3	72.0	41.4	2.351	
7,000.0	6,995.7	6,995.7	6,995.7	15.6	15.6	-171.52	-0.3	-30.3	90.4	59.3	2.910	
7,100.0	7,093.9	7,093.9	7,093.9	15.8	15.8	-172.99	-0.3	-30.3	109.2	77.7	3.467	
7,200.0	7,192.1	7,192.1	7,192.1	16.0	16.0	-174.03	-0.3	-30.3	128.1	96.1	4.011	
7,300.0	7,290.3	7,290.3	7,290.3	16.3	16.2	-174.80	-0.3	-30.3	146.9	114.6	4.541	
7,400.0	7,388.5	7,388.5	7,388.5	16.6	16.5	-175.39	-0.3	-30.3	165.9	133.1	5.058	
7,500.0	7,486.6	7,486.6	7,486.6	16.8	16.7	-175.86	-0.3	-30.3	184.8	151.5	5.561	
7,600.0	7,584.8	7,584.8	7,584.8	17.1	16.9	-176.25	-0.3	-30.3	203.7	170.0	6.052	
7,700.0	7,683.0	7,683.0	7,683.0	17.4	17.1	-176.57	-0.3	-30.3	222.6	188.5	6.530	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec 8, T26S, R33E - Tigercat Federal Com #2H - Wellbore #1 - Design #1 — Offset Site Error: 0.0 usft

Survey Program: 0-MWD default — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
7,800.0	7,781.2	7,781.2	7,781.2	17.6	17.3	-176.84	-0.3	-30.3	241.6	207.0	6.995	
7,900.0	7,879.4	7,879.4	7,879.4	17.9	17.6	-177.07	-0.3	-30.3	260.5	225.6	7.449	
8,000.0	7,977.6	7,977.6	7,977.6	18.2	17.8	-177.27	-0.3	-30.3	279.5	244.1	7.892	
8,100.0	8,075.7	8,075.7	8,075.7	18.5	18.0	-177.44	-0.3	-30.3	298.4	262.6	8.324	
8,200.0	8,173.9	8,173.9	8,173.9	18.8	18.2	-177.59	-0.3	-30.3	317.4	281.1	8.745	
8,300.0	8,272.1	8,272.1	8,272.1	19.1	18.4	-177.73	-0.3	-30.3	336.3	299.6	9.155	
8,400.0	8,370.3	8,370.3	8,370.3	19.4	18.7	-177.85	-0.3	-30.3	355.3	318.1	9.556	
8,500.0	8,468.5	8,468.5	8,468.5	19.7	18.9	-177.96	-0.3	-30.3	374.3	336.6	9.947	
8,600.0	8,566.7	8,566.7	8,566.7	20.1	19.1	-178.06	-0.3	-30.3	393.2	355.2	10.329	
8,700.0	8,664.8	8,664.8	8,664.8	20.4	19.3	-178.15	-0.3	-30.3	412.2	373.7	10.701	
8,800.0	8,763.0	8,763.0	8,763.0	20.7	19.6	-178.23	-0.3	-30.3	431.2	392.2	11.065	
8,900.0	8,861.2	8,861.2	8,861.2	21.0	19.8	-178.30	-0.3	-30.3	450.1	410.7	11.421	
9,000.0	8,959.4	8,959.4	8,959.4	21.3	20.0	-178.37	-0.3	-30.3	469.1	429.2	11.768	
9,100.0	9,057.6	9,057.6	9,057.6	21.7	20.2	-178.43	-0.3	-30.3	488.0	447.7	12.107	
9,200.0	9,155.8	9,155.8	9,155.8	22.0	20.4	-178.49	-0.3	-30.3	507.0	466.3	12.439	
9,300.0	9,253.9	9,253.9	9,253.9	22.3	20.7	-178.55	-0.3	-30.3	526.0	484.8	12.763	
9,400.0	9,352.1	9,352.1	9,352.1	22.7	20.9	-178.60	-0.3	-30.3	544.9	503.3	13.080	
9,500.0	9,450.3	9,450.3	9,450.3	23.0	21.1	-178.65	-0.3	-30.3	563.9	521.8	13.390	
9,600.0	9,548.5	9,548.5	9,548.5	23.4	21.3	-178.69	-0.3	-30.3	582.9	540.3	13.693	
9,700.0	9,646.7	9,646.7	9,646.7	23.7	21.5	-178.73	-0.3	-30.3	601.8	558.8	13.990	
9,800.0	9,744.9	9,744.9	9,744.9	24.1	21.8	-178.77	-0.3	-30.3	620.8	577.3	14.280	
9,900.0	9,843.2	9,835.5	9,835.5	24.4	22.0	144.84	-0.5	-30.3	638.7	594.8	14.561	
10,000.0	9,940.6	9,900.0	9,899.6	24.6	22.1	100.23	-6.7	-30.3	652.5	608.5	14.834	
10,100.0	10,033.2	9,963.1	9,961.0	24.8	22.2	85.73	-21.1	-30.1	662.7	618.7	15.063	
10,200.0	10,116.8	10,025.0	10,018.9	24.9	22.3	80.31	-43.0	-30.0	669.3	625.4	15.224	
10,300.0	10,187.8	10,093.7	10,079.2	24.9	22.4	78.65	-75.7	-29.7	672.5	628.4	15.255	
10,400.0	10,243.1	10,161.3	10,133.4	25.0	22.5	78.97	-116.1	-29.5	672.5	628.2	15.169	
10,500.0	10,280.2	10,231.3	10,182.8	25.1	22.7	80.72	-165.5	-29.1	670.1	625.2	14.951	
10,600.0	10,297.7	10,304.4	10,226.2	25.2	22.9	83.62	-224.3	-28.7	665.9	620.3	14.625	
10,700.0	10,299.3	10,383.8	10,262.6	25.5	23.2	86.81	-294.7	-28.1	661.9	615.5	14.263	
10,800.0	10,299.8	10,475.0	10,289.3	25.9	23.6	89.09	-381.8	-27.5	660.8	613.3	13.936	
10,900.0	10,300.3	10,573.4	10,299.1	26.4	24.1	89.90	-479.5	-26.8	660.7	612.0	13.590	
11,000.0	10,300.8	10,673.4	10,300.1	27.1	24.8	89.94	-579.5	-26.1	660.6	610.6	13.203	
11,100.0	10,301.2	10,773.4	10,301.1	27.9	25.6	89.99	-679.5	-25.3	660.6	609.0	12.787	
11,200.0	10,301.7	10,873.4	10,302.1	28.7	26.5	90.03	-779.5	-24.6	660.6	607.1	12.349	
11,300.0	10,302.2	10,973.4	10,303.1	29.7	27.5	90.07	-879.5	-23.9	660.6	605.1	11.902	
11,400.0	10,302.7	11,073.3	10,304.0	30.7	28.5	90.12	-979.5	-23.1	660.6	602.9	11.454	
11,500.0	10,303.2	11,173.3	10,305.0	31.9	29.7	90.16	-1,079.5	-22.4	660.6	600.6	11.012	
11,600.0	10,303.7	11,273.3	10,306.0	33.0	30.9	90.20	-1,179.4	-21.7	660.6	598.1	10.582	
11,700.0	10,304.2	11,373.3	10,307.0	34.3	32.1	90.25	-1,279.4	-21.0	660.5	595.6	10.166	
11,800.0	10,304.7	11,473.3	10,308.0	35.6	33.5	90.29	-1,379.4	-20.2	660.5	592.9	9.767	
11,900.0	10,305.2	11,573.3	10,309.0	36.9	34.8	90.33	-1,479.4	-19.5	660.5	590.1	9.386	
12,000.0	10,305.6	11,673.3	10,310.0	38.3	36.2	90.38	-1,579.4	-18.8	660.5	587.3	9.024	
12,100.0	10,306.1	11,773.3	10,311.0	39.7	37.6	90.42	-1,679.4	-18.0	660.5	584.4	8.681	
12,200.0	10,306.6	11,873.3	10,311.9	41.1	39.1	90.46	-1,779.4	-17.3	660.5	581.4	8.356	
12,300.0	10,307.1	11,973.3	10,312.9	42.6	40.6	90.51	-1,879.4	-16.6	660.5	578.4	8.049	
12,400.0	10,307.6	12,073.3	10,313.9	44.1	42.1	90.55	-1,979.4	-15.8	660.5	575.3	7.760	
12,500.0	10,308.1	12,173.3	10,314.9	45.6	43.7	90.59	-2,079.4	-15.1	660.4	572.2	7.487	
12,600.0	10,308.6	12,273.3	10,315.9	47.1	45.3	90.64	-2,179.4	-14.4	660.4	569.1	7.229	
12,700.0	10,309.1	12,373.3	10,316.9	48.7	46.8	90.68	-2,279.3	-13.6	660.4	565.9	6.986	
12,800.0	10,309.5	12,473.3	10,317.9	50.3	48.4	90.72	-2,379.3	-12.9	660.4	562.7	6.756	
12,900.0	10,310.0	12,573.3	10,318.9	51.9	50.1	90.76	-2,479.3	-12.2	660.4	559.4	6.539	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec 8, T26S, R33E - Tigercat Federal Com #2H - Wellbore #1 - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

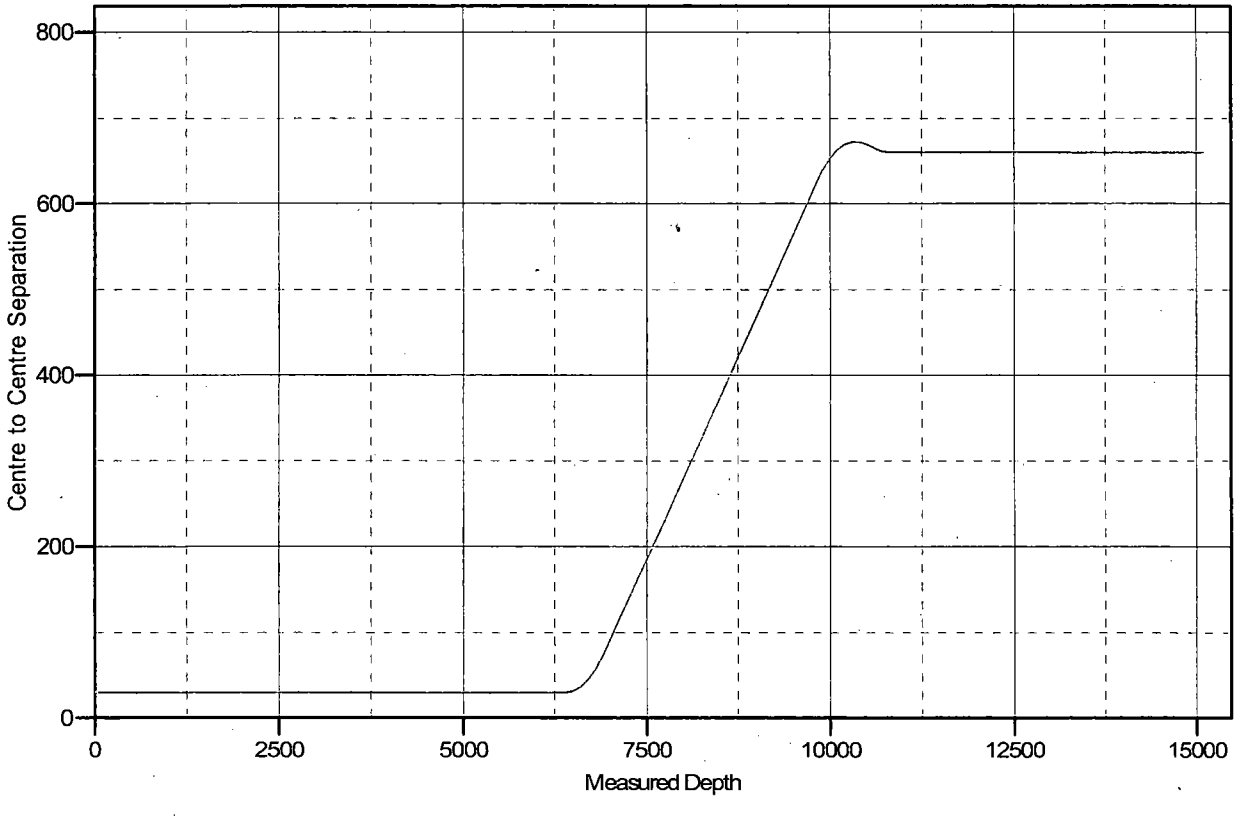
Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
13,000.0	10,310.5	12,673.3	10,319.8	53.5	51.7	90.81	-2,579.3	-11.5	660.4	556.1	6.334	
13,100.0	10,311.0	12,773.3	10,320.8	55.1	53.3	90.85	-2,679.3	-10.7	660.4	552.8	6.140	
13,200.0	10,311.5	12,873.3	10,321.8	56.7	55.0	90.89	-2,779.3	-10.0	660.4	549.5	5.956	
13,300.0	10,312.0	12,973.3	10,322.8	58.4	56.6	90.94	-2,879.3	-9.3	660.4	546.2	5.782	
13,400.0	10,312.5	13,073.3	10,323.8	60.0	58.3	90.98	-2,979.3	-8.5	660.4	542.8	5.617	
13,500.0	10,313.0	13,173.3	10,324.8	61.7	60.0	91.02	-3,079.3	-7.8	660.4	539.4	5.461	
13,600.0	10,313.5	13,273.3	10,325.8	63.4	61.7	91.07	-3,179.3	-7.1	660.4	536.0	5.312	
13,700.0	10,313.9	13,373.3	10,326.8	65.1	63.4	91.11	-3,279.3	-6.3	660.4	532.6	5.171	
13,800.0	10,314.4	13,473.3	10,327.7	66.8	65.1	91.15	-3,379.3	-5.6	660.3	529.2	5.036	
13,900.0	10,314.9	13,573.3	10,328.7	68.4	66.8	91.20	-3,479.2	-4.9	660.3	525.8	4.908	
14,000.0	10,315.4	13,673.3	10,329.7	70.1	68.5	91.24	-3,579.2	-4.1	660.3	522.4	4.786	
14,100.0	10,315.9	13,773.3	10,330.7	71.9	70.2	91.28	-3,679.2	-3.4	660.3	518.9	4.669	
14,200.0	10,316.4	13,873.3	10,331.7	73.6	72.0	91.33	-3,779.2	-2.7	660.3	515.4	4.558	
14,300.0	10,316.9	13,973.3	10,332.7	75.3	73.7	91.37	-3,879.2	-2.0	660.3	512.0	4.451	
14,400.0	10,317.4	14,073.3	10,333.7	77.0	75.4	91.41	-3,979.2	-1.2	660.3	508.5	4.349	
14,500.0	10,317.9	14,173.3	10,334.7	78.7	77.2	91.46	-4,079.2	-0.5	660.3	505.0	4.252	
14,600.0	10,318.3	14,273.3	10,335.6	80.5	78.9	91.50	-4,179.2	0.2	660.3	501.5	4.158	
14,700.0	10,318.8	14,373.3	10,336.6	82.2	80.7	91.54	-4,279.2	1.0	660.3	498.0	4.069	
14,800.0	10,319.3	14,473.3	10,337.6	83.9	82.4	91.59	-4,379.2	1.7	660.3	494.5	3.983	
14,900.0	10,319.8	14,573.3	10,338.6	85.7	84.2	91.63	-4,479.2	2.4	660.3	491.0	3.900	
15,000.0	10,320.3	14,673.3	10,339.6	87.4	85.9	91.67	-4,579.1	3.2	660.3	487.5	3.821	
15,100.0	10,320.8	14,773.3	10,340.6	89.2	87.7	91.72	-4,679.1	3.9	660.3	484.0	3.745	

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB @ 3351.0usft (Noram 21)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Tigercat Federal Com #1H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.39°

Ladder Plot



LEGEND

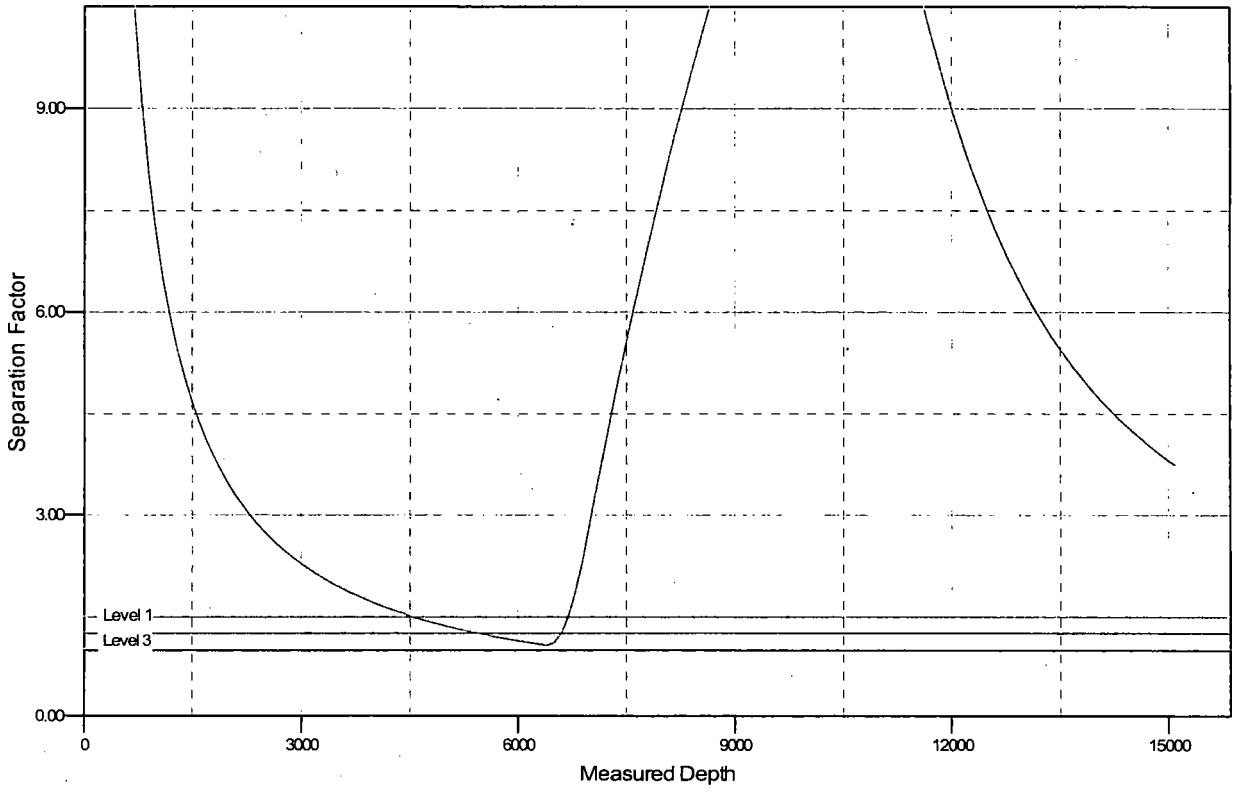
ıercat Federal Com #2H, Wellbore #1, Design #1 V0

Company:	COG Operating, LLC	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Project:	Lea County, NM	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Reference Site:	Sec 8, T26S, R33E	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #1	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB @ 3351.0usft (Noram 21)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Tigercat Federal Com #1H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.39°

Separation Factor Plot



LEGEND

ıercat Federal Com #2H, Wellbore #1, Design #1 V0

CONCHO

COG Operating, LLC

Lea County, NM
Sec 8, T26S, R33E
Tigercat Federal Com #1H

Wellbore #1

Plan: Design #2

QES Well Planning Report

20 September, 2017

QES
DIRECTIONAL DRILLING

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec 8, T26S, R33E				
Site Position:		**Northing:**	387,868.90 usft	**Latitude:**	32° 3' 51.084 N
From:	Map	**Easting:**	730,106.20 usft	**Longitude:**	103° 35' 25.921 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.39 °

Well	Tigercat Federal Com #1H				
Well Position	**+N/-S**	0.0 usft	**Northing:**	387,868.90 usft	**Latitude:**	32° 3' 51.084 N
	+E/-W	0.0 usft	**Easting:**	730,106.20 usft	**Longitude:**	103° 35' 25.921 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**		**Ground Level:**	3,322.0 usft

Wellbore	Wellbore #1				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	9/5/2017	6.93	59.91	47,819.30331497

Design	Design #2				
Audit Notes:					
Version:		**Phase:**	PLAN	**Tie On Depth:**	0.0
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.0	0.0	0.0	176.02	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.00	0.00	0.00	0.00	
6,943.5	10.87	63.84	6,940.2	22.7	46.1	2.00	2.00	0.00	63.84	
9,848.2	10.87	63.84	9,792.9	264.1	537.8	0.00	0.00	0.00	0.00	
10,636.4	89.87	179.61	10,302.0	-210.1	628.9	12.00	10.02	14.69	115.39	
20,424.4	89.87	179.61	10,324.0	-9,997.8	695.5	0.00	0.00	0.00	0.00	PBHL Tigercat Federa

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
Rustler									
850.0	0.00	0.00	850.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
TOS									
1,180.0	0.00	0.00	1,180.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
BOS (Fletcher)									
4,680.0	0.00	0.00	4,680.0	0.0	0.0	0.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00
LMAR (Top Delaware)									
4,849.0	0.00	0.00	4,849.0	0.0	0.0	0.0	0.00	0.00	0.00
BLCN									
4,869.0	0.00	0.00	4,869.0	0.0	0.0	0.0	0.00	0.00	0.00
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
CYCN									
5,931.0	0.00	0.00	5,931.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 2°/100'									
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	2.00	63.84	6,500.0	0.8	1.6	-0.7	2.00	2.00	0.00
6,600.0	4.00	63.84	6,599.8	3.1	6.3	-2.6	2.00	2.00	0.00
6,700.0	6.00	63.84	6,699.5	6.9	14.1	-5.9	2.00	2.00	0.00
6,800.0	8.00	63.84	6,798.7	12.3	25.0	-10.5	2.00	2.00	0.00
6,900.0	10.00	63.84	6,897.5	19.2	39.1	-16.4	2.00	2.00	0.00
Hold 10.87° Inc., 63.84° Azm									
6,943.5	10.87	63.84	6,940.2	22.7	46.1	-19.4	2.00	2.00	0.00
7,000.0	10.87	63.84	6,995.7	27.4	55.7	-23.4	0.00	0.00	0.00
7,100.0	10.87	63.84	7,093.9	35.7	72.6	-30.5	0.00	0.00	0.00
7,200.0	10.87	63.84	7,192.1	44.0	89.6	-37.7	0.00	0.00	0.00
7,300.0	10.87	63.84	7,290.3	52.3	106.5	-44.8	0.00	0.00	0.00
7,400.0	10.87	63.84	7,388.6	60.6	123.4	-51.9	0.00	0.00	0.00
BYCN									
7,493.0	10.87	63.84	7,479.9	68.3	139.1	-58.5	0.00	0.00	0.00
7,500.0	10.87	63.84	7,486.8	68.9	140.3	-59.0	0.00	0.00	0.00
7,600.0	10.87	63.84	7,585.0	77.2	157.3	-66.1	0.00	0.00	0.00
7,700.0	10.87	63.84	7,683.2	85.5	174.2	-73.3	0.00	0.00	0.00
7,800.0	10.87	63.84	7,781.4	93.9	191.1	-80.4	0.00	0.00	0.00
7,900.0	10.87	63.84	7,879.6	102.2	208.0	-87.5	0.00	0.00	0.00
8,000.0	10.87	63.84	7,977.8	110.5	225.0	-94.6	0.00	0.00	0.00
8,100.0	10.87	63.84	8,076.0	118.8	241.9	-101.7	0.00	0.00	0.00
8,200.0	10.87	63.84	8,174.2	127.1	258.8	-108.8	0.00	0.00	0.00
8,300.0	10.87	63.84	8,272.4	135.4	275.7	-116.0	0.00	0.00	0.00
8,400.0	10.87	63.84	8,370.6	143.7	292.7	-123.1	0.00	0.00	0.00
8,500.0	10.87	63.84	8,468.8	152.1	309.6	-130.2	0.00	0.00	0.00
8,600.0	10.87	63.84	8,567.0	160.4	326.5	-137.3	0.00	0.00	0.00
8,700.0	10.87	63.84	8,665.2	168.7	343.5	-144.4	0.00	0.00	0.00
8,800.0	10.87	63.84	8,763.4	177.0	360.4	-151.6	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
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Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,900.0	10.87	63.84	8,861.6	185.3	377.3	-158.7	0.00	0.00	0.00
9,000.0	10.87	63.84	8,959.8	193.6	394.2	-165.8	0.00	0.00	0.00
Bone Sprg (BSGL)									
9,031.3	10.87	63.84	8,990.6	196.2	399.5	-168.0	0.00	0.00	0.00
9,100.0	10.87	63.84	9,058.1	201.9	411.2	-172.9	0.00	0.00	0.00
U Avalon Sh									
9,197.3	10.87	63.84	9,153.6	210.0	427.6	-179.8	0.00	0.00	0.00
9,200.0	10.87	63.84	9,156.3	210.2	428.1	-180.0	0.00	0.00	0.00
9,300.0	10.87	63.84	9,254.5	218.6	445.0	-187.2	0.00	0.00	0.00
9,400.0	10.87	63.84	9,352.7	226.9	461.9	-194.3	0.00	0.00	0.00
L Avalon Sh									
9,436.5	10.87	63.84	9,388.6	229.9	468.1	-196.9	0.00	0.00	0.00
9,500.0	10.87	63.84	9,450.9	235.2	478.9	-201.4	0.00	0.00	0.00
9,600.0	10.87	63.84	9,549.1	243.5	495.8	-208.5	0.00	0.00	0.00
9,700.0	10.87	63.84	9,647.3	251.8	512.7	-215.6	0.00	0.00	0.00
Basal Avalon									
9,703.3	10.87	63.84	9,650.5	252.1	513.3	-215.9	0.00	0.00	0.00
9,800.0	10.87	63.84	9,745.5	260.1	529.6	-222.7	0.00	0.00	0.00
KOP: Build 12°/100' @ 9848.3' MD									
9,848.2	10.87	63.84	9,792.9	264.1	537.8	-226.2	0.00	0.00	0.00
9,850.0	10.78	64.86	9,794.6	264.3	538.1	-226.3	12.00	-5.05	57.96
9,875.0	9.92	80.92	9,819.2	265.6	542.4	-227.3	12.00	-3.44	64.24
9,900.0	9.92	98.39	9,843.8	265.6	546.6	-227.1	12.00	0.00	69.90
9,925.0	10.78	114.45	9,868.4	264.4	550.9	-225.5	12.00	3.45	64.21
9,950.0	12.33	127.34	9,892.9	261.8	555.1	-222.6	12.00	6.17	51.58
9,975.0	14.33	137.05	9,917.2	257.9	559.4	-218.4	12.00	8.03	38.84
10,000.0	16.64	144.28	9,941.3	252.7	563.6	-213.0	12.00	9.21	28.91
FBSG_sand									
10,014.9	18.10	147.70	9,955.5	249.0	566.0	-209.2	12.00	9.85	22.99
10,025.0	19.13	149.73	9,965.1	246.3	567.7	-206.3	12.00	10.15	20.08
10,050.0	21.75	153.94	9,988.6	238.6	571.8	-198.3	12.00	10.47	16.85
10,075.0	24.45	157.28	10,011.6	229.6	575.8	-189.1	12.00	10.80	13.34
10,100.0	27.21	159.98	10,034.1	219.5	579.8	-178.7	12.00	11.04	10.80
10,125.0	30.01	162.21	10,056.0	208.2	583.7	-167.2	12.00	11.21	8.94
10,150.0	32.85	164.10	10,077.3	195.7	587.4	-154.5	12.00	11.34	7.53
10,175.0	35.70	165.71	10,098.0	182.1	591.1	-140.6	12.00	11.44	6.46
10,200.0	38.58	167.12	10,117.9	167.4	594.6	-125.8	12.00	11.51	5.62
10,225.0	41.47	168.35	10,137.1	151.7	598.0	-109.8	12.00	11.57	4.95
10,250.0	44.38	169.46	10,155.4	135.0	601.3	-93.0	12.00	11.62	4.41
10,275.0	47.29	170.45	10,172.8	117.3	604.4	-75.1	12.00	11.66	3.98
10,300.0	50.22	171.35	10,189.3	98.8	607.4	-56.4	12.00	11.69	3.62
10,325.0	53.14	172.19	10,204.8	79.4	610.2	-36.8	12.00	11.71	3.32
10,350.0	56.08	172.95	10,219.2	59.2	612.8	-16.5	12.00	11.73	3.08
10,375.0	59.02	173.67	10,232.6	38.2	615.3	4.6	12.00	11.75	2.87
10,400.0	61.96	174.35	10,245.0	16.6	617.6	26.3	12.00	11.77	2.70
10,425.0	64.90	174.99	10,256.1	-5.7	619.6	48.7	12.00	11.78	2.56
10,450.0	67.85	175.60	10,266.2	-28.5	621.5	71.6	12.00	11.79	2.44
10,475.0	70.80	176.18	10,275.0	-51.8	623.2	94.9	12.00	11.80	2.34
10,500.0	73.75	176.74	10,282.6	-75.6	624.7	118.8	12.00	11.81	2.25
10,525.0	76.70	177.29	10,289.0	-99.7	625.9	142.9	12.00	11.81	2.19
10,550.0	79.66	177.82	10,294.1	-124.2	627.0	167.4	12.00	11.82	2.13
10,575.0	82.61	178.35	10,297.9	-148.9	627.8	192.1	12.00	11.82	2.09
10,600.0	85.57	178.86	10,300.5	-173.7	628.4	216.9	12.00	11.82	2.07

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,625.0	88.53	179.38	10,301.8	-198.7	628.8	241.8	12.00	11.82	2.05
EOC: 10636.4' MD, 89.87° Inc, 179.61° Azm									
10,636.4	89.87	179.61	10,302.0	-210.1	628.9	253.2	12.00	11.82	2.04
10,700.0	89.87	179.61	10,302.1	-273.7	629.3	316.7	0.00	0.00	0.00
10,800.0	89.87	179.61	10,302.3	-373.7	630.0	416.5	0.00	0.00	0.00
10,900.0	89.87	179.61	10,302.6	-473.7	630.7	516.3	0.00	0.00	0.00
11,000.0	89.87	179.61	10,302.8	-573.7	631.4	616.1	0.00	0.00	0.00
11,100.0	89.87	179.61	10,303.0	-673.7	632.0	715.9	0.00	0.00	0.00
11,200.0	89.87	179.61	10,303.2	-773.7	632.7	815.7	0.00	0.00	0.00
11,300.0	89.87	179.61	10,303.5	-873.7	633.4	915.5	0.00	0.00	0.00
11,400.0	89.87	179.61	10,303.7	-973.7	634.1	1,015.3	0.00	0.00	0.00
11,500.0	89.87	179.61	10,303.9	-1,073.7	634.8	1,115.1	0.00	0.00	0.00
11,600.0	89.87	179.61	10,304.1	-1,173.7	635.4	1,214.9	0.00	0.00	0.00
11,700.0	89.87	179.61	10,304.4	-1,273.6	636.1	1,314.7	0.00	0.00	0.00
11,800.0	89.87	179.61	10,304.6	-1,373.6	636.8	1,414.5	0.00	0.00	0.00
11,900.0	89.87	179.61	10,304.8	-1,473.6	637.5	1,514.3	0.00	0.00	0.00
12,000.0	89.87	179.61	10,305.0	-1,573.6	638.2	1,614.1	0.00	0.00	0.00
12,100.0	89.87	179.61	10,305.3	-1,673.6	638.8	1,713.9	0.00	0.00	0.00
12,200.0	89.87	179.61	10,305.5	-1,773.6	639.5	1,813.7	0.00	0.00	0.00
12,300.0	89.87	179.61	10,305.7	-1,873.6	640.2	1,913.5	0.00	0.00	0.00
12,400.0	89.87	179.61	10,305.9	-1,973.6	640.9	2,013.3	0.00	0.00	0.00
12,500.0	89.87	179.61	10,306.2	-2,073.6	641.6	2,113.2	0.00	0.00	0.00
12,600.0	89.87	179.61	10,306.4	-2,173.6	642.2	2,213.0	0.00	0.00	0.00
12,700.0	89.87	179.61	10,306.6	-2,273.6	642.9	2,312.8	0.00	0.00	0.00
12,800.0	89.87	179.61	10,306.8	-2,373.6	643.6	2,412.6	0.00	0.00	0.00
12,900.0	89.87	179.61	10,307.1	-2,473.6	644.3	2,512.4	0.00	0.00	0.00
13,000.0	89.87	179.61	10,307.3	-2,573.6	645.0	2,612.2	0.00	0.00	0.00
13,100.0	89.87	179.61	10,307.5	-2,673.6	645.6	2,712.0	0.00	0.00	0.00
13,200.0	89.87	179.61	10,307.7	-2,773.6	646.3	2,811.8	0.00	0.00	0.00
13,300.0	89.87	179.61	10,308.0	-2,873.6	647.0	2,911.6	0.00	0.00	0.00
13,400.0	89.87	179.61	10,308.2	-2,973.6	647.7	3,011.4	0.00	0.00	0.00
13,500.0	89.87	179.61	10,308.4	-3,073.6	648.4	3,111.2	0.00	0.00	0.00
13,600.0	89.87	179.61	10,308.6	-3,173.6	649.0	3,211.0	0.00	0.00	0.00
13,700.0	89.87	179.61	10,308.9	-3,273.6	649.7	3,310.8	0.00	0.00	0.00
13,800.0	89.87	179.61	10,309.1	-3,373.6	650.4	3,410.6	0.00	0.00	0.00
13,900.0	89.87	179.61	10,309.3	-3,473.6	651.1	3,510.4	0.00	0.00	0.00
14,000.0	89.87	179.61	10,309.5	-3,573.6	651.8	3,610.2	0.00	0.00	0.00
14,100.0	89.87	179.61	10,309.8	-3,673.6	652.5	3,710.0	0.00	0.00	0.00
14,200.0	89.87	179.61	10,310.0	-3,773.6	653.1	3,809.8	0.00	0.00	0.00
14,300.0	89.87	179.61	10,310.2	-3,873.6	653.8	3,909.6	0.00	0.00	0.00
14,400.0	89.87	179.61	10,310.4	-3,973.6	654.5	4,009.4	0.00	0.00	0.00
14,500.0	89.87	179.61	10,310.7	-4,073.6	655.2	4,109.2	0.00	0.00	0.00
14,600.0	89.87	179.61	10,310.9	-4,173.6	655.9	4,209.0	0.00	0.00	0.00
14,700.0	89.87	179.61	10,311.1	-4,273.6	656.5	4,308.8	0.00	0.00	0.00
14,800.0	89.87	179.61	10,311.3	-4,373.6	657.2	4,408.6	0.00	0.00	0.00
14,900.0	89.87	179.61	10,311.6	-4,473.6	657.9	4,508.4	0.00	0.00	0.00
15,000.0	89.87	179.61	10,311.8	-4,573.6	658.6	4,608.2	0.00	0.00	0.00
15,100.0	89.87	179.61	10,312.0	-4,673.6	659.3	4,708.0	0.00	0.00	0.00
15,200.0	89.87	179.61	10,312.2	-4,773.6	659.9	4,807.8	0.00	0.00	0.00
15,300.0	89.87	179.61	10,312.5	-4,873.6	660.6	4,907.7	0.00	0.00	0.00
15,400.0	89.87	179.61	10,312.7	-4,973.6	661.3	5,007.5	0.00	0.00	0.00
15,500.0	89.87	179.61	10,312.9	-5,073.6	662.0	5,107.3	0.00	0.00	0.00
15,600.0	89.87	179.61	10,313.1	-5,173.5	662.7	5,207.1	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,700.0	89.87	179.61	10,313.4	-5,273.5	663.3	5,306.9	0.00	0.00	0.00
15,800.0	89.87	179.61	10,313.6	-5,373.5	664.0	5,406.7	0.00	0.00	0.00
15,900.0	89.87	179.61	10,313.8	-5,473.5	664.7	5,506.5	0.00	0.00	0.00
16,000.0	89.87	179.61	10,314.0	-5,573.5	665.4	5,606.3	0.00	0.00	0.00
16,100.0	89.87	179.61	10,314.3	-5,673.5	666.1	5,706.1	0.00	0.00	0.00
16,200.0	89.87	179.61	10,314.5	-5,773.5	666.7	5,805.9	0.00	0.00	0.00
16,300.0	89.87	179.61	10,314.7	-5,873.5	667.4	5,905.7	0.00	0.00	0.00
16,400.0	89.87	179.61	10,314.9	-5,973.5	668.1	6,005.5	0.00	0.00	0.00
16,500.0	89.87	179.61	10,315.2	-6,073.5	668.8	6,105.3	0.00	0.00	0.00
16,600.0	89.87	179.61	10,315.4	-6,173.5	669.5	6,205.1	0.00	0.00	0.00
16,700.0	89.87	179.61	10,315.6	-6,273.5	670.1	6,304.9	0.00	0.00	0.00
16,800.0	89.87	179.61	10,315.8	-6,373.5	670.8	6,404.7	0.00	0.00	0.00
16,900.0	89.87	179.61	10,316.1	-6,473.5	671.5	6,504.5	0.00	0.00	0.00
17,000.0	89.87	179.61	10,316.3	-6,573.5	672.2	6,604.3	0.00	0.00	0.00
17,100.0	89.87	179.61	10,316.5	-6,673.5	672.9	6,704.1	0.00	0.00	0.00
17,200.0	89.87	179.61	10,316.7	-6,773.5	673.6	6,803.9	0.00	0.00	0.00
17,300.0	89.87	179.61	10,317.0	-6,873.5	674.2	6,903.7	0.00	0.00	0.00
17,400.0	89.87	179.61	10,317.2	-6,973.5	674.9	7,003.5	0.00	0.00	0.00
17,500.0	89.87	179.61	10,317.4	-7,073.5	675.6	7,103.3	0.00	0.00	0.00
17,600.0	89.87	179.61	10,317.6	-7,173.5	676.3	7,203.1	0.00	0.00	0.00
17,700.0	89.87	179.61	10,317.9	-7,273.5	677.0	7,302.9	0.00	0.00	0.00
17,800.0	89.87	179.61	10,318.1	-7,373.5	677.6	7,402.7	0.00	0.00	0.00
17,900.0	89.87	179.61	10,318.3	-7,473.5	678.3	7,502.5	0.00	0.00	0.00
18,000.0	89.87	179.61	10,318.5	-7,573.5	679.0	7,602.3	0.00	0.00	0.00
18,100.0	89.87	179.61	10,318.8	-7,673.5	679.7	7,702.2	0.00	0.00	0.00
18,200.0	89.87	179.61	10,319.0	-7,773.5	680.4	7,802.0	0.00	0.00	0.00
18,300.0	89.87	179.61	10,319.2	-7,873.5	681.0	7,901.8	0.00	0.00	0.00
18,400.0	89.87	179.61	10,319.4	-7,973.5	681.7	8,001.6	0.00	0.00	0.00
18,500.0	89.87	179.61	10,319.7	-8,073.5	682.4	8,101.4	0.00	0.00	0.00
18,600.0	89.87	179.61	10,319.9	-8,173.5	683.1	8,201.2	0.00	0.00	0.00
18,700.0	89.87	179.61	10,320.1	-8,273.5	683.8	8,301.0	0.00	0.00	0.00
18,800.0	89.87	179.61	10,320.3	-8,373.5	684.4	8,400.8	0.00	0.00	0.00
18,900.0	89.87	179.61	10,320.6	-8,473.5	685.1	8,500.6	0.00	0.00	0.00
19,000.0	89.87	179.61	10,320.8	-8,573.5	685.8	8,600.4	0.00	0.00	0.00
19,100.0	89.87	179.61	10,321.0	-8,673.5	686.5	8,700.2	0.00	0.00	0.00
19,200.0	89.87	179.61	10,321.2	-8,773.5	687.2	8,800.0	0.00	0.00	0.00
19,300.0	89.87	179.61	10,321.5	-8,873.5	687.8	8,899.8	0.00	0.00	0.00
19,400.0	89.87	179.61	10,321.7	-8,973.4	688.5	8,999.6	0.00	0.00	0.00
19,500.0	89.87	179.61	10,321.9	-9,073.4	689.2	9,099.4	0.00	0.00	0.00
19,600.0	89.87	179.61	10,322.1	-9,173.4	689.9	9,199.2	0.00	0.00	0.00
19,700.0	89.87	179.61	10,322.4	-9,273.4	690.6	9,299.0	0.00	0.00	0.00
19,800.0	89.87	179.61	10,322.6	-9,373.4	691.3	9,398.8	0.00	0.00	0.00
19,900.0	89.87	179.61	10,322.8	-9,473.4	691.9	9,498.6	0.00	0.00	0.00
20,000.0	89.87	179.61	10,323.0	-9,573.4	692.6	9,598.4	0.00	0.00	0.00
20,100.0	89.87	179.61	10,323.3	-9,673.4	693.3	9,698.2	0.00	0.00	0.00
20,200.0	89.87	179.61	10,323.5	-9,773.4	694.0	9,798.0	0.00	0.00	0.00
20,300.0	89.87	179.61	10,323.7	-9,873.4	694.7	9,897.8	0.00	0.00	0.00
20,400.0	89.87	179.61	10,323.9	-9,973.4	695.3	9,997.6	0.00	0.00	0.00
TD @ 20424.4' MD/10324.0' TVD									
20,424.4	89.87	179.61	10,324.0	-9,997.8	695.5	10,022.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Tigercat Federal Com #1H
Company:	COG Operating, LLC	**TVD Reference:**	KB @ 3351.0usft (Noram 21)
Project:	Lea County, NM	**MD Reference:**	KB @ 3351.0usft (Noram 21)
Site:	Sec 8, T26S, R33E	**North Reference:**	Grid
Well:	Tigercat Federal Com #1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #2		

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
LTP Tigercat Federal Co	0.00	0.00	0.0	-9,867.8	694.7	378,001.12	730,800.93	32° 2' 13.387 N	103° 35' 18.640 W
- plan misses target center by 9892.2usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Point									
FTP Tigercat Federal Cc	0.00	0.00	0.0	28.7	629.6	387,897.58	730,735.75	32° 3' 51.325 N	103° 35' 18.604 W
- plan misses target center by 630.2usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Point									
PBHL Tigercat Federal C	0.00	0.01	10,324.0	-9,997.8	695.5	377,871.10	730,801.70	32° 2' 12.100 N	103° 35' 18.641 W
- plan hits target center									
- Point									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
850.0	850.0	Rustler		0.13	176.02
1,180.0	1,180.0	TOS		0.13	176.02
4,680.0	4,680.0	BOS (Fletcher)		0.13	176.02
4,849.0	4,849.0	LMAR (Top Delaware)		0.13	176.02
4,869.0	4,869.0	BLCN		0.13	176.02
5,931.0	5,931.0	CYCN		0.13	176.02
7,493.0	7,479.9	BYCN		0.13	176.02
9,031.3	8,990.6	Bone Sprg (BSGL)		0.13	176.02
9,197.3	9,153.6	U Avalon Sh		0.13	176.02
9,436.5	9,388.6	L Avalon Sh		0.13	176.02
9,703.3	9,650.5	Basal Avalon		0.13	176.02
10,014.9	9,955.5	FBSG_sand		0.13	176.02

Plan Annotations

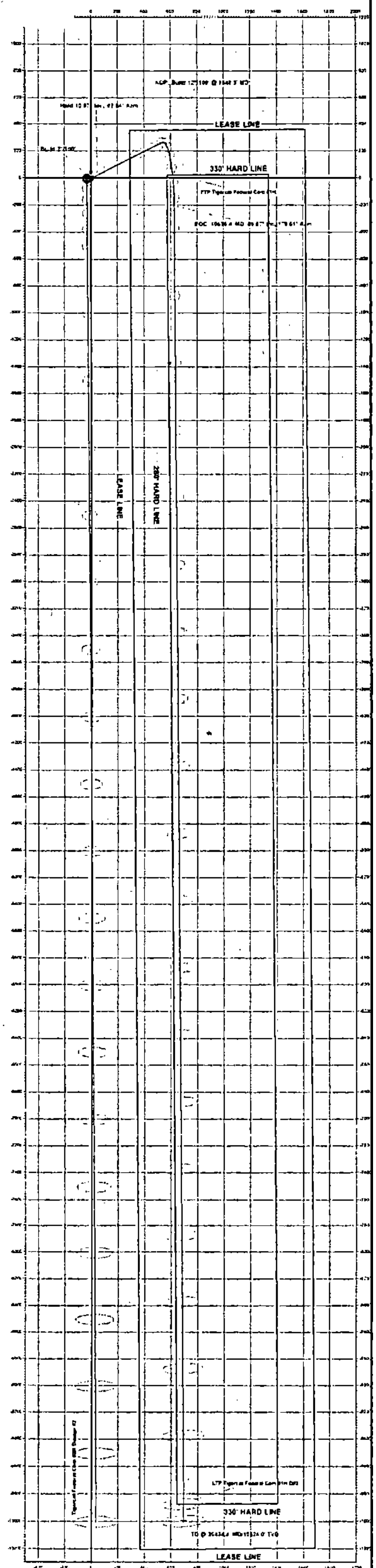
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
6,400.0	6,400.0	0.0	0.0	Build 2°/100'
6,943.5	6,940.2	22.7	46.1	Hold 10.87° Inc., 63.84° Azm
9,848.2	9,792.9	264.1	537.8	KOP: Build 12°/100' @ 9848.3' MD
10,636.4	10,302.0	-210.1	628.9	EOC: 10636.4' MD, 89.87° Inc, 179.61° Azm
20,424.4	10,324.0	-9,997.8	695.5	TD @ 20424.4' MD/10324.0' TVD

CONCHO

QES
DIRECTIONAL DRILLING

Tigercat Federal Com #1H
Lea County, NM
Q170*** & WT-170***
Design #2

Company Name: COG Operating, LLC
Tigercat Federal Com #1H
Lea County, NM
Rig: Noram 21
Created By: Shelly Peterkin
Date: 8/20/2017



WELL DETAILS: Tigercat Federal Com #1H

Ground Level: 3322.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	387668.99	730186.29	32° 3' 11.884 N	103° 35' 25.921 W	

DESIGN TARGET DETAILS

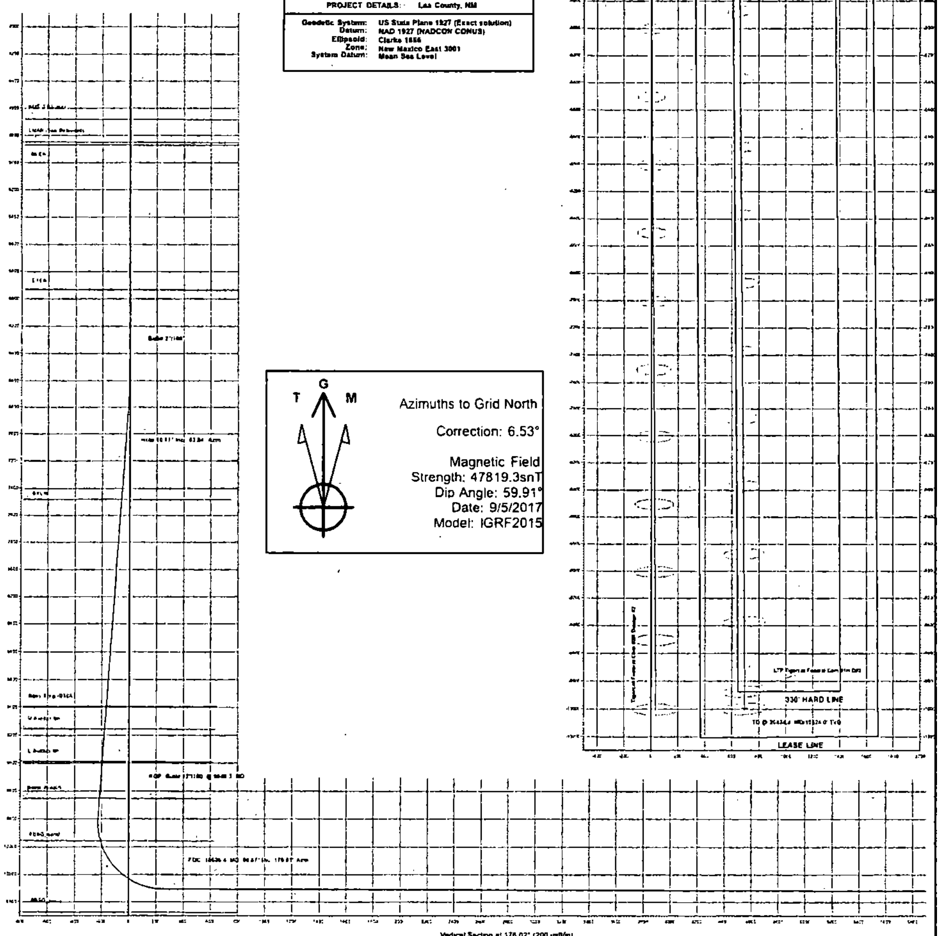
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
FTP Tigercat Federal Com #1H	0.0	28.7	629.6	387697.54	730735.75	32° 3' 01.375 N	103° 35' 18.334 W
LTP Tigercat Federal Com #1H DEI	0.0	-9987.0	694.7	378001.12	730840.93	32° 2' 13.387 N	103° 35' 18.640 W
PBHL Tigercat Federal Com #1H DEI	10324.9	-9997.8	695.5	377671.10	730881.75	32° 2' 12.180 N	103° 35' 18.641 W

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
6400.0	0.00	0.00	6400.0	0.0	0.0	0.0	0.0	Build 2°/100'
6943.5	10.87	63.84	6940.2	22.7	46.1	-19.4	51.4	Hold 10.87° Inc., 63.84° Azm
9848.3	10.87	63.84	9792.9	264.1	537.8	-220.2	599.2	KOP: Build 12°/100' @ 9848.3' MD
10636.4	89.87	179.61	10302.6	-210.1	620.9	253.2	1101.2	EOC: 10636.4' MD, 89.87° Inc, 179.61° Azm
20424.4	89.87	179.61	10324.9	-9997.8	695.5	10022.8	10581.2	TD @ 20424.4' MD/10324.9' TVD

PROJECT DETAILS: Lea County, NM

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level



Azimuths to Grid North
Correction: 6.53°
Magnetic Field
Strength: 47819.3snT
Dip Angle: 59.91°
Date: 9/5/2017
Model: IGRF2015