PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG OPERATING LLC.
LEASE NO.:	NMNM120365
WELL NAME & NO.:	24H –HENNIN FEDERAL
SURFACE HOLE FOOTAGE:	210'/N & 2162'/E
BOTTOM HOLE FOOTAGE	200'/S & 2310'/E
LOCATION:	Section 3.,T26S., R.35E., NMP
COUNTY:	LEA County, New Mexico

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

A. Hydrogen Sulfide

1. Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

1. The **10 3/4** inch surface casing shall be set at approximately **975** 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 **7 5/8** inch intermediate casing is:

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

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

   - Cement should tie-back at least **200** feet into previous casing string. Operator shall provide method of verification. **Excess calculates to 23% - additional cement will be required.**

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 **5000 (5M)** psi.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **7 5/8** inch intermediate casing shoe shall be **10,000 (10M)** psi. **Variance approved to use a 5M annular. The annular must be tested to full working pressure (5000 psi.)**

MHH 02152018

GENERAL REQUIREMENTS

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

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

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

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

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

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

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

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

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

A. CASING

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

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

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

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

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

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

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

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

B. PRESSURE CONTROL

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

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

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

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

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Operator shall perform the intermediate casing integrity test to 70% of the casing burst. This will test the multi-bowl seals.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

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

    a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after

installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

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

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

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

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

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

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

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

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.

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

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COUNTY:	LEA County, New Mexico

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Approval Date: 03/22/2018

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

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

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

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

Range
The allotment fence shall not be damaged during construction of this location. If fence is damaged then construction will be halted till the blm has been contacted and the fence has been repaired.

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

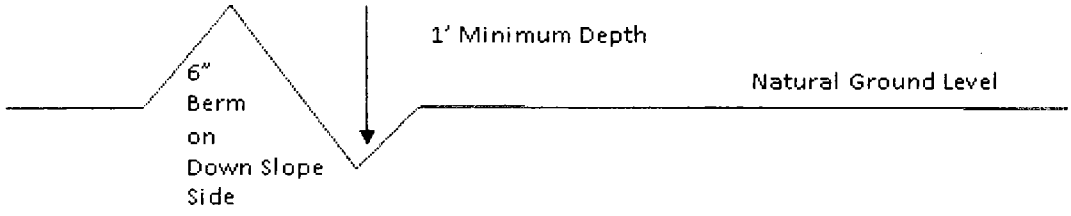
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

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

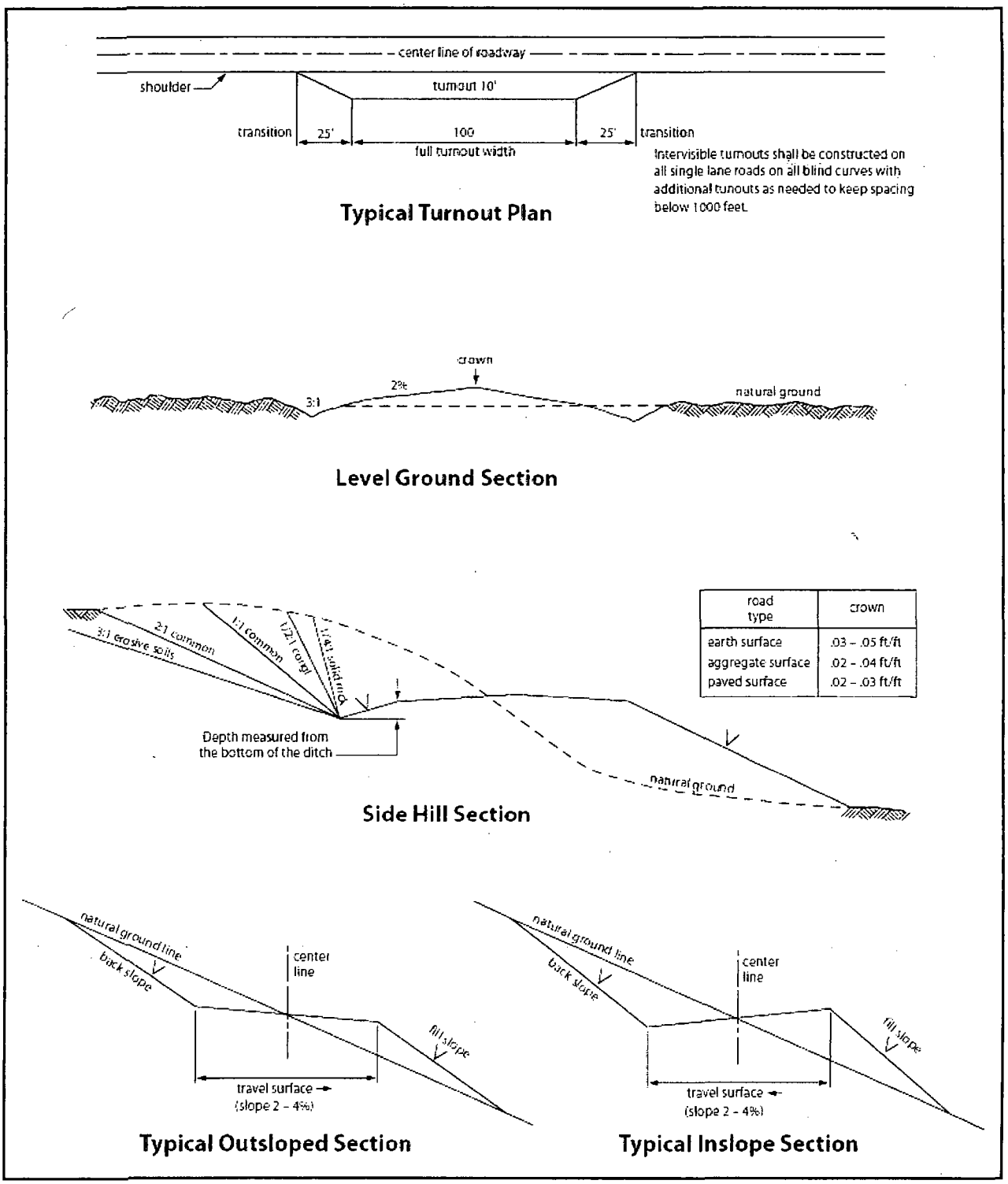


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

Containment Structures

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

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

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).

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

Seed Mixture for LPC Sand/Shinnery Sites

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

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

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

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

*Pounds of pure live seed:

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

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.

Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
	From	To							
13.5"	0	975	10.75	45.5	N80	BTC	5.54	1.18	23.44
9.875"	0	11975	7.625	29.7	P110	BTC	1.27	1.08	3.05
6.75"	0	11475	5.5	23	P110	BTC	1.90	1.99	3.17
6.75"	11475	17,481	5	18	P110	BTC	1.90	1.99	3.17
			BLM Minimum Safety Factor				1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

The 5" casing will be run back 500' into the intermediate casing to ensure the coupling OD clearance is greater than .422" for the cement bond tie in.

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

CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)
Sec. 3, T 26 S. , R 35 E
Hennin Federal 24H

Wellbore #1
Plan #1

Anticollision Report

15 August, 2017

INTEGRITY
Directional Services

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Reference Plan #1

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.00ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.00 ft	**Error Surface:**	Circular Conic
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 8/15/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,480.89	Plan #1 (Wellbore #1)	MWD	MWD - Standard

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Sec. 3, T 26 S. , R 35 E						
Hennin Federal 12H - Wellbore #1 - Plan #1	6,500.00	6,499.30	30.10	1.17	1.040	Level 2, CC, ES, SF

Offset Design Sec. 3, T 26 S. , R 35 E - Hennin Federal 12H - Wellbore #1 - Plan #1 — Offset Site Error: 0.00 ft

Survey Program: 0-MWD — Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	89.43	0.30	30.10	30.11				
100.00	100.00	99.30	99.30	0.08	0.08	89.43	0.30	30.10	30.10	29.94	0.17	181.614	
200.00	200.00	199.30	199.30	0.31	0.31	89.43	0.30	30.10	30.10	29.49	0.61	49.003	
300.00	300.00	299.30	299.30	0.53	0.53	89.43	0.30	30.10	30.10	29.04	1.06	28.296	
400.00	400.00	399.30	399.30	0.76	0.76	89.43	0.30	30.10	30.10	28.59	1.51	19.891	
500.00	500.00	499.30	499.30	0.98	0.98	89.43	0.30	30.10	30.10	28.14	1.96	15.335	
600.00	600.00	599.30	599.30	1.21	1.21	89.43	0.30	30.10	30.10	27.69	2.41	12.478	
700.00	700.00	699.30	699.30	1.43	1.43	89.43	0.30	30.10	30.10	27.24	2.86	10.518	
800.00	800.00	799.30	799.30	1.66	1.65	89.43	0.30	30.10	30.10	26.79	3.31	9.090	
900.00	900.00	899.30	899.30	1.88	1.88	89.43	0.30	30.10	30.10	26.34	3.76	8.004	
1,000.00	1,000.00	999.30	999.30	2.11	2.10	89.43	0.30	30.10	30.10	25.89	4.21	7.149	
1,100.00	1,100.00	1,099.30	1,099.30	2.33	2.33	89.43	0.30	30.10	30.10	25.44	4.66	6.459	
1,200.00	1,200.00	1,199.30	1,199.30	2.56	2.55	89.43	0.30	30.10	30.10	24.99	5.11	5.891	
1,300.00	1,300.00	1,299.30	1,299.30	2.78	2.78	89.43	0.30	30.10	30.10	24.54	5.56	5.415	
1,400.00	1,400.00	1,399.30	1,399.30	3.01	3.00	89.43	0.30	30.10	30.10	24.09	6.01	5.010	
1,500.00	1,500.00	1,499.30	1,499.30	3.23	3.23	89.43	0.30	30.10	30.10	23.64	6.46	4.661	
1,600.00	1,600.00	1,599.30	1,599.30	3.45	3.45	89.43	0.30	30.10	30.10	23.19	6.91	4.358	
1,700.00	1,700.00	1,699.30	1,699.30	3.68	3.68	89.43	0.30	30.10	30.10	22.74	7.36	4.091	
1,800.00	1,800.00	1,799.30	1,799.30	3.90	3.90	89.43	0.30	30.10	30.10	22.29	7.81	3.856	
1,900.00	1,900.00	1,899.30	1,899.30	4.13	4.13	89.43	0.30	30.10	30.10	21.85	8.26	3.646	
2,000.00	2,000.00	1,999.30	1,999.30	4.35	4.35	89.43	0.30	30.10	30.10	21.40	8.71	3.458	
2,100.00	2,100.00	2,099.30	2,099.30	4.58	4.58	89.43	0.30	30.10	30.10	20.95	9.16	3.288	
2,200.00	2,200.00	2,199.30	2,199.30	4.80	4.80	89.43	0.30	30.10	30.10	20.50	9.60	3.134	
2,300.00	2,300.00	2,299.30	2,299.30	5.03	5.03	89.43	0.30	30.10	30.10	20.05	10.05	2.994	
2,400.00	2,400.00	2,399.30	2,399.30	5.25	5.25	89.43	0.30	30.10	30.10	19.60	10.50	2.866	
2,500.00	2,500.00	2,499.30	2,499.30	5.48	5.48	89.43	0.30	30.10	30.10	19.15	10.95	2.748	

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

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
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Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 3, T 26 S. , R 35 E - Hennin Federal 12H - Wellbore #1 - Plan #1 — Offset Site Error: 0.00 ft

Survey Program: 0-MWD — Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
2,600.00	2,600.00	2,599.30	2,599.30	5.70	5.70	89.43	0.30	30.10	30.10	18.70	11.40	2.640	
2,700.00	2,700.00	2,699.30	2,699.30	5.93	5.93	89.43	0.30	30.10	30.10	18.25	11.85	2.540	
2,800.00	2,800.00	2,799.30	2,799.30	6.15	6.15	89.43	0.30	30.10	30.10	17.80	12.30	2.447	
2,900.00	2,900.00	2,899.30	2,899.30	6.38	6.38	89.43	0.30	30.10	30.10	17.35	12.75	2.361	
3,000.00	3,000.00	2,999.30	2,999.30	6.60	6.60	89.43	0.30	30.10	30.10	16.90	13.20	2.280	
3,100.00	3,100.00	3,099.30	3,099.30	6.83	6.82	89.43	0.30	30.10	30.10	16.45	13.65	2.205	
3,200.00	3,200.00	3,199.30	3,199.30	7.05	7.05	89.43	0.30	30.10	30.10	16.00	14.10	2.135	
3,300.00	3,300.00	3,299.30	3,299.30	7.28	7.27	89.43	0.30	30.10	30.10	15.55	14.55	2.069	
3,400.00	3,400.00	3,399.30	3,399.30	7.50	7.50	89.43	0.30	30.10	30.10	15.10	15.00	2.007	
3,500.00	3,500.00	3,499.30	3,499.30	7.73	7.72	89.43	0.30	30.10	30.10	14.65	15.45	1.948	
3,600.00	3,600.00	3,599.30	3,599.30	7.95	7.95	89.43	0.30	30.10	30.10	14.20	15.90	1.893	
3,700.00	3,700.00	3,699.30	3,699.30	8.17	8.17	89.43	0.30	30.10	30.10	13.75	16.35	1.841	
3,800.00	3,800.00	3,799.30	3,799.30	8.40	8.40	89.43	0.30	30.10	30.10	13.30	16.80	1.792	
3,900.00	3,900.00	3,899.30	3,899.30	8.62	8.62	89.43	0.30	30.10	30.10	12.85	17.25	1.745	
4,000.00	4,000.00	3,999.30	3,999.30	8.85	8.85	89.43	0.30	30.10	30.10	12.41	17.70	1.701	
4,100.00	4,100.00	4,099.30	4,099.30	9.07	9.07	89.43	0.30	30.10	30.10	11.96	18.15	1.659	
4,200.00	4,200.00	4,199.30	4,199.30	9.30	9.30	89.43	0.30	30.10	30.10	11.51	18.60	1.619	
4,300.00	4,300.00	4,299.30	4,299.30	9.52	9.52	89.43	0.30	30.10	30.10	11.06	19.05	1.581	
4,400.00	4,400.00	4,399.30	4,399.30	9.75	9.75	89.43	0.30	30.10	30.10	10.61	19.49	1.544	
4,500.00	4,500.00	4,499.30	4,499.30	9.97	9.97	89.43	0.30	30.10	30.10	10.16	19.94	1.509	
4,600.00	4,600.00	4,599.30	4,599.30	10.20	10.20	89.43	0.30	30.10	30.10	9.71	20.39	1.476	Level 3
4,700.00	4,700.00	4,699.30	4,699.30	10.42	10.42	89.43	0.30	30.10	30.10	9.26	20.84	1.444	Level 3
4,800.00	4,800.00	4,799.30	4,799.30	10.65	10.65	89.43	0.30	30.10	30.10	8.81	21.29	1.414	Level 3
4,900.00	4,900.00	4,899.30	4,899.30	10.87	10.87	89.43	0.30	30.10	30.10	8.36	21.74	1.384	Level 3
5,000.00	5,000.00	4,999.30	4,999.30	11.10	11.10	89.43	0.30	30.10	30.10	7.91	22.19	1.356	Level 3
5,100.00	5,100.00	5,099.30	5,099.30	11.32	11.32	89.43	0.30	30.10	30.10	7.46	22.64	1.329	Level 3
5,200.00	5,200.00	5,199.30	5,199.30	11.55	11.54	89.43	0.30	30.10	30.10	7.01	23.09	1.304	Level 3
5,300.00	5,300.00	5,299.30	5,299.30	11.77	11.77	89.43	0.30	30.10	30.10	6.56	23.54	1.279	Level 3
5,400.00	5,400.00	5,399.30	5,399.30	12.00	11.99	89.43	0.30	30.10	30.10	6.11	23.99	1.255	Level 3
5,500.00	5,500.00	5,499.30	5,499.30	12.22	12.22	89.43	0.30	30.10	30.10	5.66	24.44	1.232	Level 2
5,600.00	5,600.00	5,599.30	5,599.30	12.45	12.44	89.43	0.30	30.10	30.10	5.21	24.89	1.209	Level 2
5,700.00	5,700.00	5,699.30	5,699.30	12.67	12.67	89.43	0.30	30.10	30.10	4.76	25.34	1.188	Level 2
5,800.00	5,800.00	5,799.30	5,799.30	12.89	12.89	89.43	0.30	30.10	30.10	4.31	25.79	1.167	Level 2
5,900.00	5,900.00	5,899.30	5,899.30	13.12	13.12	89.43	0.30	30.10	30.10	3.86	26.24	1.147	Level 2
6,000.00	6,000.00	5,999.30	5,999.30	13.34	13.34	89.43	0.30	30.10	30.10	3.41	26.69	1.128	Level 2
6,100.00	6,100.00	6,099.30	6,099.30	13.57	13.57	89.43	0.30	30.10	30.10	2.96	27.14	1.109	Level 2
6,200.00	6,200.00	6,199.30	6,199.30	13.79	13.79	89.43	0.30	30.10	30.10	2.52	27.59	1.091	Level 2
6,300.00	6,300.00	6,299.30	6,299.30	14.02	14.02	89.43	0.30	30.10	30.10	2.07	28.04	1.074	Level 2
6,400.00	6,400.00	6,399.30	6,399.30	14.24	14.24	89.43	0.30	30.10	30.10	1.62	28.49	1.057	Level 2
6,500.00	6,500.00	6,499.30	6,499.30	14.47	14.47	89.43	0.30	30.10	30.10	1.17	28.93	1.040	Level 2, CC, ES, SF
6,600.00	6,599.98	6,598.57	6,598.55	14.69	14.69	130.51	1.58	31.21	32.36	2.99	29.38	1.102	Level 2
6,607.24	6,607.22	6,605.74	6,605.72	14.71	14.70	130.51	1.78	31.37	32.70	3.29	29.41	1.112	Level 2
6,700.00	6,699.91	6,698.33	6,698.23	14.91	14.90	130.33	4.55	33.77	37.38	7.56	29.81	1.254	Level 3
6,800.00	6,799.84	6,798.20	6,798.02	15.13	15.12	130.17	7.55	36.35	42.43	12.17	30.25	1.402	Level 3
6,900.00	6,899.77	6,898.07	6,897.82	15.35	15.34	130.04	10.55	38.94	47.47	16.78	30.69	1.547	
7,000.00	6,999.70	6,997.94	6,997.61	15.57	15.56	129.93	13.55	41.53	52.52	21.39	31.13	1.687	
7,100.00	7,099.63	7,097.82	7,097.40	15.79	15.78	129.85	16.55	44.12	57.57	26.00	31.57	1.824	
7,200.00	7,199.56	7,197.69	7,197.20	16.01	16.00	129.78	19.55	46.70	62.62	30.61	32.01	1.956	
7,300.00	7,299.49	7,297.56	7,296.99	16.23	16.22	129.72	22.55	49.29	67.67	35.22	32.45	2.085	
7,400.00	7,399.42	7,397.43	7,396.79	16.45	16.44	129.66	25.55	51.88	72.72	39.83	32.89	2.211	
7,500.00	7,499.35	7,497.30	7,496.58	16.67	16.66	129.62	28.55	54.46	77.77	44.43	33.33	2.333	
7,600.00	7,599.28	7,597.18	7,596.37	16.89	16.88	129.58	31.55	57.05	82.81	49.04	33.77	2.452	

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

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Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 3, T 26 S. , R 35 E - Hennin Federal 12H - Wellbore #1 - Plan #1 — Offset Site Error: 0.00 ft

Survey Program: 0-MWD — Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,700.00	7,699.21	7,697.05	7,696.17	17.11	17.11	129.54	34.55	59.64	87.86	53.64	34.22	2.568	
7,800.00	7,799.14	7,796.92	7,795.96	17.34	17.33	129.51	37.55	62.23	92.91	58.25	34.66	2.680	
7,900.00	7,899.07	7,896.79	7,895.76	17.56	17.55	129.48	40.55	64.81	97.96	62.85	35.11	2.790	
8,000.00	7,999.00	7,996.67	7,995.55	17.78	17.77	129.46	43.55	67.40	103.01	67.46	35.55	2.897	
8,100.00	8,098.93	8,096.54	8,095.34	18.00	17.99	129.43	46.55	69.99	108.06	72.06	36.00	3.002	
8,200.00	8,198.86	8,196.41	8,195.14	18.23	18.22	129.41	49.55	72.58	113.11	76.66	36.44	3.104	
8,300.00	8,298.79	8,296.28	8,294.93	18.45	18.44	129.39	52.55	75.16	118.16	81.27	36.89	3.203	
8,400.00	8,398.72	8,396.16	8,394.72	18.67	18.66	129.38	55.55	77.75	123.21	85.87	37.34	3.300	
8,500.00	8,498.65	8,496.03	8,494.52	18.90	18.89	129.36	58.55	80.34	128.25	90.47	37.79	3.394	
8,600.00	8,598.58	8,595.90	8,594.31	19.12	19.11	129.34	61.55	82.93	133.30	95.07	38.23	3.486	
8,700.00	8,698.51	8,695.77	8,694.11	19.35	19.34	129.33	64.55	85.51	138.35	99.67	38.68	3.577	
8,800.00	8,798.44	8,795.65	8,793.90	19.57	19.56	129.32	67.55	88.10	143.40	104.27	39.13	3.665	
8,900.00	8,898.37	8,895.52	8,893.69	19.80	19.79	129.31	70.55	90.69	148.45	108.87	39.58	3.750	
9,000.00	8,998.30	8,995.39	8,993.49	20.02	20.01	129.29	73.55	93.27	153.50	113.47	40.03	3.834	
9,100.00	9,098.23	9,095.26	9,093.28	20.25	20.24	129.28	76.55	95.86	158.55	118.07	40.48	3.917	
9,200.00	9,198.16	9,195.14	9,193.08	20.47	20.46	129.27	79.55	98.45	163.60	122.67	40.93	3.997	
9,300.00	9,298.09	9,295.01	9,292.87	20.70	20.69	129.26	82.55	101.04	168.65	127.26	41.38	4.075	
9,400.00	9,398.02	9,394.88	9,392.66	20.92	20.91	129.26	85.54	103.62	173.70	131.86	41.84	4.152	
9,500.00	9,497.95	9,494.75	9,492.46	21.15	21.14	129.25	88.54	106.21	178.74	136.46	42.29	4.227	
9,600.00	9,597.88	9,594.63	9,592.25	21.38	21.36	129.24	91.54	108.80	183.79	141.05	42.74	4.300	
9,700.00	9,697.81	9,694.50	9,692.04	21.60	21.59	129.23	94.54	111.39	188.84	145.65	43.19	4.372	
9,800.00	9,797.74	9,794.37	9,791.84	21.83	21.82	129.22	97.54	113.97	193.89	150.25	43.64	4.443	
9,900.00	9,897.67	9,894.24	9,891.63	22.05	22.04	129.22	100.54	116.56	198.94	154.84	44.10	4.511	
10,000.00	9,997.60	9,994.12	9,991.43	22.28	22.27	129.21	103.54	119.15	203.99	159.44	44.55	4.579	
10,100.00	10,097.53	10,093.99	10,091.22	22.51	22.50	129.21	106.54	121.74	209.04	164.04	45.00	4.645	
10,200.00	10,197.46	10,193.86	10,191.01	22.74	22.72	129.20	109.54	124.32	214.09	168.63	45.46	4.710	
10,300.00	10,297.39	10,293.73	10,290.81	22.96	22.95	129.19	112.54	126.91	219.14	173.23	45.91	4.773	
10,400.00	10,397.32	10,393.61	10,390.60	23.19	23.18	129.19	115.54	129.50	224.19	177.82	46.37	4.835	
10,500.00	10,497.25	10,493.48	10,490.40	23.42	23.40	129.18	118.54	132.08	229.24	182.41	46.82	4.896	
10,600.00	10,597.18	10,593.35	10,590.19	23.64	23.63	129.18	121.54	134.67	234.28	187.01	47.28	4.956	
10,700.00	10,697.11	10,693.22	10,689.98	23.87	23.86	129.17	124.54	137.26	239.33	191.60	47.73	5.014	
10,800.00	10,797.04	10,793.10	10,789.78	24.10	24.09	129.17	127.54	139.85	244.38	196.20	48.19	5.072	
10,900.00	10,896.97	10,892.97	10,889.57	24.33	24.32	129.17	130.54	142.43	249.43	200.79	48.64	5.128	
11,000.00	10,996.90	10,992.84	10,989.36	24.56	24.54	129.16	133.54	145.02	254.48	205.38	49.10	5.183	
11,100.00	11,096.83	11,092.71	11,089.16	24.78	24.77	129.16	136.54	147.61	259.53	209.98	49.55	5.237	
11,200.00	11,196.76	11,192.59	11,188.95	25.01	25.00	129.15	139.54	150.20	264.58	214.57	50.01	5.290	
11,300.00	11,296.69	11,292.46	11,288.75	25.24	25.23	129.15	142.54	152.78	269.63	219.16	50.47	5.343	
11,400.00	11,396.62	11,392.33	11,388.54	25.47	25.46	129.15	145.54	155.37	274.68	223.75	50.92	5.394	
11,500.00	11,496.55	11,492.20	11,488.33	25.70	25.68	129.14	148.54	157.96	279.73	228.35	51.38	5.444	
11,600.00	11,596.48	11,592.08	11,588.13	25.93	25.91	129.14	151.54	160.54	284.78	232.94	51.84	5.494	
11,700.00	11,696.41	11,691.95	11,687.92	26.15	26.14	129.14	154.54	163.13	289.82	237.53	52.30	5.542	
11,800.00	11,796.34	11,791.82	11,787.72	26.38	26.37	129.13	157.54	165.72	294.87	242.12	52.75	5.590	
11,900.00	11,896.27	11,891.81	11,887.63	26.61	26.60	129.14	160.47	168.31	299.92	246.71	53.21	5.637	
12,000.00	11,996.20	11,991.34	11,986.53	26.84	26.76	131.40	151.43	170.98	304.93	251.33	53.60	5.689	
12,100.00	12,096.13	12,082.34	12,073.54	27.07	26.88	136.66	125.39	173.48	312.09	258.13	53.95	5.784	
12,150.16	12,146.25	12,123.22	12,110.69	27.18	26.93	139.89	108.40	174.60	317.94	263.82	54.12	5.875	
12,175.00	12,171.08	12,142.45	12,127.64	27.23	26.96	-124.48	99.32	175.13	321.54	267.35	54.19	5.934	
12,200.00	12,196.04	12,161.52	12,144.07	27.27	26.98	-94.36	89.65	175.64	325.50	271.24	54.25	6.000	
12,225.00	12,220.90	12,180.33	12,159.88	27.31	27.00	-85.42	79.48	176.14	329.73	275.41	54.31	6.071	
12,250.00	12,245.59	12,200.00	12,175.97	27.35	27.02	-80.43	68.18	176.66	334.19	279.82	54.37	6.146	
12,275.00	12,270.05	12,217.25	12,189.69	27.39	27.04	-77.01	57.74	177.11	338.84	284.41	54.43	6.225	
12,300.00	12,294.20	12,235.40	12,203.71	27.42	27.06	-74.21	46.22	177.58	343.63	289.14	54.48	6.307	

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

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 3, T 26 S. , R 35 E - Hennin Federal 12H - Wellbore #1 - Plan #1 — Offset Site Error: 0.00 ft

Survey Program: 0-MWD — Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
12,325.00	12,317.99	12,253.35	12,217.13	27.46	27.08	-71.82	34.31	178.03	348.52	293.98	54.54	6.391	
12,350.00	12,341.35	12,271.14	12,229.98	27.49	27.10	-69.71	22.02	178.48	353.46	298.88	54.59	6.475	
12,375.00	12,364.20	12,288.77	12,242.26	27.52	27.12	-67.80	9.38	178.91	358.43	303.80	54.64	6.560	
12,400.00	12,386.50	12,306.25	12,253.97	27.55	27.13	-66.06	-3.60	179.33	363.39	308.70	54.68	6.645	
12,425.00	12,408.17	12,325.00	12,265.98	27.58	27.15	-64.41	-17.98	179.77	368.30	313.57	54.73	6.729	
12,450.00	12,429.17	12,340.83	12,275.68	27.61	27.17	-63.00	-30.48	180.13	373.13	318.35	54.77	6.812	
12,475.00	12,449.42	12,357.94	12,285.69	27.63	27.19	-61.64	-44.35	180.51	377.85	323.03	54.82	6.893	
12,500.00	12,468.88	12,375.00	12,295.17	27.66	27.21	-60.38	-58.53	180.88	382.44	327.58	54.87	6.971	
12,525.00	12,487.50	12,391.86	12,304.04	27.68	27.23	-59.23	-72.87	181.24	386.87	331.96	54.91	7.046	
12,550.00	12,505.21	12,408.69	12,312.38	27.71	27.25	-58.16	-87.48	181.59	391.13	336.17	54.96	7.117	
12,575.00	12,521.98	12,425.00	12,319.97	27.73	27.27	-57.20	-101.91	181.91	395.18	340.18	55.00	7.185	
12,600.00	12,537.76	12,442.12	12,327.39	27.75	27.30	-56.29	-117.33	182.24	399.02	343.97	55.05	7.248	
12,625.00	12,552.50	12,458.73	12,334.07	27.78	27.33	-55.48	-132.54	182.54	402.62	347.52	55.11	7.306	
12,650.00	12,566.17	12,475.00	12,340.09	27.80	27.36	-54.75	-147.65	182.83	405.97	350.81	55.16	7.360	
12,675.00	12,578.72	12,491.78	12,345.76	27.83	27.40	-54.08	-163.44	183.12	409.06	353.84	55.22	7.407	
12,700.00	12,590.12	12,508.23	12,350.77	27.86	27.44	-53.50	-179.11	183.39	411.87	356.58	55.29	7.449	
12,725.00	12,600.35	12,525.00	12,355.32	27.90	27.48	-52.97	-195.24	183.65	414.39	359.02	55.37	7.484	
12,750.00	12,609.37	12,541.02	12,359.14	27.94	27.52	-52.53	-210.80	183.88	416.62	361.16	55.46	7.512	
12,775.00	12,617.15	12,557.36	12,362.50	27.99	27.57	-52.14	-226.79	184.11	418.54	362.99	55.56	7.534	
12,800.00	12,623.68	12,575.00	12,365.50	28.05	27.62	-51.81	-244.17	184.34	420.16	364.49	55.67	7.547	
12,825.00	12,628.94	12,589.98	12,367.55	28.12	27.67	-51.57	-259.00	184.52	421.45	365.66	55.78	7.555	
12,850.00	12,632.92	12,606.26	12,369.24	28.19	27.72	-51.38	-275.19	184.70	422.42	366.51	55.91	7.555	
12,875.00	12,635.59	12,625.00	12,370.51	28.27	27.78	-51.25	-293.89	184.90	423.08	367.02	56.06	7.547	
12,900.00	12,636.97	12,640.42	12,371.00	28.36	27.84	-51.19	-309.30	185.05	423.39	367.19	56.20	7.534	
12,901.24	12,637.00	12,640.42	12,371.00	28.36	27.84	-51.19	-309.30	185.05	423.39	367.19	56.20	7.533	
13,000.00	12,639.59	12,737.91	12,372.54	28.77	28.27	-51.08	-406.77	185.93	424.04	367.00	57.03	7.435	
13,100.00	12,642.21	12,837.90	12,374.11	29.29	28.80	-50.97	-506.75	186.84	424.69	366.61	58.08	7.312	
13,200.00	12,644.83	12,937.90	12,375.69	29.91	29.44	-50.86	-606.73	187.75	425.35	366.01	59.34	7.168	
13,300.00	12,647.45	13,037.89	12,377.26	30.62	30.17	-50.76	-706.70	188.66	426.02	365.22	60.80	7.007	
13,400.00	12,650.07	13,137.89	12,378.84	31.43	31.00	-50.65	-806.68	189.57	426.68	364.25	62.43	6.835	
13,500.00	12,652.69	13,237.88	12,380.41	32.32	31.91	-50.54	-906.66	190.48	427.34	363.12	64.22	6.654	
13,600.00	12,655.31	13,337.87	12,381.99	33.28	32.89	-50.43	-1,006.64	191.39	428.01	361.83	66.17	6.468	
13,700.00	12,657.93	13,437.87	12,383.56	34.32	33.94	-50.32	-1,106.62	192.29	428.67	360.41	68.26	6.280	
13,800.00	12,660.55	13,537.86	12,385.14	35.42	35.06	-50.22	-1,206.59	193.20	429.34	358.86	70.48	6.092	
13,900.00	12,663.17	13,637.86	12,386.71	36.58	36.23	-50.11	-1,306.57	194.11	430.01	357.20	72.81	5.906	
14,000.00	12,665.79	13,737.85	12,388.28	37.78	37.46	-50.00	-1,406.55	195.02	430.68	355.44	75.25	5.724	
14,100.00	12,668.41	13,837.85	12,389.86	39.04	38.73	-49.89	-1,506.53	195.93	431.36	353.58	77.78	5.546	
14,200.00	12,671.03	13,937.84	12,391.43	40.34	40.05	-49.79	-1,606.51	196.84	432.03	351.64	80.39	5.374	
14,300.00	12,673.65	14,037.84	12,393.01	41.68	41.41	-49.68	-1,706.48	197.75	432.71	349.62	83.09	5.208	
14,400.00	12,676.27	14,137.83	12,394.58	43.06	42.79	-49.58	-1,806.46	198.66	433.38	347.53	85.85	5.048	
14,500.00	12,678.89	14,237.83	12,396.16	44.46	44.22	-49.47	-1,906.44	199.57	434.06	345.38	88.68	4.895	
14,600.00	12,681.51	14,337.82	12,397.73	45.90	45.67	-49.37	-2,006.42	200.47	434.74	343.18	91.57	4.748	
14,700.00	12,684.13	14,437.81	12,399.31	47.36	47.14	-49.26	-2,106.40	201.38	435.43	340.92	94.51	4.607	
14,800.00	12,686.75	14,537.81	12,400.88	48.85	48.64	-49.16	-2,206.37	202.29	436.11	338.61	97.49	4.473	
14,900.00	12,689.37	14,637.80	12,402.46	50.36	50.16	-49.06	-2,306.35	203.20	436.79	336.27	100.52	4.345	
15,000.00	12,691.99	14,737.80	12,404.03	51.89	51.70	-48.95	-2,406.33	204.11	437.48	333.88	103.59	4.223	
15,100.00	12,694.61	14,837.79	12,405.61	53.44	53.26	-48.85	-2,506.31	205.02	438.17	331.47	106.70	4.106	
15,200.00	12,697.23	14,937.79	12,407.18	55.01	54.84	-48.75	-2,606.29	205.93	438.86	329.01	109.84	3.995	
15,300.00	12,699.85	15,037.78	12,408.76	56.59	56.43	-48.64	-2,706.26	206.84	439.55	326.53	113.01	3.889	
15,400.00	12,702.47	15,137.78	12,410.33	58.18	58.03	-48.54	-2,806.24	207.75	440.24	324.03	116.21	3.788	
15,500.00	12,705.09	15,237.77	12,411.91	59.79	59.65	-48.44	-2,906.22	208.65	440.93	321.50	119.44	3.692	
15,600.00	12,707.71	15,337.76	12,413.48	61.41	61.27	-48.34	-3,006.20	209.56	441.63	318.94	122.68	3.600	

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Offset Design Sec. 3, T 26 S. , R 35 E - Hennin Federal 12H - Wellbore #1 - Plan #1

Offset Site Error: 0.00 ft

Survey Program: 0-MWD

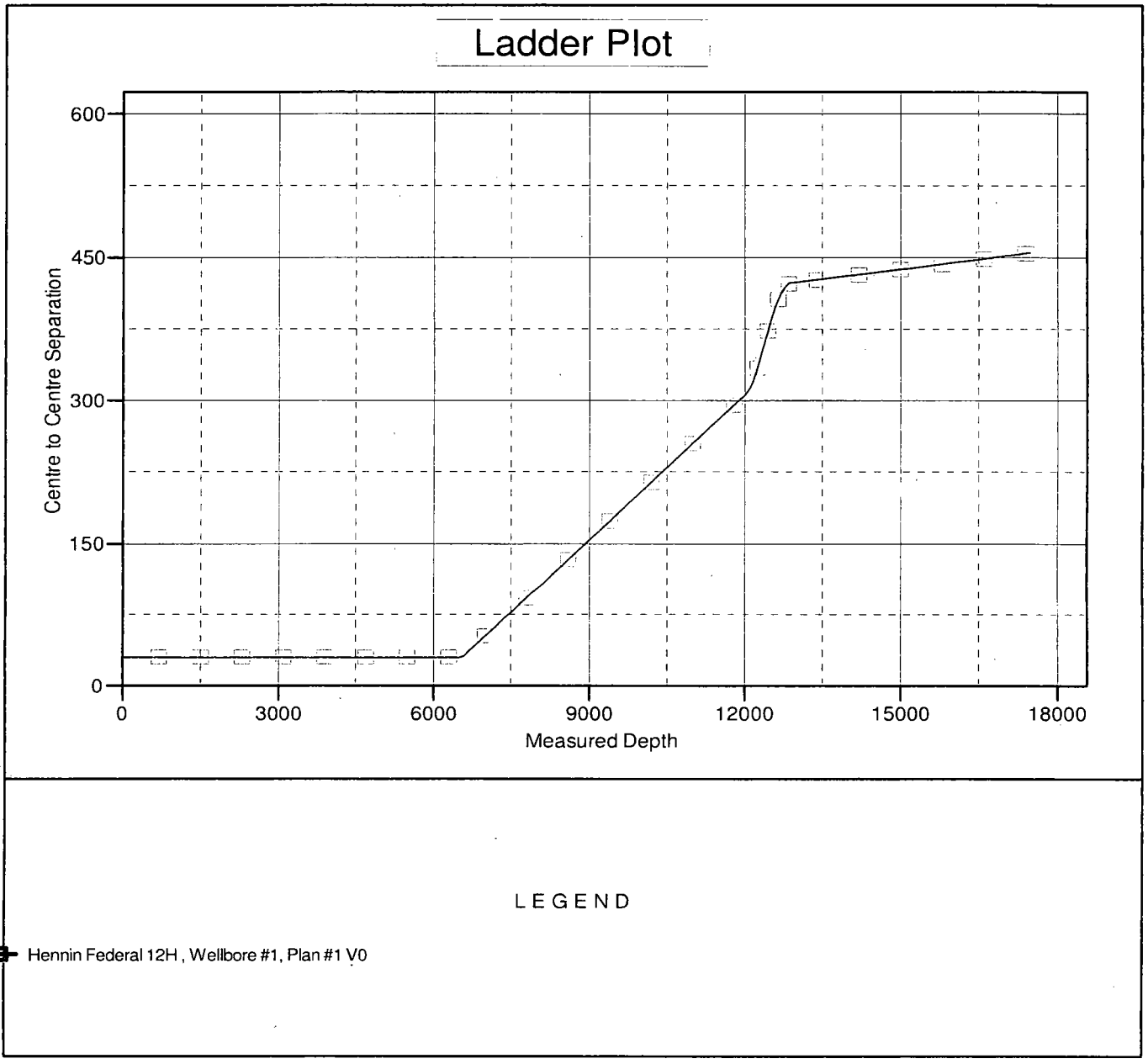
Offset Well Error: 0.00 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
15,700.00	12,710.33	15,437.76	12,415.06	63.04	62.91	-48.24	-3,106.18	210.47	442.32	316.37	125.95	3.512	
15,800.00	12,712.95	15,537.75	12,416.63	64.68	64.56	-48.14	-3,206.15	211.38	443.02	313.78	129.24	3.428	
15,900.00	12,715.57	15,637.75	12,418.21	66.33	66.22	-48.04	-3,306.13	212.29	443.72	311.17	132.55	3.347	
16,000.00	12,718.19	15,737.74	12,419.78	67.99	67.89	-47.94	-3,406.11	213.20	444.42	308.54	135.88	3.271	
16,100.00	12,720.81	15,837.74	12,421.35	69.66	69.56	-47.84	-3,506.09	214.11	445.12	305.90	139.22	3.197	
16,200.00	12,723.43	15,937.73	12,422.93	71.34	71.24	-47.74	-3,606.07	215.02	445.82	303.24	142.58	3.127	
16,300.00	12,726.05	16,037.73	12,424.50	73.02	72.93	-47.64	-3,706.05	215.93	446.53	300.58	145.95	3.059	
16,400.00	12,728.67	16,137.72	12,426.08	74.71	74.62	-47.54	-3,806.02	216.83	447.23	297.90	149.33	2.995	
16,500.00	12,731.29	16,237.72	12,427.65	76.40	76.33	-47.44	-3,906.00	217.74	447.94	295.21	152.73	2.933	
16,600.00	12,733.91	16,337.71	12,429.23	78.11	78.03	-47.34	-4,005.98	218.65	448.65	292.51	156.14	2.873	
16,700.00	12,736.54	16,437.70	12,430.80	79.81	79.74	-47.24	-4,105.96	219.56	449.35	289.80	159.55	2.816	
16,800.00	12,739.16	16,537.70	12,432.38	81.52	81.46	-47.15	-4,205.94	220.47	450.07	287.08	162.98	2.761	
16,900.00	12,741.78	16,637.69	12,433.95	83.24	83.18	-47.05	-4,305.91	221.38	450.78	284.36	166.42	2.709	
17,000.00	12,744.40	16,737.69	12,435.53	84.96	84.91	-46.95	-4,405.89	222.29	451.49	281.62	169.87	2.658	
17,100.00	12,747.02	16,837.68	12,437.10	86.69	86.64	-46.85	-4,505.87	223.20	452.20	278.88	173.32	2.609	
17,200.00	12,749.64	16,937.68	12,438.68	88.42	88.37	-46.76	-4,605.85	224.11	452.92	276.14	176.78	2.562	
17,300.00	12,752.26	17,037.67	12,440.25	90.15	90.11	-46.66	-4,705.83	225.01	453.64	273.38	180.25	2.517	
17,400.00	12,754.88	17,137.67	12,441.83	91.88	91.85	-46.57	-4,805.80	225.92	454.36	270.63	183.73	2.473	
17,481.06	12,757.00	17,212.92	12,443.01	93.29	93.16	-46.49	-4,881.04	226.61	454.98	268.52	186.45	2.440	

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=26' @ 3196.70ft
Offset Depths are relative to Offset Datum
Central Meridian is -104.333334

Coordinates are relative to: Hennin Federal 24H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.52°

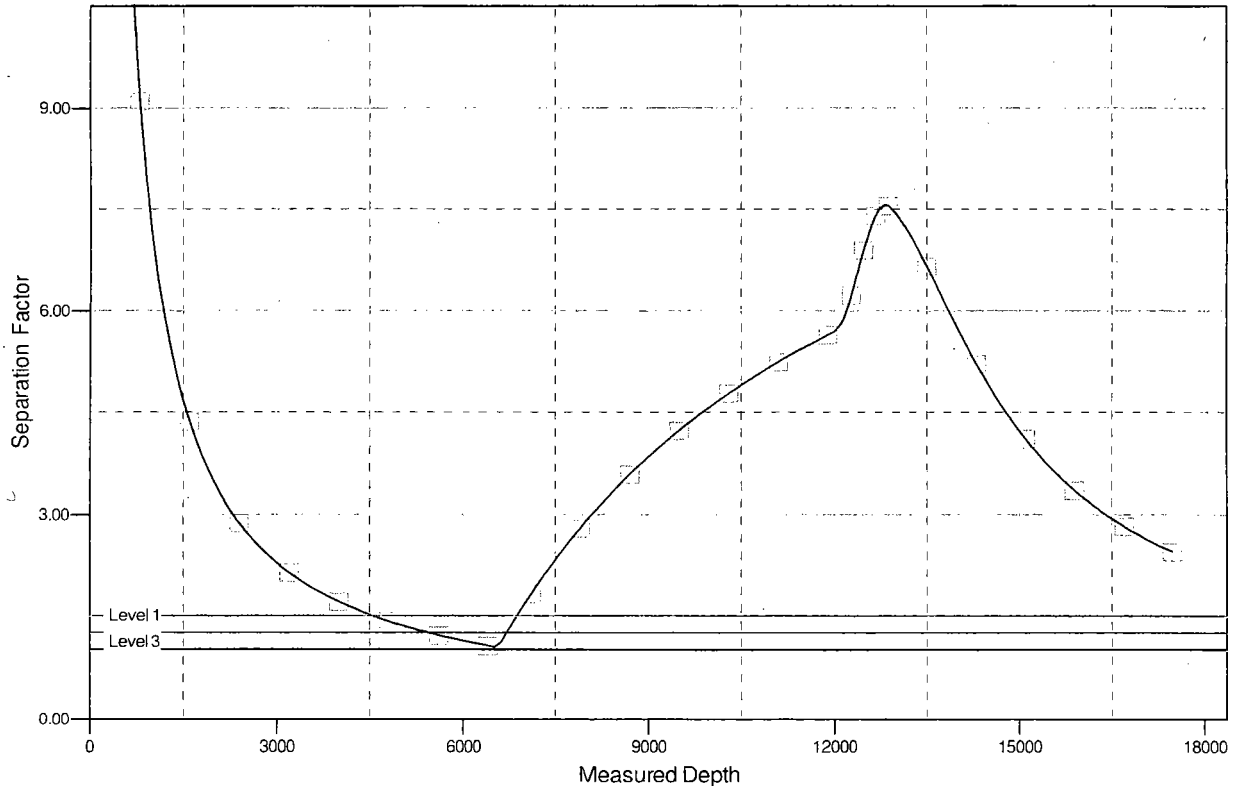


Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Reference Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Site Error:	0.00 ft	**North Reference:**	Grid
Reference Well:	Hennin Federal 24H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Multi User Db
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=26' @ 3196.70ft
Offset Depths are relative to Offset Datum
Central Meridian is -104.333334

Coordinates are relative to: Hennin Federal 24H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.52°

Separation Factor Plot



LEGEND

Hennin Federal 12H , Wellbore #1, Plan #1 V0

CONCHO

COG Operating L L C
Project: Lea County, NM (NAD27 NME)
Site: Sec. 3, T 26 S. , R 35 E
Well: Hennin Federal 24H
Wellbore: Wellbore #1
Plan: Plan #1 (Hennin Federal 24H /Wellbore #1)

INTEGRITY Directional Services

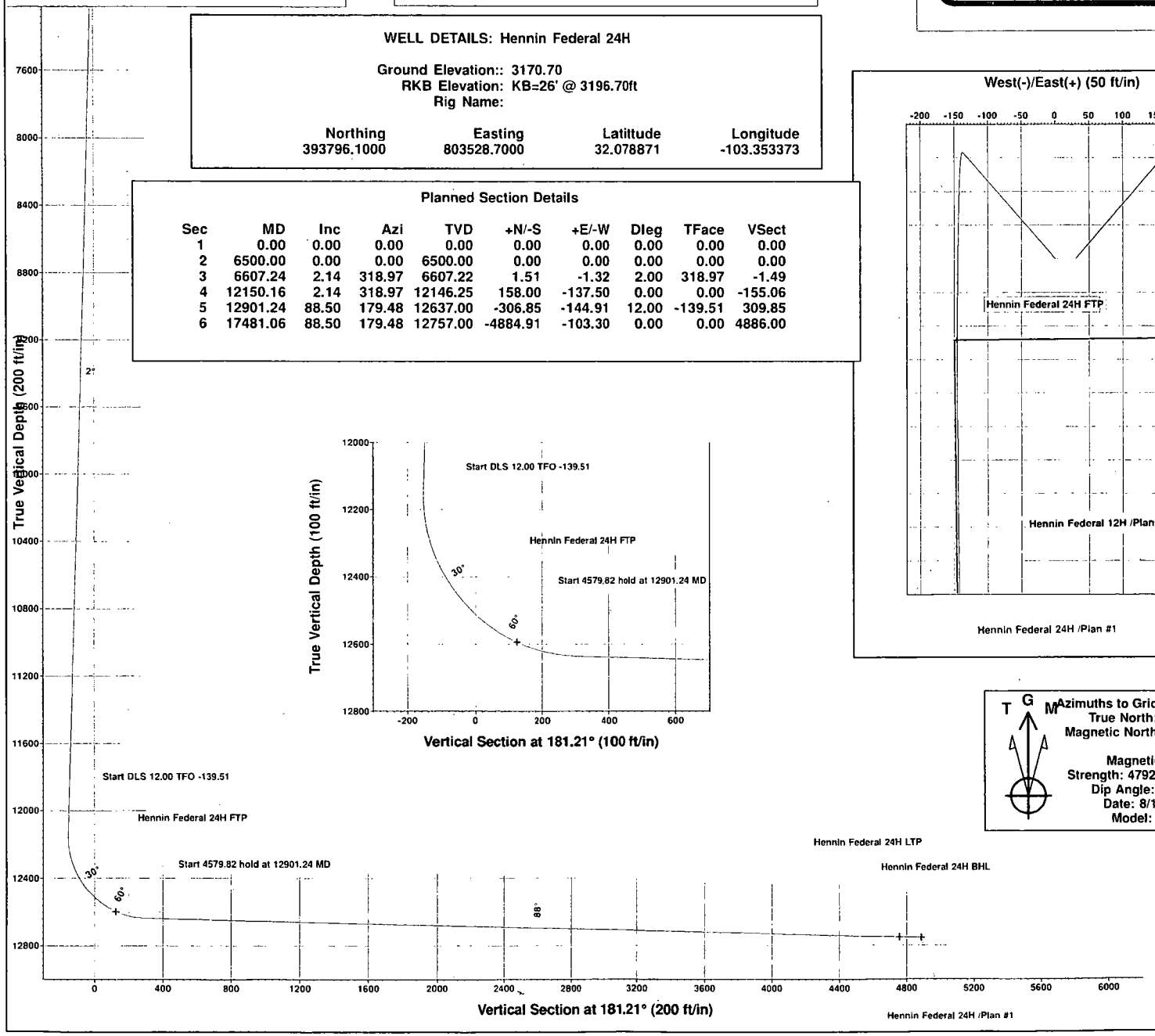
WELL DETAILS: Hennin Federal 24H

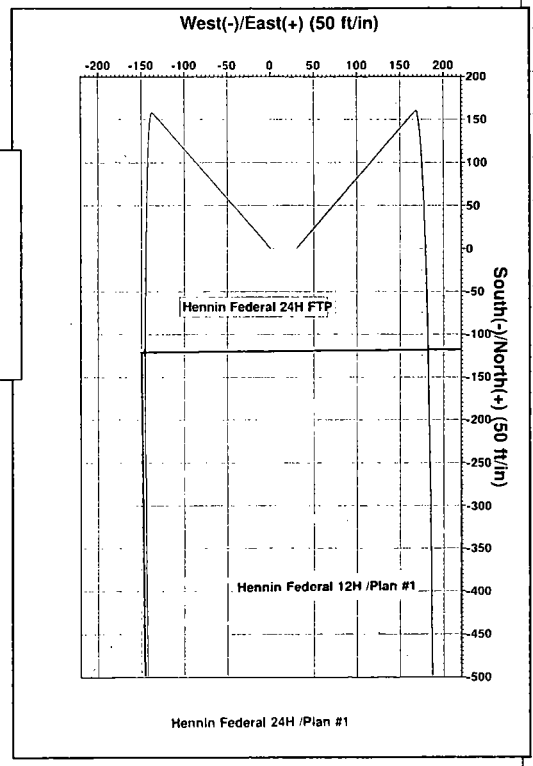
Ground Elevation:: 3170.70
RKB Elevation: KB=26' @ 3196.70ft
Rig Name:

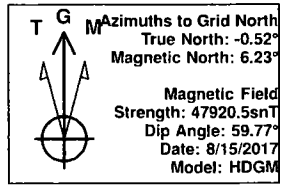
Northing	Easting	Latitude	Longitude
393796.1000	803528.7000	32.078871	-103.353373

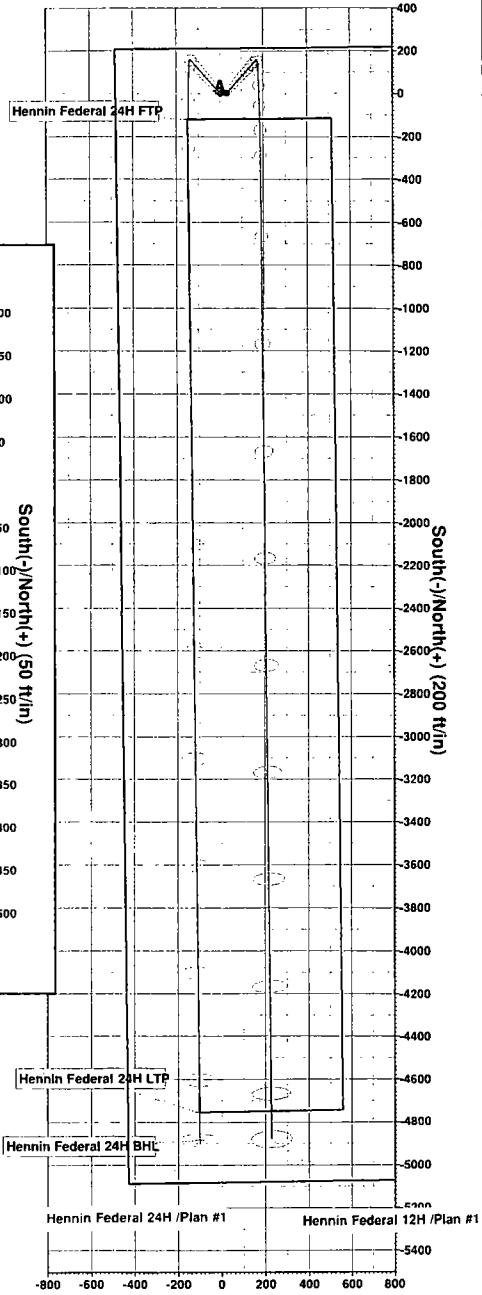
Planned Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	6500.00	0.00	0.00	6500.00	0.00	0.00	0.00	0.00	0.00
3	6607.24	2.14	318.97	6607.22	1.51	-1.32	2.00	318.97	-1.49
4	12150.16	2.14	318.97	12146.25	158.00	-137.50	0.00	0.00	-155.06
5	12901.24	88.50	179.48	12637.00	-306.85	-144.91	12.00	-139.51	309.85
6	17481.06	88.50	179.48	12757.00	-4884.91	-103.30	0.00	0.00	4886.00









PROJECT DETAILS: Lea County, NM (NAD27 NME)
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
Local North: Grid

CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)
Sec. 3, T 26 S. , R 35 E
Hennin Federal 24H

Wellbore #1

Plan: Plan #1

Standard Survey Report

15 August, 2017

INTEGRITY
Directional Services

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Project Lea County, NM (NAD27 NME)

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. 3, T 26 S. , R 35 E

Site Position:		**Northing:**	393,796.4000 usft	**Latitude:**	32.078871
From:	Map	**Easting:**	803,558.8000 usft	**Longitude:**	-103.353276
Position Uncertainty:	0.00 ft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.52 °

Well Hennin Federal 24H

Well Position	**+N/-S**	0.00 ft	**Northing:**	393,796.1000 usft	**Latitude:**	32.078871
	+E/-W	0.00 ft	**Easting:**	803,528.7000 usft	**Longitude:**	-103.353373
Position Uncertainty		0.00 ft	**Wellhead Elevation:**	0.00 ft	**Ground Level:**	3,170.70 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	8/15/2017	6.75	59.77	47,921

Design Plan #1

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	181.21

Survey Tool Program **Date** 8/15/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.00	17,480.89	Plan #1 (Wellbore #1)	MWD	MWD - Standard

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
6,600.00	2.00	318.97	6,599.98	1.32	-1.15	-1.29	2.00	2.00	0.00
6,607.24	2.14	318.97	6,607.22	1.51	-1.32	-1.49	2.00	2.00	0.00
Start 5542.92 hold at 6607.24 MD									
6,700.00	2.14	318.97	6,699.91	4.13	-3.60	-4.06	0.00	0.00	0.00
6,800.00	2.14	318.97	6,799.84	6.96	-6.05	-6.83	0.00	0.00	0.00
6,900.00	2.14	318.97	6,899.77	9.78	-8.51	-9.60	0.00	0.00	0.00
7,000.00	2.14	318.97	6,999.70	12.60	-10.97	-12.37	0.00	0.00	0.00
7,100.00	2.14	318.97	7,099.63	15.43	-13.42	-15.14	0.00	0.00	0.00
7,200.00	2.14	318.97	7,199.56	18.25	-15.88	-17.91	0.00	0.00	0.00
7,300.00	2.14	318.97	7,299.49	21.07	-18.34	-20.68	0.00	0.00	0.00
7,400.00	2.14	318.97	7,399.42	23.89	-20.79	-23.45	0.00	0.00	0.00
7,500.00	2.14	318.97	7,499.35	26.72	-23.25	-26.22	0.00	0.00	0.00
7,600.00	2.14	318.97	7,599.28	29.54	-25.71	-28.99	0.00	0.00	0.00
7,700.00	2.14	318.97	7,699.21	32.36	-28.17	-31.76	0.00	0.00	0.00
7,800.00	2.14	318.97	7,799.14	35.19	-30.62	-34.53	0.00	0.00	0.00
7,900.00	2.14	318.97	7,899.07	38.01	-33.08	-37.30	0.00	0.00	0.00
8,000.00	2.14	318.97	7,999.00	40.83	-35.54	-40.07	0.00	0.00	0.00
8,100.00	2.14	318.97	8,098.93	43.66	-37.99	-42.84	0.00	0.00	0.00
8,200.00	2.14	318.97	8,198.86	46.48	-40.45	-45.61	0.00	0.00	0.00
8,300.00	2.14	318.97	8,298.79	49.30	-42.91	-48.39	0.00	0.00	0.00
8,400.00	2.14	318.97	8,398.72	52.13	-45.36	-51.16	0.00	0.00	0.00
8,500.00	2.14	318.97	8,498.65	54.95	-47.82	-53.93	0.00	0.00	0.00
8,600.00	2.14	318.97	8,598.58	57.77	-50.28	-56.70	0.00	0.00	0.00
8,700.00	2.14	318.97	8,698.51	60.60	-52.73	-59.47	0.00	0.00	0.00
8,800.00	2.14	318.97	8,798.44	63.42	-55.19	-62.24	0.00	0.00	0.00
8,900.00	2.14	318.97	8,898.37	66.24	-57.65	-65.01	0.00	0.00	0.00
9,000.00	2.14	318.97	8,998.30	69.07	-60.10	-67.78	0.00	0.00	0.00
9,100.00	2.14	318.97	9,098.23	71.89	-62.56	-70.55	0.00	0.00	0.00
9,200.00	2.14	318.97	9,198.16	74.71	-65.02	-73.32	0.00	0.00	0.00
9,300.00	2.14	318.97	9,298.09	77.54	-67.48	-76.09	0.00	0.00	0.00

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	KB=26' @ 3196.70ft
Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,400.00	2.14	318.97	9,398.02	80.36	-69.93	-78.86	0.00	0.00	0.00
9,500.00	2.14	318.97	9,497.95	83.18	-72.39	-81.63	0.00	0.00	0.00
9,600.00	2.14	318.97	9,597.88	86.00	-74.85	-84.40	0.00	0.00	0.00
9,700.00	2.14	318.97	9,697.81	88.83	-77.30	-87.17	0.00	0.00	0.00
9,800.00	2.14	318.97	9,797.74	91.65	-79.76	-89.94	0.00	0.00	0.00
9,900.00	2.14	318.97	9,897.67	94.47	-82.22	-92.71	0.00	0.00	0.00
10,000.00	2.14	318.97	9,997.60	97.30	-84.67	-95.49	0.00	0.00	0.00
10,100.00	2.14	318.97	10,097.53	100.12	-87.13	-98.26	0.00	0.00	0.00
10,200.00	2.14	318.97	10,197.46	102.94	-89.59	-101.03	0.00	0.00	0.00
10,300.00	2.14	318.97	10,297.39	105.77	-92.04	-103.80	0.00	0.00	0.00
10,400.00	2.14	318.97	10,397.32	108.59	-94.50	-106.57	0.00	0.00	0.00
10,500.00	2.14	318.97	10,497.25	111.41	-96.96	-109.34	0.00	0.00	0.00
10,600.00	2.14	318.97	10,597.18	114.24	-99.41	-112.11	0.00	0.00	0.00
10,700.00	2.14	318.97	10,697.11	117.06	-101.87	-114.88	0.00	0.00	0.00
10,800.00	2.14	318.97	10,797.04	119.88	-104.33	-117.65	0.00	0.00	0.00
10,900.00	2.14	318.97	10,896.97	122.71	-106.79	-120.42	0.00	0.00	0.00
11,000.00	2.14	318.97	10,996.90	125.53	-109.24	-123.19	0.00	0.00	0.00
11,100.00	2.14	318.97	11,096.83	128.35	-111.70	-125.96	0.00	0.00	0.00
11,200.00	2.14	318.97	11,196.76	131.18	-114.16	-128.73	0.00	0.00	0.00
11,300.00	2.14	318.97	11,296.69	134.00	-116.61	-131.50	0.00	0.00	0.00
11,400.00	2.14	318.97	11,396.62	136.82	-119.07	-134.27	0.00	0.00	0.00
11,500.00	2.14	318.97	11,496.55	139.64	-121.53	-137.04	0.00	0.00	0.00
11,600.00	2.14	318.97	11,596.48	142.47	-123.98	-139.81	0.00	0.00	0.00
11,700.00	2.14	318.97	11,696.41	145.29	-126.44	-142.59	0.00	0.00	0.00
11,800.00	2.14	318.97	11,796.34	148.11	-128.90	-145.36	0.00	0.00	0.00
11,900.00	2.14	318.97	11,896.27	150.94	-131.35	-148.13	0.00	0.00	0.00
12,000.00	2.14	318.97	11,996.20	153.76	-133.81	-150.90	0.00	0.00	0.00
12,100.00	2.14	318.97	12,096.13	156.58	-136.27	-153.67	0.00	0.00	0.00
12,150.16	2.14	318.97	12,146.25	158.00	-137.50	-155.06	0.00	0.00	0.00
Start DLS 12.00 TFO -139.51									
12,200.00	4.57	197.16	12,196.04	156.81	-138.70	-153.84	12.00	4.86	-244.39
12,300.00	16.41	184.18	12,294.20	138.85	-140.91	-135.84	12.00	11.84	-12.98
12,400.00	28.38	182.02	12,386.50	100.88	-142.79	-97.83	12.00	11.97	-2.16
12,500.00	40.37	181.08	12,468.88	44.54	-144.24	-41.48	12.00	11.99	-0.94
12,600.00	52.36	180.52	12,537.76	-27.70	-145.21	30.76	12.00	11.99	-0.56
12,700.00	64.36	180.11	12,590.12	-112.68	-145.66	115.73	12.00	12.00	-0.41
12,709.70	65.52	180.08	12,594.23	-121.47	-145.67	124.52	12.00	12.00	-0.36
Hennin Federal 24H FTP									
12,800.00	76.35	179.78	12,623.68	-206.69	-145.56	209.72	12.00	12.00	-0.33
12,900.00	88.35	179.48	12,636.97	-305.61	-144.92	308.61	12.00	12.00	-0.30
12,901.24	88.50	179.48	12,637.00	-306.85	-144.91	309.85	12.00	12.00	-0.29
Start 4579.82 hold at 12901.24 MD									
13,000.00	88.50	179.48	12,639.59	-405.58	-144.01	408.53	0.00	0.00	0.00
13,100.00	88.50	179.48	12,642.21	-505.54	-143.10	508.45	0.00	0.00	0.00

Company:	COG Operating L L C	**Local Co-ordinate Reference:**	Well Hennin Federal 24H
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Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,200.00	88.50	179.48	12,644.83	-605.50	-142.20	608.37	0.00	0.00	0.00
13,300.00	88.50	179.48	12,647.45	-705.46	-141.29	708.29	0.00	0.00	0.00
13,400.00	88.50	179.48	12,650.07	-805.42	-140.38	808.21	0.00	0.00	0.00
13,500.00	88.50	179.48	12,652.69	-905.38	-139.47	908.13	0.00	0.00	0.00
13,600.00	88.50	179.48	12,655.31	-1,005.34	-138.56	1,008.05	0.00	0.00	0.00
13,700.00	88.50	179.48	12,657.93	-1,105.31	-137.65	1,107.97	0.00	0.00	0.00
13,800.00	88.50	179.48	12,660.55	-1,205.27	-136.74	1,207.89	0.00	0.00	0.00
13,900.00	88.50	179.48	12,663.17	-1,305.23	-135.84	1,307.81	0.00	0.00	0.00
14,000.00	88.50	179.48	12,665.79	-1,405.19	-134.93	1,407.73	0.00	0.00	0.00
14,100.00	88.50	179.48	12,668.41	-1,505.15	-134.02	1,507.65	0.00	0.00	0.00
14,200.00	88.50	179.48	12,671.03	-1,605.11	-133.11	1,607.57	0.00	0.00	0.00
14,300.00	88.50	179.48	12,673.65	-1,705.08	-132.20	1,707.49	0.00	0.00	0.00
14,400.00	88.50	179.48	12,676.27	-1,805.04	-131.29	1,807.41	0.00	0.00	0.00
14,500.00	88.50	179.48	12,678.89	-1,905.00	-130.38	1,907.33	0.00	0.00	0.00
14,600.00	88.50	179.48	12,681.51	-2,004.96	-129.48	2,007.25	0.00	0.00	0.00
14,700.00	88.50	179.48	12,684.13	-2,104.92	-128.57	2,107.17	0.00	0.00	0.00
14,800.00	88.50	179.48	12,686.75	-2,204.88	-127.66	2,207.09	0.00	0.00	0.00
14,900.00	88.50	179.48	12,689.37	-2,304.84	-126.75	2,307.01	0.00	0.00	0.00
15,000.00	88.50	179.48	12,691.99	-2,404.81	-125.84	2,406.93	0.00	0.00	0.00
15,100.00	88.50	179.48	12,694.61	-2,504.77	-124.93	2,506.85	0.00	0.00	0.00
15,200.00	88.50	179.48	12,697.23	-2,604.73	-124.02	2,606.77	0.00	0.00	0.00
15,300.00	88.50	179.48	12,699.85	-2,704.69	-123.12	2,706.69	0.00	0.00	0.00
15,400.00	88.50	179.48	12,702.47	-2,804.65	-122.21	2,806.61	0.00	0.00	0.00
15,500.00	88.50	179.48	12,705.09	-2,904.61	-121.30	2,906.53	0.00	0.00	0.00
15,600.00	88.50	179.48	12,707.71	-3,004.58	-120.39	3,006.45	0.00	0.00	0.00
15,700.00	88.50	179.48	12,710.33	-3,104.54	-119.48	3,106.37	0.00	0.00	0.00
15,800.00	88.50	179.48	12,712.95	-3,204.50	-118.57	3,206.29	0.00	0.00	0.00
15,900.00	88.50	179.48	12,715.57	-3,304.46	-117.66	3,306.21	0.00	0.00	0.00
16,000.00	88.50	179.48	12,718.19	-3,404.42	-116.76	3,406.13	0.00	0.00	0.00
16,100.00	88.50	179.48	12,720.81	-3,504.38	-115.85	3,506.05	0.00	0.00	0.00
16,200.00	88.50	179.48	12,723.43	-3,604.34	-114.94	3,605.97	0.00	0.00	0.00
16,300.00	88.50	179.48	12,726.05	-3,704.31	-114.03	3,705.89	0.00	0.00	0.00
16,400.00	88.50	179.48	12,728.67	-3,804.27	-113.12	3,805.81	0.00	0.00	0.00
16,500.00	88.50	179.48	12,731.29	-3,904.23	-112.21	3,905.73	0.00	0.00	0.00
16,600.00	88.50	179.48	12,733.91	-4,004.19	-111.30	4,005.65	0.00	0.00	0.00
16,700.00	88.50	179.48	12,736.54	-4,104.15	-110.40	4,105.57	0.00	0.00	0.00
16,800.00	88.50	179.48	12,739.16	-4,204.11	-109.49	4,205.49	0.00	0.00	0.00
16,900.00	88.50	179.48	12,741.78	-4,304.08	-108.58	4,305.41	0.00	0.00	0.00
17,000.00	88.50	179.48	12,744.40	-4,404.04	-107.67	4,405.33	0.00	0.00	0.00
17,100.00	88.50	179.48	12,747.02	-4,504.00	-106.76	4,505.25	0.00	0.00	0.00
17,200.00	88.50	179.48	12,749.64	-4,603.96	-105.85	4,605.17	0.00	0.00	0.00
17,300.00	88.50	179.48	12,752.26	-4,703.92	-104.95	4,705.09	0.00	0.00	0.00
17,351.11	88.50	179.48	12,753.60	-4,755.02	-104.48	4,756.16	0.00	0.00	0.00
Hennin Federal 24H LTP									

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Site:	Sec. 3, T 26 S. , R 35 E	**MD Reference:**	KB=26' @ 3196.70ft
Well:	Hennin Federal 24H	**North Reference:**	Grid
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Plan #1	**Database:**	EDM 5000.1 Multi User Db

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
17,400.00	88.50	179.48	12,754.88	-4,803.88	-104.04	4,805.01	0.00	0.00	0.00
17,481.06	88.50	179.48	12,757.00	-4,884.91	-103.30	4,886.00	0.00	0.00	0.00
TD at 17481.06 - Hennin Federal 24H BHL									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Hennin Federal 24H F	0.00	0.00	12,594.24	-121.49	-146.69	393,674.6071	803,382.0123	32.078541	-103.353850
- plan misses target center by 1.02ft at 12709.73ft MD (12594.24 TVD, -121.49 N, -145.67 E)									
- Point									
Hennin Federal 24H L	0.00	0.00	12,753.60	-4,755.02	-104.62	389,041.0931	803,424.0764	32.065804	-103.353850
- plan misses target center by 0.14ft at 17351.11ft MD (12753.60 TVD, -4755.02 N, -104.48 E)									
- Point									
Hennin Federal 24H E	0.00	0.00	12,757.00	-4,884.91	-103.30	388,911.2000	803,425.4000	32.065447	-103.353850
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
6500	6500	0	0	Start Build 2.00
6607	6607	2	-1	Start 5542.92 hold at 6607.24 MD
12,150	12,146	158	-137	Start DLS 12.00 TFO -139.51
12,901	12,637	-307	-145	Start 4579.82 hold at 12901.24 MD
17,481	12,757	-4885	-103	TD at 17481.06

Checked By: _____ Approved By: _____ Date: _____

COG Operating, LLC - Hennin Federal 24H

1. Geologic Formations

TVD of target	12,757' EOL	Pilot hole depth	NA
MD at TD:	17,481'	Deepest expected fresh water:	240'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	947	Water	
Top of Salt	1280	Salt	
Base of Salt	5031	Salt	
Lamar	5251	Salt Water	
Bell Canyon	5278	Salt Water	
Cherry Canyon	6178	Oil/Gas	
Brushy Canyon	7747	Oil/Gas	
Bone Spring Lime	9082	Oil/Gas	
U. Avalon Shale	9401	Oil/Gas	
L. Avalon Shale	9569	Oil/Gas	
1st Bone Spring Sand	10358	Oil/Gas	
2nd Bone Spring Sand	10843	Oil/Gas	
3rd Bone Spring Sand	11967	Oil/Gas	
Wolfcamp	12402	Target Oil/Gas	
Strawn	13775	Not Penetrated	Abnormal Press.

2. Casing Program

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Body
13.5"	0	975	10.75	45.5	N80	BTC	5.54	1.18	23.44
9.875"	0	11975	7.625	29.7	P110	BTC	1.27	1.08	3.05
6.75"	0	11475	5.5	23	P110	BTC	1.90	1.99	3.17
6.75"	11475	17,481	5	18	P110	BTC	1.90	1.99	3.17
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Surface burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface and
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

The 5" casing will be run back 500' into the intermediate casing to ensure the coupling OD clearance is greater than .422" for the cement bond tie in.

COG Operating, LLC - Hennin Federal 24H

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

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	240	13.5	1.75	9	12	Lead: Class C + 4% Gel + 1% CaCl2
	200	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl2
Inter.	1000	10.3	3.6	21.48	16	Tuned Light Blend
	250	16.4	1.08	4.32	8	Tail: Class H
Prod	150	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	640	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results
Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
1st Intermediate	0'	50%
Production	11,475'	35% OH in Lateral (KOP to EOL)

4. Pressure Control Equipment

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

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	x	Tested to:
9-7/8"	13-5/8"	5M	Annular	X	2500 psi
			Blind Ram	X	5M
			Pipe Ram		
			Double Ram	X	
			Other*		
6-3/4"	13-5/8"	10M	Annular	x	50% testing pressure
			Blind Ram	x	10M
			Pipe Ram	x	
			Double Ram		
			Other*		

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

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

X	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
	N Are anchors required by manufacturer?
N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.6 - 8.8	28-34	N/C
Surf csg	9-5/8" Int shoe	Brine Diesel Emulsion	8.4 - 9	28-34	N/C
7-5/8" Int shoe	Lateral TD	OBM	9.6 - 11.5	35-45	<20

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

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

6. Logging and Testing Procedures

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

Additional logs planned		Interval
N	Resistivity	Pilot Hole TD to ICP
N	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	7630 psi at 12757' TVD
Abnormal Temperature	NO 180 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

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

8. Other Facets of Operation

Y	Is it a walking operation?
N	Is casing pre-set?

x	H2S Plan.
x	BOP & Choke Schematics.
x	Directional Plan

1. Component and Preventer Compatibility Table

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

Component	OD	Preventer	RWP
Drill pipe	4.5"	Upper 4.5-7" VBR Lower 4.5-7" VBR	10M
HWDP	4.5"		
Jars	4.875" - 5"		
Drill collars and MWD tools	4.75" - 5"		
Mud Motor	4.75"-5.875"		
Production casing	5.5" & 5"		
ALL	0- 13.625"	Annular	5M
Open-hole	-	Blind Rams	10M

VBR = Variable Bore Ram with compatible range listed in chart.

2. Well Control and Shut-In Procedures

Well control procedures are specific to the rig equipment and the operation at the time the kick occurs. Below are minimum tasks prescribed to assure a proper shut-in while drilling, tripping, running casing, pipe out of the hole (open hole), and moving the BHA through the BOPs. The maximum pressure at which well control is transferred from the annular to another compatible ram is 2500 psi.

Drilling:

1. Sound the alarm (alert rig crew)
2. Space out the drill string
3. Shut down pumps and stop the rotary
4. Shut-in the well with the annular with HCR and choke in closed position
5. Confirm the well is shut-in
6. Notify contractor and company representatives
7. Read and record the following data
    - Time of shut-in
    - SIDPP and SICP
    - Pit gain
8. If pressure has increased to or is anticipated to increase to 2500 psi, confirm spacing and close the upper pipe rams.
9. Prepare for well kill operation.

Tripping:

1. Sound alarm (alert rig crew)
2. Stab full opening safety valve and close the valve
3. Space out the drill string
4. Shut-in the well with the annular with HCR and choke in closed position
5. Confirm shut-in
6. Notify contractor and company representatives
7. Read and record the following data:

- Time of shut-in
- SIDPP and SICP
- Pit gain

8. If pressure has increased to or is anticipated to increase to 2500 psi, confirm spacing and close the upper pipe rams.
9. Prepare for well kill operation.

Running Casing

1. Sound alarm (alert rig crew)
2. Stab crossover and valve and close the valve
3. Shut-in the well with annular with HCR and choke in closed position
4. Confirm shut-in
5. Notify contractor and company representatives
6. Read and record the following data
   - Time of shut-in
   - SIDPP and SICP
   - Pit gain
7. If pressure has increased to or is anticipated to increase to 2500 psi, confirm spacing and close the upper pipe rams.
8. Prepare for well kill operation

No Pipe in Hole (Open Hole)

1. At any point when pipe or BHA are not in BOP stack, well will be shut in with blind rams, HCR will be open and choke will be closed. If pressure increase is observed:
2. Sound alarm (alert crew)
3. Confirm shut-in
4. Notify contractor and company representatives
5. Read and record the following data
   - Time of shut-in
   - Time of pressure increase
   - SICP
6. Prepare for well kill operation

Pulling BHA through BOP Stack

1. Prior to pulling last joint/stand of drillpipe through the stack, perform a flow check. If well is flowing:
   a. Sound alarm (alert crew)
   b. Stab full opening safety valve and close the valve
   c. Space out drill string with tooljoint just beneath the upper pipe ram.
   d. Shut-in the well with upper pipe ram with HCR and choke in closed position
   e. Confirm shut-in
   f. Notify contractor and company representatives
   g. Read and record the following data
      - Time of shut-in
      - SIDPP and SICP
      - Pit gain
   h. Prepare for well kill operation.

2. With BHA in the stack:
    a. If possible to pick up high enough, pull BHA clear of the stack
        i. Follow "Open Hole" procedure above
    b. If impossible to pick up high enough to pull BHA clear of the stack:
        i. Stab crossover, make up one joint/stand of drillpipe, and full opening safety valve and close
        ii. Space out drill string with tooljoint just beneath the upper pipe ram.
        iii. Shut-in the well with upper pipe ram with HCR and choke in closed position
        iv. Confirm shut-in
        v. Notify contractor and company representatives
        vi. Read and record the following:
            - Time of shut-in
            - SIDPP and SICP
            - Pit gain
        vii. Prepare for well kill operation.

3. Well Control Drills

Well control drills are specific to the rig equipment, personnel and operation at the time a kick occurs. Each crew will execute one drill weekly relevant to ongoing operations, but will make a reasonable attempt to vary the type of drills. The drills will be recorded in the daily drilling log. Below are minimum tasks for respective well control drills.

Drilling/Pit:

Action	Responsible Party
Initiate Drill • Lift Flow Sensor or Pit Float to indicate a kick • Immediately record start time	Company Representative / Rig Manager
Recognition • Driller and/or Crew recognizes indicator • Driller stop drilling, pick up off bottom and spaces out drill string, stop pumps and rotary • Conduct flow check	Driller
Initiate Action • Sound alarm, notify rig crew that the well is flowing	Company Representative / Rig Manager
Reaction • Driller moves BOP remote and stands by • Crew is at their assigned stations • Time is stopped • Record time and drill type in the Drilling Report	Driller / Crew

Tripping Pit Drills (either in the hole or out of the hole)

Action	Responsible Party
Initiate Drill • Lift Flow Sensor or Pit Float to indicate a kick • Immediately record start time	Company Representative / Rig Manager
Recognition • Driller recognizes indicator • Suspends tripping operations • Conduct Flow Check	Driller
Initiate Action • Sound alarm, notify rig crew that the well is flowing	Company Representative / Rig Manager
Reaction • Position tool joint above rotary and set slips • Stab FOSV and close valve • Driller moves to BOP remote and stands by • Crew is at their assigned stations • Time is stopped • Record time and drill type in the Drilling Report	Driller / Crew

Choke

Action	Responsible Party
• Have designated choke operator on station at the choke panel • Close annular preventer • Pressure annulus up 200-300 psi • Pump slowly to bump the float and obtain SIDPP • At choke operator instruction, slowly bring pumps online to slow pump rate while holding casing pressure constant at the SICP. • Allow time for the well to stabilize. Mark and record circulating drillpipe pressure. • Measure time lag on drillpipe gauge after choke adjustments. • Hold casing pressure constant as pumps are slowed down while choke is closed. • Record time and drill type in the Drilling Report	Company Man / Rig Manager & Rig Crew

APD ID: 10400016340 **Submission Date:** 08/22/2017

Operator Name: COG OPERATING LLC

Well Name: HENNIN FEDERAL **Well Number:** 24H

Well Type: OIL WELL **Well Work Type:** Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

COG_Hennin_24H_Existing_Road_08-22-2017.pdf

Existing Road Purpose: ACCESS **Row(s) Exist?** NO

ROW ID(s)

ID:

Do the existing roads need to be improved? NO

Existing Road Improvement Description:

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG_Hennin_24H_Maps_08-22-2017.pdf

New road type: TWO-TRACK

Length: 220.6 Feet **Width (ft.):** 30

Max slope (%): 33 **Max grade (%):** 1

Army Corp of Engineers (ACOE) permit required? NO

ACOE Permit Number(s):

New road travel width: 14

New road access erosion control: Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

New road access plan or profile prepared? NO

New road access plan attachment:

Access road engineering design? NO

Access road engineering design attachment:

50