PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG OPERATING, LLC
LEASE NO.:	NMNM128368
WELL NAME & NO.:	4H-LITTLE BEAR FEDERAL COM
SURFACE HOLE FOOTAGE:	384'/S & 1151'/W
BOTTOM HOLE FOOTAGE	2440'/S & 1650'/W
LOCATION:	T-20S, R-34E, S-33. NMPM
COUNTY:	LEA, NM

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 **13 3/8** inch surface casing shall be set at approximately **1860** 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 **24 hours in the Potash Area** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

    c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength,

whichever is greater.

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

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

2. The minimum required fill of cement behind the **9 5/8** inch intermediate casing is:

Operator has proposed a DV tool at a depth of **3850'**, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to potash.**

❖ **Special Capitan Reef requirements.** If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall do the following:

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

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

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

- Cement to surface. Operator shall provide method of verification.

C. PRESSURE CONTROL

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

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

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** inch intermediate casing shoe shall be **5000 (5M)** psi.

D. SPECIAL REQUIREMENT(S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

Waste Minimization Plan (WMP)

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

MHH 08062018

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

OPERATOR'S NAME:	COG OPERATING, LLC
LEASE NO.:	NMNM128368
WELL NAME & NO.:	4H-LITTLE BEAR FEDERAL COM
SURFACE HOLE FOOTAGE:	384'/S & 1151'/W
BOTTOM HOLE FOOTAGE	2440'/S & 1650'/W
LOCATION:	T-20S, R-34E, S-33. NMPM
COUNTY:	LEA, NM

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

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

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.

Timing Limitation Exceptions:
The Carlsbad Field Office will publish an annual map of where the LPC timing and noise stipulations and conditions of approval (Limitations) will apply for the identified year (between March 1 and June 15) based on the latest survey information. The LPC Timing Area map will identify areas which are Habitat Areas (HA), Isolated Population Area (IPA), and Primary Population Area (PPA). The LPC Timing Area map will also have an area in red crosshatch. The red crosshatch area is the only area where an operator is required to submit a request for exception to the LPC Limitations. If an operator is operating outside the red crosshatch area, the LPC Limitations do not apply for that year and an exception to LPC Limitations is not required.

Watershed

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

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.

A leak detection plan will be submitted to the BLM Carlsbad Field Office for approval prior to pipeline installation. The method could incorporate gauges to detect pressure drops, situating values and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

Potash

Lessees must comply with the 2012Secretarial Potash Order. The Order is designed to manage the efficient development of oil, gas, and potash resources. Section 6 of the Order provides general provisions which must be followed to minimize conflict between the industries and ensure the safety of operations.

To minimize impacts to potash resources, the proposed well is confined within the boundaries of the established Little Bear Drill Island (See Potash Memo and Map in attached file for Drill Island description).

Range

The proponent shall not damage the allotment fence. If fence is damaged during construction all operations must cease till the BLM has been contacted along with the BLM grazing permitee.

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

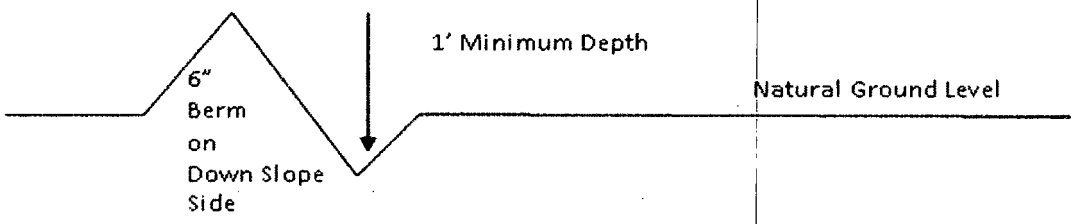
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

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

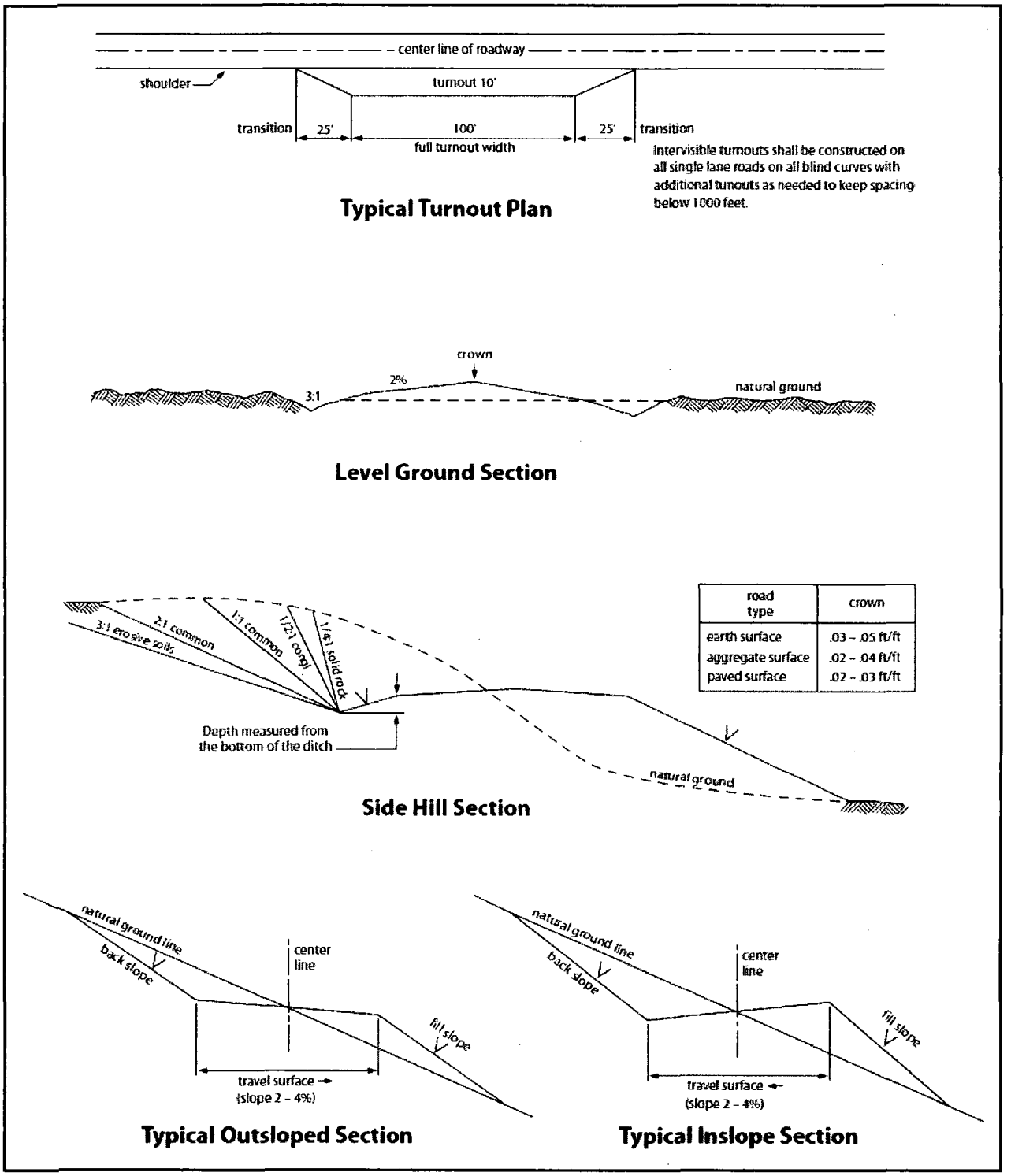


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

Containment Structures

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

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

B. PIPELINES

STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES

A copy of the Grant and attachments, including stipulations, survey plat(s) and/or map(s), shall be on location during construction. BLM personnel may request to review a copy of your permit during construction to ensure compliance with all stipulations.

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

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

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

3. Holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601, *et seq.* or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*) on the Right-of-Way (unless the release or threatened release is wholly unrelated to activity of the Right-of-Way Holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way Holder on the Right-of-Way. This provision applies without

regard to whether a release is caused by Holder, its agent, or unrelated third parties.

4. Holder shall be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2883.1-4. Holder shall be held to a standard of strict liability for damage or injury to the United States resulting from pipe rupture, fire, or spills caused or substantially aggravated by any of the following within the right-of-way or permit area:

a. Activities of Holder including, but not limited to: construction, operation, maintenance, and termination of the facility;

b. Activities of other parties including, but not limited to:
   (1) Land clearing
   (2) Earth-disturbing and earth-moving work
   (3) Blasting
   (4) Vandalism and sabotage;

c. Acts of God.

The maximum limitation for such strict liability damages shall not exceed one million dollars ($1,000,000) for any one event, and any liability in excess of such amount shall be determined by the ordinary rules of negligence of the jurisdiction in which the damage or injury occurred.

This section shall not impose strict liability for damage or injury resulting primarily from an act of war or from the negligent acts or omissions of the United States.

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

6. All construction and maintenance activity shall be confined to the authorized right-of-way width of **20** feet. If the pipeline route follows an existing road or buried pipeline right-of-way, the surface pipeline shall be installed no farther than 10 feet from the edge of the road or buried pipeline right-of-way. If existing surface pipelines prevent this distance, the proposed surface pipeline shall be installed immediately adjacent to the outer surface pipeline. All construction and maintenance activity shall be confined to existing roads or right-of-ways.

7. No blading or clearing of any vegetation shall be allowed unless approved in

writing by the Authorized Officer.

8. Holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky of duney areas, the pipeline shall be "snaked" around hummocks and dunes rather than suspended across these features.

9. The pipeline shall be buried with a minimum of **24** inches under all roads, "two-tracks," and trails. Burial of the pipe will continue for 20 feet on each side of each crossing. The condition of the road, upon completion of construction, shall be returned to at least its former state with no bumps or dips remaining in the road surface.

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

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

12. Excluding the pipe, all above-ground structures not subject to safety requirement shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2; designated by the Rocky Mountain Five State Interagency Committee.

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

14. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.

15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate cultural or scientific values. The holder will be responsible

for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

16. 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, powerline 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.

17. Surface pipelines shall be less than or equal to 4 inches and a working pressure below 125 psi.

18. Special Stipulations:

a. **Lesser Prairie-Chicken:** Oil and gas activities will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities and pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Normal vehicle use on existing roads will not be restricted.

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

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Operator Certification Data Report

08/08/2018

Operator Certification

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

NAME: Mayte Reyes **Signed on:** 04/18/2018

Title: Regulatory Analyst

Street Address: 2208 W Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6945

Email address: Mreyes1@concho.com

Field Representative

Representative Name: Rand French

Street Address: 2208 West Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6940

Email address: rfrench@concho.com

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

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

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

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

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

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

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

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

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

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

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

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

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

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

g. Communication:
Company vehicles equipped with cellular telephone.

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

WARNING

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

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

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

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

EMERGENCY RESPONSE NUMBERS

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

COG Operating LLC

Lea County, NM (NAD27 NME)
Little Bear Federal Com
4H

OH
Plan 1 04-12-18

Anticollision Report

12 April, 2018

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Reference	Plan 1 04-12-18		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 50,000.00 u	**Error Surface:**	Major Axis
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 4/12/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	18,893.51	Plan 1 04-12-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Battle 34 Federal						
4H - OH / Job #61199 - Plan 3 05-09-17	10,577.44	10,408.82	28,841.85	28,769.73	399.921	CC
4H - OH / Job #61199 - Plan 3 05-09-17	10,700.00	10,408.82	28,842.11	28,769.57	397.601	ES
4H - OH / Job #61199 - Plan 3 05-09-17	18,893.59	10,408.82	36,521.23	36,372.05	244.820	SF
Little Bear Federal Com						
3H - OH - Plan 1 04-12-18	18,893.59	18,890.49	1,335.03	1,106.88	5.852	CC, ES, SF
5H - OH - Plan 1 04-12-18	2,415.28	2,419.28	59.90	43.02	3.547	CC
5H - OH - Plan 1 04-12-18	2,500.00	2,503.92	59.90	42.41	3.425	ES, SF
7H - OH - Plan 1 04-12-18	6,853.95	6,682.49	1,956.17	1,905.86	38.883	CC
7H - OH - Plan 1 04-12-18	18,893.59	19,128.87	2,007.91	1,779.83	8.804	ES, SF
8H - OH - Plan 1 04-12-18	10,916.29	10,981.78	659.94	580.07	8.262	CC
8H - OH - Plan 1 04-12-18	18,893.59	19,169.71	696.35	468.54	3.057	ES, SF
9H - OH - Plan 1 04-12-18	2,416.33	2,417.33	30.00	13.12	1.777	CC
9H - OH - Plan 1 04-12-18	2,500.00	2,501.00	30.00	12.52	1.716	ES, SF
Paloma 21 Federal						
#1H - WB1 / Job #1411774 - Plan #1 09-15-14	18,893.59	18,177.25	1,365.08	1,088.37	4.933	CC, ES, SF

Offset Design Battle 34 Federal - 4H - OH / Job #61199 - Plan 3 05-09-17 — **Offset Site Error:** 0.00 usft

Survey Program: 83-, 1610- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	177.00	-29,196.48	1,532.66	29,236.96				
100.00	100.00	0.00	0.00	0.14	0.00	177.00	-29,196.48	1,532.66	29,236.70				
128.50	128.50	0.00	0.00	0.24	0.00	177.00	-29,196.48	1,532.66	29,236.68				
200.00	200.00	65.04	65.04	0.49	0.04	177.00	-29,196.49	1,532.53	29,236.69	29,236.16	0.53	N/A	
300.00	300.00	145.15	145.15	0.85	0.16	177.00	-29,196.56	1,532.04	29,236.74	29,235.73	1.01	N/A	
400.00	400.00	235.42	235.41	1.21	0.32	177.00	-29,196.71	1,531.22	29,236.86	29,235.33	1.53	N/A	
500.00	500.00	369.18	369.17	1.57	0.56	177.00	-29,196.82	1,529.83	29,236.87	29,234.74	2.13	N/A	
529.21	529.21	400.73	400.71	1.67	0.61	177.00	-29,196.81	1,529.47	29,236.84	29,234.56	2.29	N/A	
600.00	600.00	428.91	428.89	1.93	0.66	177.00	-29,196.84	1,529.17	29,236.89	29,234.30	2.59	N/A	
700.00	700.00	483.36	483.34	2.29	0.76	177.00	-29,197.01	1,528.65	29,237.14	29,234.09	3.05	9,601.133	
800.00	800.00	769.58	769.55	2.65	1.26	177.01	-29,197.27	1,526.00	29,237.29	29,233.38	3.91	7,478.594	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
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Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Battle 34 Federal - 4H - OH / Job #61199 - Plan 3 05-09-17 — **Offset Site Error:** 0.00 usft

Survey Program: 83-, 1610- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
900.00	900.00	826.32	826.28	3.00	1.36	177.01	-29,197.27	1,525.56	29,237.15	29,232.79	4.37	6,693.653	
954.78	954.78	826.32	826.28	3.20	1.36	177.01	-29,197.27	1,525.56	29,237.10	29,232.54	4.56	6,405.636	
1,000.00	1,000.00	826.32	826.28	3.36	1.36	177.01	-29,197.27	1,525.56	29,237.14	29,232.41	4.73	6,185.969	
1,100.00	1,100.00	859.18	859.14	3.72	1.42	177.01	-29,197.40	1,525.28	29,237.43	29,232.28	5.14	5,684.903	
1,200.00	1,200.00	917.81	917.77	4.08	1.53	177.01	-29,197.71	1,524.72	29,237.90	29,232.29	5.61	5,216.128	
1,300.00	1,300.00	917.81	917.77	4.44	1.53	177.01	-29,197.71	1,524.72	29,238.60	29,232.63	5.96	4,902.712	
1,400.00	1,400.00	979.62	979.57	4.80	1.64	177.01	-29,198.24	1,524.08	29,239.44	29,233.01	6.43	4,546.355	
1,500.00	1,500.00	1,010.12	1,010.07	5.15	1.69	177.01	-29,198.59	1,523.75	29,240.56	29,233.71	6.84	4,272.575	
1,600.00	1,600.00	1,073.95	1,073.89	5.51	1.80	177.01	-29,199.44	1,523.05	29,241.84	29,234.53	7.31	3,997.602	
1,700.00	1,700.00	1,102.10	1,102.04	5.87	1.85	177.01	-29,199.85	1,522.74	29,243.30	29,235.58	7.72	3,786.527	
1,800.00	1,800.00	1,184.36	1,184.28	6.23	2.00	177.02	-29,201.24	1,521.77	29,244.92	29,236.70	8.23	3,554.925	
1,900.00	1,900.00	1,184.36	1,184.28	6.59	2.00	177.02	-29,201.24	1,521.77	29,246.76	29,238.18	8.59	3,406.702	
2,000.00	2,000.00	1,255.93	1,255.83	6.95	2.12	177.02	-29,202.70	1,520.75	29,248.75	29,239.68	9.07	3,224.761	
2,100.00	2,100.00	2,167.21	2,166.86	7.31	3.43	177.04	-29,209.14	1,509.29	29,248.77	29,238.03	10.74	2,724.549	
2,200.00	2,200.00	2,267.21	2,266.86	7.66	3.67	177.04	-29,208.49	1,509.06	29,248.10	29,236.77	11.33	2,581.448	
2,300.00	2,300.00	2,367.21	2,366.85	8.02	3.93	177.04	-29,207.83	1,508.83	29,247.43	29,235.48	11.95	2,447.552	
2,400.00	2,400.00	2,467.21	2,466.85	8.38	4.21	177.04	-29,207.17	1,508.61	29,246.76	29,234.17	12.59	2,323.142	
2,500.00	2,500.00	2,567.20	2,566.84	8.74	4.51	177.04	-29,206.52	1,508.38	29,246.09	29,232.85	13.25	2,208.037	
2,600.00	2,599.98	2,667.17	2,666.81	9.08	4.82	53.72	-29,205.86	1,508.16	29,244.39	29,230.49	13.90	2,103.803	
2,700.00	2,699.84	2,767.00	2,766.63	9.42	5.14	53.79	-29,205.20	1,507.93	29,240.63	29,226.07	14.55	2,008.989	
2,800.00	2,799.45	2,866.56	2,866.20	9.75	5.47	53.90	-29,204.55	1,507.70	29,234.80	29,219.58	15.22	1,920.787	
2,899.95	2,898.65	2,965.69	2,965.32	10.09	5.80	54.04	-29,203.90	1,507.48	29,226.93	29,211.04	15.90	1,838.706	
3,000.00	2,997.73	3,064.69	3,064.32	10.44	6.14	54.07	-29,203.25	1,507.26	29,218.04	29,201.46	16.58	1,762.083	
3,100.00	3,096.76	3,163.64	3,163.26	10.79	6.49	54.09	-29,202.60	1,507.03	29,209.15	29,191.88	17.28	1,690.654	
3,200.00	3,195.78	3,262.59	3,262.21	11.14	6.84	54.11	-29,201.95	1,506.81	29,200.27	29,182.29	17.98	1,623.995	
3,300.00	3,294.81	3,361.54	3,361.16	11.50	7.19	54.13	-29,201.30	1,506.58	29,191.39	29,172.70	18.69	1,561.743	
3,400.00	3,393.84	3,460.48	3,460.10	11.86	7.55	54.15	-29,200.65	1,506.36	29,182.52	29,163.11	19.41	1,503.550	
3,500.00	3,492.86	3,559.43	3,559.05	12.22	7.91	54.18	-29,200.00	1,506.14	29,173.65	29,153.52	20.13	1,449.090	
3,600.00	3,591.89	3,658.38	3,657.99	12.59	8.27	54.20	-29,199.35	1,505.91	29,164.79	29,143.93	20.86	1,398.061	
3,700.00	3,690.92	3,757.33	3,756.94	12.96	8.63	54.22	-29,198.70	1,505.69	29,155.93	29,134.34	21.59	1,350.188	
3,800.00	3,789.95	3,856.28	3,855.88	13.33	9.00	54.24	-29,198.05	1,505.46	29,147.08	29,124.74	22.33	1,305.215	
3,900.00	3,888.97	3,955.22	3,954.83	13.70	9.37	54.27	-29,197.40	1,505.24	29,138.23	29,115.15	23.07	1,262.911	
4,000.00	3,988.00	4,054.17	4,053.78	14.08	9.74	54.29	-29,196.75	1,505.02	29,129.38	29,105.56	23.82	1,223.065	
4,100.00	4,087.03	4,153.12	4,152.72	14.46	10.11	54.31	-29,196.09	1,504.79	29,120.54	29,095.97	24.56	1,185.486	
4,200.00	4,186.05	4,252.07	4,251.67	14.84	10.48	54.33	-29,195.44	1,504.57	29,111.70	29,086.39	25.31	1,149.998	
4,300.00	4,285.08	4,351.02	4,350.61	15.22	10.85	54.36	-29,194.79	1,504.34	29,102.87	29,076.80	26.07	1,116.444	
4,400.00	4,384.11	4,449.96	4,449.56	15.60	11.22	54.38	-29,194.14	1,504.12	29,094.04	29,067.22	26.82	1,084.678	
4,500.00	4,483.13	4,548.91	4,548.50	15.98	11.60	54.40	-29,193.49	1,503.90	29,085.22	29,057.64	27.58	1,054.569	
4,600.00	4,582.16	4,647.86	4,647.45	16.37	11.97	54.42	-29,192.84	1,503.67	29,076.40	29,048.06	28.34	1,025.997	
4,700.00	4,681.19	4,746.81	4,746.40	16.75	12.35	54.45	-29,192.19	1,503.45	29,067.59	29,038.48	29.10	998.854	
4,800.00	4,780.22	4,845.76	4,845.34	17.14	12.73	54.47	-29,191.54	1,503.22	29,058.78	29,028.91	29.86	973.039	
4,900.00	4,879.24	4,944.71	4,944.29	17.53	13.10	54.49	-29,190.89	1,503.00	29,049.97	29,019.34	30.63	948.462	
5,000.00	4,978.27	5,043.65	5,043.23	17.91	13.48	54.51	-29,190.24	1,502.78	29,041.17	29,009.78	31.39	925.039	
5,100.00	5,077.30	5,142.60	5,142.18	18.30	13.86	54.54	-29,189.59	1,502.55	29,032.37	29,000.21	32.16	902.693	
5,200.00	5,176.32	5,241.55	5,241.12	18.69	14.24	54.56	-29,188.94	1,502.33	29,023.58	28,990.65	32.93	881.355	
5,300.00	5,275.35	5,340.50	5,340.07	19.08	14.62	54.58	-29,188.29	1,502.10	29,014.80	28,981.10	33.70	860.960	
5,400.00	5,374.38	5,439.45	5,439.02	19.48	14.99	54.60	-29,187.64	1,501.88	29,006.01	28,971.54	34.47	841.450	
5,500.00	5,473.41	5,538.39	5,537.96	19.87	15.37	54.63	-29,186.99	1,501.66	28,997.24	28,961.99	35.24	822.769	
5,600.00	5,572.43	5,637.34	5,636.91	20.26	15.75	54.65	-29,186.34	1,501.43	28,988.46	28,952.45	36.02	804.867	
5,700.00	5,671.46	5,736.29	5,735.85	20.66	16.13	54.67	-29,185.69	1,501.21	28,979.69	28,942.90	36.79	787.698	
5,800.00	5,770.49	5,835.24	5,834.80	21.05	16.51	54.70	-29,185.04	1,500.98	28,970.93	28,933.36	37.57	771.220	
5,900.00	5,869.51	5,934.19	5,933.74	21.45	16.90	54.72	-29,184.39	1,500.76	28,962.17	28,923.83	38.34	755.391	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Battle 34 Federal - 4H - OH / Job #61199 - Plan 3 05-09-17 — **Offset Site Error:** 0.00 usft

Survey Program: 83-, 1610- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
6,000.00	5,968.54	6,033.13	6,032.69	21.84	17.28	54.74	-29,183.74	1,500.54	28,953.41	28,914.30	39.12	740.176	
6,100.00	6,067.57	6,132.08	6,131.64	22.24	17.66	54.76	-29,183.09	1,500.31	28,944.66	28,904.77	39.89	725.540	
6,200.00	6,166.60	6,231.03	6,230.58	22.63	18.04	54.79	-29,182.44	1,500.09	28,935.92	28,895.25	40.67	711.452	
6,300.00	6,265.62	6,329.98	6,329.53	23.03	18.42	54.81	-29,181.79	1,499.86	28,927.18	28,885.73	41.45	697.881	
6,400.00	6,364.65	6,428.93	6,428.47	23.43	18.80	54.83	-29,181.14	1,499.64	28,918.44	28,876.21	42.23	684.802	
6,500.00	6,463.68	6,527.87	6,527.42	23.82	19.18	54.85	-29,180.49	1,499.42	28,909.71	28,866.70	43.01	672.187	
6,600.00	6,562.70	6,626.82	6,626.36	24.22	19.57	54.88	-29,179.84	1,499.19	28,900.98	28,857.19	43.79	660.013	
6,700.00	6,661.73	6,725.77	6,725.31	24.62	19.95	54.90	-29,179.19	1,498.97	28,892.26	28,847.69	44.57	648.258	
6,800.00	6,760.76	6,824.72	6,824.26	25.02	20.33	54.92	-29,178.54	1,498.74	28,883.54	28,838.19	45.35	636.901	
6,900.00	6,859.95	6,923.84	6,923.38	25.41	20.71	54.83	-29,177.89	1,498.52	28,875.57	28,829.44	46.13	626.010	
7,000.00	6,959.52	7,023.36	7,022.89	25.79	21.10	54.75	-29,177.23	1,498.29	28,869.59	28,822.70	46.89	615.703	
7,100.00	7,059.36	7,123.16	7,122.69	26.15	21.48	54.70	-29,176.58	1,498.07	28,865.62	28,817.99	47.64	605.956	
7,200.00	7,159.33	7,223.11	7,222.64	26.50	21.87	54.67	-29,175.92	1,497.84	28,863.68	28,815.31	48.37	596.738	
7,300.00	7,259.33	7,323.11	7,322.64	26.83	22.26	178.02	-29,175.26	1,497.62	28,862.99	28,813.91	49.08	588.024	
7,400.00	7,359.33	7,423.11	7,422.63	27.15	22.65	178.02	-29,174.61	1,497.39	28,862.33	28,812.53	49.80	579.559	
7,500.00	7,459.33	7,523.11	7,522.63	27.48	23.03	178.02	-29,173.95	1,497.16	28,861.66	28,811.15	50.52	571.324	
7,600.00	7,559.33	7,623.10	7,622.62	27.81	23.42	178.02	-29,173.29	1,496.94	28,861.00	28,809.76	51.23	563.310	
7,700.00	7,659.33	7,723.10	7,722.62	28.15	23.81	178.02	-29,172.64	1,496.71	28,860.33	28,808.38	51.95	555.509	
7,800.00	7,759.33	7,823.10	7,822.61	28.48	24.20	178.02	-29,171.98	1,496.48	28,859.67	28,807.00	52.67	547.913	
7,900.00	7,859.33	7,923.10	7,922.61	28.81	24.58	178.02	-29,171.32	1,496.26	28,859.00	28,805.61	53.39	540.515	
8,000.00	7,959.33	8,023.09	8,022.60	29.14	24.97	178.02	-29,170.66	1,496.03	28,858.34	28,804.23	54.11	533.306	
8,100.00	8,059.33	8,123.09	8,122.60	29.47	25.36	178.03	-29,170.01	1,495.81	28,857.68	28,802.84	54.83	526.279	
8,200.00	8,159.33	8,223.09	8,222.59	29.81	25.75	178.03	-29,169.35	1,495.58	28,857.01	28,801.46	55.56	519.430	
8,300.00	8,259.33	8,323.09	8,322.59	30.14	26.13	178.03	-29,168.69	1,495.35	28,856.35	28,800.07	56.28	512.750	
8,400.00	8,359.33	8,423.08	8,422.58	30.48	26.52	178.03	-29,168.04	1,495.13	28,855.68	28,798.68	57.00	506.234	
8,500.00	8,459.33	8,523.08	8,522.58	30.81	26.91	178.03	-29,167.38	1,494.90	28,855.02	28,797.29	57.72	499.876	
8,600.00	8,559.33	8,623.08	8,622.57	31.15	27.30	178.03	-29,166.72	1,494.67	28,854.35	28,795.90	58.45	493.670	
8,700.00	8,659.33	8,723.08	8,722.57	31.49	27.69	178.03	-29,166.06	1,494.45	28,853.69	28,794.51	59.17	487.612	
8,800.00	8,759.33	8,823.08	8,822.56	31.82	28.08	178.03	-29,165.41	1,494.22	28,853.02	28,793.12	59.90	481.697	
8,900.00	8,859.33	8,923.07	8,922.56	32.16	28.46	178.03	-29,164.75	1,493.99	28,852.36	28,791.73	60.62	475.918	
9,000.00	8,959.33	9,023.07	9,022.55	32.50	28.85	178.03	-29,164.09	1,493.77	28,851.69	28,790.34	61.35	470.273	
9,100.00	9,059.33	9,123.07	9,122.55	32.84	29.24	178.03	-29,163.44	1,493.54	28,851.03	28,788.95	62.08	464.756	
9,200.00	9,159.33	9,223.07	9,222.54	33.18	29.63	178.03	-29,162.78	1,493.32	28,850.37	28,787.56	62.81	459.363	
9,300.00	9,259.33	9,323.06	9,322.54	33.52	30.02	178.03	-29,162.12	1,493.09	28,849.70	28,786.17	63.53	454.091	
9,400.00	9,359.33	9,423.06	9,422.53	33.86	30.41	178.03	-29,161.46	1,492.86	28,849.04	28,784.78	64.26	448.935	
9,500.00	9,459.33	9,523.06	9,522.53	34.20	30.79	178.03	-29,160.81	1,492.64	28,848.37	28,783.38	64.99	443.891	
9,600.00	9,559.33	9,623.06	9,622.52	34.54	31.18	178.03	-29,160.15	1,492.41	28,847.71	28,781.99	65.72	438.957	
9,700.00	9,659.33	9,723.05	9,722.52	34.88	31.57	178.03	-29,159.49	1,492.18	28,847.04	28,780.59	66.45	434.128	
9,800.00	9,759.33	9,823.05	9,822.52	35.22	31.96	178.03	-29,158.84	1,491.96	28,846.38	28,779.20	67.18	429.402	
9,900.00	9,859.33	9,923.05	9,922.51	35.56	32.35	178.03	-29,158.18	1,491.73	28,845.71	28,777.81	67.91	424.774	
10,000.00	9,959.33	10,023.05	10,022.51	35.90	32.74	178.03	-29,157.52	1,491.50	28,845.05	28,776.41	68.64	420.243	
10,100.00	10,059.33	10,123.04	10,122.50	36.24	33.13	178.03	-29,156.86	1,491.28	28,844.38	28,775.02	69.37	415.806	
10,200.00	10,159.33	10,223.04	10,222.50	36.59	33.52	178.03	-29,156.21	1,491.05	28,843.72	28,773.62	70.10	411.458	
10,300.00	10,259.33	10,323.04	10,322.49	36.93	33.90	178.03	-29,155.55	1,490.83	28,843.06	28,772.22	70.83	407.199	
10,400.00	10,359.33	10,408.82	10,408.27	37.27	34.24	178.03	-29,154.99	1,490.63	28,842.39	28,770.89	71.51	403.337	
10,500.00	10,459.33	10,408.82	10,408.27	37.61	34.24	178.03	-29,154.99	1,490.63	28,841.95	28,770.10	71.85	401.403	
10,577.44	10,536.77	10,408.82	10,408.27	37.88	34.24	178.03	-29,154.99	1,490.63	28,841.85	28,769.73	72.12	399.921	CC
10,600.00	10,559.33	10,408.82	10,408.27	37.96	34.24	178.03	-29,154.99	1,490.63	28,841.86	28,769.66	72.20	399.492	
10,700.00	10,659.33	10,408.82	10,408.27	38.30	34.24	178.03	-29,154.99	1,490.63	28,842.11	28,769.57	72.54	397.601	ES
10,800.00	10,759.33	10,408.82	10,408.27	38.65	34.24	178.03	-29,154.99	1,490.63	28,842.71	28,769.82	72.88	395.732	
10,900.00	10,859.33	10,408.82	10,408.27	38.99	34.24	178.03	-29,154.99	1,490.63	28,843.65	28,770.42	73.23	393.884	
11,000.00	10,959.17	10,408.82	10,408.27	39.33	34.24	178.45	-29,154.99	1,490.63	28,848.61	28,775.04	73.57	392.129	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Battle 34 Federal - 4H - OH / Job #61199 - Plan 3 05-09-17 — **Offset Site Error:** 0.00 usft

Survey Program: 83-, 1610- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,100.00	11,056.39	10,408.82	10,408.27	39.64	34.24	178.36	-29,154.99	1,490.63	28,872.83	28,798.95	73.88	390.817	
11,200.00	11,146.77	10,408.82	10,408.27	39.90	34.24	178.18	-29,154.99	1,490.63	28,916.93	28,842.80	74.14	390.054	
11,300.00	11,226.37	10,408.82	10,408.27	40.09	34.24	177.85	-29,154.99	1,490.63	28,978.91	28,904.58	74.33	389.868	
11,400.00	11,291.71	10,408.82	10,408.27	40.22	34.24	177.23	-29,154.99	1,490.63	29,055.94	28,981.49	74.46	390.240	
11,500.00	11,339.94	10,408.82	10,408.27	40.28	34.24	175.82	-29,154.99	1,490.63	29,144.57	29,070.05	74.52	391.099	
11,600.00	11,368.94	10,408.82	10,408.27	40.29	34.24	170.65	-29,154.99	1,490.63	29,240.82	29,166.29	74.53	392.326	
11,700.00	11,377.44	10,408.82	10,408.27	40.28	34.24	28.80	-29,154.99	1,490.63	29,340.44	29,265.93	74.52	393.742	
11,800.00	11,374.24	10,408.82	10,408.27	40.33	34.24	23.38	-29,154.99	1,490.63	29,440.23	29,365.61	74.62	394.548	
11,900.00	11,370.99	10,408.82	10,408.27	40.54	34.24	23.38	-29,154.99	1,490.63	29,540.01	29,465.17	74.83	394.745	
12,000.00	11,367.75	10,408.82	10,408.27	40.82	34.24	23.38	-29,154.99	1,490.63	29,639.79	29,564.69	75.10	394.679	
12,100.00	11,364.50	10,408.82	10,408.27	41.15	34.24	23.38	-29,154.99	1,490.63	29,739.57	29,664.16	75.41	394.356	
12,200.00	11,361.26	10,408.82	10,408.27	41.53	34.24	23.38	-29,154.99	1,490.63	29,839.36	29,763.58	75.78	393.788	
12,300.00	11,358.01	10,408.82	10,408.27	41.94	34.24	23.38	-29,154.99	1,490.63	29,939.14	29,862.96	76.18	392.984	
12,400.00	11,354.77	10,408.82	10,408.27	42.41	34.24	23.38	-29,154.99	1,490.63	30,038.93	29,962.29	76.65	391.923	
12,500.00	11,351.52	10,408.82	10,408.27	42.91	34.24	23.38	-29,154.99	1,490.63	30,138.72	30,061.57	77.15	390.655	
12,600.00	11,348.27	10,408.82	10,408.27	43.46	34.24	23.38	-29,154.99	1,490.63	30,238.51	30,160.82	77.69	389.199	
12,700.00	11,345.03	10,408.82	10,408.27	44.04	34.24	23.38	-29,154.99	1,490.63	30,338.30	30,260.02	78.28	387.567	
12,800.00	11,341.78	10,408.82	10,408.27	44.66	34.24	23.38	-29,154.99	1,490.63	30,438.10	30,359.19	78.90	385.772	
12,900.00	11,338.54	10,408.82	10,408.27	45.32	34.24	23.38	-29,154.99	1,490.63	30,537.89	30,458.33	79.56	383.828	
13,000.00	11,335.29	10,408.82	10,408.27	46.02	34.24	23.38	-29,154.99	1,490.63	30,637.69	30,557.43	80.26	381.747	
13,100.00	11,332.05	10,408.82	10,408.27	46.75	34.24	23.38	-29,154.99	1,490.63	30,737.49	30,656.50	80.99	379.544	
13,200.00	11,328.80	10,408.82	10,408.27	47.51	34.24	23.38	-29,154.99	1,490.63	30,837.28	30,755.54	81.75	377.231	
13,300.00	11,325.55	10,408.82	10,408.27	48.30	34.24	23.38	-29,154.99	1,490.63	30,937.08	30,854.55	82.54	374.820	
13,400.00	11,322.31	10,408.82	10,408.27	49.12	34.24	23.38	-29,154.99	1,490.63	31,036.89	30,953.53	83.36	372.324	
13,500.00	11,319.06	10,408.82	10,408.27	49.97	34.24	23.38	-29,154.99	1,490.63	31,136.69	31,052.48	84.21	369.753	
13,600.00	11,315.82	10,408.82	10,408.27	50.85	34.24	23.38	-29,154.99	1,490.63	31,236.49	31,151.41	85.09	367.119	
13,700.00	11,312.57	10,408.82	10,408.27	51.75	34.24	23.38	-29,154.99	1,490.63	31,336.30	31,250.31	85.99	364.431	
13,800.00	11,309.32	10,408.82	10,408.27	52.67	34.24	23.38	-29,154.99	1,490.63	31,436.10	31,349.19	86.91	361.699	
13,900.00	11,306.08	10,408.82	10,408.27	53.62	34.24	23.38	-29,154.99	1,490.63	31,535.91	31,448.05	87.86	358.932	
14,000.00	11,302.83	10,408.82	10,408.27	54.59	34.24	23.38	-29,154.99	1,490.63	31,635.72	31,546.89	88.83	356.136	
14,100.00	11,299.59	10,408.82	10,408.27	55.58	34.24	23.38	-29,154.99	1,490.63	31,735.53	31,645.71	89.82	353.321	
14,200.00	11,296.34	10,408.82	10,408.27	56.59	34.24	23.38	-29,154.99	1,490.63	31,835.34	31,744.51	90.83	350.492	
14,300.00	11,293.10	10,408.82	10,408.27	57.62	34.24	23.38	-29,154.99	1,490.63	31,935.15	31,843.29	91.86	347.655	
14,400.00	11,289.85	10,408.82	10,408.27	58.67	34.24	23.38	-29,154.99	1,490.63	32,034.97	31,942.06	92.90	344.816	
14,500.00	11,286.60	10,408.82	10,408.27	59.73	34.24	23.38	-29,154.99	1,490.63	32,134.78	32,040.82	93.97	341.980	
14,600.00	11,283.36	10,408.82	10,408.27	60.81	34.24	23.38	-29,154.99	1,490.63	32,234.60	32,139.55	95.04	339.152	
14,700.00	11,280.11	10,408.82	10,408.27	61.90	34.24	23.38	-29,154.99	1,490.63	32,334.41	32,238.28	96.14	336.335	
14,800.00	11,276.87	10,408.82	10,408.27	63.01	34.24	23.38	-29,154.99	1,490.63	32,434.23	32,336.99	97.24	333.533	
14,900.00	11,273.62	10,408.82	10,408.27	64.13	34.24	23.38	-29,154.99	1,490.63	32,534.05	32,435.69	98.36	330.749	
15,000.00	11,270.38	10,408.82	10,408.27	65.26	34.24	23.38	-29,154.99	1,490.63	32,633.87	32,534.37	99.50	327.985	
15,100.00	11,267.13	10,408.82	10,408.27	66.40	34.24	23.38	-29,154.99	1,490.63	32,733.69	32,633.05	100.64	325.245	
15,200.00	11,263.88	10,408.82	10,408.27	67.56	34.24	23.38	-29,154.99	1,490.63	32,833.52	32,731.72	101.80	322.531	
15,300.00	11,260.64	10,408.82	10,408.27	68.73	34.24	23.38	-29,154.99	1,490.63	32,933.34	32,830.37	102.97	319.843	
15,400.00	11,257.39	10,408.82	10,408.27	69.91	34.24	23.38	-29,154.99	1,490.63	33,033.17	32,929.02	104.14	317.184	
15,500.00	11,254.15	10,408.82	10,408.27	71.09	34.24	23.38	-29,154.99	1,490.63	33,132.99	33,027.66	105.33	314.556	
15,600.00	11,250.90	10,408.82	10,408.27	72.29	34.24	23.38	-29,154.99	1,490.63	33,232.82	33,126.29	106.53	311.959	
15,700.00	11,247.66	10,408.82	10,408.27	73.50	34.24	23.38	-29,154.99	1,490.63	33,332.65	33,224.91	107.74	309.394	
15,800.00	11,244.41	10,408.82	10,408.27	74.71	34.24	23.38	-29,154.99	1,490.63	33,432.47	33,323.52	108.95	306.862	
15,900.00	11,241.16	10,408.82	10,408.27	75.93	34.24	23.38	-29,154.99	1,490.63	33,532.30	33,422.13	110.17	304.363	
16,000.00	11,237.92	10,408.82	10,408.27	77.16	34.24	23.38	-29,154.99	1,490.63	33,632.14	33,520.73	111.40	301.899	
16,100.00	11,234.67	10,408.82	10,408.27	78.40	34.24	23.38	-29,154.99	1,490.63	33,731.97	33,619.33	112.64	299.469	
16,200.00	11,231.43	10,408.82	10,408.27	79.65	34.24	23.38	-29,154.99	1,490.63	33,831.80	33,717.92	113.88	297.073	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Battle 34 Federal - 4H - OH / Job #61199 - Plan 3 05-09-17 — **Offset Site Error:** 0.00 usft

Survey Program: 83-, 1610- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
16,300.00	11,228.18	10,408.82	10,408.27	80.90	34.24	23.38	-29,154.99	1,490.63	33,931.63	33,816.50	115.13	294.713	
16,400.00	11,224.94	10,408.82	10,408.27	82.15	34.24	23.38	-29,154.99	1,490.63	34,031.47	33,915.08	116.39	292.387	
16,500.00	11,221.69	10,408.82	10,408.27	83.42	34.24	23.38	-29,154.99	1,490.63	34,131.30	34,013.65	117.66	290.096	
16,600.00	11,218.44	10,408.82	10,408.27	84.69	34.24	23.38	-29,154.99	1,490.63	34,231.14	34,112.22	118.92	287.840	
16,700.00	11,215.20	10,408.82	10,408.27	85.96	34.24	23.38	-29,154.99	1,490.63	34,330.98	34,210.78	120.20	285.618	
16,800.00	11,211.95	10,408.82	10,408.27	87.24	34.24	23.38	-29,154.99	1,490.63	34,430.82	34,309.34	121.48	283.430	
16,900.00	11,208.71	10,408.82	10,408.27	88.53	34.24	23.38	-29,154.99	1,490.63	34,530.66	34,407.89	122.76	281.277	
17,000.00	11,205.46	10,408.82	10,408.27	89.82	34.24	23.38	-29,154.99	1,490.63	34,630.50	34,506.44	124.05	279.157	
17,100.00	11,202.22	10,408.82	10,408.27	91.11	34.24	23.38	-29,154.99	1,490.63	34,730.34	34,604.99	125.35	277.070	
17,200.00	11,198.97	10,408.82	10,408.27	92.41	34.24	23.38	-29,154.99	1,490.63	34,830.18	34,703.53	126.65	275.017	
17,300.00	11,195.72	10,408.82	10,408.27	93.71	34.24	23.38	-29,154.99	1,490.63	34,930.03	34,802.07	127.95	272.996	
17,400.00	11,192.48	10,408.82	10,408.27	95.02	34.24	23.38	-29,154.99	1,490.63	35,029.87	34,900.61	129.26	271.008	
17,500.00	11,189.23	10,408.82	10,408.27	96.33	34.24	23.38	-29,154.99	1,490.63	35,129.71	34,999.15	130.57	269.051	
17,600.00	11,185.99	10,408.82	10,408.27	97.65	34.24	23.38	-29,154.99	1,490.63	35,229.56	35,097.68	131.88	267.125	
17,700.00	11,182.74	10,408.82	10,408.27	98.96	34.24	23.38	-29,154.99	1,490.63	35,329.41	35,196.20	133.20	265.230	
17,800.00	11,179.50	10,408.82	10,408.27	100.29	34.24	23.38	-29,154.99	1,490.63	35,429.25	35,294.73	134.52	263.366	
17,900.00	11,176.25	10,408.82	10,408.27	101.61	34.24	23.38	-29,154.99	1,490.63	35,529.10	35,393.25	135.85	261.531	
18,000.00	11,173.00	10,408.82	10,408.27	102.94	34.24	23.38	-29,154.99	1,490.63	35,628.95	35,491.77	137.18	259.726	
18,100.00	11,169.76	10,408.82	10,408.27	104.27	34.24	23.38	-29,154.99	1,490.63	35,728.80	35,590.29	138.51	257.950	
18,200.00	11,166.51	10,408.82	10,408.27	105.61	34.24	23.38	-29,154.99	1,490.63	35,828.65	35,688.81	139.85	256.202	
18,300.00	11,163.27	10,408.82	10,408.27	106.94	34.24	23.38	-29,154.99	1,490.63	35,928.51	35,787.32	141.18	254.482	
18,400.00	11,160.02	10,408.82	10,408.27	108.28	34.24	23.38	-29,154.99	1,490.63	36,028.36	35,885.84	142.52	252.790	
18,500.00	11,156.78	10,408.82	10,408.27	109.63	34.24	23.38	-29,154.99	1,490.63	36,128.21	35,984.35	143.87	251.124	
18,600.00	11,153.53	10,408.82	10,408.27	110.97	34.24	23.38	-29,154.99	1,490.63	36,228.07	36,082.85	145.21	249.485	
18,700.00	11,150.28	10,408.82	10,408.27	112.32	34.24	23.38	-29,154.99	1,490.63	36,327.92	36,181.36	146.56	247.871	
18,800.00	11,147.04	10,408.82	10,408.27	113.67	34.24	23.38	-29,154.99	1,490.63	36,427.78	36,279.87	147.91	246.284	
18,893.59	11,144.00	10,408.82	10,408.27	114.94	34.24	23.38	-29,154.99	1,490.63	36,521.23	36,372.05	149.18	244.820 SF	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 3H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	3.00	3.00	0.00	0.00	80.62	327.30	1,980.40	2,007.26				
100.00	100.00	103.00	103.00	0.14	0.14	80.62	327.30	1,980.40	2,007.26	2,006.98	0.28	7,178.847	
200.00	200.00	203.00	203.00	0.49	0.50	80.62	327.30	1,980.40	2,007.26	2,006.27	1.00	2,014.211	
300.00	300.00	303.00	303.00	0.85	0.86	80.62	327.30	1,980.40	2,007.26	2,005.55	1.71	1,171.445	
400.00	400.00	403.00	403.00	1.21	1.22	80.62	327.30	1,980.40	2,007.26	2,004.83	2.43	825.886	
500.00	500.00	503.00	503.00	1.57	1.58	80.62	327.30	1,980.40	2,007.26	2,004.12	3.15	637.757	
600.00	600.00	603.00	603.00	1.93	1.94	80.62	327.30	1,980.40	2,007.26	2,003.40	3.86	519.435	
700.00	700.00	703.00	703.00	2.29	2.29	80.62	327.30	1,980.40	2,007.26	2,002.68	4.58	438.146	
800.00	800.00	803.00	803.00	2.65	2.65	80.62	327.30	1,980.40	2,007.26	2,001.97	5.30	378.857	
900.00	900.00	903.00	903.00	3.00	3.01	80.62	327.30	1,980.40	2,007.26	2,001.25	6.02	333.701	
1,000.00	1,000.00	1,003.00	1,003.00	3.36	3.37	80.62	327.30	1,980.40	2,007.26	2,000.53	6.73	298.163	
1,100.00	1,100.00	1,103.00	1,103.00	3.72	3.73	80.62	327.30	1,980.40	2,007.26	1,999.82	7.45	269.466	
1,200.00	1,200.00	1,203.00	1,203.00	4.08	4.09	80.62	327.30	1,980.40	2,007.26	1,999.10	8.17	245.808	
1,300.00	1,300.00	1,303.00	1,303.00	4.44	4.45	80.62	327.30	1,980.40	2,007.26	1,998.38	8.88	225.969	
1,400.00	1,400.00	1,403.00	1,403.00	4.80	4.80	80.62	327.30	1,980.40	2,007.26	1,997.66	9.60	209.093	
1,500.00	1,500.00	1,503.00	1,503.00	5.15	5.16	80.62	327.30	1,980.40	2,007.26	1,996.95	10.32	194.562	
1,600.00	1,600.00	1,603.00	1,603.00	5.51	5.52	80.62	327.30	1,980.40	2,007.26	1,996.23	11.03	181.920	
1,700.00	1,700.00	1,703.00	1,703.00	5.87	5.88	80.62	327.30	1,980.40	2,007.26	1,995.51	11.75	170.821	
1,800.00	1,800.00	1,803.00	1,803.00	6.23	6.24	80.62	327.30	1,980.40	2,007.26	1,994.80	12.47	160.998	
1,900.00	1,900.00	1,903.00	1,903.00	6.59	6.60	80.62	327.30	1,980.40	2,007.26	1,994.08	13.18	152.243	
2,000.00	2,000.00	2,003.00	2,003.00	6.95	6.95	80.62	327.30	1,980.40	2,007.26	1,993.36	13.90	144.392	
2,100.00	2,100.00	2,103.00	2,103.00	7.31	7.31	80.62	327.30	1,980.40	2,007.26	1,992.65	14.62	137.310	
2,200.00	2,200.00	2,203.00	2,203.00	7.66	7.67	80.62	327.30	1,980.40	2,007.26	1,991.93	15.34	130.891	
2,300.00	2,300.00	2,303.00	2,303.00	8.02	8.03	80.62	327.30	1,980.40	2,007.26	1,991.21	16.05	125.045	
2,400.00	2,400.00	2,403.00	2,403.00	8.38	8.39	80.62	327.30	1,980.40	2,007.26	1,990.49	16.77	119.699	
2,500.00	2,500.00	2,504.03	2,504.03	8.74	8.75	80.62	327.30	1,980.40	2,007.26	1,989.77	17.49	114.772	
2,600.00	2,599.98	2,638.20	2,638.14	9.08	9.20	-42.73	324.04	1,979.71	2,005.08	1,986.79	18.28	109.659	
2,700.00	2,699.84	2,771.84	2,771.43	9.42	9.64	-42.69	314.69	1,977.73	1,998.64	1,979.58	19.05	104.899	
2,800.00	2,799.45	2,904.46	2,903.11	9.75	10.07	-42.64	299.42	1,974.49	1,987.97	1,968.15	19.82	100.282	
2,899.95	2,898.65	3,002.24	2,999.95	10.09	10.40	-42.70	286.10	1,971.66	1,974.01	1,953.52	20.49	96.341	
3,000.00	2,997.73	3,101.07	3,097.81	10.44	10.73	-42.60	272.64	1,968.81	1,958.77	1,937.60	21.17	92.522	
3,100.00	3,096.76	3,199.83	3,195.62	10.79	11.07	-42.49	259.18	1,965.95	1,943.54	1,921.68	21.86	88.906	
3,200.00	3,195.78	3,298.60	3,293.42	11.14	11.42	-42.38	245.73	1,963.10	1,928.32	1,905.77	22.56	85.481	
3,300.00	3,294.81	3,397.37	3,391.23	11.50	11.76	-42.27	232.28	1,960.25	1,913.11	1,889.85	23.26	82.234	
3,400.00	3,393.84	3,496.14	3,489.04	11.86	12.12	-42.16	218.82	1,957.39	1,897.91	1,873.93	23.98	79.157	
3,500.00	3,492.86	3,594.91	3,586.84	12.22	12.47	-42.04	205.37	1,954.54	1,882.71	1,858.01	24.70	76.238	
3,600.00	3,591.89	3,693.68	3,684.65	12.59	12.83	-41.93	191.92	1,951.69	1,867.52	1,842.10	25.42	73.468	
3,700.00	3,690.92	3,792.45	3,782.45	12.96	13.19	-41.81	178.46	1,948.84	1,852.34	1,826.19	26.15	70.837	
3,800.00	3,789.95	3,891.22	3,880.26	13.33	13.55	-41.69	165.01	1,945.98	1,837.16	1,810.28	26.88	68.338	
3,900.00	3,888.97	3,989.99	3,978.07	13.70	13.92	-41.57	151.55	1,943.13	1,821.99	1,794.37	27.62	65.961	
4,000.00	3,988.00	4,088.75	4,075.87	14.08	14.29	-41.45	138.10	1,940.28	1,806.84	1,778.47	28.37	63.699	
4,100.00	4,087.03	4,187.52	4,173.68	14.46	14.66	-41.32	124.65	1,937.42	1,791.68	1,762.57	29.11	61.544	
4,200.00	4,186.05	4,286.29	4,271.49	14.84	15.03	-41.19	111.19	1,934.57	1,776.54	1,746.68	29.86	59.491	
4,300.00	4,285.08	4,385.06	4,369.29	15.22	15.40	-41.06	97.74	1,931.72	1,761.41	1,730.79	30.62	57.533	
4,400.00	4,384.11	4,483.83	4,467.10	15.60	15.77	-40.93	84.28	1,928.86	1,746.29	1,714.91	31.37	55.664	
4,500.00	4,483.13	4,582.60	4,564.91	15.98	16.15	-40.80	70.83	1,926.01	1,731.17	1,699.04	32.13	53.878	
4,600.00	4,582.16	4,681.37	4,662.71	16.37	16.53	-40.66	57.38	1,923.16	1,716.06	1,683.17	32.89	52.171	
4,700.00	4,681.19	4,780.14	4,760.52	16.75	16.91	-40.52	43.92	1,920.30	1,700.97	1,667.31	33.66	50.538	
4,800.00	4,780.22	4,878.90	4,858.33	17.14	17.29	-40.38	30.47	1,917.45	1,685.88	1,651.46	34.42	48.974	
4,900.00	4,879.24	4,977.67	4,956.13	17.53	17.67	-40.24	17.02	1,914.60	1,670.81	1,635.61	35.19	47.477	
5,000.00	4,978.27	5,076.44	5,053.94	17.91	18.05	-40.09	3.56	1,911.74	1,655.74	1,619.78	35.96	46.040	
5,100.00	5,077.30	5,175.21	5,151.75	18.30	18.43	-39.94	-9.89	1,908.89	1,640.69	1,603.95	36.74	44.662	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 3H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,176.32	5,273.98	5,249.55	18.69	18.82	-39.79	-23.35	1,906.04	1,625.64	1,588.13	37.51	43.340	
5,300.00	5,275.35	5,372.75	5,347.36	19.08	19.20	-39.63	-36.80	1,903.18	1,610.61	1,572.33	38.29	42.069	
5,400.00	5,374.38	5,471.52	5,445.17	19.48	19.59	-39.48	-50.25	1,900.33	1,595.59	1,556.53	39.06	40.847	
5,500.00	5,473.41	5,570.29	5,542.97	19.87	19.97	-39.32	-63.71	1,897.48	1,580.58	1,540.74	39.84	39.672	
5,600.00	5,572.43	5,669.05	5,640.78	20.26	20.36	-39.15	-77.16	1,894.62	1,565.59	1,524.97	40.62	38.541	
5,700.00	5,671.46	5,767.82	5,738.59	20.66	20.75	-38.98	-90.61	1,891.77	1,550.61	1,509.20	41.40	37.452	
5,800.00	5,770.49	5,866.59	5,836.39	21.05	21.13	-38.81	-104.07	1,888.92	1,535.64	1,493.45	42.19	36.402	
5,900.00	5,869.51	5,965.36	5,934.20	21.45	21.52	-38.64	-117.52	1,886.06	1,520.68	1,477.71	42.97	35.390	
6,000.00	5,968.54	6,064.13	6,032.01	21.84	21.91	-38.46	-130.98	1,883.21	1,505.74	1,461.99	43.75	34.414	
6,100.00	6,067.57	6,162.90	6,129.81	22.24	22.30	-38.28	-144.43	1,880.36	1,490.81	1,446.27	44.54	33.471	
6,200.00	6,166.60	6,261.67	6,227.62	22.63	22.69	-38.10	-157.88	1,877.50	1,475.90	1,430.57	45.33	32.561	
6,300.00	6,265.62	6,360.44	6,325.43	23.03	23.08	-37.91	-171.34	1,874.65	1,461.00	1,414.89	46.11	31.682	
6,400.00	6,364.65	6,459.21	6,423.23	23.43	23.48	-37.72	-184.79	1,871.80	1,446.12	1,399.22	46.90	30.832	
6,500.00	6,463.68	6,557.97	6,521.04	23.82	23.87	-37.52	-198.25	1,868.94	1,431.25	1,383.56	47.69	30.010	
6,600.00	6,562.70	6,656.74	6,618.85	24.22	24.26	-37.32	-211.70	1,866.09	1,416.41	1,367.92	48.48	29.214	
6,700.00	6,661.73	6,755.51	6,716.65	24.62	24.65	-37.12	-225.15	1,863.24	1,401.57	1,352.30	49.27	28.444	
6,800.00	6,760.76	6,854.28	6,814.46	25.02	25.05	-36.91	-238.61	1,860.38	1,386.76	1,336.70	50.07	27.699	
6,900.00	6,859.95	6,953.15	6,912.37	25.41	25.44	-36.52	-252.07	1,857.53	1,373.00	1,322.15	50.85	26.999	
7,000.00	6,959.52	7,052.22	7,010.47	25.79	25.84	-36.05	-265.57	1,854.67	1,362.03	1,310.40	51.63	26.383	
7,100.00	7,059.36	7,151.37	7,108.65	26.15	26.23	-35.53	-279.07	1,851.80	1,353.93	1,301.55	52.38	25.847	
7,200.00	7,159.33	7,249.77	7,206.09	26.50	26.62	-34.96	-292.48	1,848.96	1,348.76	1,295.64	53.12	25.390	
7,300.00	7,259.33	7,339.86	7,295.50	26.83	26.98	88.86	-303.38	1,846.65	1,345.86	1,292.06	53.80	25.015	
7,400.00	7,359.33	7,429.93	7,385.18	27.15	27.32	89.21	-311.52	1,844.92	1,343.78	1,289.31	54.47	24.669	
7,500.00	7,459.33	7,520.44	7,475.51	27.48	27.65	89.44	-316.92	1,843.78	1,342.44	1,287.31	55.13	24.350	
7,600.00	7,559.33	7,611.21	7,566.23	27.81	27.96	89.55	-319.52	1,843.22	1,341.81	1,286.03	55.78	24.056	
7,658.13	7,617.45	7,665.43	7,620.45	28.01	28.14	89.56	-319.78	1,843.17	1,341.74	1,285.60	56.15	23.896	
7,700.00	7,659.33	7,707.30	7,662.33	28.15	28.28	89.56	-319.78	1,843.17	1,341.74	1,285.32	56.42	23.781	
7,800.00	7,759.33	7,807.30	7,762.33	28.48	28.60	89.56	-319.78	1,843.17	1,341.74	1,284.67	57.07	23.510	
7,900.00	7,859.33	7,907.30	7,862.33	28.81	28.92	89.56	-319.78	1,843.17	1,341.74	1,284.02	57.72	23.244	
8,000.00	7,959.33	8,007.30	7,962.33	29.14	29.24	89.56	-319.78	1,843.17	1,341.74	1,283.37	58.38	22.983	
8,100.00	8,059.33	8,107.30	8,062.33	29.47	29.56	89.56	-319.78	1,843.17	1,341.74	1,282.71	59.03	22.728	
8,200.00	8,159.33	8,207.30	8,162.33	29.81	29.88	89.56	-319.78	1,843.17	1,341.74	1,282.05	59.69	22.478	
8,300.00	8,259.33	8,307.30	8,262.33	30.14	30.21	89.56	-319.78	1,843.17	1,341.74	1,281.39	60.35	22.232	
8,400.00	8,359.33	8,407.30	8,362.33	30.48	30.53	89.56	-319.78	1,843.17	1,341.74	1,280.73	61.01	21.992	
8,500.00	8,459.33	8,507.30	8,462.33	30.81	30.86	89.56	-319.78	1,843.17	1,341.74	1,280.07	61.67	21.756	
8,600.00	8,559.33	8,607.30	8,562.33	31.15	31.18	89.56	-319.78	1,843.17	1,341.74	1,279.41	62.33	21.525	
8,700.00	8,659.33	8,707.30	8,662.33	31.49	31.51	89.56	-319.78	1,843.17	1,341.74	1,278.75	63.00	21.298	
8,800.00	8,759.33	8,807.30	8,762.33	31.82	31.84	89.56	-319.78	1,843.17	1,341.74	1,278.08	63.66	21.076	
8,900.00	8,859.33	8,907.30	8,862.33	32.16	32.17	89.56	-319.78	1,843.17	1,341.74	1,277.42	64.33	20.858	
9,000.00	8,959.33	9,007.30	8,962.33	32.50	32.50	89.56	-319.78	1,843.17	1,341.74	1,276.75	65.00	20.644	
9,100.00	9,059.33	9,107.30	9,062.33	32.84	32.83	89.56	-319.78	1,843.17	1,341.74	1,276.08	65.66	20.434	
9,200.00	9,159.33	9,207.30	9,162.33	33.18	33.16	89.56	-319.78	1,843.17	1,341.74	1,275.41	66.33	20.228	
9,300.00	9,259.33	9,307.30	9,262.33	33.52	33.49	89.56	-319.78	1,843.17	1,341.74	1,274.74	67.00	20.025	
9,400.00	9,359.33	9,407.30	9,362.33	33.86	33.82	89.56	-319.78	1,843.17	1,341.74	1,274.07	67.67	19.827	
9,500.00	9,459.33	9,507.30	9,462.33	34.20	34.15	89.56	-319.78	1,843.17	1,341.74	1,273.40	68.34	19.632	
9,600.00	9,559.33	9,607.30	9,562.33	34.54	34.48	89.56	-319.78	1,843.17	1,341.74	1,272.73	69.02	19.441	
9,700.00	9,659.33	9,707.30	9,662.33	34.88	34.81	89.56	-319.78	1,843.17	1,341.74	1,272.05	69.69	19.253	
9,800.00	9,759.33	9,807.30	9,762.33	35.22	35.15	89.56	-319.78	1,843.17	1,341.74	1,271.38	70.37	19.068	
9,900.00	9,859.33	9,907.30	9,862.33	35.56	35.48	89.56	-319.78	1,843.17	1,341.74	1,270.70	71.04	18.887	
10,000.00	9,959.33	10,007.30	9,962.33	35.90	35.82	89.56	-319.78	1,843.17	1,341.74	1,270.03	71.72	18.709	
10,100.00	10,059.33	10,107.30	10,062.33	36.24	36.15	89.56	-319.78	1,843.17	1,341.74	1,269.35	72.39	18.534	
10,200.00	10,159.33	10,207.30	10,162.33	36.59	36.49	89.56	-319.78	1,843.17	1,341.74	1,268.67	73.07	18.362	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 3H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	10,259.33	10,307.30	10,262.33	36.93	36.82	89.56	-319.78	1,843.17	1,341.74	1,267.99	73.75	18.193	
10,400.00	10,359.33	10,407.30	10,362.33	37.27	37.16	89.56	-319.78	1,843.17	1,341.74	1,267.31	74.43	18.027	
10,500.00	10,459.33	10,507.30	10,462.33	37.61	37.50	89.56	-319.78	1,843.17	1,341.74	1,266.64	75.11	17.864	
10,600.00	10,559.33	10,607.30	10,562.33	37.96	37.83	89.56	-319.78	1,843.17	1,341.74	1,265.95	75.79	17.703	
10,700.00	10,659.33	10,707.30	10,662.33	38.30	38.17	89.56	-319.78	1,843.17	1,341.74	1,265.27	76.47	17.546	
10,800.00	10,759.33	10,807.30	10,762.33	38.65	38.51	89.56	-319.78	1,843.17	1,341.74	1,264.59	77.15	17.391	
10,900.00	10,859.33	10,907.30	10,862.33	38.99	38.85	89.56	-319.78	1,843.17	1,341.74	1,263.91	77.84	17.238	
11,000.00	10,959.17	11,007.34	10,962.14	39.33	39.17	89.94	-315.03	1,843.13	1,341.74	1,263.24	78.50	17.091	
11,100.00	11,056.39	11,107.10	11,058.73	39.64	39.45	89.87	-290.82	1,842.93	1,341.72	1,262.63	79.09	16.964	
11,200.00	11,146.77	11,206.52	11,147.91	39.90	39.68	89.81	-247.28	1,842.57	1,341.69	1,262.12	79.57	16.861	
11,300.00	11,226.37	11,305.62	11,225.93	40.09	39.85	89.75	-186.46	1,842.06	1,341.64	1,261.70	79.94	16.783	
11,400.00	11,291.71	11,404.45	11,289.60	40.22	39.98	89.71	-111.10	1,841.43	1,341.58	1,261.39	80.19	16.729	
11,500.00	11,339.94	11,503.07	11,336.33	40.28	40.07	89.68	-24.47	1,840.71	1,341.51	1,261.16	80.35	16.696	
11,600.00	11,368.94	11,601.52	11,364.27	40.29	40.14	89.66	69.75	1,839.93	1,341.43	1,261.00	80.43	16.678	
11,700.00	11,377.44	11,700.00	11,372.33	40.28	40.19	89.65	167.73	1,839.11	1,341.34	1,260.88	80.47	16.669	
11,800.00	11,374.24	11,799.79	11,369.25	40.33	40.28	89.66	267.46	1,838.28	1,341.25	1,260.60	80.66	16.629	
11,900.00	11,370.99	11,899.79	11,366.14	40.54	40.42	89.67	367.41	1,837.45	1,341.17	1,260.15	81.02	16.554	
12,000.00	11,367.75	11,999.79	11,363.04	40.82	40.62	89.67	467.36	1,836.62	1,341.08	1,259.60	81.48	16.460	
12,100.00	11,364.50	12,099.79	11,359.93	41.15	40.86	89.68	567.31	1,835.79	1,340.99	1,258.95	82.04	16.346	
12,200.00	11,361.26	12,199.79	11,356.83	41.53	41.16	89.68	667.25	1,834.96	1,340.90	1,258.20	82.70	16.214	
12,300.00	11,358.01	12,299.79	11,353.72	41.94	41.50	89.69	767.20	1,834.12	1,340.81	1,257.36	83.46	16.066	
12,400.00	11,354.77	12,399.79	11,350.61	42.41	41.90	89.70	867.15	1,833.29	1,340.72	1,256.42	84.31	15.902	
12,500.00	11,351.52	12,499.79	11,347.51	42.91	42.34	89.70	967.10	1,832.46	1,340.64	1,255.38	85.25	15.726	
12,600.00	11,348.27	12,599.79	11,344.40	43.46	42.82	89.71	1,067.05	1,831.63	1,340.55	1,254.27	86.28	15.537	
12,700.00	11,345.03	12,699.79	11,341.30	44.04	43.34	89.71	1,167.00	1,830.80	1,340.46	1,253.07	87.39	15.339	
12,800.00	11,341.78	12,799.79	11,338.19	44.66	43.91	89.72	1,266.94	1,829.96	1,340.37	1,251.79	88.58	15.132	
12,900.00	11,338.54	12,899.79	11,335.08	45.32	44.52	89.73	1,366.89	1,829.13	1,340.28	1,250.44	89.85	14.917	
13,000.00	11,335.29	12,999.79	11,331.98	46.02	45.16	89.73	1,466.84	1,828.30	1,340.20	1,249.01	91.19	14.697	
13,100.00	11,332.05	13,099.79	11,328.87	46.75	45.85	89.74	1,566.79	1,827.47	1,340.11	1,247.51	92.60	14.472	
13,200.00	11,328.80	13,199.79	11,325.76	47.51	46.56	89.74	1,666.74	1,826.64	1,340.02	1,245.94	94.08	14.244	
13,300.00	11,325.55	13,299.79	11,322.66	48.30	47.31	89.75	1,766.68	1,825.81	1,339.93	1,244.31	95.62	14.014	
13,400.00	11,322.31	13,399.79	11,319.55	49.12	48.09	89.76	1,866.63	1,824.97	1,339.84	1,242.62	97.22	13.782	
13,500.00	11,319.06	13,499.79	11,316.45	49.97	48.91	89.76	1,966.58	1,824.14	1,339.75	1,240.87	98.88	13.549	
13,600.00	11,315.82	13,599.79	11,313.34	50.85	49.75	89.77	2,066.53	1,823.31	1,339.67	1,239.07	100.60	13.317	
13,700.00	11,312.57	13,699.79	11,310.23	51.75	50.61	89.77	2,166.48	1,822.48	1,339.58	1,237.21	102.37	13.086	
13,800.00	11,309.32	13,799.79	11,307.13	52.67	51.51	89.78	2,266.42	1,821.65	1,339.49	1,235.31	104.18	12.857	
13,900.00	11,306.08	13,899.78	11,304.02	53.62	52.43	89.79	2,366.37	1,820.81	1,339.40	1,233.35	106.05	12.630	
14,000.00	11,302.83	13,999.78	11,300.91	54.59	53.37	89.79	2,466.32	1,819.98	1,339.31	1,231.35	107.96	12.405	
14,100.00	11,299.59	14,099.78	11,297.81	55.58	54.33	89.80	2,566.27	1,819.15	1,339.23	1,229.31	109.92	12.184	
14,200.00	11,296.34	14,199.78	11,294.70	56.59	55.32	89.80	2,666.22	1,818.32	1,339.14	1,227.23	111.91	11.966	
14,300.00	11,293.10	14,299.78	11,291.60	57.62	56.32	89.81	2,766.17	1,817.49	1,339.05	1,225.11	113.94	11.752	
14,400.00	11,289.85	14,399.78	11,288.49	58.67	57.34	89.81	2,866.11	1,816.66	1,338.96	1,222.95	116.01	11.542	
14,500.00	11,286.60	14,499.78	11,285.38	59.73	58.39	89.82	2,966.06	1,815.82	1,338.87	1,220.76	118.12	11.335	
14,600.00	11,283.36	14,599.78	11,282.28	60.81	59.44	89.83	3,066.01	1,814.99	1,338.79	1,218.54	120.25	11.133	
14,700.00	11,280.11	14,699.78	11,279.17	61.90	60.52	89.83	3,165.96	1,814.16	1,338.70	1,216.28	122.42	10.935	
14,800.00	11,276.87	14,799.78	11,276.07	63.01	61.61	89.84	3,265.91	1,813.33	1,338.61	1,214.00	124.61	10.742	
14,900.00	11,273.62	14,899.78	11,272.96	64.13	62.71	89.84	3,365.85	1,812.50	1,338.52	1,211.69	126.84	10.553	
15,000.00	11,270.38	14,999.78	11,269.85	65.26	63.83	89.85	3,465.80	1,811.66	1,338.43	1,209.35	129.09	10.368	
15,100.00	11,267.13	15,099.78	11,266.75	66.40	64.96	89.86	3,565.75	1,810.83	1,338.35	1,206.98	131.36	10.188	
15,200.00	11,263.88	15,199.78	11,263.64	67.56	66.10	89.86	3,665.70	1,810.00	1,338.26	1,204.60	133.66	10.012	
15,300.00	11,260.64	15,299.78	11,260.53	68.73	67.25	89.87	3,765.65	1,809.17	1,338.17	1,202.19	135.98	9.841	
15,400.00	11,257.39	15,399.78	11,257.43	69.91	68.42	89.87	3,865.60	1,808.34	1,338.08	1,199.76	138.33	9.673	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 3H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,500.00	11,254.15	15,499.78	11,254.32	71.09	69.59	89.88	3,965.54	1,807.50	1,338.00	1,197.31	140.69	9.510	
15,600.00	11,250.90	15,599.78	11,251.22	72.29	70.78	89.89	4,065.49	1,806.67	1,337.91	1,194.84	143.07	9.351	
15,700.00	11,247.66	15,699.78	11,248.11	73.50	71.98	89.89	4,165.44	1,805.84	1,337.82	1,192.35	145.47	9.196	
15,800.00	11,244.41	15,799.78	11,245.00	74.71	73.18	89.90	4,265.39	1,805.01	1,337.73	1,189.84	147.89	9.045	
15,900.00	11,241.16	15,899.78	11,241.90	75.93	74.39	89.90	4,365.34	1,804.18	1,337.64	1,187.32	150.33	8.898	
16,000.00	11,237.92	15,999.78	11,238.79	77.16	75.61	89.91	4,465.28	1,803.35	1,337.56	1,184.78	152.78	8.755	
16,100.00	11,234.67	16,099.78	11,235.68	78.40	76.84	89.92	4,565.23	1,802.51	1,337.47	1,182.23	155.24	8.615	
16,200.00	11,231.43	16,199.78	11,232.58	79.65	78.08	89.92	4,665.18	1,801.68	1,337.38	1,179.66	157.72	8.479	
16,300.00	11,228.18	16,299.78	11,229.47	80.90	79.32	89.93	4,765.13	1,800.85	1,337.29	1,177.08	160.22	8.347	
16,400.00	11,224.94	16,399.78	11,226.37	82.15	80.57	89.93	4,865.08	1,800.02	1,337.21	1,174.48	162.72	8.218	
16,500.00	11,221.69	16,499.78	11,223.26	83.42	81.83	89.94	4,965.03	1,799.19	1,337.12	1,171.87	165.24	8.092	
16,600.00	11,218.44	16,599.78	11,220.15	84.69	83.09	89.95	5,064.97	1,798.35	1,337.03	1,169.25	167.78	7.969	
16,700.00	11,215.20	16,699.78	11,217.05	85.96	84.36	89.95	5,164.92	1,797.52	1,336.94	1,166.62	170.32	7.850	
16,800.00	11,211.95	16,799.78	11,213.94	87.24	85.63	89.96	5,264.87	1,796.69	1,336.86	1,163.98	172.87	7.733	
16,900.00	11,208.71	16,899.78	11,210.84	88.53	86.91	89.96	5,364.82	1,795.86	1,336.77	1,161.33	175.44	7.620	
17,000.00	11,205.46	16,999.78	11,207.73	89.82	88.20	89.97	5,464.77	1,795.03	1,336.68	1,158.67	178.01	7.509	
17,100.00	11,202.22	17,099.78	11,204.62	91.11	89.48	89.98	5,564.71	1,794.20	1,336.59	1,156.00	180.59	7.401	
17,200.00	11,198.97	17,199.78	11,201.52	92.41	90.78	89.98	5,664.66	1,793.36	1,336.51	1,153.32	183.19	7.296	
17,300.00	11,195.72	17,299.78	11,198.41	93.71	92.08	89.99	5,764.61	1,792.53	1,336.42	1,150.63	185.79	7.193	
17,400.00	11,192.48	17,399.78	11,195.30	95.02	93.38	89.99	5,864.56	1,791.70	1,336.33	1,147.93	188.40	7.093	
17,500.00	11,189.23	17,499.78	11,192.20	96.33	94.69	90.00	5,964.51	1,790.87	1,336.24	1,145.22	191.02	6.995	
17,600.00	11,185.99	17,599.78	11,189.09	97.65	96.00	90.01	6,064.45	1,790.04	1,336.15	1,142.51	193.64	6.900	
17,700.00	11,182.74	17,699.78	11,185.99	98.96	97.31	90.01	6,164.40	1,789.20	1,336.07	1,139.79	196.28	6.807	
17,800.00	11,179.50	17,799.78	11,182.88	100.29	98.63	90.02	6,264.35	1,788.37	1,335.98	1,137.06	198.92	6.716	
17,900.00	11,176.25	17,899.78	11,179.77	101.61	99.95	90.02	6,364.30	1,787.54	1,335.89	1,134.33	201.56	6.628	
18,000.00	11,173.00	17,999.78	11,176.67	102.94	101.28	90.03	6,464.25	1,786.71	1,335.81	1,131.59	204.22	6.541	
18,100.00	11,169.76	18,099.78	11,173.56	104.27	102.61	90.04	6,564.20	1,785.88	1,335.72	1,128.84	206.88	6.457	
18,200.00	11,166.51	18,199.78	11,170.46	105.61	103.94	90.04	6,664.14	1,785.05	1,335.63	1,126.09	209.54	6.374	
18,300.00	11,163.27	18,299.78	11,167.35	106.94	105.27	90.05	6,764.09	1,784.21	1,335.54	1,123.33	212.22	6.293	
18,400.00	11,160.02	18,399.78	11,164.24	108.28	106.61	90.05	6,864.04	1,783.38	1,335.46	1,120.56	214.89	6.214	
18,500.00	11,156.78	18,499.78	11,161.14	109.63	107.95	90.06	6,963.99	1,782.55	1,335.37	1,117.79	217.58	6.137	
18,600.00	11,153.53	18,599.78	11,158.03	110.97	109.29	90.07	7,063.94	1,781.72	1,335.28	1,115.01	220.27	6.062	
18,700.00	11,150.28	18,699.78	11,154.92	112.32	110.64	90.07	7,163.88	1,780.89	1,335.19	1,112.23	222.96	5.989	
18,800.00	11,147.04	18,799.78	11,151.82	113.67	111.99	90.08	7,263.83	1,780.05	1,335.11	1,109.45	225.66	5.917	
18,877.24	11,144.53	18,877.01	11,149.42	114.72	113.03	90.08	7,341.03	1,779.41	1,335.04	1,107.29	227.74	5.862	
18,893.59	11,144.00	18,890.49	11,149.00	114.94	113.21	90.08	7,354.50	1,779.30	1,335.03	1,106.88	228.15	5.852	CC, ES, SF

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 5H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	4.00	4.00	0.00	0.01	-90.48	-0.50	-59.90	59.90				
100.00	100.00	104.00	104.00	0.14	0.15	-90.48	-0.50	-59.90	59.90	59.62	0.29	208.880	
200.00	200.00	204.00	204.00	0.49	0.51	-90.48	-0.50	-59.90	59.90	58.90	1.00	59.680	
300.00	300.00	304.00	304.00	0.85	0.87	-90.48	-0.50	-59.90	59.90	58.18	1.72	34.813	
400.00	400.00	404.00	404.00	1.21	1.23	-90.48	-0.50	-59.90	59.90	57.46	2.44	24.574	
500.00	500.00	504.00	504.00	1.57	1.58	-90.48	-0.50	-59.90	59.90	56.75	3.15	18.989	
600.00	600.00	604.00	604.00	1.93	1.94	-90.48	-0.50	-59.90	59.90	56.03	3.87	15.473	
700.00	700.00	704.00	704.00	2.29	2.30	-90.48	-0.50	-59.90	59.90	55.31	4.59	13.055	
800.00	800.00	804.00	804.00	2.65	2.66	-90.48	-0.50	-59.90	59.90	54.60	5.31	11.291	
900.00	900.00	904.00	904.00	3.00	3.02	-90.48	-0.50	-59.90	59.90	53.88	6.02	9.947	
1,000.00	1,000.00	1,004.00	1,004.00	3.36	3.38	-90.48	-0.50	-59.90	59.90	53.16	6.74	8.889	
1,100.00	1,100.00	1,104.00	1,104.00	3.72	3.74	-90.48	-0.50	-59.90	59.90	52.45	7.46	8.034	
1,200.00	1,200.00	1,204.00	1,204.00	4.08	4.09	-90.48	-0.50	-59.90	59.90	51.73	8.17	7.329	
1,300.00	1,300.00	1,304.00	1,304.00	4.44	4.45	-90.48	-0.50	-59.90	59.90	51.01	8.89	6.738	
1,400.00	1,400.00	1,404.00	1,404.00	4.80	4.81	-90.48	-0.50	-59.90	59.90	50.30	9.61	6.235	
1,500.00	1,500.00	1,504.00	1,504.00	5.15	5.17	-90.48	-0.50	-59.90	59.90	49.58	10.32	5.802	
1,600.00	1,600.00	1,604.00	1,604.00	5.51	5.53	-90.48	-0.50	-59.90	59.90	48.86	11.04	5.425	
1,700.00	1,700.00	1,704.00	1,704.00	5.87	5.89	-90.48	-0.50	-59.90	59.90	48.14	11.76	5.095	
1,800.00	1,800.00	1,804.00	1,804.00	6.23	6.24	-90.48	-0.50	-59.90	59.90	47.43	12.47	4.802	
1,900.00	1,900.00	1,904.00	1,904.00	6.59	6.60	-90.48	-0.50	-59.90	59.90	46.71	13.19	4.541	
2,000.00	2,000.00	2,004.00	2,004.00	6.95	6.96	-90.48	-0.50	-59.90	59.90	45.99	13.91	4.307	
2,100.00	2,100.00	2,104.00	2,104.00	7.31	7.32	-90.48	-0.50	-59.90	59.90	45.28	14.63	4.096	
2,200.00	2,200.00	2,204.00	2,204.00	7.66	7.68	-90.48	-0.50	-59.90	59.90	44.56	15.34	3.904	
2,300.00	2,300.00	2,304.00	2,304.00	8.02	8.04	-90.48	-0.50	-59.90	59.90	43.84	16.06	3.730	
2,400.00	2,400.00	2,404.00	2,404.00	8.38	8.40	-90.48	-0.50	-59.90	59.90	43.13	16.78	3.571	
2,415.28	2,415.28	2,419.28	2,419.28	8.44	8.45	-90.48	-0.50	-59.90	59.90	43.02	16.89	3.547	CC
2,500.00	2,500.00	2,503.92	2,503.92	8.74	8.75	-90.48	-0.50	-59.90	59.90	42.41	17.49	3.425	ES, SF
2,600.00	2,599.98	2,601.95	2,601.93	9.08	9.09	146.34	-1.24	-61.56	63.05	44.87	18.18	3.469	
2,700.00	2,699.84	2,700.00	2,699.84	9.42	9.42	146.84	-3.35	-66.27	72.21	53.37	18.84	3.833	
2,800.00	2,799.45	2,795.84	2,795.31	9.75	9.75	147.44	-6.74	-73.83	87.34	67.84	19.50	4.479	
2,899.95	2,898.65	2,890.62	2,889.42	10.09	10.07	147.98	-11.37	-84.17	108.33	88.17	20.16	5.373	
3,000.00	2,997.73	2,983.89	2,981.59	10.44	10.39	148.27	-17.17	-97.11	133.67	112.84	20.83	6.416	
3,100.00	3,096.76	3,079.44	3,075.70	10.79	10.73	148.14	-23.94	-112.21	160.84	139.32	21.52	7.474	
3,200.00	3,195.78	3,175.66	3,170.46	11.14	11.08	148.04	-30.77	-127.45	188.06	165.84	22.22	8.463	
3,300.00	3,294.81	3,271.89	3,265.22	11.50	11.43	147.97	-37.60	-142.70	215.28	192.35	22.93	9.389	
3,400.00	3,393.84	3,368.11	3,359.98	11.86	11.78	147.91	-44.43	-157.95	242.50	218.86	23.65	10.256	
3,500.00	3,492.86	3,464.33	3,454.75	12.22	12.14	147.87	-51.26	-173.20	269.72	245.35	24.37	11.069	
3,600.00	3,591.89	3,560.56	3,549.51	12.59	12.51	147.83	-58.10	-188.45	296.94	271.84	25.10	11.831	
3,700.00	3,690.92	3,656.78	3,644.27	12.96	12.87	147.80	-64.93	-203.69	324.16	298.33	25.83	12.548	
3,800.00	3,789.95	3,753.01	3,739.03	13.33	13.24	147.77	-71.76	-218.94	351.38	324.80	26.57	13.223	
3,900.00	3,888.97	3,849.23	3,833.79	13.70	13.62	147.75	-78.59	-234.19	378.60	351.28	27.32	13.858	
4,000.00	3,988.00	3,945.45	3,928.56	14.08	13.99	147.73	-85.42	-249.44	405.82	377.75	28.07	14.458	
4,100.00	4,087.03	4,041.68	4,023.32	14.46	14.37	147.71	-92.26	-264.69	433.04	404.21	28.82	15.023	
4,200.00	4,186.05	4,137.90	4,118.08	14.84	14.75	147.70	-99.09	-279.94	460.26	430.67	29.58	15.558	
4,300.00	4,285.08	4,234.13	4,212.84	15.22	15.13	147.68	-105.92	-295.18	487.48	457.13	30.34	16.065	
4,400.00	4,384.11	4,330.35	4,307.61	15.60	15.51	147.67	-112.75	-310.43	514.70	483.59	31.11	16.544	
4,500.00	4,483.13	4,426.57	4,402.37	15.98	15.90	147.66	-119.58	-325.68	541.92	510.04	31.88	16.999	
4,600.00	4,582.16	4,522.80	4,497.13	16.37	16.28	147.65	-126.42	-340.93	569.14	536.49	32.65	17.432	
4,700.00	4,681.19	4,619.02	4,591.89	16.75	16.67	147.64	-133.25	-356.18	596.36	562.93	33.42	17.842	
4,800.00	4,780.22	4,715.25	4,686.66	17.14	17.06	147.63	-140.08	-371.42	623.58	589.37	34.20	18.233	
4,900.00	4,879.24	4,811.47	4,781.42	17.53	17.45	147.62	-146.91	-386.67	650.79	615.82	34.98	18.605	
5,000.00	4,978.27	4,907.70	4,876.18	17.91	17.85	147.62	-153.74	-401.92	678.01	642.25	35.76	18.960	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 5H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,077.30	5,003.92	4,970.94	18.30	18.24	147.61	-160.57	-417.17	705.23	668.69	36.54	19.299	
5,200.00	5,176.32	5,100.14	5,065.70	18.69	18.63	147.61	-167.41	-432.42	732.45	695.13	37.33	19.622	
5,300.00	5,275.35	5,196.37	5,160.47	19.08	19.03	147.60	-174.24	-447.66	759.67	721.56	38.12	19.931	
5,400.00	5,374.38	5,292.59	5,255.23	19.48	19.43	147.60	-181.07	-462.91	786.89	747.99	38.90	20.227	
5,500.00	5,473.41	5,388.82	5,349.99	19.87	19.82	147.59	-187.90	-478.16	814.11	774.42	39.69	20.510	
5,600.00	5,572.43	5,485.04	5,444.75	20.26	20.22	147.59	-194.73	-493.41	841.33	800.85	40.49	20.781	
5,700.00	5,671.46	5,581.26	5,539.52	20.66	20.62	147.58	-201.57	-508.66	868.55	827.27	41.28	21.041	
5,800.00	5,770.49	5,677.49	5,634.28	21.05	21.02	147.58	-208.40	-523.91	895.77	853.70	42.07	21.291	
5,900.00	5,869.51	5,773.71	5,729.04	21.45	21.42	147.57	-215.23	-539.15	922.99	880.12	42.87	21.531	
6,000.00	5,968.54	5,869.94	5,823.80	21.84	21.82	147.57	-222.06	-554.40	950.21	906.55	43.67	21.761	
6,100.00	6,067.57	5,966.16	5,918.57	22.24	22.23	147.57	-228.89	-569.65	977.43	932.97	44.46	21.983	
6,200.00	6,166.60	6,062.38	6,013.33	22.63	22.63	147.56	-235.73	-584.90	1,004.65	959.39	45.26	22.196	
6,300.00	6,265.62	6,158.61	6,108.09	23.03	23.03	147.56	-242.56	-600.15	1,031.87	985.81	46.06	22.402	
6,400.00	6,364.65	6,254.83	6,202.85	23.43	23.44	147.56	-249.39	-615.39	1,059.09	1,012.23	46.86	22.600	
6,500.00	6,463.68	6,351.06	6,297.61	23.82	23.84	147.56	-256.22	-630.64	1,086.31	1,038.65	47.67	22.790	
6,600.00	6,562.70	6,447.28	6,392.38	24.22	24.25	147.55	-263.05	-645.89	1,113.53	1,065.06	48.47	22.975	
6,700.00	6,661.73	6,543.50	6,487.14	24.62	24.65	147.55	-269.89	-661.14	1,140.75	1,091.48	49.27	23.152	
6,800.00	6,760.76	6,639.73	6,581.90	25.02	25.06	147.55	-276.72	-676.39	1,167.97	1,117.90	50.08	23.324	
6,900.00	6,859.95	6,736.24	6,676.95	25.41	25.46	147.76	-283.57	-691.68	1,194.13	1,143.26	50.88	23.471	
7,000.00	6,959.52	6,833.44	6,772.67	25.79	25.87	147.89	-290.47	-707.08	1,217.46	1,165.80	51.66	23.565	
7,100.00	7,059.36	6,931.22	6,868.97	26.15	26.29	147.91	-297.41	-722.58	1,237.92	1,185.48	52.44	23.607	
7,200.00	7,159.33	7,029.47	6,965.72	26.50	26.70	147.81	-304.39	-738.15	1,255.50	1,202.30	53.20	23.599	
7,300.00	7,259.33	7,127.94	7,062.70	26.83	27.12	-89.15	-311.38	-753.75	1,271.29	1,217.34	53.95	23.566	
7,400.00	7,359.33	7,226.43	7,159.68	27.15	27.54	-89.47	-318.37	-769.36	1,287.09	1,232.40	54.69	23.533	
7,500.00	7,459.33	7,353.12	7,284.59	27.48	28.07	-89.86	-327.04	-788.71	1,302.50	1,246.95	55.55	23.446	
7,600.00	7,559.33	7,523.53	7,453.73	27.81	28.74	-90.23	-335.46	-807.49	1,313.54	1,256.99	56.56	23.226	
7,700.00	7,659.33	7,695.81	7,625.66	28.15	29.36	-90.42	-339.77	-817.11	1,319.15	1,261.64	57.51	22.939	
7,800.00	7,759.33	7,833.49	7,763.33	28.48	29.81	-90.44	-340.34	-818.38	1,319.89	1,261.60	58.29	22.644	
7,900.00	7,859.33	7,933.49	7,863.33	28.81	30.13	-90.44	-340.34	-818.38	1,319.89	1,260.95	58.94	22.395	
8,000.00	7,959.33	8,033.49	7,963.33	29.14	30.45	-90.44	-340.34	-818.38	1,319.89	1,260.30	59.59	22.150	
8,100.00	8,059.33	8,133.49	8,063.33	29.47	30.77	-90.44	-340.34	-818.38	1,319.89	1,259.65	60.24	21.910	
8,200.00	8,159.33	8,233.49	8,163.33	29.81	31.09	-90.44	-340.34	-818.38	1,319.89	1,258.99	60.90	21.674	
8,300.00	8,259.33	8,333.49	8,263.33	30.14	31.41	-90.44	-340.34	-818.38	1,319.89	1,258.34	61.55	21.443	
8,400.00	8,359.33	8,433.49	8,363.33	30.48	31.73	-90.44	-340.34	-818.38	1,319.89	1,257.68	62.21	21.216	
8,500.00	8,459.33	8,533.49	8,463.33	30.81	32.06	-90.44	-340.34	-818.38	1,319.89	1,257.02	62.87	20.994	
8,600.00	8,559.33	8,633.49	8,563.33	31.15	32.38	-90.44	-340.34	-818.38	1,319.89	1,256.36	63.53	20.776	
8,700.00	8,659.33	8,733.49	8,663.33	31.49	32.70	-90.44	-340.34	-818.38	1,319.89	1,255.70	64.19	20.562	
8,800.00	8,759.33	8,833.49	8,763.33	31.82	33.03	-90.44	-340.34	-818.38	1,319.89	1,255.04	64.85	20.352	
8,900.00	8,859.33	8,933.49	8,863.33	32.16	33.36	-90.44	-340.34	-818.38	1,319.89	1,254.37	65.52	20.146	
9,000.00	8,959.33	9,033.49	8,963.33	32.50	33.68	-90.44	-340.34	-818.38	1,319.89	1,253.71	66.18	19.944	
9,100.00	9,059.33	9,133.49	9,063.33	32.84	34.01	-90.44	-340.34	-818.38	1,319.89	1,253.04	66.85	19.745	
9,200.00	9,159.33	9,233.49	9,163.33	33.18	34.34	-90.44	-340.34	-818.38	1,319.89	1,252.38	67.51	19.550	
9,300.00	9,259.33	9,333.49	9,263.33	33.52	34.67	-90.44	-340.34	-818.38	1,319.89	1,251.71	68.18	19.359	
9,400.00	9,359.33	9,433.49	9,363.33	33.86	34.99	-90.44	-340.34	-818.38	1,319.89	1,251.04	68.85	19.171	
9,500.00	9,459.33	9,533.49	9,463.33	34.20	35.32	-90.44	-340.34	-818.38	1,319.89	1,250.37	69.52	18.986	
9,600.00	9,559.33	9,633.49	9,563.33	34.54	35.65	-90.44	-340.34	-818.38	1,319.89	1,249.70	70.19	18.804	
9,700.00	9,659.33	9,733.49	9,663.33	34.88	35.99	-90.44	-340.34	-818.38	1,319.89	1,249.03	70.86	18.626	
9,800.00	9,759.33	9,833.49	9,763.33	35.22	36.32	-90.44	-340.34	-818.38	1,319.89	1,248.35	71.53	18.451	
9,900.00	9,859.33	9,933.49	9,863.33	35.56	36.65	-90.44	-340.34	-818.38	1,319.89	1,247.68	72.21	18.279	
10,000.00	9,959.33	10,033.49	9,963.33	35.90	36.98	-90.44	-340.34	-818.38	1,319.89	1,247.01	72.88	18.110	
10,100.00	10,059.33	10,133.49	10,063.33	36.24	37.31	-90.44	-340.34	-818.38	1,319.89	1,246.33	73.56	17.944	
10,200.00	10,159.33	10,233.49	10,163.33	36.59	37.65	-90.44	-340.34	-818.38	1,319.89	1,245.66	74.23	17.781	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 5H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	10,259.33	10,333.49	10,263.33	36.93	37.98	-90.44	-340.34	-818.38	1,319.89	1,244.98	74.91	17.620	
10,400.00	10,359.33	10,433.49	10,363.33	37.27	38.31	-90.44	-340.34	-818.38	1,319.89	1,244.30	75.59	17.462	
10,500.00	10,459.33	10,533.49	10,463.33	37.61	38.65	-90.44	-340.34	-818.38	1,319.89	1,243.63	76.26	17.307	
10,600.00	10,559.33	10,633.49	10,563.33	37.96	38.98	-90.44	-340.34	-818.38	1,319.89	1,242.95	76.94	17.154	
10,700.00	10,659.33	10,733.49	10,663.33	38.30	39.32	-90.44	-340.34	-818.38	1,319.89	1,242.27	77.62	17.004	
10,800.00	10,759.33	10,833.49	10,763.33	38.65	39.66	-90.44	-340.34	-818.38	1,319.89	1,241.59	78.30	16.856	
10,900.00	10,859.33	10,933.49	10,863.33	38.99	39.99	-90.44	-340.34	-818.38	1,319.89	1,240.91	78.98	16.711	
10,900.03	10,859.35	10,933.52	10,863.35	38.99	39.99	-90.44	-340.34	-818.38	1,319.89	1,240.91	78.98	16.711	
11,000.00	10,959.17	11,033.44	10,963.27	39.33	40.33	-90.17	-340.20	-818.39	1,319.89	1,240.24	79.66	16.569	
11,100.00	11,056.39	11,134.84	11,063.62	39.64	40.65	-90.60	-327.07	-818.48	1,319.96	1,239.67	80.29	16.440	
11,200.00	11,146.77	11,238.43	11,160.93	39.90	40.93	-91.00	-292.13	-818.74	1,320.09	1,239.26	80.83	16.332	
11,300.00	11,226.37	11,344.16	11,250.10	40.09	41.15	-91.37	-235.72	-819.16	1,320.27	1,239.03	81.24	16.251	
11,400.00	11,291.71	11,451.86	11,325.94	40.22	41.29	-91.67	-159.57	-819.73	1,320.46	1,238.95	81.51	16.200	
11,500.00	11,339.94	11,561.19	11,383.52	40.28	41.35	-91.90	-66.92	-820.43	1,320.62	1,238.99	81.63	16.178	
11,600.00	11,368.94	11,671.68	11,418.80	40.29	41.35	-92.03	37.52	-821.20	1,320.73	1,239.09	81.64	16.178	
11,700.00	11,377.44	11,782.72	11,429.19	40.28	41.31	-92.07	147.82	-822.03	1,320.76	1,239.17	81.59	16.187	
11,800.00	11,374.24	11,883.51	11,425.31	40.33	41.31	-92.04	248.54	-822.78	1,320.74	1,239.05	81.69	16.168	
11,900.00	11,370.99	11,983.51	11,421.41	40.54	41.36	-92.02	348.46	-823.53	1,320.72	1,238.76	81.96	16.115	
12,000.00	11,367.75	12,083.51	11,417.50	40.82	41.52	-91.99	448.37	-824.27	1,320.70	1,238.31	82.38	16.031	
12,100.00	11,364.50	12,183.51	11,413.59	41.15	41.79	-91.96	548.29	-825.02	1,320.68	1,237.71	82.97	15.918	
12,200.00	11,361.26	12,283.51	11,409.68	41.53	42.14	-91.93	648.21	-825.76	1,320.65	1,236.98	83.68	15.783	
12,300.00	11,358.01	12,383.50	11,405.77	41.94	42.54	-91.90	748.13	-826.51	1,320.63	1,236.15	84.49	15.631	
12,400.00	11,354.77	12,483.50	11,401.86	42.41	42.99	-91.87	848.05	-827.25	1,320.61	1,235.22	85.40	15.464	
12,500.00	11,351.52	12,583.50	11,397.96	42.91	43.49	-91.84	947.97	-828.00	1,320.59	1,234.20	86.40	15.285	
12,600.00	11,348.27	12,683.50	11,394.05	43.46	44.02	-91.81	1,047.89	-828.75	1,320.58	1,233.10	87.48	15.096	
12,700.00	11,345.03	12,783.49	11,390.14	44.04	44.60	-91.79	1,147.80	-829.49	1,320.56	1,231.92	88.64	14.898	
12,800.00	11,341.78	12,883.49	11,386.23	44.66	45.21	-91.76	1,247.72	-830.24	1,320.54	1,230.66	89.88	14.693	
12,900.00	11,338.54	12,983.49	11,382.32	45.32	45.86	-91.73	1,347.64	-830.98	1,320.52	1,229.33	91.19	14.481	
13,000.00	11,335.29	13,083.49	11,378.41	46.02	46.55	-91.70	1,447.56	-831.73	1,320.50	1,227.93	92.57	14.265	
13,100.00	11,332.05	13,183.49	11,374.50	46.75	47.27	-91.67	1,547.48	-832.48	1,320.48	1,226.47	94.02	14.045	
13,200.00	11,328.80	13,283.48	11,370.60	47.51	48.02	-91.64	1,647.40	-833.22	1,320.47	1,224.94	95.53	13.822	
13,300.00	11,325.55	13,383.48	11,366.69	48.30	48.80	-91.61	1,747.32	-833.97	1,320.45	1,223.34	97.10	13.598	
13,400.00	11,322.31	13,483.48	11,362.78	49.12	49.62	-91.58	1,847.23	-834.71	1,320.43	1,221.69	98.74	13.373	
13,500.00	11,319.06	13,583.48	11,358.87	49.97	50.46	-91.56	1,947.15	-835.46	1,320.42	1,219.99	100.43	13.148	
13,600.00	11,315.82	13,683.48	11,354.96	50.85	51.32	-91.53	2,047.07	-836.21	1,320.40	1,218.23	102.17	12.924	
13,700.00	11,312.57	13,783.47	11,351.05	51.75	52.21	-91.50	2,146.99	-836.95	1,320.38	1,216.42	103.96	12.701	
13,800.00	11,309.32	13,883.47	11,347.15	52.67	53.13	-91.47	2,246.91	-837.70	1,320.37	1,214.56	105.80	12.479	
13,900.00	11,306.08	13,983.47	11,343.24	53.62	54.07	-91.44	2,346.83	-838.44	1,320.35	1,212.66	107.69	12.261	
14,000.00	11,302.83	14,083.47	11,339.33	54.59	55.03	-91.41	2,446.75	-839.19	1,320.34	1,210.72	109.62	12.045	
14,100.00	11,299.59	14,183.46	11,335.42	55.58	56.01	-91.38	2,546.67	-839.93	1,320.32	1,208.73	111.59	11.832	
14,200.00	11,296.34	14,283.46	11,331.51	56.59	57.01	-91.35	2,646.58	-840.68	1,320.31	1,206.71	113.60	11.622	
14,300.00	11,293.10	14,383.46	11,327.60	57.62	58.03	-91.32	2,746.50	-841.43	1,320.30	1,204.65	115.65	11.416	
14,400.00	11,289.85	14,483.46	11,323.69	58.67	59.06	-91.30	2,846.42	-842.17	1,320.28	1,202.55	117.73	11.214	
14,500.00	11,286.60	14,583.46	11,319.79	59.73	60.12	-91.27	2,946.34	-842.92	1,320.27	1,200.42	119.85	11.016	
14,600.00	11,283.36	14,683.45	11,315.88	60.81	61.19	-91.24	3,046.26	-843.66	1,320.26	1,198.26	121.99	10.822	
14,700.00	11,280.11	14,783.45	11,311.97	61.90	62.27	-91.21	3,146.18	-844.41	1,320.24	1,196.07	124.17	10.633	
14,800.00	11,276.87	14,883.45	11,308.06	63.01	63.37	-91.18	3,246.10	-845.16	1,320.23	1,193.86	126.38	10.447	
14,900.00	11,273.62	14,983.45	11,304.15	64.13	64.48	-91.15	3,346.01	-845.90	1,320.22	1,191.61	128.61	10.266	
15,000.00	11,270.38	15,083.44	11,300.24	65.26	65.61	-91.12	3,445.93	-846.65	1,320.21	1,189.34	130.87	10.088	
15,100.00	11,267.13	15,183.44	11,296.34	66.40	66.74	-91.09	3,545.85	-847.39	1,320.20	1,187.05	133.15	9.915	
15,200.00	11,263.88	15,283.44	11,292.43	67.56	67.89	-91.07	3,645.77	-848.14	1,320.19	1,184.73	135.45	9.746	
15,300.00	11,260.64	15,383.44	11,288.52	68.73	69.05	-91.04	3,745.69	-848.88	1,320.18	1,182.40	137.78	9.582	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 5H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,400.00	11,257.39	15,483.44	11,284.61	69.91	70.22	-91.01	3,845.61	-849.63	1,320.17	1,180.04	140.13	9.421	
15,500.00	11,254.15	15,583.43	11,280.70	71.09	71.40	-90.98	3,945.53	-850.38	1,320.16	1,177.66	142.50	9.265	
15,600.00	11,250.90	15,683.43	11,276.79	72.29	72.59	-90.95	4,045.44	-851.12	1,320.15	1,175.27	144.88	9.112	
15,700.00	11,247.66	15,783.43	11,272.88	73.50	73.79	-90.92	4,145.36	-851.87	1,320.14	1,172.85	147.29	8.963	
15,800.00	11,244.41	15,883.43	11,268.98	74.71	75.00	-90.89	4,245.28	-852.61	1,320.13	1,170.42	149.71	8.818	
15,900.00	11,241.16	15,983.42	11,265.07	75.93	76.21	-90.86	4,345.20	-853.36	1,320.12	1,167.98	152.15	8.677	
16,000.00	11,237.92	16,083.42	11,261.16	77.16	77.44	-90.84	4,445.12	-854.11	1,320.11	1,165.51	154.60	8.539	
16,100.00	11,234.67	16,183.42	11,257.25	78.40	78.67	-90.81	4,545.04	-854.85	1,320.11	1,163.04	157.07	8.405	
16,200.00	11,231.43	16,283.42	11,253.34	79.65	79.91	-90.78	4,644.96	-855.60	1,320.10	1,160.55	159.55	8.274	
16,300.00	11,228.18	16,383.42	11,249.43	80.90	81.15	-90.75	4,744.87	-856.34	1,320.09	1,158.04	162.05	8.146	
16,400.00	11,224.94	16,483.41	11,245.53	82.15	82.40	-90.72	4,844.79	-857.09	1,320.08	1,155.53	164.56	8.022	
16,500.00	11,221.69	16,583.41	11,241.62	83.42	83.66	-90.69	4,944.71	-857.83	1,320.08	1,153.00	167.08	7.901	
16,600.00	11,218.44	16,683.41	11,237.71	84.69	84.92	-90.66	5,044.63	-858.58	1,320.07	1,150.46	169.61	7.783	
16,700.00	11,215.20	16,783.41	11,233.80	85.96	86.19	-90.63	5,144.55	-859.33	1,320.07	1,147.91	172.15	7.668	
16,800.00	11,211.95	16,883.40	11,229.89	87.24	87.47	-90.61	5,244.47	-860.07	1,320.06	1,145.35	174.71	7.556	
16,900.00	11,208.71	16,983.40	11,225.98	88.53	88.75	-90.58	5,344.39	-860.82	1,320.06	1,142.78	177.27	7.447	
17,000.00	11,205.46	17,083.40	11,222.07	89.82	90.03	-90.55	5,444.30	-861.56	1,320.05	1,140.20	179.85	7.340	
17,100.00	11,202.22	17,183.40	11,218.17	91.11	91.32	-90.52	5,544.22	-862.31	1,320.05	1,137.62	182.43	7.236	
17,200.00	11,198.97	17,283.40	11,214.26	92.41	92.61	-90.49	5,644.14	-863.06	1,320.04	1,135.02	185.02	7.134	
17,300.00	11,195.72	17,383.39	11,210.35	93.71	93.91	-90.46	5,744.06	-863.80	1,320.04	1,132.41	187.63	7.036	
17,400.00	11,192.48	17,483.39	11,206.44	95.02	95.22	-90.43	5,843.98	-864.55	1,320.04	1,129.80	190.24	6.939	
17,500.00	11,189.23	17,583.39	11,202.53	96.33	96.52	-90.40	5,943.90	-865.29	1,320.03	1,127.18	192.85	6.845	
17,600.00	11,185.99	17,683.39	11,198.62	97.65	97.83	-90.38	6,043.82	-866.04	1,320.03	1,124.55	195.48	6.753	
17,700.00	11,182.74	17,783.39	11,194.72	98.96	99.15	-90.35	6,143.73	-866.79	1,320.03	1,121.92	198.11	6.663	
17,800.00	11,179.50	17,883.38	11,190.81	100.29	100.47	-90.32	6,243.65	-867.53	1,320.03	1,119.27	200.75	6.575	
17,900.00	11,176.25	17,983.38	11,186.90	101.61	101.79	-90.29	6,343.57	-868.28	1,320.02	1,116.63	203.40	6.490	
18,000.00	11,173.00	18,083.38	11,182.99	102.94	103.11	-90.26	6,443.49	-869.02	1,320.02	1,113.97	206.05	6.406	
18,100.00	11,169.76	18,183.38	11,179.08	104.27	104.44	-90.23	6,543.41	-869.77	1,320.02	1,111.31	208.71	6.325	
18,200.00	11,166.51	18,283.37	11,175.17	105.61	105.77	-90.20	6,643.33	-870.51	1,320.02	1,108.64	211.38	6.245	
18,300.00	11,163.27	18,383.37	11,171.26	106.94	107.10	-90.17	6,743.25	-871.26	1,320.02	1,105.97	214.05	6.167	
18,372.70	11,160.91	18,456.07	11,168.42	107.92	108.07	-90.15	6,815.89	-871.80	1,320.02	1,104.03	215.99	6.111	
18,400.00	11,160.02	18,483.37	11,167.36	108.28	108.44	-90.14	6,843.17	-872.01	1,320.02	1,103.30	216.72	6.091	
18,500.00	11,156.78	18,583.37	11,163.45	109.63	109.78	-90.12	6,943.08	-872.75	1,320.02	1,100.61	219.41	6.016	
18,600.00	11,153.53	18,683.37	11,159.54	110.97	111.12	-90.09	7,043.00	-873.50	1,320.02	1,097.93	222.09	5.944	
18,700.00	11,150.28	18,783.36	11,155.63	112.32	112.47	-90.06	7,142.92	-874.24	1,320.02	1,095.23	224.79	5.872	
18,800.00	11,147.04	18,883.36	11,151.72	113.67	113.81	-90.03	7,242.84	-874.99	1,320.02	1,092.54	227.48	5.803	
18,893.59	11,144.00	18,976.94	11,148.06	114.94	115.07	-90.00	7,336.35	-875.69	1,320.02	1,090.01	230.01	5.739	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 7H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	4.00	4.00	0.00	0.01	80.75	327.50	2,010.40	2,036.90				
100.00	100.00	104.00	104.00	0.14	0.15	80.75	327.50	2,010.40	2,036.90	2,036.62	0.28	7,192.627	
200.00	200.00	204.00	204.00	0.49	0.51	80.75	327.50	2,010.40	2,036.90	2,035.90	1.00	2,036.624	
300.00	300.00	304.00	304.00	0.85	0.86	80.75	327.50	2,010.40	2,036.90	2,035.18	1.72	1,186.259	
400.00	400.00	404.00	404.00	1.21	1.22	80.75	327.50	2,010.40	2,036.90	2,034.47	2.43	836.846	
500.00	500.00	504.00	504.00	1.57	1.58	80.75	327.50	2,010.40	2,036.90	2,033.75	3.15	646.437	
600.00	600.00	604.00	604.00	1.93	1.94	80.75	327.50	2,010.40	2,036.90	2,033.03	3.87	526.616	
700.00	700.00	704.00	704.00	2.29	2.30	80.75	327.50	2,010.40	2,036.90	2,032.32	4.58	444.268	
800.00	800.00	804.00	804.00	2.65	2.66	80.75	327.50	2,010.40	2,036.90	2,031.60	5.30	384.191	
900.00	900.00	904.00	904.00	3.00	3.01	80.75	327.50	2,010.40	2,036.90	2,030.88	6.02	338.427	
1,000.00	1,000.00	1,004.00	1,004.00	3.36	3.37	80.75	327.50	2,010.40	2,036.90	2,030.17	6.74	302.405	
1,100.00	1,100.00	1,104.00	1,104.00	3.72	3.73	80.75	327.50	2,010.40	2,036.90	2,029.45	7.45	273.313	
1,200.00	1,200.00	1,204.00	1,204.00	4.08	4.09	80.75	327.50	2,010.40	2,036.90	2,028.73	8.17	249.328	
1,300.00	1,300.00	1,304.00	1,304.00	4.44	4.45	80.75	327.50	2,010.40	2,036.90	2,028.01	8.89	229.213	
1,400.00	1,400.00	1,404.00	1,404.00	4.80	4.81	80.75	327.50	2,010.40	2,036.90	2,027.30	9.60	212.101	
1,500.00	1,500.00	1,504.00	1,504.00	5.15	5.17	80.75	327.50	2,010.40	2,036.90	2,026.58	10.32	197.367	
1,600.00	1,600.00	1,604.00	1,604.00	5.51	5.52	80.75	327.50	2,010.40	2,036.90	2,025.86	11.04	184.546	
1,700.00	1,700.00	1,704.00	1,704.00	5.87	5.88	80.75	327.50	2,010.40	2,036.90	2,025.15	11.75	173.290	
1,800.00	1,800.00	1,804.00	1,804.00	6.23	6.24	80.75	327.50	2,010.40	2,036.90	2,024.43	12.47	163.328	
1,900.00	1,900.00	1,904.00	1,904.00	6.59	6.60	80.75	327.50	2,010.40	2,036.90	2,023.71	13.19	154.449	
2,000.00	2,000.00	2,004.00	2,004.00	6.95	6.96	80.75	327.50	2,010.40	2,036.90	2,023.00	13.91	146.486	
2,100.00	2,100.00	2,104.00	2,104.00	7.31	7.32	80.75	327.50	2,010.40	2,036.90	2,022.28	14.62	139.303	
2,200.00	2,200.00	2,204.00	2,204.00	7.66	7.67	80.75	327.50	2,010.40	2,036.90	2,021.56	15.34	132.792	
2,300.00	2,300.00	2,304.00	2,304.00	8.02	8.03	80.75	327.50	2,010.40	2,036.90	2,020.84	16.06	126.863	
2,400.00	2,400.00	2,404.00	2,404.00	8.38	8.39	80.75	327.50	2,010.40	2,036.90	2,020.13	16.77	121.440	
2,500.00	2,500.00	2,500.00	2,500.00	8.74	8.74	80.75	327.50	2,010.40	2,036.90	2,019.43	17.48	116.558	
2,515.68	2,515.68	2,514.73	2,514.73	8.79	8.79	-42.61	327.47	2,010.42	2,036.89	2,019.31	17.58	115.865	
2,600.00	2,599.98	2,577.82	2,577.81	9.08	9.00	-42.62	326.66	2,011.04	2,036.28	2,018.20	18.09	112.585	
2,700.00	2,699.84	2,652.64	2,652.57	9.42	9.25	-42.64	324.27	2,012.87	2,034.33	2,015.67	18.67	108.972	
2,800.00	2,799.45	2,727.46	2,727.22	9.75	9.50	-42.69	320.34	2,015.89	2,031.05	2,011.80	19.25	105.504	
2,899.95	2,898.65	2,800.00	2,799.45	10.09	9.74	-42.75	315.05	2,019.95	2,026.45	2,006.62	19.83	102.184	
3,000.00	2,997.73	2,877.14	2,876.05	10.44	10.00	-42.73	307.83	2,025.49	2,021.79	2,001.35	20.43	98.939	
3,100.00	3,096.76	2,952.00	2,950.12	10.79	10.25	-42.66	299.27	2,032.06	2,018.37	1,997.34	21.04	95.941	
3,200.00	3,195.78	3,035.67	3,032.60	11.14	10.54	-42.53	288.05	2,040.66	2,016.13	1,994.45	21.68	93.002	
3,300.00	3,294.81	3,135.48	3,130.88	11.50	10.88	-42.36	274.30	2,051.22	2,014.16	1,991.77	22.38	89.981	
3,400.00	3,393.84	3,235.28	3,229.17	11.86	11.24	-42.20	260.54	2,061.77	2,012.21	1,989.11	23.10	87.110	
3,500.00	3,492.86	3,335.09	3,327.46	12.22	11.60	-42.03	246.78	2,072.32	2,010.27	1,986.45	23.82	84.382	
3,600.00	3,591.89	3,434.89	3,425.75	12.59	11.96	-41.86	233.03	2,082.88	2,008.35	1,983.80	24.55	81.790	
3,700.00	3,690.92	3,534.70	3,524.03	12.96	12.33	-41.69	219.27	2,093.43	2,006.45	1,981.16	25.29	79.327	
3,800.00	3,789.95	3,634.50	3,622.32	13.33	12.71	-41.52	205.51	2,103.98	2,004.57	1,978.53	26.04	76.985	
3,900.00	3,888.97	3,734.31	3,720.61	13.70	13.09	-41.35	191.76	2,114.53	2,002.70	1,975.92	26.79	74.758	
4,000.00	3,988.00	3,834.11	3,818.90	14.08	13.47	-41.18	178.00	2,125.09	2,000.86	1,973.31	27.55	72.639	
4,100.00	4,087.03	3,933.92	3,917.18	14.46	13.85	-41.01	164.25	2,135.64	1,999.03	1,970.72	28.31	70.621	
4,200.00	4,186.05	4,033.72	4,015.47	14.84	14.24	-40.84	150.49	2,146.19	1,997.22	1,968.14	29.07	68.699	
4,300.00	4,285.08	4,133.53	4,113.76	15.22	14.63	-40.66	136.73	2,156.75	1,995.42	1,965.58	29.84	66.866	
4,400.00	4,384.11	4,233.33	4,212.05	15.60	15.02	-40.49	122.98	2,167.30	1,993.65	1,963.03	30.62	65.118	
4,500.00	4,483.13	4,333.14	4,310.33	15.98	15.41	-40.32	109.22	2,177.85	1,991.89	1,960.50	31.39	63.449	
4,600.00	4,582.16	4,432.94	4,408.62	16.37	15.81	-40.15	95.47	2,188.41	1,990.15	1,957.97	32.17	61.856	
4,700.00	4,681.19	4,532.75	4,506.91	16.75	16.21	-39.98	81.71	2,198.96	1,988.43	1,955.47	32.96	60.332	
4,800.00	4,780.22	4,632.55	4,605.20	17.14	16.61	-39.80	67.95	2,209.51	1,986.72	1,952.98	33.74	58.875	
4,900.00	4,879.24	4,732.36	4,703.48	17.53	17.01	-39.63	54.20	2,220.06	1,985.04	1,950.50	34.53	57.480	
5,000.00	4,978.27	4,832.16	4,801.77	17.91	17.41	-39.46	40.44	2,230.62	1,983.37	1,948.04	35.33	56.145	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 7H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,077.30	4,931.97	4,900.06	18.30	17.82	-39.28	26.69	2,241.17	1,981.72	1,945.60	36.12	54.864	
5,200.00	5,176.32	5,031.77	4,998.35	18.69	18.22	-39.11	12.93	2,251.72	1,980.09	1,943.17	36.92	53.637	
5,300.00	5,275.35	5,131.58	5,096.64	19.08	18.63	-38.94	-0.83	2,262.28	1,978.48	1,940.76	37.72	52.458	
5,400.00	5,374.38	5,231.38	5,194.92	19.48	19.04	-38.76	-14.58	2,272.83	1,976.88	1,938.37	38.52	51.327	
5,500.00	5,473.41	5,331.19	5,293.21	19.87	19.45	-38.59	-28.34	2,283.38	1,975.31	1,935.99	39.32	50.239	
5,600.00	5,572.43	5,430.99	5,391.50	20.26	19.86	-38.41	-42.10	2,293.94	1,973.75	1,933.63	40.12	49.194	
5,700.00	5,671.46	5,530.80	5,489.79	20.66	20.27	-38.24	-55.85	2,304.49	1,972.21	1,931.29	40.93	48.188	
5,800.00	5,770.49	5,630.60	5,588.07	21.05	20.68	-38.06	-69.61	2,315.04	1,970.69	1,928.96	41.73	47.220	
5,900.00	5,869.51	5,730.41	5,686.36	21.45	21.10	-37.88	-83.36	2,325.59	1,969.19	1,926.65	42.54	46.287	
6,000.00	5,968.54	5,830.21	5,784.65	21.84	21.51	-37.71	-97.12	2,336.15	1,967.71	1,924.36	43.35	45.388	
6,100.00	6,067.57	5,930.02	5,882.94	22.24	21.93	-37.53	-110.88	2,346.70	1,966.25	1,922.08	44.16	44.522	
6,200.00	6,166.60	6,029.82	5,981.22	22.63	22.34	-37.35	-124.63	2,357.25	1,964.80	1,919.82	44.98	43.686	
6,300.00	6,265.62	6,129.63	6,079.51	23.03	22.76	-37.18	-138.39	2,367.81	1,963.37	1,917.58	45.79	42.878	
6,400.00	6,364.65	6,229.43	6,177.80	23.43	23.18	-37.00	-152.14	2,378.36	1,961.97	1,915.36	46.60	42.099	
6,500.00	6,463.68	6,329.24	6,276.09	23.82	23.59	-36.82	-165.90	2,388.91	1,960.58	1,913.16	47.42	41.346	
6,600.00	6,562.70	6,429.04	6,374.37	24.22	24.01	-36.65	-179.66	2,399.47	1,959.21	1,910.97	48.24	40.618	
6,700.00	6,661.73	6,528.85	6,472.66	24.62	24.43	-36.47	-193.41	2,410.02	1,957.86	1,908.80	49.05	39.913	
6,800.00	6,760.76	6,628.65	6,570.95	25.02	24.85	-36.29	-207.17	2,420.57	1,956.52	1,906.65	49.87	39.232	
6,853.95	6,814.25	6,682.49	6,623.97	25.23	25.08	-36.18	-214.59	2,426.26	1,956.17	1,905.86	50.31	38.883	CC
6,900.00	6,859.95	6,728.41	6,669.19	25.41	25.27	-36.09	-220.92	2,431.12	1,956.26	1,905.58	50.68	38.597	
7,000.00	6,959.52	6,827.98	6,767.24	25.79	25.69	-35.86	-234.64	2,441.65	1,958.82	1,907.34	51.48	38.050	
7,100.00	7,059.36	6,927.23	6,864.98	26.15	26.11	-35.61	-248.32	2,452.14	1,964.26	1,912.00	52.26	37.586	
7,200.00	7,159.33	7,026.04	6,962.30	26.50	26.53	-35.33	-261.94	2,462.59	1,972.61	1,919.58	53.02	37.202	
7,300.00	7,259.33	7,124.53	7,059.28	26.83	26.94	88.41	-275.52	2,473.00	1,982.82	1,929.05	53.77	36.877	
7,400.00	7,359.33	7,269.21	7,202.11	27.15	27.54	88.95	-293.77	2,487.01	1,992.41	1,937.71	54.70	36.427	
7,500.00	7,459.33	7,439.93	7,371.85	27.48	28.20	89.37	-308.10	2,498.00	1,998.75	1,943.07	55.68	35.896	
7,600.00	7,559.33	7,612.23	7,543.94	27.81	28.80	89.55	-314.41	2,502.84	2,001.53	1,944.91	56.62	35.351	
7,700.00	7,659.33	7,731.62	7,663.33	28.15	29.18	89.56	-314.70	2,503.07	2,001.66	1,944.33	57.33	34.915	
7,800.00	7,759.33	7,831.62	7,763.33	28.48	29.50	89.56	-314.70	2,503.07	2,001.66	1,943.68	57.97	34.526	
7,900.00	7,859.33	7,931.62	7,863.33	28.81	29.81	89.56	-314.70	2,503.07	2,001.66	1,943.04	58.62	34.145	
8,000.00	7,959.33	8,031.62	7,963.33	29.14	30.13	89.56	-314.70	2,503.07	2,001.66	1,942.39	59.27	33.771	
8,100.00	8,059.33	8,131.62	8,063.33	29.47	30.45	89.56	-314.70	2,503.07	2,001.66	1,941.74	59.92	33.405	
8,200.00	8,159.33	8,231.62	8,163.33	29.81	30.76	89.56	-314.70	2,503.07	2,001.66	1,941.09	60.57	33.045	
8,300.00	8,259.33	8,331.62	8,263.33	30.14	31.08	89.56	-314.70	2,503.07	2,001.66	1,940.43	61.23	32.693	
8,400.00	8,359.33	8,431.62	8,363.33	30.48	31.40	89.56	-314.70	2,503.07	2,001.66	1,939.78	61.88	32.347	
8,500.00	8,459.33	8,531.62	8,463.33	30.81	31.72	89.56	-314.70	2,503.07	2,001.66	1,939.12	62.54	32.007	
8,600.00	8,559.33	8,631.62	8,563.33	31.15	32.04	89.56	-314.70	2,503.07	2,001.66	1,938.46	63.19	31.674	
8,700.00	8,659.33	8,731.62	8,663.33	31.49	32.37	89.56	-314.70	2,503.07	2,001.66	1,937.81	63.85	31.348	
8,800.00	8,759.33	8,831.62	8,763.33	31.82	32.69	89.56	-314.70	2,503.07	2,001.66	1,937.15	64.51	31.027	
8,900.00	8,859.33	8,931.62	8,863.33	32.16	33.01	89.56	-314.70	2,503.07	2,001.66	1,936.48	65.17	30.712	
9,000.00	8,959.33	9,031.62	8,963.33	32.50	33.34	89.56	-314.70	2,503.07	2,001.66	1,935.82	65.84	30.403	
9,100.00	9,059.33	9,131.62	9,063.33	32.84	33.66	89.56	-314.70	2,503.07	2,001.66	1,935.16	66.50	30.100	
9,200.00	9,159.33	9,231.62	9,163.33	33.18	33.99	89.56	-314.70	2,503.07	2,001.66	1,934.49	67.16	29.802	
9,300.00	9,259.33	9,331.62	9,263.33	33.52	34.31	89.56	-314.70	2,503.07	2,001.66	1,933.83	67.83	29.510	
9,400.00	9,359.33	9,431.62	9,363.33	33.86	34.64	89.56	-314.70	2,503.07	2,001.66	1,933.16	68.50	29.223	
9,500.00	9,459.33	9,531.62	9,463.33	34.20	34.97	89.56	-314.70	2,503.07	2,001.66	1,932.49	69.16	28.940	
9,600.00	9,559.33	9,631.62	9,563.33	34.54	35.30	89.56	-314.70	2,503.07	2,001.66	1,931.83	69.83	28.663	
9,700.00	9,659.33	9,731.62	9,663.33	34.88	35.63	89.56	-314.70	2,503.07	2,001.66	1,931.16	70.50	28.391	
9,800.00	9,759.33	9,831.62	9,763.33	35.22	35.96	89.56	-314.70	2,503.07	2,001.66	1,930.49	71.17	28.124	
9,900.00	9,859.33	9,931.62	9,863.33	35.56	36.29	89.56	-314.70	2,503.07	2,001.66	1,929.81	71.84	27.861	
10,000.00	9,959.33	10,031.62	9,963.33	35.90	36.62	89.56	-314.70	2,503.07	2,001.66	1,929.14	72.52	27.603	
10,100.00	10,059.33	10,131.62	10,063.33	36.24	36.95	89.56	-314.70	2,503.07	2,001.66	1,928.47	73.19	27.349	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 7H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	10,159.33	10,231.62	10,163.33	36.59	37.28	89.56	-314.70	2,503.07	2,001.66	1,927.80	73.86	27.099	
10,300.00	10,259.33	10,331.62	10,263.33	36.93	37.61	89.56	-314.70	2,503.07	2,001.66	1,927.12	74.54	26.854	
10,400.00	10,359.33	10,431.62	10,363.33	37.27	37.94	89.56	-314.70	2,503.07	2,001.66	1,926.44	75.21	26.613	
10,500.00	10,459.33	10,531.62	10,463.33	37.61	38.28	89.56	-314.70	2,503.07	2,001.66	1,925.77	75.89	26.376	
10,600.00	10,559.33	10,631.62	10,563.33	37.96	38.61	89.56	-314.70	2,503.07	2,001.66	1,925.09	76.57	26.142	
10,700.00	10,659.33	10,731.62	10,663.33	38.30	38.94	89.56	-314.70	2,503.07	2,001.66	1,924.41	77.25	25.913	
10,800.00	10,759.33	10,831.62	10,763.33	38.65	39.28	89.56	-314.70	2,503.07	2,001.66	1,923.74	77.92	25.687	
10,900.00	10,859.33	10,931.62	10,863.33	38.99	39.61	89.56	-314.70	2,503.07	2,001.66	1,923.06	78.60	25.465	
10,928.34	10,887.66	10,959.95	10,891.66	39.09	39.71	90.00	-314.70	2,503.07	2,001.66	1,922.87	78.79	25.404	
11,000.00	10,959.17	11,031.47	10,963.17	39.33	39.95	90.09	-314.70	2,503.07	2,001.66	1,922.38	79.28	25.249	
11,100.00	11,056.39	11,128.68	11,060.39	39.64	40.27	90.70	-314.70	2,503.07	2,001.83	1,921.91	79.91	25.050	
11,200.00	11,146.77	11,225.76	11,157.39	39.90	40.59	91.71	-312.43	2,503.05	2,002.75	1,922.26	80.49	24.881	
11,300.00	11,226.37	11,337.38	11,266.21	40.09	40.91	92.84	-288.74	2,502.85	2,004.58	1,923.57	81.00	24.747	
11,400.00	11,291.71	11,464.25	11,379.32	40.22	41.18	93.94	-232.10	2,502.38	2,007.00	1,925.60	81.40	24.656	
11,500.00	11,339.94	11,609.47	11,485.26	40.28	41.37	94.94	-133.59	2,501.56	2,009.51	1,927.86	81.65	24.612	
11,600.00	11,368.94	11,772.91	11,563.01	40.29	41.43	95.66	9.25	2,500.37	2,011.37	1,929.64	81.72	24.612	
11,700.00	11,377.44	11,945.81	11,588.08	40.28	41.39	95.90	179.36	2,498.96	2,011.89	1,930.22	81.67	24.634	
11,800.00	11,374.24	12,045.81	11,585.11	40.33	41.40	95.91	279.32	2,498.13	2,011.83	1,930.05	81.78	24.602	
11,900.00	11,370.99	12,145.81	11,582.14	40.54	41.45	95.91	379.27	2,497.30	2,011.77	1,929.72	82.05	24.520	
12,000.00	11,367.75	12,245.81	11,579.18	40.82	41.57	95.92	479.22	2,496.47	2,011.71	1,929.28	82.43	24.404	
12,100.00	11,364.50	12,345.81	11,576.21	41.15	41.76	95.93	579.17	2,495.64	2,011.66	1,928.68	82.98	24.244	
12,200.00	11,361.26	12,445.81	11,573.24	41.53	42.02	95.94	679.13	2,494.81	2,011.60	1,927.98	83.62	24.056	
12,300.00	11,358.01	12,545.81	11,570.28	41.94	42.34	95.95	779.08	2,493.98	2,011.54	1,927.18	84.36	23.845	
12,400.00	11,354.77	12,645.81	11,567.31	42.41	42.72	95.96	879.03	2,493.14	2,011.48	1,926.29	85.20	23.610	
12,500.00	11,351.52	12,745.81	11,564.34	42.91	43.14	95.96	978.98	2,492.31	2,011.43	1,925.31	86.12	23.356	
12,600.00	11,348.27	12,845.80	11,561.38	43.46	43.60	95.97	1,078.93	2,491.48	2,011.37	1,924.24	87.13	23.085	
12,700.00	11,345.03	12,945.80	11,558.41	44.04	44.11	95.98	1,178.89	2,490.65	2,011.31	1,923.09	88.22	22.799	
12,800.00	11,341.78	13,045.80	11,555.44	44.66	44.66	95.99	1,278.84	2,489.82	2,011.26	1,921.87	89.39	22.500	
12,900.00	11,338.54	13,145.80	11,552.48	45.32	45.25	96.00	1,378.79	2,488.99	2,011.20	1,920.56	90.64	22.190	
13,000.00	11,335.29	13,245.80	11,549.51	46.02	45.88	96.00	1,478.74	2,488.16	2,011.14	1,919.19	91.96	21.871	
13,100.00	11,332.05	13,345.80	11,546.54	46.75	46.55	96.01	1,578.69	2,487.33	2,011.09	1,917.74	93.35	21.545	
13,200.00	11,328.80	13,445.80	11,543.58	47.51	47.24	96.02	1,678.65	2,486.50	2,011.03	1,916.23	94.80	21.213	
13,300.00	11,325.55	13,545.80	11,540.61	48.30	47.98	96.03	1,778.60	2,485.67	2,010.97	1,914.65	96.32	20.877	
13,400.00	11,322.31	13,645.80	11,537.64	49.12	48.74	96.04	1,878.55	2,484.84	2,010.92	1,913.01	97.90	20.540	
13,500.00	11,319.06	13,745.80	11,534.68	49.97	49.53	96.05	1,978.50	2,484.01	2,010.86	1,911.32	99.54	20.201	
13,600.00	11,315.82	13,845.80	11,531.71	50.85	50.36	96.05	2,078.45	2,483.18	2,010.81	1,909.56	101.24	19.862	
13,700.00	11,312.57	13,945.80	11,528.74	51.75	51.20	96.06	2,178.41	2,482.35	2,010.75	1,907.76	102.99	19.524	
13,800.00	11,309.32	14,045.80	11,525.78	52.67	52.08	96.07	2,278.36	2,481.52	2,010.69	1,905.90	104.79	19.188	
13,900.00	11,306.08	14,145.80	11,522.81	53.62	52.98	96.08	2,378.31	2,480.69	2,010.64	1,904.00	106.63	18.855	
14,000.00	11,302.83	14,245.80	11,519.84	54.59	53.90	96.09	2,478.26	2,479.85	2,010.58	1,902.05	108.53	18.526	
14,100.00	11,299.59	14,345.80	11,516.88	55.58	54.85	96.09	2,578.22	2,479.02	2,010.52	1,900.06	110.46	18.201	
14,200.00	11,296.34	14,445.80	11,513.91	56.59	55.82	96.10	2,678.17	2,478.19	2,010.47	1,898.03	112.44	17.881	
14,300.00	11,293.10	14,545.80	11,510.94	57.62	56.81	96.11	2,778.12	2,477.36	2,010.41	1,895.96	114.45	17.566	
14,400.00	11,289.85	14,645.80	11,507.98	58.67	57.81	96.12	2,878.07	2,476.53	2,010.36	1,893.86	116.50	17.256	
14,500.00	11,286.60	14,745.80	11,505.01	59.73	58.84	96.13	2,978.02	2,475.70	2,010.30	1,891.71	118.59	16.952	
14,600.00	11,283.36	14,845.80	11,502.04	60.81	59.88	96.13	3,077.98	2,474.87	2,010.24	1,889.54	120.70	16.654	
14,700.00	11,280.11	14,945.80	11,499.08	61.90	60.94	96.14	3,177.93	2,474.04	2,010.19	1,887.33	122.85	16.362	
14,800.00	11,276.87	15,045.80	11,496.11	63.01	62.01	96.15	3,277.88	2,473.21	2,010.13	1,885.10	125.03	16.077	
14,900.00	11,273.62	15,145.80	11,493.14	64.13	63.10	96.16	3,377.83	2,472.38	2,010.08	1,882.83	127.24	15.797	
15,000.00	11,270.38	15,245.79	11,490.18	65.26	64.20	96.17	3,477.78	2,471.55	2,010.02	1,880.54	129.48	15.524	
15,100.00	11,267.13	15,345.79	11,487.21	66.40	65.32	96.18	3,577.74	2,470.72	2,009.96	1,878.23	131.74	15.257	
15,200.00	11,263.88	15,445.79	11,484.24	67.56	66.45	96.18	3,677.69	2,469.89	2,009.91	1,875.89	134.02	14.997	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 7H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,300.00	11,260.64	15,545.79	11,481.28	68.73	67.59	96.19	3,777.64	2,469.06	2,009.85	1,873.53	136.33	14.743	
15,400.00	11,257.39	15,645.79	11,478.31	69.91	68.74	96.20	3,877.59	2,468.23	2,009.80	1,871.14	138.66	14.495	
15,500.00	11,254.15	15,745.79	11,475.35	71.09	69.90	96.21	3,977.55	2,467.40	2,009.74	1,868.74	141.01	14.253	
15,600.00	11,250.90	15,845.79	11,472.38	72.29	71.08	96.22	4,077.50	2,466.57	2,009.69	1,866.31	143.38	14.017	
15,700.00	11,247.66	15,945.79	11,469.41	73.50	72.26	96.22	4,177.45	2,465.73	2,009.63	1,863.87	145.76	13.787	
15,800.00	11,244.41	16,045.79	11,466.45	74.71	73.45	96.23	4,277.40	2,464.90	2,009.58	1,861.41	148.17	13.563	
15,900.00	11,241.16	16,145.79	11,463.48	75.93	74.65	96.24	4,377.35	2,464.07	2,009.52	1,858.93	150.59	13.344	
16,000.00	11,237.92	16,245.79	11,460.51	77.16	75.86	96.25	4,477.31	2,463.24	2,009.46	1,856.43	153.03	13.131	
16,100.00	11,234.67	16,345.79	11,457.55	78.40	77.08	96.26	4,577.26	2,462.41	2,009.41	1,853.92	155.49	12.923	
16,200.00	11,231.43	16,445.79	11,454.58	79.65	78.31	96.27	4,677.21	2,461.58	2,009.35	1,851.40	157.95	12.721	
16,300.00	11,228.18	16,545.79	11,451.61	80.90	79.54	96.27	4,777.16	2,460.75	2,009.30	1,848.86	160.44	12.524	
16,400.00	11,224.94	16,645.79	11,448.65	82.15	80.78	96.28	4,877.11	2,459.92	2,009.24	1,846.31	162.93	12.332	
16,500.00	11,221.69	16,745.79	11,445.68	83.42	82.03	96.29	4,977.07	2,459.09	2,009.19	1,843.74	165.44	12.144	
16,600.00	11,218.44	16,845.79	11,442.71	84.69	83.28	96.30	5,077.02	2,458.26	2,009.13	1,841.17	167.97	11.962	
16,700.00	11,215.20	16,945.79	11,439.75	85.96	84.54	96.31	5,176.97	2,457.43	2,009.08	1,838.58	170.50	11.784	
16,800.00	11,211.95	17,045.79	11,436.78	87.24	85.80	96.31	5,276.92	2,456.60	2,009.02	1,835.98	173.04	11.610	
16,900.00	11,208.71	17,145.79	11,433.81	88.53	87.07	96.32	5,376.87	2,455.77	2,008.97	1,833.37	175.60	11.441	
17,000.00	11,205.46	17,245.79	11,430.85	89.82	88.35	96.33	5,476.83	2,454.94	2,008.91	1,830.75	178.17	11.276	
17,100.00	11,202.22	17,345.79	11,427.88	91.11	89.63	96.34	5,576.78	2,454.11	2,008.86	1,828.12	180.74	11.115	
17,200.00	11,198.97	17,445.79	11,424.91	92.41	90.92	96.35	5,676.73	2,453.28	2,008.80	1,825.48	183.33	10.958	
17,300.00	11,195.72	17,545.78	11,421.95	93.71	92.21	96.36	5,776.68	2,452.44	2,008.75	1,822.83	185.92	10.804	
17,400.00	11,192.48	17,645.78	11,418.98	95.02	93.50	96.36	5,876.64	2,451.61	2,008.69	1,820.17	188.52	10.655	
17,500.00	11,189.23	17,745.78	11,416.01	96.33	94.80	96.37	5,976.59	2,450.78	2,008.64	1,817.51	191.13	10.509	
17,600.00	11,185.99	17,845.78	11,413.05	97.65	96.11	96.38	6,076.54	2,449.95	2,008.58	1,814.83	193.75	10.367	
17,700.00	11,182.74	17,945.78	11,410.08	98.96	97.41	96.39	6,176.49	2,449.12	2,008.53	1,812.15	196.38	10.228	
17,800.00	11,179.50	18,045.78	11,407.11	100.29	98.72	96.40	6,276.44	2,448.29	2,008.47	1,809.46	199.01	10.092	
17,900.00	11,176.25	18,145.78	11,404.15	101.61	100.04	96.41	6,376.40	2,447.46	2,008.42	1,806.77	201.65	9.960	
18,000.00	11,173.00	18,245.78	11,401.18	102.94	101.36	96.41	6,476.35	2,446.63	2,008.37	1,804.07	204.30	9.830	
18,100.00	11,169.76	18,345.78	11,398.21	104.27	102.68	96.42	6,576.30	2,445.80	2,008.31	1,801.36	206.95	9.704	
18,200.00	11,166.51	18,445.78	11,395.25	105.61	104.01	96.43	6,676.25	2,444.97	2,008.26	1,798.64	209.61	9.581	
18,300.00	11,163.27	18,545.78	11,392.28	106.94	105.33	96.44	6,776.20	2,444.14	2,008.20	1,795.92	212.28	9.460	
18,400.00	11,160.02	18,645.78	11,389.31	108.28	106.67	96.45	6,876.16	2,443.31	2,008.15	1,793.20	214.95	9.342	
18,500.00	11,156.78	18,745.78	11,386.35	109.63	108.00	96.45	6,976.11	2,442.48	2,008.09	1,790.46	217.63	9.227	
18,600.00	11,153.53	18,845.78	11,383.38	110.97	109.34	96.46	7,076.06	2,441.65	2,008.04	1,787.73	220.31	9.115	
18,700.00	11,150.28	18,945.78	11,380.41	112.32	110.68	96.47	7,176.01	2,440.82	2,007.98	1,784.99	223.00	9.004	
18,800.00	11,147.04	19,045.78	11,377.45	113.67	112.02	96.48	7,275.96	2,439.99	2,007.93	1,782.24	225.69	8.897	
18,884.18	11,144.31	19,128.87	11,374.98	114.81	113.14	96.49	7,359.01	2,439.29	2,007.88	1,779.93	227.95	8.808	
18,893.59	11,144.00	19,128.87	11,374.98	114.94	113.14	96.49	7,359.01	2,439.29	2,007.91	1,779.83	228.08	8.804	ES, SF

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 8H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	3.00	3.00	0.00	0.00	80.48	327.00	1,950.40	1,977.62				
100.00	100.00	103.00	103.00	0.14	0.14	80.48	327.00	1,950.40	1,977.62	1,977.34	0.28	7,072.834	
200.00	200.00	203.00	203.00	0.49	0.50	80.48	327.00	1,950.40	1,977.62	1,976.63	1.00	1,984.466	
300.00	300.00	303.00	303.00	0.85	0.86	80.48	327.00	1,950.40	1,977.62	1,975.91	1.71	1,154.146	
400.00	400.00	403.00	403.00	1.21	1.22	80.48	327.00	1,950.40	1,977.62	1,975.19	2.43	813.690	
500.00	500.00	503.00	503.00	1.57	1.58	80.48	327.00	1,950.40	1,977.62	1,974.47	3.15	628.339	
600.00	600.00	603.00	603.00	1.93	1.94	80.48	327.00	1,950.40	1,977.62	1,973.76	3.86	511.764	
700.00	700.00	703.00	703.00	2.29	2.29	80.48	327.00	1,950.40	1,977.62	1,973.04	4.58	431.676	
800.00	800.00	803.00	803.00	2.65	2.65	80.48	327.00	1,950.40	1,977.62	1,972.32	5.30	373.262	
900.00	900.00	903.00	903.00	3.00	3.01	80.48	327.00	1,950.40	1,977.62	1,971.61	6.02	328.773	
1,000.00	1,000.00	1,003.00	1,003.00	3.36	3.37	80.48	327.00	1,950.40	1,977.62	1,970.89	6.73	293.760	
1,100.00	1,100.00	1,103.00	1,103.00	3.72	3.73	80.48	327.00	1,950.40	1,977.62	1,970.17	7.45	265.487	
1,200.00	1,200.00	1,203.00	1,203.00	4.08	4.09	80.48	327.00	1,950.40	1,977.62	1,969.46	8.17	242.178	
1,300.00	1,300.00	1,303.00	1,303.00	4.44	4.45	80.48	327.00	1,950.40	1,977.62	1,968.74	8.88	222.632	
1,400.00	1,400.00	1,403.00	1,403.00	4.80	4.80	80.48	327.00	1,950.40	1,977.62	1,968.02	9.60	206.005	
1,500.00	1,500.00	1,503.00	1,503.00	5.15	5.16	80.48	327.00	1,950.40	1,977.62	1,967.31	10.32	191.689	
1,600.00	1,600.00	1,603.00	1,603.00	5.51	5.52	80.48	327.00	1,950.40	1,977.62	1,966.59	11.03	179.234	
1,700.00	1,700.00	1,703.00	1,703.00	5.87	5.88	80.48	327.00	1,950.40	1,977.62	1,965.87	11.75	168.298	
1,800.00	1,800.00	1,803.00	1,803.00	6.23	6.24	80.48	327.00	1,950.40	1,977.62	1,965.15	12.47	158.620	
1,900.00	1,900.00	1,903.00	1,903.00	6.59	6.60	80.48	327.00	1,950.40	1,977.62	1,964.44	13.18	149.995	
2,000.00	2,000.00	2,003.00	2,003.00	6.95	6.95	80.48	327.00	1,950.40	1,977.62	1,963.72	13.90	142.259	
2,100.00	2,100.00	2,103.00	2,103.00	7.31	7.31	80.48	327.00	1,950.40	1,977.62	1,963.00	14.62	135.282	
2,200.00	2,200.00	2,203.00	2,203.00	7.66	7.67	80.48	327.00	1,950.40	1,977.62	1,962.29	15.34	128.958	
2,300.00	2,300.00	2,303.00	2,303.00	8.02	8.03	80.48	327.00	1,950.40	1,977.62	1,961.57	16.05	123.198	
2,400.00	2,400.00	2,403.00	2,403.00	8.38	8.39	80.48	327.00	1,950.40	1,977.62	1,960.85	16.77	117.931	
2,500.00	2,500.00	2,507.45	2,507.45	8.74	8.76	80.48	326.99	1,950.39	1,977.62	1,960.12	17.50	113.000	
2,600.00	2,599.98	2,755.07	2,754.74	9.08	9.59	-42.87	319.77	1,941.65	1,972.37	1,953.69	18.68	105.592	
2,700.00	2,699.84	2,998.00	2,995.49	9.42	10.42	-42.86	299.50	1,917.12	1,957.21	1,937.38	19.84	98.666	
2,800.00	2,799.45	3,155.13	3,149.55	9.75	10.98	-42.98	279.82	1,893.31	1,933.61	1,912.88	20.73	93.279	
2,899.95	2,898.65	3,251.42	3,243.73	10.09	11.33	-43.30	267.07	1,877.88	1,906.91	1,885.49	21.42	89.025	
3,000.00	2,997.73	3,347.48	3,337.70	10.44	11.68	-43.26	254.35	1,862.48	1,878.96	1,856.83	22.12	84.937	
3,100.00	3,096.76	3,443.50	3,431.62	10.79	12.04	-43.23	241.63	1,847.10	1,851.02	1,828.19	22.83	81.066	
3,200.00	3,195.78	3,539.51	3,525.53	11.14	12.41	-43.20	228.91	1,831.71	1,823.09	1,799.53	23.55	77.397	
3,300.00	3,294.81	3,635.53	3,619.45	11.50	12.79	-43.17	216.20	1,816.32	1,795.15	1,770.87	24.29	73.920	
3,400.00	3,393.84	3,731.54	3,713.36	11.86	13.16	-43.14	203.48	1,800.93	1,767.22	1,742.20	25.02	70.624	
3,500.00	3,492.86	3,827.55	3,807.28	12.22	13.54	-43.10	190.77	1,785.55	1,739.29	1,713.52	25.77	67.498	
3,600.00	3,591.89	3,923.57	3,901.20	12.59	13.93	-43.06	178.05	1,770.16	1,711.35	1,684.83	26.52	64.531	
3,700.00	3,690.92	4,019.58	3,995.11	12.96	14.32	-43.03	165.34	1,754.77	1,683.42	1,656.14	27.28	61.714	
3,800.00	3,789.95	4,115.60	4,089.03	13.33	14.71	-42.99	152.62	1,739.39	1,655.49	1,627.45	28.04	59.038	
3,900.00	3,888.97	4,211.61	4,182.94	13.70	15.11	-42.95	139.91	1,724.00	1,627.56	1,598.75	28.81	56.494	
4,000.00	3,988.00	4,307.62	4,276.86	14.08	15.50	-42.91	127.19	1,708.61	1,599.63	1,570.05	29.58	54.073	
4,100.00	4,087.03	4,403.64	4,370.78	14.46	15.90	-42.86	114.48	1,693.23	1,571.70	1,541.34	30.36	51.768	
4,200.00	4,186.05	4,499.65	4,464.69	14.84	16.31	-42.82	101.76	1,677.84	1,543.78	1,512.63	31.14	49.571	
4,300.00	4,285.08	4,595.67	4,558.61	15.22	16.71	-42.77	89.04	1,662.45	1,515.85	1,483.92	31.93	47.477	
4,400.00	4,384.11	4,691.68	4,652.53	15.60	17.12	-42.73	76.33	1,647.07	1,487.92	1,455.20	32.72	45.478	
4,500.00	4,483.13	4,787.69	4,746.44	15.98	17.53	-42.68	63.61	1,631.68	1,460.00	1,426.49	33.51	43.570	
4,600.00	4,582.16	4,883.71	4,840.36	16.37	17.94	-42.62	50.90	1,616.29	1,432.07	1,397.77	34.30	41.746	
4,700.00	4,681.19	4,979.72	4,934.27	16.75	18.35	-42.57	38.18	1,600.91	1,404.15	1,369.05	35.10	40.001	
4,800.00	4,780.22	5,075.74	5,028.19	17.14	18.77	-42.52	25.47	1,585.52	1,376.23	1,340.32	35.90	38.331	
4,900.00	4,879.24	5,171.75	5,122.11	17.53	19.18	-42.46	12.75	1,570.13	1,348.31	1,311.60	36.71	36.732	
5,000.00	4,978.27	5,267.76	5,216.02	17.91	19.60	-42.40	0.04	1,554.74	1,320.39	1,282.88	37.51	35.199	
5,100.00	5,077.30	5,363.78	5,309.94	18.30	20.02	-42.33	-12.68	1,539.36	1,292.47	1,254.15	38.32	33.728	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 8H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,176.32	5,459.79	5,403.86	18.69	20.44	-42.27	-25.39	1,523.97	1,264.55	1,225.43	39.13	32.317	
5,300.00	5,275.35	5,555.81	5,497.77	19.08	20.86	-42.20	-38.11	1,508.58	1,236.64	1,196.70	39.94	30.962	
5,400.00	5,374.38	5,651.82	5,591.69	19.48	21.28	-42.13	-50.83	1,493.20	1,208.73	1,167.97	40.75	29.659	
5,500.00	5,473.41	5,747.83	5,685.60	19.87	21.70	-42.05	-63.54	1,477.81	1,180.82	1,139.25	41.57	28.406	
5,600.00	5,572.43	5,843.85	5,779.52	20.26	22.12	-41.97	-76.26	1,462.42	1,152.91	1,110.52	42.39	27.200	
5,700.00	5,671.46	5,939.86	5,873.44	20.66	22.55	-41.89	-88.97	1,447.04	1,125.00	1,081.80	43.20	26.039	
5,800.00	5,770.49	6,035.88	5,967.35	21.05	22.97	-41.80	-101.69	1,431.65	1,097.10	1,053.07	44.02	24.921	
5,900.00	5,869.51	6,131.89	6,061.27	21.45	23.40	-41.71	-114.40	1,416.26	1,069.19	1,024.35	44.84	23.842	
6,000.00	5,968.54	6,227.90	6,155.19	21.84	23.83	-41.61	-127.12	1,400.88	1,041.29	995.63	45.67	22.802	
6,100.00	6,067.57	6,323.92	6,249.10	22.24	24.25	-41.51	-139.83	1,385.49	1,013.40	966.91	46.49	21.798	
6,200.00	6,166.60	6,419.93	6,343.02	22.63	24.68	-41.40	-152.55	1,370.10	985.50	938.19	47.31	20.829	
6,300.00	6,265.62	6,515.95	6,436.93	23.03	25.11	-41.29	-165.27	1,354.71	957.61	909.47	48.14	19.892	
6,400.00	6,364.65	6,611.96	6,530.85	23.43	25.54	-41.17	-177.98	1,339.33	929.73	880.76	48.97	18.987	
6,500.00	6,463.68	6,707.97	6,624.77	23.82	25.97	-41.04	-190.70	1,323.94	901.84	852.05	49.79	18.112	
6,600.00	6,562.70	6,803.99	6,718.68	24.22	26.40	-40.90	-203.41	1,308.55	873.97	823.34	50.62	17.265	
6,700.00	6,661.73	6,900.00	6,812.60	24.62	26.83	-40.76	-216.13	1,293.17	846.09	794.64	51.45	16.445	
6,800.00	6,760.76	6,996.02	6,906.51	25.02	27.26	-40.60	-228.84	1,277.78	818.23	765.94	52.28	15.650	
6,900.00	6,859.95	7,092.27	7,000.67	25.41	27.69	-40.06	-241.59	1,262.35	791.32	738.21	53.11	14.900	
7,000.00	6,959.52	7,189.11	7,095.39	25.79	28.13	-39.33	-254.41	1,246.84	766.99	713.07	53.92	14.224	
7,100.00	7,059.36	7,286.41	7,190.56	26.15	28.57	-38.43	-267.30	1,231.24	745.36	690.63	54.72	13.621	
7,200.00	7,159.33	7,384.06	7,286.08	26.50	29.01	-37.38	-280.23	1,215.59	726.51	671.00	55.51	13.088	
7,300.00	7,259.33	7,471.74	7,371.93	26.83	29.40	86.85	-291.57	1,201.88	709.99	653.76	56.23	12.627	
7,400.00	7,359.33	7,553.93	7,452.83	27.15	29.75	87.57	-300.81	1,190.70	695.77	638.86	56.91	12.226	
7,500.00	7,459.33	7,636.90	7,534.88	27.48	30.10	88.19	-308.63	1,181.23	683.96	626.38	57.58	11.878	
7,600.00	7,559.33	7,720.53	7,617.91	27.81	30.43	88.71	-314.99	1,173.54	674.54	616.30	58.24	11.582	
7,700.00	7,659.33	7,800.00	7,697.05	28.15	30.72	89.10	-319.59	1,167.97	667.49	608.62	58.87	11.338	
7,800.00	7,759.33	7,889.19	7,786.07	28.48	31.04	89.39	-323.09	1,163.73	662.73	603.21	59.52	11.135	
7,900.00	7,859.33	7,973.94	7,870.77	28.81	31.32	89.54	-324.78	1,161.69	660.30	600.17	60.13	10.981	
7,975.19	7,934.51	8,040.68	7,937.51	29.06	31.53	89.56	-325.03	1,161.39	659.94	599.35	60.59	10.891	
8,000.00	7,959.33	8,065.49	7,962.33	29.14	31.61	89.56	-325.03	1,161.39	659.94	599.19	60.75	10.863	
8,100.00	8,059.33	8,165.49	8,062.33	29.47	31.91	89.56	-325.03	1,161.39	659.94	598.56	61.39	10.750	
8,200.00	8,159.33	8,265.49	8,162.33	29.81	32.22	89.56	-325.03	1,161.39	659.94	597.92	62.03	10.640	
8,300.00	8,259.33	8,365.49	8,262.33	30.14	32.52	89.56	-325.03	1,161.39	659.94	597.28	62.67	10.531	
8,400.00	8,359.33	8,465.49	8,362.33	30.48	32.83	89.56	-325.03	1,161.39	659.94	596.64	63.31	10.424	
8,500.00	8,459.33	8,565.49	8,462.33	30.81	33.14	89.56	-325.03	1,161.39	659.94	595.99	63.95	10.319	
8,600.00	8,559.33	8,665.49	8,562.33	31.15	33.45	89.56	-325.03	1,161.39	659.94	595.35	64.60	10.216	
8,700.00	8,659.33	8,765.49	8,662.33	31.49	33.76	89.56	-325.03	1,161.39	659.94	594.70	65.24	10.115	
8,800.00	8,759.33	8,865.49	8,762.33	31.82	34.07	89.56	-325.03	1,161.39	659.94	594.05	65.89	10.016	
8,900.00	8,859.33	8,965.49	8,862.33	32.16	34.38	89.56	-325.03	1,161.39	659.94	593.40	66.54	9.918	
9,000.00	8,959.33	9,065.49	8,962.33	32.50	34.69	89.56	-325.03	1,161.39	659.94	592.75	67.19	9.822	
9,100.00	9,059.33	9,165.49	9,062.33	32.84	35.00	89.56	-325.03	1,161.39	659.94	592.10	67.84	9.728	
9,200.00	9,159.33	9,265.49	9,162.33	33.18	35.32	89.56	-325.03	1,161.39	659.94	591.45	68.50	9.635	
9,300.00	9,259.33	9,365.49	9,262.33	33.52	35.63	89.56	-325.03	1,161.39	659.94	590.79	69.15	9.544	
9,400.00	9,359.33	9,465.49	9,362.33	33.86	35.95	89.56	-325.03	1,161.39	659.94	590.14	69.81	9.454	
9,500.00	9,459.33	9,565.49	9,462.33	34.20	36.27	89.56	-325.03	1,161.39	659.94	589.48	70.46	9.366	
9,600.00	9,559.33	9,665.49	9,562.33	34.54	36.58	89.56	-325.03	1,161.39	659.94	588.82	71.12	9.279	
9,700.00	9,659.33	9,765.49	9,662.33	34.88	36.90	89.56	-325.03	1,161.39	659.94	588.17	71.78	9.194	
9,800.00	9,759.33	9,865.49	9,762.33	35.22	37.22	89.56	-325.03	1,161.39	659.94	587.51	72.44	9.110	
9,900.00	9,859.33	9,965.49	9,862.33	35.56	37.54	89.56	-325.03	1,161.39	659.94	586.84	73.10	9.028	
10,000.00	9,959.33	10,065.49	9,962.33	35.90	37.86	89.56	-325.03	1,161.39	659.94	586.18	73.76	8.947	
10,100.00	10,059.33	10,165.49	10,062.33	36.24	38.18	89.56	-325.03	1,161.39	659.94	585.52	74.43	8.867	
10,200.00	10,159.33	10,265.49	10,162.33	36.59	38.50	89.56	-325.03	1,161.39	659.94	584.85	75.09	8.789	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 8H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	10,259.33	10,365.49	10,262.33	36.93	38.83	89.56	-325.03	1,161.39	659.94	584.19	75.76	8.712	
10,400.00	10,359.33	10,465.49	10,362.33	37.27	39.15	89.56	-325.03	1,161.39	659.94	583.52	76.42	8.636	
10,500.00	10,459.33	10,565.49	10,462.33	37.61	39.47	89.56	-325.03	1,161.39	659.94	582.86	77.09	8.561	
10,600.00	10,559.33	10,665.49	10,562.33	37.96	39.80	89.56	-325.03	1,161.39	659.94	582.19	77.76	8.487	
10,700.00	10,659.33	10,765.49	10,662.33	38.30	40.12	89.56	-325.03	1,161.39	659.94	581.52	78.43	8.415	
10,800.00	10,759.33	10,865.49	10,762.33	38.65	40.45	89.56	-325.03	1,161.39	659.94	580.85	79.09	8.344	
10,900.00	10,859.33	10,965.49	10,862.33	38.99	40.77	89.56	-325.03	1,161.39	659.94	580.18	79.77	8.274	
10,916.29	10,875.61	10,981.78	10,878.61	39.05	40.83	90.00	-325.03	1,161.39	659.94	580.07	79.87	8.262 CC	
11,000.00	10,959.17	11,065.34	10,962.17	39.33	41.10	90.30	-325.03	1,161.39	659.95	579.52	80.43	8.205	
11,100.00	11,056.39	11,162.56	11,059.39	39.64	41.42	92.14	-325.03	1,161.39	660.46	579.40	81.06	8.148	
11,200.00	11,146.77	11,258.67	11,155.45	39.90	41.73	95.21	-323.31	1,161.38	663.34	581.71	81.63	8.126	
11,300.00	11,226.37	11,369.48	11,263.80	40.09	42.04	98.63	-301.25	1,161.21	669.12	586.99	82.13	8.147	
11,400.00	11,291.71	11,495.92	11,377.35	40.22	42.29	101.95	-246.49	1,160.81	676.87	594.35	82.51	8.203	
11,500.00	11,339.94	11,641.53	11,485.03	40.28	42.44	104.93	-149.32	1,160.08	684.94	602.22	82.72	8.281	
11,600.00	11,368.94	11,806.69	11,565.42	40.29	42.42	107.09	-5.99	1,159.02	691.08	608.37	82.71	8.355	
11,700.00	11,377.44	11,984.50	11,592.18	40.28	42.26	107.80	168.76	1,157.72	693.12	610.58	82.54	8.397	
11,781.11	11,375.44	12,064.95	11,589.69	40.31	42.19	107.76	249.16	1,157.12	692.97	610.43	82.54	8.396	
11,800.00	11,374.24	12,083.84	11,589.10	40.33	42.17	107.81	268.04	1,156.98	693.15	610.60	82.55	8.396	
11,900.00	11,370.99	12,183.84	11,585.99	40.54	42.10	107.82	367.99	1,156.24	693.20	610.50	82.69	8.383	
12,000.00	11,367.75	12,283.83	11,582.89	40.82	42.04	107.83	467.94	1,155.49	693.24	610.34	82.90	8.362	
12,100.00	11,364.50	12,383.83	11,579.78	41.15	42.00	107.84	567.89	1,154.75	693.28	610.10	83.18	8.335	
12,200.00	11,361.26	12,483.83	11,576.68	41.53	42.10	107.85	667.84	1,154.00	693.33	609.51	83.81	8.272	
12,300.00	11,358.01	12,583.83	11,573.57	41.94	42.42	107.86	767.78	1,153.26	693.37	608.83	84.54	8.202	
12,400.00	11,354.77	12,683.83	11,570.46	42.41	42.81	107.87	867.73	1,152.52	693.42	608.05	85.36	8.123	
12,500.00	11,351.52	12,783.83	11,567.36	42.91	43.24	107.88	967.68	1,151.77	693.46	607.18	86.28	8.038	
12,600.00	11,348.27	12,883.83	11,564.25	43.46	43.71	107.89	1,067.63	1,151.03	693.50	606.23	87.27	7.946	
12,700.00	11,345.03	12,983.83	11,561.15	44.04	44.22	107.90	1,167.58	1,150.29	693.55	605.20	88.35	7.850	
12,800.00	11,341.78	13,083.83	11,558.04	44.66	44.77	107.92	1,267.53	1,149.54	693.59	604.08	89.51	7.749	
12,900.00	11,338.54	13,183.83	11,554.93	45.32	45.36	107.93	1,367.48	1,148.80	693.63	602.89	90.74	7.644	
13,000.00	11,335.29	13,283.83	11,551.83	46.02	45.98	107.94	1,467.43	1,148.06	693.68	601.63	92.05	7.536	
13,100.00	11,332.05	13,383.83	11,548.72	46.75	46.64	107.95	1,567.38	1,147.31	693.72	600.30	93.42	7.425	
13,200.00	11,328.80	13,483.83	11,545.61	47.51	47.33	107.96	1,667.32	1,146.57	693.77	598.90	94.87	7.313	
13,300.00	11,325.55	13,583.83	11,542.51	48.30	48.05	107.97	1,767.27	1,145.83	693.81	597.43	96.38	7.199	
13,400.00	11,322.31	13,683.83	11,539.40	49.12	48.81	107.98	1,867.22	1,145.08	693.85	595.91	97.94	7.084	
13,500.00	11,319.06	13,783.83	11,536.30	49.97	49.59	107.99	1,967.17	1,144.34	693.90	594.33	99.57	6.969	
13,600.00	11,315.82	13,883.83	11,533.19	50.85	50.40	108.00	2,067.12	1,143.60	693.94	592.69	101.25	6.854	
13,700.00	11,312.57	13,983.83	11,530.08	51.75	51.24	108.01	2,167.07	1,142.85	693.99	590.99	102.99	6.738	
13,800.00	11,309.32	14,083.83	11,526.98	52.67	52.11	108.03	2,267.02	1,142.11	694.03	589.25	104.78	6.624	
13,900.00	11,306.08	14,183.83	11,523.87	53.62	53.00	108.04	2,366.97	1,141.37	694.07	587.45	106.62	6.510	
14,000.00	11,302.83	14,283.83	11,520.76	54.59	53.91	108.05	2,466.92	1,140.62	694.12	585.61	108.50	6.397	
14,100.00	11,299.59	14,383.83	11,517.66	55.58	54.85	108.06	2,566.86	1,139.88	694.16	583.73	110.43	6.286	
14,200.00	11,296.34	14,483.83	11,514.55	56.59	55.80	108.07	2,666.81	1,139.14	694.21	581.81	112.40	6.176	
14,300.00	11,293.10	14,583.83	11,511.45	57.62	56.78	108.08	2,766.76	1,138.39	694.25	579.85	114.40	6.068	
14,400.00	11,289.85	14,683.83	11,508.34	58.67	57.78	108.09	2,866.71	1,137.65	694.29	577.85	116.45	5.962	
14,500.00	11,286.60	14,783.83	11,505.23	59.73	58.79	108.10	2,966.66	1,136.91	694.34	575.82	118.52	5.858	
14,600.00	11,283.36	14,883.83	11,502.13	60.81	59.83	108.11	3,066.61	1,136.16	694.38	573.75	120.63	5.756	
14,700.00	11,280.11	14,983.83	11,499.02	61.90	60.88	108.12	3,166.56	1,135.42	694.43	571.65	122.77	5.656	
14,800.00	11,276.87	15,083.83	11,495.92	63.01	61.94	108.13	3,266.51	1,134.68	694.47	569.52	124.95	5.558	
14,900.00	11,273.62	15,183.83	11,492.81	64.13	63.02	108.15	3,366.46	1,133.93	694.52	567.37	127.15	5.462	
15,000.00	11,270.38	15,283.83	11,489.70	65.26	64.11	108.16	3,466.40	1,133.19	694.56	565.19	129.37	5.369	
15,100.00	11,267.13	15,383.83	11,486.60	66.40	65.22	108.17	3,566.35	1,132.45	694.60	562.98	131.63	5.277	
15,200.00	11,263.88	15,483.83	11,483.49	67.56	66.34	108.18	3,666.30	1,131.70	694.65	560.75	133.90	5.188	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 8H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,300.00	11,260.64	15,583.83	11,480.38	68.73	67.47	108.19	3,766.25	1,130.96	694.69	558.49	136.20	5.100	
15,400.00	11,257.39	15,683.83	11,477.28	69.91	68.62	108.20	3,866.20	1,130.22	694.74	556.21	138.52	5.015	
15,500.00	11,254.15	15,783.83	11,474.17	71.09	69.77	108.21	3,966.15	1,129.47	694.78	553.91	140.87	4.932	
15,600.00	11,250.90	15,883.83	11,471.07	72.29	70.94	108.22	4,066.10	1,128.73	694.83	551.60	143.23	4.851	
15,700.00	11,247.66	15,983.83	11,467.96	73.50	72.11	108.23	4,166.05	1,127.98	694.87	549.26	145.61	4.772	
15,800.00	11,244.41	16,083.83	11,464.85	74.71	73.30	108.24	4,266.00	1,127.24	694.92	546.90	148.01	4.695	
15,900.00	11,241.16	16,183.83	11,461.75	75.93	74.49	108.25	4,365.94	1,126.50	694.96	544.53	150.43	4.620	
16,000.00	11,237.92	16,283.83	11,458.64	77.16	75.70	108.27	4,465.89	1,125.75	695.00	542.14	152.86	4.547	
16,100.00	11,234.67	16,383.83	11,455.53	78.40	76.91	108.28	4,565.84	1,125.01	695.05	539.74	155.31	4.475	
16,200.00	11,231.43	16,483.83	11,452.43	79.65	78.13	108.29	4,665.79	1,124.27	695.09	537.32	157.77	4.406	
16,300.00	11,228.18	16,583.83	11,449.32	80.90	79.35	108.30	4,765.74	1,123.52	695.14	534.89	160.25	4.338	
16,400.00	11,224.94	16,683.83	11,446.22	82.15	80.59	108.31	4,865.69	1,122.78	695.18	532.44	162.74	4.272	
16,500.00	11,221.69	16,783.83	11,443.11	83.42	81.83	108.32	4,965.64	1,122.04	695.23	529.98	165.25	4.207	
16,600.00	11,218.44	16,883.83	11,440.00	84.69	83.08	108.33	5,065.59	1,121.29	695.27	527.51	167.76	4.144	
16,700.00	11,215.20	16,983.83	11,436.90	85.96	84.33	108.34	5,165.54	1,120.55	695.32	525.03	170.29	4.083	
16,800.00	11,211.95	17,083.83	11,433.79	87.24	85.59	108.35	5,265.48	1,119.81	695.36	522.53	172.83	4.023	
16,900.00	11,208.71	17,183.83	11,430.69	88.53	86.85	108.36	5,365.43	1,119.06	695.41	520.03	175.38	3.965	
17,000.00	11,205.46	17,283.83	11,427.58	89.82	88.12	108.37	5,465.38	1,118.32	695.45	517.51	177.94	3.908	
17,100.00	11,202.22	17,383.83	11,424.47	91.11	89.40	108.39	5,565.33	1,117.58	695.50	514.99	180.51	3.853	
17,200.00	11,198.97	17,483.83	11,421.37	92.41	90.68	108.40	5,665.28	1,116.83	695.54	512.45	183.09	3.799	
17,300.00	11,195.72	17,583.83	11,418.26	93.71	91.97	108.41	5,765.23	1,116.09	695.59	509.91	185.68	3.746	
17,400.00	11,192.48	17,683.83	11,415.15	95.02	93.26	108.42	5,865.18	1,115.35	695.63	507.35	188.28	3.695	
17,500.00	11,189.23	17,783.83	11,412.05	96.33	94.55	108.43	5,965.13	1,114.60	695.68	504.79	190.88	3.645	
17,600.00	11,185.99	17,883.83	11,408.94	97.65	95.85	108.44	6,065.08	1,113.86	695.72	502.22	193.50	3.596	
17,700.00	11,182.74	17,983.83	11,405.84	98.96	97.15	108.45	6,165.02	1,113.12	695.77	499.65	196.12	3.548	
17,800.00	11,179.50	18,083.83	11,402.73	100.29	98.46	108.46	6,264.97	1,112.37	695.81	497.06	198.75	3.501	
17,900.00	11,176.25	18,183.83	11,399.62	101.61	99.77	108.47	6,364.92	1,111.63	695.86	494.47	201.38	3.455	
18,000.00	11,173.00	18,283.83	11,396.52	102.94	101.09	108.48	6,464.87	1,110.89	695.90	491.87	204.03	3.411	
18,100.00	11,169.76	18,383.83	11,393.41	104.27	102.40	108.49	6,564.82	1,110.14	695.95	489.27	206.68	3.367	
18,200.00	11,166.51	18,483.83	11,390.30	105.61	103.73	108.50	6,664.77	1,109.40	695.99	486.66	209.33	3.325	
18,300.00	11,163.27	18,583.83	11,387.20	106.94	105.05	108.52	6,764.72	1,108.66	696.04	484.04	212.00	3.283	
18,400.00	11,160.02	18,683.83	11,384.09	108.28	106.38	108.53	6,864.67	1,107.91	696.08	481.42	214.66	3.243	
18,500.00	11,156.78	18,783.83	11,380.99	109.63	107.71	108.54	6,964.62	1,107.17	696.13	478.79	217.34	3.203	
18,600.00	11,153.53	18,883.83	11,377.88	110.97	109.04	108.55	7,064.56	1,106.43	696.17	476.16	220.02	3.164	
18,700.00	11,150.28	18,983.83	11,374.77	112.32	110.38	108.56	7,164.51	1,105.68	696.22	473.52	222.70	3.126	
18,800.00	11,147.04	19,083.83	11,371.67	113.67	111.72	108.57	7,264.46	1,104.94	696.26	470.87	225.39	3.089	
18,805.33	11,146.86	19,089.16	11,371.50	113.74	111.79	108.57	7,269.79	1,104.90	696.27	470.73	225.53	3.087	
18,893.59	11,144.00	19,169.71	11,369.00	114.94	112.87	108.58	7,350.30	1,104.30	696.35	468.54	227.81	3.057	ES, SF

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 9H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	1.00	1.00	0.00	0.00	-90.38	-0.20	-30.00	30.00				
100.00	100.00	101.00	101.00	0.14	0.14	-90.38	-0.20	-30.00	30.00	29.72	0.28	108.689	
200.00	200.00	201.00	201.00	0.49	0.50	-90.38	-0.20	-30.00	30.00	29.01	0.99	30.213	
300.00	300.00	301.00	301.00	0.85	0.86	-90.38	-0.20	-30.00	30.00	28.29	1.71	17.545	
400.00	400.00	401.00	401.00	1.21	1.22	-90.38	-0.20	-30.00	30.00	27.57	2.43	12.362	
500.00	500.00	501.00	501.00	1.57	1.57	-90.38	-0.20	-30.00	30.00	26.86	3.14	9.543	
600.00	600.00	601.00	601.00	1.93	1.93	-90.38	-0.20	-30.00	30.00	26.14	3.86	7.771	
700.00	700.00	701.00	701.00	2.29	2.29	-90.38	-0.20	-30.00	30.00	25.42	4.58	6.554	
800.00	800.00	801.00	801.00	2.65	2.65	-90.38	-0.20	-30.00	30.00	24.71	5.29	5.666	
900.00	900.00	901.00	901.00	3.00	3.01	-90.38	-0.20	-30.00	30.00	23.99	6.01	4.990	
1,000.00	1,000.00	1,001.00	1,001.00	3.36	3.37	-90.38	-0.20	-30.00	30.00	23.27	6.73	4.459	
1,100.00	1,100.00	1,101.00	1,101.00	3.72	3.72	-90.38	-0.20	-30.00	30.00	22.56	7.45	4.029	
1,200.00	1,200.00	1,201.00	1,201.00	4.08	4.08	-90.38	-0.20	-30.00	30.00	21.84	8.16	3.675	
1,300.00	1,300.00	1,301.00	1,301.00	4.44	4.44	-90.38	-0.20	-30.00	30.00	21.12	8.88	3.379	
1,400.00	1,400.00	1,401.00	1,401.00	4.80	4.80	-90.38	-0.20	-30.00	30.00	20.40	9.60	3.126	
1,500.00	1,500.00	1,501.00	1,501.00	5.15	5.16	-90.38	-0.20	-30.00	30.00	19.69	10.31	2.909	
1,600.00	1,600.00	1,601.00	1,601.00	5.51	5.52	-90.38	-0.20	-30.00	30.00	18.97	11.03	2.720	
1,700.00	1,700.00	1,701.00	1,701.00	5.87	5.88	-90.38	-0.20	-30.00	30.00	18.25	11.75	2.554	
1,800.00	1,800.00	1,801.00	1,801.00	6.23	6.23	-90.38	-0.20	-30.00	30.00	17.54	12.46	2.407	
1,900.00	1,900.00	1,901.00	1,901.00	6.59	6.59	-90.38	-0.20	-30.00	30.00	16.82	13.18	2.276	
2,000.00	2,000.00	2,001.00	2,001.00	6.95	6.95	-90.38	-0.20	-30.00	30.00	16.10	13.90	2.159	
2,100.00	2,100.00	2,101.00	2,101.00	7.31	7.31	-90.38	-0.20	-30.00	30.00	15.39	14.61	2.053	
2,200.00	2,200.00	2,201.00	2,201.00	7.66	7.67	-90.38	-0.20	-30.00	30.00	14.67	15.33	1.957	
2,300.00	2,300.00	2,301.00	2,301.00	8.02	8.03	-90.38	-0.20	-30.00	30.00	13.95	16.05	1.869	
2,400.00	2,400.00	2,401.00	2,401.00	8.38	8.38	-90.38	-0.20	-30.00	30.00	13.23	16.77	1.789	
2,416.33	2,416.33	2,417.33	2,417.33	8.44	8.44	-90.38	-0.20	-30.00	30.00	13.12	16.88	1.777 CC	
2,500.00	2,500.00	2,501.00	2,501.00	8.74	8.74	-90.38	-0.20	-30.00	30.00	12.52	17.48	1.716 ES, SF	
2,600.00	2,599.98	2,600.57	2,600.55	9.08	9.08	145.03	-1.85	-30.63	32.10	13.94	18.17	1.767	
2,700.00	2,699.84	2,700.00	2,699.84	9.42	9.41	142.22	-6.72	-32.50	38.45	19.63	18.82	2.043	
2,800.00	2,799.45	2,798.58	2,798.03	9.75	9.73	139.17	-14.71	-35.57	49.11	29.63	19.48	2.521	
2,899.95	2,898.65	2,897.49	2,896.41	10.09	10.05	137.87	-24.37	-39.27	63.28	43.13	20.15	3.141	
3,000.00	2,997.73	2,996.34	2,994.72	10.44	10.38	138.03	-34.01	-42.96	78.75	57.93	20.82	3.782	
3,100.00	3,096.76	3,095.14	3,092.97	10.79	10.72	138.14	-43.65	-46.66	94.22	72.71	21.51	4.381	
3,200.00	3,195.78	3,193.93	3,191.23	11.14	11.06	138.22	-53.29	-50.36	109.69	87.49	22.20	4.941	
3,300.00	3,294.81	3,292.73	3,289.48	11.50	11.40	138.28	-62.93	-54.05	125.15	102.26	22.89	5.466	
3,400.00	3,393.84	3,391.53	3,387.74	11.86	11.74	138.33	-72.57	-57.75	140.62	117.02	23.60	5.959	
3,500.00	3,492.86	3,490.32	3,486.00	12.22	12.08	138.37	-82.21	-61.44	156.08	131.78	24.31	6.421	
3,600.00	3,591.89	3,589.12	3,584.25	12.59	12.43	138.40	-91.85	-65.14	171.55	146.53	25.02	6.856	
3,700.00	3,690.92	3,687.92	3,682.51	12.96	12.78	138.42	-101.48	-68.84	187.02	161.28	25.74	7.266	
3,800.00	3,789.95	3,786.71	3,780.76	13.33	13.13	138.45	-111.12	-72.53	202.48	176.02	26.46	7.652	
3,900.00	3,888.97	3,885.51	3,879.02	13.70	13.49	138.46	-120.76	-76.23	217.95	190.76	27.19	8.016	
4,000.00	3,988.00	3,984.31	3,977.28	14.08	13.84	138.48	-130.40	-79.92	233.42	205.50	27.92	8.360	
4,100.00	4,087.03	4,083.10	4,075.53	14.46	14.20	138.49	-140.04	-83.62	248.88	220.23	28.65	8.686	
4,200.00	4,186.05	4,181.90	4,173.79	14.84	14.56	138.51	-149.68	-87.32	264.35	234.96	29.39	8.994	
4,300.00	4,285.08	4,280.70	4,272.04	15.22	14.91	138.52	-159.32	-91.01	279.82	249.69	30.13	9.287	
4,400.00	4,384.11	4,379.49	4,370.30	15.60	15.27	138.53	-168.96	-94.71	295.28	264.41	30.87	9.565	
4,500.00	4,483.13	4,478.29	4,468.55	15.98	15.64	138.54	-178.60	-98.40	310.75	279.13	31.62	9.828	
4,600.00	4,582.16	4,577.09	4,566.81	16.37	16.00	138.54	-188.24	-102.10	326.22	293.85	32.36	10.079	
4,700.00	4,681.19	4,675.88	4,665.07	16.75	16.36	138.55	-197.88	-105.80	341.68	308.57	33.11	10.319	
4,800.00	4,780.22	4,774.68	4,763.32	17.14	16.73	138.56	-207.52	-109.49	357.15	323.29	33.86	10.546	
4,900.00	4,879.24	4,873.48	4,861.58	17.53	17.09	138.57	-217.16	-113.19	372.62	338.00	34.62	10.764	
5,000.00	4,978.27	4,972.27	4,959.83	17.91	17.46	138.57	-226.80	-116.88	388.08	352.71	35.37	10.971	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 9H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,077.30	5,071.07	5,058.09	18.30	17.83	138.58	-236.44	-120.58	403.55	367.42	36.13	11.170	
5,200.00	5,176.32	5,169.87	5,156.34	18.69	18.19	138.58	-246.07	-124.28	419.02	382.13	36.89	11.359	
5,300.00	5,275.35	5,268.66	5,254.60	19.08	18.56	138.59	-255.71	-127.97	434.49	396.84	37.65	11.541	
5,400.00	5,374.38	5,367.46	5,352.86	19.48	18.93	138.59	-265.35	-131.67	449.95	411.54	38.41	11.715	
5,500.00	5,473.41	5,466.26	5,451.11	19.87	19.30	138.59	-274.99	-135.36	465.42	426.25	39.17	11.882	
5,600.00	5,572.43	5,565.05	5,549.37	20.26	19.67	138.60	-284.63	-139.06	480.89	440.95	39.93	12.042	
5,700.00	5,671.46	5,663.85	5,647.62	20.66	20.04	138.60	-294.27	-142.76	496.35	455.65	40.70	12.196	
5,800.00	5,770.49	5,762.65	5,745.88	21.05	20.41	138.60	-303.91	-146.45	511.82	470.36	41.46	12.344	
5,900.00	5,869.51	5,861.44	5,844.14	21.45	20.78	138.61	-313.55	-150.15	527.29	485.06	42.23	12.486	
6,000.00	5,968.54	5,962.92	5,945.07	21.84	21.17	138.62	-323.31	-153.89	542.69	499.68	43.01	12.619	
6,100.00	6,067.57	6,071.86	6,053.69	22.24	21.57	138.92	-330.97	-156.82	556.77	512.97	43.80	12.711	
6,200.00	6,166.60	6,181.01	6,162.77	22.63	21.95	139.57	-334.76	-158.28	569.10	524.51	44.59	12.764	
6,300.00	6,265.62	6,284.87	6,266.62	23.03	22.31	140.46	-335.21	-158.45	580.01	534.67	45.34	12.793	
6,400.00	6,364.65	6,383.90	6,365.65	23.43	22.64	141.31	-335.21	-158.45	590.85	544.78	46.07	12.826	
6,500.00	6,463.68	6,482.93	6,464.68	23.82	22.97	142.14	-335.21	-158.45	601.81	555.02	46.80	12.860	
6,600.00	6,562.70	6,581.95	6,563.70	24.22	23.31	142.93	-335.21	-158.45	612.90	565.37	47.53	12.895	
6,700.00	6,661.73	6,680.98	6,662.73	24.62	23.64	143.70	-335.21	-158.45	624.10	575.84	48.26	12.932	
6,800.00	6,760.76	6,780.01	6,761.76	25.02	23.97	144.44	-335.21	-158.45	635.40	586.41	48.99	12.969	
6,900.00	6,859.95	6,879.20	6,860.95	25.41	24.31	145.19	-335.21	-158.45	645.75	596.03	49.72	12.987	
7,000.00	6,959.52	6,978.77	6,960.52	25.79	24.65	145.74	-335.21	-158.45	653.33	602.89	50.44	12.953	
7,100.00	7,059.36	7,078.60	7,060.36	26.15	24.99	146.07	-335.21	-158.45	658.06	606.93	51.14	12.868	
7,200.00	7,159.33	7,178.57	7,160.33	26.50	25.33	146.20	-335.21	-158.45	659.91	608.09	51.82	12.734	
7,300.00	7,259.33	7,278.57	7,260.33	26.83	25.67	-90.44	-335.21	-158.45	659.94	607.44	52.49	12.572	
7,400.00	7,359.33	7,378.57	7,360.33	27.15	26.01	-90.44	-335.21	-158.45	659.94	606.77	53.16	12.413	
7,500.00	7,459.33	7,478.57	7,460.33	27.48	26.35	-90.44	-335.21	-158.45	659.94	606.10	53.83	12.259	
7,600.00	7,559.33	7,578.57	7,560.33	27.81	26.69	-90.44	-335.21	-158.45	659.94	605.43	54.51	12.108	
7,700.00	7,659.33	7,678.57	7,660.33	28.15	27.03	-90.44	-335.21	-158.45	659.94	604.76	55.18	11.960	
7,800.00	7,759.33	7,778.57	7,760.33	28.48	27.38	-90.44	-335.21	-158.45	659.94	604.08	55.85	11.816	
7,900.00	7,859.33	7,878.57	7,860.33	28.81	27.72	-90.44	-335.21	-158.45	659.94	603.41	56.53	11.674	
8,000.00	7,959.33	7,978.57	7,960.33	29.14	28.06	-90.44	-335.21	-158.45	659.94	602.73	57.20	11.536	
8,100.00	8,059.33	8,078.57	8,060.33	29.47	28.41	-90.44	-335.21	-158.45	659.94	602.05	57.88	11.401	
8,200.00	8,159.33	8,178.57	8,160.33	29.81	28.75	-90.44	-335.21	-158.45	659.94	601.38	58.56	11.269	
8,300.00	8,259.33	8,278.57	8,260.33	30.14	29.10	-90.44	-335.21	-158.45	659.94	600.70	59.24	11.140	
8,400.00	8,359.33	8,378.57	8,360.33	30.48	29.44	-90.44	-335.21	-158.45	659.94	600.02	59.92	11.014	
8,500.00	8,459.33	8,478.57	8,460.33	30.81	29.79	-90.44	-335.21	-158.45	659.94	599.34	60.60	10.890	
8,600.00	8,559.33	8,578.57	8,560.33	31.15	30.13	-90.44	-335.21	-158.45	659.94	598.65	61.28	10.769	
8,700.00	8,659.33	8,678.57	8,660.33	31.49	30.48	-90.44	-335.21	-158.45	659.94	597.97	61.96	10.650	
8,800.00	8,759.33	8,778.57	8,760.33	31.82	30.82	-90.44	-335.21	-158.45	659.94	597.29	62.65	10.534	
8,900.00	8,859.33	8,878.57	8,860.33	32.16	31.17	-90.44	-335.21	-158.45	659.94	596.61	63.33	10.420	
9,000.00	8,959.33	8,978.57	8,960.33	32.50	31.52	-90.44	-335.21	-158.45	659.94	595.92	64.02	10.309	
9,100.00	9,059.33	9,078.57	9,060.33	32.84	31.86	-90.44	-335.21	-158.45	659.94	595.24	64.70	10.200	
9,200.00	9,159.33	9,178.57	9,160.33	33.18	32.21	-90.44	-335.21	-158.45	659.94	594.55	65.39	10.093	
9,300.00	9,259.33	9,278.57	9,260.33	33.52	32.56	-90.44	-335.21	-158.45	659.94	593.86	66.07	9.988	
9,400.00	9,359.33	9,378.57	9,360.33	33.86	32.91	-90.44	-335.21	-158.45	659.94	593.17	66.76	9.885	
9,500.00	9,459.33	9,478.57	9,460.33	34.20	33.25	-90.44	-335.21	-158.45	659.94	592.49	67.45	9.784	
9,600.00	9,559.33	9,578.57	9,560.33	34.54	33.60	-90.44	-335.21	-158.45	659.94	591.80	68.14	9.685	
9,700.00	9,659.33	9,678.57	9,660.33	34.88	33.95	-90.44	-335.21	-158.45	659.94	591.11	68.83	9.588	
9,800.00	9,759.33	9,778.57	9,760.33	35.22	34.30	-90.44	-335.21	-158.45	659.94	590.42	69.52	9.493	
9,900.00	9,859.33	9,878.57	9,860.33	35.56	34.65	-90.44	-335.21	-158.45	659.94	589.73	70.21	9.400	
10,000.00	9,959.33	9,978.57	9,960.33	35.90	35.00	-90.44	-335.21	-158.45	659.94	589.04	70.90	9.308	
10,100.00	10,059.33	10,078.57	10,060.33	36.24	35.35	-90.44	-335.21	-158.45	659.94	588.35	71.59	9.218	
10,200.00	10,159.33	10,178.57	10,160.33	36.59	35.70	-90.44	-335.21	-158.45	659.94	587.66	72.28	9.130	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 9H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	10,259.33	10,278.57	10,260.33	36.93	36.05	-90.44	-335.21	-158.45	659.94	586.96	72.97	9.043	
10,400.00	10,359.33	10,378.57	10,360.33	37.27	36.40	-90.44	-335.21	-158.45	659.94	586.27	73.67	8.958	
10,500.00	10,459.33	10,478.57	10,460.33	37.61	36.75	-90.44	-335.21	-158.45	659.94	585.58	74.36	8.875	
10,600.00	10,559.33	10,578.57	10,560.33	37.96	37.10	-90.44	-335.21	-158.45	659.94	584.88	75.05	8.793	
10,700.00	10,659.33	10,678.57	10,660.33	38.30	37.45	-90.44	-335.21	-158.45	659.94	584.19	75.75	8.712	
10,800.00	10,759.33	10,778.57	10,760.33	38.65	37.80	-90.44	-335.21	-158.45	659.94	583.49	76.44	8.633	
10,900.00	10,859.33	10,878.57	10,860.33	38.99	38.15	-90.44	-335.21	-158.45	659.94	582.80	77.14	8.555	
10,900.05	10,859.38	10,878.62	10,860.38	38.99	38.15	-90.44	-335.21	-158.45	659.94	582.80	77.14	8.555	
11,000.00	10,959.17	10,978.42	10,960.17	39.33	38.50	-90.33	-335.21	-158.45	659.95	582.12	77.83	8.480	
11,100.00	11,056.39	11,075.64	11,057.39	39.64	38.84	-92.17	-335.21	-158.45	660.47	581.99	78.48	8.416	
11,200.00	11,146.77	11,167.98	11,149.73	39.90	39.16	-95.18	-335.02	-158.45	663.50	584.44	79.06	8.393	
11,300.00	11,226.37	11,276.68	11,257.10	40.09	39.52	-98.89	-319.63	-158.57	670.29	590.67	79.61	8.419	
11,400.00	11,291.71	11,403.08	11,373.74	40.22	39.88	-102.58	-271.90	-158.92	679.73	599.63	80.10	8.486	
11,500.00	11,339.94	11,552.94	11,490.00	40.28	40.22	-106.05	-178.31	-159.62	689.91	609.41	80.50	8.570	
11,600.00	11,368.94	11,728.91	11,581.72	40.29	40.52	-108.70	-29.31	-160.73	697.87	617.05	80.82	8.635	
11,700.00	11,377.44	11,922.98	11,613.25	40.28	40.80	-109.60	160.83	-162.15	700.53	619.45	81.08	8.640	
11,789.59	11,375.18	12,011.37	11,610.26	40.32	40.95	-109.54	249.16	-162.81	700.27	618.95	81.32	8.612	
11,800.00	11,374.24	12,021.79	11,609.91	40.33	40.97	-109.59	259.58	-162.89	700.47	619.11	81.36	8.610	
11,900.00	11,370.99	12,121.79	11,606.52	40.54	41.20	-109.57	359.52	-163.63	700.42	618.62	81.80	8.563	
12,000.00	11,367.75	12,221.79	11,603.14	40.82	41.48	-109.56	459.46	-164.38	700.38	618.04	82.34	8.506	
12,100.00	11,364.50	12,321.79	11,599.75	41.15	41.80	-109.55	559.40	-165.12	700.33	617.35	82.98	8.440	
12,200.00	11,361.26	12,421.79	11,596.37	41.53	42.17	-109.54	659.33	-165.87	700.29	616.57	83.71	8.365	
12,300.00	11,358.01	12,521.79	11,592.98	41.94	42.59	-109.53	759.27	-166.61	700.24	615.70	84.54	8.283	
12,400.00	11,354.77	12,621.79	11,589.60	42.41	43.05	-109.52	859.21	-167.36	700.19	614.73	85.46	8.193	
12,500.00	11,351.52	12,721.79	11,586.21	42.91	43.56	-109.51	959.15	-168.10	700.15	613.68	86.47	8.097	
12,600.00	11,348.27	12,821.79	11,582.83	43.46	44.10	-109.50	1,059.09	-168.85	700.10	612.54	87.56	7.995	
12,700.00	11,345.03	12,921.79	11,579.44	44.04	44.69	-109.49	1,159.03	-169.59	700.06	611.32	88.73	7.889	
12,800.00	11,341.78	13,021.79	11,576.06	44.66	45.32	-109.48	1,258.97	-170.34	700.01	610.03	89.98	7.780	
12,900.00	11,338.54	13,121.79	11,572.67	45.32	45.98	-109.47	1,358.91	-171.08	699.97	608.66	91.30	7.666	
13,000.00	11,335.29	13,221.79	11,569.29	46.02	46.68	-109.46	1,458.85	-171.83	699.92	607.23	92.69	7.551	
13,100.00	11,332.05	13,321.79	11,565.90	46.75	47.41	-109.44	1,558.79	-172.58	699.87	605.72	94.15	7.433	
13,200.00	11,328.80	13,421.79	11,562.51	47.51	48.17	-109.43	1,658.73	-173.32	699.83	604.15	95.68	7.314	
13,300.00	11,325.55	13,521.79	11,559.13	48.30	48.96	-109.42	1,758.67	-174.07	699.78	602.52	97.26	7.195	
13,400.00	11,322.31	13,621.79	11,555.74	49.12	49.79	-109.41	1,858.61	-174.81	699.74	600.83	98.91	7.075	
13,500.00	11,319.06	13,721.79	11,552.36	49.97	50.64	-109.40	1,958.55	-175.56	699.69	599.08	100.61	6.955	
13,600.00	11,315.82	13,821.79	11,548.97	50.85	51.52	-109.39	2,058.49	-176.30	699.65	597.28	102.36	6.835	
13,700.00	11,312.57	13,921.79	11,545.59	51.75	52.42	-109.38	2,158.43	-177.05	699.60	595.43	104.17	6.716	
13,800.00	11,309.32	14,021.79	11,542.20	52.67	53.34	-109.37	2,258.37	-177.79	699.56	593.54	106.02	6.598	
13,900.00	11,306.08	14,121.79	11,538.82	53.62	54.29	-109.36	2,358.31	-178.54	699.51	591.60	107.92	6.482	
14,000.00	11,302.83	14,221.79	11,535.43	54.59	55.26	-109.35	2,458.25	-179.28	699.47	589.61	109.86	6.367	
14,100.00	11,299.59	14,321.79	11,532.05	55.58	56.25	-109.34	2,558.19	-180.03	699.42	587.58	111.84	6.254	
14,200.00	11,296.34	14,421.79	11,528.66	56.59	57.27	-109.33	2,658.13	-180.77	699.38	585.52	113.86	6.143	
14,300.00	11,293.10	14,521.79	11,525.28	57.62	58.29	-109.32	2,758.07	-181.52	699.33	583.42	115.91	6.033	
14,400.00	11,289.85	14,621.79	11,521.89	58.67	59.34	-109.30	2,858.01	-182.26	699.28	581.28	118.01	5.926	
14,500.00	11,286.60	14,721.79	11,518.51	59.73	60.40	-109.29	2,957.95	-183.01	699.24	579.11	120.13	5.821	
14,600.00	11,283.36	14,821.79	11,515.12	60.81	61.48	-109.28	3,057.89	-183.75	699.19	576.91	122.29	5.718	
14,700.00	11,280.11	14,921.79	11,511.74	61.90	62.57	-109.27	3,157.83	-184.50	699.15	574.68	124.47	5.617	
14,800.00	11,276.87	15,021.79	11,508.35	63.01	63.68	-109.26	3,257.77	-185.24	699.10	572.42	126.69	5.518	
14,900.00	11,273.62	15,121.79	11,504.96	64.13	64.80	-109.25	3,357.71	-185.99	699.06	570.13	128.93	5.422	
15,000.00	11,270.38	15,221.79	11,501.58	65.26	65.93	-109.24	3,457.65	-186.73	699.01	567.82	131.19	5.328	
15,100.00	11,267.13	15,321.79	11,498.19	66.40	67.08	-109.23	3,557.59	-187.48	698.97	565.49	133.48	5.236	
15,200.00	11,263.88	15,421.79	11,494.81	67.56	68.23	-109.22	3,657.53	-188.22	698.92	563.13	135.79	5.147	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Little Bear Federal Com - 9H - OH - Plan 1 04-12-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,300.00	11,260.64	15,521.79	11,491.42	68.73	69.40	-109.21	3,757.47	-188.97	698.88	560.75	138.13	5.060	
15,400.00	11,257.39	15,621.79	11,488.04	69.91	70.58	-109.20	3,857.41	-189.72	698.83	558.35	140.48	4.974	
15,500.00	11,254.15	15,721.79	11,484.65	71.09	71.76	-109.19	3,957.35	-190.46	698.79	555.93	142.86	4.891	
15,600.00	11,250.90	15,821.79	11,481.27	72.29	72.96	-109.17	4,057.29	-191.21	698.74	553.49	145.25	4.811	
15,700.00	11,247.66	15,921.79	11,477.88	73.50	74.17	-109.16	4,157.23	-191.95	698.70	551.04	147.66	4.732	
15,800.00	11,244.41	16,021.79	11,474.50	74.71	75.38	-109.15	4,257.17	-192.70	698.65	548.56	150.09	4.655	
15,900.00	11,241.16	16,121.79	11,471.11	75.93	76.60	-109.14	4,357.11	-193.44	698.61	546.07	152.53	4.580	
16,000.00	11,237.92	16,221.79	11,467.73	77.16	77.83	-109.13	4,457.05	-194.19	698.56	543.57	154.99	4.507	
16,100.00	11,234.67	16,321.79	11,464.34	78.40	79.07	-109.12	4,556.99	-194.93	698.52	541.05	157.47	4.436	
16,200.00	11,231.43	16,421.79	11,460.96	79.65	80.31	-109.11	4,656.93	-195.68	698.47	538.52	159.95	4.367	
16,300.00	11,228.18	16,521.79	11,457.57	80.90	81.56	-109.10	4,756.87	-196.42	698.43	535.97	162.46	4.299	
16,400.00	11,224.94	16,621.79	11,454.19	82.15	82.82	-109.09	4,856.81	-197.17	698.38	533.42	164.97	4.233	
16,500.00	11,221.69	16,721.79	11,450.80	83.42	84.08	-109.08	4,956.75	-197.91	698.34	530.84	167.50	4.169	
16,600.00	11,218.44	16,821.79	11,447.41	84.69	85.35	-109.07	5,056.69	-198.66	698.30	528.26	170.03	4.107	
16,700.00	11,215.20	16,921.79	11,444.03	85.96	86.62	-109.05	5,156.63	-199.40	698.25	525.67	172.58	4.046	
16,800.00	11,211.95	17,021.79	11,440.64	87.24	87.90	-109.04	5,256.57	-200.15	698.21	523.07	175.14	3.987	
16,900.00	11,208.71	17,121.79	11,437.26	88.53	89.18	-109.03	5,356.51	-200.89	698.16	520.45	177.71	3.929	
17,000.00	11,205.46	17,221.79	11,433.87	89.82	90.47	-109.02	5,456.45	-201.64	698.12	517.83	180.29	3.872	
17,100.00	11,202.22	17,321.79	11,430.49	91.11	91.77	-109.01	5,556.39	-202.38	698.07	515.20	182.88	3.817	
17,200.00	11,198.97	17,421.79	11,427.10	92.41	93.06	-109.00	5,656.33	-203.13	698.03	512.55	185.47	3.763	
17,300.00	11,195.72	17,521.79	11,423.72	93.71	94.37	-108.99	5,756.27	-203.87	697.98	509.90	188.08	3.711	
17,400.00	11,192.48	17,621.79	11,420.33	95.02	95.67	-108.98	5,856.20	-204.62	697.94	507.25	190.69	3.660	
17,500.00	11,189.23	17,721.79	11,416.95	96.33	96.98	-108.97	5,956.14	-205.37	697.89	504.58	193.31	3.610	
17,600.00	11,185.99	17,821.79	11,413.56	97.65	98.30	-108.96	6,056.08	-206.11	697.85	501.91	195.94	3.561	
17,700.00	11,182.74	17,921.78	11,410.18	98.96	99.62	-108.95	6,156.02	-206.86	697.81	499.23	198.58	3.514	
17,800.00	11,179.50	18,021.78	11,406.79	100.29	100.94	-108.94	6,255.96	-207.60	697.76	496.54	201.22	3.468	
17,900.00	11,176.25	18,121.78	11,403.41	101.61	102.26	-108.92	6,355.90	-208.35	697.72	493.84	203.87	3.422	
18,000.00	11,173.00	18,221.78	11,400.02	102.94	103.59	-108.91	6,455.84	-209.09	697.67	491.14	206.53	3.378	
18,100.00	11,169.76	18,321.78	11,396.64	104.27	104.92	-108.90	6,555.78	-209.84	697.63	488.44	209.19	3.335	
18,200.00	11,166.51	18,421.78	11,393.25	105.61	106.25	-108.89	6,655.72	-210.58	697.58	485.72	211.86	3.293	
18,300.00	11,163.27	18,521.78	11,389.86	106.94	107.59	-108.88	6,755.66	-211.33	697.54	483.00	214.54	3.251	
18,400.00	11,160.02	18,621.78	11,386.48	108.28	108.93	-108.87	6,855.60	-212.07	697.50	480.28	217.21	3.211	
18,500.00	11,156.78	18,721.78	11,383.09	109.63	110.27	-108.86	6,955.54	-212.82	697.45	477.55	219.90	3.172	
18,600.00	11,153.53	18,821.78	11,379.71	110.97	111.62	-108.85	7,055.48	-213.56	697.41	474.82	222.59	3.133	
18,700.00	11,150.28	18,921.78	11,376.32	112.32	112.96	-108.84	7,155.42	-214.31	697.36	472.08	225.29	3.095	
18,800.00	11,147.04	19,021.78	11,372.94	113.67	114.31	-108.83	7,255.36	-215.05	697.32	469.33	227.99	3.059	
18,885.68	11,144.26	19,107.46	11,370.04	114.83	115.47	-108.82	7,340.99	-215.69	697.28	466.98	230.30	3.028	
18,893.59	11,144.00	19,108.57	11,370.00	114.94	115.49	-108.82	7,342.10	-215.70	697.31	466.89	230.42	3.026	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Paloma 21 Federal - #1H - WB1 / Job #1411774 - Plan #1 09-15-14 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	18,177.25	11,082.41	0.00	161.78	-5.87	7,875.00	-809.60	13,757.45				
100.00	100.00	18,177.25	11,082.41	0.14	161.78	-5.87	7,875.00	-809.60	13,675.79	13,513.88	161.91	84.463	
200.00	200.00	18,177.25	11,082.41	0.49	161.78	-5.87	7,875.00	-809.60	13,594.37	13,432.10	162.27	83.775	
300.00	300.00	18,177.25	11,082.41	0.85	161.78	-5.87	7,875.00	-809.60	13,513.20	13,350.57	162.63	83.091	
400.00	400.00	18,177.25	11,082.41	1.21	161.78	-5.87	7,875.00	-809.60	13,432.29	13,269.30	162.99	82.412	
500.00	500.00	18,177.25	11,082.41	1.57	161.78	-5.87	7,875.00	-809.60	13,351.63	13,188.28	163.35	81.737	
600.00	600.00	18,177.25	11,082.41	1.93	161.78	-5.87	7,875.00	-809.60	13,271.24	13,107.53	163.71	81.067	
700.00	700.00	18,177.25	11,082.41	2.29	161.78	-5.87	7,875.00	-809.60	13,191.11	13,027.05	164.07	80.401	
800.00	800.00	18,177.25	11,082.41	2.65	161.78	-5.87	7,875.00	-809.60	13,111.26	12,946.84	164.42	79.740	
900.00	900.00	18,177.25	11,082.41	3.00	161.78	-5.87	7,875.00	-809.60	13,031.69	12,866.90	164.78	79.084	
1,000.00	1,000.00	18,177.25	11,082.41	3.36	161.78	-5.87	7,875.00	-809.60	12,952.40	12,787.25	165.14	78.432	
1,100.00	1,100.00	18,177.25	11,082.41	3.72	161.78	-5.87	7,875.00	-809.60	12,873.39	12,707.89	165.50	77.785	
1,200.00	1,200.00	18,177.25	11,082.41	4.08	161.78	-5.87	7,875.00	-809.60	12,794.68	12,628.83	165.86	77.142	
1,300.00	1,300.00	18,177.25	11,082.41	4.44	161.78	-5.87	7,875.00	-809.60	12,716.27	12,550.06	166.22	76.504	
1,400.00	1,400.00	18,177.25	11,082.41	4.80	161.78	-5.87	7,875.00	-809.60	12,638.17	12,471.59	166.57	75.871	
1,500.00	1,500.00	18,177.25	11,082.41	5.15	161.78	-5.87	7,875.00	-809.60	12,560.38	12,393.44	166.93	75.242	
1,600.00	1,600.00	18,177.25	11,082.41	5.51	161.78	-5.87	7,875.00	-809.60	12,482.90	12,315.61	167.29	74.617	
1,700.00	1,700.00	18,177.25	11,082.41	5.87	161.78	-5.87	7,875.00	-809.60	12,405.74	12,238.09	167.65	73.998	
1,800.00	1,800.00	18,177.25	11,082.41	6.23	161.78	-5.87	7,875.00	-809.60	12,328.91	12,160.91	168.01	73.383	
1,900.00	1,900.00	18,177.25	11,082.41	6.59	161.78	-5.87	7,875.00	-809.60	12,252.42	12,084.05	168.37	72.772	
2,000.00	2,000.00	18,177.25	11,082.41	6.95	161.78	-5.87	7,875.00	-809.60	12,176.27	12,007.54	168.73	72.166	
2,100.00	2,100.00	18,177.25	11,082.41	7.31	161.78	-5.87	7,875.00	-809.60	12,100.46	11,931.38	169.08	71.565	
2,200.00	2,200.00	18,177.25	11,082.41	7.66	161.78	-5.87	7,875.00	-809.60	12,025.01	11,855.57	169.44	70.968	
2,300.00	2,300.00	18,177.25	11,082.41	8.02	161.78	-5.87	7,875.00	-809.60	11,949.92	11,780.12	169.80	70.376	
2,400.00	2,400.00	18,177.25	11,082.41	8.38	161.78	-5.87	7,875.00	-809.60	11,875.20	11,705.04	170.16	69.789	
2,500.00	2,500.00	18,177.25	11,082.41	8.74	161.78	-5.87	7,875.00	-809.60	11,800.85	11,630.33	170.52	69.206	
2,600.00	2,599.98	18,177.25	11,082.41	9.08	161.78	-130.87	7,875.00	-809.60	11,727.64	11,556.78	170.86	68.638	
2,700.00	2,699.84	18,177.25	11,082.41	9.42	161.78	-132.39	7,875.00	-809.60	11,656.42	11,485.22	171.20	68.088	
2,800.00	2,799.45	18,177.25	11,082.41	9.75	161.78	-133.79	7,875.00	-809.60	11,587.31	11,415.78	171.53	67.552	
2,899.95	2,898.65	18,177.25	11,082.41	10.09	161.78	-135.07	7,875.00	-809.60	11,520.47	11,348.60	171.87	67.029	
3,000.00	2,997.73	18,177.25	11,082.41	10.44	161.78	-135.07	7,875.00	-809.60	11,454.96	11,282.75	172.22	66.514	
3,100.00	3,096.76	18,177.25	11,082.41	10.79	161.78	-135.07	7,875.00	-809.60	11,390.00	11,217.43	172.57	66.003	
3,200.00	3,195.78	18,177.25	11,082.41	11.14	161.78	-135.07	7,875.00	-809.60	11,325.54	11,152.62	172.92	65.495	
3,300.00	3,294.81	18,177.25	11,082.41	11.50	161.78	-135.07	7,875.00	-809.60	11,261.60	11,088.32	173.28	64.991	
3,400.00	3,393.84	18,177.25	11,082.41	11.86	161.78	-135.07	7,875.00	-809.60	11,198.19	11,024.55	173.64	64.491	
3,500.00	3,492.86	18,177.25	11,082.41	12.22	161.78	-135.07	7,875.00	-809.60	11,135.31	10,961.31	174.00	63.995	
3,600.00	3,591.89	18,177.25	11,082.41	12.59	161.78	-135.07	7,875.00	-809.60	11,072.98	10,898.62	174.37	63.503	
3,700.00	3,690.92	18,177.25	11,082.41	12.96	161.78	-135.07	7,875.00	-809.60	11,011.21	10,836.47	174.74	63.016	
3,800.00	3,789.95	18,177.25	11,082.41	13.33	161.78	-135.07	7,875.00	-809.60	10,950.00	10,774.89	175.11	62.532	
3,900.00	3,888.97	18,177.25	11,082.41	13.70	161.78	-135.07	7,875.00	-809.60	10,889.37	10,713.89	175.48	62.054	
4,000.00	3,988.00	18,177.25	11,082.41	14.08	161.78	-135.07	7,875.00	-809.60	10,829.32	10,653.46	175.86	61.580	
4,100.00	4,087.03	18,177.25	11,082.41	14.46	161.78	-135.07	7,875.00	-809.60	10,769.86	10,593.63	176.24	61.111	
4,200.00	4,186.05	18,177.25	11,082.41	14.84	161.78	-135.07	7,875.00	-809.60	10,711.01	10,534.40	176.61	60.646	
4,300.00	4,285.08	18,177.25	11,082.41	15.22	161.78	-135.07	7,875.00	-809.60	10,652.77	10,475.78	176.99	60.187	
4,400.00	4,384.11	18,177.25	11,082.41	15.60	161.78	-135.07	7,875.00	-809.60	10,595.16	10,417.78	177.38	59.733	
4,500.00	4,483.13	18,177.25	11,082.41	15.98	161.78	-135.07	7,875.00	-809.60	10,538.18	10,360.42	177.76	59.283	
4,600.00	4,582.16	18,177.25	11,082.41	16.37	161.78	-135.07	7,875.00	-809.60	10,481.84	10,303.69	178.14	58.839	
4,700.00	4,681.19	18,177.25	11,082.41	16.75	161.78	-135.07	7,875.00	-809.60	10,426.16	10,247.63	178.53	58.400	
4,800.00	4,780.22	18,177.25	11,082.41	17.14	161.78	-135.07	7,875.00	-809.60	10,371.14	10,192.22	178.92	57.966	
4,900.00	4,879.24	18,177.25	11,082.41	17.53	161.78	-135.07	7,875.00	-809.60	10,316.80	10,137.49	179.30	57.538	
5,000.00	4,978.27	18,177.25	11,082.41	17.91	161.78	-135.07	7,875.00	-809.60	10,263.14	10,083.45	179.69	57.115	
5,100.00	5,077.30	18,177.25	11,082.41	18.30	161.78	-135.07	7,875.00	-809.60	10,210.19	10,030.10	180.08	56.697	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Paloma 21 Federal - #1H - WB1 / Job #1411774 - Plan #1 09-15-14 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,176.32	18,177.25	11,082.41	18.69	161.78	-135.07	7,875.00	-809.60	10,157.94	9,977.47	180.47	56.285	
5,300.00	5,275.35	18,177.25	11,082.41	19.08	161.78	-135.07	7,875.00	-809.60	10,106.41	9,925.55	180.86	55.879	
5,400.00	5,374.38	18,177.25	11,082.41	19.48	161.78	-135.07	7,875.00	-809.60	10,055.61	9,874.35	181.26	55.478	
5,500.00	5,473.41	18,177.25	11,082.41	19.87	161.78	-135.07	7,875.00	-809.60	10,005.55	9,823.91	181.65	55.082	
5,600.00	5,572.43	18,177.25	11,082.41	20.26	161.78	-135.07	7,875.00	-809.60	9,956.25	9,774.21	182.04	54.692	
5,700.00	5,671.46	18,177.25	11,082.41	20.66	161.78	-135.07	7,875.00	-809.60	9,907.71	9,725.27	182.43	54.308	
5,800.00	5,770.49	18,177.25	11,082.41	21.05	161.78	-135.07	7,875.00	-809.60	9,859.94	9,677.11	182.83	53.930	
5,900.00	5,869.51	18,177.25	11,082.41	21.45	161.78	-135.07	7,875.00	-809.60	9,812.96	9,629.74	183.22	53.557	
6,000.00	5,968.54	18,177.25	11,082.41	21.84	161.78	-135.07	7,875.00	-809.60	9,766.78	9,583.16	183.62	53.190	
6,100.00	6,067.57	18,177.25	11,082.41	22.24	161.78	-135.07	7,875.00	-809.60	9,721.41	9,537.40	184.02	52.829	
6,200.00	6,166.60	18,177.25	11,082.41	22.63	161.78	-135.07	7,875.00	-809.60	9,676.86	9,492.45	184.41	52.474	
6,300.00	6,265.62	18,177.25	11,082.41	23.03	161.78	-135.07	7,875.00	-809.60	9,633.14	9,448.33	184.81	52.125	
6,400.00	6,364.65	18,177.25	11,082.41	23.43	161.78	-135.07	7,875.00	-809.60	9,590.27	9,405.06	185.21	51.782	
6,500.00	6,463.68	18,177.25	11,082.41	23.82	161.78	-135.07	7,875.00	-809.60	9,548.25	9,362.64	185.60	51.444	
6,600.00	6,562.70	18,177.25	11,082.41	24.22	161.78	-135.07	7,875.00	-809.60	9,507.09	9,321.09	186.00	51.113	
6,700.00	6,661.73	18,177.25	11,082.41	24.62	161.78	-135.07	7,875.00	-809.60	9,466.82	9,280.42	186.40	50.788	
6,800.00	6,760.76	18,177.25	11,082.41	25.02	161.78	-135.07	7,875.00	-809.60	9,427.43	9,240.63	186.80	50.468	
6,900.00	6,859.95	18,177.25	11,082.41	25.41	161.78	-134.54	7,875.00	-809.60	9,388.10	9,200.90	187.19	50.152	
7,000.00	6,959.52	18,177.25	11,082.41	25.79	161.78	-133.91	7,875.00	-809.60	9,347.43	9,159.87	187.57	49.835	
7,100.00	7,059.36	18,177.25	11,082.41	26.15	161.78	-133.24	7,875.00	-809.60	9,305.46	9,117.53	187.93	49.515	
7,200.00	7,159.33	18,177.25	11,082.41	26.50	161.78	-132.53	7,875.00	-809.60	9,262.19	9,073.92	188.28	49.195	
7,300.00	7,259.33	18,177.25	11,082.41	26.83	161.78	-9.08	7,875.00	-809.60	9,218.47	9,029.86	188.60	48.877	
7,400.00	7,359.33	18,177.25	11,082.41	27.15	161.78	-9.08	7,875.00	-809.60	9,175.61	8,986.67	188.93	48.565	
7,500.00	7,459.33	18,177.25	11,082.41	27.48	161.78	-9.08	7,875.00	-809.60	9,133.64	8,944.37	189.26	48.259	
7,600.00	7,559.33	18,177.25	11,082.41	27.81	161.78	-9.08	7,875.00	-809.60	9,092.57	8,902.98	189.59	47.958	
7,700.00	7,659.33	18,177.25	11,082.41	28.15	161.78	-9.08	7,875.00	-809.60	9,052.43	8,862.50	189.92	47.663	
7,800.00	7,759.33	18,177.25	11,082.41	28.48	161.78	-9.08	7,875.00	-809.60	9,013.21	8,822.96	190.26	47.374	
7,900.00	7,859.33	18,177.25	11,082.41	28.81	161.78	-9.08	7,875.00	-809.60	8,974.94	8,784.35	190.59	47.091	
8,000.00	7,959.33	18,177.25	11,082.41	29.14	161.78	-9.08	7,875.00	-809.60	8,937.62	8,746.70	190.92	46.813	
8,100.00	8,059.33	18,177.25	11,082.41	29.47	161.78	-9.08	7,875.00	-809.60	8,901.27	8,710.02	191.25	46.542	
8,200.00	8,159.33	18,177.25	11,082.41	29.81	161.78	-9.08	7,875.00	-809.60	8,865.90	8,674.32	191.59	46.276	
8,300.00	8,259.33	18,177.25	11,082.41	30.14	161.78	-9.08	7,875.00	-809.60	8,831.52	8,639.60	191.92	46.016	
8,400.00	8,359.33	18,177.25	11,082.41	30.48	161.78	-9.08	7,875.00	-809.60	8,798.15	8,605.89	192.26	45.762	
8,500.00	8,459.33	18,177.25	11,082.41	30.81	161.78	-9.08	7,875.00	-809.60	8,765.78	8,573.19	192.59	45.515	
8,600.00	8,559.33	18,177.25	11,082.41	31.15	161.78	-9.08	7,875.00	-809.60	8,734.44	8,541.51	192.93	45.273	
8,700.00	8,659.33	18,177.25	11,082.41	31.49	161.78	-9.08	7,875.00	-809.60	8,704.14	8,510.88	193.27	45.037	
8,800.00	8,759.33	18,177.25	11,082.41	31.82	161.78	-9.08	7,875.00	-809.60	8,674.88	8,481.28	193.60	44.808	
8,900.00	8,859.33	18,177.25	11,082.41	32.16	161.78	-9.08	7,875.00	-809.60	8,646.69	8,452.75	193.94	44.584	
9,000.00	8,959.33	18,177.25	11,082.41	32.50	161.78	-9.08	7,875.00	-809.60	8,619.56	8,425.28	194.28	44.367	
9,100.00	9,059.33	18,177.25	11,082.41	32.84	161.78	-9.08	7,875.00	-809.60	8,593.50	8,398.89	194.62	44.156	
9,200.00	9,159.33	18,177.25	11,082.41	33.18	161.78	-9.08	7,875.00	-809.60	8,568.54	8,373.58	194.96	43.951	
9,300.00	9,259.33	18,177.25	11,082.41	33.52	161.78	-9.08	7,875.00	-809.60	8,544.67	8,349.38	195.29	43.753	
9,400.00	9,359.33	18,177.25	11,082.41	33.86	161.78	-9.08	7,875.00	-809.60	8,521.91	8,326.28	195.63	43.561	
9,500.00	9,459.33	18,177.25	11,082.41	34.20	161.78	-9.08	7,875.00	-809.60	8,500.27	8,304.29	195.97	43.374	
9,600.00	9,559.33	18,177.25	11,082.41	34.54	161.78	-9.08	7,875.00	-809.60	8,479.75	8,283.43	196.31	43.195	
9,700.00	9,659.33	18,177.25	11,082.41	34.88	161.78	-9.08	7,875.00	-809.60	8,460.36	8,263.70	196.66	43.021	
9,800.00	9,759.33	18,177.25	11,082.41	35.22	161.78	-9.08	7,875.00	-809.60	8,442.11	8,245.12	197.00	42.854	
9,900.00	9,859.33	18,177.25	11,082.41	35.56	161.78	-9.08	7,875.00	-809.60	8,425.01	8,227.67	197.34	42.693	
10,000.00	9,959.33	18,177.25	11,082.41	35.90	161.78	-9.08	7,875.00	-809.60	8,409.07	8,211.39	197.68	42.539	
10,100.00	10,059.33	18,177.25	11,082.41	36.24	161.78	-9.08	7,875.00	-809.60	8,394.28	8,196.26	198.02	42.391	
10,200.00	10,159.33	18,177.25	11,082.41	36.59	161.78	-9.08	7,875.00	-809.60	8,380.66	8,182.30	198.36	42.249	
10,300.00	10,259.33	18,177.25	11,082.41	36.93	161.78	-9.08	7,875.00	-809.60	8,368.22	8,169.51	198.71	42.113	

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Paloma 21 Federal - #1H - WB1 / Job #1411774 - Plan #1 09-15-14 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	10,359.33	18,177.25	11,082.41	37.27	161.78	-9.08	7,875.00	-809.60	8,356.95	8,157.90	199.05	41.984	
10,500.00	10,459.33	18,177.25	11,082.41	37.61	161.78	-9.08	7,875.00	-809.60	8,346.87	8,147.47	199.39	41.861	
10,600.00	10,559.33	18,177.25	11,082.41	37.96	161.78	-9.08	7,875.00	-809.60	8,337.97	8,138.23	199.74	41.745	
10,700.00	10,659.33	18,177.25	11,082.41	38.30	161.78	-9.08	7,875.00	-809.60	8,330.27	8,130.18	200.08	41.635	
10,800.00	10,759.33	18,177.25	11,082.41	38.65	161.78	-9.08	7,875.00	-809.60	8,323.75	8,123.33	200.42	41.531	
10,900.00	10,859.33	18,177.25	11,082.41	38.99	161.78	-9.08	7,875.00	-809.60	8,318.44	8,117.67	200.77	41.433	
11,000.00	10,959.17	18,177.25	11,082.41	39.33	161.78	-8.76	7,875.00	-809.60	8,310.70	8,109.59	201.11	41.324	
11,100.00	11,056.39	18,177.25	11,082.41	39.64	161.78	-9.25	7,875.00	-809.60	8,285.47	8,084.05	201.42	41.135	
11,200.00	11,146.77	18,177.25	11,082.41	39.90	161.78	-10.24	7,875.00	-809.60	8,241.97	8,040.29	201.68	40.867	
11,300.00	11,226.37	18,177.25	11,082.41	40.09	161.78	-11.99	7,875.00	-809.60	8,181.82	7,979.95	201.87	40.530	
11,400.00	11,291.71	18,177.25	11,082.41	40.22	161.78	-15.16	7,875.00	-809.60	8,107.31	7,905.32	202.00	40.136	
11,500.00	11,339.94	18,177.25	11,082.41	40.28	161.78	-21.56	7,875.00	-809.60	8,021.36	7,819.30	202.06	39.698	
11,600.00	11,368.94	18,177.25	11,082.41	40.29	161.78	-38.10	7,875.00	-809.60	7,927.41	7,725.34	202.07	39.231	
11,700.00	11,377.44	18,177.25	11,082.41	40.28	161.78	-91.10	7,875.00	-809.60	7,829.36	7,627.31	202.06	38.748	
11,800.00	11,374.24	18,177.25	11,082.41	40.33	161.78	-95.71	7,875.00	-809.60	7,730.67	7,528.52	202.16	38.241	
11,900.00	11,370.99	18,177.25	11,082.41	40.54	161.78	-95.71	7,875.00	-809.60	7,632.02	7,429.65	202.37	37.713	
12,000.00	11,367.75	18,177.25	11,082.41	40.82	161.78	-95.71	7,875.00	-809.60	7,533.40	7,330.76	202.64	37.176	
12,100.00	11,364.50	18,177.25	11,082.41	41.15	161.78	-95.71	7,875.00	-809.60	7,434.82	7,231.87	202.95	36.633	
12,200.00	11,361.26	18,177.25	11,082.41	41.53	161.78	-95.71	7,875.00	-809.60	7,336.28	7,132.96	203.32	36.083	
12,300.00	11,358.01	18,177.25	11,082.41	41.94	161.78	-95.71	7,875.00	-809.60	7,237.78	7,034.05	203.72	35.527	
12,400.00	11,354.77	18,177.25	11,082.41	42.41	161.78	-95.71	7,875.00	-809.60	7,139.31	6,935.13	204.19	34.965	
12,500.00	11,351.52	18,177.25	11,082.41	42.91	161.78	-95.71	7,875.00	-809.60	7,040.90	6,836.21	204.69	34.398	
12,600.00	11,348.27	18,177.25	11,082.41	43.46	161.78	-95.71	7,875.00	-809.60	6,942.52	6,737.29	205.23	33.827	
12,700.00	11,345.03	18,177.25	11,082.41	44.04	161.78	-95.71	7,875.00	-809.60	6,844.20	6,638.38	205.82	33.253	
12,800.00	11,341.78	18,177.25	11,082.41	44.66	161.78	-95.71	7,875.00	-809.60	6,745.92	6,539.48	206.44	32.677	
12,900.00	11,338.54	18,177.25	11,082.41	45.32	161.78	-95.71	7,875.00	-809.60	6,647.70	6,440.59	207.10	32.099	
13,000.00	11,335.29	18,177.25	11,082.41	46.02	161.78	-95.71	7,875.00	-809.60	6,549.53	6,341.73	207.80	31.519	
13,100.00	11,332.05	18,177.25	11,082.41	46.75	161.78	-95.71	7,875.00	-809.60	6,451.41	6,242.88	208.53	30.938	
13,200.00	11,328.80	18,177.25	11,082.41	47.51	161.78	-95.71	7,875.00	-809.60	6,353.35	6,144.07	209.29	30.357	
13,300.00	11,325.55	18,177.25	11,082.41	48.30	161.78	-95.71	7,875.00	-809.60	6,255.36	6,045.28	210.08	29.776	
13,400.00	11,322.31	18,177.25	11,082.41	49.12	161.78	-95.71	7,875.00	-809.60	6,157.43	5,946.53	210.90	29.196	
13,500.00	11,319.06	18,177.25	11,082.41	49.97	161.78	-95.71	7,875.00	-809.60	6,059.57	5,847.82	211.75	28.617	
13,600.00	11,315.82	18,177.25	11,082.41	50.85	161.78	-95.71	7,875.00	-809.60	5,961.77	5,749.15	212.63	28.039	
13,700.00	11,312.57	18,177.25	11,082.41	51.75	161.78	-95.71	7,875.00	-809.60	5,864.06	5,650.53	213.53	27.463	
13,800.00	11,309.32	18,177.25	11,082.41	52.67	161.78	-95.71	7,875.00	-809.60	5,766.42	5,551.97	214.45	26.889	
13,900.00	11,306.08	18,177.25	11,082.41	53.62	161.78	-95.71	7,875.00	-809.60	5,668.86	5,453.46	215.40	26.318	
14,000.00	11,302.83	18,177.25	11,082.41	54.59	161.78	-95.71	7,875.00	-809.60	5,571.39	5,355.02	216.37	25.749	
14,100.00	11,299.59	18,177.25	11,082.41	55.58	161.78	-95.71	7,875.00	-809.60	5,474.01	5,256.65	217.36	25.184	
14,200.00	11,296.34	18,177.25	11,082.41	56.59	161.78	-95.71	7,875.00	-809.60	5,376.73	5,158.36	218.37	24.622	
14,300.00	11,293.10	18,177.25	11,082.41	57.62	161.78	-95.71	7,875.00	-809.60	5,279.55	5,060.15	219.40	24.064	
14,400.00	11,289.85	18,177.25	11,082.41	58.67	161.78	-95.71	7,875.00	-809.60	5,182.48	4,962.03	220.44	23.509	
14,500.00	11,286.60	18,177.25	11,082.41	59.73	161.78	-95.71	7,875.00	-809.60	5,085.52	4,864.01	221.51	22.959	
14,600.00	11,283.36	18,177.25	11,082.41	60.81	161.78	-95.71	7,875.00	-809.60	4,988.68	4,766.09	222.59	22.412	
14,700.00	11,280.11	18,177.25	11,082.41	61.90	161.78	-95.71	7,875.00	-809.60	4,891.96	4,668.29	223.68	21.871	
14,800.00	11,276.87	18,177.25	11,082.41	63.01	161.78	-95.71	7,875.00	-809.60	4,795.38	4,570.60	224.78	21.333	
14,900.00	11,273.62	18,177.25	11,082.41	64.13	161.78	-95.71	7,875.00	-809.60	4,698.95	4,473.04	225.91	20.801	
15,000.00	11,270.38	18,177.25	11,082.41	65.26	161.78	-95.71	7,875.00	-809.60	4,602.67	4,375.63	227.04	20.273	
15,100.00	11,267.13	18,177.25	11,082.41	66.40	161.78	-95.71	7,875.00	-809.60	4,506.55	4,278.36	228.18	19.750	
15,200.00	11,263.88	18,177.25	11,082.41	67.56	161.78	-95.71	7,875.00	-809.60	4,410.60	4,181.26	229.34	19.232	
15,300.00	11,260.64	18,177.25	11,082.41	68.73	161.78	-95.71	7,875.00	-809.60	4,314.83	4,084.32	230.51	18.719	
15,400.00	11,257.39	18,177.25	11,082.41	69.91	161.78	-95.71	7,875.00	-809.60	4,219.26	3,987.58	231.69	18.211	
15,500.00	11,254.15	18,177.25	11,082.41	71.09	161.78	-95.71	7,875.00	-809.60	4,123.91	3,891.03	232.87	17.709	

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

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Offset Design Paloma 21 Federal - #1H - WB1 / Job #1411774 - Plan #1 09-15-14 — **Offset Site Error:** 0.00 usft

Survey Program: 0- — **Offset Well Error:** 0.00 usft

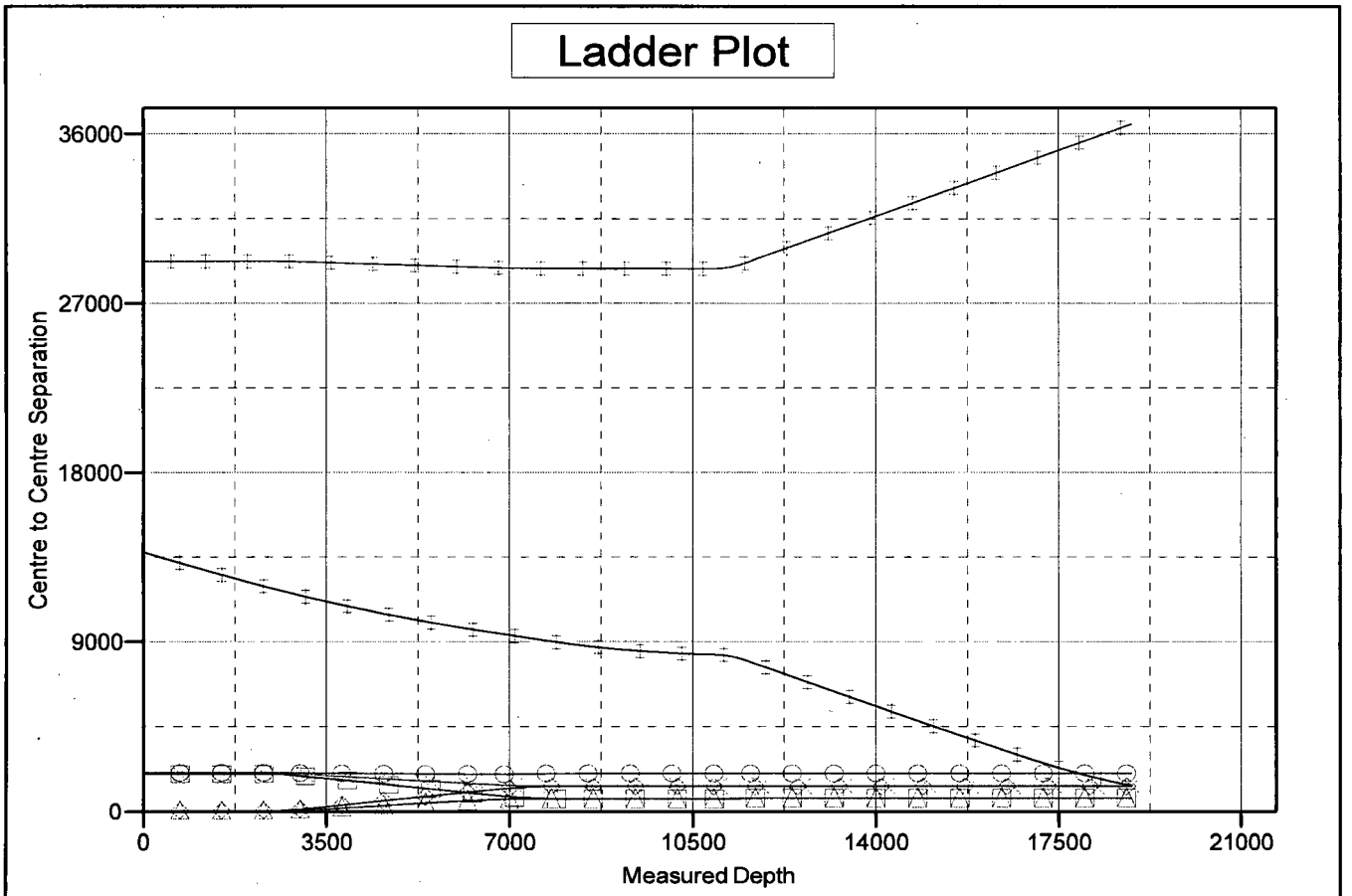
Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,600.00	11,250.90	18,177.25	11,082.41	72.29	161.78	-95.71	7,875.00	-809.60	4,028.77	3,794.70	234.07	17.212	
15,700.00	11,247.66	18,177.25	11,082.41	73.50	161.78	-95.71	7,875.00	-809.60	3,933.88	3,698.61	235.28	16.720	
15,800.00	11,244.41	18,177.25	11,082.41	74.71	161.78	-95.71	7,875.00	-809.60	3,839.25	3,602.76	236.49	16.234	
15,900.00	11,241.16	18,177.25	11,082.41	75.93	161.78	-95.71	7,875.00	-809.60	3,744.90	3,507.18	237.71	15.754	
16,000.00	11,237.92	18,177.25	11,082.41	77.16	161.78	-95.71	7,875.00	-809.60	3,650.84	3,411.90	238.94	15.279	
16,100.00	11,234.67	18,177.25	11,082.41	78.40	161.78	-95.71	7,875.00	-809.60	3,557.12	3,316.94	240.18	14.810	
16,200.00	11,231.43	18,177.25	11,082.41	79.65	161.78	-95.71	7,875.00	-809.60	3,463.74	3,222.32	241.42	14.347	
16,300.00	11,228.18	18,177.25	11,082.41	80.90	161.78	-95.71	7,875.00	-809.60	3,370.74	3,128.07	242.67	13.890	
16,400.00	11,224.94	18,177.25	11,082.41	82.15	161.78	-95.71	7,875.00	-809.60	3,278.16	3,034.23	243.93	13.439	
16,500.00	11,221.69	18,177.25	11,082.41	83.42	161.78	-95.71	7,875.00	-809.60	3,186.02	2,940.83	245.20	12.994	
16,600.00	11,218.44	18,177.25	11,082.41	84.69	161.78	-95.71	7,875.00	-809.60	3,094.37	2,847.91	246.46	12.555	
16,700.00	11,215.20	18,177.25	11,082.41	85.96	161.78	-95.71	7,875.00	-809.60	3,003.26	2,755.52	247.74	12.123	
16,800.00	11,211.95	18,177.25	11,082.41	87.24	161.78	-95.71	7,875.00	-809.60	2,912.73	2,663.71	249.02	11.697	
16,900.00	11,208.71	18,177.25	11,082.41	88.53	161.78	-95.71	7,875.00	-809.60	2,822.83	2,572.53	250.30	11.278	
17,000.00	11,205.46	18,177.25	11,082.41	89.82	161.78	-95.71	7,875.00	-809.60	2,733.64	2,482.05	251.59	10.865	
17,100.00	11,202.22	18,177.25	11,082.41	91.11	161.78	-95.71	7,875.00	-809.60	2,645.22	2,392.34	252.89	10.460	
17,200.00	11,198.97	18,177.25	11,082.41	92.41	161.78	-95.71	7,875.00	-809.60	2,557.66	2,303.47	254.19	10.062	
17,300.00	11,195.72	18,177.25	11,082.41	93.71	161.78	-95.71	7,875.00	-809.60	2,471.04	2,215.55	255.49	9.672	
17,400.00	11,192.48	18,177.25	11,082.41	95.02	161.78	-95.71	7,875.00	-809.60	2,385.47	2,128.67	256.80	9.289	
17,500.00	11,189.23	18,177.25	11,082.41	96.33	161.78	-95.71	7,875.00	-809.60	2,301.06	2,042.95	258.11	8.915	
17,600.00	11,185.99	18,177.25	11,082.41	97.65	161.78	-95.71	7,875.00	-809.60	2,217.94	1,958.52	259.42	8.549	
17,700.00	11,182.74	18,177.25	11,082.41	98.96	161.78	-95.71	7,875.00	-809.60	2,136.28	1,875.54	260.74	8.193	
17,800.00	11,179.50	18,177.25	11,082.41	100.29	161.78	-95.71	7,875.00	-809.60	2,056.23	1,794.17	262.07	7.846	
17,900.00	11,176.25	18,177.25	11,082.41	101.61	161.78	-95.71	7,875.00	-809.60	1,978.01	1,714.62	263.39	7.510	
18,000.00	11,173.00	18,177.25	11,082.41	102.94	161.78	-95.71	7,875.00	-809.60	1,901.82	1,637.10	264.72	7.184	
18,100.00	11,169.76	18,177.25	11,082.41	104.27	161.78	-95.71	7,875.00	-809.60	1,827.93	1,561.88	266.05	6.871	
18,200.00	11,166.51	18,177.25	11,082.41	105.61	161.78	-95.71	7,875.00	-809.60	1,756.63	1,489.24	267.39	6.570	
18,300.00	11,163.27	18,177.25	11,082.41	106.94	161.78	-95.71	7,875.00	-809.60	1,688.24	1,419.52	268.72	6.282	
18,400.00	11,160.02	18,177.25	11,082.41	108.28	161.78	-95.71	7,875.00	-809.60	1,623.14	1,353.07	270.06	6.010	
18,500.00	11,156.78	18,177.25	11,082.41	109.63	161.78	-95.71	7,875.00	-809.60	1,561.73	1,290.32	271.41	5.754	
18,600.00	11,153.53	18,177.25	11,082.41	110.97	161.78	-95.71	7,875.00	-809.60	1,504.46	1,231.71	272.75	5.516	
18,700.00	11,150.28	18,177.25	11,082.41	112.32	161.78	-95.71	7,875.00	-809.60	1,451.83	1,177.73	274.10	5.297	
18,800.00	11,147.04	18,177.25	11,082.41	113.67	161.78	-95.71	7,875.00	-809.60	1,404.36	1,128.91	275.45	5.098	
18,893.59	11,144.00	18,177.25	11,082.41	114.94	161.78	-95.71	7,875.00	-809.60	1,365.08	1,088.37	276.72	4.933	CC, ES, SF

Anticollision Report

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3828.00usft (Ensign 155)	Coordinates are relative to: 4H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.00000 W	Grid Convergence at Surface is: 0.41°

Ladder Plot



LEGEND

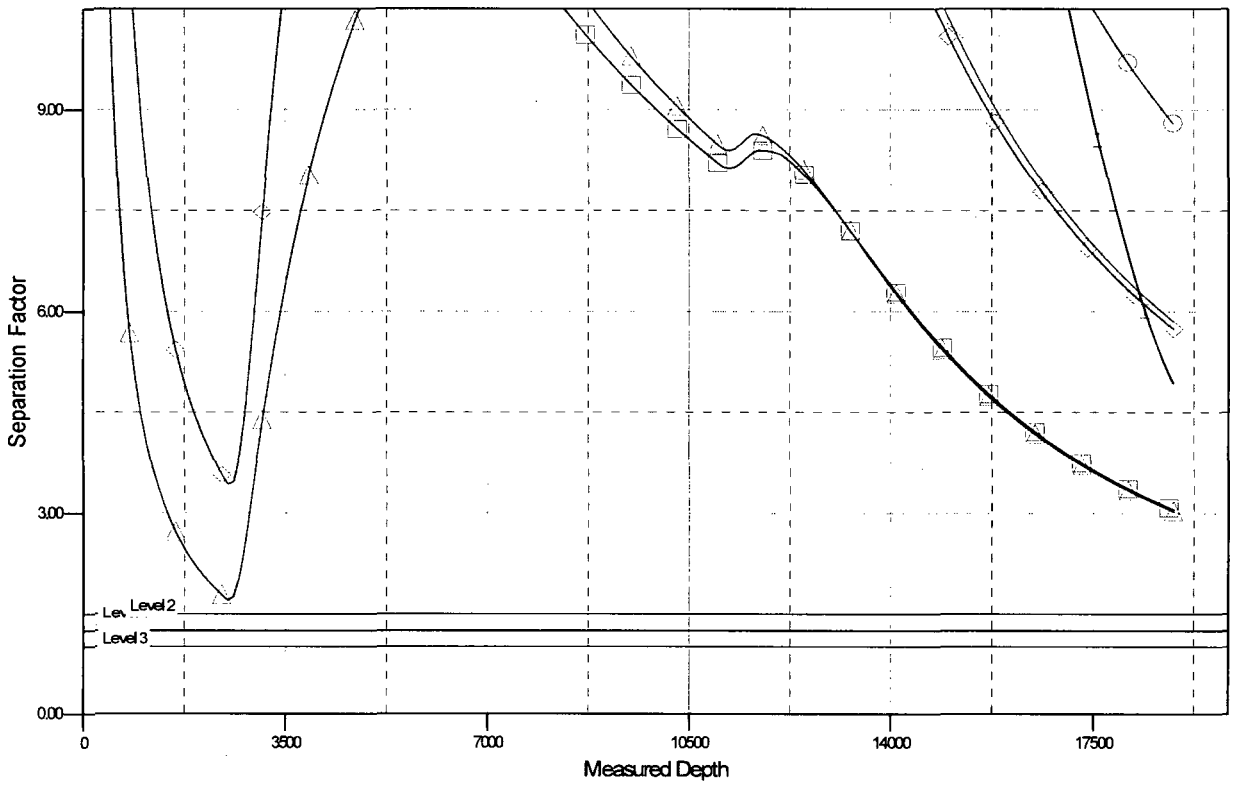
- 8H, OH, Plan 1 04-12-18 V0
- 7H, OH, Plan 1 04-12-18 V0
- 5H, OH, Plan 1 04-12-18 V0
- 9H, OH, Plan 1 04-12-18 V0
- 3H, OH, Plan 1 04-12-18 V0
- 4H, OH / Job #61199, Plan 3 05-09-17 V0
- #1H, WB1 / Job #1411774, Plan #1 09-15-14

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 4H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Reference Site:	Little Bear Federal Com	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 04-12-18	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3828.00usft (Ensign 155)	Coordinates are relative to: 4H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.00000 W	Grid Convergence at Surface is: 0.41°

Separation Factor Plot



LEGEND

- 8H, OH, Plan 1 04-12-18 V0
- 7H, OH, Plan 1 04-12-18 V0
- 5H, OH, Plan 1 04-12-18 V0
- 9H, OH, Plan 1 04-12-18 V0
- 3H, OH, Plan 1 04-12-18 V0
- 4H, OH / Job #61199, Plan 3 05-09-17 V0
- #1H, WB1 / Job #1411774, Plan #1 09-15-14'

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

CONCHO

Project: Lea County, NM (NAD27 NME)
Site: Little Bear Federal Com
Well: 4H
Wellbore: OH
Design: Plan 1 04-12-18
Rig: Ensign 155

T G M

Azimuths to Grid North
True North: -0.41°
Magnetic North: 6.35°

Magnetic Field
Strength: 48261.1snT
Dip Angle: 60.45°
Date: 4/10/2018
Model: MVHD

RKB @ 3828.00usft (Ensign 155)

3804.00

WELL DETAILS

3804.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	554915.90	735397.00	32° 31' 23.71586 N	103° 34' 10.61720 W

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well 4H, Grid North

Latitude: 32° 31' 23.71586 N
Longitude: 103° 34' 10.61720 W

Grid East: 735397.00
Grid North: 554915.90
Scale Factor: 1.000

Geomagnetic Model: MVHD
Sample Date: 10-Apr-18
Magnetic Declination: 6.76°
Dip Angle from Horizontal: 60.45°
Magnetic Field Strength: 48261.07091357nT

To convert a Magnetic Direction to a Grid Direction, Add 6.35°
To convert a Magnetic Direction to a True Direction, Add 6.76° East
To convert a True Direction to a Grid Direction, Subtract 0.41°

DESIGN TARGET DETAILS

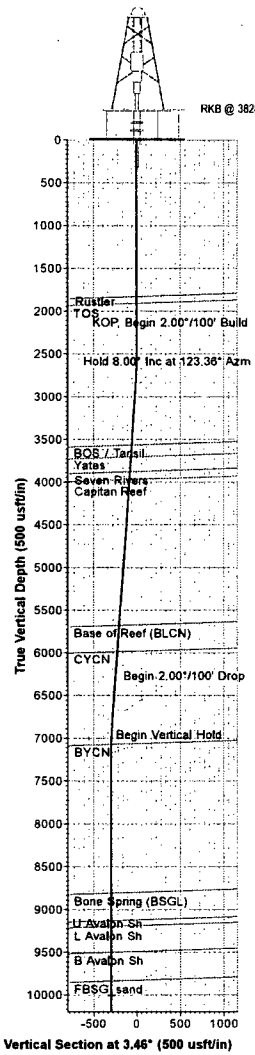
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Little Bear Fed Com 4H	11144.00	7346.20	444.30	562262.10	735841.30	32° 32' 36.37501 N	103° 34' 4.81193 W
LTP - Little Bear Fed Com 4H	11147.25	7216.14	445.33	562132.04	735842.33	32° 32' 35.08800 N	103° 34' 4.81080 W
FTP - Little Bear Fed Com 4H	11384.00	-50.05	499.38	554865.85	735896.38	32° 31' 23.18520 N	103° 34' 4.78920 W

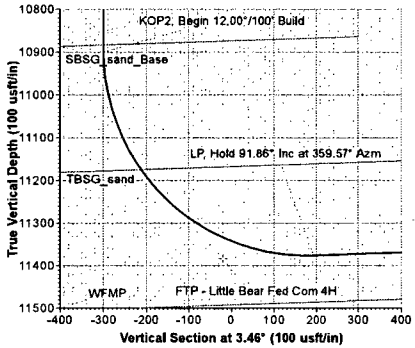
SECTION DETAILS

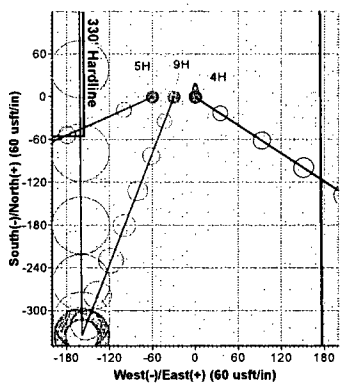
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 2.00°/100' Build
3	2899.95	8.00	123.36	2898.65	-15.33	23.28	2.00	123.36	-13.89		Hold 8.00° Inc at 123.36° Azm
4	6813.73	8.00	123.36	6774.35	-314.78	478.18	0.00	0.00	-285.34		Begin 2.00°/100' Drop
5	7213.67	0.00	0.00	7173.00	-330.10	501.46	2.00	180.00	-299.23		Begin Vertical Hold
6	10940.74	0.00	0.00	10900.07	-330.10	501.46	0.00	0.00	-299.23		KOP2, Begin 12.00°/100' Build
7	11706.24	91.86	359.57	11377.28	162.84	497.79	12.00	359.57	192.60		LP, Hold 91.86° Inc at 359.57° Azm
8	18893.59	91.86	359.57	11144.00	7346.20	444.30	0.00	0.00	7359.62	BHL - Little Bear Fed Com 4H	TD at 18893.59

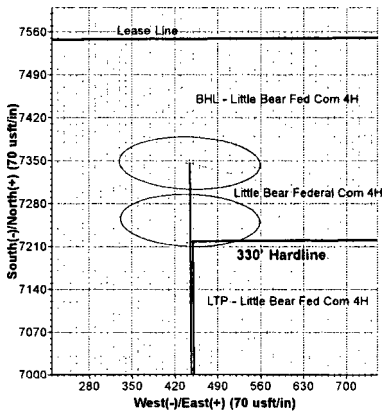
LEGEND

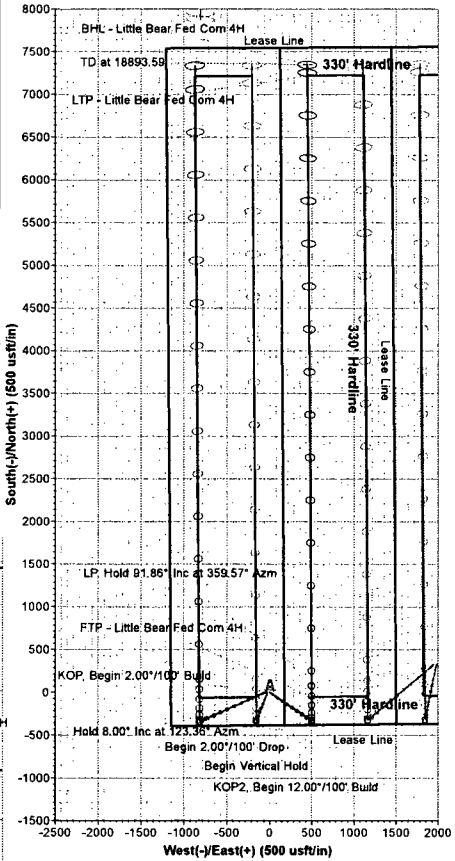
- 4H, OH / Job #61199, Plan 3 05-09-17 V0
- 8H, OH, Plan 1 04-12-18 V0
- 7H, OH, Plan 1 04-12-18 V0
- 5H, OH, Plan 1 04-12-18 V0
- 9H, OH, Plan 1 04-12-18 V0
- #1H, WB1 / Job #1411774, Plan #1 09-15-14 V0
- 3H, OH, Plan 1 04-12-18 V0
- Plan 1 04-12-18

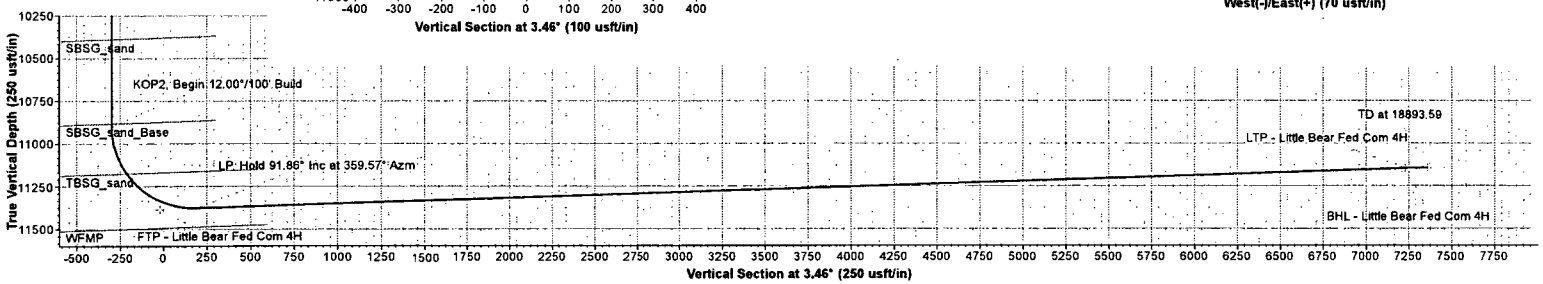












Created By: David Transou Date: 10:31, April 12 2018

COG Operating LLC

Lea County, NM (NAD27 NME)
Little Bear Federal Com
4H

OH

Plan: Plan 1 04-12-18

Standard Planning Report

12 April, 2018

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 4H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

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	Little Bear Federal Com				
Site Position:		**Northing:**	555,243.20 usft	**Latitude:**	32° 31' 26.81346 N
From:	Map	**Easting:**	737,377.40 usft	**Longitude:**	103° 33' 47.46075 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.41 °

Well	4H					
Well Position	**+N/-S**	-327.30 usft	**Northing:**	554,915.90 usft	**Latitude:**	32° 31' 23.71586 N
	+E/-W	-1,980.40 usft	**Easting:**	735,397.00 usft	**Longitude:**	103° 34' 10.61720 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**		**Ground Level:**	3,804.00 usft

Wellbore	OH				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	MVHD	4/10/2018	6.76	60.45	48,261.07091357

Design	Plan 1 04-12-18				
Audit Notes:					
Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.00	0.00	0.00	3.46	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	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	
2,899.95	8.00	123.36	2,898.65	-15.33	23.28	2.00	2.00	0.00	123.36	
6,813.73	8.00	123.36	6,774.35	-314.78	478.18	0.00	0.00	0.00	0.00	
7,213.67	0.00	0.00	7,173.00	-330.11	501.47	2.00	-2.00	0.00	180.00	
10,940.74	0.00	0.00	10,900.07	-330.11	501.47	0.00	0.00	0.00	0.00	
11,706.24	91.86	359.57	11,377.28	162.84	497.79	12.00	12.00	0.00	359.57	
18,893.59	91.86	359.57	11,144.00	7,346.20	444.30	0.00	0.00	0.00	0.00	BHL - Little Bear Fe

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Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,833.00	0.00	0.00	1,833.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
1,913.00	0.00	0.00	1,913.00	0.00	0.00	0.00	0.00	0.00	0.00
TOS									
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
2,600.00	2.00	123.36	2,599.98	-0.96	1.46	-0.87	2.00	2.00	0.00
2,700.00	4.00	123.36	2,699.84	-3.84	5.83	-3.48	2.00	2.00	0.00
2,800.00	6.00	123.36	2,799.45	-8.63	13.11	-7.82	2.00	2.00	0.00
2,899.95	8.00	123.36	2,898.65	-15.33	23.28	-13.89	2.00	2.00	0.00
Hold 8.00° Inc at 123.36° Azm									
2,900.00	8.00	123.36	2,898.70	-15.33	23.29	-13.90	0.00	0.00	0.00
3,000.00	8.00	123.36	2,997.73	-22.98	34.91	-20.83	0.00	0.00	0.00
3,100.00	8.00	123.36	3,096.76	-30.63	46.53	-27.77	0.00	0.00	0.00
3,200.00	8.00	123.36	3,195.78	-38.28	58.16	-34.70	0.00	0.00	0.00
3,300.00	8.00	123.36	3,294.81	-45.93	69.78	-41.64	0.00	0.00	0.00
3,400.00	8.00	123.36	3,393.84	-53.59	81.40	-48.57	0.00	0.00	0.00
3,500.00	8.00	123.36	3,492.86	-61.24	93.03	-55.51	0.00	0.00	0.00
3,571.80	8.00	123.36	3,563.96	-66.73	101.37	-60.49	0.00	0.00	0.00
BOS / Tansil									
3,600.00	8.00	123.36	3,591.89	-68.89	104.65	-62.45	0.00	0.00	0.00
3,700.00	8.00	123.36	3,690.92	-76.54	116.27	-69.38	0.00	0.00	0.00
3,714.51	8.00	123.36	3,705.29	-77.65	117.96	-70.39	0.00	0.00	0.00
Yates									
3,800.00	8.00	123.36	3,789.95	-84.19	127.90	-76.32	0.00	0.00	0.00
3,888.59	8.00	123.36	3,877.68	-90.97	138.19	-82.46	0.00	0.00	0.00
Seven Rivers									
3,900.00	8.00	123.36	3,888.97	-91.84	139.52	-83.25	0.00	0.00	0.00
3,980.70	8.00	123.36	3,968.89	-98.02	148.90	-88.85	0.00	0.00	0.00
Capitan Reef									
4,000.00	8.00	123.36	3,988.00	-99.49	151.14	-90.19	0.00	0.00	0.00
4,100.00	8.00	123.36	4,087.03	-107.14	162.76	-97.12	0.00	0.00	0.00
4,200.00	8.00	123.36	4,186.05	-114.80	174.39	-104.06	0.00	0.00	0.00
4,300.00	8.00	123.36	4,285.08	-122.45	186.01	-110.99	0.00	0.00	0.00
4,400.00	8.00	123.36	4,384.11	-130.10	197.63	-117.93	0.00	0.00	0.00
4,500.00	8.00	123.36	4,483.13	-137.75	209.26	-124.87	0.00	0.00	0.00
4,600.00	8.00	123.36	4,582.16	-145.40	220.88	-131.80	0.00	0.00	0.00
4,700.00	8.00	123.36	4,681.19	-153.05	232.50	-138.74	0.00	0.00	0.00
4,800.00	8.00	123.36	4,780.22	-160.70	244.13	-145.67	0.00	0.00	0.00
4,900.00	8.00	123.36	4,879.24	-168.36	255.75	-152.61	0.00	0.00	0.00
5,000.00	8.00	123.36	4,978.27	-176.01	267.37	-159.54	0.00	0.00	0.00
5,100.00	8.00	123.36	5,077.30	-183.66	279.00	-166.48	0.00	0.00	0.00
5,200.00	8.00	123.36	5,176.32	-191.31	290.62	-173.42	0.00	0.00	0.00
5,300.00	8.00	123.36	5,275.35	-198.96	302.24	-180.35	0.00	0.00	0.00
5,400.00	8.00	123.36	5,374.38	-206.61	313.86	-187.29	0.00	0.00	0.00
5,500.00	8.00	123.36	5,473.41	-214.26	325.49	-194.22	0.00	0.00	0.00
5,600.00	8.00	123.36	5,572.43	-221.91	337.11	-201.16	0.00	0.00	0.00
5,700.00	8.00	123.36	5,671.46	-229.57	348.73	-208.09	0.00	0.00	0.00
5,704.35	8.00	123.36	5,675.77	-229.90	349.24	-208.40	0.00	0.00	0.00
Base of Reef (BLCN)									
5,800.00	8.00	123.36	5,770.49	-237.22	360.36	-215.03	0.00	0.00	0.00
5,900.00	8.00	123.36	5,869.51	-244.87	371.98	-221.96	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 4H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,000.00	8.00	123.36	5,968.54	-252.52	383.60	-228.90	0.00	0.00	0.00
6,016.09	8.00	123.36	5,984.47	-253.75	385.47	-230.02	0.00	0.00	0.00
CYCN									
6,100.00	8.00	123.36	6,067.57	-260.17	395.23	-235.84	0.00	0.00	0.00
6,200.00	8.00	123.36	6,166.60	-267.82	406.85	-242.77	0.00	0.00	0.00
6,300.00	8.00	123.36	6,265.62	-275.47	418.47	-249.71	0.00	0.00	0.00
6,400.00	8.00	123.36	6,364.65	-283.12	430.10	-256.64	0.00	0.00	0.00
6,500.00	8.00	123.36	6,463.68	-290.78	441.72	-263.58	0.00	0.00	0.00
6,600.00	8.00	123.36	6,562.70	-298.43	453.34	-270.51	0.00	0.00	0.00
6,700.00	8.00	123.36	6,661.73	-306.08	464.97	-277.45	0.00	0.00	0.00
6,800.00	8.00	123.36	6,760.76	-313.73	476.59	-284.39	0.00	0.00	0.00
6,813.73	8.00	123.36	6,774.35	-314.78	478.18	-285.34	0.00	0.00	0.00
Begin 2.00°/100' Drop									
6,900.00	6.27	123.36	6,859.95	-320.67	487.14	-290.68	2.00	-2.00	0.00
7,000.00	4.27	123.36	6,959.52	-325.73	494.81	-295.26	2.00	-2.00	0.00
7,100.00	2.27	123.36	7,059.36	-328.87	499.58	-298.11	2.00	-2.00	0.00
7,112.34	2.03	123.36	7,071.69	-329.12	499.97	-298.34	2.00	-2.00	0.00
BYCN									
7,200.00	0.27	123.36	7,159.33	-330.09	501.44	-299.21	2.00	-2.00	0.00
7,213.67	0.00	0.00	7,173.00	-330.11	501.47	-299.23	2.00	-2.00	0.00
Begin Vertical Hold									
8,853.39	0.00	0.00	8,812.72	-330.11	501.47	-299.23	0.00	0.00	0.00
Bone Spring (BSGL)									
9,174.39	0.00	0.00	9,133.72	-330.11	501.47	-299.23	0.00	0.00	0.00
U Avalon Sh									
9,242.39	0.00	0.00	9,201.72	-330.11	501.47	-299.23	0.00	0.00	0.00
L Avalon Sh									
9,547.39	0.00	0.00	9,506.72	-330.11	501.47	-299.23	0.00	0.00	0.00
B Avalon Sh									
9,883.39	0.00	0.00	9,842.72	-330.11	501.47	-299.23	0.00	0.00	0.00
FBSG_sand									
10,432.39	0.00	0.00	10,391.72	-330.11	501.47	-299.23	0.00	0.00	0.00
SBSG_sand									
10,924.39	0.00	0.00	10,883.72	-330.11	501.47	-299.23	0.00	0.00	0.00
SBSG_sand_Base									
10,940.74	0.00	0.00	10,900.07	-330.11	501.47	-299.23	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
11,000.00	7.11	359.57	10,959.17	-326.43	501.44	-295.57	12.00	12.00	0.00
11,100.00	19.11	359.57	11,056.39	-303.79	501.27	-272.98	12.00	12.00	0.00
11,200.00	31.11	359.57	11,146.77	-261.43	500.95	-230.71	12.00	12.00	0.00
11,234.79	35.29	359.57	11,175.88	-242.39	500.81	-211.71	12.00	12.00	0.00
TBSG_sand									
11,300.00	43.11	359.57	11,226.37	-201.21	500.51	-170.63	12.00	12.00	0.00
11,400.00	55.11	359.57	11,291.71	-125.75	499.94	-95.34	12.00	12.00	0.00
11,500.00	67.11	359.57	11,339.94	-38.36	499.29	-8.15	12.00	12.00	0.00
11,600.00	79.11	359.57	11,368.94	57.15	498.58	87.15	12.00	12.00	0.00
11,700.00	91.11	359.57	11,377.44	156.60	497.84	186.37	12.00	12.00	0.00
11,706.24	91.86	359.57	11,377.28	162.84	497.79	192.60	12.00	12.00	0.00
LP, Hold 91.86° Inc at 359.57° Azm									
11,800.00	91.86	359.57	11,374.24	256.55	497.10	286.09	0.00	0.00	0.00
11,900.00	91.86	359.57	11,370.99	356.49	496.35	385.81	0.00	0.00	0.00
12,000.00	91.86	359.57	11,367.75	456.44	495.61	485.52	0.00	0.00	0.00

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Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,100.00	91.86	359.57	11,364.50	556.38	494.86	585.24	0.00	0.00	0.00
12,200.00	91.86	359.57	11,361.26	656.33	494.12	684.96	0.00	0.00	0.00
12,300.00	91.86	359.57	11,358.01	756.27	493.37	784.68	0.00	0.00	0.00
12,400.00	91.86	359.57	11,354.77	856.22	492.63	884.39	0.00	0.00	0.00
12,500.00	91.86	359.57	11,351.52	956.16	491.89	984.11	0.00	0.00	0.00
12,600.00	91.86	359.57	11,348.27	1,056.10	491.14	1,083.83	0.00	0.00	0.00
12,700.00	91.86	359.57	11,345.03	1,156.05	490.40	1,183.55	0.00	0.00	0.00
12,800.00	91.86	359.57	11,341.78	1,255.99	489.65	1,283.26	0.00	0.00	0.00
12,900.00	91.86	359.57	11,338.54	1,355.94	488.91	1,382.98	0.00	0.00	0.00
13,000.00	91.86	359.57	11,335.29	1,455.88	488.16	1,482.70	0.00	0.00	0.00
13,100.00	91.86	359.57	11,332.05	1,555.83	487.42	1,582.41	0.00	0.00	0.00
13,200.00	91.86	359.57	11,328.80	1,655.77	486.68	1,682.13	0.00	0.00	0.00
13,300.00	91.86	359.57	11,325.55	1,755.72	485.93	1,781.85	0.00	0.00	0.00
13,400.00	91.86	359.57	11,322.31	1,855.66	485.19	1,881.57	0.00	0.00	0.00
13,500.00	91.86	359.57	11,319.06	1,955.61	484.44	1,981.28	0.00	0.00	0.00
13,600.00	91.86	359.57	11,315.82	2,055.55	483.70	2,081.00	0.00	0.00	0.00
13,700.00	91.86	359.57	11,312.57	2,155.49	482.95	2,180.72	0.00	0.00	0.00
13,800.00	91.86	359.57	11,309.32	2,255.44	482.21	2,280.44	0.00	0.00	0.00
13,900.00	91.86	359.57	11,306.08	2,355.38	481.47	2,380.15	0.00	0.00	0.00
14,000.00	91.86	359.57	11,302.83	2,455.33	480.72	2,479.87	0.00	0.00	0.00
14,100.00	91.86	359.57	11,299.59	2,555.27	479.98	2,579.59	0.00	0.00	0.00
14,200.00	91.86	359.57	11,296.34	2,655.22	479.23	2,679.31	0.00	0.00	0.00
14,300.00	91.86	359.57	11,293.10	2,755.16	478.49	2,779.02	0.00	0.00	0.00
14,400.00	91.86	359.57	11,289.85	2,855.11	477.74	2,878.74	0.00	0.00	0.00
14,500.00	91.86	359.57	11,286.60	2,955.05	477.00	2,978.46	0.00	0.00	0.00
14,600.00	91.86	359.57	11,283.36	3,055.00	476.26	3,078.17	0.00	0.00	0.00
14,700.00	91.86	359.57	11,280.11	3,154.94	475.51	3,177.89	0.00	0.00	0.00
14,800.00	91.86	359.57	11,276.87	3,254.88	474.77	3,277.61	0.00	0.00	0.00
14,900.00	91.86	359.57	11,273.62	3,354.83	474.02	3,377.33	0.00	0.00	0.00
15,000.00	91.86	359.57	11,270.38	3,454.77	473.28	3,477.04	0.00	0.00	0.00
15,100.00	91.86	359.57	11,267.13	3,554.72	472.53	3,576.76	0.00	0.00	0.00
15,200.00	91.86	359.57	11,263.88	3,654.66	471.79	3,676.48	0.00	0.00	0.00
15,300.00	91.86	359.57	11,260.64	3,754.61	471.05	3,776.20	0.00	0.00	0.00
15,400.00	91.86	359.57	11,257.39	3,854.55	470.30	3,875.91	0.00	0.00	0.00
15,500.00	91.86	359.57	11,254.15	3,954.50	469.56	3,975.63	0.00	0.00	0.00
15,600.00	91.86	359.57	11,250.90	4,054.44	468.81	4,075.35	0.00	0.00	0.00
15,700.00	91.86	359.57	11,247.66	4,154.39	468.07	4,175.07	0.00	0.00	0.00
15,800.00	91.86	359.57	11,244.41	4,254.33	467.32	4,274.78	0.00	0.00	0.00
15,900.00	91.86	359.57	11,241.16	4,354.27	466.58	4,374.50	0.00	0.00	0.00
16,000.00	91.86	359.57	11,237.92	4,454.22	465.84	4,474.22	0.00	0.00	0.00
16,100.00	91.86	359.57	11,234.67	4,554.16	465.09	4,573.93	0.00	0.00	0.00
16,200.00	91.86	359.57	11,231.43	4,654.11	464.35	4,673.65	0.00	0.00	0.00
16,300.00	91.86	359.57	11,228.18	4,754.05	463.60	4,773.37	0.00	0.00	0.00
16,400.00	91.86	359.57	11,224.94	4,854.00	462.86	4,873.09	0.00	0.00	0.00
16,500.00	91.86	359.57	11,221.69	4,953.94	462.12	4,972.80	0.00	0.00	0.00
16,600.00	91.86	359.57	11,218.44	5,053.89	461.37	5,072.52	0.00	0.00	0.00
16,700.00	91.86	359.57	11,215.20	5,153.83	460.63	5,172.24	0.00	0.00	0.00
16,800.00	91.86	359.57	11,211.95	5,253.78	459.88	5,271.96	0.00	0.00	0.00
16,900.00	91.86	359.57	11,208.71	5,353.72	459.14	5,371.67	0.00	0.00	0.00
17,000.00	91.86	359.57	11,205.46	5,453.66	458.39	5,471.39	0.00	0.00	0.00
17,100.00	91.86	359.57	11,202.22	5,553.61	457.65	5,571.11	0.00	0.00	0.00
17,200.00	91.86	359.57	11,198.97	5,653.55	456.91	5,670.83	0.00	0.00	0.00
17,300.00	91.86	359.57	11,195.72	5,753.50	456.16	5,770.54	0.00	0.00	0.00
17,400.00	91.86	359.57	11,192.48	5,853.44	455.42	5,870.26	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 4H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
17,500.00	91.86	359.57	11,189.23	5,953.39	454.67	5,969.98	0.00	0.00	0.00
17,600.00	91.86	359.57	11,185.99	6,053.33	453.93	6,069.69	0.00	0.00	0.00
17,700.00	91.86	359.57	11,182.74	6,153.28	453.18	6,169.41	0.00	0.00	0.00
17,800.00	91.86	359.57	11,179.50	6,253.22	452.44	6,269.13	0.00	0.00	0.00
17,900.00	91.86	359.57	11,176.25	6,353.17	451.70	6,368.85	0.00	0.00	0.00
18,000.00	91.86	359.57	11,173.00	6,453.11	450.95	6,468.56	0.00	0.00	0.00
18,100.00	91.86	359.57	11,169.76	6,553.05	450.21	6,568.28	0.00	0.00	0.00
18,200.00	91.86	359.57	11,166.51	6,653.00	449.46	6,668.00	0.00	0.00	0.00
18,300.00	91.86	359.57	11,163.27	6,752.94	448.72	6,767.72	0.00	0.00	0.00
18,400.00	91.86	359.57	11,160.02	6,852.89	447.97	6,867.43	0.00	0.00	0.00
18,500.00	91.86	359.57	11,156.78	6,952.83	447.23	6,967.15	0.00	0.00	0.00
18,600.00	91.86	359.57	11,153.53	7,052.78	446.49	7,066.87	0.00	0.00	0.00
18,700.00	91.86	359.57	11,150.28	7,152.72	445.74	7,166.58	0.00	0.00	0.00
18,800.00	91.86	359.57	11,147.04	7,252.67	445.00	7,266.30	0.00	0.00	0.00
18,893.59	91.86	359.57	11,144.00	7,346.20	444.30	7,359.62	0.00	0.00	0.00
TD at 18893.59									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
BHL - Little Bear Fed - plan hits target center - Point	0.00	0.00	11,144.00	7,346.20	444.30	562,262.10	735,841.30	32° 32' 36.37501 N	103° 34' 4.81193 W
LTP - Little Bear Fed (- plan misses target center by 0.98usft at 18763.49usft MD (11148.22 TVD, 7216.17 N, 445.27 E) - Point	0.00	0.00	11,147.25	7,216.14	445.33	562,132.04	735,842.33	32° 32' 35.08800 N	103° 34' 4.81080 W
FTP - Little Bear Fed (- plan misses target center by 45.39usft at 11501.62usft MD (11340.57 TVD, -36.86 N, 499.28 E) - Point	0.00	0.00	11,384.00	-50.05	499.38	554,865.86	735,896.38	32° 31' 23.18520 N	103° 34' 4.78920 W

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 4H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3828.00usft (Ensign 155)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3828.00usft (Ensign 155)
Site:	Little Bear Federal Com	**North Reference:**	Grid
Well:	4H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 04-12-18		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,833.00	1,833.00	Rustler		-1.86	3.46
1,913.00	1,913.00	TOS		-1.86	3.46
3,571.80	3,563.96	BOS / Tansil		-1.86	3.46
3,714.51	3,705.29	Yates		-1.86	3.46
3,888.59	3,877.68	Seven Rivers		-1.86	3.46
3,980.70	3,968.89	Capitan Reef		-1.86	3.46
5,704.35	5,675.77	Base of Reef (BLCN)		-1.86	3.46
6,016.09	5,984.47	CYCN		-1.86	3.46
7,112.34	7,071.69	BYCN		-1.86	3.46
8,853.39	8,812.72	Bone Spring (BSGL)		-1.86	3.46
9,174.39	9,133.72	U Avalon Sh		-1.86	3.46
9,242.39	9,201.72	L Avalon Sh		-1.86	3.46
9,547.39	9,506.72	B Avalon Sh		-1.86	3.46
9,883.39	9,842.72	FBSG_sand		-1.86	3.46
10,432.39	10,391.72	SBSG_sand		-1.86	3.46
10,924.39	10,883.72	SBSG_sand_Base		-1.86	3.46
11,234.79	11,175.88	TBSG_sand		-1.86	3.46

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
2,500.00	2,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2,899.95	2,898.65	-15.33	23.28	Hold 8.00° Inc at 123.36° Azm
6,813.73	6,774.35	-314.78	478.18	Begin 2.00°/100' Drop
7,213.67	7,173.00	-330.11	501.47	Begin Vertical Hold
10,940.74	10,900.07	-330.11	501.47	KOP2, Begin 12.00°/100' Build
11,706.24	11,377.28	162.84	497.79	LP, Hold 91.86° Inc at 359.57° Azm
18,893.59	11,144.00	7,346.20	444.30	TD at 18893.59

	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?	Y
If yes, does production casing cement tie back a minimum of 50' above the Reef?	Y
Is well within the designated 4 string boundary?	N
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	Y
If yes, are the first three strings cemented to surface?	Y
Is 2nd string set 100' to 600' below the base of salt?	N
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(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.	810	12.7	2.0	9.6	16	Lead: 35:65:6 C Blend
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
Inter., Stage 1	310	12.7	1.98	10.6	16	Lead: 35:65:6 C Blend
	200	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
DV/ECP @ 3850						
Inter., Stage 2	680	12.7	2.0	10.6	16	Lead: Class C + 4% Gel + 1% CaCl2
	200	14.8	1.35	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	1340	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	2200	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	0'	35% OH in Lateral (KOP to EOL) – 40% OH in Vertical

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:
12-1/4"	13-5/8"	3M	Annular	x	1500 psi
			Blind Ram	X	3M
			Pipe Ram	X	
			Double Ram		
			Other*		
8-3/4"	13-5/8"	5M	Annular	x	50% testing pressure
			Blind Ram	x	5M
			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	Saturated Brine	9.8 - 10.2	28-34	N/C
9-5/8" Int shoe	Lateral TD	Cut Brine	8.6 - 9.4	28-34	N/C

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

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	5565 psi at 11384' TVD
Abnormal Temperature	NO 170 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

APD ID: 10400029550 **Submission Date:** 04/19/2018

Operator Name: COG OPERATING LLC

Well Name: LITTLE BEAR FEDERAL COM **Well Number:** 4H

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_Little_Bear_4H_Exist_Rd_20180418094034.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_Little_Bear_4H_MapsPlats_20180418074127.pdf

New road type: TWO-TRACK

Length: 4606.1 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:

Access surfacing type: OTHER

Access topsoil source: ONSITE

Access surfacing type description: Caliche

Access onsite topsoil source depth: 6

Offsite topsoil source description:

Onsite topsoil removal process: Blading

Access other construction information: No turnouts are planned. Re-routing access road around proposed well location.

Access miscellaneous information:

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

Drainage Control

New road drainage crossing: OTHER

Drainage Control comments: None necessary.

Road Drainage Control Structures (DCS) description: None needed.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

COG_Little_Bear_4H_1Mile_Data_20180418074207.pdf

Existing Wells description:

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

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: Production will be sent to the proposed Little Bear Wolfcamp Central Tank Battery. A surface flow line of approximately 335' of 3" steel pipe carrying oil, gas and water under a maximum pressure of 125 psi will go to the facility at the Little Bear Wolfcamp Central Tank Battery location. We plan to install a 4" surface polyethylene pipe transporting Gas Lift Gas from the Little Bear Wolfcamp Central Tank Battery to the Little Bear Federal Com #4H, 5H and 9H location. The surface Gas Lift Gas pipe of approximately 335' under a maximum pressure of 125 psi will be installed as per the flowline plat. The tank battery and facilities will be installed according to API specifications.
Production Facilities map:

COG_Little_Bear_4H_CTB_20180419095545.pdf
COG_Little_Bear_4H_Flowline_20180419095557.pdf
COG_Little_Bear_4H_Prod_Facility_20180419095605.pdf

Operator Name: COG OPERATIN _C

Well Name: LITTLE BEAR FEDERAL COM **Well Number:** 4H

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: INTERMEDIATE/PRODUCTION CASING **Water source type:** OTHER

Describe type: Brine H2O

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: COMMERCIAL

Water source transport method: TRUCKING

Source transportation land ownership: COMMERCIAL

Water source volume (barrels): 22500 **Source volume (acre-feet):** 2.9000947

Source volume (gal): 945000

Water source use type: STIMULATION, SURFACE CASING **Water source type:** OTHER

Describe type: Fresh H2O

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: PRIVATE

Water source transport method: PIPELINE

Source transportation land ownership: PRIVATE

Water source volume (barrels): 337500 **Source volume (acre-feet):** 43.50142

Source volume (gal): 14175000

Water source and transportation map:

COG_Little_Bear_4H_Brine_H2O_20180419105604.pdf

COG_Little_Bear_4H_Fresh_H2O_20180419105614.pdf

Water source comments: Fresh water will be obtained from Berry Ranch/GWWS water well located in Section 34. T20S. R34E. Brine water will be obtained from the Salty Dog Brine station in Section 5. T19S. R36E.

New water well? NO

New Water Well Info

Well latitude: **Well Longitude:** **Well datum:**

Well target aquifer:

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

Aquifer comments:

Aquifer documentation:

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

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

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

Drilling method: **Drill material:**

Grout material: **Grout depth:**

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

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Caliche will be obtained from the actual well site if available. If not available onsite, or is not plentiful from the well site, caliche will be obtained from Danny Berry caliche pit located in Section 28, T20S, R34E.
Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling fluids and produced oil and water during drilling and completion operations

Amount of waste: 6000 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling waste will be stored safely and disposed of properly

Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Waste type: SEWAGE

Waste content description: Human waste and gray water

Amount of waste: 250 gallons

Waste disposal frequency : Weekly

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility
Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Waste type: GARBAGE

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

Amount of waste: 125 pounds

Waste disposal frequency : Weekly

Safe containment description: Garbage and trash produced during drilling and completion operations will be collected in a trash container and disposed of properly at a state approved disposal facility
Safe containmant attachment:

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

Disposal location description: Trucked to an approved disposal facility

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

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

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

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

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Roll off cuttings containers on tracks

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

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

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

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Little_Bear_4H_CTB_20180419095633.pdf

COG_Little_Bear_4H_Flowline_20180419095645.pdf

COG_Little_Bear_4H_Prod_Facility_20180419095656.pdf

Comments: Production will be sent to the proposed Little Bear Wolfcamp Central Tank Battery. A surface flow line of approximately 335' of 3" steel pipe carrying oil, gas and water under a maximum pressure of 125 psi will go to the facility at the Little Bear Wolfcamp Central Tank Battery location. We plan to install a 4" surface polyethylene pipe transporting Gas Lift Gas from the Little Bear Wolfcamp Central Tank Battery to the Little Bear Federal Com #4H, 5H and 9H location. The surface Gas Lift Gas pipe of approximately 335' under a maximum pressure of 125 psi will be installed as per the flowline plat. The tank battery and facilities will be installed according to API specifications.

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: LITTLE BEAR FEDERAL COM

Multiple Well Pad Number: 4H, 5H AND 9H

Recontouring attachment:

Drainage/Erosion control construction: Approximately 400' of straw waddles will be placed on the west side to reduce sediment impacts to fragile/sensitive soils.

Drainage/Erosion control reclamation: Reclaim eastwest side 80' and south side 80'

Well pad proposed disturbance (acres): 3.67	**Well pad interim reclamation (acres):** 0.15	**Well pad long term disturbance (acres):** 2.35
Road proposed disturbance (acres): 0.51	**Road interim reclamation (acres):** 0.51	**Road long term disturbance (acres):** 0.51
Powerline proposed disturbance (acres): 0	**Powerline interim reclamation (acres):** 0	**Powerline long term disturbance (acres):** 0
Pipeline proposed disturbance (acres): 0.03	**Pipeline interim reclamation (acres):** 0.03	**Pipeline long term disturbance (acres):** 0.03
Other proposed disturbance (acres): 0	**Other interim reclamation (acres):** 0	**Other long term disturbance (acres):** 0
Total proposed disturbance: 4.21	**Total interim reclamation:** 0.69	**Total long term disturbance:** 2.89

Disturbance Comments:

Reconstruction method: New construction of pad.

Topsoil redistribution: Reclaim east side 80' and south side 80'

Soil treatment: None

Existing Vegetation at the well pad: Shinnery Oak/Mesquite grassland

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: N/A

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Operator Name: COG OPERATING LLC

Well Name: LITTLE BEAR FEDERAL COM **Well Number:** 4H

Seed Summary	
Seed Type	**Pounds/Acre**

Total pounds/Acre:

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name: Rand **Last Name:** French

Phone: (432)254-5556 **Email:** rfrench@concho.com

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: N/A

Weed treatment plan attachment:

Monitoring plan description: N/A

Monitoring plan attachment:

Success standards: N/A

Pit closure description: N/A

Pit closure attachment:

COG_Little_Bear_4H_Closed_Loop_20180418075452.pdf

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: BUREAU OF LAND MANAGEMENT

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

Operator Name: COG OPERATIN_ _C

Well Name: LITTLE BEAR FEDERAL COM **Well Number:** 4H

State Local Office:

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

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

Section 12 - Other Information

Right of Way needed? NO **Use APD as ROW?**

ROW Type(s):

ROW Applications

SUPO Additional Information:

Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed on 2/18/2018 by Rand French (COG) and Jeff Robertson (BLM).

Other SUPO Attachment

COG_Little_Bear_4H_Certification_20180418075506.pdf