

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG OPERATING LLC.
LEASE NO.:	NMNM014164
WELL NAME & NO.:	601H-FASCINATOR FEDERAL COM
SURFACE HOLE FOOTAGE:	210'/N & 2130'/W
BOTTOM HOLE FOOTAGE:	200'/S & 1950'/W
LOCATION:	Section. 30., T24S., R.35E., NMP
COUNTY:	LEA County, New Mexico

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

A. Hydrogen Sulfide

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

B. CASING

1. The 13 3/8 inch surface casing shall be set at approximately 1145 feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of 8 hours or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength,

whichever is greater.

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

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

Operator has proposed a DV tool at a depth of **5440'**, 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.

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

- Cement should tie-back at least **200** feet into previous casing string. Operator shall provide method of verification.

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M) psi**
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** inch intermediate casing shoe shall be **10,000 (10M) psi**. **Variance approved to use a 5M annular. The annular must be tested to full working pressure (5000 psi.)**

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 08042018

GENERAL REQUIREMENTS

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

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

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

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

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

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
 - a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
 - b. When the operator proposes to set surface casing with Spudder Rig
 - Notify the BLM when moving in and removing the Spudder Rig.
 - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
 - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.
2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

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

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.
2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.
3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.
4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

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

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.
3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Operator shall perform the intermediate casing integrity test to 70% of the casing burst. This will test the multi-bowl seals.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the

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

- b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.
- c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
- d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
- e. The results of the test shall be reported to the appropriate BLM office.
- f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

PECOS DISTRICT SURFACE USE CONDITIONS OF APPROVAL

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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.

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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)

Hydrology

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, siting valves and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.

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

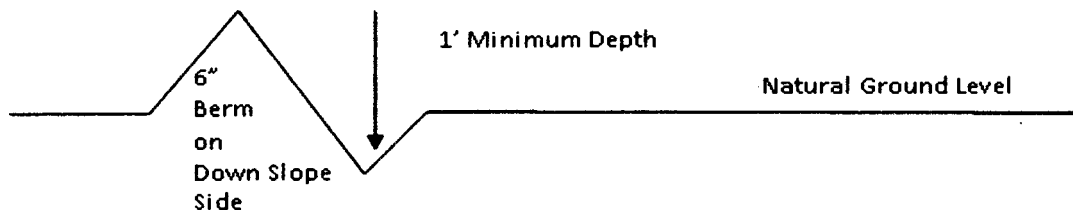
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outslowing 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:

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

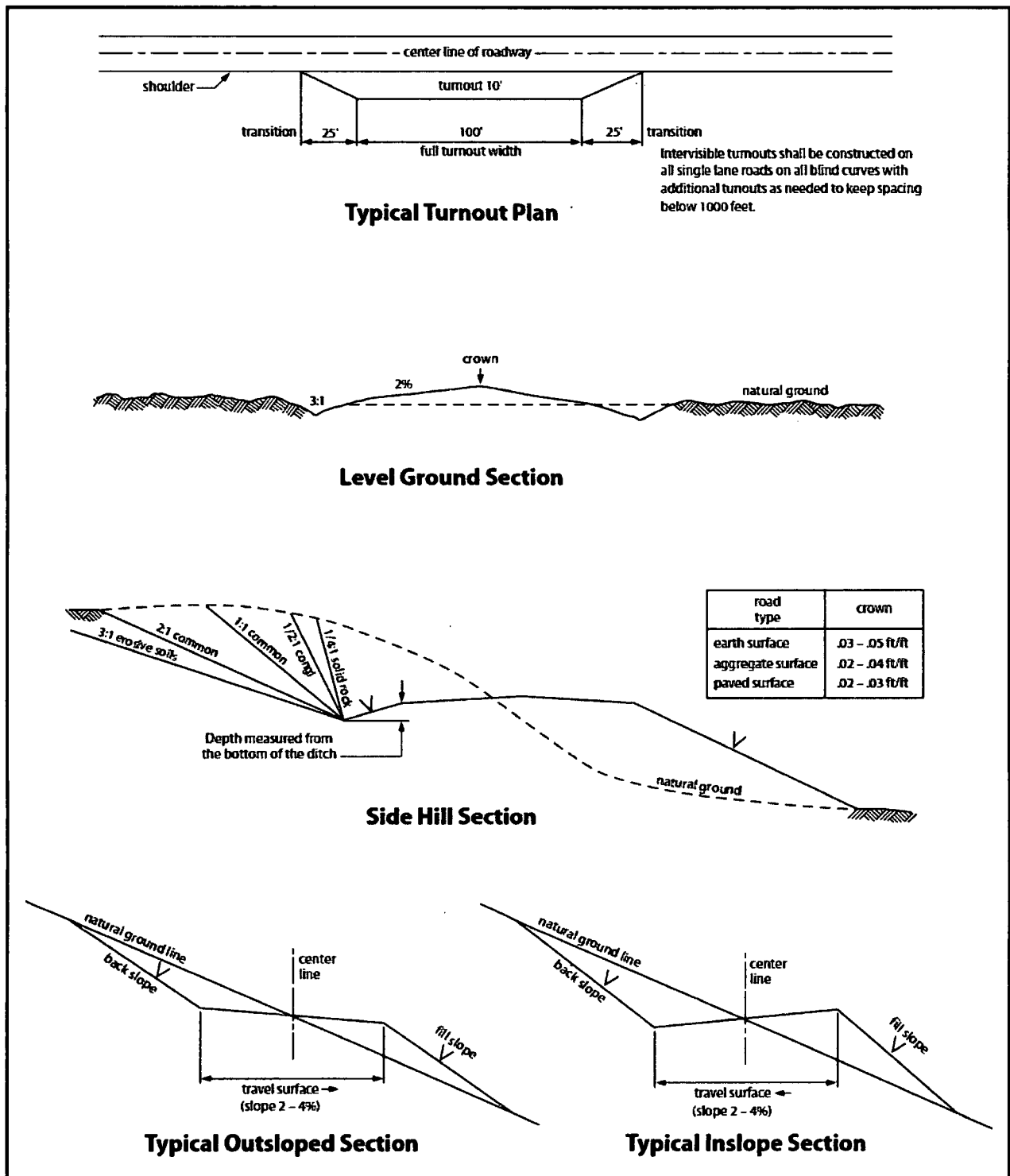


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

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

Exclosure Netting (Open-top Tanks)

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

Chemical and Fuel Secondary Containment and Exclosure Screening

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

Open-Vent Exhaust Stack Exclosures

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

Containment Structures

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

Painting Requirement

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

Seed Mixture 3, for Shallow Sites

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

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

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

<u>Species</u>	<u>lb/acre</u>
Plains Bristlegrass (<i>Setaria macrostachya</i>)	1.0
Green Sprangletop (<i>Leptochloa dubia</i>)	2.0
Sideoats Grama (<i>Bouteloua curtipendula</i>)	5.0

*Pounds of pure live seed:

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



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

Operator Certification Data Report

08/07/2018

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: 03/21/2018

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 (H₂S).
- b. The proper use and maintenance of personal protective equipment and life support systems.
- c. The proper use of H₂S 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 H₂S 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. H₂S SAFETY EQUIPMENT AND SYSTEMS

Note: All H₂S 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.

W A R N I N G

**YOU ARE ENTERING AN H₂S 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

	<u>OFFICE</u>	<u>MOBILE</u>
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

	<u>OFFICE</u>
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



PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Fascinator Fed Com

601H

OH

Plan 1 02-21-18

Anticollision Report

21 February, 2018





Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Reference Plan 1 02-21-18

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

Survey Tool Program Date 2/21/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	11,992.12	Plan 1 02-21-18 (OH)	Scientific Keeper	Scientific Drilling Intl. Standard Wireline Keeper
11,992.12	22,296.82	Plan 1 02-21-18 (OH)	MWD+IFR1+MS	OWSG Rev. 2 MWD + IFR1 + Multi-Station Corre

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Fascinator Fed Com						
701H - OH - Plan 1 02-21-18	2,500.00	2,499.00	29.90	23.45	4.634 [°] CC, ES	
701H - OH - Plan 1 02-21-18	22,296.82	22,723.19	389.90	222.44	2.328 SF	
702H - OH - Plan 1 02-21-18	2,587.12	2,586.56	30.02	23.43	4.557 CC	
702H - OH - Plan 1 02-21-18	2,600.00	2,599.43	30.03	23.43	4.549 ES	

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18

Survey Program: 0-Scientific Keeper, 12141-MWD+IFR1+MS

Offset Site Error: 0.00 usft

Offset Well Error: 0.00 usft

Reference	Offset	Semi Major Axis	Distance	Warning									
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	0.00	0.00	0.00	0.00	89.62	0.20	29.90	29.92				
100.00	100.00	99.00	99.00	0.07	0.07	89.62	0.20	29.90	29.90	29.77	0.13	227.000	
200.00	200.00	199.00	199.00	0.20	0.19	89.62	0.20	29.90	29.90	29.51	0.39	76.714	
300.00	300.00	299.00	299.00	0.33	0.33	89.62	0.20	29.90	29.90	29.25	0.65	45.829	
400.00	400.00	399.00	399.00	0.46	0.46	89.62	0.20	29.90	29.90	28.98	0.92	32.654	
500.00	500.00	499.00	499.00	0.59	0.59	89.62	0.20	29.90	29.90	28.72	1.18	25.358	
600.00	600.00	599.00	599.00	0.72	0.72	89.62	0.20	29.90	29.90	28.46	1.44	20.726	
700.00	700.00	699.00	699.00	0.85	0.85	89.62	0.20	29.90	29.90	28.19	1.71	17.524	
800.00	800.00	799.00	799.00	0.99	0.98	89.62	0.20	29.90	29.90	27.93	1.97	15.179	
900.00	900.00	899.00	899.00	1.12	1.12	89.62	0.20	29.90	29.90	27.67	2.23	13.387	
1,000.00	1,000.00	999.00	999.00	1.25	1.25	89.62	0.20	29.90	29.90	27.40	2.50	11.974	
1,100.00	1,100.00	1,099.00	1,099.00	1.38	1.38	89.62	0.20	29.90	29.90	27.14	2.76	10.831	
1,200.00	1,200.00	1,199.00	1,199.00	1.51	1.51	89.62	0.20	29.90	29.90	26.88	3.02	9.886	
1,300.00	1,300.00	1,299.00	1,299.00	1.64	1.64	89.62	0.20	29.90	29.90	26.61	3.29	9.094	
1,400.00	1,400.00	1,399.00	1,399.00	1.78	1.78	89.62	0.20	29.90	29.90	26.35	3.55	8.419	
1,500.00	1,500.00	1,499.00	1,499.00	1.91	1.91	89.62	0.20	29.90	29.90	26.09	3.82	7.837	
1,600.00	1,600.00	1,599.00	1,599.00	2.04	2.04	89.62	0.20	29.90	29.90	25.82	4.08	7.330	
1,700.00	1,700.00	1,699.00	1,699.00	2.17	2.17	89.62	0.20	29.90	29.90	25.56	4.34	6.885	
1,800.00	1,800.00	1,799.00	1,799.00	2.30	2.30	89.62	0.20	29.90	29.90	25.29	4.61	6.491	
1,900.00	1,900.00	1,899.00	1,899.00	2.44	2.43	89.62	0.20	29.90	29.90	25.03	4.87	6.140	
2,000.00	2,000.00	1,999.00	1,999.00	2.57	2.57	89.62	0.20	29.90	29.90	24.77	5.13	5.824	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18													Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Keeper, 12141-MWD+IFR1+MS													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N/-S (usft)		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
2,100.00	2,100.00	2,099.00	2,099.00	2.70	2.70	89.62	0.20	29.90	29.90	24.50	5.40	5.540		
2,200.00	2,200.00	2,199.00	2,199.00	2.83	2.83	89.62	0.20	29.90	29.90	24.24	5.66	5.282		
2,300.00	2,300.00	2,299.00	2,299.00	2.96	2.96	89.62	0.20	29.90	29.90	23.98	5.92	5.047		
2,400.00	2,400.00	2,399.00	2,399.00	3.09	3.09	89.62	0.20	29.90	29.90	23.71	6.19	4.832		
2,500.00	2,500.00	2,499.00	2,499.00	3.23	3.23	89.62	0.20	29.90	29.90	23.45	6.45	4.634 CC, ES		
2,567.24	2,567.24	2,565.74	2,565.73	3.27	3.30	-147.96	0.76	30.41	31.09	24.52	6.57	4.731		
2,600.00	2,599.98	2,598.45	2,598.44	3.26	3.34	-149.65	1.32	30.93	32.29	25.69	6.60	4.891		
2,700.00	2,699.96	2,698.34	2,698.30	3.25	3.45	-154.08	3.04	32.51	36.12	29.42	6.70	5.391		
2,800.00	2,799.93	2,798.24	2,798.17	3.25	3.56	-157.65	4.76	34.09	40.12	33.32	6.81	5.895		
2,900.00	2,899.90	2,898.13	2,898.03	3.25	3.67	-160.57	6.48	35.67	44.25	37.34	6.92	6.396		
3,000.00	2,999.87	2,998.02	2,997.90	3.26	3.78	-162.98	8.20	37.24	48.48	41.44	7.04	6.889		
3,100.00	3,099.85	3,097.91	3,097.76	3.27	3.89	-165.00	9.92	38.82	52.78	45.61	7.16	7.368		
3,200.00	3,199.82	3,197.80	3,197.62	3.29	4.01	-166.72	11.64	40.40	57.13	49.83	7.29	7.833		
3,300.00	3,299.79	3,297.69	3,297.49	3.31	4.12	-168.19	13.36	41.98	61.52	54.09	7.43	8.280		
3,400.00	3,399.76	3,397.59	3,397.35	3.34	4.24	-169.47	15.08	43.56	65.95	58.38	7.57	8.708		
3,500.00	3,499.74	3,497.48	3,497.22	3.37	4.35	-170.58	16.79	45.14	70.41	62.69	7.72	9.118		
3,600.00	3,599.71	3,597.37	3,597.08	3.40	4.47	-171.56	18.51	46.72	74.90	67.02	7.88	9.509		
3,700.00	3,699.68	3,697.26	3,696.95	3.45	4.59	-172.43	20.23	48.30	79.40	71.36	8.04	9.881		
3,800.00	3,799.65	3,797.15	3,796.81	3.49	4.71	-173.21	21.95	49.88	83.92	75.72	8.20	10.234		
3,900.00	3,899.63	3,897.04	3,896.68	3.54	4.83	-173.91	23.67	51.46	88.45	80.08	8.37	10.568		
4,000.00	3,999.60	3,996.94	3,996.54	3.60	4.95	-174.54	25.39	53.04	93.00	84.45	8.54	10.885		
4,100.00	4,099.57	4,096.83	4,096.40	3.65	5.07	-175.11	27.11	54.62	97.55	88.83	8.72	11.185		
4,200.00	4,199.54	4,196.72	4,196.27	3.71	5.19	-175.63	28.83	56.20	102.11	93.21	8.90	11.468		
4,300.00	4,299.52	4,296.61	4,296.13	3.78	5.31	-176.10	30.55	57.78	106.68	97.59	9.09	11.736		
4,400.00	4,399.49	4,396.50	4,396.00	3.85	5.43	-176.54	32.27	59.36	111.26	101.98	9.28	11.989		
4,500.00	4,499.46	4,496.40	4,495.86	3.92	5.56	-176.94	33.99	60.94	115.85	106.37	9.47	12.228		
4,600.00	4,599.43	4,596.29	4,595.73	3.99	5.68	-177.31	35.71	62.51	120.43	110.76	9.67	12.453		
4,700.00	4,699.41	4,696.18	4,695.59	4.07	5.80	-177.65	37.43	64.09	125.03	115.16	9.87	12.666		
4,800.00	4,799.38	4,796.07	4,795.46	4.15	5.92	-177.97	39.15	65.67	129.63	119.55	10.07	12.867		
4,900.00	4,899.35	4,895.96	4,895.32	4.23	6.05	-178.27	40.87	67.25	134.23	123.95	10.28	13.057		
5,000.00	4,999.32	4,995.85	4,995.18	4.32	6.17	-178.55	42.59	68.83	138.83	128.34	10.49	13.236		
5,100.00	5,099.30	5,095.75	5,095.05	4.40	6.30	-178.81	44.31	70.41	143.44	132.74	10.70	13.406		
5,200.00	5,199.27	5,195.64	5,194.91	4.49	6.42	-179.05	46.03	71.99	148.05	137.14	10.91	13.566		
5,300.00	5,299.24	5,295.53	5,294.78	4.58	6.54	-179.28	47.75	73.57	152.66	141.54	11.13	13.718		
5,400.00	5,399.21	5,395.42	5,394.64	4.68	6.67	-179.50	49.47	75.15	157.28	145.93	11.35	13.861		
5,500.00	5,499.19	5,495.31	5,494.51	4.77	6.79	-179.70	51.19	76.73	161.90	150.33	11.57	13.997		
5,600.00	5,599.16	5,595.20	5,594.37	4.87	6.92	-179.89	52.91	78.31	166.52	154.73	11.79	14.126		
5,700.00	5,699.13	5,695.10	5,694.24	4.97	7.04	-179.93	54.63	79.89	171.14	159.13	12.01	14.248		
5,800.00	5,799.10	5,794.99	5,794.10	5.07	7.17	-179.75	56.35	81.47	175.76	163.52	12.24	14.364		
5,900.00	5,899.08	5,894.88	5,893.96	5.17	7.30	-179.59	58.06	83.05	180.39	167.92	12.46	14.474		
6,000.00	5,999.05	5,994.77	5,993.83	5.27	7.42	-179.44	59.78	84.63	185.01	172.32	12.69	14.578		
6,100.00	6,099.02	6,094.66	6,093.69	5.37	7.55	-179.29	61.50	86.21	189.64	176.72	12.92	14.678		
6,200.00	6,198.99	6,194.55	6,193.56	5.48	7.67	-179.15	63.22	87.79	194.27	181.12	13.15	14.772		
6,300.00	6,298.97	6,294.45	6,293.42	5.58	7.80	-179.01	64.94	89.36	198.90	185.51	13.38	14.862		
6,400.00	6,398.94	6,394.34	6,393.29	5.69	7.93	-178.89	66.66	90.94	203.53	189.91	13.62	14.948		
6,500.00	6,498.91	6,494.23	6,493.15	5.80	8.05	-178.76	68.38	92.52	208.16	194.31	13.85	15.030		
6,600.00	6,598.88	6,594.12	6,593.02	5.90	8.18	-178.65	70.10	94.10	212.79	198.70	14.09	15.108		
6,700.00	6,698.86	6,694.01	6,692.88	6.01	8.31	-178.54	71.82	95.68	217.42	203.10	14.32	15.182		
6,800.00	6,798.83	6,793.91	6,792.74	6.12	8.43	-178.43	73.54	97.26	222.06	207.50	14.56	15.253		
6,900.00	6,898.80	6,893.80	6,892.61	6.24	8.56	-178.33	75.26	98.84	226.69	211.90	14.80	15.321		
7,000.00	6,998.77	6,993.69	6,992.47	6.35	8.69	-178.23	76.98	100.42	231.33	216.29	15.04	15.386		
7,100.00	7,098.75	7,093.58	7,092.34	6.46	8.82	-178.13	78.70	102.00	235.96	220.69	15.27	15.448		

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

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Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18													Offset Site Error: 0.00 usft	
Survey Program: 0-Scientific Keeper, 12141-MWD+IFR1+MS													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	+E-W (usft)						
7,200.00	7,198.72	7,193.47	7,192.20	6.57	8.94	178.04	80.42	103.58	240.60	225.08	15.52	15.507		
7,300.00	7,298.69	7,293.36	7,292.07	6.69	9.07	177.95	82.14	105.16	245.24	229.48	15.76	15.564		
7,400.00	7,398.66	7,393.26	7,391.93	6.80	9.20	177.87	83.86	106.74	249.87	233.88	16.00	15.619		
7,500.00	7,498.64	7,493.15	7,491.80	6.92	9.32	177.79	85.58	108.32	254.51	238.27	16.24	15.671		
7,600.00	7,598.61	7,593.04	7,591.66	7.03	9.45	177.71	87.30	109.90	259.15	242.67	16.48	15.721		
7,700.00	7,698.58	7,692.93	7,691.52	7.15	9.58	177.63	89.02	111.48	263.79	247.06	16.73	15.770		
7,800.00	7,798.55	7,792.82	7,791.39	7.26	9.71	177.56	90.74	113.06	268.43	251.46	16.97	15.816		
7,900.00	7,898.53	7,892.71	7,891.25	7.38	9.84	177.49	92.46	114.63	273.07	255.85	17.22	15.861		
8,000.00	7,998.50	7,992.61	7,991.12	7.50	9.96	177.42	94.18	116.21	277.71	260.25	17.46	15.904		
8,100.00	8,098.47	8,092.50	8,090.98	7.62	10.09	177.36	95.90	117.79	282.35	264.64	17.71	15.945		
8,200.00	8,198.44	8,192.39	8,190.85	7.73	10.22	177.29	97.62	119.37	286.99	269.04	17.95	15.984		
8,300.00	8,298.41	8,292.28	8,290.71	7.85	10.35	177.23	99.33	120.95	291.63	273.43	18.20	16.023		
8,400.00	8,398.39	8,392.17	8,390.58	7.97	10.48	177.17	101.05	122.53	296.28	277.83	18.45	16.059		
8,500.00	8,498.36	8,492.06	8,490.44	8.09	10.60	177.11	102.77	124.11	300.92	282.22	18.70	16.095		
8,600.00	8,598.33	8,591.96	8,590.30	8.21	10.73	177.06	104.49	125.69	305.56	286.62	18.94	16.129		
8,700.00	8,698.30	8,691.85	8,690.17	8.33	10.86	177.00	106.21	127.27	310.20	291.01	19.19	16.162		
8,800.00	8,798.28	8,791.74	8,790.03	8.45	10.99	176.95	107.93	128.85	314.85	295.41	19.44	16.194		
8,900.00	8,898.25	8,891.63	8,889.90	8.57	11.12	176.90	109.65	130.43	319.49	299.80	19.69	16.225		
9,000.00	8,998.22	8,991.52	8,989.76	8.69	11.25	176.85	111.37	132.01	324.13	304.19	19.94	16.255		
9,100.00	9,098.19	9,091.42	9,089.63	8.81	11.38	176.80	113.09	133.59	328.78	308.59	20.19	16.283		
9,200.00	9,198.17	9,191.31	9,189.49	8.94	11.50	176.75	114.81	135.17	333.42	312.98	20.44	16.311		
9,300.00	9,298.14	9,291.20	9,289.36	9.06	11.63	176.70	116.53	136.75	338.07	317.37	20.69	16.338		
9,400.00	9,398.11	9,391.09	9,389.22	9.18	11.76	176.66	118.25	138.33	342.71	321.77	20.94	16.364		
9,500.00	9,498.08	9,490.98	9,489.08	9.30	11.89	176.62	119.97	139.90	347.36	326.16	21.19	16.389		
9,600.00	9,598.06	9,590.87	9,588.95	9.42	12.02	176.57	121.69	141.48	352.00	330.56	21.45	16.414		
9,700.00	9,698.03	9,690.77	9,688.81	9.55	12.15	176.53	123.41	143.06	356.65	334.95	21.70	16.438		
9,800.00	9,798.00	9,790.66	9,788.68	9.67	12.28	176.49	125.13	144.64	361.29	339.34	21.95	16.461		
9,900.00	9,897.97	9,890.55	9,888.54	9.79	12.40	176.45	126.85	146.22	365.94	343.74	22.20	16.483		
10,000.00	9,997.95	9,990.44	9,988.41	9.92	12.53	176.42	128.57	147.80	370.58	348.13	22.45	16.504		
10,100.00	10,097.92	10,090.33	10,088.27	10.04	12.66	176.38	130.29	149.38	375.23	352.52	22.71	16.525		
10,200.00	10,197.89	10,190.22	10,188.14	10.16	12.79	176.34	132.01	150.96	379.87	356.91	22.96	16.546		
10,300.00	10,297.86	10,290.12	10,288.00	10.29	12.92	176.31	133.73	152.54	384.52	361.31	23.21	16.566		
10,400.00	10,397.84	10,390.01	10,387.86	10.41	13.05	176.27	135.45	154.12	389.17	365.70	23.47	16.585		
10,500.00	10,497.81	10,489.90	10,487.73	10.54	13.18	176.24	137.17	155.70	393.81	370.09	23.72	16.603		
10,600.00	10,597.78	10,589.79	10,587.59	10.66	13.31	176.20	138.89	157.28	398.46	374.49	23.97	16.622		
10,700.00	10,697.75	10,689.68	10,687.46	10.78	13.44	176.17	140.60	158.86	403.11	378.88	24.23	16.639		
10,800.00	10,797.73	10,789.57	10,787.32	10.91	13.57	176.14	142.32	160.44	407.75	383.27	24.48	16.656		
10,900.00	10,897.70	10,889.47	10,887.19	11.03	13.70	176.11	144.04	162.02	412.40	387.66	24.73	16.673		
11,000.00	10,997.67	10,989.36	10,987.05	11.16	13.82	176.08	145.76	163.60	417.05	392.06	24.99	16.689		
11,100.00	11,097.64	11,089.25	11,086.92	11.28	13.95	176.05	147.48	165.18	421.69	396.45	25.24	16.705		
11,200.00	11,197.62	11,189.14	11,186.78	11.41	14.08	176.02	149.20	166.75	426.34	400.84	25.50	16.720		
11,300.00	11,297.59	11,289.03	11,286.64	11.53	14.21	175.99	150.92	168.33	430.99	405.23	25.75	16.735		
11,400.00	11,397.56	11,388.92	11,386.51	11.66	14.34	175.97	152.64	169.91	435.64	409.63	26.01	16.750		
11,500.00	11,497.53	11,488.82	11,486.37	11.78	14.47	175.94	154.36	171.49	440.28	414.02	26.26	16.764		
11,600.00	11,597.51	11,588.71	11,586.24	11.91	14.60	175.91	156.08	173.07	444.93	418.41	26.52	16.778		
11,700.00	11,697.48	11,688.60	11,686.10	12.04	14.73	175.89	157.80	174.65	449.58	422.80	26.77	16.792		
11,724.88	11,722.35	11,713.46	11,710.95	12.07	14.76	175.88	158.23	175.04	450.73	423.90	26.84	16.795		
11,792.13	11,789.59	11,780.66	11,778.13	12.12	14.85	51.63	159.39	176.11	453.07	426.11	26.97	16.802		
11,800.00	11,797.47	11,788.53	11,786.00	12.12	14.86	51.62	159.52	176.23	453.26	426.28	26.98	16.801		
11,900.00	11,897.47	11,891.17	11,888.62	12.14	14.99	51.58	161.25	177.82	455.52	428.39	27.13	16.789		
11,992.13	11,989.59	11,991.15	11,988.59	12.13	15.11	51.57	161.57	178.12	455.88	428.64	27.24	16.735		
12,000.00	11,997.46	11,999.02	11,996.46	12.13	15.12	-127.83	161.57	178.12	455.92	428.67	27.26	16.727		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18													Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Keeper, 12141-MWD+IFR1+MS													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)				Offset	Reference	Offset
12,025.00	12,022.44	12,023.99	12,021.44	12.13	15.15	-127.87	161.57	178.12	456.58	429.25	27.33	16.705		
12,050.00	12,047.32	12,048.88	12,046.32	12.13	15.18	-127.97	161.57	178.12	458.04	430.60	27.44	16.690		
12,075.00	12,072.05	12,073.60	12,071.05	12.14	15.21	-128.11	161.57	178.12	460.32	432.72	27.60	16.677		
12,100.00	12,096.55	12,098.10	12,095.55	12.14	15.24	-128.29	161.57	178.12	463.43	435.61	27.82	16.658		
12,125.00	12,120.76	12,122.31	12,119.76	12.15	15.25	-128.51	161.57	178.12	467.38	439.08	28.30	16.515		
12,150.00	12,144.60	12,155.06	12,152.50	12.15	15.26	-129.00	161.37	178.12	472.14	443.02	29.12	16.212		
12,175.00	12,168.03	12,223.48	12,220.52	12.16	15.26	-130.25	154.49	178.19	476.27	446.23	30.05	15.852		
12,200.00	12,190.96	12,295.50	12,290.27	12.17	15.28	-131.07	136.84	178.38	478.92	447.69	31.23	15.336		
12,225.00	12,213.34	12,369.60	12,358.43	12.18	15.31	-131.38	107.95	178.68	479.92	447.33	32.59	14.727		
12,250.00	12,235.11	12,443.87	12,421.44	12.19	15.35	-131.16	68.78	179.09	479.22	445.16	34.06	14.072		
12,275.00	12,256.21	12,516.39	12,476.38	12.20	15.40	-130.43	21.56	179.59	476.86	441.27	35.59	13.400		
12,300.00	12,276.57	12,585.55	12,521.55	12.22	15.46	-129.25	-30.72	180.14	472.98	435.83	37.15	12.733		
12,325.00	12,296.15	12,650.24	12,556.56	12.23	15.51	-127.72	-85.07	180.71	467.79	429.07	38.72	12.082		
12,350.00	12,314.89	12,709.96	12,582.09	12.25	15.57	-125.94	-139.01	181.28	461.55	421.27	40.28	11.458		
12,375.00	12,332.73	12,764.64	12,599.39	12.27	15.62	-124.00	-190.84	181.82	454.50	412.68	41.82	10.868		
12,400.00	12,349.64	12,814.54	12,609.92	12.29	15.66	-121.98	-239.59	182.34	446.89	403.57	43.33	10.315		
12,425.00	12,365.56	12,860.09	12,615.05	12.32	15.70	-119.93	-284.83	182.81	438.94	394.15	44.78	9.802		
12,450.00	12,380.44	12,893.02	12,616.13	12.34	15.72	-118.53	-317.74	183.16	430.91	384.73	46.18	9.331		
12,475.00	12,394.26	12,914.05	12,616.44	12.37	15.74	-117.93	-338.77	183.38	423.64	376.14	47.51	8.917		
12,500.00	12,406.97	12,935.76	12,616.76	12.40	15.76	-117.29	-360.48	183.61	417.25	368.49	48.76	8.557		
12,525.00	12,418.53	12,958.09	12,617.09	12.44	15.78	-116.63	-382.80	183.84	411.69	361.75	49.93	8.245		
12,550.00	12,428.92	12,980.98	12,617.43	12.47	15.80	-115.98	-405.69	184.08	406.91	355.89	51.01	7.976		
12,575.00	12,438.10	13,004.36	12,617.77	12.51	15.82	-115.35	-429.06	184.33	402.87	350.86	52.00	7.747		
12,600.00	12,446.06	13,028.17	12,618.13	12.55	15.84	-114.78	-452.87	184.58	399.51	346.62	52.90	7.553		
12,625.00	12,452.76	13,052.35	12,618.48	12.59	15.87	-114.27	-477.05	184.83	396.80	343.12	53.69	7.391		
12,650.00	12,458.20	13,076.83	12,618.84	12.64	15.89	-113.84	-501.52	185.09	394.70	340.33	54.37	7.260		
12,675.00	12,462.34	13,101.54	12,619.21	12.68	15.92	-113.51	-526.22	185.35	393.16	338.22	54.94	7.156		
12,700.00	12,465.20	13,126.41	12,619.57	12.73	15.95	-113.29	-551.09	185.61	392.17	336.77	55.40	7.079		
12,725.00	12,466.75	13,151.38	12,619.94	12.78	15.98	-113.18	-576.06	185.88	391.70	335.95	55.75	7.026		
12,750.00	12,467.00	13,161.26	12,620.09	12.80	15.99	-113.17	-585.94	185.98	391.66	335.80	55.86	7.012		
12,800.00	12,467.99	13,226.38	12,621.05	12.95	16.08	-113.17	-651.05	186.66	391.65	335.64	56.01	6.992		
12,900.00	12,469.50	13,326.38	12,622.52	13.21	16.23	-113.16	-751.03	187.72	391.63	335.35	56.28	6.958		
13,000.00	12,471.02	13,426.38	12,623.99	13.50	16.41	-113.15	-851.01	188.77	391.61	335.01	56.60	6.919		
13,100.00	12,472.54	13,526.38	12,625.47	13.84	16.62	-113.15	-951.00	189.82	391.59	334.64	56.96	6.875		
13,200.00	12,474.05	13,626.38	12,626.94	14.21	16.85	-113.14	-1,050.98	190.87	391.57	334.22	57.35	6.827		
13,300.00	12,475.57	13,726.38	12,628.41	14.61	17.12	-113.14	-1,150.96	191.92	391.55	333.76	57.79	6.775		
13,400.00	12,477.09	13,826.38	12,629.88	15.04	17.43	-113.13	-1,250.95	192.98	391.54	333.27	58.27	6.719		
13,500.00	12,478.60	13,926.38	12,631.36	15.49	17.77	-113.13	-1,350.93	194.03	391.52	332.73	58.78	6.660		
13,600.00	12,480.12	14,026.38	12,632.83	15.98	18.15	-113.12	-1,450.91	195.08	391.50	332.16	59.34	6.598		
13,700.00	12,481.64	14,126.38	12,634.30	16.48	18.56	-113.11	-1,550.90	196.13	391.48	331.56	59.92	6.533		
13,800.00	12,483.15	14,226.38	12,635.78	17.00	19.01	-113.11	-1,650.88	197.18	391.46	330.92	60.55	6.465		
13,900.00	12,484.67	14,326.38	12,637.25	17.55	19.49	-113.10	-1,750.86	198.24	391.44	330.24	61.20	6.396		
14,000.00	12,486.18	14,426.38	12,638.72	18.11	20.00	-113.10	-1,850.85	199.29	391.42	329.53	61.89	6.324		
14,100.00	12,487.70	14,526.38	12,640.20	18.68	20.53	-113.09	-1,950.83	200.34	391.41	328.79	62.61	6.251		
14,200.00	12,489.22	14,626.38	12,641.67	19.27	21.09	-113.09	-2,050.82	201.39	391.39	328.02	63.37	6.177		
14,300.00	12,490.73	14,726.38	12,643.14	19.87	21.66	-113.08	-2,150.80	202.44	391.37	327.22	64.15	6.101		
14,400.00	12,492.25	14,826.38	12,644.62	20.48	22.25	-113.07	-2,250.78	203.50	391.35	326.39	64.96	6.025		
14,500.00	12,493.77	14,926.38	12,646.09	21.10	22.86	-113.07	-2,350.77	204.55	391.33	325.54	65.80	5.948		
14,600.00	12,495.28	15,026.38	12,647.56	21.73	23.49	-113.06	-2,450.75	205.60	391.31	324.65	66.66	5.870		
14,700.00	12,496.80	15,126.38	12,649.04	22.37	24.12	-113.06	-2,550.73	206.65	391.30	323.75	67.55	5.793		
14,800.00	12,498.32	15,226.38	12,650.51	23.02	24.76	-113.05	-2,650.72	207.70	391.28	322.81	68.46	5.715		
14,900.00	12,499.83	15,326.38	12,651.98	23.68	25.42	-113.05	-2,750.70	208.76	391.26	321.86	69.40	5.638		

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 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18													Offset Site Error: 0.00 usft	
Survey Program: 0-Scientific Keeper, 12141-MWD+IFR1+MS													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
15,000.00	12,501.35	15,426.38	12,653.46	24.34	26.08	-113.04	-2,850.68	209.81	391.24	320.88	70.36	5.560		
15,100.00	12,502.87	15,526.38	12,654.93	25.01	26.75	-113.03	-2,950.67	210.86	391.22	319.88	71.34	5.484		
15,200.00	12,504.38	15,626.38	12,656.40	25.68	27.43	-113.03	-3,050.65	211.91	391.20	318.86	72.35	5.407		
15,300.00	12,505.90	15,726.38	12,657.87	26.36	28.11	-113.02	-3,150.64	212.96	391.18	317.82	73.37	5.332		
15,400.00	12,507.41	15,826.38	12,659.35	27.04	28.80	-113.02	-3,250.62	214.01	391.17	316.76	74.41	5.257		
15,500.00	12,508.93	15,926.38	12,660.82	27.73	29.49	-113.01	-3,350.60	215.07	391.15	315.68	75.47	5.183		
15,600.00	12,510.45	16,026.38	12,662.29	28.42	30.18	-113.01	-3,450.59	216.12	391.13	314.58	76.55	5.110		
15,700.00	12,511.96	16,126.38	12,663.77	29.11	30.89	-113.00	-3,550.57	217.17	391.11	313.47	77.64	5.037		
15,800.00	12,513.48	16,226.38	12,665.24	29.81	31.59	-112.99	-3,650.55	218.22	391.09	312.34	78.75	4.966		
15,900.00	12,515.00	16,326.38	12,666.71	30.51	32.30	-112.99	-3,750.54	219.27	391.07	311.20	79.88	4.896		
16,000.00	12,516.51	16,426.38	12,668.19	31.22	33.01	-112.98	-3,850.52	220.33	391.06	310.04	81.02	4.827		
16,100.00	12,518.03	16,526.38	12,669.66	31.93	33.72	-112.98	-3,950.50	221.38	391.04	308.86	82.17	4.759		
16,200.00	12,519.55	16,626.38	12,671.13	32.64	34.44	-112.97	-4,050.49	222.43	391.02	307.68	83.34	4.692		
16,300.00	12,521.06	16,726.38	12,672.61	33.35	35.16	-112.97	-4,150.47	223.48	391.00	306.48	84.52	4.626		
16,400.00	12,522.58	16,826.38	12,674.08	34.07	35.88	-112.96	-4,250.46	224.53	390.98	305.27	85.71	4.561		
16,500.00	12,524.10	16,926.38	12,675.55	34.78	36.60	-112.95	-4,350.44	225.59	390.96	304.04	86.92	4.498		
16,600.00	12,525.61	17,026.38	12,677.03	35.50	37.32	-112.95	-4,450.42	226.64	390.94	302.81	88.14	4.436		
16,700.00	12,527.13	17,126.38	12,678.50	36.22	38.05	-112.94	-4,550.41	227.69	390.93	301.56	89.37	4.374		
16,800.00	12,528.64	17,226.38	12,679.97	36.95	38.78	-112.94	-4,650.39	228.74	390.91	300.30	90.60	4.314		
16,900.00	12,530.16	17,326.38	12,681.45	37.67	39.51	-112.93	-4,750.37	229.79	390.89	299.04	91.85	4.256		
17,000.00	12,531.68	17,426.38	12,682.92	38.40	40.24	-112.93	-4,850.36	230.85	390.87	297.76	93.11	4.198		
17,100.00	12,533.19	17,526.38	12,684.39	39.12	40.97	-112.92	-4,950.34	231.90	390.85	296.47	94.38	4.141		
17,200.00	12,534.71	17,626.38	12,685.87	39.85	41.71	-112.91	-5,050.32	232.95	390.83	295.18	95.66	4.086		
17,300.00	12,536.23	17,726.38	12,687.34	40.58	42.44	-112.91	-5,150.31	234.00	390.82	293.87	96.94	4.031		
17,400.00	12,537.74	17,826.38	12,688.81	41.31	43.18	-112.90	-5,250.29	235.05	390.80	292.56	98.23	3.978		
17,500.00	12,539.26	17,926.38	12,690.28	42.05	43.91	-112.90	-5,350.27	236.11	390.78	291.24	99.54	3.926		
17,600.00	12,540.78	18,026.38	12,691.76	42.78	44.65	-112.89	-5,450.26	237.16	390.76	289.92	100.85	3.875		
17,700.00	12,542.29	18,126.38	12,693.23	43.52	45.39	-112.89	-5,550.24	238.21	390.74	288.58	102.16	3.825		
17,800.00	12,543.81	18,226.38	12,694.70	44.25	46.13	-112.88	-5,650.23	239.26	390.72	287.24	103.49	3.776		
17,900.00	12,545.33	18,326.38	12,696.18	44.99	46.87	-112.87	-5,750.21	240.31	390.71	285.89	104.82	3.728		
18,000.00	12,546.84	18,426.38	12,697.65	45.73	47.61	-112.87	-5,850.19	241.36	390.69	284.53	106.15	3.680		
18,100.00	12,548.36	18,526.38	12,699.12	46.47	48.36	-112.86	-5,950.18	242.42	390.67	283.17	107.50	3.634		
18,200.00	12,549.87	18,626.38	12,700.60	47.21	49.10	-112.86	-6,050.16	243.47	390.65	281.80	108.85	3.589		
18,300.00	12,551.39	18,726.38	12,702.07	47.95	49.84	-112.85	-6,150.14	244.52	390.63	280.43	110.20	3.545		
18,400.00	12,552.91	18,826.38	12,703.54	48.69	50.59	-112.85	-6,250.13	245.57	390.61	279.05	111.56	3.501		
18,500.00	12,554.42	18,926.38	12,705.02	49.43	51.33	-112.84	-6,350.11	246.62	390.60	277.67	112.93	3.459		
18,600.00	12,555.94	19,026.38	12,706.49	50.17	52.08	-112.83	-6,450.09	247.68	390.58	276.28	114.30	3.417		
18,700.00	12,557.46	19,126.38	12,707.96	50.91	52.83	-112.83	-6,550.08	248.73	390.56	274.88	115.68	3.376		
18,800.00	12,558.97	19,226.38	12,709.44	51.66	53.57	-112.82	-6,650.06	249.78	390.54	273.48	117.06	3.336		
18,900.00	12,560.49	19,326.38	12,710.91	52.40	54.32	-112.82	-6,750.05	250.83	390.52	272.08	118.44	3.297		
19,000.00	12,562.01	19,426.38	12,712.38	53.15	55.07	-112.81	-6,850.03	251.88	390.50	270.67	119.83	3.259		
19,100.00	12,563.52	19,526.38	12,713.86	53.89	55.82	-112.80	-6,950.01	252.94	390.49	269.26	121.23	3.221		
19,200.00	12,565.04	19,626.38	12,715.33	54.64	56.57	-112.80	-7,050.00	253.99	390.47	267.84	122.63	3.184		
19,300.00	12,566.56	19,726.38	12,716.80	55.39	57.32	-112.79	-7,149.98	255.04	390.45	266.42	124.03	3.148		
19,400.00	12,568.07	19,826.38	12,718.28	56.13	58.07	-112.79	-7,249.96	256.09	390.43	264.99	125.44	3.113		
19,500.00	12,569.59	19,926.38	12,719.75	56.88	58.82	-112.78	-7,349.95	257.14	390.41	263.56	126.85	3.078		
19,600.00	12,571.10	20,026.38	12,721.22	57.63	59.57	-112.78	-7,449.93	258.20	390.39	262.13	128.26	3.044		
19,700.00	12,572.62	20,126.38	12,722.69	58.38	60.32	-112.77	-7,549.91	259.25	390.38	260.69	129.68	3.010		
19,800.00	12,574.14	20,226.38	12,724.17	59.13	61.07	-112.76	-7,649.90	260.30	390.36	259.25	131.10	2.977		
19,900.00	12,575.65	20,326.38	12,725.64	59.88	61.82	-112.76	-7,749.88	261.35	390.34	257.81	132.53	2.945		
20,000.00	12,577.17	20,426.38	12,727.11	60.63	62.57	-112.75	-7,849.86	262.40	390.32	256.36	133.96	2.914		
20,100.00	12,578.69	20,526.38	12,728.59	61.38	63.33	-112.75	-7,949.85	263.46	390.30	254.91	135.39	2.883		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 701H - OH - Plan 1 02-21-18												Offset Site Error:	0.00 usft
Survey Program: 0-Scientific Keeper, 12141-MWVD+IFR1+MS												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
20,200.00	12,580.20	20,626.38	12,730.06	62.13	64.08	-112.74	-8,049.83	264.51	390.28	253.46	136.82	2.852	
20,300.00	12,581.72	20,726.38	12,731.53	62.88	64.83	-112.74	-8,149.82	265.56	390.27	252.01	138.26	2.823	
20,400.00	12,583.24	20,826.38	12,733.01	63.63	65.59	-112.73	-8,249.80	266.61	390.25	250.55	139.70	2.793	
20,500.00	12,584.75	20,926.38	12,734.48	64.38	66.34	-112.72	-8,349.78	267.66	390.23	249.09	141.14	2.765	
20,600.00	12,586.27	21,026.38	12,735.95	65.13	67.09	-112.72	-8,449.77	268.72	390.21	247.62	142.58	2.737	
20,700.00	12,587.79	21,126.38	12,737.43	65.88	67.85	-112.71	-8,549.75	269.77	390.19	246.16	144.04	2.709	
20,800.00	12,589.30	21,226.38	12,738.90	66.64	68.60	-112.71	-8,649.73	270.82	390.17	244.69	145.49	2.682	
20,900.00	12,590.82	21,326.38	12,740.37	67.39	69.36	-112.70	-8,749.72	271.87	390.16	243.22	146.94	2.655	
21,000.00	12,592.33	21,426.38	12,741.85	68.14	70.11	-112.70	-8,849.70	272.92	390.14	241.74	148.40	2.629	
21,100.00	12,593.85	21,526.38	12,743.32	68.90	70.87	-112.69	-8,949.68	273.97	390.12	240.27	149.85	2.603	
21,200.00	12,595.37	21,626.38	12,744.79	69.65	71.62	-112.68	-9,049.67	275.03	390.10	238.79	151.31	2.578	
21,300.00	12,596.88	21,726.38	12,746.27	70.40	72.38	-112.68	-9,149.65	276.08	390.08	237.31	152.78	2.553	
21,400.00	12,598.40	21,826.38	12,747.74	71.16	73.13	-112.67	-9,249.64	277.13	390.06	235.82	154.24	2.529	
21,500.00	12,599.92	21,926.38	12,749.21	71.91	73.89	-112.67	-9,349.62	278.18	390.05	234.34	155.71	2.505	
21,600.00	12,601.43	22,026.38	12,750.68	72.67	74.64	-112.66	-9,449.60	279.23	390.03	232.85	157.17	2.481	
21,700.00	12,602.95	22,126.38	12,752.16	73.42	75.40	-112.65	-9,549.59	280.29	390.01	231.37	158.65	2.458	
21,800.00	12,604.47	22,226.38	12,753.63	74.18	76.16	-112.65	-9,649.57	281.34	389.99	229.87	160.12	2.436	
21,900.00	12,605.98	22,326.38	12,755.10	74.93	76.91	-112.64	-9,749.55	282.39	389.97	228.38	161.59	2.413	
22,000.00	12,607.50	22,426.38	12,756.58	75.69	77.67	-112.64	-9,849.54	283.44	389.96	226.89	163.07	2.391	
22,100.00	12,609.02	22,526.38	12,758.05	76.44	78.43	-112.63	-9,949.52	284.49	389.94	225.39	164.54	2.370	
22,200.00	12,610.53	22,626.38	12,759.52	77.20	79.18	-112.63	-10,049.50	285.55	389.92	223.90	166.02	2.349	
22,296.82	12,612.00	22,723.19	12,760.95	77.93	79.92	-112.62	-10,146.30	286.56	389.90	222.44	167.46	2.328 SF	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 702H - OH - Plan 1 02-21-18													Offset Site Error: 0.00 usft	
Survey Program: 0-Scientific Keeper, 12242-MWD+IFR1+MS													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)				Between Centres (usft)	Between Ellipses (usft)	
0.00	0.00	0.00	0.00	0.00	0.00	-90.57	-0.30	-30.10	30.10					
100.00	100.00	100.00	100.00	0.07	0.07	-90.57	-0.30	-30.10	30.10	29.97	0.13	227.382		
200.00	200.00	200.00	200.00	0.20	0.20	-90.57	-0.30	-30.10	30.10	29.71	0.39	76.973		
300.00	300.00	300.00	300.00	0.33	0.33	-90.57	-0.30	-30.10	30.10	29.45	0.65	46.044		
400.00	400.00	400.00	400.00	0.46	0.46	-90.57	-0.30	-30.10	30.10	29.18	0.92	32.826		
500.00	500.00	500.00	500.00	0.59	0.59	-90.57	-0.30	-30.10	30.10	28.92	1.18	25.500		
600.00	600.00	600.00	600.00	0.72	0.72	-90.57	-0.30	-30.10	30.10	28.66	1.44	20.846		
700.00	700.00	700.00	700.00	0.85	0.85	-90.57	-0.30	-30.10	30.10	28.39	1.71	17.628		
800.00	800.00	800.00	800.00	0.99	0.99	-90.57	-0.30	-30.10	30.10	28.13	1.97	15.271		
900.00	900.00	900.00	900.00	1.12	1.12	-90.57	-0.30	-30.10	30.10	27.87	2.23	13.469		
1,000.00	1,000.00	1,000.00	1,000.00	1.25	1.25	-90.57	-0.30	-30.10	30.10	27.60	2.50	12.048		
1,100.00	1,100.00	1,100.00	1,100.00	1.38	1.38	-90.57	-0.30	-30.10	30.10	27.34	2.76	10.898		
1,200.00	1,200.00	1,200.00	1,200.00	1.51	1.51	-90.57	-0.30	-30.10	30.10	27.08	3.03	9.949		
1,300.00	1,300.00	1,300.00	1,300.00	1.64	1.64	-90.57	-0.30	-30.10	30.10	26.81	3.29	9.151		
1,400.00	1,400.00	1,400.00	1,400.00	1.78	1.78	-90.57	-0.30	-30.10	30.10	26.55	3.55	8.472		
1,500.00	1,500.00	1,500.00	1,500.00	1.91	1.91	-90.57	-0.30	-30.10	30.10	26.28	3.82	7.887		
1,600.00	1,600.00	1,600.00	1,600.00	2.04	2.04	-90.57	-0.30	-30.10	30.10	26.02	4.08	7.377		
1,700.00	1,700.00	1,700.00	1,700.00	2.17	2.17	-90.57	-0.30	-30.10	30.10	25.76	4.34	6.929		
1,800.00	1,800.00	1,800.00	1,800.00	2.30	2.30	-90.57	-0.30	-30.10	30.10	25.49	4.61	6.533		
1,900.00	1,900.00	1,900.00	1,900.00	2.44	2.44	-90.57	-0.30	-30.10	30.10	25.23	4.87	6.179		
2,000.00	2,000.00	2,000.00	2,000.00	2.57	2.57	-90.57	-0.30	-30.10	30.10	24.97	5.14	5.862		
2,100.00	2,100.00	2,100.00	2,100.00	2.70	2.70	-90.57	-0.30	-30.10	30.10	24.70	5.40	5.576		
2,200.00	2,200.00	2,200.00	2,200.00	2.83	2.83	-90.57	-0.30	-30.10	30.10	24.44	5.66	5.316		
2,300.00	2,300.00	2,300.00	2,300.00	2.96	2.96	-90.57	-0.30	-30.10	30.10	24.18	5.93	5.080		
2,400.00	2,400.00	2,400.00	2,400.00	3.09	3.09	-90.57	-0.30	-30.10	30.10	23.91	6.19	4.863		
2,500.00	2,500.00	2,500.00	2,500.00	3.23	3.23	-90.57	-0.30	-30.10	30.10	23.65	6.45	4.664		
2,567.24	2,567.24	2,566.72	2,566.71	3.27	3.30	35.51	0.23	-30.67	30.03	23.46	6.57	4.571		
2,587.12	2,587.11	2,586.56	2,586.55	3.26	3.32	36.64	0.56	-31.03	30.02	23.43	6.59	4.557 CC		
2,600.00	2,599.98	2,599.43	2,599.41	3.26	3.34	37.37	0.77	-31.26	30.03	23.43	6.60	4.549 ES		
2,700.00	2,699.96	2,699.38	2,699.34	3.25	3.44	43.06	2.44	-33.08	30.21	23.52	6.69	4.513		
2,800.00	2,799.93	2,799.34	2,799.26	3.25	3.55	48.62	4.11	-34.89	30.69	23.90	6.79	4.517		
2,900.00	2,899.90	2,899.29	2,899.19	3.25	3.65	53.96	5.79	-36.70	31.45	24.55	6.90	4.557		
3,000.00	2,999.87	2,999.25	2,999.11	3.26	3.76	59.01	7.46	-38.52	32.47	25.45	7.02	4.627		
3,100.00	3,099.85	3,099.20	3,099.04	3.27	3.87	63.72	9.13	-40.33	33.72	26.59	7.14	4.725		
3,200.00	3,199.82	3,199.16	3,198.96	3.29	3.98	68.07	10.80	-42.14	35.19	27.92	7.27	4.844		
3,300.00	3,299.79	3,299.12	3,298.89	3.31	4.09	72.04	12.47	-43.96	36.84	29.44	7.40	4.979		
3,400.00	3,399.76	3,399.07	3,398.81	3.34	4.20	75.66	14.14	-45.77	38.65	31.11	7.54	5.127		
3,500.00	3,499.74	3,499.03	3,498.74	3.37	4.32	78.95	15.81	-47.58	40.61	32.92	7.68	5.284		
3,600.00	3,599.71	3,598.98	3,598.66	3.40	4.43	81.92	17.49	-49.40	42.68	34.84	7.84	5.447		
3,700.00	3,699.68	3,698.94	3,698.59	3.45	4.55	84.61	19.16	-51.21	44.86	36.87	7.99	5.613		
3,800.00	3,799.65	3,798.89	3,798.51	3.49	4.66	87.05	20.83	-53.03	47.13	38.97	8.15	5.780		
3,900.00	3,899.63	3,898.85	3,898.43	3.54	4.78	89.26	22.50	-54.84	49.47	41.15	8.32	5.946		
4,000.00	3,999.60	3,998.80	3,998.36	3.60	4.90	91.27	24.17	-56.65	51.88	43.39	8.49	6.110		
4,100.00	4,099.57	4,098.76	4,098.28	3.65	5.01	93.10	25.84	-58.47	54.35	45.69	8.67	6.271		
4,200.00	4,199.54	4,198.71	4,198.21	3.71	5.13	94.76	27.51	-60.28	56.87	48.03	8.85	6.428		
4,300.00	4,299.52	4,298.67	4,298.13	3.78	5.25	96.29	29.19	-62.09	59.44	50.41	9.03	6.581		
4,400.00	4,399.49	4,398.62	4,398.06	3.85	5.37	97.68	30.86	-63.91	62.04	52.82	9.22	6.729		
4,500.00	4,499.46	4,498.58	4,497.98	3.92	5.49	98.97	32.53	-65.72	64.68	55.27	9.41	6.872		
4,600.00	4,599.43	4,598.53	4,597.91	3.99	5.61	100.15	34.20	-67.53	67.35	57.74	9.61	7.010		
4,700.00	4,699.41	4,698.49	4,697.83	4.07	5.73	101.24	35.87	-69.35	70.04	60.23	9.81	7.143		
4,800.00	4,799.38	4,798.44	4,797.76	4.15	5.86	102.26	37.54	-71.16	72.76	62.75	10.01	7.270		
4,900.00	4,899.35	4,898.40	4,897.68	4.23	5.98	103.19	39.21	-72.97	75.49	65.28	10.21	7.393		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 702H - OH - Plan 1 02-21-18													Offset Site Error:	0.00 usft
Survey Program: O-Scientific Keeper, 12242-MWD+IFR1+MS													Offset Well Error:	0.00 usft
Reference	Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,000.00	4,999.32	4,998.35	4,997.61	4.32	6.10	104.07	40.89	-74.79	78.25	67.83	10.42	7.511		
5,100.00	5,099.30	5,098.31	5,097.53	4.40	6.22	104.88	42.56	-76.60	81.02	70.40	10.63	7.624		
5,200.00	5,199.27	5,198.26	5,197.46	4.49	6.35	105.64	44.23	-78.41	83.81	72.97	10.84	7.732		
5,300.00	5,299.24	5,298.22	5,297.38	4.58	6.47	106.35	45.90	-80.23	86.62	75.56	11.05	7.835		
5,400.00	5,399.21	5,398.17	5,397.31	4.68	6.59	107.01	47.57	-82.04	89.43	78.16	11.27	7.935		
5,500.00	5,499.19	5,498.13	5,497.23	4.77	6.72	107.64	49.24	-83.86	92.26	80.77	11.49	8.030		
5,600.00	5,599.16	5,598.08	5,597.15	4.87	6.84	108.23	50.91	-85.67	95.09	83.39	11.71	8.121		
5,700.00	5,699.13	5,698.04	5,697.08	4.97	6.97	108.78	52.59	-87.48	97.94	86.01	11.93	8.208		
5,800.00	5,799.10	5,797.99	5,797.00	5.07	7.09	109.30	54.26	-89.30	100.80	88.64	12.16	8.292		
5,900.00	5,899.08	5,897.95	5,896.93	5.17	7.21	109.79	55.93	-91.11	103.66	91.28	12.38	8.372		
6,000.00	5,999.05	5,997.90	5,996.85	5.27	7.34	110.26	57.60	-92.92	106.53	93.92	12.61	8.449		
6,100.00	6,099.02	6,097.86	6,096.78	5.37	7.46	110.70	59.27	-94.74	109.41	96.57	12.84	8.523		
6,200.00	6,199.99	6,197.81	6,196.70	5.48	7.59	111.12	60.94	-96.55	112.29	99.22	13.07	8.594		
6,300.00	6,299.97	6,297.77	6,296.63	5.58	7.71	111.52	62.61	-98.36	115.18	101.88	13.30	8.662		
6,400.00	6,399.94	6,397.72	6,396.55	5.69	7.84	111.90	64.29	-100.18	118.07	104.54	13.53	8.727		
6,500.00	6,499.91	6,497.68	6,496.48	5.80	7.97	112.26	65.96	-101.99	120.97	107.21	13.76	8.790		
6,600.00	6,599.88	6,597.64	6,596.40	5.90	8.09	112.60	67.63	-103.80	123.87	109.88	14.00	8.850		
6,700.00	6,699.86	6,697.59	6,696.33	6.01	8.22	112.93	69.30	-105.62	126.78	112.55	14.23	8.908		
6,800.00	6,799.83	6,797.55	6,796.25	6.12	8.34	113.25	70.97	-107.43	129.69	115.22	14.47	8.963		
6,900.00	6,899.80	6,897.50	6,896.18	6.24	8.47	113.55	72.64	-109.24	132.61	117.90	14.71	9.017		
7,000.00	6,999.77	6,997.46	6,996.10	6.35	8.60	113.83	74.32	-111.06	135.53	120.58	14.94	9.069		
7,100.00	7,099.75	7,097.41	7,096.03	6.46	8.72	114.11	75.99	-112.87	138.45	123.27	15.18	9.118		
7,200.00	7,199.72	7,197.37	7,195.95	6.57	8.85	114.37	77.66	-114.68	141.37	125.95	15.42	9.166		
7,300.00	7,299.69	7,297.32	7,295.87	6.69	8.98	114.62	79.33	-116.50	144.30	128.64	15.66	9.213		
7,400.00	7,399.66	7,397.28	7,395.80	6.80	9.10	114.87	81.00	-118.31	147.23	131.33	15.90	9.257		
7,500.00	7,499.64	7,497.23	7,495.72	6.92	9.23	115.10	82.67	-120.13	150.17	134.02	16.15	9.300		
7,600.00	7,599.61	7,597.19	7,595.65	7.03	9.36	115.32	84.34	-121.94	153.10	136.71	16.39	9.341		
7,700.00	7,699.58	7,697.14	7,695.57	7.15	9.49	115.54	86.02	-123.75	156.04	139.41	16.63	9.382		
7,800.00	7,799.55	7,797.10	7,795.50	7.26	9.61	115.75	87.69	-125.57	158.98	142.10	16.88	9.420		
7,900.00	7,899.53	7,897.05	7,895.42	7.38	9.74	115.95	89.36	-127.38	161.92	144.80	17.12	9.458		
8,000.00	7,999.50	7,997.01	7,995.35	7.50	9.87	116.14	91.03	-129.19	164.86	147.50	17.37	9.494		
8,100.00	8,099.47	8,096.96	8,095.27	7.62	9.99	116.33	92.70	-131.01	167.81	150.20	17.61	9.529		
8,200.00	8,199.44	8,196.92	8,195.20	7.73	10.12	116.51	94.37	-132.82	170.76	152.90	17.86	9.563		
8,300.00	8,299.41	8,296.87	8,295.12	7.85	10.25	116.68	96.04	-134.63	173.71	155.60	18.10	9.596		
8,400.00	8,399.39	8,396.83	8,395.05	7.97	10.38	116.85	97.72	-136.45	176.66	158.31	18.35	9.627		
8,500.00	8,499.36	8,496.78	8,494.97	8.09	10.51	117.01	99.39	-138.26	179.61	161.01	18.60	9.658		
8,600.00	8,599.33	8,596.74	8,594.90	8.21	10.63	117.17	101.06	-140.07	182.56	163.72	18.84	9.688		
8,700.00	8,699.30	8,696.69	8,694.82	8.33	10.76	117.32	102.73	-141.89	185.52	166.42	19.09	9.717		
8,800.00	8,799.28	8,796.65	8,794.75	8.45	10.89	117.47	104.40	-143.70	188.47	169.13	19.34	9.745		
8,900.00	8,899.25	8,896.60	8,894.67	8.57	11.02	117.61	106.07	-145.51	191.43	171.84	19.59	9.772		
9,000.00	8,999.22	8,996.56	8,994.60	8.69	11.15	117.75	107.74	-147.33	194.39	174.55	19.84	9.799		
9,100.00	9,099.19	9,096.51	9,094.52	8.81	11.27	117.88	109.42	-149.14	197.35	177.26	20.09	9.824		
9,200.00	9,199.17	9,196.47	9,194.44	8.94	11.40	118.01	111.09	-150.96	200.31	179.97	20.34	9.849		
9,300.00	9,299.14	9,296.42	9,294.37	9.06	11.53	118.14	112.76	-152.77	203.27	182.68	20.59	9.873		
9,400.00	9,399.11	9,396.38	9,394.29	9.18	11.66	118.26	114.43	-154.58	206.23	185.39	20.84	9.897		
9,500.00	9,499.08	9,496.33	9,494.22	9.30	11.79	118.38	116.10	-156.40	209.20	188.11	21.09	9.920		
9,600.00	9,599.06	9,596.29	9,594.14	9.42	11.91	118.50	117.77	-158.21	212.16	190.82	21.34	9.942		
9,700.00	9,699.03	9,696.24	9,694.07	9.55	12.04	118.61	119.44	-160.02	215.13	193.54	21.59	9.964		
9,800.00	9,799.00	9,796.20	9,793.99	9.67	12.17	118.72	121.12	-161.84	218.09	196.25	21.84	9.985		
9,900.00	9,899.97	9,896.15	9,893.92	9.79	12.30	118.83	122.79	-163.65	221.06	198.96	22.09	10.006		
10,000.00	9,999.95	9,996.11	9,993.84	9.92	12.43	118.93	124.46	-165.46	224.03	201.68	22.35	10.026		
10,100.00	10,099.92	10,096.07	10,093.77	10.04	12.56	119.03	126.13	-167.28	226.99	204.40	22.60	10.045		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 702H - OH - Plan 1 02-21-18												Offset Site Error:	0.00 usft
Survey Program: O-Scientific Keeper, 12242-MWD+IFR1+MS												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N-S (usft)	+E-W (usft)					
10,200.00	10,197.89	10,196.02	10,193.69	10.16	12.69	119.13	127.80	-169.09	229.96	207.11	22.85	10.064	
10,300.00	10,297.86	10,295.98	10,293.62	10.29	12.81	119.23	129.47	-170.90	232.93	209.83	23.10	10.083	
10,400.00	10,397.84	10,395.93	10,393.54	10.41	12.94	119.32	131.14	-172.72	235.90	212.55	23.35	10.101	
10,500.00	10,497.81	10,495.89	10,493.47	10.54	13.07	119.41	132.82	-174.53	238.87	215.27	23.61	10.118	
10,600.00	10,597.78	10,595.84	10,593.39	10.66	13.20	119.50	134.49	-176.34	241.84	217.98	23.86	10.136	
10,700.00	10,697.75	10,695.80	10,693.32	10.78	13.33	119.59	136.16	-178.16	244.82	220.70	24.11	10.152	
10,800.00	10,797.73	10,795.75	10,793.24	10.91	13.46	119.67	137.83	-179.97	247.79	223.42	24.37	10.169	
10,900.00	10,897.70	10,895.71	10,893.16	11.03	13.59	119.76	139.50	-181.79	250.76	226.14	24.62	10.185	
11,000.00	10,997.67	10,995.66	10,993.09	11.16	13.72	119.84	141.17	-183.60	253.74	228.86	24.88	10.200	
11,100.00	11,097.64	11,095.62	11,093.01	11.28	13.85	119.92	142.84	-185.41	256.71	231.58	25.13	10.216	
11,200.00	11,197.62	11,195.57	11,192.94	11.41	13.97	119.99	144.52	-187.23	259.68	234.30	25.38	10.230	
11,300.00	11,297.59	11,295.53	11,292.86	11.53	14.10	120.07	146.19	-189.04	262.66	237.02	25.64	10.245	
11,400.00	11,397.56	11,395.48	11,392.79	11.66	14.23	120.14	147.86	-190.85	265.63	239.74	25.89	10.259	
11,500.00	11,497.53	11,495.44	11,492.71	11.78	14.36	120.22	149.53	-192.67	268.61	242.46	26.15	10.273	
11,600.00	11,597.51	11,595.39	11,592.64	11.91	14.49	120.29	151.20	-194.48	271.59	245.19	26.40	10.287	
11,700.00	11,697.48	11,695.35	11,692.56	12.04	14.62	120.36	152.87	-196.29	274.56	247.91	26.66	10.300	
11,724.88	11,722.35	11,720.22	11,717.43	12.07	14.65	120.37	153.29	-196.74	275.30	248.58	26.72	10.303	
11,792.13	11,789.59	11,787.44	11,784.63	12.12	14.74	-3.93	154.41	-197.96	276.91	250.05	26.86	10.311	
11,800.00	11,797.47	11,795.31	11,792.50	12.12	14.75	-3.96	154.54	-198.11	277.05	250.18	26.87	10.312	
11,900.00	11,897.47	11,895.28	11,892.44	12.14	14.88	-4.30	156.22	-199.92	278.85	251.83	27.02	10.321	
11,992.13	11,989.59	11,988.59	11,985.71	12.13	15.00	-4.62	157.74	-201.58	280.48	253.35	27.13	10.339	
12,000.00	11,997.46	11,997.07	11,994.20	12.13	15.01	175.97	157.84	-201.69	280.65	253.50	27.15	10.338	
12,025.00	12,022.44	12,023.98	12,021.10	12.13	15.04	175.93	158.05	-201.91	281.91	254.69	27.22	10.355	
12,050.00	12,047.32	12,050.20	12,047.32	12.13	15.07	175.94	158.09	-201.95	284.32	256.98	27.34	10.400	
12,075.00	12,072.05	12,074.93	12,072.05	12.14	15.10	175.96	158.09	-201.95	287.98	260.49	27.49	10.475	
12,100.00	12,096.55	12,099.43	12,096.55	12.14	15.13	175.98	158.09	-201.95	292.93	265.22	27.71	10.572	
12,125.00	12,120.76	12,123.63	12,120.76	12.15	15.16	176.01	158.09	-201.95	299.15	271.14	28.02	10.678	
12,150.00	12,144.60	12,147.48	12,144.60	12.15	15.18	176.05	158.09	-201.95	306.63	278.15	28.48	10.765	
12,175.00	12,168.03	12,170.90	12,168.03	12.16	15.21	176.08	158.09	-201.95	315.34	286.16	29.18	10.806	
12,200.00	12,190.96	12,193.84	12,190.96	12.17	15.24	176.11	158.09	-201.95	325.27	295.17	30.10	10.805	
12,225.00	12,213.34	12,216.22	12,213.34	12.18	15.26	176.14	158.09	-201.95	336.38	305.21	31.17	10.790	
12,250.00	12,235.11	12,237.99	12,235.11	12.19	15.29	176.17	158.09	-201.95	348.65	316.32	32.33	10.783	
12,275.00	12,256.21	12,293.12	12,290.13	12.20	15.30	176.38	155.27	-201.92	360.83	325.45	35.38	10.199	
12,300.00	12,276.57	12,392.43	12,387.06	12.22	15.32	176.71	134.60	-201.70	369.94	332.92	37.02	9.993	
12,325.00	12,296.15	12,520.37	12,502.07	12.23	15.37	176.92	79.47	-201.12	375.12	336.44	38.68	9.699	
12,350.00	12,314.89	12,617.74	12,577.30	12.25	15.44	176.95	17.96	-200.47	375.57	335.28	40.29	9.321	
12,375.00	12,332.73	12,749.77	12,656.69	12.27	15.55	176.81	-86.99	-199.37	371.38	329.50	41.88	8.868	
12,400.00	12,349.64	12,851.46	12,696.38	12.29	15.65	176.54	-180.39	-198.38	362.99	319.58	43.41	8.361	
12,425.00	12,365.56	12,938.85	12,714.05	12.32	15.73	176.17	-265.85	-197.48	351.27	306.37	44.90	7.824	
12,450.00	12,380.44	12,993.38	12,717.12	12.34	15.78	175.89	-320.27	-196.91	337.31	290.98	46.32	7.282	
12,475.00	12,394.26	13,014.41	12,717.43	12.37	15.80	175.86	-341.30	-196.69	323.82	276.14	47.68	6.792	
12,500.00	12,406.97	13,036.13	12,717.75	12.40	15.82	175.82	-363.00	-196.46	311.46	262.50	48.96	6.362	
12,525.00	12,418.53	13,058.45	12,718.08	12.44	15.84	175.78	-385.33	-196.22	300.25	250.09	50.15	5.986	
12,550.00	12,428.92	13,081.34	12,718.42	12.47	15.86	175.73	-408.21	-195.98	290.22	238.96	51.26	5.662	
12,575.00	12,438.10	13,104.72	12,718.76	12.51	15.88	175.68	-431.59	-195.74	281.40	229.13	52.27	5.383	
12,600.00	12,446.06	13,128.54	12,719.11	12.55	15.91	175.64	-455.40	-195.49	273.81	220.63	53.19	5.148	
12,625.00	12,452.76	13,152.71	12,719.47	12.59	15.94	175.60	-479.57	-195.23	267.48	213.49	54.00	4.954	
12,650.00	12,458.20	13,177.19	12,719.83	12.64	15.97	175.56	-504.04	-194.97	262.42	207.73	54.70	4.798	
12,675.00	12,462.34	13,201.90	12,720.19	12.68	16.00	175.53	-528.75	-194.71	258.65	203.37	55.29	4.678	
12,700.00	12,465.20	13,226.77	12,720.56	12.73	16.03	175.51	-553.62	-194.45	256.17	200.41	55.76	4.594	
12,725.00	12,466.75	13,251.74	12,720.93	12.78	16.06	175.50	-578.58	-194.19	254.99	198.87	56.13	4.543	
12,734.88	12,467.00	13,261.63	12,721.07	12.80	16.08	175.50	-588.47	-194.08	254.89	198.65	56.24	4.532	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 702H - OH - Plan 1 02-21-18													Offset Site Error:	0.00 usft
Survey Program: O-Scientific Keeper, 12242-MWD+IFR1+MS													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance				Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor	
12,800.00	12,467.99	13,326.74	12,722.03	12.95	16.17	175.50	-653.57	-193.40	254.86	198.47	56.39	4.520		
12,900.00	12,469.50	13,426.74	12,723.50	13.21	16.34	175.50	-753.55	-192.34	254.81	198.15	56.66	4.497		
13,000.00	12,471.02	13,526.74	12,724.98	13.50	16.53	175.50	-853.54	-191.29	254.77	197.80	56.97	4.472		
13,100.00	12,472.54	13,626.74	12,726.45	13.84	16.75	175.50	-953.52	-190.24	254.73	197.40	57.33	4.443		
13,200.00	12,474.05	13,726.74	12,727.92	14.21	17.00	175.50	-1,053.51	-189.18	254.69	196.96	57.72	4.412		
13,300.00	12,475.57	13,826.74	12,729.40	14.61	17.29	175.50	-1,153.49	-188.13	254.64	196.49	58.16	4.379		
13,400.00	12,477.09	13,926.74	12,730.87	15.04	17.61	175.49	-1,253.47	-187.08	254.60	195.97	58.63	4.342		
13,500.00	12,478.60	14,026.74	12,732.34	15.49	17.96	175.49	-1,353.46	-186.02	254.56	195.41	59.14	4.304		
13,600.00	12,480.12	14,126.74	12,733.82	15.98	18.34	175.49	-1,453.44	-184.97	254.51	194.82	59.69	4.264		
13,700.00	12,481.64	14,226.74	12,735.29	16.48	18.76	175.49	-1,553.42	-183.91	254.47	194.20	60.27	4.222		
13,800.00	12,483.15	14,326.74	12,736.76	17.00	19.21	175.49	-1,653.41	-182.86	254.43	193.53	60.89	4.178		
13,900.00	12,484.67	14,426.74	12,738.24	17.55	19.69	175.49	-1,753.39	-181.81	254.38	192.84	61.55	4.133		
14,000.00	12,486.18	14,526.74	12,739.71	18.11	20.20	175.49	-1,853.37	-180.75	254.34	192.11	62.23	4.087		
14,100.00	12,487.70	14,626.74	12,741.18	18.68	20.73	175.49	-1,953.36	-179.70	254.30	191.35	62.95	4.040		
14,200.00	12,489.22	14,726.74	12,742.66	19.27	21.29	175.49	-2,053.34	-178.65	254.26	190.56	63.70	3.992		
14,300.00	12,490.73	14,826.74	12,744.13	19.87	21.86	175.49	-2,153.32	-177.59	254.21	189.74	64.47	3.943		
14,400.00	12,492.25	14,926.74	12,745.60	20.48	22.45	175.49	-2,253.31	-176.54	254.17	188.89	65.28	3.894		
14,500.00	12,493.77	15,026.74	12,747.08	21.10	23.05	175.49	-2,353.29	-175.49	254.13	188.01	66.11	3.844		
14,600.00	12,495.28	15,126.74	12,748.55	21.73	23.67	175.49	-2,453.28	-174.43	254.08	187.11	66.97	3.794		
14,700.00	12,496.80	15,226.74	12,750.02	22.37	24.30	175.48	-2,553.26	-173.38	254.04	186.18	67.86	3.744		
14,800.00	12,498.32	15,326.74	12,751.50	23.02	24.94	175.48	-2,653.24	-172.33	254.00	185.23	68.77	3.694		
14,900.00	12,499.83	15,426.74	12,752.97	23.68	25.59	175.48	-2,753.23	-171.27	253.95	184.25	69.70	3.643		
15,000.00	12,501.35	15,526.74	12,754.44	24.34	26.25	175.48	-2,853.21	-170.22	253.91	183.25	70.66	3.594		
15,100.00	12,502.87	15,626.74	12,755.92	25.01	26.91	175.48	-2,953.19	-169.16	253.87	182.23	71.64	3.544		
15,200.00	12,504.38	15,726.74	12,757.39	25.68	27.58	175.48	-3,053.18	-168.11	253.83	181.19	72.63	3.495		
15,300.00	12,505.90	15,826.74	12,758.86	26.36	28.26	175.48	-3,153.16	-167.06	253.78	180.13	73.65	3.446		
15,400.00	12,507.41	15,926.74	12,760.34	27.04	28.94	175.48	-3,253.14	-166.00	253.74	179.05	74.69	3.397		
15,500.00	12,508.93	16,026.74	12,761.81	27.73	29.63	175.48	-3,353.13	-164.95	253.70	177.95	75.75	3.349		
15,600.00	12,510.45	16,126.74	12,763.28	28.42	30.33	175.48	-3,453.11	-163.90	253.65	176.83	76.82	3.302		
15,700.00	12,511.96	16,226.74	12,764.76	29.11	31.02	175.48	-3,553.09	-162.84	253.61	175.70	77.91	3.255		
15,800.00	12,513.48	16,326.74	12,766.23	29.81	31.72	175.48	-3,653.08	-161.79	253.57	174.55	79.01	3.209		
15,900.00	12,515.00	16,426.74	12,767.70	30.51	32.43	175.48	-3,753.06	-160.74	253.52	173.39	80.14	3.164		
16,000.00	12,516.51	16,526.74	12,769.18	31.22	33.14	175.47	-3,853.05	-159.68	253.48	172.21	81.27	3.119		
16,100.00	12,518.03	16,626.74	12,770.65	31.93	33.85	175.47	-3,953.03	-158.63	253.44	171.01	82.42	3.075		
16,200.00	12,519.55	16,726.74	12,772.12	32.64	34.56	175.47	-4,053.01	-157.57	253.39	169.81	83.59	3.031		
16,300.00	12,521.06	16,826.74	12,773.60	33.35	35.27	175.47	-4,153.00	-156.52	253.35	168.59	84.77	2.989		
16,400.00	12,522.58	16,926.74	12,775.07	34.07	35.99	175.47	-4,252.98	-155.47	253.31	167.35	85.96	2.947		
16,500.00	12,524.10	17,026.74	12,776.54	34.78	36.71	175.47	-4,352.96	-154.41	253.27	166.11	87.16	2.906		
16,600.00	12,525.61	17,126.74	12,778.02	35.50	37.44	175.47	-4,452.95	-153.36	253.22	164.85	88.37	2.865		
16,700.00	12,527.13	17,226.74	12,779.49	36.22	38.16	175.47	-4,552.93	-152.31	253.18	163.58	89.60	2.826		
16,800.00	12,528.64	17,326.74	12,780.96	36.95	38.89	175.47	-4,652.91	-151.25	253.14	162.30	90.83	2.787		
16,900.00	12,530.16	17,426.74	12,782.44	37.67	39.61	175.47	-4,752.90	-150.20	253.09	161.02	92.08	2.749		
17,000.00	12,531.68	17,526.74	12,783.91	38.40	40.34	175.47	-4,852.88	-149.15	253.05	159.72	93.33	2.711		
17,100.00	12,533.19	17,626.74	12,785.38	39.12	41.07	175.47	-4,952.87	-148.09	253.01	158.41	94.60	2.675		
17,200.00	12,534.71	17,726.74	12,786.86	39.85	41.80	175.47	-5,052.85	-147.04	252.96	157.09	95.87	2.639		
17,300.00	12,536.23	17,826.74	12,788.33	40.58	42.54	175.46	-5,152.83	-145.99	252.92	155.77	97.15	2.603		
17,400.00	12,537.74	17,926.74	12,789.80	41.31	43.27	175.46	-5,252.82	-144.93	252.88	154.43	98.44	2.569		
17,500.00	12,539.26	18,026.74	12,791.28	42.05	44.01	175.46	-5,352.80	-143.88	252.84	153.09	99.74	2.535		
17,600.00	12,540.78	18,126.74	12,792.75	42.78	44.74	175.46	-5,452.78	-142.82	252.79	151.74	101.05	2.502		
17,700.00	12,542.29	18,226.74	12,794.22	43.52	45.48	175.46	-5,552.77	-141.77	252.75	150.39	102.36	2.469		
17,800.00	12,543.81	18,326.74	12,795.70	44.25	46.22	175.46	-5,652.75	-140.72	252.71	149.02	103.68	2.437		
17,900.00	12,545.33	18,426.74	12,797.17	44.99	46.96	175.46	-5,752.73	-139.66	252.66	147.65	105.01	2.406		

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

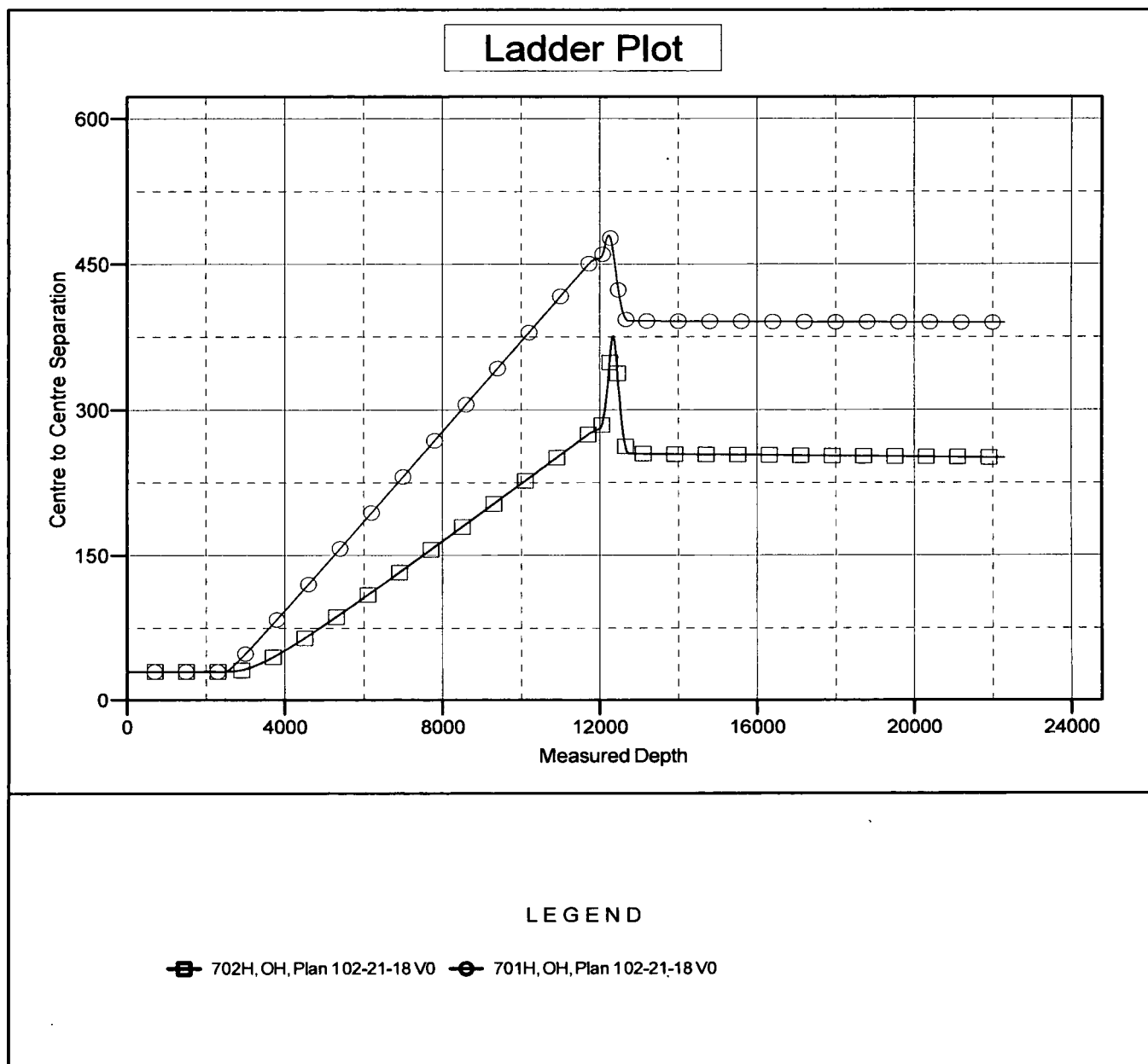
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	Survey Calculation 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 02-21-18	Offset TVD Reference:	Offset Datum

Offset Design Fascinator Fed Com - 702H - OH - Plan 1 02-21-18												Offset Site Error:	0.00 usft
Survey Program: O-Scientific Keeper, 12242-MWD+IFR1+MS												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
18,000.00	12,546.84	18,526.74	12,798.64	45.73	47.70	175.46	-5,852.72	-138.61	252.62	146.27	106.35	2.375	
18,100.00	12,548.36	18,626.74	12,800.12	46.47	48.44	175.46	-5,952.70	-137.56	252.58	144.89	107.69	2.345	
18,200.00	12,549.87	18,726.74	12,801.59	47.21	49.18	175.46	-6,052.68	-136.50	252.53	143.50	109.03	2.316	
18,300.00	12,551.39	18,826.74	12,803.06	47.95	49.93	175.46	-6,152.67	-135.45	252.49	142.10	110.39	2.287	
18,400.00	12,552.91	18,926.74	12,804.54	48.69	50.67	175.46	-6,252.65	-134.40	252.45	140.70	111.75	2.259	
18,500.00	12,554.42	19,026.74	12,806.01	49.43	51.41	175.46	-6,352.64	-133.34	252.41	139.30	113.11	2.232	
18,600.00	12,555.94	19,126.74	12,807.48	50.17	52.16	175.45	-6,452.62	-132.29	252.36	137.88	114.48	2.204	
18,700.00	12,557.46	19,226.74	12,808.96	50.91	52.90	175.45	-6,552.60	-131.23	252.32	136.47	115.85	2.178	
18,800.00	12,558.97	19,326.74	12,810.43	51.66	53.65	175.45	-6,652.59	-130.18	252.28	135.04	117.23	2.152	
18,900.00	12,560.49	19,426.74	12,811.90	52.40	54.40	175.45	-6,752.57	-129.13	252.23	133.62	118.62	2.126	
19,000.00	12,562.01	19,526.74	12,813.37	53.15	55.14	175.45	-6,852.55	-128.07	252.19	132.19	120.00	2.102	
19,100.00	12,563.52	19,626.74	12,814.85	53.89	55.89	175.45	-6,952.54	-127.02	252.15	130.75	121.40	2.077	
19,200.00	12,565.04	19,726.74	12,816.32	54.64	56.64	175.45	-7,052.52	-125.97	252.10	129.31	122.79	2.053	
19,300.00	12,566.56	19,826.74	12,817.79	55.39	57.39	175.45	-7,152.50	-124.91	252.06	127.87	124.20	2.030	
19,400.00	12,568.07	19,926.74	12,819.27	56.13	58.14	175.45	-7,252.49	-123.86	252.02	126.42	125.60	2.007	
19,500.00	12,569.59	20,026.74	12,820.74	56.88	58.88	175.45	-7,352.47	-122.81	251.98	124.97	127.01	1.984	
19,600.00	12,571.10	20,126.74	12,822.21	57.63	59.63	175.45	-7,452.45	-121.75	251.93	123.51	128.42	1.962	
19,700.00	12,572.62	20,226.74	12,823.69	58.38	60.38	175.45	-7,552.44	-120.70	251.89	122.05	129.84	1.940	
19,800.00	12,574.14	20,326.74	12,825.16	59.13	61.14	175.44	-7,652.42	-119.65	251.85	120.59	131.26	1.919	
19,900.00	12,575.65	20,426.74	12,826.63	59.88	61.89	175.44	-7,752.41	-118.59	251.80	119.12	132.68	1.898	
20,000.00	12,577.17	20,526.74	12,828.11	60.63	62.64	175.44	-7,852.39	-117.54	251.76	117.65	134.11	1.877	
20,100.00	12,578.69	20,626.74	12,829.58	61.38	63.39	175.44	-7,952.37	-116.48	251.72	116.18	135.54	1.857	
20,200.00	12,580.20	20,726.74	12,831.05	62.13	64.14	175.44	-8,052.36	-115.43	251.67	114.70	136.97	1.837	
20,300.00	12,581.72	20,826.74	12,832.53	62.88	64.89	175.44	-8,152.34	-114.38	251.63	113.22	138.41	1.818	
20,400.00	12,583.24	20,926.74	12,834.00	63.63	65.65	175.44	-8,252.32	-113.32	251.59	111.74	139.85	1.799	
20,500.00	12,584.75	21,026.74	12,835.47	64.38	66.40	175.44	-8,352.31	-112.27	251.54	110.26	141.29	1.780	
20,600.00	12,586.27	21,126.74	12,836.95	65.13	67.15	175.44	-8,452.29	-111.22	251.50	108.77	142.73	1.762	
20,700.00	12,587.79	21,226.74	12,838.42	65.88	67.90	175.44	-8,552.27	-110.16	251.46	107.28	144.18	1.744	
20,800.00	12,589.30	21,326.74	12,839.89	66.64	68.66	175.44	-8,652.26	-109.11	251.42	105.79	145.63	1.726	
20,900.00	12,590.82	21,426.74	12,841.37	67.39	69.41	175.44	-8,752.24	-108.06	251.37	104.29	147.08	1.709	
21,000.00	12,592.33	21,526.74	12,842.84	68.14	70.17	175.44	-8,852.22	-107.00	251.33	102.80	148.53	1.692	
21,100.00	12,593.85	21,626.74	12,844.31	68.90	70.92	175.43	-8,952.21	-105.95	251.29	101.30	149.99	1.675	
21,200.00	12,595.37	21,726.74	12,845.79	69.65	71.68	175.43	-9,052.19	-104.89	251.24	99.80	151.45	1.659	
21,300.00	12,596.88	21,826.74	12,847.26	70.40	72.43	175.43	-9,152.18	-103.84	251.20	98.29	152.91	1.643	
21,400.00	12,598.40	21,926.74	12,848.73	71.16	73.19	175.43	-9,252.16	-102.79	251.16	96.79	154.37	1.627	
21,500.00	12,599.92	22,026.74	12,850.21	71.91	73.94	175.43	-9,352.14	-101.73	251.11	95.28	155.84	1.611	
21,600.00	12,601.43	22,126.74	12,851.68	72.67	74.70	175.43	-9,452.13	-100.68	251.07	93.77	157.30	1.596	
21,700.00	12,602.95	22,226.74	12,853.15	73.42	75.45	175.43	-9,552.11	-99.63	251.03	92.26	158.77	1.581	
21,800.00	12,604.47	22,326.74	12,854.63	74.18	76.21	175.43	-9,652.09	-98.57	250.99	90.74	160.24	1.566	
21,900.00	12,605.98	22,426.74	12,856.10	74.93	76.96	175.43	-9,752.08	-97.52	250.94	89.23	161.72	1.552	
22,000.00	12,607.50	22,526.74	12,857.57	75.69	77.72	175.43	-9,852.06	-96.47	250.90	87.71	163.19	1.537	
22,100.00	12,609.02	22,626.74	12,859.05	76.44	78.48	175.43	-9,952.04	-95.41	250.86	86.19	164.67	1.523	
22,200.00	12,610.53	22,726.74	12,860.52	77.20	79.23	175.43	-10,052.03	-94.36	250.81	84.67	166.15	1.510	
22,296.82	12,612.00	22,823.56	12,861.95	77.93	79.97	175.43	-10,148.83	-93.34	250.77	83.19	167.58	1.496 Level 3, SF	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 601H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Reference Site:	Fascinator Fed Com	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	601H	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 02-21-18	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB @ 3372.00usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 601H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.49°



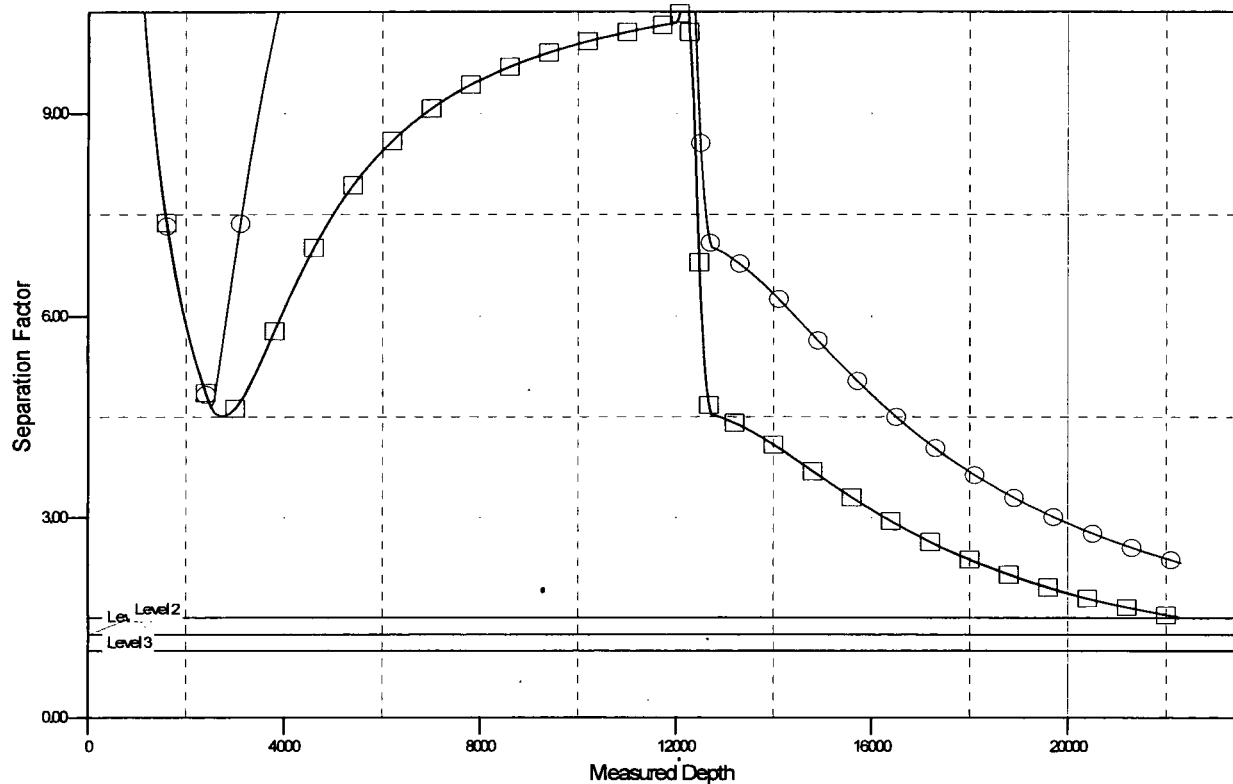
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Fascinator Fed Com
Site Error: 0.00 usft
Reference Well: 601H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 02-21-18

Local Co-ordinate Reference: Well 601H
TVD Reference: RKB @ 3372.00usft (McVay 8)
MD Reference: RKB @ 3372.00usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA Compass
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB @ 3372.00usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 601H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.49°

Separation Factor Plot



LEGEND

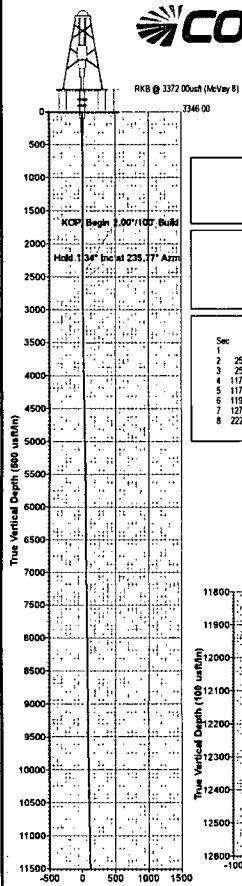
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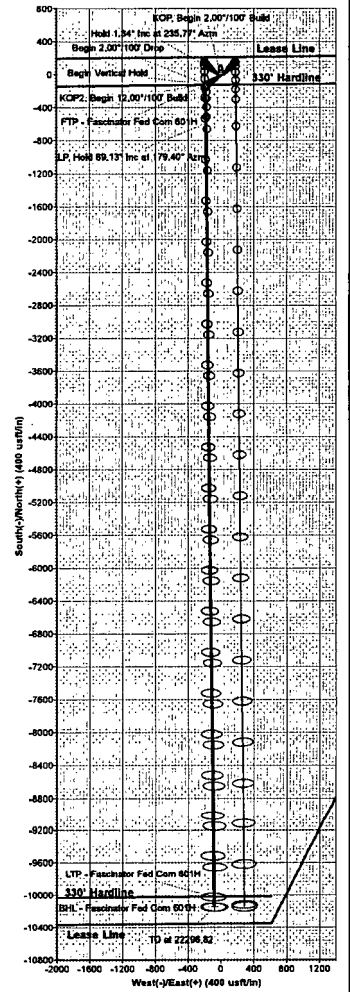
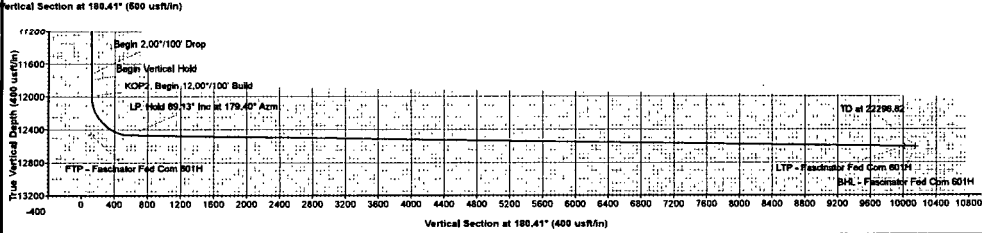
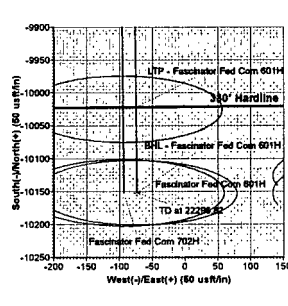
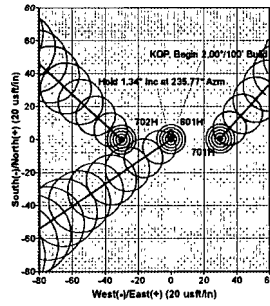
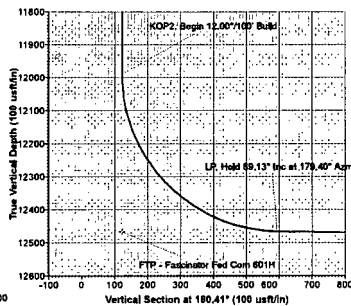
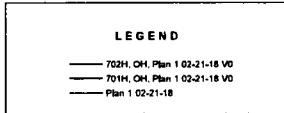
Project: Lea County, NM (NAD27 NME)
Site: Fascinator Fed Com
Well: 601H
Wellbore: OH
Design: Plan 1 02-21-18
Rig: McVay 8



North
Magnetic North: 6.27°
True North: 0.00°
Magnetic Field Strength: 47966.8nT
Dip Angle: 59.90°
Date: 2/20/2018
Model: MVHD



WELL DETAILS										
				3346.00						
-N/S	-E/W	Northing	Easting	Latitude	Longitude					
0.00	0.00	435910.50	78532.20	32° 11' 42.1748 N	103° 24' 28.0689 W					
DESIGN TARGET DETAILS										
Name	TVD	-N/S	-E/W	Northing	Easting	Latitude	Longitude			
FTP - Fascinator Fed Com 601H	12467.00	-121.80	-179.00	435788.70	786126.20	32° 11' 40.8820 N	103° 24' 30.1908 W			
BHL - Fascinator Fed Com 601H	12612.00	-10152.30	-73.30	425758.20	786231.80	32° 10' 17.0121 N	103° 24' 29.86780 W			
LTP - Fascinator Fed Com 601H	12612.00	-10022.30	-74.90	425888.20	786230.30	32° 10' 3.00631 N	103° 24' 29.97341 W			
SECTION DETAILS										
Sec	MD	Inc	Ab	TVD	-N/S	-E/W	Deg	Face	V-Set 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	KCPZ Begn 2.00'100' Bust
3	2567.24	1.34	235.77	2567.24	-0.44	-0.65	2.00	235.77	0.45	Hold 1 34" Inc 235.77' Azm
4	11724.88	1.34	235.77	11722.35	-121.36	-178.35	0.00	0.00	122.04	KCPZ Begn 2.00'100' Dmp
5	11792.12	0.00	0.00	11789.59	-121.80	-179.00	2.00	180.00	123.09	KCPZ Vertical Hold
6	11992.12	0.00	0.00	11989.59	-121.80	-179.00	0.00	0.00	123.09	KCPZ Begn 12.00'100' Bust
7	12734.68	69.13	179.40	12467.00	-502.00	-174.05	12.00	179.40	593.24	LP Hold 12 13" Inc 179.40' Azm
8	22296.82	69.13	179.40	12612.00	-10152.30	-73.30	0.00	0.00	152.56	BHL - Fascinator Fed Com 601H TD at 22296.82





PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)

Fascinator Fed Com

601H

OH

Plan: Plan 1 02-21-18

Standard Planning Report

21 February, 2018



Database:	USA Compass	Local Co-ordinate Reference:	Well 601H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

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		Fascinator Fed Com				
Site Position:		Northing:	435,910.50 usft	Latitude:	32° 11' 42.17248 N	
From:	Map	Easting:	786,305.20 usft	Longitude:	103° 24' 28.09899 W	
Position Uncertainty:		0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.49

Well	601H					
Well Position	+N/-S	0.00 usft	Northing:	435,910.50 usft	Latitude:	32° 11' 42.17248 N
	+E/-W	0.00 usft	Easting:	786,305.20 usft	Longitude:	103° 24' 28.09899 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	3,346.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	2/20/2018	6.76	59.90	47,966.49771481

Design	Plan 1 02-21-18			
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	180.41

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	
2,567.24	1.34	235.77	2,567.24	-0.44	-0.65	2.00	2.00	0.00	235.77	
11,724.88	1.34	235.77	11,722.35	-121.36	-178.35	0.00	0.00	0.00	0.00	
11,792.13	0.00	0.00	11,789.59	-121.80	-179.00	2.00	-2.00	0.00	180.00	
11,992.13	0.00	0.00	11,989.59	-121.80	-179.00	0.00	0.00	0.00	0.00	
12,734.88	89.13	179.40	12,467.00	-592.00	-174.05	12.00	12.00	24.15	179.40	
22,296.82	89.13	179.40	12,612.00	-10,152.30	-73.30	0.00	0.00	0.00	0.00	BHL - Fascinator F

Database:	USA Compass	Local Co-ordinate Reference:	Well 601H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

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
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									
2,567.24	1.34	235.77	2,567.24	-0.44	-0.65	0.45	2.00	2.00	0.00
Hold 1.34° Inc at 235.77° Azm									
2,600.00	1.34	235.77	2,599.98	-0.88	-1.29	0.89	0.00	0.00	0.00
2,700.00	1.34	235.77	2,699.96	-2.20	-3.23	2.22	0.00	0.00	0.00
2,800.00	1.34	235.77	2,799.93	-3.52	-5.17	3.55	0.00	0.00	0.00
2,900.00	1.34	235.77	2,899.90	-4.84	-7.11	4.89	0.00	0.00	0.00
3,000.00	1.34	235.77	2,999.87	-6.16	-9.05	6.22	0.00	0.00	0.00
3,100.00	1.34	235.77	3,099.85	-7.48	-10.99	7.56	0.00	0.00	0.00
3,200.00	1.34	235.77	3,199.82	-8.80	-12.93	8.89	0.00	0.00	0.00
3,300.00	1.34	235.77	3,299.79	-10.12	-14.87	10.23	0.00	0.00	0.00
3,400.00	1.34	235.77	3,399.76	-11.44	-16.81	11.56	0.00	0.00	0.00
3,500.00	1.34	235.77	3,499.74	-12.76	-18.75	12.89	0.00	0.00	0.00
3,600.00	1.34	235.77	3,599.71	-14.08	-20.69	14.23	0.00	0.00	0.00
3,700.00	1.34	235.77	3,699.68	-15.40	-22.63	15.56	0.00	0.00	0.00
3,800.00	1.34	235.77	3,799.65	-16.72	-24.57	16.90	0.00	0.00	0.00
3,900.00	1.34	235.77	3,899.63	-18.04	-26.51	18.23	0.00	0.00	0.00
4,000.00	1.34	235.77	3,999.60	-19.36	-28.45	19.57	0.00	0.00	0.00
4,100.00	1.34	235.77	4,099.57	-20.68	-30.39	20.90	0.00	0.00	0.00
4,200.00	1.34	235.77	4,199.54	-22.00	-32.33	22.23	0.00	0.00	0.00
4,300.00	1.34	235.77	4,299.52	-23.32	-34.27	23.57	0.00	0.00	0.00
4,400.00	1.34	235.77	4,399.49	-24.64	-36.22	24.90	0.00	0.00	0.00
4,500.00	1.34	235.77	4,499.46	-25.96	-38.16	26.24	0.00	0.00	0.00
4,600.00	1.34	235.77	4,599.43	-27.28	-40.10	27.57	0.00	0.00	0.00
4,700.00	1.34	235.77	4,699.41	-28.60	-42.04	28.91	0.00	0.00	0.00
4,800.00	1.34	235.77	4,799.38	-29.92	-43.98	30.24	0.00	0.00	0.00
4,900.00	1.34	235.77	4,899.35	-31.24	-45.92	31.58	0.00	0.00	0.00
5,000.00	1.34	235.77	4,999.32	-32.56	-47.86	32.91	0.00	0.00	0.00
5,100.00	1.34	235.77	5,099.30	-33.88	-49.80	34.24	0.00	0.00	0.00
5,200.00	1.34	235.77	5,199.27	-35.21	-51.74	35.58	0.00	0.00	0.00
5,300.00	1.34	235.77	5,299.24	-36.53	-53.68	36.91	0.00	0.00	0.00
5,400.00	1.34	235.77	5,399.21	-37.85	-55.62	38.25	0.00	0.00	0.00
5,500.00	1.34	235.77	5,499.19	-39.17	-57.56	39.58	0.00	0.00	0.00
5,600.00	1.34	235.77	5,599.16	-40.49	-59.50	40.92	0.00	0.00	0.00
5,700.00	1.34	235.77	5,699.13	-41.81	-61.44	42.25	0.00	0.00	0.00
5,800.00	1.34	235.77	5,799.10	-43.13	-63.38	43.58	0.00	0.00	0.00
5,900.00	1.34	235.77	5,899.08	-44.45	-65.32	44.92	0.00	0.00	0.00
6,000.00	1.34	235.77	5,999.05	-45.77	-67.26	46.25	0.00	0.00	0.00
6,100.00	1.34	235.77	6,099.02	-47.09	-69.20	47.59	0.00	0.00	0.00
6,200.00	1.34	235.77	6,198.99	-48.41	-71.14	48.92	0.00	0.00	0.00
6,300.00	1.34	235.77	6,298.97	-49.73	-73.08	50.26	0.00	0.00	0.00
6,400.00	1.34	235.77	6,398.94	-51.05	-75.02	51.59	0.00	0.00	0.00
6,500.00	1.34	235.77	6,498.91	-52.37	-76.96	52.92	0.00	0.00	0.00
6,600.00	1.34	235.77	6,598.88	-53.69	-78.90	54.26	0.00	0.00	0.00
6,700.00	1.34	235.77	6,698.86	-55.01	-80.84	55.59	0.00	0.00	0.00
6,800.00	1.34	235.77	6,798.83	-56.33	-82.78	56.93	0.00	0.00	0.00
6,900.00	1.34	235.77	6,898.80	-57.65	-84.73	58.26	0.00	0.00	0.00
7,000.00	1.34	235.77	6,998.77	-58.97	-86.67	59.60	0.00	0.00	0.00
7,100.00	1.34	235.77	7,098.75	-60.29	-88.61	60.93	0.00	0.00	0.00
7,200.00	1.34	235.77	7,198.72	-61.61	-90.55	62.26	0.00	0.00	0.00
7,300.00	1.34	235.77	7,298.69	-62.93	-92.49	63.60	0.00	0.00	0.00
7,400.00	1.34	235.77	7,398.66	-64.25	-94.43	64.93	0.00	0.00	0.00

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Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

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)
7,500.00	1.34	235.77	7,498.64	-65.57	-96.37	66.27	0.00	0.00	0.00
7,600.00	1.34	235.77	7,598.61	-66.89	-98.31	67.60	0.00	0.00	0.00
7,700.00	1.34	235.77	7,698.58	-68.21	-100.25	68.94	0.00	0.00	0.00
7,800.00	1.34	235.77	7,798.55	-69.53	-102.19	70.27	0.00	0.00	0.00
7,900.00	1.34	235.77	7,898.53	-70.85	-104.13	71.60	0.00	0.00	0.00
8,000.00	1.34	235.77	7,998.50	-72.17	-106.07	72.94	0.00	0.00	0.00
8,100.00	1.34	235.77	8,098.47	-73.50	-108.01	74.27	0.00	0.00	0.00
8,200.00	1.34	235.77	8,198.44	-74.82	-109.95	75.61	0.00	0.00	0.00
8,300.00	1.34	235.77	8,298.41	-76.14	-111.89	76.94	0.00	0.00	0.00
8,400.00	1.34	235.77	8,398.39	-77.46	-113.83	78.28	0.00	0.00	0.00
8,500.00	1.34	235.77	8,498.36	-78.78	-115.77	79.61	0.00	0.00	0.00
8,600.00	1.34	235.77	8,598.33	-80.10	-117.71	80.94	0.00	0.00	0.00
8,700.00	1.34	235.77	8,698.30	-81.42	-119.65	82.28	0.00	0.00	0.00
8,800.00	1.34	235.77	8,798.28	-82.74	-121.59	83.61	0.00	0.00	0.00
8,900.00	1.34	235.77	8,898.25	-84.06	-123.53	84.95	0.00	0.00	0.00
9,000.00	1.34	235.77	8,998.22	-85.38	-125.47	86.28	0.00	0.00	0.00
9,100.00	1.34	235.77	9,098.19	-86.70	-127.41	87.62	0.00	0.00	0.00
9,200.00	1.34	235.77	9,198.17	-88.02	-129.35	88.95	0.00	0.00	0.00
9,300.00	1.34	235.77	9,298.14	-89.34	-131.30	90.28	0.00	0.00	0.00
9,400.00	1.34	235.77	9,398.11	-90.66	-133.24	91.62	0.00	0.00	0.00
9,500.00	1.34	235.77	9,498.08	-91.98	-135.18	92.95	0.00	0.00	0.00
9,600.00	1.34	235.77	9,598.06	-93.30	-137.12	94.29	0.00	0.00	0.00
9,700.00	1.34	235.77	9,698.03	-94.62	-139.06	95.62	0.00	0.00	0.00
9,800.00	1.34	235.77	9,798.00	-95.94	-141.00	96.96	0.00	0.00	0.00
9,900.00	1.34	235.77	9,897.97	-97.26	-142.94	98.29	0.00	0.00	0.00
10,000.00	1.34	235.77	9,997.95	-98.58	-144.88	99.63	0.00	0.00	0.00
10,100.00	1.34	235.77	10,097.92	-99.90	-146.82	100.96	0.00	0.00	0.00
10,200.00	1.34	235.77	10,197.89	-101.22	-148.76	102.29	0.00	0.00	0.00
10,300.00	1.34	235.77	10,297.86	-102.54	-150.70	103.63	0.00	0.00	0.00
10,400.00	1.34	235.77	10,397.84	-103.86	-152.64	104.96	0.00	0.00	0.00
10,500.00	1.34	235.77	10,497.81	-105.18	-154.58	106.30	0.00	0.00	0.00
10,600.00	1.34	235.77	10,597.78	-106.50	-156.52	107.63	0.00	0.00	0.00
10,700.00	1.34	235.77	10,697.75	-107.82	-158.46	108.97	0.00	0.00	0.00
10,800.00	1.34	235.77	10,797.73	-109.14	-160.40	110.30	0.00	0.00	0.00
10,900.00	1.34	235.77	10,897.70	-110.46	-162.34	111.63	0.00	0.00	0.00
11,000.00	1.34	235.77	10,997.67	-111.79	-164.28	112.97	0.00	0.00	0.00
11,100.00	1.34	235.77	11,097.64	-113.11	-166.22	114.30	0.00	0.00	0.00
11,200.00	1.34	235.77	11,197.62	-114.43	-168.16	115.64	0.00	0.00	0.00
11,300.00	1.34	235.77	11,297.59	-115.75	-170.10	116.97	0.00	0.00	0.00
11,400.00	1.34	235.77	11,397.56	-117.07	-172.04	118.31	0.00	0.00	0.00
11,500.00	1.34	235.77	11,497.53	-118.39	-173.98	119.64	0.00	0.00	0.00
11,600.00	1.34	235.77	11,597.51	-119.71	-175.92	120.97	0.00	0.00	0.00
11,700.00	1.34	235.77	11,697.48	-121.03	-177.86	122.31	0.00	0.00	0.00
11,724.88	1.34	235.77	11,722.35	-121.36	-178.35	122.64	0.00	0.00	0.00
Begin 2.00°/100' Drop									
11,792.13	0.00	0.00	11,789.59	-121.80	-179.00	123.09	2.00	-2.00	0.00
Begin Vertical Hold									
11,992.13	0.00	0.00	11,989.59	-121.80	-179.00	123.09	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
12,000.00	0.95	179.40	11,997.46	-121.86	-179.00	123.15	12.00	12.00	0.00
12,100.00	12.95	179.40	12,096.55	-133.93	-178.87	135.22	12.00	12.00	0.00
12,200.00	24.95	179.40	12,190.96	-166.34	-178.53	167.62	12.00	12.00	0.00
12,300.00	36.95	179.40	12,276.57	-217.66	-177.99	218.94	12.00	12.00	0.00

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Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

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)
12,400.00	48.95	179.40	12,349.64	-285.66	-177.27	286.94	12.00	12.00	0.00
12,500.00	60.95	179.40	12,406.97	-367.37	-176.41	368.64	12.00	12.00	0.00
12,600.00	72.95	179.40	12,446.06	-459.21	-175.44	460.47	12.00	12.00	0.00
12,700.00	84.95	179.40	12,465.20	-557.17	-174.41	558.42	12.00	12.00	0.00
12,734.88	89.13	179.40	12,467.00	-592.00	-174.05	593.24	12.00	12.00	0.00
LP, Hold 89.13° Inc at 179.40° Azm									
12,800.00	89.13	179.40	12,467.99	-657.10	-173.36	658.34	0.00	0.00	0.00
12,900.00	89.13	179.40	12,469.50	-757.09	-172.31	758.31	0.00	0.00	0.00
13,000.00	89.13	179.40	12,471.02	-857.07	-171.25	858.28	0.00	0.00	0.00
13,100.00	89.13	179.40	12,472.54	-957.05	-170.20	958.26	0.00	0.00	0.00
13,200.00	89.13	179.40	12,474.05	-1,057.03	-169.14	1,058.23	0.00	0.00	0.00
13,300.00	89.13	179.40	12,475.57	-1,157.02	-168.09	1,158.20	0.00	0.00	0.00
13,400.00	89.13	179.40	12,477.09	-1,257.00	-167.04	1,258.17	0.00	0.00	0.00
13,500.00	89.13	179.40	12,478.60	-1,356.98	-165.98	1,358.15	0.00	0.00	0.00
13,600.00	89.13	179.40	12,480.12	-1,456.97	-164.93	1,458.12	0.00	0.00	0.00
13,700.00	89.13	179.40	12,481.64	-1,556.95	-163.88	1,558.09	0.00	0.00	0.00
13,800.00	89.13	179.40	12,483.15	-1,656.93	-162.82	1,658.06	0.00	0.00	0.00
13,900.00	89.13	179.40	12,484.67	-1,756.92	-161.77	1,758.04	0.00	0.00	0.00
14,000.00	89.13	179.40	12,486.18	-1,856.90	-160.72	1,858.01	0.00	0.00	0.00
14,100.00	89.13	179.40	12,487.70	-1,956.88	-159.66	1,957.98	0.00	0.00	0.00
14,200.00	89.13	179.40	12,489.22	-2,056.86	-158.61	2,057.96	0.00	0.00	0.00
14,300.00	89.13	179.40	12,490.73	-2,156.85	-157.55	2,157.93	0.00	0.00	0.00
14,400.00	89.13	179.40	12,492.25	-2,256.83	-156.50	2,257.90	0.00	0.00	0.00
14,500.00	89.13	179.40	12,493.77	-2,356.81	-155.45	2,357.87	0.00	0.00	0.00
14,600.00	89.13	179.40	12,495.28	-2,456.80	-154.39	2,457.85	0.00	0.00	0.00
14,700.00	89.13	179.40	12,496.80	-2,556.78	-153.34	2,557.82	0.00	0.00	0.00
14,800.00	89.13	179.40	12,498.32	-2,656.76	-152.29	2,657.79	0.00	0.00	0.00
14,900.00	89.13	179.40	12,499.83	-2,756.74	-151.23	2,757.77	0.00	0.00	0.00
15,000.00	89.13	179.40	12,501.35	-2,856.73	-150.18	2,857.74	0.00	0.00	0.00
15,100.00	89.13	179.40	12,502.87	-2,956.71	-149.13	2,957.71	0.00	0.00	0.00
15,200.00	89.13	179.40	12,504.38	-3,056.69	-148.07	3,057.68	0.00	0.00	0.00
15,300.00	89.13	179.40	12,505.90	-3,156.68	-147.02	3,157.66	0.00	0.00	0.00
15,400.00	89.13	179.40	12,507.41	-3,256.66	-145.97	3,257.63	0.00	0.00	0.00
15,500.00	89.13	179.40	12,508.93	-3,356.64	-144.91	3,357.60	0.00	0.00	0.00
15,600.00	89.13	179.40	12,510.45	-3,456.63	-143.86	3,457.57	0.00	0.00	0.00
15,700.00	89.13	179.40	12,511.96	-3,556.61	-142.80	3,557.55	0.00	0.00	0.00
15,800.00	89.13	179.40	12,513.48	-3,656.59	-141.75	3,657.52	0.00	0.00	0.00
15,900.00	89.13	179.40	12,515.00	-3,756.57	-140.70	3,757.49	0.00	0.00	0.00
16,000.00	89.13	179.40	12,516.51	-3,856.56	-139.64	3,857.47	0.00	0.00	0.00
16,100.00	89.13	179.40	12,518.03	-3,956.54	-138.59	3,957.44	0.00	0.00	0.00
16,200.00	89.13	179.40	12,519.55	-4,056.52	-137.54	4,057.41	0.00	0.00	0.00
16,300.00	89.13	179.40	12,521.06	-4,156.51	-136.48	4,157.38	0.00	0.00	0.00
16,400.00	89.13	179.40	12,522.58	-4,256.49	-135.43	4,257.36	0.00	0.00	0.00
16,500.00	89.13	179.40	12,524.10	-4,356.47	-134.38	4,357.33	0.00	0.00	0.00
16,600.00	89.13	179.40	12,525.61	-4,456.46	-133.32	4,457.30	0.00	0.00	0.00
16,700.00	89.13	179.40	12,527.13	-4,556.44	-132.27	4,557.27	0.00	0.00	0.00
16,800.00	89.13	179.40	12,528.64	-4,656.42	-131.21	4,657.25	0.00	0.00	0.00
16,900.00	89.13	179.40	12,530.16	-4,756.40	-130.16	4,757.22	0.00	0.00	0.00
17,000.00	89.13	179.40	12,531.68	-4,856.39	-129.11	4,857.19	0.00	0.00	0.00
17,100.00	89.13	179.40	12,533.19	-4,956.37	-128.05	4,957.17	0.00	0.00	0.00
17,200.00	89.13	179.40	12,534.71	-5,056.35	-127.00	5,057.14	0.00	0.00	0.00
17,300.00	89.13	179.40	12,536.23	-5,156.34	-125.95	5,157.11	0.00	0.00	0.00
17,400.00	89.13	179.40	12,537.74	-5,256.32	-124.89	5,257.08	0.00	0.00	0.00
17,500.00	89.13	179.40	12,539.26	-5,356.30	-123.84	5,357.06	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 601H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

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)
17,600.00	89.13	179.40	12,540.78	-5,456.28	-122.79	5,457.03	0.00	0.00	0.00
17,700.00	89.13	179.40	12,542.29	-5,556.27	-121.73	5,557.00	0.00	0.00	0.00
17,800.00	89.13	179.40	12,543.81	-5,656.25	-120.68	5,656.97	0.00	0.00	0.00
17,900.00	89.13	179.40	12,545.33	-5,756.23	-119.63	5,756.95	0.00	0.00	0.00
18,000.00	89.13	179.40	12,546.84	-5,856.22	-118.57	5,856.92	0.00	0.00	0.00
18,100.00	89.13	179.40	12,548.36	-5,956.20	-117.52	5,956.89	0.00	0.00	0.00
18,200.00	89.13	179.40	12,549.87	-6,056.18	-116.46	6,056.87	0.00	0.00	0.00
18,300.00	89.13	179.40	12,551.39	-6,156.17	-115.41	6,156.84	0.00	0.00	0.00
18,400.00	89.13	179.40	12,552.91	-6,256.15	-114.36	6,256.81	0.00	0.00	0.00
18,500.00	89.13	179.40	12,554.42	-6,356.13	-113.30	6,356.78	0.00	0.00	0.00
18,600.00	89.13	179.40	12,555.94	-6,456.11	-112.25	6,456.76	0.00	0.00	0.00
18,700.00	89.13	179.40	12,557.46	-6,556.10	-111.20	6,556.73	0.00	0.00	0.00
18,800.00	89.13	179.40	12,558.97	-6,656.08	-110.14	6,656.70	0.00	0.00	0.00
18,900.00	89.13	179.40	12,560.49	-6,756.06	-109.09	6,756.67	0.00	0.00	0.00
19,000.00	89.13	179.40	12,562.01	-6,856.05	-108.04	6,856.65	0.00	0.00	0.00
19,100.00	89.13	179.40	12,563.52	-6,956.03	-106.98	6,956.62	0.00	0.00	0.00
19,200.00	89.13	179.40	12,565.04	-7,056.01	-105.93	7,056.59	0.00	0.00	0.00
19,300.00	89.13	179.40	12,566.56	-7,155.99	-104.87	7,156.57	0.00	0.00	0.00
19,400.00	89.13	179.40	12,568.07	-7,255.98	-103.82	7,256.54	0.00	0.00	0.00
19,500.00	89.13	179.40	12,569.59	-7,355.96	-102.77	7,356.51	0.00	0.00	0.00
19,600.00	89.13	179.40	12,571.10	-7,455.94	-101.71	7,456.48	0.00	0.00	0.00
19,700.00	89.13	179.40	12,572.62	-7,555.93	-100.66	7,556.46	0.00	0.00	0.00
19,800.00	89.13	179.40	12,574.14	-7,655.91	-99.61	7,656.43	0.00	0.00	0.00
19,900.00	89.13	179.40	12,575.65	-7,755.89	-98.55	7,756.40	0.00	0.00	0.00
20,000.00	89.13	179.40	12,577.17	-7,855.88	-97.50	7,856.37	0.00	0.00	0.00
20,100.00	89.13	179.40	12,578.69	-7,955.86	-96.45	7,956.35	0.00	0.00	0.00
20,200.00	89.13	179.40	12,580.20	-8,055.84	-95.39	8,056.32	0.00	0.00	0.00
20,300.00	89.13	179.40	12,581.72	-8,155.82	-94.34	8,156.29	0.00	0.00	0.00
20,400.00	89.13	179.40	12,583.24	-8,255.81	-93.28	8,256.27	0.00	0.00	0.00
20,500.00	89.13	179.40	12,584.75	-8,355.79	-92.23	8,356.24	0.00	0.00	0.00
20,600.00	89.13	179.40	12,586.27	-8,455.77	-91.18	8,456.21	0.00	0.00	0.00
20,700.00	89.13	179.40	12,587.79	-8,555.76	-90.12	8,556.18	0.00	0.00	0.00
20,800.00	89.13	179.40	12,589.30	-8,655.74	-89.07	8,656.16	0.00	0.00	0.00
20,900.00	89.13	179.40	12,590.82	-8,755.72	-88.02	8,756.13	0.00	0.00	0.00
21,000.00	89.13	179.40	12,592.33	-8,855.71	-86.96	8,856.10	0.00	0.00	0.00
21,100.00	89.13	179.40	12,593.85	-8,955.69	-85.91	8,956.07	0.00	0.00	0.00
21,200.00	89.13	179.40	12,595.37	-9,055.67	-84.86	9,056.05	0.00	0.00	0.00
21,300.00	89.13	179.40	12,596.88	-9,155.65	-83.80	9,156.02	0.00	0.00	0.00
21,400.00	89.13	179.40	12,598.40	-9,255.64	-82.75	9,255.99	0.00	0.00	0.00
21,500.00	89.13	179.40	12,599.92	-9,355.62	-81.70	9,355.97	0.00	0.00	0.00
21,600.00	89.13	179.40	12,601.43	-9,455.60	-80.64	9,455.94	0.00	0.00	0.00
21,700.00	89.13	179.40	12,602.95	-9,555.59	-79.59	9,555.91	0.00	0.00	0.00
21,800.00	89.13	179.40	12,604.47	-9,655.57	-78.53	9,655.88	0.00	0.00	0.00
21,900.00	89.13	179.40	12,605.98	-9,755.55	-77.48	9,755.86	0.00	0.00	0.00
22,000.00	89.13	179.40	12,607.50	-9,855.53	-76.43	9,855.83	0.00	0.00	0.00
22,100.00	89.13	179.40	12,609.02	-9,955.52	-75.37	9,955.80	0.00	0.00	0.00
22,200.00	89.13	179.40	12,610.53	-10,055.50	-74.32	10,055.78	0.00	0.00	0.00
22,296.82	89.13	179.40	12,612.00	-10,152.30	-73.30	10,152.56	0.00	0.00	0.00
TD at 22296.82									

Database:	USA Compass	Local Co-ordinate Reference:	Well 601H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3372.00usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3372.00usft (McVay 8)
Site:	Fascinator Fed Com	North Reference:	Grid
Well:	601H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-18		

Design Targets
Target Name

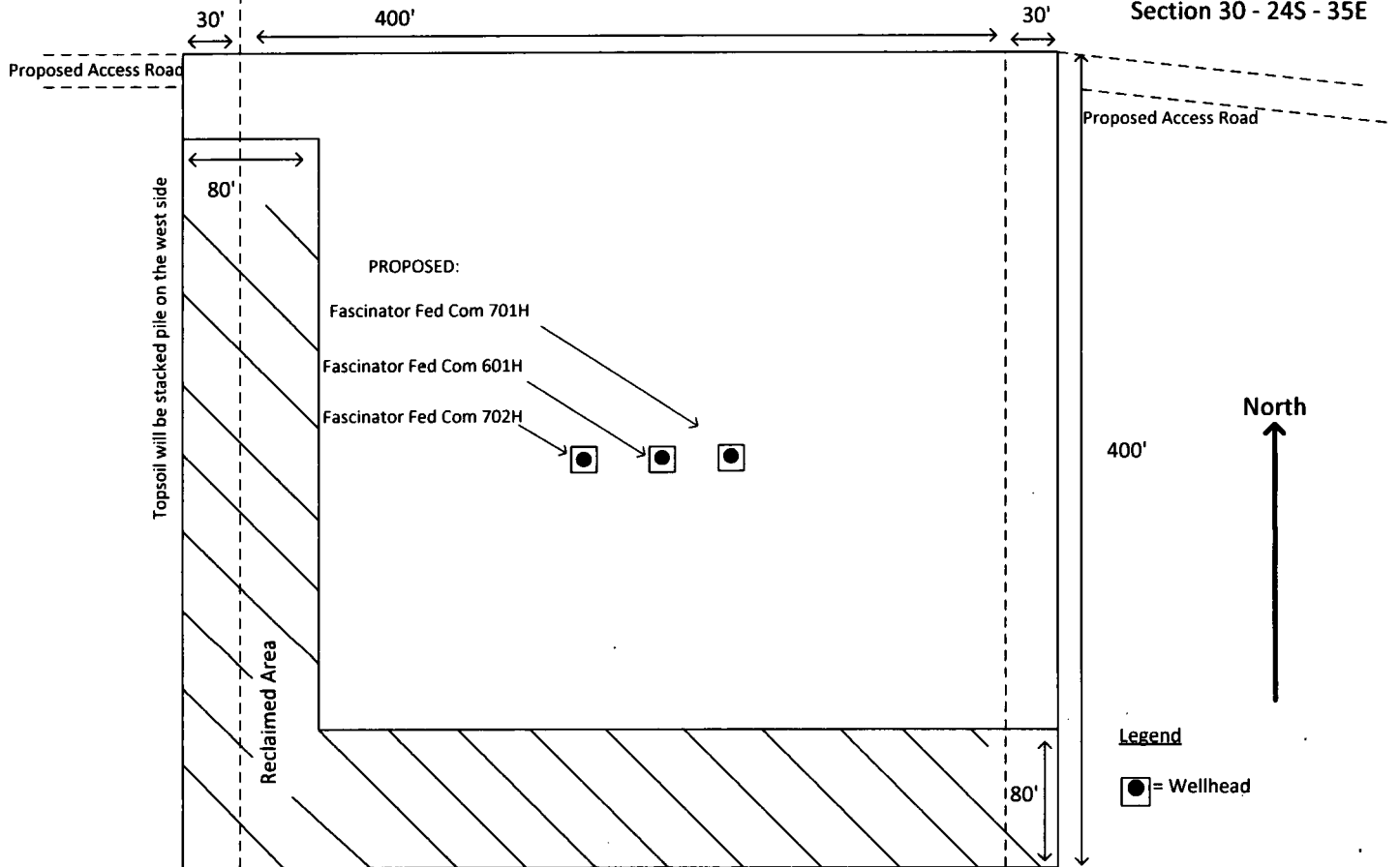
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
FTP - Fascinator Fed	0.00	0.00	12,467.00	-121.80	-179.00	435,788.70	786,126.20	32° 11' 40.98250 N	03° 24' 30.19408 W
- plan misses target center by 197.91usft at 12374.22usft MD (12332.19 TVD, -266.69 N, -177.47 E)									
- Point									
BHL - Fascinator Fed	0.00	0.00	12,612.00	-10,152.30	-73.30	425,758.20	786,231.90	32° 10' 1.72012 N	03° 24' 29.96780 W
- plan hits target center									
- Point									
LTP - Fascinator Fed	0.00	0.00	12,612.00	-10,022.30	-74.90	425,888.20	786,230.30	32° 10' 3.00663 N	03° 24' 29.97342 W
- plan misses target center by 1.98usft at 22166.82usft MD (12610.03 TVD, -10022.33 N, -74.67 E)									
- Point									

Plan Annotations

Measured Depth	Vertical Depth	Local-Coordinates		Comment
(usft)	(usft)	+N/-S	+E/-W	
(usft)	(usft)	(usft)	(usft)	
2,500.00	2,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2,567.24	2,567.24	-0.44	-0.65	Hold 1.34° Inc at 235.77° Azm
11,724.88	11,722.35	-121.36	-178.35	Begin 2.00°/100' Drop
11,792.13	11,789.59	-121.80	-179.00	Begin Vertical Hold
11,992.13	11,989.59	-121.80	-179.00	KOP2, Begin 12.00°/100' Build
12,734.88	12,467.00	-592.00	-174.05	LP, Hold 89.13° Inc at 179.40° Azm
22,296.82	12,612.00	-10,152.30	-73.30	TD at 22296.82

Exhibit 3

Well Site Layout Production Facility Layout Fascinator Federal Com 601H Section 30 - 24S - 35E



Proposed CTB will be permitted on the south side of the location at a later date.