PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM134886
WELL NAME & NO.:	Bonaid Federal Com 15H
SURFACE HOLE FOOTAGE:	210'/N & 1080'/W
BOTTOM HOLE FOOTAGE	200'/S & 990'/W
LOCATION:	Section 17, T.24 S., R.35 E., NMPM
COUNTY:	Lea County, New Mexico

HOBBS OCD
AUG 06 2018
RECEIVED

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 **1000** 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 **5300'**, 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 to surface. If cement does not circulate, contact the appropriate BLM office.

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** intermediate casing shoe shall be **10,000 (10M)** psi. **Varince is approved to use a 5M Annular which shall be tested to 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 06262018

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. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
    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.

4. Pressure Control Equipment

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

BOP installed and tested before drilling which hole?	Size?	System Rated WP	Type	✓	Tested to:
12-1/4"	13-5/8"	5M	Annular	X	2500 psi
			Blind Ram	X	5M
			Pipe Ram	X	
			Double Ram		
			Other*		
8-3/4"	13-5/8"	10M	**5M Annular**	X	~~5000~~ ~~3500~~ **PSI**
			Blind Ram	X	10M
			Pipe Ram	X	
			Double Ram		
			Other*		

PLEASE SEE ATTACHED VARIANCE FOR 5M ANNULAR.

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

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NMNM134886
WELL NAME & NO.:	Bonaid Federal Com 15H
SURFACE HOLE FOOTAGE:	210'/N & 1080'/W
BOTTOM HOLE FOOTAGE	200'/S & 990'/W
LOCATION:	Section 17, T.24 S., R.35 E., NMPM
COUNTY:	Lea County, New Mexico

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

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

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

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

This authorization is subject to your Certificate of Participation and/or Certificate of Inclusion under the New Mexico Candidate Conservation Agreement. Because it involves surface disturbing activities covered under your Certificate, your Habitat Conservation Fund Account with the Center of Excellence for Hazardous Materials Management (CEHMM) will be debited according to Exhibit B Part 2 of the Certificate of Participation.

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

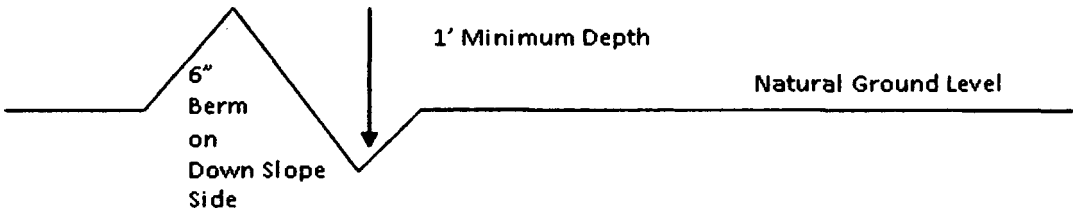
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

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

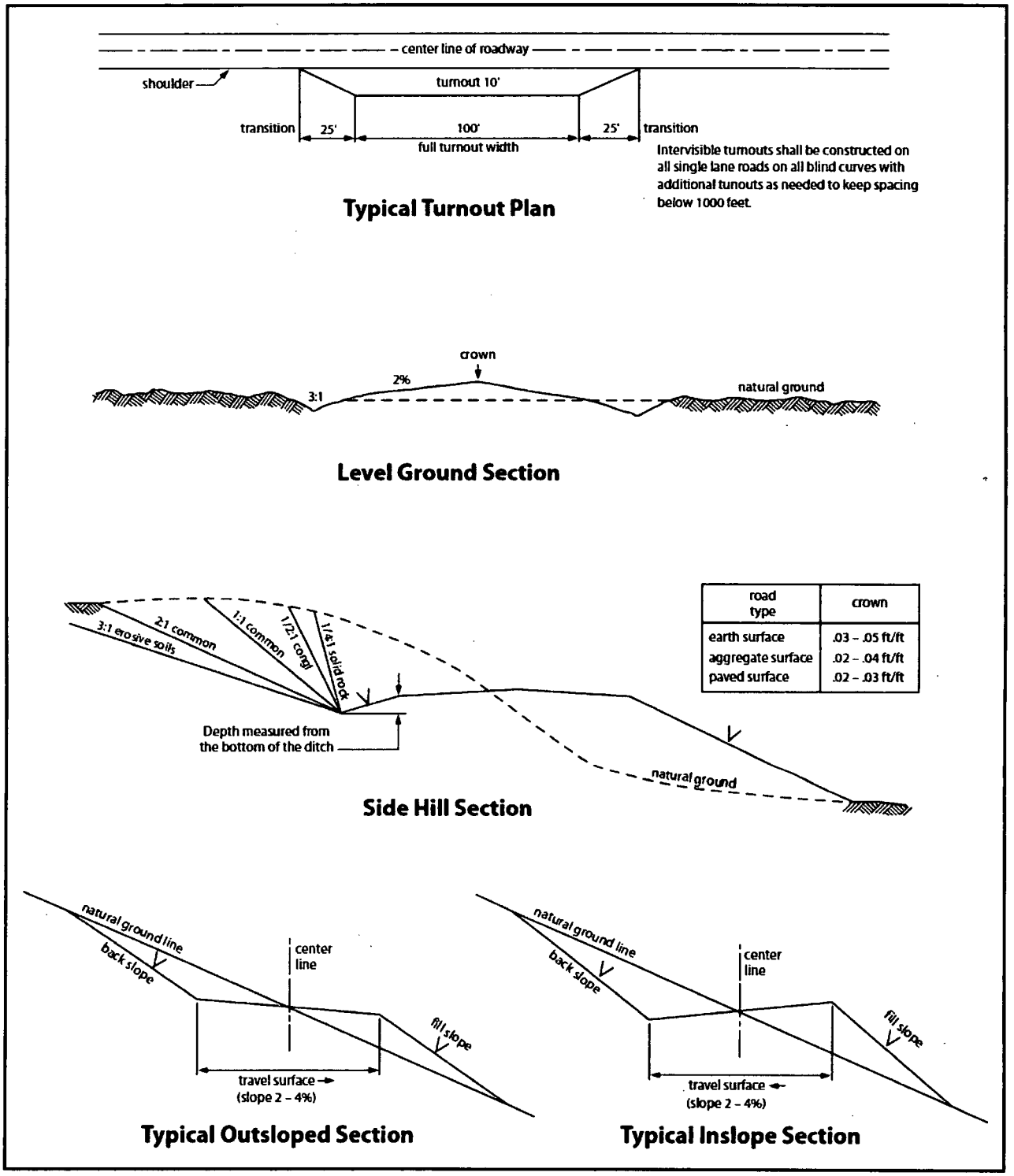


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

Approval Date: 07/13/2018

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).

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

Company: COG
Lease #:NMNM134886
Well name: Bonaid Federal 14H and 15H
May 21st, 2018

Seed Mixture for LPC Sand/Shinnery Sites

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

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

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

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

*Pounds of pure live seed:

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

Approval Date: 07/13/2018

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

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

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

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

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

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

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

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

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

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

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

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

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

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

g. Communication:
Company vehicles equipped with cellular telephone.

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

WARNING

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

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

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

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

EMERGENCY RESPONSE NUMBERS

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

COG OPERATING, LLC

Lea County, NM (NAD27) NMEZ
Bonaid Federal COM
#15H

OH

Plan: Plan #1 - IP

Standard Planning Report

07 February, 2018

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

Project	Lea County, NM (NAD27) NMEZ		
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	Bonaid Federal COM				
Site Position:		**Northing:**	446,509.70 usft	**Latitude:**	32° 13' 26.694 N
From:	Map	**Easting:**	790,481.60 usft	**Longitude:**	103° 23' 38.423 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.50 °

Well	#15H					
Well Position	**+N/-S**	-0.30 usft	**Northing:**	446,509.40 usft	**Latitude:**	32° 13' 26.694 N
	+E/-W	-30.00 usft	**Easting:**	790,451.60 usft	**Longitude:**	103° 23' 38.773 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**		**Ground Level:**	3,376.50 usft

Wellbore	OH			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	02/07/18	6.80	60.08	47,890.87835397

Design	Plan #1 - IP				
Audit Notes:					
Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.00	0.00	0.00	149.49	

Plan Survey Tool Program **Date** 02/07/18

	Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	21,872.94	Plan #1 - IP (OH)	MWD	
				MWD v3:standard declination	

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	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,566.67	1.00	270.00	1,566.66	0.00	-0.58	1.50	1.50	0.00	270.00	
6,700.79	1.00	270.00	6,700.00	0.00	-90.18	0.00	0.00	0.00	0.00	
6,767.45	0.00	0.00	6,766.66	0.00	-90.77	1.50	-1.50	0.00	180.00	
11,438.86	0.00	0.00	11,438.07	0.00	-90.77	0.00	0.00	0.00	0.00	
12,166.23	87.28	179.49	11,915.00	-454.82	-86.70	12.00	12.00	24.68	179.49	
21,873.90	87.28	179.49	12,375.00	-10,151.20	0.10	0.00	0.00	0.00	0.00	

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
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Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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
SHL(BFC#15H) - TW(BFC#15H)									
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
Start of Nudge: 1° INC,2700°AZ/@1.5°DLS									
1,566.67	1.00	270.00	1,566.66	0.00	-0.58	-0.30	1.50	1.50	0.00
1,600.00	1.00	270.00	1,599.99	0.00	-1.16	-0.59	0.00	0.00	0.00
1,700.00	1.00	270.00	1,699.98	0.00	-2.91	-1.48	0.00	0.00	0.00
1,800.00	1.00	270.00	1,799.96	0.00	-4.65	-2.36	0.00	0.00	0.00
1,900.00	1.00	270.00	1,899.95	0.00	-6.40	-3.25	0.00	0.00	0.00
2,000.00	1.00	270.00	1,999.93	0.00	-8.14	-4.13	0.00	0.00	0.00
2,100.00	1.00	270.00	2,099.92	0.00	-9.89	-5.02	0.00	0.00	0.00
2,200.00	1.00	270.00	2,199.90	0.00	-11.63	-5.91	0.00	0.00	0.00
2,300.00	1.00	270.00	2,299.88	0.00	-13.38	-6.79	0.00	0.00	0.00
2,400.00	1.00	270.00	2,399.87	0.00	-15.13	-7.68	0.00	0.00	0.00
2,500.00	1.00	270.00	2,499.85	0.00	-16.87	-8.57	0.00	0.00	0.00
2,600.00	1.00	270.00	2,599.84	0.00	-18.62	-9.45	0.00	0.00	0.00
2,700.00	1.00	270.00	2,699.82	0.00	-20.36	-10.34	0.00	0.00	0.00
2,800.00	1.00	270.00	2,799.81	0.00	-22.11	-11.22	0.00	0.00	0.00
2,900.00	1.00	270.00	2,899.79	0.00	-23.85	-12.11	0.00	0.00	0.00
3,000.00	1.00	270.00	2,999.78	0.00	-25.60	-13.00	0.00	0.00	0.00
3,100.00	1.00	270.00	3,099.76	0.00	-27.34	-13.88	0.00	0.00	0.00
3,200.00	1.00	270.00	3,199.75	0.00	-29.09	-14.77	0.00	0.00	0.00
3,300.00	1.00	270.00	3,299.73	0.00	-30.83	-15.65	0.00	0.00	0.00
3,400.00	1.00	270.00	3,399.72	0.00	-32.58	-16.54	0.00	0.00	0.00
3,500.00	1.00	270.00	3,499.70	0.00	-34.32	-17.43	0.00	0.00	0.00
3,600.00	1.00	270.00	3,599.69	0.00	-36.07	-18.31	0.00	0.00	0.00
3,700.00	1.00	270.00	3,699.67	0.00	-37.81	-19.20	0.00	0.00	0.00
3,800.00	1.00	270.00	3,799.66	0.00	-39.56	-20.08	0.00	0.00	0.00
3,900.00	1.00	270.00	3,899.64	0.00	-41.30	-20.97	0.00	0.00	0.00
4,000.00	1.00	270.00	3,999.63	0.00	-43.05	-21.86	0.00	0.00	0.00
4,100.00	1.00	270.00	4,099.61	0.00	-44.79	-22.74	0.00	0.00	0.00
4,200.00	1.00	270.00	4,199.60	0.00	-46.54	-23.63	0.00	0.00	0.00
4,300.00	1.00	270.00	4,299.58	0.00	-48.29	-24.51	0.00	0.00	0.00
4,400.00	1.00	270.00	4,399.57	0.00	-50.03	-25.40	0.00	0.00	0.00
4,500.00	1.00	270.00	4,499.55	0.00	-51.78	-26.29	0.00	0.00	0.00
4,600.00	1.00	270.00	4,599.53	0.00	-53.52	-27.17	0.00	0.00	0.00
4,700.00	1.00	270.00	4,699.52	0.00	-55.27	-28.06	0.00	0.00	0.00
4,800.00	1.00	270.00	4,799.50	0.00	-57.01	-28.94	0.00	0.00	0.00
4,900.00	1.00	270.00	4,899.49	0.00	-58.76	-29.83	0.00	0.00	0.00

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Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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)
5,000.00	1.00	270.00	4,999.47	0.00	-60.50	-30.72	0.00	0.00	0.00
5,100.00	1.00	270.00	5,099.46	0.00	-62.25	-31.60	0.00	0.00	0.00
5,200.00	1.00	270.00	5,199.44	0.00	-63.99	-32.49	0.00	0.00	0.00
5,300.00	1.00	270.00	5,299.43	0.00	-65.74	-33.37	0.00	0.00	0.00
5,400.00	1.00	270.00	5,399.41	0.00	-67.48	-34.26	0.00	0.00	0.00
5,500.00	1.00	270.00	5,499.40	0.00	-69.23	-35.15	0.00	0.00	0.00
5,600.00	1.00	270.00	5,599.38	0.00	-70.97	-36.03	0.00	0.00	0.00
5,700.00	1.00	270.00	5,699.37	0.00	-72.72	-36.92	0.00	0.00	0.00
5,800.00	1.00	270.00	5,799.35	0.00	-74.46	-37.80	0.00	0.00	0.00
5,900.00	1.00	270.00	5,899.34	0.00	-76.21	-38.69	0.00	0.00	0.00
6,000.00	1.00	270.00	5,999.32	0.00	-77.95	-39.58	0.00	0.00	0.00
6,100.00	1.00	270.00	6,099.31	0.00	-79.70	-40.46	0.00	0.00	0.00
6,200.00	1.00	270.00	6,199.29	0.00	-81.44	-41.35	0.00	0.00	0.00
6,300.00	1.00	270.00	6,299.28	0.00	-83.19	-42.23	0.00	0.00	0.00
6,400.00	1.00	270.00	6,399.26	0.00	-84.94	-43.12	0.00	0.00	0.00
6,500.00	1.00	270.00	6,499.25	0.00	-86.68	-44.01	0.00	0.00	0.00
6,600.00	1.00	270.00	6,599.23	0.00	-88.43	-44.89	0.00	0.00	0.00
6,700.79	1.00	270.00	6,700.00	0.00	-90.18	-45.79	0.00	0.00	0.00
Drop to Vertical /@1.5°DLS									
6,767.45	0.00	0.00	6,766.66	0.00	-90.77	-46.08	1.50	-1.50	0.00
6,800.00	0.00	0.00	6,799.21	0.00	-90.77	-46.08	0.00	0.00	0.00
6,900.00	0.00	0.00	6,899.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,000.00	0.00	0.00	6,999.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,100.00	0.00	0.00	7,099.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,200.00	0.00	0.00	7,199.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,300.00	0.00	0.00	7,299.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,400.00	0.00	0.00	7,399.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,500.00	0.00	0.00	7,499.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,600.00	0.00	0.00	7,599.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,700.00	0.00	0.00	7,699.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,800.00	0.00	0.00	7,799.21	0.00	-90.77	-46.08	0.00	0.00	0.00
7,900.00	0.00	0.00	7,899.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,000.00	0.00	0.00	7,999.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,100.00	0.00	0.00	8,099.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,200.00	0.00	0.00	8,199.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,300.00	0.00	0.00	8,299.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,400.00	0.00	0.00	8,399.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,500.00	0.00	0.00	8,499.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,600.00	0.00	0.00	8,599.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,700.00	0.00	0.00	8,699.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,800.00	0.00	0.00	8,799.21	0.00	-90.77	-46.08	0.00	0.00	0.00
8,900.00	0.00	0.00	8,899.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,000.00	0.00	0.00	8,999.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,100.00	0.00	0.00	9,099.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,200.00	0.00	0.00	9,199.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,300.00	0.00	0.00	9,299.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,400.00	0.00	0.00	9,399.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,500.00	0.00	0.00	9,499.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,600.00	0.00	0.00	9,599.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,700.00	0.00	0.00	9,699.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,800.00	0.00	0.00	9,799.21	0.00	-90.77	-46.08	0.00	0.00	0.00
9,900.00	0.00	0.00	9,899.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,000.00	0.00	0.00	9,999.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,100.00	0.00	0.00	10,099.21	0.00	-90.77	-46.08	0.00	0.00	0.00

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,200.00	0.00	0.00	10,199.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,300.00	0.00	0.00	10,299.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,400.00	0.00	0.00	10,399.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,500.00	0.00	0.00	10,499.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,600.00	0.00	0.00	10,599.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,700.00	0.00	0.00	10,699.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,800.00	0.00	0.00	10,799.21	0.00	-90.77	-46.08	0.00	0.00	0.00
10,900.00	0.00	0.00	10,899.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,000.00	0.00	0.00	10,999.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,100.00	0.00	0.00	11,099.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,200.00	0.00	0.00	11,199.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,300.00	0.00	0.00	11,299.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,400.00	0.00	0.00	11,399.21	0.00	-90.77	-46.08	0.00	0.00	0.00
11,438.86	0.00	0.00	11,438.07	0.00	-90.77	-46.08	0.00	0.00	0.00
KOP: 11438.86' MD, 11438.07' TVD - Build at 12°/100ft to 87.28° INC @ 179.49° AZ									
11,450.00	1.34	179.49	11,449.21	-0.13	-90.77	-45.97	12.00	12.00	0.00
11,475.00	4.34	179.49	11,474.18	-1.37	-90.75	-44.90	12.00	12.00	0.00
11,500.00	7.34	179.49	11,499.04	-3.91	-90.73	-42.70	12.00	12.00	0.00
11,525.00	10.34	179.49	11,523.74	-7.75	-90.70	-39.37	12.00	12.00	0.00
11,550.00	13.34	179.49	11,548.21	-12.88	-90.65	-34.93	12.00	12.00	0.00
11,575.00	16.34	179.49	11,572.37	-19.28	-90.59	-29.39	12.00	12.00	0.00
11,600.00	19.34	179.49	11,596.17	-26.93	-90.53	-22.75	12.00	12.00	0.00
11,625.00	22.34	179.49	11,619.53	-35.83	-90.45	-15.05	12.00	12.00	0.00
11,650.00	25.34	179.49	11,642.40	-45.93	-90.36	-6.30	12.00	12.00	0.00
11,675.00	28.34	179.49	11,664.70	-57.21	-90.25	3.47	12.00	12.00	0.00
11,700.00	31.34	179.49	11,686.39	-69.65	-90.14	14.24	12.00	12.00	0.00
11,725.00	34.34	179.49	11,707.39	-83.20	-90.02	25.98	12.00	12.00	0.00
11,750.00	37.34	179.49	11,727.65	-97.84	-89.89	38.65	12.00	12.00	0.00
11,775.00	40.34	179.49	11,747.12	-113.51	-89.75	52.23	12.00	12.00	0.00
11,800.00	43.34	179.49	11,765.75	-130.18	-89.60	66.67	12.00	12.00	0.00
11,825.00	46.34	179.49	11,783.47	-147.81	-89.44	81.93	12.00	12.00	0.00
11,850.00	49.34	179.49	11,800.25	-166.34	-89.28	97.98	12.00	12.00	0.00
11,875.00	52.34	179.49	11,816.04	-185.72	-89.10	114.77	12.00	12.00	0.00
11,881.19	53.08	179.49	11,819.79	-190.64	-89.06	119.03	12.00	12.00	0.00
FTP(BFC#15H)									
11,900.00	55.34	179.49	11,830.79	-205.90	-88.92	132.24	12.00	12.00	0.00
11,925.00	58.34	179.49	11,844.46	-226.82	-88.74	150.37	12.00	12.00	0.00
11,950.00	61.34	179.49	11,857.02	-248.44	-88.54	169.09	12.00	12.00	0.00
11,975.00	64.34	179.49	11,868.44	-270.67	-88.34	188.35	12.00	12.00	0.00
12,000.00	67.34	179.49	11,878.67	-293.48	-88.14	208.10	12.00	12.00	0.00
12,025.00	70.34	179.49	11,887.69	-316.79	-87.93	228.29	12.00	12.00	0.00
12,050.00	73.34	179.49	11,895.49	-340.54	-87.72	248.86	12.00	12.00	0.00
12,075.00	76.34	179.49	11,902.02	-364.67	-87.50	269.75	12.00	12.00	0.00
12,100.00	79.34	179.49	11,907.29	-389.10	-87.28	290.91	12.00	12.00	0.00
12,125.00	82.34	179.49	11,911.27	-413.78	-87.06	312.29	12.00	12.00	0.00
12,150.00	85.34	179.49	11,913.95	-438.63	-86.84	333.81	12.00	12.00	0.00
12,166.23	87.28	179.49	11,915.00	-454.83	-86.69	347.84	12.00	12.00	0.00
EOC: 12166.23' MD, 11915.00' TVD, 87.28° INC, 179.49° AZ, 347.84' VS									
12,200.00	87.28	179.49	11,916.60	-488.56	-86.39	377.05	0.00	0.00	0.00
12,300.00	87.28	179.49	11,921.34	-588.44	-85.50	463.56	0.00	0.00	0.00
12,400.00	87.28	179.49	11,926.08	-688.32	-84.60	550.07	0.00	0.00	0.00
12,500.00	87.28	179.49	11,930.81	-788.21	-83.71	636.57	0.00	0.00	0.00
12,600.00	87.28	179.49	11,935.55	-888.09	-82.82	723.08	0.00	0.00	0.00

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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)
12,700.00	87.28	179.49	11,940.29	-987.98	-81.92	809.59	0.00	0.00	0.00
12,800.00	87.28	179.49	11,945.03	-1,087.86	-81.03	896.10	0.00	0.00	0.00
12,900.00	87.28	179.49	11,949.77	-1,187.74	-80.13	982.61	0.00	0.00	0.00
13,000.00	87.28	179.49	11,954.51	-1,287.63	-79.24	1,069.11	0.00	0.00	0.00
13,100.00	87.28	179.49	11,959.25	-1,387.51	-78.35	1,155.62	0.00	0.00	0.00
13,200.00	87.28	179.49	11,963.98	-1,487.39	-77.45	1,242.13	0.00	0.00	0.00
13,300.00	87.28	179.49	11,968.72	-1,587.28	-76.56	1,328.64	0.00	0.00	0.00
13,400.00	87.28	179.49	11,973.46	-1,687.16	-75.66	1,415.14	0.00	0.00	0.00
13,500.00	87.28	179.49	11,978.20	-1,787.04	-74.77	1,501.65	0.00	0.00	0.00
13,600.00	87.28	179.49	11,982.94	-1,886.93	-73.88	1,588.16	0.00	0.00	0.00
13,700.00	87.28	179.49	11,987.68	-1,986.81	-72.98	1,674.67	0.00	0.00	0.00
13,800.00	87.28	179.49	11,992.42	-2,086.70	-72.09	1,761.17	0.00	0.00	0.00
13,900.00	87.28	179.49	11,997.15	-2,186.58	-71.19	1,847.68	0.00	0.00	0.00
14,000.00	87.28	179.49	12,001.89	-2,286.46	-70.30	1,934.19	0.00	0.00	0.00
14,100.00	87.28	179.49	12,006.63	-2,386.35	-69.41	2,020.70	0.00	0.00	0.00
14,200.00	87.28	179.49	12,011.37	-2,486.23	-68.51	2,107.21	0.00	0.00	0.00
14,300.00	87.28	179.49	12,016.11	-2,586.11	-67.62	2,193.71	0.00	0.00	0.00
14,400.00	87.28	179.49	12,020.85	-2,686.00	-66.72	2,280.22	0.00	0.00	0.00
14,500.00	87.28	179.49	12,025.59	-2,785.88	-65.83	2,366.73	0.00	0.00	0.00
14,600.00	87.28	179.49	12,030.32	-2,885.77	-64.93	2,453.24	0.00	0.00	0.00
14,700.00	87.28	179.49	12,035.06	-2,985.65	-64.04	2,539.74	0.00	0.00	0.00
14,800.00	87.28	179.49	12,039.80	-3,085.53	-63.15	2,626.25	0.00	0.00	0.00
14,900.00	87.28	179.49	12,044.54	-3,185.42	-62.25	2,712.76	0.00	0.00	0.00
15,000.00	87.28	179.49	12,049.28	-3,285.30	-61.36	2,799.27	0.00	0.00	0.00
15,100.00	87.28	179.49	12,054.02	-3,385.18	-60.46	2,885.78	0.00	0.00	0.00
15,200.00	87.28	179.49	12,058.76	-3,485.07	-59.57	2,972.28	0.00	0.00	0.00
15,300.00	87.28	179.49	12,063.49	-3,584.95	-58.68	3,058.79	0.00	0.00	0.00
15,400.00	87.28	179.49	12,068.23	-3,684.83	-57.78	3,145.30	0.00	0.00	0.00
15,500.00	87.28	179.49	12,072.97	-3,784.72	-56.89	3,231.81	0.00	0.00	0.00
15,600.00	87.28	179.49	12,077.71	-3,884.60	-55.99	3,318.31	0.00	0.00	0.00
15,700.00	87.28	179.49	12,082.45	-3,984.49	-55.10	3,404.82	0.00	0.00	0.00
15,800.00	87.28	179.49	12,087.19	-4,084.37	-54.21	3,491.33	0.00	0.00	0.00
15,900.00	87.28	179.49	12,091.93	-4,184.25	-53.31	3,577.84	0.00	0.00	0.00
16,000.00	87.28	179.49	12,096.66	-4,284.14	-52.42	3,664.35	0.00	0.00	0.00
16,100.00	87.28	179.49	12,101.40	-4,384.02	-51.52	3,750.85	0.00	0.00	0.00
16,200.00	87.28	179.49	12,106.14	-4,483.90	-50.63	3,837.36	0.00	0.00	0.00
16,300.00	87.28	179.49	12,110.88	-4,583.79	-49.74	3,923.87	0.00	0.00	0.00
16,400.00	87.28	179.49	12,115.62	-4,683.67	-48.84	4,010.38	0.00	0.00	0.00
16,500.00	87.28	179.49	12,120.36	-4,783.55	-47.95	4,096.88	0.00	0.00	0.00
16,600.00	87.28	179.49	12,125.09	-4,883.44	-47.05	4,183.39	0.00	0.00	0.00
16,700.00	87.28	179.49	12,129.83	-4,983.32	-46.16	4,269.90	0.00	0.00	0.00
16,800.00	87.28	179.49	12,134.57	-5,083.21	-45.27	4,356.41	0.00	0.00	0.00
16,900.00	87.28	179.49	12,139.31	-5,183.09	-44.37	4,442.92	0.00	0.00	0.00
17,000.00	87.28	179.49	12,144.05	-5,282.97	-43.48	4,529.42	0.00	0.00	0.00
17,100.00	87.28	179.49	12,148.79	-5,382.86	-42.58	4,615.93	0.00	0.00	0.00
17,200.00	87.28	179.49	12,153.53	-5,482.74	-41.69	4,702.44	0.00	0.00	0.00
17,300.00	87.28	179.49	12,158.26	-5,582.62	-40.79	4,788.95	0.00	0.00	0.00
17,400.00	87.28	179.49	12,163.00	-5,682.51	-39.90	4,875.45	0.00	0.00	0.00
17,500.00	87.28	179.49	12,167.74	-5,782.39	-39.01	4,961.96	0.00	0.00	0.00
17,600.00	87.28	179.49	12,172.48	-5,882.28	-38.11	5,048.47	0.00	0.00	0.00
17,700.00	87.28	179.49	12,177.22	-5,982.16	-37.22	5,134.98	0.00	0.00	0.00
17,800.00	87.28	179.49	12,181.96	-6,082.04	-36.32	5,221.48	0.00	0.00	0.00
17,900.00	87.28	179.49	12,186.70	-6,181.93	-35.43	5,307.99	0.00	0.00	0.00
18,000.00	87.28	179.49	12,191.43	-6,281.81	-34.54	5,394.50	0.00	0.00	0.00

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

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)
18,100.00	87.28	179.49	12,196.17	-6,381.69	-33.64	5,481.01	0.00	0.00	0.00
18,200.00	87.28	179.49	12,200.91	-6,481.58	-32.75	5,567.52	0.00	0.00	0.00
18,300.00	87.28	179.49	12,205.65	-6,581.46	-31.85	5,654.02	0.00	0.00	0.00
18,400.00	87.28	179.49	12,210.39	-6,681.34	-30.96	5,740.53	0.00	0.00	0.00
18,500.00	87.28	179.49	12,215.13	-6,781.23	-30.07	5,827.04	0.00	0.00	0.00
18,600.00	87.28	179.49	12,219.87	-6,881.11	-29.17	5,913.55	0.00	0.00	0.00
18,700.00	87.28	179.49	12,224.60	-6,981.00	-28.28	6,000.05	0.00	0.00	0.00
18,800.00	87.28	179.49	12,229.34	-7,080.88	-27.38	6,086.56	0.00	0.00	0.00
18,900.00	87.28	179.49	12,234.08	-7,180.76	-26.49	6,173.07	0.00	0.00	0.00
19,000.00	87.28	179.49	12,238.82	-7,280.65	-25.60	6,259.58	0.00	0.00	0.00
19,100.00	87.28	179.49	12,243.56	-7,380.53	-24.70	6,346.09	0.00	0.00	0.00
19,200.00	87.28	179.49	12,248.30	-7,480.41	-23.81	6,432.59	0.00	0.00	0.00
19,300.00	87.28	179.49	12,253.04	-7,580.30	-22.91	6,519.10	0.00	0.00	0.00
19,400.00	87.28	179.49	12,257.77	-7,680.18	-22.02	6,605.61	0.00	0.00	0.00
19,500.00	87.28	179.49	12,262.51	-7,780.06	-21.12	6,692.12	0.00	0.00	0.00
19,600.00	87.28	179.49	12,267.25	-7,879.95	-20.23	6,778.62	0.00	0.00	0.00
19,700.00	87.28	179.49	12,271.99	-7,979.83	-19.34	6,865.13	0.00	0.00	0.00
19,800.00	87.28	179.49	12,276.73	-8,079.72	-18.44	6,951.64	0.00	0.00	0.00
19,900.00	87.28	179.49	12,281.47	-8,179.60	-17.55	7,038.15	0.00	0.00	0.00
20,000.00	87.28	179.49	12,286.20	-8,279.48	-16.65	7,124.66	0.00	0.00	0.00
20,100.00	87.28	179.49	12,290.94	-8,379.37	-15.76	7,211.16	0.00	0.00	0.00
20,200.00	87.28	179.49	12,295.68	-8,479.25	-14.87	7,297.67	0.00	0.00	0.00
20,300.00	87.28	179.49	12,300.42	-8,579.13	-13.97	7,384.18	0.00	0.00	0.00
20,400.00	87.28	179.49	12,305.16	-8,679.02	-13.08	7,470.69	0.00	0.00	0.00
20,500.00	87.28	179.49	12,309.90	-8,778.90	-12.18	7,557.19	0.00	0.00	0.00
20,600.00	87.28	179.49	12,314.64	-8,878.79	-11.29	7,643.70	0.00	0.00	0.00
20,700.00	87.28	179.49	12,319.37	-8,978.67	-10.40	7,730.21	0.00	0.00	0.00
20,800.00	87.28	179.49	12,324.11	-9,078.55	-9.50	7,816.72	0.00	0.00	0.00
20,900.00	87.28	179.49	12,328.85	-9,178.44	-8.61	7,903.23	0.00	0.00	0.00
21,000.00	87.28	179.49	12,333.59	-9,278.32	-7.71	7,989.73	0.00	0.00	0.00
21,100.00	87.28	179.49	12,338.33	-9,378.20	-6.82	8,076.24	0.00	0.00	0.00
21,200.00	87.28	179.49	12,343.07	-9,478.09	-5.93	8,162.75	0.00	0.00	0.00
21,300.00	87.28	179.49	12,347.81	-9,577.97	-5.03	8,249.26	0.00	0.00	0.00
21,400.00	87.28	179.49	12,352.54	-9,677.85	-4.14	8,335.76	0.00	0.00	0.00
21,500.00	87.28	179.49	12,357.28	-9,777.74	-3.24	8,422.27	0.00	0.00	0.00
21,600.00	87.28	179.49	12,362.02	-9,877.62	-2.35	8,508.78	0.00	0.00	0.00
21,700.00	87.28	179.49	12,366.76	-9,977.51	-1.45	8,595.29	0.00	0.00	0.00
21,800.00	87.28	179.49	12,371.50	-10,077.39	-0.56	8,681.80	0.00	0.00	0.00
21,873.90	87.28	179.49	12,375.00	-10,151.20	0.10	8,745.72	0.00	0.00	0.00

TD: 21873.90' MD, 12375.00' TVD - PBHL(BFC#15H)

Database:	EDM 5000.14 Single User Db	**Local Co-ordinate Reference:**	Well #15H
Company:	COG OPERATING, LLC	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Project:	Lea County, NM (NAD27) NMEZ	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site:	Bonaid Federal COM	**North Reference:**	Grid
Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 - IP		

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL(BFC#15H) - plan misses target center by 318.79usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	212.20	237.90	446,721.60	790,689.50	32° 13' 28.773 N	103° 23' 35.982 W
TW(BFC#15H) - plan misses target center by 10151.20usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Rectangle (sides W80.00 H10,151.20 D0.00)	0.00	0.00	0.00	-10,151.20	0.10	436,358.20	790,451.70	32° 11' 46.247 N	103° 23' 39.804 W
FTP(BFC#15H) - plan misses target center by 117.93usft at 11881.19usft MD (11819.79 TVD, -190.64 N, -89.06 E) - Point	0.00	0.00	11,915.00	-121.05	-89.09	446,388.35	790,362.51	32° 13' 25.504 N	103° 23' 39.822 W
PBHL(BFC#15H) - plan hits target center - Point	0.00	0.00	12,375.00	-10,151.20	0.10	436,358.20	790,451.70	32° 11' 46.247 N	103° 23' 39.804 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
1,500.00	1,500.00	0.00	0.00	Start of Nudge: 1° INC,2700°AZ/@1.5°DLS
6,700.79	6,700.00	0.00	-90.18	Drop to Vertical /@1.5°DLS
11,438.86	11,438.07	0.00	-90.77	KOP: 11438.86' MD, 11438.07' TVD
11,438.86	11,438.07	0.00	-90.77	Build at 12°/100ft to 87.28° INC @ 179.49° AZ
12,166.23	11,915.00	-454.83	-86.69	EOC: 12166.23' MD, 11915.00' TVD, 87.28° INC, 179.49° AZ, 347.84' VS
21,873.90	12,375.00	-10,151.20	0.10	TD: 21873.90' MD, 12375.00' TVD

CONCHO

COG OPERATING, LLC
Project: Lea County, NM (NAD27) NMEZ
Site: Bonaid Federal COM
Well: #15H
Wellbore: OH
Plan: Plan #1 - IP (#15H/OH)

WELL DETAILS: #15H

Ground Elevation:: 3376.50
RKB Elevation: RKB @ 3401.50usft (Rig KB = 25')
Rig Name: Rig KB = 25'

Surface Hole Location

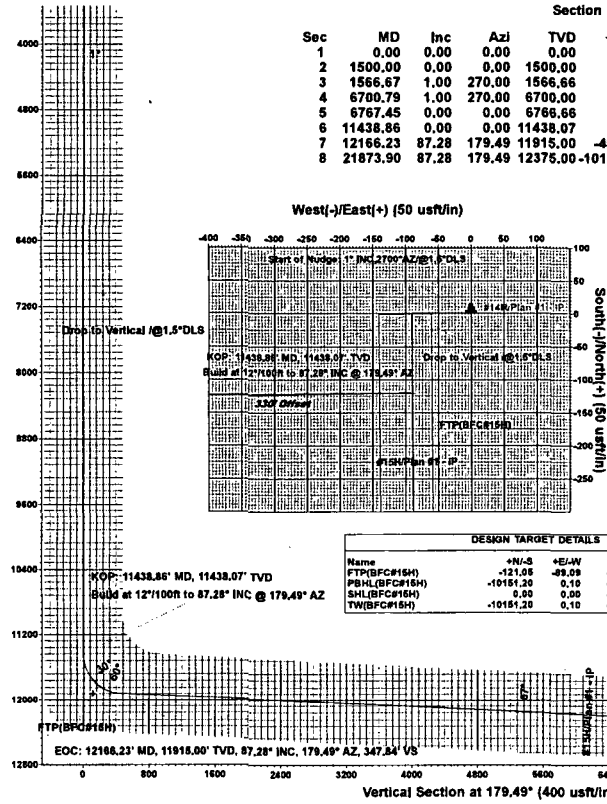
Northing	Easting	Latitude	Longitude
446509.40	790451.60	32° 13' 26.694 N	103° 23' 38.773 W

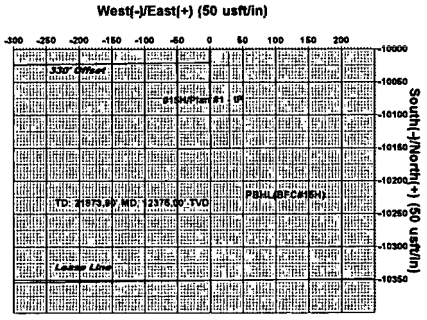
Azimuths to Grid North
True North: -0.50°
Magnetic North: 6.30°

Magnetic Field
Strength: 47890.9snT
Dip Angle: 60.08°
Date: 02/07/2018
Model: IGRF2015

Section Details

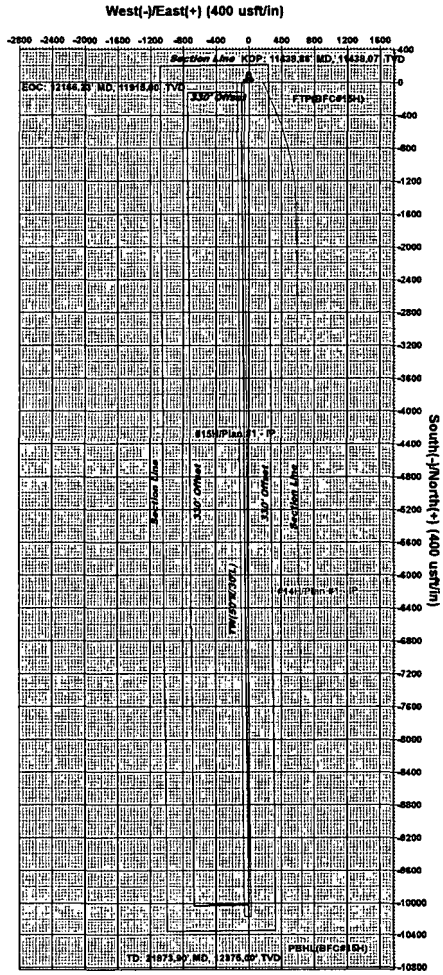
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00
3	1566.67	1.00	270.00	1566.66	0.00	-0.58	1.50	270.00	-0.01
4	6700.79	1.00	270.00	6700.00	0.00	-90.18	0.00	0.00	-0.80
5	6767.45	0.00	0.00	6766.66	0.00	-90.77	1.50	180.00	-0.81
6	11438.86	0.00	0.00	11438.07	0.00	-90.77	0.00	0.00	-0.81
7	12166.23	87.28	179.49	11915.00	-454.82	-86.70	12.00	179.49	454.03
8	21873.90	87.28	179.49	12375.00	-10151.20	0.10	0.00	0.00	10150.80





DESIGN TARGET DETAILS					
Name	+N/-S	+E/-W	Northing	Easting
FTP(BFC#15H)	-121.05	-89.09	446388.35	790362.51
PBHL(BFC#15H)	-10151.20	0.10	436358.20	790451.70
SHL(BFC#15H)	0.00	0.00	446509.40	790451.60
TW(BFC#15H)	-10151.20	0.10	436358.20	790451.70

PROJECT DETAILS: Lea County, NM (NAD27) NMEZ
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid



VON ENERGY SERVICES, LLC

VON Directional
2407 E. Murphy St. Bldg. E3 Odessa, TX 79761
Phone: 432-232-8838

Plan: Plan #1 - IP (#15H/OH)
Created By: Gabriel Cruz Date: 18:28, February 07 2018

COG OPERATING, LLC

Lea County, NM (NAD27) NMEZ
Bonaid Federal COM
#15H

OH
Plan #1 - IP

Anticollision Report

07 February, 2018

Anticollision Report

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference	Plan #1 - IP		
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 9,999.98 usft	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.000 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 02/07/18

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	21,872.94	Plan #1 - IP (OH)	MWD	MWD v3:standard declination

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Bonaid Federal COM						
#14H - OH - Plan #1 - IP	1,500.00	1,500.20	30.00	23.54	4.642	CC, ES
#14H - OH - Plan #1 - IP	1,566.67	1,567.01	31.16	24.42	4.622	SF

Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.20	0.20	0.00	0.00	89.43	0.30	30.00	30.00				
100.00	100.00	100.20	100.20	0.08	0.08	89.43	0.30	30.00	30.00	29.83	.169	177.498	
200.00	200.00	200.20	200.20	0.31	0.31	89.43	0.30	30.00	30.00	29.38	.619	48.502	
300.00	300.00	300.20	300.20	0.53	0.53	89.43	0.30	30.00	30.00	28.93	1.068	28.089	
400.00	400.00	400.20	400.20	0.76	0.76	89.43	0.30	30.00	30.00	28.48	1.518	19.769	
500.00	500.00	500.20	500.20	0.98	0.98	89.43	0.30	30.00	30.00	28.03	1.967	15.251	
600.00	600.00	600.20	600.20	1.21	1.21	89.43	0.30	30.00	30.00	27.58	2.417	12.414	
700.00	700.00	700.20	700.20	1.43	1.43	89.43	0.30	30.00	30.00	27.14	2.866	10.467	
800.00	800.00	800.20	800.20	1.66	1.66	89.43	0.30	30.00	30.00	26.69	3.316	9.048	
900.00	900.00	900.20	900.20	1.88	1.88	89.43	0.30	30.00	30.00	26.24	3.765	7.968	
1,000.00	1,000.00	1,000.20	1,000.20	2.11	2.11	89.43	0.30	30.00	30.00	25.79	4.215	7.118	
1,100.00	1,100.00	1,100.20	1,100.20	2.33	2.33	89.43	0.30	30.00	30.00	25.34	4.664	6.432	
1,200.00	1,200.00	1,200.20	1,200.20	2.56	2.56	89.43	0.30	30.00	30.00	24.89	5.114	5.867	
1,300.00	1,300.00	1,300.20	1,300.20	2.78	2.78	89.43	0.30	30.00	30.00	24.44	5.563	5.393	
1,400.00	1,400.00	1,400.20	1,400.20	3.01	3.01	89.43	0.30	30.00	30.00	23.99	6.013	4.989	
1,500.00	1,500.00	1,500.20	1,500.20	3.23	3.23	89.43	0.30	30.00	30.00	23.54	6.462	4.642	CC, ES
1,566.67	1,566.66	1,567.01	1,566.32	3.37	3.37	179.45	0.30	30.58	31.16	24.42	6.743	4.622	SF
1,600.00	1,599.99	1,600.36	1,599.63	3.44	3.44	179.47	0.30	31.16	32.33	25.45	6.875	4.702	
1,700.00	1,699.98	1,700.43	1,699.55	3.64	3.64	179.52	0.30	32.90	35.82	28.54	7.273	4.925	
1,800.00	1,799.96	1,800.49	1,799.48	3.84	3.84	179.56	0.30	34.65	39.31	31.63	7.677	5.120	
1,900.00	1,899.95	1,900.55	1,899.40	4.05	4.05	179.60	0.30	36.39	42.80	34.71	8.086	5.293	
2,000.00	1,999.93	2,000.61	1,999.32	4.25	4.26	179.63	0.30	38.13	46.29	37.79	8.499	5.446	
2,100.00	2,099.92	2,100.67	2,099.25	4.46	4.47	179.65	0.30	39.88	49.78	40.86	8.916	5.583	
2,200.00	2,199.90	2,200.73	2,199.17	4.68	4.68	179.68	0.30	41.62	53.27	43.93	9.335	5.706	
2,300.00	2,299.88	2,300.79	2,299.09	4.89	4.89	179.70	0.30	43.37	56.76	47.00	9.758	5.816	

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 #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,400.00	2,399.87	2,400.85	2,399.02	5.10	5.10	179.71	0.30	45.11	60.25	50.06	10.183	5.916	
2,500.00	2,499.85	2,500.91	2,498.94	5.32	5.32	179.73	0.30	46.85	63.74	53.13	10.610	6.007	
2,600.00	2,599.84	2,600.97	2,598.87	5.53	5.54	179.74	0.30	48.60	67.23	56.19	11.039	6.090	
2,700.00	2,699.82	2,701.03	2,698.79	5.75	5.75	179.76	0.30	50.34	70.72	59.25	11.469	6.166	
2,800.00	2,799.81	2,801.10	2,798.71	5.97	5.97	179.77	0.30	52.09	74.21	62.30	11.901	6.235	
2,900.00	2,899.79	2,901.16	2,898.64	6.19	6.19	179.78	0.30	53.83	77.70	65.36	12.334	6.299	
3,000.00	2,999.78	3,001.22	2,998.56	6.41	6.41	179.79	0.30	55.58	81.19	68.42	12.769	6.358	
3,100.00	3,099.76	3,101.28	3,098.49	6.63	6.63	179.80	0.30	57.32	84.68	71.47	13.204	6.413	
3,200.00	3,199.75	3,201.34	3,198.41	6.85	6.85	179.80	0.30	59.06	88.17	74.52	13.641	6.463	
3,300.00	3,299.73	3,301.40	3,298.33	7.07	7.07	179.81	0.30	60.81	91.66	77.58	14.078	6.511	
3,400.00	3,399.72	3,401.46	3,398.26	7.29	7.29	179.82	0.30	62.55	95.15	80.63	14.516	6.554	
3,500.00	3,499.70	3,501.52	3,498.18	7.51	7.51	179.83	0.30	64.30	98.64	83.68	14.955	6.596	
3,600.00	3,599.69	3,601.58	3,598.10	7.73	7.73	179.83	0.30	66.04	102.13	86.73	15.394	6.634	
3,700.00	3,699.67	3,701.64	3,698.03	7.95	7.95	179.84	0.30	67.78	105.61	89.78	15.834	6.670	
3,800.00	3,799.66	3,801.70	3,797.95	8.17	8.18	179.84	0.30	69.53	109.10	92.83	16.275	6.704	
3,900.00	3,899.64	3,901.77	3,897.88	8.40	8.40	179.85	0.30	71.27	112.59	95.88	16.716	6.736	
4,000.00	3,999.63	4,001.83	3,997.80	8.62	8.62	179.85	0.30	73.02	116.08	98.93	17.158	6.766	
4,100.00	4,099.61	4,101.89	4,097.72	8.84	8.84	179.86	0.30	74.76	119.57	101.97	17.600	6.794	
4,200.00	4,199.60	4,201.95	4,197.65	9.07	9.07	179.86	0.30	76.51	123.06	105.02	18.043	6.821	
4,300.00	4,299.58	4,302.01	4,297.57	9.29	9.29	179.86	0.30	78.25	126.55	108.07	18.485	6.846	
4,400.00	4,399.57	4,402.07	4,397.50	9.51	9.51	179.87	0.30	79.99	130.04	111.12	18.929	6.870	
4,500.00	4,499.55	4,502.13	4,497.42	9.74	9.74	179.87	0.30	81.74	133.53	114.16	19.372	6.893	
4,600.00	4,599.53	4,602.19	4,597.34	9.96	9.96	179.87	0.30	83.48	137.02	117.21	19.816	6.915	
4,700.00	4,699.52	4,702.25	4,697.27	10.18	10.18	179.88	0.30	85.23	140.51	120.25	20.260	6.935	
4,800.00	4,799.50	4,802.31	4,797.19	10.41	10.41	179.88	0.30	86.97	144.00	123.30	20.705	6.955	
4,900.00	4,899.49	4,902.37	4,897.11	10.63	10.63	179.88	0.30	88.72	147.49	126.34	21.149	6.974	
5,000.00	4,999.47	5,002.44	4,997.04	10.86	10.86	179.89	0.30	90.46	150.98	129.39	21.594	6.992	
5,100.00	5,099.46	5,102.50	5,096.96	11.08	11.08	179.89	0.30	92.20	154.47	132.43	22.039	7.009	
5,200.00	5,199.44	5,202.56	5,196.89	11.31	11.31	179.89	0.30	93.95	157.96	135.48	22.485	7.025	
5,300.00	5,299.43	5,302.62	5,296.81	11.53	11.53	179.89	0.30	95.69	161.45	138.52	22.930	7.041	
5,400.00	5,399.41	5,402.68	5,396.73	11.75	11.76	179.90	0.30	97.44	164.94	141.57	23.376	7.056	
5,500.00	5,499.40	5,502.74	5,496.66	11.98	11.98	179.90	0.30	99.18	168.43	144.61	23.822	7.071	
5,600.00	5,599.38	5,602.80	5,596.58	12.20	12.21	179.90	0.30	100.92	171.92	147.66	24.268	7.084	
5,700.00	5,699.37	5,702.86	5,696.51	12.43	12.43	179.90	0.30	102.67	175.41	150.70	24.714	7.098	
5,800.00	5,799.35	5,802.92	5,796.43	12.65	12.66	179.90	0.30	104.41	178.90	153.74	25.160	7.111	
5,900.00	5,899.34	5,902.98	5,896.35	12.88	12.88	179.91	0.30	106.16	182.39	156.79	25.607	7.123	
6,000.00	5,999.32	6,003.04	5,996.28	13.11	13.11	179.91	0.30	107.90	185.88	159.83	26.053	7.135	
6,100.00	6,099.31	6,103.11	6,096.20	13.33	13.33	179.91	0.30	109.65	189.37	162.87	26.500	7.146	
6,200.00	6,199.29	6,203.17	6,196.13	13.56	13.56	179.91	0.30	111.39	192.86	165.92	26.947	7.157	
6,300.00	6,299.28	6,303.23	6,296.05	13.78	13.78	179.91	0.30	113.13	196.35	168.96	27.394	7.168	
6,400.00	6,399.26	6,403.29	6,395.97	14.01	14.01	179.91	0.30	114.88	199.84	172.00	27.841	7.178	
6,500.00	6,499.25	6,503.35	6,495.90	14.23	14.23	179.92	0.30	116.62	203.33	175.04	28.288	7.188	
6,600.00	6,599.23	6,603.41	6,595.82	14.46	14.46	179.92	0.30	118.37	206.82	178.09	28.736	7.197	
6,700.79	6,700.00	6,702.69	6,696.53	14.69	14.68	179.92	0.30	120.12	210.34	181.16	29.183	7.208	
6,767.45	6,766.66	6,763.96	6,763.16	14.83	14.82	89.92	0.30	121.29	212.09	182.62	29.463	7.198	
6,800.00	6,799.21	6,803.50	6,795.70	14.90	14.91	89.92	0.30	121.85	212.65	183.03	29.619	7.180	
6,900.00	6,899.21	6,903.52	6,895.67	15.10	15.14	89.92	0.30	123.60	214.40	184.35	30.050	7.135	
7,000.00	6,999.21	7,003.53	6,995.64	15.31	15.36	89.92	0.30	125.34	216.14	185.66	30.481	7.091	
7,100.00	7,099.21	7,103.55	7,095.61	15.52	15.59	89.92	0.30	127.09	217.89	186.98	30.912	7.049	
7,200.00	7,199.21	7,203.56	7,195.58	15.72	15.81	89.92	0.30	128.83	219.63	188.29	31.345	7.007	
7,300.00	7,299.21	7,303.58	7,295.55	15.93	16.04	89.92	0.30	130.58	221.38	189.60	31.777	6.967	
7,400.00	7,399.21	7,403.59	7,395.52	16.14	16.26	89.92	0.30	132.32	223.13	190.91	32.210	6.927	

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 #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,500.00	7,499.21	7,503.61	7,495.49	16.35	16.49	89.92	0.30	134.07	224.87	192.23	32.644	6.889	
7,600.00	7,599.21	7,603.62	7,595.46	16.56	16.72	89.92	0.30	135.81	226.62	193.54	33.078	6.851	
7,700.00	7,699.21	7,703.64	7,695.43	16.77	16.94	89.92	0.30	137.56	228.36	194.85	33.512	6.814	
7,800.00	7,799.21	7,803.65	7,795.40	16.98	17.17	89.93	0.30	139.30	230.11	196.16	33.947	6.778	
7,900.00	7,899.21	7,903.67	7,895.37	17.19	17.39	89.93	0.30	141.05	231.85	197.47	34.382	6.743	
8,000.00	7,999.21	8,003.68	7,995.33	17.40	17.62	89.93	0.30	142.79	233.60	198.78	34.818	6.709	
8,100.00	8,099.21	8,103.70	8,095.30	17.61	17.85	89.93	0.30	144.54	235.34	200.09	35.254	6.676	
8,200.00	8,199.21	8,203.71	8,195.27	17.82	18.07	89.93	0.30	146.28	237.09	201.40	35.690	6.643	
8,300.00	8,299.21	8,303.73	8,295.24	18.04	18.30	89.93	0.30	148.03	238.83	202.71	36.127	6.611	
8,400.00	8,399.21	8,403.74	8,395.21	18.25	18.52	89.93	0.30	149.77	240.58	204.01	36.564	6.580	
8,500.00	8,499.21	8,503.76	8,495.18	18.46	18.75	89.93	0.30	151.52	242.32	205.32	37.001	6.549	
8,600.00	8,599.21	8,596.23	8,595.15	18.67	18.96	89.93	0.30	153.26	244.07	206.65	37.422	6.522	
8,700.00	8,699.21	8,703.79	8,695.12	18.89	19.20	89.93	0.30	155.01	245.81	207.94	37.876	6.490	
8,800.00	8,799.21	8,803.80	8,795.09	19.10	19.43	89.93	0.30	156.75	247.56	209.24	38.315	6.461	
8,900.00	8,899.21	8,903.82	8,895.06	19.31	19.65	89.93	0.30	158.50	249.30	210.55	38.753	6.433	
9,000.00	8,999.21	9,003.84	8,995.03	19.53	19.88	89.93	0.30	160.24	251.05	211.86	39.192	6.406	
9,100.00	9,099.21	9,103.85	9,095.00	19.74	20.11	89.93	0.30	161.99	252.79	213.16	39.630	6.379	
9,200.00	9,199.21	9,203.87	9,194.97	19.96	20.33	89.93	0.30	163.73	254.54	214.47	40.070	6.352	
9,300.00	9,299.21	9,303.88	9,294.94	20.17	20.56	89.93	0.30	165.48	256.28	215.78	40.509	6.327	
9,400.00	9,399.21	9,403.90	9,394.91	20.39	20.79	89.93	0.30	167.22	258.03	217.08	40.949	6.301	
9,500.00	9,499.21	9,503.91	9,494.88	20.60	21.01	89.93	0.30	168.97	259.78	218.39	41.388	6.277	
9,600.00	9,599.21	9,603.93	9,594.85	20.82	21.24	89.93	0.30	170.71	261.52	219.69	41.829	6.252	
9,700.00	9,699.21	9,696.06	9,694.82	21.03	21.45	89.93	0.30	172.46	263.27	221.01	42.251	6.231	
9,800.00	9,799.21	9,780.79	9,779.27	21.25	21.64	90.91	-4.22	175.83	267.39	224.77	42.620	6.274	
9,900.00	9,899.21	9,858.66	9,854.97	21.46	21.82	94.21	-20.23	183.87	278.95	236.06	42.889	6.504	
10,000.00	9,999.21	9,929.15	9,920.17	21.68	22.01	98.82	-44.34	195.13	299.97	256.96	43.012	6.974	
10,100.00	10,099.21	9,990.67	9,973.34	21.89	22.19	103.64	-72.44	207.86	332.14	289.18	42.961	7.731	
10,200.00	10,199.21	10,043.18	10,015.28	22.11	22.36	108.01	-101.26	220.69	375.72	332.93	42.785	8.781	
10,300.00	10,299.21	10,087.50	10,047.81	22.33	22.52	111.70	-128.80	232.82	429.65	387.08	42.569	10.093	
10,400.00	10,399.21	10,125.00	10,073.06	22.54	22.67	114.74	-154.19	243.92	492.23	449.85	42.385	11.613	
10,500.00	10,499.21	10,156.30	10,092.41	22.76	22.81	117.16	-176.74	253.72	561.75	519.49	42.262	13.292	
10,600.00	10,599.21	10,183.00	10,107.62	22.98	22.94	119.14	-196.88	262.44	636.69	594.48	42.216	15.082	
10,700.00	10,699.21	10,206.00	10,116.65	23.19	23.02	120.34	-210.10	268.15	715.94	673.74	42.199	16.966	
10,800.00	10,799.21	10,225.00	10,128.99	23.41	23.16	122.05	-230.07	276.75	798.41	756.09	42.319	18.866	
10,900.00	10,899.21	10,242.39	10,136.90	23.63	23.26	123.18	-244.30	282.86	883.58	841.12	42.455	20.812	
11,000.00	10,999.21	10,250.00	10,140.18	23.85	23.30	123.66	-250.61	285.56	970.93	928.34	42.596	22.794	
11,100.00	11,099.21	10,275.00	10,150.18	24.06	23.45	125.18	-271.67	294.58	1,059.88	1,017.02	42.854	24.732	
11,200.00	11,199.21	10,275.00	10,150.18	24.28	23.45	125.18	-271.67	294.58	1,150.30	1,107.25	43.045	26.723	
11,300.00	11,299.21	10,300.00	10,158.97	24.50	23.61	126.62	-293.19	303.77	1,241.87	1,198.52	43.350	28.648	
11,400.00	11,399.21	10,300.00	10,158.97	24.72	23.61	126.62	-293.19	303.77	1,334.29	1,290.69	43.595	30.606	
11,438.86	11,438.07	10,300.00	10,158.97	24.80	23.61	126.62	-293.19	303.77	1,370.49	1,326.79	43.697	31.363	
11,450.00	11,449.21	10,300.00	10,158.97	24.83	23.61	-50.19	-293.19	303.77	1,380.87	1,337.14	43.726	31.580	
11,475.00	11,474.18	10,300.00	10,158.97	24.87	23.61	-44.85	-293.19	303.77	1,403.97	1,360.18	43.790	32.061	
11,500.00	11,499.04	10,310.30	10,162.23	24.92	23.68	-40.08	-302.18	307.60	1,426.62	1,382.74	43.878	32.513	
11,525.00	11,523.74	10,313.05	10,163.06	24.97	23.70	-36.31	-304.59	308.62	1,448.99	1,405.04	43.946	32.972	
11,550.00	11,548.21	10,316.00	10,163.94	25.01	23.72	-33.14	-307.18	309.73	1,470.94	1,426.93	44.012	33.421	
11,575.00	11,572.37	10,325.00	10,166.52	25.06	23.78	-30.43	-315.12	313.10	1,492.48	1,448.39	44.091	33.850	
11,600.00	11,596.17	10,325.00	10,166.52	25.11	23.78	-28.17	-315.12	313.10	1,513.42	1,469.27	44.148	34.281	
11,625.00	11,619.53	10,325.00	10,166.52	25.16	23.78	-26.23	-315.12	313.10	1,533.85	1,489.64	44.203	34.700	
11,650.00	11,642.40	10,325.00	10,166.52	25.20	23.78	-24.54	-315.12	313.10	1,553.72	1,509.47	44.258	35.106	
11,675.00	11,664.70	10,325.00	10,166.52	25.25	23.78	-23.07	-315.12	313.10	1,573.01	1,528.70	44.311	35.500	
11,700.00	11,686.39	10,337.27	10,169.77	25.30	23.87	-21.86	-326.01	317.73	1,591.49	1,547.10	44.387	35.855	

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 #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,725.00	11,707.39	10,350.00	10,172.81	25.34	23.96	-20.83	-337.38	322.56	1,609.46	1,565.00	44.462	36.199	
11,750.00	11,727.65	10,350.00	10,172.81	25.39	23.96	-19.85	-337.38	322.56	1,626.55	1,582.04	44.510	36.543	
11,775.00	11,747.12	10,350.00	10,172.81	25.44	23.96	-18.98	-337.38	322.56	1,642.93	1,598.37	44.557	36.872	
11,800.00	11,765.75	10,350.00	10,172.81	25.50	23.96	-18.22	-337.38	322.56	1,658.58	1,613.98	44.603	37.185	
11,825.00	11,783.47	10,350.00	10,172.81	25.55	23.96	-17.53	-337.38	322.56	1,673.49	1,628.84	44.649	37.481	
11,850.00	11,800.25	10,363.10	10,175.60	25.61	24.06	-17.05	-349.17	327.56	1,687.40	1,642.69	44.715	37.736	
11,875.00	11,816.04	10,375.00	10,177.83	25.68	24.15	-16.62	-359.93	332.11	1,700.64	1,655.86	44.779	37.979	
11,900.00	11,830.79	10,375.00	10,177.83	25.75	24.15	-16.15	-359.93	332.11	1,712.87	1,668.05	44.821	38.216	
11,925.00	11,844.46	10,375.00	10,177.83	25.83	24.15	-15.72	-359.93	332.11	1,724.29	1,679.42	44.864	38.434	
11,950.00	11,857.02	10,375.00	10,177.83	25.91	24.15	-15.35	-359.93	332.11	1,734.86	1,689.96	44.907	38.633	
11,975.00	11,868.44	10,386.79	10,179.75	26.00	24.25	-15.14	-370.64	336.64	1,744.40	1,699.44	44.967	38.793	
12,000.00	11,878.67	10,400.00	10,181.56	26.10	24.35	-14.99	-382.70	341.74	1,753.17	1,708.14	45.029	38.934	
12,025.00	11,887.69	10,400.00	10,181.56	26.20	24.35	-14.74	-382.70	341.74	1,760.83	1,715.76	45.073	39.067	
12,050.00	11,895.49	10,400.00	10,181.56	26.31	24.35	-14.53	-382.70	341.74	1,767.60	1,722.49	45.117	39.178	
12,075.00	11,902.02	10,400.00	10,181.56	26.42	24.35	-14.35	-382.70	341.74	1,773.48	1,728.32	45.162	39.269	
12,100.00	11,907.29	10,411.52	10,182.84	26.54	24.45	-14.33	-393.24	346.19	1,778.29	1,733.07	45.224	39.322	
12,125.00	11,911.27	10,425.00	10,183.99	26.67	24.56	-14.37	-405.62	351.40	1,782.27	1,736.98	45.290	39.352	
12,150.00	11,913.95	10,425.00	10,183.99	26.81	24.56	-14.29	-405.62	351.40	1,785.11	1,739.77	45.339	39.372	
12,166.23	11,915.00	10,425.00	10,183.99	26.90	24.56	-14.25	-405.62	351.40	1,786.45	1,741.08	45.372	39.373	
12,200.00	11,916.60	10,425.00	10,183.99	27.09	24.56	-14.25	-405.62	351.40	1,789.18	1,743.73	45.445	39.370	
12,300.00	11,921.34	10,482.06	10,186.10	27.75	25.06	-14.91	-458.27	373.28	1,799.77	1,753.99	45.780	39.314	
12,400.00	11,926.08	10,595.65	10,189.49	28.51	26.16	-16.11	-564.32	413.82	1,811.14	1,764.86	46.277	39.137	
12,500.00	11,930.81	10,712.48	10,193.00	29.36	27.43	-17.20	-674.98	451.09	1,821.96	1,775.07	46.885	38.860	
12,600.00	11,935.55	10,832.27	10,196.61	30.31	28.85	-18.16	-789.93	484.59	1,832.00	1,784.39	47.601	38.486	
12,700.00	11,940.29	10,954.72	10,200.31	31.34	30.38	-18.97	-908.77	513.83	1,841.04	1,792.63	48.416	38.026	
12,800.00	11,945.03	11,079.45	10,204.08	32.44	32.00	-19.64	-1,030.99	538.37	1,848.91	1,799.60	49.316	37.491	
12,900.00	11,949.77	11,206.04	10,207.91	33.60	33.70	-20.15	-1,156.01	557.80	1,855.47	1,805.18	50.286	36.898	
13,000.00	11,954.51	11,334.02	10,211.76	34.83	35.44	-20.50	-1,283.16	571.82	1,860.58	1,809.27	51.314	36.259	
13,100.00	11,959.25	11,462.91	10,215.62	36.11	37.22	-20.69	-1,411.71	580.17	1,864.18	1,811.81	52.367	35.598	
13,200.00	11,963.98	11,584.59	10,219.24	37.44	38.90	-20.71	-1,533.29	582.86	1,866.27	1,812.85	53.413	34.940	
13,300.00	11,968.72	11,684.58	10,222.21	38.81	40.31	-20.69	-1,633.23	583.76	1,867.92	1,813.47	54.450	34.306	
13,400.00	11,973.46	11,784.56	10,225.18	40.21	41.76	-20.67	-1,733.17	584.66	1,869.58	1,814.05	55.529	33.669	
13,500.00	11,978.20	11,884.55	10,228.15	41.66	43.23	-20.65	-1,833.10	585.55	1,871.24	1,814.59	56.650	33.032	
13,600.00	11,982.94	11,984.53	10,231.11	43.13	44.74	-20.63	-1,933.04	586.45	1,872.90	1,815.09	57.808	32.398	
13,700.00	11,987.68	12,084.51	10,234.08	44.64	46.26	-20.61	-2,032.98	587.35	1,874.56	1,815.55	59.003	31.770	
13,800.00	11,992.42	12,184.50	10,237.05	46.16	47.81	-20.60	-2,132.91	588.24	1,876.21	1,815.98	60.232	31.150	
13,900.00	11,997.15	12,284.48	10,240.02	47.71	49.39	-20.58	-2,232.85	589.14	1,877.87	1,816.38	61.492	30.538	
14,000.00	12,001.89	12,384.47	10,242.99	49.29	50.98	-20.56	-2,332.78	590.04	1,879.53	1,816.75	62.782	29.937	
14,100.00	12,006.63	12,484.45	10,245.95	50.88	52.58	-20.54	-2,432.72	590.93	1,881.19	1,817.09	64.100	29.348	
14,200.00	12,011.37	12,584.44	10,248.92	52.48	54.21	-20.52	-2,532.66	591.83	1,882.85	1,817.41	65.444	28.771	
14,300.00	12,016.11	12,684.42	10,251.89	54.11	55.84	-20.50	-2,632.59	592.72	1,884.51	1,817.70	66.812	28.206	
14,400.00	12,020.85	12,784.40	10,254.86	55.74	57.49	-20.48	-2,732.53	593.62	1,886.17	1,817.97	68.202	27.656	
14,500.00	12,025.59	12,884.39	10,257.83	57.39	59.16	-20.46	-2,832.47	594.52	1,887.83	1,818.22	69.614	27.118	
14,600.00	12,030.32	12,984.37	10,260.79	59.06	60.83	-20.44	-2,932.40	595.41	1,889.49	1,818.45	71.046	26.595	
14,700.00	12,035.06	13,084.36	10,263.76	60.73	62.51	-20.43	-3,032.34	596.31	1,891.15	1,818.65	72.497	26.086	
14,800.00	12,039.80	13,184.34	10,266.73	62.41	64.20	-20.41	-3,132.27	597.21	1,892.81	1,818.85	73.965	25.591	
14,900.00	12,044.54	13,284.33	10,269.70	64.11	65.91	-20.39	-3,232.21	598.10	1,894.47	1,819.02	75.450	25.109	
15,000.00	12,049.28	13,384.31	10,272.67	65.81	67.61	-20.37	-3,332.15	599.00	1,896.13	1,819.18	76.950	24.641	
15,100.00	12,054.02	13,484.29	10,275.63	67.52	69.33	-20.35	-3,432.08	599.89	1,897.80	1,819.33	78.464	24.187	
15,200.00	12,058.76	13,584.28	10,278.60	69.23	71.05	-20.33	-3,532.02	600.79	1,899.46	1,819.47	79.992	23.746	
15,300.00	12,063.49	13,684.26	10,281.57	70.95	72.78	-20.31	-3,631.96	601.69	1,901.12	1,819.59	81.533	23.317	
15,400.00	12,068.23	13,784.25	10,284.54	72.68	74.52	-20.30	-3,731.89	602.58	1,902.78	1,819.70	83.085	22.902	

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 #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
15,500.00	12,072.97	13,884.23	10,287.51	74.42	76.26	-20.28	-3,831.83	603.48	1,904.44	1,819.79	84.649	22.498	
15,600.00	12,077.71	13,984.22	10,290.47	76.16	78.01	-20.26	-3,931.76	604.38	1,906.11	1,819.88	86.223	22.107	
15,700.00	12,082.45	14,084.20	10,293.44	77.91	79.76	-20.24	-4,031.70	605.27	1,907.77	1,819.96	87.807	21.727	
15,800.00	12,087.19	14,184.18	10,296.41	79.66	81.51	-20.22	-4,131.64	606.17	1,909.43	1,820.03	89.401	21.358	
15,900.00	12,091.93	14,284.17	10,299.38	81.41	83.27	-20.20	-4,231.57	607.06	1,911.09	1,820.09	91.003	21.000	
16,000.00	12,096.66	14,384.15	10,302.35	83.17	85.03	-20.19	-4,331.51	607.96	1,912.76	1,820.14	92.613	20.653	
16,100.00	12,101.40	14,484.14	10,305.31	84.93	86.80	-20.17	-4,431.45	608.86	1,914.42	1,820.19	94.231	20.316	
16,200.00	12,106.14	14,584.12	10,308.28	86.70	88.57	-20.15	-4,531.38	609.75	1,916.08	1,820.23	95.857	19.989	
16,300.00	12,110.88	14,684.11	10,311.25	88.47	90.35	-20.13	-4,631.32	610.65	1,917.75	1,820.26	97.489	19.671	
16,400.00	12,115.62	14,784.09	10,314.22	90.24	92.12	-20.11	-4,731.25	611.55	1,919.41	1,820.28	99.127	19.363	
16,500.00	12,120.36	14,884.07	10,317.19	92.02	93.90	-20.09	-4,831.19	612.44	1,921.07	1,820.30	100.772	19.064	
16,600.00	12,125.09	14,984.06	10,320.15	93.80	95.68	-20.08	-4,931.13	613.34	1,922.74	1,820.32	102.422	18.773	
16,700.00	12,129.83	15,084.04	10,323.12	95.58	97.47	-20.06	-5,031.06	614.23	1,924.40	1,820.32	104.078	18.490	
16,800.00	12,134.57	15,184.03	10,326.09	97.37	99.26	-20.04	-5,131.00	615.13	1,926.07	1,820.33	105.739	18.215	
16,900.00	12,139.31	15,284.01	10,329.06	99.16	101.05	-20.02	-5,230.94	616.03	1,927.73	1,820.33	107.405	17.948	
17,000.00	12,144.05	15,384.00	10,332.03	100.94	102.84	-20.00	-5,330.87	616.92	1,929.40	1,820.32	109.075	17.689	
17,100.00	12,148.79	15,483.98	10,334.99	102.74	104.63	-19.99	-5,430.81	617.82	1,931.06	1,820.31	110.749	17.436	
17,200.00	12,153.53	15,583.96	10,337.96	104.53	106.43	-19.97	-5,530.74	618.72	1,932.73	1,820.30	112.428	17.191	
17,300.00	12,158.26	15,683.95	10,340.93	106.33	108.23	-19.95	-5,630.68	619.61	1,934.39	1,820.28	114.110	16.952	
17,400.00	12,163.00	15,783.93	10,343.90	108.12	110.03	-19.93	-5,730.62	620.51	1,936.06	1,820.26	115.796	16.720	
17,500.00	12,167.74	15,883.92	10,346.87	109.92	111.83	-19.92	-5,830.55	621.41	1,937.73	1,820.24	117.485	16.493	
17,600.00	12,172.48	15,983.90	10,349.83	111.72	113.63	-19.90	-5,930.49	622.30	1,939.39	1,820.21	119.177	16.273	
17,700.00	12,177.22	16,083.89	10,352.80	113.53	115.44	-19.88	-6,030.42	623.20	1,941.06	1,820.18	120.873	16.059	
17,800.00	12,181.96	16,183.87	10,355.77	115.33	117.24	-19.86	-6,130.36	624.09	1,942.72	1,820.15	122.571	15.850	
17,900.00	12,186.70	16,283.85	10,358.74	117.14	119.05	-19.84	-6,230.30	624.99	1,944.39	1,820.12	124.272	15.646	
18,000.00	12,191.43	16,383.84	10,361.71	118.94	120.86	-19.83	-6,330.23	625.89	1,946.06	1,820.08	125.975	15.448	
18,100.00	12,196.17	16,483.82	10,364.67	120.75	122.67	-19.81	-6,430.17	626.78	1,947.72	1,820.04	127.681	15.255	
18,200.00	12,200.91	16,583.81	10,367.64	122.56	124.48	-19.79	-6,530.11	627.68	1,949.39	1,820.00	129.389	15.066	
18,300.00	12,205.65	16,683.79	10,370.61	124.37	126.29	-19.77	-6,630.04	628.58	1,951.06	1,819.96	131.099	14.882	
18,400.00	12,210.39	16,783.78	10,373.58	126.19	128.11	-19.76	-6,729.98	629.47	1,952.73	1,819.92	132.811	14.703	
18,500.00	12,215.13	16,883.76	10,376.55	128.00	129.92	-19.74	-6,829.91	630.37	1,954.39	1,819.87	134.525	14.528	
18,600.00	12,219.87	16,983.75	10,379.51	129.81	131.74	-19.72	-6,929.85	631.26	1,956.06	1,819.82	136.240	14.357	
18,700.00	12,224.60	17,083.73	10,382.48	131.63	133.55	-19.70	-7,029.79	632.16	1,957.73	1,819.77	137.958	14.191	
18,800.00	12,229.34	17,183.71	10,385.45	133.44	135.37	-19.69	-7,129.72	633.06	1,959.40	1,819.72	139.676	14.028	
18,900.00	12,234.08	17,283.70	10,388.42	135.26	137.19	-19.67	-7,229.66	633.95	1,961.07	1,819.67	141.397	13.869	
19,000.00	12,238.82	17,383.68	10,391.39	137.08	139.01	-19.65	-7,329.60	634.85	1,962.74	1,819.62	143.118	13.714	
19,100.00	12,243.56	17,483.67	10,394.35	138.90	140.83	-19.63	-7,429.53	635.75	1,964.41	1,819.56	144.841	13.562	
19,200.00	12,248.30	17,583.65	10,397.32	140.72	142.65	-19.62	-7,529.47	636.64	1,966.07	1,819.51	146.565	13.414	
19,300.00	12,253.04	17,683.64	10,400.29	142.54	144.47	-19.60	-7,629.40	637.54	1,967.74	1,819.45	148.290	13.270	
19,400.00	12,257.77	17,783.62	10,403.26	144.36	146.30	-19.58	-7,729.34	638.43	1,969.41	1,819.40	150.016	13.128	
19,500.00	12,262.51	17,883.60	10,406.23	146.18	148.12	-19.57	-7,829.28	639.33	1,971.08	1,819.34	151.743	12.990	
19,600.00	12,267.25	17,983.59	10,409.19	148.01	149.94	-19.55	-7,929.21	640.23	1,972.75	1,819.28	153.471	12.854	
19,700.00	12,271.99	18,083.57	10,412.16	149.83	151.77	-19.53	-8,029.15	641.12	1,974.42	1,819.22	155.200	12.722	
19,800.00	12,276.73	18,183.56	10,415.13	151.66	153.60	-19.51	-8,129.09	642.02	1,976.09	1,819.16	156.930	12.592	
19,900.00	12,281.47	18,283.54	10,418.10	153.48	155.42	-19.50	-8,229.02	642.92	1,977.76	1,819.10	158.660	12.465	
20,000.00	12,286.20	18,383.53	10,421.07	155.31	157.25	-19.48	-8,328.96	643.81	1,979.43	1,819.04	160.391	12.341	
20,100.00	12,290.94	18,483.51	10,424.03	157.13	159.08	-19.46	-8,428.89	644.71	1,981.10	1,818.98	162.123	12.220	
20,200.00	12,295.68	18,583.49	10,427.00	158.96	160.90	-19.45	-8,528.83	645.61	1,982.77	1,818.92	163.855	12.101	
20,300.00	12,300.42	18,683.48	10,429.97	160.79	162.73	-19.43	-8,628.77	646.50	1,984.45	1,818.86	165.587	11.984	
20,400.00	12,305.16	18,783.46	10,432.94	162.61	164.56	-19.41	-8,728.70	647.40	1,986.12	1,818.80	167.321	11.870	
20,500.00	12,309.90	18,883.45	10,435.91	164.44	166.39	-19.39	-8,828.64	648.29	1,987.79	1,818.73	169.054	11.758	
20,600.00	12,314.64	18,983.43	10,438.87	166.27	168.22	-19.38	-8,928.58	649.19	1,989.46	1,818.67	170.788	11.649	

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 #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

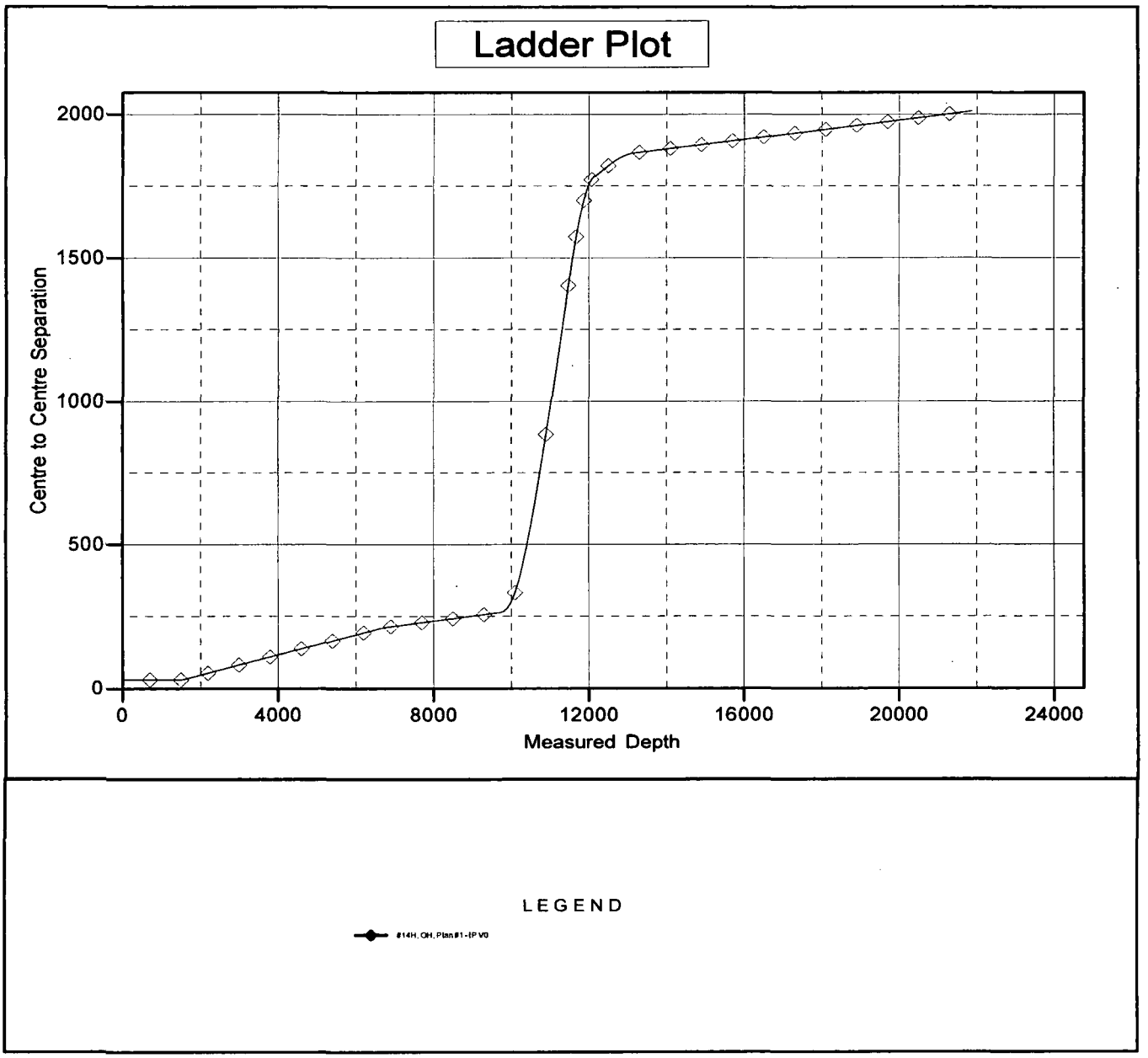
Offset Design Bonaid Federal COM - #14H - OH - Plan #1 - IP — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
20,700.00	12,319.37	19,083.42	10,441.84	168.10	170.05	-19.36	-9,028.51	650.09	1,991.13	1,818.61	172.522	11.541	
20,800.00	12,324.11	19,183.40	10,444.81	169.93	171.88	-19.34	-9,128.45	650.98	1,992.80	1,818.55	174.257	11.436	
20,900.00	12,328.85	19,283.38	10,447.78	171.76	173.71	-19.33	-9,228.38	651.88	1,994.47	1,818.48	175.991	11.333	
21,000.00	12,333.59	19,383.37	10,450.75	173.59	175.54	-19.31	-9,328.32	652.78	1,996.15	1,818.42	177.726	11.232	
21,100.00	12,338.33	19,483.35	10,453.71	175.42	177.38	-19.29	-9,428.26	653.67	1,997.82	1,818.36	179.461	11.132	
21,200.00	12,343.07	19,583.34	10,456.68	177.25	179.21	-19.28	-9,528.19	654.57	1,999.49	1,818.30	181.197	11.035	
21,300.00	12,347.81	19,683.32	10,459.65	179.09	181.04	-19.26	-9,628.13	655.46	2,001.16	1,818.23	182.932	10.939	
21,400.00	12,352.54	19,783.31	10,462.62	180.92	182.87	-19.24	-9,728.07	656.36	2,002.84	1,818.17	184.668	10.846	
21,500.00	12,357.28	19,883.29	10,465.59	182.75	184.71	-19.23	-9,828.00	657.26	2,004.51	1,818.11	186.403	10.754	
21,600.00	12,362.02	19,983.27	10,468.55	184.59	186.54	-19.21	-9,927.94	658.15	2,006.18	1,818.04	188.139	10.663	
21,700.00	12,366.76	20,083.26	10,471.52	186.42	188.38	-19.19	-10,027.87	659.05	2,007.86	1,817.98	189.874	10.575	
21,800.00	12,371.50	20,183.24	10,474.49	188.25	190.21	-19.18	-10,127.81	659.95	2,009.53	1,817.92	191.610	10.488	
21,873.90	12,375.00	20,200.44	10,475.00	189.35	190.53	-19.17	-10,145.00	660.10	2,011.57	1,819.31	192.259	10.463	

Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3401.50usft (Rig KB = 25')	Coordinates are relative to: #15H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 20' 0.000 W	Grid Convergence at Surface is: 0.50°



Company:	COG OPERATING, LLC	**Local Co-ordinate Reference:**	Well #15H
Project:	Lea County, NM (NAD27) NMEZ	**TVD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Reference Site:	Bonaid Federal COM	**MD Reference:**	RKB @ 3401.50usft (Rig KB = 25')
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	#15H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.000 sigma
Reference Wellbore	OH	**Database:**	EDM 5000.14 Single User Db
Reference Design:	Plan #1 - IP	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3401.50usft (Rig KB = 25')
Offset Depths are relative to Offset Datum
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: #15H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.50°