

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	NM121958
WELL NAME & NO.:	Dominator 25 Federal 407H
SURFACE HOLE FOOTAGE:	310'/S & 1522'/W
BOTTOM HOLE FOOTAGE:	200'/N & 990'/W
LOCATION:	Section 25, T. 25 S., R. 33 E.
COUNTY:	Lea County, New Mexico

HOBBS OCD
MAY 07 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 **1150** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
 - c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength,

whichever is greater.

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

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

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

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

- Cement should tie-back at least **200** feet into previous casing string. Operator shall provide method of verification. **Excess calculates to 17% - additional cement might be required.**

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).
2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **13 3/8** inch surface casing shoe shall be **2000 (2M) psi Annular. In the case where the only BOP installed is an annular preventer, it shall be tested to a minimum of 2000 psi (which may require upgrading to 3M or 5M annular).**
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** inch intermediate casing shoe shall be **3000 (3M) psi.**

D. SPECIAL REQUIREMENT(S)

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 04102018

GENERAL REQUIREMENTS

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

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

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

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

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

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

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

A. CASING

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

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

B. PRESSURE CONTROL

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

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

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

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

State of New Mexico
 Lands & Natural Resources Department
RESERVATION DIVISION
 100 SOUTH ST. FRANCIS DR.
 Santa Fe, New Mexico 87505

Form C-102
 Revised August 1, 2011
 Submit one copy to appropriate
 District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

Code	Pool Name Bone Spring
Property Name DOMINATOR 25 FEDERAL	Well Number 407H
Operator Name COG OPERATING, LLC	Elevation 3338.5'

Surface Location

Idn	Feet from the	North/South line	Feet from the	East/West line	County
	310	SOUTH	1522	WEST	LEA

Location If Different From Surface

Idn	Feet from the	North/South line	Feet from the	East/West line	County
	200	NORTH	990	WEST	LEA

Order No.

ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
 NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

	04231.3 N 89968.3 E LTP L & 990' FWL 32.107859° N 103.531403° W	NAD 83 NME PROPOSED BOTTOM HOLE LOCATION Y=404029.0 N X=789637.5 E LAT.=32.108216° N LONG.=103.531403° W	OPERATOR CERTIFICATION I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. <i>Mat Reg</i> 11/4/17 Signature Date Printed Name E-mail Address @cchocho.com	
	222.1 N 546.0 E	58	NAD 83 NME SURFACE LOCATION Y=399263.6 N X=790206.2 E LAT.=32.095106° N LONG.=103.529681° W	SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. 0 08 1 1 Date of Survey
	1952.0 N 1008.1 E	1522'	Y=398962.5 N X=791329.5 E	Signature & Seal of Professional Surveyor Chad L. Harcrow 10/20/17 Certificate No. CHAD HARCROW 17777 W.O. # 17-1253 DRAWN BY: SP

Approval Date: 04/16/2018

PECOS DISTRICT SURFACE USE CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
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WELL NAME & NO.:	Dominator 25 Federal 407H
SURFACE HOLE FOOTAGE:	310'/S & 1522'/W
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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.

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I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken:

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

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

Range

The operator must contact the allotment holder prior to construction to identify the location of the pipeline. The operator must take measures to protect the pipeline from compression or other damages. If the pipeline is damaged or compromised in any way near the proposed project as a result of oil and gas activity, the operator is responsible for repairing the pipeline immediately. The operator must notify the BLM office (575-234-5972) and the private surface landowner or the grazing allotment holder if any damage occurs to structures that provide water to livestock.

Watershed

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

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

Exclosure Fencing

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

G. ON LEASE ACCESS ROADS**Road Width**

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

Surfacing

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

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

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

Crowning

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

Ditching

Ditching shall be required on both sides of the road.

Turnouts

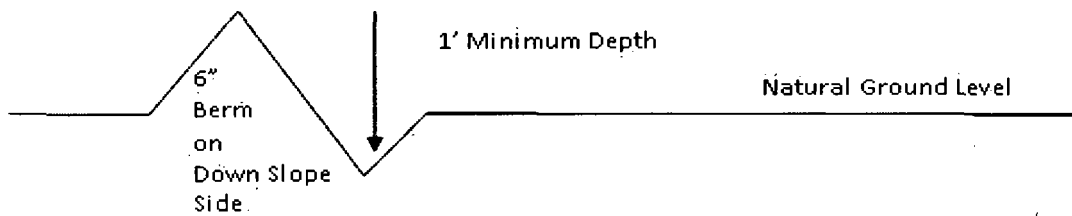
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

Cattle guards

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

Fence Requirement

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

Public Access

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

Construction Steps

1. Salvage topsoil
2. Construct road

3. Redistribute topsoil
4. Revegetate slopes

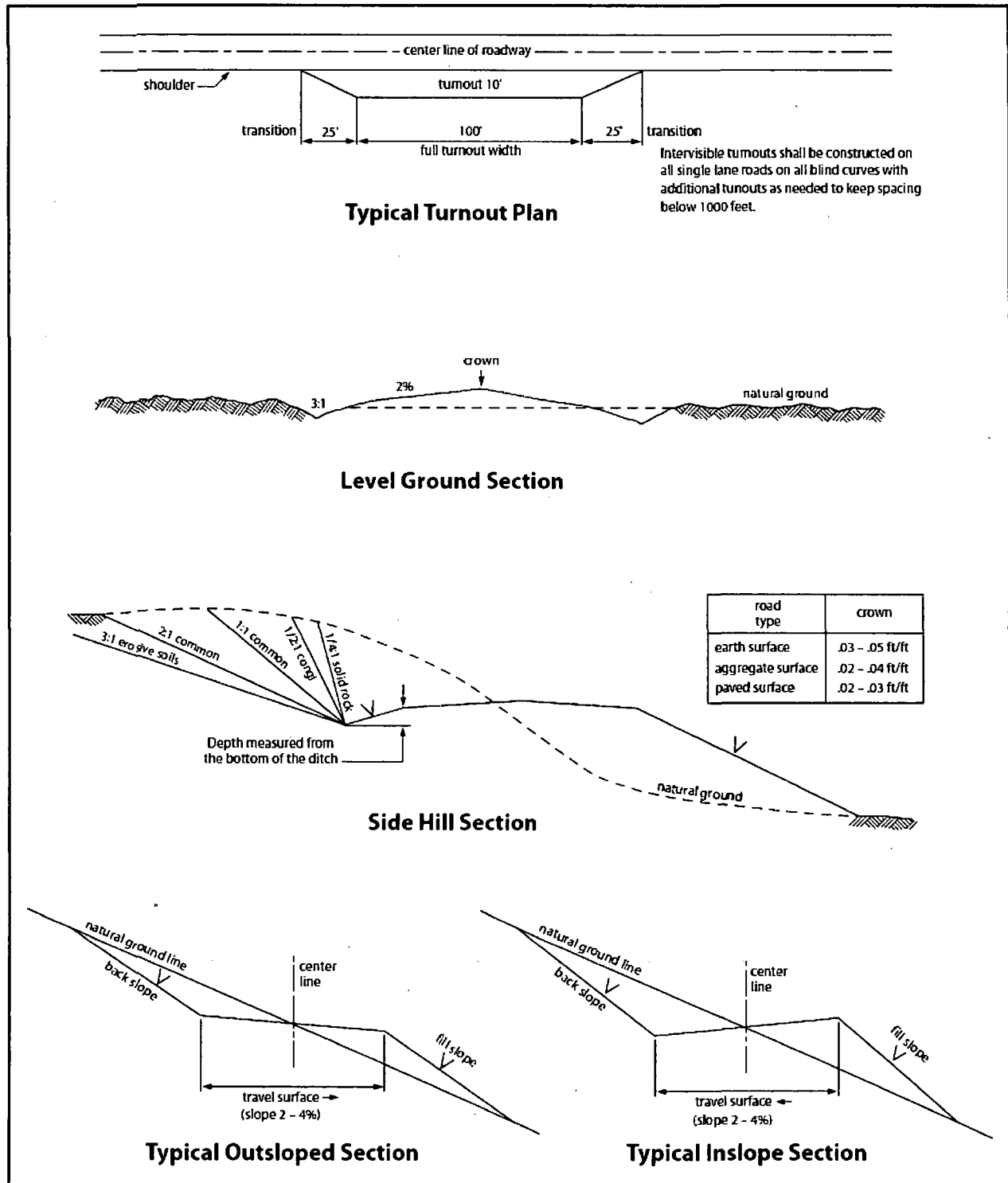


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities

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

Exclosure Netting (Open-top Tanks)

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

Chemical and Fuel Secondary Containment and Exclosure Screening

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

Open-Vent Exhaust Stack Exclosures

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

Containment Structures

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

Painting Requirement

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

B. PIPELINES

STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES

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

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

1. Holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. Holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, Holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC § 2601 *et seq.* (1982) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant (*see* 40 CFR, Part 702-799 and in particular, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193). Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the Authorized Officer concurrent with the filing of the reports to the involved Federal agency or State government.
3. Holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601, *et seq.* or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*) on the Right-of-Way (unless the release or threatened release is wholly unrelated to activity of the Right-of-Way Holder's activity on the Right-of-Way), or resulting from the activity of the Right-of-Way Holder on the Right-of-Way. This provision applies without regard to whether a release is caused by Holder, its agent, or unrelated third

parties.

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

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

c. Acts of God.

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

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

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

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

7. No blading or clearing of any vegetation shall be allowed unless approved in writing by the Authorized Officer.
8. Holder shall install the pipeline on the surface in such a manner that will minimize suspension of the pipeline across low areas in the terrain. In hummocky or dune areas, the pipeline shall be "snaked" around hummocks and dunes rather than suspended across these features.
9. The pipeline shall be buried with a minimum of 24 inches under all roads, "two-tracks," and trails. Burial of the pipe will continue for 20 feet on each side of each crossing. The condition of the road, upon completion of construction, shall be returned to at least its former state with no bumps or dips remaining in the road surface.
10. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.
11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.
12. Excluding the pipe, all above-ground structures not subject to safety requirement shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2; designated by the Rocky Mountain Five State Interagency Committee.
13. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. Signs will be maintained in a legible condition for the life of the pipeline.
14. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway.
15. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed

is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

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

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

18. Special Stipulations:

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

VIII. INTERIM RECLAMATION

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

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

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

loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

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

Seed Mixture for LPC Sand/Shinnery Sites

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

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

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

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

*Pounds of pure live seed:

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

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

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

- a. The hazards and characteristics of hydrogen sulfide (H₂S).
- b. The proper use and maintenance of personal protective equipment and life support systems.
- c. The proper use of H₂S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
- d. The proper techniques for first aid and rescue procedures.

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

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

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

2. H₂S SAFETY EQUIPMENT AND SYSTEMS

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

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

- b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.
- c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.
- d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.
- e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.
- f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.
- g. Communication:
Company vehicles equipped with cellular telephone.

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

W A R N I N G

**YOU ARE ENTERING AN H₂S AREA
AUTHORIZED PERSONNEL ONLY**

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

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

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

EMERGENCY RESPONSE NUMBERS

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



COG Operating LLC

Lea County, NM (NAD27 NME)

Dominator 25 Federal

407H

OH

Plan 1 11-16-17

Anticollision Report

16 November, 2017





Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Reference Plan 1 11-16-17

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

Survey Tool Program Date 11/16/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	15,480.12	Plan 1 11-16-17 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Dominator 25 Federal						
107H - OH - Plan 1 11-16-17	966.36	967.26	59.90	53.42	9.244	CC
107H - OH - Plan 1 11-16-17	1,300.00	1,295.64	60.81	52.04	6.929	ES
107H - OH - Plan 1 11-16-17	9,107.17	9,103.41	193.17	127.47	2.940	SF
307H - OH - Plan 1 11-16-17	966.40	967.20	29.90	23.42	4.615	CC
307H - OH - Plan 1 11-16-17	4,500.00	4,498.13	48.89	16.38	1.504	ES
307H - OH - Plan 1 11-16-17	9,700.00	9,698.11	100.39	30.58	1.438	Level 3, SF
608H - OH - Plan 1 11-16-17	4,705.08	4,702.35	44.22	10.50	1.311	Level 3, CC, ES
608H - OH - Plan 1 11-16-17	4,800.00	4,796.90	44.98	10.58	1.308	Level 3, SF
711H - OH - Plan 1 11-16-17	1,246.82	1,246.63	28.02	19.57	3.316	CC, ES
711H - OH - Plan 1 11-16-17	1,300.00	1,299.59	28.43	19.61	3.222	SF
712H - OH - Plan 1 11-16-17	1,567.23	1,566.21	17.55	6.83	1.636	CC
712H - OH - Plan 1 11-16-17	1,600.00	1,598.85	17.78	6.82	1.622	ES, SF

Offset Design Dominator 25 Federal - 107H - OH - Plan 1 11-16-17

Survey Program: 0-MWD+HDGM

Reference Measured Depth (usft)	Offset Measured 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	0.90	0.00	0.00	0.00	-90.48	-0.50	-59.90	59.90	59.63	0.27	223.103
100.00	100.00	100.90	100.00	0.13	0.14	-90.48	-0.50	-59.90	59.90	58.92	0.99	60.787
200.00	200.00	200.90	200.00	0.49	0.49	-90.48	-0.50	-59.90	59.90	58.20	1.70	35.187
300.00	300.00	300.90	300.00	0.85	0.85	-90.48	-0.50	-59.90	59.90	57.48	2.42	24.760
400.00	400.00	400.90	400.00	1.21	1.21	-90.48	-0.50	-59.90	59.90	56.77	3.14	19.100
500.00	500.00	500.90	500.00	1.57	1.57	-90.48	-0.50	-59.90	59.90	56.05	3.85	15.546
600.00	600.00	600.90	600.00	1.92	1.93	-90.48	-0.50	-59.90	59.90	55.33	4.57	13.107
700.00	700.00	700.90	700.00	2.28	2.29	-90.48	-0.50	-59.90	59.90	54.61	5.29	11.330
800.00	800.00	800.90	800.00	2.64	2.65	-90.48	-0.50	-59.90	59.90	53.90	6.00	9.977
900.00	900.00	900.90	900.00	3.00	3.00	-90.48	-0.50	-59.90	59.90	53.42	6.48	9.244 CC
966.36	966.36	967.26	966.36	3.24	3.24	-90.48	-0.50	-59.90	59.90	53.19	6.72	8.918
1,000.00	1,000.00	1,000.00	999.10	3.36	3.36	-90.48	-0.50	-59.90	59.90	52.59	7.41	8.098
1,100.00	1,099.98	1,098.84	1,097.92	3.71	3.70	20.96	-0.65	-61.60	60.00	52.19	8.09	7.453
1,200.00	1,199.84	1,196.78	1,195.73	4.05	4.04	22.29	-1.09	-66.63	60.27	52.04	8.78	6.929 ES
1,300.00	1,299.49	1,295.64	1,294.25	4.39	4.39	24.38	-1.80	-74.72	60.81	52.06	9.48	6.491
1,400.00	1,399.11	1,395.61	1,393.84	4.74	4.74	26.54	-2.56	-83.40	61.54	52.06		

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



Phoenix Technology Services LP

Anticollision Report



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Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 107H - OH - Plan 1 11-16-17													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
1,500.00	1,498.73	1,495.58	1,493.43	5.10	5.10	28.66	-3.32	-92.08	62.36	52.17	10.19	6.118		
1,600.00	1,598.35	1,595.55	1,593.02	5.45	5.46	30.71	-4.07	-100.76	63.26	52.35	10.91	5.797		
1,700.00	1,697.97	1,695.52	1,692.61	5.81	5.82	32.71	-4.83	-109.44	64.23	52.60	11.63	5.521		
1,800.00	1,797.59	1,795.49	1,792.20	6.18	6.18	34.64	-5.59	-118.12	65.29	52.93	12.36	5.281		
1,900.00	1,897.21	1,895.46	1,891.79	6.54	6.55	36.51	-6.35	-126.80	66.41	53.32	13.09	5.073		
2,000.00	1,996.83	1,995.43	1,991.38	6.91	6.92	38.32	-7.11	-135.48	67.60	53.78	13.83	4.890		
2,100.00	2,096.45	2,095.41	2,090.97	7.28	7.29	40.06	-7.87	-144.16	68.86	54.30	14.56	4.729		
2,200.00	2,196.07	2,195.38	2,190.56	7.64	7.65	41.74	-8.63	-152.84	70.18	54.88	15.30	4.587		
2,300.00	2,295.69	2,295.35	2,290.15	8.01	8.02	43.35	-9.39	-161.52	71.56	55.52	16.04	4.461		
2,400.00	2,395.31	2,395.32	2,389.74	8.38	8.40	44.90	-10.15	-170.20	72.99	56.21	16.78	4.350		
2,500.00	2,494.93	2,495.29	2,489.33	8.76	8.77	46.40	-10.91	-178.88	74.47	56.95	17.52	4.250		
2,600.00	2,594.55	2,595.26	2,588.92	9.13	9.14	47.83	-11.67	-187.56	76.00	57.74	18.27	4.161		
2,700.00	2,694.17	2,695.23	2,688.51	9.50	9.51	49.20	-12.43	-196.24	77.58	58.57	19.01	4.081		
2,800.00	2,793.78	2,795.20	2,788.10	9.87	9.88	50.52	-13.19	-204.92	79.20	59.44	19.76	4.009		
2,900.00	2,893.40	2,895.17	2,887.69	10.25	10.26	51.79	-13.95	-213.60	80.86	60.36	20.50	3.944		
3,000.00	2,993.02	2,995.14	2,987.28	10.62	10.63	53.00	-14.71	-222.28	82.56	61.31	21.25	3.885		
3,100.00	3,092.64	3,095.11	3,086.87	10.99	11.01	54.17	-15.47	-230.96	84.29	62.29	22.00	3.832		
3,200.00	3,192.26	3,195.08	3,186.46	11.37	11.38	55.29	-16.23	-239.64	86.06	63.31	22.75	3.783		
3,300.00	3,291.88	3,295.05	3,286.05	11.74	11.75	56.36	-16.98	-248.32	87.86	64.36	23.50	3.739		
3,400.00	3,391.50	3,395.02	3,385.64	12.12	12.13	57.39	-17.74	-257.00	89.69	65.44	24.25	3.699		
3,500.00	3,491.12	3,494.99	3,485.23	12.49	12.50	58.37	-18.50	-265.68	91.54	66.55	25.00	3.662		
3,600.00	3,590.74	3,594.96	3,584.82	12.87	12.88	59.32	-19.26	-274.36	93.43	67.68	25.75	3.629		
3,700.00	3,690.36	3,694.93	3,684.41	13.24	13.25	60.23	-20.02	-283.04	95.33	68.84	26.50	3.598		
3,800.00	3,789.98	3,794.90	3,784.00	13.62	13.63	61.11	-20.78	-291.72	97.26	70.01	27.25	3.569		
3,900.00	3,889.60	3,894.88	3,883.59	14.00	14.01	61.95	-21.54	-300.40	99.22	71.21	28.00	3.543		
4,000.00	3,989.22	3,994.85	3,983.18	14.37	14.38	62.76	-22.30	-309.08	101.19	72.43	28.75	3.519		
4,100.00	4,088.84	4,094.82	4,082.77	14.75	14.76	63.53	-23.06	-317.76	103.18	73.67	29.51	3.497		
4,200.00	4,188.46	4,194.79	4,182.36	15.12	15.13	64.28	-23.82	-326.44	105.19	74.93	30.26	3.476		
4,300.00	4,288.08	4,294.76	4,281.95	15.50	15.51	65.00	-24.58	-335.12	107.22	76.21	31.01	3.457		
4,400.00	4,387.70	4,394.73	4,381.54	15.88	15.89	65.69	-25.34	-343.80	109.26	77.50	31.76	3.440		
4,500.00	4,487.32	4,494.70	4,481.13	16.25	16.26	66.36	-26.10	-352.48	111.32	78.80	32.52	3.423		
4,600.00	4,586.94	4,594.66	4,580.72	16.63	16.64	67.02	-26.86	-361.16	113.71	80.44	33.27	3.418		
4,700.00	4,686.56	4,694.60	4,680.28	17.01	17.01	67.78	-27.62	-369.83	116.66	82.64	34.02	3.429		
4,800.00	4,786.18	4,794.55	4,779.84	17.38	17.39	68.51	-28.37	-378.51	119.63	84.85	34.77	3.440		
4,900.00	4,885.80	4,894.49	4,879.41	17.76	17.77	69.20	-29.13	-387.19	122.62	87.09	35.53	3.451		
5,000.00	4,985.42	4,994.44	4,978.97	18.14	18.14	70.00	-29.89	-395.87	125.62	89.34	36.28	3.462		
5,100.00	5,085.04	5,094.38	5,078.54	18.51	18.52	70.80	-30.65	-404.55	128.64	91.61	37.03	3.474		
5,200.00	5,184.66	5,194.33	5,178.10	18.89	18.90	71.60	-31.41	-413.22	131.68	93.89	37.79	3.485		
5,300.00	5,284.28	5,294.27	5,277.67	19.27	19.27	72.40	-32.17	-421.90	134.73	96.18	38.54	3.496		
5,400.00	5,383.90	5,394.22	5,377.23	19.64	19.65	73.20	-32.93	-430.58	137.79	98.49	39.29	3.506		
5,500.00	5,483.52	5,494.16	5,476.80	20.02	20.03	74.00	-33.69	-439.26	140.86	100.81	40.05	3.517		
5,600.00	5,583.14	5,594.11	5,576.36	20.40	20.40	74.80	-34.45	-447.93	143.94	103.14	40.80	3.528		
5,700.00	5,682.76	5,694.05	5,675.92	20.78	20.78	75.60	-35.21	-456.61	147.04	105.48	41.56	3.538		
5,800.00	5,782.38	5,794.00	5,775.49	21.15	21.16	76.40	-35.97	-465.29	150.14	107.83	42.31	3.549		
5,900.00	5,882.00	5,893.94	5,875.05	21.53	21.54	77.20	-36.73	-473.97	153.26	110.19	43.07	3.559		
6,000.00	5,981.62	5,993.89	5,974.62	21.91	21.91	78.00	-37.49	-482.64	156.38	112.56	43.82	3.569		
6,100.00	6,081.24	6,093.83	6,074.18	22.29	22.29	78.80	-38.24	-491.32	159.51	114.93	44.57	3.578		
6,200.00	6,180.86	6,193.78	6,173.75	22.66	22.67	79.60	-39.00	-500.00	162.65	117.32	45.33	3.588		
6,300.00	6,280.48	6,293.72	6,273.31	23.04	23.04	80.16	-39.76	-508.68	165.79	119.71	46.08	3.598		
6,400.00	6,380.10	6,393.67	6,372.88	23.42	23.42	82.53	-40.52	-517.35	168.94	122.11	46.84	3.607		
6,500.00	6,479.72	6,495.42	6,474.30	23.80	23.80	83.08	-41.24	-525.51	171.78	124.18	47.60	3.609		
6,600.00	6,579.34	6,598.23	6,576.99	24.17	24.17	84.61	-41.66	-530.38	173.09	124.74	48.35	3.580		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 107H - OH - Plan 1 11-16-17													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
6,700.00	6,678.96	6,700.22	6,678.96	24.55	24.52	87.17	-41.77	-531.62	173.00	123.93	49.08	3.525		
6,798.54	6,777.12	6,798.38	6,777.12	24.92	24.85	90.00	-41.77	-531.62	172.79	123.02	49.77	3.472		
6,800.00	6,778.58	6,799.84	6,778.58	24.93	24.85	90.04	-41.77	-531.62	172.79	123.01	49.78	3.471		
6,900.00	6,878.20	6,899.46	6,878.20	25.31	25.19	92.92	-41.77	-531.62	173.02	122.52	50.49	3.426		
7,000.00	6,977.82	6,999.08	6,977.82	25.69	25.52	95.78	-41.77	-531.62	173.68	122.47	51.21	3.392		
7,100.00	7,077.44	7,098.70	7,077.44	26.06	25.85	98.61	-41.77	-531.62	174.77	122.86	51.92	3.366		
7,200.00	7,177.06	7,198.32	7,177.06	26.44	26.19	101.39	-41.77	-531.62	176.29	123.66	52.63	3.350		
7,300.00	7,276.68	7,297.94	7,276.68	26.82	26.52	104.13	-41.77	-531.62	178.22	124.88	53.34	3.341		
7,400.00	7,376.30	7,397.56	7,376.30	27.20	26.86	106.80	-41.77	-531.62	180.55	126.50	54.05	3.340		
7,500.00	7,475.92	7,497.18	7,475.92	27.58	27.19	109.40	-41.77	-531.62	183.27	128.50	54.77	3.346		
7,600.00	7,575.54	7,596.80	7,575.54	27.95	27.53	111.92	-41.77	-531.62	186.35	130.87	55.48	3.359		
7,700.00	7,675.18	7,696.44	7,675.18	28.33	27.87	114.31	-41.77	-531.62	189.70	133.50	56.20	3.376		
7,800.00	7,775.01	7,796.26	7,775.01	28.70	28.20	115.92	-41.77	-531.62	192.14	135.24	56.90	3.377		
7,900.00	7,874.98	7,896.23	7,874.98	29.05	28.54	116.54	-41.77	-531.62	193.15	135.55	57.59	3.354		
8,000.00	7,974.98	7,996.23	7,974.98	29.38	28.88	-0.44	-41.77	-531.62	193.17	134.91	58.26	3.316		
8,100.00	8,074.98	8,096.23	8,074.98	29.70	29.22	-0.44	-41.77	-531.62	193.17	134.24	58.93	3.278		
8,200.00	8,174.98	8,196.23	8,174.98	30.03	29.56	-0.44	-41.77	-531.62	193.17	133.57	59.59	3.241		
8,300.00	8,274.98	8,296.23	8,274.98	30.36	29.90	-0.44	-41.77	-531.62	193.17	132.90	60.26	3.205		
8,400.00	8,374.98	8,396.23	8,374.98	30.68	30.25	-0.44	-41.77	-531.62	193.17	132.24	60.93	3.170		
8,500.00	8,474.98	8,496.23	8,474.98	31.01	30.59	-0.44	-41.77	-531.62	193.17	131.56	61.60	3.136		
8,600.00	8,574.98	8,596.23	8,574.98	31.34	30.93	-0.44	-41.77	-531.62	193.17	130.89	62.27	3.102		
8,700.00	8,674.98	8,696.23	8,674.98	31.67	31.27	-0.44	-41.77	-531.62	193.17	130.22	62.94	3.069		
8,800.00	8,774.98	8,796.23	8,774.98	32.00	31.61	-0.44	-41.77	-531.62	193.17	129.55	63.62	3.036		
8,900.00	8,874.98	8,896.23	8,874.98	32.33	31.96	-0.44	-41.77	-531.62	193.17	128.87	64.29	3.004		
9,000.00	8,974.98	8,996.23	8,974.98	32.67	32.30	-0.44	-41.77	-531.62	193.17	128.20	64.97	2.973		
9,100.00	9,074.98	9,096.23	9,074.98	33.00	32.65	-0.44	-41.77	-531.62	193.17	127.52	65.64	2.943		
9,107.17	9,082.15	9,103.41	9,082.15	33.02	32.67	-0.44	-41.77	-531.62	193.17	127.47	65.69	2.940 SF		
9,200.00	9,174.98	9,175.00	9,153.67	33.33	32.92	-0.44	-39.45	-531.64	196.64	130.40	66.25	2.968		
9,300.00	9,274.98	9,245.32	9,222.88	33.66	33.15	-0.44	-27.40	-531.73	213.97	147.15	66.82	3.202		
9,400.00	9,374.98	9,309.63	9,284.01	34.00	33.36	-0.44	-7.60	-531.89	244.86	177.50	67.35	3.635		
9,500.00	9,474.98	9,367.71	9,336.50	34.33	33.52	-0.44	17.20	-532.08	287.66	219.80	67.86	4.239		
9,600.00	9,574.98	9,418.97	9,380.02	34.67	33.66	-0.44	44.23	-532.28	340.51	272.18	68.33	4.984		
9,700.00	9,674.98	9,463.57	9,415.33	35.00	33.76	-0.44	71.44	-532.49	401.60	332.83	68.77	5.840		
9,800.00	9,774.98	9,500.00	9,442.20	35.34	33.84	-0.44	96.03	-532.68	469.34	400.16	69.18	6.784		
9,900.00	9,874.98	9,535.27	9,466.36	35.68	33.91	-0.44	121.72	-532.88	542.38	472.80	69.58	7.795		
10,000.00	9,974.98	9,563.90	9,484.53	36.01	33.96	-0.44	143.84	-533.04	619.69	549.72	69.97	8.857		
10,100.00	10,074.98	9,588.69	9,499.16	36.35	34.00	-0.44	163.84	-533.20	700.42	630.08	70.35	9.957		
10,200.00	10,174.98	9,610.25	9,511.03	36.69	34.03	-0.44	181.84	-533.34	783.92	713.20	70.72	11.085		
10,300.00	10,274.40	9,625.00	9,518.68	37.02	34.05	0.00	194.45	-533.43	864.82	793.75	71.07	12.168		
10,400.00	10,369.81	9,650.00	9,530.74	37.31	34.09	0.00	216.34	-533.60	935.22	863.81	71.40	13.098		
10,500.00	10,457.03	9,675.00	9,541.64	37.55	34.13	0.00	238.84	-533.77	993.84	922.16	71.68	13.865		
10,600.00	10,532.26	9,711.42	9,555.38	37.73	34.19	0.00	272.56	-534.03	1,039.43	967.51	71.91	14.454		
10,700.00	10,592.20	9,740.88	9,564.58	37.83	34.24	0.00	300.54	-534.24	1,071.44	999.37	72.07	14.866		
10,800.00	10,634.24	9,775.00	9,573.06	37.88	34.31	0.00	333.58	-534.50	1,089.27	1,017.09	72.19	15.090		
10,900.00	10,656.54	9,800.00	9,577.77	37.88	34.36	0.00	358.13	-534.68	1,092.56	1,020.32	72.24	15.124		
11,000.00	10,659.82	9,825.00	9,581.18	37.98	34.42	0.00	382.89	-534.87	1,083.08	1,010.67	72.41	14.957		
11,100.00	10,659.38	9,862.30	9,583.85	38.22	34.51	0.00	420.09	-535.16	1,076.10	1,003.37	72.73	14.795		
11,171.79	10,659.06	9,893.99	9,584.04	38.43	34.60	0.00	451.77	-535.40	1,075.04	1,002.01	73.02	14.722		
11,200.00	10,658.94	9,922.20	9,583.91	38.51	34.68	0.00	479.98	-535.62	1,075.04	1,001.85	73.19	14.689		
11,300.00	10,658.49	10,022.20	9,583.44	38.85	34.99	0.00	579.98	-536.38	1,075.06	1,001.22	73.84	14.558		
11,400.00	10,658.05	10,122.20	9,582.98	39.24	35.36	0.00	679.97	-537.15	1,075.08	1,000.48	74.60	14.411		
11,500.00	10,657.61	10,222.20	9,582.52	39.67	35.79	0.00	779.97	-537.91	1,075.10	999.64	75.46	14.247		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 107H - OH - Plan 1 11-16-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)					
11,600.00	10,657.17	10,322.20	9,582.06	40.15	36.27	0.00	879.96	-538.68	1,075.12	998.71	76.42	14.069	
11,700.00	10,656.73	10,422.20	9,581.60	40.67	36.79	0.00	979.96	-539.44	1,075.14	997.68	77.46	13.879	
11,800.00	10,656.28	10,522.20	9,581.13	41.23	37.37	0.00	1,079.96	-540.21	1,075.16	996.56	78.60	13.679	
11,900.00	10,655.84	10,622.20	9,580.67	41.84	37.98	0.00	1,179.95	-540.97	1,075.18	995.36	79.82	13.470	
12,000.00	10,655.40	10,722.20	9,580.21	42.48	38.64	0.00	1,279.95	-541.74	1,075.20	994.08	81.12	13.254	
12,100.00	10,654.96	10,822.20	9,579.75	43.16	39.35	0.00	1,379.94	-542.50	1,075.22	992.71	82.51	13.032	
12,200.00	10,654.51	10,922.20	9,579.28	43.88	40.09	0.00	1,479.94	-543.27	1,075.24	991.28	83.96	12.806	
12,300.00	10,654.07	11,022.20	9,578.82	44.63	40.87	0.00	1,579.94	-544.03	1,075.26	989.77	85.49	12.577	
12,400.00	10,653.63	11,122.20	9,578.36	45.41	41.68	0.00	1,679.93	-544.80	1,075.28	988.19	87.09	12.347	
12,500.00	10,653.19	11,222.20	9,577.90	46.23	42.52	0.00	1,779.93	-545.56	1,075.30	986.55	88.75	12.116	
12,600.00	10,652.74	11,322.20	9,577.44	47.07	43.40	0.00	1,879.92	-546.33	1,075.32	984.85	90.47	11.886	
12,700.00	10,652.30	11,422.20	9,576.97	47.94	44.30	0.00	1,979.92	-547.09	1,075.34	983.09	92.25	11.657	
12,800.00	10,651.86	11,522.20	9,576.51	48.84	45.24	0.00	2,079.92	-547.86	1,075.36	981.28	94.08	11.431	
12,900.00	10,651.42	11,622.20	9,576.05	49.76	46.20	0.00	2,179.91	-548.62	1,075.38	979.42	95.96	11.207	
13,000.00	10,650.97	11,722.20	9,575.59	50.71	47.18	0.00	2,279.91	-549.39	1,075.40	977.51	97.89	10.986	
13,100.00	10,650.53	11,822.20	9,575.13	51.68	48.18	0.00	2,379.90	-550.15	1,075.42	975.56	99.86	10.769	
13,200.00	10,650.09	11,922.20	9,574.66	52.67	49.21	0.00	2,479.90	-550.92	1,075.44	973.56	101.88	10.556	
13,300.00	10,649.65	12,022.20	9,574.20	53.68	50.26	0.00	2,579.90	-551.68	1,075.46	971.52	103.94	10.347	
13,400.00	10,649.20	12,122.20	9,573.74	54.71	51.32	0.00	2,679.89	-552.45	1,075.48	969.45	106.03	10.143	
13,500.00	10,648.76	12,222.20	9,573.28	55.76	52.41	0.00	2,779.89	-553.21	1,075.50	967.34	108.16	9.943	
13,600.00	10,648.32	12,322.20	9,572.81	56.82	53.50	0.00	2,879.88	-553.98	1,075.52	965.19	110.33	9.749	
13,700.00	10,647.88	12,422.20	9,572.35	57.90	54.62	0.00	2,979.88	-554.74	1,075.54	963.02	112.52	9.558	
13,800.00	10,647.43	12,522.20	9,571.89	59.00	55.75	0.00	3,079.88	-555.51	1,075.56	960.81	114.75	9.373	
13,900.00	10,646.99	12,622.20	9,571.43	60.11	56.89	0.00	3,179.87	-556.27	1,075.58	958.58	117.00	9.193	
14,000.00	10,646.55	12,722.20	9,570.97	61.23	58.05	0.00	3,279.87	-557.04	1,075.60	956.32	119.28	9.017	
14,100.00	10,646.11	12,822.20	9,570.50	62.37	59.22	0.00	3,379.86	-557.80	1,075.62	954.03	121.59	8.847	
14,200.00	10,645.67	12,922.20	9,570.04	63.51	60.40	0.00	3,479.86	-558.57	1,075.64	951.72	123.91	8.680	
14,300.00	10,645.22	13,022.20	9,569.58	64.67	61.59	0.00	3,579.86	-559.33	1,075.66	949.39	126.27	8.519	
14,400.00	10,644.78	13,122.20	9,569.12	65.84	62.79	0.00	3,679.85	-560.10	1,075.67	947.04	128.64	8.362	
14,500.00	10,644.34	13,222.20	9,568.65	67.03	64.00	0.00	3,779.85	-560.86	1,075.69	944.67	131.03	8.210	
14,600.00	10,643.90	13,322.20	9,568.19	68.22	65.22	0.00	3,879.84	-561.63	1,075.71	942.27	133.44	8.061	
14,700.00	10,643.45	13,422.20	9,567.73	69.42	66.45	0.00	3,979.84	-562.39	1,075.73	939.86	135.87	7.917	
14,800.00	10,643.01	13,522.20	9,567.27	70.63	67.69	0.00	4,079.84	-563.16	1,075.75	937.44	138.32	7.778	
14,900.00	10,642.57	13,622.20	9,566.81	71.84	68.94	0.00	4,179.83	-563.92	1,075.77	935.00	140.78	7.642	
15,000.00	10,642.13	13,722.20	9,566.34	73.07	70.19	0.00	4,279.83	-564.69	1,075.79	932.54	143.25	7.510	
15,100.00	10,641.68	13,822.20	9,565.88	74.30	71.45	0.00	4,379.82	-565.45	1,075.81	930.07	145.75	7.381	
15,200.00	10,641.24	13,922.20	9,565.42	75.54	72.71	0.00	4,479.82	-566.22	1,075.83	927.58	148.25	7.257	
15,300.00	10,640.80	14,022.20	9,564.96	76.79	73.98	0.00	4,579.82	-566.98	1,075.85	925.08	150.77	7.136	
15,400.00	10,640.36	14,122.20	9,564.50	78.04	75.26	0.00	4,679.81	-567.75	1,075.87	922.57	153.30	7.018	
15,480.52	10,640.00	14,202.72	9,564.12	78.91	76.29	0.00	4,760.33	-568.36	1,075.89	920.68	155.21	6.932	



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 307H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.00	0.00	0.80	0.00	0.00	0.00	-90.57	-0.30	-29.90	29.90					
100.00	100.00	100.80	100.00	0.13	0.14	-90.57	-0.30	-29.90	29.90	29.63	0.27	111.516		
200.00	200.00	200.80	200.00	0.49	0.49	-90.57	-0.30	-29.90	29.90	28.92	0.99	30.354		
300.00	300.00	300.80	300.00	0.85	0.85	-90.57	-0.30	-29.90	29.90	28.20	1.70	17.568		
400.00	400.00	400.80	400.00	1.21	1.21	-90.57	-0.30	-29.90	29.90	27.48	2.42	12.361		
500.00	500.00	500.80	500.00	1.57	1.57	-90.57	-0.30	-29.90	29.90	26.77	3.14	9.535		
600.00	600.00	600.80	600.00	1.92	1.93	-90.57	-0.30	-29.90	29.90	26.05	3.85	7.761		
700.00	700.00	700.80	700.00	2.28	2.29	-90.57	-0.30	-29.90	29.90	25.33	4.57	6.543		
800.00	800.00	800.80	800.00	2.64	2.64	-90.57	-0.30	-29.90	29.90	24.61	5.29	5.656		
900.00	900.00	900.80	900.00	3.00	3.00	-90.57	-0.30	-29.90	29.90	23.90	6.00	4.981		
966.40	966.40	967.20	966.40	3.24	3.24	-90.57	-0.30	-29.90	29.90	23.42	6.48	4.615 CC		
1,000.00	1,000.00	1,000.79	999.99	3.36	3.36	-90.57	-0.30	-29.90	29.90	23.18	6.72	4.449		
1,100.00	1,099.98	1,100.00	1,099.18	3.71	3.71	20.75	-0.75	-31.59	29.97	22.56	7.41	4.043		
1,119.82	1,119.78	1,119.41	1,118.58	3.77	3.77	20.89	-0.94	-32.30	29.99	22.44	7.55	3.974		
1,200.00	1,199.84	1,198.79	1,197.83	4.05	4.04	21.74	-2.08	-36.56	30.11	22.03	8.09	3.723		
1,300.00	1,299.49	1,298.27	1,296.96	4.39	4.39	23.30	-4.21	-44.49	30.38	21.60	8.78	3.460		
1,400.00	1,399.11	1,398.26	1,396.58	4.74	4.74	24.89	-6.47	-52.91	30.71	21.23	9.48	3.239		
1,500.00	1,498.73	1,498.26	1,496.20	5.10	5.10	26.45	-8.72	-61.33	31.06	20.87	10.19	3.047		
1,600.00	1,598.35	1,598.25	1,595.81	5.45	5.46	27.98	-10.98	-69.75	31.43	20.52	10.91	2.881		
1,700.00	1,697.97	1,698.25	1,695.43	5.81	5.82	29.47	-13.23	-78.17	31.83	20.20	11.63	2.737		
1,800.00	1,797.59	1,798.24	1,795.04	6.18	6.18	30.92	-15.49	-86.58	32.25	19.89	12.36	2.609		
1,900.00	1,897.21	1,898.24	1,894.66	6.54	6.55	32.33	-17.74	-95.00	32.68	19.60	13.09	2.497		
2,000.00	1,996.83	1,998.24	1,994.27	6.91	6.91	33.71	-20.00	-103.42	33.14	19.32	13.82	2.398		
2,100.00	2,096.45	2,098.23	2,093.89	7.28	7.28	35.04	-22.26	-111.84	33.62	19.06	14.56	2.309		
2,200.00	2,196.07	2,198.23	2,193.50	7.64	7.65	36.34	-24.51	-120.26	34.11	18.82	15.29	2.230		
2,300.00	2,295.69	2,298.22	2,293.12	8.01	8.02	37.60	-26.77	-128.68	34.62	18.59	16.03	2.159		
2,400.00	2,395.31	2,398.22	2,392.73	8.38	8.39	38.83	-29.02	-137.09	35.15	18.37	16.77	2.095		
2,500.00	2,494.93	2,498.22	2,492.35	8.76	8.76	40.02	-31.28	-145.51	35.69	18.17	17.52	2.037		
2,600.00	2,594.55	2,598.21	2,591.96	9.13	9.13	41.17	-33.53	-153.93	36.24	17.98	18.26	1.985		
2,700.00	2,694.17	2,698.21	2,691.58	9.50	9.50	42.28	-35.79	-162.35	36.81	17.81	19.00	1.937		
2,800.00	2,793.78	2,798.20	2,791.19	9.87	9.88	43.36	-38.05	-170.77	37.40	17.65	19.75	1.894		
2,900.00	2,893.40	2,898.20	2,890.81	10.25	10.25	44.41	-40.30	-179.19	38.00	17.50	20.50	1.854		
3,000.00	2,993.02	2,998.20	2,990.43	10.62	10.62	45.43	-42.56	-187.60	38.61	17.36	21.24	1.817		
3,100.00	3,092.64	3,098.19	3,090.04	10.99	11.00	46.41	-44.81	-196.02	39.23	17.23	21.99	1.784		
3,200.00	3,192.26	3,198.19	3,189.66	11.37	11.37	47.36	-47.07	-204.44	39.86	17.12	22.74	1.753		
3,300.00	3,291.88	3,298.18	3,289.27	11.74	11.75	48.29	-49.32	-212.86	40.50	17.01	23.49	1.724		
3,400.00	3,391.50	3,398.18	3,388.89	12.12	12.12	49.18	-51.58	-221.28	41.16	16.92	24.24	1.698		
3,500.00	3,491.12	3,498.17	3,488.50	12.49	12.50	50.04	-53.83	-229.69	41.82	16.83	24.99	1.673		
3,600.00	3,590.74	3,598.17	3,588.12	12.87	12.87	50.88	-56.09	-238.11	42.49	16.75	25.74	1.651		
3,700.00	3,690.36	3,698.17	3,687.73	13.24	13.25	51.69	-58.35	-246.53	43.17	16.68	26.49	1.630		
3,800.00	3,789.98	3,798.16	3,787.35	13.62	13.62	52.48	-60.60	-254.95	43.86	16.62	27.24	1.610		
3,900.00	3,889.60	3,898.16	3,886.96	14.00	14.00	53.24	-62.86	-263.37	44.56	16.56	28.00	1.592		
4,000.00	3,989.22	3,998.15	3,986.58	14.37	14.38	53.98	-65.11	-271.79	45.27	16.52	28.75	1.575		
4,100.00	4,088.84	4,098.15	4,086.19	14.75	14.75	54.70	-67.37	-280.20	45.98	16.48	29.50	1.559		
4,200.00	4,188.46	4,198.15	4,185.81	15.12	15.13	55.39	-69.62	-288.62	46.70	16.44	30.25	1.544		
4,300.00	4,288.08	4,298.14	4,285.42	15.50	15.51	56.06	-71.88	-297.04	47.42	16.42	31.01	1.529		
4,400.00	4,387.70	4,398.14	4,385.04	15.88	15.88	56.71	-74.14	-305.46	48.16	16.40	31.76	1.516		
4,500.00	4,487.32	4,498.13	4,484.66	16.25	16.26	57.35	-76.39	-313.88	48.89	16.38	32.51	1.504 ES		
4,600.00	4,586.94	4,598.12	4,584.27	16.63	16.63	64.11	-78.65	-322.30	49.93	16.67	33.27	1.501		
4,700.00	4,686.56	4,698.11	4,683.87	17.01	17.01	65.17	-80.90	-330.71	51.49	17.47	34.02	1.514		
4,800.00	4,786.18	4,798.09	4,783.47	17.38	17.39	66.17	-83.16	-339.13	53.07	18.30	34.77	1.526		
4,900.00	4,885.80	4,898.07	4,883.08	17.76	17.77	67.11	-85.41	-347.55	54.66	19.13	35.53	1.539		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 307H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance				Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor	
5,000.00	4,985.42	4,998.06	4,982.68	18.14	18.14	68.00	-87.67	-355.96	56.27	19.99	36.28	1.551		
5,100.00	5,085.04	5,098.04	5,082.28	18.51	18.52	68.84	-89.92	-364.38	57.88	20.85	37.03	1.563		
5,200.00	5,184.66	5,198.02	5,181.88	18.89	18.90	69.63	-92.18	-372.80	59.51	21.73	37.79	1.575		
5,300.00	5,284.28	5,298.01	5,281.49	19.27	19.27	70.38	-94.43	-381.22	61.15	22.61	38.54	1.587		
5,400.00	5,383.90	5,397.99	5,381.09	19.64	19.65	71.09	-96.69	-389.63	62.80	23.51	39.30	1.598		
5,500.00	5,483.52	5,497.98	5,480.69	20.02	20.03	71.77	-98.95	-398.05	64.46	24.41	40.05	1.610		
5,600.00	5,583.14	5,597.96	5,580.30	20.40	20.41	72.41	-101.20	-406.47	66.13	25.32	40.80	1.621		
5,700.00	5,682.76	5,697.94	5,679.90	20.78	20.78	73.01	-103.46	-414.88	67.80	26.25	41.56	1.632		
5,800.00	5,782.38	5,797.93	5,779.50	21.15	21.16	73.59	-105.71	-423.30	69.49	27.17	42.31	1.642		
5,900.00	5,882.00	5,897.91	5,879.10	21.53	21.54	74.15	-107.97	-431.72	71.18	28.11	43.07	1.653		
6,000.00	5,981.62	5,997.89	5,978.71	21.91	21.92	74.67	-110.22	-440.14	72.87	29.05	43.82	1.663		
6,100.00	6,081.24	6,097.88	6,078.31	22.29	22.29	75.17	-112.48	-448.55	74.57	30.00	44.58	1.673		
6,200.00	6,180.86	6,197.86	6,177.91	22.66	22.67	75.65	-114.73	-456.97	76.28	30.95	45.33	1.683		
6,300.00	6,280.48	6,297.84	6,277.52	23.04	23.05	76.11	-116.99	-465.39	77.99	31.90	46.09	1.692		
6,400.00	6,380.10	6,397.83	6,377.12	23.42	23.43	76.55	-119.24	-473.80	79.71	32.87	46.84	1.702		
6,500.00	6,479.72	6,497.81	6,476.72	23.80	23.80	76.97	-121.50	-482.22	81.43	33.83	47.60	1.711		
6,600.00	6,579.34	6,597.79	6,576.33	24.17	24.18	77.38	-123.75	-490.64	83.16	34.80	48.36	1.720		
6,700.00	6,678.96	6,697.78	6,675.93	24.55	24.56	77.76	-126.01	-499.06	84.89	35.78	49.11	1.728		
6,800.00	6,778.58	6,797.76	6,775.53	24.93	24.94	78.13	-128.27	-507.47	86.62	36.75	49.87	1.737		
6,900.00	6,878.20	6,897.74	6,875.13	25.31	25.31	78.49	-130.52	-515.89	88.36	37.74	50.62	1.745		
7,000.00	6,977.82	6,998.31	6,975.35	25.69	25.69	79.06	-132.69	-523.98	89.95	38.57	51.38	1.751		
7,100.00	7,077.44	7,099.42	7,076.31	26.06	26.06	81.41	-134.08	-529.16	90.44	38.31	52.12	1.735		
7,200.00	7,177.06	7,200.18	7,177.05	26.44	26.41	85.87	-134.54	-530.90	90.03	37.18	52.85	1.704		
7,274.76	7,251.54	7,274.66	7,251.54	26.72	26.65	90.00	-134.54	-530.90	89.80	36.42	53.38	1.682		
7,300.00	7,276.68	7,299.81	7,276.68	26.82	26.74	91.40	-134.54	-530.90	89.82	36.27	53.55	1.677		
7,400.00	7,376.30	7,399.43	7,376.30	27.20	27.06	96.90	-134.54	-530.90	90.46	36.20	54.26	1.667		
7,500.00	7,475.92	7,499.05	7,475.92	27.58	27.39	102.28	-134.54	-530.90	91.91	36.95	54.97	1.672		
7,600.00	7,575.54	7,598.67	7,575.54	27.95	27.72	107.44	-134.54	-530.90	94.16	38.48	55.68	1.691		
7,700.00	7,675.18	7,698.31	7,675.18	28.33	28.05	112.24	-134.54	-530.90	97.05	40.67	56.38	1.721		
7,800.00	7,775.01	7,798.14	7,775.01	28.70	28.39	115.35	-134.54	-530.90	99.38	42.30	57.08	1.741		
7,900.00	7,874.98	7,898.11	7,874.98	29.05	28.72	116.54	-134.54	-530.90	100.37	42.60	57.77	1.737		
8,000.00	7,974.98	7,998.11	7,974.98	29.38	29.05	-0.44	-134.54	-530.90	100.39	41.96	58.43	1.718		
8,100.00	8,074.98	8,098.11	8,074.98	29.70	29.39	-0.44	-134.54	-530.90	100.39	41.30	59.09	1.699		
8,200.00	8,174.98	8,198.11	8,174.98	30.03	29.72	-0.44	-134.54	-530.90	100.39	40.64	59.75	1.680		
8,300.00	8,274.98	8,298.11	8,274.98	30.36	30.06	-0.44	-134.54	-530.90	100.39	39.98	60.41	1.662		
8,400.00	8,374.98	8,398.11	8,374.98	30.68	30.39	-0.44	-134.54	-530.90	100.39	39.31	61.08	1.644		
8,500.00	8,474.98	8,498.11	8,474.98	31.01	30.73	-0.44	-134.54	-530.90	100.39	38.65	61.74	1.626		
8,600.00	8,574.98	8,598.11	8,574.98	31.34	31.07	-0.44	-134.54	-530.90	100.39	37.98	62.41	1.609		
8,700.00	8,674.98	8,698.11	8,674.98	31.67	31.40	-0.44	-134.54	-530.90	100.39	37.31	63.08	1.592		
8,800.00	8,774.98	8,798.11	8,774.98	32.00	31.74	-0.44	-134.54	-530.90	100.39	36.64	63.74	1.575		
8,900.00	8,874.98	8,898.11	8,874.98	32.33	32.08	-0.44	-134.54	-530.90	100.39	35.98	64.41	1.558		
9,000.00	8,974.98	8,998.11	8,974.98	32.67	32.42	-0.44	-134.54	-530.90	100.39	35.30	65.08	1.542		
9,100.00	9,074.98	9,098.11	9,074.98	33.00	32.76	-0.44	-134.54	-530.90	100.39	34.63	65.76	1.527		
9,200.00	9,174.98	9,198.11	9,174.98	33.33	33.10	-0.44	-134.54	-530.90	100.39	33.96	66.43	1.511		
9,300.00	9,274.98	9,298.11	9,274.98	33.66	33.44	-0.44	-134.54	-530.90	100.39	33.29	67.10	1.496 Level 3		
9,400.00	9,374.98	9,398.11	9,374.98	34.00	33.78	-0.44	-134.54	-530.90	100.39	32.61	67.78	1.481 Level 3		
9,500.00	9,474.98	9,498.11	9,474.98	34.33	34.12	-0.44	-134.54	-530.90	100.39	31.94	68.45	1.467 Level 3		
9,600.00	9,574.98	9,598.11	9,574.98	34.67	34.46	-0.44	-134.54	-530.90	100.39	31.26	69.13	1.452 Level 3		
9,700.00	9,674.98	9,698.11	9,674.98	35.00	34.80	-0.44	-134.54	-530.90	100.39	30.58	69.80	1.438 Level 3, SF		
9,800.00	9,774.98	9,781.25	9,757.80	35.34	35.08	-0.44	-128.45	-530.95	107.86	37.44	70.42	1.532		
9,900.00	9,874.98	9,858.95	9,833.16	35.68	35.33	-0.44	-109.90	-531.09	131.84	60.84	71.00	1.857		
10,000.00	9,974.98	9,929.08	9,897.81	36.01	35.53	-0.44	-82.86	-531.30	170.53	98.99	71.54	2.384		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 307H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)						
10,100.00	10,074.98	9,990.17	9,950.36	36.35	35.68	-0.44	-51.82	-531.54	221.50	149.47	72.03	3.075		
10,200.00	10,174.98	10,042.23	9,991.72	36.69	35.79	-0.44	-20.24	-531.78	282.27	209.79	72.48	3.895		
10,300.00	10,274.40	10,089.62	10,026.18	37.02	35.88	0.00	12.26	-532.03	344.08	271.18	72.89	4.720		
10,400.00	10,369.81	10,137.33	10,057.45	37.31	35.95	0.00	48.28	-532.30	396.95	323.69	73.26	5.418		
10,500.00	10,457.03	10,185.29	10,085.10	37.55	36.01	0.00	87.43	-532.60	440.26	366.70	73.56	5.985		
10,600.00	10,532.26	10,233.41	10,108.76	37.73	36.05	0.00	129.31	-532.92	473.53	399.76	73.78	6.418		
10,700.00	10,592.20	10,281.63	10,128.12	37.83	36.09	0.00	173.45	-533.26	496.40	422.48	73.92	6.715		
10,800.00	10,634.24	10,325.00	10,141.65	37.88	36.12	0.00	214.64	-533.58	508.66	434.66	74.00	6.874		
10,900.00	10,656.54	10,375.00	10,152.54	37.88	36.17	0.00	263.41	-533.95	510.05	436.00	74.05	6.888		
11,000.00	10,659.82	10,425.00	10,158.27	37.98	36.26	0.00	313.06	-534.33	502.34	428.09	74.25	6.765		
11,089.10	10,659.43	10,483.76	10,159.08	38.19	36.38	0.00	371.79	-534.78	500.35	425.78	74.57	6.710		
11,100.00	10,659.38	10,494.65	10,159.03	38.22	36.41	0.00	382.69	-534.86	500.35	425.73	74.63	6.705		
11,200.00	10,658.94	10,594.65	10,158.58	38.51	36.68	0.00	482.68	-535.63	500.36	425.17	75.19	6.655		
11,300.00	10,658.49	10,694.65	10,158.13	38.85	37.00	0.00	582.68	-536.39	500.37	424.52	75.86	6.596		
11,400.00	10,658.05	10,794.65	10,157.67	39.24	37.38	0.00	682.68	-537.16	500.38	423.77	76.62	6.531		
11,500.00	10,657.61	10,894.65	10,157.22	39.67	37.80	0.00	782.67	-537.92	500.39	422.92	77.48	6.459		
11,600.00	10,657.17	10,994.65	10,156.77	40.15	38.28	0.00	882.67	-538.69	500.41	421.98	78.43	6.381		
11,700.00	10,656.73	11,094.65	10,156.32	40.67	38.80	0.00	982.66	-539.45	500.42	420.95	79.47	6.297		
11,800.00	10,656.28	11,194.65	10,155.86	41.23	39.36	0.00	1,082.66	-540.22	500.43	419.83	80.59	6.209		
11,900.00	10,655.84	11,294.65	10,155.41	41.84	39.97	0.00	1,182.66	-540.98	500.44	418.63	81.80	6.117		
12,000.00	10,655.40	11,394.65	10,154.96	42.48	40.62	0.00	1,282.65	-541.75	500.45	417.35	83.10	6.023		
12,100.00	10,654.96	11,494.65	10,154.51	43.16	41.30	0.00	1,382.65	-542.51	500.46	415.99	84.46	5.925		
12,200.00	10,654.51	11,594.65	10,154.05	43.88	42.03	0.00	1,482.64	-543.28	500.47	414.56	85.90	5.826		
12,300.00	10,654.07	11,694.65	10,153.60	44.63	42.79	0.00	1,582.64	-544.04	500.48	413.06	87.42	5.725		
12,400.00	10,653.63	11,794.65	10,153.15	45.41	43.58	0.00	1,682.64	-544.81	500.49	411.49	88.99	5.624		
12,500.00	10,653.19	11,894.65	10,152.70	46.23	44.41	0.00	1,782.63	-545.58	500.50	409.86	90.63	5.522		
12,600.00	10,652.74	11,994.65	10,152.24	47.07	45.26	0.00	1,882.63	-546.34	500.51	408.17	92.33	5.421		
12,700.00	10,652.30	12,094.65	10,151.79	47.94	46.15	0.00	1,982.63	-547.11	500.52	406.43	94.09	5.320		
12,800.00	10,651.86	12,194.65	10,151.34	48.84	47.06	0.00	2,082.62	-547.87	500.53	404.63	95.90	5.219		
12,900.00	10,651.42	12,294.65	10,150.89	49.76	48.00	0.00	2,182.62	-548.64	500.54	402.77	97.76	5.120		
13,000.00	10,650.97	12,394.65	10,150.43	50.71	48.96	0.00	2,282.61	-549.40	500.55	400.88	99.67	5.022		
13,100.00	10,650.53	12,494.65	10,149.98	51.68	49.94	0.00	2,382.61	-550.17	500.56	398.93	101.62	4.926		
13,200.00	10,650.09	12,594.65	10,149.53	52.67	50.95	0.00	2,482.61	-550.93	500.57	396.95	103.62	4.831		
13,300.00	10,649.65	12,694.65	10,149.08	53.68	51.98	0.00	2,582.60	-551.70	500.58	394.92	105.66	4.738		
13,400.00	10,649.20	12,794.65	10,148.62	54.71	53.02	0.00	2,682.60	-552.46	500.59	392.86	107.73	4.647		
13,500.00	10,648.76	12,894.65	10,148.17	55.76	54.08	0.00	2,782.59	-553.23	500.60	390.76	109.84	4.557		
13,600.00	10,648.32	12,994.65	10,147.72	56.82	55.16	0.00	2,882.59	-553.99	500.61	388.62	111.98	4.470		
13,700.00	10,647.88	13,094.65	10,147.27	57.90	56.26	0.00	2,982.59	-554.76	500.62	386.46	114.16	4.385		
13,800.00	10,647.43	13,194.65	10,146.81	59.00	57.37	0.00	3,082.58	-555.52	500.63	384.26	116.37	4.302		
13,900.00	10,646.99	13,294.65	10,146.36	60.11	58.49	0.00	3,182.58	-556.29	500.64	382.04	118.60	4.221		
14,000.00	10,646.55	13,394.65	10,145.91	61.23	59.63	0.00	3,282.57	-557.05	500.65	379.78	120.86	4.142		
14,100.00	10,646.11	13,494.65	10,145.46	62.37	60.78	0.00	3,382.57	-557.82	500.66	377.51	123.15	4.065		
14,200.00	10,645.67	13,594.65	10,145.00	63.51	61.94	0.00	3,482.57	-558.58	500.67	375.21	125.46	3.991		
14,300.00	10,645.22	13,694.65	10,144.55	64.67	63.12	0.00	3,582.56	-559.35	500.68	372.88	127.79	3.918		
14,400.00	10,644.78	13,794.65	10,144.10	65.84	64.30	0.00	3,682.56	-560.11	500.69	370.54	130.15	3.847		
14,500.00	10,644.34	13,894.65	10,143.65	67.03	65.50	0.00	3,782.55	-560.88	500.70	368.17	132.52	3.778		
14,600.00	10,643.90	13,994.65	10,143.19	68.22	66.70	0.00	3,882.55	-561.64	500.71	365.79	134.92	3.711		
14,700.00	10,643.45	14,094.65	10,142.74	69.42	67.91	0.00	3,982.55	-562.41	500.72	363.39	137.33	3.646		
14,800.00	10,643.01	14,194.65	10,142.29	70.63	69.14	0.00	4,082.54	-563.18	500.73	360.97	139.76	3.583		
14,900.00	10,642.57	14,294.65	10,141.84	71.84	70.37	0.00	4,182.54	-563.94	500.74	358.53	142.21	3.521		
15,000.00	10,642.13	14,394.65	10,141.38	73.07	71.60	0.00	4,282.53	-564.71	500.75	356.08	144.67	3.461		
15,100.00	10,641.68	14,494.65	10,140.93	74.30	72.85	0.00	4,382.53	-565.47	500.76	353.61	147.15	3.403		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 307H - OH - Plan 1 11-16-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,200.00	10,641.24	14,594.65	10,140.48	75.54	74.10	0.00	4,482.53	-566.24	500.77	351.13	149.64	3.347	
15,300.00	10,640.80	14,694.65	10,140.03	76.79	75.36	0.00	4,582.52	-567.00	500.78	348.63	152.14	3.291	
15,400.00	10,640.36	14,794.65	10,139.57	78.04	76.62	0.00	4,682.52	-567.77	500.79	346.13	154.66	3.238	
15,480.52	10,640.00	14,875.17	10,139.21	78.91	77.64	0.00	4,763.03	-568.38	500.79	344.24	156.56	3.199	

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 608H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Tooface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.00	0.00	0.40	0.00	0.00	0.00	-116.99	-30.40	-59.70	66.99					
100.00	100.00	100.40	100.00	0.13	0.13	-116.99	-30.40	-59.70	66.99	66.73	0.27	251.195		
200.00	200.00	200.40	200.00	0.49	0.49	-116.99	-30.40	-59.70	66.99	66.01	0.98	68.108		
300.00	300.00	300.40	300.00	0.85	0.85	-116.99	-30.40	-59.70	66.99	65.29	1.70	39.395		
400.00	400.00	400.40	400.00	1.21	1.21	-116.99	-30.40	-59.70	66.99	64.58	2.42	27.712		
500.00	500.00	500.40	500.00	1.57	1.57	-116.99	-30.40	-59.70	66.99	63.86	3.13	21.373		
600.00	600.00	600.40	600.00	1.92	1.93	-116.99	-30.40	-59.70	66.99	63.14	3.85	17.395		
700.00	700.00	700.40	700.00	2.28	2.28	-116.99	-30.40	-59.70	66.99	62.43	4.57	14.665		
800.00	800.00	800.40	800.00	2.64	2.64	-116.99	-30.40	-59.70	66.99	61.71	5.29	12.676		
900.00	900.00	900.40	900.00	3.00	3.00	-116.99	-30.40	-59.70	66.99	60.99	6.00	11.162		
966.53	966.53	966.93	966.53	3.24	3.24	-116.99	-30.40	-59.70	66.99	60.52	6.48	10.340		
1,000.00	1,000.00	1,000.00	999.60	3.36	3.36	-116.99	-30.40	-59.70	67.00	60.28	6.72	9.973		
1,100.00	1,099.98	1,098.11	1,097.69	3.71	3.70	-6.21	-31.24	-61.15	66.98	59.57	7.40	9.046		
1,200.00	1,199.84	1,195.82	1,195.27	4.05	4.03	-6.90	-33.75	-65.49	66.90	58.83	8.07	8.286		
1,263.10	1,262.76	1,257.65	1,256.90	4.26	4.24	-7.53	-36.19	-69.71	67.16	58.66	8.50	7.899		
1,300.00	1,299.49	1,294.55	1,293.66	4.39	4.37	-8.00	-37.80	-72.50	66.88	58.12	8.76	7.637		
1,400.00	1,399.11	1,394.54	1,393.27	4.74	4.71	-9.17	-42.16	-80.05	66.98	57.53	9.46	7.084		
1,500.00	1,498.73	1,494.53	1,492.88	5.10	5.07	-10.34	-46.53	-87.59	67.11	56.95	10.16	6.603		
1,600.00	1,598.35	1,594.52	1,592.49	5.45	5.42	-11.50	-50.89	-95.14	67.27	56.39	10.88	6.184		
1,700.00	1,697.97	1,694.51	1,692.10	5.81	5.78	-12.66	-55.26	-102.69	67.45	55.85	11.60	5.816		
1,800.00	1,797.59	1,794.50	1,791.71	6.18	6.14	-13.81	-59.62	-110.24	67.66	55.34	12.32	5.491		
1,900.00	1,897.21	1,894.49	1,891.32	6.54	6.51	-14.96	-63.98	-117.78	67.90	54.85	13.05	5.203		
2,000.00	1,996.83	1,994.48	1,990.93	6.91	6.87	-16.09	-68.35	-125.33	68.17	54.39	13.78	4.946		
2,100.00	2,096.45	2,094.47	2,090.54	7.28	7.24	-17.22	-72.71	-132.88	68.46	53.95	14.52	4.716		
2,200.00	2,196.07	2,194.46	2,190.15	7.64	7.61	-18.33	-77.08	-140.43	68.78	53.53	15.25	4.509		
2,300.00	2,295.69	2,294.45	2,289.76	8.01	7.98	-19.44	-81.44	-147.97	69.13	53.13	15.99	4.323		
2,400.00	2,395.31	2,394.45	2,389.37	8.38	8.35	-20.53	-85.80	-155.52	69.50	52.76	16.73	4.153		
2,500.00	2,494.93	2,494.44	2,488.98	8.76	8.72	-21.61	-90.17	-163.07	69.89	52.42	17.47	4.000		
2,600.00	2,594.55	2,594.43	2,588.59	9.13	9.09	-22.68	-94.53	-170.62	70.31	52.09	18.22	3.859		
2,700.00	2,694.17	2,694.42	2,688.20	9.50	9.46	-23.74	-98.90	-178.16	70.75	51.79	18.96	3.731		
2,800.00	2,793.78	2,794.41	2,787.81	9.87	9.83	-24.78	-103.26	-185.71	71.22	51.51	19.71	3.614		
2,900.00	2,893.40	2,894.40	2,887.42	10.25	10.21	-25.81	-107.62	-193.26	71.71	51.26	20.45	3.506		
3,000.00	2,993.02	2,994.39	2,987.03	10.62	10.58	-26.82	-111.99	-200.81	72.23	51.03	21.20	3.407		
3,100.00	3,092.64	3,094.38	3,086.64	10.99	10.96	-27.82	-116.35	-208.35	72.76	50.81	21.95	3.315		
3,200.00	3,192.26	3,194.37	3,186.25	11.37	11.33	-28.80	-120.72	-215.90	73.32	50.62	22.70	3.230		
3,300.00	3,291.88	3,294.36	3,285.86	11.74	11.70	-29.77	-125.08	-223.45	73.90	50.45	23.45	3.152		
3,400.00	3,391.50	3,394.35	3,385.47	12.12	12.08	-30.73	-129.44	-231.00	74.50	50.30	24.20	3.079		
3,500.00	3,491.12	3,494.34	3,485.08	12.49	12.45	-31.67	-133.81	-238.54	75.12	50.17	24.95	3.011		
3,600.00	3,590.74	3,594.33	3,584.69	12.87	12.83	-32.59	-138.17	-246.09	75.76	50.06	25.70	2.948		
3,700.00	3,690.36	3,694.32	3,684.30	13.24	13.21	-33.50	-142.54	-253.64	76.42	49.97	26.45	2.889		
3,800.00	3,789.98	3,794.31	3,783.91	13.62	13.58	-34.39	-146.90	-261.19	77.10	49.90	27.20	2.834		
3,900.00	3,889.60	3,896.73	3,886.07	14.00	13.96	-35.88	-150.47	-267.36	76.22	48.27	27.96	2.727		
4,000.00	3,989.22	3,998.93	3,988.20	14.37	14.33	-36.78	-152.21	-270.37	72.28	43.58	28.70	2.519		
4,100.00	4,088.84	4,099.57	4,088.84	14.75	14.67	-43.41	-152.40	-270.70	66.01	36.59	29.41	2.244		
4,200.00	4,188.46	4,199.19	4,188.46	15.12	15.00	-49.13	-152.40	-270.70	59.96	29.84	30.12	1.991		
4,300.00	4,288.08	4,298.80	4,288.08	15.50	15.33	-56.04	-152.40	-270.70	54.64	23.81	30.83	1.772		
4,400.00	4,387.70	4,398.42	4,387.70	15.88	15.67	-64.27	-152.40	-270.70	50.28	18.74	31.54	1.594		
4,500.00	4,487.32	4,498.04	4,487.32	16.25	16.00	-73.83	-152.40	-270.70	47.15	14.89	32.26	1.462 Level 3		
4,600.00	4,586.94	4,597.66	4,586.94	16.63	16.34	-78.35	-152.40	-270.70	45.15	12.18	32.97	1.370 Level 3		
4,700.00	4,686.56	4,697.28	4,686.56	17.01	16.68	-89.43	-152.40	-270.70	44.22	10.54	33.68	1.313 Level 3		
4,705.08	4,691.62	4,702.35	4,691.62	17.03	16.69	-90.00	-152.40	-270.70	44.22	10.50	33.72	1.311 Level 3, CC, ES		
4,800.00	4,786.18	4,796.90	4,786.18	17.38	17.01	-100.55	-152.40	-270.70	44.98	10.58	34.40	1.308 Level 3, SF		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 608H - OH - Plan 1 11-16-17													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
4,900.00	4,885.80	4,896.52	4,885.80	17.76	17.35	-110.93	-152.40	-270.70	47.36	12.25	35.11	1.349	Level 3	
5,000.00	4,985.42	4,996.14	4,985.42	18.14	17.69	-120.05	-152.40	-270.70	51.13	15.30	35.83	1.427	Level 3	
5,100.00	5,085.04	5,095.76	5,085.04	18.51	18.03	-127.77	-152.40	-270.70	56.02	19.47	36.55	1.533		
5,200.00	5,184.66	5,195.38	5,184.66	18.89	18.38	-134.15	-152.40	-270.70	61.74	24.48	37.27	1.657		
5,300.00	5,284.28	5,295.00	5,284.28	19.27	18.72	-139.41	-152.40	-270.70	68.11	30.12	37.98	1.793		
5,400.00	5,383.90	5,394.62	5,383.90	19.64	19.06	-143.74	-152.40	-270.70	74.94	36.24	38.70	1.936		
5,500.00	5,483.52	5,494.25	5,483.52	20.02	19.40	-147.33	-152.40	-270.70	82.14	42.71	39.42	2.083		
5,600.00	5,583.14	5,593.87	5,583.14	20.40	19.75	-150.33	-152.40	-270.70	89.60	49.45	40.14	2.232		
5,700.00	5,682.76	5,693.49	5,682.76	20.78	20.09	-152.87	-152.40	-270.70	97.26	56.40	40.87	2.380		
5,800.00	5,782.38	5,793.11	5,782.38	21.15	20.43	-155.04	-152.40	-270.70	105.09	63.51	41.59	2.527		
5,900.00	5,882.00	5,892.73	5,882.00	21.53	20.78	-156.90	-152.40	-270.70	113.05	70.74	42.31	2.672		
6,000.00	5,981.62	5,992.35	5,981.62	21.91	21.12	-158.51	-152.40	-270.70	121.11	78.08	43.03	2.815		
6,100.00	6,081.24	6,091.97	6,081.24	22.29	21.47	-159.93	-152.40	-270.70	129.26	85.51	43.75	2.954		
6,200.00	6,180.86	6,191.59	6,180.86	22.66	21.81	-161.17	-152.40	-270.70	137.47	93.00	44.48	3.091		
6,300.00	6,280.48	6,291.21	6,280.48	23.04	22.16	-162.28	-152.40	-270.70	145.75	100.54	45.20	3.224		
6,400.00	6,380.10	6,390.83	6,380.10	23.42	22.51	-163.26	-152.40	-270.70	154.07	108.14	45.93	3.355		
6,500.00	6,479.72	6,490.45	6,479.72	23.80	22.85	-164.15	-152.40	-270.70	162.43	115.78	46.65	3.482		
6,600.00	6,579.34	6,590.07	6,579.34	24.17	23.20	-164.94	-152.40	-270.70	170.82	123.45	47.38	3.606		
6,700.00	6,678.96	6,689.69	6,678.96	24.55	23.55	-165.67	-152.40	-270.70	179.25	131.14	48.10	3.726		
6,800.00	6,778.58	6,789.31	6,778.58	24.93	23.90	-166.32	-152.40	-270.70	187.70	138.87	48.83	3.844		
6,900.00	6,878.20	6,888.93	6,878.20	25.31	24.24	-166.93	-152.40	-270.70	196.17	146.62	49.55	3.959		
7,000.00	6,977.82	6,988.55	6,977.82	25.69	24.59	-167.48	-152.40	-270.70	204.66	154.38	50.28	4.071		
7,100.00	7,077.44	7,088.17	7,077.44	26.06	24.94	-167.98	-152.40	-270.70	213.17	162.17	51.00	4.179		
7,200.00	7,177.06	7,187.79	7,177.06	26.44	25.29	-168.45	-152.40	-270.70	221.70	169.97	51.73	4.286		
7,300.00	7,276.68	7,287.41	7,276.68	26.82	25.64	-168.89	-152.40	-270.70	230.24	177.78	52.46	4.389		
7,400.00	7,376.30	7,387.03	7,376.30	27.20	25.99	-169.29	-152.40	-270.70	238.79	185.60	53.19	4.490		
7,500.00	7,475.92	7,486.65	7,475.92	27.58	26.34	-169.66	-152.40	-270.70	247.35	193.44	53.91	4.588		
7,600.00	7,575.54	7,586.27	7,575.54	27.95	26.69	-170.01	-152.40	-270.70	255.92	201.28	54.64	4.684		
7,700.00	7,675.18	7,685.91	7,675.18	28.33	27.04	-170.34	-152.40	-270.70	264.30	208.93	55.37	4.773		
7,800.00	7,775.01	7,785.74	7,775.01	28.70	27.39	-170.57	-152.40	-270.70	269.97	213.89	56.09	4.814		
7,900.00	7,874.98	7,885.70	7,874.98	29.05	27.74	-170.65	-152.40	-270.70	272.21	215.42	56.79	4.793		
8,000.00	7,974.98	7,985.70	7,974.98	29.38	28.09	72.35	-152.40	-270.70	272.25	214.78	57.47	4.737		
8,100.00	8,074.98	8,085.70	8,074.98	29.70	28.44	72.35	-152.40	-270.70	272.25	214.10	58.15	4.682		
8,200.00	8,174.98	8,185.70	8,174.98	30.03	28.80	72.35	-152.40	-270.70	272.25	213.43	58.82	4.628		
8,300.00	8,274.98	8,285.70	8,274.98	30.36	29.15	72.35	-152.40	-270.70	272.25	212.75	59.50	4.575		
8,400.00	8,374.98	8,385.70	8,374.98	30.68	29.50	72.35	-152.40	-270.70	272.25	212.07	60.18	4.524		
8,500.00	8,474.98	8,485.70	8,474.98	31.01	29.85	72.35	-152.40	-270.70	272.25	211.38	60.87	4.473		
8,600.00	8,574.98	8,585.70	8,574.98	31.34	30.21	72.35	-152.40	-270.70	272.25	210.70	61.55	4.423		
8,700.00	8,674.98	8,685.70	8,674.98	31.67	30.56	72.35	-152.40	-270.70	272.25	210.02	62.23	4.375		
8,800.00	8,774.98	8,785.70	8,774.98	32.00	30.91	72.35	-152.40	-270.70	272.25	209.34	62.91	4.327		
8,900.00	8,874.98	8,885.70	8,874.98	32.33	31.26	72.35	-152.40	-270.70	272.25	208.65	63.60	4.281		
9,000.00	8,974.98	8,985.70	8,974.98	32.67	31.62	72.35	-152.40	-270.70	272.25	207.97	64.28	4.235		
9,100.00	9,074.98	9,085.70	9,074.98	33.00	31.97	72.35	-152.40	-270.70	272.25	207.28	64.97	4.190		
9,200.00	9,174.98	9,185.70	9,174.98	33.33	32.32	72.35	-152.40	-270.70	272.25	206.59	65.66	4.147		
9,300.00	9,274.98	9,285.70	9,274.98	33.66	32.68	72.35	-152.40	-270.70	272.25	205.91	66.34	4.104		
9,400.00	9,374.98	9,385.70	9,374.98	34.00	33.03	72.35	-152.40	-270.70	272.25	205.22	67.03	4.062		
9,500.00	9,474.98	9,485.70	9,474.98	34.33	33.39	72.35	-152.40	-270.70	272.25	204.53	67.72	4.020		
9,600.00	9,574.98	9,585.70	9,574.98	34.67	33.74	72.35	-152.40	-270.70	272.25	203.84	68.41	3.980		
9,700.00	9,674.98	9,685.70	9,674.98	35.00	34.09	72.35	-152.40	-270.70	272.25	203.15	69.10	3.940		
9,800.00	9,774.98	9,785.70	9,774.98	35.34	34.45	72.35	-152.40	-270.70	272.25	202.46	69.79	3.901		
9,900.00	9,874.98	9,885.70	9,874.98	35.68	34.80	72.35	-152.40	-270.70	272.25	201.77	70.48	3.863		
10,000.00	9,974.98	9,985.70	9,974.98	36.01	35.16	72.35	-152.40	-270.70	272.25	201.08	71.17	3.825		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 608H - OH - Plan 1 11-16-17													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,100.00	10,074.98	10,085.70	10,074.98	36.35	35.51	72.35	-152.40	-270.70	272.25	200.39	71.86	3.789		
10,200.00	10,174.98	10,185.70	10,174.98	36.69	35.86	72.35	-152.40	-270.70	272.25	199.70	72.55	3.752		
10,300.00	10,274.40	10,285.13	10,274.40	37.02	36.22	74.88	-152.40	-270.70	269.75	196.51	73.23	3.683		
10,400.00	10,369.81	10,380.54	10,369.81	37.31	36.56	81.49	-152.40	-270.70	263.48	189.61	73.87	3.567		
10,488.95	10,447.92	10,458.65	10,447.92	37.52	36.83	90.00	-152.40	-270.70	260.06	185.71	74.36	3.498		
10,500.00	10,457.03	10,467.76	10,457.03	37.55	36.86	91.13	-152.40	-270.70	260.14	185.72	74.42	3.496		
10,600.00	10,532.26	10,542.99	10,532.26	37.73	37.13	100.65	-152.40	-270.70	269.81	194.95	74.86	3.604		
10,700.00	10,592.20	10,602.93	10,592.20	37.83	37.34	106.68	-152.40	-270.70	301.06	225.88	75.18	4.005		
10,800.00	10,634.24	10,644.97	10,634.24	37.88	37.49	106.79	-152.40	-270.70	355.38	280.01	75.37	4.715		
10,900.00	10,656.54	10,667.27	10,656.54	37.88	37.57	98.92	-152.40	-270.70	427.66	352.21	75.45	5.668		
11,000.00	10,659.82	10,670.55	10,659.82	37.98	37.58	89.57	-152.40	-270.70	510.56	434.98	75.58	6.756		
11,100.00	10,659.38	10,670.11	10,659.38	38.22	37.58	89.47	-152.40	-270.70	598.78	522.96	75.80	7.899		
11,200.00	10,658.94	10,669.67	10,658.94	38.51	37.58	89.38	-152.40	-270.70	690.22	614.13	76.09	9.071		
11,300.00	10,658.49	10,669.22	10,658.49	38.85	37.58	89.28	-152.40	-270.70	783.76	707.33	76.43	10.254		
11,400.00	10,658.05	10,668.78	10,658.05	39.24	37.58	89.18	-152.40	-270.70	878.72	801.90	76.82	11.439		
11,500.00	10,657.61	10,668.34	10,657.61	39.67	37.58	89.08	-152.40	-270.70	974.69	897.44	77.25	12.618		
11,600.00	10,657.17	10,667.90	10,657.17	40.15	37.57	88.99	-152.40	-270.70	1,071.40	993.67	77.72	13.785		
11,700.00	10,656.73	10,667.45	10,656.73	40.67	37.57	88.89	-152.40	-270.70	1,168.66	1,090.41	78.24	14.936		
11,800.00	10,656.28	10,667.01	10,656.28	41.23	37.57	88.79	-152.40	-270.70	1,266.34	1,187.54	78.80	16.069		
11,900.00	10,655.84	10,666.57	10,655.84	41.84	37.57	88.69	-152.40	-270.70	1,364.36	1,284.96	79.41	17.182		
12,000.00	10,655.40	10,666.13	10,655.40	42.48	37.57	88.60	-152.40	-270.70	1,462.65	1,382.61	80.05	18.272		
12,100.00	10,654.96	10,665.68	10,654.96	43.16	37.57	88.50	-152.40	-270.70	1,561.16	1,480.43	80.73	19.339		
12,200.00	10,654.51	10,665.24	10,654.51	43.88	37.57	88.40	-152.40	-270.70	1,659.85	1,578.41	81.44	20.381		
12,300.00	10,654.07	10,664.80	10,654.07	44.63	37.56	88.31	-152.40	-270.70	1,758.68	1,676.49	82.19	21.397		
12,400.00	10,653.63	10,664.36	10,653.63	45.41	37.56	88.21	-152.40	-270.70	1,857.64	1,774.67	82.97	22.389		
12,500.00	10,653.19	14,253.46	12,519.52	46.23	51.08	172.07	1,780.59	-285.51	1,884.37	1,787.07	97.31	19.365		
12,600.00	10,652.74	14,353.46	12,519.86	47.07	51.83	172.07	1,880.58	-286.28	1,885.15	1,786.25	98.89	19.062		
12,700.00	10,652.30	14,453.45	12,520.20	47.94	52.60	172.07	1,980.58	-287.05	1,885.92	1,785.38	100.54	18.758		
12,800.00	10,651.86	14,553.45	12,520.53	48.84	53.40	172.08	2,080.57	-287.81	1,886.69	1,784.45	102.24	18.454		
12,900.00	10,651.42	14,653.45	12,520.87	49.76	54.22	172.08	2,180.57	-288.58	1,887.46	1,783.48	103.99	18.151		
13,000.00	10,650.97	14,753.44	12,521.21	50.71	55.07	172.08	2,280.56	-289.34	1,888.24	1,782.45	105.78	17.850		
13,100.00	10,650.53	14,853.44	12,521.55	51.68	55.95	172.09	2,380.55	-290.11	1,889.01	1,781.38	107.63	17.551		
13,200.00	10,650.09	14,953.44	12,521.88	52.67	56.85	172.09	2,480.55	-290.88	1,889.78	1,780.26	109.52	17.256		
13,300.00	10,649.65	15,053.44	12,522.22	53.68	57.77	172.09	2,580.54	-291.64	1,890.55	1,779.11	111.45	16.964		
13,400.00	10,649.20	15,153.43	12,522.56	54.71	58.71	172.10	2,680.53	-292.41	1,891.32	1,777.91	113.42	16.676		
13,500.00	10,648.76	15,253.43	12,522.90	55.76	59.67	172.10	2,780.53	-293.18	1,892.10	1,776.67	115.42	16.393		
13,600.00	10,648.32	15,353.43	12,523.23	56.82	60.65	172.10	2,880.52	-293.94	1,892.87	1,775.40	117.47	16.114		
13,700.00	10,647.88	15,453.42	12,523.57	57.90	61.64	172.11	2,980.51	-294.71	1,893.64	1,774.10	119.54	15.841		
13,800.00	10,647.43	15,553.42	12,523.91	59.00	62.66	172.11	3,080.51	-295.47	1,894.41	1,772.76	121.65	15.572		
13,900.00	10,646.99	15,653.42	12,524.25	60.11	63.69	172.11	3,180.50	-296.24	1,895.19	1,771.39	123.79	15.309		
14,000.00	10,646.55	15,753.41	12,524.58	61.23	64.73	172.12	3,280.49	-297.01	1,895.96	1,770.00	125.96	15.052		
14,100.00	10,646.11	15,853.41	12,524.92	62.37	65.79	172.12	3,380.49	-297.77	1,896.73	1,768.57	128.16	14.800		
14,200.00	10,645.67	15,953.41	12,525.26	63.51	66.87	172.12	3,480.48	-298.54	1,897.50	1,767.12	130.38	14.554		
14,300.00	10,645.22	16,053.41	12,525.60	64.67	67.95	172.13	3,580.47	-299.31	1,898.28	1,765.65	132.63	14.313		
14,400.00	10,644.78	16,153.40	12,525.93	65.84	69.05	172.13	3,680.47	-300.07	1,899.05	1,764.15	134.90	14.078		
14,500.00	10,644.34	16,253.40	12,526.27	67.03	70.17	172.13	3,780.46	-300.84	1,899.82	1,762.63	137.19	13.848		
14,600.00	10,643.90	16,353.40	12,526.61	68.22	71.29	172.14	3,880.45	-301.61	1,900.59	1,761.09	139.51	13.624		
14,700.00	10,643.45	16,453.39	12,526.95	69.42	72.43	172.14	3,980.45	-302.37	1,901.37	1,759.52	141.84	13.405		
14,800.00	10,643.01	16,553.39	12,527.28	70.63	73.57	172.14	4,080.44	-303.14	1,902.14	1,757.94	144.20	13.191		
14,900.00	10,642.57	16,653.39	12,527.62	71.84	74.73	172.15	4,180.43	-303.90	1,902.91	1,756.34	146.57	12.983		
15,000.00	10,642.13	16,753.38	12,527.96	73.07	75.89	172.15	4,280.43	-304.67	1,903.68	1,754.72	148.96	12.780		
15,100.00	10,641.68	16,853.38	12,528.30	74.30	77.07	172.15	4,380.42	-305.44	1,904.46	1,753.09	151.37	12.582		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 608H - OH - Plan 1 11-16-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance					Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)		Separation Factor
15,200.00	10,641.24	16,953.38	12,528.63	75.54	78.25	172.16	4,480.41	-306.20	1,905.23	1,751.44	153.79	12.389	
15,300.00	10,640.80	17,053.37	12,528.97	76.79	79.44	172.16	4,580.41	-306.97	1,906.00	1,749.77	156.23	12.200	
15,400.00	10,640.36	17,153.37	12,529.31	78.04	80.64	172.16	4,680.40	-307.74	1,906.77	1,748.09	158.68	12.017	
15,480.52	10,640.00	17,233.89	12,529.58	78.91	81.61	172.17	4,760.92	-308.35	1,907.39	1,746.87	160.52	11.882	

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



Phoenix Technology Services LP

Anticollision Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Dominator 25 Federal
Site Error: 0.00 usft
Reference Well: 407H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 11-16-17

Local Co-ordinate Reference: Well 407H
TVD Reference: GL + KB @ 3364.50usft (McVay 8)
MD Reference: GL + KB @ 3364.50usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Dominator 25 Federal - 711H - OH - Plan 1 11-16-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toothface (")	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.10	0.00	0.00	0.00	179.43	-29.90	0.30	29.90				
100.00	100.00	100.10	100.00	0.13	0.13	179.43	-29.90	0.30	29.90	29.64	0.27	112.569	
200.00	200.00	200.10	200.00	0.49	0.49	179.43	-29.90	0.30	29.90	28.92	0.98	30.432	
300.00	300.00	300.10	300.00	0.85	0.85	179.43	-29.90	0.30	29.90	28.20	1.70	17.594	
400.00	400.00	400.10	400.00	1.21	1.21	179.43	-29.90	0.30	29.90	27.49	2.42	12.374	
500.00	500.00	500.10	500.00	1.57	1.57	179.43	-29.90	0.30	29.90	26.77	3.13	9.543	
600.00	600.00	600.10	600.00	1.92	1.93	179.43	-29.90	0.30	29.90	26.05	3.85	7.766	
700.00	700.00	700.10	700.00	2.28	2.28	179.43	-29.90	0.30	29.90	25.33	4.57	6.547	
800.00	800.00	800.10	800.00	2.64	2.64	179.43	-29.90	0.30	29.90	24.62	5.28	5.659	
900.00	900.00	900.10	900.00	3.00	3.00	179.43	-29.90	0.30	29.90	23.90	6.00	4.983	
1,000.00	1,000.00	1,000.10	1,000.00	3.36	3.36	179.43	-29.90	0.30	29.90	23.18	6.72	4.451	
1,100.00	1,099.98	1,100.08	1,099.98	3.71	3.72	-72.78	-29.90	0.30	29.34	21.91	7.42	3.952	
1,200.00	1,199.84	1,199.94	1,199.84	4.05	4.08	-82.98	-29.90	0.30	28.23	20.11	8.12	3.477	
1,246.82	1,246.53	1,246.63	1,246.53	4.21	4.24	-90.00	-29.90	0.30	28.02	19.57	8.45	3.316 CC, ES	
1,300.00	1,299.49	1,299.59	1,299.49	4.39	4.43	-99.73	-29.90	0.30	28.43	19.61	8.82	3.222 SF	
1,400.00	1,399.11	1,399.21	1,399.11	4.74	4.79	-115.70	-29.90	0.30	31.12	21.59	9.53	3.265	
1,500.00	1,498.73	1,498.83	1,498.73	5.10	5.15	-128.35	-29.90	0.30	35.78	25.54	10.24	3.493	
1,600.00	1,598.35	1,598.45	1,598.35	5.45	5.50	-137.75	-29.90	0.30	41.77	30.81	10.96	3.811	
1,700.00	1,697.97	1,698.07	1,697.97	5.81	5.86	-144.67	-29.90	0.30	48.58	36.91	11.68	4.161	
1,800.00	1,797.59	1,797.69	1,797.59	6.18	6.22	-149.84	-29.90	0.30	55.93	43.53	12.40	4.512	
1,900.00	1,897.21	1,897.31	1,897.21	6.54	6.58	-153.78	-29.90	0.30	63.62	50.50	13.12	4.850	
2,000.00	1,996.83	1,996.93	1,996.83	6.91	6.93	-156.86	-29.90	0.30	71.55	57.71	13.84	5.169	
2,100.00	2,096.45	2,096.79	2,096.67	7.28	7.27	-158.16	-31.53	0.14	79.49	64.94	14.55	5.463	
2,200.00	2,196.07	2,196.70	2,196.44	7.64	7.60	-156.93	-36.62	-0.36	87.17	71.93	15.24	5.719	
2,300.00	2,295.69	2,296.38	2,295.79	8.01	7.93	-154.03	-44.77	-1.15	94.81	78.87	15.94	5.948	
2,400.00	2,395.31	2,395.96	2,394.99	8.38	8.25	-151.30	-53.41	-1.99	102.66	86.02	16.64	6.170	
2,500.00	2,494.93	2,495.54	2,494.19	8.76	8.59	-148.95	-62.04	-2.84	110.71	93.37	17.34	6.384	
2,600.00	2,594.55	2,595.12	2,593.39	9.13	8.92	-146.93	-70.68	-3.68	118.92	100.87	18.05	6.588	
2,700.00	2,694.17	2,694.70	2,692.59	9.50	9.26	-145.17	-79.31	-4.52	127.26	108.50	18.76	6.782	
2,800.00	2,793.78	2,794.28	2,791.79	9.87	9.61	-143.63	-87.95	-5.36	135.71	116.23	19.48	6.967	
2,900.00	2,893.40	2,893.86	2,891.00	10.25	9.95	-142.27	-96.59	-6.21	144.24	124.04	20.20	7.141	
3,000.00	2,993.02	2,993.44	2,990.20	10.62	10.30	-141.06	-105.22	-7.05	152.84	131.92	20.92	7.306	
3,100.00	3,092.64	3,093.02	3,089.40	10.99	10.65	-139.98	-113.86	-7.89	161.51	139.86	21.65	7.461	
3,200.00	3,192.26	3,192.60	3,188.60	11.37	11.00	-139.01	-122.49	-8.73	170.22	147.85	22.37	7.609	
3,300.00	3,291.88	3,292.18	3,287.80	11.74	11.36	-138.13	-131.13	-9.58	178.98	155.88	23.10	7.748	
3,400.00	3,391.50	3,391.76	3,387.00	12.12	11.71	-137.34	-139.76	-10.42	187.78	163.95	23.83	7.879	
3,500.00	3,491.12	3,491.34	3,486.21	12.49	12.07	-136.62	-148.40	-11.26	196.60	172.04	24.56	8.004	
3,600.00	3,590.74	3,590.92	3,585.41	12.87	12.43	-135.96	-157.04	-12.10	205.46	180.17	25.30	8.122	
3,700.00	3,690.36	3,690.50	3,684.61	13.24	12.79	-135.35	-165.67	-12.95	214.34	188.31	26.03	8.234	
3,800.00	3,789.98	3,790.09	3,783.81	13.62	13.15	-134.80	-174.31	-13.79	223.25	196.48	26.77	8.340	
3,900.00	3,889.60	3,889.67	3,883.01	14.00	13.51	-134.28	-182.94	-14.63	232.17	204.67	27.50	8.441	
4,000.00	3,989.22	3,989.25	3,982.21	14.37	13.87	-133.81	-191.58	-15.47	241.11	212.87	28.24	8.537	
4,100.00	4,088.84	4,088.83	4,081.42	14.75	14.23	-133.36	-200.22	-16.32	250.07	221.08	28.98	8.628	
4,200.00	4,188.46	4,188.41	4,180.62	15.12	14.60	-132.95	-208.85	-17.16	259.03	229.31	29.72	8.715	
4,300.00	4,288.08	4,287.99	4,279.82	15.50	14.96	-132.57	-217.49	-18.00	268.02	237.55	30.46	8.798	
4,400.00	4,387.70	4,388.42	4,379.88	15.88	15.33	-132.23	-226.09	-18.84	276.97	245.76	31.21	8.875	
4,500.00	4,487.32	4,491.73	4,482.99	16.25	15.70	-132.39	-232.32	-19.45	285.02	253.06	31.96	8.918	
4,600.00	4,586.94	4,595.06	4,586.29	16.63	16.07	-127.29	-234.84	-19.69	291.55	258.85	32.70	8.916	
4,700.00	4,686.56	4,695.33	4,686.56	17.01	16.41	-128.62	-234.90	-19.70	296.94	263.52	33.42	8.886	
4,800.00	4,786.18	4,794.95	4,786.18	17.38	16.75	-129.91	-234.90	-19.70	302.46	268.33	34.13	8.861	
4,900.00	4,885.80	4,894.57	4,885.80	17.76	17.09	-131.15	-234.90	-19.70	308.14	273.29	34.85	8.842	
5,000.00	4,985.42	4,994.19	4,985.42	18.14	17.43	-132.34	-234.90	-19.70	313.95	278.38	35.57	8.827	

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 711H - OH - Plan 1 11-16-17											Offset Site Error: 0.00 usft		
Survey Program: 0-MWD+HDGM											Offset Well Error: 0.00 usft		
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,085.04	5,093.81	5,085.04	18.51	17.77	-133.49	-234.90	-19.70	319.89	283.60	36.28	8.816	
5,200.00	5,184.66	5,193.43	5,184.66	18.89	18.11	-134.60	-234.90	-19.70	325.95	288.95	37.00	8.809	
5,300.00	5,284.28	5,293.05	5,284.28	19.27	18.45	-135.67	-234.90	-19.70	332.14	294.41	37.72	8.805	
5,400.00	5,383.90	5,392.67	5,383.90	19.64	18.80	-136.69	-234.90	-19.70	338.43	299.99	38.44	8.804	
5,500.00	5,483.52	5,492.29	5,483.52	20.02	19.14	-137.69	-234.90	-19.70	344.83	305.67	39.16	8.805	
5,600.00	5,583.14	5,591.91	5,583.14	20.40	19.49	-138.64	-234.90	-19.70	351.33	311.44	39.88	8.809	
5,700.00	5,682.76	5,691.53	5,682.76	20.78	19.83	-139.56	-234.90	-19.70	357.92	317.31	40.61	8.815	
5,800.00	5,782.38	5,791.15	5,782.38	21.15	20.17	-140.45	-234.90	-19.70	364.60	323.27	41.33	8.822	
5,900.00	5,882.00	5,890.77	5,882.00	21.53	20.52	-141.30	-234.90	-19.70	371.37	329.32	42.05	8.831	
6,000.00	5,981.62	5,990.39	5,981.62	21.91	20.87	-142.12	-234.90	-19.70	378.21	335.44	42.77	8.842	
6,100.00	6,081.24	6,090.01	6,081.24	22.29	21.21	-142.92	-234.90	-19.70	385.13	341.63	43.50	8.854	
6,200.00	6,180.86	6,189.63	6,180.86	22.66	21.56	-143.68	-234.90	-19.70	392.12	347.90	44.22	8.867	
6,300.00	6,280.48	6,289.25	6,280.48	23.04	21.90	-144.42	-234.90	-19.70	399.18	354.24	44.95	8.881	
6,400.00	6,380.10	6,388.87	6,380.10	23.42	22.25	-145.14	-234.90	-19.70	406.30	360.63	45.67	8.896	
6,500.00	6,479.72	6,488.49	6,479.72	23.80	22.60	-145.83	-234.90	-19.70	413.49	367.09	46.40	8.912	
6,600.00	6,579.34	6,588.11	6,579.34	24.17	22.95	-146.49	-234.90	-19.70	420.73	373.61	47.12	8.929	
6,700.00	6,678.96	6,687.73	6,678.96	24.55	23.29	-147.13	-234.90	-19.70	428.02	380.18	47.85	8.946	
6,800.00	6,778.58	6,787.35	6,778.58	24.93	23.64	-147.75	-234.90	-19.70	435.37	386.80	48.57	8.963	
6,900.00	6,878.20	6,886.97	6,878.20	25.31	23.99	-148.36	-234.90	-19.70	442.77	393.47	49.30	8.981	
7,000.00	6,977.82	6,986.59	6,977.82	25.69	24.34	-148.94	-234.90	-19.70	450.21	400.19	50.03	9.000	
7,100.00	7,077.44	7,086.21	7,077.44	26.06	24.69	-149.50	-234.90	-19.70	457.70	406.95	50.75	9.018	
7,200.00	7,177.06	7,185.83	7,177.06	26.44	25.04	-150.04	-234.90	-19.70	465.23	413.75	51.48	9.037	
7,300.00	7,276.68	7,285.45	7,276.68	26.82	25.39	-150.57	-234.90	-19.70	472.80	420.59	52.21	9.056	
7,400.00	7,376.30	7,385.07	7,376.30	27.20	25.74	-151.08	-234.90	-19.70	480.41	427.48	52.93	9.076	
7,500.00	7,475.92	7,484.69	7,475.92	27.58	26.09	-151.57	-234.90	-19.70	488.06	434.39	53.66	9.095	
7,600.00	7,575.54	7,584.31	7,575.54	27.95	26.44	-152.05	-234.90	-19.70	495.74	441.35	54.39	9.114	
7,700.00	7,675.18	7,683.95	7,675.18	28.33	26.79	-152.53	-234.90	-19.70	503.27	448.15	55.12	9.131	
7,800.00	7,775.01	7,783.78	7,775.01	28.70	27.14	-152.87	-234.90	-19.70	508.38	452.55	55.84	9.105	
7,900.00	7,874.98	7,883.75	7,874.98	29.05	27.49	-153.01	-234.90	-19.70	510.40	453.86	56.54	9.027	
8,000.00	7,974.98	7,983.75	7,974.98	29.38	27.84	90.00	-234.90	-19.70	510.44	453.22	57.22	8.921	
8,100.00	8,074.98	8,083.75	8,074.98	29.70	28.19	90.00	-234.90	-19.70	510.44	452.54	57.90	8.816	
8,200.00	8,174.98	8,183.75	8,174.98	30.03	28.55	90.00	-234.90	-19.70	510.44	451.86	58.58	8.714	
8,300.00	8,274.98	8,283.75	8,274.98	30.36	28.90	90.00	-234.90	-19.70	510.44	451.18	59.26	8.614	
8,400.00	8,374.98	8,383.75	8,374.98	30.68	29.25	90.00	-234.90	-19.70	510.44	450.50	59.94	8.516	
8,500.00	8,474.98	8,483.75	8,474.98	31.01	29.61	90.00	-234.90	-19.70	510.44	449.82	60.62	8.421	
8,600.00	8,574.98	8,583.75	8,574.98	31.34	29.96	90.00	-234.90	-19.70	510.44	449.14	61.30	8.327	
8,700.00	8,674.98	8,683.75	8,674.98	31.67	30.31	90.00	-234.90	-19.70	510.44	448.46	61.98	8.235	
8,800.00	8,774.98	8,783.75	8,774.98	32.00	30.66	90.00	-234.90	-19.70	510.44	447.77	62.67	8.145	
8,900.00	8,874.98	8,883.75	8,874.98	32.33	31.02	90.00	-234.90	-19.70	510.44	447.09	63.35	8.057	
9,000.00	8,974.98	8,983.75	8,974.98	32.67	31.37	90.00	-234.90	-19.70	510.44	446.40	64.04	7.971	
9,100.00	9,074.98	9,083.75	9,074.98	33.00	31.73	90.00	-234.90	-19.70	510.44	445.72	64.72	7.886	
9,200.00	9,174.98	9,183.75	9,174.98	33.33	32.08	90.00	-234.90	-19.70	510.44	445.03	65.41	7.804	
9,300.00	9,274.98	9,283.75	9,274.98	33.66	32.43	90.00	-234.90	-19.70	510.44	444.34	66.10	7.723	
9,400.00	9,374.98	9,383.75	9,374.98	34.00	32.79	90.00	-234.90	-19.70	510.44	443.65	66.79	7.643	
9,500.00	9,474.98	9,483.75	9,474.98	34.33	33.14	90.00	-234.90	-19.70	510.44	442.97	67.47	7.565	
9,600.00	9,574.98	9,583.75	9,574.98	34.67	33.49	90.00	-234.90	-19.70	510.44	442.28	68.16	7.489	
9,700.00	9,674.98	9,683.75	9,674.98	35.00	33.85	90.00	-234.90	-19.70	510.44	441.59	68.85	7.414	
9,800.00	9,774.98	9,783.75	9,774.98	35.34	34.20	90.00	-234.90	-19.70	510.44	440.90	69.54	7.340	
9,900.00	9,874.98	9,883.75	9,874.98	35.68	34.56	90.00	-234.90	-19.70	510.44	440.21	70.23	7.268	
10,000.00	9,974.98	9,983.75	9,974.98	36.01	34.91	90.00	-234.90	-19.70	510.44	439.52	70.92	7.197	
10,100.00	10,074.98	10,083.75	10,074.98	36.35	35.27	90.00	-234.90	-19.70	510.44	438.82	71.62	7.127	
10,200.00	10,174.98	10,183.75	10,174.98	36.69	35.62	90.00	-234.90	-19.70	510.44	438.13	72.31	7.059	

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 711H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
10,210.24	10,185.21	10,193.99	10,185.21	36.72	35.66	90.45	-234.90	-19.70	510.44	438.06	72.38	7.052		
10,300.00	10,274.40	10,283.17	10,274.40	37.02	35.97	91.41	-234.90	-19.70	510.59	437.60	72.99	6.995		
10,400.00	10,369.81	10,378.58	10,369.81	37.31	36.31	94.34	-234.90	-19.70	512.16	438.54	73.62	6.957		
10,500.00	10,457.03	10,465.81	10,457.03	37.55	36.62	98.27	-234.90	-19.70	518.42	444.24	74.17	6.989		
10,600.00	10,532.26	10,541.03	10,532.26	37.73	36.89	101.77	-234.90	-19.70	533.81	459.20	74.61	7.154		
10,700.00	10,592.20	10,600.98	10,592.20	37.83	37.10	103.36	-234.90	-19.70	562.38	487.45	74.93	7.505		
10,800.00	10,634.24	10,643.02	10,634.24	37.88	37.25	101.71	-234.90	-19.70	605.98	530.86	75.13	8.066		
10,900.00	10,656.54	10,665.31	10,656.54	37.88	37.33	95.70	-234.90	-19.70	663.51	588.30	75.21	8.823		
11,000.00	10,659.82	10,668.60	10,659.82	37.98	37.34	89.74	-234.90	-19.70	731.35	656.02	75.33	9.708		
11,100.00	10,659.38	10,668.15	10,659.38	38.22	37.34	89.69	-234.90	-19.70	806.00	730.44	75.56	10.667		
11,200.00	10,658.94	10,667.71	10,658.94	38.51	37.34	89.64	-234.90	-19.70	885.65	809.80	75.85	11.676		
11,300.00	10,658.49	10,667.27	10,658.49	38.85	37.34	89.59	-234.90	-19.70	969.09	892.90	76.19	12.720		
11,400.00	10,658.05	10,666.83	10,658.05	39.24	37.33	89.54	-234.90	-19.70	1,055.41	978.84	76.57	13.783		
11,500.00	10,657.61	10,666.38	10,657.61	39.67	37.33	89.49	-234.90	-19.70	1,143.96	1,066.95	77.00	14.856		
11,600.00	10,657.17	10,665.94	10,657.17	40.15	37.33	89.44	-234.90	-19.70	1,234.26	1,156.78	77.48	15.930		
11,700.00	10,656.73	10,665.50	10,656.73	40.67	37.33	89.39	-234.90	-19.70	1,325.95	1,247.95	78.00	16.999		
11,800.00	10,656.28	10,665.06	10,656.28	41.23	37.33	89.34	-234.90	-19.70	1,418.77	1,340.21	78.56	18.059		
11,900.00	10,655.84	10,664.61	10,655.84	41.84	37.33	89.29	-234.90	-19.70	1,512.50	1,433.33	79.16	19.106		
12,000.00	10,655.40	10,664.17	10,655.40	42.48	37.33	89.24	-234.90	-19.70	1,606.98	1,527.18	79.81	20.136		
12,100.00	10,654.96	10,663.73	10,654.96	43.16	37.32	89.19	-234.90	-19.70	1,702.10	1,621.62	80.48	21.148		
12,200.00	10,654.51	10,663.29	10,654.51	43.88	37.32	89.14	-234.90	-19.70	1,797.75	1,716.55	81.20	22.140		
12,300.00	10,654.07	10,662.84	10,654.07	44.63	37.32	89.09	-234.90	-19.70	1,893.85	1,811.90	81.95	23.110		
12,400.00	10,653.63	10,662.40	10,653.63	45.41	37.32	89.04	-234.90	-19.70	1,990.33	1,907.60	82.73	24.058		
12,500.00	10,653.19	14,451.00	12,635.01	46.23	51.69	165.56	1,782.28	-35.30	2,046.47	1,948.55	97.92	20.900		
12,600.00	10,652.74	14,550.99	12,635.34	47.07	52.45	165.57	1,882.27	-36.07	2,047.21	1,947.70	99.52	20.572		
12,700.00	10,652.30	14,650.99	12,635.67	47.94	53.23	165.57	1,982.27	-36.85	2,047.96	1,946.79	101.17	20.242		
12,800.00	10,651.86	14,750.99	12,636.00	48.84	54.04	165.58	2,082.26	-37.62	2,048.71	1,945.83	102.88	19.913		
12,900.00	10,651.42	14,850.99	12,636.33	49.76	54.88	165.58	2,182.25	-38.39	2,049.45	1,944.81	104.64	19.586		
13,000.00	10,650.97	14,950.98	12,636.66	50.71	55.74	165.59	2,282.25	-39.17	2,050.20	1,943.75	106.45	19.260		
13,100.00	10,650.53	15,050.98	12,636.99	51.68	56.62	165.60	2,382.24	-39.94	2,050.95	1,942.65	108.30	18.937		
13,200.00	10,650.09	15,150.98	12,637.33	52.67	57.53	165.60	2,482.23	-40.71	2,051.70	1,941.50	110.20	18.618		
13,300.00	10,649.65	15,250.97	12,637.66	53.68	58.46	165.61	2,582.23	-41.49	2,052.44	1,940.31	112.14	18.303		
13,400.00	10,649.20	15,350.97	12,637.99	54.71	59.40	165.61	2,682.22	-42.26	2,053.19	1,939.08	114.11	17.993		
13,500.00	10,648.76	15,450.97	12,638.32	55.76	60.37	165.62	2,782.21	-43.03	2,053.94	1,937.81	116.13	17.687		
13,600.00	10,648.32	15,550.96	12,638.65	56.82	61.36	165.62	2,882.21	-43.81	2,054.69	1,936.51	118.18	17.386		
13,700.00	10,647.88	15,650.96	12,638.98	57.90	62.36	165.63	2,982.20	-44.58	2,055.43	1,935.17	120.26	17.091		
13,800.00	10,647.43	15,750.96	12,639.31	59.00	63.38	165.63	3,082.19	-45.35	2,056.18	1,933.80	122.38	16.802		
13,900.00	10,646.99	15,850.96	12,639.64	60.11	64.41	165.64	3,182.19	-46.13	2,056.93	1,932.41	124.52	16.519		
14,000.00	10,646.55	15,950.95	12,639.98	61.23	65.46	165.65	3,282.18	-46.90	2,057.68	1,930.98	126.69	16.241		
14,100.00	10,646.11	16,050.95	12,640.31	62.37	66.53	165.65	3,382.18	-47.67	2,058.42	1,929.53	128.90	15.970		
14,200.00	10,645.67	16,150.95	12,640.64	63.51	67.61	165.66	3,482.17	-48.45	2,059.17	1,928.05	131.12	15.704		
14,300.00	10,645.22	16,250.94	12,640.97	64.67	68.70	165.66	3,582.16	-49.22	2,059.92	1,926.54	133.37	15.445		
14,400.00	10,644.78	16,350.94	12,641.30	65.84	69.80	165.67	3,682.16	-49.99	2,060.67	1,925.02	135.65	15.191		
14,500.00	10,644.34	16,450.94	12,641.63	67.03	70.92	165.67	3,782.15	-50.77	2,061.41	1,923.47	137.95	14.944		
14,600.00	10,643.90	16,550.93	12,641.96	68.22	72.05	165.68	3,882.14	-51.54	2,062.16	1,921.90	140.26	14.702		
14,700.00	10,643.45	16,650.93	12,642.29	69.42	73.19	165.68	3,982.14	-52.32	2,062.91	1,920.31	142.60	14.466		
14,800.00	10,643.01	16,750.93	12,642.63	70.63	74.33	165.69	4,082.13	-53.09	2,063.66	1,918.70	144.96	14.236		
14,900.00	10,642.57	16,850.93	12,642.96	71.84	75.49	165.70	4,182.12	-53.86	2,064.40	1,917.07	147.34	14.012		
15,000.00	10,642.13	16,950.92	12,643.29	73.07	76.66	165.70	4,282.12	-54.64	2,065.15	1,915.42	149.73	13.793		
15,100.00	10,641.68	17,050.92	12,643.62	74.30	77.84	165.71	4,382.11	-55.41	2,065.90	1,913.76	152.14	13.579		
15,200.00	10,641.24	17,150.92	12,643.95	75.54	79.02	165.71	4,482.10	-56.18	2,066.65	1,912.08	154.56	13.371		
15,300.00	10,640.80	17,250.91	12,644.28	76.79	80.22	165.72	4,582.10	-56.96	2,067.39	1,910.39	157.00	13.168		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 711H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance								Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
15,400.00	10,640.36	17,350.91	12,644.61	78.04	81.42	165.72	4,682.09	-57.73	2,068.14	1,908.68	159.46	12.970		
15,480.52	10,640.00	17,431.43	12,644.88	78.91	82.39	165.73	4,762.60	-58.35	2,068.74	1,907.44	161.30	12.825		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 712H - OH - Plan 1 11-16-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset +N/-S (usft)	Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.50	0.00	0.00	0.00	-135.48	-30.20	-29.70	42.36					
100.00	100.00	100.50	100.00	0.13	0.13	-135.48	-30.20	-29.70	42.36	42.09	0.27	158.604		
200.00	200.00	200.50	200.00	0.49	0.49	-135.48	-30.20	-29.70	42.36	41.37	0.98	43.046		
300.00	300.00	300.50	300.00	0.85	0.85	-135.48	-30.20	-29.70	42.36	40.66	1.70	24.902		
400.00	400.00	400.50	400.00	1.21	1.21	-135.48	-30.20	-29.70	42.36	39.94	2.42	17.518		
500.00	500.00	500.50	500.00	1.57	1.57	-135.48	-30.20	-29.70	42.36	39.22	3.13	13.512		
600.00	600.00	600.50	600.00	1.92	1.93	-135.48	-30.20	-29.70	42.36	38.51	3.85	10.997		
700.00	700.00	700.50	700.00	2.28	2.29	-135.48	-30.20	-29.70	42.36	37.79	4.57	9.271		
800.00	800.00	800.50	800.00	2.64	2.64	-135.48	-30.20	-29.70	42.36	37.07	5.29	8.014		
900.00	900.00	900.50	900.00	3.00	3.00	-135.48	-30.20	-29.70	42.36	36.35	6.00	7.056		
1,000.00	1,000.00	1,000.50	1,000.00	3.36	3.36	-135.48	-30.20	-29.70	42.36	35.64	6.72	6.304		
1,100.00	1,099.98	1,100.48	1,099.98	3.71	3.72	-25.51	-30.20	-29.70	40.78	33.35	7.42	5.492		
1,200.00	1,199.84	1,200.34	1,199.84	4.05	4.08	-29.13	-30.20	-29.70	36.12	28.00	8.12	4.447		
1,300.00	1,299.49	1,299.99	1,299.49	4.39	4.43	-37.10	-30.20	-29.70	29.16	20.34	8.83	3.305		
1,400.00	1,399.11	1,399.61	1,399.11	4.74	4.79	-50.40	-30.20	-29.70	22.81	13.28	9.53	2.393		
1,500.00	1,498.73	1,499.23	1,498.73	5.10	5.15	-71.60	-30.20	-29.70	18.50	8.26	10.24	1.806		
1,567.23	1,565.71	1,566.21	1,565.71	5.34	5.39	-90.00	-30.20	-29.70	17.55	6.83	10.73	1.636 CC		
1,600.00	1,598.35	1,598.85	1,598.35	5.45	5.51	-99.21	-30.20	-29.70	17.78	6.82	10.96	1.622 ES, SF		
1,700.00	1,697.97	1,698.47	1,697.97	5.81	5.86	-123.30	-30.20	-29.70	21.02	9.34	11.68	1.800		
1,800.00	1,797.59	1,798.09	1,797.59	6.18	6.22	-139.03	-30.20	-29.70	26.83	14.43	12.40	2.164		
1,900.00	1,897.21	1,897.71	1,897.21	6.54	6.58	-148.72	-30.20	-29.70	33.90	20.78	13.12	2.584		
2,000.00	1,996.83	1,997.33	1,996.83	6.91	6.93	-154.96	-30.20	-29.70	41.60	27.76	13.84	3.005		
2,100.00	2,096.45	2,098.20	2,097.69	7.28	7.28	-157.97	-31.30	-30.97	48.39	33.83	14.56	3.324		
2,200.00	2,196.07	2,199.45	2,198.79	7.64	7.62	-157.76	-34.73	-34.95	52.60	37.34	15.26	3.447		
2,300.00	2,295.69	2,300.10	2,299.09	8.01	7.95	-155.39	-40.18	-41.26	54.57	38.60	15.97	3.417		
2,400.00	2,395.31	2,400.06	2,398.67	8.38	8.29	-152.87	-45.87	-47.87	56.31	39.63	16.68	3.377		
2,500.00	2,494.93	2,500.01	2,498.24	8.76	8.63	-150.51	-51.57	-54.47	58.16	40.77	17.39	3.344		
2,600.00	2,594.55	2,599.97	2,597.81	9.13	8.98	-148.30	-57.26	-61.07	60.09	41.99	18.11	3.319		
2,700.00	2,694.17	2,699.92	2,697.39	9.50	9.33	-146.22	-62.96	-67.67	62.12	43.29	18.83	3.300		
2,800.00	2,793.78	2,799.88	2,796.96	9.87	9.68	-144.28	-68.66	-74.28	64.22	44.67	19.55	3.285		
2,900.00	2,893.40	2,899.83	2,896.54	10.25	10.03	-142.47	-74.35	-80.88	66.38	46.11	20.27	3.274		
3,000.00	2,993.02	2,999.79	2,996.11	10.62	10.38	-140.77	-80.05	-87.48	68.61	47.61	21.00	3.267		
3,100.00	3,092.64	3,099.74	3,095.68	10.99	10.74	-139.18	-85.74	-94.08	70.90	49.17	21.73	3.263		
3,200.00	3,192.26	3,199.70	3,195.26	11.37	11.09	-137.69	-91.44	-100.68	73.24	50.77	22.46	3.260		
3,300.00	3,291.88	3,299.65	3,294.83	11.74	11.45	-136.29	-97.13	-107.29	75.62	52.42	23.20	3.260		
3,400.00	3,391.50	3,399.61	3,394.41	12.12	11.81	-134.98	-102.83	-113.89	78.05	54.12	23.93	3.261		
3,500.00	3,491.12	3,499.56	3,493.98	12.49	12.17	-133.75	-108.53	-120.49	80.51	55.84	24.67	3.264		
3,600.00	3,590.74	3,599.52	3,593.55	12.87	12.54	-132.59	-114.22	-127.09	83.01	57.61	25.40	3.268		
3,700.00	3,690.36	3,699.47	3,693.13	13.24	12.90	-131.50	-119.92	-133.70	85.54	59.40	26.14	3.272		
3,800.00	3,789.98	3,799.43	3,792.70	13.62	13.26	-130.48	-125.61	-140.30	88.10	61.22	26.88	3.277		
3,900.00	3,889.60	3,899.38	3,892.28	14.00	13.63	-129.51	-131.31	-146.90	90.69	63.07	27.62	3.283		
4,000.00	3,989.22	3,999.34	3,991.85	14.37	13.99	-128.60	-137.01	-153.50	93.30	64.93	28.37	3.289		
4,100.00	4,088.84	4,099.29	4,091.43	14.75	14.36	-127.73	-142.70	-160.11	95.93	66.83	29.11	3.296		
4,200.00	4,188.46	4,199.25	4,191.00	15.12	14.73	-126.91	-148.40	-166.71	98.59	68.74	29.85	3.303		
4,300.00	4,288.08	4,299.20	4,290.57	15.50	15.09	-126.14	-154.09	-173.31	101.26	70.67	30.60	3.310		
4,400.00	4,387.70	4,399.16	4,390.15	15.88	15.46	-125.40	-159.79	-179.91	103.95	72.61	31.34	3.317		
4,500.00	4,487.32	4,499.11	4,489.72	16.25	15.83	-124.71	-165.48	-186.51	106.66	74.58	32.09	3.324		
4,600.00	4,586.94	4,599.08	4,589.30	16.63	16.20	-118.16	-171.18	-193.12	109.09	76.26	32.83	3.323		
4,700.00	4,686.56	4,699.06	4,688.90	17.01	16.57	-117.76	-176.88	-199.72	111.04	77.46	33.58	3.307		
4,800.00	4,786.18	4,799.03	4,788.50	17.38	16.94	-117.37	-182.58	-206.32	112.99	78.67	34.32	3.292		
4,900.00	4,885.80	4,899.01	4,888.10	17.76	17.31	-117.00	-188.27	-212.93	114.95	79.88	35.07	3.278		
5,000.00	4,985.42	4,998.99	4,987.69	18.14	17.68	-116.64	-193.97	-219.53	116.91	81.09	35.82	3.264		

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 712H - OH - Plan 1 11-16-17													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,100.00	5,085.04	5,098.97	5,087.29	18.51	18.05	-116.29	-199.67	-226.14	118.88	82.31	36.57	3.251		
5,200.00	5,184.66	5,198.95	5,186.89	18.89	18.42	-115.95	-205.36	-232.74	120.85	83.53	37.32	3.239		
5,300.00	5,284.28	5,298.92	5,286.48	19.27	18.80	-115.62	-211.06	-239.34	122.82	84.76	38.06	3.227		
5,400.00	5,383.90	5,398.90	5,386.08	19.64	19.17	-115.31	-216.76	-245.95	124.80	85.99	38.81	3.215		
5,500.00	5,483.52	5,498.88	5,485.68	20.02	19.54	-115.00	-222.46	-252.55	126.78	87.22	39.56	3.205		
5,600.00	5,583.14	5,598.86	5,585.27	20.40	19.91	-114.71	-228.15	-259.16	128.77	88.45	40.31	3.194		
5,700.00	5,682.76	5,698.28	5,684.37	20.78	20.28	-114.74	-233.34	-265.17	130.90	89.84	41.06	3.188		
5,800.00	5,782.38	5,797.26	5,783.24	21.15	20.64	-116.12	-236.40	-268.72	133.69	91.89	41.79	3.199		
5,900.00	5,882.00	5,896.03	5,882.00	21.53	20.98	-118.82	-237.25	-269.70	137.40	94.89	42.51	3.232		
6,000.00	5,981.62	5,995.65	5,981.62	21.91	21.32	-121.89	-237.25	-269.70	141.82	98.59	43.23	3.281		
6,100.00	6,081.24	6,095.27	6,081.24	22.29	21.65	-124.78	-237.25	-269.70	146.61	102.68	43.94	3.337		
6,200.00	6,180.86	6,194.89	6,180.86	22.66	21.99	-127.47	-237.25	-269.70	151.76	107.11	44.65	3.399		
6,300.00	6,280.48	6,294.51	6,280.48	23.04	22.33	-129.98	-237.25	-269.70	157.22	111.85	45.37	3.465		
6,400.00	6,380.10	6,394.13	6,380.10	23.42	22.67	-132.33	-237.25	-269.70	162.97	116.88	46.09	3.536		
6,500.00	6,479.72	6,493.75	6,479.72	23.80	23.01	-134.51	-237.25	-269.70	168.97	122.16	46.80	3.610		
6,600.00	6,579.34	6,593.37	6,579.34	24.17	23.35	-136.53	-237.25	-269.70	175.19	127.67	47.52	3.687		
6,700.00	6,678.96	6,692.99	6,678.96	24.55	23.69	-138.42	-237.25	-269.70	181.62	133.38	48.24	3.765		
6,800.00	6,778.58	6,792.61	6,778.58	24.93	24.03	-140.18	-237.25	-269.70	188.23	139.28	48.96	3.845		
6,900.00	6,878.20	6,892.23	6,878.20	25.31	24.37	-141.81	-237.25	-269.70	195.01	145.34	49.67	3.926		
7,000.00	6,977.82	6,991.85	6,977.82	25.69	24.71	-143.34	-237.25	-269.70	201.94	151.54	50.39	4.007		
7,100.00	7,077.44	7,091.47	7,077.44	26.06	25.05	-144.76	-237.25	-269.70	208.99	157.88	51.11	4.089		
7,200.00	7,177.06	7,191.09	7,177.06	26.44	25.39	-146.09	-237.25	-269.70	216.17	164.34	51.83	4.171		
7,300.00	7,276.68	7,290.71	7,276.68	26.82	25.73	-147.34	-237.25	-269.70	223.46	170.91	52.55	4.252		
7,400.00	7,376.30	7,390.33	7,376.30	27.20	26.08	-148.50	-237.25	-269.70	230.85	177.57	53.27	4.333		
7,500.00	7,475.92	7,489.95	7,475.92	27.58	26.42	-149.59	-237.25	-269.70	238.32	184.33	54.00	4.414		
7,600.00	7,575.54	7,589.57	7,575.54	27.95	26.76	-150.62	-237.25	-269.70	245.88	191.16	54.72	4.494		
7,700.00	7,675.18	7,689.21	7,675.18	28.33	27.11	-151.59	-237.25	-269.70	253.32	197.88	55.44	4.569		
7,800.00	7,775.01	7,789.04	7,775.01	28.70	27.45	-152.24	-237.25	-269.70	258.40	202.25	56.15	4.602		
7,900.00	7,874.98	7,889.01	7,874.98	29.05	27.80	-152.49	-237.25	-269.70	260.42	203.57	56.85	4.581		
8,000.00	7,974.98	7,989.01	7,974.98	29.38	28.15	90.51	-237.25	-269.70	260.45	202.93	57.52	4.528		
8,100.00	8,074.98	8,089.01	8,074.98	29.70	28.49	90.51	-237.25	-269.70	260.45	202.25	58.20	4.475		
8,200.00	8,174.98	8,189.01	8,174.98	30.03	28.84	90.51	-237.25	-269.70	260.45	201.58	58.87	4.424		
8,300.00	8,274.98	8,289.01	8,274.98	30.36	29.19	90.51	-237.25	-269.70	260.45	200.91	59.54	4.374		
8,400.00	8,374.98	8,389.01	8,374.98	30.68	29.54	90.51	-237.25	-269.70	260.45	200.23	60.22	4.325		
8,500.00	8,474.98	8,489.01	8,474.98	31.01	29.88	90.51	-237.25	-269.70	260.45	199.55	60.90	4.277		
8,600.00	8,574.98	8,589.01	8,574.98	31.34	30.23	90.51	-237.25	-269.70	260.45	198.88	61.57	4.230		
8,700.00	8,674.98	8,689.01	8,674.98	31.67	30.58	90.51	-237.25	-269.70	260.45	198.20	62.25	4.184		
8,800.00	8,774.98	8,789.01	8,774.98	32.00	30.93	90.51	-237.25	-269.70	260.45	197.52	62.93	4.139		
8,900.00	8,874.98	8,889.01	8,874.98	32.33	31.28	90.51	-237.25	-269.70	260.45	196.84	63.61	4.094		
9,000.00	8,974.98	8,989.01	8,974.98	32.67	31.63	90.51	-237.25	-269.70	260.45	196.16	64.29	4.051		
9,100.00	9,074.98	9,089.01	9,074.98	33.00	31.97	90.51	-237.25	-269.70	260.45	195.48	64.97	4.009		
9,200.00	9,174.98	9,189.01	9,174.98	33.33	32.32	90.51	-237.25	-269.70	260.45	194.79	65.66	3.967		
9,300.00	9,274.98	9,289.01	9,274.98	33.66	32.67	90.51	-237.25	-269.70	260.45	194.11	66.34	3.926		
9,400.00	9,374.98	9,389.01	9,374.98	34.00	33.02	90.51	-237.25	-269.70	260.45	193.43	67.02	3.886		
9,500.00	9,474.98	9,489.01	9,474.98	34.33	33.37	90.51	-237.25	-269.70	260.45	192.74	67.71	3.847		
9,600.00	9,574.98	9,589.01	9,574.98	34.67	33.72	90.51	-237.25	-269.70	260.45	192.06	68.39	3.808		
9,700.00	9,674.98	9,689.01	9,674.98	35.00	34.07	90.51	-237.25	-269.70	260.45	191.37	69.08	3.770		
9,800.00	9,774.98	9,789.01	9,774.98	35.34	34.42	90.51	-237.25	-269.70	260.45	190.69	69.76	3.733		
9,900.00	9,874.98	9,889.01	9,874.98	35.68	34.78	90.51	-237.25	-269.70	260.45	190.00	70.45	3.697		
10,000.00	9,974.98	9,989.01	9,974.98	36.01	35.13	90.51	-237.25	-269.70	260.45	189.31	71.14	3.661		
10,100.00	10,074.98	10,089.01	10,074.98	36.35	35.48	90.51	-237.25	-269.70	260.45	188.62	71.83	3.626		
10,200.00	10,174.98	10,189.01	10,174.98	36.69	35.83	90.51	-237.25	-269.70	260.45	187.93	72.52	3.592		

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



Phoenix Technology Services LP

Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 712H - OH - Plan 1 11-16-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
10,207.85	10,182.82	10,196.86	10,182.82	36.71	35.86	90.96	-237.25	-269.70	260.45	187.88	72.57	3.589	
10,300.00	10,274.40	10,288.43	10,274.40	37.02	36.18	92.85	-237.25	-269.70	260.75	187.56	73.19	3.562	
10,400.00	10,369.81	10,383.84	10,369.81	37.31	36.51	98.55	-237.25	-269.70	263.87	190.05	73.82	3.574	
10,500.00	10,457.03	10,471.07	10,457.03	37.55	36.82	105.97	-237.25	-269.70	275.89	201.52	74.37	3.710	
10,600.00	10,532.26	10,546.29	10,532.26	37.73	37.08	112.28	-237.25	-269.70	303.93	229.12	74.81	4.063	
10,700.00	10,592.20	10,606.24	10,592.20	37.83	37.29	115.01	-237.25	-269.70	351.80	276.67	75.13	4.683	
10,800.00	10,634.24	10,648.28	10,634.24	37.88	37.44	112.14	-237.25	-269.70	418.07	342.75	75.32	5.551	
10,900.00	10,656.54	10,670.57	10,656.54	37.88	37.52	101.09	-237.25	-269.70	497.89	422.49	75.40	6.604	
11,000.00	10,659.82	10,673.86	10,659.82	37.98	37.53	89.49	-237.25	-269.70	585.33	509.81	75.52	7.750	
11,100.00	10,659.38	10,673.41	10,659.38	38.22	37.53	89.39	-237.25	-269.70	676.36	600.61	75.75	8.929	
11,200.00	10,658.94	10,672.97	10,658.94	38.51	37.53	89.30	-237.25	-269.70	769.61	693.57	76.04	10.121	
11,300.00	10,658.49	10,672.53	10,658.49	38.85	37.53	89.20	-237.25	-269.70	864.37	787.99	76.38	11.317	
11,400.00	10,658.05	10,672.09	10,658.05	39.24	37.53	89.10	-237.25	-269.70	960.20	883.43	76.77	12.508	
11,500.00	10,657.61	10,671.64	10,657.61	39.67	37.52	89.00	-237.25	-269.70	1,056.80	979.60	77.20	13.690	
11,600.00	10,657.17	10,671.20	10,657.17	40.15	37.52	88.91	-237.25	-269.70	1,153.98	1,076.30	77.67	14.857	
11,700.00	10,656.73	10,670.76	10,656.73	40.67	37.52	88.81	-237.25	-269.70	1,251.60	1,173.41	78.19	16.007	
11,800.00	10,656.28	10,670.32	10,656.28	41.23	37.52	88.71	-237.25	-269.70	1,349.57	1,270.82	78.75	17.137	
11,900.00	10,655.84	10,669.87	10,655.84	41.84	37.52	88.61	-237.25	-269.70	1,447.82	1,368.46	79.36	18.245	
12,000.00	10,655.40	10,669.43	10,655.40	42.48	37.52	88.52	-237.25	-269.70	1,546.29	1,466.29	80.00	19.329	
12,100.00	10,654.96	10,668.99	10,654.96	43.16	37.52	88.42	-237.25	-269.70	1,644.95	1,564.27	80.68	20.390	
12,200.00	10,654.51	10,668.55	10,654.51	43.88	37.51	88.32	-237.25	-269.70	1,743.76	1,662.37	81.39	21.425	
12,300.00	10,654.07	10,668.10	10,654.07	44.63	37.51	88.22	-237.25	-269.70	1,842.70	1,760.56	82.14	22.434	
12,400.00	10,653.63	10,667.66	10,653.63	45.41	37.51	88.13	-237.25	-269.70	1,941.74	1,858.82	82.92	23.417	
12,500.00	10,653.19	10,667.22	10,653.19	46.23	37.51	88.03	-237.25	-269.70	2,040.88	1,957.15	83.73	24.373	
12,600.00	10,652.74	10,666.79	10,652.74	47.07	52.76	172.82	1,893.76	-286.18	2,082.62	1,982.78	99.83	20.861	
12,700.00	10,652.30	10,666.35	10,652.30	47.94	53.55	172.82	1,993.75	-286.95	2,082.73	1,981.24	101.49	20.522	
12,800.00	10,651.86	10,665.91	10,651.86	48.84	54.35	172.82	2,093.75	-287.72	2,082.84	1,979.64	103.19	20.184	
12,900.00	10,651.42	10,665.47	10,651.42	49.76	55.19	172.82	2,193.74	-288.49	2,082.94	1,978.00	104.95	19.847	
13,000.00	10,650.97	10,665.03	10,650.97	50.71	56.04	172.82	2,293.74	-289.27	2,083.05	1,976.30	106.75	19.513	
13,100.00	10,650.53	10,664.59	10,650.53	51.68	56.92	172.82	2,393.74	-290.04	2,083.16	1,974.56	108.60	19.181	
13,200.00	10,650.09	10,664.15	10,650.09	52.67	57.83	172.83	2,493.73	-290.81	2,083.27	1,972.77	110.50	18.854	
13,300.00	10,649.65	10,663.71	10,649.65	53.68	58.75	172.83	2,593.73	-291.59	2,083.38	1,970.95	112.43	18.530	
13,400.00	10,649.20	10,663.27	10,649.20	54.71	59.70	172.83	2,693.73	-292.36	2,083.49	1,969.08	114.41	18.211	
13,500.00	10,648.76	10,662.83	10,648.76	55.76	60.66	172.83	2,793.72	-293.13	2,083.60	1,967.18	116.42	17.898	
13,600.00	10,648.32	10,662.39	10,648.32	56.82	61.64	172.83	2,893.72	-293.91	2,083.71	1,965.24	118.46	17.589	
13,700.00	10,647.88	10,661.95	10,647.88	57.90	62.64	172.83	2,993.72	-294.68	2,083.82	1,963.27	120.54	17.287	
13,800.00	10,647.43	10,661.51	10,647.43	59.00	63.66	172.83	3,093.71	-295.45	2,083.93	1,961.27	122.66	16.990	
13,900.00	10,646.99	10,661.07	10,646.99	60.11	64.69	172.83	3,193.71	-296.23	2,084.04	1,959.24	124.80	16.699	
14,000.00	10,646.55	10,660.63	10,646.55	61.23	65.74	172.83	3,293.70	-297.00	2,084.14	1,957.17	126.97	16.414	
14,100.00	10,646.11	10,660.19	10,646.11	62.37	66.80	172.83	3,393.70	-297.77	2,084.25	1,955.09	129.17	16.136	
14,200.00	10,645.67	10,659.75	10,645.67	63.51	67.88	172.83	3,493.70	-298.54	2,084.36	1,952.97	131.39	15.864	
14,300.00	10,645.22	10,659.31	10,645.22	64.67	68.97	172.83	3,593.69	-299.32	2,084.47	1,950.83	133.64	15.598	
14,400.00	10,644.78	10,658.87	10,644.78	65.84	70.07	172.83	3,693.69	-300.09	2,084.58	1,948.67	135.91	15.338	
14,500.00	10,644.34	10,658.43	10,644.34	67.03	71.18	172.83	3,793.69	-300.86	2,084.69	1,946.48	138.21	15.084	
14,600.00	10,643.90	10,657.99	10,643.90	68.22	72.31	172.83	3,893.68	-301.64	2,084.80	1,944.28	140.52	14.836	
14,700.00	10,643.45	10,657.55	10,643.45	69.42	73.44	172.83	3,993.68	-302.41	2,084.91	1,942.05	142.86	14.594	
14,800.00	10,643.01	10,657.11	10,643.01	70.63	74.59	172.83	4,093.68	-303.18	2,085.02	1,939.80	145.21	14.358	
14,900.00	10,642.57	10,656.67	10,642.57	71.84	75.74	172.84	4,193.67	-303.96	2,085.13	1,937.54	147.59	14.128	
15,000.00	10,642.13	10,656.23	10,642.13	73.07	76.91	172.84	4,293.67	-304.73	2,085.23	1,935.26	149.98	13.904	
15,100.00	10,641.68	10,655.79	10,641.68	74.30	78.08	172.84	4,393.67	-305.50	2,085.34	1,932.96	152.38	13.685	
15,200.00	10,641.24	10,655.35	10,641.24	75.54	79.27	172.84	4,493.66	-306.28	2,085.45	1,930.65	154.81	13.471	
15,300.00	10,640.80	10,654.91	10,640.80	76.79	80.46	172.84	4,593.66	-307.05	2,085.56	1,928.32	157.24	13.263	

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



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 407H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Reference Site:	Dominator 25 Federal	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	407H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 1 11-16-17	Offset TVD Reference:	Reference Datum

Offset Design Dominator 25 Federal - 712H - OH - Plan 1 11-16-17												Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM												Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
15,400.00	10,640.36	17,464.69	12,709.74	78.04	81.66	172.84	4,693.65	-307.82	2,085.67	1,925.97	159.70	13.060	
15,480.52	10,640.00	17,538.71	12,709.50	78.91	82.48	172.84	4,767.68	-308.39	2,085.77	1,924.37	161.39	12.923	

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



Phoenix Technology Services LP

Anticollision Report



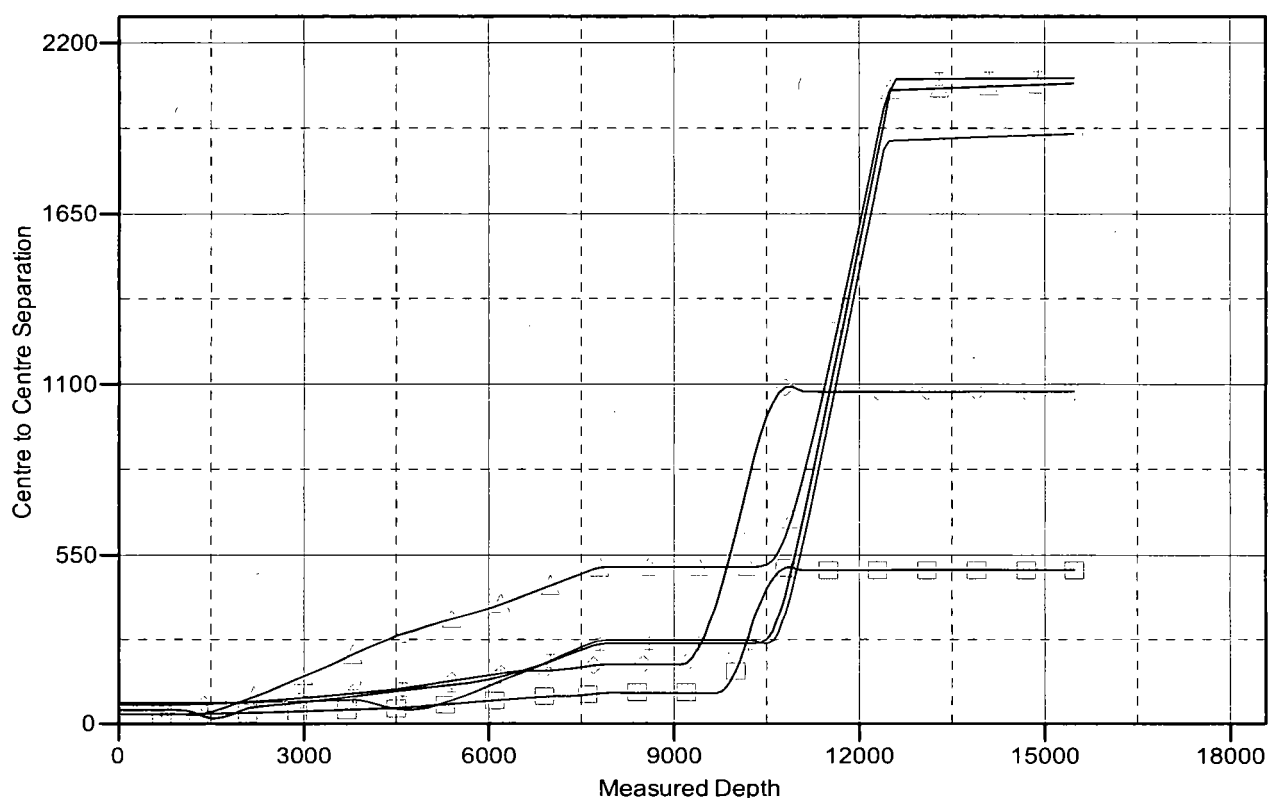
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Dominator 25 Federal
Site Error: 0.00 usft
Reference Well: 407H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 11-16-17

Local Co-ordinate Reference: Well 407H
TVD Reference: GL + KB @ 3364.50usft (McVay 8)
MD Reference: GL + KB @ 3364.50usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Reference Depths are relative to GL + KB @ 3364.50usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 407H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.43°

Ladder Plot



LEGEND

▲ 711H, OH, Plan 1 11-16-17 V0 ● 608H, OH, Plan 1 11-16-17 V0 ◆ 107H, OH, Plan 1 11-16-17 V0
■ 712H, OH, Plan 1 11-16-17 V0 □ 307H, OH, Plan 1 11-16-17 V0

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



Phoenix Technology Services LP

Anticollision Report



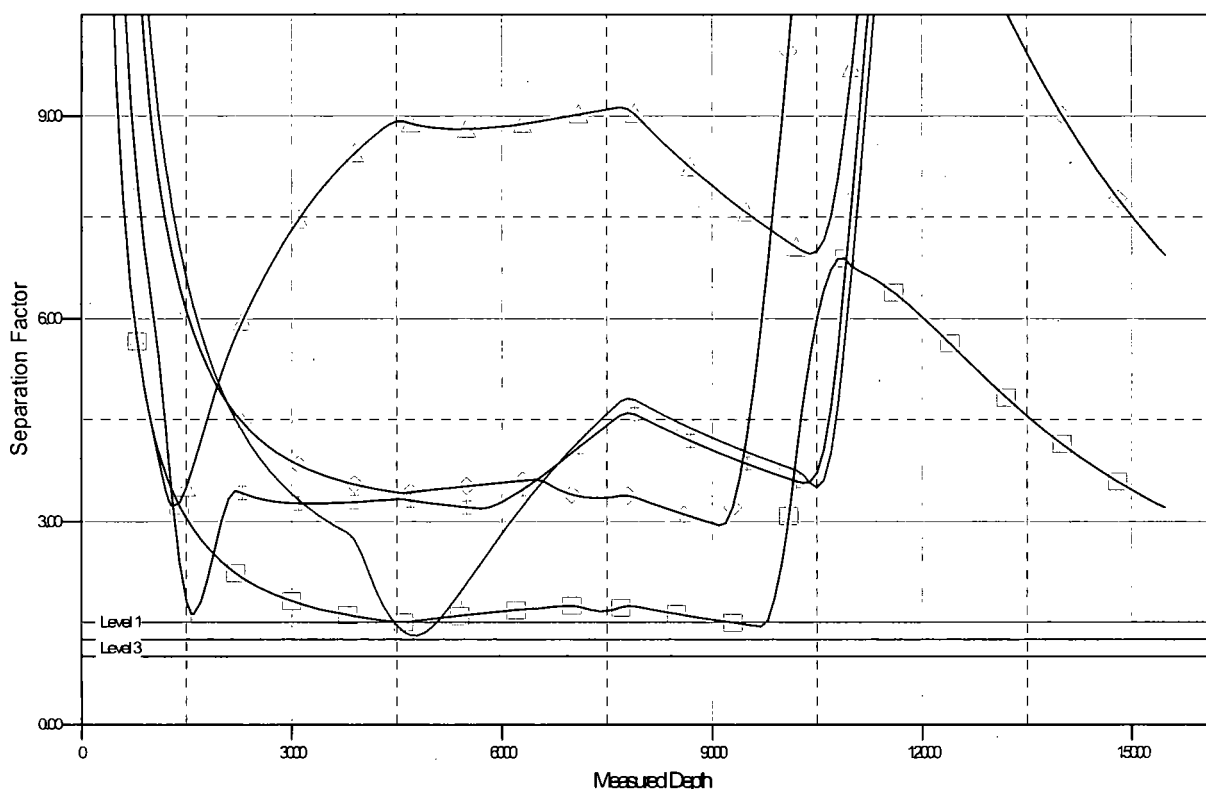
Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Reference Site: Dominator 25 Federal
Site Error: 0.00 usft
Reference Well: 407H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 1 11-16-17

Local Co-ordinate Reference: Well 407H
TVD Reference: GL + KB @ 3364.50usft (McVay 8)
MD Reference: GL + KB @ 3364.50usft (McVay 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Reference Depths are relative to GL + KB @ 3364.50usft (McVay 8)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 407H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.43°

Separation Factor Plot



LEGEND

▲ 711H, OH, Plan 1 11-16-17 V0 ● 608H, OH, Plan 1 11-16-17 V0 ◆ 107H, OH, Plan 1 11-16-17 V0
◆ 712H, OH, Plan 1 11-16-17 V0 ■ 307H, OH, Plan 1 11-16-17 V0

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



Project: Lea County, NM (NAD27 NME)
Site: Dominator 25 Federal
Well: 407H
Wellbore: OH
Design: Plan 1 11-16-17
Rig: McVay 8



PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.43°
Magnetic North: 6.36°
Magnetic Field
Strength: 47930.0nT
Dip Angle: 58.82°
Date: 11/15/2017
Model: HDGM

WELL DETAILS

GL - KB @ 3364.50usft (McVay 8)
Ground Level: 3338.50

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Dominator 25 Federal 407H	10640.00	4765.30	-568.40	403971.30	748451.10	32° 5' 29.12842 N	103° 31' 51.35944 W
LTP - Dominator 25 Federal 407H	10640.00	4635.35	-567.38	403841.35	748452.12	32° 6' 27.84240 N	103° 31' 51.35880 W
FTP - Dominator 25 Federal 407H	10660.00	15.74	-532.07	399221.74	748487.43	32° 5' 42.12600 N	103° 31' 51.34800 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	TFace	VSec	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2	1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00	0.00	Hold 5.00° Inc at 249.00° Azm
3	1250.00	5.00	249.00	1249.68	-3.91	-10.18	2.00	249.00	-2.67	-2.67	Begin 2.00°/100' Turn
4	4550.00	5.00	249.00	4537.13	-106.98	-278.69	0.00	0.00	-73.22	-73.22	Hold 243.01° Azm
5	4576.10	5.00	243.01	4563.12	-107.90	-280.76	2.00	-93.50	-73.89	-73.89	Begin 2.00°/100' Drop
6	7665.28	5.00	243.01	7640.55	-229.99	-520.44	0.00	0.00	-166.73	-166.73	Begin Vertical Hold
7	7915.02	0.00	0.00	7890.00	-234.93	-530.14	2.00	180.00	-170.49	-170.49	KOP2, Begin 12.00°/100' Build
8	10207.56	0.00	0.00	10182.54	-234.93	-530.14	0.00	0.00	-170.49	-170.49	LP, Hold 90.25° Inc at 359.56° Azm
9	10959.68	90.25	359.56	10960.00	234.63	-533.81	12.00	359.56	306.14	306.14	FTP - Dominator 25 Federal 407H
10	15480.52	90.25	359.56	10640.00	4765.30	-568.40	0.00	0.00	4799.08	4799.08	BHL - Dominator 25 Federal 407H

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

Local Origin: Well 407H, Grid North

Latitude: 32° 5' 41.93101 N
Longitude: 103° 31' 45.16466 W

Grid East: 749019.50
Grid North: 399206.00
Scale Factor: 1.000

Geomagnetic Model: HDGM

Sample Date: 15-Nov-17

Magnetic Declination: 6.78°

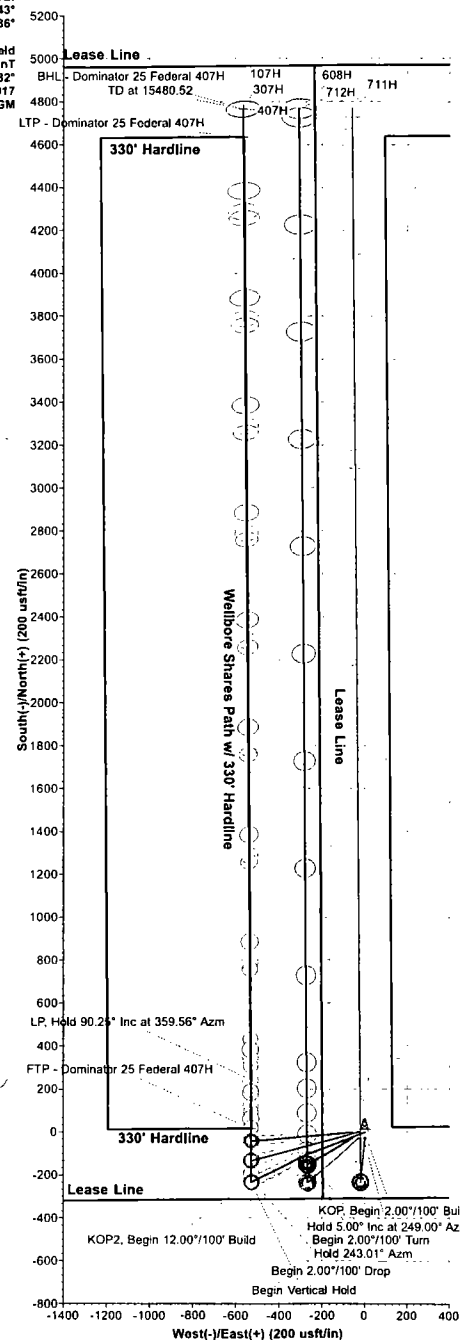
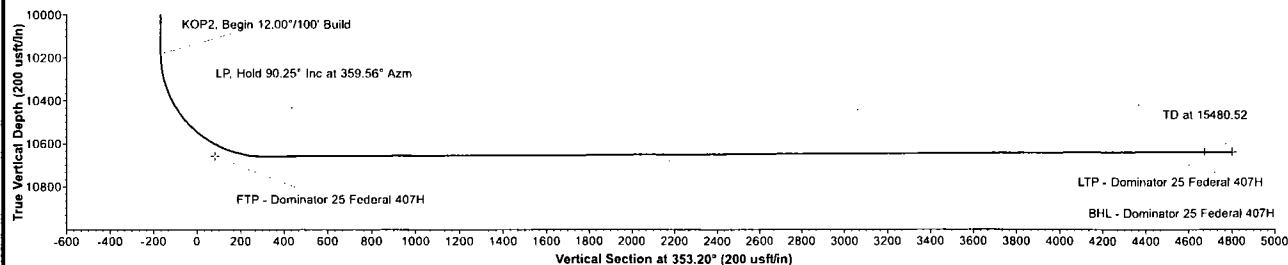
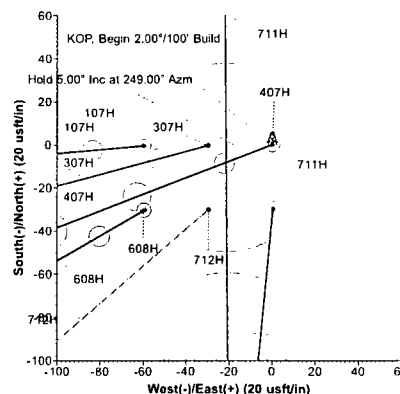
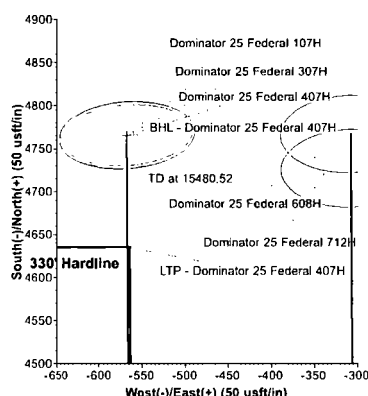
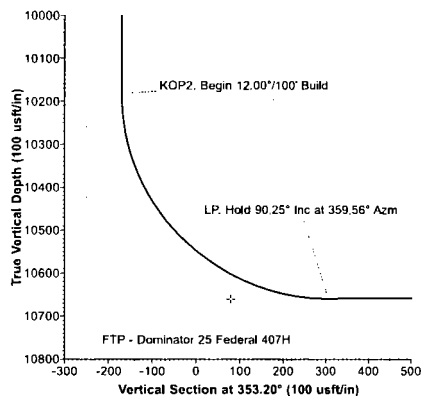
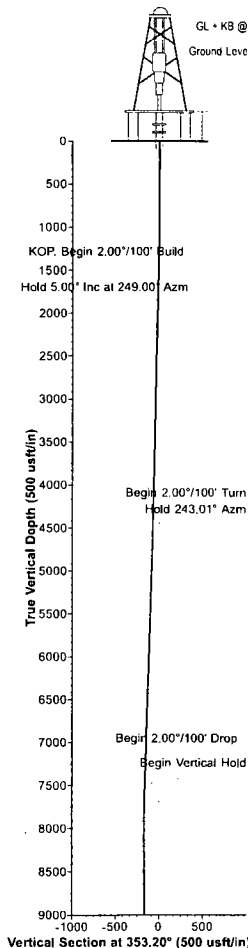
Dip Angle from Horizontal: 59.82°

Magnetic Field Strength: 47930

To convert a Magnetic Direction to a Grid Direction, Add 6.36°
To convert a Magnetic Direction to a True Direction, Add 6.78° East
To convert a True Direction to a Grid Direction, Subtract 0.43°

LEGEND

— 711H, OH, Plan 1 11-16-17 V0
— 712H, OH, Plan 1 11-16-17 V0
— 608H, OH, Plan 1 11-16-17 V0
— 307H, OH, Plan 1 11-16-17 V0
— 107H, OH, Plan 1 11-16-17 V0
— Plan 1 11-16-17





COG Operating LLC

Lea County, NM (NAD27 NME)

Dominator 25 Federal

407H

OH

Plan: Plan 1 11-16-17

Standard Planning Report

16 November, 2017





Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 407H
Company:	COG Operating LLC	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site:	Dominator 25 Federal	North Reference:	Grid
Well:	407H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 11-16-17		

Project	Lea County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Dominator 25 Federal		
Site Position:		Northing:	399,205.50 usft
From:	Map	Easting:	748,959.60 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 5' 41.93048 N
		Longitude:	103° 31' 45.86098 W
		Grid Convergence:	0.43 °

Well	407H		
Well Position	+N/-S	0.50 usft	Northing:
	+E/-W	59.90 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 5' 41.93101 N
		Longitude:	103° 31' 45.16466 W
		Ground Level:	3,338.50 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	11/15/2017	6.78
			Dip Angle
			(°)
			59.82
			Field Strength
			(nT)
			47,930

Design	Plan 1 11-16-17		
Audit Notes:			
Version:	Phase:	PROTOTYPE	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			353.20

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 (°)
0.00	0.00	0.00	0.00	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
1,250.00	5.00	249.00	1,249.68	-3.91	-10.18	2.00	2.00	0.00	249.00
4,550.00	5.00	249.00	4,537.13	-106.98	-278.69	0.00	0.00	0.00	0.00
4,576.10	5.00	243.01	4,563.12	-107.90	-280.76	2.00	-0.02	-22.97	-93.50
7,665.26	5.00	243.01	7,640.55	-229.99	-520.44	0.00	0.00	0.00	0.00
7,915.02	0.00	0.01	7,890.00	-234.93	-530.14	2.00	-2.00	0.00	180.00
10,207.56	0.00	0.01	10,182.54	-234.93	-530.14	0.00	0.00	0.00	0.01
10,959.68	90.25	359.56	10,660.00	244.63	-533.81	12.00	12.00	-0.06	359.56
15,480.52	90.25	359.56	10,640.00	4,765.30	-568.40	0.00	0.00	0.00	0.00
									0.00 BHL - Dominator 25



Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 407H
Company:	COG Operating LLC	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site:	Dominator 25 Federal	North Reference:	Grid
Well:	407H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 11-16-17		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
1,100.00	2.00	249.00	1,099.98	-0.63	-1.63	-0.43	2.00	2.00	0.00
1,200.00	4.00	249.00	1,199.84	-2.50	-6.51	-1.71	2.00	2.00	0.00
1,250.00	5.00	249.00	1,249.68	-3.91	-10.18	-2.67	2.00	2.00	0.00
Hold 5.00° Inc at 249.00° Azm									
1,300.00	5.00	249.00	1,299.49	-5.47	-14.25	-3.74	0.00	0.00	0.00
1,400.00	5.00	249.00	1,399.11	-8.59	-22.38	-5.88	0.00	0.00	0.00
1,500.00	5.00	249.00	1,498.73	-11.72	-30.52	-8.02	0.00	0.00	0.00
1,600.00	5.00	249.00	1,598.35	-14.84	-38.66	-10.16	0.00	0.00	0.00
1,700.00	5.00	249.00	1,697.97	-17.96	-46.79	-12.29	0.00	0.00	0.00
1,800.00	5.00	249.00	1,797.59	-21.09	-54.93	-14.43	0.00	0.00	0.00
1,900.00	5.00	249.00	1,897.21	-24.21	-63.07	-16.57	0.00	0.00	0.00
2,000.00	5.00	249.00	1,996.83	-27.33	-71.20	-18.71	0.00	0.00	0.00
2,100.00	5.00	249.00	2,096.45	-30.46	-79.34	-20.84	0.00	0.00	0.00
2,200.00	5.00	249.00	2,196.07	-33.58	-87.48	-22.98	0.00	0.00	0.00
2,300.00	5.00	249.00	2,295.69	-36.70	-95.61	-25.12	0.00	0.00	0.00
2,400.00	5.00	249.00	2,395.31	-39.83	-103.75	-27.26	0.00	0.00	0.00
2,500.00	5.00	249.00	2,494.93	-42.95	-111.89	-29.39	0.00	0.00	0.00
2,600.00	5.00	249.00	2,594.55	-46.07	-120.02	-31.53	0.00	0.00	0.00
2,700.00	5.00	249.00	2,694.17	-49.20	-128.16	-33.67	0.00	0.00	0.00
2,800.00	5.00	249.00	2,793.78	-52.32	-136.30	-35.81	0.00	0.00	0.00
2,900.00	5.00	249.00	2,893.40	-55.44	-144.43	-37.95	0.00	0.00	0.00
3,000.00	5.00	249.00	2,993.02	-58.57	-152.57	-40.08	0.00	0.00	0.00
3,100.00	5.00	249.00	3,092.64	-61.69	-160.71	-42.22	0.00	0.00	0.00
3,200.00	5.00	249.00	3,192.26	-64.81	-168.84	-44.36	0.00	0.00	0.00
3,300.00	5.00	249.00	3,291.88	-67.94	-176.98	-46.50	0.00	0.00	0.00
3,400.00	5.00	249.00	3,391.50	-71.06	-185.12	-48.63	0.00	0.00	0.00
3,500.00	5.00	249.00	3,491.12	-74.18	-193.25	-50.77	0.00	0.00	0.00
3,600.00	5.00	249.00	3,590.74	-77.31	-201.39	-52.91	0.00	0.00	0.00
3,700.00	5.00	249.00	3,690.36	-80.43	-209.53	-55.05	0.00	0.00	0.00
3,800.00	5.00	249.00	3,789.98	-83.55	-217.66	-57.18	0.00	0.00	0.00
3,900.00	5.00	249.00	3,889.60	-86.68	-225.80	-59.32	0.00	0.00	0.00
4,000.00	5.00	249.00	3,989.22	-89.80	-233.94	-61.46	0.00	0.00	0.00
4,100.00	5.00	249.00	4,088.84	-92.92	-242.07	-63.60	0.00	0.00	0.00
4,200.00	5.00	249.00	4,188.46	-96.05	-250.21	-65.74	0.00	0.00	0.00
4,300.00	5.00	249.00	4,288.08	-99.17	-258.35	-67.87	0.00	0.00	0.00
4,400.00	5.00	249.00	4,387.70	-102.29	-266.48	-70.01	0.00	0.00	0.00
4,500.00	5.00	249.00	4,487.32	-105.42	-274.62	-72.15	0.00	0.00	0.00
4,550.00	5.00	249.00	4,537.13	-106.98	-278.69	-73.22	0.00	0.00	0.00
Begin 2.00°/100' Turn									
4,576.10	5.00	243.01	4,563.12	-107.90	-280.76	-73.89	2.00	-0.02	-22.97
Hold 243.01° Azm									
4,600.00	5.00	243.01	4,586.94	-108.85	-282.62	-74.61	0.00	0.00	0.00
4,700.00	5.00	243.01	4,686.56	-112.80	-290.38	-77.61	0.00	0.00	0.00
4,800.00	5.00	243.01	4,786.18	-116.75	-298.13	-80.62	0.00	0.00	0.00
4,900.00	5.00	243.01	4,885.80	-120.70	-305.89	-83.62	0.00	0.00	0.00
5,000.00	5.00	243.01	4,985.42	-124.66	-313.65	-86.63	0.00	0.00	0.00
5,100.00	5.00	243.01	5,085.04	-128.61	-321.41	-89.63	0.00	0.00	0.00
5,200.00	5.00	243.01	5,184.66	-132.56	-329.17	-92.64	0.00	0.00	0.00
5,300.00	5.00	243.01	5,284.28	-136.51	-336.93	-95.65	0.00	0.00	0.00
5,400.00	5.00	243.01	5,383.90	-140.46	-344.69	-98.65	0.00	0.00	0.00
5,500.00	5.00	243.01	5,483.52	-144.42	-352.45	-101.66	0.00	0.00	0.00



Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 407H
Company:	COG Operating LLC	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site:	Dominator 25 Federal	North Reference:	Grid
Well:	407H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 11-16-17		

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)
5,600.00	5.00	243.01	5,583.14	-148.37	-360.20	-104.66	0.00	0.00	0.00
5,700.00	5.00	243.01	5,682.76	-152.32	-367.96	-107.67	0.00	0.00	0.00
5,800.00	5.00	243.01	5,782.38	-156.27	-375.72	-110.67	0.00	0.00	0.00
5,900.00	5.00	243.01	5,882.00	-160.22	-383.48	-113.68	0.00	0.00	0.00
6,000.00	5.00	243.01	5,981.62	-164.18	-391.24	-116.68	0.00	0.00	0.00
6,100.00	5.00	243.01	6,081.24	-168.13	-399.00	-119.69	0.00	0.00	0.00
6,200.00	5.00	243.01	6,180.86	-172.08	-406.76	-122.69	0.00	0.00	0.00
6,300.00	5.00	243.01	6,280.48	-176.03	-414.52	-125.70	0.00	0.00	0.00
6,400.00	5.00	243.01	6,380.10	-179.99	-422.28	-128.70	0.00	0.00	0.00
6,500.00	5.00	243.01	6,479.72	-183.94	-430.03	-131.71	0.00	0.00	0.00
6,600.00	5.00	243.01	6,579.34	-187.89	-437.79	-134.72	0.00	0.00	0.00
6,700.00	5.00	243.01	6,678.96	-191.84	-445.55	-137.72	0.00	0.00	0.00
6,800.00	5.00	243.01	6,778.58	-195.79	-453.31	-140.73	0.00	0.00	0.00
6,900.00	5.00	243.01	6,878.20	-199.75	-461.07	-143.73	0.00	0.00	0.00
7,000.00	5.00	243.01	6,977.82	-203.70	-468.83	-146.74	0.00	0.00	0.00
7,100.00	5.00	243.01	7,077.44	-207.65	-476.59	-149.74	0.00	0.00	0.00
7,200.00	5.00	243.01	7,177.06	-211.60	-484.35	-152.75	0.00	0.00	0.00
7,300.00	5.00	243.01	7,276.68	-215.56	-492.10	-155.75	0.00	0.00	0.00
7,400.00	5.00	243.01	7,376.30	-219.51	-499.86	-158.76	0.00	0.00	0.00
7,500.00	5.00	243.01	7,475.92	-223.46	-507.62	-161.76	0.00	0.00	0.00
7,600.00	5.00	243.01	7,575.54	-227.41	-515.38	-164.77	0.00	0.00	0.00
7,665.26	5.00	243.01	7,640.55	-229.99	-520.44	-166.73	0.00	0.00	0.00
Begin 2.00°/100' Drop									
7,700.00	4.30	243.01	7,675.18	-231.27	-522.95	-167.70	2.00	-2.00	0.00
7,800.00	2.30	243.01	7,775.01	-233.88	-528.08	-169.69	2.00	-2.00	0.00
7,900.00	0.30	243.01	7,874.98	-234.91	-530.10	-170.47	2.00	-2.00	0.00
7,915.02	0.00	0.01	7,890.00	-234.93	-530.14	-170.49	2.00	-2.00	0.00
Begin Vertical Hold									
10,207.56	0.00	0.00	10,182.54	-234.93	-530.14	-170.49	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
10,300.00	11.09	359.56	10,274.40	-226.01	-530.21	-161.62	12.00	12.00	0.00
10,400.00	23.09	359.56	10,369.81	-196.67	-530.43	-132.47	12.00	12.00	0.00
10,500.00	35.09	359.56	10,457.03	-148.14	-530.80	-84.23	12.00	12.00	0.00
10,600.00	47.09	359.56	10,532.26	-82.54	-531.31	-19.03	12.00	12.00	0.00
10,700.00	59.09	359.56	10,592.20	-2.72	-531.92	60.30	12.00	12.00	0.00
10,800.00	71.09	359.56	10,634.24	87.81	-532.61	150.27	12.00	12.00	0.00
10,900.00	83.09	359.56	10,656.54	185.10	-533.35	246.97	12.00	12.00	0.00
10,959.68	90.25	359.56	10,660.00	244.63	-533.81	306.14	12.00	12.00	0.00
LP, Hold 90.25° Inc at 359.56° Azm									
11,000.00	90.25	359.56	10,659.82	284.96	-534.12	346.21	0.00	0.00	0.00
11,100.00	90.25	359.56	10,659.38	384.95	-534.88	445.59	0.00	0.00	0.00
11,200.00	90.25	359.56	10,658.94	484.95	-535.65	544.98	0.00	0.00	0.00
11,300.00	90.25	359.56	10,658.49	584.94	-536.41	644.36	0.00	0.00	0.00
11,400.00	90.25	359.56	10,658.05	684.94	-537.18	743.74	0.00	0.00	0.00
11,500.00	90.25	359.56	10,657.61	784.94	-537.94	843.13	0.00	0.00	0.00
11,600.00	90.25	359.56	10,657.17	884.93	-538.71	942.51	0.00	0.00	0.00
11,700.00	90.25	359.56	10,656.73	984.93	-539.47	1,041.89	0.00	0.00	0.00
11,800.00	90.25	359.56	10,656.28	1,084.92	-540.24	1,141.27	0.00	0.00	0.00
11,900.00	90.25	359.56	10,655.84	1,184.92	-541.00	1,240.66	0.00	0.00	0.00
12,000.00	90.25	359.56	10,655.40	1,284.92	-541.77	1,340.04	0.00	0.00	0.00
12,100.00	90.25	359.56	10,654.96	1,384.91	-542.53	1,439.42	0.00	0.00	0.00
12,200.00	90.25	359.56	10,654.51	1,484.91	-543.30	1,538.81	0.00	0.00	0.00
12,300.00	90.25	359.56	10,654.07	1,584.91	-544.06	1,638.19	0.00	0.00	0.00



Phoenix Technology Services LP

Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 407H
Company:	COG Operating LLC	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site:	Dominator 25 Federal	North Reference:	Grid
Well:	407H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 11-16-17		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,400.00	90.25	359.56	10,653.63	1,684.90	-544.83	1,737.57	0.00	0.00	0.00
12,500.00	90.25	359.56	10,653.19	1,784.90	-545.60	1,836.95	0.00	0.00	0.00
12,600.00	90.25	359.56	10,652.74	1,884.89	-546.36	1,936.34	0.00	0.00	0.00
12,700.00	90.25	359.56	10,652.30	1,984.89	-547.13	2,035.72	0.00	0.00	0.00
12,800.00	90.25	359.56	10,651.86	2,084.89	-547.89	2,135.10	0.00	0.00	0.00
12,900.00	90.25	359.56	10,651.42	2,184.88	-548.66	2,234.49	0.00	0.00	0.00
13,000.00	90.25	359.56	10,650.97	2,284.88	-549.42	2,333.87	0.00	0.00	0.00
13,100.00	90.25	359.56	10,650.53	2,384.87	-550.19	2,433.25	0.00	0.00	0.00
13,200.00	90.25	359.56	10,650.09	2,484.87	-550.95	2,532.63	0.00	0.00	0.00
13,300.00	90.25	359.56	10,649.65	2,584.87	-551.72	2,632.02	0.00	0.00	0.00
13,400.00	90.25	359.56	10,649.20	2,684.86	-552.48	2,731.40	0.00	0.00	0.00
13,500.00	90.25	359.56	10,648.76	2,784.86	-553.25	2,830.78	0.00	0.00	0.00
13,600.00	90.25	359.56	10,648.32	2,884.85	-554.01	2,930.17	0.00	0.00	0.00
13,700.00	90.25	359.56	10,647.88	2,984.85	-554.78	3,029.55	0.00	0.00	0.00
13,800.00	90.25	359.56	10,647.43	3,084.85	-555.54	3,128.93	0.00	0.00	0.00
13,900.00	90.25	359.56	10,646.99	3,184.84	-556.31	3,228.31	0.00	0.00	0.00
14,000.00	90.25	359.56	10,646.55	3,284.84	-557.07	3,327.70	0.00	0.00	0.00
14,100.00	90.25	359.56	10,646.11	3,384.84	-557.84	3,427.08	0.00	0.00	0.00
14,200.00	90.25	359.56	10,645.67	3,484.83	-558.60	3,526.46	0.00	0.00	0.00
14,300.00	90.25	359.56	10,645.22	3,584.83	-559.37	3,625.85	0.00	0.00	0.00
14,400.00	90.25	359.56	10,644.78	3,684.82	-560.13	3,725.23	0.00	0.00	0.00
14,500.00	90.25	359.56	10,644.34	3,784.82	-560.90	3,824.61	0.00	0.00	0.00
14,600.00	90.25	359.56	10,643.90	3,884.82	-561.66	3,923.99	0.00	0.00	0.00
14,700.00	90.25	359.56	10,643.45	3,984.81	-562.43	4,023.38	0.00	0.00	0.00
14,800.00	90.25	359.56	10,643.01	4,084.81	-563.19	4,122.76	0.00	0.00	0.00
14,900.00	90.25	359.56	10,642.57	4,184.80	-563.96	4,222.14	0.00	0.00	0.00
15,000.00	90.25	359.56	10,642.13	4,284.80	-564.72	4,321.53	0.00	0.00	0.00
15,100.00	90.25	359.56	10,641.68	4,384.80	-565.49	4,420.91	0.00	0.00	0.00
15,200.00	90.25	359.56	10,641.24	4,484.79	-566.25	4,520.29	0.00	0.00	0.00
15,300.00	90.25	359.56	10,640.80	4,584.79	-567.02	4,619.67	0.00	0.00	0.00
15,400.00	90.25	359.56	10,640.36	4,684.78	-567.78	4,719.06	0.00	0.00	0.00
15,480.52	90.25	359.56	10,640.00	4,765.30	-568.40	4,799.08	0.00	0.00	0.00
TD at 15480.52									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
BHL - Dominator 25 F	0.00	0.00	10,640.00	4,765.30	-568.40	403,971.30	748,451.10	32° 6' 29.12842 N	03° 31' 51.35945 W
- plan hits target center									
- Point									
LTP - Dominator 25 F	0.00	0.00	10,640.00	4,635.35	-567.38	403,841.35	748,452.12	32° 6' 27.84240 N	03° 31' 51.35880 W
- plan misses target center by 0.58usft at 15350.56usft MD (10640.57 TVD, 4635.35 N, -567.41 E)									
- Point									
FTP - Dominator 25 F	0.00	0.00	10,660.00	15.74	-532.07	399,221.74	748,487.43	32° 5' 42.12600 N	03° 31' 51.34800 W
- plan misses target center by 51.12usft at 10745.38usft MD (10613.63 TVD, 37.26 N, -532.22 E)									
- Point									



Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 407H
Company:	COG Operating LLC	TVD Reference:	GL + KB @ 3364.50usft (McVay 8)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	GL + KB @ 3364.50usft (McVay 8)
Site:	Dominator 25 Federal	North Reference:	Grid
Well:	407H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 11-16-17		

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,000.00	1,000.00	0.00	0.00	KOP, Begin 2.00°/100' Build
1,250.00	1,249.68	-3.91	-10.18	Hold 5.00° Inc at 249.00° Azm
4,550.00	4,537.13	-106.98	-278.69	Begin 2.00°/100' Turn
4,576.10	4,563.12	-107.90	-280.76	Hold 243.01° Azm
7,665.26	7,640.55	-229.99	-520.44	Begin 2.00°/100' Drop
7,915.02	7,890.00	-234.93	-530.14	Begin Vertical Hold
10,207.56	10,182.54	-234.93	-530.14	KOP2, Begin 12.00°/100' Build
10,959.68	10,660.00	244.63	-533.81	LP, Hold 90.25° Inc at 359.56° Azm
15,480.52	10,640.00	4,765.30	-568.40	TD at 15480.52