PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG OPERATING LLC
LEASE NO.:	NMLC029406B
WELL NAME & NO.:	17H – ZEPPO 5 FEDERAL COM
SURFACE HOLE FOOTAGE:	2490'/N & 1375'/E
BOTTOM HOLE FOOTAGE	10'/S & 990'/E
LOCATION:	Section 5.,T17S., R.32E., NMP
COUNTY:	LEA County, New Mexico

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

A. Hydrogen Sulfide

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

B. CASING

1. The **13 3/8** inch surface casing shall be set at approximately **986** 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:

Option 1 (Single Stage):

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

Option 2:

Operator has proposed a DV tool at a depth of 1055'. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

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

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office.

3. The minimum required fill of cement behind the **7 X 5 1/2** inch production casing is:

Operator has proposed DV tool at depth of 5249' (KOP)

a. First stage to DV tool: - Cement not required – using isolation packer system.

b. Second stage above DV tool:

- Cement as proposed. Operator shall provide method of verification.

C. PRESSURE CONTROL

1. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi. **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).

D. SPECIAL REQUIREMENT(S)

Communitization Agreement

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

Waste Minimization Plan (WMP)

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

MHH 09062018

GENERAL REQUIREMENTS

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

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

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

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

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

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

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

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

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

A. CASING

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

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

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

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

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

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

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

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

B. PRESSURE CONTROL

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

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

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

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

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

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

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

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

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

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

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

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

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

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

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

C. DRILLING MUD

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

D. WASTE MATERIAL AND FLUIDS

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

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

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

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SURFACE HOLE FOOTAGE:	2490'/N & 1375'/E
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COUNTY:	LEA County, New Mexico

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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.

Watershed

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

VI. CONSTRUCTION

A. NOTIFICATION

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

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

B. TOPSOIL

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

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

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

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

D. FEDERAL MINERAL MATERIALS PIT

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

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

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

F. EXCLOSURE FENCING (CELLARS & PITS)

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

G. ON LEASE ACCESS ROADS

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

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

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

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

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

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

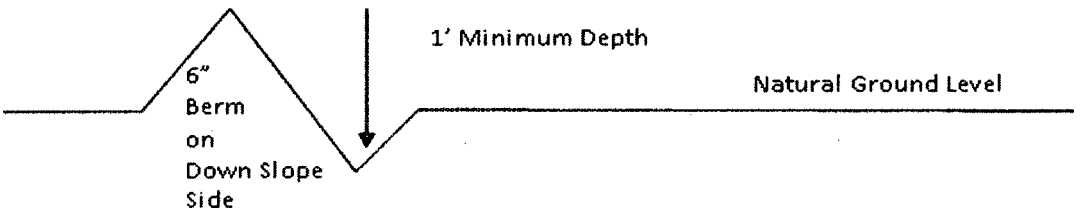
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

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

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

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

Construction Steps

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

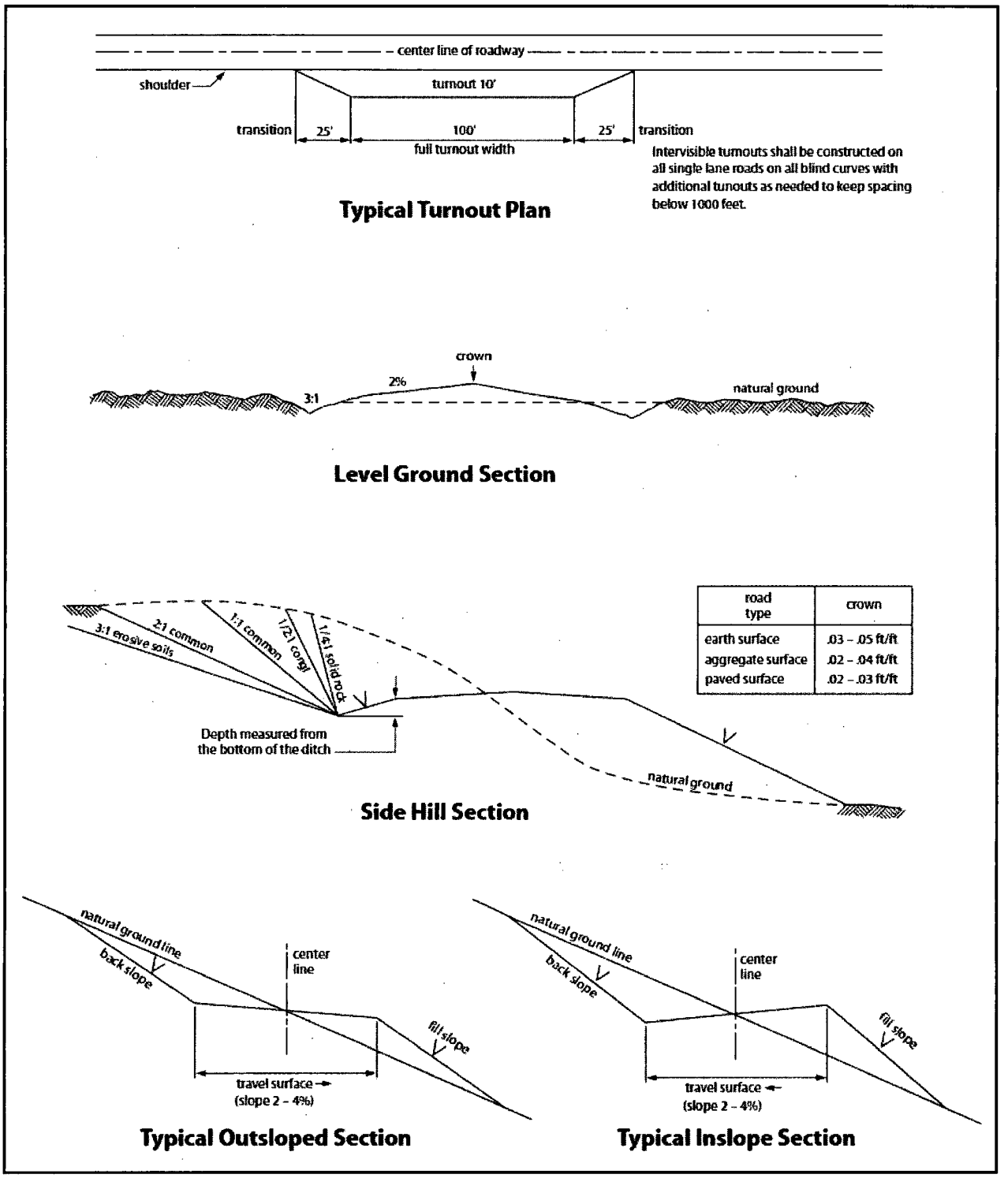


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

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

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

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

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

Containment Structures

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

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

B. PIPELINES

STANDARD STIPULATIONS FOR SURFACE INSTALLED PIPELINES

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

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

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

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

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

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

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

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

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

c. Acts of God.

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

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

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

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

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

writing by the Authorized Officer.

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

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

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

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

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

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

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

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

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

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

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

18. Special Stipulations:

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

VIII. INTERIM RECLAMATION

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

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

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

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

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

IX. FINAL ABANDONMENT & RECLAMATION

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

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

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

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

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

Seed Mixture for LPC Sand/Shinnery Sites

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

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

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

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

*Pounds of pure live seed:

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

COG Operating LLC

Hydrogen Sulfide Drilling Operation Plan

I. 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:

1. The hazards an characteristics of hydrogen sulfide (H2S)
2. The proper use and maintenance of personal protective equipment and life support systems.
3. The proper use of H2S detectors alarms warning systems, briefing areas, evacuation procedures, and prevailing winds.
4. The proper techniques for first aid and rescue procedures.

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

1. The effects of H2S on metal components. If high tensile tubular are to be used, personnel well be trained in their special maintenance requirements.
2. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
3. The contents and requirements of the H2S Drilling Operations Plan and 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. **The concentrations of H2S of wells in this area from surface to TD are low enough that a contingency plan is not required.**

II. 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 reasonable expected to contain H2S.

1. **Well Control Equipment:**

   A. Flare line.

   B. Choke manifold with minimum of one remotely operated choke.

   C. Closed Loop Blow Down Tank

   D. Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.

   E. Auxiliary equipment may include if applicable: mud-gas separator, annular preventer & rotating head.

2. **Protective equipment for essential personnel:**

   A. SCBA (Self contained breathing apparatus) 30-minute units located in the doghouse and at briefing areas, as indicated on well site diagram.

3. **H2S detection and monitoring equipment:**

   A. Portable H2S monitors positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 PPM are reached.

4. **Visual warning systems:**

   A. Wind direction indicators as shown on well site diagram.

   B. Caution/Danger signs (Exhibit #7) 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.

5. **Mud program:**

   A. The mud program has been designed to minimize the volume of H2S circulated to surface. Proper mud weight, safe drilling practices, and the use of H2S scavengers will minimize hazards when penetrating H2S bearing zones.

6. **Metallurgy:**

   A. All drill strings, casings, tubing, wellhead, blowout preventer, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.

   B. All elastomers used for packing and seals shall be H2S trim.

7. **Communication:**

   A. Radio communications in company vehicles including cellular telephone and 2-way radio.

   B. Land line (telephone) communication at Office.

8. **Well testing:**

   A. Drill stem testing will be performed with a minimum number of personnel in the immediate vicinity, which are necessary to safely and adequately conduct the test. The drill stem testing will be conducted during daylight hours and formation fluids will not be flowed to the surface. All drill-stem-testing operations conducted in an H2S environment will use the closed chamber method of testing.

   B. There will be no drill stem testing.

EXHIBIT #7

WARNING

YOU ARE ENTERING AN H2S

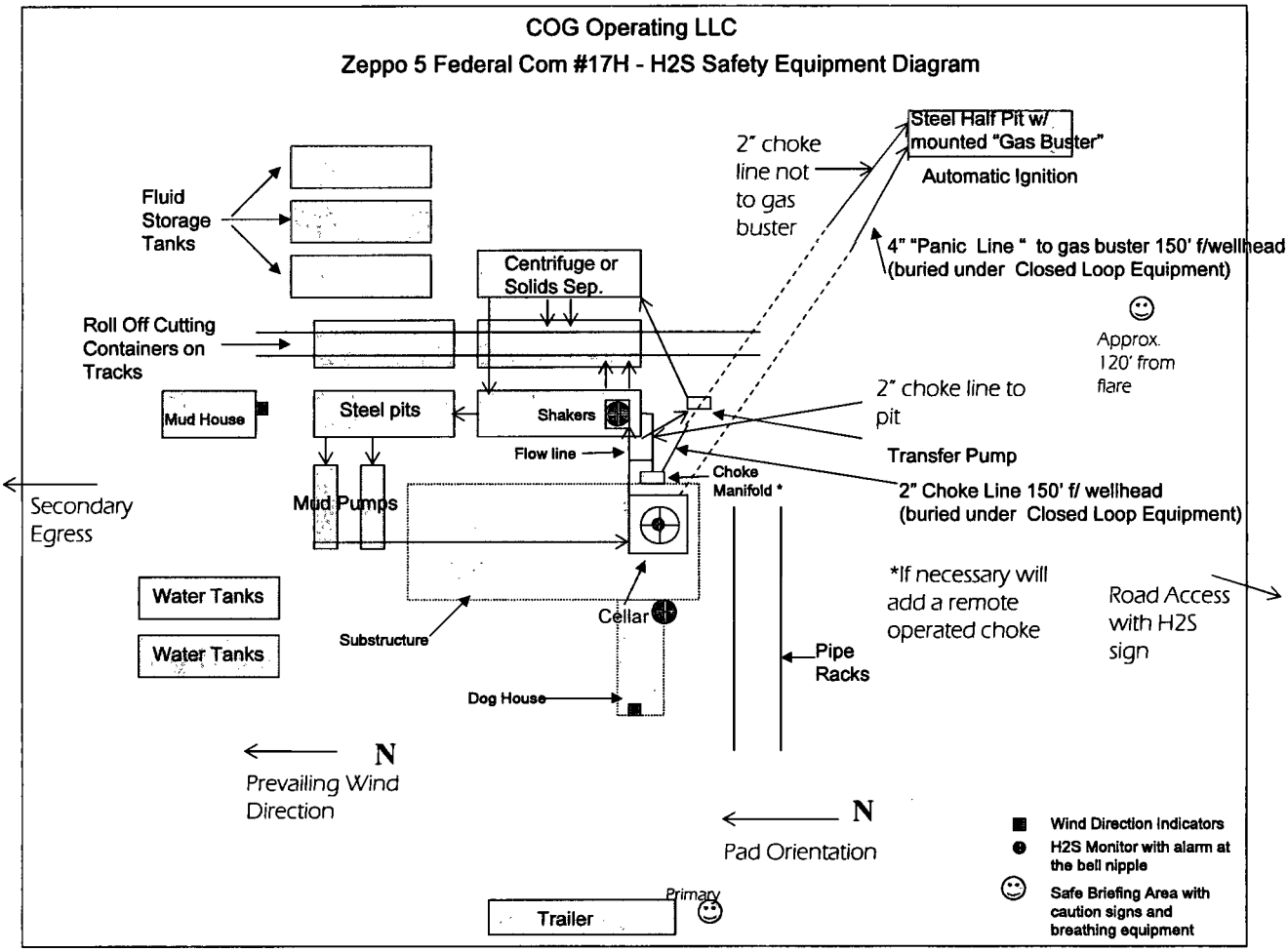
AUTHORIZED PERSONNEL ONLY

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. **CHECK WITH COG OPERATING FOREMAN AT**

COG OPERATING LLC
1-432-683-7443
1-575-746-2010

EDDY COUNTY EMERGENCY NUMBERS
ARTESIA FIRE DEPT. 575-746-5050
ARTESIA POLICE DEPT. 575-746-5000
EDDY CO. SHERIFF DEPT. 575-746-9888

LEA COUNTY EMERGENCY NUMBERS
HOBBS FIRE DEPT. 575-397-9308
HOBBS POLICE DEPT. 575-397-9285
LEA CO. SHERIFF DEPT. 575-396-1196


COG Operating LLC
Zeppo 5 Federal Com #17H - H2S Safety Equipment Diagram
Steel Half Pit w/ mounted "Gas Buster"
Automatic Ignition
2" choke line not to gas buster
4" "Panic Line " to gas buster 150' f/wellhead (buried under Closed Loop Equipment)
Approx. 120' from flare
Fluid Storage Tanks
Centrifuge or Solids Sep.
Roll Off Cutting Containers on Tracks
Mud House
Steel pits
Shakers
2" choke line to pit
Transfer Pump
Flow line
Choke Manifold *
2" Choke Line 150' f/ wellhead (buried under Closed Loop Equipment)
Secondary Egress
Mud Pumps
Water Tanks
Water Tanks
Substructure
Cellar
*If necessary will add a remote operated choke
Road Access with H2S sign
Pipe Racks
Dog House
N
Prevailing Wind Direction
N
Pad Orientation
Primary
Trailer
Wind Direction Indicators
H2S Monitor with alarm at the bell nipple
Safe Briefing Area with caution signs and breathing equipment

CONCHO

Project: Lea County, NM (NAD27 NME)
Site: Zeppo 5 Federal COM
Well: 17H
Wellbore: OH
Design: Plan 1 07-25-18
Rig: Double K 7

PHOENIX TECHNOLOGY SERVICES

Azimuths to Grid North
True North: -0.30°
Magnetic North: 6.72°

Magnetic Field
Strength: 48322.6snT
Dip Angle: 60.80°
Date: 7/24/2018
Model: MVHD

RKB @ 4131.00usft (Double K 7)

4114.00

WELL DETAILS

4114.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	678653.40	668946.60	32° 51' 52.16796 N	103° 46' 59.20919 W

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Zeppo 5 Federal Com 17H	5800.70	-8246.90	149.90	670406.50	669096.50	32° 50' 30.55775 N	103° 46' 57.95581 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00		KOP1, Begin 1.50°/100' Build
3	1333.33	5.00	90.00	1332.91	0.00	14.54	1.50	90.00	0.26		Hold 5.00° Inc at 90.00° Azm
4	2468.33	5.00	90.00	2463.59	0.00	113.46	0.00	0.00	2.06		Begin 1.50°/100' Drop
5	2801.67	0.00	0.00	2796.50	0.00	127.99	1.50	180.00	2.33		Begin Vertical Hold
6	5248.72	0.00	0.00	5243.56	0.00	127.99	0.00	0.00	2.33		KOP2, Begin 12.00°/100' Build
7	5993.83	89.41	179.85	5721.00	-472.57	129.25	12.00	179.85	474.84		LP, Hold 89.41° Inc at 179.85° Azm
8	13768.60	89.41	179.85	5800.70	-8246.90	149.90	0.00	0.00	8248.27	BHL - Zeppo 5 Federal Com 17H	TD at 13768.60

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 17H, Grid North

Latitude: 32° 51' 52.16796 N
Longitude: 103° 46' 59.20919 W

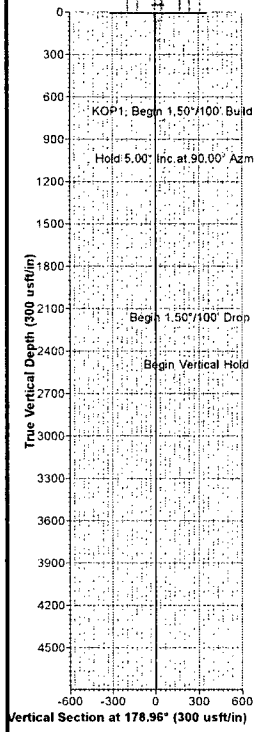
Grid East: 668946.60
Grid North: 678653.40
Scale Factor: 1.000

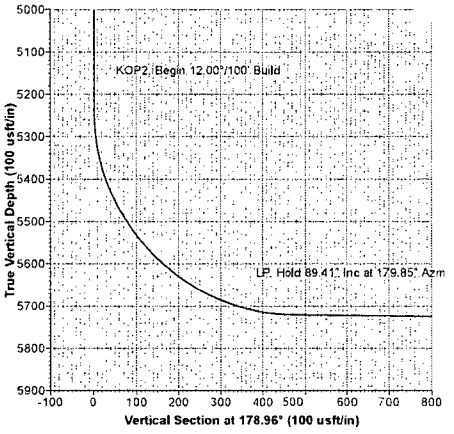
Geomagnetic Model: MVHD
Sample Date: 24-Jul-18
Magnetic Declination: 7.02°
Dip Angle from Horizontal: 60.80°
Magnetic Field Strength: 48322.6273671 3nT

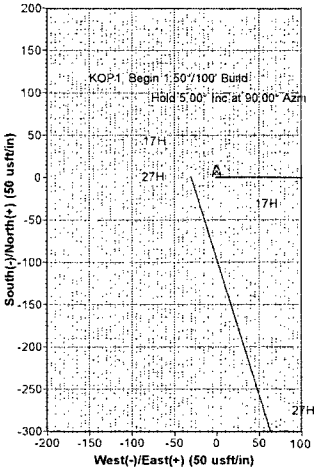
To convert a Magnetic Direction to a Grid Direction, Add 6.72°
To convert a Magnetic Direction to a True Direction, Add 7.02° East
To convert a True Direction to a Grid Direction, Subtract 0.30°

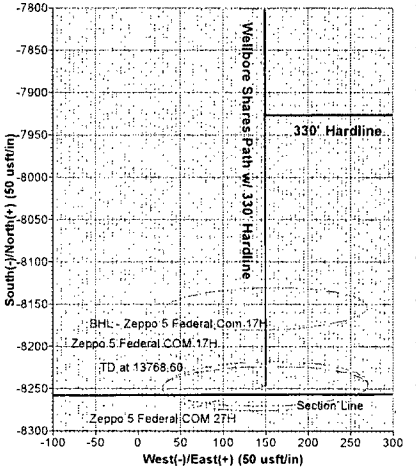
LEGEND

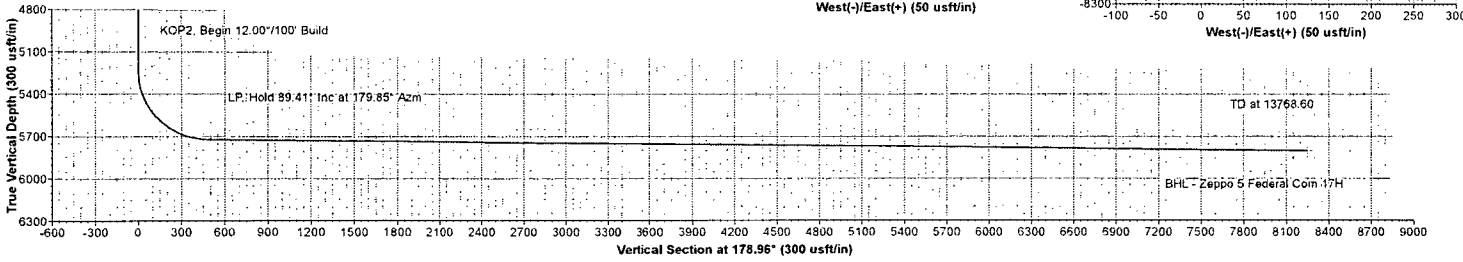
- 18H, OH / 62984, Surveys (Double K 7) V0
- 18H, OH, Plan 2 07-25-18 V0
- 28H, OH / 62985, Plan 3 07-22-18 V0
- 28H, OH / 62985, Surveys (Double K 7) V0
- 26H, OH, Plan 2 07-25-18 V0
- 28H, OH, Plan 2 07-25-18 V0
- 27H, OH, Plan 1 07-25-18 V0
- 23H, OH, Surveys V0
- 16H, OH, Plan 2 07-25-18 V0
- Plan 1 07-25-18

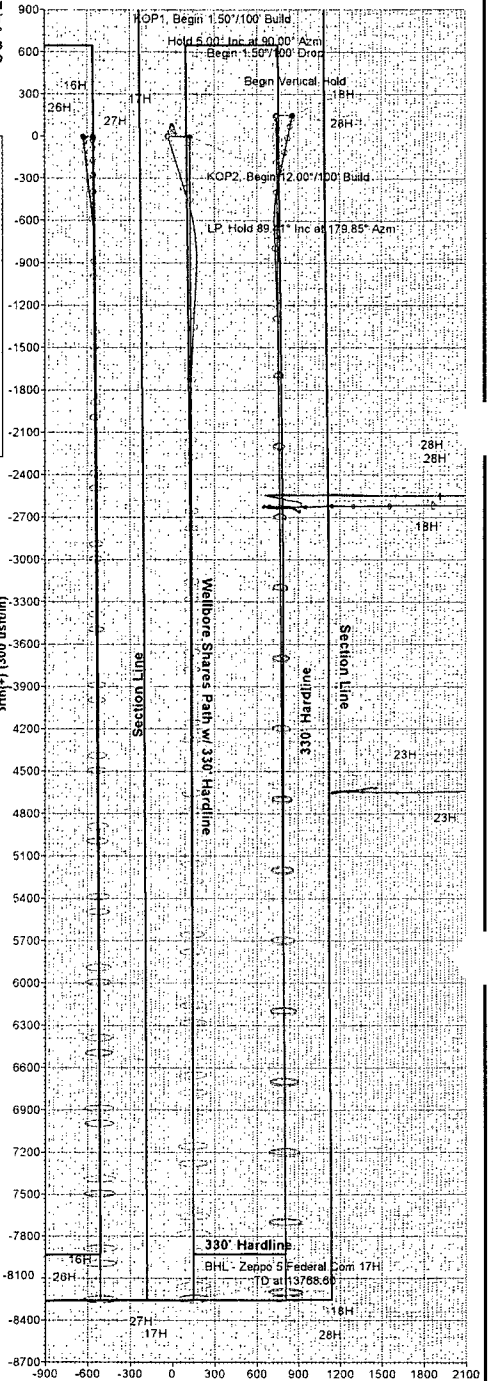












Created By: David Transou Date: 13:42, July 25 2018

PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Zeppo 5 Federal COM
17H

OH

Plan: Plan 1 07-25-18

Standard Planning Report

25 July, 2018

CONCHO

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 17H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site:	Zeppo 5 Federal COM	**North Reference:**	Grid
Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 07-25-18		

Project Lea County, NM (NAD27 NME)

Map System:	US State Plane 1927 (Exact solution)	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site Zeppo 5 Federal COM

Site Position:		**Northing:**	678,461.10 usft	**Latitude:**	32° 51' 50.30032 N
From:	Map	**Easting:**	668,262.80 usft	**Longitude:**	103° 47' 7.23770 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.30 °

Well 17H

Well Position	**+N/-S**	192.30 usft	**Northing:**	678,653.40 usft	**Latitude:**	32° 51' 52.16796 N
	+E/-W	683.80 usft	**Easting:**	668,946.60 usft	**Longitude:**	103° 46' 59.20920 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**		**Ground Level:**	4,114.00 usft

Wellbore OH

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	MVHD	7/24/2018	7.02	60.80	48,322.62736713

Design Plan 1 07-25-18

Audit Notes:

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

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.00	0.00	0.00	178.96

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,333.33	5.00	90.00	1,332.91	0.00	14.54	1.50	1.50	0.00	90.00	
2,468.33	5.00	90.00	2,463.59	0.00	113.46	0.00	0.00	0.00	0.00	
2,801.67	0.00	0.00	2,796.50	0.00	127.99	1.50	-1.50	0.00	180.00	
5,248.72	0.00	0.00	5,243.56	0.00	127.99	0.00	0.00	0.00	0.00	
5,993.83	89.41	179.85	5,721.00	-472.57	129.25	12.00	12.00	24.14	179.85	
13,768.60	89.41	179.85	5,800.70	-8,246.90	149.90	0.00	0.00	0.00	0.00	BHL - Zeppo 5 Federa

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 17H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site:	Zeppo 5 Federal COM	**North Reference:**	Grid
Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 07-25-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP1, Begin 1.50°/100' Build									
1,100.00	1.50	90.00	1,099.99	0.00	1.31	0.02	1.50	1.50	0.00
1,200.00	3.00	90.00	1,199.91	0.00	5.23	0.10	1.50	1.50	0.00
1,300.00	4.50	90.00	1,299.69	0.00	11.77	0.21	1.50	1.50	0.00
1,333.33	5.00	90.00	1,332.91	0.00	14.54	0.26	1.50	1.50	0.00
Hold 5.00° Inc at 90.00° Azm									
1,400.00	5.00	90.00	1,399.32	0.00	20.35	0.37	0.00	0.00	0.00
1,500.00	5.00	90.00	1,498.94	0.00	29.06	0.53	0.00	0.00	0.00
1,600.00	5.00	90.00	1,598.56	0.00	37.78	0.69	0.00	0.00	0.00
1,700.00	5.00	90.00	1,698.18	0.00	46.49	0.84	0.00	0.00	0.00
1,800.00	5.00	90.00	1,797.80	0.00	55.21	1.00	0.00	0.00	0.00
1,900.00	5.00	90.00	1,897.42	0.00	63.92	1.16	0.00	0.00	0.00
2,000.00	5.00	90.00	1,997.04	0.00	72.64	1.32	0.00	0.00	0.00
2,100.00	5.00	90.00	2,096.66	0.00	81.35	1.48	0.00	0.00	0.00
2,200.00	5.00	90.00	2,196.28	0.00	90.07	1.64	0.00	0.00	0.00
2,300.00	5.00	90.00	2,295.90	0.00	98.79	1.80	0.00	0.00	0.00
2,400.00	5.00	90.00	2,395.52	0.00	107.50	1.95	0.00	0.00	0.00
2,468.33	5.00	90.00	2,463.59	0.00	113.46	2.06	0.00	0.00	0.00
Begin 1.50°/100' Drop									
2,500.00	4.53	90.00	2,495.15	0.00	116.09	2.11	1.50	-1.50	0.00
2,600.00	3.02	90.00	2,594.93	0.00	122.67	2.23	1.50	-1.50	0.00
2,700.00	1.52	90.00	2,694.85	0.00	126.64	2.30	1.50	-1.50	0.00
2,800.00	0.02	90.00	2,794.84	0.00	127.99	2.33	1.50	-1.50	0.00
2,801.67	0.00	0.00	2,796.50	0.00	127.99	2.33	1.50	-1.50	0.00
Begin Vertical Hold									
5,248.72	0.00	0.00	5,243.56	0.00	127.99	2.33	0.00	0.00	0.00
KOP2, Begin 12.00°/100' Build									
5,300.00	6.15	179.85	5,294.74	-2.75	128.00	5.08	12.00	12.00	0.00
5,400.00	18.15	179.85	5,392.32	-23.76	128.06	26.09	12.00	12.00	0.00
5,500.00	30.15	179.85	5,483.40	-64.61	128.16	66.93	12.00	12.00	0.00
5,600.00	42.15	179.85	5,563.99	-123.49	128.32	125.81	12.00	12.00	0.00
5,700.00	54.15	179.85	5,630.59	-197.85	128.52	200.15	12.00	12.00	0.00
5,800.00	66.15	179.85	5,680.26	-284.43	128.75	286.72	12.00	12.00	0.00
5,900.00	78.15	179.85	5,710.85	-379.44	129.00	381.72	12.00	12.00	0.00
5,993.83	89.41	179.85	5,721.00	-472.57	129.25	474.84	12.00	12.00	0.00
LP, Hold 89.41° Inc at 179.85° Azm									
6,000.00	89.41	179.85	5,721.06	-478.74	129.26	481.01	0.00	0.00	0.00
6,100.00	89.41	179.85	5,722.09	-578.73	129.53	580.99	0.00	0.00	0.00
6,200.00	89.41	179.85	5,723.11	-678.73	129.80	680.97	0.00	0.00	0.00
6,300.00	89.41	179.85	5,724.14	-778.72	130.06	780.96	0.00	0.00	0.00
6,400.00	89.41	179.85	5,725.16	-878.72	130.33	880.94	0.00	0.00	0.00
6,500.00	89.41	179.85	5,726.19	-978.71	130.59	980.92	0.00	0.00	0.00
6,600.00	89.41	179.85	5,727.21	-1,078.70	130.86	1,080.90	0.00	0.00	0.00
6,700.00	89.41	179.85	5,728.24	-1,178.70	131.12	1,180.89	0.00	0.00	0.00
6,800.00	89.41	179.85	5,729.26	-1,278.69	131.39	1,280.87	0.00	0.00	0.00
6,900.00	89.41	179.85	5,730.29	-1,378.69	131.65	1,380.85	0.00	0.00	0.00
7,000.00	89.41	179.85	5,731.31	-1,478.68	131.92	1,480.84	0.00	0.00	0.00
7,100.00	89.41	179.85	5,732.34	-1,578.68	132.19	1,580.82	0.00	0.00	0.00
7,200.00	89.41	179.85	5,733.36	-1,678.67	132.45	1,680.80	0.00	0.00	0.00
7,300.00	89.41	179.85	5,734.39	-1,778.67	132.72	1,780.78	0.00	0.00	0.00
7,400.00	89.41	179.85	5,735.41	-1,878.66	132.98	1,880.77	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 17H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site:	Zeppo 5 Federal COM	**North Reference:**	Grid
Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 07-25-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,500.00	89.41	179.85	5,736.44	-1,978.65	133.25	1,980.75	0.00	0.00	0.00
7,600.00	89.41	179.85	5,737.46	-2,078.65	133.51	2,080.73	0.00	0.00	0.00
7,700.00	89.41	179.85	5,738.49	-2,178.64	133.78	2,180.71	0.00	0.00	0.00
7,800.00	89.41	179.85	5,739.52	-2,278.64	134.05	2,280.70	0.00	0.00	0.00
7,900.00	89.41	179.85	5,740.54	-2,378.63	134.31	2,380.68	0.00	0.00	0.00
8,000.00	89.41	179.85	5,741.57	-2,478.63	134.58	2,480.66	0.00	0.00	0.00
8,100.00	89.41	179.85	5,742.59	-2,578.62	134.84	2,580.65	0.00	0.00	0.00
8,200.00	89.41	179.85	5,743.62	-2,678.61	135.11	2,680.63	0.00	0.00	0.00
8,300.00	89.41	179.85	5,744.64	-2,778.61	135.37	2,780.61	0.00	0.00	0.00
8,400.00	89.41	179.85	5,745.67	-2,878.60	135.64	2,880.59	0.00	0.00	0.00
8,500.00	89.41	179.85	5,746.69	-2,978.60	135.90	2,980.58	0.00	0.00	0.00
8,600.00	89.41	179.85	5,747.72	-3,078.59	136.17	3,080.56	0.00	0.00	0.00
8,700.00	89.41	179.85	5,748.74	-3,178.59	136.44	3,180.54	0.00	0.00	0.00
8,800.00	89.41	179.85	5,749.77	-3,278.58	136.70	3,280.52	0.00	0.00	0.00
8,900.00	89.41	179.85	5,750.79	-3,378.58	136.97	3,380.51	0.00	0.00	0.00
9,000.00	89.41	179.85	5,751.82	-3,478.57	137.23	3,480.49	0.00	0.00	0.00
9,100.00	89.41	179.85	5,752.84	-3,578.56	137.50	3,580.47	0.00	0.00	0.00
9,200.00	89.41	179.85	5,753.87	-3,678.56	137.76	3,680.45	0.00	0.00	0.00
9,300.00	89.41	179.85	5,754.89	-3,778.55	138.03	3,780.44	0.00	0.00	0.00
9,400.00	89.41	179.85	5,755.92	-3,878.55	138.30	3,880.42	0.00	0.00	0.00
9,500.00	89.41	179.85	5,756.94	-3,978.54	138.56	3,980.40	0.00	0.00	0.00
9,600.00	89.41	179.85	5,757.97	-4,078.54	138.83	4,080.39	0.00	0.00	0.00
9,700.00	89.41	179.85	5,758.99	-4,178.53	139.09	4,180.37	0.00	0.00	0.00
9,800.00	89.41	179.85	5,760.02	-4,278.53	139.36	4,280.35	0.00	0.00	0.00
9,900.00	89.41	179.85	5,761.04	-4,378.52	139.62	4,380.33	0.00	0.00	0.00
10,000.00	89.41	179.85	5,762.07	-4,478.51	139.89	4,480.32	0.00	0.00	0.00
10,100.00	89.41	179.85	5,763.09	-4,578.51	140.15	4,580.30	0.00	0.00	0.00
10,200.00	89.41	179.85	5,764.12	-4,678.50	140.42	4,680.28	0.00	0.00	0.00
10,300.00	89.41	179.85	5,765.14	-4,778.50	140.69	4,780.26	0.00	0.00	0.00
10,400.00	89.41	179.85	5,766.17	-4,878.49	140.95	4,880.25	0.00	0.00	0.00
10,500.00	89.41	179.85	5,767.19	-4,978.49	141.22	4,980.23	0.00	0.00	0.00
10,600.00	89.41	179.85	5,768.22	-5,078.48	141.48	5,080.21	0.00	0.00	0.00
10,700.00	89.41	179.85	5,769.24	-5,178.47	141.75	5,180.20	0.00	0.00	0.00
10,800.00	89.41	179.85	5,770.27	-5,278.47	142.01	5,280.18	0.00	0.00	0.00
10,900.00	89.41	179.85	5,771.29	-5,378.46	142.28	5,380.16	0.00	0.00	0.00
11,000.00	89.41	179.85	5,772.32	-5,478.46	142.55	5,480.14	0.00	0.00	0.00
11,100.00	89.41	179.85	5,773.34	-5,578.45	142.81	5,580.13	0.00	0.00	0.00
11,200.00	89.41	179.85	5,774.37	-5,678.45	143.08	5,680.11	0.00	0.00	0.00
11,300.00	89.41	179.85	5,775.39	-5,778.44	143.34	5,780.09	0.00	0.00	0.00
11,400.00	89.41	179.85	5,776.42	-5,878.44	143.61	5,880.07	0.00	0.00	0.00
11,500.00	89.41	179.85	5,777.44	-5,978.43	143.87	5,980.06	0.00	0.00	0.00
11,600.00	89.41	179.85	5,778.47	-6,078.42	144.14	6,080.04	0.00	0.00	0.00
11,700.00	89.41	179.85	5,779.49	-6,178.42	144.41	6,180.02	0.00	0.00	0.00
11,800.00	89.41	179.85	5,780.52	-6,278.41	144.67	6,280.01	0.00	0.00	0.00
11,900.00	89.41	179.85	5,781.54	-6,378.41	144.94	6,379.99	0.00	0.00	0.00
12,000.00	89.41	179.85	5,782.57	-6,478.40	145.20	6,479.97	0.00	0.00	0.00
12,100.00	89.41	179.85	5,783.60	-6,578.40	145.47	6,579.95	0.00	0.00	0.00
12,200.00	89.41	179.85	5,784.62	-6,678.39	145.73	6,679.94	0.00	0.00	0.00
12,300.00	89.41	179.85	5,785.65	-6,778.38	146.00	6,779.92	0.00	0.00	0.00
12,400.00	89.41	179.85	5,786.67	-6,878.38	146.26	6,879.90	0.00	0.00	0.00
12,500.00	89.41	179.85	5,787.70	-6,978.37	146.53	6,979.88	0.00	0.00	0.00
12,600.00	89.41	179.85	5,788.72	-7,078.37	146.80	7,079.87	0.00	0.00	0.00
12,700.00	89.41	179.85	5,789.75	-7,178.36	147.06	7,179.85	0.00	0.00	0.00
12,800.00	89.41	179.85	5,790.77	-7,278.36	147.33	7,279.83	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 17H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site:	Zeppo 5 Federal COM	**North Reference:**	Grid
Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 07-25-18		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,900.00	89.41	179.85	5,791.80	-7,378.35	147.59	7,379.82	0.00	0.00	0.00
13,000.00	89.41	179.85	5,792.82	-7,478.35	147.86	7,479.80	0.00	0.00	0.00
13,100.00	89.41	179.85	5,793.85	-7,578.34	148.12	7,579.78	0.00	0.00	0.00
13,200.00	89.41	179.85	5,794.87	-7,678.33	148.39	7,679.76	0.00	0.00	0.00
13,300.00	89.41	179.85	5,795.90	-7,778.33	148.66	7,779.75	0.00	0.00	0.00
13,400.00	89.41	179.85	5,796.92	-7,878.32	148.92	7,879.73	0.00	0.00	0.00
13,500.00	89.41	179.85	5,797.95	-7,978.32	149.19	7,979.71	0.00	0.00	0.00
13,600.00	89.41	179.85	5,798.97	-8,078.31	149.45	8,079.69	0.00	0.00	0.00
13,700.00	89.41	179.85	5,800.00	-8,178.31	149.72	8,179.68	0.00	0.00	0.00
13,768.60	89.41	179.85	5,800.70	-8,246.90	149.90	8,248.27	0.00	0.00	0.00
TD at 13768.60									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
BHL - Zeppo 5 Federal C - plan hits target center - Point	0.00	0.00	5,800.70	-8,246.90	149.90	670,406.50	669,096.50	32° 50' 30.55775 N	103° 46' 57.95581 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
1,000.00	1,000.00	0.00	0.00	KOP1, Begin 1.50°/100' Build
1,333.33	1,332.91	0.00	14.54	Hold 5.00° Inc at 90.00° Azm
2,468.33	2,463.59	0.00	113.46	Begin 1.50°/100' Drop
2,801.67	2,796.50	0.00	127.99	Begin Vertical Hold
5,248.72	5,243.56	0.00	127.99	KOP2, Begin 12.00°/100' Build
5,993.83	5,721.00	-472.57	129.25	LP, Hold 89.41° Inc at 179.85° Azm
13,768.60	5,800.70	-8,246.90	149.90	TD at 13768.60

PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Zeppo 5 Federal COM
17H

OH
Plan 1 07-25-18

Anticollision Report

25 July, 2018

CONCHO

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Reference	Plan 1 07-25-18		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 50,000.00 usft	**Error Surface:**	Major Axis
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 7/25/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	13,767.92	Plan 1 07-25-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Shovel Head Federal Com						
18H - OH / 62984 - Surveys (Double K 7)	8,142.30	5,420.11	667.99	613.98	12.369	CC, ES
18H - OH / 62984 - Surveys (Double K 7)	8,300.00	5,422.46	686.34	630.30	12.246	SF
28H - OH / 62985 - Plan 3 07-22-18	8,059.46	5,700.00	518.36	471.42	11.042	CC, ES
28H - OH / 62985 - Plan 3 07-22-18	8,100.00	5,700.00	519.95	472.49	10.955	SF
28H - OH / 62985 - Surveys (Double K 7)	8,065.53	5,685.00	540.07	489.83	10.750	CC, ES
28H - OH / 62985 - Surveys (Double K 7)	8,100.00	5,685.00	541.17	490.49	10.679	SF
Sneed 9 Federal Com						
23H - OH - Surveys	10,176.07	5,772.17	1,002.43	921.55	12.393	CC
23H - OH - Surveys	10,200.00	5,772.16	1,002.72	921.50	12.346	ES
23H - OH - Surveys	10,300.00	5,772.11	1,010.07	927.45	12.226	SF
Zeppo 5 Federal COM						
16H - OH - Plan 2 07-25-18	1,000.00	994.00	559.90	553.18	83.214	CC
16H - OH - Plan 2 07-25-18	13,768.60	13,757.91	659.97	417.67	2.724	ES, SF
18H - OH - Plan 2 07-25-18	6,135.19	6,316.75	599.68	554.89	13.391	CC
18H - OH - Plan 2 07-25-18	13,768.60	13,947.26	659.96	415.80	2.703	ES, SF
26H - OH - Plan 2 07-25-18	1,000.00	993.00	589.90	583.18	87.719	CC
26H - OH - Plan 2 07-25-18	13,768.60	14,159.41	764.13	521.46	3.149	ES, SF
27H - OH - Plan 1 07-25-18	1,000.00	999.00	30.00	23.25	4.447	CC, ES
27H - OH - Plan 1 07-25-18	13,768.60	14,286.26	500.17	257.67	2.063	SF
28H - OH - Plan 2 07-25-18	2,884.30	2,894.46	633.88	613.60	31.255	CC
28H - OH - Plan 2 07-25-18	13,768.60	14,333.39	767.82	523.12	3.138	ES, SF

Offset Design Shovel Head Federal Com - 18H - OH / 62984 - Surveys (Double K 7) — **Offset Site Error:** 0.00 usft

Survey Program: 100-NS-GYRO-MS, 4600-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	24.00	0.00	0.00	160.92	-2,646.56	915.65	2,800.58				
100.00	100.00	76.64	100.64	0.15	0.08	160.92	-2,646.60	915.52	2,800.47	2,800.24	0.23	N/A	
127.15	127.15	103.07	127.07	0.25	0.12	160.92	-2,646.62	915.41	2,800.47	2,800.10	0.36	7,694.305	
200.00	200.00	169.76	193.76	0.51	0.27	160.92	-2,646.84	915.29	2,800.64	2,799.86	0.78	3,592.554	
300.00	300.00	273.32	297.32	0.87	0.52	160.93	-2,647.03	915.15	2,800.76	2,799.37	1.39	2,018.629	
400.00	400.00	379.19	403.19	1.22	0.77	160.93	-2,647.04	914.98	2,800.71	2,798.72	1.99	1,404.555	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 18H - OH / 62984 - Surveys (Double K 7) — Offset Site Error: 0.00 usft

Survey Program: 100-NS-GYRO-MS, 4600-MWD+HDGM — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
500.00	500.00	479.62	503.62	1.58	1.01	160.94	-2,647.00	914.75	2,800.60	2,798.01	2.59	1,080.283	
592.58	592.58	568.58	592.58	1.91	1.21	160.94	-2,646.94	914.58	2,800.49	2,797.36	3.12	896.842	
600.00	600.00	575.00	599.00	1.94	1.22	160.94	-2,646.94	914.56	2,800.49	2,797.32	3.16	885.198	
700.00	700.00	672.74	696.74	2.30	1.46	160.95	-2,647.24	914.15	2,800.64	2,796.87	3.76	744.177	
800.00	800.00	769.15	793.14	2.66	1.70	160.96	-2,647.56	913.77	2,800.82	2,796.45	4.36	641.958	
900.00	900.00	868.21	892.20	3.02	1.94	160.97	-2,647.95	913.55	2,801.12	2,796.16	4.95	565.323	
1,000.00	1,000.00	967.33	991.33	3.38	2.19	160.97	-2,648.32	913.26	2,801.38	2,795.82	5.56	503.690	
1,100.00	1,099.99	1,066.88	1,090.87	3.72	2.43	71.01	-2,648.78	912.96	2,801.29	2,795.13	6.16	454.822	
1,200.00	1,199.91	1,167.22	1,191.21	4.07	2.69	71.11	-2,649.19	912.66	2,800.30	2,793.54	6.76	414.292	
1,300.00	1,299.69	1,266.69	1,290.68	4.42	2.94	71.27	-2,649.69	912.33	2,798.56	2,791.20	7.36	380.123	
1,400.00	1,399.32	1,360.98	1,384.97	4.77	3.19	71.45	-2,650.10	911.96	2,796.11	2,788.15	7.96	351.237	
1,500.00	1,498.94	1,459.75	1,483.73	5.13	3.43	71.62	-2,650.77	911.72	2,793.91	2,785.35	8.56	326.480	
1,600.00	1,598.56	1,559.78	1,583.77	5.49	3.68	71.80	-2,651.47	911.44	2,791.74	2,782.57	9.17	304.568	
1,700.00	1,698.18	1,658.42	1,682.40	5.85	3.93	71.98	-2,652.20	911.11	2,789.62	2,779.84	9.78	285.292	
1,800.00	1,797.80	1,754.65	1,778.62	6.22	4.17	72.16	-2,652.98	910.78	2,787.59	2,777.21	10.39	268.379	
1,900.00	1,897.42	1,850.99	1,874.96	6.58	4.42	72.33	-2,653.82	910.38	2,785.64	2,774.64	11.00	253.253	
2,000.00	1,997.04	1,953.83	1,977.80	6.95	4.68	72.52	-2,654.79	910.09	2,783.81	2,772.19	11.62	239.493	
2,100.00	2,096.66	2,048.94	2,072.91	7.32	4.90	72.69	-2,655.56	910.07	2,781.96	2,769.75	12.21	227.795	
2,200.00	2,196.28	2,148.74	2,172.70	7.69	5.12	72.86	-2,656.51	910.19	2,780.33	2,767.52	12.80	217.179	
2,300.00	2,295.90	2,252.73	2,276.68	8.06	5.35	73.05	-2,657.49	910.33	2,778.71	2,765.31	13.41	207.285	
2,400.00	2,395.52	2,336.96	2,360.91	8.43	5.54	73.19	-2,658.35	910.49	2,777.19	2,763.23	13.96	198.879	
2,500.00	2,495.15	2,432.94	2,456.88	8.80	5.74	73.35	-2,659.47	910.87	2,775.96	2,761.42	14.54	190.922	
2,600.00	2,594.93	2,875.00	2,896.92	9.16	6.56	74.34	-2,647.14	881.89	2,770.37	2,754.65	15.73	176.166	
2,700.00	2,694.85	2,975.00	2,995.79	9.52	6.72	74.45	-2,639.25	869.17	2,758.18	2,741.94	16.24	169.867	
2,800.00	2,794.84	3,025.00	3,045.38	9.87	6.79	74.40	-2,635.68	863.95	2,747.94	2,731.28	16.66	164.897	
2,900.00	2,894.84	3,075.00	3,095.03	10.22	6.88	164.49	-2,632.78	858.76	2,739.64	2,722.54	17.10	160.255	
3,000.00	2,994.84	3,117.20	3,136.97	10.57	6.96	164.57	-2,631.34	854.37	2,733.46	2,715.93	17.53	155.973	
3,100.00	3,094.84	3,189.89	3,209.25	10.92	7.11	164.71	-2,629.90	846.79	2,728.76	2,710.74	18.03	151.369	
3,200.00	3,194.84	3,279.61	3,298.49	11.26	7.31	164.89	-2,628.65	837.61	2,724.72	2,706.15	18.57	146.700	
3,300.00	3,294.84	3,364.51	3,382.96	11.61	7.50	165.06	-2,627.74	829.13	2,721.10	2,701.98	19.11	142.355	
3,400.00	3,394.84	3,437.66	3,455.68	11.96	7.68	165.22	-2,627.84	821.18	2,718.41	2,698.77	19.64	138.414	
3,500.00	3,494.84	3,532.91	3,550.29	12.31	7.91	165.45	-2,628.57	810.19	2,716.22	2,695.99	20.22	134.304	
3,600.00	3,594.84	3,628.76	3,645.53	12.66	8.15	165.67	-2,629.47	799.48	2,714.32	2,693.51	20.81	130.409	
3,700.00	3,694.84	3,736.36	3,752.48	13.02	8.42	165.92	-2,630.28	787.61	2,712.35	2,690.91	21.43	126.543	
3,800.00	3,794.84	3,844.97	3,860.33	13.37	8.69	166.19	-2,630.92	774.86	2,710.07	2,688.01	22.06	122.855	
3,900.00	3,894.84	3,953.09	3,967.57	13.72	8.97	166.47	-2,631.41	761.05	2,707.46	2,684.78	22.69	119.350	
4,000.00	3,994.84	4,085.96	4,099.12	14.07	9.31	166.86	-2,631.77	742.41	2,704.55	2,681.17	23.38	115.689	
4,100.00	4,094.84	4,201.31	4,213.36	14.42	9.60	167.18	-2,630.46	726.54	2,700.30	2,676.28	24.02	112.418	
4,200.00	4,194.84	4,308.78	4,319.85	14.78	9.86	167.47	-2,628.42	712.25	2,695.48	2,670.84	24.64	109.394	
4,300.00	4,294.84	4,375.00	4,385.62	15.13	10.03	167.62	-2,627.57	704.56	2,691.61	2,666.45	25.16	106.983	
4,400.00	4,394.84	4,470.77	4,480.83	15.48	10.27	167.83	-2,626.70	694.33	2,688.43	2,662.68	25.75	104.388	
4,500.00	4,494.84	4,575.00	4,584.45	15.84	10.53	168.06	-2,625.43	683.09	2,684.96	2,658.59	26.37	101.818	
4,600.00	4,594.84	4,658.15	4,667.14	16.19	10.64	168.24	-2,624.51	674.32	2,681.74	2,654.91	26.83	99.947	
4,700.00	4,694.84	4,731.73	4,740.36	16.55	10.73	168.39	-2,624.35	667.14	2,679.55	2,652.26	27.28	98.221	
4,800.00	4,794.84	4,817.31	4,825.60	16.90	10.80	168.55	-2,624.82	659.51	2,678.27	2,650.56	27.70	96.676	
4,900.00	4,894.84	4,902.95	4,911.03	17.25	10.82	168.68	-2,625.22	653.62	2,677.37	2,649.29	28.08	95.354	
5,000.00	4,994.84	5,019.66	5,027.63	17.61	10.86	168.79	-2,625.33	648.53	2,676.64	2,648.17	28.47	94.004	
5,100.00	5,094.84	5,132.65	5,140.59	17.96	10.92	168.82	-2,623.98	646.53	2,675.12	2,646.23	28.88	92.623	
5,200.00	5,194.84	5,181.00	5,188.87	18.32	10.94	168.77	-2,623.16	648.72	2,674.35	2,645.09	29.26	91.396	
5,229.66	5,224.49	5,191.49	5,199.31	18.42	10.95	-11.10	-2,623.04	649.68	2,674.07	2,644.70	29.37	91.047	
5,300.00	5,294.74	5,223.46	5,231.02	18.66	10.96	-11.23	-2,622.78	653.73	2,673.01	2,643.38	29.63	90.224	
5,400.00	5,392.32	5,275.00	5,281.54	18.99	11.00	-11.92	-2,622.47	663.86	2,655.67	2,625.69	29.99	88.566	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 18H - OH / 62984 - Surveys (Double K 7)

Offset Site Error: 0.00 usft

Survey Program: 100-NS-GYRO-MS, 4600-MWD+HDGM

Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,500.00	5,483.40	5,307.00	5,312.36	19.30	11.02	-13.16	-2,622.28	672.43	2,620.53	2,590.21	30.32	86.442	
5,600.00	5,563.99	5,338.00	5,341.68	19.59	11.04	-15.29	-2,622.14	682.48	2,569.00	2,538.37	30.63	83.879	
5,700.00	5,630.59	5,370.00	5,371.27	19.90	11.07	-18.94	-2,622.19	694.64	2,503.03	2,472.07	30.97	80.830	
5,800.00	5,680.26	5,383.04	5,383.10	20.26	11.09	-24.90	-2,622.29	700.14	2,424.96	2,393.62	31.34	77.371	
5,900.00	5,710.85	5,402.00	5,400.02	20.67	11.11	-36.87	-2,622.48	708.69	2,337.49	2,305.72	31.77	73.570	
6,000.00	5,721.06	5,402.00	5,400.02	21.11	11.11	-59.13	-2,622.48	708.69	2,243.75	2,211.53	32.22	69.637	
6,100.00	5,722.09	5,402.00	5,400.02	21.63	11.11	-59.13	-2,622.48	708.69	2,148.50	2,115.76	32.74	65.631	
6,200.00	5,723.11	5,402.00	5,400.02	22.23	11.11	-59.13	-2,622.48	708.69	2,053.70	2,020.36	33.33	61.610	
6,300.00	5,724.14	5,402.00	5,400.02	22.90	11.11	-59.13	-2,622.48	708.69	1,959.41	1,925.41	34.01	57.616	
6,400.00	5,725.16	5,402.00	5,400.02	23.65	11.11	-59.13	-2,622.48	708.69	1,865.72	1,830.97	34.75	53.687	
6,500.00	5,726.19	5,402.00	5,400.02	24.45	11.11	-59.13	-2,622.48	708.69	1,772.73	1,737.17	35.56	49.853	
6,600.00	5,727.21	5,402.00	5,400.02	25.32	11.11	-59.13	-2,622.48	708.69	1,680.53	1,644.11	36.42	46.138	
6,700.00	5,728.24	5,402.00	5,400.02	26.23	11.11	-59.13	-2,622.48	708.69	1,589.28	1,551.94	37.34	42.562	
6,800.00	5,729.26	5,402.00	5,400.02	27.20	11.11	-59.13	-2,622.48	708.69	1,499.15	1,460.84	38.30	39.139	
6,900.00	5,730.29	5,402.00	5,400.02	28.20	11.11	-59.13	-2,622.48	708.69	1,410.34	1,371.03	39.31	35.879	
7,000.00	5,731.31	5,402.00	5,400.02	29.24	11.11	-59.13	-2,622.48	708.69	1,323.14	1,282.79	40.35	32.791	
7,100.00	5,732.34	5,402.00	5,400.02	30.32	11.11	-59.13	-2,622.48	708.69	1,237.87	1,196.44	41.43	29.881	
7,200.00	5,733.36	5,402.00	5,400.02	31.43	11.11	-59.13	-2,622.48	708.69	1,154.97	1,112.43	42.53	27.155	
7,300.00	5,734.39	5,402.00	5,400.02	32.56	11.11	-59.13	-2,622.48	708.69	1,074.97	1,031.31	43.67	24.618	
7,400.00	5,735.41	5,410.71	5,407.69	33.72	11.12	-59.87	-2,622.58	712.82	998.52	953.68	44.84	22.271	
7,500.00	5,736.44	5,411.84	5,408.68	34.90	11.12	-59.97	-2,622.60	713.36	926.62	880.60	46.02	20.136	
7,600.00	5,737.46	5,413.01	5,409.71	36.10	11.12	-60.07	-2,622.62	713.92	860.35	813.13	47.22	18.221	
7,700.00	5,738.49	5,414.22	5,410.77	37.31	11.12	-60.17	-2,622.63	714.50	801.11	752.67	48.44	16.539	
7,800.00	5,739.52	5,415.47	5,411.86	38.55	11.13	-60.28	-2,622.65	715.11	750.56	700.89	49.67	15.110	
7,900.00	5,740.54	5,416.77	5,413.00	39.79	11.13	-60.39	-2,622.67	715.74	710.56	659.64	50.92	13.954	
8,000.00	5,741.57	5,418.12	5,414.17	41.06	11.13	-60.51	-2,622.70	716.39	682.97	630.79	52.19	13.087	
8,100.00	5,742.59	5,419.51	5,415.39	42.33	11.13	-60.63	-2,622.72	717.07	669.33	615.87	53.46	12.520	
8,142.30	5,743.02	5,420.11	5,415.92	42.87	11.13	-60.68	-2,622.73	717.37	667.99	613.98	54.01	12.369	CC, ES
8,200.00	5,743.62	5,420.96	5,416.65	43.62	11.13	-60.75	-2,622.74	717.78	670.47	615.73	54.75	12.247	
8,300.00	5,744.64	5,422.46	5,417.96	44.91	11.13	-60.88	-2,622.77	718.52	686.34	630.30	56.04	12.246	SF
8,400.00	5,745.67	5,424.02	5,419.32	46.21	11.14	-61.01	-2,622.80	719.29	715.95	658.60	57.35	12.484	
8,500.00	5,746.69	5,425.64	5,420.73	47.53	11.14	-61.15	-2,622.83	720.09	757.69	699.03	58.67	12.915	
8,600.00	5,747.72	5,433.00	5,427.09	48.85	11.15	-61.78	-2,622.98	723.77	809.73	749.73	60.00	13.496	
8,700.00	5,748.74	5,433.00	5,427.09	50.18	11.15	-61.78	-2,622.98	723.77	870.13	808.80	61.32	14.189	
8,800.00	5,749.77	5,433.00	5,427.09	51.51	11.15	-61.78	-2,622.98	723.77	937.33	874.67	62.66	14.959	
8,900.00	5,750.79	5,433.00	5,427.09	52.85	11.15	-61.78	-2,622.98	723.77	1,009.97	945.97	64.00	15.781	
9,000.00	5,751.82	5,433.00	5,427.09	54.20	11.15	-61.78	-2,622.98	723.77	1,086.97	1,021.63	65.35	16.634	
9,100.00	5,752.84	5,433.00	5,427.09	55.55	11.15	-61.78	-2,622.98	723.77	1,167.46	1,100.76	66.70	17.504	
9,200.00	5,753.87	5,433.00	5,427.09	56.91	11.15	-61.78	-2,622.98	723.77	1,250.77	1,182.72	68.05	18.379	
9,300.00	5,754.89	5,440.60	5,433.64	58.27	11.16	-62.43	-2,623.15	727.64	1,336.34	1,266.91	69.43	19.248	
9,400.00	5,755.92	5,442.60	5,435.35	59.63	11.17	-62.60	-2,623.20	728.66	1,423.80	1,353.00	70.80	20.111	
9,500.00	5,756.94	5,444.62	5,437.08	61.00	11.17	-62.78	-2,623.24	729.70	1,512.81	1,440.64	72.17	20.962	
9,600.00	5,757.97	5,446.66	5,438.83	62.37	11.17	-62.95	-2,623.29	730.76	1,603.12	1,529.57	73.55	21.797	
9,700.00	5,758.99	5,448.73	5,440.60	63.75	11.18	-63.13	-2,623.34	731.84	1,694.50	1,619.58	74.93	22.616	
9,800.00	5,760.02	5,450.83	5,442.39	65.13	11.18	-63.31	-2,623.39	732.93	1,786.81	1,710.50	76.31	23.415	
9,900.00	5,761.04	5,452.95	5,444.20	66.51	11.18	-63.49	-2,623.44	734.04	1,879.90	1,802.21	77.70	24.196	
10,000.00	5,762.07	5,455.10	5,446.02	67.90	11.19	-63.67	-2,623.49	735.17	1,973.67	1,894.58	79.09	24.956	
10,100.00	5,763.09	5,457.28	5,447.87	69.29	11.19	-63.86	-2,623.54	736.32	2,068.01	1,987.53	80.48	25.697	
10,200.00	5,764.12	5,464.00	5,453.56	70.68	11.20	-64.43	-2,623.71	739.89	2,162.87	2,080.99	81.88	26.415	
10,300.00	5,765.14	5,464.00	5,453.56	72.07	11.20	-64.43	-2,623.71	739.89	2,258.15	2,174.88	83.27	27.118	
10,400.00	5,766.17	5,464.00	5,453.56	73.47	11.20	-64.43	-2,623.71	739.89	2,353.83	2,269.16	84.67	27.801	
10,500.00	5,767.19	5,480.33	5,467.28	74.87	11.23	-65.80	-2,624.20	748.73	2,449.84	2,363.74	86.10	28.454	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 18H - OH / 62984 - Surveys (Double K 7) — **Offset Site Error:** 0.00 usft

Survey Program: 100-NS-GYRO-MS, 4600-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,600.00	5,768.22	5,484.54	5,470.74	76.27	11.24	-66.16	-2,624.42	751.14	2,546.09	2,458.59	87.51	29.096	
10,700.00	5,769.24	5,500.83	5,484.30	77.67	11.28	-67.51	-2,625.03	760.13	2,642.66	2,553.72	88.94	29.712	
10,800.00	5,770.27	5,504.36	5,487.21	79.07	11.28	-67.81	-2,625.19	762.13	2,739.44	2,649.09	90.35	30.319	
10,900.00	5,771.29	5,507.94	5,490.14	80.48	11.29	-68.10	-2,625.36	764.17	2,836.44	2,744.68	91.77	30.909	
11,000.00	5,772.32	5,511.56	5,493.10	81.88	11.30	-68.40	-2,625.52	766.25	2,933.64	2,840.45	93.18	31.483	
11,100.00	5,773.34	5,519.00	5,499.15	83.29	11.32	-69.00	-2,625.87	770.56	3,031.01	2,936.40	94.61	32.038	
11,200.00	5,774.37	5,519.00	5,499.15	84.70	11.32	-69.00	-2,625.87	770.56	3,128.53	3,032.52	96.02	32.583	
11,300.00	5,775.39	5,519.00	5,499.15	86.11	11.32	-69.00	-2,625.87	770.56	3,226.21	3,128.78	97.43	33.114	
11,400.00	5,776.42	5,519.00	5,499.15	87.52	11.32	-69.00	-2,625.87	770.56	3,324.03	3,225.19	98.84	33.630	
11,500.00	5,777.44	5,519.00	5,499.15	88.94	11.32	-69.00	-2,625.87	770.56	3,421.97	3,321.71	100.25	34.133	
11,600.00	5,778.47	5,519.00	5,499.15	90.35	11.32	-69.00	-2,625.87	770.56	3,520.03	3,418.36	101.67	34.622	
11,700.00	5,779.49	5,519.00	5,499.15	91.77	11.32	-69.00	-2,625.87	770.56	3,618.19	3,515.10	103.08	35.099	
11,800.00	5,780.52	5,519.00	5,499.15	93.18	11.32	-69.00	-2,625.87	770.56	3,716.45	3,611.95	104.50	35.563	
11,900.00	5,781.54	5,530.50	5,508.42	94.60	11.35	-69.93	-2,626.38	777.36	3,814.74	3,708.79	105.95	36.005	
12,000.00	5,782.57	5,532.01	5,509.63	96.02	11.35	-70.05	-2,626.44	778.27	3,913.16	3,805.79	107.37	36.444	
12,100.00	5,783.60	5,533.49	5,510.81	97.44	11.36	-70.17	-2,626.51	779.16	4,011.66	3,902.86	108.80	36.872	
12,200.00	5,784.62	5,534.94	5,511.96	98.86	11.36	-70.29	-2,626.57	780.03	4,110.23	4,000.00	110.22	37.290	
12,300.00	5,785.65	5,536.37	5,513.09	100.29	11.36	-70.40	-2,626.62	780.89	4,208.86	4,097.21	111.65	37.697	
12,400.00	5,786.67	5,537.76	5,514.20	101.71	11.37	-70.51	-2,626.68	781.74	4,307.55	4,194.48	113.08	38.095	
12,500.00	5,787.70	5,539.12	5,515.28	103.13	11.37	-70.62	-2,626.73	782.57	4,406.30	4,291.80	114.50	38.482	
12,600.00	5,788.72	5,551.00	5,524.61	104.56	11.40	-71.55	-2,627.18	789.91	4,505.15	4,389.20	115.96	38.851	
12,700.00	5,789.75	5,551.00	5,524.61	105.98	11.40	-71.55	-2,627.18	789.91	4,604.00	4,486.61	117.38	39.222	
12,800.00	5,790.77	5,551.00	5,524.61	107.41	11.40	-71.55	-2,627.18	789.91	4,702.89	4,584.08	118.81	39.583	
12,900.00	5,791.80	5,551.00	5,524.61	108.83	11.40	-71.55	-2,627.18	789.91	4,801.83	4,681.60	120.24	39.937	
13,000.00	5,792.82	5,551.00	5,524.61	110.26	11.40	-71.55	-2,627.18	789.91	4,900.81	4,779.15	121.66	40.282	
13,100.00	5,793.85	5,551.00	5,524.61	111.69	11.40	-71.55	-2,627.18	789.91	4,999.84	4,876.74	123.09	40.619	
13,200.00	5,794.87	5,551.00	5,524.61	113.12	11.40	-71.55	-2,627.18	789.91	5,098.90	4,974.38	124.52	40.949	
13,300.00	5,795.90	5,551.00	5,524.61	114.54	11.40	-71.55	-2,627.18	789.91	5,197.99	5,072.05	125.95	41.271	
13,400.00	5,796.92	5,551.00	5,524.61	115.97	11.40	-71.55	-2,627.18	789.91	5,297.12	5,169.75	127.38	41.586	
13,500.00	5,797.95	5,551.00	5,524.61	117.40	11.40	-71.55	-2,627.18	789.91	5,396.29	5,267.48	128.81	41.894	
13,600.00	5,798.97	5,551.00	5,524.61	118.83	11.40	-71.55	-2,627.18	789.91	5,495.48	5,365.24	130.24	42.196	
13,700.00	5,800.00	5,551.00	5,524.61	120.27	11.40	-71.55	-2,627.18	789.91	5,594.70	5,463.03	131.67	42.491	
13,768.60	5,800.70	5,551.00	5,524.61	121.10	11.40	-71.55	-2,627.18	789.91	5,662.78	5,530.28	132.50	42.737	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Plan 3 07-22-18

Offset Site Error: 0.00 usft

Survey Program: 5305-Scientific Keeper

Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	5,400.00	5,405.80	0.00	0.00	165.14	-2,544.08	674.93	6,012.53				
100.00	100.00	5,400.00	5,405.80	0.15	0.00	165.14	-2,544.08	674.93	5,922.79	5,922.64	0.15	N/A	
200.00	200.00	5,400.00	5,405.80	0.51	0.00	165.14	-2,544.08	674.93	5,833.37	5,832.87	0.51	N/A	
300.00	300.00	5,400.00	5,405.80	0.87	0.00	165.14	-2,544.08	674.93	5,744.31	5,743.44	0.87	6,633.849	
400.00	400.00	5,400.00	5,405.80	1.22	0.00	165.14	-2,544.08	674.93	5,655.61	5,654.39	1.22	4,619.161	
500.00	500.00	5,400.00	5,405.80	1.58	0.00	165.14	-2,544.08	674.93	5,567.29	5,565.71	1.58	3,517.255	
600.00	600.00	5,400.00	5,405.80	1.94	0.00	165.14	-2,544.08	674.93	5,479.38	5,477.44	1.94	2,822.497	
700.00	700.00	5,400.00	5,405.80	2.30	0.00	165.14	-2,544.08	674.93	5,391.89	5,389.59	2.30	2,344.508	
800.00	800.00	5,400.00	5,405.80	2.66	0.00	165.14	-2,544.08	674.93	5,304.84	5,302.18	2.66	1,995.600	
900.00	900.00	5,400.00	5,405.80	3.02	0.00	165.14	-2,544.08	674.93	5,218.25	5,215.23	3.02	1,729.766	
1,000.00	1,000.00	5,400.00	5,405.80	3.38	0.00	165.14	-2,544.08	674.93	5,132.15	5,128.78	3.38	1,520.543	
1,100.00	1,099.99	5,400.00	5,405.80	3.72	0.00	77.57	-2,544.08	674.93	5,046.40	5,042.67	3.73	1,354.651	
1,200.00	1,199.91	5,400.00	5,405.80	4.07	0.00	80.00	-2,544.08	674.93	4,960.88	4,956.81	4.07	1,218.949	
1,300.00	1,299.69	5,400.00	5,405.80	4.42	0.00	82.41	-2,544.08	674.93	4,875.68	4,871.26	4.42	1,103.403	
1,400.00	1,399.32	5,400.00	5,405.80	4.77	0.00	83.21	-2,544.08	674.93	4,790.90	4,786.13	4.77	1,003.871	
1,500.00	1,498.94	5,400.00	5,405.80	5.13	0.00	83.21	-2,544.08	674.93	4,706.70	4,701.57	5.13	917.544	
1,600.00	1,598.56	5,400.00	5,405.80	5.49	0.00	83.21	-2,544.08	674.93	4,623.14	4,617.65	5.49	842.149	
1,700.00	1,698.18	5,400.00	5,405.80	5.85	0.00	83.21	-2,544.08	674.93	4,540.23	4,534.38	5.85	775.850	
1,800.00	1,797.80	5,400.00	5,405.80	6.22	0.00	83.21	-2,544.08	674.93	4,458.03	4,451.82	6.22	717.180	
1,900.00	1,897.42	5,400.00	5,405.80	6.58	0.00	83.21	-2,544.08	674.93	4,376.58	4,369.99	6.58	664.960	
2,000.00	1,997.04	5,400.00	5,405.80	6.95	0.00	83.21	-2,544.08	674.93	4,295.90	4,288.95	6.95	618.233	
2,100.00	2,096.66	5,400.00	5,405.80	7.32	0.00	83.21	-2,544.08	674.93	4,216.05	4,208.74	7.32	576.219	
2,200.00	2,196.28	5,400.00	5,405.80	7.69	0.00	83.21	-2,544.08	674.93	4,137.08	4,129.40	7.69	538.277	
2,300.00	2,295.90	5,400.00	5,405.80	8.06	0.00	83.21	-2,544.08	674.93	4,059.04	4,050.98	8.06	503.877	
2,400.00	2,395.52	5,400.00	5,405.80	8.43	0.00	83.21	-2,544.08	674.93	3,981.98	3,973.55	8.43	472.573	
2,500.00	2,495.15	5,400.00	5,405.80	8.80	0.00	82.67	-2,544.08	674.93	3,905.96	3,897.17	8.80	444.013	
2,600.00	2,594.93	5,400.00	5,405.80	9.16	0.00	81.00	-2,544.08	674.93	3,831.23	3,822.07	9.16	418.118	
2,700.00	2,694.85	5,400.00	5,405.80	9.52	0.00	79.40	-2,544.08	674.93	3,757.96	3,748.44	9.52	394.643	
2,800.00	2,794.84	5,400.00	5,405.80	9.87	0.00	77.89	-2,544.08	674.93	3,686.28	3,676.40	9.87	373.355	
2,900.00	2,894.84	5,400.00	5,405.80	10.22	0.00	167.87	-2,544.08	674.93	3,616.14	3,605.92	10.22	353.825	
3,000.00	2,994.84	5,400.00	5,405.80	10.57	0.00	167.87	-2,544.08	674.93	3,547.43	3,536.86	10.57	335.691	
3,100.00	3,094.84	5,400.00	5,405.80	10.92	0.00	167.87	-2,544.08	674.93	3,480.24	3,469.32	10.92	318.828	
3,200.00	3,194.84	5,400.00	5,405.80	11.26	0.00	167.87	-2,544.08	674.93	3,414.65	3,403.39	11.26	303.134	
3,300.00	3,294.84	5,400.00	5,405.80	11.61	0.00	167.87	-2,544.08	674.93	3,350.77	3,339.16	11.61	288.514	
3,400.00	3,394.84	5,400.00	5,405.80	11.96	0.00	167.87	-2,544.08	674.93	3,288.69	3,276.73	11.96	274.886	
3,500.00	3,494.84	5,400.00	5,405.80	12.31	0.00	167.87	-2,544.08	674.93	3,228.51	3,216.20	12.31	262.177	
3,600.00	3,594.84	5,400.00	5,405.80	12.66	0.00	167.87	-2,544.08	674.93	3,170.35	3,157.68	12.67	250.321	
3,700.00	3,694.84	5,400.00	5,405.80	13.02	0.00	167.87	-2,544.08	674.93	3,114.30	3,101.29	13.02	239.260	
3,800.00	3,794.84	5,400.00	5,405.80	13.37	0.00	167.87	-2,544.08	674.93	3,060.51	3,047.14	13.37	228.942	
3,900.00	3,894.84	5,400.00	5,405.80	13.72	0.00	167.87	-2,544.08	674.93	3,009.07	2,995.35	13.72	219.319	
4,000.00	3,994.84	5,400.00	5,405.80	14.07	0.00	167.87	-2,544.08	674.93	2,960.12	2,946.05	14.07	210.349	
4,100.00	4,094.84	5,400.00	5,405.80	14.42	0.00	167.87	-2,544.08	674.93	2,913.78	2,899.36	14.43	201.994	
4,200.00	4,194.84	5,400.00	5,405.80	14.78	0.00	167.87	-2,544.08	674.93	2,870.18	2,855.40	14.78	194.220	
4,300.00	4,294.84	5,400.00	5,405.80	15.13	0.00	167.87	-2,544.08	674.93	2,829.44	2,814.31	15.13	186.994	
4,400.00	4,394.84	5,400.00	5,405.80	15.48	0.00	167.87	-2,544.08	674.93	2,791.69	2,776.21	15.48	180.288	
4,500.00	4,494.84	5,400.00	5,405.80	15.84	0.00	167.87	-2,544.08	674.93	2,757.05	2,741.22	15.84	174.076	
4,600.00	4,594.84	5,400.00	5,405.80	16.19	0.00	167.87	-2,544.08	674.93	2,725.65	2,709.46	16.19	168.332	
4,700.00	4,694.84	5,400.00	5,405.80	16.55	0.00	167.87	-2,544.08	674.93	2,697.58	2,681.04	16.55	163.034	
4,800.00	4,794.84	5,400.00	5,405.80	16.90	0.00	167.87	-2,544.08	674.93	2,672.97	2,656.07	16.90	158.160	
4,900.00	4,894.84	5,400.00	5,405.80	17.25	0.00	167.87	-2,544.08	674.93	2,651.90	2,634.65	17.25	153.690	
5,000.00	4,994.84	5,400.00	5,405.80	17.61	0.00	167.87	-2,544.08	674.93	2,634.46	2,616.85	17.61	149.605	
5,100.00	5,094.84	5,400.00	5,405.80	17.96	0.00	167.87	-2,544.08	674.93	2,620.72	2,602.76	17.96	145.886	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Plan 3 07-22-18 — Offset Site Error: 0.00 usft

Survey Program: 5305-Scientific Keeper — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,194.84	5,400.00	5,405.80	18.32	0.00	167.87	-2,544.08	674.93	2,610.75	2,592.43	18.32	142.515	
5,300.00	5,294.74	5,413.51	5,419.22	18.66	0.08	-12.09	-2,543.75	673.41	2,601.85	2,583.08	18.77	138.586	
5,400.00	5,392.32	5,509.92	5,514.99	18.99	0.57	-12.63	-2,541.38	662.59	2,576.66	2,555.96	20.69	124.507	
5,500.00	5,483.40	5,597.23	5,601.73	19.30	0.61	-13.98	-2,539.24	652.79	2,532.39	2,510.44	21.95	115.356	
5,600.00	5,563.99	5,633.38	5,637.75	19.59	0.63	-16.48	-2,538.40	650.10	2,471.73	2,448.65	23.08	107.086	
5,700.00	5,630.59	5,650.00	5,654.37	19.90	0.63	-20.85	-2,538.04	649.71	2,397.65	2,373.57	24.08	99.568	
5,800.00	5,680.26	5,685.42	5,689.77	20.26	0.64	-29.75	-2,537.35	650.63	2,312.60	2,287.62	24.99	92.558	
5,900.00	5,710.85	5,700.00	5,704.30	20.67	0.64	-48.98	-2,537.10	651.71	2,220.08	2,194.37	25.71	86.340	
6,000.00	5,721.06	5,700.00	5,704.30	21.11	0.64	-85.81	-2,537.10	651.71	2,123.69	2,097.45	26.24	80.920	
6,100.00	5,722.09	5,700.00	5,704.30	21.63	0.64	-85.81	-2,537.10	651.71	2,026.87	2,000.11	26.76	75.743	
6,200.00	5,723.11	5,700.00	5,704.30	22.23	0.64	-85.81	-2,537.10	651.71	1,930.36	1,903.00	27.36	70.560	
6,300.00	5,724.14	5,700.00	5,704.30	22.90	0.64	-85.81	-2,537.10	651.71	1,834.23	1,806.20	28.03	65.434	
6,400.00	5,725.16	5,700.00	5,704.30	23.65	0.64	-85.81	-2,537.10	651.71	1,738.54	1,709.76	28.78	60.417	
6,500.00	5,726.19	5,700.00	5,704.30	24.45	0.64	-85.81	-2,537.10	651.71	1,643.36	1,613.77	29.58	55.551	
6,600.00	5,727.21	5,700.00	5,704.30	25.32	0.64	-85.81	-2,537.10	651.71	1,548.78	1,518.33	30.45	50.867	
6,700.00	5,728.24	5,700.00	5,704.30	26.23	0.64	-85.81	-2,537.10	651.71	1,454.93	1,423.57	31.36	46.388	
6,800.00	5,729.26	5,700.00	5,704.30	27.20	0.64	-85.81	-2,537.10	651.71	1,361.96	1,329.64	32.33	42.131	
6,900.00	5,730.29	5,700.00	5,704.30	28.20	0.64	-85.81	-2,537.10	651.71	1,270.06	1,236.73	33.33	38.103	
7,000.00	5,731.31	5,700.00	5,704.30	29.24	0.64	-85.81	-2,537.10	651.71	1,179.47	1,145.10	34.37	34.313	
7,100.00	5,732.34	5,700.00	5,704.30	30.32	0.64	-85.81	-2,537.10	651.71	1,090.53	1,055.08	35.45	30.762	
7,200.00	5,733.36	5,700.00	5,704.30	31.43	0.64	-85.81	-2,537.10	651.71	1,003.68	967.12	36.56	27.456	
7,300.00	5,734.39	5,700.00	5,704.30	32.56	0.64	-85.81	-2,537.10	651.71	919.50	881.81	37.69	24.397	
7,400.00	5,735.41	5,700.00	5,704.30	33.72	0.64	-85.81	-2,537.10	651.71	838.80	799.95	38.85	21.592	
7,500.00	5,736.44	5,700.00	5,704.30	34.90	0.64	-85.81	-2,537.10	651.71	762.69	722.66	40.03	19.054	
7,600.00	5,737.46	5,700.00	5,704.30	36.10	0.64	-85.81	-2,537.10	651.71	692.68	651.45	41.23	16.802	
7,700.00	5,738.49	5,700.00	5,704.30	37.31	0.64	-85.81	-2,537.10	651.71	630.80	588.36	42.44	14.862	
7,800.00	5,739.52	5,700.00	5,704.30	38.55	0.64	-85.81	-2,537.10	651.71	579.67	536.00	43.68	13.272	
7,900.00	5,740.54	5,700.00	5,704.30	39.79	0.64	-85.81	-2,537.10	651.71	542.34	497.41	44.93	12.072	
8,000.00	5,741.57	5,700.00	5,704.30	41.06	0.64	-85.81	-2,537.10	651.71	521.76	475.58	46.19	11.297	
8,059.46	5,742.17	5,700.00	5,704.30	41.81	0.64	-85.81	-2,537.10	651.71	518.36	471.42	46.94	11.042	CC, ES
8,100.00	5,742.59	5,700.00	5,704.30	42.33	0.64	-85.81	-2,537.10	651.71	519.95	472.49	47.46	10.955	SF
8,200.00	5,743.62	5,700.00	5,704.30	43.62	0.64	-85.81	-2,537.10	651.71	537.08	488.33	48.75	11.018	
8,300.00	5,744.64	5,700.00	5,704.30	44.91	0.64	-85.81	-2,537.10	651.71	571.45	521.41	50.04	11.420	
8,400.00	5,745.67	5,700.00	5,704.30	46.21	0.64	-85.81	-2,537.10	651.71	620.22	568.87	51.35	12.079	
8,500.00	5,746.69	5,700.00	5,704.30	47.53	0.64	-85.81	-2,537.10	651.71	680.28	627.62	52.66	12.919	
8,600.00	5,747.72	5,700.00	5,704.30	48.85	0.64	-85.81	-2,537.10	651.71	748.92	694.94	53.98	13.874	
8,700.00	5,748.74	5,700.00	5,704.30	50.18	0.64	-85.81	-2,537.10	651.71	824.01	768.70	55.31	14.899	
8,800.00	5,749.77	5,700.00	5,704.30	51.51	0.64	-85.81	-2,537.10	651.71	903.94	847.29	56.64	15.959	
8,900.00	5,750.79	5,700.00	5,704.30	52.85	0.64	-85.81	-2,537.10	651.71	987.53	929.54	57.98	17.032	
9,000.00	5,751.82	5,700.00	5,704.30	54.20	0.64	-85.81	-2,537.10	651.71	1,073.93	1,014.60	59.33	18.102	
9,100.00	5,752.84	5,700.00	5,704.30	55.55	0.64	-85.81	-2,537.10	651.71	1,162.51	1,101.83	60.68	19.158	
9,200.00	5,753.87	5,700.00	5,704.30	56.91	0.64	-85.81	-2,537.10	651.71	1,252.81	1,190.77	62.04	20.195	
9,300.00	5,754.89	5,700.00	5,704.30	58.27	0.64	-85.81	-2,537.10	651.71	1,344.48	1,281.09	63.40	21.207	
9,400.00	5,755.92	5,700.00	5,704.30	59.63	0.64	-85.81	-2,537.10	651.71	1,437.27	1,372.51	64.76	22.193	
9,500.00	5,756.94	5,700.00	5,704.30	61.00	0.64	-85.81	-2,537.10	651.71	1,530.97	1,464.83	66.13	23.150	
9,600.00	5,757.97	5,700.00	5,704.30	62.37	0.64	-85.81	-2,537.10	651.71	1,625.41	1,557.91	67.51	24.078	
9,700.00	5,758.99	5,700.00	5,704.30	63.75	0.64	-85.81	-2,537.10	651.71	1,720.49	1,651.60	68.88	24.977	
9,800.00	5,760.02	5,700.00	5,704.30	65.13	0.64	-85.81	-2,537.10	651.71	1,816.09	1,745.83	70.26	25.848	
9,900.00	5,761.04	5,700.00	5,704.30	66.51	0.64	-85.81	-2,537.10	651.71	1,912.14	1,840.50	71.64	26.689	
10,000.00	5,762.07	5,700.00	5,704.30	67.90	0.64	-85.81	-2,537.10	651.71	2,008.58	1,935.55	73.03	27.503	
10,100.00	5,763.09	5,688.43	5,692.77	69.29	0.64	-84.53	-2,537.30	650.82	2,105.29	2,030.89	74.40	28.297	
10,200.00	5,764.12	5,688.02	5,692.36	70.68	0.64	-84.49	-2,537.31	650.79	2,202.35	2,126.56	75.79	29.058	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Plan 3 07-22-18 — Offset Site Error: 0.00 usft

Survey Program: 5305-Scientific Keeper — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	5,765.14	5,687.61	5,691.95	72.07	0.64	-84.44	-2,537.31	650.77	2,299.66	2,222.48	77.18	29.795	
10,400.00	5,766.17	5,687.19	5,691.53	73.47	0.64	-84.39	-2,537.32	650.74	2,397.19	2,318.61	78.58	30.507	
10,500.00	5,767.19	5,686.77	5,691.11	74.87	0.64	-84.35	-2,537.33	650.71	2,494.92	2,414.94	79.98	31.196	
10,600.00	5,768.22	5,686.34	5,690.68	76.27	0.64	-84.30	-2,537.34	650.69	2,592.82	2,511.44	81.38	31.863	
10,700.00	5,769.24	5,685.91	5,690.26	77.67	0.64	-84.25	-2,537.35	650.66	2,690.87	2,608.10	82.78	32.508	
10,800.00	5,770.27	5,685.48	5,689.82	79.07	0.64	-84.21	-2,537.35	650.64	2,789.06	2,704.89	84.18	33.133	
10,900.00	5,771.29	5,685.04	5,689.39	80.48	0.64	-84.16	-2,537.36	650.61	2,887.38	2,801.80	85.58	33.738	
11,000.00	5,772.32	5,684.60	5,688.95	81.88	0.64	-84.11	-2,537.37	650.58	2,985.81	2,898.82	86.99	34.324	
11,100.00	5,773.34	5,684.16	5,688.50	83.29	0.64	-84.06	-2,537.38	650.56	3,084.34	2,995.94	88.40	34.892	
11,200.00	5,774.37	5,683.71	5,688.06	84.70	0.64	-84.01	-2,537.39	650.53	3,182.96	3,093.15	89.81	35.443	
11,300.00	5,775.39	5,683.26	5,687.60	86.11	0.64	-83.96	-2,537.39	650.51	3,281.66	3,190.45	91.22	35.977	
11,400.00	5,776.42	5,682.80	5,687.15	87.52	0.64	-83.91	-2,537.40	650.48	3,380.44	3,287.81	92.63	36.495	
11,500.00	5,777.44	5,682.34	5,686.69	88.94	0.64	-83.86	-2,537.41	650.46	3,479.29	3,385.25	94.04	36.998	
11,600.00	5,778.47	5,681.87	5,686.22	90.35	0.64	-83.81	-2,537.42	650.43	3,578.21	3,482.75	95.45	37.486	
11,700.00	5,779.49	5,681.40	5,685.76	91.77	0.64	-83.76	-2,537.43	650.41	3,677.18	3,580.31	96.87	37.960	
11,800.00	5,780.52	5,680.93	5,685.28	93.18	0.64	-83.70	-2,537.44	650.38	3,776.20	3,677.92	98.29	38.420	
11,900.00	5,781.54	5,680.45	5,684.80	94.60	0.64	-83.65	-2,537.45	650.36	3,875.28	3,775.58	99.70	38.868	
12,000.00	5,782.57	5,679.97	5,684.32	96.02	0.64	-83.60	-2,537.45	650.33	3,974.40	3,873.28	101.12	39.303	
12,100.00	5,783.60	5,679.48	5,683.84	97.44	0.64	-83.54	-2,537.46	650.31	4,073.57	3,971.03	102.54	39.726	
12,200.00	5,784.62	5,678.99	5,683.34	98.86	0.64	-83.49	-2,537.47	650.29	4,172.77	4,068.81	103.96	40.138	
12,300.00	5,785.65	5,678.49	5,682.85	100.29	0.64	-83.43	-2,537.48	650.26	4,272.01	4,166.63	105.38	40.538	
12,400.00	5,786.67	5,677.99	5,682.35	101.71	0.64	-83.38	-2,537.49	650.24	4,371.29	4,264.49	106.80	40.928	
12,500.00	5,787.70	5,677.49	5,681.84	103.13	0.64	-83.32	-2,537.50	650.22	4,470.60	4,362.37	108.23	41.307	
12,600.00	5,788.72	5,676.98	5,681.33	104.56	0.64	-83.27	-2,537.51	650.19	4,569.94	4,460.29	109.65	41.677	
12,700.00	5,789.75	5,676.46	5,680.82	105.98	0.64	-83.21	-2,537.52	650.17	4,669.30	4,558.23	111.08	42.037	
12,800.00	5,790.77	5,675.94	5,680.30	107.41	0.64	-83.15	-2,537.53	650.15	4,768.70	4,656.20	112.50	42.388	
12,900.00	5,791.80	5,675.41	5,679.77	108.83	0.64	-83.10	-2,537.54	650.13	4,868.12	4,754.19	113.93	42.731	
13,000.00	5,792.82	5,674.88	5,679.24	110.26	0.64	-83.04	-2,537.55	650.11	4,967.56	4,852.20	115.35	43.064	
13,100.00	5,793.85	5,674.35	5,678.71	111.69	0.64	-82.98	-2,537.56	650.08	5,067.02	4,950.24	116.78	43.390	
13,200.00	5,794.87	5,673.80	5,678.16	113.12	0.64	-82.92	-2,537.57	650.06	5,166.50	5,048.30	118.21	43.708	
13,300.00	5,795.90	5,673.26	5,677.62	114.54	0.64	-82.86	-2,537.58	650.04	5,266.01	5,146.37	119.63	44.018	
13,400.00	5,796.92	5,672.71	5,677.07	115.97	0.64	-82.80	-2,537.59	650.02	5,365.53	5,244.47	121.06	44.320	
13,500.00	5,797.95	5,672.15	5,676.51	117.40	0.64	-82.74	-2,537.60	650.00	5,465.07	5,342.58	122.49	44.616	
13,600.00	5,798.97	5,671.58	5,675.95	118.83	0.64	-82.67	-2,537.61	649.98	5,564.62	5,440.70	123.92	44.904	
13,700.00	5,800.00	5,671.01	5,675.38	120.27	0.64	-82.61	-2,537.62	649.97	5,664.19	5,538.84	125.35	45.186	
13,768.60	5,800.70	5,670.62	5,674.98	121.10	0.64	-82.57	-2,537.63	649.95	5,732.51	5,606.32	126.19	45.429	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Surveys (Double K 7) — Offset Site Error: 0.00 usft

Survey Program: 100-Scientific Keeper, 5600-MWD+HDGM — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	24.00	0.00	0.00	160.73	-2,616.60	914.70	2,771.98				
100.00	100.00	99.85	123.85	0.15	0.07	160.74	-2,616.26	914.38	2,771.55	2,771.33	0.22	N/A	
140.03	140.03	116.04	140.03	0.29	0.08	160.74	-2,616.19	914.36	2,771.38	2,771.00	0.38	7,364.021	
200.00	200.00	151.19	175.18	0.51	0.10	160.73	-2,616.29	914.71	2,771.69	2,771.09	0.60	4,588.920	
300.00	300.00	273.11	297.09	0.87	0.22	160.70	-2,616.35	916.11	2,772.11	2,771.02	1.09	2,542.072	
400.00	400.00	360.55	384.54	1.22	0.33	160.69	-2,616.41	916.78	2,772.43	2,770.87	1.56	1,782.731	
500.00	500.00	465.40	489.37	1.58	0.46	160.67	-2,616.67	917.94	2,773.03	2,770.98	2.04	1,356.447	
600.00	600.00	571.82	595.79	1.94	0.60	160.65	-2,616.59	919.02	2,773.29	2,770.75	2.54	1,091.763	
700.00	700.00	669.11	693.08	2.30	0.72	160.64	-2,616.58	919.50	2,773.45	2,770.43	3.02	917.401	
800.00	800.00	770.64	794.61	2.66	0.83	160.64	-2,616.83	919.70	2,773.75	2,770.27	3.49	795.819	
900.00	900.00	863.77	887.74	3.02	0.93	160.63	-2,617.14	919.98	2,774.16	2,770.21	3.95	702.752	
1,000.00	1,000.00	966.01	989.98	3.38	1.04	160.63	-2,617.58	920.21	2,774.64	2,770.22	4.41	629.055	
1,100.00	1,099.99	1,069.76	1,093.73	3.72	1.13	70.66	-2,617.90	920.31	2,774.53	2,769.67	4.85	571.595	
1,200.00	1,199.91	1,177.66	1,201.62	4.07	1.19	70.76	-2,618.13	920.21	2,773.41	2,768.15	5.26	527.479	
1,300.00	1,299.69	1,276.31	1,300.28	4.42	1.18	70.93	-2,618.19	919.91	2,771.21	2,765.61	5.60	494.636	
1,400.00	1,399.32	1,380.20	1,404.17	4.77	1.18	71.12	-2,618.15	919.68	2,768.31	2,762.36	5.95	465.028	
1,500.00	1,498.94	1,478.06	1,502.03	5.13	1.19	71.29	-2,618.12	919.29	2,765.33	2,759.01	6.32	437.494	
1,600.00	1,598.56	1,581.05	1,605.01	5.49	1.22	71.48	-2,618.10	918.95	2,762.42	2,755.71	6.71	411.872	
1,700.00	1,698.18	1,671.74	1,695.70	5.85	1.24	71.63	-2,618.00	918.86	2,759.52	2,752.43	7.10	388.866	
1,800.00	1,797.80	1,765.37	1,789.33	6.22	1.34	71.79	-2,618.23	918.85	2,757.01	2,749.46	7.55	365.050	
1,900.00	1,897.42	1,874.00	1,897.96	6.58	1.43	71.99	-2,618.51	918.61	2,754.47	2,746.46	8.01	343.883	
2,000.00	1,997.04	1,977.07	2,001.03	6.95	1.49	72.17	-2,618.53	918.41	2,751.74	2,743.30	8.44	326.222	
2,100.00	2,096.66	2,070.67	2,094.63	7.32	1.53	72.33	-2,618.47	918.46	2,749.02	2,740.17	8.85	310.701	
2,200.00	2,196.28	2,171.87	2,195.84	7.69	1.63	72.51	-2,618.64	918.43	2,746.54	2,737.22	9.31	294.912	
2,300.00	2,295.90	2,275.00	2,298.96	8.06	1.67	72.69	-2,618.49	918.30	2,743.74	2,734.01	9.73	282.023	
2,400.00	2,395.52	2,383.24	2,407.21	8.43	1.76	72.88	-2,618.56	918.23	2,741.22	2,731.03	10.19	269.028	
2,500.00	2,495.15	2,476.96	2,500.93	8.80	1.80	73.03	-2,618.31	918.16	2,738.41	2,727.81	10.59	258.476	
2,600.00	2,594.93	2,589.76	2,613.72	9.16	1.84	73.14	-2,617.86	917.90	2,736.05	2,725.04	11.01	248.564	
2,700.00	2,694.85	2,680.18	2,704.14	9.52	1.89	73.19	-2,617.34	917.98	2,734.37	2,722.96	11.41	239.652	
2,800.00	2,794.84	2,785.67	2,809.63	9.87	1.94	73.20	-2,616.73	917.60	2,733.37	2,721.55	11.82	231.288	
2,900.00	2,894.84	2,888.61	2,912.57	10.22	2.01	163.21	-2,616.29	917.61	2,732.91	2,720.68	12.23	223.501	
3,000.00	2,994.84	2,979.43	3,003.38	10.57	2.07	163.20	-2,615.72	917.58	2,732.31	2,719.67	12.64	216.239	
3,100.00	3,094.84	3,077.78	3,101.73	10.92	2.14	163.20	-2,615.18	917.55	2,731.78	2,718.73	13.05	209.266	
3,200.00	3,194.84	3,306.49	3,330.21	11.26	2.32	163.08	-2,607.40	920.99	2,728.69	2,715.10	13.58	200.891	
3,300.00	3,294.84	3,455.52	3,478.94	11.61	2.45	163.05	-2,598.11	919.80	2,722.32	2,708.26	14.06	193.624	
3,400.00	3,394.84	3,568.03	3,591.05	11.96	2.54	163.15	-2,591.80	913.10	2,715.20	2,700.70	14.50	187.211	
3,500.00	3,494.84	3,697.14	3,718.90	12.31	2.64	163.46	-2,586.44	896.23	2,707.41	2,692.45	14.96	181.025	
3,600.00	3,594.84	3,770.27	3,790.74	12.66	2.70	163.72	-2,584.76	882.71	2,699.81	2,684.44	15.36	175.716	
3,700.00	3,694.84	3,880.63	3,899.01	13.02	2.79	164.14	-2,582.50	861.50	2,692.41	2,676.60	15.81	170.333	
3,800.00	3,794.84	3,994.22	4,010.69	13.37	2.89	164.55	-2,579.24	840.96	2,684.66	2,668.41	16.26	165.135	
3,900.00	3,894.84	4,068.94	4,084.25	13.72	2.96	164.80	-2,576.96	828.06	2,677.07	2,660.39	16.68	160.526	
4,000.00	3,994.84	4,185.38	4,199.27	14.07	3.07	165.14	-2,572.81	810.42	2,669.62	2,652.48	17.14	155.774	
4,100.00	4,094.84	4,255.63	4,268.76	14.42	3.13	165.34	-2,570.27	800.49	2,662.48	2,644.92	17.56	151.643	
4,200.00	4,194.84	4,361.75	4,373.89	14.78	3.24	165.61	-2,566.80	786.43	2,655.94	2,637.93	18.01	147.443	
4,300.00	4,294.84	4,416.78	4,428.45	15.13	3.29	165.75	-2,565.16	779.37	2,649.94	2,631.52	18.42	143.858	
4,400.00	4,394.84	4,494.46	4,505.59	15.48	3.37	165.93	-2,563.90	770.34	2,645.46	2,626.61	18.85	140.343	
4,500.00	4,494.84	4,613.82	4,624.11	15.84	3.48	166.22	-2,561.73	756.42	2,640.86	2,621.53	19.32	136.670	
4,600.00	4,594.84	4,702.28	4,712.06	16.19	3.58	166.40	-2,559.66	747.30	2,636.12	2,616.35	19.77	133.356	
4,700.00	4,694.84	4,800.00	4,809.36	16.55	3.68	166.57	-2,557.39	738.44	2,631.73	2,611.51	20.22	130.133	
4,800.00	4,794.84	4,907.34	4,916.24	16.90	3.79	166.77	-2,554.83	728.85	2,627.34	2,606.65	20.69	126.979	
4,900.00	4,894.84	4,992.75	5,001.25	17.25	3.88	166.92	-2,552.79	720.88	2,622.90	2,601.76	21.14	124.090	
5,000.00	4,994.84	5,101.61	5,109.42	17.61	4.00	167.17	-2,550.81	708.81	2,618.61	2,597.00	21.61	121.186	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Surveys (Double K 7) — Offset Site Error: 0.00 usft

Survey Program: 100-Scientific Keeper 5600-MWD+HDGM — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,094.84	5,206.38	5,213.47	17.96	4.11	167.42	-2,548.87	696.73	2,614.25	2,592.17	22.08	118.418	
5,200.00	5,194.84	5,305.00	5,311.43	18.32	4.22	167.65	-2,546.40	685.60	2,609.35	2,586.81	22.54	115.766	
5,300.00	5,294.74	5,380.28	5,386.33	18.66	4.25	-12.17	-2,544.81	678.20	2,602.54	2,579.61	22.92	113.533	
5,400.00	5,392.32	5,447.69	5,453.56	18.99	4.28	-12.77	-2,543.83	673.37	2,579.12	2,555.71	23.41	110.170	
5,500.00	5,483.40	5,510.88	5,516.67	19.30	4.30	-14.13	-2,543.29	670.39	2,537.52	2,513.23	24.29	104.473	
5,600.00	5,563.99	5,567.17	5,572.94	19.59	4.33	-16.63	-2,543.12	668.98	2,479.31	2,453.77	25.54	97.082	
5,700.00	5,630.59	5,622.00	5,627.77	19.90	4.35	-21.20	-2,543.23	668.76	2,406.80	2,379.79	27.01	89.104	
5,800.00	5,680.26	5,645.98	5,651.75	20.26	4.36	-29.63	-2,543.31	669.34	2,322.85	2,294.83	28.02	82.899	
5,900.00	5,710.85	5,666.24	5,671.96	20.67	4.38	-47.99	-2,543.33	670.53	2,230.96	2,202.11	28.85	77.322	
6,000.00	5,721.06	5,673.01	5,678.71	21.11	4.38	-83.25	-2,543.32	671.10	2,134.92	2,105.48	29.44	72.515	
6,100.00	5,722.09	5,673.46	5,679.16	21.63	4.38	-83.29	-2,543.31	671.14	2,038.33	2,008.37	29.96	68.042	
6,200.00	5,723.11	5,673.89	5,679.59	22.23	4.38	-83.34	-2,543.31	671.18	1,942.08	1,911.53	30.56	63.559	
6,300.00	5,724.14	5,674.30	5,680.00	22.90	4.38	-83.38	-2,543.31	671.22	1,846.24	1,815.00	31.23	59.117	
6,400.00	5,725.16	5,674.70	5,680.39	23.65	4.38	-83.42	-2,543.31	671.26	1,750.85	1,718.88	31.97	54.757	
6,500.00	5,726.19	5,675.09	5,680.78	24.45	4.38	-83.47	-2,543.31	671.30	1,656.02	1,623.23	32.78	50.515	
6,600.00	5,727.21	5,675.46	5,681.15	25.32	4.38	-83.50	-2,543.31	671.33	1,561.82	1,528.18	33.65	46.416	
6,700.00	5,728.24	5,675.82	5,681.50	26.23	4.38	-83.54	-2,543.31	671.37	1,468.40	1,433.83	34.57	42.482	
6,800.00	5,729.26	5,676.16	5,681.85	27.20	4.38	-83.58	-2,543.30	671.40	1,375.90	1,340.37	35.53	38.726	
6,900.00	5,730.29	5,676.50	5,682.18	28.20	4.38	-83.61	-2,543.30	671.44	1,284.52	1,247.99	36.53	35.159	
7,000.00	5,731.31	5,676.82	5,682.50	29.24	4.38	-83.65	-2,543.30	671.47	1,194.53	1,156.95	37.58	31.789	
7,100.00	5,732.34	5,677.13	5,682.81	30.32	4.38	-83.68	-2,543.30	671.50	1,106.26	1,067.60	38.65	28.620	
7,200.00	5,733.36	5,677.43	5,683.11	31.43	4.38	-83.71	-2,543.30	671.53	1,020.15	980.39	39.76	25.657	
7,300.00	5,734.39	5,677.73	5,683.41	32.56	4.39	-83.75	-2,543.30	671.56	936.81	895.91	40.89	22.908	
7,400.00	5,735.41	5,685.00	5,690.64	33.72	4.39	-84.52	-2,543.25	672.35	857.09	815.02	42.06	20.375	
7,500.00	5,736.44	5,685.00	5,690.64	34.90	4.39	-84.52	-2,543.25	672.35	781.98	738.74	43.24	18.083	
7,600.00	5,737.46	5,685.00	5,690.64	36.10	4.39	-84.52	-2,543.25	672.35	713.02	668.57	44.44	16.043	
7,700.00	5,738.49	5,685.00	5,690.64	37.31	4.39	-84.52	-2,543.25	672.35	652.14	606.48	45.66	14.282	
7,800.00	5,739.52	5,685.00	5,690.64	38.55	4.39	-84.52	-2,543.25	672.35	601.81	554.92	46.89	12.833	
7,900.00	5,740.54	5,685.00	5,690.64	39.79	4.39	-84.52	-2,543.25	672.35	564.87	516.72	48.14	11.733	
8,000.00	5,741.57	5,685.00	5,690.64	41.06	4.39	-84.52	-2,543.25	672.35	544.03	494.63	49.40	11.012	
8,065.53	5,742.24	5,685.00	5,690.64	41.89	4.39	-84.52	-2,543.25	672.35	540.07	489.83	50.24	10.750	CC, ES
8,100.00	5,742.59	5,685.00	5,690.64	42.33	4.39	-84.52	-2,543.25	672.35	541.17	490.49	50.68	10.679	SF
8,200.00	5,743.62	5,685.00	5,690.64	43.62	4.39	-84.52	-2,543.25	672.35	556.56	504.60	51.96	10.711	
8,300.00	5,744.64	5,685.00	5,690.64	44.91	4.39	-84.52	-2,543.25	672.35	588.77	535.51	53.26	11.055	
8,400.00	5,745.67	5,685.00	5,690.64	46.21	4.39	-84.52	-2,543.25	672.35	635.25	580.69	54.56	11.643	
8,500.00	5,746.69	5,685.00	5,690.64	47.53	4.39	-84.52	-2,543.25	672.35	693.14	637.26	55.88	12.405	
8,600.00	5,747.72	5,685.00	5,690.64	48.85	4.39	-84.52	-2,543.25	672.35	759.83	702.63	57.20	13.285	
8,700.00	5,748.74	5,685.00	5,690.64	50.18	4.39	-84.52	-2,543.25	672.35	833.20	774.68	58.52	14.237	
8,800.00	5,749.77	5,685.00	5,690.64	51.51	4.39	-84.52	-2,543.25	672.35	911.66	851.80	59.86	15.230	
8,900.00	5,750.79	5,685.00	5,690.64	52.85	4.39	-84.52	-2,543.25	672.35	993.99	932.79	61.20	16.242	
9,000.00	5,751.82	5,685.00	5,690.64	54.20	4.39	-84.52	-2,543.25	672.35	1,079.31	1,016.77	62.55	17.256	
9,100.00	5,752.84	5,685.00	5,690.64	55.55	4.39	-84.52	-2,543.25	672.35	1,166.97	1,103.07	63.90	18.263	
9,200.00	5,753.87	5,685.00	5,690.64	56.91	4.39	-84.52	-2,543.25	672.35	1,256.46	1,191.21	65.25	19.255	
9,300.00	5,754.89	5,685.00	5,690.64	58.27	4.39	-84.52	-2,543.25	672.35	1,347.44	1,280.83	66.61	20.227	
9,400.00	5,755.92	5,685.00	5,690.64	59.63	4.39	-84.52	-2,543.25	672.35	1,439.61	1,371.63	67.98	21.177	
9,500.00	5,756.94	5,685.00	5,690.64	61.00	4.39	-84.52	-2,543.25	672.35	1,532.77	1,463.42	69.35	22.102	
9,600.00	5,757.97	5,685.00	5,690.64	62.37	4.39	-84.52	-2,543.25	672.35	1,626.74	1,556.02	70.72	23.002	
9,700.00	5,758.99	5,685.00	5,690.64	63.75	4.39	-84.52	-2,543.25	672.35	1,721.39	1,649.29	72.10	23.875	
9,800.00	5,760.02	5,685.00	5,690.64	65.13	4.39	-84.52	-2,543.25	672.35	1,816.61	1,743.13	73.48	24.723	
9,900.00	5,761.04	5,685.00	5,690.64	66.51	4.39	-84.52	-2,543.25	672.35	1,912.32	1,837.46	74.86	25.545	
10,000.00	5,762.07	5,685.00	5,690.64	67.90	4.39	-84.52	-2,543.25	672.35	2,008.45	1,932.20	76.25	26.341	
10,100.00	5,763.09	5,685.00	5,690.64	69.29	4.39	-84.52	-2,543.25	672.35	2,104.94	2,027.30	77.64	27.113	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Shovel Head Federal Com - 28H - OH / 62985 - Surveys (Double K 7)

Offset Site Error: 0.00 usft

Survey Program: 100-Scientific Keeper, 5600-MWD+HDGM

Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	5,764.12	5,685.00	5,690.64	70.68	4.39	-84.52	-2,543.25	672.35	2,201.74	2,122.71	79.03	27.861	
10,300.00	5,765.14	5,685.00	5,690.64	72.07	4.39	-84.52	-2,543.25	672.35	2,298.81	2,218.39	80.42	28.585	
10,400.00	5,766.17	5,685.00	5,690.64	73.47	4.39	-84.52	-2,543.25	672.35	2,396.13	2,314.31	81.82	29.287	
10,500.00	5,767.19	5,685.00	5,690.64	74.87	4.39	-84.52	-2,543.25	672.35	2,493.66	2,410.44	83.21	29.967	
10,600.00	5,768.22	5,685.00	5,690.64	76.27	4.39	-84.52	-2,543.25	672.35	2,591.37	2,506.76	84.61	30.626	
10,700.00	5,769.24	5,685.00	5,690.64	77.67	4.39	-84.52	-2,543.25	672.35	2,689.26	2,603.25	86.01	31.265	
10,800.00	5,770.27	5,685.00	5,690.64	79.07	4.39	-84.52	-2,543.25	672.35	2,787.29	2,699.88	87.42	31.885	
10,900.00	5,771.29	5,685.00	5,690.64	80.48	4.39	-84.52	-2,543.25	672.35	2,885.46	2,796.64	88.82	32.485	
11,000.00	5,772.32	5,685.00	5,690.64	81.88	4.39	-84.52	-2,543.25	672.35	2,983.76	2,893.53	90.23	33.068	
11,100.00	5,773.34	5,685.00	5,690.64	83.29	4.39	-84.52	-2,543.25	672.35	3,082.16	2,990.52	91.64	33.634	
11,200.00	5,774.37	5,685.00	5,690.64	84.70	4.39	-84.52	-2,543.25	672.35	3,180.66	3,087.61	93.05	34.183	
11,300.00	5,775.39	5,685.00	5,690.64	86.11	4.39	-84.52	-2,543.25	672.35	3,279.25	3,184.79	94.46	34.716	
11,400.00	5,776.42	5,685.00	5,690.64	87.52	4.39	-84.52	-2,543.25	672.35	3,377.93	3,282.05	95.87	35.234	
11,500.00	5,777.44	5,685.00	5,690.64	88.94	4.39	-84.52	-2,543.25	672.35	3,476.68	3,379.39	97.28	35.737	
11,600.00	5,778.47	5,685.00	5,690.64	90.35	4.39	-84.52	-2,543.25	672.35	3,575.50	3,476.80	98.70	36.226	
11,700.00	5,779.49	5,685.00	5,690.64	91.77	4.39	-84.52	-2,543.25	672.35	3,674.38	3,574.26	100.12	36.701	
11,800.00	5,780.52	5,685.00	5,690.64	93.18	4.39	-84.52	-2,543.25	672.35	3,773.32	3,671.79	101.53	37.164	
11,900.00	5,781.54	5,685.00	5,690.64	94.60	4.39	-84.52	-2,543.25	672.35	3,872.32	3,769.37	102.95	37.613	
12,000.00	5,782.57	5,685.00	5,690.64	96.02	4.39	-84.52	-2,543.25	672.35	3,971.37	3,867.00	104.37	38.051	
12,100.00	5,783.60	5,685.00	5,690.64	97.44	4.39	-84.52	-2,543.25	672.35	4,070.46	3,964.67	105.79	38.477	
12,200.00	5,784.62	5,685.00	5,690.64	98.86	4.39	-84.52	-2,543.25	672.35	4,169.60	4,062.39	107.21	38.891	
12,300.00	5,785.65	5,685.00	5,690.64	100.29	4.39	-84.52	-2,543.25	672.35	4,268.77	4,160.14	108.63	39.295	
12,400.00	5,786.67	5,685.00	5,690.64	101.71	4.39	-84.52	-2,543.25	672.35	4,367.99	4,257.93	110.06	39.689	
12,500.00	5,787.70	5,685.00	5,690.64	103.13	4.39	-84.52	-2,543.25	672.35	4,467.24	4,355.76	111.48	40.072	
12,600.00	5,788.72	5,685.00	5,690.64	104.56	4.39	-84.52	-2,543.25	672.35	4,566.52	4,453.62	112.90	40.446	
12,700.00	5,789.75	5,685.00	5,690.64	105.98	4.39	-84.52	-2,543.25	672.35	4,665.83	4,551.51	114.33	40.811	
12,800.00	5,790.77	5,685.00	5,690.64	107.41	4.39	-84.52	-2,543.25	672.35	4,765.18	4,649.42	115.75	41.166	
12,900.00	5,791.80	5,685.00	5,690.64	108.83	4.39	-84.52	-2,543.25	672.35	4,864.54	4,747.36	117.18	41.513	
13,000.00	5,792.82	5,685.00	5,690.64	110.26	4.39	-84.52	-2,543.25	672.35	4,963.94	4,845.33	118.61	41.852	
13,100.00	5,793.85	5,685.00	5,690.64	111.69	4.39	-84.52	-2,543.25	672.35	5,063.36	4,943.32	120.04	42.182	
13,200.00	5,794.87	5,685.00	5,690.64	113.12	4.39	-84.52	-2,543.25	672.35	5,162.80	5,041.33	121.46	42.505	
13,300.00	5,795.90	5,685.00	5,690.64	114.54	4.39	-84.52	-2,543.25	672.35	5,262.26	5,139.37	122.89	42.820	
13,400.00	5,796.92	5,685.00	5,690.64	115.97	4.39	-84.52	-2,543.25	672.35	5,361.74	5,237.42	124.32	43.128	
13,500.00	5,797.95	5,685.00	5,690.64	117.40	4.39	-84.52	-2,543.25	672.35	5,461.24	5,335.49	125.75	43.429	
13,600.00	5,798.97	5,685.00	5,690.64	118.83	4.39	-84.52	-2,543.25	672.35	5,560.76	5,433.58	127.18	43.723	
13,700.00	5,800.00	5,685.00	5,690.64	120.27	4.39	-84.52	-2,543.25	672.35	5,660.30	5,531.68	128.61	44.010	
13,768.60	5,800.70	5,685.00	5,690.64	121.10	4.39	-84.52	-2,543.25	672.35	5,728.59	5,599.14	129.45	44.254	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Sneed 9 Federal Com - 23H - OH - Surveys — **Offset Site Error:** 0.00 usft

Survey Program: 100-NS-GYRO-MS, 2311-MWD — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	33.00	0.00	0.00	162.58	-4,624.30	1,450.70	4,846.63				
100.00	100.00	47.05	80.05	0.15	0.05	162.58	-4,624.37	1,450.81	4,846.65	4,846.45	0.20	N/A	
200.00	200.00	139.84	172.84	0.51	0.21	162.57	-4,624.78	1,451.61	4,847.32	4,846.60	0.72	6,757.033	
300.00	300.00	248.38	281.37	0.87	0.48	162.56	-4,624.81	1,452.53	4,847.58	4,846.23	1.35	3,592.305	
400.00	400.00	331.91	364.90	1.22	0.70	162.56	-4,625.16	1,453.13	4,848.18	4,846.26	1.92	2,524.449	
500.00	500.00	435.73	468.72	1.58	0.96	162.55	-4,625.70	1,453.94	4,848.92	4,846.37	2.55	1,903.379	
600.00	600.00	557.14	590.12	1.94	1.27	162.55	-4,626.09	1,454.42	4,849.35	4,846.13	3.22	1,508.226	
700.00	700.00	673.96	706.95	2.30	1.51	162.54	-4,626.05	1,454.61	4,849.36	4,845.54	3.81	1,271.482	
800.00	800.00	776.34	809.32	2.66	1.66	162.54	-4,625.82	1,454.67	4,849.16	4,844.84	4.32	1,122.850	
900.00	900.00	891.67	924.65	3.02	1.80	162.54	-4,625.46	1,454.60	4,848.85	4,844.04	4.82	1,006.430	
1,000.00	1,000.00	994.28	1,027.26	3.38	1.91	162.54	-4,624.96	1,454.32	4,848.30	4,843.02	5.29	917.016	
1,100.00	1,099.99	1,102.28	1,135.26	3.72	2.08	72.57	-4,624.27	1,454.20	4,847.27	4,841.46	5.81	834.395	
1,200.00	1,199.91	1,195.10	1,228.08	4.07	2.29	72.64	-4,623.56	1,454.46	4,845.45	4,839.08	6.36	761.378	
1,300.00	1,299.69	1,292.75	1,325.72	4.42	2.53	72.74	-4,622.82	1,454.99	4,842.94	4,835.99	6.95	696.653	
1,400.00	1,399.32	1,387.98	1,420.95	4.77	2.77	72.83	-4,622.11	1,455.70	4,839.90	4,832.35	7.55	641.368	
1,500.00	1,498.94	1,485.19	1,518.15	5.13	3.02	72.92	-4,621.47	1,456.39	4,836.90	4,828.75	8.15	593.356	
1,600.00	1,598.56	1,582.69	1,615.65	5.49	3.27	73.01	-4,620.93	1,456.91	4,833.96	4,825.20	8.76	551.753	
1,700.00	1,698.18	1,677.54	1,710.50	5.85	3.52	73.09	-4,620.49	1,457.34	4,831.10	4,821.73	9.37	515.732	
1,800.00	1,797.80	1,774.24	1,807.19	6.22	3.77	73.18	-4,620.06	1,458.03	4,828.35	4,818.36	9.98	483.738	
1,900.00	1,897.42	1,880.42	1,913.36	6.58	4.04	73.27	-4,619.40	1,459.34	4,825.58	4,814.96	10.62	454.321	
2,000.00	1,997.04	1,983.27	2,016.19	6.95	4.31	73.35	-4,618.44	1,461.16	4,822.69	4,811.44	11.26	428.475	
2,100.00	2,096.66	2,074.84	2,107.73	7.32	4.54	73.41	-4,617.51	1,463.23	4,819.86	4,808.00	11.86	406.379	
2,200.00	2,196.28	2,159.21	2,192.07	7.69	4.71	73.46	-4,616.68	1,465.67	4,817.27	4,804.87	12.40	388.557	
2,300.00	2,295.90	2,238.23	2,271.04	8.06	4.82	73.51	-4,616.22	1,468.08	4,815.08	4,802.21	12.87	374.088	
2,400.00	2,395.52	2,317.96	2,350.74	8.43	4.91	73.56	-4,616.09	1,470.57	4,813.34	4,800.00	13.34	360.859	
2,500.00	2,495.15	2,513.29	2,545.95	8.80	4.95	73.77	-4,616.02	1,467.64	4,810.08	4,796.34	13.75	349.916	
2,600.00	2,594.93	2,620.71	2,653.20	9.16	4.98	73.88	-4,616.59	1,461.56	4,807.18	4,793.03	14.15	339.816	
2,700.00	2,694.85	2,778.27	2,810.41	9.52	5.06	74.03	-4,616.82	1,451.24	4,804.48	4,789.90	14.58	329.537	
2,800.00	2,794.84	2,898.75	2,930.48	9.87	5.14	74.12	-4,616.16	1,441.38	4,801.28	4,786.27	15.01	319.888	
2,900.00	2,894.84	2,996.58	3,027.89	10.22	5.22	164.22	-4,615.89	1,432.35	4,798.48	4,783.05	15.44	310.841	
3,000.00	2,994.84	3,073.77	3,104.67	10.57	5.29	164.31	-4,616.08	1,424.38	4,795.93	4,780.07	15.86	302.449	
3,100.00	3,094.84	3,145.77	3,176.31	10.92	5.36	164.40	-4,616.61	1,417.15	4,793.92	4,777.65	16.28	294.529	
3,200.00	3,194.84	3,219.16	3,249.36	11.26	5.44	164.48	-4,617.52	1,410.10	4,792.53	4,775.82	16.70	286.925	
3,300.00	3,294.84	3,295.00	3,324.83	11.61	5.53	164.57	-4,618.80	1,402.78	4,791.58	4,774.44	17.14	279.542	
3,400.00	3,394.84	3,390.00	3,419.32	11.96	5.65	164.69	-4,620.90	1,393.25	4,791.05	4,773.44	17.62	271.952	
3,500.00	3,494.84	3,536.43	3,564.71	12.31	5.87	164.89	-4,623.83	1,376.08	4,789.82	4,771.64	18.19	263.376	
3,600.00	3,594.84	3,627.93	3,655.61	12.66	6.01	165.02	-4,625.36	1,365.68	4,788.48	4,769.80	18.68	256.404	
3,700.00	3,694.84	3,720.00	3,747.13	13.02	6.16	165.14	-4,626.87	1,355.79	4,787.29	4,768.11	19.17	249.695	
3,800.00	3,794.84	3,814.36	3,840.94	13.37	6.32	165.26	-4,628.55	1,345.74	4,786.28	4,766.59	19.69	243.129	
3,900.00	3,894.84	3,908.65	3,934.68	13.72	6.49	165.38	-4,630.28	1,335.71	4,785.36	4,765.15	20.21	236.777	
4,000.00	3,994.84	4,003.65	4,029.13	14.07	6.67	165.50	-4,632.16	1,325.67	4,784.61	4,763.87	20.74	230.699	
4,100.00	4,094.84	4,101.87	4,126.80	14.42	6.85	165.63	-4,634.08	1,315.46	4,783.91	4,762.64	21.28	224.835	
4,200.00	4,194.84	4,255.54	4,279.42	14.78	7.16	165.84	-4,636.90	1,297.86	4,782.95	4,761.01	21.94	217.992	
4,300.00	4,294.84	4,458.81	4,480.99	15.13	7.61	166.15	-4,637.48	1,271.59	4,780.03	4,757.29	22.74	210.233	
4,400.00	4,394.84	4,569.77	4,591.04	15.48	7.85	166.31	-4,636.39	1,257.46	4,776.01	4,752.67	23.34	204.657	
4,500.00	4,494.84	4,646.45	4,667.09	15.84	8.03	166.42	-4,635.57	1,247.74	4,772.00	4,748.14	23.87	199.947	
4,600.00	4,594.84	4,715.00	4,735.06	16.19	8.19	166.52	-4,635.70	1,238.83	4,769.00	4,744.61	24.38	195.583	
4,700.00	4,694.84	4,751.55	4,771.31	16.55	8.28	166.58	-4,636.12	1,234.15	4,766.87	4,742.04	24.82	192.021	
4,800.00	4,794.84	4,811.00	4,830.33	16.90	8.42	166.67	-4,637.08	1,227.14	4,765.70	4,740.38	25.32	188.213	
4,900.00	4,894.84	4,900.92	4,919.68	17.25	8.63	166.79	-4,638.86	1,217.19	4,765.08	4,739.19	25.88	184.101	
5,000.00	4,994.84	4,993.73	5,011.89	17.61	8.85	166.91	-4,640.86	1,206.83	4,764.64	4,738.18	26.46	180.082	
5,100.00	5,094.84	5,118.54	5,136.05	17.96	9.13	167.07	-4,643.01	1,194.25	4,764.05	4,736.95	27.10	175.815	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Sneed 9 Federal Com - 23H - OH - Surveys — **Offset Site Error:** 0.00 usft

Survey Program: 100-NS-GYRO-MS, 2311-MWD — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,194.84	5,220.86	5,237.94	18.32	9.36	167.18	-4,644.06	1,185.05	4,763.04	4,735.37	27.67	172.113	
5,300.00	5,294.74	5,295.43	5,312.22	18.66	9.52	-12.67	-4,645.09	1,178.47	4,759.74	4,731.56	28.18	168.896	
5,400.00	5,392.32	5,385.81	5,402.22	18.99	9.73	-13.20	-4,646.64	1,170.41	4,738.95	4,710.23	28.71	165.035	
5,500.00	5,483.40	5,473.42	5,489.47	19.30	9.92	-14.47	-4,648.23	1,162.70	4,698.93	4,669.71	29.22	160.809	
5,600.00	5,563.99	5,541.75	5,557.54	19.59	10.08	-16.82	-4,649.57	1,156.78	4,641.46	4,611.80	29.66	156.472	
5,700.00	5,630.59	5,619.70	5,635.19	19.90	10.25	-21.18	-4,651.18	1,150.19	4,569.02	4,538.88	30.14	151.571	
5,800.00	5,680.26	5,705.95	5,721.27	20.26	10.42	-30.15	-4,651.97	1,144.96	4,484.40	4,453.72	30.68	146.171	
5,900.00	5,710.85	5,765.86	5,781.13	20.67	10.53	-51.10	-4,651.74	1,142.67	4,391.47	4,360.27	31.20	140.760	
6,000.00	5,721.06	5,776.08	5,791.36	21.11	10.55	-91.57	-4,651.63	1,142.42	4,294.70	4,263.04	31.66	135.640	
6,100.00	5,722.09	5,775.89	5,791.16	21.63	10.55	-91.56	-4,651.63	1,142.43	4,197.53	4,165.35	32.18	130.449	
6,200.00	5,723.11	5,782.39	5,797.66	22.23	10.56	-91.93	-4,651.55	1,142.23	4,100.48	4,067.69	32.79	125.051	
6,300.00	5,724.14	5,781.98	5,797.25	22.90	10.56	-91.91	-4,651.56	1,142.24	4,003.59	3,970.12	33.46	119.640	
6,400.00	5,725.16	5,781.60	5,796.87	23.65	10.56	-91.89	-4,651.56	1,142.25	3,906.85	3,872.65	34.21	114.213	
6,500.00	5,726.19	5,781.24	5,796.51	24.45	10.56	-91.87	-4,651.57	1,142.26	3,810.29	3,775.27	35.01	108.824	
6,600.00	5,727.21	5,780.90	5,796.17	25.32	10.56	-91.85	-4,651.57	1,142.27	3,713.90	3,678.03	35.88	103.516	
6,700.00	5,728.24	5,780.58	5,795.85	26.23	10.56	-91.83	-4,651.58	1,142.27	3,617.72	3,580.92	36.79	98.325	
6,800.00	5,729.26	5,780.27	5,795.55	27.20	10.56	-91.81	-4,651.58	1,142.28	3,521.74	3,483.99	37.76	93.277	
6,900.00	5,730.29	5,779.99	5,795.26	28.20	10.56	-91.79	-4,651.58	1,142.29	3,426.00	3,387.24	38.76	88.390	
7,000.00	5,731.31	5,779.72	5,794.99	29.24	10.56	-91.78	-4,651.59	1,142.30	3,330.50	3,290.70	39.80	83.677	
7,100.00	5,732.34	5,779.46	5,794.73	30.32	10.56	-91.76	-4,651.59	1,142.30	3,235.28	3,194.40	40.88	79.146	
7,200.00	5,733.36	5,774.29	5,789.57	31.43	10.55	-91.47	-4,651.65	1,142.46	3,140.36	3,098.39	41.97	74.821	
7,300.00	5,734.39	5,774.18	5,789.46	32.56	10.55	-91.46	-4,651.65	1,142.46	3,045.76	3,002.66	43.10	70.660	
7,400.00	5,735.41	5,774.08	5,789.35	33.72	10.55	-91.46	-4,651.65	1,142.47	2,951.52	2,907.25	44.26	66.683	
7,500.00	5,736.44	5,773.97	5,789.25	34.90	10.55	-91.45	-4,651.65	1,142.47	2,857.66	2,812.22	45.44	62.886	
7,600.00	5,737.46	5,773.87	5,789.15	36.10	10.55	-91.44	-4,651.65	1,142.47	2,764.24	2,717.60	46.64	59.266	
7,700.00	5,738.49	5,773.78	5,789.05	37.31	10.54	-91.44	-4,651.65	1,142.47	2,671.29	2,623.43	47.86	55.817	
7,800.00	5,739.52	5,773.68	5,788.96	38.55	10.54	-91.43	-4,651.65	1,142.48	2,578.87	2,529.78	49.09	52.532	
7,900.00	5,740.54	5,773.60	5,788.87	39.79	10.54	-91.43	-4,651.66	1,142.48	2,487.04	2,436.70	50.34	49.405	
8,000.00	5,741.57	5,773.51	5,788.78	41.06	10.54	-91.42	-4,651.66	1,142.48	2,395.86	2,344.26	51.60	46.431	
8,100.00	5,742.59	5,773.43	5,788.70	42.33	10.54	-91.42	-4,651.66	1,142.48	2,305.42	2,252.54	52.87	43.602	
8,200.00	5,743.62	5,773.35	5,788.62	43.62	10.54	-91.41	-4,651.66	1,142.48	2,215.79	2,161.63	54.16	40.912	
8,300.00	5,744.64	5,773.27	5,788.54	44.91	10.54	-91.41	-4,651.66	1,142.48	2,127.09	2,071.64	55.45	38.358	
8,400.00	5,745.67	5,773.19	5,788.47	46.21	10.54	-91.41	-4,651.66	1,142.49	2,039.44	1,982.68	56.76	35.932	
8,500.00	5,746.69	5,773.12	5,788.39	47.53	10.54	-91.40	-4,651.66	1,142.49	1,952.97	1,894.90	58.07	33.631	
8,600.00	5,747.72	5,773.05	5,788.32	48.85	10.54	-91.40	-4,651.66	1,142.49	1,867.85	1,808.46	59.39	31.450	
8,700.00	5,748.74	5,772.98	5,788.26	50.18	10.54	-91.39	-4,651.66	1,142.49	1,784.28	1,723.56	60.72	29.386	
8,800.00	5,749.77	5,772.91	5,788.19	51.51	10.54	-91.39	-4,651.66	1,142.49	1,702.48	1,640.43	62.05	27.436	
8,900.00	5,750.79	5,772.85	5,788.12	52.85	10.54	-91.39	-4,651.66	1,142.49	1,622.72	1,559.33	63.39	25.597	
9,000.00	5,751.82	5,772.79	5,788.06	54.20	10.54	-91.38	-4,651.66	1,142.50	1,545.32	1,480.58	64.74	23.869	
9,100.00	5,752.84	5,772.73	5,788.00	55.55	10.54	-91.38	-4,651.66	1,142.50	1,470.65	1,404.56	66.09	22.251	
9,200.00	5,753.87	5,772.67	5,787.94	56.91	10.54	-91.38	-4,651.67	1,142.50	1,399.14	1,331.69	67.45	20.744	
9,300.00	5,754.89	5,772.61	5,787.88	58.27	10.54	-91.37	-4,651.67	1,142.50	1,331.31	1,262.50	68.81	19.348	
9,400.00	5,755.92	5,772.55	5,787.83	59.63	10.54	-91.37	-4,651.67	1,142.50	1,267.74	1,197.56	70.18	18.065	
9,500.00	5,756.94	5,772.50	5,787.77	61.00	10.54	-91.37	-4,651.67	1,142.50	1,209.11	1,137.57	71.54	16.900	
9,600.00	5,757.97	5,772.45	5,787.72	62.37	10.54	-91.36	-4,651.67	1,142.50	1,156.17	1,083.25	72.92	15.856	
9,700.00	5,758.99	5,772.40	5,787.67	63.75	10.54	-91.36	-4,651.67	1,142.51	1,109.74	1,035.44	74.29	14.937	
9,800.00	5,760.02	5,772.35	5,787.62	65.13	10.54	-91.36	-4,651.67	1,142.51	1,070.66	994.98	75.67	14.148	
9,900.00	5,761.04	5,772.30	5,787.57	66.51	10.54	-91.35	-4,651.67	1,142.51	1,039.76	962.70	77.06	13.493	
10,000.00	5,762.07	5,772.25	5,787.52	67.90	10.54	-91.35	-4,651.67	1,142.51	1,017.78	939.34	78.44	12.975	
10,100.00	5,763.09	5,772.20	5,787.48	69.29	10.54	-91.35	-4,651.67	1,142.51	1,005.32	925.49	79.83	12.593	
10,176.07	5,763.87	5,772.17	5,787.44	70.35	10.54	-91.35	-4,651.67	1,142.51	1,002.43	921.55	80.89	12.393	CC
10,200.00	5,764.12	5,772.16	5,787.43	70.68	10.54	-91.35	-4,651.67	1,142.51	1,002.72	921.50	81.22	12.346	ES

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Sneed 9 Federal Com - 23H - OH - Surveys — **Offset Site Error:** 0.00 usft

Survey Program: 100-NS-GYRO-MS, 2311-MWD — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	5,765.14	5,772.11	5,787.39	72.07	10.54	-91.34	-4,651.67	1,142.51	1,010.07	927.45	82.61	12.226 SF	
10,400.00	5,766.17	5,772.07	5,787.35	73.47	10.54	-91.34	-4,651.67	1,142.51	1,027.14	943.13	84.01	12.226	
10,500.00	5,767.19	5,772.03	5,787.30	74.87	10.54	-91.34	-4,651.67	1,142.51	1,053.47	968.07	85.41	12.335	
10,600.00	5,768.22	5,771.99	5,787.26	76.27	10.54	-91.34	-4,651.67	1,142.51	1,088.39	1,001.58	86.81	12.538	
10,700.00	5,769.24	5,771.95	5,787.22	77.67	10.54	-91.33	-4,651.67	1,142.52	1,131.10	1,042.89	88.21	12.823	
10,800.00	5,770.27	5,771.91	5,787.18	79.07	10.54	-91.33	-4,651.67	1,142.52	1,180.75	1,091.13	89.61	13.176	
10,900.00	5,771.29	5,771.87	5,787.15	80.48	10.54	-91.33	-4,651.67	1,142.52	1,236.51	1,145.49	91.02	13.585	
11,000.00	5,772.32	5,771.83	5,787.11	81.88	10.54	-91.33	-4,651.67	1,142.52	1,297.59	1,205.16	92.42	14.040	
11,100.00	5,773.34	5,771.80	5,787.07	83.29	10.54	-91.33	-4,651.68	1,142.52	1,363.28	1,269.44	93.83	14.529	
11,200.00	5,774.37	5,771.76	5,787.04	84.70	10.54	-91.32	-4,651.68	1,142.52	1,432.94	1,337.69	95.24	15.045	
11,300.00	5,775.39	5,771.73	5,787.00	86.11	10.54	-91.32	-4,651.68	1,142.52	1,506.02	1,409.37	96.65	15.582	
11,400.00	5,776.42	5,771.69	5,786.97	87.52	10.54	-91.32	-4,651.68	1,142.52	1,582.05	1,483.98	98.06	16.133	
11,500.00	5,777.44	5,771.66	5,786.93	88.94	10.54	-91.32	-4,651.68	1,142.52	1,660.62	1,561.14	99.48	16.693	
11,600.00	5,778.47	5,771.63	5,786.90	90.35	10.54	-91.32	-4,651.68	1,142.52	1,741.39	1,640.50	100.89	17.260	
11,700.00	5,779.49	5,771.59	5,786.87	91.77	10.54	-91.31	-4,651.68	1,142.52	1,824.07	1,721.76	102.31	17.829	
11,800.00	5,780.52	5,771.56	5,786.84	93.18	10.54	-91.31	-4,651.68	1,142.52	1,908.41	1,804.68	103.73	18.398	
11,900.00	5,781.54	5,771.53	5,786.81	94.60	10.54	-91.31	-4,651.68	1,142.53	1,994.19	1,889.05	105.14	18.966	
12,000.00	5,782.57	5,771.50	5,786.78	96.02	10.54	-91.31	-4,651.68	1,142.53	2,081.25	1,974.68	106.56	19.531	
12,100.00	5,783.60	5,763.00	5,778.28	97.44	10.53	-90.82	-4,651.76	1,142.76	2,169.45	2,061.48	107.97	20.093	
12,200.00	5,784.62	5,763.00	5,778.28	98.86	10.53	-90.82	-4,651.76	1,142.76	2,258.61	2,149.22	109.39	20.647	
12,300.00	5,785.65	5,763.00	5,778.28	100.29	10.53	-90.82	-4,651.76	1,142.76	2,348.64	2,237.83	110.81	21.195	
12,400.00	5,786.67	5,763.00	5,778.28	101.71	10.53	-90.82	-4,651.76	1,142.76	2,439.44	2,327.21	112.24	21.735	
12,500.00	5,787.70	5,763.00	5,778.28	103.13	10.53	-90.82	-4,651.76	1,142.76	2,530.94	2,417.28	113.66	22.268	
12,600.00	5,788.72	5,763.00	5,778.28	104.56	10.53	-90.82	-4,651.76	1,142.76	2,623.06	2,507.98	115.08	22.793	
12,700.00	5,789.75	5,763.00	5,778.28	105.98	10.53	-90.82	-4,651.76	1,142.76	2,715.74	2,599.23	116.51	23.309	
12,800.00	5,790.77	5,763.00	5,778.28	107.41	10.53	-90.82	-4,651.76	1,142.76	2,808.92	2,690.99	117.93	23.818	
12,900.00	5,791.80	5,763.00	5,778.28	108.83	10.53	-90.82	-4,651.76	1,142.76	2,902.55	2,783.19	119.36	24.318	
13,000.00	5,792.82	5,763.00	5,778.28	110.26	10.53	-90.82	-4,651.76	1,142.76	2,996.60	2,875.81	120.79	24.809	
13,100.00	5,793.85	5,763.00	5,778.28	111.69	10.53	-90.82	-4,651.76	1,142.76	3,091.02	2,968.80	122.21	25.292	
13,200.00	5,794.87	5,763.00	5,778.28	113.12	10.53	-90.82	-4,651.76	1,142.76	3,185.78	3,062.13	123.64	25.766	
13,300.00	5,795.90	5,763.00	5,778.28	114.54	10.53	-90.82	-4,651.76	1,142.76	3,280.85	3,155.78	125.07	26.232	
13,400.00	5,796.92	5,763.00	5,778.28	115.97	10.53	-90.82	-4,651.76	1,142.76	3,376.20	3,249.70	126.50	26.689	
13,500.00	5,797.95	5,763.00	5,778.28	117.40	10.53	-90.82	-4,651.76	1,142.76	3,471.82	3,343.89	127.93	27.138	
13,600.00	5,798.97	5,763.00	5,778.28	118.83	10.53	-90.82	-4,651.76	1,142.76	3,567.68	3,438.32	129.36	27.579	
13,700.00	5,800.00	5,763.00	5,778.28	120.27	10.53	-90.82	-4,651.76	1,142.76	3,663.76	3,532.96	130.79	28.012	
13,768.60	5,800.70	5,763.00	5,778.28	121.10	10.53	-90.82	-4,651.76	1,142.76	3,729.79	3,598.16	131.63	28.336	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 16H - OH - Plan 2 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	6.00	0.00	0.00	-90.21	-2.00	-559.90	559.94				
100.00	100.00	94.00	100.00	0.15	0.14	-90.21	-2.00	-559.90	559.90	559.61	0.29	1,940.029	
200.00	200.00	194.00	200.00	0.51	0.49	-90.21	-2.00	-559.90	559.90	558.91	0.99	563.870	
300.00	300.00	294.00	300.00	0.87	0.84	-90.21	-2.00	-559.90	559.90	558.19	1.71	327.446	
400.00	400.00	394.00	400.00	1.22	1.20	-90.21	-2.00	-559.90	559.90	557.48	2.43	230.712	
500.00	500.00	494.00	500.00	1.58	1.56	-90.21	-2.00	-559.90	559.90	556.76	3.14	178.098	
600.00	600.00	594.00	600.00	1.94	1.92	-90.21	-2.00	-559.90	559.90	556.04	3.86	145.025	
700.00	700.00	694.00	700.00	2.30	2.28	-90.21	-2.00	-559.90	559.90	555.33	4.58	122.312	
800.00	800.00	794.00	800.00	2.66	2.64	-90.21	-2.00	-559.90	559.90	554.61	5.29	105.749	
900.00	900.00	894.00	900.00	3.02	3.00	-90.21	-2.00	-559.90	559.90	553.89	6.01	93.138	
1,000.00	1,000.00	994.00	1,000.00	3.38	3.35	-90.21	-2.00	-559.90	559.90	553.18	6.73	83.214	CC
1,100.00	1,099.99	1,093.99	1,099.99	3.72	3.71	179.80	-2.00	-559.90	561.21	553.78	7.44	75.463	
1,200.00	1,199.91	1,193.91	1,199.91	4.07	4.07	179.80	-2.00	-559.90	565.14	557.00	8.14	69.430	
1,300.00	1,299.69	1,293.69	1,299.69	4.42	4.43	179.80	-2.00	-559.90	571.68	562.83	8.85	64.623	
1,400.00	1,399.32	1,393.32	1,399.32	4.77	4.78	179.80	-2.00	-559.90	580.25	570.69	9.56	60.713	
1,500.00	1,498.94	1,492.94	1,498.94	5.13	5.14	179.80	-2.00	-559.90	588.96	578.69	10.27	57.339	
1,600.00	1,598.56	1,592.56	1,598.56	5.49	5.50	179.81	-2.00	-559.90	597.68	586.69	10.99	54.391	
1,700.00	1,698.18	1,692.18	1,698.18	5.85	5.86	179.81	-2.00	-559.90	606.40	594.69	11.71	51.793	
1,800.00	1,797.80	1,791.80	1,797.80	6.22	6.21	179.81	-2.00	-559.90	615.11	602.68	12.43	49.489	
1,900.00	1,897.42	1,891.42	1,897.42	6.58	6.57	179.82	-2.00	-559.90	623.83	610.67	13.15	47.432	
2,000.00	1,997.04	1,991.04	1,997.04	6.95	6.93	179.82	-2.00	-559.90	632.54	618.67	13.88	45.585	
2,100.00	2,096.66	2,090.66	2,096.66	7.32	7.28	179.82	-2.00	-559.90	641.26	626.66	14.60	43.918	
2,200.00	2,196.28	2,190.28	2,196.28	7.69	7.64	179.82	-2.00	-559.90	649.97	634.65	15.33	42.406	
2,300.00	2,295.90	2,289.90	2,295.90	8.06	8.00	179.83	-2.00	-559.90	658.69	642.63	16.05	41.029	
2,400.00	2,395.52	2,389.52	2,395.52	8.43	8.36	179.83	-2.00	-559.90	667.40	650.62	16.78	39.769	
2,500.00	2,495.15	2,489.15	2,495.15	8.80	8.71	179.83	-2.00	-559.90	675.99	658.48	17.51	38.606	
2,600.00	2,594.93	2,588.93	2,594.93	9.16	9.07	179.83	-2.00	-559.90	682.57	664.34	18.23	37.435	
2,700.00	2,694.85	2,688.85	2,694.85	9.52	9.43	179.83	-2.00	-559.90	686.54	667.59	18.95	36.227	
2,800.00	2,794.84	2,788.84	2,794.84	9.87	9.79	179.83	-2.00	-559.90	687.89	668.23	19.66	34.988	
2,900.00	2,894.84	2,888.84	2,894.84	10.22	10.15	-90.17	-2.00	-559.90	687.90	667.53	20.37	33.777	
3,000.00	2,994.84	2,988.84	2,994.84	10.57	10.50	-90.17	-2.00	-559.90	687.90	666.82	21.07	32.645	
3,100.00	3,094.84	3,088.84	3,094.84	10.92	10.86	-90.17	-2.00	-559.90	687.90	666.12	21.78	31.586	
3,200.00	3,194.84	3,188.84	3,194.84	11.26	11.22	-90.17	-2.00	-559.90	687.90	665.41	22.49	30.593	
3,300.00	3,294.84	3,288.84	3,294.84	11.61	11.58	-90.17	-2.00	-559.90	687.90	664.70	23.19	29.659	
3,400.00	3,394.84	3,388.84	3,394.84	11.96	11.94	-90.17	-2.00	-559.90	687.90	663.99	23.90	28.780	
3,500.00	3,494.84	3,488.84	3,494.84	12.31	12.30	-90.17	-2.00	-559.90	687.90	663.28	24.61	27.951	
3,600.00	3,594.84	3,588.84	3,594.84	12.66	12.66	-90.17	-2.00	-559.90	687.90	662.57	25.32	27.168	
3,700.00	3,694.84	3,688.84	3,694.84	13.02	13.01	-90.17	-2.00	-559.90	687.90	661.87	26.03	26.427	
3,800.00	3,794.84	3,788.84	3,794.84	13.37	13.37	-90.17	-2.00	-559.90	687.90	661.16	26.74	25.725	
3,900.00	3,894.84	3,888.84	3,894.84	13.72	13.73	-90.17	-2.00	-559.90	687.90	660.44	27.45	25.059	
4,000.00	3,994.84	3,988.84	3,994.84	14.07	14.09	-90.17	-2.00	-559.90	687.90	659.73	28.16	24.427	
4,100.00	4,094.84	4,088.84	4,094.84	14.42	14.45	-90.17	-2.00	-559.90	687.90	659.02	28.87	23.825	
4,200.00	4,194.84	4,188.84	4,194.84	14.78	14.81	-90.17	-2.00	-559.90	687.90	658.31	29.58	23.252	
4,300.00	4,294.84	4,288.84	4,294.84	15.13	15.16	-90.17	-2.00	-559.90	687.90	657.60	30.30	22.706	
4,400.00	4,394.84	4,388.84	4,394.84	15.48	15.52	-90.17	-2.00	-559.90	687.90	656.89	31.01	22.185	
4,500.00	4,494.84	4,488.84	4,494.84	15.84	15.88	-90.17	-2.00	-559.90	687.90	656.18	31.72	21.687	
4,600.00	4,594.84	4,588.84	4,594.84	16.19	16.24	-90.17	-2.00	-559.90	687.90	655.46	32.43	21.210	
4,700.00	4,694.84	4,688.84	4,694.84	16.55	16.60	-90.17	-2.00	-559.90	687.90	654.75	33.14	20.754	
4,800.00	4,794.84	4,788.84	4,794.84	16.90	16.96	-90.17	-2.00	-559.90	687.90	654.04	33.86	20.318	
4,900.00	4,894.84	4,888.84	4,894.84	17.25	17.32	-90.17	-2.00	-559.90	687.90	653.33	34.57	19.899	
5,000.00	4,994.84	4,988.84	4,994.84	17.61	17.67	-90.17	-2.00	-559.90	687.90	652.61	35.28	19.496	
5,100.00	5,094.84	5,088.84	5,094.84	17.96	18.03	-90.17	-2.00	-559.90	687.90	651.90	36.00	19.110	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 16H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,194.84	5,188.84	5,194.84	18.32	18.39	-90.17	-2.00	-559.90	687.90	651.19	36.71	18.739	
5,300.00	5,294.74	5,289.07	5,294.97	18.66	18.73	89.99	-4.78	-559.88	687.89	650.49	37.40	18.395	
5,400.00	5,392.32	5,389.51	5,392.96	18.99	19.06	89.99	-25.98	-559.75	687.81	649.77	38.04	18.079	
5,500.00	5,483.40	5,489.93	5,484.34	19.30	19.35	89.99	-67.16	-559.50	687.67	649.02	38.65	17.793	
5,600.00	5,563.99	5,590.29	5,565.07	19.59	19.65	89.99	-126.48	-559.15	687.47	648.23	39.24	17.520	
5,700.00	5,630.59	5,690.59	5,631.61	19.90	19.98	89.99	-201.28	-558.69	687.22	647.35	39.87	17.236	
5,800.00	5,680.26	5,790.81	5,681.05	20.26	20.33	89.99	-288.25	-558.16	686.92	646.33	40.59	16.924	
5,900.00	5,710.85	5,890.95	5,711.28	20.67	20.73	90.00	-383.52	-557.59	686.60	645.20	41.40	16.586	
6,000.00	5,721.06	5,990.99	5,721.06	21.11	21.17	90.00	-482.90	-556.98	686.26	643.98	42.28	16.231	
6,100.00	5,722.09	6,090.99	5,721.90	21.63	21.67	89.98	-582.89	-556.38	685.92	642.62	43.30	15.840	
6,200.00	5,723.11	6,190.99	5,722.74	22.23	22.26	89.97	-682.89	-555.77	685.58	641.09	44.49	15.410	
6,300.00	5,724.14	6,290.99	5,723.58	22.90	22.93	89.95	-782.88	-555.17	685.24	639.41	45.83	14.952	
6,400.00	5,725.16	6,390.99	5,724.41	23.65	23.66	89.94	-882.87	-554.56	684.90	637.59	47.31	14.477	
6,500.00	5,726.19	6,490.99	5,725.25	24.45	24.46	89.92	-982.87	-553.95	684.56	635.64	48.91	13.995	
6,600.00	5,727.21	6,590.99	5,726.09	25.32	25.32	89.90	-1,082.86	-553.35	684.22	633.58	50.64	13.512	
6,700.00	5,728.24	6,690.99	5,726.93	26.23	26.23	89.89	-1,182.86	-552.74	683.88	631.41	52.46	13.035	
6,800.00	5,729.26	6,790.99	5,727.76	27.20	27.19	89.87	-1,282.85	-552.13	683.54	629.15	54.38	12.569	
6,900.00	5,730.29	6,890.98	5,728.60	28.20	28.19	89.86	-1,382.84	-551.53	683.20	626.81	56.39	12.116	
7,000.00	5,731.31	6,990.98	5,729.44	29.24	29.23	89.84	-1,482.84	-550.92	682.86	624.39	58.47	11.679	
7,100.00	5,732.34	7,090.98	5,730.28	30.32	30.30	89.82	-1,582.83	-550.32	682.52	621.90	60.62	11.260	
7,200.00	5,733.36	7,190.98	5,731.12	31.43	31.40	89.81	-1,682.83	-549.71	682.18	619.35	62.83	10.858	
7,300.00	5,734.39	7,290.98	5,731.95	32.56	32.53	89.79	-1,782.82	-549.10	681.84	616.75	65.09	10.476	
7,400.00	5,735.41	7,390.98	5,732.79	33.72	33.68	89.78	-1,882.81	-548.50	681.50	614.10	67.40	10.111	
7,500.00	5,736.44	7,490.98	5,733.63	34.90	34.86	89.76	-1,982.81	-547.89	681.16	611.40	69.76	9.765	
7,600.00	5,737.46	7,590.98	5,734.47	36.10	36.06	89.75	-2,082.80	-547.29	680.82	608.66	72.15	9.436	
7,700.00	5,738.49	7,690.98	5,735.30	37.31	37.27	89.73	-2,182.79	-546.68	680.48	605.89	74.59	9.123	
7,800.00	5,739.52	7,790.98	5,736.14	38.55	38.50	89.71	-2,282.79	-546.07	680.14	603.09	77.05	8.827	
7,900.00	5,740.54	7,890.98	5,736.98	39.79	39.75	89.70	-2,382.78	-545.47	679.80	600.25	79.55	8.546	
8,000.00	5,741.57	7,990.98	5,737.82	41.06	41.01	89.68	-2,482.78	-544.86	679.46	597.39	82.07	8.279	
8,100.00	5,742.59	8,090.98	5,738.66	42.33	42.28	89.67	-2,582.77	-544.25	679.12	594.51	84.61	8.026	
8,200.00	5,743.62	8,190.97	5,739.49	43.62	43.57	89.65	-2,682.76	-543.65	678.78	591.60	87.18	7.786	
8,300.00	5,744.64	8,290.97	5,740.33	44.91	44.86	89.63	-2,782.76	-543.04	678.44	588.67	89.77	7.557	
8,400.00	5,745.67	8,390.97	5,741.17	46.21	46.16	89.62	-2,882.75	-542.44	678.10	585.72	92.38	7.340	
8,500.00	5,746.69	8,490.97	5,742.01	47.53	47.48	89.60	-2,982.75	-541.83	677.76	582.76	95.00	7.134	
8,600.00	5,747.72	8,590.97	5,742.84	48.85	48.80	89.59	-3,082.74	-541.22	677.42	579.78	97.64	6.938	
8,700.00	5,748.74	8,690.97	5,743.68	50.18	50.12	89.57	-3,182.73	-540.62	677.08	576.78	100.30	6.751	
8,800.00	5,749.77	8,790.97	5,744.52	51.51	51.46	89.55	-3,282.73	-540.01	676.75	573.78	102.97	6.572	
8,900.00	5,750.79	8,890.97	5,745.36	52.85	52.80	89.54	-3,382.72	-539.40	676.41	570.76	105.65	6.402	
9,000.00	5,751.82	8,990.97	5,746.20	54.20	54.14	89.52	-3,482.72	-538.80	676.07	567.73	108.34	6.240	
9,100.00	5,752.84	9,090.97	5,747.03	55.55	55.50	89.51	-3,582.71	-538.19	675.73	564.68	111.05	6.085	
9,200.00	5,753.87	9,190.97	5,747.87	56.91	56.85	89.49	-3,682.70	-537.59	675.39	561.63	113.76	5.937	
9,300.00	5,754.89	9,290.97	5,748.71	58.27	58.21	89.47	-3,782.70	-536.98	675.05	558.57	116.48	5.795	
9,400.00	5,755.92	9,390.97	5,749.55	59.63	59.58	89.46	-3,882.69	-536.37	674.71	555.50	119.21	5.660	
9,500.00	5,756.94	9,490.96	5,750.38	61.00	60.95	89.44	-3,982.68	-535.77	674.37	552.42	121.95	5.530	
9,600.00	5,757.97	9,590.96	5,751.22	62.37	62.32	89.42	-4,082.68	-535.16	674.03	549.34	124.70	5.405	
9,700.00	5,758.99	9,690.96	5,752.06	63.75	63.70	89.41	-4,182.67	-534.55	673.70	546.25	127.45	5.286	
9,800.00	5,760.02	9,790.96	5,752.90	65.13	65.08	89.39	-4,282.67	-533.95	673.36	543.15	130.21	5.171	
9,900.00	5,761.04	9,890.96	5,753.73	66.51	66.46	89.38	-4,382.66	-533.34	673.02	540.04	132.98	5.061	
10,000.00	5,762.07	9,990.96	5,754.57	67.90	67.85	89.36	-4,482.65	-532.74	672.68	536.93	135.75	4.955	
10,100.00	5,763.09	10,090.96	5,755.41	69.29	69.24	89.34	-4,582.65	-532.13	672.34	533.82	138.52	4.854	
10,200.00	5,764.12	10,190.96	5,756.25	70.68	70.63	89.33	-4,682.64	-531.52	672.00	530.70	141.31	4.756	
10,300.00	5,765.14	10,290.96	5,757.09	72.07	72.02	89.31	-4,782.64	-530.92	671.66	527.57	144.09	4.661	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 16H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	5,766.17	10,390.96	5,757.92	73.47	73.42	89.29	-4,882.63	-530.31	671.33	524.44	146.88	4.570	
10,500.00	5,767.19	10,490.96	5,758.76	74.87	74.81	89.28	-4,982.62	-529.70	670.99	521.31	149.68	4.483	
10,600.00	5,768.22	10,590.96	5,759.60	76.27	76.21	89.26	-5,082.62	-529.10	670.65	518.17	152.48	4.398	
10,700.00	5,769.24	10,690.96	5,760.44	77.67	77.62	89.25	-5,182.61	-528.49	670.31	515.03	155.28	4.317	
10,800.00	5,770.27	10,790.96	5,761.27	79.07	79.02	89.23	-5,282.61	-527.89	669.97	511.88	158.09	4.238	
10,900.00	5,771.29	10,890.95	5,762.11	80.48	80.43	89.21	-5,382.60	-527.28	669.64	508.73	160.90	4.162	
11,000.00	5,772.32	10,990.95	5,762.95	81.88	81.83	89.20	-5,482.59	-526.67	669.30	505.58	163.72	4.088	
11,100.00	5,773.34	11,090.95	5,763.79	83.29	83.24	89.18	-5,582.59	-526.07	668.96	502.43	166.53	4.017	
11,200.00	5,774.37	11,190.95	5,764.63	84.70	84.65	89.16	-5,682.58	-525.46	668.62	499.27	169.35	3.948	
11,300.00	5,775.39	11,290.95	5,765.46	86.11	86.06	89.15	-5,782.58	-524.86	668.28	496.11	172.17	3.881	
11,400.00	5,776.42	11,390.95	5,766.30	87.52	87.48	89.13	-5,882.57	-524.25	667.95	492.95	175.00	3.817	
11,500.00	5,777.44	11,490.95	5,767.14	88.94	88.89	89.11	-5,982.56	-523.64	667.61	489.78	177.83	3.754	
11,600.00	5,778.47	11,590.95	5,767.98	90.35	90.31	89.10	-6,082.56	-523.04	667.27	486.61	180.66	3.694	
11,700.00	5,779.49	11,690.95	5,768.81	91.77	91.72	89.08	-6,182.55	-522.43	666.93	483.44	183.49	3.635	
11,800.00	5,780.52	11,790.95	5,769.65	93.18	93.14	89.06	-6,282.54	-521.82	666.60	480.27	186.33	3.578	
11,900.00	5,781.54	11,890.95	5,770.49	94.60	94.56	89.05	-6,382.54	-521.22	666.26	477.10	189.16	3.522	
12,000.00	5,782.57	11,990.95	5,771.33	96.02	95.98	89.03	-6,482.53	-520.61	665.92	473.92	192.00	3.468	
12,100.00	5,783.60	12,090.95	5,772.17	97.44	97.40	89.01	-6,582.53	-520.01	665.58	470.74	194.84	3.416	
12,200.00	5,784.62	12,190.94	5,773.00	98.86	98.82	89.00	-6,682.52	-519.40	665.25	467.56	197.68	3.365	
12,300.00	5,785.65	12,290.94	5,773.84	100.29	100.24	88.98	-6,782.51	-518.79	664.91	464.38	200.53	3.316	
12,400.00	5,786.67	12,390.94	5,774.68	101.71	101.67	88.96	-6,882.51	-518.19	664.57	461.20	203.38	3.268	
12,500.00	5,787.70	12,490.94	5,775.52	103.13	103.09	88.95	-6,982.50	-517.58	664.24	458.01	206.22	3.221	
12,600.00	5,788.72	12,590.94	5,776.35	104.56	104.52	88.93	-7,082.50	-516.97	663.90	454.83	209.07	3.175	
12,700.00	5,789.75	12,690.94	5,777.19	105.98	105.94	88.91	-7,182.49	-516.37	663.56	451.64	211.92	3.131	
12,800.00	5,790.77	12,790.94	5,778.03	107.41	107.37	88.90	-7,282.48	-515.76	663.22	448.45	214.77	3.088	
12,900.00	5,791.80	12,890.94	5,778.87	108.83	108.80	88.88	-7,382.48	-515.16	662.89	445.26	217.63	3.046	
13,000.00	5,792.82	12,990.94	5,779.70	110.26	110.22	88.86	-7,482.47	-514.55	662.55	442.07	220.48	3.005	
13,100.00	5,793.85	13,090.94	5,780.54	111.69	111.65	88.85	-7,582.47	-513.94	662.21	438.87	223.34	2.965	
13,200.00	5,794.87	13,190.94	5,781.38	113.12	113.08	88.83	-7,682.46	-513.34	661.88	435.68	226.20	2.926	
13,300.00	5,795.90	13,290.94	5,782.22	114.54	114.51	88.81	-7,782.45	-512.73	661.54	432.49	229.05	2.888	
13,400.00	5,796.92	13,390.94	5,783.06	115.97	115.94	88.80	-7,882.45	-512.12	661.20	429.29	231.91	2.851	
13,500.00	5,797.95	13,490.93	5,783.89	117.40	117.37	88.78	-7,982.44	-511.52	660.87	426.09	234.77	2.815	
13,600.00	5,798.97	13,590.93	5,784.73	118.83	118.80	88.76	-8,082.43	-510.91	660.53	422.89	237.64	2.780	
13,700.00	5,800.00	13,690.93	5,785.57	120.27	120.23	88.75	-8,182.43	-510.31	660.19	419.70	240.50	2.745	
13,768.60	5,800.70	13,757.91	5,786.13	121.10	121.19	88.73	-8,249.40	-509.90	659.97	417.67	242.29	2.724 ES, SF	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 18H - OH - Plan 2 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	13.00	0.00	0.00	0.02	79.91	152.90	859.00	872.50				
100.00	100.00	113.00	100.00	0.15	0.20	79.91	152.90	859.00	872.50	872.16	0.34	2,535.360	
200.00	200.00	213.00	200.00	0.51	0.55	79.91	152.90	859.00	872.50	871.44	1.06	822.280	
300.00	300.00	313.00	300.00	0.87	0.91	79.91	152.90	859.00	872.50	870.72	1.78	490.715	
400.00	400.00	413.00	400.00	1.22	1.27	79.91	152.90	859.00	872.50	870.01	2.49	349.705	
500.00	500.00	513.00	500.00	1.58	1.63	79.91	152.90	859.00	872.50	869.29	3.21	271.646	
600.00	600.00	613.00	600.00	1.94	1.99	79.91	152.90	859.00	872.50	868.57	3.93	222.076	
700.00	700.00	713.00	700.00	2.30	2.35	79.91	152.90	859.00	872.50	867.86	4.65	187.805	
800.00	800.00	813.00	800.00	2.66	2.70	79.91	152.90	859.00	872.50	867.14	5.36	162.697	
900.00	900.00	913.00	900.00	3.02	3.06	79.91	152.90	859.00	872.50	866.42	6.08	143.511	
1,000.00	1,000.00	1,013.00	1,000.00	3.38	3.42	79.91	152.90	859.00	872.50	865.70	6.80	128.373	
1,100.00	1,099.99	1,112.99	1,099.99	3.72	3.78	-10.11	152.90	859.00	871.21	863.71	7.51	116.083	
1,200.00	1,199.91	1,212.91	1,199.91	4.07	4.14	-10.17	152.90	859.00	867.35	859.14	8.21	105.673	
1,300.00	1,299.69	1,312.69	1,299.69	4.42	4.50	-10.26	152.90	859.00	860.91	852.00	8.91	96.574	
1,400.00	1,399.32	1,412.32	1,399.32	4.77	4.85	-10.37	152.90	859.00	852.48	842.85	9.63	88.566	
1,500.00	1,498.94	1,511.94	1,498.94	5.13	5.21	-10.48	152.90	859.00	843.91	833.57	10.34	81.618	
1,600.00	1,598.56	1,611.56	1,598.56	5.49	5.57	-10.59	152.90	859.00	835.34	824.28	11.06	75.550	
1,700.00	1,698.18	1,711.18	1,698.18	5.85	5.92	-10.70	152.90	859.00	826.77	814.99	11.78	70.207	
1,800.00	1,797.80	1,810.80	1,797.80	6.22	6.28	-10.81	152.90	859.00	818.20	805.71	12.50	65.470	
1,900.00	1,897.42	1,910.42	1,897.42	6.58	6.64	-10.93	152.90	859.00	809.64	796.42	13.22	61.243	
2,000.00	1,997.04	2,010.04	1,997.04	6.95	7.00	-11.04	152.90	859.00	801.09	787.14	13.94	57.450	
2,100.00	2,096.66	2,109.66	2,096.66	7.32	7.35	-11.16	152.90	859.00	792.53	777.86	14.67	54.026	
2,200.00	2,196.28	2,209.28	2,196.28	7.69	7.71	-11.29	152.90	859.00	783.98	768.59	15.40	50.923	
2,300.00	2,295.90	2,308.90	2,295.90	8.06	8.07	-11.41	152.90	859.00	775.44	759.31	16.12	48.097	
2,400.00	2,395.52	2,408.52	2,395.52	8.43	8.42	-11.54	152.90	859.00	766.89	750.04	16.85	45.513	
2,500.00	2,495.15	2,508.15	2,495.15	8.80	8.78	-11.66	152.90	859.00	758.48	740.91	17.58	43.150	
2,600.00	2,594.93	2,607.93	2,594.93	9.16	9.14	-11.75	152.90	859.00	752.04	733.74	18.30	41.091	
2,700.00	2,694.85	2,707.85	2,694.85	9.52	9.50	-11.80	152.90	859.00	748.15	729.13	19.02	39.336	
2,800.00	2,794.84	2,807.84	2,794.84	9.87	9.86	-11.81	152.90	859.00	746.83	727.10	19.73	37.855	
2,884.30	2,879.14	2,892.14	2,879.14	10.17	10.16	78.19	152.90	859.00	746.81	726.48	20.32	36.746	
2,900.00	2,894.84	2,907.84	2,894.84	10.22	10.21	78.19	152.90	859.00	746.83	726.39	20.43	36.548	
3,000.00	2,994.84	3,007.84	2,994.84	10.57	10.57	78.19	152.90	859.00	746.83	725.69	21.14	35.328	
3,100.00	3,094.84	3,107.84	3,094.84	10.92	10.93	78.19	152.90	859.00	746.83	724.98	21.85	34.185	
3,200.00	3,194.84	3,207.84	3,194.84	11.26	11.29	78.19	152.90	859.00	746.83	724.27	22.55	33.113	
3,300.00	3,294.84	3,307.84	3,294.84	11.61	11.65	78.19	152.90	859.00	746.83	723.56	23.26	32.106	
3,400.00	3,394.84	3,407.84	3,394.84	11.96	12.01	78.19	152.90	859.00	746.83	722.86	23.97	31.157	
3,500.00	3,494.84	3,507.84	3,494.84	12.31	12.36	78.19	152.90	859.00	746.83	722.15	24.68	30.262	
3,600.00	3,594.84	3,607.84	3,594.84	12.66	12.72	78.19	152.90	859.00	746.83	721.44	25.39	29.416	
3,700.00	3,694.84	3,707.84	3,694.84	13.02	13.08	78.19	152.90	859.00	746.83	720.73	26.10	28.616	
3,800.00	3,794.84	3,807.84	3,794.84	13.37	13.44	78.19	152.90	859.00	746.83	720.02	26.81	27.858	
3,900.00	3,894.84	3,907.84	3,894.84	13.72	13.80	78.19	152.90	859.00	746.83	719.31	27.52	27.139	
4,000.00	3,994.84	4,007.84	3,994.84	14.07	14.16	78.19	152.90	859.00	746.83	718.60	28.23	26.456	
4,100.00	4,094.84	4,107.84	4,094.84	14.42	14.52	78.19	152.90	859.00	746.83	717.89	28.94	25.806	
4,200.00	4,194.84	4,207.84	4,194.84	14.78	14.87	78.19	152.90	859.00	746.83	717.17	29.65	25.186	
4,300.00	4,294.84	4,307.84	4,294.84	15.13	15.23	78.19	152.90	859.00	746.83	716.46	30.36	24.596	
4,400.00	4,394.84	4,407.84	4,394.84	15.48	15.59	78.19	152.90	859.00	746.83	715.75	31.08	24.033	
4,500.00	4,494.84	4,507.84	4,494.84	15.84	15.95	78.19	152.90	859.00	746.83	715.04	31.79	23.494	
4,600.00	4,594.84	4,607.84	4,594.84	16.19	16.31	78.19	152.90	859.00	746.83	714.33	32.50	22.979	
4,700.00	4,694.84	4,707.84	4,694.84	16.55	16.67	78.19	152.90	859.00	746.83	713.61	33.21	22.486	
4,800.00	4,794.84	4,807.84	4,794.84	16.90	17.03	78.19	152.90	859.00	746.83	712.90	33.93	22.014	
4,900.00	4,894.84	4,907.84	4,894.84	17.25	17.38	78.19	152.90	859.00	746.83	712.19	34.64	21.561	
5,000.00	4,994.84	5,007.84	4,994.84	17.61	17.74	78.19	152.90	859.00	746.83	711.48	35.35	21.126	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 18H - OH - Plan 2 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,094.84	5,107.84	5,094.84	17.96	18.10	78.19	152.90	859.00	746.83	710.76	36.06	20.708	
5,200.00	5,194.84	5,207.84	5,194.84	18.32	18.46	78.19	152.90	859.00	746.83	710.05	36.78	20.306	
5,300.00	5,294.74	5,378.00	5,363.99	18.66	19.03	-101.45	140.23	856.31	745.43	707.74	37.69	19.777	
5,400.00	5,392.32	5,618.75	5,574.67	18.99	19.76	-98.67	31.49	833.19	730.43	691.68	38.75	18.851	
5,500.00	5,483.40	5,798.77	5,682.21	19.30	20.36	-95.11	-108.43	803.45	705.31	665.65	39.66	17.785	
5,600.00	5,563.99	5,932.53	5,723.64	19.59	20.88	-92.22	-232.38	777.11	676.96	636.49	40.47	16.727	
5,700.00	5,630.59	6,026.96	5,731.11	19.90	21.30	-90.59	-324.33	757.63	649.53	608.33	41.19	15.767	
5,800.00	5,680.26	6,086.26	5,731.57	20.26	21.59	-90.61	-382.68	747.08	628.19	586.35	41.84	15.013	
5,900.00	5,710.85	6,152.12	5,732.07	20.67	21.94	-90.60	-447.93	738.20	613.41	570.80	42.61	14.397	
6,000.00	5,721.06	6,221.59	5,732.61	21.11	22.34	-91.06	-517.12	732.10	604.17	560.71	43.46	13.903	
6,100.00	5,722.09	6,300.00	5,733.22	21.63	22.83	-91.05	-595.47	729.25	600.06	555.60	44.46	13.497	
6,135.19	5,722.45	6,316.75	5,733.35	21.84	22.94	-91.04	-612.21	729.20	599.68	554.89	44.78	13.391	CC
6,200.00	5,723.11	6,362.87	5,733.70	22.23	23.25	-91.03	-658.33	730.06	600.71	555.23	45.48	13.208	
6,300.00	5,724.14	6,462.18	5,734.46	22.90	23.98	-91.00	-757.57	733.53	603.93	557.05	46.88	12.883	
6,400.00	5,725.16	6,562.12	5,735.23	23.65	24.76	-90.97	-857.45	737.02	607.15	558.74	48.41	12.542	
6,500.00	5,726.19	6,662.07	5,736.00	24.45	25.61	-90.94	-957.34	740.51	610.37	560.31	50.06	12.192	
6,600.00	5,727.21	6,762.02	5,736.77	25.32	26.51	-90.91	-1,057.22	743.99	613.59	561.76	51.83	11.839	
6,700.00	5,728.24	6,861.97	5,737.53	26.23	27.46	-90.88	-1,157.10	747.48	616.81	563.12	53.69	11.488	
6,800.00	5,729.26	6,961.91	5,738.30	27.20	28.45	-90.85	-1,256.99	750.97	620.03	564.38	55.65	11.142	
6,900.00	5,730.29	7,061.86	5,739.07	28.20	29.48	-90.83	-1,356.87	754.46	623.25	565.57	57.68	10.805	
7,000.00	5,731.31	7,178.77	5,739.96	29.24	30.73	-90.80	-1,473.74	757.01	625.17	565.20	59.97	10.425	
7,100.00	5,732.34	7,278.77	5,740.72	30.32	31.83	-90.77	-1,573.73	757.79	625.68	563.53	62.15	10.067	
7,200.00	5,733.36	7,378.77	5,741.48	31.43	32.96	-90.75	-1,673.73	758.57	626.19	561.80	64.39	9.725	
7,300.00	5,734.39	7,478.77	5,742.25	32.56	34.12	-90.72	-1,773.72	759.35	626.70	560.02	66.68	9.399	
7,400.00	5,735.41	7,578.77	5,743.01	33.72	35.29	-90.70	-1,873.71	760.13	627.21	558.20	69.01	9.089	
7,500.00	5,736.44	7,678.76	5,743.77	34.90	36.49	-90.67	-1,973.70	760.91	627.72	556.33	71.39	8.793	
7,600.00	5,737.46	7,778.76	5,744.53	36.10	37.70	-90.65	-2,073.70	761.69	628.23	554.43	73.80	8.513	
7,700.00	5,738.49	7,878.76	5,745.29	37.31	38.94	-90.62	-2,173.69	762.47	628.74	552.49	76.25	8.246	
7,800.00	5,739.52	7,978.76	5,746.05	38.55	40.18	-90.60	-2,273.68	763.25	629.25	550.53	78.73	7.993	
7,900.00	5,740.54	8,078.76	5,746.81	39.79	41.44	-90.57	-2,373.67	764.02	629.76	548.53	81.24	7.752	
8,000.00	5,741.57	8,178.76	5,747.57	41.06	42.71	-90.55	-2,473.67	764.80	630.28	546.51	83.77	7.524	
8,100.00	5,742.59	8,278.75	5,748.33	42.33	44.00	-90.52	-2,573.66	765.58	630.79	544.46	86.33	7.307	
8,200.00	5,743.62	8,378.75	5,749.09	43.62	45.29	-90.50	-2,673.65	766.36	631.30	542.40	88.90	7.101	
8,300.00	5,744.64	8,478.75	5,749.85	44.91	46.59	-90.48	-2,773.64	767.14	631.81	540.31	91.50	6.905	
8,400.00	5,745.67	8,578.75	5,750.61	46.21	47.90	-90.45	-2,873.64	767.92	632.32	538.21	94.12	6.718	
8,500.00	5,746.69	8,678.75	5,751.37	47.53	49.22	-90.43	-2,973.63	768.70	632.83	536.09	96.75	6.541	
8,600.00	5,747.72	8,778.75	5,752.13	48.85	50.55	-90.40	-3,073.62	769.48	633.35	533.95	99.40	6.372	
8,700.00	5,748.74	8,878.74	5,752.90	50.18	51.88	-90.38	-3,173.61	770.26	633.86	531.80	102.06	6.211	
8,800.00	5,749.77	8,978.74	5,753.66	51.51	53.22	-90.35	-3,273.61	771.04	634.37	529.64	104.73	6.057	
8,900.00	5,750.79	9,078.74	5,754.42	52.85	54.57	-90.33	-3,373.60	771.82	634.88	527.47	107.42	5.910	
9,000.00	5,751.82	9,178.74	5,755.18	54.20	55.92	-90.31	-3,473.59	772.60	635.40	525.28	110.11	5.770	
9,100.00	5,752.84	9,278.74	5,755.94	55.55	57.27	-90.28	-3,573.58	773.38	635.91	523.09	112.82	5.636	
9,200.00	5,753.87	9,378.74	5,756.70	56.91	58.63	-90.26	-3,673.58	774.16	636.42	520.88	115.54	5.508	
9,300.00	5,754.89	9,478.73	5,757.46	58.27	60.00	-90.23	-3,773.57	774.94	636.93	518.67	118.27	5.386	
9,400.00	5,755.92	9,578.73	5,758.22	59.63	61.37	-90.21	-3,873.56	775.72	637.45	516.45	121.00	5.268	
9,500.00	5,756.94	9,678.73	5,758.98	61.00	62.74	-90.19	-3,973.55	776.50	637.96	514.22	123.74	5.156	
9,600.00	5,757.97	9,778.73	5,759.74	62.37	64.12	-90.16	-4,073.54	777.28	638.47	511.98	126.49	5.048	
9,700.00	5,758.99	9,878.73	5,760.50	63.75	65.50	-90.14	-4,173.54	778.06	638.99	509.74	129.25	4.944	
9,800.00	5,760.02	9,978.73	5,761.26	65.13	66.88	-90.11	-4,273.53	778.84	639.50	507.49	132.01	4.844	
9,900.00	5,761.04	10,078.72	5,762.02	66.51	68.26	-90.09	-4,373.52	779.62	640.01	505.24	134.78	4.749	
10,000.00	5,762.07	10,178.72	5,762.78	67.90	69.65	-90.07	-4,473.51	780.40	640.53	502.98	137.55	4.657	
10,100.00	5,763.09	10,278.72	5,763.54	69.29	71.04	-90.04	-4,573.51	781.18	641.04	500.71	140.33	4.568	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 18H - OH - Plan 2 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	5,764.12	10,378.72	5,764.31	70.68	72.44	-90.02	-4,673.50	781.96	641.56	498.44	143.11	4.483	
10,300.00	5,765.14	10,478.72	5,765.07	72.07	73.83	-90.00	-4,773.49	782.74	642.07	496.17	145.90	4.401	
10,400.00	5,766.17	10,578.72	5,765.83	73.47	75.23	-89.97	-4,873.48	783.52	642.58	493.89	148.70	4.321	
10,500.00	5,767.19	10,678.71	5,766.59	74.87	76.63	-89.95	-4,973.48	784.30	643.10	491.60	151.49	4.245	
10,600.00	5,768.22	10,778.71	5,767.35	76.27	78.03	-89.93	-5,073.47	785.08	643.61	489.32	154.30	4.171	
10,700.00	5,769.24	10,878.71	5,768.11	77.67	79.43	-89.90	-5,173.46	785.86	644.13	487.03	157.10	4.100	
10,800.00	5,770.27	10,978.71	5,768.87	79.07	80.84	-89.88	-5,273.45	786.63	644.64	484.73	159.91	4.031	
10,900.00	5,771.29	11,078.71	5,769.63	80.48	82.25	-89.86	-5,373.45	787.41	645.16	482.43	162.72	3.965	
11,000.00	5,772.32	11,178.71	5,770.39	81.88	83.65	-89.83	-5,473.44	788.19	645.67	480.13	165.54	3.900	
11,100.00	5,773.34	11,278.70	5,771.15	83.29	85.06	-89.81	-5,573.43	788.97	646.19	477.83	168.35	3.838	
11,200.00	5,774.37	11,378.70	5,771.91	84.70	86.48	-89.79	-5,673.42	789.75	646.70	475.52	171.18	3.778	
11,300.00	5,775.39	11,478.70	5,772.67	86.11	87.89	-89.76	-5,773.42	790.53	647.22	473.22	174.00	3.720	
11,400.00	5,776.42	11,578.70	5,773.43	87.52	89.30	-89.74	-5,873.41	791.31	647.73	470.90	176.83	3.663	
11,500.00	5,777.44	11,678.70	5,774.19	88.94	90.72	-89.72	-5,973.40	792.09	648.25	468.59	179.66	3.608	
11,600.00	5,778.47	11,778.70	5,774.95	90.35	92.13	-89.69	-6,073.39	792.87	648.76	466.28	182.49	3.555	
11,700.00	5,779.49	11,878.69	5,775.72	91.77	93.55	-89.67	-6,173.39	793.65	649.28	463.96	185.32	3.504	
11,800.00	5,780.52	11,978.69	5,776.48	93.18	94.97	-89.65	-6,273.38	794.43	649.79	461.64	188.16	3.453	
11,900.00	5,781.54	12,078.69	5,777.24	94.60	96.39	-89.62	-6,373.37	795.21	650.31	459.32	190.99	3.405	
12,000.00	5,782.57	12,178.69	5,778.00	96.02	97.81	-89.60	-6,473.36	795.99	650.82	456.99	193.83	3.358	
12,100.00	5,783.60	12,278.69	5,778.76	97.44	99.23	-89.58	-6,573.35	796.77	651.34	454.67	196.67	3.312	
12,200.00	5,784.62	12,378.69	5,779.52	98.86	100.66	-89.55	-6,673.35	797.55	651.86	452.34	199.52	3.267	
12,300.00	5,785.65	12,478.68	5,780.28	100.29	102.08	-89.53	-6,773.34	798.33	652.37	450.01	202.36	3.224	
12,400.00	5,786.67	12,578.68	5,781.04	101.71	103.50	-89.51	-6,873.33	799.11	652.89	447.68	205.21	3.182	
12,500.00	5,787.70	12,678.68	5,781.80	103.13	104.93	-89.49	-6,973.32	799.89	653.41	445.35	208.06	3.140	
12,600.00	5,788.72	12,778.68	5,782.56	104.56	106.35	-89.46	-7,073.32	800.67	653.92	443.01	210.91	3.100	
12,700.00	5,789.75	12,878.68	5,783.32	105.98	107.78	-89.44	-7,173.31	801.45	654.44	440.68	213.76	3.062	
12,800.00	5,790.77	12,978.68	5,784.08	107.41	109.21	-89.42	-7,273.30	802.23	654.95	438.34	216.61	3.024	
12,900.00	5,791.80	13,078.67	5,784.84	108.83	110.63	-89.40	-7,373.29	803.01	655.47	436.00	219.47	2.987	
13,000.00	5,792.82	13,178.67	5,785.60	110.26	112.06	-89.37	-7,473.29	803.79	655.99	433.67	222.32	2.951	
13,100.00	5,793.85	13,278.67	5,786.36	111.69	113.49	-89.35	-7,573.28	804.57	656.51	431.33	225.18	2.915	
13,200.00	5,794.87	13,378.67	5,787.13	113.12	114.92	-89.33	-7,673.27	805.35	657.02	428.99	228.04	2.881	
13,300.00	5,795.90	13,478.67	5,787.89	114.54	116.35	-89.30	-7,773.26	806.13	657.54	426.64	230.90	2.848	
13,400.00	5,796.92	13,578.67	5,788.65	115.97	117.78	-89.28	-7,873.26	806.91	658.06	424.30	233.76	2.815	
13,500.00	5,797.95	13,678.66	5,789.41	117.40	119.21	-89.26	-7,973.25	807.69	658.57	421.96	236.62	2.783	
13,600.00	5,798.97	13,778.66	5,790.17	118.83	120.65	-89.24	-8,073.24	808.47	659.09	419.61	239.48	2.752	
13,700.00	5,800.00	13,878.66	5,790.93	120.27	122.08	-89.22	-8,173.23	809.25	659.61	417.27	242.34	2.722	
13,768.60	5,800.70	13,947.26	5,791.45	121.10	123.06	-89.20	-8,241.83	809.78	659.96	415.80	244.16	2.703	ES, SF

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 26H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	7.00	0.00	0.00	-90.19	-2.00	-589.90	589.94				
100.00	100.00	93.00	100.00	0.15	0.14	-90.19	-2.00	-589.90	589.90	589.62	0.29	2,054.567	
200.00	200.00	193.00	200.00	0.51	0.48	-90.19	-2.00	-589.90	589.90	588.91	0.99	596.234	
300.00	300.00	293.00	300.00	0.87	0.84	-90.19	-2.00	-589.90	589.90	588.20	1.71	345.716	
400.00	400.00	393.00	400.00	1.22	1.20	-90.19	-2.00	-589.90	589.90	587.48	2.42	243.433	
500.00	500.00	493.00	500.00	1.58	1.56	-90.19	-2.00	-589.90	589.90	586.76	3.14	187.855	
600.00	600.00	593.00	600.00	1.94	1.92	-90.19	-2.00	-589.90	589.90	586.05	3.86	152.937	
700.00	700.00	693.00	700.00	2.30	2.27	-90.19	-2.00	-589.90	589.90	585.33	4.57	128.966	
800.00	800.00	793.00	800.00	2.66	2.63	-90.19	-2.00	-589.90	589.90	584.61	5.29	111.491	
900.00	900.00	893.00	900.00	3.02	2.99	-90.19	-2.00	-589.90	589.90	583.90	6.01	98.187	
1,000.00	1,000.00	993.00	1,000.00	3.38	3.35	-90.19	-2.00	-589.90	589.90	583.18	6.72	87.719	CC
1,100.00	1,099.99	1,080.51	1,087.51	3.72	3.66	179.81	-2.00	-590.75	592.19	584.81	7.38	80.223	
1,200.00	1,199.91	1,166.80	1,173.74	4.07	3.96	179.81	-2.00	-593.54	599.35	591.33	8.02	74.687	
1,300.00	1,299.69	1,260.89	1,267.72	4.42	4.28	179.81	-2.00	-598.32	610.94	602.24	8.70	70.221	
1,400.00	1,399.32	1,359.94	1,366.63	4.77	4.63	179.81	-2.00	-603.51	624.71	615.31	9.40	66.455	
1,500.00	1,498.94	1,458.97	1,465.52	5.13	4.98	179.82	-2.00	-608.69	638.63	628.52	10.11	63.190	
1,600.00	1,598.56	1,557.99	1,564.41	5.49	5.33	179.82	-2.00	-613.87	652.54	641.73	10.82	60.326	
1,700.00	1,698.18	1,657.02	1,663.30	5.85	5.68	179.83	-2.00	-619.05	666.46	654.93	11.53	57.796	
1,800.00	1,797.80	1,756.19	1,774.34	6.22	6.07	179.83	-2.00	-624.26	679.88	667.59	12.29	55.316	
1,900.00	1,897.42	1,889.37	1,895.50	6.58	6.50	179.83	-2.00	-626.52	690.45	677.37	13.09	52.762	
2,000.00	1,997.04	1,990.91	1,997.04	6.95	6.86	179.84	-2.00	-626.54	699.18	685.37	13.81	50.618	
2,100.00	2,096.66	2,090.53	2,096.66	7.32	7.22	179.84	-2.00	-626.54	707.89	693.36	14.53	48.705	
2,200.00	2,196.28	2,190.15	2,196.28	7.69	7.57	179.84	-2.00	-626.54	716.61	701.35	15.26	46.970	
2,300.00	2,295.90	2,289.77	2,295.90	8.06	7.93	179.84	-2.00	-626.54	725.33	709.35	15.98	45.388	
2,400.00	2,395.52	2,389.39	2,395.52	8.43	8.28	179.84	-2.00	-626.54	734.04	717.34	16.71	43.940	
2,500.00	2,495.15	2,489.02	2,495.15	8.80	8.63	179.84	-2.00	-626.54	742.63	725.20	17.43	42.604	
2,600.00	2,594.93	2,588.80	2,594.93	9.16	8.99	179.85	-2.00	-626.54	749.21	731.06	18.15	41.274	
2,700.00	2,694.85	2,688.72	2,694.85	9.52	9.35	179.85	-2.00	-626.54	753.18	734.31	18.87	39.919	
2,800.00	2,794.84	2,788.70	2,794.84	9.87	9.70	179.85	-2.00	-626.54	754.53	734.96	19.57	38.546	
2,900.00	2,894.84	2,888.70	2,894.84	10.22	10.06	-90.15	-2.00	-626.54	754.53	734.25	20.28	37.209	
3,000.00	2,994.84	2,988.70	2,994.84	10.57	10.41	-90.15	-2.00	-626.54	754.53	733.55	20.98	35.961	
3,100.00	3,094.84	3,088.70	3,094.84	10.92	10.77	-90.15	-2.00	-626.54	754.53	732.85	21.69	34.792	
3,200.00	3,194.84	3,188.70	3,194.84	11.26	11.13	-90.15	-2.00	-626.54	754.53	732.14	22.39	33.695	
3,300.00	3,294.84	3,288.70	3,294.84	11.61	11.49	-90.15	-2.00	-626.54	754.53	731.43	23.10	32.665	
3,400.00	3,394.84	3,388.70	3,394.84	11.96	11.84	-90.15	-2.00	-626.54	754.53	730.73	23.81	31.695	
3,500.00	3,494.84	3,488.70	3,494.84	12.31	12.20	-90.15	-2.00	-626.54	754.53	730.02	24.51	30.780	
3,600.00	3,594.84	3,588.70	3,594.84	12.66	12.56	-90.15	-2.00	-626.54	754.53	729.31	25.22	29.916	
3,700.00	3,694.84	3,688.70	3,694.84	13.02	12.91	-90.15	-2.00	-626.54	754.53	728.60	25.93	29.098	
3,800.00	3,794.84	3,788.70	3,794.84	13.37	13.27	-90.15	-2.00	-626.54	754.53	727.89	26.64	28.324	
3,900.00	3,894.84	3,888.70	3,894.84	13.72	13.63	-90.15	-2.00	-626.54	754.53	727.18	27.35	27.589	
4,000.00	3,994.84	3,988.70	3,994.84	14.07	13.99	-90.15	-2.00	-626.54	754.53	726.47	28.06	26.891	
4,100.00	4,094.84	4,088.70	4,094.84	14.42	14.34	-90.15	-2.00	-626.54	754.53	725.76	28.77	26.227	
4,200.00	4,194.84	4,188.70	4,194.84	14.78	14.70	-90.15	-2.00	-626.54	754.53	725.05	29.48	25.595	
4,300.00	4,294.84	4,288.70	4,294.84	15.13	15.06	-90.15	-2.00	-626.54	754.53	724.34	30.19	24.993	
4,400.00	4,394.84	4,388.70	4,394.84	15.48	15.42	-90.15	-2.00	-626.54	754.53	723.63	30.90	24.417	
4,500.00	4,494.84	4,488.70	4,494.84	15.84	15.77	-90.15	-2.00	-626.54	754.53	722.92	31.61	23.868	
4,600.00	4,594.84	4,588.70	4,594.84	16.19	16.13	-90.15	-2.00	-626.54	754.53	722.21	32.32	23.343	
4,700.00	4,694.84	4,688.70	4,694.84	16.55	16.49	-90.15	-2.00	-626.54	754.53	721.50	33.04	22.840	
4,800.00	4,794.84	4,788.70	4,794.84	16.90	16.85	-90.15	-2.00	-626.54	754.53	720.78	33.75	22.358	
4,900.00	4,894.84	4,888.70	4,894.84	17.25	17.21	-90.15	-2.00	-626.54	754.53	720.07	34.46	21.896	
5,000.00	4,994.84	4,988.70	4,994.84	17.61	17.56	-90.15	-2.00	-626.54	754.53	719.36	35.17	21.452	
5,100.00	5,094.84	5,088.70	5,094.84	17.96	17.92	-90.15	-2.00	-626.54	754.53	718.65	35.89	21.026	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 26H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,194.84	5,188.70	5,194.84	18.32	18.28	-90.15	-2.00	-626.54	754.53	717.93	36.60	20.617	
5,200.00	5,194.84	5,188.71	5,194.84	18.32	18.28	-90.15	-2.00	-626.54	754.53	717.93	36.60	20.617	
5,300.00	5,294.74	5,288.60	5,294.74	18.66	18.64	90.21	-2.00	-626.54	754.54	717.24	37.30	20.230	
5,400.00	5,392.32	5,386.19	5,392.32	18.99	18.99	91.71	-2.00	-626.54	754.91	716.93	37.98	19.879	
5,500.00	5,483.40	5,477.26	5,483.40	19.30	19.31	94.23	-2.00	-626.54	757.29	718.68	38.61	19.614	
5,600.00	5,563.99	5,557.86	5,563.99	19.59	19.60	96.92	-2.00	-626.54	764.57	725.39	39.19	19.511	
5,700.00	5,630.59	5,624.45	5,630.59	19.90	19.84	98.73	-2.00	-626.54	780.04	740.31	39.73	19.631	
5,800.00	5,680.26	5,767.49	5,771.99	20.26	20.31	104.29	-19.65	-624.68	803.85	763.29	40.57	19.815	
5,900.00	5,710.85	6,229.43	6,095.11	20.67	21.79	118.27	-322.58	-592.84	819.72	777.27	42.45	19.310	
6,000.00	5,721.06	6,459.73	6,121.64	21.11	22.80	119.79	-548.76	-569.07	808.11	764.19	43.92	18.401	
6,100.00	5,722.09	6,559.21	6,122.47	21.63	23.35	120.14	-647.69	-558.67	799.18	754.20	44.98	17.769	
6,200.00	5,723.11	6,631.16	6,123.08	22.23	23.80	120.36	-719.36	-552.31	791.76	745.74	46.02	17.204	
6,300.00	5,724.14	6,700.00	6,123.65	22.90	24.25	120.44	-788.13	-549.53	788.38	741.24	47.15	16.722	
6,400.00	5,725.16	6,790.85	6,124.41	23.65	24.89	120.44	-878.97	-548.96	787.93	739.39	48.54	16.234	
6,500.00	5,726.19	6,890.85	6,125.25	24.45	25.66	120.44	-978.97	-548.43	787.61	737.49	50.11	15.716	
6,600.00	5,727.21	6,990.85	6,126.09	25.32	26.49	120.44	-1,078.96	-547.90	787.29	735.48	51.80	15.197	
6,700.00	5,728.24	7,090.85	6,126.93	26.23	27.37	120.44	-1,178.96	-547.37	786.96	733.36	53.60	14.682	
6,800.00	5,729.26	7,190.85	6,127.76	27.20	28.29	120.44	-1,278.95	-546.84	786.64	731.15	55.49	14.177	
6,900.00	5,730.29	7,290.85	6,128.60	28.20	29.26	120.43	-1,378.95	-546.31	786.32	728.85	57.46	13.684	
7,000.00	5,731.31	7,390.84	6,129.44	29.24	30.27	120.43	-1,478.94	-545.78	785.99	726.48	59.51	13.207	
7,100.00	5,732.34	7,490.84	6,130.27	30.32	31.31	120.43	-1,578.93	-545.25	785.67	724.04	61.63	12.748	
7,200.00	5,733.36	7,590.84	6,131.11	31.43	32.38	120.43	-1,678.93	-544.72	785.35	721.54	63.81	12.307	
7,300.00	5,734.39	7,690.84	6,131.95	32.56	33.49	120.43	-1,778.92	-544.19	785.02	718.98	66.05	11.886	
7,400.00	5,735.41	7,790.84	6,132.79	33.72	34.62	120.42	-1,878.92	-543.66	784.70	716.37	68.33	11.484	
7,500.00	5,736.44	7,890.84	6,133.62	34.90	35.77	120.42	-1,978.91	-543.13	784.38	713.71	70.66	11.100	
7,600.00	5,737.46	7,990.84	6,134.46	36.10	36.94	120.42	-2,078.91	-542.60	784.05	711.02	73.04	10.735	
7,700.00	5,738.49	8,090.84	6,135.30	37.31	38.13	120.42	-2,178.90	-542.07	783.73	708.29	75.45	10.388	
7,800.00	5,739.52	8,190.84	6,136.14	38.55	39.34	120.42	-2,278.90	-541.54	783.41	705.52	77.89	10.058	
7,900.00	5,740.54	8,290.84	6,136.97	39.79	40.57	120.41	-2,378.89	-541.01	783.09	702.72	80.36	9.744	
8,000.00	5,741.57	8,390.84	6,137.81	41.06	41.81	120.41	-2,478.89	-540.48	782.76	699.90	82.86	9.446	
8,100.00	5,742.59	8,490.84	6,138.65	42.33	43.06	120.41	-2,578.88	-539.95	782.44	697.05	85.39	9.163	
8,200.00	5,743.62	8,590.84	6,139.49	43.62	44.33	120.41	-2,678.87	-539.42	782.12	694.17	87.94	8.894	
8,300.00	5,744.64	8,690.84	6,140.32	44.91	45.60	120.41	-2,778.87	-538.89	781.79	691.28	90.51	8.637	
8,400.00	5,745.67	8,790.84	6,141.16	46.21	46.89	120.40	-2,878.86	-538.36	781.47	688.37	93.10	8.393	
8,500.00	5,746.69	8,890.84	6,142.00	47.53	48.19	120.40	-2,978.86	-537.83	781.15	685.43	95.71	8.161	
8,600.00	5,747.72	8,990.84	6,142.83	48.85	49.49	120.40	-3,078.85	-537.30	780.82	682.49	98.34	7.940	
8,700.00	5,748.74	9,090.84	6,143.67	50.18	50.80	120.40	-3,178.85	-536.77	780.50	679.52	100.98	7.729	
8,800.00	5,749.77	9,190.84	6,144.51	51.51	52.12	120.40	-3,278.84	-536.24	780.18	676.54	103.63	7.528	
8,900.00	5,750.79	9,290.83	6,145.35	52.85	53.45	120.39	-3,378.84	-535.71	779.86	673.55	106.30	7.336	
9,000.00	5,751.82	9,390.83	6,146.18	54.20	54.79	120.39	-3,478.83	-535.18	779.53	670.55	108.98	7.153	
9,100.00	5,752.84	9,490.83	6,147.02	55.55	56.12	120.39	-3,578.83	-534.65	779.21	667.54	111.67	6.978	
9,200.00	5,753.87	9,590.83	6,147.86	56.91	57.47	120.39	-3,678.82	-534.12	778.89	664.51	114.37	6.810	
9,300.00	5,754.89	9,690.83	6,148.70	58.27	58.82	120.38	-3,778.82	-533.59	778.56	661.48	117.09	6.650	
9,400.00	5,755.92	9,790.83	6,149.53	59.63	60.17	120.38	-3,878.81	-533.06	778.24	658.43	119.81	6.496	
9,500.00	5,756.94	9,890.83	6,150.37	61.00	61.53	120.38	-3,978.80	-532.53	777.92	655.38	122.53	6.349	
9,600.00	5,757.97	9,990.83	6,151.21	62.37	62.90	120.38	-4,078.80	-532.00	777.59	652.32	125.27	6.207	
9,700.00	5,758.99	10,090.83	6,152.04	63.75	64.26	120.38	-4,178.79	-531.47	777.27	649.26	128.01	6.072	
9,800.00	5,760.02	10,190.83	6,152.88	65.13	65.63	120.37	-4,278.79	-530.94	776.95	646.18	130.77	5.942	
9,900.00	5,761.04	10,290.83	6,153.72	66.51	67.01	120.37	-4,378.78	-530.41	776.62	643.10	133.52	5.816	
10,000.00	5,762.07	10,390.83	6,154.56	67.90	68.39	120.37	-4,478.78	-529.88	776.30	640.02	136.29	5.696	
10,100.00	5,763.09	10,490.83	6,155.39	69.29	69.77	120.37	-4,578.77	-529.35	775.98	636.92	139.05	5.580	
10,200.00	5,764.12	10,590.83	6,156.23	70.68	71.15	120.37	-4,678.77	-528.82	775.66	633.83	141.83	5.469	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 26H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	5,765.14	10,690.83	6,157.07	72.07	72.54	120.36	-4,778.76	-528.29	775.33	630.72	144.61	5.362	
10,400.00	5,766.17	10,790.83	6,157.91	73.47	73.92	120.36	-4,878.76	-527.76	775.01	627.62	147.39	5.258	
10,500.00	5,767.19	10,890.83	6,158.74	74.87	75.32	120.36	-4,978.75	-527.23	774.69	624.51	150.18	5.158	
10,600.00	5,768.22	10,990.83	6,159.58	76.27	76.71	120.36	-5,078.74	-526.70	774.36	621.39	152.97	5.062	
10,700.00	5,769.24	11,090.83	6,160.42	77.67	78.10	120.36	-5,178.74	-526.17	774.04	618.27	155.77	4.969	
10,800.00	5,770.27	11,190.82	6,161.26	79.07	79.50	120.35	-5,278.73	-525.64	773.72	615.15	158.57	4.879	
10,900.00	5,771.29	11,290.82	6,162.09	80.48	80.90	120.35	-5,378.73	-525.11	773.39	612.02	161.38	4.792	
11,000.00	5,772.32	11,390.82	6,162.93	81.88	82.30	120.35	-5,478.72	-524.58	773.07	608.89	164.18	4.709	
11,100.00	5,773.34	11,490.82	6,163.77	83.29	83.71	120.35	-5,578.72	-524.05	772.75	605.75	167.00	4.627	
11,200.00	5,774.37	11,590.82	6,164.60	84.70	85.11	120.34	-5,678.71	-523.52	772.43	602.62	169.81	4.549	
11,300.00	5,775.39	11,690.82	6,165.44	86.11	86.52	120.34	-5,778.71	-522.99	772.10	599.48	172.63	4.473	
11,400.00	5,776.42	11,790.82	6,166.28	87.52	87.92	120.34	-5,878.70	-522.46	771.78	596.33	175.45	4.399	
11,500.00	5,777.44	11,890.82	6,167.12	88.94	89.33	120.34	-5,978.70	-521.93	771.46	593.19	178.27	4.327	
11,600.00	5,778.47	11,990.82	6,167.95	90.35	90.74	120.34	-6,078.69	-521.40	771.13	590.04	181.09	4.258	
11,700.00	5,779.49	12,090.82	6,168.79	91.77	92.15	120.33	-6,178.68	-520.87	770.81	586.89	183.92	4.191	
11,800.00	5,780.52	12,190.82	6,169.63	93.18	93.57	120.33	-6,278.68	-520.34	770.49	583.74	186.75	4.126	
11,900.00	5,781.54	12,290.82	6,170.47	94.60	94.98	120.33	-6,378.67	-519.81	770.16	580.58	189.58	4.062	
12,000.00	5,782.57	12,390.82	6,171.30	96.02	96.40	120.33	-6,478.67	-519.28	769.84	577.42	192.42	4.001	
12,100.00	5,783.60	12,490.82	6,172.14	97.44	97.81	120.33	-6,578.66	-518.75	769.52	574.26	195.26	3.941	
12,200.00	5,784.62	12,590.82	6,172.98	98.86	99.23	120.32	-6,678.66	-518.23	769.20	571.10	198.09	3.883	
12,300.00	5,785.65	12,690.82	6,173.81	100.29	100.65	120.32	-6,778.65	-517.70	768.87	567.94	200.93	3.826	
12,400.00	5,786.67	12,790.82	6,174.65	101.71	102.07	120.32	-6,878.65	-517.17	768.55	564.77	203.78	3.772	
12,500.00	5,787.70	12,890.82	6,175.49	103.13	103.49	120.32	-6,978.64	-516.64	768.23	561.61	206.62	3.718	
12,600.00	5,788.72	12,990.82	6,176.33	104.56	104.91	120.32	-7,078.64	-516.11	767.90	558.44	209.47	3.666	
12,700.00	5,789.75	13,090.81	6,177.16	105.98	106.33	120.31	-7,178.63	-515.58	767.58	555.27	212.31	3.615	
12,800.00	5,790.77	13,190.81	6,178.00	107.41	107.75	120.31	-7,278.63	-515.05	767.26	552.10	215.16	3.566	
12,900.00	5,791.80	13,290.81	6,178.84	108.83	109.18	120.31	-7,378.62	-514.52	766.93	548.92	218.01	3.518	
13,000.00	5,792.82	13,390.81	6,179.68	110.26	110.60	120.31	-7,478.61	-513.99	766.61	545.75	220.86	3.471	
13,100.00	5,793.85	13,490.81	6,180.51	111.69	112.03	120.30	-7,578.61	-513.46	766.29	542.57	223.71	3.425	
13,200.00	5,794.87	13,590.81	6,181.35	113.12	113.45	120.30	-7,678.60	-512.93	765.97	539.40	226.57	3.381	
13,300.00	5,795.90	13,690.81	6,182.19	114.54	114.88	120.30	-7,778.60	-512.40	765.64	536.22	229.42	3.337	
13,400.00	5,796.92	13,790.81	6,183.03	115.97	116.31	120.30	-7,878.59	-511.87	765.32	533.04	232.28	3.295	
13,500.00	5,797.95	13,890.81	6,183.86	117.40	117.73	120.30	-7,978.59	-511.34	765.00	529.86	235.14	3.253	
13,600.00	5,798.97	13,990.81	6,184.70	118.83	119.16	120.29	-8,078.58	-510.81	764.67	526.68	238.00	3.213	
13,700.00	5,800.00	14,090.81	6,185.54	120.27	120.59	120.29	-8,178.58	-510.28	764.35	523.50	240.86	3.173	
13,768.60	5,800.70	14,159.41	6,186.11	121.10	121.57	120.29	-8,247.17	-509.91	764.13	521.46	242.67	3.149	ES, SF

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 27H - OH - Plan 1 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	1.00	0.00	0.00	-90.01	0.00	-30.00	30.02				
100.00	100.00	99.00	100.00	0.15	0.15	-90.01	0.00	-30.00	30.00	29.70	0.30	101.336	
200.00	200.00	199.00	200.00	0.51	0.50	-90.01	0.00	-30.00	30.00	28.99	1.01	29.677	
300.00	300.00	299.00	300.00	0.87	0.86	-90.01	0.00	-30.00	30.00	28.27	1.73	17.363	
400.00	400.00	399.00	400.00	1.22	1.22	-90.01	0.00	-30.00	30.00	27.56	2.44	12.271	
500.00	500.00	499.00	500.00	1.58	1.58	-90.01	0.00	-30.00	30.00	26.84	3.16	9.489	
600.00	600.00	599.00	600.00	1.94	1.94	-90.01	0.00	-30.00	30.00	26.12	3.88	7.735	
700.00	700.00	699.00	700.00	2.30	2.30	-90.01	0.00	-30.00	30.00	25.40	4.60	6.528	
800.00	800.00	799.00	800.00	2.66	2.65	-90.01	0.00	-30.00	30.00	24.69	5.31	5.647	
900.00	900.00	899.00	900.00	3.02	3.01	-90.01	0.00	-30.00	30.00	23.97	6.03	4.976	
1,000.00	1,000.00	999.00	1,000.00	3.38	3.37	-90.01	0.00	-30.00	30.00	23.25	6.75	4.447	CC, ES
1,100.00	1,099.99	1,098.99	1,099.99	3.72	3.73	179.99	0.00	-30.00	31.31	23.85	7.45	4.200	
1,200.00	1,199.91	1,198.91	1,199.91	4.07	4.09	179.99	0.00	-30.00	35.23	27.08	8.16	4.319	
1,300.00	1,299.69	1,298.69	1,299.69	4.42	4.45	179.99	0.00	-30.00	41.77	32.91	8.86	4.713	
1,400.00	1,399.32	1,398.32	1,399.32	4.77	4.80	180.00	0.00	-30.00	50.35	40.77	9.58	5.258	
1,500.00	1,498.94	1,497.94	1,498.94	5.13	5.16	180.00	0.00	-30.00	59.06	48.77	10.29	5.740	
1,600.00	1,598.56	1,597.56	1,598.56	5.49	5.52	180.00	0.00	-30.00	67.78	56.77	11.01	6.158	
1,700.00	1,698.18	1,697.18	1,698.18	5.85	5.87	180.00	0.00	-30.00	76.49	64.77	11.73	6.523	
1,800.00	1,797.80	1,796.80	1,797.80	6.22	6.23	180.00	0.00	-30.00	85.21	72.76	12.45	6.846	
1,900.00	1,897.42	1,896.42	1,897.42	6.58	6.59	180.00	0.00	-30.00	93.92	80.75	13.17	7.132	
2,000.00	1,997.04	1,996.04	1,997.04	6.95	6.95	180.00	0.00	-30.00	102.64	88.75	13.89	7.387	
2,100.00	2,096.66	2,095.66	2,096.66	7.32	7.30	180.00	0.00	-30.00	111.35	96.74	14.62	7.617	
2,200.00	2,196.28	2,195.28	2,196.28	7.69	7.66	180.00	0.00	-30.00	120.07	104.72	15.35	7.825	
2,300.00	2,295.90	2,294.90	2,295.90	8.06	8.02	180.00	0.00	-30.00	128.79	112.71	16.07	8.013	
2,400.00	2,395.52	2,394.52	2,395.52	8.43	8.37	180.00	0.00	-30.00	137.50	120.70	16.80	8.185	
2,500.00	2,495.15	2,494.15	2,495.15	8.80	8.73	180.00	0.00	-30.00	146.09	128.56	17.53	8.335	
2,600.00	2,594.93	2,593.93	2,594.93	9.16	9.09	180.00	0.00	-30.00	152.67	134.42	18.25	8.365	
2,700.00	2,694.85	2,693.85	2,694.85	9.52	9.45	180.00	0.00	-30.00	156.64	137.67	18.97	8.258	
2,800.00	2,794.84	2,793.84	2,794.84	9.87	9.81	180.00	0.00	-30.00	157.99	138.31	19.68	8.029	
2,900.00	2,894.84	2,893.84	2,894.84	10.22	10.16	-90.00	0.00	-30.00	157.99	137.61	20.38	7.751	
3,000.00	2,994.84	2,993.84	2,994.84	10.57	10.52	-90.00	0.00	-30.00	157.99	136.90	21.09	7.491	
3,100.00	3,094.84	3,093.84	3,094.84	10.92	10.88	-90.00	0.00	-30.00	157.99	136.20	21.80	7.249	
3,200.00	3,194.84	3,193.84	3,194.84	11.26	11.24	-90.00	0.00	-30.00	157.99	135.49	22.50	7.021	
3,300.00	3,294.84	3,293.84	3,294.84	11.61	11.60	-90.00	0.00	-30.00	157.99	134.78	23.21	6.807	
3,400.00	3,394.84	3,393.84	3,394.84	11.96	11.96	-90.00	0.00	-30.00	157.99	134.07	23.92	6.605	
3,500.00	3,494.84	3,493.84	3,494.84	12.31	12.31	-90.00	0.00	-30.00	157.99	133.36	24.63	6.415	
3,600.00	3,594.84	3,593.84	3,594.84	12.66	12.67	-90.00	0.00	-30.00	157.99	132.65	25.34	6.235	
3,700.00	3,694.84	3,693.84	3,694.84	13.02	13.03	-90.00	0.00	-30.00	157.99	131.94	26.05	6.065	
3,800.00	3,794.84	3,793.84	3,794.84	13.37	13.39	-90.00	0.00	-30.00	157.99	131.23	26.76	5.904	
3,900.00	3,894.84	3,893.84	3,894.84	13.72	13.75	-90.00	0.00	-30.00	157.99	130.52	27.47	5.752	
4,000.00	3,994.84	3,993.84	3,994.84	14.07	14.11	-90.00	0.00	-30.00	157.99	129.81	28.18	5.607	
4,100.00	4,094.84	4,093.84	4,094.84	14.42	14.47	-90.00	0.00	-30.00	157.99	129.10	28.89	5.469	
4,200.00	4,194.84	4,193.84	4,194.84	14.78	14.82	-90.00	0.00	-30.00	157.99	128.39	29.60	5.337	
4,300.00	4,294.84	4,293.84	4,294.84	15.13	15.18	-90.00	0.00	-30.00	157.99	127.68	30.31	5.212	
4,400.00	4,394.84	4,393.84	4,394.84	15.48	15.54	-90.00	0.00	-30.00	157.99	126.97	31.03	5.092	
4,500.00	4,494.84	4,493.84	4,494.84	15.84	15.90	-90.00	0.00	-30.00	157.99	126.25	31.74	4.978	
4,600.00	4,594.84	4,593.84	4,594.84	16.19	16.26	-90.00	0.00	-30.00	157.99	125.54	32.45	4.869	
4,700.00	4,694.84	4,693.84	4,694.84	16.55	16.62	-90.00	0.00	-30.00	157.99	124.83	33.16	4.764	
4,800.00	4,794.84	4,793.84	4,794.84	16.90	16.97	-90.00	0.00	-30.00	157.99	124.12	33.88	4.664	
4,900.00	4,894.84	4,893.84	4,894.84	17.25	17.33	-90.00	0.00	-30.00	157.99	123.40	34.59	4.568	
5,000.00	4,994.84	4,993.84	4,994.84	17.61	17.69	-90.00	0.00	-30.00	157.99	122.69	35.30	4.476	
5,100.00	5,094.84	5,093.84	5,094.84	17.96	18.05	-90.00	0.00	-30.00	157.99	121.98	36.01	4.387	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 27H - OH - Plan 1 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,194.84	5,193.84	5,194.84	18.32	18.41	-90.00	0.00	-30.00	157.99	121.26	36.73	4.302	
5,200.00	5,194.84	5,193.84	5,194.84	18.32	18.41	-90.00	0.00	-30.00	157.99	121.26	36.73	4.302	
5,300.00	5,294.74	5,293.74	5,294.74	18.66	18.77	91.14	0.00	-30.00	158.02	120.60	37.43	4.222	
5,400.00	5,392.32	5,391.32	5,392.32	18.99	19.12	98.27	0.00	-30.00	159.83	121.72	38.11	4.194	
5,500.00	5,483.40	5,482.40	5,483.40	19.30	19.44	109.59	0.00	-30.00	170.85	132.11	38.74	4.410	
5,600.00	5,563.99	5,562.99	5,563.99	19.59	19.73	120.17	0.00	-30.00	200.79	161.47	39.32	5.107	
5,700.00	5,630.59	5,629.59	5,630.59	19.90	19.97	126.31	0.00	-30.00	253.52	213.65	39.87	6.359	
5,800.00	5,680.26	5,679.26	5,680.26	20.26	20.15	126.09	0.00	-30.00	325.73	285.32	40.41	8.061	
5,900.00	5,710.85	5,709.85	5,710.85	20.67	20.26	116.27	0.00	-30.00	411.40	370.48	40.92	10.053	
6,000.00	5,721.06	6,514.18	6,221.27	21.11	23.16	178.73	-476.58	118.18	500.34	456.06	44.27	11.301	
6,040.14	5,721.47	6,552.75	6,221.67	21.32	23.37	179.90	-513.75	128.47	500.23	455.53	44.69	11.193	
6,100.00	5,722.09	6,611.26	6,222.28	21.63	23.70	-178.55	-570.63	142.15	500.42	455.09	45.33	11.040	
6,200.00	5,723.11	6,711.27	6,223.33	22.23	24.32	-176.53	-668.99	160.12	501.22	454.68	46.55	10.768	
6,300.00	5,724.14	6,813.33	6,224.39	22.90	25.00	-175.28	-770.40	171.34	502.02	454.12	47.91	10.479	
6,400.00	5,725.16	6,916.44	6,225.47	23.65	25.73	-174.86	-873.41	175.31	502.35	452.97	49.38	10.174	
6,500.00	5,726.19	7,018.83	6,226.52	24.45	26.48	-175.26	-975.73	172.11	502.06	451.13	50.94	9.857	
6,600.00	5,727.21	7,118.68	6,227.55	25.32	27.25	-175.88	-1,075.43	166.89	501.65	449.07	52.57	9.542	
6,700.00	5,728.24	7,218.53	6,228.58	26.23	28.08	-176.51	-1,175.14	161.66	501.29	446.97	54.31	9.230	
6,800.00	5,729.26	7,318.38	6,229.61	27.20	28.95	-177.13	-1,274.85	156.44	500.99	444.84	56.15	8.923	
6,900.00	5,730.29	7,418.23	6,230.64	28.20	29.86	-177.76	-1,374.55	151.21	500.75	442.68	58.07	8.624	
7,000.00	5,731.31	7,518.08	6,231.67	29.24	30.82	-178.39	-1,474.26	145.99	500.57	440.50	60.06	8.334	
7,100.00	5,732.34	7,617.92	6,232.69	30.32	31.81	-179.02	-1,573.97	140.76	500.45	438.32	62.13	8.055	
7,200.00	5,733.36	7,717.74	6,233.72	31.43	32.84	-179.62	-1,673.64	135.72	500.39	436.13	64.26	7.786	
7,300.00	5,734.39	7,817.66	6,234.74	32.56	33.91	-179.75	-1,773.55	134.87	500.39	433.91	66.47	7.528	
7,400.00	5,735.41	7,917.66	6,235.77	33.72	35.02	-179.76	-1,873.54	135.10	500.38	431.64	68.74	7.279	
7,500.00	5,736.44	8,017.66	6,236.79	34.90	36.16	-179.76	-1,973.54	135.33	500.38	429.32	71.05	7.042	
7,600.00	5,737.46	8,117.66	6,237.81	36.10	37.32	-179.76	-2,073.53	135.56	500.38	426.96	73.41	6.816	
7,700.00	5,738.49	8,217.66	6,238.83	37.31	38.49	-179.77	-2,173.52	135.79	500.37	424.57	75.81	6.601	
7,800.00	5,739.52	8,317.66	6,239.85	38.55	39.69	-179.77	-2,273.52	136.03	500.37	422.13	78.23	6.396	
7,900.00	5,740.54	8,417.66	6,240.88	39.79	40.90	-179.78	-2,373.51	136.26	500.37	419.67	80.69	6.201	
8,000.00	5,741.57	8,517.66	6,241.90	41.06	42.13	-179.78	-2,473.51	136.49	500.36	417.18	83.18	6.015	
8,100.00	5,742.59	8,617.66	6,242.92	42.33	43.37	-179.78	-2,573.50	136.72	500.36	414.66	85.70	5.839	
8,200.00	5,743.62	8,717.66	6,243.94	43.62	44.62	-179.79	-2,673.50	136.96	500.36	412.12	88.24	5.671	
8,300.00	5,744.64	8,817.66	6,244.96	44.91	45.89	-179.79	-2,773.49	137.19	500.35	409.56	90.80	5.511	
8,400.00	5,745.67	8,917.66	6,245.99	46.21	47.16	-179.79	-2,873.49	137.42	500.35	406.97	93.38	5.358	
8,500.00	5,746.69	9,017.66	6,247.01	47.53	48.45	-179.80	-2,973.48	137.65	500.35	404.37	95.98	5.213	
8,600.00	5,747.72	9,117.66	6,248.03	48.85	49.74	-179.80	-3,073.48	137.88	500.34	401.75	98.59	5.075	
8,700.00	5,748.74	9,217.66	6,249.05	50.18	51.05	-179.81	-3,173.47	138.12	500.34	399.12	101.22	4.943	
8,800.00	5,749.77	9,317.66	6,250.07	51.51	52.36	-179.81	-3,273.46	138.35	500.34	396.47	103.87	4.817	
8,900.00	5,750.79	9,417.66	6,251.09	52.85	53.68	-179.81	-3,373.46	138.58	500.33	393.81	106.53	4.697	
9,000.00	5,751.82	9,517.66	6,252.12	54.20	55.00	-179.82	-3,473.45	138.81	500.33	391.13	109.20	4.582	
9,100.00	5,752.84	9,617.66	6,253.14	55.55	56.33	-179.82	-3,573.45	139.05	500.33	388.44	111.88	4.472	
9,200.00	5,753.87	9,717.66	6,254.16	56.91	57.67	-179.83	-3,673.44	139.28	500.32	385.75	114.58	4.367	
9,300.00	5,754.89	9,817.66	6,255.18	58.27	59.01	-179.83	-3,773.44	139.51	500.32	383.04	117.28	4.266	
9,400.00	5,755.92	9,917.66	6,256.20	59.63	60.36	-179.83	-3,873.43	139.74	500.32	380.32	119.99	4.170	
9,500.00	5,756.94	10,017.66	6,257.23	61.00	61.71	-179.84	-3,973.43	139.97	500.31	377.60	122.71	4.077	
9,600.00	5,757.97	10,117.66	6,258.25	62.37	63.07	-179.84	-4,073.42	140.21	500.31	374.87	125.44	3.988	
9,700.00	5,758.99	10,217.66	6,259.27	63.75	64.43	-179.84	-4,173.41	140.44	500.31	372.12	128.18	3.903	
9,800.00	5,760.02	10,317.66	6,260.29	65.13	65.79	-179.85	-4,273.41	140.67	500.30	369.38	130.93	3.821	
9,900.00	5,761.04	10,417.66	6,261.31	66.51	67.16	-179.85	-4,373.40	140.90	500.30	366.62	133.68	3.743	
10,000.00	5,762.07	10,517.66	6,262.34	67.90	68.53	-179.86	-4,473.40	141.14	500.30	363.86	136.43	3.667	
10,100.00	5,763.09	10,617.66	6,263.36	69.29	69.91	-179.86	-4,573.39	141.37	500.29	361.09	139.20	3.594	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 27H - OH - Plan 1 07-25-18 — **Offset Site Error:** 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	5,764.12	10,717.66	6,264.38	70.68	71.29	-179.86	-4,673.39	141.60	500.29	358.32	141.97	3.524	
10,300.00	5,765.14	10,817.66	6,265.40	72.07	72.67	-179.87	-4,773.38	141.83	500.29	355.55	144.74	3.456	
10,400.00	5,766.17	10,917.66	6,266.42	73.47	74.05	-179.87	-4,873.38	142.06	500.28	352.76	147.52	3.391	
10,500.00	5,767.19	11,017.66	6,267.45	74.87	75.44	-179.87	-4,973.37	142.30	500.28	349.98	150.30	3.328	
10,600.00	5,768.22	11,117.66	6,268.47	76.27	76.83	-179.88	-5,073.37	142.53	500.28	347.18	153.09	3.268	
10,700.00	5,769.24	11,217.66	6,269.49	77.67	78.22	-179.88	-5,173.36	142.76	500.27	344.39	155.88	3.209	
10,800.00	5,770.27	11,317.66	6,270.51	79.07	79.61	-179.89	-5,273.35	142.99	500.27	341.59	158.68	3.153	
10,900.00	5,771.29	11,417.66	6,271.53	80.48	81.01	-179.89	-5,373.35	143.23	500.27	338.79	161.48	3.098	
11,000.00	5,772.32	11,517.66	6,272.56	81.88	82.40	-179.89	-5,473.34	143.46	500.26	335.98	164.28	3.045	
11,100.00	5,773.34	11,617.66	6,273.58	83.29	83.80	-179.90	-5,573.34	143.69	500.26	333.17	167.09	2.994	
11,200.00	5,774.37	11,717.66	6,274.60	84.70	85.20	-179.90	-5,673.33	143.92	500.26	330.35	169.90	2.944	
11,300.00	5,775.39	11,817.66	6,275.62	86.11	86.60	-179.91	-5,773.33	144.15	500.25	327.54	172.72	2.896	
11,400.00	5,776.42	11,917.66	6,276.64	87.52	88.01	-179.91	-5,873.32	144.39	500.25	324.72	175.53	2.850	
11,500.00	5,777.44	12,017.66	6,277.66	88.94	89.41	-179.91	-5,973.32	144.62	500.25	321.90	178.35	2.805	
11,600.00	5,778.47	12,117.66	6,278.69	90.35	90.82	-179.92	-6,073.31	144.85	500.24	319.07	181.17	2.761	
11,700.00	5,779.49	12,217.66	6,279.71	91.77	92.23	-179.92	-6,173.30	145.08	500.24	316.24	184.00	2.719	
11,800.00	5,780.52	12,317.66	6,280.73	93.18	93.64	-179.92	-6,273.30	145.32	500.24	313.41	186.82	2.678	
11,900.00	5,781.54	12,417.66	6,281.75	94.60	95.05	-179.93	-6,373.29	145.55	500.23	310.58	189.65	2.638	
12,000.00	5,782.57	12,517.66	6,282.77	96.02	96.46	-179.93	-6,473.29	145.78	500.23	307.75	192.48	2.599	
12,100.00	5,783.60	12,617.66	6,283.80	97.44	97.87	-179.94	-6,573.28	146.01	500.23	304.91	195.32	2.561	
12,200.00	5,784.62	12,717.66	6,284.82	98.86	99.29	-179.94	-6,673.28	146.25	500.22	302.07	198.15	2.524	
12,300.00	5,785.65	12,817.66	6,285.84	100.29	100.70	-179.94	-6,773.27	146.48	500.22	299.23	200.99	2.489	
12,400.00	5,786.67	12,917.66	6,286.86	101.71	102.12	-179.95	-6,873.27	146.71	500.22	296.39	203.83	2.454	
12,500.00	5,787.70	13,017.66	6,287.88	103.13	103.54	-179.95	-6,973.26	146.94	500.21	293.55	206.67	2.420	
12,600.00	5,788.72	13,117.66	6,288.91	104.56	104.95	-179.96	-7,073.26	147.17	500.21	290.70	209.51	2.388	
12,700.00	5,789.75	13,217.66	6,289.93	105.98	106.37	-179.96	-7,173.25	147.41	500.21	287.85	212.35	2.356	
12,800.00	5,790.77	13,317.66	6,290.95	107.41	107.79	-179.96	-7,273.24	147.64	500.20	285.01	215.20	2.324	
12,900.00	5,791.80	13,417.66	6,291.97	108.83	109.21	-179.97	-7,373.24	147.87	500.20	282.15	218.05	2.294	
13,000.00	5,792.82	13,517.66	6,292.99	110.26	110.64	-179.97	-7,473.23	148.10	500.20	279.30	220.90	2.264	
13,100.00	5,793.85	13,617.66	6,294.02	111.69	112.06	-179.97	-7,573.23	148.34	500.20	276.45	223.75	2.236	
13,200.00	5,794.87	13,717.66	6,295.04	113.12	113.48	-179.98	-7,673.22	148.57	500.19	273.60	226.60	2.207	
13,300.00	5,795.90	13,817.66	6,296.06	114.54	114.91	-179.98	-7,773.22	148.80	500.19	270.74	229.45	2.180	
13,400.00	5,796.92	13,917.66	6,297.08	115.97	116.33	-179.99	-7,873.21	149.03	500.19	267.88	232.30	2.153	
13,500.00	5,797.95	14,017.66	6,298.10	117.40	117.75	-179.99	-7,973.21	149.26	500.18	265.02	235.16	2.127	
13,600.00	5,798.97	14,117.66	6,299.12	118.83	119.18	-179.99	-8,073.20	149.50	500.18	262.16	238.01	2.101	
13,700.00	5,800.00	14,217.66	6,300.15	120.27	120.57	-180.00	-8,173.20	149.73	500.18	259.34	240.83	2.077	
13,768.60	5,800.70	14,286.26	6,300.85	121.10	121.40	-180.00	-8,241.79	149.89	500.17	257.67	242.50	2.063 SF	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 28H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	12.00	0.00	0.00	0.02	79.55	152.90	828.90	842.88				
100.00	100.00	112.00	100.00	0.15	0.19	79.55	152.90	828.90	842.88	842.54	0.34	2,475.077	
200.00	200.00	212.00	200.00	0.51	0.55	79.55	152.90	828.90	842.88	841.83	1.06	797.059	
300.00	300.00	312.00	300.00	0.87	0.91	79.55	152.90	828.90	842.88	841.11	1.77	475.015	
400.00	400.00	412.00	400.00	1.22	1.27	79.55	152.90	828.90	842.88	840.39	2.49	338.320	
500.00	500.00	512.00	500.00	1.58	1.63	79.55	152.90	828.90	842.88	839.68	3.21	262.718	
600.00	600.00	612.00	600.00	1.94	1.98	79.55	152.90	828.90	842.88	838.96	3.93	214.733	
700.00	700.00	712.00	700.00	2.30	2.34	79.55	152.90	828.90	842.88	838.24	4.64	181.570	
800.00	800.00	812.00	800.00	2.66	2.70	79.55	152.90	828.90	842.88	837.52	5.36	157.279	
900.00	900.00	912.00	900.00	3.02	3.06	79.55	152.90	828.90	842.88	836.81	6.08	138.721	
1,000.00	1,000.00	1,015.33	1,003.33	3.38	3.43	79.55	152.90	828.87	842.86	836.06	6.80	123.884	
1,100.00	1,099.99	1,142.90	1,130.86	3.72	3.87	-10.51	152.90	826.23	839.54	831.94	7.60	110.496	
1,200.00	1,199.91	1,269.72	1,257.49	4.07	4.31	-10.69	152.90	819.38	830.38	822.00	8.38	99.060	
1,300.00	1,299.69	1,382.15	1,369.54	4.42	4.71	-10.95	152.90	810.11	815.84	806.71	9.13	89.380	
1,400.00	1,399.32	1,480.65	1,467.67	4.77	5.06	-11.20	152.90	801.53	798.93	789.10	9.83	81.249	
1,500.00	1,498.94	1,579.13	1,565.77	5.13	5.42	-11.45	152.90	792.94	781.89	771.35	10.54	74.151	
1,600.00	1,598.56	1,677.61	1,663.88	5.49	5.77	-11.70	152.90	784.36	764.87	753.61	11.26	67.920	
1,700.00	1,698.18	1,776.09	1,761.99	5.85	6.13	-11.97	152.90	775.78	747.87	735.88	11.98	62.415	
1,800.00	1,797.80	1,874.57	1,860.09	6.22	6.49	-12.26	152.90	767.19	730.88	718.17	12.71	57.520	
1,900.00	1,897.42	1,973.06	1,958.20	6.58	6.85	-12.55	152.90	758.61	713.90	700.47	13.43	53.144	
2,000.00	1,997.04	2,058.20	2,043.08	6.95	7.16	-12.81	152.90	751.92	697.80	683.68	14.11	49.448	
2,100.00	2,096.66	2,142.33	2,127.07	7.32	7.47	-13.03	152.90	747.16	683.81	669.02	14.78	46.252	
2,200.00	2,196.28	2,226.96	2,211.65	7.69	7.77	-13.23	152.90	744.23	671.97	656.51	15.46	43.476	
2,300.00	2,295.90	2,312.00	2,296.69	8.06	8.07	-13.40	152.90	743.18	662.29	646.16	16.13	41.068	
2,400.00	2,395.52	2,410.84	2,395.52	8.43	8.42	-13.57	152.90	743.18	653.81	636.96	16.84	38.819	
2,500.00	2,495.15	2,510.47	2,495.15	8.80	8.77	-13.74	152.90	743.18	645.46	627.90	17.56	36.753	
2,600.00	2,594.93	2,610.25	2,594.93	9.16	9.12	-13.86	152.90	743.18	639.07	620.79	18.28	34.963	
2,700.00	2,694.85	2,710.17	2,694.85	9.52	9.47	-13.93	152.90	743.18	635.21	616.23	18.99	33.452	
2,800.00	2,794.84	2,810.15	2,794.84	9.87	9.82	-13.96	152.90	743.18	633.90	614.21	19.69	32.191	
2,884.30	2,879.14	2,894.46	2,879.14	10.17	10.12	76.04	152.90	743.18	633.88	613.60	20.28	31.255	CC
2,900.00	2,894.84	2,910.15	2,894.84	10.22	10.17	76.04	152.90	743.18	633.90	613.51	20.39	31.087	
3,000.00	2,994.84	3,010.15	2,994.84	10.57	10.52	76.04	152.90	743.18	633.90	612.81	21.09	30.055	
3,100.00	3,094.84	3,110.15	3,094.84	10.92	10.88	76.04	152.90	743.18	633.90	612.11	21.79	29.088	
3,200.00	3,194.84	3,210.15	3,194.84	11.26	11.23	76.04	152.90	743.18	633.90	611.41	22.49	28.180	
3,300.00	3,294.84	3,310.15	3,294.84	11.61	11.58	76.04	152.90	743.18	633.90	610.70	23.20	27.326	
3,400.00	3,394.84	3,410.15	3,394.84	11.96	11.94	76.04	152.90	743.18	633.90	610.00	23.90	26.521	
3,500.00	3,494.84	3,510.15	3,494.84	12.31	12.29	76.04	152.90	743.18	633.90	609.29	24.61	25.761	
3,600.00	3,594.84	3,610.15	3,594.84	12.66	12.65	76.04	152.90	743.18	633.90	608.59	25.31	25.043	
3,700.00	3,694.84	3,710.15	3,694.84	13.02	13.00	76.04	152.90	743.18	633.90	607.88	26.02	24.363	
3,800.00	3,794.84	3,810.15	3,794.84	13.37	13.36	76.04	152.90	743.18	633.90	607.18	26.73	23.719	
3,900.00	3,894.84	3,910.15	3,894.84	13.72	13.71	76.04	152.90	743.18	633.90	606.47	27.43	23.108	
4,000.00	3,994.84	4,010.15	3,994.84	14.07	14.07	76.04	152.90	743.18	633.90	605.76	28.14	22.527	
4,100.00	4,094.84	4,110.15	4,094.84	14.42	14.42	76.04	152.90	743.18	633.90	605.05	28.85	21.974	
4,200.00	4,194.84	4,210.15	4,194.84	14.78	14.78	76.04	152.90	743.18	633.90	604.34	29.56	21.447	
4,300.00	4,294.84	4,310.15	4,294.84	15.13	15.13	76.04	152.90	743.18	633.90	603.64	30.27	20.945	
4,400.00	4,394.84	4,410.15	4,394.84	15.48	15.49	76.04	152.90	743.18	633.90	602.93	30.98	20.465	
4,500.00	4,494.84	4,510.15	4,494.84	15.84	15.85	76.04	152.90	743.18	633.90	602.22	31.68	20.007	
4,600.00	4,594.84	4,610.15	4,594.84	16.19	16.20	76.04	152.90	743.18	633.90	601.51	32.39	19.568	
4,700.00	4,694.84	4,710.15	4,694.84	16.55	16.56	76.04	152.90	743.18	633.90	600.80	33.11	19.148	
4,800.00	4,794.84	4,810.15	4,794.84	16.90	16.92	76.04	152.90	743.18	633.90	600.09	33.82	18.746	
4,900.00	4,894.84	4,910.15	4,894.84	17.25	17.27	76.04	152.90	743.18	633.90	599.38	34.53	18.360	
5,000.00	4,994.84	5,010.15	4,994.84	17.61	17.63	76.04	152.90	743.18	633.90	598.66	35.24	17.989	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 28H - OH - Plan 2 07-25-18 — Offset Site Error: 0.00 usft

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

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	5,094.84	5,110.15	5,094.84	17.96	17.98	76.04	152.90	743.18	633.90	597.95	35.95	17.633	
5,200.00	5,194.84	5,210.15	5,194.84	18.32	18.34	76.04	152.90	743.18	633.90	597.24	36.66	17.291	
5,200.00	5,194.84	5,210.16	5,194.84	18.32	18.34	76.04	152.90	743.18	633.90	597.24	36.66	17.291	
5,300.00	5,294.74	5,310.06	5,294.74	18.66	18.70	-103.97	152.90	743.18	634.56	597.20	37.36	16.985	
5,400.00	5,392.32	5,407.64	5,392.32	18.99	19.05	-105.12	152.90	743.18	639.99	601.95	38.04	16.826	
5,500.00	5,483.40	5,498.72	5,483.40	19.30	19.37	-106.87	152.90	743.18	652.34	613.67	38.67	16.870	
5,600.00	5,563.99	5,579.31	5,563.99	19.59	19.66	-108.31	152.90	743.18	674.12	634.88	39.24	17.178	
5,700.00	5,630.59	5,645.90	5,630.59	19.90	19.90	-108.37	152.90	743.18	707.69	667.90	39.79	17.785	
5,800.00	5,680.26	5,924.51	5,897.15	20.26	20.79	-119.43	86.08	743.71	750.00	708.95	41.04	18.274	
5,900.00	5,710.85	6,465.55	6,131.40	20.67	22.72	-123.73	-371.23	747.34	747.84	704.45	43.39	17.237	
5,997.17	5,721.63	6,562.05	6,132.15	21.10	23.22	-123.56	-467.73	748.10	742.68	698.36	44.32	16.757	
6,000.00	5,721.06	6,564.92	6,132.18	21.11	23.23	-123.60	-470.60	748.13	743.01	698.67	44.35	16.754	
6,100.00	5,722.09	6,664.92	6,132.96	21.63	23.83	-123.56	-570.59	748.92	743.32	697.87	45.45	16.353	
6,200.00	5,723.11	6,764.92	6,133.75	22.23	24.49	-123.52	-670.58	749.71	743.63	696.91	46.72	15.918	
6,300.00	5,724.14	6,864.92	6,134.53	22.90	25.22	-123.48	-770.57	750.50	743.94	695.82	48.12	15.460	
6,400.00	5,725.16	6,964.92	6,135.32	23.65	26.01	-123.45	-870.57	751.30	744.25	694.59	49.65	14.989	
6,500.00	5,726.19	7,064.91	6,136.11	24.45	26.85	-123.41	-970.56	752.09	744.55	693.25	51.31	14.512	
6,600.00	5,727.21	7,164.91	6,136.89	25.32	27.75	-123.37	-1,070.55	752.88	744.86	691.79	53.07	14.036	
6,700.00	5,728.24	7,264.91	6,137.68	26.23	28.69	-123.33	-1,170.54	753.68	745.17	690.25	54.93	13.567	
6,800.00	5,729.26	7,364.91	6,138.46	27.20	29.67	-123.30	-1,270.53	754.47	745.48	688.61	56.87	13.108	
6,900.00	5,730.29	7,464.91	6,139.25	28.20	30.69	-123.26	-1,370.53	755.26	745.79	686.89	58.90	12.663	
7,000.00	5,731.31	7,564.91	6,140.03	29.24	31.75	-123.22	-1,470.52	756.06	746.10	685.11	60.99	12.233	
7,100.00	5,732.34	7,664.90	6,140.82	30.32	32.83	-123.18	-1,570.51	756.85	746.41	683.26	63.15	11.819	
7,200.00	5,733.36	7,764.90	6,141.61	31.43	33.95	-123.15	-1,670.50	757.64	746.72	681.35	65.37	11.423	
7,300.00	5,734.39	7,864.90	6,142.39	32.56	35.08	-123.11	-1,770.50	758.44	747.03	679.39	67.64	11.044	
7,400.00	5,735.41	7,964.90	6,143.18	33.72	36.24	-123.07	-1,870.49	759.23	747.34	677.39	69.96	10.683	
7,500.00	5,736.44	8,064.90	6,143.96	34.90	37.42	-123.03	-1,970.48	760.02	747.66	675.34	72.32	10.338	
7,600.00	5,737.46	8,164.90	6,144.75	36.10	38.62	-123.00	-2,070.47	760.82	747.97	673.25	74.72	10.011	
7,700.00	5,738.49	8,264.89	6,145.53	37.31	39.84	-122.96	-2,170.46	761.61	748.28	671.13	77.15	9.699	
7,800.00	5,739.52	8,364.89	6,146.32	38.55	41.07	-122.92	-2,270.46	762.40	748.59	668.98	79.61	9.403	
7,900.00	5,740.54	8,464.89	6,147.11	39.79	42.31	-122.88	-2,370.45	763.20	748.91	666.80	82.11	9.121	
8,000.00	5,741.57	8,564.89	6,147.89	41.06	43.57	-122.85	-2,470.44	763.99	749.22	664.59	84.63	8.853	
8,100.00	5,742.59	8,664.89	6,148.68	42.33	44.84	-122.81	-2,570.43	764.78	749.53	662.36	87.17	8.599	
8,200.00	5,743.62	8,764.89	6,149.46	43.62	46.12	-122.77	-2,670.42	765.58	749.85	660.11	89.73	8.356	
8,300.00	5,744.64	8,864.88	6,150.25	44.91	47.41	-122.74	-2,770.42	766.37	750.16	657.84	92.32	8.126	
8,400.00	5,745.67	8,964.88	6,151.03	46.21	48.71	-122.70	-2,870.41	767.16	750.48	655.55	94.92	7.906	
8,500.00	5,746.69	9,064.88	6,151.82	47.53	50.02	-122.66	-2,970.40	767.96	750.79	653.25	97.54	7.697	
8,600.00	5,747.72	9,164.88	6,152.61	48.85	51.33	-122.62	-3,070.39	768.75	751.11	650.93	100.18	7.497	
8,700.00	5,748.74	9,264.88	6,153.39	50.18	52.66	-122.59	-3,170.38	769.54	751.42	648.59	102.83	7.307	
8,800.00	5,749.77	9,364.88	6,154.18	51.51	53.99	-122.55	-3,270.38	770.34	751.74	646.24	105.50	7.126	
8,900.00	5,750.79	9,464.87	6,154.96	52.85	55.32	-122.51	-3,370.37	771.13	752.05	643.88	108.17	6.952	
9,000.00	5,751.82	9,564.87	6,155.75	54.20	56.66	-122.48	-3,470.36	771.92	752.37	641.51	110.86	6.787	
9,100.00	5,752.84	9,664.87	6,156.53	55.55	58.01	-122.44	-3,570.35	772.72	752.69	639.13	113.56	6.628	
9,200.00	5,753.87	9,764.87	6,157.32	56.91	59.36	-122.40	-3,670.34	773.51	753.00	636.74	116.27	6.476	
9,300.00	5,754.89	9,864.87	6,158.11	58.27	60.72	-122.36	-3,770.34	774.30	753.32	634.34	118.99	6.331	
9,400.00	5,755.92	9,964.87	6,158.89	59.63	62.08	-122.33	-3,870.33	775.10	753.64	631.93	121.71	6.192	
9,500.00	5,756.94	10,064.86	6,159.68	61.00	63.45	-122.29	-3,970.32	775.89	753.96	629.51	124.45	6.058	
9,600.00	5,757.97	10,164.86	6,160.46	62.37	64.81	-122.25	-4,070.31	776.68	754.28	627.09	127.19	5.930	
9,700.00	5,758.99	10,264.86	6,161.25	63.75	66.19	-122.22	-4,170.31	777.48	754.59	624.66	129.94	5.807	
9,800.00	5,760.02	10,364.86	6,162.03	65.13	67.56	-122.18	-4,270.30	778.27	754.91	622.22	132.69	5.689	
9,900.00	5,761.04	10,464.86	6,162.82	66.51	68.94	-122.14	-4,370.29	779.06	755.23	619.78	135.46	5.576	
10,000.00	5,762.07	10,564.86	6,163.60	67.90	70.32	-122.11	-4,470.28	779.86	755.55	617.33	138.22	5.466	

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

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Offset Design Zeppo 5 Federal COM - 28H - OH - Plan 2 07-25-18 — **Offset Site Error:** 0.00 usft

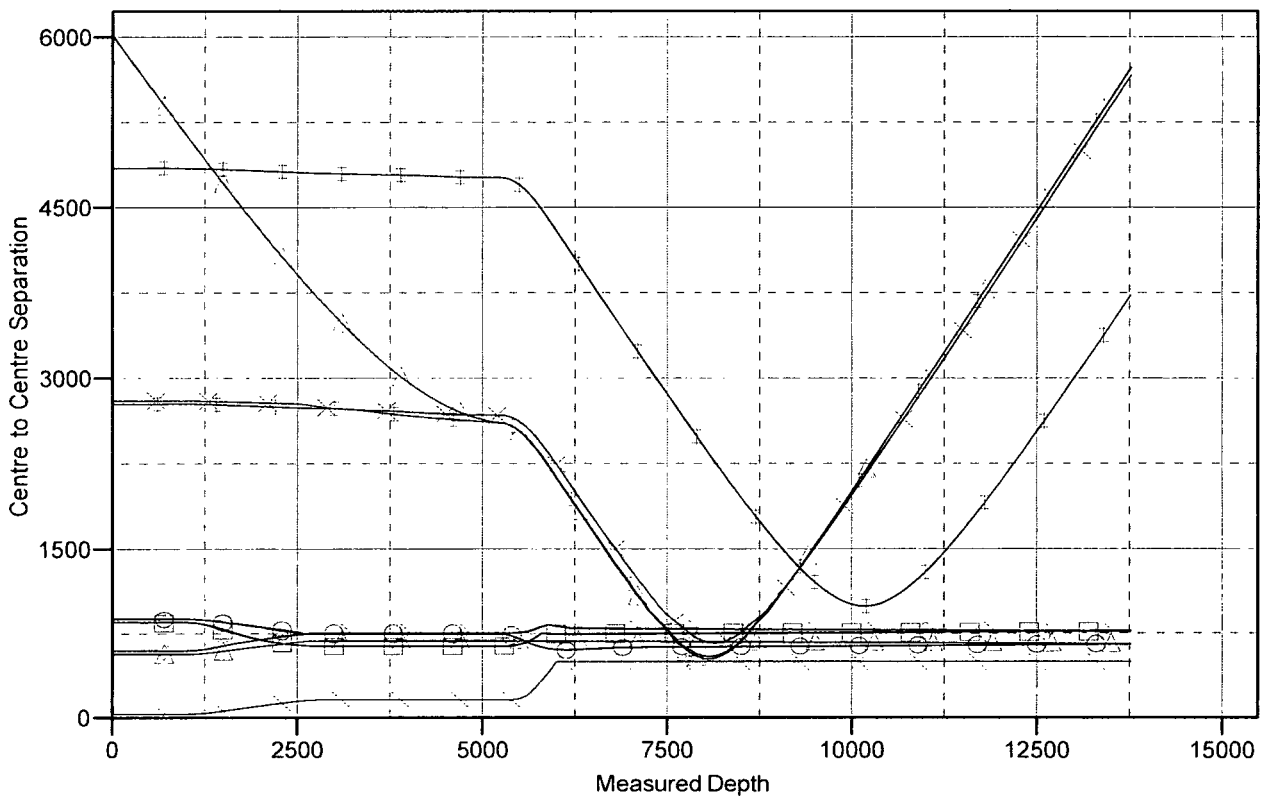
Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi-Major Axis Reference (usft)	Semi-Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,100.00	5,763.09	10,664.85	6,164.39	69.29	71.71	-122.07	-4,570.27	780.65	755.87	614.88	141.00	5.361	
10,200.00	5,764.12	10,764.85	6,165.18	70.68	73.10	-122.03	-4,670.27	781.44	756.19	612.42	143.77	5.260	
10,300.00	5,765.14	10,864.85	6,165.96	72.07	74.49	-122.00	-4,770.26	782.24	756.51	609.95	146.56	5.162	
10,400.00	5,766.17	10,964.85	6,166.75	73.47	75.88	-121.96	-4,870.25	783.03	756.83	607.49	149.35	5.068	
10,500.00	5,767.19	11,064.85	6,167.53	74.87	77.27	-121.92	-4,970.24	783.82	757.15	605.02	152.14	4.977	
10,600.00	5,768.22	11,164.85	6,168.32	76.27	78.67	-121.89	-5,070.23	784.62	757.48	602.54	154.93	4.889	
10,700.00	5,769.24	11,264.84	6,169.10	77.67	80.07	-121.85	-5,170.23	785.41	757.80	600.06	157.73	4.804	
10,800.00	5,770.27	11,364.84	6,169.89	79.07	81.47	-121.82	-5,270.22	786.20	758.12	597.58	160.54	4.722	
10,900.00	5,771.29	11,464.84	6,170.68	80.48	82.87	-121.78	-5,370.21	787.00	758.44	595.10	163.35	4.643	
11,000.00	5,772.32	11,564.84	6,171.46	81.88	84.27	-121.74	-5,470.20	787.79	758.76	592.61	166.16	4.567	
11,100.00	5,773.34	11,664.84	6,172.25	83.29	85.68	-121.71	-5,570.19	788.58	759.09	590.12	168.97	4.492	
11,200.00	5,774.37	11,764.84	6,173.03	84.70	87.09	-121.67	-5,670.19	789.38	759.41	587.62	171.79	4.421	
11,300.00	5,775.39	11,864.83	6,173.82	86.11	88.50	-121.63	-5,770.18	790.17	759.73	585.13	174.61	4.351	
11,400.00	5,776.42	11,964.83	6,174.60	87.52	89.91	-121.60	-5,870.17	790.96	760.06	582.63	177.43	4.284	
11,500.00	5,777.44	12,064.83	6,175.39	88.94	91.32	-121.56	-5,970.16	791.76	760.38	580.13	180.25	4.218	
11,600.00	5,778.47	12,164.83	6,176.18	90.35	92.73	-121.53	-6,070.15	792.55	760.71	577.62	183.08	4.155	
11,700.00	5,779.49	12,264.83	6,176.96	91.77	94.14	-121.49	-6,170.15	793.34	761.03	575.12	185.91	4.094	
11,800.00	5,780.52	12,364.83	6,177.75	93.18	95.56	-121.45	-6,270.14	794.14	761.36	572.61	188.74	4.034	
11,900.00	5,781.54	12,464.82	6,178.53	94.60	96.98	-121.42	-6,370.13	794.93	761.68	570.10	191.58	3.976	
12,000.00	5,782.57	12,564.82	6,179.32	96.02	98.39	-121.38	-6,470.12	795.72	762.01	567.59	194.42	3.919	
12,100.00	5,783.60	12,664.82	6,180.10	97.44	99.81	-121.34	-6,570.12	796.52	762.33	565.08	197.25	3.865	
12,200.00	5,784.62	12,764.82	6,180.89	98.86	101.23	-121.31	-6,670.11	797.31	762.66	562.57	200.09	3.812	
12,300.00	5,785.65	12,864.82	6,181.68	100.29	102.65	-121.27	-6,770.10	798.10	762.99	560.05	202.94	3.760	
12,400.00	5,786.67	12,964.82	6,182.46	101.71	104.07	-121.24	-6,870.09	798.90	763.31	557.53	205.78	3.709	
12,500.00	5,787.70	13,064.81	6,183.25	103.13	105.49	-121.20	-6,970.08	799.69	763.64	555.02	208.63	3.660	
12,600.00	5,788.72	13,164.81	6,184.03	104.56	106.92	-121.17	-7,070.08	800.48	763.97	552.50	211.47	3.613	
12,700.00	5,789.75	13,264.81	6,184.82	105.98	108.34	-121.13	-7,170.07	801.28	764.30	549.98	214.32	3.566	
12,800.00	5,790.77	13,364.81	6,185.60	107.41	109.76	-121.09	-7,270.06	802.07	764.62	547.45	217.17	3.521	
12,900.00	5,791.80	13,464.81	6,186.39	108.83	111.19	-121.06	-7,370.05	802.86	764.95	544.93	220.02	3.477	
13,000.00	5,792.82	13,564.81	6,187.18	110.26	112.62	-121.02	-7,470.04	803.66	765.28	542.41	222.88	3.434	
13,100.00	5,793.85	13,664.80	6,187.96	111.69	114.04	-120.99	-7,570.04	804.45	765.61	539.88	225.73	3.392	
13,200.00	5,794.87	13,764.80	6,188.75	113.12	115.47	-120.95	-7,670.03	805.24	765.94	537.35	228.58	3.351	
13,300.00	5,795.90	13,864.80	6,189.53	114.54	116.90	-120.92	-7,770.02	806.04	766.27	534.83	231.44	3.311	
13,400.00	5,796.92	13,964.80	6,190.32	115.97	118.33	-120.88	-7,870.01	806.83	766.60	532.30	234.30	3.272	
13,500.00	5,797.95	14,064.80	6,191.10	117.40	119.75	-120.84	-7,970.00	807.62	766.93	529.77	237.16	3.234	
13,600.00	5,798.97	14,164.80	6,191.89	118.83	121.18	-120.81	-8,070.00	808.42	767.26	527.24	240.02	3.197	
13,700.00	5,800.00	14,264.79	6,192.68	120.27	122.61	-120.77	-8,169.99	809.21	767.59	524.71	242.88	3.160	
13,768.60	5,800.70	14,333.39	6,193.21	121.10	123.60	-120.75	-8,238.58	809.75	767.82	523.12	244.69	3.138	ES, SF

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Reference Depths are relative to RKB @ 4131.00usft (Double K 7)	Coordinates are relative to: 17H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.00000 W	Grid Convergence at Surface is: 0.30°

Ladder Plot



LEGEND

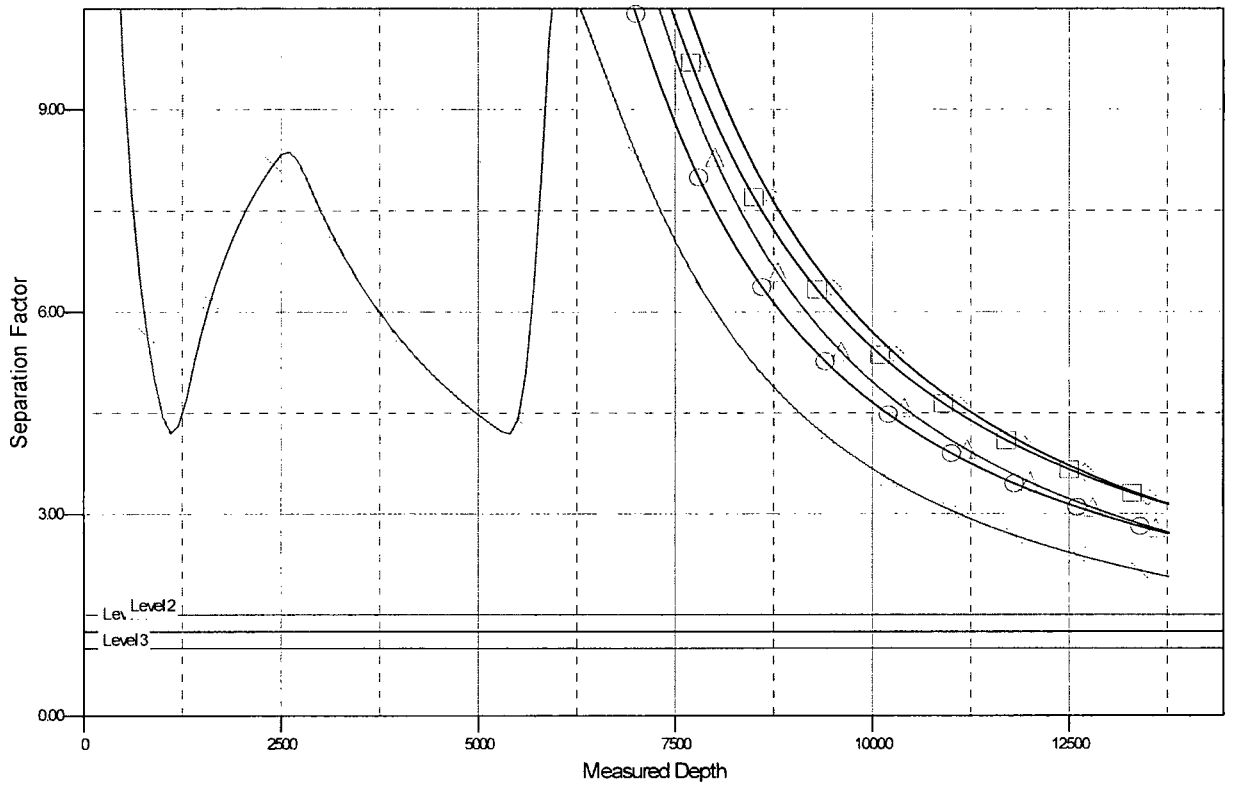
- 18H, OH / 62984, Surveys (Double K 7) V0
- 28H, OH / 62985, Surveys (Double K 7) V0
- 27H, OH, Plan 1 07-25-18 V0
- 18H, OH, Plan 2 07-25-18 V0
- 26H, OH, Plan 2 07-25-18 V0
- 23H, OH, Surveys V0
- 28H, OH / 62985, Plan 3 07-22-18 V0
- 28H, OH, Plan 2 07-25-18 V0
- 16H, OH, Plan 2 07-25-18 V0

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 17H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 4131.00usft (Double K 7)
Reference Site:	Zeppo 5 Federal COM	**MD Reference:**	RKB @ 4131.00usft (Double K 7)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	17H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 07-25-18	**Offset TVD Reference:**	Reference Datum

Reference Depths are relative to RKB @ 4131.00usft (Double K 7)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 17H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.30°

Separation Factor Plot



LEGEND

- 18H, OH / 62984, Surveys (Double K 7) V0
- 28H, OH / 62985, Surveys (Double K 7) V0
- 27H, OH, Plan 1 07-25-18 V0
- 18H, OH, Plan 2 07-25-18 V0
- 26H, OH, Plan 2 07-25-18 V0
- 23H, OH, Surveys V0
- 28H, OH / 62985, Plan 3 07-22-18 V0
- 28H, OH, Plan 2 07-25-18 V0
- 16H, OH, Plan 2 07-25-18 V0

Closed Loop Operation & Maintenance Procedure

All drilling fluid circulated over shaker(s) with cuttings discharged into roll off container.

Fluid and fines below shaker(s) are circulated with transfer pump through centrifuge(s) or solids separator with cuttings and fines discharged into roll off container.

Fluid is continuously re-circulated through equipment with polymer added to aid separation of cutting fines.

Roll off containers are lined and de-watered with fluids re-circulated into system.

Additional tank is used to capture unused drilling fluid or cement returns from casing jobs.

This equipment will be maintained 24 hrs./day by solids control personnel and or rig crews that stay on location.

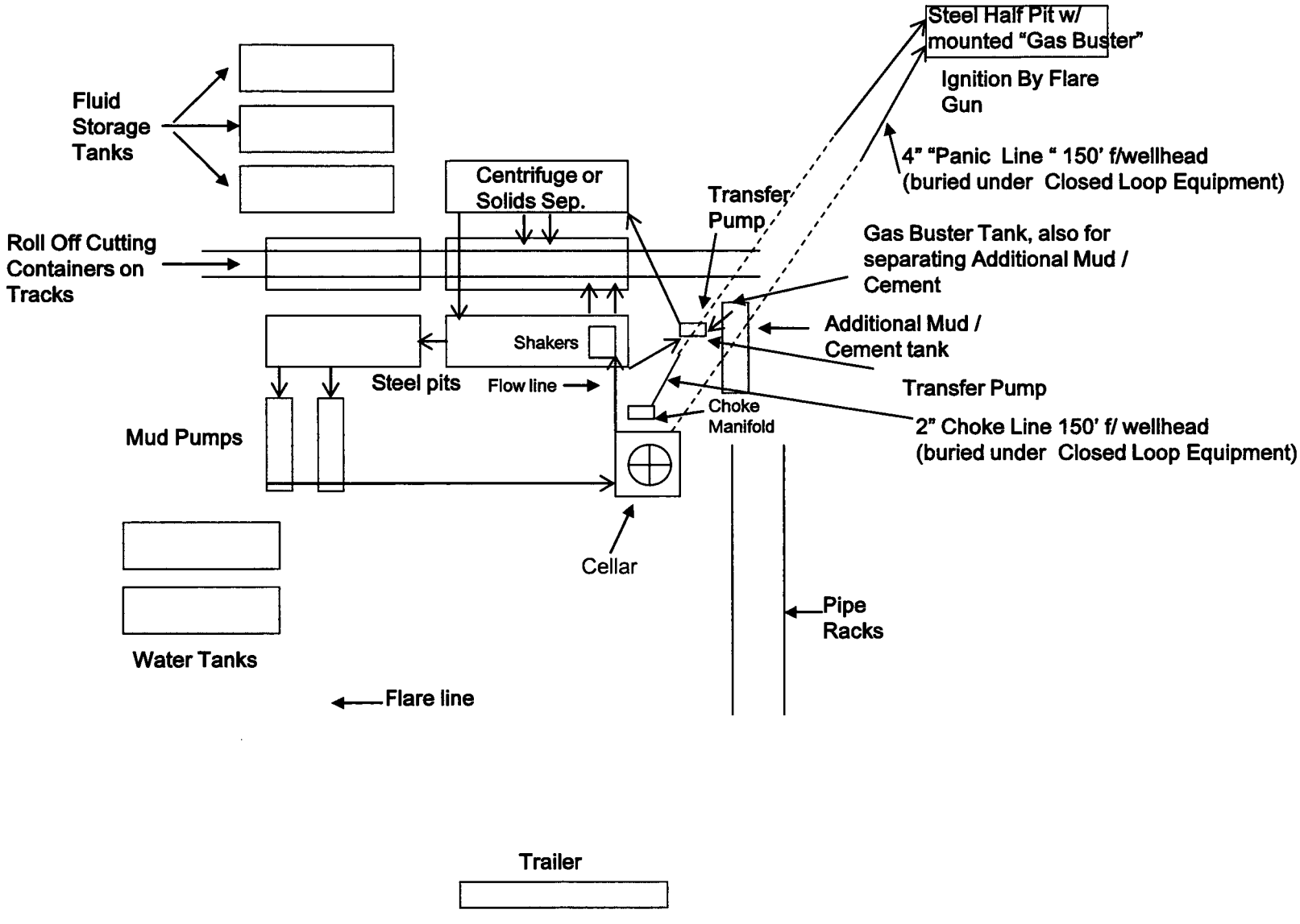
Cuttings will be hauled to either:

CRI (permit number R9166)
or
GMI (permit number 711-019-001)

dependent upon which rig is available to drill this well.

COG Operating LLC

Closed Loop Equipment Diagram



Zeppo 5 Federal Com #17H

Contingent Multi-Stage Cement Discussion:

COG does not anticipate losing circulation or encountering water flows while drilling this well. If these situations arise, COG requests approval in this APD to set DV tools where necessary immediately without having to shut down the rig and wait for sundry approval.

Lost Circulation or Water flow Contingent DV Tool Cement Plans are as follows:

1. If lost circulation occurs while drilling the 12 ¼" intermediate hole, it may become necessary to set a DV tool in the 9 5/8" casing. The DV tool depth will be based on hole conditions and cement volumes will be adjusted proportionally. If the DV Tool is needed, it will be set a minimum of 50 feet below the previous casing and a minimum of 200 feet above the current shoe.

2. If water flows in the San Andres are encountered, it may become necessary to set a DV tool in the 7" casing. These water flows normally occur in areas where produced water disposal is happening. This dense cement is used to combat water flows. This cement recipe also has a right angle set time and is mixed a little under saturated so the water flow will be absorbed by cement. The DV tool depth will be based on hole conditions and cement volumes will be adjusted proportionally. If the DV tool is needed, it will be set a minimum of 50 feet below the previous casing and a minimum of 200 feet above the current shoe.

Casing	Bottom MD of Segment	Lead or Tail	Cement Type	Additives	Quantity (Sks)	Yield (cu.ft./sk)	Density (lbs./gal)
Inter. Multi-Stage	+/- 1055'	1st Lead	50:50:10 C: Poz:Gel	5% Salt + 5 pps LCM + 0.25 pps CF	150	2.45	11.8
		1st Tail	Class C	2% Cacl2	200	1.32	14.8
		2nd Lead	50:50:10 C: Poz:Gel	5% Salt + 5 pps LCM + 0.25 pps CF	200	2.45	11.8
Prod. Multi-Stage	+/- 4000'	1st Lead	35:65:6 C:Poz Gel	5% salt+5 pps LCM+0.2% SMS + 1% FL-25+1% BA-58+0.3% FL-52A+ 0.125 pps CF	400	2.01	12.5
		1st Tail	Class C	0.3% R-3 + 1.5% CD-32	1850	1.37	14
		2nd Lead	35:65:6 C:Poz Gel	5% salt + 5 pp LCM + 0.2% SMS + 1% FL-25+ 1% BA-58 + 0.3% FL-52A + 0.125 pps CF	650	2.01	12.5
		2nd Tail	50:50:2 C: PozGel	5% salt + 3 pps LCM + 0.6% SMS + 1% FL-25 + 1% BA-58 + 0.125 pps CF	150	0.99	16.8